DM ROMA
CONSULTING ENGINEERS

January 12, 2022

Alex Sirois, Code Enforcement Officer
Town of Raymond
401 Webbs Mills Road
Raymond, ME 04071

Re: Final Subdivision Plan Application
Raymond Hills Village Condominium
Raymond Hills LLC - Applicant

Dear Alex and Planning Board Members:

Enclosed please find an updated Application Form reflecting the additional acreage and additional dwelling units that have been added to the project since we made our initial application. We have also included revised plans that have been updated in response to comments received from the Town, Maine DEP and other stakeholders. The following is a list of other specific items contained with this application package, and an explanation of the status of outside agency review:

Wastewater Disposal

We have included a copy of the approval letter received from the State of Maine Department of Health and Human Services for the engineered wastewater disposal system, along with HHE-200 designs of the two additional wastewater disposal fields.

Stormwater Management

We have revised the plans to address the review comments from the Maine DEP and Cumberland County Soil and Water Conservation District that were received on January 5th. Attached is a copy of our current Stormwater Management Report and Soils Test Pits in the location of the proposed stormwater BMPs. To our knowledge there are no outstanding comments and we expect the Stormwater Permit Order is ready to be written. We will provide a copy of the permit order once it is received. Within the Stormwater Management Report, we have included a letter from Contech approving the Filterra design and an email from ADS approving the Stormtech design.

Maine Department of Transportation

We have received approval from the Maine DOT to connect into the storm drain system in Route 85. We have also received a Driveway/Entrance permit for the proposed road access to Route 85. Attached are copies of the Stormwater Drainage Connection Agreement and Driveway Entrance Permit.

Water Supply

We have addressed the comments received from the Portland Water District and have asked for an updated Ability to Serve letter, which will be provided to the Town upon receipt. The PWD has assured us that their calculations indicate that adequate water will be available for the fire hydrants, but they do not "guarantee" water pressure so they are not going to put their opinion in writing. We understand that it is the applicant's responsibility to demonstrate that the hydrants provide the required flow rate. We are confident based on our meetings with PWD, the results of the 2-hydrant

flow test and PWD's indication that water pressures are very high in this area that the water system design will be adequate for fire protection and domestic pressure expectations.

Scenic or Natural Beauty Impacts

We sent revised plans to Maine Natural Areas Program and Maine Department of Inland Fisheries and Wildlife showing the additional land that will be added to the project. Attached are letters from those two agencies indicating that there will be no negative impacts to mapped significant or sensitive natural areas. A revised plan was also provided to Maine Historic Preservation Commission, and we have net yet received a response.

Financial Capacity

An updated letter from Androscoggin Bank is enclosed indicating that the applicant has the financial capacity to complete the expanded 25-unit project.

Wetland Inventory

The additional 3.7-acre parcel that is proposed to be added to the project was investigated by Mainely Soils to determine if any wetlands were present. Attached is a letter indicating no wetlands were found on the property.

We wish to be included on the next available Planning Board agenda to continue discussion and review of this project. Please let us know if you have any questions or require any additional information.

Sincerely,

DM ROMA CONSULTING ENGINEERS

Dustin M. Roma, P.E.
President

Town of Raymond Planning Board
Application for Subdivision and Site Review

rev 1-25-17

Property Information

Map 51 Lot 22-A
Zoning District VR
Street Address: 0 WEBBS MILL ROAD
Deed Reference
Book 37806 Page 72
Parcel Size 12.5 acres

Office Use Only

Filing Fee$_____Abutter notices $_____

Legal ad fee$_____Fire Department$_____

Escrow $_____Total fees $_____

Applicant Information

Name: RAYMOND HILLS, LLC Telephone:_____
Address: 9 DAVIS FARM ROAD Fax:_____
RAYMOND, ME 04071 email: TCLINTON01@COMCAST.NET

Note: Attach permission from owner if application not signed by owner.

Agent Information X check here if correspondence should be directed to agent

Name: DUSTIN ROMA, DM ROMA CONSULTING ENGINEERS Telephone: 310 - 0506
Address: PO BOX 1116 Fax:_____
WINDHAM, ME 04062 email: DUSTIN@DMROMA.COM

Owner Information:

Name: TIMOTHY CLINTON Telephone:_____
Address: 9 DAVIS FARM ROAD Fax:_____
RAYMOND, ME 04071 email: TCLINTON01@COMCAST.NET

Proposed Development (check all that apply)

X Subdivision _____ Site Plan
_____ Pre-Application Conference
_____ Preliminary Plan Review
X Final Plan Review
_____ Other: _____

Project Type:

_____ Single Family Subdivision
X - DUPLEX Multi-family Development
_____ Commercial
_____ Industrial
_____ Other: _____

Town of Raymond Planning Board
Application for Subdivision and Site Review

rev 1-25-17

Proposed Development Name: RAYMOND HILLS VILLAGE

_____ Number of Lots

___25__ Number of Units

_____ Total Square Footage of Comm./Ind. Bldgs.

Proposed Road Name(s):

HONEY HILL LANE

Other Approvals Required:

_____ Zoning Board of Appeals: ____ Variance ____ Special Exception

____X____ ME Dept. of Environmental Protection

The undersigned, being the applicant, owner or legal representative of the property, hereby certifies that all information contained in this application is true and correct to the best of his/her knowledge and submits such information for review by the Town for conformance with all applicable regulations, ordinances, and codes of the town, state and federal government.

The undersigned, by their signature below authorizes any member of or authorized agent of the Town of Raymond or other review agency to enter the property for the purposes of review of this application.

_____
Print Name of Property Owner

_____ _____
Signature of Property Owner Date

DUSTIN ROMA
Print Name of Owner's Agent

Dustin Roma
_____ 7-14-21
Signature of Owner's Agent Date

AGREEMENT
Between The
MAINE DEPARTMENT OF TRANSPORTATION
And
Raymond Hills, LLC
Regarding A
STORMWATER DRAINAGE CONNECTION
Commercial

This **AGREEMENT** is entered into on this_____day of _____ 2022, by and between the **State of Maine,** by and through its **Department of Transportation** (hereinafter referred to as MaineDOT) and Raymond Hills, LLC its successors and assigns (hereinafter referred to as the Land Owner).

I. Recitals

1. Land Owner owns a certain parcel of land and buildings and on Town of Raymond Tax Maps, Map 5 Lot 1 and Map 51 Lot 22A (hereinafter referred to as the Premises) located on the East side of Route 85 in the Town of Raymond, County of Cumberland, State of Maine; said Premises IS more particularly described in a deed to Raymond Hills, LLC dated July 13, 2021 recorded July 14, 2021 in the Cumberland County Registry of Deeds in Book 38426, Page 102.

2. MaineDOT controls and manages the Route 85 right of way adjacent to the Premises. Route 85 is depicted on a plan entitled "Maine Department of Transportation, Right of Way Map, Raymond, dated March 2003 Sheet 3, DOT File No. 3-429, WIN 9779.00 (hereinafter referred to as the "Plan").

3. Route 85 contains a drainage system (the "Highway Drainage System") that includes an catch basin located adjacent to the Premises at approximate centerline Stations 1+400 right as shown on the Plan.

4. In the interest of public health and safety, MaineDOT has agreed to permit Land Owner to connect a private underground commercial storm drainage pipe (the "Commercial Storm Drain") to the Highway Drainage System. The Commercial Storm Drain originates at the Premises and will be connected to the Highway Drainage System located alongside Route 85 according to specifications approved by MaineDOT and subject to the terms and conditions set forth in this Agreement.

II. DRAINAGE AGREEMENT

1. Location of Tie-in.

Land Owner shall connect the Commercial Storm Drain to the Highway Drainage System within the Route 85 right of way at a point located approximately 15 feet to the right of centerline Station 1+400 as sown on the Plan. The Commercial Storm Drain shall tie in to the catch basin

or similar device within MaineDOT's right of way which will allow MaineDOT employees to inspect effluent entering the Highway Drainage System.

2. Plan showing Location of Tie-in.

The Land Owner shall ensure that a properly functioning backflow prevention device, is installed in the Commercial Storm Drain. The Land Owner shall ensure that the backflow prevention device will function to prevent effluent from flowing out of the Commercial Storm Drain and into the Premises.

A sketch or diagram shown the point of connection where the Commercial Storm Drain is tied into the Highway Drainage System shall be attached to this Drainage Agreement.

3. Cost.

The Land Owner shall be responsible for all costs related to the initial connection of the Commercial Storm Drain to the Highway Drainage System. Thereafter, the Land Owner shall also be responsible for the cost of any modification, maintenance and/or repair of the Commercial Storm Drain.

4. Hazardous Substances and Pollutants Prohibited; Liability.

The Land Owner understands that the purpose of the Commercial Storm Drain is to facilitate the flow of naturally occurring excess storm water, ground water or surface water from on the Premises into the Roadside Drainage System. The Land Owner agrees to allow only naturally occurring excess storm water, ground water or surface water to pass through the Commercial Storm Drain. The Land Owner shall not allow any hazardous substances or pollutants to pass through the Commercial Storm Drain. Further, Land Owner shall not permit the following substances to enter the Commercial Storm Drain:

a. groundwater impacted by leach field effluent or any other contaminants;
b. gray water/black water discharge; and/or
c. sediment-laden surface water

The Land Owner agrees to assume liability for damages that result in hazardous substances or pollutants in concentrations prohibited by the Clean Water Act and pass through Land Owner's Commercial Storm Drain.

5. Release of Claims; Indemnification

Land Owner hereby releases, acquits, forever discharges and agrees to hold harmless MaineDOT, its employees, representatives, subcontractors and agents from any and all causes of action, including claims under the Maine Tort Claims Act, claims for contribution and indemnification, and any other claim whatsoever, whether now existing or arising in the future, that results from the entry of effluent from the Commercial Storm Drain into the Premises.

The Land Owner shall indemnify and hold harmless MaineDOT and its officers, agents and employees from any and all claims, suits or liabilities of every kind or nature arising out of any alleged breach of this contract, product liability claim, or negligent, intentional, malicious or criminal act, error or omission by the Land Owner related to the Commercial Storm Drain. Nothing herein shall, nor is intended to, waive any defense, immunity or limitation of liability that may be available to MaineDOT, its officers, agents or employees, under the Maine Tort Claims Act or any other law.

6. Termination

This Agreement may be terminated by the Land Owner or by MaineDOT upon ten (10) days' written notice by the terminating party. Upon such termination, duly authorized officers, employees, or agents of MaineDOT shall have the right to disconnect the Commercial Storm Drain from the Highway Drainage System. Land Owner hereby releases MaineDOT from claims for damages resulting from the disconnection of the Commercial Storm Drain from the Highway Drainage System. Termination rights may be exercised for any reason.

7. Notice of Breach; Curative Action

The MaineDOT shall provide Land Owner with written notice of any breach of the terms of this Agreement and Land Owner shall have thirty days from the receipt of such notice to commence curative action of such breach. In the event Land Owner fails to commence curative action within 30 days or fails to carry out said curative action to completion satisfactory to MaineDOT, or in the event of any circumstances related to the Land Owner's maintenance of the Commercial Storm Drain that MaineDOT deems to be an emergency to which Land Owner is unwilling or unable to adequately respond, then the MaineDOT shall have the right to cure such breach or emergency without giving notice to Land Owner and Land Owner shall pay to MaineDOT all reasonable costs and expenses related to MaineDOT's curative action. In addition, in the event of such a breach of any of the terms of this Agreement, MaineDOT, in its sole discretion, shall have the option of terminating this Agreement and disconnecting the Commercial Storm Drain.

THIS AGREEMENT shall be binding upon MaineDOT and Land Owner, their respective heirs, successors and assigns.

THIS AGREEMENT is signed by the parties below and becomes effective on the day and date first written above.

Raymond Hills, LLC

By:_____
Print Name: _____
Its: _____, duly authorized

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

By:_____
Print Name: _____
Region Engineer, duly authorized

Janet T. Mills
Governor

Jeanne M. Lambrew, Ph.D.
Commissioner

Maine Department of Health and Human Services
Maine Center for Disease Control and Prevention
11 State House Station
286 Water Street
Augusta, Maine 04333-0011
Tel; (207) 287-8016; Fax (207) 287-9058
TTY: Dial 711 (Maine Relay)

10/8/2021

DM ROMA CONSULTING ENGINEERS
Attn: JAYSON HASKELL, P.E.
P.O. Box 1116
Windham, ME 04062

Subject: Approval, Raymond Hills Village

Dear Mr. Haskell:

The Division of Environmental Health has completed a review of a design for an engineered subsurface sewage disposal system design for Raymond Hills Village. The HHE-200 Form dated 8/20/2021 was prepared by Brady A. Fricke. The system was designed by DM ROMA Consulting Engineers, with plans signed and stamped by Jason R. Haskell, P.E. #13002.

Hereinafter, the term "design engineer" shall refer collectively to DM ROMA Consulting Engineers, its staff, and its representatives unless otherwise specified; and the term "owner" shall refer collectively to Raymond Hills, LLC, its staff, and its representatives unless otherwise specified.

Design Flow

The design flow is 3,960 gallons per day (gpd), based upon Table 4C of the Maine State Plumbing Code, Subsurface Wastewater Disposal Rules (Rules). The design flow of 3,960 gpd is approved with the notation that the suitability of the design flow is the responsibility of the design engineer.

Treatment Tank(s)

The design includes qty=10, Norweco Singulair Wastewater Treatment System, each capable of 600 gpd.

Disposal Areas

The proposed septic field will utilize 116 concrete chambers, divided into two separate pods, 10 feet apart, with 64 sf/chamber.

Soils

The soils are classified 4C, with a sizing factor of 2.6 sf/gpd.

Well Setback

There are no potable water supply wells reported within 300 feet of the proposal.

Mounding Analysis

The proposed system will not result in groundwater mounding sufficient to intrude into the disposal area, according to the report dated August 25, 2021 by Stephen Marcotte, C.G. GE539.

Site Transmission Analysis

The proposed system design demonstrates that there are sufficient soils down-gradient to prevent the effluent from surfacing within 50 feet of the disposal field, according to the report dated August 25, 2021 by Stephen Marcotte, C.G. #GE539.

Interagency Review

This project was reviewed by The Maine Department of Environmental Protection (MDEP) pursuant to the Site Location of Development Act. Review of the proposed on-site engineered subsurface wastewater disposal systems considered the water quality standards of the Site Law, including: (1) the geology of the project area and vicinity, (2) effects of the project on groundwater and surfacewater quality, and (3) public and private uses of groundwater and surfacewater resources in the project area and vicinity. The review found no reason to believe that normal operation of the proposed engineered subsurface wastewater disposal systems will result in unreasonable adverse impact on the natural environment or other uses of groundwater and surfacewater, and provided that the systems are properly constructed and maintained.

Comments regarding the project impacts on groundwater and surfacewater resources, and any additional information needed are offered below.

- Project site is not located on a significant sand and gravel aquifer, as mapped by the Maine Geo-logical Survey (MGS).
- Project site is located in the watershed of a waterbody most at risk from development (Chapter 502, DEP Regulations).
- There do not appear to be any watercourses in the vicinity of the proposed project.
- The proposed engineered disposal system is not within the 100-year flood plain (Zone A), as mapped by the Federal Emergency Management Agency (FEMA).
- The proposed disposal system is not located within the shoreland zone as defined in 38 MRS §435 et seq.
- The nearest known public water supply wells are located approximately 1 mile to the southwest of the proposed engineered disposal system.
- Mounding analysis predicts a 1.6-foot watertable rise under the center of the disposal field, and recommends the disposal field bottom be 2 feet above the hydraulically-restrictive soil horizon, and removal of native topsoil and placement of at least 1 foot of specified backfill (per Table 11.A of the Rules) below the field. According to the cross-section diagram, the topsoil removal and addition of backfill is not specified, although the original topsoil may provide for some waste-water treatment. In addition, it is not certain that the 2-foot separation distance is met in the design without knowing the ground elevation at TP 2 (located at the uphill edge of the disposal field), which indicates a restrictive layer at a 2-foot depth.
- There do not appear to be any wetlands in the vicinity of the proposed project.

Miscellaneous

No variance to the Subsurface Wastewater Rules is required.

The design engineer and the Division met and discussed the proposal on August 18, 2021 pursuant to Section 10.2.a of the Rules.

Findings

The system meets the Rules, unless otherwise noted. Therefore, the design is approved with the following conditions and comments:

1. The owner must retain the design engineer to oversee construction. The constructed system may not be used unless all pertinent requirements of the Rules have been met.

2. Construction must not commence until the owner has obtained the necessary plumbing permit from the Local Plumbing Inspector (LPI).

3. The design engineer must provide sufficient supervision to assure that the system is constructed as designed and in accordance with the code and other regulations. Attention must be given to site preparation, fill selection and placement, installation of pipes, mechanical and electrical systems.

4. The design engineer must provide the owner and this office with a brief report on the construction including any unexpected conditions encountered and any changes made from the approved drawings. The LPI must not issue the Certificate of Approval until the LPI has received the aforementioned report from the design engineer.

5. The design engineer must test all systems prior to acceptance by the owner. The testing must determine whether the components were correctly installed and whether they function as designed. This includes confirmation that flow dividing devices or configurations function as intended.

6. The design engineer, with the concurrence of the LPI must determine when the site conditions are suitable for construction.

7. Construction must cease whenever the design engineer determines that the site conditions, or workmanship, or materials are unacceptable.

8. The owner and design engineer must inform the LPI of the proposed construction schedule and must also inform the LPI of the progress of construction. They must cooperate fully with the LPI in scheduling any inspections and providing any equipment necessary for the inspection.

9. The design engineer must provide the owner with an Operations and Maintenance Manual containing written recommendations for the operation and maintenance of the system including inspection and pumping schedules and record keeping procedures.

10. The owner must operate the system within the requirements of Rules and the limitations of this design.

11. The owner must inform the LPI and the design engineer of any operational problem and/or malfunction.

12. The Local Plumbing Inspector must inspect the engineered disposal system in accordance with Section 11 Letter I of the Rules. In addition, the property owner must retain the design engineer to inspect the construction of the system. The inspection must be sufficient for the design engineer to determine that the system was installed as designed.

13. This approval is only for the rules administered by this office and it does not consider other federal, state, or local regulations. The owner is responsible for compliance with any other pertinent regulations.

14. By accepting this approval and the associated plumbing permit, the owner agrees to comply fully with the conditions of approval and the Subsurface Wastewater Disposal Rules.

Based upon this approval of the design, the LPI may issue the permit required for an engineered system.

Because installation and owner maintenance have a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of the system.

Should you have any questions, please feel free to contact me at (207) 287-5685, or by e-mail at Nathan.saunders@maine.gov.

Sincerely,

Nathan S. Saunders P.E.
Senior Environmental Engineer
Division of Environmental and Community Health
Drinking Water Program

ec: Jason Haskell, P.E. via e-mail
Alex Sirois, Raymond CEO
William Noble, C.G. MDEP
Alex Pugh, C.G. MEDWP
William Dawson, P.E. MEDWP

SUBSURFACE WASTEWATER DISPOSAL SYSTEM APPLICATION

Maine Department of Human Services
Division of Health Engineering, 10 SHS
(207) 287-5672 Fax: (207) 287-3165

PROPERTY LOCATION

City, Town, or Plantation	Raymond
Street or Road	Webbs Mills Road Map 51 Lot 22A
Subdivision, Lot #	

OWNER/APPLICANT INFORMATION

Name (last, first, MI): Raymond Hills, LLC — Owner ☒ Applicant

Mailing Address of Owner/Applicant	9 Davis Farm Road
	Raymond, ME 04071
Daytime Tel. #	

OWNER OR APPLICANT STATEMENT

I state and acknowledge that the information submitted is correct to the best of my knowledge and understand that any falsification is reason for the Department and/or Local Plumbing Inspector to deny a Permit.

_____ _____
Signature of Owner or Applicant — Date

>> CAUTION: PERMIT REQUIRED - ATTACH IN SPACE BELOW <<

Town_____ Permit#_____

Date Permit Issued / / Fee:$_____ Double Fee Charged [ ]

_____ L.P.I. # _____

Local Plumbing Inspector

☐ Owner ☐ Town ☐ State

The Subsurface Wastewater Disposal System ***shall not*** be installed until a Permit is attached HERE by the Local Plumbing Inspector. The Permit shall authorize the owner or installer to install the disposal system in accordance with this application and the Maine Subsurface Wastewater Disposal Rules.

Municipal Tax Map # _____ Lot # _____

CAUTION: INSPECTION REQUIRED

I have inspected the installation authoirzed above and found it to be in compliance with the Subsurface Wastewater Disposal Rules Application. _____ (1st) date approved

_____ _____
Local Plumbing Inspector Signature — (2nd) date approved

PERMIT INFORMATION

TYPE OF APPLICATION

☒1. First Time System
2. Replacement System
Type replaced: _____
Year installed: _____
3. Expanded System
a. Minor Expansion
b. Major Expansion
4. Experimental System
5. Seasonal Conversion

THIS APPLICATION REQUIRES

☒1. No Rule Variance
2. First Time System Variance
a. Local Plumbing Inspector Approval
b. State & Local Plumbing Inspector Approval
3. Replacement System Variance
a. Local Plumbing Inspector Approval
b. State & Local Plumbing Inspector Approval
4. Minimum Lot Size Variance
5. Seasonal Conversion Permit

DISPOSAL SYSTEM COMPONENTS

☒1. Complete Non-engineered System
2. Primitive System (graywater & alt. toilet)
3. Alternative Toilet, specify:_____
4. Non-engineered Treatment Tank (only)
5. Holding Tank, _____ gallons
6. Non-engineered Disposal Field (only)
7. Separated Laundry System
8. Complete Engineered System (2000 gpd or more)
9. Engineered Treatment Tank (only)
10. Engineered Disposal Field (only)
11. Pre-treatment, specify: _____
12. Miscellaneous Components

SIZE OF PROPERTY

8.81 SQ. FT. ☒ ACRES

SHORELAND ZONING

Yes ☒No

DISPOSAL SYSTEM TO SERVE

1. Single Family Dwelling Unit, No. of Bedrooms: ____
2. Multiple Family Dwelling, No. of Units: _____
☒3. Other: 2x3 bedroom condos + 2x2 bedroom condos (specify)

Current Use Seasonal Year Round ☒Undeveloped

TYPE OF WATER SUPPLY

☒1. Drilled Well 2. Dug Well 3. Private
4. Public 5. Other

DESIGN DETAILS (SYSTEM LAYOUT SHOWN ON PAGE 3)

TREATMENT TANK

☒1. Concrete
☒a. Regular
b. Low Profile
2. Plastic
3. Other: _____
CAPACITY: 1,000X2 / 1,500X1 GAL.

DISPOSAL FIELD TYPE & SIZE

1. Stone Bed 2. Stone Trench
☒3. Proprietary Device
☒a. cluster array c. Linear
☒b. regular load d. H-20 load
4. Other: _____
SIZE: 1,188 ☒ sq. ft. lin. ft.

GARBAGE DISPOSAL UNIT

☒1. No 2. Yes 3. Maybe
If Yes or Maybe, specify one below:
a. multi-compartment tank
b. ___ tanks in series
c. increase in tank capacity
d. Filter on Tank Outlet

DESIGN FLOW

900 gallons per day
BASED ON:
☒1. Table 501.1 (dwelling unit(s))
2. Table 501.2 (other facilities)
SHOW CALCULATIONS for other facilites
2x3 BEDROOMS@540gpd
+2x2 BEDROOMS@360gpd
=900 GPD
3. Section 503.0 (meter readings)
ATTACH WATER METER DATA

SOIL DATA & DESIGN CLASS

PROFILE CONDITION
4 / C
at Observation Hole # TP-1
Depth >40 "
of Most Limiting Soil Factor

DISPOSAL FIELD SIZING

1. Small---2.0 sq. ft. / gpd
☒2. Medium---2.6 sq. ft. / gpd
3. Medium---Large 3.3 sq. f.t / gpd
4. Large---4.1 sq. ft. / gpd
5. Extra Large---5.0 sq. ft. / gpd

EFFLUENT/EJECTOR PUMP

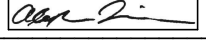
1. Not Required
☒2. May Be Required
3. Required
Specify only for engineered systems:
DOSE: _____ gallons

LATITUDE AND LONGITUDE

at center of disposal area
Lat. 43 d 53 m 21.31 s
Lon. -70 d 27 m 29.11 s

SITE EVALUATOR STATEMENT

I certify that on 12/9/2021 (date) I completed a site evaluation on this property and state that the data reported are accurate and that the proposed system is in compliance with the State of Maine Subsurface Wastewater Disposal Rules (10-144A CMR 241).



Site Evaluator Signature — 391 SE # — 12/9/2021 Date

Alexander A. Finamore — (207) 650-4313 — alfinamore@yahoo.com
Site Evaluator Name Printed — Telephone Number — E-mail Address

Note: Changes to or deviations from the design should be confirmed with the Site Evaluator.

SUBSURFACE WASTEWATER DISPOSAL SYSTEM APPLICATION

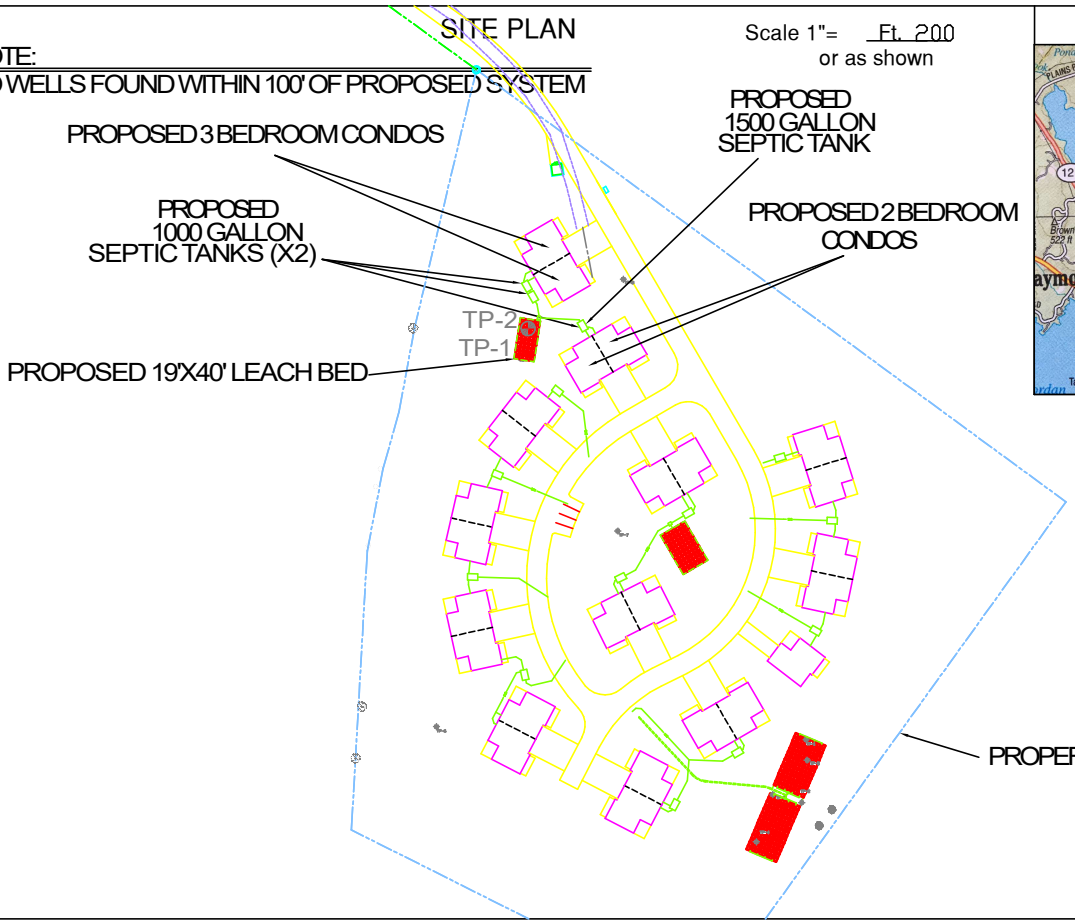
Maine Department of Human Services
Division of Health Engineering, 10 SHS
(207) 287-5672 FAX (207) 287-3165

Town, City ,Plantation	Street, Road, Subdivision	Owner or Applicant Name
Raymond	Raymond Hills Condos	Raymond Hills, LLC

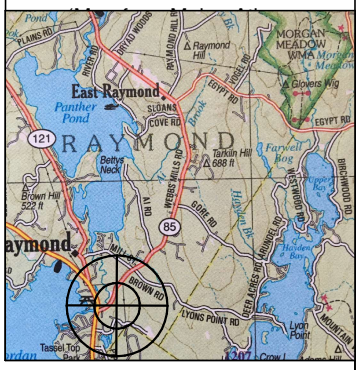
SITE PLAN

Scale 1"= Ft. 200 or as shown

NOTE:
NO WELLS FOUND WITHIN 100' OF PROPOSED SYSTEM



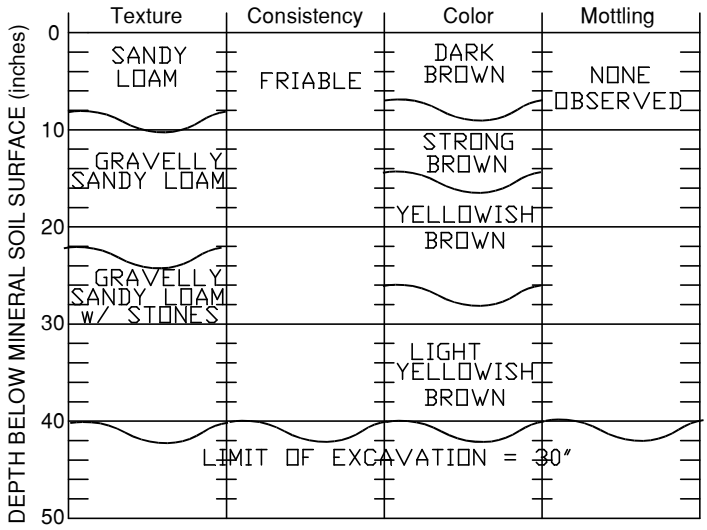
SITE LOCATION PLAN



SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP-1 ☒ Test pit ☐ Boring

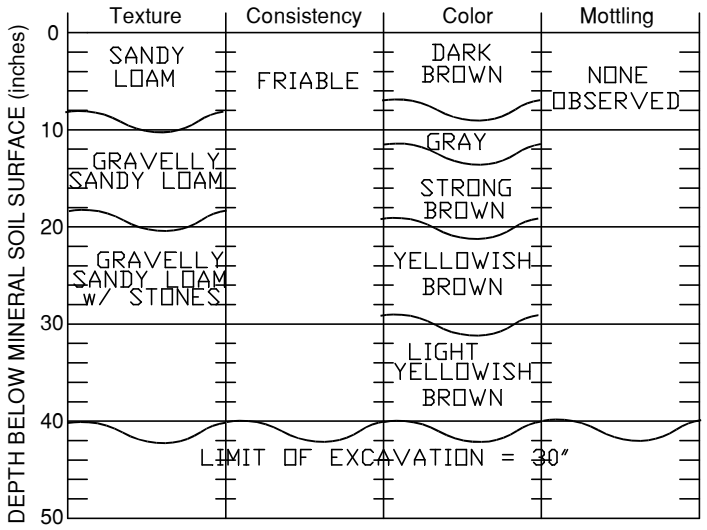
1 " Depth of Organic Horizon Above Mineral Soil



Soil Classification	Slope	Limiting Factor	
4 Profile / C Condition	2 %	>40 "	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☒ Pit Depth

Observation Hole TP-2 ☒ Test pit ☐ Boring

1 " Depth of Organic Horizon Above Mineral Soil



Soil Classification	Slope	Limiting Factor	
4 Profile / C Condition	2 %	>40 "	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☒ Pit Depth

Site Evaluator Signature | 391 SE # | 12/9/2021 Date

SUBSURFACE WASTEWATER DISPOSAL SYSTEM APPLICATION

Maine Department of Human Services
Division of Health Engineering, 10 SHS
(207) 287-5672 FAX (207) 287-3165

Town, City ,Plantation	Street, Road, Subdivision	Owner or Applicant Name
Raymond	BED A Raymond Hills Subdivision	Raymond Hills, LLC

SUBSURFACE WASTEWATER DISPOSAL PLAN

Scale 1" = FT. 30

PROPOSED DISPOSAL FIELD

5 ROWS OF 10 ELJEN SAND FILTERS

NOTE: REMOVE VEGETATION AND SCARIFY ORIGINAL SOIL UNDER ENTIRE FILL AREA

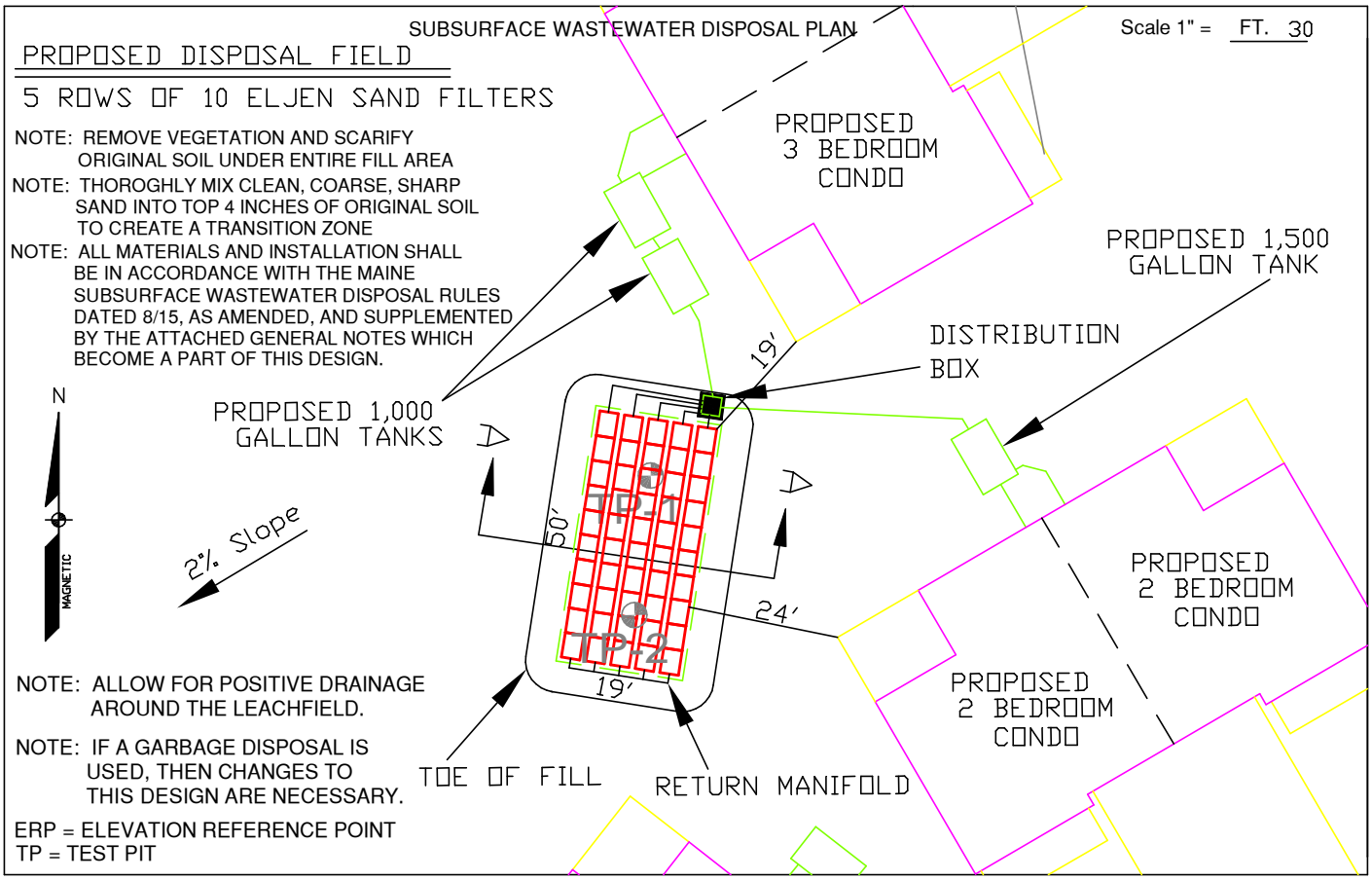
NOTE: THOROGHLY MIX CLEAN, COARSE, SHARP SAND INTO TOP 4 INCHES OF ORIGINAL SOIL TO CREATE A TRANSITION ZONE

NOTE: ALL MATERIALS AND INSTALLATION SHALL BE IN ACCORDANCE WITH THE MAINE SUBSURFACE WASTEWATER DISPOSAL RULES DATED 8/15, AS AMENDED, AND SUPPLEMENTED BY THE ATTACHED GENERAL NOTES WHICH BECOME A PART OF THIS DESIGN.

NOTE: ALLOW FOR POSITIVE DRAINAGE AROUND THE LEACHFIELD.

NOTE: IF A GARBAGE DISPOSAL IS USED, THEN CHANGES TO THIS DESIGN ARE NECESSARY.

ERP = ELEVATION REFERENCE POINT
TP = TEST PIT



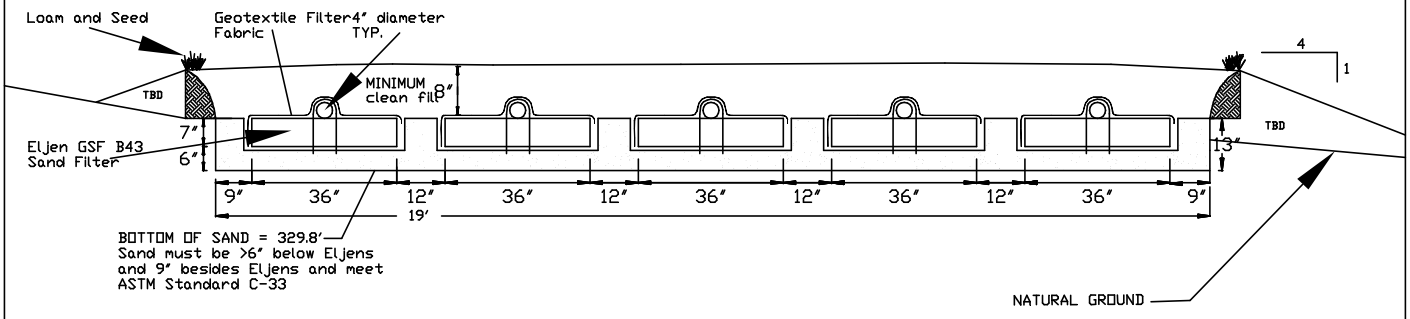
BACKFILL REQUIREMENTS		CONSTRUCTION ELEVATIONS		ELEVATION REFERENCE POINT	
Depth of Fill (Upslope)	TBD	Finished Grade Elevation	332'	Location & Description	TBD
Depth of Fill (Downslope)	TBD	Top of Distribution Pipe	331.3'		
		Bottom of Disposal Area (Bottom of Sand)	329.8'	Reference Elevation	0"

DISPOSAL FIELD CROSS SECTION

CROSS SECTION A-A'

12" SEPARATION USED IN DESIGN

SCALE:
VERTICAL: 1" = 3'
HORIZONTAL: 1" = 5'



Site Evaluator Signature | 391 SE # | 12/10/2021 Date

General Notes
(attachment to form HHE-200)
<1,000 gpd Septic System

The nature of the site evaluation profession is one of interpretation of soil and site conditions. We, in the field, attempt to both provide a satisfactory service to the client, and comply by the rules by which we are bound – The Maine Subsurface Wastewater Disposal Rules. If at any time you, the client, are not satisfied with the services provided or the results found, it is your right to hire another site evaluator for a second opinion.

Property information is supplied by the owner, applicant or representative. Such information presented herein shall be verified as correct by the owner or applicant prior to signing this application.

All work shall be in accordance with the Maine Subsurface Wastewater Disposal Rules dated 8/15, as amended.

All work should be performed under dry conditions only (for disposal area).

No vehicular or equipment traffic to be allowed on disposal area. Disposal field shall be constructed from outside the corner stakes located in the field. The downslope area is also to be protected in the same manner.

Backfill, if required, is to be gravelly coarse sand to coarse sand texture and to be free of foreign debris. If backfill is coarser than original soil, then mix top 4" of backfill and original soil with rototiller.

No neighboring wells are apparent (unless so indicated) within 100' of disposal area. Owner or applicant shall verify this prior to signing the application.

The disposal field stone shall be clean, uniform in size and free of fines, dust, ashes, or clay. It shall be no smaller than ¾ inch and no larger than 2 ½ inches in size (per Section 11.F.2 of the Maine subsurface Wastewater Disposal Rules).

Minimum separation distances required (unless reduced by variance or special circumstance).

a) Wells with water usage of 2000 or more gpd or public water supply wells:
   Disposal Fields: 300'
   Septic Tanks and Holding Tanks: 100'
b) Any well to disposal area: 100'
c) Any well to septic tank: 100'
d) Septic tank or disposal area to lake, river, stream or brook: 100' for major watercourse, 50' for minor watercourse
e) House to treatment tank: 8'
f) House to disposal area: 20'

- For all other separation distances, use separations for less than 1,000 gpd per Maine Subsurface Wastewater Disposal Rules Table 7B.

Location of septic system near a wetland may require a separate permit. As such, the owner, prior to construction of the septic system, shall hire a professional to evaluate proximity of adjacent wetlands and prepare necessary permit applications.

0. Garbage disposals are not recommended and, if installed, are done so at the owner's risk. The additional waste load requires increased maintenance frequency, higher potential for failure, and larger septic tanks.
1. Pump stations, when required, shall be installed watertight to prevent infiltration of ground and/or surface water.
2. Force mains and pressure lines shall be flushed of any foreign material and pumps shall be checked for proper on/off cycle before being put into service.
3. Force mains, pump stations, and/or gravity piping subject to freezing shall be installed below frost line or adequately insulated.

SUBSURFACE WASTEWATER DISPOSAL SYSTEM APPLICATION

Maine Department of Human Services
Division of Health Engineering, 10 SHS
(207) 287-5672 Fax: (207) 287-3165

PROPERTY LOCATION

City, Town, or Plantation	Raymond
Street or Road	Webbs Mills Road Map 51 Lot 22A
Subdivision, Lot #	

OWNER/APPLICANT INFORMATION

Name (last, first, MI): Raymond Hills, LLC — Owner ☒ Applicant

Mailing Address of Owner/Applicant	9 Davis Farm Road
	Raymond, ME 04071
Daytime Tel. #	

OWNER OR APPLICANT STATEMENT

I state and acknowledge that the information submitted is correct to the best of my knowledge and understand that any falsification is reason for the Department and/or Local Plumbing Inspector to deny a Permit.

_____ _____
Signature of Owner or Applicant — Date

>> CAUTION: PERMIT REQUIRED - ATTACH IN SPACE BELOW <<

Town_____ Permit#_____

Date Permit Issued / / Fee:$_____ Double Fee Charged [ ]

_____ L.P.I. # _____

Local Plumbing Inspector

☐ Owner ☐ Town ☐ State

The Subsurface Wastewater Disposal System ***shall not*** be installed until a Permit is attached HERE by the Local Plumbing Inspector. The Permit shall authorize the owner or installer to install the disposal system in accordance with this application and the Maine Subsurface Wastewater Disposal Rules.

Municipal Tax Map # _____ Lot # _____

CAUTION: INSPECTION REQUIRED

I have inspected the installation authoirzed above and found it to be in compliance with the Subsurface Wastewater Disposal Rules Application. _____ (1st) date approved

_____ _____
Local Plumbing Inspector Signature — (2nd) date approved

PERMIT INFORMATION

TYPE OF APPLICATION

☒1. First Time System
2. Replacement System
Type replaced: _____
Year installed: _____
3. Expanded System
a. Minor Expansion
b. Major Expansion
4. Experimental System
5. Seasonal Conversion

THIS APPLICATION REQUIRES

☒1. No Rule Variance
2. First Time System Variance
a. Local Plumbing Inspector Approval
b. State & Local Plumbing Inspector Approval
3. Replacement System Variance
a. Local Plumbing Inspector Approval
b. State & Local Plumbing Inspector Approval
4. Minimum Lot Size Variance
5. Seasonal Conversion Permit

DISPOSAL SYSTEM COMPONENTS

☒1. Complete Non-engineered System
2. Primitive System (graywater & alt. toilet)
3. Alternative Toilet, specify:_____
4. Non-engineered Treatment Tank (only)
5. Holding Tank, _____ gallons
6. Non-engineered Disposal Field (only)
7. Separated Laundry System
8. Complete Engineered System (2000 gpd or more)
9. Engineered Treatment Tank (only)
10. Engineered Disposal Field (only)
11. Pre-treatment, specify: _____
12. Miscellaneous Components

SIZE OF PROPERTY

8.81 SQ. FT. ☒ ACRES

SHORELAND ZONING

Yes ☒No

DISPOSAL SYSTEM TO SERVE BED B

1. Single Family Dwelling Unit, No. of Bedrooms: ____
2. Multiple Family Dwelling, No. of Units: _____
☒3. Other: 2x3 bedroom condos + 2x2 bedroom condos (specify)

Current Use Seasonal Year Round ☒Undeveloped

TYPE OF WATER SUPPLY

☒1. Drilled Well 2. Dug Well 3. Private
4. Public 5. Other

DESIGN DETAILS (SYSTEM LAYOUT SHOWN ON PAGE 3)

TREATMENT TANK

☒1. Concrete
☒a. Regular
b. Low Profile
2. Plastic
3. Other: _____
CAPACITY: 1,000X2 / 1,500X1 GAL.

DISPOSAL FIELD TYPE & SIZE

1. Stone Bed 2. Stone Trench
☒3. Proprietary Device
☒a. cluster array c. Linear
☒b. regular load d. H-20 load
4. Other: _____
SIZE: 2340 ☒ sq. ft. lin. ft.

GARBAGE DISPOSAL UNIT

☒1. No 2. Yes 3. Maybe
If Yes or Maybe, specify one below:
a. multi-compartment tank
b. ___ tanks in series
c. increase in tank capacity
d. Filter on Tank Outlet

DESIGN FLOW

900 gallons per day
BASED ON:
☒1. Table 501.1 (dwelling unit(s))
2. Table 501.2 (other facilities)
SHOW CALCULATIONS for other facilites
2x3 BEDROOMS@540gpd
+2x2 BEDROOMS@360gpd
=900 GPD
3. Section 503.0 (meter readings)
ATTACH WATER METER DATA

SOIL DATA & DESIGN CLASS

PROFILE CONDITION
4 / C
at Observation Hole # TP-1
Depth >40 "
of Most Limiting Soil Factor

DISPOSAL FIELD SIZING

1. Small---2.0 sq. ft. / gpd
☒2. Medium---2.6 sq. ft. / gpd
3. Medium---Large 3.3 sq. f.t / gpd
4. Large---4.1 sq. ft. / gpd
5. Extra Large---5.0 sq. ft. / gpd

EFFLUENT/EJECTOR PUMP

1. Not Required
☒2. May Be Required
3. Required
Specify only for engineered systems:
DOSE: _____ gallons

LATITUDE AND LONGITUDE

at center of disposal area
Lat. 43 d 53 m 19.64 s
Lon. -70 d 27 m 27.16 s

SITE EVALUATOR STATEMENT

I certify that on 12/9/2021 (date) I completed a site evaluation on this property and state that the data reported are accurate and that the proposed system is in compliance with the State of Maine Subsurface Wastewater Disposal Rules (10-144A CMR 241).

_____ 391 12/9/2021
Site Evaluator Signature — SE # — Date

Alexander A. Finamore (207) 650-4313 alfinamore@yahoo.com
Site Evaluator Name Printed — Telephone Number — E-mail Address

Note: Changes to or deviations from the design should be confirmed with the Site Evaluator.

SUBSURFACE WASTEWATER DISPOSAL SYSTEM APPLICATION

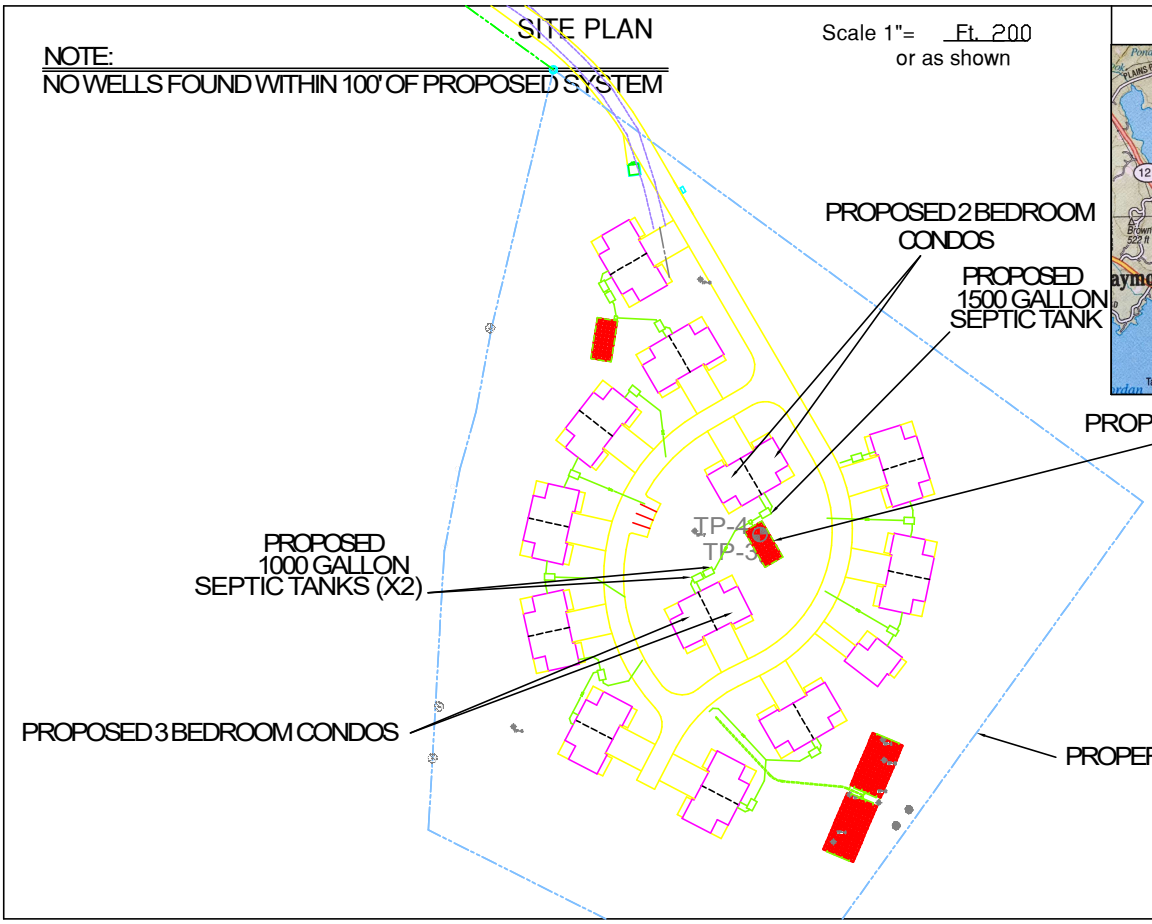
Maine Department of Human Services
Division of Health Engineering, 10 SHS
(207) 287-5672 FAX (207) 287-3165

Town, City ,Plantation	Street, Road, Subdivision	Owner or Applicant Name
Raymond	BED B Raymond Hills Condos	Raymond Hills, LLC

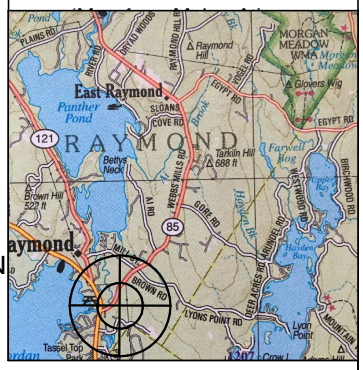
SITE PLAN

Scale 1"= Ft. 200 or as shown

NOTE:
NO WELLS FOUND WITHIN 100' OF PROPOSED SYSTEM



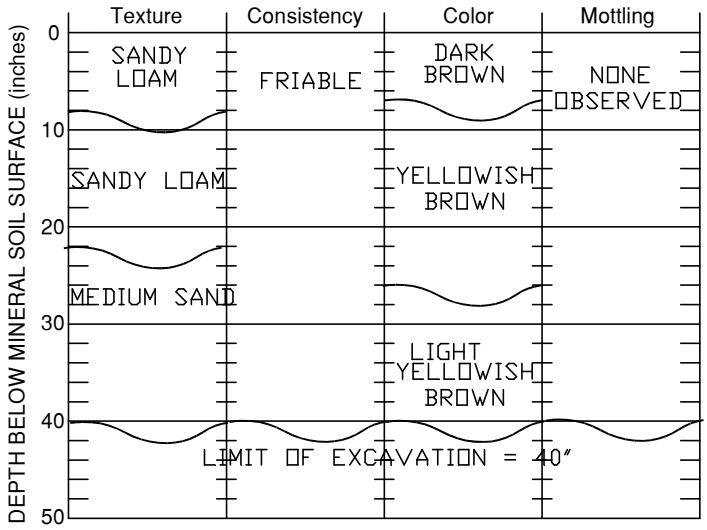
SITE LOCATION PLAN



SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP-3 ☒ Test pit ☐ Boring

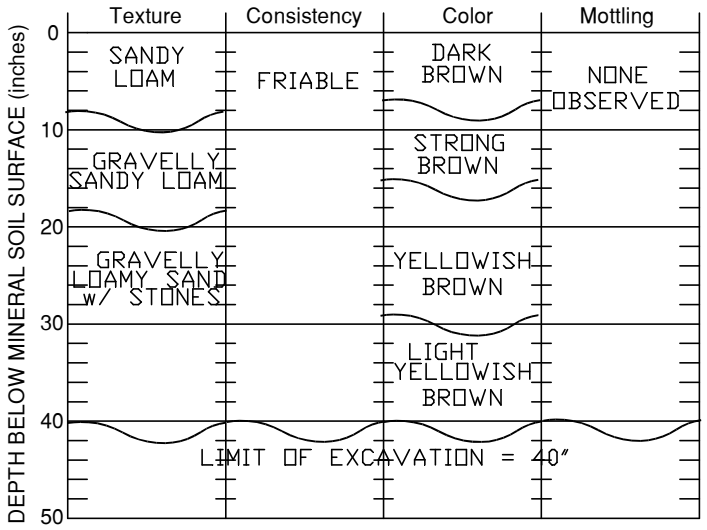
1 " Depth of Organic Horizon Above Mineral Soil



Soil Classification		Slope	Limiting Factor	
5 Profile	C Condition	2 %	>40 "	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☒ Pit Depth

Observation Hole TP-4 ☒ Test pit ☐ Boring

1 " Depth of Organic Horizon Above Mineral Soil



Soil Classification		Slope	Limiting Factor	
4 Profile	C Condition	2 %	>40 "	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☒ Pit Depth

Site Evaluator Signature | 391 SE # | 12/10/2021 Date

SUBSURFACE WASTEWATER DISPOSAL SYSTEM APPLICATION

Maine Department of Human Services
Division of Health Engineering, 10 SHS
(207) 287-5672 FAX (207) 287-3165

Town, City ,Plantation	Street, Road, Subdivision	Owner or Applicant Name
Raymond	BED B Raymond Hills Subdivision	Raymond Hills, LLC

SUBSURFACE WASTEWATER DISPOSAL PLAN

Scale 1" = FT. 30

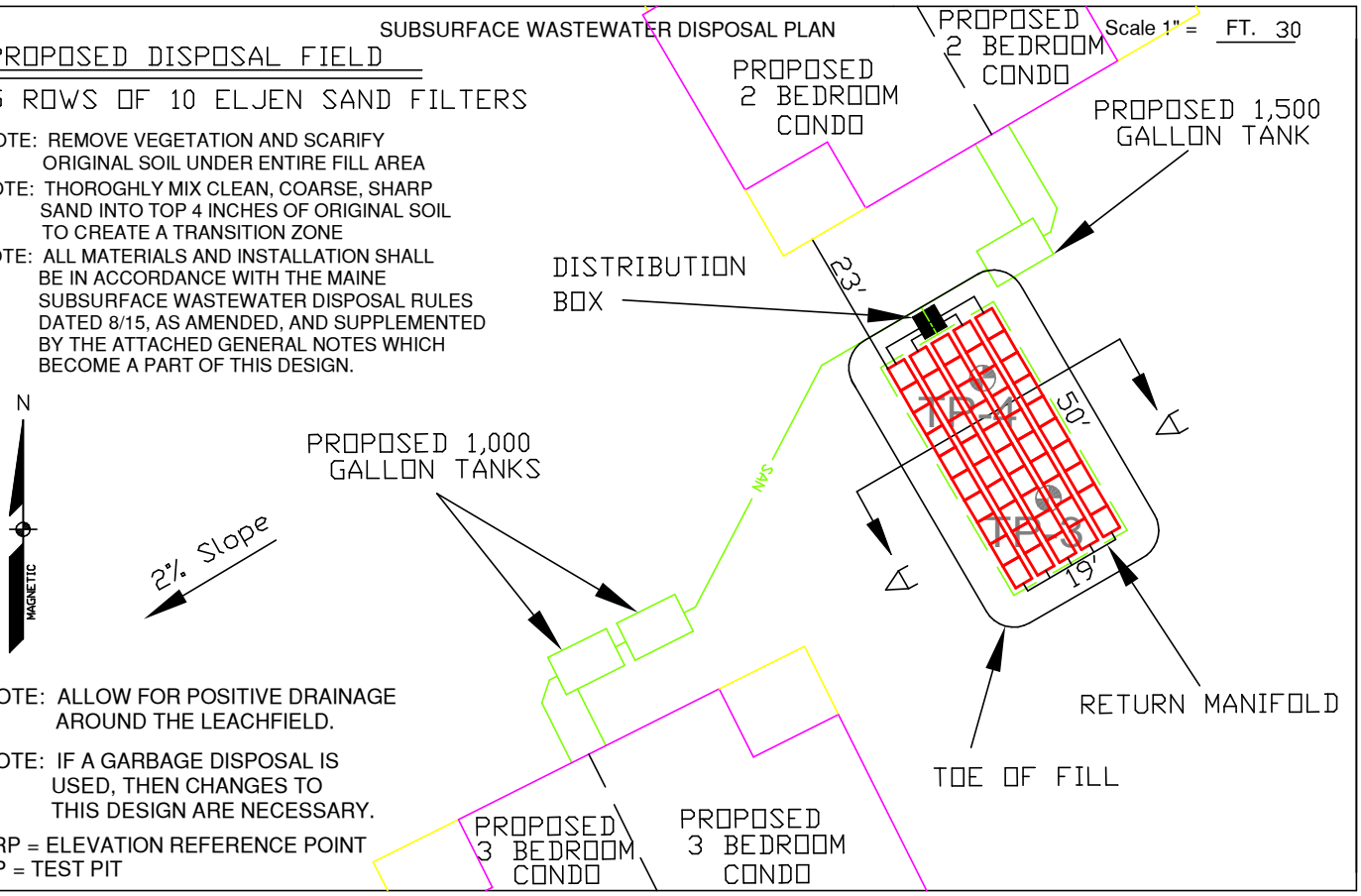
PROPOSED DISPOSAL FIELD

5 ROWS OF 10 ELJEN SAND FILTERS

NOTE: REMOVE VEGETATION AND SCARIFY ORIGINAL SOIL UNDER ENTIRE FILL AREA

NOTE: THOROGHLY MIX CLEAN, COARSE, SHARP SAND INTO TOP 4 INCHES OF ORIGINAL SOIL TO CREATE A TRANSITION ZONE

NOTE: ALL MATERIALS AND INSTALLATION SHALL BE IN ACCORDANCE WITH THE MAINE SUBSURFACE WASTEWATER DISPOSAL RULES DATED 8/15, AS AMENDED, AND SUPPLEMENTED BY THE ATTACHED GENERAL NOTES WHICH BECOME A PART OF THIS DESIGN.



NOTE: ALLOW FOR POSITIVE DRAINAGE AROUND THE LEACHFIELD.

NOTE: IF A GARBAGE DISPOSAL IS USED, THEN CHANGES TO THIS DESIGN ARE NECESSARY.

ERP = ELEVATION REFERENCE POINT
TP = TEST PIT

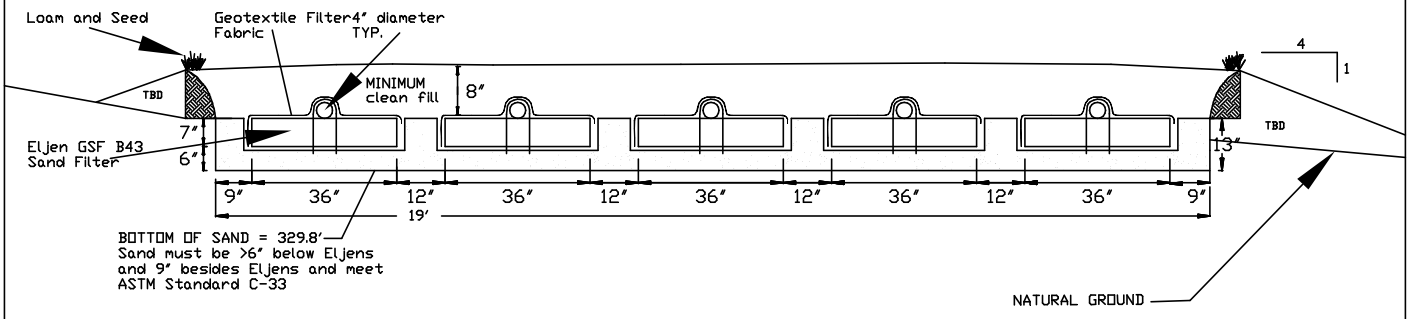
BACKFILL REQUIREMENTS		CONSTRUCTION ELEVATIONS		ELEVATION REFERENCE POINT	
Depth of Fill (Upslope)	TBD	Finished Grade Elevation	335.8′	Location & Description	TBD
Depth of Fill (Downslope)	TBD	Top of Distribution Pipe	335.2′		
		Bottom of Disposal Area (Bottom of Sand)	333.7′	Reference Elevation	0″

DISPOSAL FIELD CROSS SECTION

CROSS SECTION A-A'

12" SEPARATION USED IN DESIGN

SCALE:
VERTICAL: 1" = 3′
HORIZONTAL: 1" = 5′



Site Evaluator Signature	SE #	Date	
	391	12/10/2021	Page 3 of 3
			HHE-200 Rev. 2/2011

General Notes
(attachment to form HHE-200)
<1,000 gpd Septic System

The nature of the site evaluation profession is one of interpretation of soil and site conditions. We, in the field, attempt to both provide a satisfactory service to the client, and comply by the rules by which we are bound – The Maine Subsurface Wastewater Disposal Rules. If at any time you, the client, are not satisfied with the services provided or the results found, it is your right to hire another site evaluator for a second opinion.

Property information is supplied by the owner, applicant or representative. Such information presented herein shall be verified as correct by the owner or applicant prior to signing this application.

All work shall be in accordance with the Maine Subsurface Wastewater Disposal Rules dated 8/15, as amended.

All work should be performed under dry conditions only (for disposal area).

No vehicular or equipment traffic to be allowed on disposal area. Disposal field shall be constructed from outside the corner stakes located in the field. The downslope area is also to be protected in the same manner.

Backfill, if required, is to be gravelly coarse sand to coarse sand texture and to be free of foreign debris. If backfill is coarser than original soil, then mix top 4" of backfill and original soil with rototiller.

No neighboring wells are apparent (unless so indicated) within 100' of disposal area. Owner or applicant shall verify this prior to signing the application.

The disposal field stone shall be clean, uniform in size and free of fines, dust, ashes, or clay. It shall be no smaller than ¾ inch and no larger than 2 ½ inches in size (per Section 11.F.2 of the Maine subsurface Wastewater Disposal Rules).

Minimum separation distances required (unless reduced by variance or special circumstance).

a) Wells with water usage of 2000 or more gpd or public water supply wells:
   Disposal Fields: 300'
   Septic Tanks and Holding Tanks: 100'
b) Any well to disposal area: 100'
c) Any well to septic tank: 100'
d) Septic tank or disposal area to lake, river, stream or brook: 100' for major watercourse, 50' for minor watercourse
e) House to treatment tank: 8'
f) House to disposal area: 20'

- For all other separation distances, use separations for less than 1,000 gpd per Maine Subsurface Wastewater Disposal Rules Table 7B.

Location of septic system near a wetland may require a separate permit. As such, the owner, prior to construction of the septic system, shall hire a professional to evaluate proximity of adjacent wetlands and prepare necessary permit applications.

0. Garbage disposals are not recommended and, if installed, are done so at the owner's risk. The additional waste load requires increased maintenance frequency, higher potential for failure, and larger septic tanks.
1. Pump stations, when required, shall be installed watertight to prevent infiltration of ground and/or surface water.
2. Force mains and pressure lines shall be flushed of any foreign material and pumps shall be checked for proper on/off cycle before being put into service.
3. Force mains, pump stations, and/or gravity piping subject to freezing shall be installed below frost line or adequately insulated.

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
177 STATE HOUSE STATION
AUGUSTA, MAINE 04333

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

December 14, 2021

Jayson Haskell
DM Roma
PO Box 1116
Windham, ME 04062

Via email: jayson@dmroma.com

Re: Rare and exemplary botanical features in proximity to: #21006, Raymond Hills Apartments, Expanded Area, Raymond, Maine

Dear Mr. Haskell:

I have searched the Maine Natural Areas Program's Biological and Conservation Data System files in response to your request received December 9, 2021 for information on the presence of rare or unique botanical features documented from the vicinity of the project in Raymond, Maine. Rare and unique botanical features include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities. Our review involves examining maps, manual and computerized records, other sources of information such as scientific articles or published references, and the personal knowledge of staff or cooperating experts.

Our official response covers only botanical features. For authoritative information and official response for zoological features you must make a similar request to the Maine Department of Inland Fisheries and Wildlife, 284 State Street, Augusta, Maine 04333.

According to the information currently in our Biological and Conservation Data System files, there are no rare botanical features documented specifically within the project area. This lack of data may indicate minimal survey efforts rather than confirm the absence of rare botanical features. You may want to have the site inventoried by a qualified field biologist to ensure that no undocumented rare features are inadvertently harmed.

If a field survey of the project area is conducted, please refer to the enclosed supplemental information regarding rare and exemplary botanical features documented to occur in the vicinity of the project site. The list may include information on features that have been known to occur historically in the area as well as recently field-verified information. While historic records have not been documented in several years, they may persist in the area if suitable habitat exists. The enclosed list identifies features with potential to occur in the area, and it should be considered if you choose to conduct field surveys.

This finding is available and appropriate for preparation and review of environmental assessments, but it is not a substitute for on-site surveys. Comprehensive field surveys do not exist for all natural areas in Maine, and in the absence of a specific field investigation, the Maine Natural Areas Program cannot provide a definitive statement on the presence or absence of unusual natural features at this site.

MOLLY DOCHERTY, DIRECTOR
MAINE NATURAL AREAS PROGRAM
BLOSSOM LANE, DEERING BUILDING

PHONE: (207) 287-804490
WWW.MAINE.GOV/DACF/MNAP

The Maine Natural Areas Program (MNAP) is continuously working to achieve a more comprehensive database of exemplary natural features in Maine. We would appreciate the contribution of any information obtained should you decide to do field work. MNAP welcomes coordination with individuals or organizations proposing environmental alteration or conducting environmental assessments. If, however, data provided by MNAP are to be published in any form, the Program should be informed at the outset and credited as the source.

The Maine Natural Areas Program has instituted a fee structure of $75.00 an hour to recover the actual cost of processing your request for information. You will receive an invoice for $150.00 for two hours of our services.

Thank you for using MNAP in the environmental review process. Please do not hesitate to contact me if you have further questions about the Natural Areas Program or about rare or unique botanical features on this site.

Sincerely,

Lisa St. Hilaire

Lisa St. Hilaire | Information Manager | Maine Natural Areas Program
207-287-8044 | lisa.st.hilaire@maine.gov

Rare and Exemplary Botanical Features within 4 miles of
Project: #21006, Raymond Hills Apartments, Expanded Area, Raymond, Maine

Common Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
Nodding Pogonia						
	T	S2	G4?	2010-08-18	5	Hardwood to mixed forest (forest, upland)
Oak - Pine Forest						
	<null>	S5	G5	2005-06-21	5	Hardwood to mixed forest (forest, upland)
Pitch Pine Bog						
	<null>	S2	G3G5	2004-06-21	10	Forested wetland,Coastal non-tidal wetland (non-forested, wetland)
Red Maple Swamp						
	<null>	S5	G3G5	2004-06-21	16	Forested wetland
Scarlet Oak						
	E	S1	G5	1916-08	2	Hardwood to mixed forest (forest, upland)

Conservation Status Ranks

State and Global Ranks: This ranking system facilitates a quick assessment of a species' or habitat type's rarity and is the primary tool used to develop conservation, protection, and restoration priorities for individual species and natural habitat types. Each species or habitat is assigned both a state (S) and global (G) rank on a scale of 1 to 5. Factors such as range extent, the number of occurrences, intensity of threats, etc., contribute to the assignment of state and global ranks. The definitions for state and global ranks are comparable but applied at different geographic scales; something that is state imperiled may be globally secure.

The information supporting these ranks is developed and maintained by the Maine Natural Areas Program (state ranks) and NatureServe (global ranks).

Rank	Definition
S1 **G1**	**Critically Imperiled** – At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
S2 **G2**	**Imperiled** – At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3 **G3**	**Vulnerable** – At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4 **G4**	**Apparently Secure** – At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5 **G5**	**Secure** – At very low risk or extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
SX **GX**	**Presumed Extinct** – Not located despite intensive searches and virtually no likelihood of rediscovery.
SH **GH**	**Possibly Extinct** – Known from only historical occurrences but still some hope of rediscovery.
S#S# **G#G#**	**Range Rank** – A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem.
SU **GU**	**Unrankable** – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
GNR **SNR**	**Unranked** – Global or subnational conservation status not yet assessed.
SNA **GNA**	**Not Applicable** – A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities (e.g., non-native species or ecosystems.
Qualifier	**Definition**
S#? **G#?**	**Inexact Numeric Rank** – Denotes inexact numeric rank.
Q	**Questionable taxonomy that may reduce conservation priority** – Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable. The "Q" modifier is only used at a global level.
T#	**Infraspecific Taxon (trinomial)** – The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank.

State Status: Endangered and Threatened are legal status designations authorized by statute. Please refer to MRSA Title 12, §544 and §544-B.

Status	Definition
E	**Endangered** – Any native plant species in danger of extinction throughout all or a significant portion of its range within the State or Federally listed as Endangered.
T	**Threatened** – Any native plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range in the State or Federally listed as Threatened.
SC	**Special Concern** – A native plant species that is rare in the State, but not rare enough to be considered Threatened or Endangered.
PE	**Potentially Extirpated** – A native plant species that has not been documented in the State in over 20 years, or loss of the last known occurrence.

Element Occurrence (EO) Ranks: Quality assessments that designate viability of a population or integrity of habitat. These ranks are based on size, condition, and landscape context. Range ranks (e.g., AB, BC) and uncertainty ranks (e.g., B?) are allowed. The Maine Natural Areas Program tracks all occurrences of rare plants and natural communities/ecosystems (S1-S3) as well as exemplary common natural community types (S4-S5 with EO ranks A/B).

Rank	Definition
A	**Excellent** – Excellent estimated viability/ecological integrity.
B	**Good** – Good estimated viability/ecological integrity.
C	**Fair** – Fair estimated viability/ecological integrity.
D	**Poor** – Poor estimated viability/ecological integrity.
E	**Extant** – Verified extant, but viability/ecological integrity not assessed.
H	**Historical** – Lack of field information within past 20 years verifying continued existence of the occurrence, but not enough to document extirpation.
X	**Extirpated** – Documented loss of population/destruction of habitat.
U	**Unrankable** – Occurrence unable to be ranked due to lack of sufficient information (e.g., possible mistaken identification).
NR	**Not Ranked** – An occurrence rank has not been assigned.

Visit the Maine Natural Areas Program website for more information
http://www.maine.gov/dacf/mnap

maine DEPARTMENT OF Agriculture Conservation & Forestry
NATURAL AREAS

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
353 WATER STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO
COMMISSIONER

December 27, 2021

Jayson Haskell
DM Roma Consulting Engineers
P.O. Box 1116
Windham, ME 04062

RE: Information Request – Raymond Hills Apartments Project, Raymond

Dear Jayson:

Per your request received on December 09, 2021, we have reviewed current Maine Department of Inland Fisheries and Wildlife (MDIFW) information for known locations of Endangered, Threatened, and Special Concern species; designated Essential and Significant Wildlife Habitats; and inland fisheries habitat concerns within the vicinity of the *Raymond Hills Apartments* project in Raymond.

Our Department has not mapped any Essential Habitats that would be directly affected by your project.

Endangered, Threatened, and Special Concern Species

Bat Species – Of the eight species of bats that occur in Maine, the three *Myotis* species are protected under Maine's Endangered Species Act (MESA) and are afforded special protection under 12 M.R.S §12801 - §12810. The three *Myotis* species include little brown bat (State Endangered), northern long-eared bat (State Endangered), and eastern small-footed bat (State Threatened). The five remaining bat species are listed as Special Concern: big brown bat, red bat, hoary bat, silver-haired bat, and tri-colored bat. While a comprehensive statewide inventory for bats has not been completed, based on historical evidence it is likely that several of these species occur within the project area during migration and/or the breeding season. However, our Agency does not anticipate significant impacts to any of the bat species as a result of this project.

Significant Wildlife Habitat

Significant Vernal Pools - At this time MDIFW Significant Wildlife Habitat (SWH) maps indicate no known presence of SWHs subject to protection under the Natural Resources Protection Act (NRPA) within the project area, which include Waterfowl and Wading Bird Habitats, Seabird Nesting Islands, Shorebird Areas, and Significant Vernal Pools. However, a comprehensive statewide inventory for Significant Vernal Pools has not been completed. Therefore, we recommend that surveys for vernal pools be conducted within the project boundary by qualified wetland scientists prior to final project design to determine whether there are Significant Vernal Pools present in the area. These surveys should extend up to 250 feet beyond the anticipated project footprint because of potential performance standard requirements for off-site Significant Vernal Pools, assuming such pools are located on land owned or controlled by the applicant. Once surveys are completed, survey forms should be submitted to our Agency for review well before the submission of any necessary permits. Our Department will need to review and verify any vernal pool data prior to final determination of significance.

Fisheries Habitat

We recommend that 100-foot undisturbed vegetated buffers be maintained along streams. Buffers should be measured from the edge of stream or associated fringe and floodplain wetlands. Maintaining and enhancing buffers along streams that support coldwater fisheries is critical to the protection of water temperatures, water quality, natural inputs of coarse woody debris, and various forms of aquatic life necessary to support conditions required by many fish species. Stream crossings should be avoided, but if a stream crossing is necessary, or an existing crossing needs to be modified, it should be designed to provide full fish passage. Small streams, including intermittent streams, can provide crucial rearing habitat, cold water for thermal refugia, and abundant food for juvenile salmonids on a seasonal basis and undersized crossings may inhibit these functions. Generally, MDIFW recommends that all new, modified, and replacement stream crossings be sized to span at least 1.2 times the bankfull width of the stream. In addition, we generally recommend that stream crossings be open bottomed (i.e. natural bottom), although embedded structures which are backfilled with representative streambed material have been shown to be effective in not only providing habitat connectivity for fish but also for other aquatic organisms. Construction Best Management Practices should be closely followed to avoid erosion, sedimentation, alteration of stream flow, and other impacts as eroding soils from construction activities can travel significant distances as well as transport other pollutants resulting in direct impacts to fish and fisheries habitat. In addition, we recommend that any necessary instream work occur between July 15 and October 1.

This consultation review has been conducted specifically for known MDIFW jurisdictional features and should not be interpreted as a comprehensive review for the presence of other regulated features that may occur in this area. Prior to the start of any future site disturbance we recommend additional consultation with the municipality, and other state resource agencies including the Maine Natural Areas Program, Maine Department of Marine Resources, and Maine Department of Environmental Protection in order to avoid unintended protected resource disturbance.

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

Becca Settele
Wildlife Biologist

January 6, 2022

Jayson Haskell
DMR Engineering Consultants
PO Box 1116
Windham, ME 04062

RE: Wetland Evaluation for Raymond Hills Village

Dear Mr. Haskell:

On January 6, 2022 a 3.7 acre portion of land identified by the Town of Raymond as Tax Map 5, Lot 1 was surveyed for the presence of wetlands. This portion of land was to be conveyed to the owner of Tax Map 8, Lot 22A as part of the Raymond Hills Village project. The site consisted of vacant forested land.

The site was dominated by upland forested vegetation including red oak (*Quercus rubra*), white pine (*Pinus strobus*), white oak (Quercus alba), american beech (*Fagus grandifolia*), red maple (*Acer rubrum*), bracken fern (*Pteridium aquilinum*), and teaberry (*Gaultheria procumbens*). Soils throughout the site revealed bouldery sandy loams and no evidence of a seasonal water table within the upper 36 inches. This is consistent with the USDA Cumberland County Soil survey which maps the site as containing the Herman soil series, which are somewhat excessively drained to drained glacial till soils. No evidence of wetland hydrology was observed onsite.

Please find a photo log attached. Army Corps Wetland Delineation forms can be provided upon request documenting upland conditions.

If you have any questions, please feel free to email me at: mainelysoils@gmail.com or call 207-650-4313.

Sincerely,

Alexander A. Finamore
LSE #391
CWS #267

Natural Resource Photographs – 1/6/2022
Raymond Hills Project, Raymond, Maine

Photo 1: View looking westerly at the upland area within the CMP Rights of way.

Photo 2: View looking easterly at upland forested area from the CMP Rights of way

Photo 3: View looking northeasterly within the central portion of the study area.

Photo 4: View looking northeasterly within the eastern extent of the study area.

Androscoggin Bank

A Banking Force For Good | Certified B Corporation

January 11, 2022

Re: Raymond Hills Project

To The Town of Raymond -

We are pleased to confirm that Timothy Clinton has the financial capacity to support the 25-unit residential project in Raymond, Maine.

Androscoggin Bank has a long standing relationship with Timothy Clinton and he is currently in good standing. This letter is not a commitment to lend funds, however, we strongly believe Timothy Clinton has the financial capacity to support this project.

I trust this letter complies with the requirements. If you should need further information or clarification, please feel free to contact me at (207) 518-6315.

Sincerely,

Melissa Knutson
VP, Commercial Loan Officer
100 Middle Street
West Tower, Suite 303
Portland, Maine 04101
Office: 207.518.6315

DM ROMA
CONSULTING ENGINEERS

STORMWATER MANAGEMENT REPORT

RAYMOND HILLS VILLAGE
WEBBS MILLS ROAD
RAYMOND, MAINE

A. Narrative

Raymond Hills, LLC, the applicant, is proposing to develop a 12.55-acre parcel on Webbs Mills Road in Raymond, Maine. The project site is identified as Lot 22A on the Town of Raymond Assessor's Map 51 and as a portion of Lot 1 on the Town of Raymond Assessor's Map 5, is located in the Village Residential Zoning District. Access to the project site will be from Webbs Mills Road through an existing access easement on the adjacent property, which currently contains a substandard gravel road. The remaining site is primarily undeveloped woodland.

The development will include the construction of twelve (12) duplex style buildings and one (1) single unit style building, creating 25 residential units. The project will also include the construction of an approximately 1,770 linear foot driveway to access the units. The project will be served by public water, common subsurface wastewater disposal system and underground electrical, communication and cable.

In general, the property drains to the west, toward Webbs Mills Road. The flow is directed to a closed drainage system within the roadway and directly discharges into the end of Panther Run and into Sebago Lake. The Sebago Lake watershed is indicated as a Lake Watershed Most at Risk from Development by the Maine Department of Environmental Protection (MDEP).

B. Alterations to Land Cover

Based on the proposed design, the applicant will be responsible for creating approximately 100,089 square feet (2.30± acres) of impervious surface consisting of the proposed buildings and driveway pavement and approximately 230,661 square feet (5.30± acres) of landscaped area associated with lawn and landscaping, totaling approximately 330,750 square feet (7.59± acres) of developed area.

As this project is located within a Watershed of a Lake Most at Risk from Development and is generating over 20,000 square feet of impervious surface, a Stormwater Permit from the MDEP will need to be obtained. The stormwater design will be required to meet the Basic and Phosphorous Standards of the Chapter 500 Stormwater Management rules.

In addition, the Town of Raymond Land Use Ordinance requires that the post-development stormwater runoff does not exceed the pre-development stormwater runoff for the 24-hour duration, 2-, 10- and 25-year frequency storm events.

The site is moderately sloped (5-13%) in the area where the buildings will be constructed with steeper slopes to the west adjacent to the property boundary. Soils on the property were determined utilizing the Medium Intensity Soil Maps for Cumberland County, Maine published by the Natural Resources Conservation Service.

The soils boundaries and hydrologic soils group (HSG) designations are indicated on the watershed maps within the design plan set and a Soils Map has been included as Attachment 1 of this report. Test pits were also excavated in the location of the proposed BMPs. The test pit logs are also included in Attachment 1 of this report.

C. Methodology and Modeling Assumptions

The proposed stormwater management system has been designed utilizing Best Management Practices to maintain existing drainage patterns while providing stormwater quality improvement measures. The goal of the storm drainage system design is to remove potential stormwater pollutants from runoff generated by the development while providing attenuation of the peak rates of runoff leaving the site. The method utilized to predict the surface water runoff rates in this analysis is a computer program entitled HydroCAD, which is based on the same methods that were originally developed by the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service, and utilized in the TR-20 modeling program. Peak rates of runoff are forecasted based upon land use, hydrologic soil conditions, vegetative cover, contributing watershed area, time of concentration, rainfall data, storage volumes of detention basins and the hydraulic capacity of structures. The computer model predicts the amount of runoff as a function of time, with the ability to include the attenuation effect due to dams, lakes, large wetlands, floodplains and constructed stormwater management basins. The input data for rainfalls with statistical recurrence frequencies of 2-, 10- and 25 years was obtained from Appendix H of the MDEP, Chapter 500 Stormwater Management, last revised in 2015. The National Weather Service developed four synthetic storm types to simulate rainfall patterns around the country. For analysis in Cumberland County, Maine, the type III rainfall pattern with a 24-hour duration is appropriate.

D. Basic Standards

The project is required by the MDEP to provide permanent and temporary Erosion Control Best Management Practices. These methods are outlined in detail in the plan set.

E. Phosphorous Standard

Since the project site is located within the watershed of a Lake Most at Risk from Development and will generate more than 20,000 square feet of new impervious surface, the project is required to meet the Phosphorous Standards outlined in the MDEP Chapter 500 Stormwater Management rules. To meet this standard, two (2) underdrained soil filter basin, one Filterra Bioretention Unit and the requirement of installing roofline drip edge filters around each building have been incorporated into the stormwater infrastructure.

Based on our calculations, the project site's Project Phosphorous Budget (PPB) was determined to be 0.854± lbs P/year. The proposed projects Pre-Treatment Phosphorous Export was calculated to be 3.35± lbs P/year. The calculations prepared for this standard indicated that the project's stormwater infrastructure effectively reduces the site's phosphorus export by approximately 65%; resulting in a total Post-Treatment Phosphorous Export (PPE) of 1.16± lbs P/year. The project design does not have the opportunity to claim source elimination mitigation credit (SEC), nor will the project design provide treatment to a pre-existing source. The proposed project design will provide treatment for 0.85± acres of paved roadway, 0.39± acres of paved driveway, 1.01± acres of new roof area, and 4.34± acres of landscaping. As illustrated on Worksheet 4 of the Phosphorous Budget calculations, the total Post-

Treatment Phosphorous Export (PPE) of 1.16 lbs P/year; approximately 0.30 lbs P/year more than the Project's Phosphorus Budget (0.85 lbs P/year). These calculations can be found on the enclosed worksheets as Attachment 2 in this report.

The watershed map has been included in the design plan set and the calculations related to the Phosphorous Standard have been included in this report as Attachment 2.

The sizing calculations for the underdrained soil filter basins have been included as Attachment 3 of this report. To demonstrate that the emergency overflow of the grassed underdrained soil filter basin has the required 1 foot of freeboard between the emergency spillway and the top of berm during the 25-year storm event assuming failure of the other discharge devices and evidence of the drain down time of the basin is between 24 to 48 hours have been included in this section. The sizing calculations for the required channel protection volume storage, achieved by the subsurface chamber system, after the Filterra units has been included in Attachment 4 of this report. The sizing calculations for the Filterra units as prepared by Contech are also included in this section. The roofline dripedge sizing calculations are included in Attachment 5 of this report.

F. Flooding Analysis

As a requirement of the Town of Raymond Land Use Ordinance, the project will need to limit the peak rates of runoff to the pre-development condition during the 24-hour, 2-, 10- and 25-year frequency storm events. The project's stormwater design incorporates the integration of two underdrained filter basins, and a subsurface chamber system to provide the required stormwater attenuation during the design storm events. Three study points were chosen to demonstrate the site design's compliance with the Town's standard.

The first study point (SP-1) is located at the intersection of the site's driveway and Webbs Mills Road. There is an existing catch basin that will be connected into by the subsurface chamber system. The flow that enters the basin is conveyed via storm drain southwesterly within Webbs Mills Road and eventually discharges into Panther Run and ultimately Sebago Lake.

The second study point (SP-2) is the location where runoff from both on and offsite drains across the western and northwestern property boundary onto the abutting property, now or formerly owned by Sharon Kitchens. Primarily, the flow onto this property isn't channelized and sheets across the parcel boundary. Drainage from this study point flows across the property, discharging into the closed drainage system within Webbs Mills Road and eventually into Panther Run and Sebago Lake.

The third study point (SP-3) is located along the southwestern property boundary where drainage from both on and offsite is collected in a natural drainage swale, onsite, and then flows across the property boundary, now or formerly owned by Jean Thurlow, Deborah Libby and Esther Small. Drainage from this study point flows across the property, discharging into the closed drainage system within Webbs Mills Road and eventually into Panther Run and Sebago Lake.

The following table summarizes the analysis:

Table 1 – Peak Rates of Stormwater Runoff						
Study Point	2-Year (cfs)		10-Year (cfs)		25-Year (cfs)	
	Pre	Post	Pre	Post	Pre	Post
SP1	0.62	0.61	1.61	1.60	2.53	2.49
SP2	<0.01	<0.01	0.06	0.06	0.35	0.25
SP3	<0.01	0.04	0.04	0.01	0.40	0.09

As illustrated in Table 1, the project reduces or maintains the existing flow conditions at all Study Points. t.

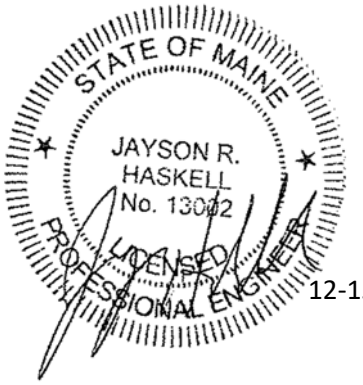
The watershed maps showing pre-development and post-development drainage patterns are included in the plan set. The pre-development and post-development drainage computations performed with the HydroCAD software program are included as Attachment 6 of this report.

G. Maintenance of common facilities or property

The applicant will be responsible for the maintenance of the stormwater facilities until a homeowner's association is created. An Inspection, Maintenance and Housekeeping Plan for the project has been created and has been included in as Attachment 7 of this report.

Prepared by:

DM ROMA CONSULTING ENGINEERS



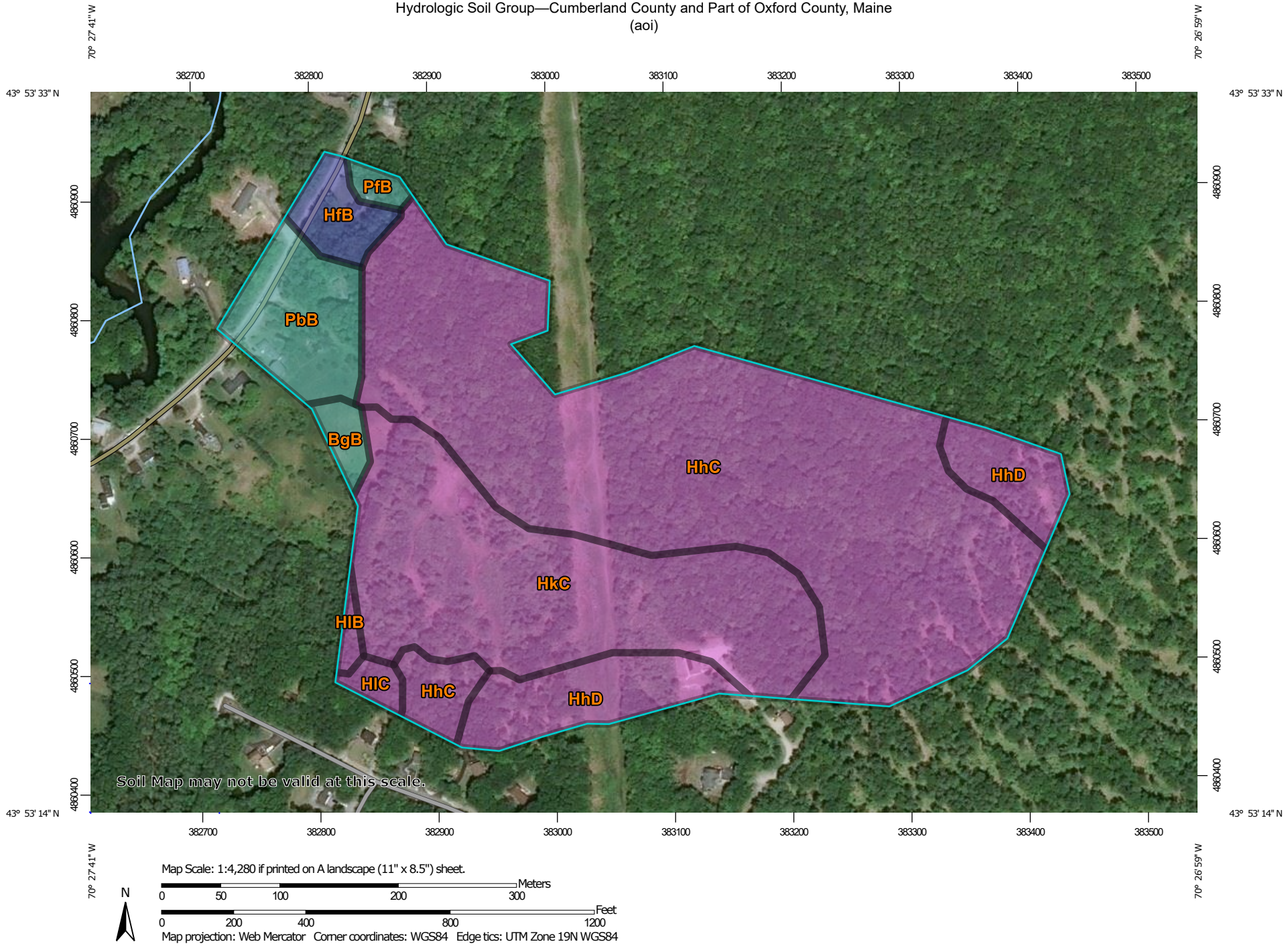
Jayson R. Haskell P.E.
Southern Maine Regional Manager

12-15-2021

ATTACHMENT 1

SOILS MAP & BMP TEST PIT LOGS

Hydrologic Soil Group—Cumberland County and Part of Oxford County, Maine
(aoi)



Map Scale: 1:4,280 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 18, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 7, 2019—Jul 2, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BgB	Nicholville very fine sandy loam, 0 to 8 percent slopes	C	0.6	1.2%
HfB	Hartland very fine sandy loam, 3 to 8 percent slopes	B	1.2	2.5%
HhC	Hermon sandy loam, 8 to 15 percent slopes, very stony	A	25.8	53.3%
HhD	Hermon sandy loam, 15 to 35 percent slopes, very stony	A	4.4	9.2%
HkC	Hermon sandy loam, 8 to 20 percent slopes, extremely stony	A	12.3	25.5%
HlB	Hinckley loamy sand, 3 to 8 percent slopes	A	0.3	0.5%
HlC	Hinckley loamy sand, 8 to 15 percent slopes	A	0.4	0.8%
PbB	Paxton fine sandy loam, 3 to 8 percent slopes	C	3.0	6.3%
PfB	Paxton very stony fine sandy loam, 3 to 8 percent slopes	C	0.4	0.7%
Totals for Area of Interest			**48.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Town, City, Plantation	Street, Road Subdivision	PREPARED FOR Owner's Name
RAYMOND	WEBBS MILL ROAD	DMROMA

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP-6 ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)	Texture	Consistency	Color	Mottling
0–10	LOAMY SAND	FRIABLE	DK BROWN	
10–20	COBBLY LOAMY SAND		YELLOW BROWN	
20–30	COBBLY SAND		LIGHT YELLOW BROWN	
30–40	LOAMY SAND & COARSE SAND AND GRAVELL	FIRM	LIGHT GRAY	FEW DISTINCT
40–50				

Soil Classification (Profile / Condition)	Slope	Limiting Factor	
	____ %	36"	■ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

FOR WASTEWATER DISPOSAL

FOR SOILS MAPPING — Soil Series Name:	Drainage Class:	Hydrologic Group:
WAUMBECK (VARIANT)	MODERATELY WELL DRAINED	B

Observation Hole TP-7 ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)	Texture	Consistency	Color	Mottling
0–40				
40–50	LIMIT OF EXCAVATION 60"			

Existing Grade at TP-6 = 307.00+/-
Limiting Factor=36"
Approx. Ground Water Elev.=304.00+/-
Bottom of FB1 Filter Section=307.50
Separation from GW = 3.5' >1.5' and not excessively well drained or well drained soils. An impermeable liner has not been proposed for this system.

Soil Classification (Profile / Condition)	Slope	Limiting Factor	
	____ %	____"	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Soil Series Name:	Drainage Class:	Hydrologic Group:

SOIL DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole TP-8 ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)	Texture	Consistency	Color	Mottling
0–30				
30–40	LIMIT OF EXCAVATION			
40–50				

Existing Grade at TP-9 = 298.00+/-
Limiting Factor=32"
Approx. Ground Water Elev.=295.33+/-
Bottom of Stormtech System=290.65
Separation from GW = 4.68' below groundwater. An impermeable liner has been proposed for this system.

Soil Classification (Profile / Condition)	Slope	Limiting Factor	
	____ %	____"	☐ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

FOR WASTEWATER DISPOSAL

FOR SOILS MAPPING — Soil Series Name:	Drainage Class:	Hydrologic Group:

Observation Hole TP-9 ■ Test Pit ☐ Boring
_____" Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (inches)	Texture	Consistency	Color	Mottling
0–10	FINE AND MEDIUM SAND	SOMEWHAT FRIABLE	BROWN	
10–20			YELLOW BROWN	
20–30	VERY COBBLY AND STONY LOAMY SAND AND SANDY LOAM	FIRM	LIGHT OLIVE BROWN	
30–40			OLIVE GRAY	FEW FAINT
40–50	LIMIT OF EXCAVATION 60"			

Soil Classification (Profile / Condition)	Slope	Limiting Factor	
	____ %	32"	■ Ground Water ☐ Restrictive Layer ☐ Bedrock ☐ Pit Depth

Soil Series Name:	Drainage Class:	Hydrologic Group:
SKERRY (VARIANT)	MODERATLEY WELL DRAINED	C

Christopher J. Coppi — Site Evaluator / Soil Scientist Signature

403/631 — SE/CSS #

7/1/21 — Date

ALBERT FRICK ASSOCIATES – 731 FOSS ROAD, LIMERICK, MAINE 04048– (207) 839-5563

FORM F

SOIL PROFILE/CLASSIFICATION INFORMATION

Detailed Description of Subsurface Conditions at Project Sites

Project Name:	Applicant Name:	Project Location (municipality):
Raymond Hills Condos	Raymond Hills, LLC	Raymond

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: TP-1 [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling
FINE SANDY LOAM	FRIABLE	DARK BROWN	NONE OBSERVED
LOAMY SAND		YELLOWISH BROWN	
LOAMY SAND w/ ANGULAR COBBLES		LIGHT YELLOWISH BROWN	
	VERY FRIABLE	GREYISH BROWN	
LIMIT OF EXCAVATION = 48"			

[■] hydric [ ] non-hydric | Slope %: 0-5 | Limiting factor: >48" | [ ] ground water [ ] restrictive layer [ ] bedrock

C.S.S. Soil Series / phase name: | Drainage Class | Hydrologic Group

L.S.E. Soil Classification: 4 (Profile) | C (Soil Condition)

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: [ ] [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling

[ ] hydric [■] non-hydric | Slope % | Limiting factor | [ ] ground water [■] restrictive layer [ ] bedrock

C.S.S. Soil Series / phase name: | Drainage Class | Hydrologic Group

L.S.E. Soil Classification: Profile | Soil Condition

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: [ ] [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling

[■] hydric [■] non-hydric | Slope % | Limiting factor | [■] ground water [■] restrictive layer [■] bedrock

C.S.S. Soil Series / phase name: | Drainage Class | Hydrologic Group

L.S.E. Soil Classification: Profile | Soil Condition

SOIL DESCRIPTION AND CLASSIFICATION

Exploration Symbol: [ ] [X] Test Pit [ ] Boring

0 " Depth of Organic Horizon Above Mineral Soil

DEPTH BELOW MINERAL SOIL SURFACE (Inches)

Texture	Consistency	Color	Mottling

[■] hydric [■] non-hydric | Slope % | Limiting factor | [■] ground water [■] restrictive layer [■] bedrock

C.S.S. Soil Series / phase name: | Drainage Class | Hydrologic Group

L.S.E. Soil Classification: Profile | Soil Condition

Professional Endorsements *(as applicable)*

C.S.S.	signature:	Date:
	name printed/typed:	Lic.#:
L.S.E.	signature: [signature]	Date: 12/9/21
	name printed/typed: Alexander A. Finamore	Lic.#: 391

ATTACHMENT 2

PHOSPHOROUS STANDARD CALCULATIONS

Worksheet 1 - PPB calculations

Project Name: Raymond Hills Village ~ Webb Mills Road

Lake Watershed: SEBAGO LAKE

Town: WINDHAM, MAINE

Standard Calculations

Watershed per acre phosphorus budget (Appendix C)	**PAPB**	0.061	lbs P/acre/year
Total acreage of development parcel:	**TA**	14.00	acres
NWI wetland acreage:	**WA**	0	acres
Steep slope acreage:	**SA**	0	acres
Project acreage: A = TA - (WA+ SA)	**A**	14	acres
Project Phosphorus Budget: PPB = P x A	**PPB**	0.854	**lbs P/year**

Small Watershed Adjustment

If Project Acreage (A) is greater than the threshold acreage for the small watershed threshold (SWT, from pertinent lake and town info in the table in Appendix C), calculate an alternative PPB using the analysis below and use this value if it is less than the the Standard Calculation PPB.

Small Watershed Threshold (Appendix C):	**SWT**		acres
Project acreage:	**A**		acres
Allowable increase in town's share of annual phosphorus load to lake (Appendix C):	**FC**		lbs P/year
Area available for development (Appendix C):	**AAD**		acres
Ratio of A to AAD (R=A/AAD)	**R**		

Project Phosphorus Budget

If R < 0.5, PPB = [(FC x R)/2] + [FC/4]	**PPB**		**lbs P/year**
If R> 0.5, PPB = FC x R	**PPB**		**lbs P/year**

Worksheet 2

Pre-PPE and Post-PPE Calculations

Calculate phosphorus export from development for before and after treatment
Use as many sheets as needed for each development type (commercial, roads, residential lots, etc.)

Project name: Raymond Hills Village **Development type**: RESIDENTIAL Sheet # 1 of 1

Land Surface Type or Lot #(s) with description	Acres or # of lots	Export Coefficient from Table 3.1 Table 3.2	Pre-treatment Algal Av. P Export (lbs P/year)	Treatment Factor for BMP(s) from Chapter 6	Post-treatment Algal Av. P Export (lbs P/year)	Description of BMPs
Road Pavement-F1	0.15	1.75	0.2549	0.4	0.10196	Filterra 1
Road Pavement-FB1	0.26	1.75	0.4635	0.26	0.12050	Filter Basin 1
Road Pavement-FB2A	0.34	1.75	0.5950	0.28	0.16660	Filter Basin 2A
Road Pavement-FB2B	0.10	1.75	0.1750	0.25	0.04375	Filter Basin 2B
Road Pavement -Untreated	0.06	1.75	0.1050	1	0.10500	None
Driveway -FB1	0.09	1.75	0.15471189	0.26	0.04023	Filter Basin 1
Driveway -FB2A	0.18	1.75	0.315	0.28	0.08820	Filter Basin 2A
Driveway -FB2B	0.12	1.75	0.21	0.25	0.05250	Filter Basin 2B
Roof - Drip Edge Only	1.01	0.5	0.505	0.4	0.20200	Drip Edge
Grass A - F1	0.03	0.1	0.0027	0.4	0.00107	Filterra 1
Grass A - FB1	1.40	0.1	0.1400	0.26	0.03640	Filter Basin 1
Grass A - FB2A	1.41	0.1	0.1410	0.28	0.03948	Filter Basin 2A
Grass A - FB2B	1.39	0.1	0.1390	0.25	0.03475	Filter Basin 2B
Grass C - F1	0.11	0.3	0.0340	0.4	0.01358	Filterra 1
Grass A - Untreated	0.88	0.1	0.0880	1	0.08800	None
Grass C -Untreated	0.08	0.3	0.0231	1	0.02310	None
		Total Pre-PPE (lbs P/year)	3.3457961	**Total PostPPE (lbs P/year)**	1.15711639	

WORKSHEET 4 - PROJECT PHOSPHORUS EXPORT SUMMARY

Summarizing the project's algal available phosphorus export (PPE)

Project Name: Raymond Hills Village

Project Phosphorus Budget - Worksheet 1	**PPB**	0.85	lbs P/year
Total Pre-Treatment Phosphorus Export - Worksheet 2	**Pre-PPE**	3.35	lbs P/year
Total Post-Treatment Phosphorus Export - Worksheet 2	**Post-PPE**	1.16	lbs P/year
Total Phosphorus Mitigation Credit - Worksheet 3	**TMC**	0.00	lbs P/year
Project Phosphorus Export (Post-PPE - TMC)	**PPE**	1.16	lbs P/year

Is the Project Phosphorus Export ≤ the Project Phosphorus Budget? (PPE≤PPB)

*If **YES**, PPE is less than or equal to PPB and the project meets its phosphorus budget .* *If **NO,** PPE is greater than PPB, more reduction in phosphorus export is required or the payment of a compensation fee may be an option*	NO
The amount of phosphorus that needs further treatment or compensation	0.30 lbs P/year

Has Project Phosphorus Export been sufficiently reduced?
Is (Pre-PPE - Post-PPE)/Pre-PPE greater than 0.60?

*If **YES**, in some watersheds the compensation fee is an available option.* *If **NO**, more treatment must be provided. PPE must be further reduced.*	YES
*The post-treatment phosphorus export must be less than 40% of the pre-treatment export (Post-PPE < 0.4*Pre-PPE)*	65.42 %

If the project is located in a watershed that is eligible for a compensation fee (or is a residential subdivision with buffers), a compensation fee may be appropriate as follows:

If Project Export has been reduced by greater than 60% and less than 75%, $25,000 per pound minus $833 per 1% Percent Export	**$6,210**
If Project Export has been reduced by greater than 75%, $12,500 per pound minus $500 per 1% Project Export	

ATTACHMENT 3

UNDERDRAINED FILTER BASIN SIZING CALCULATIONS

Raymond Hills Village
Calculated by: JRH
Printed 12/15/2021
Job #21006

Filter Basin FB-1

Tributary Impervious Area=	15,387	sf	(WS-12, WS-13 & WS-20 Impervious Area)
Tributary Landscaped Area=	60,955	sf	(WS-12, WS-13 & WS-20 Landscaped Area)

Water Quality Volume (WQV) Calculation

WQV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area

WQV (Required) = 3,314 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
300	2,927	0
302	4,331	7,256
304	6,412	17,887

Outlet Elevation = 301.50

Storage Volume Provided= 5,142 cf > Required

Filter Bottom Calculation

Filter Area (Required) = 5%xImpervious Area + 2%xLandscaped Area

Filter Area (Required) = 1,988 sf

Filter Area Provided = 2,927 sf > Required

Underdrain Orifice Calculation

Max Orifice Diameter (inches) = 0.035x^0.4599 (X=Filter Area (sf))

Max Orifice Diameter (Required)= 1.37 inches

Orifice Diameter (Provided)= 1.00 inch

Sediment Forebay Sizing

Tributary Pavement Requiring Sanding 15,387 sf

Required Sediment Forebay Volume :

10 storms/year x sanded area (acres) x 500lbs/acre-storm / 90 lbs/cf

Sediment Volume (Required) 19.6 cf

Sediment Volume (Provided): 115.0 cf > Required

DRAW DOWN TIME - FB-1

Hydrograph for Pond FB1:

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	300.00	0.00	0.00	0.00
2.50	0.00	0	300.00	0.00	0.00	0.00
5.00	0.00	0	300.00	0.00	0.00	0.00
7.50	0.00	0	300.00	0.00	0.00	0.00
10.00	**0.01**	0	300.00	0.01	0.01	0.00
12.50	**0.21**	976	300.32	0.05	0.05	0.00
15.00	0.18	1,503	300.49	0.05	0.05	0.00
17.50	0.19	2,841	300.88	0.05	0.05	0.00
20.00	0.15	3,847	301.16	0.05	0.05	0.00
22.50	0.14	**4,669**	**301.38**	**0.05**	**0.05**	**0.00**
25.00	0.01	**5,126**	**301.50**	**0.05**	**0.05**	**0.00**
27.50	0.00	4,649	301.37	0.05	0.05	0.00
30.00	0.00	4,166	301.25	0.05	0.05	0.00
32.50	0.00	3,690	301.12	0.05	0.05	0.00
35.00	0.00	3,221	300.99	0.05	0.05	0.00
37.50	0.00	2,760	300.86	0.05	0.05	0.00
40.00	0.00	2,307	300.73	0.05	0.05	0.00
42.50	0.00	1,862	300.60	0.05	0.05	0.00
45.00	0.00	1,426	300.46	0.05	0.05	0.00
47.50	0.00	998	300.33	0.05	0.05	0.00
50.00	0.00	579	300.19	0.05	0.05	0.00
52.50	0.00	169	300.06	0.05	0.05	0.00
55.00	0.00	0	300.00	0.00	0.00	0.00
57.50	0.00	0	300.00	0.00	0.00	0.00
60.00	0.00	0	300.00	0.00	0.00	0.00
62.50	0.00	0	300.00	0.00	0.00	0.00
65.00	0.00	0	300.00	0.00	0.00	0.00
67.50	0.00	0	300.00	0.00	0.00	0.00
70.00	0.00	0	300.00	0.00	0.00	0.00

BASIN PEAK (HR)= 25
BASIN EMPTY (HR) = 55
55 -25= 30 HR TO DRAIN

SPILLWAY RUN - FB-1

Summary for Pond FB1:

[44] Hint: Outlet device #2 is below defined storage

Inflow Area = 967,952 sf, 1.99% Impervious, Inflow Depth = 0.17" for 25-Year event
Inflow = 0.93 cfs @ 12.10 hrs, Volume= 13,914 cf
Outflow = 0.39 cfs @ 16.26 hrs, Volume= 8,772 cf, Atten= 58%, Lag= 249.6 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 0.39 cfs @ 16.26 hrs, Volume= 8,772 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 301.60' @ 16.26 hrs Surf.Area= 4,027 sf Storage= 5,532 cf

Plug-Flow detention time= 289.9 min calculated for 8,766 cf (63% of inflow)
Center-of-Mass det. time= 149.4 min (1,184.7 - 1,035.3)

Volume	Invert	Avail.Storage	Storage Description
#1	300.00'	17,887 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
300.00	2,927	215.0	0	0	2,927
302.00	4,331	252.8	7,212	7,212	4,410
304.00	6,412	313.7	10,675	17,887	7,213

Device	Routing	Invert	Outlet Devices
#1	Primary	297.00'	**1.0" Vert. 1" Orifice at end of 4"UD X 0.00** C= 0.600
#2	Device 1	297.73'	**4.0" Round 4" SD** L= 47.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 297.73' / 297.00' S= 0.0155 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#3	Device 1	300.00'	**2.410 in/hr Exfiltration over Surface area**
#4	Secondary	301.50'	**5.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=300.00' TW=297.00' (Dynamic Tailwater)
└─**1=1" Orifice at end of 4"UD** (Controls 0.00 cfs)
└─**2=4" SD** (Passes 0.00 cfs of 0.40 cfs potential flow)
└─**3=Exfiltration** (Passes 0.00 cfs of 0.16 cfs potential flow)

Secondary OutFlow Max=0.39 cfs @ 16.26 hrs HW=301.60' TW=297.35' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 0.39 cfs @ 0.80 fps)

PEAK ELEVATION DURING SPILLWAY RUN = 301.6'
TOP OF BERM ELEV.=303.00 = 1.4' FREEBOARD >1'

Raymond Hills Village
Calculated by: JRH
Printed 12/15/2021
Job #21006

Filter Basin FB-2

Filter Cell A

Tributary Impervious Area=	22,531 sf	(WS-31, WS-32 & WS-34 Impervious Area)
Tributary Landscaped Area=	61,667 sf	(WS-31, WS-32 & WS-34 Landscaped Area)

Water Quality Volume (WQV) Calculation

WQV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area

WQV (Required) = 3,933 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
310	2,993	0
311.5	4,680	5,708

Outlet Elevation = 311.50

Storage Volume Provided= 5,708 cf > Required

Filter Bottom Calculation

Filter Area (Required) = 5%xImpervious Area + 2%xLandscaped Area

Filter Area (Required) = 2,360 sf

Filter Area Provided = 2,993 sf > Required

Sediment Forebay Sizing

Tributary Pavement Requiring Sanding 22,531 sf

Required Sediment Forebay Volume :

10 storms/year x sanded area (acres) x 500lbs/acre-storm / 90 lbs/cf

Sediment Volume (Required) 28.7 cf

Sediment Volume (Provided): 37.7 cf > Required

Treatment Factor (Phosphorous Calculations)

TF = 0.4 (L-Required / L-Provided)

TF = 0.28

Filter Cell B

Tributary Impervious Area=	13,739	sf	(WS-30 Impervious Area)
Tributary Landscaped Area=	63,163	sf	(WS-30 Landscaped Area)

Water Quality Volume (WQV) Calculation

WQV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area

WQV (Required) = 3,250 cf

Stage Storage Volume

Elevation	Area (sf)	Storage (cf)
310	3,007	0
311.5	4,161	5,376

Outlet Elevation = 311.50

Storage Volume Provided= 5,376 cf > Required

Filter Bottom Calculation

Filter Area (Required) = 5%xImpervious Area + 2%xLandscaped Area

Filter Area (Required) = 1,950 sf

Filter Area Provided = 3,007 sf > Required

Sediment Forebay Sizing

Tributary Pavement Requiring Sanding 13,739 sf

Required Sediment Forebay Volume :

10 storms/year x sanded area (acres) x 500lbs/acre-storm / 90 lbs/cf

Sediment Volume (Required) 17.5 cf

Sediment Volume (Provided): 25.1 cf > Required

Treatment Factor (Phosphorous Calculations)

TF = 0.4 (L-Required / L-Provided)

TF = 0.24

TF (min) = 0.25

DRAW DOWN TIME - FB-2

Hydrograph for Pond FB2:

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	310.00	0.00	0.00	**0.00**
2.50	0.00	0	310.00	0.00	0.00	0.00
5.00	0.00	0	310.00	0.00	0.00	0.00
7.50	0.00	0	310.00	0.00	0.00	0.00
10.00	**0.01**	0	310.00	0.01	0.01	0.00
12.50	**1.45**	3,884	310.60	0.10	0.10	0.00
15.00	0.41	8,350	311.18	0.11	0.11	0.00
17.50	0.23	10,095	311.39	0.11	0.11	0.00
20.00	0.16	10,770	311.47	0.11	0.11	0.00
22.50	0.13	**11,101**	**311.50**	**0.11**	**0.11**	0.00
25.00	0.00	**10,868**	**311.48**	**0.11**	**0.11**	0.00
27.50	0.00	9,869	311.36	0.11	0.11	0.00
30.00	0.00	8,887	311.25	0.11	0.11	0.00
32.50	0.00	7,921	311.13	0.11	0.11	0.00
35.00	0.00	6,974	311.01	0.10	0.10	0.00
37.50	0.00	6,044	310.89	0.10	0.10	0.00
40.00	0.00	5,132	310.77	0.10	0.10	0.00
42.50	0.00	4,240	310.65	0.10	0.10	0.00
45.00	0.00	3,368	310.52	0.10	0.10	0.00
47.50	0.00	2,516	310.40	0.09	0.09	0.00
50.00	0.00	1,685	310.27	0.09	0.09	0.00
52.50	0.00	876	310.14	0.09	0.09	0.00
55.00	0.00	90	310.01	0.09	0.09	0.00
57.50	0.00	0	310.00	0.00	0.00	0.00
60.00	0.00	0	310.00	0.00	0.00	0.00
62.50	0.00	0	310.00	0.00	0.00	0.00
65.00	0.00	0	310.00	0.00	0.00	0.00
67.50	0.00	0	310.00	0.00	0.00	0.00
70.00	0.00	0	310.00	0.00	0.00	0.00

BASIN PEAK (HR)= 22.5
BASIN EMPTY (HR) = 57.5
57.5 -22.5= 35 HR TO DRAIN

SPILLWAY RUN - FB-2

Summary for Pond FB2:

Inflow Area = 362,978 sf, 17.86% Impervious, Inflow Depth = 0.91" for 25-Year event
Inflow = 3.84 cfs @ 12.16 hrs, Volume= 27,576 cf
Outflow = 0.04 cfs @ 24.36 hrs, Volume= 327 cf, Atten= 99%, Lag= 732.2 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 0.04 cfs @ 24.36 hrs, Volume= 327 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 313.02' @ 24.36 hrs Surf.Area= 12,571 sf Storage= 27,499 cf

Plug-Flow detention time= 960.1 min calculated for 327 cf (1% of inflow)
Center-of-Mass det. time= 695.9 min (1,596.2 - 900.3)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	40,967 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
310.00	6,000	579.0	0	0	6,000
311.50	8,841	610.0	11,062	11,062	9,066
312.00	10,315	684.8	4,784	15,846	16,780
314.00	14,948	789.9	25,120	40,967	29,201

Device	Routing	Invert	Outlet Devices
#1	Primary	307.73'	**12.0" Round 12" SD X 0.00** L= 32.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 307.73' / 307.00' S= 0.0228 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	307.83'	**1.5" Vert. 1.5" Orifice at end of 4"UD** C= 0.600
#3	Device 2	310.00'	**2.410 in/hr Exfiltration over Surface area**
#4	Device 1	311.50'	**3.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	312.50'	**Neenah R4345 Beehive Grate Light Duty-req. structure** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600
#6	Secondary	313.00'	**6.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=310.00' TW=0.00' (Dynamic Tailwater)
- **1=12" SD** (Controls 0.00 cfs)
- **2=1.5" Orifice at end of 4"UD** (Passes 0.00 cfs of 0.09 cfs potential flow)
  - **3=Exfiltration** (Passes 0.00 cfs of 0.33 cfs potential flow)
- **4=Orifice/Grate** (Controls 0.00 cfs)
- **5=Neenah R4345 Beehive Grate Light Duty-req. structure** (Controls 0.00 cfs)

Secondary OutFlow Max=0.04 cfs @ 24.36 hrs HW=313.02' TW=0.00' (Dynamic Tailwater)
- **6=Broad-Crested Rectangular Weir** (Weir Controls 0.04 cfs @ 0.36 fps)

PEAK ELEVATION DURING SPILLWAY RUN = 313.02'
TOP OF BERM ELEV.=314.1 = 1.08' FREEBOARD >1'

ATTACHMENT 4

FILTERRAS & STORMTECH CHAMBER SIZING CALCULATIONS

Raymond Hills Village
Calculated by: JRH
Printed 12/15/2021
Job #21006

Channel Protection Volume Sizing - Filterras

Subsurface Stormwater System

CPV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area
CPV=Channel Protection Volume

Tributary Watersheds =	WS-11	
Tributary Impervious Area=	6,345	sf
Tributary Landscaped Area=	5,935	sf
CPV (Required)=	**727**	**cf**

Specified Chamber= Stormtech SC-310
CPV (Provided)=
See Stage Storage Table from HydroCAD

DRAIN DOWN CALCULATION - STORMTECH

21006-Post *Type III 24-hr Stormtech Rainfall=4.70"*

Prepared by {enter your company name here} Printed 12/15/2021

Hydrograph for Pond ST: StormTech

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	290.65	0.00
1.50	0.00	0	290.65	0.00
3.00	0.00	0	290.65	0.00
4.50	0.00	0	290.65	0.00
6.00	0.00	0	290.65	0.00
7.50	0.00	0	290.65	0.00
9.00	0.01	13	290.67	0.00
10.50	0.03	54	290.74	0.02
12.00	**0.57**	**353**	**291.20**	**0.17**
13.50	**0.20**	**735**	**291.54**	**0.35**
15.00	0.15	348	291.19	0.17
16.50	0.11	243	291.06	0.13
18.00	0.09	182	290.96	0.10
19.50	0.09	156	290.91	0.09
21.00	0.08	145	290.89	0.08
22.50	0.08	137	290.88	0.08
24.00	0.07	131	290.87	0.07
25.50	0.05	99	290.82	0.05
27.00	0.05	97	290.81	0.05
28.50	0.05	96	290.81	0.05
30.00	0.05	96	290.81	0.05
31.50	0.05	95	290.81	0.05
33.00	0.00	59	290.75	0.02
34.50	0.00	20	290.68	0.00
36.00	0.00	12	290.67	0.00
37.50	0.00	9	290.66	0.00
39.00	0.00	7	290.66	0.00
40.50	0.00	5	290.66	0.00
42.00	0.00	5	290.66	0.00
43.50	0.00	4	290.66	0.00
45.00	0.00	3	290.66	0.00
46.50	0.00	3	290.66	0.00
48.00	0.00	3	290.65	0.00
49.50	0.00	3	290.65	0.00
51.00	0.00	2	290.65	0.00
52.50	0.00	2	290.65	0.00
54.00	0.00	2	290.65	0.00
55.50	0.00	2	290.65	0.00
57.00	0.00	2	290.65	0.00
58.50	0.00	2	290.65	0.00
60.00	0.00	2	290.65	0.00
61.50	0.00	1	290.65	0.00
63.00	0.00	1	290.65	0.00
64.50	0.00	1	290.65	0.00
66.00	0.00	1	290.65	0.00
67.50	0.00	1	290.65	0.00
69.00	0.00	1	290.65	0.00
70.50	0.00	1	290.65	0.00
72.00	0.00	1	290.65	0.00

Storm event that generates enough stormwater flow to meet channel protection volume

Required Channel Protection Volume = 727 cf
Top of overflow weir in OCS-1 = 292.73
Provided CPV=735 cf > 727 cf
Start Time of Drain Down Calc=13.5 hrs

Goal = Drain down between 24 hrs & 48 hrs
48.0 hrs - 13.50 hrs = 34.5 hrs

ATTACHMENT 5

ROOFLINE DRIPEDGE SIZING CALCULATIONS

DM ROMA
CONSULTING ENGINEERS

Raymond Hills Village
Calculated by: JRH
Printed 12/15/2021
Job #21006

Drip Edge Sizing Calculations

Tributary Impervious Area =	3,520	sf
Tributary Landscaped Area=	0	sf

Water Quality Volume (WQV) Calculation

WQV (Required) = 1.0"xImpervious Area + 0.4"xLandscaped Area

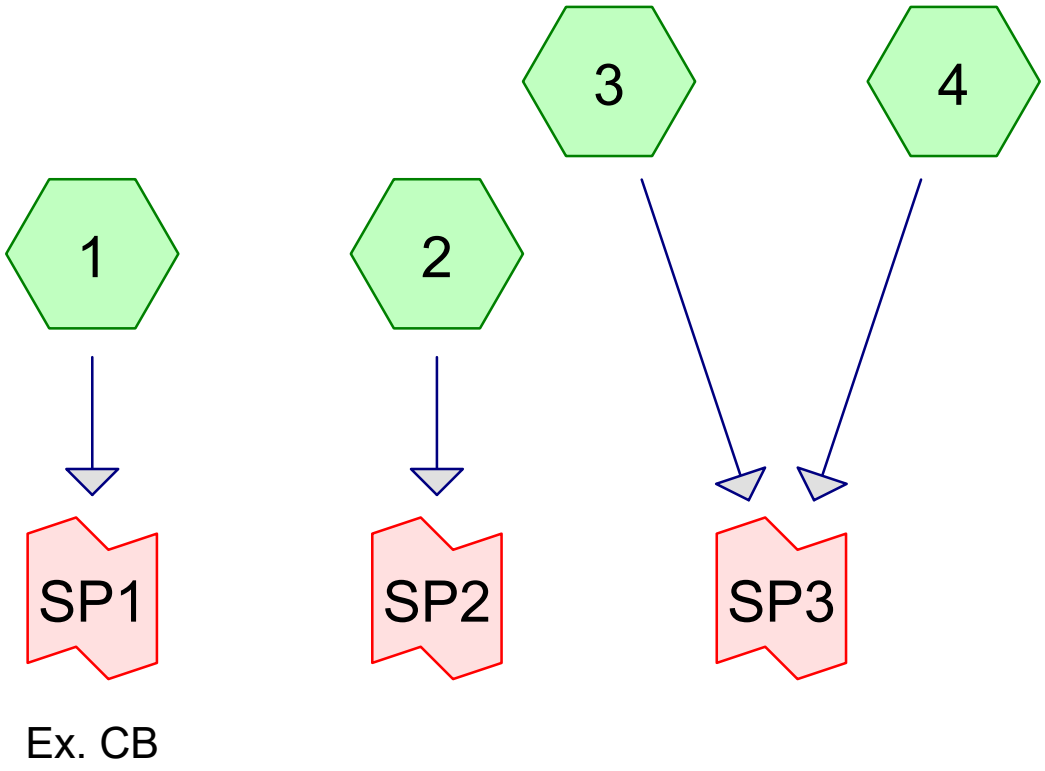
WQV (Required) = 293 cf

Drip Edge sizing:

Width	2	feet
Surface Area of Dripedge	508	sf
Depth of Stone Reservoir	1.5	feet
% Void (crushed stone)	40%	
Total Volume Provided:	**305**	**cf > Required**

ATTACHMENT 6

HYDROCAD OUTPUT



Ex. CB

Subcat Reach Pond Link

Routing Diagram for 21006-Pre

Prepared by {enter your company name here}, Printed 12/15/2021

Time span=0.00-72.00 hrs, dt=0.03 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=40,982 sf 10.02% Impervious Runoff Depth=0.72"
Flow Length=520' Tc=8.8 min CN=69 Runoff=0.62 cfs 2,472 cf

Subcatchment 2: Runoff Area=243,110 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=642' Tc=21.8 min CN=37 Runoff=0.00 cfs 0 cf

Subcatchment 3: Runoff Area=77,234 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=482' Tc=10.9 min CN=34 Runoff=0.00 cfs 0 cf

Subcatchment 4: Runoff Area=1,143,742 sf 0.40% Impervious Runoff Depth=0.00"
Flow Length=2,497' Tc=28.3 min CN=32 Runoff=0.00 cfs 0 cf

Link SP1: Ex. CB Inflow=0.62 cfs 2,472 cf
Primary=0.62 cfs 2,472 cf

Link SP2: Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link SP3: Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Time span=0.00-72.00 hrs, dt=0.03 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=40,982 sf 10.02% Impervious Runoff Depth=1.67"
Flow Length=520' Tc=8.8 min CN=69 Runoff=1.61 cfs 5,710 cf

Subcatchment 2: Runoff Area=243,110 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=642' Tc=21.8 min CN=37 Runoff=0.06 cfs 1,587 cf

Subcatchment 3: Runoff Area=77,234 sf 0.00% Impervious Runoff Depth=0.03"
Flow Length=482' Tc=10.9 min CN=34 Runoff=0.01 cfs 165 cf

Subcatchment 4: Runoff Area=1,143,742 sf 0.40% Impervious Runoff Depth=0.01"
Flow Length=2,497' Tc=28.3 min CN=32 Runoff=0.03 cfs 541 cf

Link SP1: Ex. CB Inflow=1.61 cfs 5,710 cf
Primary=1.61 cfs 5,710 cf

Link SP2: Inflow=0.06 cfs 1,587 cf
Primary=0.06 cfs 1,587 cf

Link SP3: Inflow=0.04 cfs 705 cf
Primary=0.04 cfs 705 cf

Time span=0.00-72.00 hrs, dt=0.03 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=40,982 sf 10.02% Impervious Runoff Depth=2.56"
Flow Length=520' Tc=8.8 min CN=69 Runoff=2.53 cfs 8,734 cf

Subcatchment 2: Runoff Area=243,110 sf 0.00% Impervious Runoff Depth=0.30"
Flow Length=642' Tc=21.8 min CN=37 Runoff=0.35 cfs 5,981 cf

Subcatchment 3: Runoff Area=77,234 sf 0.00% Impervious Runoff Depth=0.17"
Flow Length=482' Tc=10.9 min CN=34 Runoff=0.04 cfs 1,110 cf

Subcatchment 4: Runoff Area=1,143,742 sf 0.40% Impervious Runoff Depth=0.11"
Flow Length=2,497' Tc=28.3 min CN=32 Runoff=0.36 cfs 10,043 cf

Link SP1: Ex. CB Inflow=2.53 cfs 8,734 cf
Primary=2.53 cfs 8,734 cf

Link SP2: Inflow=0.35 cfs 5,981 cf
Primary=0.35 cfs 5,981 cf

Link SP3: Inflow=0.40 cfs 11,153 cf
Primary=0.40 cfs 11,153 cf

Summary for Subcatchment 1:

Runoff = 2.53 cfs @ 12.13 hrs, Volume= 8,734 cf, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	1,284	98	Existing roofs
*	3,420	96	Existing gravel surface
*	2,822	98	Existing paved road
*	11,576	74	Existing Grass C
	8,427	32	Woods/grass comb., Good, HSG A
	13,453	72	Woods/grass comb., Good, HSG C
	40,982	69	Weighted Average
	36,876	66	89.98% Pervious Area
	4,106	98	10.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	69	0.1729	0.17		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	76	0.0659	6.84	191.57	**Channel Flow, Seg B to C** Area= 28.0 sf Perim= 56.3' r= 0.50' n= 0.035 Earth, dense weeds
0.7	81	0.1487	1.93		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
0.1	76	0.0562	15.63	1,430.20	**Trap/Vee/Rect Channel Flow, Seg D to E** Bot.W=2.00' D=3.00' Z= 3.0 & 16.0 '/' Top.W=59.00' n= 0.030 Earth, grassed & winding
0.1	46	0.1188	10.69	411.59	**Channel Flow, Seg E to F** Area= 38.5 sf Perim= 77.7' r= 0.50' n= 0.030 Earth, grassed & winding
0.6	61	0.0984	1.57		**Shallow Concentrated Flow, Seg F to G** Woodland Kv= 5.0 fps
0.1	27	0.0831	4.64		**Shallow Concentrated Flow, Seg G to H** Unpaved Kv= 16.1 fps
0.2	84	0.0446	7.71	48.60	**Trap/Vee/Rect Channel Flow, Seg H to I** Bot.W=0.00' D=0.50' Z= 50.0 & 0.4 '/' Top.W=25.20' n= 0.016 Asphalt, rough
8.8	520	Total			

Summary for Subcatchment 2:

Runoff = 0.35 cfs @ 12.67 hrs, Volume= 5,981 cf, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	6,574	96	Existing Gravel Surface
	5,028	39	>75% Grass cover, Good, HSG A
	3,113	74	>75% Grass cover, Good, HSG C
	214,964	32	Woods/grass comb., Good, HSG A
	13,431	72	Woods/grass comb., Good, HSG C
	243,110	37	Weighted Average
	243,110	37	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	87	0.0800	0.13		**Sheet Flow, A TO B** Woods: Light underbrush n= 0.400 P2= 3.10"
5.6	63	0.2400	0.19		**Sheet Flow, B TO C** Woods: Light underbrush n= 0.400 P2= 3.10"
2.3	154	0.0486	1.10		**Shallow Concentrated Flow, C TO D** Woodland Kv= 5.0 fps
1.5	178	0.1500	1.94		**Shallow Concentrated Flow, D TO E** Woodland Kv= 5.0 fps
0.8	122	0.2500	2.50		**Shallow Concentrated Flow, E TO F** Woodland Kv= 5.0 fps
0.1	15	0.0200	2.28		**Shallow Concentrated Flow, F TO G** Unpaved Kv= 16.1 fps
0.3	23	0.0500	1.12		**Shallow Concentrated Flow, G TO H** Woodland Kv= 5.0 fps
21.8	642	Total			

Summary for Subcatchment 3:

Runoff = 0.04 cfs @ 13.86 hrs, Volume= 1,110 cf, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	60,254	32	Woods/grass comb., Good, HSG A
	16,980	39	>75% Grass cover, Good, HSG A
*	0	98	Existing House and Driveway
	77,234	34	Weighted Average
	77,234	34	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	101	0.1786	0.18		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	73	0.1096	5.33		**Shallow Concentrated Flow, Seg B to C** Unpaved Kv= 16.1 fps
0.5	103	0.0194	3.68	98.36	**Channel Flow, Seg C to D** Area= 26.7 sf Perim= 54.3' r= 0.49' n= 0.035 Earth, dense weeds
0.3	109	0.0552	6.21	203.64	**Channel Flow, Seg D to E** Area= 32.8 sf Perim= 66.8' r= 0.49' n= 0.035 Earth, dense weeds
0.7	96	0.2187	2.34		**Shallow Concentrated Flow, Seg D to E** Woodland Kv= 5.0 fps
10.9	482	Total			

Summary for Subcatchment 4:

Runoff = 0.36 cfs @ 15.39 hrs, Volume= 10,043 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	1,136,601	32	Woods/grass comb., Good, HSG A
	2,595	39	>75% Grass cover, Good, HSG A
*	4,546	98	Existing House and Driveway
	1,143,742	32	Weighted Average
	1,139,196	32	99.60% Pervious Area
	4,546	98	0.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	150	0.1500	0.19		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	264	0.0304	4.60	325.27	**Channel Flow, Seg B to C** Area= 70.7 sf Perim= 144.3' r= 0.49' n= 0.035 Earth, dense weeds
6.9	296	0.0203	0.71		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
2.0	611	0.0377	5.12	105.45	**Channel Flow, Seg D to E** Area= 20.6 sf Perim= 42.1' r= 0.49' n= 0.035 Earth, dense weeds
2.9	274	0.1021	1.60		**Shallow Concentrated Flow, Seg E to F** Woodland Kv= 5.0 fps
0.3	102	0.1569	6.38		**Shallow Concentrated Flow, Seg F to G** Unpaved Kv= 16.1 fps
1.1	338	0.0402	5.34	343.04	**Channel Flow, Seg G to H** Area= 64.3 sf Perim= 129.6' r= 0.50' n= 0.035 Earth, dense weeds
0.4	242	0.0400	8.96	141.19	**Trap/Vee/Rect Channel Flow, Seg H to I** Bot.W=3.00' D=1.50' Z= 5.0 '/' Top.W=18.00' n= 0.030 Earth, grassed & winding
0.2	220	0.1000	21.04	504.96	**Trap/Vee/Rect Channel Flow, Seg I to J** Bot.W=2.00' D=3.00' Z= 2.0 '/' Top.W=14.00' n= 0.030 Earth, grassed & winding
28.3	2,497	Total			

Summary for Link SP1: Ex. CB

Inflow Area = 40,982 sf, 10.02% Impervious, Inflow Depth = 2.56" for 25-Year event
Inflow = 2.53 cfs @ 12.13 hrs, Volume= 8,734 cf
Primary = 2.53 cfs @ 12.13 hrs, Volume= 8,734 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Summary for Link SP2:

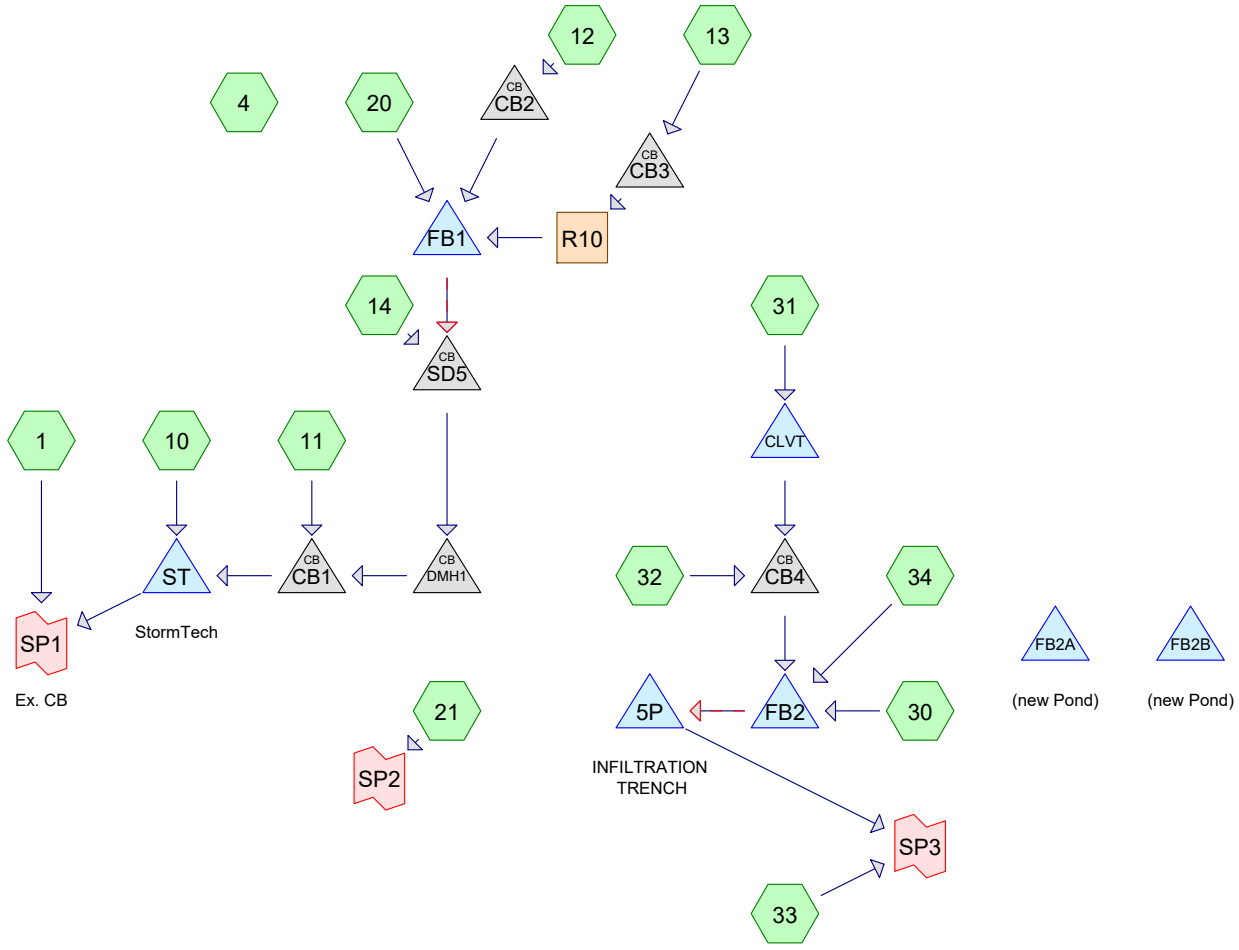
Inflow Area = 243,110 sf, 0.00% Impervious, Inflow Depth = 0.30" for 25-Year event
Inflow = 0.35 cfs @ 12.67 hrs, Volume= 5,981 cf
Primary = 0.35 cfs @ 12.67 hrs, Volume= 5,981 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Summary for Link SP3:

Inflow Area = 1,220,976 sf, 0.37% Impervious, Inflow Depth = 0.11" for 25-Year event
Inflow = 0.40 cfs @ 15.34 hrs, Volume= 11,153 cf
Primary = 0.40 cfs @ 15.34 hrs, Volume= 11,153 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs



Subcat Reach Pond Link

Routing Diagram for 21006-Post

Prepared by {enter your company name here}, Printed 12/15/2021

Time span=0.00-72.00 hrs, dt=0.03 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=34,579 sf 12.41% Impervious Runoff Depth=0.68"
Flow Length=520' Tc=8.9 min CN=68 Runoff=0.48 cfs 1,956 cf

Subcatchment 4: Runoff Area=1,143,742 sf 0.40% Impervious Runoff Depth=0.00"
Flow Length=2,497' Tc=28.3 min CN=32 Runoff=0.00 cfs 0 cf

Subcatchment 10: Runoff Area=6,500 sf 32.94% Impervious Runoff Depth=1.46"
Flow Length=168' Tc=6.0 min CN=82 Runoff=0.25 cfs 790 cf

Subcatchment 11: Runoff Area=32,408 sf 19.06% Impervious Runoff Depth=0.48"
Flow Length=410' Tc=14.4 min CN=63 Runoff=0.22 cfs 1,284 cf

Subcatchment 12: Runoff Area=3,438 sf 68.00% Impervious Runoff Depth=1.26"
Flow Length=184' Tc=6.0 min CN=79 Runoff=0.11 cfs 362 cf

Subcatchment 13: Runoff Area=8,090 sf 56.90% Impervious Runoff Depth=0.92"
Flow Length=178' Tc=6.0 min CN=73 Runoff=0.19 cfs 620 cf

Subcatchment 14: Runoff Area=1,659 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=52' Slope=0.1000 '/' Tc=6.0 min CN=39 Runoff=0.00 cfs 0 cf

Subcatchment 20: Runoff Area=956,424 sf 1.28% Impervious Runoff Depth=0.00"
Flow Length=3,105' Tc=40.6 min CN=33 Runoff=0.00 cfs 0 cf

Subcatchment 21: Runoff Area=37,974 sf 13.11% Impervious Runoff Depth=0.01"
Flow Length=141' Tc=13.4 min CN=43 Runoff=0.00 cfs 47 cf

Subcatchment 30: Runoff Area=261,916 sf 10.22% Impervious Runoff Depth=0.00"
Flow Length=1,202' Tc=22.6 min CN=41 Runoff=0.00 cfs 74 cf

Subcatchment 31: Runoff Area=51,474 sf 36.33% Impervious Runoff Depth=0.44"
Flow Length=203' Slope=0.0400 '/' Tc=15.8 min CN=62 Runoff=0.29 cfs 1,883 cf

Subcatchment 32: Runoff Area=26,227 sf 57.60% Impervious Runoff Depth=0.92"
Flow Length=261' Tc=7.0 min CN=73 Runoff=0.58 cfs 2,010 cf

Subcatchment 33: Runoff Area=61,118 sf 6.58% Impervious Runoff Depth=0.00"
Flow Length=409' Tc=23.0 min CN=37 Runoff=0.00 cfs 0 cf

Subcatchment 34: Runoff Area=23,361 sf 18.22% Impervious Runoff Depth=0.11"
Flow Length=46' Tc=6.0 min CN=50 Runoff=0.01 cfs 212 cf

Reach R10: Avg. Flow Depth=0.04' Max Vel=2.00 fps Inflow=0.19 cfs 620 cf
n=0.025 L=212.0' S=0.0790 '/' Capacity=248.35 cfs Outflow=0.18 cfs 620 cf

Pond 5P: INFILTRATION TRENCH Peak Elev=306.54' Storage=269 cf Inflow=0.09 cfs 4,182 cf
Discarded=0.09 cfs 4,182 cf Primary=0.00 cfs 0 cf Outflow=0.09 cfs 4,182 cf

Pond CB1: Peak Elev=291.68' Inflow=0.26 cfs 2,265 cf
12.0" Round Culvert n=0.013 L=4.0' S=0.0600 '/' Outflow=0.26 cfs 2,265 cf

Pond CB2: Peak Elev=303.20' Inflow=0.11 cfs 362 cf
12.0" Round Culvert n=0.013 L=38.0' S=0.0053 '/' Outflow=0.11 cfs 362 cf

Pond CB3: Peak Elev=321.20' Inflow=0.19 cfs 620 cf
12.0" Round Culvert n=0.013 L=37.0' S=0.0054 '/' Outflow=0.19 cfs 620 cf

Pond CB4: Peak Elev=322.64' Inflow=0.69 cfs 3,892 cf
15.0" Round Culvert n=0.013 L=95.0' S=0.0126 '/' Outflow=0.69 cfs 3,892 cf

Pond CLVT: Peak Elev=323.10' Storage=2 cf Inflow=0.29 cfs 1,883 cf
12.0" Round Culvert n=0.013 L=30.0' S=0.0150 '/' Outflow=0.29 cfs 1,883 cf

Pond DMH1: Peak Elev=296.36' Inflow=0.05 cfs 982 cf
12.0" Round Culvert n=0.013 L=198.0' S=0.0195 '/' Outflow=0.05 cfs 982 cf

Pond FB1: Peak Elev=300.09' Storage=280 cf Inflow=0.29 cfs 981 cf
Primary=0.05 cfs 982 cf Secondary=0.00 cfs 0 cf Outflow=0.05 cfs 982 cf

Pond FB2: Peak Elev=310.24' Storage=1,506 cf Inflow=0.69 cfs 4,178 cf
Primary=0.09 cfs 4,182 cf Secondary=0.00 cfs 0 cf Outflow=0.09 cfs 4,182 cf

Pond FB2A: (new Pond) Peak Elev=0.00' Storage=0 cf

Pond FB2B: (new Pond) Peak Elev=0.00' Storage=0 cf

Pond SD5: Peak Elev=297.12' Inflow=0.05 cfs 982 cf
12.0" Round Culvert n=0.013 L=34.0' S=0.0074 '/' Outflow=0.05 cfs 982 cf

Pond ST: StormTech Peak Elev=291.30' Storage=467 cf Inflow=0.40 cfs 3,055 cf
Outflow=0.24 cfs 3,054 cf

Link SP1: Ex. CB Inflow=0.61 cfs 5,011 cf
Primary=0.61 cfs 5,011 cf

Link SP2: Inflow=0.00 cfs 47 cf
Primary=0.00 cfs 47 cf

Link SP3: Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Time span=0.00-72.00 hrs, dt=0.03 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=34,579 sf 12.41% Impervious Runoff Depth=1.60"
Flow Length=520' Tc=8.9 min CN=68 Runoff=1.29 cfs 4,612 cf

Subcatchment 4: Runoff Area=1,143,742 sf 0.40% Impervious Runoff Depth=0.01"
Flow Length=2,497' Tc=28.3 min CN=32 Runoff=0.03 cfs 541 cf

Subcatchment 10: Runoff Area=6,500 sf 32.94% Impervious Runoff Depth=2.72"
Flow Length=168' Tc=6.0 min CN=82 Runoff=0.47 cfs 1,475 cf

Subcatchment 11: Runoff Area=32,408 sf 19.06% Impervious Runoff Depth=1.26"
Flow Length=410' Tc=14.4 min CN=63 Runoff=0.76 cfs 3,408 cf

Subcatchment 12: Runoff Area=3,438 sf 68.00% Impervious Runoff Depth=2.46"
Flow Length=184' Tc=6.0 min CN=79 Runoff=0.23 cfs 705 cf

Subcatchment 13: Runoff Area=8,090 sf 56.90% Impervious Runoff Depth=1.97"
Flow Length=178' Tc=6.0 min CN=73 Runoff=0.42 cfs 1,329 cf

Subcatchment 14: Runoff Area=1,659 sf 0.00% Impervious Runoff Depth=0.13"
Flow Length=52' Slope=0.1000 '/' Tc=6.0 min CN=39 Runoff=0.00 cfs 18 cf

Subcatchment 20: Runoff Area=956,424 sf 1.28% Impervious Runoff Depth=0.01"
Flow Length=3,105' Tc=40.6 min CN=33 Runoff=0.05 cfs 1,113 cf

Subcatchment 21: Runoff Area=37,974 sf 13.11% Impervious Runoff Depth=0.25"
Flow Length=141' Tc=13.4 min CN=43 Runoff=0.06 cfs 790 cf

Subcatchment 30: Runoff Area=261,916 sf 10.22% Impervious Runoff Depth=0.18"
Flow Length=1,202' Tc=22.6 min CN=41 Runoff=0.17 cfs 4,017 cf

Subcatchment 31: Runoff Area=51,474 sf 36.33% Impervious Runoff Depth=1.20"
Flow Length=203' Slope=0.0400 '/' Tc=15.8 min CN=62 Runoff=1.09 cfs 5,139 cf

Subcatchment 32: Runoff Area=26,227 sf 57.60% Impervious Runoff Depth=1.97"
Flow Length=261' Tc=7.0 min CN=73 Runoff=1.32 cfs 4,309 cf

Subcatchment 33: Runoff Area=61,118 sf 6.58% Impervious Runoff Depth=0.08"
Flow Length=409' Tc=23.0 min CN=37 Runoff=0.01 cfs 399 cf

Subcatchment 34: Runoff Area=23,361 sf 18.22% Impervious Runoff Depth=0.54"
Flow Length=46' Tc=6.0 min CN=50 Runoff=0.17 cfs 1,044 cf

Reach R10: Avg. Flow Depth=0.07' Max Vel=2.70 fps Inflow=0.42 cfs 1,329 cf
n=0.025 L=212.0' S=0.0790 '/' Capacity=248.35 cfs Outflow=0.41 cfs 1,329 cf

Pond 5P: INFILTRATION TRENCH Peak Elev=306.56' Storage=274 cf Inflow=0.11 cfs 14,511 cf
Discarded=0.11 cfs 14,511 cf Primary=0.00 cfs 0 cf Outflow=0.11 cfs 14,511 cf

Pond CB1: Peak Elev=292.08' Inflow=0.81 cfs 6,572 cf
12.0" Round Culvert n=0.013 L=4.0' S=0.0600 '/' Outflow=0.81 cfs 6,572 cf

Pond CB2: Peak Elev=303.28' Inflow=0.23 cfs 705 cf
12.0" Round Culvert n=0.013 L=38.0' S=0.0053 '/' Outflow=0.23 cfs 705 cf

Pond CB3: Peak Elev=321.34' Inflow=0.42 cfs 1,329 cf
12.0" Round Culvert n=0.013 L=37.0' S=0.0054 '/' Outflow=0.42 cfs 1,329 cf

Pond CB4: Peak Elev=323.01' Inflow=2.05 cfs 9,448 cf
15.0" Round Culvert n=0.013 L=95.0' S=0.0126 '/' Outflow=2.05 cfs 9,448 cf

Pond CLVT: Peak Elev=323.42' Storage=6 cf Inflow=1.09 cfs 5,139 cf
12.0" Round Culvert n=0.013 L=30.0' S=0.0150 '/' Outflow=1.09 cfs 5,139 cf

Pond DMH1: Peak Elev=296.37' Inflow=0.05 cfs 3,164 cf
12.0" Round Culvert n=0.013 L=198.0' S=0.0195 '/' Outflow=0.05 cfs 3,164 cf

Pond FB1: Peak Elev=300.29' Storage=866 cf Inflow=0.64 cfs 3,147 cf
Primary=0.05 cfs 3,147 cf Secondary=0.00 cfs 0 cf Outflow=0.05 cfs 3,147 cf

Pond FB2: Peak Elev=311.32' Storage=9,503 cf Inflow=2.22 cfs 14,509 cf
Primary=0.11 cfs 14,511 cf Secondary=0.00 cfs 0 cf Outflow=0.11 cfs 14,511 cf

Pond FB2A: (new Pond) Peak Elev=0.00' Storage=0 cf

Pond FB2B: (new Pond) Peak Elev=0.00' Storage=0 cf

Pond SD5: Peak Elev=297.12' Inflow=0.05 cfs 3,164 cf
12.0" Round Culvert n=0.013 L=34.0' S=0.0074 '/' Outflow=0.05 cfs 3,164 cf

Pond ST: StormTech Peak Elev=292.04' Storage=1,244 cf Inflow=1.09 cfs 8,048 cf
Outflow=0.51 cfs 8,047 cf

Link SP1: Ex. CB Inflow=1.60 cfs 12,658 cf
Primary=1.60 cfs 12,658 cf

Link SP2: Inflow=0.06 cfs 790 cf
Primary=0.06 cfs 790 cf

Link SP3: Inflow=0.01 cfs 399 cf
Primary=0.01 cfs 399 cf

Time span=0.00-72.00 hrs, dt=0.03 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1: Runoff Area=34,579 sf 12.41% Impervious Runoff Depth=2.47"
Flow Length=520' Tc=8.9 min CN=68 Runoff=2.04 cfs 7,112 cf

Subcatchment 4: Runoff Area=1,143,742 sf 0.40% Impervious Runoff Depth=0.11"
Flow Length=2,497' Tc=28.3 min CN=32 Runoff=0.36 cfs 10,043 cf

Subcatchment 10: Runoff Area=6,500 sf 32.94% Impervious Runoff Depth=3.80"
Flow Length=168' Tc=6.0 min CN=82 Runoff=0.66 cfs 2,060 cf

Subcatchment 11: Runoff Area=32,408 sf 19.06% Impervious Runoff Depth=2.04"
Flow Length=410' Tc=14.4 min CN=63 Runoff=1.30 cfs 5,504 cf

Subcatchment 12: Runoff Area=3,438 sf 68.00% Impervious Runoff Depth=3.50"
Flow Length=184' Tc=6.0 min CN=79 Runoff=0.32 cfs 1,003 cf

Subcatchment 13: Runoff Area=8,090 sf 56.90% Impervious Runoff Depth=2.92"
Flow Length=178' Tc=6.0 min CN=73 Runoff=0.63 cfs 1,971 cf

Subcatchment 14: Runoff Area=1,659 sf 0.00% Impervious Runoff Depth=0.39"
Flow Length=52' Slope=0.1000 '/' Tc=6.0 min CN=39 Runoff=0.01 cfs 54 cf

Subcatchment 20: Runoff Area=956,424 sf 1.28% Impervious Runoff Depth=0.14"
Flow Length=3,105' Tc=40.6 min CN=33 Runoff=0.40 cfs 10,940 cf

Subcatchment 21: Runoff Area=37,974 sf 13.11% Impervious Runoff Depth=0.60"
Flow Length=141' Tc=13.4 min CN=43 Runoff=0.25 cfs 1,913 cf

Subcatchment 30: Runoff Area=261,916 sf 10.22% Impervious Runoff Depth=0.49"
Flow Length=1,202' Tc=22.6 min CN=41 Runoff=1.06 cfs 10,764 cf

Subcatchment 31: Runoff Area=51,474 sf 36.33% Impervious Runoff Depth=1.95"
Flow Length=203' Slope=0.0400 '/' Tc=15.8 min CN=62 Runoff=1.90 cfs 8,385 cf

Subcatchment 32: Runoff Area=26,227 sf 57.60% Impervious Runoff Depth=2.92"
Flow Length=261' Tc=7.0 min CN=73 Runoff=1.98 cfs 6,389 cf

Subcatchment 33: Runoff Area=61,118 sf 6.58% Impervious Runoff Depth=0.30"
Flow Length=409' Tc=23.0 min CN=37 Runoff=0.09 cfs 1,504 cf

Subcatchment 34: Runoff Area=23,361 sf 18.22% Impervious Runoff Depth=1.05"
Flow Length=46' Tc=6.0 min CN=50 Runoff=0.50 cfs 2,037 cf

Reach R10: Avg. Flow Depth=0.09' Max Vel=3.12 fps Inflow=0.63 cfs 1,971 cf
n=0.025 L=212.0' S=0.0790 '/' Capacity=248.35 cfs Outflow=0.63 cfs 1,971 cf

Pond 5P: INFILTRATION TRENCH Peak Elev=306.65' Storage=307 cf Inflow=0.29 cfs 27,577 cf
Discarded=0.26 cfs 26,475 cf Primary=0.03 cfs 1,102 cf Outflow=0.29 cfs 27,577 cf

Pond CB1: Peak Elev=292.95' Inflow=1.35 cfs 19,472 cf
12.0" Round Culvert n=0.013 L=4.0' S=0.0600 '/' Outflow=1.35 cfs 19,472 cf

Pond CB2: Peak Elev=303.34' Inflow=0.32 cfs 1,003 cf
12.0" Round Culvert n=0.013 L=38.0' S=0.0053 '/' Outflow=0.32 cfs 1,003 cf

Pond CB3: Peak Elev=321.44' Inflow=0.63 cfs 1,971 cf
12.0" Round Culvert n=0.013 L=37.0' S=0.0054 '/' Outflow=0.63 cfs 1,971 cf

Pond CB4: Peak Elev=323.33' Inflow=3.34 cfs 14,775 cf
15.0" Round Culvert n=0.013 L=95.0' S=0.0126 '/' Outflow=3.34 cfs 14,775 cf

Pond CLVT: Peak Elev=323.73' Storage=12 cf Inflow=1.90 cfs 8,385 cf
12.0" Round Culvert n=0.013 L=30.0' S=0.0150 '/' Outflow=1.90 cfs 8,385 cf

Pond DMH1: Peak Elev=296.58' Inflow=0.35 cfs 13,969 cf
12.0" Round Culvert n=0.013 L=198.0' S=0.0195 '/' Outflow=0.35 cfs 13,969 cf

Pond FB1: Peak Elev=301.58' Storage=5,462 cf Inflow=0.95 cfs 13,914 cf
Primary=0.05 cfs 7,971 cf Secondary=0.29 cfs 5,944 cf Outflow=0.35 cfs 13,915 cf

Pond FB2: Peak Elev=312.12' Storage=17,119 cf Inflow=3.85 cfs 27,576 cf
Primary=0.29 cfs 27,577 cf Secondary=0.00 cfs 0 cf Outflow=0.29 cfs 27,577 cf

Pond FB2A: (new Pond) Peak Elev=0.00' Storage=0 cf

Pond FB2B: (new Pond) Peak Elev=0.00' Storage=0 cf

Pond SD5: Peak Elev=297.33' Inflow=0.35 cfs 13,969 cf
12.0" Round Culvert n=0.013 L=34.0' S=0.0074 '/' Outflow=0.35 cfs 13,969 cf

Pond ST: StormTech Peak Elev=292.84' Storage=1,785 cf Inflow=1.75 cfs 21,533 cf
Outflow=1.31 cfs 21,530 cf

Link SP1: Ex. CB Inflow=2.49 cfs 28,643 cf
Primary=2.49 cfs 28,643 cf

Link SP2: Inflow=0.25 cfs 1,913 cf
Primary=0.25 cfs 1,913 cf

Link SP3: Inflow=0.09 cfs 2,606 cf
Primary=0.09 cfs 2,606 cf

Summary for Subcatchment 1:

Runoff = 2.04 cfs @ 12.13 hrs, Volume= 7,112 cf, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	164	98	Proposed paved roads & driveways
*	0	74	New Grass C
	8,091	32	Woods/grass comb., Good, HSG A
	15,808	72	Woods/grass comb., Good, HSG C
*	4,330	74	Existing >75% Grass cover, Good, HSG C
*	2,842	98	Existing paved road
*	2,060	96	Existing gravel surface
*	1,284	98	Existing roofs
	34,579	68	Weighted Average
	30,289	63	87.59% Pervious Area
	4,290	98	12.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	69	0.1729	0.17		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	76	0.0659	7.26	203.18	**Channel Flow, Seg B to C** Area= 28.0 sf Perim= 56.3' r= 0.50' n= 0.033
0.7	81	0.1487	1.93		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
0.2	76	0.0562	7.81	89.84	**Trap/Vee/Rect Channel Flow, Seg D to E** Bot.W=2.00' D=1.00' Z= 3.0 & 16.0 '/' Top.W=21.00' n= 0.030
0.1	46	0.1188	10.69	411.59	**Channel Flow, Seg E to F** Area= 38.5 sf Perim= 77.7' r= 0.50' n= 0.030
0.6	61	0.0984	1.57		**Shallow Concentrated Flow, Seg F to G** Woodland Kv= 5.0 fps
0.1	27	0.0831	4.64		**Shallow Concentrated Flow, Seg G to H** Unpaved Kv= 16.1 fps
0.2	84	0.0446	7.71	48.60	**Trap/Vee/Rect Channel Flow, Seg H to I** Bot.W=0.00' D=0.50' Z= 50.0 & 0.4 '/' Top.W=25.20' n= 0.016
8.9	520	Total			

Summary for Subcatchment 4:

Runoff = 0.36 cfs @ 15.39 hrs, Volume= 10,043 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	1,136,601	32	Woods/grass comb., Good, HSG A
	2,595	39	>75% Grass cover, Good, HSG A
*	4,546	98	Existing House and Driveway
	1,143,742	32	Weighted Average
	1,139,196	32	99.60% Pervious Area
	4,546	98	0.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	150	0.1500	0.19		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	264	0.0304	4.60	325.27	**Channel Flow, Seg B to C** Area= 70.7 sf Perim= 144.3' r= 0.49' n= 0.035 Earth, dense weeds
6.9	296	0.0203	0.71		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
2.0	611	0.0377	5.12	105.45	**Channel Flow, Seg D to E** Area= 20.6 sf Perim= 42.1' r= 0.49' n= 0.035 Earth, dense weeds
2.9	274	0.1021	1.60		**Shallow Concentrated Flow, Seg E to F** Woodland Kv= 5.0 fps
0.3	102	0.1569	6.38		**Shallow Concentrated Flow, Seg F to G** Unpaved Kv= 16.1 fps
1.1	338	0.0402	5.34	343.04	**Channel Flow, Seg G to H** Area= 64.3 sf Perim= 129.6' r= 0.50' n= 0.035 Earth, dense weeds
0.4	242	0.0400	8.96	141.19	**Trap/Vee/Rect Channel Flow, Seg H to I** Bot.W=3.00' D=1.50' Z= 5.0 '/' Top.W=18.00' n= 0.030 Earth, grassed & winding
0.2	220	0.1000	21.04	504.96	**Trap/Vee/Rect Channel Flow, Seg I to J** Bot.W=2.00' D=3.00' Z= 2.0 '/' Top.W=14.00' n= 0.030 Earth, grassed & winding
28.3	2,497	Total			

Summary for Subcatchment 10:

Runoff = 0.66 cfs @ 12.09 hrs, Volume= 2,060 cf, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	2,141	98	Proposed paved roads & driveways
*	2,879	74	New Grass C
	0	32	Woods/grass comb., Good, HSG A
	1,123	72	Woods/grass comb., Good, HSG C
*	357	74	Existing >75% Grass cover, Good, HSG C
*	0	98	Existing paved road
*	0	96	Existing gravel surface
*	0	98	Existing roofs
	6,500	82	Weighted Average
	4,359	73	67.06% Pervious Area
	2,141	98	32.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	32	0.1667	0.14		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.5	24	0.3114	0.26		**Sheet Flow, Seg B to C** Grass: Dense n= 0.240 P2= 3.10"
0.4	29	0.0234	1.13		**Sheet Flow, Seg C to D** Smooth surfaces n= 0.011 P2= 3.10"
0.3	83	0.0200	5.15	31.05	**Trap/Vee/Rect Channel Flow, Seg D to E** Bot.W=0.00' D=0.50' Z= 48.0 & 0.2 '/' Top.W=24.10' n= 0.016 Asphalt, rough
6.0	168	Total			

Summary for Subcatchment 11:

Runoff = 1.30 cfs @ 12.21 hrs, Volume= 5,504 cf, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	10,757	32	Woods/grass comb., Good, HSG A
	9,371	72	Woods/grass comb., Good, HSG C
	1,051	39	>75% Grass cover, Good, HSG A
	4,884	74	>75% Grass cover, Good, HSG C
*	6,178	98	Proposed paved roads w/curbs & sewers
*	167	96	Proposed gravel surface
	32,408	63	Weighted Average
	26,230	55	80.94% Pervious Area
	6,178	98	19.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	150	0.1567	0.19		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.7	85	0.1679	2.05		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
0.0	18	0.4697	11.03		**Shallow Concentrated Flow, Seg C to D** Unpaved Kv= 16.1 fps
0.2	47	0.0365	3.88		**Shallow Concentrated Flow, Seg D to E** Paved Kv= 20.3 fps
0.3	110	0.0219	6.64	41.67	**Trap/Vee/Rect Channel Flow, Seg E to F** Bot.W=0.00' D=0.50' Z= 50.0 & 0.2 '/' Top.W=25.10' n= 0.013 Asphalt, smooth
14.4	410	Total			

Summary for Subcatchment 12:

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,003 cf, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	0	32	Woods/grass comb., Good, HSG A
	0	72	Woods/grass comb., Good, HSG C
	1,100	39	>75% Grass cover, Good, HSG A
	0	74	>75% Grass cover, Good, HSG C
*	2,338	98	Proposed paved roads w/curbs & sewers
	3,438	79	Weighted Average
	1,100	39	32.00% Pervious Area
	2,338	98	68.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	17	0.0200	0.95		**Sheet Flow, A TO B** Smooth surfaces n= 0.011 P2= 3.10"
0.2	167	0.0895	13.42	84.23	**Trap/Vee/Rect Channel Flow, B TO C** Bot.W=0.00' D=0.50' Z= 50.0 & 0.2 '/' Top.W=25.10' n= 0.013 Asphalt, smooth
0.5	184	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 13:

Runoff = 0.63 cfs @ 12.09 hrs, Volume= 1,971 cf, Depth= 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	0	32	Woods/grass comb., Good, HSG A
	0	72	Woods/grass comb., Good, HSG C
	3,487	39	>75% Grass cover, Good, HSG A
	0	74	>75% Grass cover, Good, HSG C
*	3,702	98	Proposed paved roads w/curbs & sewers
*	901	98	Proposed roofs
	8,090	73	Weighted Average
	3,487	39	43.10% Pervious Area
	4,603	98	56.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	29	0.0200	0.13		**Sheet Flow, A TO B** Grass: Short n= 0.150 P2= 3.10"
0.2	149	0.0895	13.42	84.23	**Trap/Vee/Rect Channel Flow, B TO C** Bot.W=0.00' D=0.50' Z= 50.0 & 0.2 '/' Top.W=25.10' n= 0.013 Asphalt, smooth
3.9	178	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14:

Runoff = 0.01 cfs @ 12.36 hrs, Volume= 54 cf, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	0	32	Woods/grass comb., Good, HSG A
	0	72	Woods/grass comb., Good, HSG C
	1,659	39	>75% Grass cover, Good, HSG A
	0	74	>75% Grass cover, Good, HSG C
*	0	98	Proposed paved roads w/curbs & sewers
*	0	98	Proposed roofs
	1,659	39	Weighted Average
	1,659	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	52	0.1000	0.28		**Sheet Flow, A TO B** Grass: Short n= 0.150 P2= 3.10"
3.1	52	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 20:

Runoff = 0.40 cfs @ 15.29 hrs, Volume= 10,940 cf, Depth= 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	886,589	32	Woods/grass comb., Good, HSG A
	56,368	39	>75% Grass cover, Good, HSG A
*	8,167	98	Proposed paved roads w/curbs & sewers
*	1,180	96	Proposed gravel surface
*	0	98	Proposed walls
*	4,120	98	Proposed roofs
	956,424	33	Weighted Average
	944,137	32	98.72% Pervious Area
	12,287	98	1.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	150	0.1500	0.19		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	264	0.0304	4.60	325.27	**Channel Flow, Seg B to C** Area= 70.7 sf Perim= 144.3' r= 0.49' n= 0.035
6.9	296	0.0203	0.71		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
2.0	611	0.0377	5.12	105.45	**Channel Flow, Seg D to E** Area= 20.6 sf Perim= 42.1' r= 0.49' n= 0.035 Earth, dense weeds
7.4	310	0.0193	0.69		**Shallow Concentrated Flow, Seg D to E** Woodland Kv= 5.0 fps
6.9	575	0.0766	1.38		**Shallow Concentrated Flow, Seg E to F** Woodland Kv= 5.0 fps
0.3	102	0.1569	6.38		**Shallow Concentrated Flow, Seg F to G** Unpaved Kv= 16.1 fps
1.4	90	0.0450	1.06		**Shallow Concentrated Flow, Seg G to H** Woodland Kv= 5.0 fps
0.4	139	0.0150	5.23	23.52	**Trap/Vee/Rect Channel Flow, Seg H to I** Bot.W=2.00' D=1.00' Z= 3.0 & 2.0 '/' Top.W=7.00' n= 0.025
0.5	271	0.0220	9.36	131.05	**Trap/Vee/Rect Channel Flow, Seg I to J** Bot.W=2.00' D=2.00' Z= 3.0 & 2.0 '/' Top.W=12.00' n= 0.025
0.3	297	0.0800	17.85	249.90	**Trap/Vee/Rect Channel Flow, Seg J to K** Bot.W=2.00' D=2.00' Z= 3.0 & 2.0 '/' Top.W=12.00' n= 0.025
40.6	3,105	Total			

Summary for Subcatchment 21:

Runoff = 0.25 cfs @ 12.38 hrs, Volume= 1,913 cf, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	18,145	32	Woods/grass comb., Good, HSG A
	14,850	39	>75% Grass cover, Good, HSG A
	0	74	>75% Grass cover, Good, HSG C
*	0	74	Existing >75% Grass cover, Good, HSG C
*	0	98	Proposed paved roads & driveways
*	0	98	Existing paved driveway
*	0	96	Proposed gravel surface
*	0	98	Proposed walls
*	4,979	98	Proposed roofs
	37,974	43	Weighted Average
	32,995	35	86.89% Pervious Area
	4,979	98	13.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	70	0.0475	0.15		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
5.7	71	0.2900	0.21		**Sheet Flow, Seg B to C** Woods: Light underbrush n= 0.400 P2= 3.10"
13.4	141	Total			

Summary for Subcatchment 30:

Runoff = 1.06 cfs @ 12.56 hrs, Volume= 10,764 cf, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	171,902	32	Woods/grass comb., Good, HSG A
	0	72	Woods/grass comb., Good, HSG C
	60,569	39	>75% Grass cover, Good, HSG A
	0	74	>75% Grass cover, Good, HSG C
*	2,594	74	Existing >75% Grass cover, Good, HSG C
*	9,105	98	Proposed paved roads & driveways
*	4,546	98	Existing paved driveway
*	88	96	Proposed gravel surface
*	0	98	Proposed walls
*	13,112	98	Proposed roofs
	261,916	41	Weighted Average
	235,153	34	89.78% Pervious Area
	26,763	98	10.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	150	0.1400	0.18		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
4.3	284	0.0493	1.11		**Shallow Concentrated Flow, Seg B to C** Woodland Kv= 5.0 fps
0.8	124	0.2576	2.54		**Shallow Concentrated Flow, Seg C to D** Woodland Kv= 5.0 fps
0.4	134	0.1045	5.20		**Shallow Concentrated Flow, Seg D to E** Unpaved Kv= 16.1 fps
2.3	173	0.0624	1.25		**Shallow Concentrated Flow, Seg E to F** Woodland Kv= 5.0 fps
0.9	337	0.0218	6.58	56.79	**Trap/Vee/Rect Channel Flow, Seg F to G** Bot.W=2.00' D=1.50' Z= 2.0 & 3.0 '/' Top.W=9.50' n= 0.030 Earth, grassed & winding
22.6	1,202	Total			

Summary for Subcatchment 31:

Runoff = 1.90 cfs @ 12.23 hrs, Volume= 8,385 cf, Depth= 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	0	72	Woods/grass comb., Good, HSG C
	31,441	39	>75% Grass cover, Good, HSG A
	0	74	>75% Grass cover, Good, HSG C
*	0	74	Existing >75% Grass cover, Good, HSG C
*	11,660	98	Proposed paved roads & driveways
*	0	98	Existing paved driveway
*	1,333	96	Proposed gravel surface
*	0	98	Proposed walls
*	7,040	98	Proposed roofs
	51,474	62	Weighted Average
	32,774	41	63.67% Pervious Area
	18,700	98	36.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	150	0.0400	0.16		**Sheet Flow, A TO B** Grass: Dense n= 0.240 P2= 3.10"
0.6	53	0.0400	1.40		**Shallow Concentrated Flow, B TO C** Short Grass Pasture Kv= 7.0 fps
15.8	203	Total			

Summary for Subcatchment 32:

Runoff = 1.98 cfs @ 12.10 hrs, Volume= 6,389 cf, Depth= 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	0	72	Woods/grass comb., Good, HSG C
	11,121	39	>75% Grass cover, Good, HSG A
	0	74	>75% Grass cover, Good, HSG C
*	0	74	Existing >75% Grass cover, Good, HSG C
*	9,538	98	Proposed paved roads & driveways
*	0	98	Existing paved driveway
*	0	96	Proposed gravel surface
*	0	98	Proposed walls
*	5,568	98	Proposed roofs
	26,227	73	Weighted Average
	11,121	39	42.40% Pervious Area
	15,106	98	57.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	33	0.0200	0.09		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
1.0	228	0.0365	3.71	23.31	**Trap/Vee/Rect Channel Flow, Seg B to C** Bot.W=0.00' D=0.50' Z= 50.0 & 0.2 '/' Top.W=25.10' n= 0.030 Earth, grassed & winding
7.0	261	Total			

Summary for Subcatchment 33:

Runoff = 0.09 cfs @ 12.69 hrs, Volume= 1,504 cf, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	35,193	32	Woods/grass comb., Good, HSG A
	0	72	Woods/grass comb., Good, HSG C
	6,853	39	>75% Grass cover, Good, HSG A
	0	74	>75% Grass cover, Good, HSG C
*	0	74	Existing >75% Grass cover, Good, HSG C
*	0	98	Proposed paved roads & driveways
*	0	98	Existing paved driveway
*	0	96	Proposed gravel surface
*	0	98	Proposed walls
*	4,019	98	Proposed roofs
	15,053	30	Meadow, non-grazed, HSG A
	61,118	37	Weighted Average
	57,099	32	93.42% Pervious Area
	4,019	98	6.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	80	0.1750	0.17		**Sheet Flow, Seg A to B** Woods: Light underbrush n= 0.400 P2= 3.10"
12.4	70	0.0400	0.09		**Sheet Flow, Seg B to C** Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	259	0.0880	1.48		**Shallow Concentrated Flow, C TO D** Woodland Kv= 5.0 fps
23.0	409	Total			

Summary for Subcatchment 34:

Runoff = 0.50 cfs @ 12.11 hrs, Volume= 2,037 cf, Depth= 1.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
	0	72	Woods/grass comb., Good, HSG C
	19,105	39	>75% Grass cover, Good, HSG A
	0	74	>75% Grass cover, Good, HSG C
*	0	74	Existing >75% Grass cover, Good, HSG C
*	0	98	Proposed paved roads & driveways
*	0	98	Existing paved driveway
*	0	96	Proposed gravel surface
*	0	98	Proposed walls
*	4,256	98	Proposed roofs
	23,361	50	Weighted Average
	19,105	39	81.78% Pervious Area
	4,256	98	18.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	10	0.0200	0.07		**Sheet Flow, Seg A to B** Grass: Dense n= 0.240 P2= 3.10"
2.1	36	0.3300	0.29		**Sheet Flow, B TO C** Grass: Dense n= 0.240 P2= 3.10"
4.4	46	Total, Increased to minimum Tc = 6.0 min			

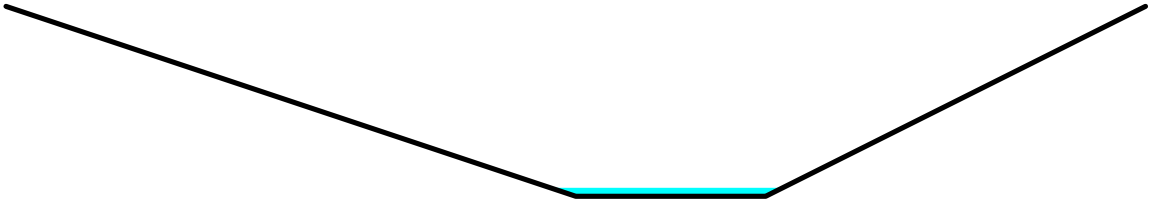
Summary for Reach R10:

Inflow Area = 8,090 sf, 56.90% Impervious, Inflow Depth = 2.92" for 25-Year event
Inflow = 0.63 cfs @ 12.09 hrs, Volume= 1,971 cf
Outflow = 0.63 cfs @ 12.10 hrs, Volume= 1,971 cf, Atten= 1%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Max. Velocity= 3.12 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.28 fps, Avg. Travel Time= 2.8 min

Peak Storage= 42 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 248.35 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 3.0 2.0 '/' Top Width= 12.00'
Length= 212.0' Slope= 0.0790 '/'
Inlet Invert= 320.75', Outlet Invert= 304.00'



Summary for Pond 5P: INFILTRATION TRENCH

Inflow Area = 362,978 sf, 17.86% Impervious, Inflow Depth = 0.91" for 25-Year event
Inflow = 0.29 cfs @ 18.52 hrs, Volume= 27,577 cf
Outflow = 0.29 cfs @ 18.56 hrs, Volume= 27,577 cf, Atten= 0%, Lag= 2.5 min
Discarded = 0.26 cfs @ 18.56 hrs, Volume= 26,475 cf
Primary = 0.03 cfs @ 18.56 hrs, Volume= 1,102 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 306.65' @ 18.56 hrs Surf.Area= 413 sf Storage= 307 cf

Plug-Flow detention time= 31.9 min calculated for 27,566 cf (100% of inflow)
Center-of-Mass det. time= 31.9 min (1,909.6 - 1,877.7)

Volume	Invert	Avail.Storage	Storage Description
#1	304.00'	2,342 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
304.00	180	56.0	0.0	0	0	180
306.00	180	56.0	40.0	144	144	292
306.50	271	65.4	100.0	112	256	388
308.00	3,000	1,006.0	100.0	2,086	2,342	80,587

Device	Routing	Invert	Outlet Devices
#1	Discarded	304.00'	**5.340 in/hr Exfiltration over Wetted area**
#2	Primary	306.60'	**1.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.26 cfs @ 18.56 hrs HW=306.65' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=0.03 cfs @ 18.56 hrs HW=306.65' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 0.03 cfs @ 0.57 fps)

Summary for Pond CB1:

Inflow Area = 1,002,019 sf, 2.54% Impervious, Inflow Depth = 0.23" for 25-Year event
Inflow = 1.35 cfs @ 12.21 hrs, Volume= 19,472 cf
Outflow = 1.35 cfs @ 12.21 hrs, Volume= 19,472 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.35 cfs @ 12.21 hrs, Volume= 19,472 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 292.95' @ 12.38 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	291.40'	**12.0" Round SD-3** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 291.40' / 291.16' S= 0.0600 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.78 cfs @ 12.21 hrs HW=292.30' TW=292.22' (Dynamic Tailwater)
1=SD-3 (Inlet Controls 0.78 cfs @ 1.05 fps)

Summary for Pond CB2:

Inflow Area = 3,438 sf, 68.00% Impervious, Inflow Depth = 3.50" for 25-Year event
Inflow = 0.32 cfs @ 12.09 hrs, Volume= 1,003 cf
Outflow = 0.32 cfs @ 12.09 hrs, Volume= 1,003 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.09 hrs, Volume= 1,003 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Peak Elev= 303.34' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	303.00'	**12.0" Round SD-6** L= 38.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 303.00' / 302.80' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.32 cfs @ 12.09 hrs HW=303.34' TW=300.17' (Dynamic Tailwater)
↑—**1=SD-6** (Barrel Controls 0.32 cfs @ 2.06 fps)

Summary for Pond CB3:

Inflow Area = 8,090 sf, 56.90% Impervious, Inflow Depth = 2.92" for 25-Year event
Inflow = 0.63 cfs @ 12.09 hrs, Volume= 1,971 cf
Outflow = 0.63 cfs @ 12.09 hrs, Volume= 1,971 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.63 cfs @ 12.09 hrs, Volume= 1,971 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 321.44' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	320.95'	**12.0" Round SD-7** L= 37.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 320.95' / 320.75' S= 0.0054 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.09 hrs HW=321.44' TW=320.84' (Dynamic Tailwater)
↑—**1=SD-7** (Barrel Controls 0.63 cfs @ 2.44 fps)

Summary for Pond CB4:

Inflow Area = 77,701 sf, 43.51% Impervious, Inflow Depth = 2.28" for 25-Year event
Inflow = 3.34 cfs @ 12.15 hrs, Volume= 14,775 cf
Outflow = 3.34 cfs @ 12.15 hrs, Volume= 14,775 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.34 cfs @ 12.15 hrs, Volume= 14,775 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 323.33' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	322.20'	**15.0" Round SD-9** L= 95.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 322.20' / 321.00' S= 0.0126 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.33 cfs @ 12.15 hrs HW=323.33' TW=310.43' (Dynamic Tailwater)
↑—**1=SD-9** (Inlet Controls 3.33 cfs @ 2.86 fps)

Summary for Pond CLVT:

Inflow Area = 51,474 sf, 36.33% Impervious, Inflow Depth = 1.95" for 25-Year event
Inflow = 1.90 cfs @ 12.23 hrs, Volume= 8,385 cf
Outflow = 1.90 cfs @ 12.23 hrs, Volume= 8,385 cf, Atten= 0%, Lag= 0.1 min
Primary = 1.90 cfs @ 12.23 hrs, Volume= 8,385 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 323.73' @ 12.21 hrs Surf.Area= 23 sf Storage= 12 cf

Plug-Flow detention time= 0.7 min calculated for 8,385 cf (100% of inflow)
Center-of-Mass det. time= 0.1 min (868.9 - 868.8)

Volume	Invert	Avail.Storage	Storage Description
#1	322.80'	956 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
322.80	5	5.0	0	0	5
324.00	31	19.9	19	19	38
326.00	1,182	330.7	936	956	8,716

Device	Routing	Invert	Outlet Devices
#1	Primary	322.80'	**12.0" Round SD-8** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 322.80' / 322.35' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.96 cfs @ 12.23 hrs HW=323.73' TW=323.26' (Dynamic Tailwater)
↑—**1=SD-8** (Outlet Controls 1.96 cfs @ 3.37 fps)

Summary for Pond DMH1:

Inflow Area = 969,611 sf, 1.98% Impervious, Inflow Depth = 0.17" for 25-Year event
Inflow = 0.35 cfs @ 16.99 hrs, Volume= 13,969 cf
Outflow = 0.35 cfs @ 16.99 hrs, Volume= 13,969 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.35 cfs @ 16.99 hrs, Volume= 13,969 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 296.58' @ 16.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	296.25'	**12.0" Round SD-4** L= 198.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 296.25' / 292.39' S= 0.0195 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.35 cfs @ 16.99 hrs HW=296.58' TW=291.76' (Dynamic Tailwater)
↑—**1=SD-4** (Inlet Controls 0.35 cfs @ 1.54 fps)

Summary for Pond FB1:

Inflow Area = 967,952 sf, 1.99% Impervious, Inflow Depth = 0.17" for 25-Year event
Inflow = 0.95 cfs @ 12.10 hrs, Volume= 13,914 cf
Outflow = 0.35 cfs @ 16.99 hrs, Volume= 13,915 cf, Atten= 63%, Lag= 293.8 min
Primary = 0.05 cfs @ 16.19 hrs, Volume= 7,971 cf
Secondary = 0.29 cfs @ 16.99 hrs, Volume= 5,944 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 301.58' @ 16.99 hrs Surf.Area= 4,014 sf Storage= 5,462 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 564.0 min (1,597.8 - 1,033.8)

Volume	Invert	Avail.Storage	Storage Description
#1	300.00'	17,887 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
300.00	2,927	215.0	0	0	2,927
302.00	4,331	252.8	7,212	7,212	4,410
304.00	6,412	313.7	10,675	17,887	7,213

Device	Routing	Invert	Outlet Devices
#1	Primary	297.00'	**1.0" Vert. 1" Orifice at end of 4"UD** C= 0.600
#2	Device 1	297.73'	**4.0" Round 4" SD** L= 47.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 297.73' / 297.00' S= 0.0155 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#3	Device 1	300.00'	**2.410 in/hr Exfiltration over Surface area**
#4	Secondary	301.50'	**5.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.05 cfs @ 16.19 hrs HW=301.51' TW=297.15' (Dynamic Tailwater)
↑**1=1" Orifice at end of 4"UD** (Orifice Controls 0.05 cfs @ 10.06 fps)
↑**2=4" SD** (Passes < 0.50 cfs potential flow)
3=Exfiltration (Passes < 0.22 cfs potential flow)

Secondary OutFlow Max=0.29 cfs @ 16.99 hrs HW=301.58' TW=297.33' (Dynamic Tailwater)
↑**4=Broad-Crested Rectangular Weir** (Weir Controls 0.29 cfs @ 0.73 fps)

Summary for Pond FB2:

Inflow Area = 362,978 sf, 17.86% Impervious, Inflow Depth = 0.91" for 25-Year event
Inflow = 3.85 cfs @ 12.14 hrs, Volume= 27,576 cf
Outflow = 0.29 cfs @ 18.52 hrs, Volume= 27,577 cf, Atten= 93%, Lag= 382.5 min
Primary = 0.29 cfs @ 18.52 hrs, Volume= 27,577 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Peak Elev= 312.12' @ 18.52 hrs Surf.Area= 10,573 sf Storage= 17,119 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 977.4 min (1,877.7 - 900.3)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	40,967 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
310.00	6,000	579.0	0	0	6,000
311.50	8,841	610.0	11,062	11,062	9,066
312.00	10,315	684.8	4,784	15,846	16,780
314.00	14,948	789.9	25,120	40,967	29,201

Device	Routing	Invert	Outlet Devices
#1	Primary	307.73'	**12.0" Round 12" SD** L= 32.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 307.73' / 307.00' S= 0.0228 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	307.83'	**1.5" Vert. 1.5" Orifice at end of 4"UD** C= 0.600
#3	Device 2	310.00'	**2.410 in/hr Exfiltration over Surface area**
#4	Device 1	311.50'	**3.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	312.50'	**Neenah R4345 Beehive Grate Light Duty-req. structure** Head (feet) 0.00 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.50 0.60 0.70 0.80 0.90 1.00 Disch. (cfs) 0.000 0.900 1.600 2.500 3.500 4.000 4.600 5.300 6.800 7.500 8.100 8.600 9.100 9.600
#6	Secondary	313.00'	**6.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.29 cfs @ 18.52 hrs HW=312.12' TW=306.65' (Dynamic Tailwater)
- **1=12" SD** (Passes 0.29 cfs of 5.89 cfs potential flow)
  - **2=1.5" Orifice at end of 4"UD** (Orifice Controls 0.12 cfs @ 9.90 fps)
    - **3=Exfiltration** (Passes 0.12 cfs of 0.59 cfs potential flow)
  - **4=Orifice/Grate** (Orifice Controls 0.17 cfs @ 3.39 fps)
  - **5=Neenah R4345 Beehive Grate Light Duty-req. structure** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=310.00' TW=304.00' (Dynamic Tailwater)
- **6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond FB2A: (new Pond)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	5,708 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
310.00	2,993	360.7	0	0	2,993
311.50	4,680	389.0	5,708	5,708	4,773

Summary for Pond FB2B: (new Pond)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	5,376 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
310.00	3,007	0	0
311.50	4,161	5,376	5,376

Summary for Pond SD5:

Inflow Area = 969,611 sf, 1.98% Impervious, Inflow Depth = 0.17" for 25-Year event
Inflow = 0.35 cfs @ 16.99 hrs, Volume= 13,969 cf
Outflow = 0.35 cfs @ 16.99 hrs, Volume= 13,969 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.35 cfs @ 16.99 hrs, Volume= 13,969 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 297.33' @ 16.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	297.00'	**12.0" Round SD-5** L= 34.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 297.00' / 296.75' S= 0.0074 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.35 cfs @ 16.99 hrs HW=297.33' TW=296.58' (Dynamic Tailwater)
↑**1=SD-5** (Barrel Controls 0.35 cfs @ 2.29 fps)

Summary for Pond ST: StormTech

Inflow Area = 1,008,519 sf, 2.73% Impervious, Inflow Depth = 0.26" for 25-Year event
Inflow = 1.75 cfs @ 12.17 hrs, Volume= 21,533 cf
Outflow = 1.31 cfs @ 12.37 hrs, Volume= 21,530 cf, Atten= 25%, Lag= 11.7 min
Primary = 1.31 cfs @ 12.37 hrs, Volume= 21,530 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs
Peak Elev= 292.84' @ 12.37 hrs Surf.Area= 1,481 sf Storage= 1,785 cf

Plug-Flow detention time= 34.6 min calculated for 21,530 cf (100% of inflow)
Center-of-Mass det. time= 34.3 min (1,367.8 - 1,333.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	290.65'	1,058 cf	**18.17'W x 81.52'L x 2.33'H Field A** 3,456 cf Overall - 811 cf Embedded = 2,645 cf x 40.0% Voids
#2A	291.15'	811 cf	**ADS_StormTech SC-310 +Cap** x 55 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 55 Chambers in 5 Rows
		1,869 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	289.65'	**12.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 289.65' / 289.15' S= 0.0833 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	292.73'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	290.65'	**3.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	291.10'	**3.2" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.28 cfs @ 12.37 hrs HW=292.84' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.28 cfs of 6.20 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.60 cfs @ 0.92 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.34 cfs @ 6.92 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.34 cfs @ 6.10 fps)

Summary for Link SP1: Ex. CB

Inflow Area = 1,043,098 sf, 3.05% Impervious, Inflow Depth = 0.33" for 25-Year event
Inflow = 2.49 cfs @ 12.14 hrs, Volume= 28,643 cf
Primary = 2.49 cfs @ 12.14 hrs, Volume= 28,643 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Summary for Link SP2:

Inflow Area = 37,974 sf, 13.11% Impervious, Inflow Depth = 0.60" for 25-Year event
Inflow = 0.25 cfs @ 12.38 hrs, Volume= 1,913 cf
Primary = 0.25 cfs @ 12.38 hrs, Volume= 1,913 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

Summary for Link SP3:

Inflow Area = 424,096 sf, 16.23% Impervious, Inflow Depth = 0.07" for 25-Year event
Inflow = 0.09 cfs @ 12.69 hrs, Volume= 2,606 cf
Primary = 0.09 cfs @ 12.69 hrs, Volume= 2,606 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.03 hrs

ATTACHMENT 7

INSPECTION, MAINTENANCE AND HOUSEKEEPING PLAN

DM ROMA
CONSULTING ENGINEERS

INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN

(Prepared by Jayson Haskell, PE #13002)

RAYMOND HILLS VILLAGE
WEBBS MILLS ROAD
RAYMOND, MAINE

Responsible Party

Owner: Raymond Hills, LLC
9 Davis Farm Road
Raymond, Maine 04071

The owner/applicant is responsible for the maintenance of all stormwater management structures and related site components and the keeping of a maintenance log book with service records until a homeowner's association is created. Once the homeowner's association is created, a Transfer Application will need to be submitted to the Maine Department of Environmental Protection to properly transfer responsibilities of the stormwater infrastructure.

Records of all inspections and maintenance work performed must be kept on file with the owner and/or homeowner's association and retained for a minimum of five years. The maintenance log will be made available to the Town and Maine Department of Environmental Protection (MDEP) upon request. At a minimum, the maintenance of stormwater management systems will be performed on the prescribed schedule.

The procedures outlined in this plan are provided as a general overview of the anticipated practices to be utilized on this site. In some instances, additional measures may be required due to unexpected conditions. *The Maine Erosion and Sedimentation Control BMP* and *Stormwater Management for Maine: Best Management Practices* Manuals published by the MDEP should be referenced for additional information.

During Construction

1. **Inspection and Corrective Action:** It is the contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section. Inspection shall occur on all disturbed and impervious areas, erosion control measures, material storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. These areas shall be inspected at least once a week as well as 24 hours before and after a storm event generating more than 0.5 inch of rainfall over a 24-hour period and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct the inspections.

2. **Maintenance:** Erosion controls shall be maintained in effective operating condition until areas are permanently stabilized. If best management practices (BMPs) need to be repaired, the repair work should be initiated upon discovery of the problem but no later than the end of the next workday. If BMPs need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within seven calendar days and prior to any rainfall event.

3. **Construction vehicles and equipment:** Construction vehicles and equipment shall not be driven or stored within the underdrained filter basin. To ensure the basin functions as designed perpetually, prohibiting vehicles and equipment from these areas will limit the risk of inhibiting the function of the basin due to compaction.

4. **Snow Storage:** The proposed underdrained filter basin shall not be utilized for snow storage. Snow storage areas shall be located away from the basin, and in areas that will direct snow melt runoff into one of the basins on site.

5. **Documentation:** A report summarizing the inspections and any corrective action taken must be maintained on site. The log must include the name(s) and qualifications of the person making the inspections; the date(s) of the inspections; and the major observations about the operation and maintenance of erosion and sedimentation controls, materials storage areas, and vehicle access points to the parcel. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and location(s) where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to MDEP and Town staff, and a copy must be provided upon request. The owner shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

Housekeeping

1. **Spill prevention:** Controls must be used to prevent pollutants from construction and waste materials on site to enter stormwater, which includes storage practices to minimize exposure of the materials to stormwater. The site contractor or operator must develop, and implement as necessary, appropriate spill prevention, containment, and response planning measures.

2. **Groundwater protection:** During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials. Any project proposing infiltration of stormwater must provide adequate pre-treatment of stormwater prior to discharge of stormwater to the infiltration area, or provide for treatment within the infiltration area, in order to prevent the

accumulation of fines, reduction in infiltration rate, and consequent flooding and destabilization.

3. **Fugitive sediment and dust:** Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control, but other water additives may be considered as needed. A stabilized construction entrance (SCE) should be included to minimize tracking of mud and sediment. If off-site tracking occurs, public roads should be swept immediately and no less than once a week and prior to significant storm events. Operations during dry months, that experience fugitive dust problems, should wet down unpaved access roads once a week or more frequently as needed with a water additive to suppress fugitive sediment and dust.

4. **Debris and other materials:** Minimize the exposure of construction debris, building and landscaping materials, trash, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials to precipitation and stormwater runoff. These materials must be prevented from becoming a pollutant source.

5. **Excavation de-watering:** Excavation de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water removed from the ponded area, either through gravity or pumping, must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the Department.

6. **Authorized Non-stormwater discharges:** Identify and prevent contamination by non-stormwater discharges. Where allowed non-stormwater discharges exist, they must be identified and steps should be taken to ensure the implementation of appropriate pollution prevention measures for the non-stormwater component(s) of the discharge. Authorized non-stormwater discharges are:
   (a) Discharges from firefighting activity;
   (b) Fire hydrant flushings;
   (c) Vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited);
   (d) Dust control runoff in accordance with permit conditions and Appendix (C)(3);
   (e) Routine external building washdown, not including surface paint removal, that does not involve detergents;
   (f) Pavement washwater (where spills/leaks of toxic or hazardous materials have not occurred, unless all spilled material had been removed) if detergents are not used;
   (g) Uncontaminated air conditioning or compressor condensate;
   (h) Uncontaminated groundwater or spring water;
   (i) Foundation or footer drain-water where flows are not contaminated;
   (j) Uncontaminated excavation dewatering (see requirements in Appendix C(5));

(k) Potable water sources including waterline flushings; and
(l) Landscape irrigation.

7. **Unauthorized non-stormwater discharges:** Approval from the Town does not authorize a discharge that is mixed with a source of non-stormwater, other than those discharges in compliance with Section 6 above. Specifically, the Town's approval does not authorize discharges of the following:
   (a) Wastewater from the washout or cleanout of concrete, stucco, paint, form release oils, curing compounds or other construction materials;
   (b) Fuels, oils or other pollutants used in vehicle and equipment operation and maintenance;
   (c) Soaps, solvents, or detergents used in vehicle and equipment washing; and
   (d) Toxic or hazardous substances from a spill or other release.

Post Construction

1. **Inspection and Corrective Action:** All stormwater measures must be maintained by the owner in effective operating condition. A qualified third-party inspector hired by the owner shall at least annually inspect the stormwater management facilities. This person should have knowledge of erosion and stormwater control including the standards and conditions of the site's approvals. The inspector shall be certified through the MDEP to inspect the stormwater infrastructure. The following areas, facilities, and measures must be inspected, and identified deficiencies must be corrected. Areas, facilities, and measures other than those listed below may also require inspection on a specific site.

   A. **Vegetated Areas:** Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

   B. **Ditches, Swales, and Open Channels:** Inspect ditches, swales, and other open channels in the spring, late fall, and after heavy rains to remove any obstructions to flow, remove accumulated sediments and debris, control vegetative growth that could obstruct flow, and repair any erosion of the ditch lining. Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity. Repair any slumping side slopes as soon as practicable. The channel must receive adequate routine maintenance to maintain capacity and prevent or correct any erosion of the channel's bottom or side slopes.

   C. **Storm Drains:** Inspect storm drains in the spring, late fall, and after heavy rains to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the storm drain's outlet.

D. **Catch Basins and Outlet Control Structures:** Inspect and, if required, clean out structure at least once a year, preferably in early spring. Clean out must include the removal and legal disposal of any accumulated sediments and debris at the bottom of the structure and inlet grate.

E. **Underdrained Filter Basin:** The filter basins are not intended to function as snow storage areas. Inspector to verify that winter plowing operations are not dumping or pushing snow into the basins. The basins shall also not be used for vehicle or heavy equipment storage. Basin should be inspected after several major storm events (0.5 inches rainfall over 24 hours) to determine drawdown time during the first year. Basins to be inspected every six months thereafter with at least one inspection after a major storm event.

   The basin should drain dry within 24 to 48 hours following a one-inch storm. If ponding exceeds 48 hours, the top of the filter bed must be rototilled to reestablish the soil's filtration capacity. If water ponds on the surface of the bed for more than 72 hours, the top several inches of the filter shall be replaced with fresh material. Inspect for debris and sediment build up in the forebay and basin and remove as needed. Mowing of the basin can only occur semi-annually to a height of no less than 6 inches utilizing a hand-held string trimmer or push-mower. Any bare areas or erosion rills shall be repaired with new filter media or sandy loam then seeded and mulched. The basin should also be inspected annually for destabilization of side slopes, embankment settling and other signs of structural failure.

F. **Emergency Spillway:** Spillways should be inspected semi-annually and following major storm events for the first year and every six months thereafter to remove any obstructions to flow. Any woody vegetation growing through riprap lining must be removed. Replace riprap on areas where any underlying filter fabric is showing through the stone or where stones have been dislodged.

G. **Filterra Bioretention Units:** Once the site is fully stabilized, and paving complete the system can be activated. Once activated, inspection should occur annually thereafter, and should be observed for debris, trash and sediment accumulation, as well as general health of the plants or trees installed within the media. Maintenance protocols from the manufacture shall be followed. A copy of Filterra's Owner's Manual has been included as Attachment A.

H. **StormTech Chambers SC-310:** The manufacture recommends that at a minimum that annual inspections are conducted. Initially the system shall be inspected every 6 months for the first year of operation. If inspection indicates that sediment has accumulated, a measurement to determine the depth of sediment shall be performed. When an average depth of 3 inches is exceeded then clean-out shall be performed. A copy of Stormtech's Operation and Maintenance Manual has been included as Attachment B.

I. **Regular Maintenance:** Clear accumulations of winter sand along roadway and parking areas once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along pavement shoulders may be removed

by grading excess sand to the pavement edge and removing it manually or by a front-end loader.

J. **Documentation:** Keep a log (report) summarizing inspections, maintenance, and any corrective actions taken. The log must include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed after removal. The log must be made accessible to Town and MDEP staff upon request. The permittee shall retain a copy of the log for a period of at least five years from the completion of permanent stabilization. Attached is a sample log.

Re-certification

Submit a certification of the following to the MDEP within three months of the expiration of each five-year interval from the date of issuance of the permit.

(a) **Identification and repair of erosion problems**. All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.

(b) **Inspection and repair of stormwater control system**. All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the system, or portions of the system.

(c) **Maintenance**. The erosion and stormwater maintenance plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the Department, and the maintenance log is being maintained.

Municipalities with separate storm sewer systems regulated under the Maine Pollutant Discharge Elimination System (MPDES) Program may report on all regulated systems under their control as part of their required annual reporting in lieu of separate certification of each system. Municipalities not regulated by the MPDES Program, but that are responsible for maintenance of permitted stormwater systems, may report on multiple stormwater systems in one report.

Duration of Maintenance

Perform maintenance as described.

INSPECTION AND MAINTENANCE LOG – GENERAL INSPECTION

RAYMOND HILLS VILLAGE
WEBBS MILLS ROAD
RAYMOND, MAINE

The following stormwater management and erosion control items shall be inspected and maintained as prescribed in the Maintenance Plan with recommended frequencies as identified below. The owner is responsible for keeping this maintenance log on file for a minimum of five years and shall provide a copy to the Town and MDEP upon request. Inspections are to be performed by a qualified third-party inspector and all corrective actions shall be performed by personnel familiar with stormwater management systems and erosion controls.

Maintenance Item	Maintenance Event	Date Performed	Responsible Personnel	Comments
Vegetated Areas	Inspect slopes and embankments early in Spring.			
Storm Drains	Inspect semiannually and after major rainfall.			
	Repair erosion at inlet or outlet of pipe.			
	Repair displaced riprap.			
	Clean accumulated sediment in culverts when >20% full.			
Catch Basins	Inspect to ensure that structure is properly draining.			
	Remove accumulated sediment semiannually.			
	Inspect grates/inlets and remove debris as needed.			
Filterra Units	Inspect annually and after major rain events to ensure that unit drains within 24-48 hours			
	Inspect annually for erosion or sediment accumulation and repair as needed.			
Stormtech SC-310 Chambers	Inspect annually for significant sediment accumulation			
	If >3" sediment accumulation, clean out system per manufacturer recommendations			
Regular Maintenance	Clear accumulation of winter sand in paved areas annually.			

INSPECTION AND MAINTENANCE LOG – UNDERDRAINED FILTER BASIN

RAYMOND HILLS VILLAGE
WEBBS MILLS ROAD
RAYMOND, MAINE

The following stormwater management and erosion control items shall be inspected and maintained as prescribed in the Maintenance Plan with recommended frequencies as identified below. The owner is responsible for keeping this maintenance log on file for a minimum of five years and shall provide a copy to the Town and MDEP upon request. Inspections are to be performed by a qualified third-party inspector and all corrective actions shall be performed by personnel familiar with stormwater management systems and erosion controls.

Maintenance Item	Maintenance Event	Date Performed	Responsible Personnel	Comments
Underdrained Filter Basin	Check after each rainfall event to ensure that pond drains within 24-48 hours.			
	Replace top several inches of filter if pond does not drain within 72 hours.			
	Mow grass no more than twice a year to no less than 6 inches in height.			
	Inspect semi-annually for erosion or sediment accumulation and repair as necessary.			
	Inspector to verify basin not utilized for snow storage			
	Inspector to verify basin not utilized for vehicle or heavy equipment storage.			
Outlet Control Structure	Inspect to ensure that structure is properly draining.			
	Remove accumulated sediment semiannually.			
	Inspect grates/inlets and remove debris as needed.			
Emergency Spillway	Inspect and remove obstructions as necessary.			
	Remove woody vegetation.			
	Replace riprap as necessary.			

ATTACHMENT A

FILTERRA OWNER'S MANUAL

1/6/2022

Filterra Sizing Summary

Raymond Hills Apartments, Raymond, ME

Design Parameters:

- MEDEP WQ Design Storm = 0.95” of Rainfall
- Filterra Media Flow Rate = 140 in/hr
- Allowable Ponding in Filterra = 9 inches

Design Summary:

Utilizing HydroCAD software, a hydrograph can be derived to represent the MEDEP’s WQ design storm by modelling a 0.95” Type III – 24 hour rain event (Figure 1 for each system). This storm can then be routed through an appropriately sized Filterra unit. Because the Filterra system can provide up to 9 inches of ponding, some flow attenuation is possible, and the Filterra system is able to accommodate a portion of the water quality volume in the head space above the media and release it at the system’s design flow rate. The hydrograph in Figure 2 for each system illustrates this concept.

Unit	Area Impervious (sf)	CN	Area Pervious (sf)	CN	MEDEP Treatment Flow (cfs)	Filterra Media Bed (ft x ft)	Vault Size (ft x ft)	Filterra Model	Ponding Depth (inches)
Filterra #1	6,186	98	26,222	55	0.08	6x4	6x4	FT0604 - Offline	3.36

The following are the hydrographs for the system:

Filterra #1:

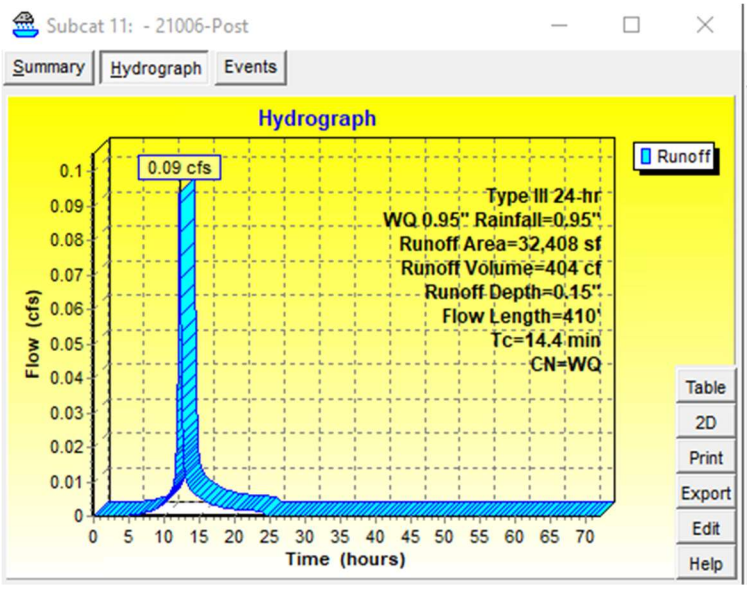


Figure 1. Inflow rate during the WQ Event.

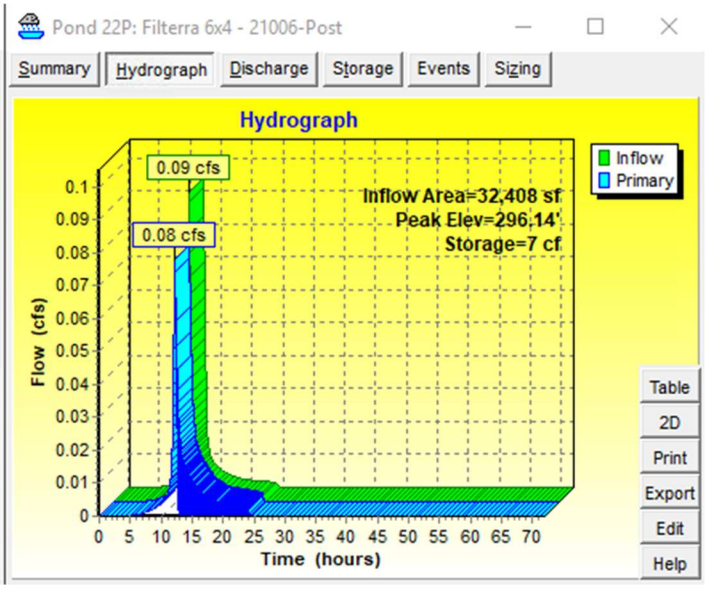


Figure 2. Inflow rate during WQ storm event compared with the Filterra outflow rate, accounting for 9” maximum ponding depth within the unit.

Thank you for the opportunity to present this to you and your client. This letter provides confirmation that the Filterra system is appropriately sized to comply with the Filterra approval letter issued by Maine Department of Environmental Protection. Please do not hesitate to contact me should you have any additional questions.

Sincerely,

Joshua Stackhouse
Contech Engineered Solutions, LLC.
(207) 219-9110
jstackhouse@conteches.com

Filterra Owner's Manual

filterra®

Bioretention Systems

CONTECH®
ENGINEERED SOLUTIONS

This Owner's Manual applies to all precast Filterra Configurations, including Filterra Bioscape Vault.

filterra®
Bioretention Systems

Table of Contents

CONTECH®
ENGINEERED SOLUTIONS

Introduction

Thank you for your purchase of the Filterra® Bioretention System. Filterra is a specially engineered stormwater treatment system incorporating high performance biofiltration media to remove pollutants from stormwater runoff. The system's biota (vegetation and soil microorganisms) then further breakdown and absorb captured pollutants. All components of the system work together to provide a sustainable long-term solution for treating stormwater runoff.

The Filterra system has been delivered to you with protection in place to resist intrusion of construction related sediment which can contaminate the biofiltration media and result in inadequate system performance. These protection devices are intended as a best practice and cannot fully prevent contamination. It is the purchaser's responsibility to provide adequate measures to prevent construction related runoff from entering the Filterra system.

Included with your purchase is Activation of the Filterra system by the manufacturer as well as a 1-year warranty from delivery of the system and 1-year of routine maintenance (mulch replacement, debris removal, and pruning of vegetation) up to twice during the first year after activation.

Design and Installation

Each project presents different scopes for the use of Filterra systems. Information and help may be provided to the design engineer during the planning process. Correct Filterra box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra units as shown in approved plans. A comprehensive installation manual is available at www.ContechES.com.

Activation Overview

Activation of the Filterra system is a procedure completed by the manufacturer to place the system into working condition. This involves the following items:

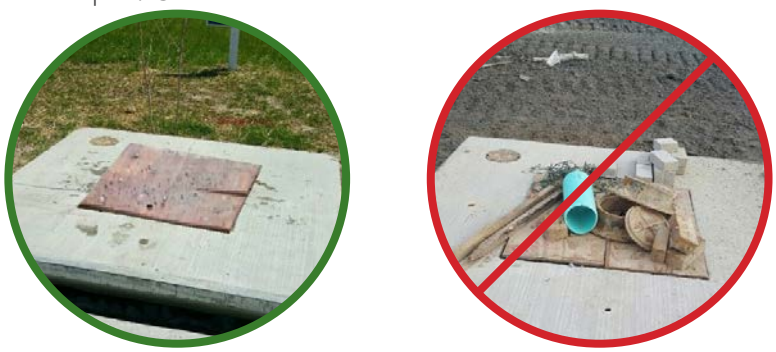
- Removal of construction runoff protection devices
- Planting of the system's vegetation
- Placement of pretreatment mulch layer using mulch certified for use in Filterra systems.

Activation MUST be provided by the manufacturer to ensure proper site conditions are met for Activation, proper installation of the vegetation, and use of pretreatment mulch certified for use in Filterra systems.

Minimum Requirements

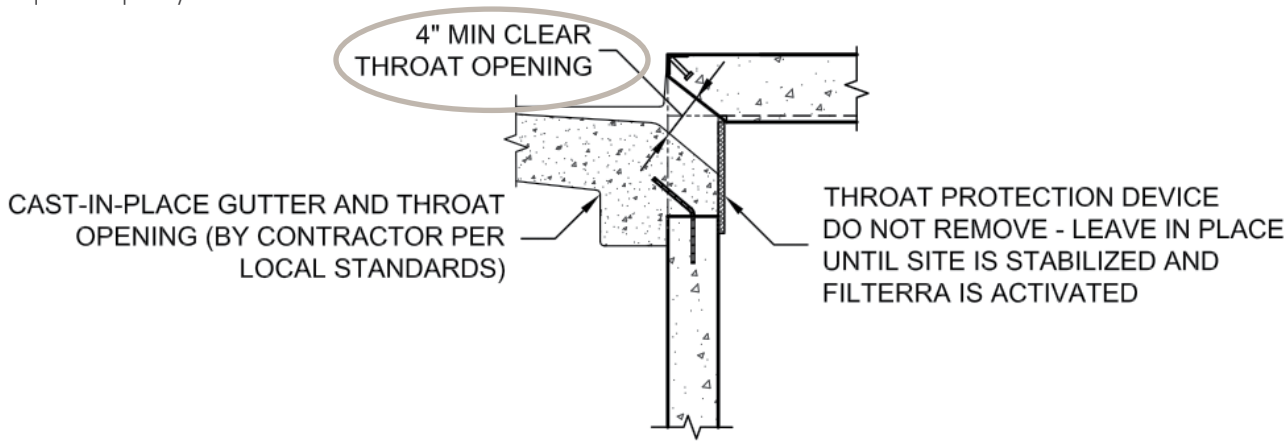
The minimum requirements for Filterra Activation are as follows:

1. The site landscaping must be fully stabilized, i.e. full landscaping installed and some grass cover (not just straw and seed) is required to reduce sediment transport. Construction debris and materials should be removed from surrounding area.



2. Final paving must be completed. Final paving ensures that paving materials will not enter and contaminate the Filterra system during the paving process, and that the plant will receive runoff from the drainage area, assisting with plant survival for the Filterra system.

3. Where curb inlets are included as part of the Filterra system, Filterra throat opening should be at least 4" in order to ensure adequate capacity for inflow and debris.



An Activation Checklist is included on page 12 to ensure proper conditions are met for Contech to perform the Activation services. A charge of $500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation.

Filterra Plant Selection Overview

A Plant List is available on the Contech website highlighting recommended plants for Filterra systems in your area. Keep in mind that plants are subject to availability due to seasonality and required minimum size for the Filterra system. Plants installed in the Filterra system are container plants (max 15 gallon) from nursery stock and will be immature in height and spread at Activation.

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra system.

The "Planting Requirements for Filterra Systems" document is included as an appendix and discusses proper selection and care of the plants within Filterra systems.

Warranty Overview

Refer to the Contech Engineered Solutions LLC Stormwater Treatment System LIMITED WARRANTY for further information. The following conditions may void the Filterra system's warranty and waive the manufacturer provided Activation and Maintenance services:

- Unauthorized activation or performance of any of the items listed in the activation overview
- Any tampering, modifications or damage to the Filterra system or runoff protection devices
- Removal of any Filterra system components
- Failure to prevent construction related runoff from entering the Filterra system
- Failure to properly store and protect any Filterra components (including media and underdrain stone) that may be shipped separately from the vault

Routine Maintenance Guidelines

With proper routine maintenance, the biofiltration media within the Filterra system should last as long as traditional bioretention media. Routine maintenance is included by the manufacturer on all Filterra systems for the first year after activation. This includes a maximum of 2 visits to remove debris, replace pretreatment mulch, and prune the vegetation. More information is provided in the Operations and Maintenance Guidelines. Some Filterra systems also contain pretreatment or outlet bays. Depending on site pollutant loading, these bays may require periodic removal of debris, however this is not included in the first year of maintenance, and would likely not be required within the first year of operation.

These services, as well as routine maintenance outside of the included first year, can be provided by certified maintenance providers listed on the Contech website. Training can also be provided to other stormwater maintenance or landscape providers.

Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement. Other reasons to maintain are:

- Avoiding legal challenges from your jurisdiction's maintenance enforcement program.
- Prolonging the expected lifespan of your Filterra media.
- Avoiding more costly media replacement.
- Helping reduce pollutant loads leaving your property.

Simple maintenance of the Filterra is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the inlet. This may include trash, silt and leaves etc. which will be contained above the mulch layer. Too much silt may inhibit the Filterra's flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated.

Maintenance visits are typically scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the maintenance provider of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing) during the first year.

Exclusion of Services

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra. The Supplier should be informed immediately.

Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra and surrounding area
2. Removal of tree grate (where applicable) and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra
7. Complete paperwork

Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates, where applicable (up to 170 lbs each). If tree grate opening expansion is necessary, safety glasses/goggles and a 3lb or greater mini sledgehammer are required. Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each media bay size. Mulch should be a double shredded, hardwood variety. Some visits may require additional Filterra engineered soil media available from the Supplier.

Media Bay Length	Media Bay Width	Filter Surface Area (ft^2)	Volume at 3" (ft^3)	# of 2 ft^3 Mulch Bags
4	4	16	4	2
6	4	24	6	3
8	4	32	8	4
6	6	36	9	5
8	6	48	12	6
10	6	60	15	8
12	6	72	18	9
13	7	91	23	12

Other sizes not listed - 1 bag per 8 ft^2 of media.

Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.

1. Inspection of Filterra and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes | no
Damage to Box Structure	yes | no
Damage to Grate (if applicable)	yes | no
Is Bypass Clear	yes | no

If yes answered to any of these observations, record with close-up photograph (numbered).

2. Removal of tree grate (if applicable) and erosion control stones

- Remove cast iron grates for access into Filterra box (if applicable).
- Dig out silt (if any) and mulch and remove trash & foreign items.

3. Removal of debris, trash and mulch

Record on Maintenance Report the following:

Silt/Clay	yes | no
Cups/ Bags	yes | no
Leaves	yes | no
Buckets Removed	_____

- After removal of mulch and debris, measure distance from the top of the Filterra engineered media soil to the top of the top slab. Compare the measured distance to the distance shown on the approved Contract Drawings for the system. Add Filterra media (not top soil or other) to bring media up as needed to distance indicated on drawings.

Record on Maintenance Report the following:

Distance to Top of Top Slab (inches)	_____
Inches of Media Added	_____

4. Mulch replacement

- Add double shredded mulch evenly across the entire unit to a depth of 3".
- Refer to Filterra Mulch Specifications for information on acceptable sources.
- Ensure correct repositioning of erosion control stones by the Filterra inlet to allow for entry of trash during a storm event.
- Replace Filterra grates (if applicable) correctly using appropriate lifting or moving tools, taking care not to damage the plant.
- Where applicable, if 6" tree grate opening is too close to plant trunk, the grate opening may be expanded to 12" using a mini sledgehammer. Refer to instructions in Appendix 3.

5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if necessary.
- Prune as necessary to encourage growth in the correct directions

Record on Maintenance Report the following:

Height above top of Filterra Unit	_____ (ft)
Width at Widest Point	_____ (ft)
Health	healthy | unhealthy
Damage to Plant	yes | no
Plant Replaced	yes | no

6. Clean area around Filterra

- Clean area around unit and remove all refuse to be disposed of appropriately.

7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra.		Trim/prune plants in accordance with typical landscaping and safety needs.
Structure	Structure has visible cracks.	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.		Vault should be repaired.
Maintenance is ideally to be performed twice annually.				

Filterra Inspection & Maintenance Log

Filterra System Size/Model:_____**Location:** _____

Date	Mulch & Debris Removed	Depth of Mulch Added	Mulch Brand	Height of Vegetation Above Top of Vault	Vegetation Species	Issues with System	Comments
1/1/17	*5 – 5 gal Buckets*	*3"*	*Lowe's Premium Brown Mulch*	*4'*	*Galaxy Magnolia*	*- Standing water in downstream structure*	*- Removed blockage in downstream structure*

Appendix 1 – Filterra® Activation Checklist

CONTECH® ENGINEERED SOLUTIONS

Project Name:______________________________ Company:______________________________

Site Contact Name: ______________________________ Site Contact Phone/Email: ____________________

Site Owner/End User Name:____________________ Site Owner/End User Phone/Email: ____________________

Preferred Activation Date: ______________________________ (provide 2 weeks minimum from date this form is submitted)

Site Designation	System Size	Final Pavement / Top Coat Complete	Landscaping Complete / Grass Emerging	Construction materials / Piles / Debris Removed	Throat Opening Measures 4" Min. Height	Plant Species Requested
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A	

Attach additional sheets as necessary.

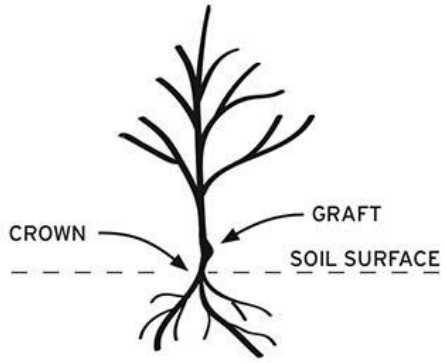
NOTE: A charge of $500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation. ONLY Contech authorized representatives can perform Activation of Filterra systems; unauthorized Activations will void the system warranty and waive manufacturer supplied Activation and 1st Year Maintenance.

______________________________ ____________________

Signature Date

Appendix 2 – Planting Requirements for Filterra® Systems

Plant Material Selection



- Select plant(s) as specified in the engineering plans and specifications.
- Select plant(s) with full root development but not to the point where root bound.
- Use local nursery container plants only. Ball and burlapped plants are not permitted.
- For precast Filterra systems with a tree grate, plant(s) must not have scaffold limbs at least 14 inches from the crown due to spacing between the top of the mulch and the tree grate. Lower branches can be pruned away provided there are sufficient scaffold branches for tree or shrub development.
- For precast Filterra systems with a tree grate, at the time of installation, it is required that plant(s) must be at least 6" above the tree grate opening at installation for all Filterra configurations. This DOES NOT apply to Full Grate Cover designs.
- Plant(s) shall not have a mature height greater than 25 feet.
- For standard 21" media depth, a 7 – 15 gallon container size shall be used. Media less than 21" (Filterra boxes only) may require smaller container plants.
- For precast Filterra systems, plant(s) should have a single trunk at installation, and pruning may be necessary at activation and maintenance for some with a tree grate of the faster growing species, or species known to produce basal sprouts.

Plant Installation

- During transport protect the plant foliage from wind and excessive jostling.
- Prior to removing the plant(s) from the container, ensure the soil moisture is sufficient to maintain the integrity of the root ball. If needed, pre-wet the container plant.
- Cut away any roots which are growing out of the container drain holes. Plants with excessive root growth from the drain holes should be rejected.
- Plant(s) should be carefully removed from the pot by gently pounding on the sides of the container with the fist to loosen root ball. Then carefully slide out. Do not lift plant(s) by trunk as this can break roots and cause soil to fall off. Extract the root ball in a horizontal position and support it to prevent it from breaking apart. Alternatively the pot can be cut away to minimize root ball disturbance.
- Remove any excess soil from above the root flare after removing plant(s) from container.
- Excavate a hole with a diameter 4" greater than the root ball, gently place the plant(s).
- If plant(s) have any circling roots from being pot bound, gently tease them loose without breaking them.
- If root ball has a root mat on the bottom, it should be shaved off with a knife just above the mat line.
- Plant the tree/shrub/grass with the top of the root ball 1" above surrounding media to allow for settling.
- All plants should have the main stem centered in the tree grate (where applicable) upon completion of installation.
- With all trees/shrubs, remove dead, diseased, crossed/rubbing, sharply crotched branches or branches growing excessively long or in wrong direction compared to majority of branches.
- To prevent transplant shock (especially if planting takes place in the hot season), it may be necessary to prune some of the foliage to compensate for reduced root uptake capacity. This is accomplished by pruning away some of the smaller secondary branches or a main scaffold branch if there are too many. Too much foliage relative to the root ball can dehydrate and damage the plant.
- Plant staking may be required.

Mulch Installation

- Only mulch that meets Contech Engineered Solutions' mulch specifications can be used in the Filterra system.
- Mulch must be applied to a depth of 3" evenly over the surface of the media.

Irrigation Requirements

- Each Filterra system must receive adequate irrigation to ensure survival of the living system during periods of drier weather.
- Irrigation sources include rainfall runoff from downspouts and/or gutter flow, applied water through the top/tree grate or in some cases from an irrigation system with emitters installed during construction.
- At Activation: Apply about one (cool climates) to two (warm climates) gallons of water per inch of trunk diameter over the root ball.
- During Establishment: In common with all plants, each Filterra plant will require more frequent watering during the establishment period. One inch of applied water per week for the first three months is recommended for cooler climates (2 to 3 inches for warmer climates). If the system is receiving rainfall runoff from the drainage area, then irrigation may not be needed. Inspection of the soil moisture content can be evaluated by gently brushing aside the mulch layer and feeling the soil. Be sure to replace the mulch when the assessment is complete. Irrigate as needed**.
- Established Plants: Established plants have fully developed root systems and can access the entire water column in the media. Therefore irrigation is less frequent but requires more applied water when performed. For a mature system assume 3.5 inches of available water within the media matrix. Irrigation demand can be estimated as 1" of irrigation demand per week. Therefore if dry periods exceed 3 weeks, irrigation may be required. It is also important to recognize that plants which are exposed to windy areas and reflected heat from paved surfaces may need more frequent irrigation. Long term care should develop a history which is more site specific.

** Five gallons per square yard approximates 1 inch of water Therefore for a 6' by 6' Filterra approximately 20-60 gallons of water is needed. To ensure even distribution of water it needs to be evenly sprinkled over the entire surface of the filter bed, with special attention to make sure the root ball is completely wetted. NOTE: if needed, measure the time it takes to fill a five gallon bucket to estimate the applied water flow rate then calculate the time needed to irrigate the Filterra. For example, if the flow rate of the sprinkler is 5 gallons/minute then it would take 12 minutes to irrigate a 6' by 6' filter.

Appendix 3 – Filterra® Tree Grate Opening Expansion Procedure

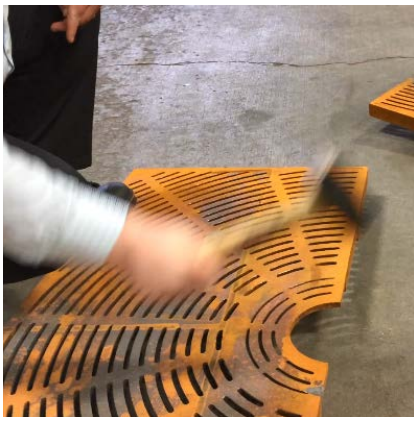
The standard grates used on all Filterra configurations that employ Tree Grates are fabricated with a 6″ opening that is designed with a breakaway section that can be removed, allowing the grate opening to be expanded to 12″ as the tree matures and the trunk widens.

The following tools are required to expand the opening:

- Mini sledgehammer (3 lb. or greater)
- Safety Glasses / Goggles

The following guidelines should be followed to properly expand the tree opening from 6″ to 12″:

1. Remove the grate from the Filterra frame, place it flat on a hard surface, and support the grate by stepping on the edge or using other weighted items such as a few mulch bags if this is being done during a Filterra maintenance event. Put on safety glasses/goggles. Align the mini sledgehammer as shown in the figure to the left. The head of the sledgehammer should be aimed just inside the wide cast iron bar between the larger grate section and the breakaway section.



2. Repeatedly hit the grate at this spot with the mini sledgehammer.

3. After several hits, the breakaway section should snap cleanly off of the larger grate section. Reinstall the grate into the Filterra grate frame. Recycle or dispose of the breakaway section per local guidelines.

filterra®
Bioretention Systems

CONTECH®
ENGINEERED SOLUTIONS

9025 Centre Pointe Drive, Suite 400
West Chester, OH 45069
info@conteches.com | 800-338-1122
www.ContechES.com

PDF 6/21

ATTACHMENT B

STORMTECH OWNER'S MANUAL

Jayson Haskell

From: Aaron Cheever <Aaron.Cheever@adspipe.com>
Sent: Monday, September 13, 2021 10:00 AM
To: Jayson Haskell
Subject: RE: Raymond Hills Village
Attachments: Raymond Hills Village REV 09-13-2021.pdf

Hi Jayson,

Thank you for your time this morning.

Please see attached for Shop Drawings that depict your System/our discussion. I also recommend using the 8”x4” Inspection Ports vs the 12”x6” for additional cost savings.

Let me know if you have any comments/questions or if you would like the CAD File.

Best Regards,

Aaron Cheever, P.E.
Engineered Product Manager
aaron.cheever@ads-pipe.com
(978) 302-0650

Advanced Drainage Systems, Inc.
adspipe.com

From: Jayson Haskell <jayson@dmroma.com>
Sent: Friday, September 10, 2021 2:58 PM
To: Aaron Cheever <Aaron.Cheever@adspipe.com>
Subject: RE: Raymond Hills Village

I should have some time on Monday morning if that works for you. 9?

From: Aaron Cheever <Aaron.Cheever@adspipe.com>
Sent: Friday, September 10, 2021 2:43 PM
To: jayson@dmroma.com
Subject: Raymond Hills Village

Hi Jayson,

I hope that this email finds you well.

I had these Plans come across my email yesterday and had a couple of questions regarding the StormTech System – specifically the inter-row side connections being shown.

Is it possible to setup a time to have a call to discuss? Please let me know what works for you.

Best Regards,

Aaron Cheever, P.E.
Engineered Product Manager
aaron.cheever@ads-pipe.com
(978) 302-0650

Advanced Drainage Systems, Inc.
adspipe.com

NOTICE: This email message is intended only for the person or entity to which it is addressed. This email message, including any attachments, may contain confidential and/or privileged information and other materials, and is protected by copyright law. Any unauthorized review, use, disclosure, or distribution is strictly prohibited. If you are not the intended recipient, then please contact the sender by reply email and delete/destroy all copies of the original email message and any attachments. This email message, including any attachments, also may contain technical, or similar types of, information and materials. The sender does not make any express or implied representations or warranties with respect to such information and materials, including, without limitation, fitness for a particular purpose or merchantability or as to the accuracy or completeness of any such information and materials, and any such representations and warranties are hereby expressly disclaimed.

ADVANCED DRAINAGE SYSTEMS, INC.

RAYMOND HILLS VILLAGE

RAYMOND, ME

SC-310 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-310.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418-16a (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2922 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310 SYSTEM

1. STORMTECH SC-310 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

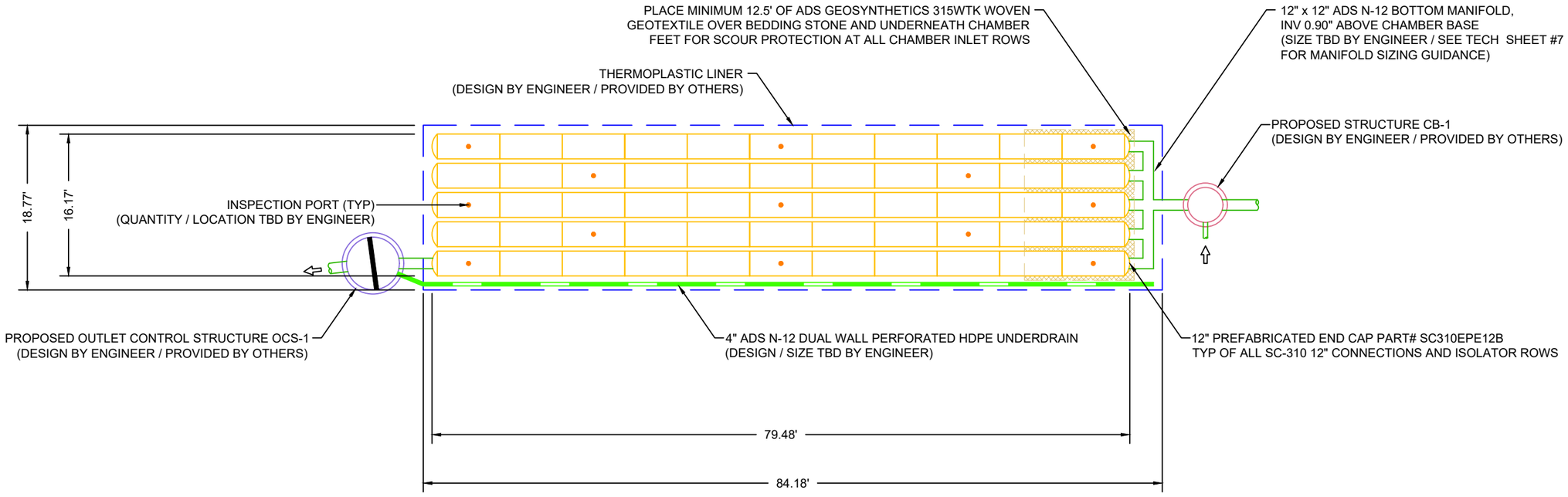
CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

CONCEPTUAL LAYOUT

(55) STORMTECH SC-310 CHAMBERS
(10) STORMTECH SC-310 END CAPS
INSTALLED WITH 6" COVER STONE, 6" BASE STONE, 40% STONE VOID
INSTALLED SYSTEM VOLUME: 1962 CF
AREA OF SYSTEM: 1580 **FT²**
PERIMETER OF SYSTEM: 206 **FT**

PROPOSED ELEVATIONS

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	300.48
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	294.48
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	293.98
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	293.98
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	293.98
TOP OF STONE:	292.98
TOP OF CHAMBER:	292.48
12" BOTTOM CONNECTION INVERT:	291.23
BOTTOM OF CHAMBER:	291.15
4" UNDERDRAIN INVERT:	290.65
BOTTOM OF STONE:	290.65



RAYMOND HILLS VILLAGE
RAYMOND, ME

DATE: 07/29/2021 | DRAWN: AC | CHECKED: ---
PROJECT #: -- |

REV	DRW	CHK	DESCRIPTION
09/13/2021	AC		ADDED INSPECTION PORTS, PER PLAN

StormTech
Detention • Retention • Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

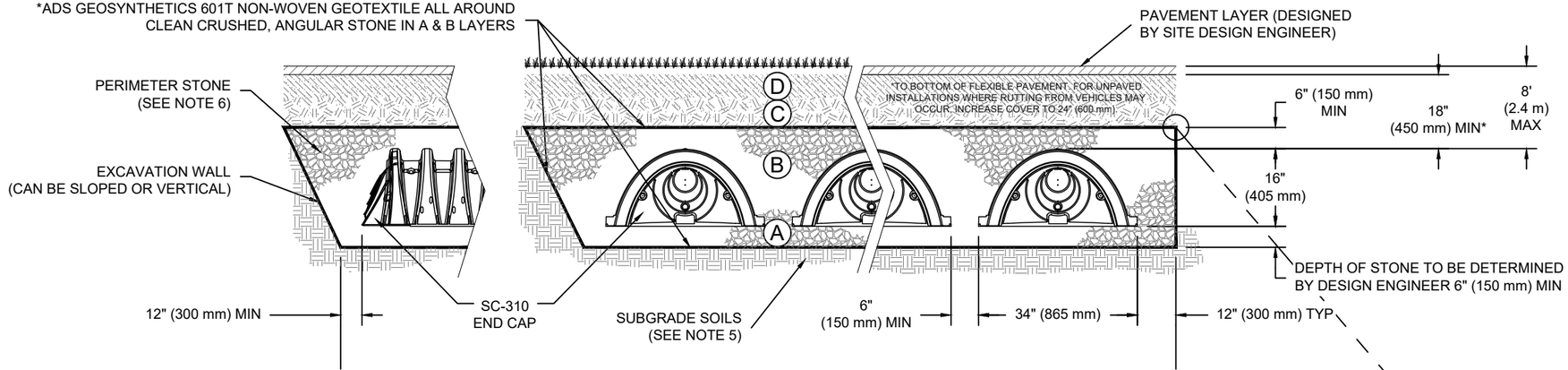
ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

NOT TO SCALE

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

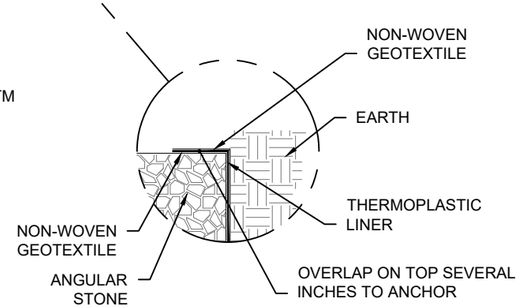
MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. [2] [3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.



NOTES:

1. SC-310 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS", OR ASTM F2922
"STANDARD SPECIFICATION FOR POLYETHYLENE (PE) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. THE "SITE DESIGN ENGINEER" REFERS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN AND LAYOUT OF THE STORMTECH CHAMBERS FOR THIS PROJECT.
5. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
6. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
7. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



THERMOPLASTIC LINER DETAIL

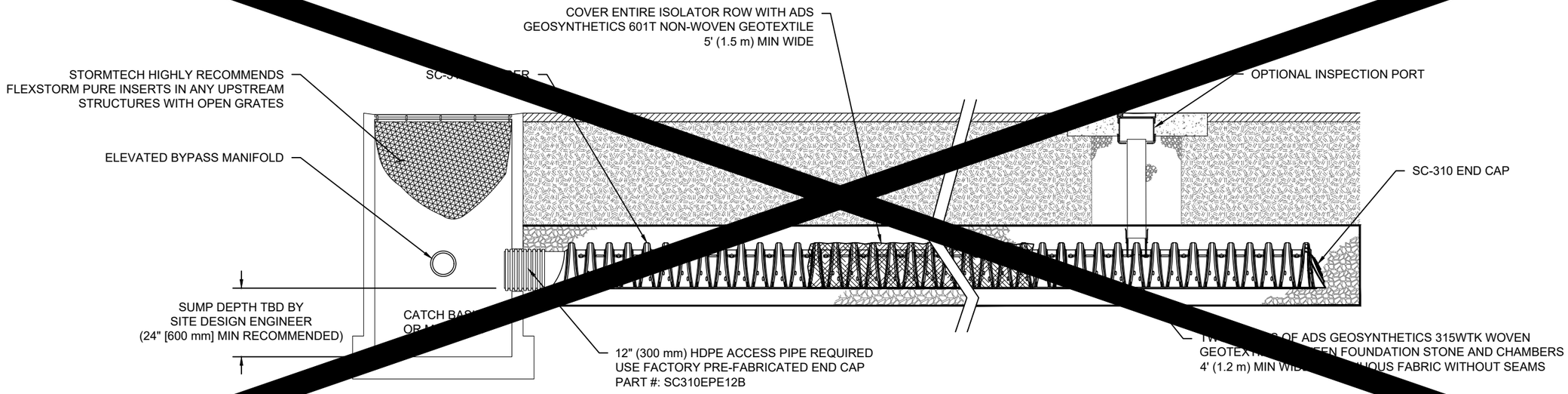
RAYMOND HILLS VILLAGE
RAYMOND, ME

DATE: 07/29/2021 | DRAWN: AC | PROJECT #: -- | CHECKED: ---

REV	DRW	CHK	DESCRIPTION
09/13/2021	AC		ADDED INSPECTION PORTS, PER PLAN

StormTech
Detention • Retention • Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473



SC-310 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH THE INLET PIPE^Ji) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY^Jii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

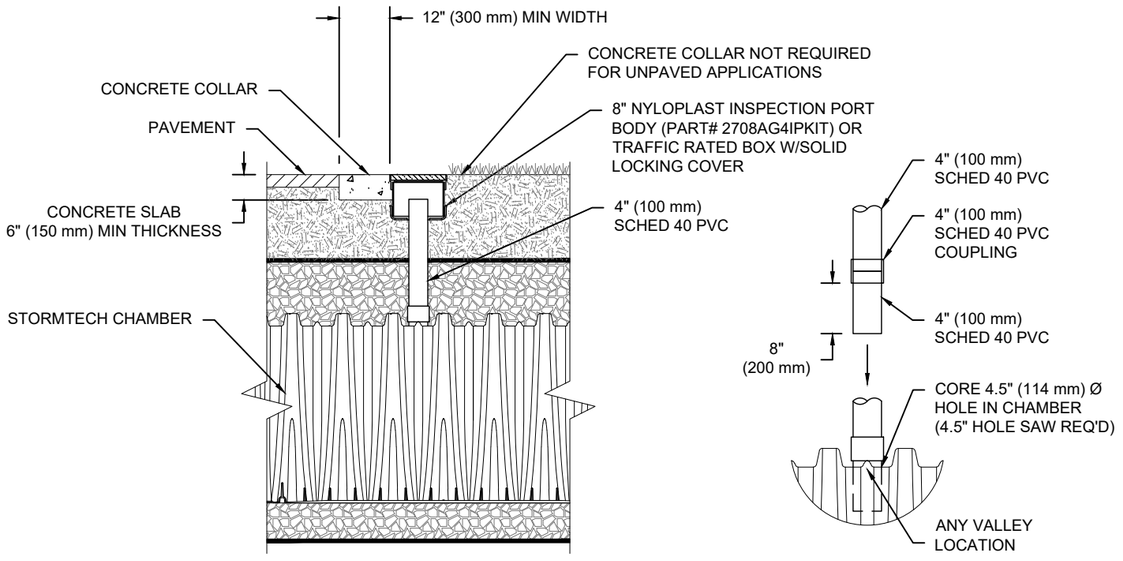
STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH FORWARD SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD ALL OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.^J
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTES:
1. INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.
2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED (4" PVC NOT PROVIDED BY ADS).

4" PVC INSPECTION PORT DETAIL
NTS

CONNECTION DETAIL
NTS

RAYMOND HILLS VILLAGE
ROCHESTER, NH

DATE: 07/29/2021 | DRAWN: AC | PROJECT #: -- | CHECKED: ---

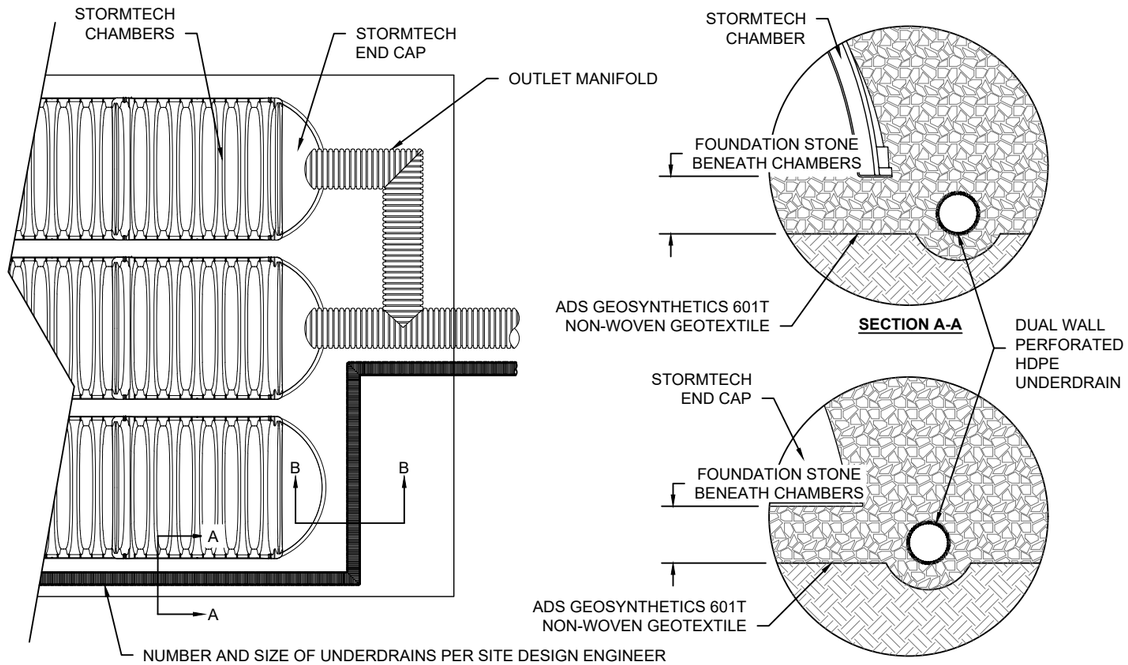
REV	DRW	CHK	DESCRIPTION
09/13/2021	AC		ADDED INSPECTION PORTS, PER PLAN

StormTech
Detention • Retention • Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

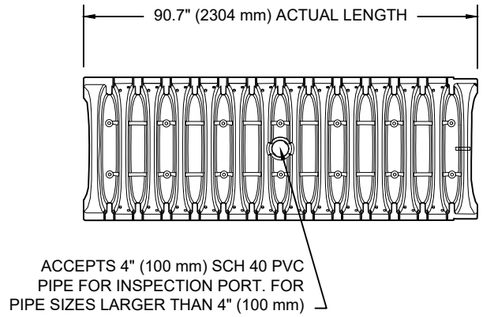
UNDERDRAIN DETAIL

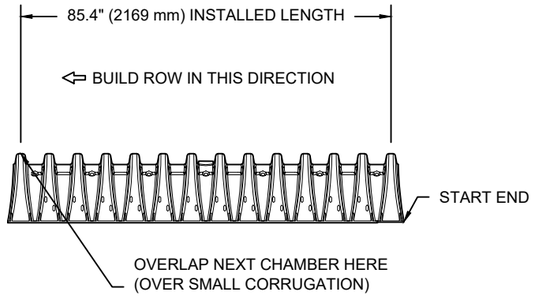
NTS

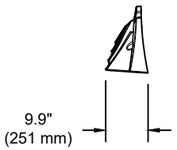


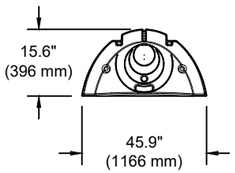
SC-310 TECHNICAL SPECIFICATION

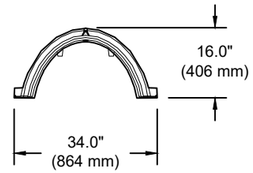
NTS











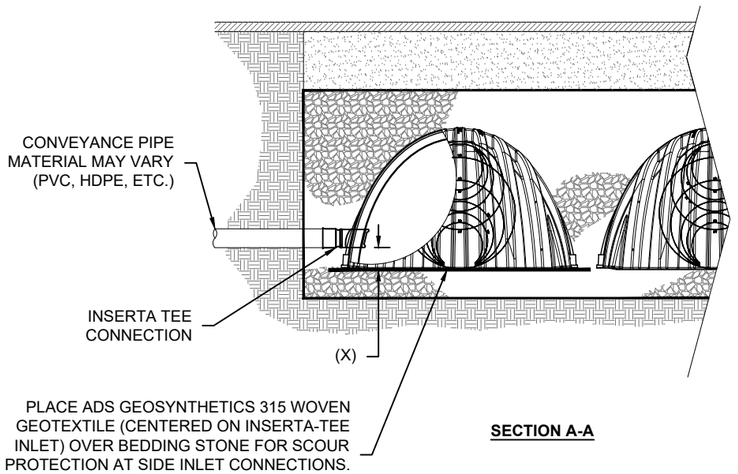
NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

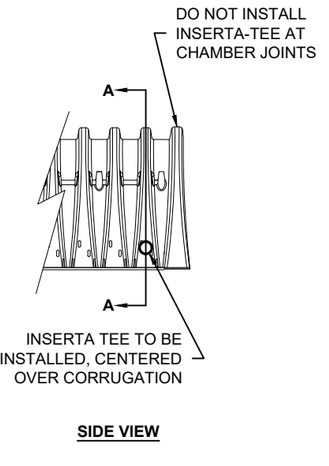
*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS

INSERTA TEE DETAIL

NTS



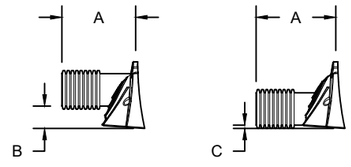
SECTION A-A



SIDE VIEW

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		



STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.8" (147 mm)	---
SC310EPE06B / SC310EPE06BPC			---	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	---
SC310EPE08B / SC310EPE08BPC			---	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	---
SC310EPE10B / SC310EPE10BPC			---	0.7" (18 mm)
SC310EPE12B	12" (300 mm)	13.5" (343 mm)	---	0.9" (23 mm)

ALL STUBS, EXCEPT FOR THE SC310EPE12B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310EPE12B THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NONINAL

RAYMOND HILLS VILLAGE
RAYMOND, NH

DATE: 07/29/2021 | DRAWN: AC | CHECKED: ---
PROJECT #: -- |

REV	DRW	CHK	DESCRIPTION
09/13/2021	AC		ADDED INSPECTION PORTS, PER PLAN

StormTech
Detention • Retention • Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

STOP/STREET SIGN

EXTEND 8" DUCTILE IRON WATER MAIN. INSTALL DEFLECTIONS AT PIPE JOINTS PER PORTLAND WATER DISTRICT STANDARDS TO PROVIDE A TYPICAL CENTERLINE OFFSET OF 6'-0"

CURBING
ROA

BS MILLS
OAD

25'R

450'+

-0+35

0+00

8"W

SD-3

1+00

6

IP-9

CB-1

OCS-1

SD-1

OHU

UGU

294

302

300

298

296

25'R

OHU

E HOLE IN
NG CATCH
FOR SD-1

INSTALL STABILIZED CONSTRUCTION ENTRANCE, SEE DETAIL

EXISTING 8" DUCTILE IRON PIPE STUB (22'). REMOVE 2' STUB AND CAP. REPLACE EXISTING SLIP JOINT RUBBER TO START

8'x4' FILTE
TOP OF ST
THROAT E
4"SD INV.

(55) SC-31
CHAMBER

LOCATION

StormTech
Detention • Retention • Water Quality
An ADS company

Isolator® Row O&M Manual

THE MOST ADVANCED NAME IN WATER MANAGEMENT SOLUTIONS™

ADS®

THE ISOLATOR® ROW

INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.

THE ISOLATOR ROW

The Isolator Row is a row of StormTech chambers, either SC-160LP, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the SC-160LP, DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

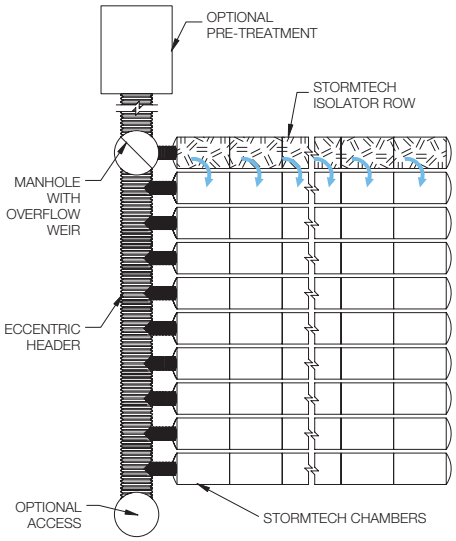
The Isolator Row is typically designed to capture the “first flush” and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

StormTech Isolator Row with Overflow Spillway (not to scale)



ISOLATOR ROW INSPECTION/MAINTENANCE

INSPECTION

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

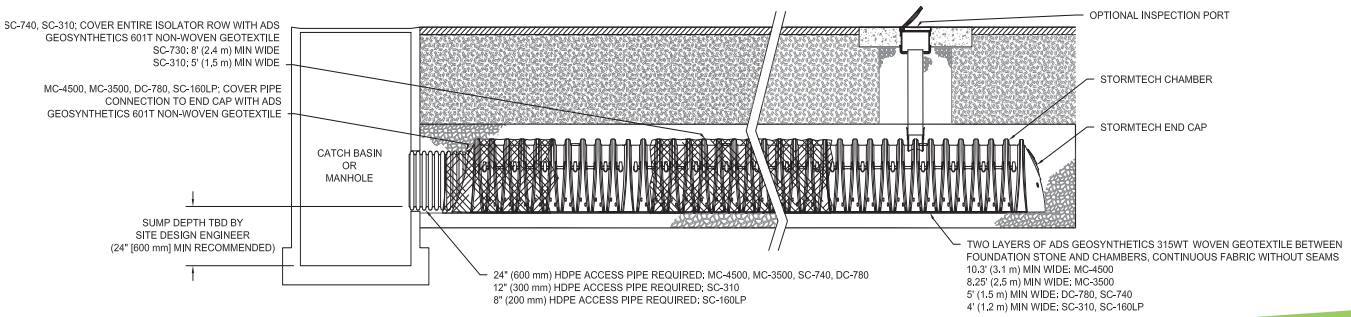
MAINTENANCE

The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)

Note: Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-4500 chamber models and is not required over the entire Isolator Row.



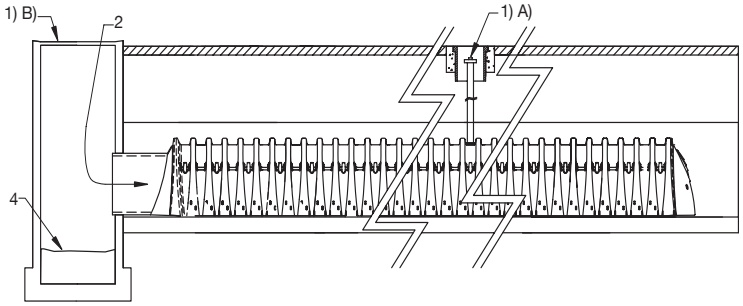
ISOLATOR ROW STEP BY STEP MAINTENANCE PROCEDURES

STEP 1
Inspect Isolator Row for sediment.
- A) Inspection ports (if present)
  - i. Remove lid from floor box frame
  - ii. Remove cap from inspection riser
  - iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
  - iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.
- B) All Isolator Rows
  - i. Remove cover from manhole at upstream end of Isolator Row
  - ii. Using a flashlight, inspect down Isolator Row through outlet pipe
    1. Mirrors on poles or cameras may be used to avoid a confined space entry
    2. Follow OSHA regulations for confined space entry if entering manhole
  - iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

STEP 2
Clean out Isolator Row using the JetVac process.
- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required

STEP 3
Replace all caps, lids and covers, record observations and actions.

STEP 4
Inspect & clean catch basins and manholes upstream of the StormTech system.



SAMPLE MAINTENANCE LOG

Date	Stadia Rod Readings		Sediment Depth (1)–(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

StormTech® Detention • Retention • Water Quality
A division of ADS

Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com