Application for

Special Permit for Limited Business District
Site Plan Approval

Pursuant to Section 4 of the Special Permit Rules and Regulations
Limited Business and Business Districts and
§Section 250-23 of the Bolton Bylaws

357 Main Street
Bolton, MA

Applicant: **Environmental Pools, Andrew Everleigh**
184R Riverneck Road
Chelmsford, MA 01824

Record Owner: **Andrew & Jill Everleigh**
184R Riverneck Road
Chelmsford, MA 01824

March 4, 2021
3571-E

Prepared by:

DILLIS & ROY
CIVIL DESIGN GROUP
CIVIL ENGINEERS LAND SURVEYORS WETLAND CONSULTANTS
WWW.DILLISANDROY.COM
1 MAIN STREET, SUITE 1 • LUNENBURG, MA 01462
PH. 978.779.6091 F. 978.779.0260

TABLE OF CONTENTS:

Attachments

1.0 Limited Business and Business Special Permit Application

From: Ch. 40A S 9 "Each application for a special permit shall be filed by the petitioner with the city or town clerk and a copy or said application, including the date and time of filing certified by the city or town clerk, shall be filed forthwith by the petitioner with the special permit granting authority.

LIMITED BUSINESS DISTRICT / BUSINESS DISTRICT
Application Form for Special Permit

Bolton, Mass_____20_____
(Date of Filing)

Name of Applicant Environmental Pools, Andrew Everleigh

Address 184R Riverneck Road, Chelmsford, MA 01824

Name of Registered Engineer or Surveyor Dillis & Roy Civil Design Group, Inc.

Address 1 Main Street, Suite 1, Lunenburg, MA 01462

Deed or property Recorded in: Book No. 57713 Page 69 of the Worcester Registry of Deeds.

Location and Description of Property (include zoning district(s)): Limited Business

Lot Frontage: 1,682 feet Lot Area: 649,524 Square Feet

Proposed Land Use(s) Requiring a Special Permit

Other retail, wholesale or service in the Limited Business District (Zoning Bylaw 250-12 D.)

Please include all materials listed in the Rules and Regulations for Limited Business Districts and Business Districts (see attached checklist) if required by the Board. Failure to include all required materials could delay processing of the application.

Signature of Owner or Agent Andrew Everleigh

Address 184R Riverneck Road Chelmsford, MA 01824

Phone Number 9786219210

Date Received_____

By_____

Fee Paid_____

LIMITED BUSINESS DISTRICT / BUSINESS DISTRICT
Checklist of Required Materials for Special Permit

_____ PROPOSED HEARING NOTICE (SEE REGULATION 3.3.4)

__X__ OTHER PERMITTING
List variances and Special Permits previously issued by the Planning Board of Appeals and any needed for this proposal

List required Special Permits or Health Permits and provide copies of any received

Note if Conservation Commission approval needed and provide copy of approval if received

__X__ DEVELOPMENT IMPACT STATEMENT
Description of proposed or possible uses

Proposed lot coverage per bylaw, total coverage of all impermeable surface including building and parking, and open space areas.

Drainage calculations

Earth removal calculations

Traffic study (12 copies) Waiver Requested

__X__ LOCUS PLAN

__X__ SITE COMPOSITE PLAN (Include design certification and legends)

General site characteristics

- Existing and proposed buildings and structures
- Driveway entrances for abutting properties and those across a public way with dimensions
- All underground tanks/structures existing or proposed or abandoned
- Zoning boundaries if applicable
- Yards/setbacks dimensioned
- Names of abutting property owners

Natural site characteristics

- Waterways
- Wetland boundaries and buffers
- Existing and proposed contours
- Open space with square footage calculations

Site improvements

- Dimensions of traffic lanes
- Label all paved surfaces and note materials
- Parking spaces and parking lot landscaping with dimensions
- Building areas for each floor
- Exterior lighting
- Existing and proposed signage
- Outdoor storage areas labeled

Site utilities

- Stormwater drainage facilities shown & dimensioned
- Underground storage containers with capacities and contents
- Water services
- Fire protection systems
- Underground utilities
- Solid waste disposal facilities
- Sewage disposal system
- Erosion and sedimentation controls
- Parking calculations

X
_____ CONSTRUCTION DETAIL PLAN

- Detail of structures
- Landscaping details Waiver Requested
- Parking details in compliance with the Bolton Zoning Bylaw
- Tabulations of building coverage and open space
- Details of outdoor lighting

_____ LANDSCAPE PLAN Waiver Requested

- Certifications
- Legend
- Number, type, & size of trees and shrubs
- Landscape buffers
- Land contours
- Site features
- Limits of work
- Perimeter of trees
- Outdoor lighting structures

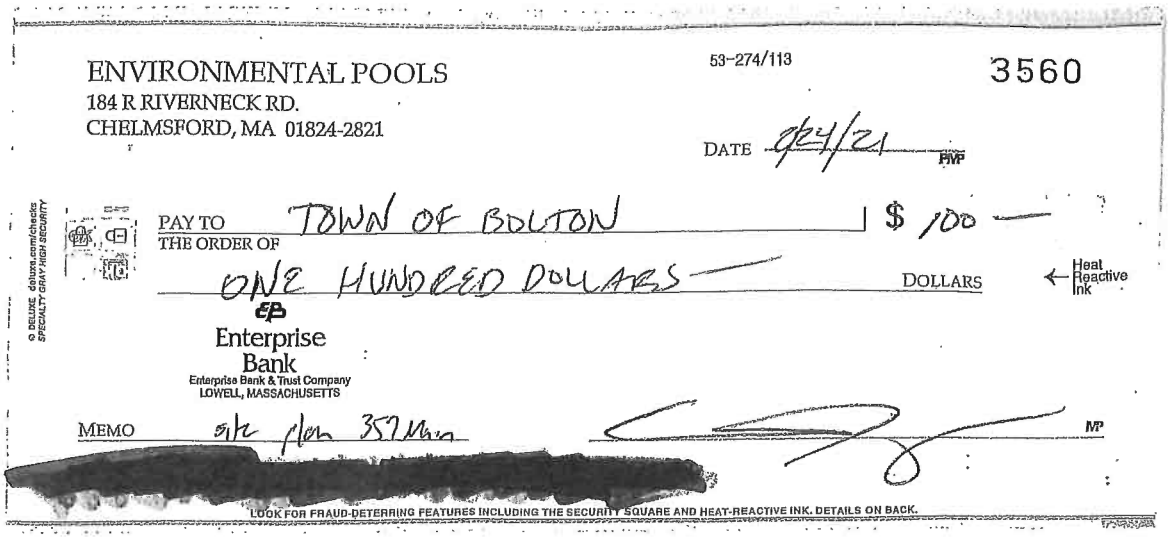
X
_____ BUILDING ELEVATION PLAN

- Certifications
- Scale
- Front, ~~rear, & side elevations with maximum height~~

_____ FLOOR PLAN Waiver Requested

- Certifications
- Scale
- Net floor area/s

Design Review Board Fee



ENVIRONMENTAL POOLS
184 R RIVERNECK RD.
CHELMSFORD, MA 01824-2821

53-274/113

3560

DATE 2/24/21

PAY TO THE ORDER OF TOWN OF BOLTON $ 100 —

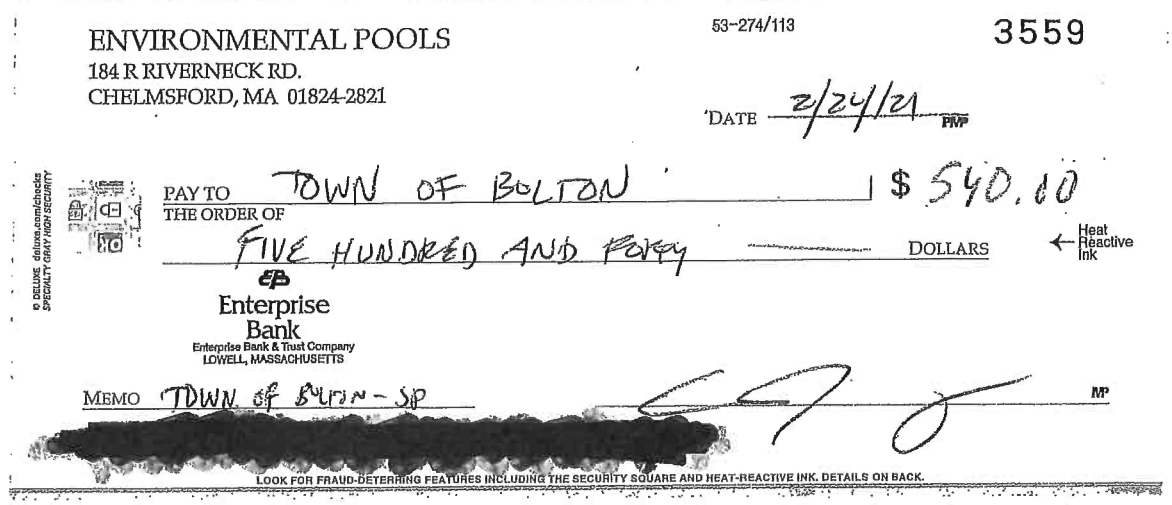
ONE HUNDRED DOLLARS — DOLLARS

Heat Reactive Ink

Enterprise Bank
Enterprise Bank & Trust Company
LOWELL, MASSACHUSETTS

MEMO Site plan 357 Main

LOOK FOR FRAUD-DETERRING FEATURES INCLUDING THE SECURITY SQUARE AND HEAT-REACTIVE INK. DETAILS ON BACK.



ENVIRONMENTAL POOLS
184 R RIVERNECK RD.
CHELMSFORD, MA 01824-2821

53-274/113

3559

DATE 2/24/21

PAY TO THE ORDER OF TOWN OF BOLTON $ 540.00

FIVE HUNDRED AND FORTY — DOLLARS

Heat Reactive Ink

Enterprise Bank
Enterprise Bank & Trust Company
LOWELL, MASSACHUSETTS

MEMO TOWN OF BOLTON - SP

LOOK FOR FRAUD-DETERRING FEATURES INCLUDING THE SECURITY SQUARE AND HEAT-REACTIVE INK. DETAILS ON BACK.

Special Permit Fee

500 foot Abutters List Report

Bolton, MA
February 15, 2021

Subject Property:

Parcel Number:	004.D-0021.0	Mailing Address:	EVERLEIGH C ANDREW & JILL J,TR A & J REALTY TR 184R RIVERNECK RD CHELMSFORD, MA 01824
CAMA Number:	004.D-0021.0		
Property Address:	184R RIVERNECK RD		

Abutters:

Parcel Number:	004.D-0022.0	Mailing Address:	MCGILVRAY THOMAS R & MARY KATE 295 MAIN ST BOLTON, MA 01740
CAMA Number:	004.D-0022.0		
Property Address:	295 MAIN ST		
Parcel Number:	004.D-0023.0	Mailing Address:	DEAN BRIAN G & ELIZABETH WAND 392 MAIN ST BOLTON, MA 01740
CAMA Number:	004.D-0023.0		
Property Address:	392 MAIN ST		
Parcel Number:	004.D-0060.0	Mailing Address:	SLATER BRUCE 356 MAIN ST BOLTON, MA 01740
CAMA Number:	004.D-0060.0		
Property Address:	356 MAIN ST		
Parcel Number:	004.D-0063.0	Mailing Address:	MCGONAGLE STEPHEN D & DIANNE MARTZ, TR STEPHEN D MCGONAGLE REV TR 30 LONG HILL RD BOLTON, MA 01740
CAMA Number:	004.D-0063.0		
Property Address:	30 LONG HILL RD		
Parcel Number:	004.D-0065.0	Mailing Address:	SLATER BRUCE A 356 MAIN ST BOLTON, MA 01740-1126
CAMA Number:	004.D-0065.0		
Property Address:	356 MAIN ST		
Parcel Number:	004.D-0072.0	Mailing Address:	SLATER BRUCE A 356 MAIN ST BOLTON, MA 01740-1126
CAMA Number:	004.D-0072.0		
Property Address:	356 MAIN ST		
Parcel Number:	004.D-0073.0	Mailing Address:	SLATER BRUCE A 356 MAIN ST BOLTON, MA 01740-1126
CAMA Number:	004.D-0073.0		
Property Address:	356 MAIN ST		
Parcel Number:	004.D-0095.0	Mailing Address:	EVERLEIGH ANDREW & JILL J,TR A & J REALTY TR 184R RIVERNECK RD CHELMSFORD, MA 01824
CAMA Number:	004.D-0095.0		
Property Address:	184R RIVERNECK RD		
Parcel Number:	004.D-0096.0	Mailing Address:	BOLTON CONSERVATION TRUST INC P O BOX 14 BOLTON, MA 01740
CAMA Number:	004.D-0096.0		
Property Address:	P O BOX 14		
Parcel Number:	004.D-0097.0	Mailing Address:	BOLTON CONSERVATION TRUST INC P O BOX 14 BOLTON, MA 01740
CAMA Number:	004.D-0097.0		
Property Address:	P O BOX 14		

500 foot Abutters List Report

Bolton, MA
February 15, 2021

Parcel Number:	004.E-0047.0	Mailing Address:	SHANKLE EDWARD J & JOAN M
CAMA Number:	004.E-0047.0		277 MAIN ST
Property Address:	277 MAIN ST		BOLTON, MA 01740
Parcel Number:	004.E-0051.0	Mailing Address:	TAYLOR PAMELA L
CAMA Number:	004.E-0051.0		269 MAIN ST
Property Address:	269 MAIN ST		BOLTON, MA 01740-1104
Parcel Number:	004.E-0052.0	Mailing Address:	BROOKS MARTHA C
CAMA Number:	004.E-0052.0		273 MAIN ST
Property Address:	273 MAIN ST		BOLTON, MA 01740
Parcel Number:	004.E-0053.0	Mailing Address:	ENGEL TONE & IVA M
CAMA Number:	004.E-0053.0		281 MAIN ST
Property Address:	281 MAIN ST		BOLTON, MA 01740-1101
Parcel Number:	004.E-0054.0	Mailing Address:	MOLINA TONY
CAMA Number:	004.E-0054.0		285 MAIN ST
Property Address:	285 MAIN ST		BOLTON, MA 01740
Parcel Number:	005.D-0022.0	Mailing Address:	TOWN OF BOLTON ACTING BOLTON
CAMA Number:	005.D-0022.0		CONSERVATION COMMISSION
Property Address:	663 MAIN ST		663 MAIN ST
			BOLTON, MA 01740
Parcel Number:	005.D-0058.0	Mailing Address:	OPEN SPACE - GREAT BROOK BOLTON
CAMA Number:	005.D-0058.0		CONSERVATION TRUST
Property Address:	663 MAIN ST		663 MAIN ST
			BOLTON, MA 01740

As set forth in the Assessor's records as of January 1, 2021.

Kelly Garlock
Assistant Assessor

2.0 Design Review Board Application

Town of Bolton

Town Hall, 663 Main Street, Bolton, MA 01740
Phone 978-779-3308 Fax 978-779-5461

Design Review Board (DRB)
Application

Please Print Clearly and Complete In Full

Return to Design Review Board
663 Main Street
Bolton MA 01740
(989)779-3308

Applicant: Environmental Pools, Andrew Everleigh

Address: 184R Riverneck Road, Chelmsford, MA Phone:

Business Name: Environmental Pools Phone: Same

Address: 184R Riverneck Road, Chelmsford, MA

Property Owner: Andrew & Jill Everleigh

Address: 184R Riverneck Road, Chelmsford, MA Phone: Same

Zoning District: Limited Business {X } Business { } Industrial { } PENC { }

Type of Project: New construction ( ) Expansion (X)

Summarize project (use additional sheet if necessary):

> The applicant, Environmental Pools, is proposing to convert the exiting business building at 357 Main Street into the office and sales facility to support their business focused on design and installation of swimming pools. The existing building will be modified, within the existing footprint, and a new storage barn will be constructed along with storage areas. The parcel is recorded in Book 457713, page 69 of the Worcester Registry of Deeds. The lot is 14.91 acres in size and is located in the Limited Business Zoning District. The proposed lot coverage is approximately 3.9% of the site. Wetland resource areas are located to the west, north and east of the project area. Modifications to the existing stormwater management outfall and the addition of subsurface infiltration systems have been designed to manage and improve the stormwater at the site.

Type of Application submitted: Planning Board Special Permit (X) Board of Selectmen Site Plan Review (X) ZBA Variance ( ) ZBA Special Permit ( )

Building Setbacks: Frontage: 1,682’ Front Set Back: 200’ Side Set Backs Right >200’ Left 52’ Rear Set backs: >200’

Wetlands Setback (where applicable): >100’ (buildings), 50’ stormwater
Describe Materials Used: Typical material required to remodel interior of a commercial building and regrade lot. Typical materials include common borrow, gravel, bituminous concrete, cement, loam, vegetation

Applicant’s Signature: _____ Date: _____

Property Owner’s Signature: Andrew Everleigh Date: 2.22.2021
(if different from the applicant)

Required Drawings:

1. Building Site Plan at 1”=10’-0” or 1”=20’-0”, which must include all property lines with setbacks dimensioned, right of ways, wetland boundaries and setbacks dimensioned, building footprint/s with total footprint square footage and total heated space square footage, all new driveways and roadways with widths and necks dimensioned, parking plan with total number of parking spaces, all fences delineated and labeled, all proposed landscaping (plant lists not required), buffers to residential areas, lighting, signage location, size and description, all exterior mechanical equipment, and define any service areas. Please also note any historical resources either on the property or on adjacent properties. Take care to key the following drawings to the site plan.
2. Building Plan/s at 1/8”=1’-0” or larger
3. Building Elevations at 1/8”=1’-0” or larger, with materials specified
4. Site perspectives if available

Please submit four (4) sets of paper copies to the Bolton Town Clerk at the address listed above and electronically at townclerk@townofbolton.com at least 2 weeks before the next posted DRB meeting.

3.0 Narrative

3.1 Introduction

On behalf of Environmental Pools, Dillis and Roy Civil Design Group, Inc. has prepared this narrative to provide support for the approval of plans for the following applications at 357 Main Street Bolton: the Special Permit Application in the Limited Business District, and Site Plan Approval. The narrative is pursuant to regulations and criteria found in Section 250-23 of the Bolton Bylaws and Section 4 of the Town of Bolton Planning Board Special Permit Rules and Regulations for Limited Business and Business.

It is anticipated that this narrative will satisfy all the requirements for all said applications. In the event certain requirements for each application overlap, the requirement will be described in the most appropriate section and referenced thereafter in subsequent sections.

3.2 Special Permit

3.2.1 Development Impact Statement

The following is a summary of the documentation required pursuant to Section 4.6 of the Limited Business and Business Rules and Regulations.

Use Description

The applicant, Environmental Pools, is proposing to convert the exiting business building at 357 Main Street into the office and sales facility to support their business focused on design and installation of swimming pools. The parcel is recorded in Book 457713, page 69 of the Worcester Registry of Deeds. The lot is 14.91 acres in size and is located in the Limited Business Zoning District. The proposed lot coverage is approximately 25,363 SF. The proposed impermeable surface of the lot is approximately 89,129 SF. Wetland resource areas are located to the west, north and east of the project area. Modifications to the existing stormwater management outfall and the addition of subsurface infiltration systems have been designed to manage and improve the stormwater at the site. A portion of the site is within a IWPA to a Public Water Supply (PWS) associated with the restaurant located on the opposite side of Main Street.

Drainage Calculations

Drainage calculations for the existing and proposed site conditions have been prepared by a Registered Professional Engineer and submitted to comply with the requirements of the Stormwater Management Standards incorporated in the Massachusetts Wetlands Protection Act Regulations, 310 CMR 10.00. The stormwater management for the site is aimed to increase groundwater recharge and prevent stormwater from causing or contributing to the pollution of surface waters and ground waters of the Commonwealth. This is accomplished by improving the operation and maintenance of stormwater best management practices (BMP).

United States Department of Agriculture Natural Resources Conservation Service

(NRCS) soil cover complex methods (TR-20) were employed to compute runoff quantities for the subject property and, where appropriate, adjacent property that drains toward a common discharge point with runoff from the subject site. HydroCAD 10.0 computer software was employed in this hydrologic analysis.

A comparison of pre- and post-development runoff quantities were performed to design a stormwater management system that will limit peak rates of runoff from development to pre-development levels for 24-hour rainfall events of 2-, 10-, 25- and 100-year return frequencies.

Hydrologic calculations for existing and proposed site conditions are included in the Stormwater Report in Attachment 1.

Earth Removal Calculations

Cut and fill calculations have been prepared by a Registered Professional Engineer. Total cut volumes for the site are approximately 1,187 cubic yards and the total fill volumes is approximately 2,699 cubic yards. Since the majority of the operations will involve filling, it is anticipated that most, if not all, of the excavated soil from the site can be re-used for fill and minimize offsite transportation of the cuttings.

See sheet C3.1 of the enclosed site plans for the volume of cut and fill along with the enclosed report generated from Carlson Civil using AutoCAD.

Traffic Study

The proposed uses of the facility are not expected to dramatically increase during peak hours. As such, a traffic study has not been performed. The applicant requests a waiver to the requirement for a traffic study.

3.2.1 Bylaw compliance

The following describes the projects compliance pursuant to the criteria for Special Permit set forth in Section 250-23.E of the Bylaws.

Safe vehicle access to and from Main Street is maintained through the existing entrance and exit provided at 357 Main Street. The existing access contains an island to separate incoming and outgoing vehicles with sufficient width to allow safe vehicular access. No changes to the existing site access are proposed.

The parking lot has been designed with minimal disturbance to existing features by utilizing much of the existing parking and access driveway layout. The additional required parking was designed to utilize an expansion of the existing edge of pavement to allow for required backing and maneuvering aisles. The front (southerly) parking area is located a minimum of fifty (50) feet from the Main Street right of way and is screened by existing mature vegetation. An additional parking area is located to the rear (north) of the existing building. This area is not visible form the right of way. Noise, odors and other similar impacts are not expected.

Trash receptacles will be placed onsite to collect rubbish and disposed of in a manner consistent with the facilities waste removal schedule and procedures.

As described in 2.2.1, Stormwater management is controlled in accordance with the Massachusetts Stormwater Standards. There is an existing stormwater management outfall at the entrance to the site. This area is to be modified to properly mitigate expected flows for all storm events, up to and including the 100-year storm. Runoff from a proposed storage barn and portions of the parking areas will be infiltrated in underground infiltration system.

It is not anticipated that excessive exhaust fumes or other emissions will migrate from the premises. Designated parking areas will isolate areas of possible car exhausts and exhaust systems inside the building will be constructed to Massachusetts building standards to ensure proper containment and release of indoor fumes.

During construction, onsite soil will be reused as fill to the maximum extant possible, all waste materials will be properly disposed and reused if possible. During operations of the facility, energy-efficient appliances will be used to reduce energy consumption. Water conserving practices will be used when available, including watering the lawn and planting at optimal times.

The existing building at the site is to remain with interior modifications to fit the use of the owner/applicant. The existing building is located over 200-feet from the Main Street right of way with limited visibility from the right of way. A proposed storage barn is to be constructed to the east of the existing building. The proposed storage barn is over 250-feet from all lot lines. The existing vegetation between the existing building and Main Street is to be preserved to the maximum extent feasible and will allow for a minimum of a 50-foot buffer of natural vegetation between Main Street and the site.

For reasons described above, the project design is consistent with the general purpose and intent of the Bolton Zoning Bylaws, as well as the existing neighborhood and environment.

3.3 Site Plan Approval

The following describes the projects compliance pursuant to the criteria for Special Permit set forth in Section 250-23.F of the Bylaws.

3.3.1 Adjoining premises are protected from detrimental uses of surface water drainage using a an improved stormwater management basin and subsurface infiltration systems as described in sections above. Protection from sound and obscenely views are protected with the existing wooded area surrounding the site along with a fifty (50) foot minimum offset of structures to property lines. The preservation of natural sunlight into the property is maintained through open space.

3.3.2 The safety and convenience for parking lot access and building entrances are promoted with clearly defined spaces. Appropriate handicapped parking spaces are provided. The arrangement of parking spaces were located within the existing parking area to the maximum extent feasible.

3.3.3 The existing building is located approximately 200-feet from the Main Street right of way. This distance along with the existing wooded area provided for limited public visibility of the site and improvements to the site are aligned with the Bolton bylaws. See Section 2.2.2 for detailed description of the compliance.

3.4 Design Review Board

3.4.1 The following describes the projects compliance pursuant to the criteria for the Design Review Board set forth in Section 250-23.G of the Bylaws.

3.4.2 The architecture of the existing building is moderately scaled and resembles similar designs including varied facades, rooflines, and well portioned windows. The project utilizes the existing building which has limited visual appearance from the street with a pleasing site entrance through wooded areas. The Architect has designed the façade with moderately sized windows. The proposed storage barn is to be a grey color to blend in with the surroundings and will be shielded form view by the existing building.

3.4.3 The façade of the existing building is to be updated and improved with pitched roofs and gables being incorporated.

3.4.4 The proposed entrance is accessible and visible from Main Street. The existing parking area is to be improved to allow for parking required by the Zoning Bylaw and adequate vehicle circulation. Additional parking areas were located behind the building within an existing storage area.

3.4.5 The exterior of the building will have a muted appearance and finished in a nonmetallic finish. Windows will be transparent and will be non-reflective.

3.4.6 There are no historic structures or resources on the property.

3.4.7 Portions of the parking lot, all dumpsters and ground level mechanical equipment will be located behind the building to avoid being seen from Main Street. Structures unable to be located in the rear of the building will be screened with scrubs. The parking lot has limited visibility from Main Street and is screend by the existing wooded area.

3.4.8 Development on the 14 acre site is limited to 3.9% building coverage (20% max allowed) and 13.7% impervious coverage (50% max allowed). Also, all areas not covered by structures or parking lots, will be protected by grass, trees and shrubs.

3.4.9 Additional lighting is not proposed as part of the proposed project. Existing building lights will be arranged in an effort to direct light away from adjacent streets and abutting properties and shielded to prevent visibility from residents. Lightening will be shut off during non-business hours. Signage on the site will conform to regulations set in section 250-18 of the Bolton Bylaws.

4.0 Deed

Worcester South District Registry of Deeds
Electronically Recorded Document

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Recording Information

Document Number	: 99596
Document Type	: DEED
Recorded Date	: September 11, 2017
Recorded Time	: 02:16:37 PM
Recorded Book and Page	: 57713 / 69
Number of Pages(including cover sheet)	: 3
Receipt Number	: 1026165
Recording Fee (including excise)	: $4,685.00

****
MASSACHUSETTS EXCISE TAX
Worcester District ROD #20 001
Date: 09/11/2017 02:16 PM
Ctrl# 173262 24237 Doc# 00099596
Fee: $4,560.00 Cons: $1,000,000.00
****

Worcester South District Registry of Deeds
Anthony J. Vigliotti, Register
90 Front St
Worcester, MA 01608
(508) 798-7717

Property Address: 357 Main Street, Bolton, MA

QUITCLAIM DEED

Nancy Skinner, as Manager of Skinner Family Properties, LLC, a Massachusetts limited liability company with a principal office address at 39 Burnham Road, Bolton, Massachusetts 01740, for consideration paid and in full consideration of One Million and 00/100 ($1,000,000.00) Dollars, grant to C. Andrew Everleigh and Jill J. Everleigh, Trustees of A & J Realty Trust u/d/t dated October 31, 2005, with a mailing address of 184R Riverneck Road, Chelmsford, MA 01824, with quitclaim covenants,

The land with the buildings thereon in Bolton, Worcester County, Massachusetts, being shown as Parcel A and Lot 3 on a Plan entitled "Plan of Land in Bolton, Massachusetts, dated July 25, 2007, Scale 1 in. = 100 ft. prepared for Nancy R. Skinner, 401 Main Street, Bolton, MA by Ducharme & Dillis, Civil Design Group, Inc." as recorded in the Worcester County Registry of Deeds in Plan Book 866, Plan 75.

Subject to the provisions of a Conservation Restriction dated December 3, 2008 and recoded at said Registry at Book 43886, Page 209.

I hereby release all rights of homestead in said premises and further state that there are no other persons entitled to any homestead rights in said premises.

The undersigned does hereby represent that the Grantor has not elected to be classified as a corporation for federal income tax purposes.

Meaning and intending to convey those same premises as conveyed in a deed recorded with Worcester County Registry of Deeds in Book 45897, Page 103.

[SIGNATURE PAGE TO FOLLOW]

Return To:

Property Address: 357 Main Street, Bolton, MA

Signed this 15th day of August, 2017.

Skinner Family Properties, LLC

By: Nancy Skinner
Nancy Skinner, Manager

COMMONWEALTH OF MASSACHUSETTS

County of:

On this 15th day of August, 2017, before me, the undersigned notary public, personally appeared Nancy Skinner, as Manager of Skinner Family Properties, LLC proved to me through satisfactory evidence of identification, which were Mass. Drivers License, to be the person whose name is signed on the preceding document, and acknowledged to me that she signed it voluntarily for its stated purpose.

JENNIFER W. MARQUIS
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
December 16, 2022

Jennifer W. Marquis
Notary Public:
My commission expires: 12/16/2022

5.0 Volume Report

3571-E-PLINEWORK2-Volume Report

Volume Report Thu Mar 4 11:35:18 2021

Comparing Grid: C:\Users\sdonohoe\Nexus\DDCDG Projects\Projects\3571E\DATA\3571-Existing grid 021621.grd
and Grid: C:\Users\sdonohoe\Nexus\DDCDG Projects\Projects\3571E\DATA\3571-proposed grid 030421.grd

Area in Cut : 30,468.5 S.F., 0.70 Acres
Area in Fill: 48,548.2 S.F., 1.11 Acres

Cut to Fill ratio: 0.44
Average Cut Depth: 1.05 Average Fill Depth: 1.50
Cut (C.Y.) / Area (acres): 654.35
Fill (C.Y.) / Area (acres): 1488.02
Cut volume: 32,048.1 C.F., 1,186.97 C.Y.
Fill volume: 72,879.2 C.F., 2,699.23 C.Y.

6.0 Waiver Request

A waiver is requested for the following requirements:

Landscape Plan – A waiver is requested from the requirement of a Landscape Plan due to the limited visibility of the site and the site being surrounded by wooded areas.

Traffic Study – A waiver is requested from the requirement of a traffic study as the project is repurposing an existing building and utilizing the existing site access.

Floor Plans – A waiver is requested from the requirement of floor plans as the project is utilizing the existing building and the proposed storage barn is for covered storage.

Attachments

STORMWATER REPORT

FOR

357 MAIN STREET

IN

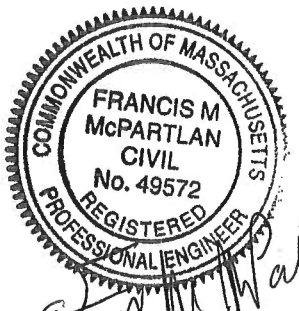
BOLTON,
MASSACHUSETTS

PREPARED BY: DILLIS & ROY
CIVIL DESIGN GROUP, INC.
1 MAIN STREET, SUITE 1
LUNENBURG, MASSACHUSETTS

PREPARED FOR: ENVIRONMENTAL POOLS
184R RIVERNECK ROAD
CHELMSFORD, MASSACHUSETTS

FEBRUARY 3RD, 2021

CDG PROJECT # **3571-E**



3/3/2021

TABLE OF CONTENTS:

1.0 Project Narrative

1.1 Project Type

The proposed project includes the development of the site at 357 Main Street in the town of Bolton, map 4D, parcel 21. The development will consist of improving the existing building, upgrading the existing parking lot to add spaces, two outdoor storage areas and a gravel access road. The existing building will be utilized as office space and warehouse. This construction requires a Special Permit from the Town of Bolton Planning Board and approval from the Board of Selectmen due to its limited business zoning.

1.2 Purpose and Scope

This report has been prepared to comply with the requirements of the Stormwater Management Standards incorporated in the Massachusetts Wetlands Protection Act Regulations, 310 CMR 10.00. These standards are intended to promote increased groundwater recharge and prevent stormwater discharges from causing or contributing to the pollution of surface waters and ground waters of the Commonwealth. The standards aim to accomplish these goals by encouraging the greater use of low impact development techniques and improving the operation and maintenance of stormwater best management practices.

This report addresses compliance of the proposed development with each of the ten stormwater standards, provides calculations to support the compliance information, and provides an Operation and Maintenance Plan and Long-Term Pollution Prevention Plan for the stormwater management system.

1.3 Proposed Development

The Applicant, Environmental Pools, is proposing the development of the site to include building upgrades, parking lot expansion, outdoor storage areas, and a gravel access road. The existing utilities, including sewer and electric, will continue to be utilized since there will be no change in use. The project scope includes creating level areas for the outdoor storage of materials, paving for additional parking spaces, and spreading gravel for the access road. Some clearing and grading will be required to construct the infiltration basin located near the front of the site, required for compliance with stormwater standards. Grading for the infiltration basin and the outdoor storage areas will be the only work within the 100-foot wetland buffer. This project will utilize the existing paved entrance to the site.

1.4 LID Measures

Care has been taken to lay out the proposed site using existing features to limit the area of disturbance. The existing driveway will be utilized as access to the site. BMPs

such as subsurface infiltration structures and an infiltration basin are used to manage the stormwater runoff. Stormwater from the impervious areas is routed via catch basin and drainpipes towards the stormwater management areas. These systems will be used to control the discharge of stormwater.

1.5 Site Description

The subject site is found on the north side of Main Street in Bolton Massachusetts. The site currently has a paved entrance and parking area, existing office building, gravel access road, and septic system. The rest of the site consists of woodlands, ledge, and some wetlands located north, north east, east and south west of the building. Great Brook briefly enters the south west corner of the property before passing under Main Street. The site is located on Map 4d Parcel 21 and is approximately 17.88 acres. There are two existing catch basins along the paved entrance and catch basins are located along Main Street as well.

The site generally consists of steep slopes and woodland with more mild slopes around the existing building. The high point is located around the existing building and therefore, runoff from the site will generally drain in all directions towards the Main Street and the exiting wetlands.

The NRCS Web Soil Survey indicates the soils within the project area mainly consist of 102C Chatfield-Hollis-Rock outcrop complex and are within Hydrologic Soils Group (HSG) B. Soils towards the back of the site consist of 245B Hinckley Sandy Loam and are within HSG A. A small portion of soils near Great Brook falls within HSG D. Soils within HSG A have high infiltration rates (low runoff potential) while soils within HSG D have slow infiltration rates (high runoff potential). On site soil testing is consistent with this data, with soils mainly in the gravelly sand to course sand range.

The proposed site falls within the Limited Business district and within the Mixed Use Village and Wireless Communication overlay districts. The lot is surrounded by residential lots and other limited business lots.

1.6 Proposed Stormwater Management System

Runoff from the proposed impervious areas will be conveyed and treated through a combination of BMP’s before being infiltrated into the ground. This will help groundwater recharge and maintain a healthy wetland environment. The following is a brief discussion of each conveyance and treatment BMP proposed.

<u>Subsurface Infiltration Chambers</u>

Two subsurface infiltration areas are included on site. Cultec prefabricated plastic chambers, model R-330XLHD, will be installed to collect the runoff from portions of the pavement and roofs. A pipe manifold will be used to spread the stormwater

evenly across all chambers. The chambers have been designed to handle the runoff associated with the 100-year storm event. Runoff from the impervious areas will be routed via catch basin and drain pipe towards these infiltration areas.

Infiltration Basin

An infiltration basin will collect runoff from a portion of the pavement and roof tops. The basin has been designed to accommodate the runoff associated with the 100-year storm event. Pretreatment is provided using a sediment forebay within the basin. Runoff will enter the basin through sheet flow and catch basins and drain pipes.

Vortsentry HS

The Vortsentry HS36 is a compact, below grade stormwater treatment system that uses helical flow technology to enhance gravitational separation of floating and settling pollutants from stormwater flows. Portions of runoff from the parking area will be routed through this system to receive proper pre-treatment before entering subsurface infiltration area A.

1.7 Methods of Analysis

United States Department of Agriculture Natural Resources Conservation Service (NRCS) soil cover complex methods (TR-20) were employed to compute runoff quantities for the subject property. HydroCAD 10.0 computer software was employed in this hydrologic analysis.

Due to the exiting topography of the site, all runoff from the proposed property will collect at three points. A pre- and post- development analysis was performed to determine that there will be no flooding at these points during the 24-hour rainfall events of the 2-, 10, 25- and 100- year return frequencies. Watershed boundaries for existing conditions are depicted on the attached Pre-development Watershed Plan. Post-Developed watershed boundaries are indicated on the Post-Development Watershed Plan.

2.0 Stormwater Standards Compliance

2.1 Standard 1 – Untreated Discharges

The stormwater management system for the proposed development will not result in any new discharges of untreated stormwater to wetland resource areas. Stormwater management structures have been designed such that there is no erosion or scour to wetland resource areas or waters of the Commonwealth.

2.2 Standard 2 – Peak Rate Attenuation

The stormwater management system for the proposed development will utilize subsurface infiltration chambers that have been sized to handle the runoff related to a 100-year, 24-hour rainfall event.

Hydrologic calculations for existing and proposed site conditions are included in Appendices D and E respectively. Calculations for 24-hour rainfall events of 2-, 10-, 25- and 100-year return frequencies are provided. Table 1 provides a summary of peak rates of runoff related to each of these storms at the design points. For all rainfall events considered, the proposed stormwater management system will control runoff from the development such that corresponding peak flows at the design point will not exceed pre-development levels.

Table 1: Design Point Peak Runoff Rates

	Pre-Developed	**Post-Developed**	**Delta**
Design Point "A"			
2-Year	0.04 cfs	0.03 cfs	-0.01 cfs
10-Year	2.61 cfs	2.13 cfs	-0.48 cfs
25-Year	4.71 cfs	3.97 cfs	-0.74 cfs
100-Year	9.10 cfs	7.88 cfs	-1.22 cfs
Design Point "B"			
2-Year	0.02 cfs	0.02 cfs	0.00 cfs
10-Year	0.50 cfs	0.44 cfs	-0.06 cfs
25-Year	1.42 cfs	1.24 cfs	-0.18 cfs
100-Year	4.27 cfs	3.72 cfs	-0.55 cfs
Design Point "C"			
2-Year	2.76 cfs	0.43 cfs	-2.33 cfs
10-Year	5.30 cfs	1.66 cfs	-3.64 cfs
25-Year	7.22 cfs	2.85 cfs	-4.37 cfs
100-Year	10.90 cfs	4.37 cfs	-6.53 cfs

2.3 Standard 3 – Recharge

As discussed in the Introduction, Natural Resource Conservation Service data indicates that the areas within the proposed development consist soils from Hydrologic Group B.

Recharge calculations can be found in Appendix F.

2.4 Standard 4 – Water Quality

82% of the impervious surfaces on site will be directed towards one of the three stormwater management systems. The only impervious area not directed towards a stormwater system is the existing paved parking area behind the building. Calculations in Appendix F show the site still meets WQV, recharge and TSS removal standards.

All of the proposed pavement and the existing parking lot in front of the building will be routed towards a stormwater management area. The deep sump catch basins paired with the Vortsentry will produce 85% TSS removal for Infiltration Area A. The deep sump catch basins paired with a sediment forebay provide 44% TSS removal for the infiltration basin. Calculations are included in Appendix F.

Infiltration Area B does not require TSS pre-treatment since it will not be collecting runoff from any paved areas.

2.5 Standard 5 – Land Uses with Higher Pollutant Loads

The current and proposed uses of the subject site do not constitute land use with higher potential pollutant load, thus Standard 5 does not apply to the proposed project.

2.6 Standard 6 – Critical Areas

The proposed project does not involve a stormwater discharge within or near to any of the areas defined as “Critical Areas” at 314 CMR 9.02 and 310 CMR 10.04.

2.7 Standard 7 – Redevelopment

The project does not qualify for re-development provisions and will meet all stormwater standards fully.

2.8 Standard 8 – Construction Period Pollution Prevention and Erosion and Sediment Control

The project is subject to the filing of an Environmental Protection Agency Notice

of Intent (EPA NOI) and a Stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to construction. This document will be prepared to satisfy the requirements of the EPA NOI and the Standard 8 Construction Period Pollution prevention and Erosion and Sedimentation Control Plan.

2.9 Standard 9 – Operation and Maintenance Plan

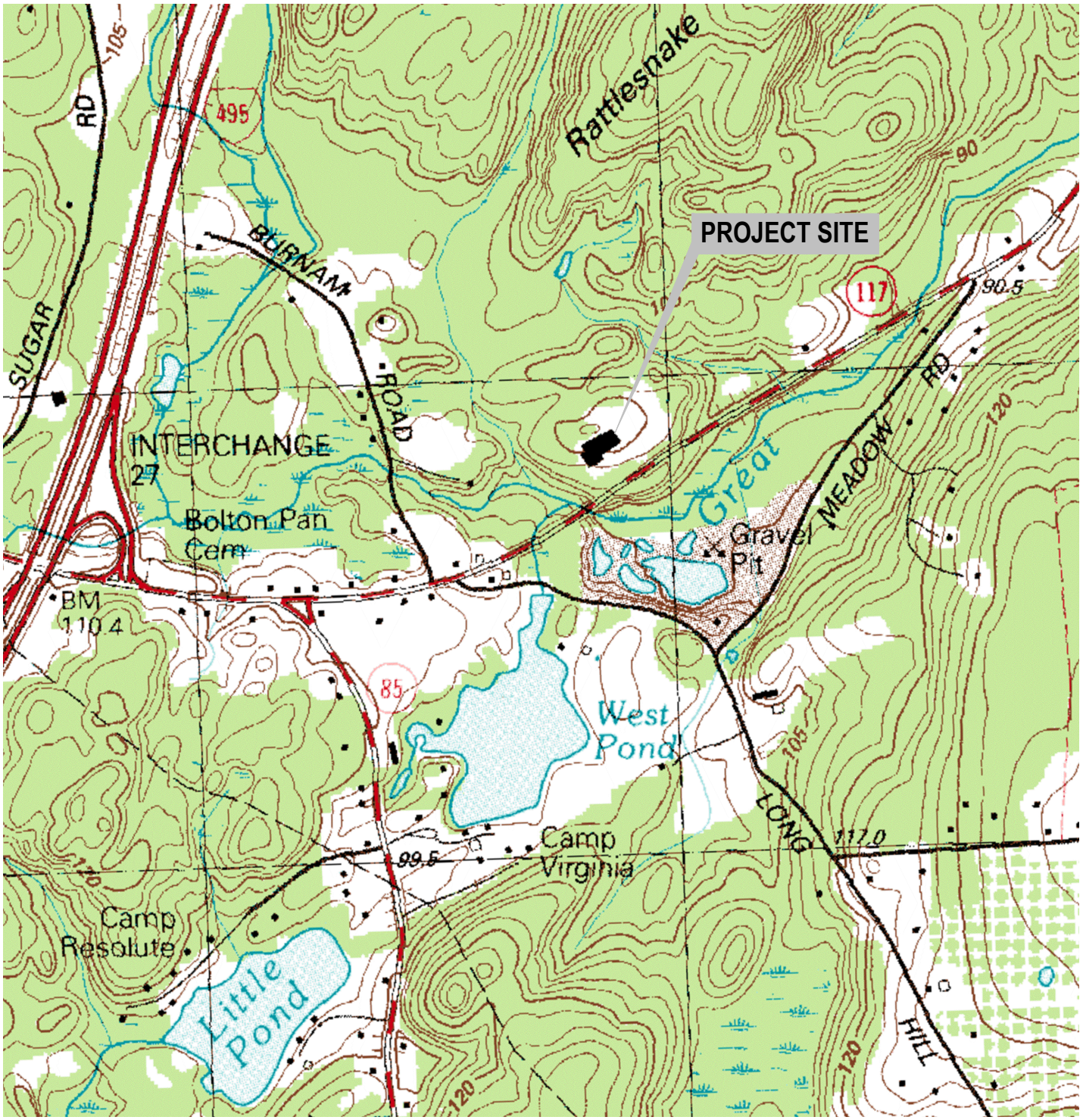
Refer to Appendix G for a complete copy of the Stormwater Operation and Maintenance Plan.

2.10 Standard 10 – Prohibition of Illicit Discharges

An illicit discharge statement will be prepared after approvals are received and prior to construction.

APPENDIX A

Locus Map



APPENDIX A - LOCUS MAP

1"=1,000'

Prepared By: Dillis & Roy Civil Design Goup, Inc.
1 Main Street, Suite 1
Lunenburg, Massachusetts

References: 1988 USGS Ayer
Massachusetts Topographic Map

Prepared For: Environmental Pools
184R Riverneck Road
Chelmsford, MA

DILLIS & ROY
CIVIL DESIGN GROUP
CIVIL ENGINEERS LAND SURVEYORS WETLAND CONSULTANTS

APPENDIX B

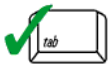
Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

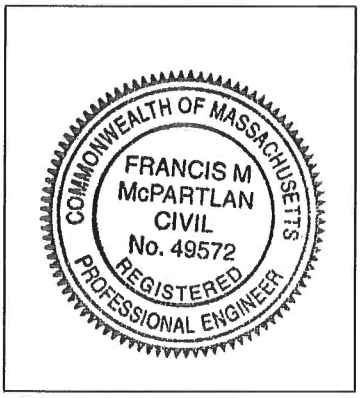
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Signature and Date 3/3/2021

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☒ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☐ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

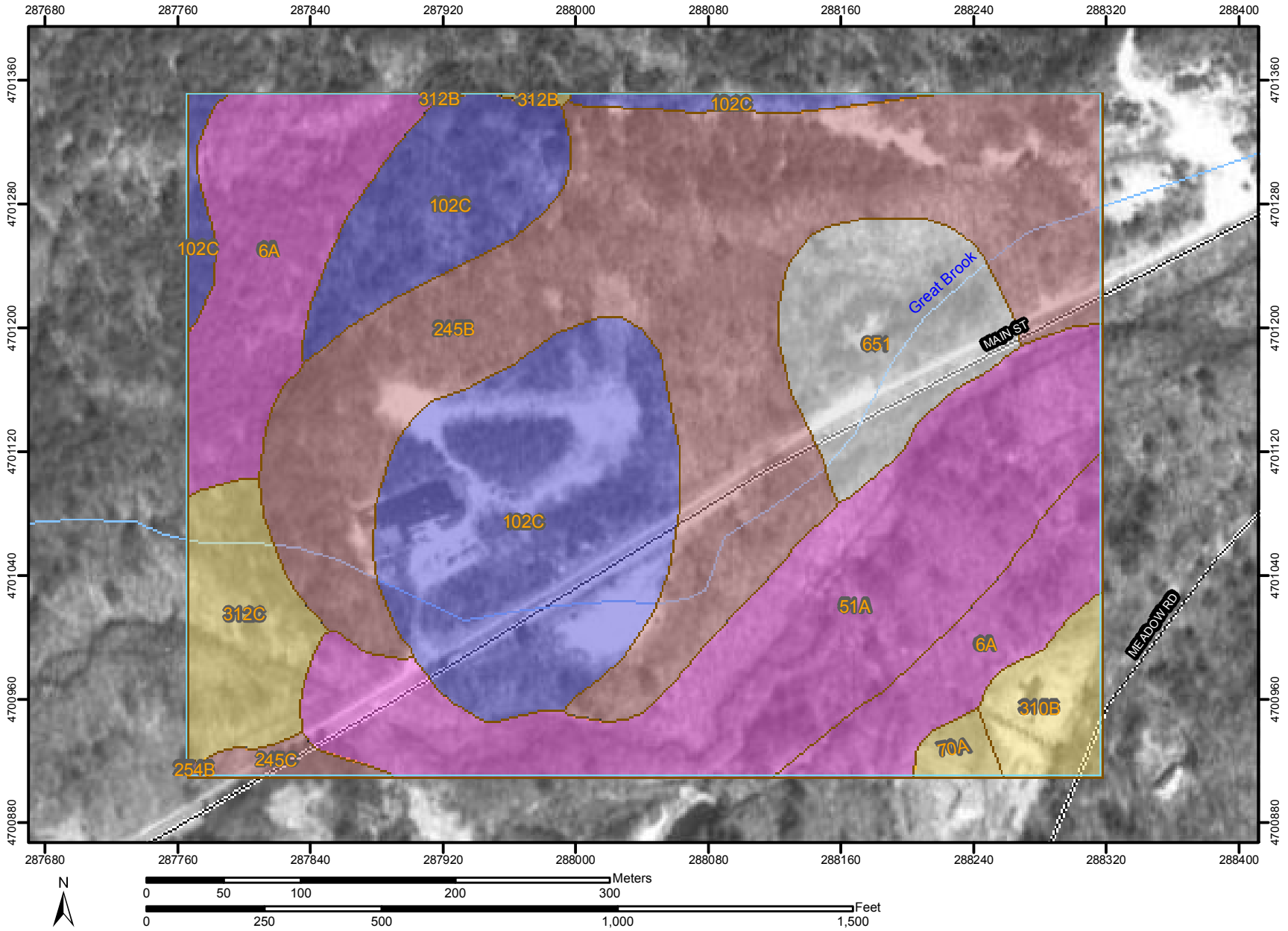
☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☒ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

APPENDIX C

NRCS Soils Data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MEADOW RD
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70A
254B
245C
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Meters
0
50
100
200
300
Feet
0
250
500
1,000
1,500

MAP LEGEND

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

Soils
- Soil Map Units

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

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 19N

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

Soil Survey Area: Worcester County, Massachusetts, Northeastern Part
Survey Area Data: Version 6, Jan 30, 2007

Date(s) aerial images were photographed: 3/29/1995

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

Hydrologic Soil Group— Summary by Map Unit — Worcester County, Massachusetts, Northeastern Part				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	D	8.1	12.6%
51A	Swansea muck, 0 to 1 percent slopes	D	11.7	18.1%
70A	Ridgebury fine sandy loam, 0 to 3 percent slopes	C	0.4	0.7%
102C	Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes	B	14.0	21.8%
245B	Hinckley sandy loam, 3 to 8 percent slopes	A	20.4	31.8%
245C	Hinckley sandy loam, 8 to 15 percent slopes	A	0.5	0.8%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	0.0	0.0%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C	1.6	2.5%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	C	0.1	0.1%
312C	Woodbridge fine sandy loam, 8 to 15 percent slopes, extremely stony	C	2.9	4.5%
651	Udorthents, smoothed		4.6	7.1%
Totals for Area of Interest (AOI)			64.4	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

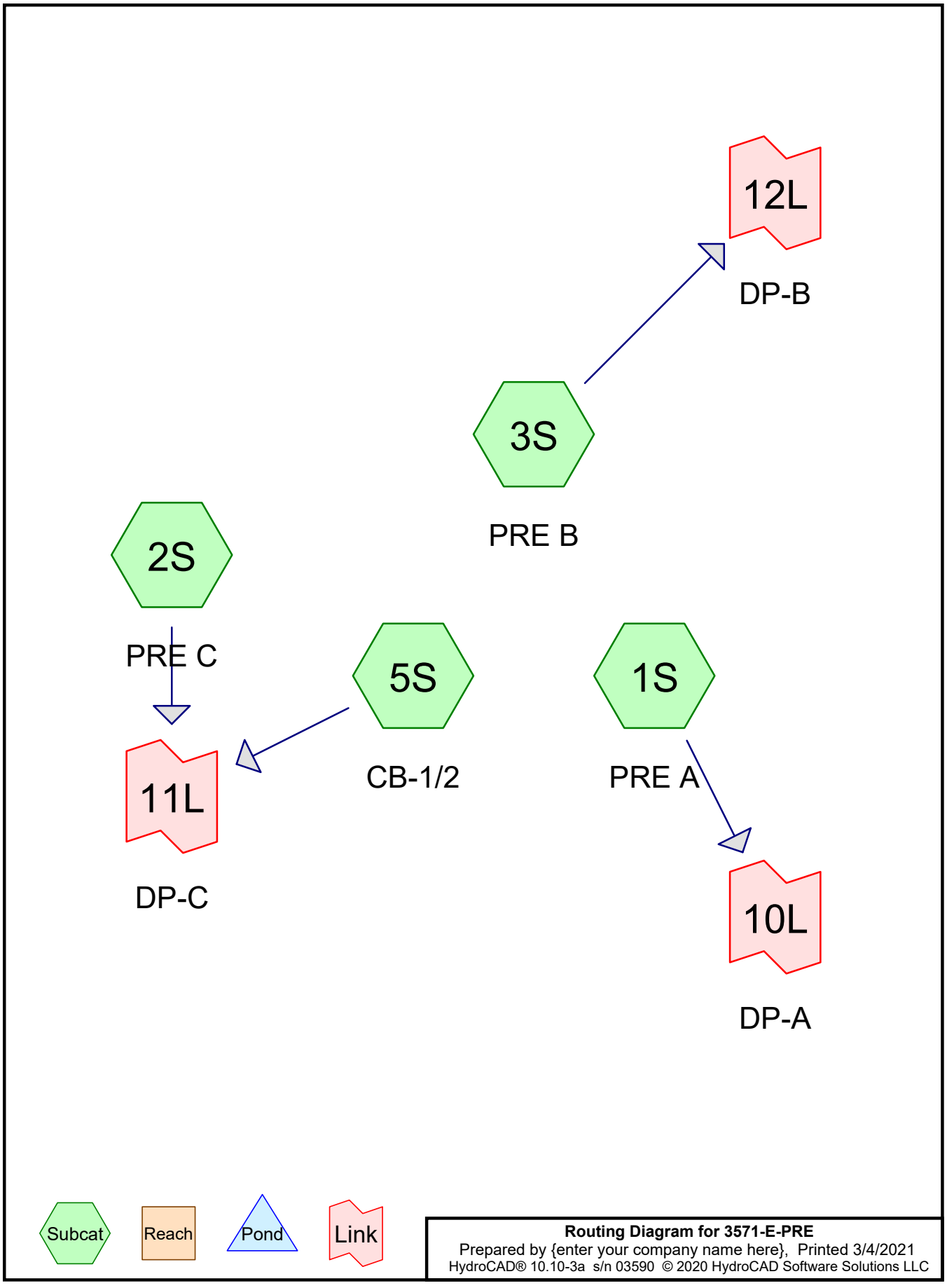
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

APPENDIX D

Existing Conditions – Hydrologic Calculations



Routing Diagram for 3571-E-PRE
Prepared by {enter your company name here}, Printed 3/4/2021

3571-E-PRE

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.10	2
2	10-year	Type III 24-hr		Default	24.00	1	4.50	2
3	25-year	Type III 24-hr		Default	24.00	1	5.40	2
4	100-year	Type III 24-hr		Default	24.00	1	7.00	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.598	61	>75% Grass cover, Good, HSG B (1S, 3S, 5S)
0.783	96	Gravel surface, HSG B (1S, 3S)
0.237	98	Paved parking, HSG A (2S, 3S)
1.142	98	Paved parking, HSG B (1S, 2S, 3S, 5S)
0.015	98	Roofs, HSG A (2S)
0.474	98	Roofs, HSG B (2S, 5S)
5.046	30	Woods, Good, HSG A (1S, 2S, 3S)
3.531	55	Woods, Good, HSG B (1S, 2S, 3S, 5S)
0.211	70	Woods, Good, HSG C (2S)
12.036	**54**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
5.297	HSG A	1S, 2S, 3S
6.528	HSG B	1S, 2S, 3S, 5S
0.211	HSG C	2S
0.000	HSG D	
0.000	Other	
12.036		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.598	0.000	0.000	0.000	0.598	>75% Grass cover, Good	1S, 3S, 5S
0.000	0.783	0.000	0.000	0.000	0.783	Gravel surface	1S, 3S
0.237	1.142	0.000	0.000	0.000	1.379	Paved parking	1S, 2S, 3S, 5S
0.015	0.474	0.000	0.000	0.000	0.489	Roofs	2S, 5S
5.046	3.531	0.211	0.000	0.000	8.788	Woods, Good	1S, 2S, 3S, 5S
5.297	**6.528**	**0.211**	**0.000**	**0.000**	**12.036**	**TOTAL AREA**	

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

Subcatchment1S: PRE A Runoff Area=166,130 sf 6.41% Impervious Runoff Depth>0.21"
Flow Length=362' Tc=6.4 min CN=56 Runoff=0.40 cfs 0.067 af

Subcatchment2S: PRE C Runoff Area=69,630 sf 19.82% Impervious Runoff Depth>0.18"
Flow Length=506' Tc=8.3 min CN=55 Runoff=0.13 cfs 0.025 af

Subcatchment3S: PRE B Runoff Area=233,564 sf 6.61% Impervious Runoff Depth>0.02"
Flow Length=453' Tc=15.8 min CN=45 Runoff=0.02 cfs 0.009 af

Subcatchment5S: CB-1/2 Runoff Area=54,974 sf 75.45% Impervious Runoff Depth>1.79"
Tc=6.0 min CN=88 Runoff=2.76 cfs 0.188 af

Link 10L: DP-A Inflow=0.40 cfs 0.067 af
Primary=0.40 cfs 0.067 af

Link 11L: DP-C Inflow=2.76 cfs 0.212 af
Primary=2.76 cfs 0.212 af

Link 12L: DP-B Inflow=0.02 cfs 0.009 af
Primary=0.02 cfs 0.009 af

Total Runoff Area = 12.036 ac Runoff Volume = 0.288 af Average Runoff Depth = 0.29"
84.48% Pervious = 10.168 ac 15.52% Impervious = 1.868 ac

Summary for Subcatchment 1S: PRE A

Runoff = 0.40 cfs @ 12.33 hrs, Volume= 0.067 af, Depth> 0.21"

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

Area (sf)	CN	Description
10,647	98	Paved parking, HSG B
19,812	96	Gravel surface, HSG B
12,642	61	>75% Grass cover, Good, HSG B
45,799	30	Woods, Good, HSG A
77,230	55	Woods, Good, HSG B
166,130	56	Weighted Average
155,483		93.59% Pervious Area
10,647		6.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0880	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.5	87	0.0180	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.7	225	0.1840	2.14		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.4	362	Total			

Summary for Subcatchment 2S: PRE C

Runoff = 0.13 cfs @ 12.39 hrs, Volume= 0.025 af, Depth> 0.18"

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

Area (sf)	CN	Description
640	98	Roofs, HSG A
9,115	98	Roofs, HSG B
2,607	98	Paved parking, HSG A
1,438	98	Paved parking, HSG B
30,142	30	Woods, Good, HSG A
16,482	55	Woods, Good, HSG B
9,206	70	Woods, Good, HSG C
69,630	55	Weighted Average
55,830		80.18% Pervious Area
13,800		19.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0640	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.8	143	0.0350	1.31		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.9	313	0.1280	1.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.3	506	Total			

Summary for Subcatchment 3S: PRE B

Runoff = 0.02 cfs @ 15.78 hrs, Volume= 0.009 af, Depth> 0.02"

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

Area (sf)	CN	Description
7,705	98	Paved parking, HSG A
7,734	98	Paved parking, HSG B
14,292	96	Gravel surface, HSG B
6,592	61	>75% Grass cover, Good, HSG B
143,847	30	Woods, Good, HSG A
53,394	55	Woods, Good, HSG B
233,564	45	Weighted Average
218,125		93.39% Pervious Area
15,439		6.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	50	0.0460	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
6.8	403	0.0390	0.99		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.8	453	Total			

Summary for Subcatchment 5S: CB-1/2

Runoff = 2.76 cfs @ 12.09 hrs, Volume= 0.188 af, Depth> 1.79"

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

Area (sf)	CN	Description
11,538	98	Roofs, HSG B
29,939	98	Paved parking, HSG B
6,804	61	>75% Grass cover, Good, HSG B
6,693	55	Woods, Good, HSG B
54,974	88	Weighted Average
13,497		24.55% Pervious Area
41,477		75.45% Impervious Area

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

Summary for Link 10L: DP-A

Inflow Area = 3.814 ac, 6.41% Impervious, Inflow Depth > 0.21" for 2-year event
Inflow = 0.40 cfs @ 12.33 hrs, Volume= 0.067 af
Primary = 0.40 cfs @ 12.33 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 11L: DP-C

Inflow Area = 2.861 ac, 44.36% Impervious, Inflow Depth > 0.89" for 2-year event
Inflow = 2.76 cfs @ 12.09 hrs, Volume= 0.212 af
Primary = 2.76 cfs @ 12.09 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 12L: DP-B

Inflow Area = 5.362 ac, 6.61% Impervious, Inflow Depth > 0.02" for 2-year event
Inflow = 0.02 cfs @ 15.78 hrs, Volume= 0.009 af
Primary = 0.02 cfs @ 15.78 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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

Subcatchment1S: PRE A Runoff Area=166,130 sf 6.41% Impervious Runoff Depth>0.70"
Flow Length=362' Tc=6.4 min CN=56 Runoff=2.61 cfs 0.224 af

Subcatchment2S: PRE C Runoff Area=69,630 sf 19.82% Impervious Runoff Depth>0.65"
Flow Length=506' Tc=8.3 min CN=55 Runoff=0.91 cfs 0.087 af

Subcatchment3S: PRE B Runoff Area=233,564 sf 6.61% Impervious Runoff Depth>0.24"
Flow Length=453' Tc=15.8 min CN=45 Runoff=0.50 cfs 0.109 af

Subcatchment5S: CB-1/2 Runoff Area=54,974 sf 75.45% Impervious Runoff Depth>3.01"
Tc=6.0 min CN=88 Runoff=4.55 cfs 0.317 af

Link 10L: DP-A Inflow=2.61 cfs 0.224 af
Primary=2.61 cfs 0.224 af

Link 11L: DP-C Inflow=5.30 cfs 0.404 af
Primary=5.30 cfs 0.404 af

Link 12L: DP-B Inflow=0.50 cfs 0.109 af
Primary=0.50 cfs 0.109 af

Total Runoff Area = 12.036 ac Runoff Volume = 0.736 af Average Runoff Depth = 0.73"
84.48% Pervious = 10.168 ac 15.52% Impervious = 1.868 ac

Summary for Subcatchment 1S: PRE A

Runoff = 2.61 cfs @ 12.12 hrs, Volume= 0.224 af, Depth> 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
10,647	98	Paved parking, HSG B
19,812	96	Gravel surface, HSG B
12,642	61	>75% Grass cover, Good, HSG B
45,799	30	Woods, Good, HSG A
77,230	55	Woods, Good, HSG B
166,130	56	Weighted Average
155,483		93.59% Pervious Area
10,647		6.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0880	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.5	87	0.0180	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.7	225	0.1840	2.14		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.4	362	Total			

Summary for Subcatchment 2S: PRE C

Runoff = 0.91 cfs @ 12.16 hrs, Volume= 0.087 af, Depth> 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
640	98	Roofs, HSG A
9,115	98	Roofs, HSG B
2,607	98	Paved parking, HSG A
1,438	98	Paved parking, HSG B
30,142	30	Woods, Good, HSG A
16,482	55	Woods, Good, HSG B
9,206	70	Woods, Good, HSG C
69,630	55	Weighted Average
55,830		80.18% Pervious Area
13,800		19.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0640	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.8	143	0.0350	1.31		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.9	313	0.1280	1.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.3	506	Total			

Summary for Subcatchment 3S: PRE B

Runoff = 0.50 cfs @ 12.52 hrs, Volume= 0.109 af, Depth> 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
7,705	98	Paved parking, HSG A
7,734	98	Paved parking, HSG B
14,292	96	Gravel surface, HSG B
6,592	61	>75% Grass cover, Good, HSG B
143,847	30	Woods, Good, HSG A
53,394	55	Woods, Good, HSG B
233,564	45	Weighted Average
218,125		93.39% Pervious Area
15,439		6.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	50	0.0460	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
6.8	403	0.0390	0.99		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.8	453	Total			

Summary for Subcatchment 5S: CB-1/2

Runoff = 4.55 cfs @ 12.09 hrs, Volume= 0.317 af, Depth> 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
11,538	98	Roofs, HSG B
29,939	98	Paved parking, HSG B
6,804	61	>75% Grass cover, Good, HSG B
6,693	55	Woods, Good, HSG B
54,974	88	Weighted Average
13,497		24.55% Pervious Area
41,477		75.45% Impervious Area

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

Summary for Link 10L: DP-A

Inflow Area = 3.814 ac, 6.41% Impervious, Inflow Depth > 0.70" for 10-year event
Inflow = 2.61 cfs @ 12.12 hrs, Volume= 0.224 af
Primary = 2.61 cfs @ 12.12 hrs, Volume= 0.224 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 11L: DP-C

Inflow Area = 2.861 ac, 44.36% Impervious, Inflow Depth > 1.69" for 10-year event
Inflow = 5.30 cfs @ 12.10 hrs, Volume= 0.404 af
Primary = 5.30 cfs @ 12.10 hrs, Volume= 0.404 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 12L: DP-B

Inflow Area = 5.362 ac, 6.61% Impervious, Inflow Depth > 0.24" for 10-year event
Inflow = 0.50 cfs @ 12.52 hrs, Volume= 0.109 af
Primary = 0.50 cfs @ 12.52 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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

Subcatchment1S: PRE A Runoff Area=166,130 sf 6.41% Impervious Runoff Depth>2.02"
Flow Length=362' Tc=6.4 min CN=56 Runoff=9.10 cfs 0.642 af

Subcatchment2S: PRE C Runoff Area=69,630 sf 19.82% Impervious Runoff Depth>1.93"
Flow Length=506' Tc=8.3 min CN=55 Runoff=3.34 cfs 0.257 af

Subcatchment3S: PRE B Runoff Area=233,564 sf 6.61% Impervious Runoff Depth>1.09"
Flow Length=453' Tc=15.8 min CN=45 Runoff=4.27 cfs 0.487 af

Subcatchment5S: CB-1/2 Runoff Area=54,974 sf 75.45% Impervious Runoff Depth>5.29"
Tc=6.0 min CN=88 Runoff=7.74 cfs 0.556 af

Link 10L: DP-A Inflow=9.10 cfs 0.642 af
Primary=9.10 cfs 0.642 af

Link 11L: DP-C Inflow=10.90 cfs 0.813 af
Primary=10.90 cfs 0.813 af

Link 12L: DP-B Inflow=4.27 cfs 0.487 af
Primary=4.27 cfs 0.487 af

Total Runoff Area = 12.036 ac Runoff Volume = 1.942 af Average Runoff Depth = 1.94"
84.48% Pervious = 10.168 ac 15.52% Impervious = 1.868 ac

Summary for Subcatchment 1S: PRE A

Runoff = 9.10 cfs @ 12.11 hrs, Volume= 0.642 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
10,647	98	Paved parking, HSG B
19,812	96	Gravel surface, HSG B
12,642	61	>75% Grass cover, Good, HSG B
45,799	30	Woods, Good, HSG A
77,230	55	Woods, Good, HSG B
166,130	56	Weighted Average
155,483		93.59% Pervious Area
10,647		6.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0880	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.5	87	0.0180	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.7	225	0.1840	2.14		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.4	362	Total			

Summary for Subcatchment 2S: PRE C

Runoff = 3.34 cfs @ 12.13 hrs, Volume= 0.257 af, Depth> 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
640	98	Roofs, HSG A
9,115	98	Roofs, HSG B
2,607	98	Paved parking, HSG A
1,438	98	Paved parking, HSG B
30,142	30	Woods, Good, HSG A
16,482	55	Woods, Good, HSG B
9,206	70	Woods, Good, HSG C
69,630	55	Weighted Average
55,830		80.18% Pervious Area
13,800		19.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0640	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.8	143	0.0350	1.31		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.9	313	0.1280	1.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.3	506	Total			

Summary for Subcatchment 3S: PRE B

Runoff = 4.27 cfs @ 12.28 hrs, Volume= 0.487 af, Depth> 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
7,705	98	Paved parking, HSG A
7,734	98	Paved parking, HSG B
14,292	96	Gravel surface, HSG B
6,592	61	>75% Grass cover, Good, HSG B
143,847	30	Woods, Good, HSG A
53,394	55	Woods, Good, HSG B
233,564	45	Weighted Average
218,125		93.39% Pervious Area
15,439		6.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	50	0.0460	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
6.8	403	0.0390	0.99		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.8	453	Total			

Summary for Subcatchment 5S: CB-1/2

Runoff = 7.74 cfs @ 12.09 hrs, Volume= 0.556 af, Depth> 5.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
11,538	98	Roofs, HSG B
29,939	98	Paved parking, HSG B
6,804	61	>75% Grass cover, Good, HSG B
6,693	55	Woods, Good, HSG B
54,974	88	Weighted Average
13,497		24.55% Pervious Area
41,477		75.45% Impervious Area

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

Summary for Link 10L: DP-A

Inflow Area = 3.814 ac, 6.41% Impervious, Inflow Depth > 2.02" for 100-year event
Inflow = 9.10 cfs @ 12.11 hrs, Volume= 0.642 af
Primary = 9.10 cfs @ 12.11 hrs, Volume= 0.642 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 11L: DP-C

Inflow Area = 2.861 ac, 44.36% Impervious, Inflow Depth > 3.41" for 100-year event
Inflow = 10.90 cfs @ 12.10 hrs, Volume= 0.813 af
Primary = 10.90 cfs @ 12.10 hrs, Volume= 0.813 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 12L: DP-B

Inflow Area = 5.362 ac, 6.61% Impervious, Inflow Depth > 1.09" for 100-year event
Inflow = 4.27 cfs @ 12.28 hrs, Volume= 0.487 af
Primary = 4.27 cfs @ 12.28 hrs, Volume= 0.487 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

3571-E-PRE
Prepared by {enter your company name here}

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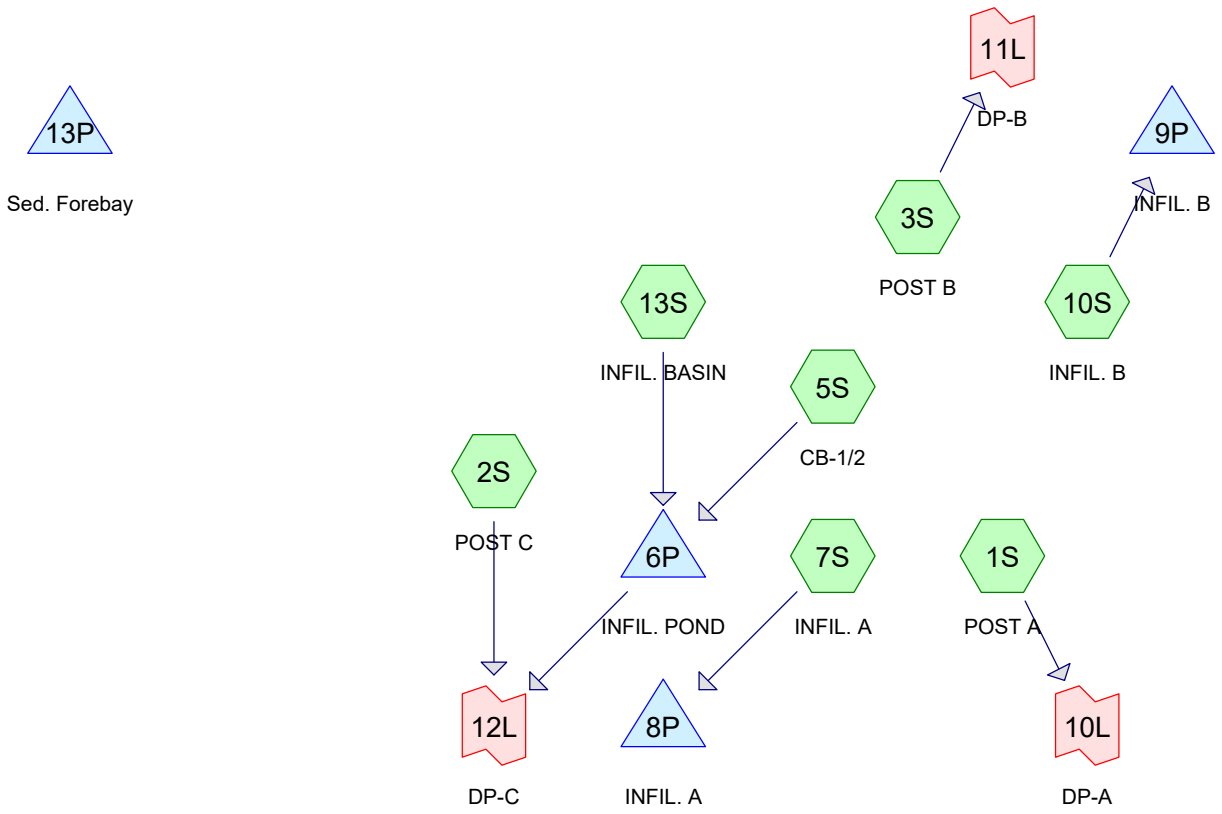
APPENDIX E

Proposed Conditions – Hydrologic Calculations



Subcat Reach Pond Link

Routing Diagram for 3571-E-POST

Prepared by {enter your company name here}, Printed 3/4/2021

3571-E-POST

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.10	2
2	10-year	Type III 24-hr		Default	24.00	1	4.50	2
3	25-year	Type III 24-hr		Default	24.00	1	5.40	2
4	100-year	Type III 24-hr		Default	24.00	1	7.00	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.441	39	>75% Grass cover, Good, HSG A (2S, 3S, 13S)
2.111	61	>75% Grass cover, Good, HSG B (1S, 2S, 3S, 5S, 10S, 13S)
0.115	80	>75% Grass cover, Good, HSG D (2S)
0.091	96	Gravel surface, HSG A (3S, 13S)
1.224	96	Gravel surface, HSG B (1S, 3S, 10S)
0.237	98	Paved parking, HSG A (3S, 13S)
1.229	98	Paved parking, HSG B (1S, 3S, 5S, 7S, 10S, 13S)
0.015	98	Roofs, HSG A (13S)
0.566	98	Roofs, HSG B (5S, 10S, 13S)
4.429	30	Woods, Good, HSG A (1S, 2S, 3S, 13S)
1.493	55	Woods, Good, HSG B (1S, 3S, 13S)
0.086	77	Woods, Good, HSG D (2S)
12.036	**58**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
5.212	HSG A	1S, 2S, 3S, 13S
6.623	HSG B	1S, 2S, 3S, 5S, 7S, 10S, 13S
0.000	HSG C	
0.202	HSG D	2S
0.000	Other	
12.036		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.441	2.111	0.000	0.115	0.000	2.668	>75% Grass cover, Good	1S, 2S, 3S, 5S, 10S, 13S
0.091	1.224	0.000	0.000	0.000	1.314	Gravel surface	1S, 3S, 10S, 13S
0.237	1.229	0.000	0.000	0.000	1.465	Paved parking	1S, 3S, 5S, 7S, 10S, 13S
0.015	0.566	0.000	0.000	0.000	0.581	Roofs	5S, 10S, 13S
4.429	1.493	0.000	0.086	0.000	6.008	Woods, Good	1S, 2S, 3S, 13S
5.212	**6.623**	**0.000**	**0.202**	**0.000**	**12.036**	**TOTAL AREA**	

3571-E-POST

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	6P	310.00	308.00	50.0	0.0400	0.013	12.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: POST A Runoff Area=151,683 sf 0.85% Impervious Runoff Depth=0.22"
Flow Length=362' Tc=6.4 min CN=55 Runoff=0.30 cfs 0.064 af

Subcatchment2S: POST C Runoff Area=17,789 sf 0.00% Impervious Runoff Depth=0.37"
Flow Length=218' Tc=7.0 min CN=60 Runoff=0.09 cfs 0.013 af

Subcatchment3S: POST B Runoff Area=203,314 sf 7.41% Impervious Runoff Depth=0.03"
Flow Length=453' Tc=15.8 min CN=45 Runoff=0.02 cfs 0.013 af

Subcatchment5S: CB-1/2 Runoff Area=59,026 sf 74.40% Impervious Runoff Depth=1.99"
Tc=6.0 min CN=89 Runoff=3.08 cfs 0.225 af

Subcatchment7S: INFIL. A Runoff Area=10,126 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.68 cfs 0.056 af

Subcatchment10S: INFIL. B Runoff Area=30,549 sf 14.78% Impervious Runoff Depth=1.83"
Tc=6.0 min CN=87 Runoff=1.47 cfs 0.107 af

Subcatchment13S: INFIL. BASIN Runoff Area=51,808 sf 27.44% Impervious Runoff Depth=0.37"
Flow Length=422' Tc=7.7 min CN=60 Runoff=0.26 cfs 0.037 af

Pond 6P: INFIL. POND Peak Elev=312.10' Storage=5,321 cf Inflow=3.26 cfs 0.261 af
Discarded=0.12 cfs 0.209 af Primary=0.40 cfs 0.052 af Outflow=0.51 cfs 0.261 af

Pond 8P: INFIL. A Peak Elev=318.92' Storage=0.022 af Inflow=0.68 cfs 0.056 af
Outflow=0.06 cfs 0.056 af

Pond 9P: INFIL. B Peak Elev=336.88' Storage=0.047 af Inflow=1.47 cfs 0.107 af
Outflow=0.10 cfs 0.107 af

Pond 13P: Sed. Forebay Peak Elev=0.00' Storage=0 cf

Link 10L: DP-A Inflow=0.30 cfs 0.064 af
Primary=0.30 cfs 0.064 af

Link 11L: DP-B Inflow=0.02 cfs 0.013 af
Primary=0.02 cfs 0.013 af

Link 12L: DP-C Inflow=0.43 cfs 0.065 af
Primary=0.43 cfs 0.065 af

Total Runoff Area = 12.036 ac Runoff Volume = 0.514 af Average Runoff Depth = 0.51"
83.00% Pervious = 9.990 ac 17.00% Impervious = 2.046 ac

Summary for Subcatchment 1S: POST A

Runoff = 0.30 cfs @ 12.36 hrs, Volume= 0.064 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
1,287	98	Paved parking, HSG B
23,043	96	Gravel surface, HSG B
28,517	61	>75% Grass cover, Good, HSG B
53,173	55	Woods, Good, HSG B
45,663	30	Woods, Good, HSG A
151,683	55	Weighted Average
150,396		99.15% Pervious Area
1,287		0.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0880	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.5	87	0.0180	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.7	225	0.1840	2.14		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.4	362	Total			

Summary for Subcatchment 2S: POST C

Runoff = 0.09 cfs @ 12.16 hrs, Volume= 0.013 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
3,246	39	>75% Grass cover, Good, HSG A
2,197	61	>75% Grass cover, Good, HSG B
5,024	80	>75% Grass cover, Good, HSG D
3,567	30	Woods, Good, HSG A
3,755	77	Woods, Good, HSG D
17,789	60	Weighted Average
17,789		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1500	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.4	168	0.1580	1.99		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	218	Total			

Summary for Subcatchment 3S: POST B

Runoff = 0.02 cfs @ 15.78 hrs, Volume= 0.013 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
7,705	98	Paved parking, HSG A
7,364	98	Paved parking, HSG B
1,911	96	Gravel surface, HSG A
12,289	96	Gravel surface, HSG B
7,650	39	>75% Grass cover, Good, HSG A
32,946	61	>75% Grass cover, Good, HSG B
130,715	30	Woods, Good, HSG A
2,734	55	Woods, Good, HSG B
203,314	45	Weighted Average
188,245		92.59% Pervious Area
15,069		7.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	50	0.0460	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
6.8	403	0.0390	0.99		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.8	453	Total			

Summary for Subcatchment 5S: CB-1/2

Runoff = 3.08 cfs @ 12.09 hrs, Volume= 0.225 af, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
11,538	98	Roofs, HSG B
32,376	98	Paved parking, HSG B
15,112	61	>75% Grass cover, Good, HSG B
59,026	89	Weighted Average
15,112		25.60% Pervious Area
43,914		74.40% Impervious Area

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

Summary for Subcatchment 7S: INFIL. A

Runoff = 0.68 cfs @ 12.09 hrs, Volume= 0.056 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
10,126	98	Paved parking, HSG B
10,126		100.00% Impervious Area

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

Summary for Subcatchment 10S: INFIL. B

Runoff = 1.47 cfs @ 12.09 hrs, Volume= 0.107 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
4,000	98	Roofs, HSG B
515	98	Paved parking, HSG B
17,967	96	Gravel surface, HSG B
8,067	61	>75% Grass cover, Good, HSG B
30,549	87	Weighted Average
26,034		85.22% Pervious Area
4,515		14.78% Impervious Area

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

Summary for Subcatchment 13S: INFIL. BASIN

Runoff = 0.26 cfs @ 12.17 hrs, Volume= 0.037 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
640	98	Roofs, HSG A
9,115	98	Roofs, HSG B
2,607	98	Paved parking, HSG A
1,856	98	Paved parking, HSG B
2,047	96	Gravel surface, HSG A
8,316	39	>75% Grass cover, Good, HSG A
5,127	61	>75% Grass cover, Good, HSG B
12,967	30	Woods, Good, HSG A
9,133	55	Woods, Good, HSG B
51,808	60	Weighted Average
37,590		72.56% Pervious Area
14,218		27.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0640	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.8	143	0.0350	1.31		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	229	0.1140	1.69		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.7	422	Total			

Summary for Pond 6P: INFIL. POND

Inflow Area = 2.544 ac, 52.45% Impervious, Inflow Depth = 1.23" for 2-year event
Inflow = 3.26 cfs @ 12.10 hrs, Volume= 0.261 af
Outflow = 0.51 cfs @ 12.67 hrs, Volume= 0.261 af, Atten= 84%, Lag= 34.4 min
Discarded = 0.12 cfs @ 12.67 hrs, Volume= 0.209 af
Primary = 0.40 cfs @ 12.67 hrs, Volume= 0.052 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 312.10' @ 12.67 hrs Surf.Area= 3,941 sf Storage= 5,321 cf

Plug-Flow detention time= 463.8 min calculated for 0.261 af (100% of inflow)
Center-of-Mass det. time= 463.4 min (1,291.7 - 828.4)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	22,534 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	1,331	153.0	0	0	1,331
312.00	3,820	277.0	4,937	4,937	5,596
314.00	6,642	332.0	10,333	15,270	8,330
315.00	7,905	351.4	7,264	22,534	9,439

Device	Routing	Invert	Outlet Devices
#1	Discarded	310.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 304.70'
#2	Primary	310.00'	**12.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 310.00' / 308.00' S= 0.0400 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	312.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	313.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads
#5	Device 2	314.00'	**48.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.12 cfs @ 12.67 hrs HW=312.10' (Free Discharge)
└**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=0.43 cfs @ 12.67 hrs HW=312.10' (Free Discharge)
└**2=Culvert** (Passes 0.43 cfs of 3.77 cfs potential flow)
  ├**3=Orifice/Grate** (Weir Controls 0.43 cfs @ 1.03 fps)
  ├**4=Orifice/Grate** (Controls 0.00 cfs)
  └**5=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 8P: INFIL. A

Inflow Area = 0.232 ac,100.00% Impervious, Inflow Depth = 2.87" for 2-year event
Inflow = 0.68 cfs @ 12.09 hrs, Volume= 0.056 af
Outflow = 0.06 cfs @ 13.00 hrs, Volume= 0.056 af, Atten= 91%, Lag= 54.8 min
Discarded = 0.06 cfs @ 13.00 hrs, Volume= 0.056 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 318.92' @ 13.00 hrs Surf.Area= 0.039 ac Storage= 0.022 af

Plug-Flow detention time= 132.5 min calculated for 0.056 af (100% of inflow)
Center-of-Mass det. time= 132.4 min (889.5 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	318.00'	0.033 af	**25.67'W x 66.50'L x 3.54'H Field A** 0.139 af Overall - 0.055 af Embedded = 0.084 af x 40.0% Voids
#2A	318.50'	0.055 af	**Cultec R-330XLHD** x 45 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		0.089 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	318.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 316.00'

Discarded OutFlow Max=0.06 cfs @ 13.00 hrs HW=318.92' (Free Discharge)
↑**1=Exfiltration** (Controls 0.06 cfs)

Pond 8P: INFIL. A - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

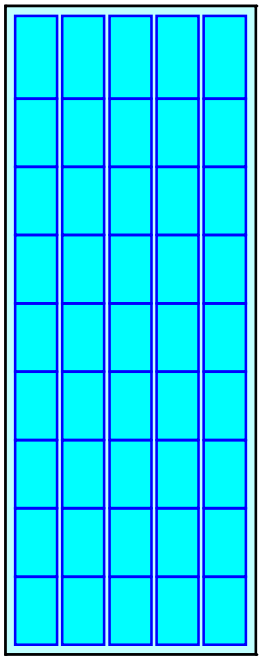
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

45 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,402.9 cf Chamber Storage

6,045.0 cf Field - 2,402.9 cf Chambers = 3,642.1 cf Stone x 40.0% Voids = 1,456.8 cf Stone Storage

Chamber Storage + Stone Storage = 3,859.8 cf = 0.089 af
Overall Storage Efficiency = 63.9%
Overall System Size = 66.50' x 25.67' x 3.54'

45 Chambers
223.9 cy Field
134.9 cy Stone



Summary for Pond 9P: INFIL. B

Inflow Area = 0.701 ac, 14.78% Impervious, Inflow Depth = 1.83" for 2-year event
Inflow = 1.47 cfs @ 12.09 hrs, Volume= 0.107 af
Outflow = 0.10 cfs @ 13.78 hrs, Volume= 0.107 af, Atten= 93%, Lag= 101.3 min
Discarded = 0.10 cfs @ 13.78 hrs, Volume= 0.107 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 336.88' @ 13.78 hrs Surf.Area= 0.090 ac Storage= 0.047 af

Plug-Flow detention time= 190.7 min calculated for 0.107 af (100% of inflow)
Center-of-Mass det. time= 190.6 min (1,010.8 - 820.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	336.00'	0.075 af	**45.00'W x 87.50'L x 3.54'H Field A** 0.320 af Overall - 0.132 af Embedded = 0.189 af x 40.0% Voids
#2A	336.50'	0.132 af	**Cultec R-330XLHD** x 108 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 9 rows
		0.207 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	336.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 328.00'

Discarded OutFlow Max=0.10 cfs @ 13.78 hrs HW=336.88' (Free Discharge)
↑**1=Exfiltration** (Controls 0.10 cfs)

Pond 9P: INFIL. B - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 9 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

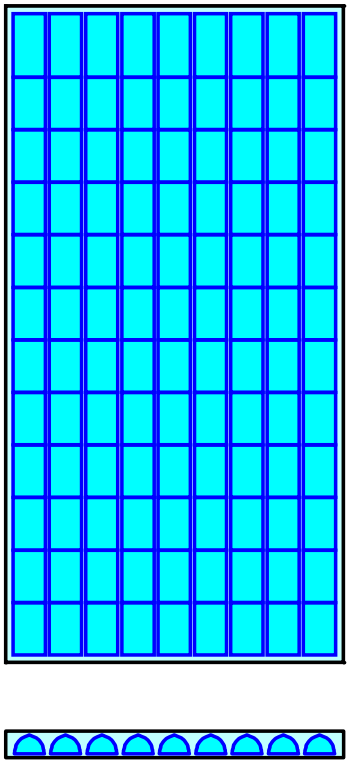
12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length
9 Rows x 52.0" Wide + 6.0" Spacing x 8 + 12.0" Side Stone x 2 = 45.00' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

108 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 9 Rows = 5,733.5 cf Chamber Storage

13,945.3 cf Field - 5,733.5 cf Chambers = 8,211.8 cf Stone x 40.0% Voids = 3,284.7 cf Stone Storage

Chamber Storage + Stone Storage = 9,018.3 cf = 0.207 af
Overall Storage Efficiency = 64.7%
Overall System Size = 87.50' x 45.00' x 3.54'

108 Chambers
516.5 cy Field
304.1 cy Stone



Summary for Pond 13P: Sed. Forebay

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	618 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	24	23.0	0	0	24
312.00	767	116.4	618	618	1,069

Summary for Link 10L: DP-A

Inflow Area = 3.482 ac, 0.85% Impervious, Inflow Depth = 0.22" for 2-year event
Inflow = 0.30 cfs @ 12.36 hrs, Volume= 0.064 af
Primary = 0.30 cfs @ 12.36 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 11L: DP-B

Inflow Area = 4.667 ac, 7.41% Impervious, Inflow Depth = 0.03" for 2-year event
Inflow = 0.02 cfs @ 15.78 hrs, Volume= 0.013 af
Primary = 0.02 cfs @ 15.78 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 12L: DP-C

Inflow Area = 2.953 ac, 45.20% Impervious, Inflow Depth = 0.26" for 2-year event
Inflow = 0.43 cfs @ 12.66 hrs, Volume= 0.065 af
Primary = 0.43 cfs @ 12.66 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: POST A Runoff Area=151,683 sf 0.85% Impervious Runoff Depth=0.74"
Flow Length=362' Tc=6.4 min CN=55 Runoff=2.13 cfs 0.215 af

Subcatchment2S: POST C Runoff Area=17,789 sf 0.00% Impervious Runoff Depth=1.02"
Flow Length=218' Tc=7.0 min CN=60 Runoff=0.40 cfs 0.035 af

Subcatchment3S: POST B Runoff Area=203,314 sf 7.41% Impervious Runoff Depth=0.30"
Flow Length=453' Tc=15.8 min CN=45 Runoff=0.44 cfs 0.115 af

Subcatchment5S: CB-1/2 Runoff Area=59,026 sf 74.40% Impervious Runoff Depth=3.30"
Tc=6.0 min CN=89 Runoff=5.00 cfs 0.372 af

Subcatchment7S: INFIL. A Runoff Area=10,126 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=1.00 cfs 0.083 af

Subcatchment10S: INFIL. B Runoff Area=30,549 sf 14.78% Impervious Runoff Depth=3.10"
Tc=6.0 min CN=87 Runoff=2.46 cfs 0.181 af

Subcatchment13S: INFIL. BASIN Runoff Area=51,808 sf 27.44% Impervious Runoff Depth=1.02"
Flow Length=422' Tc=7.7 min CN=60 Runoff=1.11 cfs 0.101 af

Pond 6P: INFIL. POND Peak Elev=312.77' Storage=8,275 cf Inflow=6.05 cfs 0.473 af
Discarded=0.15 cfs 0.240 af Primary=1.48 cfs 0.233 af Outflow=1.63 cfs 0.473 af

Pond 8P: INFIL. A Peak Elev=319.37' Storage=0.036 af Inflow=1.00 cfs 0.083 af
Outflow=0.07 cfs 0.083 af

Pond 9P: INFIL. B Peak Elev=337.52' Storage=0.096 af Inflow=2.46 cfs 0.181 af
Outflow=0.11 cfs 0.181 af

Pond 13P: Sed. Forebay Peak Elev=0.00' Storage=0 cf

Link 10L: DP-A Inflow=2.13 cfs 0.215 af
Primary=2.13 cfs 0.215 af

Link 11L: DP-B Inflow=0.44 cfs 0.115 af
Primary=0.44 cfs 0.115 af

Link 12L: DP-C Inflow=1.66 cfs 0.267 af
Primary=1.66 cfs 0.267 af

Total Runoff Area = 12.036 ac Runoff Volume = 1.102 af Average Runoff Depth = 1.10"
83.00% Pervious = 9.990 ac 17.00% Impervious = 2.046 ac

Summary for Subcatchment 1S: POST A

Runoff = 2.13 cfs @ 12.12 hrs, Volume= 0.215 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
1,287	98	Paved parking, HSG B
23,043	96	Gravel surface, HSG B
28,517	61	>75% Grass cover, Good, HSG B
53,173	55	Woods, Good, HSG B
45,663	30	Woods, Good, HSG A
151,683	55	Weighted Average
150,396		99.15% Pervious Area
1,287		0.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0880	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.5	87	0.0180	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.7	225	0.1840	2.14		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.4	362	Total			

Summary for Subcatchment 2S: POST C

Runoff = 0.40 cfs @ 12.12 hrs, Volume= 0.035 af, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
3,246	39	>75% Grass cover, Good, HSG A
2,197	61	>75% Grass cover, Good, HSG B
5,024	80	>75% Grass cover, Good, HSG D
3,567	30	Woods, Good, HSG A
3,755	77	Woods, Good, HSG D
17,789	60	Weighted Average
17,789		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1500	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.4	168	0.1580	1.99		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	218	Total			

Summary for Subcatchment 3S: POST B

Runoff = 0.44 cfs @ 12.52 hrs, Volume= 0.115 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
7,705	98	Paved parking, HSG A
7,364	98	Paved parking, HSG B
1,911	96	Gravel surface, HSG A
12,289	96	Gravel surface, HSG B
7,650	39	>75% Grass cover, Good, HSG A
32,946	61	>75% Grass cover, Good, HSG B
130,715	30	Woods, Good, HSG A
2,734	55	Woods, Good, HSG B
203,314	45	Weighted Average
188,245		92.59% Pervious Area
15,069		7.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	50	0.0460	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
6.8	403	0.0390	0.99		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.8	453	Total			

Summary for Subcatchment 5S: CB-1/2

Runoff = 5.00 cfs @ 12.09 hrs, Volume= 0.372 af, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
11,538	98	Roofs, HSG B
32,376	98	Paved parking, HSG B
15,112	61	>75% Grass cover, Good, HSG B
59,026	89	Weighted Average
15,112		25.60% Pervious Area
43,914		74.40% Impervious Area

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

Summary for Subcatchment 7S: INFIL. A

Runoff = 1.00 cfs @ 12.09 hrs, Volume= 0.083 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
10,126	98	Paved parking, HSG B
10,126		100.00% Impervious Area

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

Summary for Subcatchment 10S: INFIL. B

Runoff = 2.46 cfs @ 12.09 hrs, Volume= 0.181 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
4,000	98	Roofs, HSG B
515	98	Paved parking, HSG B
17,967	96	Gravel surface, HSG B
8,067	61	>75% Grass cover, Good, HSG B
30,549	87	Weighted Average
26,034		85.22% Pervious Area
4,515		14.78% Impervious Area

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

Summary for Subcatchment 13S: INFIL. BASIN

Runoff = 1.11 cfs @ 12.13 hrs, Volume= 0.101 af, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.50"

Area (sf)	CN	Description
640	98	Roofs, HSG A
9,115	98	Roofs, HSG B
2,607	98	Paved parking, HSG A
1,856	98	Paved parking, HSG B
2,047	96	Gravel surface, HSG A
8,316	39	>75% Grass cover, Good, HSG A
5,127	61	>75% Grass cover, Good, HSG B
12,967	30	Woods, Good, HSG A
9,133	55	Woods, Good, HSG B
51,808	60	Weighted Average
37,590		72.56% Pervious Area
14,218		27.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0640	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.8	143	0.0350	1.31		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	229	0.1140	1.69		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.7	422	Total			

Summary for Pond 6P: INFIL. POND

Inflow Area = 2.544 ac, 52.45% Impervious, Inflow Depth = 2.23" for 10-year event
Inflow = 6.05 cfs @ 12.10 hrs, Volume= 0.473 af
Outflow = 1.63 cfs @ 12.49 hrs, Volume= 0.473 af, Atten= 73%, Lag= 23.7 min
Discarded = 0.15 cfs @ 12.49 hrs, Volume= 0.240 af
Primary = 1.48 cfs @ 12.49 hrs, Volume= 0.233 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 312.77' @ 12.49 hrs Surf.Area= 4,821 sf Storage= 8,275 cf

Plug-Flow detention time= 307.8 min calculated for 0.473 af (100% of inflow)
Center-of-Mass det. time= 307.3 min (1,124.1 - 816.8)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	22,534 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	1,331	153.0	0	0	1,331
312.00	3,820	277.0	4,937	4,937	5,596
314.00	6,642	332.0	10,333	15,270	8,330
315.00	7,905	351.4	7,264	22,534	9,439

Device	Routing	Invert	Outlet Devices
#1	Discarded	310.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 304.70'
#2	Primary	310.00'	**12.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 310.00' / 308.00' S= 0.0400 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	312.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	313.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads
#5	Device 2	314.00'	**48.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.15 cfs @ 12.49 hrs HW=312.77' (Free Discharge)
└**1=Exfiltration** (Controls 0.15 cfs)

Primary OutFlow Max=1.48 cfs @ 12.49 hrs HW=312.77' (Free Discharge)
└**2=Culvert** (Passes 1.48 cfs of 4.50 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 1.48 cfs @ 4.23 fps)
  ├**4=Orifice/Grate** (Controls 0.00 cfs)
  └**5=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 8P: INFIL. A

Inflow Area = 0.232 ac,100.00% Impervious, Inflow Depth = 4.26" for 10-year event
Inflow = 1.00 cfs @ 12.09 hrs, Volume= 0.083 af
Outflow = 0.07 cfs @ 13.44 hrs, Volume= 0.083 af, Atten= 93%, Lag= 81.3 min
Discarded = 0.07 cfs @ 13.44 hrs, Volume= 0.083 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 319.37' @ 13.44 hrs Surf.Area= 0.039 ac Storage= 0.036 af

Plug-Flow detention time= 211.7 min calculated for 0.083 af (100% of inflow)
Center-of-Mass det. time= 211.6 min (961.4 - 749.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	318.00'	0.033 af	**25.67'W x 66.50'L x 3.54'H Field A** 0.139 af Overall - 0.055 af Embedded = 0.084 af x 40.0% Voids
#2A	318.50'	0.055 af	**Cultec R-330XLHD** x 45 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		0.089 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	318.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 316.00'

Discarded OutFlow Max=0.07 cfs @ 13.44 hrs HW=319.37' (Free Discharge)
1=Exfiltration (Controls 0.07 cfs)

Pond 8P: INFIL. A - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

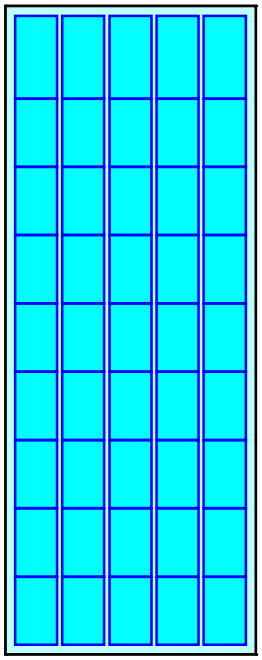
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

45 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,402.9 cf Chamber Storage

6,045.0 cf Field - 2,402.9 cf Chambers = 3,642.1 cf Stone x 40.0% Voids = 1,456.8 cf Stone Storage

Chamber Storage + Stone Storage = 3,859.8 cf = 0.089 af
Overall Storage Efficiency = 63.9%
Overall System Size = 66.50' x 25.67' x 3.54'

45 Chambers
223.9 cy Field
134.9 cy Stone



Summary for Pond 9P: INFIL. B

Inflow Area = 0.701 ac, 14.78% Impervious, Inflow Depth = 3.10" for 10-year event
Inflow = 2.46 cfs @ 12.09 hrs, Volume= 0.181 af
Outflow = 0.11 cfs @ 15.04 hrs, Volume= 0.181 af, Atten= 96%, Lag= 176.9 min
Discarded = 0.11 cfs @ 15.04 hrs, Volume= 0.181 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 337.52' @ 15.04 hrs Surf.Area= 0.090 ac Storage= 0.096 af

Plug-Flow detention time= 373.5 min calculated for 0.181 af (100% of inflow)
Center-of-Mass det. time= 373.5 min (1,178.7 - 805.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	336.00'	0.075 af	**45.00'W x 87.50'L x 3.54'H Field A** 0.320 af Overall - 0.132 af Embedded = 0.189 af x 40.0% Voids
#2A	336.50'	0.132 af	**Cultec R-330XLHD** x 108 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 9 rows
		0.207 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	336.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 328.00'

Discarded OutFlow Max=0.11 cfs @ 15.04 hrs HW=337.52' (Free Discharge)
1=Exfiltration (Controls 0.11 cfs)

Pond 9P: INFIL. B - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 9 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

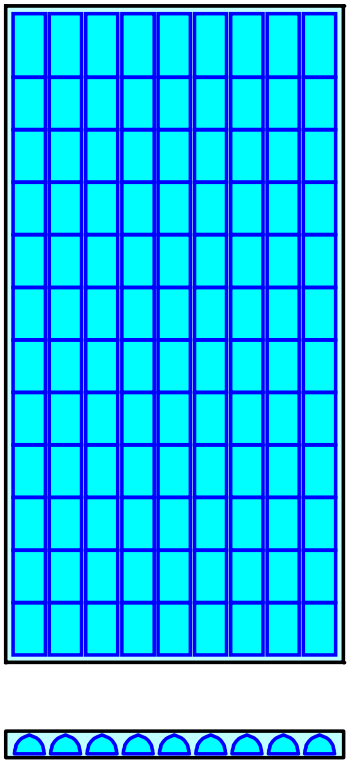
12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length
9 Rows x 52.0" Wide + 6.0" Spacing x 8 + 12.0" Side Stone x 2 = 45.00' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

108 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 9 Rows = 5,733.5 cf Chamber Storage

13,945.3 cf Field - 5,733.5 cf Chambers = 8,211.8 cf Stone x 40.0% Voids = 3,284.7 cf Stone Storage

Chamber Storage + Stone Storage = 9,018.3 cf = 0.207 af
Overall Storage Efficiency = 64.7%
Overall System Size = 87.50' x 45.00' x 3.54'

108 Chambers
516.5 cy Field
304.1 cy Stone



Summary for Pond 13P: Sed. Forebay

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	618 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	24	23.0	0	0	24
312.00	767	116.4	618	618	1,069

Summary for Link 10L: DP-A

Inflow Area = 3.482 ac, 0.85% Impervious, Inflow Depth = 0.74" for 10-year event
Inflow = 2.13 cfs @ 12.12 hrs, Volume= 0.215 af
Primary = 2.13 cfs @ 12.12 hrs, Volume= 0.215 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 11L: DP-B

Inflow Area = 4.667 ac, 7.41% Impervious, Inflow Depth = 0.30" for 10-year event
Inflow = 0.44 cfs @ 12.52 hrs, Volume= 0.115 af
Primary = 0.44 cfs @ 12.52 hrs, Volume= 0.115 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 12L: DP-C

Inflow Area = 2.953 ac, 45.20% Impervious, Inflow Depth = 1.09" for 10-year event
Inflow = 1.66 cfs @ 12.39 hrs, Volume= 0.267 af
Primary = 1.66 cfs @ 12.39 hrs, Volume= 0.267 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: POST A Runoff Area=151,683 sf 0.85% Impervious Runoff Depth=2.12"
Flow Length=362' Tc=6.4 min CN=55 Runoff=7.88 cfs 0.616 af

Subcatchment2S: POST C Runoff Area=17,789 sf 0.00% Impervious Runoff Depth=2.60"
Flow Length=218' Tc=7.0 min CN=60 Runoff=1.15 cfs 0.089 af

Subcatchment3S: POST B Runoff Area=203,314 sf 7.41% Impervious Runoff Depth=1.24"
Flow Length=453' Tc=15.8 min CN=45 Runoff=3.72 cfs 0.481 af

Subcatchment5S: CB-1/2 Runoff Area=59,026 sf 74.40% Impervious Runoff Depth=5.71"
Tc=6.0 min CN=89 Runoff=8.42 cfs 0.645 af

Subcatchment7S: INFIL. A Runoff Area=10,126 sf 100.00% Impervious Runoff Depth=6.76"
Tc=6.0 min CN=98 Runoff=1.56 cfs 0.131 af

Subcatchment10S: INFIL. B Runoff Area=30,549 sf 14.78% Impervious Runoff Depth=5.48"
Tc=6.0 min CN=87 Runoff=4.24 cfs 0.320 af

Subcatchment13S: INFIL. BASIN Runoff Area=51,808 sf 27.44% Impervious Runoff Depth=2.60"
Flow Length=422' Tc=7.7 min CN=60 Runoff=3.27 cfs 0.258 af

Pond 6P: INFIL. POND Peak Elev=313.84' Storage=14,226 cf Inflow=11.58 cfs 0.903 af
Discarded=0.21 cfs 0.268 af Primary=3.82 cfs 0.634 af Outflow=4.03 cfs 0.903 af

Pond 8P: INFIL. A Peak Elev=320.33' Storage=0.065 af Inflow=1.56 cfs 0.131 af
Outflow=0.09 cfs 0.131 af

Pond 9P: INFIL. B Peak Elev=339.26' Storage=0.197 af Inflow=4.24 cfs 0.320 af
Outflow=0.13 cfs 0.320 af

Pond 13P: Sed. Forebay Peak Elev=0.00' Storage=0 cf

Link 10L: DP-A Inflow=7.88 cfs 0.616 af
Primary=7.88 cfs 0.616 af

Link 11L: DP-B Inflow=3.72 cfs 0.481 af
Primary=3.72 cfs 0.481 af

Link 12L: DP-C Inflow=4.37 cfs 0.723 af
Primary=4.37 cfs 0.723 af

Total Runoff Area = 12.036 ac Runoff Volume = 2.540 af Average Runoff Depth = 2.53"
83.00% Pervious = 9.990 ac 17.00% Impervious = 2.046 ac

Summary for Subcatchment 1S: POST A

Runoff = 7.88 cfs @ 12.11 hrs, Volume= 0.616 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
1,287	98	Paved parking, HSG B
23,043	96	Gravel surface, HSG B
28,517	61	>75% Grass cover, Good, HSG B
53,173	55	Woods, Good, HSG B
45,663	30	Woods, Good, HSG A
151,683	55	Weighted Average
150,396		99.15% Pervious Area
1,287		0.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0880	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.5	87	0.0180	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.7	225	0.1840	2.14		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.4	362	Total			

Summary for Subcatchment 2S: POST C

Runoff = 1.15 cfs @ 12.11 hrs, Volume= 0.089 af, Depth= 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
3,246	39	>75% Grass cover, Good, HSG A
2,197	61	>75% Grass cover, Good, HSG B
5,024	80	>75% Grass cover, Good, HSG D
3,567	30	Woods, Good, HSG A
3,755	77	Woods, Good, HSG D
17,789	60	Weighted Average
17,789		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1500	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.4	168	0.1580	1.99		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	218	Total			

Summary for Subcatchment 3S: POST B

Runoff = 3.72 cfs @ 12.28 hrs, Volume= 0.481 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
7,705	98	Paved parking, HSG A
7,364	98	Paved parking, HSG B
1,911	96	Gravel surface, HSG A
12,289	96	Gravel surface, HSG B
7,650	39	>75% Grass cover, Good, HSG A
32,946	61	>75% Grass cover, Good, HSG B
130,715	30	Woods, Good, HSG A
2,734	55	Woods, Good, HSG B
203,314	45	Weighted Average
188,245		92.59% Pervious Area
15,069		7.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	50	0.0460	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
6.8	403	0.0390	0.99		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.8	453	Total			

Summary for Subcatchment 5S: CB-1/2

Runoff = 8.42 cfs @ 12.09 hrs, Volume= 0.645 af, Depth= 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
11,538	98	Roofs, HSG B
32,376	98	Paved parking, HSG B
15,112	61	>75% Grass cover, Good, HSG B
59,026	89	Weighted Average
15,112		25.60% Pervious Area
43,914		74.40% Impervious Area

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

Summary for Subcatchment 7S: INFIL. A

Runoff = 1.56 cfs @ 12.09 hrs, Volume= 0.131 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
10,126	98	Paved parking, HSG B
10,126		100.00% Impervious Area

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

Summary for Subcatchment 10S: INFIL. B

Runoff = 4.24 cfs @ 12.09 hrs, Volume= 0.320 af, Depth= 5.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
4,000	98	Roofs, HSG B
515	98	Paved parking, HSG B
17,967	96	Gravel surface, HSG B
8,067	61	>75% Grass cover, Good, HSG B
30,549	87	Weighted Average
26,034		85.22% Pervious Area
4,515		14.78% Impervious Area

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

Summary for Subcatchment 13S: INFIL. BASIN

Runoff = 3.27 cfs @ 12.12 hrs, Volume= 0.258 af, Depth= 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
640	98	Roofs, HSG A
9,115	98	Roofs, HSG B
2,607	98	Paved parking, HSG A
1,856	98	Paved parking, HSG B
2,047	96	Gravel surface, HSG A
8,316	39	>75% Grass cover, Good, HSG A
5,127	61	>75% Grass cover, Good, HSG B
12,967	30	Woods, Good, HSG A
9,133	55	Woods, Good, HSG B
51,808	60	Weighted Average
37,590		72.56% Pervious Area
14,218		27.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0640	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
1.8	143	0.0350	1.31		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	229	0.1140	1.69		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.7	422	Total			

Summary for Pond 6P: INFIL. POND

Inflow Area = 2.544 ac, 52.45% Impervious, Inflow Depth = 4.26" for 100-year event
Inflow = 11.58 cfs @ 12.10 hrs, Volume= 0.903 af
Outflow = 4.03 cfs @ 12.40 hrs, Volume= 0.903 af, Atten= 65%, Lag= 18.5 min
Discarded = 0.21 cfs @ 12.40 hrs, Volume= 0.268 af
Primary = 3.82 cfs @ 12.40 hrs, Volume= 0.634 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 313.84' @ 12.40 hrs Surf.Area= 6,387 sf Storage= 14,226 cf

Plug-Flow detention time= 189.8 min calculated for 0.902 af (100% of inflow)
Center-of-Mass det. time= 190.6 min (994.3 - 803.7)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	22,534 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	1,331	153.0	0	0	1,331
312.00	3,820	277.0	4,937	4,937	5,596
314.00	6,642	332.0	10,333	15,270	8,330
315.00	7,905	351.4	7,264	22,534	9,439

Device	Routing	Invert	Outlet Devices
#1	Discarded	310.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 304.70'
#2	Primary	310.00'	**12.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 310.00' / 308.00' S= 0.0400 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	312.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	313.00'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads
#5	Device 2	314.00'	**48.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.21 cfs @ 12.40 hrs HW=313.84' (Free Discharge)
└**1=Exfiltration** (Controls 0.21 cfs)

Primary OutFlow Max=3.82 cfs @ 12.40 hrs HW=313.84' (Free Discharge)
└**2=Culvert** (Passes 3.82 cfs of 5.46 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 2.28 cfs @ 6.53 fps)
  ├**4=Orifice/Grate** (Orifice Controls 1.54 cfs @ 4.41 fps)
  └**5=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 8P: INFIL. A

Inflow Area = 0.232 ac,100.00% Impervious, Inflow Depth = 6.76" for 100-year event
Inflow = 1.56 cfs @ 12.09 hrs, Volume= 0.131 af
Outflow = 0.09 cfs @ 13.92 hrs, Volume= 0.131 af, Atten= 94%, Lag= 109.9 min
Discarded = 0.09 cfs @ 13.92 hrs, Volume= 0.131 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 320.33' @ 13.92 hrs Surf.Area= 0.039 ac Storage= 0.065 af

Plug-Flow detention time= 327.4 min calculated for 0.131 af (100% of inflow)
Center-of-Mass det. time= 327.4 min (1,070.4 - 743.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	318.00'	0.033 af	**25.67'W x 66.50'L x 3.54'H Field A** 0.139 af Overall - 0.055 af Embedded = 0.084 af x 40.0% Voids
#2A	318.50'	0.055 af	**Cultec R-330XLHD** x 45 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		0.089 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	318.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 316.00'

Discarded OutFlow Max=0.09 cfs @ 13.92 hrs HW=320.32' (Free Discharge)
↑**1=Exfiltration** (Controls 0.09 cfs)

Pond 8P: INFIL. A - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

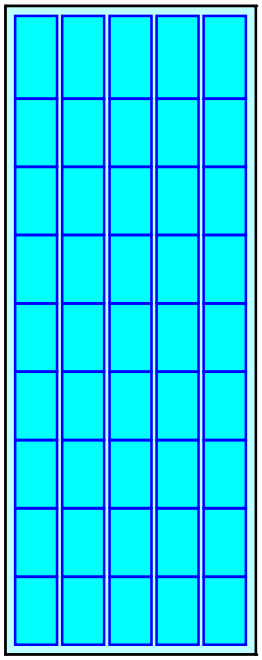
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

45 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,402.9 cf Chamber Storage

6,045.0 cf Field - 2,402.9 cf Chambers = 3,642.1 cf Stone x 40.0% Voids = 1,456.8 cf Stone Storage

Chamber Storage + Stone Storage = 3,859.8 cf = 0.089 af
Overall Storage Efficiency = 63.9%
Overall System Size = 66.50' x 25.67' x 3.54'

45 Chambers
223.9 cy Field
134.9 cy Stone



Summary for Pond 9P: INFIL. B

Inflow Area = 0.701 ac, 14.78% Impervious, Inflow Depth = 5.48" for 100-year event
Inflow = 4.24 cfs @ 12.09 hrs, Volume= 0.320 af
Outflow = 0.13 cfs @ 15.96 hrs, Volume= 0.320 af, Atten= 97%, Lag= 232.0 min
Discarded = 0.13 cfs @ 15.96 hrs, Volume= 0.320 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 339.26' @ 15.96 hrs Surf.Area= 0.090 ac Storage= 0.197 af

Plug-Flow detention time= 669.3 min calculated for 0.320 af (100% of inflow)
Center-of-Mass det. time= 669.6 min (1,458.9 - 789.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	336.00'	0.075 af	**45.00'W x 87.50'L x 3.54'H Field A** 0.320 af Overall - 0.132 af Embedded = 0.189 af x 40.0% Voids
#2A	336.50'	0.132 af	**Cultec R-330XLHD** x 108 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 9 rows
		0.207 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	336.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 328.00'

Discarded OutFlow Max=0.13 cfs @ 15.96 hrs HW=339.26' (Free Discharge)
↑**1=Exfiltration** (Controls 0.13 cfs)

Pond 9P: INFIL. B - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 9 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

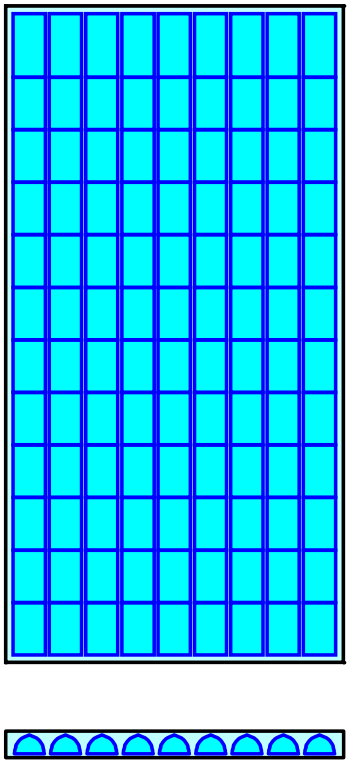
12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length
9 Rows x 52.0" Wide + 6.0" Spacing x 8 + 12.0" Side Stone x 2 = 45.00' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

108 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 9 Rows = 5,733.5 cf Chamber Storage

13,945.3 cf Field - 5,733.5 cf Chambers = 8,211.8 cf Stone x 40.0% Voids = 3,284.7 cf Stone Storage

Chamber Storage + Stone Storage = 9,018.3 cf = 0.207 af
Overall Storage Efficiency = 64.7%
Overall System Size = 87.50' x 45.00' x 3.54'

108 Chambers
516.5 cy Field
304.1 cy Stone



Summary for Pond 13P: Sed. Forebay

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	618 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	24	23.0	0	0	24
312.00	767	116.4	618	618	1,069

Summary for Link 10L: DP-A

Inflow Area = 3.482 ac, 0.85% Impervious, Inflow Depth = 2.12" for 100-year event
Inflow = 7.88 cfs @ 12.11 hrs, Volume= 0.616 af
Primary = 7.88 cfs @ 12.11 hrs, Volume= 0.616 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 11L: DP-B

Inflow Area = 4.667 ac, 7.41% Impervious, Inflow Depth = 1.24" for 100-year event
Inflow = 3.72 cfs @ 12.28 hrs, Volume= 0.481 af
Primary = 3.72 cfs @ 12.28 hrs, Volume= 0.481 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 12L: DP-C

Inflow Area = 2.953 ac, 45.20% Impervious, Inflow Depth = 2.94" for 100-year event
Inflow = 4.37 cfs @ 12.26 hrs, Volume= 0.723 af
Primary = 4.37 cfs @ 12.26 hrs, Volume= 0.723 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

3571-E-POST
Prepared by {enter your company name here}

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APPENDIX F

WQV / Recharge / TSS Removal Calculations

357 Main Street
Bolton, MA

February 3, 2021
3571-E

Infiltration Area A

Stormwater Recharge Calculations

CALCULATIONS

Recharge Volume, Rv:

$R_v = A_C x F$

Hydrologic Soil Group	Impervious Area (Ac) [1]	Target Depth (F)	Recharge Volume (Rv) Ac-feet
B	0.232	0.35	0.007
Total	**0.232**		**0.007**

*See "INFIL. A" subcatchment

Total Recharge Volume Required = 0.007 Ac-ft

Total Recharge Volume Required (Rv) = 295 C.ft

Recharge Vol. Provided (from Infil. Area A) = 2,831.4 C.ft

(Provided from 100-year storm event elevation)

REFERENCES

Table 2.3.2: Recharge Target Depth by Hydrologic Soil Group

NRCS Hydrologic Soil Group	Approx. Soil Texture	Target Depth Factor (F)
A	sand	0.6 inch
B	loam	0.35 inch
C	silty loam	0.25 inch
D	clay	0.1 inch

Drawdown Calculations

CALCULATIONS

Proposed Infiltration Area Calculations:

$$Drawdown = \frac{R_V}{(Rawls\ Rate)(Bottom\ Area)}$$

Drawdown Calculations:

Soil Texture: 3 Sandy Loam

Bottom Surface Area (A): 1,707 SF

Rawls Rate: 1.02 in/hr

Recharge Vol. Provided: 2,831 C.ft

Drawdown: 19.51 hr

Drawdown is less than 72 Hours as Required

REFERENCES

Table 2.3.3: 1982 Rawls Rates

Texture Class	NRCS Hydrologic Soil Group	Infiltration Rate
1 Sand	A	8.27 in/hr
2 Loamy Sand	A	2.41 in/hr
3 Sandy Loam	B	1.02 in/hr
4 Loam	B	0.52 in/hr
5 Silt Loam	C	0.27 in/hr
6 Sandy Clay Loam	C	0.17 in/hr
7 Clay Loam	D	0.09 in/hr
8 Silty Clay Loam	D	0.06 in/hr
9 Sandy Clay	D	0.05 in/hr
10 Silty Clay	D	0.04 in/hr
11 Clay	D	0.02 in/hr

NOTES:

Input Values

* Refer to Proposed Conditions HydroCAD modeling report

357 Main Street
Bolton, MA

February 3, 2021
3571-E

Infiltration Area B

Stormwater Recharge Calculations

CALCULATIONS

Recharge Volume, Rv:

$R_v = A_C x F$

Hydrologic Soil Group	Impervious Area (Ac) [1]	Target Depth (F)	Recharge Volume (Rv) Ac-feet
B	0.104	0.35	0.003
Total	**0.104**		**0.003**

*See "INFIL. B" subcatchments

Total Recharge Volume Required = 0.003 Ac-ft
Total Recharge Volume Required (Rv) = 132 C.ft
Recharge Vol. Provided (from Infil. Area B) = 8,581.3 C.ft
(Provided from 100-year storm event elevation)

REFERENCES

Table 2.3.2: Recharge Target Depth by Hydrologic Soil Group

NRCS Hydrologic Soil Group	Approx. Soil Texture	Target Depth Factor (F)
A	sand	0.6 inch
B	loam	0.35 inch
C	silty loam	0.25 inch
D	clay	0.1 inch

Drawdown Calculations

CALCULATIONS

Proposed Infiltration Area Calculations:

$$Drawdown = \frac{R_V}{(Rawls\ Rate)(Bottom\ Area)}$$

Drawdown Calculations:

Soil Texture: 3 Sandy Loam

Bottom Surface Area (A): 3,938 SF
Rawls Rate: **1.02 in/hr**
Recharge Vol. Provided: **8,581 C.ft**
Drawdown: **25.64 hr**
Drawdown is less than 72 Hours as Required

REFERENCES

Table 2.3.3: 1982 Rawls Rates

Texture Class	NRCS Hydrologic Soil Group	Infiltration Rate
1 Sand	A	8.27 in/hr
2 Loamy Sand	A	2.41 in/hr
3 Sandy Loam	B	1.02 in/hr
4 Loam	B	0.52 in/hr
5 Silt Loam	C	0.27 in/hr
6 Sandy Clay Loam	C	0.17 in/hr
7 Clay Loam	D	0.09 in/hr
8 Silty Clay Loam	D	0.06 in/hr
9 Sandy Clay	D	0.05 in/hr
10 Silty Clay	D	0.04 in/hr
11 Clay	D	0.02 in/hr

NOTES:

Input Values

* Refer to Proposed Conditions HydroCAD modeling report

357 Main Street
Bolton, MA

February 3, 2021
3571-E

Infiltration Basin

Stormwater Recharge Calculations

CALCULATIONS

Recharge Volume, Rv:

$R_v = A_C x F$

Hydrologic Soil Group	Impervious Area (Ac) [1]	Target Depth (F)	Recharge Volume (Rv) Ac-feet
A	0.075	0.6	0.004
B	1.260	0.35	0.037
Total	**1.335**		**0.041**

*See "CB-1, CB-2, ROOF 4, GARAGE and ROOFS 1-3" subcatchments

Total Recharge Volume Required = 0.041 Ac-ft

Total Recharge Volume Required (Rv) = 1,764 C.ft

Recharge Vol. Provided (from Infil. Basin) = 14,228.0 **C.ft**

(Provided from 100-year storm event elevation)

REFERENCES

Table 2.3.2: Recharge Target Depth by Hydrologic Soil Group

NRCS Hydrologic Soil Group	Approx. Soil Texture	Target Depth Factor (F)
A	sand	0.6 inch
B	loam	0.35 inch
C	silty loam	0.25 inch
D	clay	0.1 inch

Required Sediment Forebay vol, Fv:

$F_v = A_p(cu.ft)x0.1inch$ of impervious area

Imp. area captured by pond, Ap = 1.335 Ac

Required Sediment Forebay vol, Fv= 485 C.ft

Sediment Volume Provided = 618 **C.ft**

Drawdown Calculations

CALCULATIONS

Proposed Infiltration Area Calculations:

$$Drawdown = \frac{R_V}{(Rawls\ Rate)(Bottom\ Area)}$$

Drawdown Calculations:

Soil Texture: 3 Sandy Loam

Bottom Surface Area (A): 6,642 SF

Rawls Rate: 1.02 in/hr

Recharge Vol. Provided: 14,228 C.ft

Drawdown: 25.20 hr

Drawdown is less than 72 Hours as Required

REFERENCES

Table 2.3.3: 1982 Rawls Rates

Texture Class	NRCS Hydrologic Soil Group	Infiltration Rate
1 Sand	A	8.27 in/hr
2 Loamy Sand	A	2.41 in/hr
3 Sandy Loam	B	1.02 in/hr
4 Loam	B	0.52 in/hr
5 Silt Loam	C	0.27 in/hr
6 Sandy Clay Loam	C	0.17 in/hr
7 Clay Loam	D	0.09 in/hr
8 Silty Clay Loam	D	0.06 in/hr
9 Sandy Clay	D	0.05 in/hr
10 Silty Clay	D	0.04 in/hr
11 Clay	D	0.02 in/hr

NOTES:

Input Values

* Refer to Proposed Conditions HydroCAD modeling report

357 Main Street
Bolton, MA

February 3, 2021
3571-E

Adjusted Recharge/WQV Calcs

Stormwater Recharge Calculations

Capture Area Adjustment, Rvadj:

$$R_v adj = \frac{A_t}{A_p} x R_v$$

Imp. area captured by ponds, Ap =	1.671	Ac
Total impervious area on site, AT =	2.047	Ac
Recharge volume required, Rv =	4,458	C.ft
Capture Rate=	**82%**	OK
Capture Area Adjustment Factor=	**1.23**	
Adjusted Recharge Volume Required Rvadj =	**5,462**	**C.ft**
[1] **Total Recharge Volume Provided =**	25,640.7	**C.ft**

NOTES:

Input Values

[1] = Sum of Recharge Vol. Provided from Infil. Area A, B and Basin

Water Quality Calculations

CALCULATIONS

Water Quality Calculation:

$$V_{WQ} = D_{WQ}(ft) x\, A_T(ft^2)$$

Water Quality Depth =	1	in
Water Quality Depth , DWQ =	**0.08**	**ft.**
Total impervious area on site, AT =	2.047	Ac.
A_T =	**89,167**	**ft^2**
Required Water Quality Volume, VWQ =	**7,431**	**C.ft.**

Stormwater systems are sized to accommodate both Rvadj and WQV
(25,640.7 > 5,462 and 7,431)

REFERENCES

1 inch depth
Zone II discharges
IWPA discharges
Critical Area
Runoff from LUHPPL
Infiltration rate >2.4 inches/hour
1/2 inch depth
Discharge to other ares
8 inch
9 inch
10 inch
11 inch

Stage-Area-Storage for Pond 8P: INFIL. A (continued)

Elevation (feet)	Surface (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Storage (acre-feet)
320.08	0.039	0.058	320.60	0.039	0.072
320.09	0.039	0.058	320.61	0.039	0.072
320.10	0.039	0.059	320.62	0.039	0.073
320.11	0.039	0.059	320.63	0.039	0.073
320.12	0.039	0.059	320.64	0.039	0.073
320.13	0.039	0.060	320.65	0.039	0.073
320.14	0.039	0.060	320.66	0.039	0.074
320.15	0.039	0.060	320.67	0.039	0.074
320.16	0.039	0.060	320.68	0.039	0.074
320.17	0.039	0.061	320.69	0.039	0.074
320.18	0.039	0.061	320.70	0.039	0.074
320.19	0.039	0.061	320.71	0.039	0.075
320.20	0.039	0.062	320.72	0.039	0.075
320.21	0.039	0.062	320.73	0.039	0.075
320.22	0.039	0.062	320.74	0.039	0.075
320.23	0.039	0.062	320.75	0.039	0.076
320.24	0.039	0.063	320.76	0.039	0.076
320.25	0.039	0.063	320.77	0.039	0.076
320.26	0.039	0.063	320.78	0.039	0.076
320.27	0.039	0.064	320.79	0.039	0.076
320.28	0.039	0.064	320.80	0.039	0.077
320.29	0.039	0.064	320.81	0.039	0.077
320.30	0.039	0.064	320.82	0.039	0.077
320.31	0.039	0.065	320.83	0.039	0.077
320.32	0.039	0.065	320.84	0.039	0.077
320.33	0.039	0.065	320.85	0.039	0.078
320.34	0.039	0.065	320.86	0.039	0.078
320.35	0.039	0.066	320.87	0.039	0.078
320.36	0.039	0.066	320.88	0.039	0.078
320.37	0.039	0.066	320.89	0.039	0.078
320.38	0.039	0.067	320.90	0.039	0.078
320.39	0.039	0.067	320.91	0.039	0.079
320.40	0.039	0.067	320.92	0.039	0.079
320.41	0.039	0.067	320.93	0.039	0.079
320.42	0.039	0.068	320.94	0.039	0.079
320.43	0.039	0.068	320.95	0.039	0.079
320.44	0.039	0.068	320.96	0.039	0.079
320.45	0.039	0.068	320.97	0.039	0.080
320.46	0.039	0.069	320.98	0.039	0.080
320.47	0.039	0.069	320.99	0.039	0.080
320.48	0.039	0.069	321.00	0.039	0.080
320.49	0.039	0.069	321.01	0.039	0.080
320.50	0.039	0.070	321.02	0.039	0.080
320.51	0.039	0.070	321.03	0.039	0.081
320.52	0.039	0.070	321.04	0.039	0.081
320.53	0.039	0.070	321.05	0.039	0.081
320.54	0.039	0.071	321.06	0.039	0.081
320.55	0.039	0.071	321.07	0.039	0.081
320.56	0.039	0.071	321.08	0.039	0.081
320.57	0.039	0.071	321.09	0.039	0.082
320.58	0.039	0.072	321.10	0.039	0.082
320.59	0.039	0.072	321.11	0.039	0.082

100-yr storm peak elev.

Recharge Vol. Calcs

0.065 a-f *43,560 sf/acre

=2,831.4 cf recharge volume provided

Stage-Area-Storage for Pond 9P: INFIL. B (continued)

Elevation (feet)	Surface (acres)	Storage (acre-feet)
339.12	0.090	0.192
339.13	0.090	0.192
339.14	0.090	0.193
339.15	0.090	0.193
339.16	0.090	0.193
339.17	0.090	0.194
339.18	0.090	0.194
339.19	0.090	0.194
339.20	0.090	0.195
339.21	0.090	0.195
339.22	0.090	0.195
339.23	0.090	0.196
339.24	0.090	0.196
339.25	0.090	0.196
339.26	0.090	0.197
339.27	0.090	0.197
339.28	0.090	0.198
339.29	0.090	0.198
339.30	0.090	0.198
339.31	0.090	0.199
339.32	0.090	0.199
339.33	0.090	0.199
339.34	0.090	0.200
339.35	0.090	0.200
339.36	0.090	0.200
339.37	0.090	0.201
339.38	0.090	0.201
339.39	0.090	0.202
339.40	0.090	0.202
339.41	0.090	0.202
339.42	0.090	0.203
339.43	0.090	0.203
339.44	0.090	0.203
339.45	0.090	0.204
339.46	0.090	0.204
339.47	0.090	0.204
339.48	0.090	0.205
339.49	0.090	0.205
339.50	0.090	0.206
339.51	0.090	0.206
339.52	0.090	0.206
339.53	0.090	0.207
339.54	0.090	**0.207**

100-yr storm peak elev.

Recharge Vol. Calcs

0.197 a-f * 43,560 sf.acre

=8,581.3 cf recharge volume provided

Stage-Area-Storage for Pond 6P: INFIL. POND (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
312.08	3,918	5,247
312.10	3,943	5,325
312.12	3,967	5,404
312.14	3,992	5,484
312.16	4,017	5,564
312.18	4,042	5,645
312.20	4,067	5,726
312.22	4,092	5,807
312.24	4,118	5,890
312.26	4,143	5,972
312.28	4,168	6,055
312.30	4,194	6,139
312.32	4,219	6,223
312.34	4,245	6,308
312.36	4,271	6,393
312.38	4,296	6,478
312.40	4,322	6,565
312.42	4,348	6,651
312.44	4,374	6,739
312.46	4,400	6,826
312.48	4,427	6,915
312.50	4,453	7,003
312.52	4,479	7,093
312.54	4,506	7,183
312.56	4,532	7,273
312.58	4,559	7,364
312.60	4,585	7,455
312.62	4,612	7,547
312.64	4,639	7,640
312.66	4,666	7,733
312.68	4,692	7,826
312.70	4,719	7,921
312.72	4,747	8,015
312.74	4,774	8,110
312.76	4,801	8,206
312.78	4,828	8,302
312.80	4,856	8,399
312.82	4,883	8,497
312.84	4,911	8,595
312.86	4,938	8,693
312.88	4,966	8,792
312.90	4,994	8,892
312.92	5,022	8,992
312.94	5,050	9,093
312.96	5,078	9,194
312.98	5,106	9,296
313.00	5,134	9,398
313.02	5,162	9,501
313.04	5,191	9,605
313.06	5,219	9,709
313.08	5,248	9,813
313.10	5,276	9,919
313.12	5,305	10,024
313.14	5,333	10,131
313.16	5,362	10,238
313.18	5,391	10,345
313.20	5,420	10,453
313.22	5,449	10,562
313.24	5,478	10,671
313.26	5,507	10,781
313.28	5,537	10,892
313.30	5,566	11,003
313.32	5,596	11,114
313.34	5,625	11,227
313.36	5,655	11,339
313.38	5,684	11,453
313.40	5,714	11,567
313.42	5,744	11,681
313.44	5,774	11,796
313.46	5,804	11,912
313.48	5,834	12,029
313.50	5,864	12,146
313.52	5,894	12,263
313.54	5,924	12,381
313.56	5,955	12,500
313.58	5,985	12,619
313.60	6,016	12,740
313.62	6,046	12,860
313.64	6,077	12,981
313.66	6,108	13,103
313.68	6,138	13,226
313.70	6,169	13,349
313.72	6,200	13,472
313.74	6,231	13,597
313.76	6,262	13,722
313.78	6,294	13,847
313.80	6,325	13,973
313.82	6,356	14,100
313.84	6,388	14,228
313.86	6,419	14,356
313.88	6,451	14,484
313.90	6,482	14,614
313.92	6,514	14,744
313.94	6,546	14,874
313.96	6,578	15,006
313.98	6,610	15,137
314.00	6,642	15,270
314.02	6,666	15,403
314.04	6,690	15,537
314.06	6,715	15,671
314.08	6,739	15,805
314.10	6,763	15,940
314.12	6,788	16,076
314.14	6,812	16,212

100-yr storm peak elev.

Recharge Vol. Calcs

14,228 cf recharge volume provided

Summary for Pond 13P: Sed. Forebay

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	618 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	24	23.0	0	0	24
312.00	767	116.4	618	618	1,069

DILLIS & ROY
CIVIL DESIGN GROUP
CIVIL ENGINEERS LAND SURVEYORS WETLAND CONSULTANTS

1" Calculation Sheet

DRCDG Job # 3571-E
Calc: JPL
Date: 1/25/2021

This spreadsheet should be used to convert water quality volume to an equivilent water quality peak flow rate as outlined in the new MA DEP guidelines that take effect on October 15, 2013.

Glossary

Water Quality Flow Rate =	WQF
Water Quality Volume =	WQV*
unit peak discharge (csm/in) =	qu**
Impervious Area in watershed (square miles) =	Ai

*WQV is expressed in watershed inches (you must use 1.0-inches in all cases with this method and not 0.5-inches)
** calculate the qu based on the time of concentration (see 1" - qu Table)

Compute Water Quality Flow with the following Equation

WQF = (qu)(A)(WQV)

Input Information (in colored cells only)

Site Plan Callout		Enter qu (from 1" - qu Table)	Enter Impervious Area (SF)	Ai (sq/mi)	WQV		WQF	
	=	774	10126	0.000363	1	=	0.28	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs

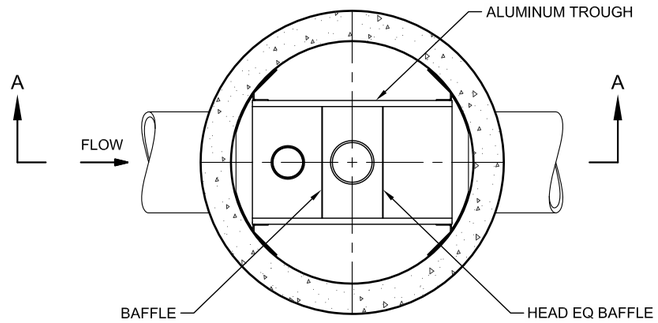
1" qu Sheet

	Tc (hours)	qu (csm/in)
	0.01	835
	0.03	835
	0.05	831
	0.067	814
5 Minutes	0.083	795
	0.1	774
	0.116	755
	0.133	736
	0.15	717
10 minutes	0.167	700
	0.183	685
	0.2	669
	0.217	654
	0.233	641
15 minutes	0.25	628
	0.3	593
	0.333	572
	0.35	563
	0.4	536
	0.416	528
	0.5	491
	0.583	460
	0.6	454
	0.667	433
	0.7	424
	0.8	398
	0.9	376
	1	356
	1.1	339
	1.2	323
	1.3	309
	1.4	296
	1.5	285
	1.6	274
	1.7	264
	1.8	255
	1.9	247
	2	239
	2.1	232
	2.2	225
	2.3	219
	2.4	213
	2.5	207
	2.6	202

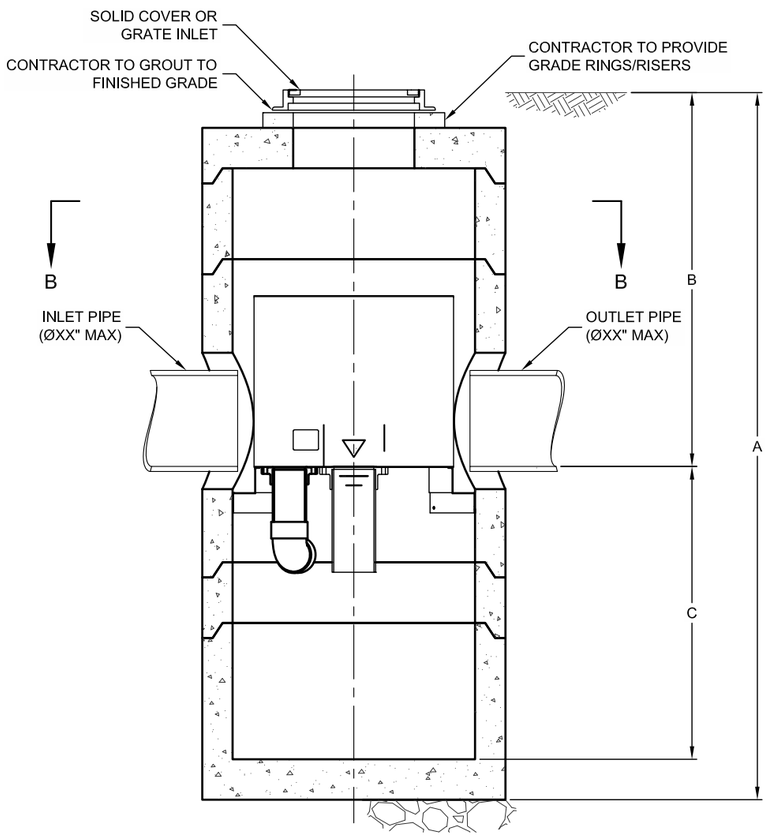
Tc (hours)	qu (csm/in)
2.7	197
2.8	192
2.9	187
3	183
3.1	179
3.2	175
3.3	171
3.4	168
3.5	164
3.6	161
3.7	158
3.8	155
3.9	152
4	149
4.1	146
4.2	144
4.3	141
4.4	139
4.5	137
4.6	134
4.7	132
4.8	130
4.9	128
5	126
5.1	124
5.2	122
5.3	120
5.4	119
5.5	117
5.6	115
5.7	114
5.8	112
5.9	111
6	109
6.1	108
6.2	106
6.3	105
6.4	104
6.5	102
6.6	101
6.7	100
6.8	99
6.9	98
7	96

Tc (hours)	qu (csm/in)
7.1	95
7.2	94
7.3	93
7.4	92
7.5	91
7.6	90
7.7	89
7.8	88
7.9	87
8	86
8.1	85
8.2	84
8.3	84
8.4	83
8.5	82
8.6	81
8.7	80
8.8	79
8.9	79
9	78
9.1	77
9.2	76
9.3	76
9.4	75
9.5	74
9.6	74
9.7	73
9.8	72
9.9	72
10	71

*Table of qu values for Ia/P Curve =0.034, listed by Tc, for Type III Storm Distribution
http://www.mass.gov/eea/docs/dep/water/resources/07v5/13wqvwqf.pdf



PLAN VIEW B-B



SECTION A-A

VortSentry®

VORTSENTRY HS DESIGN NOTES

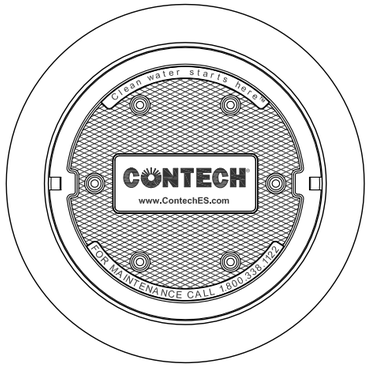
VSHS RATED TREATMENT CAPACITY IS SHOWN IN THE TABLE BELOW, OR PER LOCAL REGULATIONS. MAXIMUM HYDRAULIC INTERNAL BYPASS CAPACITY VARIES. CONTACT YOUR CONTECH REPRESENTATIVE FOR ADITIONAL INFORMATION.

THE STANDARD SOLID COVER CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW.

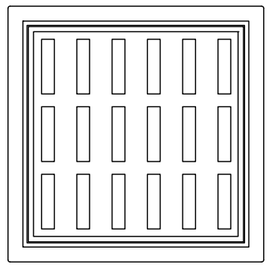
	CONFIGURATION OPTION DESCRIPTION
	GRATE INLET (NO INLET PIPE)
	GRATE INLET WITH INLET PIPE

VORTSENTRY HS GENERAL INFORMATION

Model	Manhole Diameter (ID)		Total Treatment Flow Rate		Typical Total Distance Rim to Outside Bottom A		Typical Distance Rim to Invert B		Typical Depth Below Invert (inside) C		Approximate Minimum Distance Rim to Invert		Maximum Pipe Diameter (ID)	
	FT	mm	CFS	L/S	FT	m	FT	m	FT	mm	FT	m	IN	mm
HS36	3	900	0.55	15.6	10.16	3.10	4.08	1.24	5.58	1702	3.00	0.91	18	450
HS48	4	1200	1.20	34.0	13.25	4.04	6.00	1.83	6.75	2057	4.00	1.22	24	600
HS60	5	1500	2.20	62.3	15.13	4.61	6.50	1.98	7.96	2426	4.82	1.47	30	750
HS72	6	1800	3.70	104.8	16.56	5.05	6.75	2.06	9.15	2788	5.59	1.70	36	900
HS84	7	2100	5.60	158.6	18.85	5.75	7.75	2.36	10.35	3156	5.00	1.52	42	1050
HS96	8	2400	8.10	229.4	20.87	6.36	8.50	2.59	11.54	3518	6.91	2.11	48	1200



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.



FRAME AND GRATE
(24" SQUARE)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS)	*
PEAK FLOW RATE (CFS)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. VORTSENTRY HS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET AASHTO M306 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.

INSTALLATION NOTES

1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE VORTSENTRY HS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
3. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
5. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

VORTSENTRY HS STANDARD DETAIL

APPENDIX G

Stormwater Operation & Maintenance Manual

STORMWATER OPERATION & MAINTENANCE MANUAL

For

The Property Located At
357 Main Street

In

BOLTON, MASSACHUSETTS

Prepared For: ENVIRONMENTAL POOLS
187R RIVERNECK ROAD
CHELMSFORD, MA

Prepared By: DILLIS & ROY CIVIL DESIGN GROUP, INC
1 MAIN STREET, SUITE 1
LUNENBURG, MA

February 3rd, 2021
3571-E

TABLE OF CONTENTS:

1.0 Project Narrative

1.1 Proposed Stormwater Management System

Runoff from the proposed impervious areas will be conveyed and treated through a combination of BMP's before being infiltrated into the ground. This will help groundwater recharge and maintain a healthy wetland environment. The following is a brief discussion of each conveyance and treatment BMP proposed.

Subsurface Infiltration Chambers

Subsurface infiltration areas are included on site. Cultec prefabricated plastic chambers, model R-330XLHD, will be installed to collect the runoff from the pavement and roofs. A pipe manifold will be used to spread the stormwater evenly across all chambers. The chambers have been designed to handle the runoff associated with the 100-year storm event. Runoff from the impervious areas will be routed via catch basin and drain pipe towards these infiltration areas.

Infiltration Basin

An infiltration basin will collect runoff from a portion of the pavement and roof tops. The basin has been designed to accommodate the runoff associated with the 100-year storm event. Pretreatment is provided using a sediment forebay within the basin. Runoff will enter the basin through sheet flow and catch basins and drain pipes.

Vortsentry HS

The Vortsentry HS36 is a compact, below grade stormwater treatment system that uses helical flow technology to enhance gravitational separation of floating and settling pollutants from stormwater flows. All runoff entering Infiltration Area A will be routed through this system to receive proper pre-treatment before entering the subsurface infiltration chambers.

1.2 Operation & Maintenance Tasks

The following activities should be performed routinely to allow for proper functioning of the stormwater system. The following are guidelines referring to each major component of the stormwater management system.

1.2.1 *Catch Bains, Manhole, Drain Lines*

Manholes and catch basins shall be inspected quarterly for signs of wear, settling, cracking or other fatigue. They should be inspected for signs of

root intrusion, or significant water infiltration. Catch basin sumps should be checked for silt /sediment buildup and cleaned as necessary. Cleaning should be performed by a vacuum truck. All debris and sediment shall be disposed of according to Federal, State and local regulations. Manholes and catch basins should be resealed as required and outlets should be inspected incidentally with all structure inspections.

Storm drainage inlets and outlets should be inspected incidentally with all structure inspections. Evidence of debris intrusion or excessive siltation or sedimentation could result in the need to clean a storm drain line. Flushing or jetting should be performed as required. All flushing and jetting should be performed in the direction away from any outlet devices. A vacuum truck should be used at the opposite end of the flushing or jetting to remove any silt or sediment that is cleaned from the storm drain. Catch basin grates and sumps should be cleaned quarterly and whenever the depth of deposits is greater than or equal to one half the depth of the sump.

1.2.2 Subsurface Infiltration Chambers

The subsurface detention chambers should be monitored and maintained regularly to ensure no obstructions in the systems are present. Any depressions noticed in the areas could indicate that the system has collapsed and should be inspected immediately. At a minimum, the system should be clean twice per year, in the spring and fall. The systems are equipped with inspection ports to monitor the buildup of sedimentation. If the depth of sedimentation is in excess of the manufacturer's guidelines, the systems will need to be cleaned out with high pressure water. The high-pressure water should be used on one end and a vacuum truck will be used on the opposite end to remove any silt or sediment that is cleaned from the chamber. Other maintenance will include checking the inlets and outlet for debris, survey the surrounding area for depressions and confirm no unauthorized modifications have been performed to the system. Inspections should be performed at a minimum twice per year, in the spring and fall. See Appendix A for the Cultec Operation and Maintenance Guidelines.

1.2.3 Vortsentry HS

The Vortsentry HS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. Inspection is the key to effective maintenance and is easily performed. At a minimum, inspections should be performed twice per year (spring and fall) however more frequent inspections may be necessary due to winter sanding. The Vortsentry HS should be cleaned when the sediment has accumulated to a depth of two feet in the treatment chamber. Cleaning of the Vortsentry HS

should be done during dry weather conditions when no flow is entering the system. Is should be performed using a vacuum truck.

1.2.4 Infiltration Basin

The infiltration basin should be monitored and maintained regularly to ensure no obstructions in the system are present. The basin should be monitored for the buildup of sedimentation. If the depth of sedimentation begins to impair the basins ability to infiltration water, the basin will need to be cleaned out. Other maintenance will include checking the inlets and outlet for debris. The sediment forebay should be included in all the infiltration basin inspections.

1.3 O&M Schedule & Budget

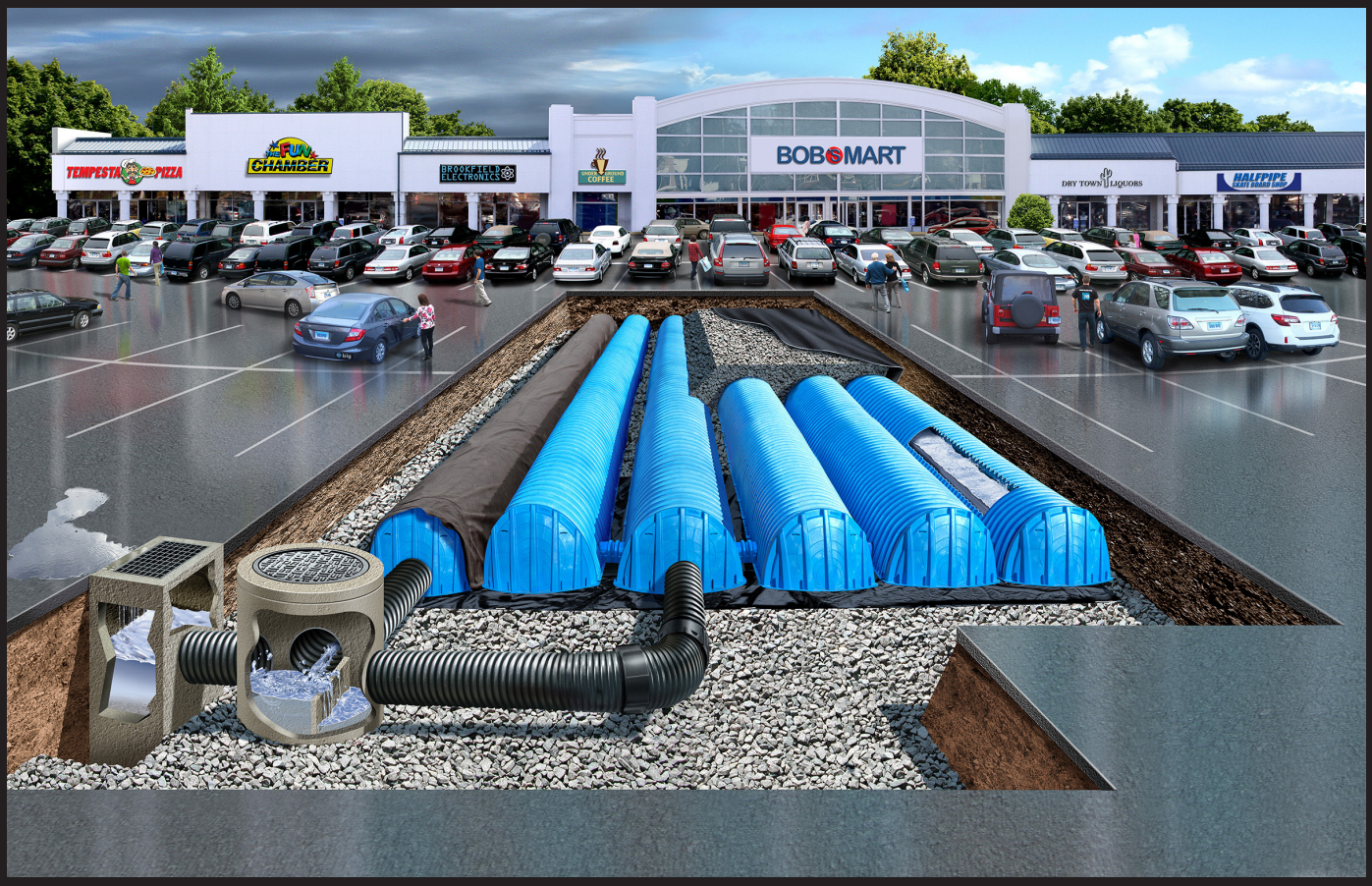
O&M Task		Monthly	Quarterly	Spring	Fall	2-years	As-required
1.	**Catch Basin, Manhole, Drain Lines**						
	Inspect rims		**x**				
	Inspect inside/inlet and outlet pipes		**x**				
	Remove sediment		**x**				**x**
2.	**Subsurface Infiltration Chambers**	**(See Appendix A)**					
3.	**Vortsentry HS**	**(See Appendix B)**					
	Inspection		**x**				
	Clean						**x**
4.	**Infiltration Bain/Sediment Forebay**						
	Inspection		**x**				
	Remove debris						**x**
	Remove silt/sediment					**x**	**x**

APPENDIX A

Cultec Operation & Maintenance

CONTACTOR® & RECHARGER®

STORMWATER MANAGEMENT SOLUTIONS



OPERATION & MAINTENANCE GUIDELINES

FOR CULTEC STORMWATER MANAGEMENT SYSTEMS

CULTEC®

Published by
CULTEC, Inc.
P.O. Box 280
878 Federal Road
Brookfield, Connecticut 06804 USA
www.cultec.com

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Contact Information:
For general information on our other products and services, please contact our offices within the United States at (800)428-5832, (203)775-4416 ext. 202, or e-mail us at custservice@cultec.com.

For technical support, please call (203)775-4416 ext. 203 or e-mail tech@cultec.com.

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Doc ID: CLT057 01-20
January 2020

These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC.
All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings.
Actual designs may vary.

This manual contains guidelines recommended by CULTEC, Inc. and may be used in conjunction with, but not to supersede, local regulations or regulatory authorities. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Introduction

The CULTEC Subsurface Stormwater Management System is a high-density polyethylene (HDPE) chamber system arranged in parallel rows surrounded by washed stone. The CULTEC chambers create arch-shaped voids within the washed stone to provide stormwater detention, retention, infiltration, and reclamation. Filter fabric is placed between the native soil and stone interface to prevent the intrusion of fines into the system. In order to minimize the amount of sediment which may enter the CULTEC system, a sediment collection device (stormwater pretreatment device) is recommended upstream from the CULTEC chamber system. Examples of pretreatment devices include, but are not limited to, an appropriately sized catch basin with sump, pretreatment catchment device, oil grit separator, or baffled distribution box. Manufactured pretreatment devices may also be used in accordance with CULTEC chambers. Installation, operation, and maintenance of these devices shall be in accordance with manufacturer's recommendations. Almost all of the sediment entering the stormwater management system will be collected within the pretreatment device.

Best Management Practices allow for the maintenance of the preliminary collection systems prior to feeding the CULTEC chambers. The pretreatment structures shall be inspected for any debris that will restrict inlet flow rates. Outfall structures, if any, such as outlet control must also be inspected for any obstructions that would restrict outlet flow rates. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Operation and Maintenance Requirements

I. Operation

CULTEC stormwater management systems shall be operated to receive only stormwater run-off in accordance with applicable local regulations. CULTEC subsurface stormwater management chambers operate at peak performance when installed in series with pretreatment. Pretreatment of suspended solids is superior to treatment of solids once they have been introduced into the system. The use of pretreatment is adequate as long as the structure is maintained and the site remains stable with finished impervious surfaces such as parking lots, walkways, and pervious areas are properly maintained. If there is to be an unstable condition, such as improvements to buildings or parking areas, all proper silt control measures shall be implemented according to local regulations.

II. Inspection and Maintenance Options

A. The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream manhole or through the CULTEC StormFilter Unit (or other pretreatment device). CCTV inspection of this row can be deployed through this access port to deter mine if any sediment has accumulated in the inlet row.

B. If the CULTEC bed is not equipped with an inspection port, then access to the inlet row will be through an upstream manhole or the CULTEC StormFilter.

1. Manhole Access
This inspection should only be carried out by persons trained in confined space entry and sewer inspection services. After the manhole cover has been removed a gas detector must be lowered into the manhole to ensure that there are not high concentrations of toxic gases present. The inspector should be lowered into the manhole with the proper safety equipment as per OSHA requirements. The inspector may be able to observe sediment from this location. If this is not possible, the inspector will need to deploy a CCTV robot to permit viewing of the sediment.

2. StormFilter Access
Remove the manhole cover to allow access to the unit. Typically a 30-inch (750 mm) pipe is used as a riser from the StormFilter to the surface. As in the case with manhole access, this access point requires a technician trained in confined space entry with proper gas detection equipment. This individual must be equipped with the proper safety equipment for entry into the StormFilter. The technician will be lowered onto the StormFilter unit. The hatch on the unit must be removed. Inside the unit are two filters which may be removed according to StormFilter maintenance guidelines. Once these filters are removed the inspector can enter the StormFilter unit to launch the CCTV camera robot.

C. The inlet row of the CULTEC system is placed on a polyethylene liner to prevent scouring of the washed stone beneath this row. This also facilitates the flushing of this row with high pressure water through a culvert cleaning nozzle. The nozzle is deployed through a manhole or the StormFilter and extended to the end of the row. The water is turned on and the inlet row is back-flushed into the manhole or StormFilter. This water is to be removed from the manhole or StormFilter using a vacuum truck.

III. Maintenance Guidelines

The following guidelines shall be adhered to for the operation and maintenance of the CULTEC stormwater management system:

A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.

B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.

C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.

D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

IV. Suggested Maintenance Schedules

A. Minor Maintenance
The following suggested schedule shall be followed for routine maintenance during the regular operation of the stormwater system:

Frequency	Action
Monthly in first year	Check inlets and outlets for clogging and remove any debris, as required.
Spring and Fall	Check inlets and outlets for clogging and remove any debris, as required.
One year after commissioning and every third year following	Check inlets and outlets for clogging and remove any debris, as required.

B. Major Maintenance
The following suggested maintenance schedule shall be followed to maintain the performance of the CULTEC stormwater management chambers. Additional work may be necessary due to insufficient performance and other issues that might be found during the inspection of the stormwater management chambers. (See table on next page)

	Frequency	Action
Inlets and Outlets	Every 3 years	• Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	• Check inlet and outlets for clogging and remove any debris as required.
CULTEC Stormwater Chambers	2 years after commissioning	• Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	• Clean stormwater management chambers and feed connectors of any debris. • Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	• Clean stormwater management chambers and feed connectors of any debris. • Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. • Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. • Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. • Attain the appropriate approvals as required. • Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1st year	• Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	• Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	• Confirm that no unauthorized modifications have been performed to the site.

For additional information concerning the maintenance of CULTEC Subsurface Stormwater Management Chambers, please contact CULTEC, Inc. at 1-800-428-5832.

WQMP
Operation & Maintenance (O&M) Plan

Project Name:_____

Prepared for:

Project Name: _____

Address:_____

City, State Zip:_____

Prepared on:

Date:_____

This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer's maintenance requirements, permits, etc.

8.1.1 Project Information

Project name	
Address	
City, State Zip	
Site size	
List of structural BMPs, number of each	
Other notes	

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

Name of Person or HOA Property Manager	
Address	
City, State Zip	
Phone number	
24-Hour Emergency Contact number	
Email	

8.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in this document.

8.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. AutoCAD files and/or GIS coordinates of BMPs shall also be submitted to the City.

Appendix ____

BMP SITE PLAN

Site plan is preferred on minimum 11” by 17” colored sheets, as long as legible.

BMP OPERATION & MAINTENANCE LOG

Project Name: _____

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

Minor Maintenance

Frequency		Action
Monthly in first year		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Month 1	Date:	
□ Month 2	Date:	
□ Month 3	Date:	
□ Month 4	Date	
□ Month 5	Date:	
□ Month 6	Date:	
□ Month 7	Date:	
□ Month 8	Date:	
□ Month 9	Date:	
□ Month 10	Date:	
□ Month 11	Date:	
□ Month 12	Date:	
Spring and Fall		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
One year after commissioning and every third year following		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Year 1	Date:	
□ Year 4	Date:	
□ Year 7	Date:	
□ Year 10	Date:	
□ Year 13	Date:	
□ Year 16	Date:	
□ Year 19	Date:	
□ Year 22	Date:	

Major Maintenance

	Frequency		Action
Inlets and Outlets	**Every 3 years**		Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
			Notes
	□ Year 1	Date:	
	□ Year 4	Date:	
	□ Year 7	Date:	
	□ Year 10	Date:	
	□ Year 13	Date:	
	□ Year 16	Date:	
	□ Year 19	Date:	
	□ Year 22	Date:	
	Spring and Fall		Check inlet and outlets for clogging and remove any debris, as required.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
CULTEC Stormwater Chambers	**2 years after commissioning**		□ Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
			Notes
	□ Year 2	Date:	

Major Maintenance

	Frequency		Action
CULTEC Stormwater Chambers	**9 years after commissioning every 9 years following**		□ Clean stormwater management chambers and feed connectors of any debris. □ Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
			Notes
	□ Year 9	Date:	
	□ Year 18	Date:	
	□ Year 27	Date:	
	□ Year 36	Date:	
	45 years after commissioning		□ Clean stormwater management chambers and feed connectors of any debris. □ Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. □ Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. □ Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. □ Attain the appropriate approvals as required. □ Establish a new operation and maintenance schedule.
			Notes
	□ Year 45	Date:	

Major Maintenance

	Frequency		Action
Surrounding Site	**Monthly in 1st year**		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Month 1	Date:	
	□ Month 2	Date:	
	□ Month 3	Date:	
	□ Month 4	Date:	
	□ Month 5	Date:	
	□ Month 6	Date:	
	□ Month 7	Date:	
	□ Month 8	Date:	
	□ Month 9	Date:	
	□ Month 10	Date:	
	□ Month 11	Date:	
	□ Month 12	Date:	
	Spring and Fall		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	Yearly		□ Confirm that no unauthorized modifications have been performed to the site.
			Notes
	□ Year 1	Date:	
	□ Year 2	Date:	
	□ Year 3	Date:	
	□ Year 4	Date:	
	□ Year 5	Date:	
	□ Year 6	Date:	
	□ Year 7	Date:	

CULTEC, Inc.
878 Federal Road • P.O. Box 280 • Brookfield, CT 06804 USA
P: (203) 775-4416 • Toll Free: 1(800) 4-CULTEC • www.cultec.com

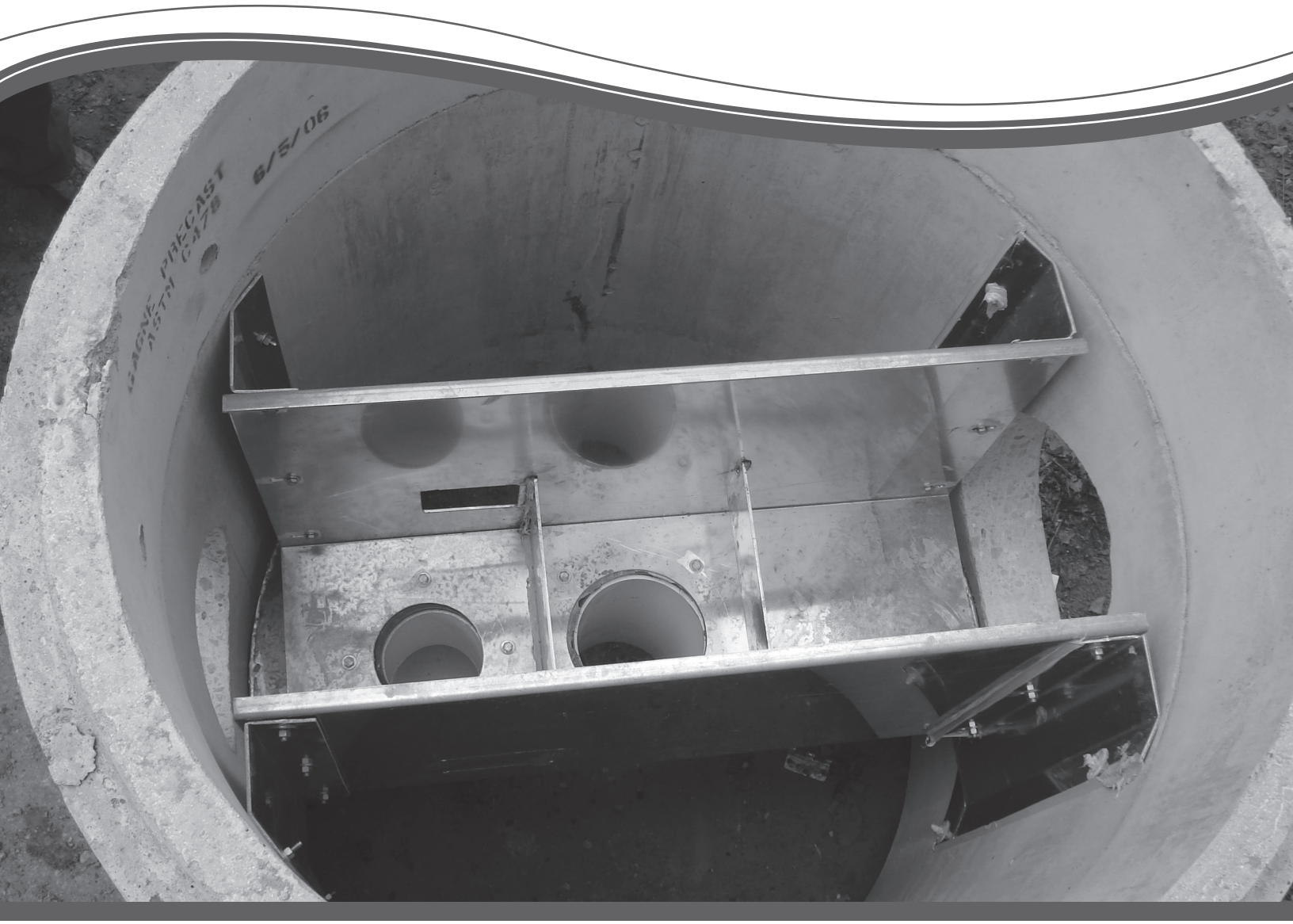
RETENTION • DETENTION • INFILTRATION • WATER QUALITY

APPENDIX B

Vortsentry HS Guide

URBANGREEN®

VortSentry® HS Guide
Operation, Design, Performance and Maintenance



CONTECH®
ENGINEERED SOLUTIONS

VortSentry® HS

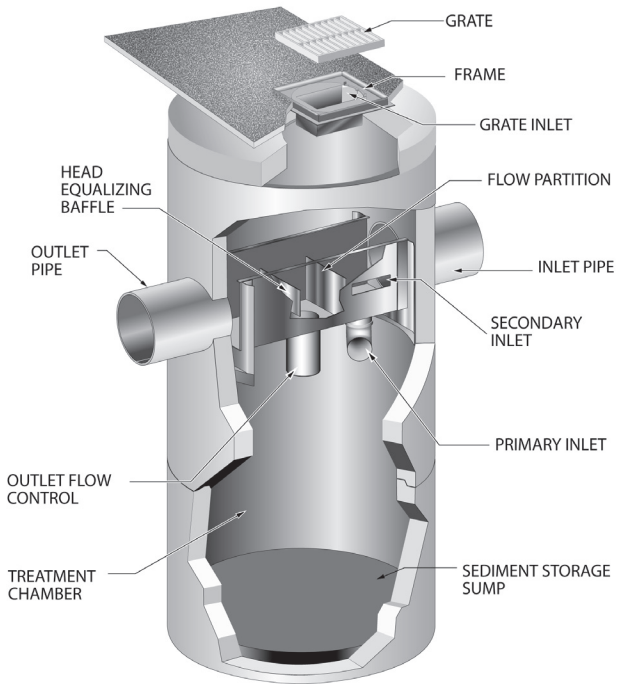
The VortSentry HS is a compact, below grade stormwater treatment system that employs helical flow technology to enhance gravitational separation of floating and settling pollutants from stormwater flows. With the ability to accept a wide range of pipe sizes, the VortSentry HS can treat and convey flows from small to large sites. A unique internal bypass design means higher flows can be diverted without the use of external bypass structures. The VortSentry HS is also available in a grate inlet configuration, which is ideal for retrofit installations.

Operation Overview

Low, frequently occurring storm flows are directed into the treatment chamber through the primary inlet. The tangentially oriented downward pipe induces a swirling motion in the treatment chamber that increases capture and containment abilities. Moderate storm flows are directed into the treatment chamber through the secondary inlet, which allows for capture of floating trash and debris. The secondary inlet also provides for treatment of higher flows without significantly increasing the velocity or turbulence in the treatment chamber. This allows for a more quiescent separation environment. Settleable solids and floating pollutants are captured and contained in the treatment chamber.

Flow exits the treatment chamber through the outlet flow control, which manages the amount of flow that is treated and helps maintain the helical flow patterns developed within the treatment chamber.

Flows exceeding the system's rated treatment flow are diverted away from the treatment chamber by the flow partition. Internal diversion of high flows eliminates the need for external bypass structures. During bypass, the head equalizing baffle applies head on the outlet flow control to limit the flow through the treatment chamber. This helps prevent re-suspension of previously captured pollutants.



Design Basics

There are two primary methods of sizing a VortSentry HS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow for a defined particle size. The summation process of the Rational Rainfall Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically, VortSentry HS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a particle gradation with an average particle size (d_{50}) of 240-microns (μm).

Water Quality Flow Rate Method

In many cases, regulations require that a specific flow rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval (i.e. the six-month storm) or a water quality depth (i.e. 1/2-inch of rainfall).

The VortSentry HS is designed to treat all flows up to the WQQ. Due to its internal bypass weir configuration, flow rates in the treatment chamber only increase minimally once the WQQ is surpassed. At influent rates higher than the WQQ, the flow partition will allow most flow exceeding the treatment flow rate to bypass the treatment chamber. This allows removal efficiency to remain relatively constant in the treatment chamber and reduces the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the VortSentry HS will remove a specific gradation of sediment at a specific removal efficiency. Therefore they are variable based on the gradation and removal efficiency specified by the design engineer and the unit size is scaled according to the project goal.

Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. The Rational Rainfall Method is a sizing program Contech uses to estimate a net annual sediment load reduction for a particular VortSentry HS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics. For more information on the Rational Rainfall Method, see *Vortechs Technical Bulletin 4: Modeling Long Term Load Reduction: The Rational Rainfall Method*, available at **www.ContechES.com/stormwater**

Treatment Flow Rate

The outlet flow control is sized to allow the WQQ to pass entirely through the treatment chamber at a water surface elevation equal to the crest of the flow partition. The head equalizing baffle applies head on the outlet flow control to limit the flow through the treatment chamber when bypass occurs, thus helping to prevent re-suspension or re-entrainment of previously captured particles.

Hydraulic Capacity

The VortSentry HS is available in three standard configurations: inline (with inlet and outlet pipes at 180° to each other), grated inlet, and a combination of grate and pipe inlets. All three configurations are available in 36-inch (900-mm) through 96-inch (2400-mm) diameter manholes.

The configuration of the system is determined by the suffix of the model name:

- A model name without a suffix denotes a standard pipe inlet (Example HS48).
- A "G" at the end of the model designation denotes a grate inlet (Example HS48G).
- A "GP" at the end of the model designation denotes a combination of grate and pipe inlets (Example HS48GP).

Performance

Full-Scale Laboratory Test Results

Laboratory testing of the VortSentry HS was conducted using F-55 Silica, a commercially available sand product with an average particle size of 240-μm (Table 1). This material was metered into a model HS48 VortSentry HS at an average concentration of between 250-mg/L and 300-mg/L at flow rates ranging from 0.50-cfs to 1.5-cfs (14-L/s to 56-L/s).

US Standard Sieve Size	Particle Size Micron (μm)	Cumulative Passing %
30	600	99.7%
40	425	95.7%
50	300	74.7%
70	212	33.7%
100	150	6.7%
140	106	0.7%

Table 1 : US Silica F-55 Particle Size Distribution

Removal efficiencies at each flow rate were calculated based on net sediment loads passing the influent and effluent sampling points. Results are illustrated in Figure 1.

Assuming that sediment in the inlet chamber is ideally mixed, removal rates through the system will decay according to the percentage of flow bypassed. This effect has been observed in the laboratory where the test system is designed to produce a

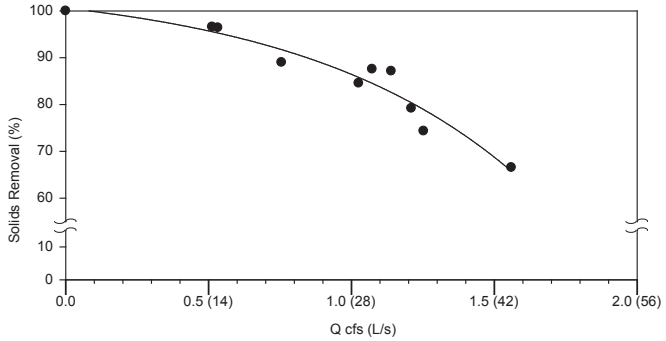


Figure 1: VortSentry HS Removal Efficiencies for 240-μm Particle Gradation

thoroughly mixed inlet stream. All VortSentry HS models have the same aspect ratio regardless of system diameter (i.e. an increase in diameter results in a corresponding increase in depth). Operating rates are expressed volumetrically.

Removal efficiency at each operating rate is calculated according to the average of volumetric and Froude scaling methods and is described by Equation 1.

Equation 1: $$\left(\frac{\text{Diameter Prototype}}{\text{Diameter Model}}\right)^{2.75} = \left(\frac{\text{Flow Rate Prototype}}{\text{Flow Rate Model}}\right)$$

Equation 1 and actual laboratory test results were used to determine the flow rate which would be required for the various VortSentry HS models to remove 80% of solids.

View report at **www.ContechES.com/stormwater**

Maintenance

The VortSentry HS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, i.e., unstable soils or heavy winter sanding will cause the treatment chamber to fill more quickly, but regular sweeping will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant deposition and transport may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall) however more frequent inspections may be necessary in equipment washdown areas and in climates where winter sanding operations may lead to rapid accumulations of a large volume of sediment. It is useful and often required as part of a permit to keep a record of each inspection. A simple inspection and maintenance log form for doing so is available for download at **www.ContechES.com/stormwater**

The VortSentry HS should be cleaned when the sediment has accumulated to a depth of two feet in the treatment chamber. This determination can be made by taking two measurements with a stadia rod or similar measuring device; one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the distance given in Table 2, the VortSentry HS should be maintained to ensure effective treatment.

Cleaning

Cleaning of the VortSentry HS should be done during dry weather conditions when no flow is entering the system. Cleanout of the VortSentry HS with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. Simply remove the manhole cover and insert the vacuum hose into the sump. All pollutants can be removed from this one access point from the surface with no requirements for Confined Space Entry.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use adsorbent pads, which solidify the oils. These are usually much easier to remove from the unit individually, and less expensive to dispose than the oil/water emulsion that may be

created by vacuuming the oily layer. Floating trash can be netted out if you wish to separate it from the other pollutants.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure proper safety precautions. If anyone physically enters the unit, Confined Space Entry procedures need to be followed.

Disposal of all material removed from the VortSentry HS should be done is accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

VortSentry HS Model	Diameter		Distance Between Water Surface and Top of Storage Sump		Sediment Storage		Oil Spill Storage	
	in.	m	ft.	m	yd^3	m^3	gal.	liter
HS36	36	0.9	3.6	1.1	0.5	0.4	83	314
HS48	48	1.2	4.7	1.4	0.9	0.7	158	598
HS60	60	1.5	6.0	1.8	1.5	1.1	258	978
HS72	72	1.8	7.1	2.2	2.1	1.6	372	1409
HS84	84	2.1	8.4	2.6	2.9	2.2	649	2458
HS96	96	2.4	9.5	2.9	3.7	2.8	845	3199

Table 2: VortSentry HS Maintenance Indicators and Sediment Storage Capacities.

Note: To avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile. Finer, silty particles at the top of the pile may be more difficult to feel with the measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.

Logon to **www.ContechES.com/stormwater** to download the VortSentry HS Inspection and Maintenance Log.

For assistance with maintaining your VortSentry HS, contact us regarding the Contech Maintenance compliance certification program.

CONTECH®
ENGINEERED SOLUTIONS

800-338-1122
www.ContechES.com

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other Contech division offerings, visit ContechES.com or call 800.338.1122

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; related foreign patents or other patents pending.

The Stormwater Management StormFilter, MFS and CDS are trademarks, registered trademarks, or licensed trademarks of Contech Engineered Solutions LLC. LEED is a registered trademark of the U.S. Green Building Council.

Support

- Drawings and specifications are available at contechstormwater.com.
- Site-specific design support is available from our engineers.

APPENDIX C

Stormwater Management System Owners/Operators

1. Stormwater Management System Owners: Environmental Pools (or current owner)
2. Current and future operators: Environmental Pools (or current owner)
3. Emergency contact information: Environmental Pools (or current owner)
4. Change of trustee: Environmental Pools (or current owner)
5. Financial Responsible Party: Environmental Pools (or current owner)
6. Routine Maintenance: Environmental Pools (or current owner)
7. O&M activities: Environmental Pools (or current owner)
8. Record keeping Environmental Pools (or current owner)

APPENDIX H

Long Term Pollution Prevention Plan

LONG TERM POLUTION PREVENTION PLAN

For the Property Located at

357 Main Street
in
Bolton, Massachusetts

Prepared For: **ENVIRONMENTAL POOLS**
184R RIVERNECK ROAD
CHELMSFORD, MA

Prepared By: **DILLIS & ROY CIVIL DESIGN GROUP, INC.**
1 MAIN STREET, SUITE 1
LUNENBURG, MA

February 3rd, 2021
3571-E

1.0 Summary

This Long-Term Pollution Prevention Plan (LTPPP) has been prepared by Ducharme & Dillis Civil Design Group, Inc. pursuant to the Massachusetts Stormwater Regulations. The proposed project consists of constructing 5 single-family homes with a common driveway, utilities and an on-site septic system.

The stormwater management system has been designed in accordance with the Massachusetts Stormwater Regulations to provide pretreatment of the stormwater prior to discharge to the resource areas.

2.0 Spill Prevention Plan

No hazardous materials other than normal and common household items are expected to be stored on site after the construction period has ended. It is expected that normal DEP notification procedures would be triggered for major spills such as home heating oil or propane and natural gas leaks.

3.0 Stormwater System O&M

A Stormwater Operation & Maintenance plan has been prepared for the proposed stormwater management system. Refer to this document for details pertaining to the required inspections, routine maintenance and operation details.

Implementation of the stormwater operation and maintenance plan is critical for the site to function as designed, and for the protection of the downstream areas from the potential for scour and erosion.

Special care should be paid to the protection and maintenance of the existing and proposed structures that support the drainage system. Refer to the O&M Plan for specific instructions.

4.0 Snow/Salt Management

4.1 Snow Plowing

Snow plowing will be performed by a private contractor or removed by the building tenants. Snow should not be piled on top of the septic system, septic tank, pump chamber, catch basins or infiltration areas and should be kept as far from the existing wetlands as possible. Refer to the Plans for allowable snow storage areas.

4.2 Street Sweeping

Street sweeping will be performed by a private contractor. It shall be performed a minimum of two times per year, in late fall and early spring.

4.3 Salting/Deicing

Salting of the pavement areas will take place during the winter months only when necessary. Salting will be performed by the same private contractor that is expected to snow plot or by the homeowner.

5.0 Waste Management

5.1 Septic Systems

Portable toilets will be utilized during construction activities and cleaned as required by the provider. The toilets will be inspected weekly and pumped as required. The portable toilets should not be used for any trash or other solid waste.

5.2 Solid Waste

A dumpster will be used for all construction related solid waste. It will be disposed of in accordance with all state and local regulations. The houses will use town or private waste services to dispose of garbage post-construction.

6.0 Lawn Maintenance

All lawn and landscaped maintenance will be performed by a private contractor. Fertilizers, herbicides and pesticides used for lawn care will be applied per the manufacturer's recommendations. If fertilizers, herbicides or pesticides need to be stored on site they will be properly stored in the proposed storage shed.

All yard waste shall be composted on-site or removed and disposed of in accordance with Town regulations. The lawn and landscaped areas will be watered as needed and shall comply with Town regulations.

7.0 Vehicle Washing

Since this project is the re-development of an office building, it is anticipated that there will be no vehicle washing on-site.

8.0 Outdoor Storage

All storage of materials shall be kept in the designated storage areas as noted on the plans. Stored materials subject to erosion shall have silt fence installed around the perimeter of the pile to prevent sediment from entering surrounding wetlands. Piles left for 21 days or more shall be stabilized with seed or covered with plastic sheeting.

Site Construction Plans

SPECIAL PERMIT PLAN

357 MAIN STREET

BOLTON, MASSACHUSETTS

SPECIAL PERMIT APPROVED IN ACCORDANCE WITH THE TOWN OF BOLTON ZONING BYLAW

BOLTON BOARD OF SELECTMEN

DATE:_____

SPECIAL PERMIT APPROVED IN ACCORDANCE WITH THE TOWN OF BOLTON ZONING BYLAW AND THE PLANNING BOARD SPECIAL PERMIT RULES & REGULATIONS FOR LIMITED BUSINESS & BUSINESS DISTRICTS

BOLTON PLANNING BOARD

DATE:_____

GENERAL NOTES/REFERENCES

1. TOPOGRAPHICAL INFORMATION SHOWN ON THIS PLAN IS BASED ON AN ON-THE-GROUND SURVEY BY DUCHARME & DILLIS CIVIL DESIGN GROUP, INC. PERFORMED IN JULY, 2001.
2. PROPERTY LINE INFORMATION SHOWN ON THIS PLAN WAS PREPARED BY DUCHARME & DILLIS CIVIL DESIGN GROUP, INC. BASED ON AN ON-THE-GROUND SURVEY PERFORMED IN JULY 2001 AND RECORDED PLANS AND DEEDS.
3. RESOURCE AREAS AS DEFINED BY THE MASSACHUSETTS WETLANDS PROTECTION ACT AND THE TOWN OF BOLTON WETLANDS BYLAW WERE DELINEATED BY DUCHARME & DILLIS CIVIL DESIGN GROUP, INC IN AUGUST 2006.
4. THE PROJECT FALLS WITHIN ZONE X AS SHOWN ON THE FLOOD INSURANCE RATE MAP 25027C0487F FOR THE TOWN OF BOLTON.
5. EXISTING UTILITES SHOWN ON THIS PLAN WERE COMPILED FROM FIELD MEASUREMENT AND RECORD PLANS. THE UTILITIES SHOWN ON THIS PLAN ARE FOR REFERENCE ONLY AND SHOULD NOT BE ASSUMED TO BE CORRECT NOR SHOULD IT BE ASSUMED THAT THE UTILITIES SHOWN ARE THE ONLY UTILITIES LOCATED ON OR NEAR THE SITE. THE CONTRACTOR SHALL CALL DIG SAFE 1-888-DIG-SAFE PRIOR TO CONSTRUCTION IN ACCORDANCE WITH STATE LAWS.

LOCUS MAP

SCALE: 1"=500'±

ZONING INFORMATION

ZONING DISTRICT: LIMITED BUSINESS
OVERLAY DISTRICTS: MIXED USE VILLAGE
WIRELESS COMMUNICATION

DESCRIPTION	REQUIRED	PROVIDED
MIN. LOT AREA	1.5 AC.	14.91± AC.
MIN. FRONTAGE	200'	1,394.21'
MIN. WIDTH @ 100' FROM STREET	150'	1,298±'
MIN. FRONT YARD	150'	200±'
MIN. SIDE/REAR YARD	50'	52'
MAX. BLDG. HEIGHT	32'	<32'
MAX. BLDG./LOT COVERAGE	20%	3.9%
MAX. IMPERVIOUS/LOT COVERAGE	50%	13.7%

RECORD INFORMATION

RECORD OWNER:
ANDREW & JILL EVERLEIGH
184R RIVERNECK ROAD
CHELMSFORD, MA 01824

DEED REFERENCE:
BOOK 57713 PAGE 69
BOOK 43886 PAGE 209
BOOK 45897 PAGE 103

PLAN REFERENCE:
PLAN BOOK 866 PLAN 75

ASSESSORS REFERENCE:
MAP: 4D PARCEL: 21

SHEET INDEX

SHEET NUMBER	SHEET TITLE	LAST REVISED
SHEET C1.0	TITLE SHEET	2/3/2021
SHEET C1.1	EXISTING CONDITIONS PLAN	2/3/2021
SHEET C2.1	SITE LAYOUT PLAN	2/3/2021
SHEET C3.1	GRADING, DRAINAGE & UTILITY PLAN	2/3/2021
SHEET C3.2	GRADING, DRAINAGE DETAILS 1	2/3/2021
SHEET C3.3	GRADING, DRAINAGE DETAILS 2	2/3/2021
SHEET C4.1	EROSION & SEDIMENT CONTROL PLAN	2/3/2021
SHEET C4.2	EROSION & SEDIMENT NOTES & DETAILS	2/3/2021

PREPARED BY:
DILLIS & ROY CIVIL DESIGN GROUP
CIVIL ENGINEERS LAND SURVEYORS WETLAND CONSULTANTS
1 MAIN STREET, SUITE 1
LUNENBURG, MA 01462
PHONE: (978) 779-6091
www.dillisandroy.com

OWNER:
ANDREW & JILL EVERLEIGH
184R RIVERNECK ROAD
CHELMSFORD, MASSACHUSETTS

APPLICANT:
ENVIRONMENTAL POOLS
184R RIVERNECK ROAD
CHELMSFORD, MASSACHUSETTS

SCALE:

COMMONWEALTH OF MASSACHUSETTS
FRANCIS M McPARTLAN
CIVIL
No. 49572
REGISTERED PROFESSIONAL ENGINEER
3/3/2021

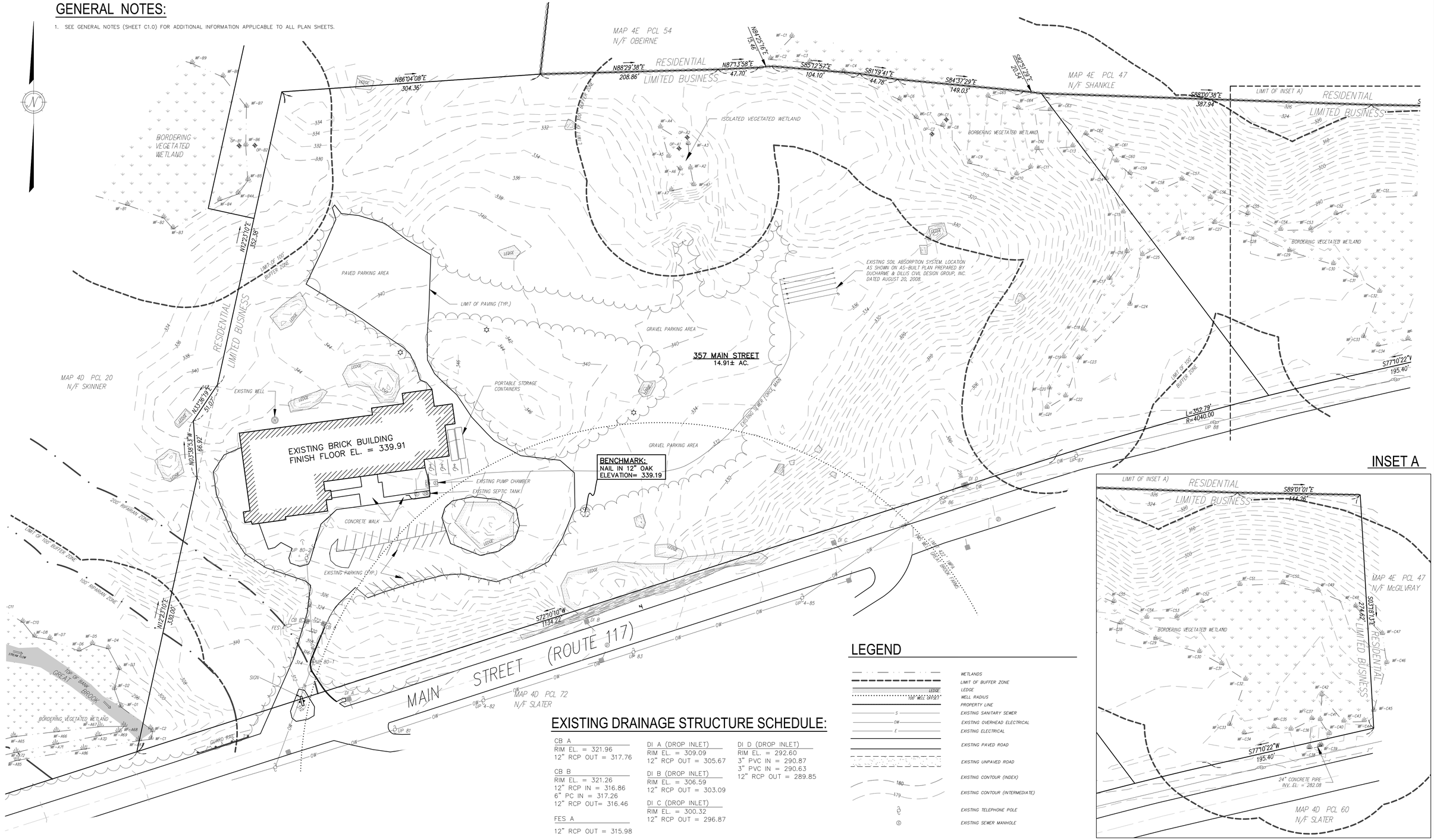
TITLE SHEET
357 MAIN STREET
BOLTON, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

DATE: 2/3/2021
JOB NO. 3571-E
DESIGN BY: JPL
DRAWING NO. 3571-E-TITLE
DRAWN BY: JPL
SHEET NO. C1.0
CHECKED BY: FMM

GENERAL NOTES:

1. SEE GENERAL NOTES (SHEET C1.0) FOR ADDITIONAL INFORMATION APPLICABLE TO ALL PLAN SHEETS.



INSET A

EXISTING DRAINAGE STRUCTURE SCHEDULE:

CB A
RIM EL. = 321.96
12" RCP OUT = 317.76

CB B
RIM EL. = 321.26
12" RCP IN = 316.86
6" PC IN = 317.26
12" RCP OUT= 316.46

FES A
12" RCP OUT = 315.98

DI A (DROP INLET)
RIM EL. = 309.09
12" RCP OUT = 305.67

DI B (DROP INLET)
RIM EL. = 306.59
12" RCP OUT = 303.09

DI C (DROP INLET)
RIM EL. = 300.32
12" RCP OUT = 296.87

DI D (DROP INLET)
RIM EL. = 292.60
3" PVC IN = 290.87
3" PVC IN = 290.63
12" RCP OUT = 289.85

LEGEND

- WETLANDS
- LIMIT OF BUFFER ZONE
- LEDGE
- 100' WELL RADIUS
- PROPERTY LINE
- EXISTING SANITARY SEWER
- EXISTING OVERHEAD ELECTRICAL
- EXISTING ELECTRICAL
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING CONTOUR (INDEX)
- EXISTING CONTOUR (INTERMEDIATE)
- EXISTING TELEPHONE POLE
- EXISTING SEWER MANHOLE

PREPARED BY:
DILLIS & ROY CIVIL DESIGN GROUP
CIVIL ENGINEERS LAND SURVEYORS WETLAND CONSULTANTS
1 MAIN STREET, SUITE 1
LUNENBURG, MA 01462
PHONE: (978) 779-6091
www.dillisandroy.com

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CHELMSFORD, MASSACHUSETTS

APPLICANT:
ENVIRONMENTAL POOLS
184R RIVERNECK ROAD
CHELMSFORD, MASSACHUSETTS

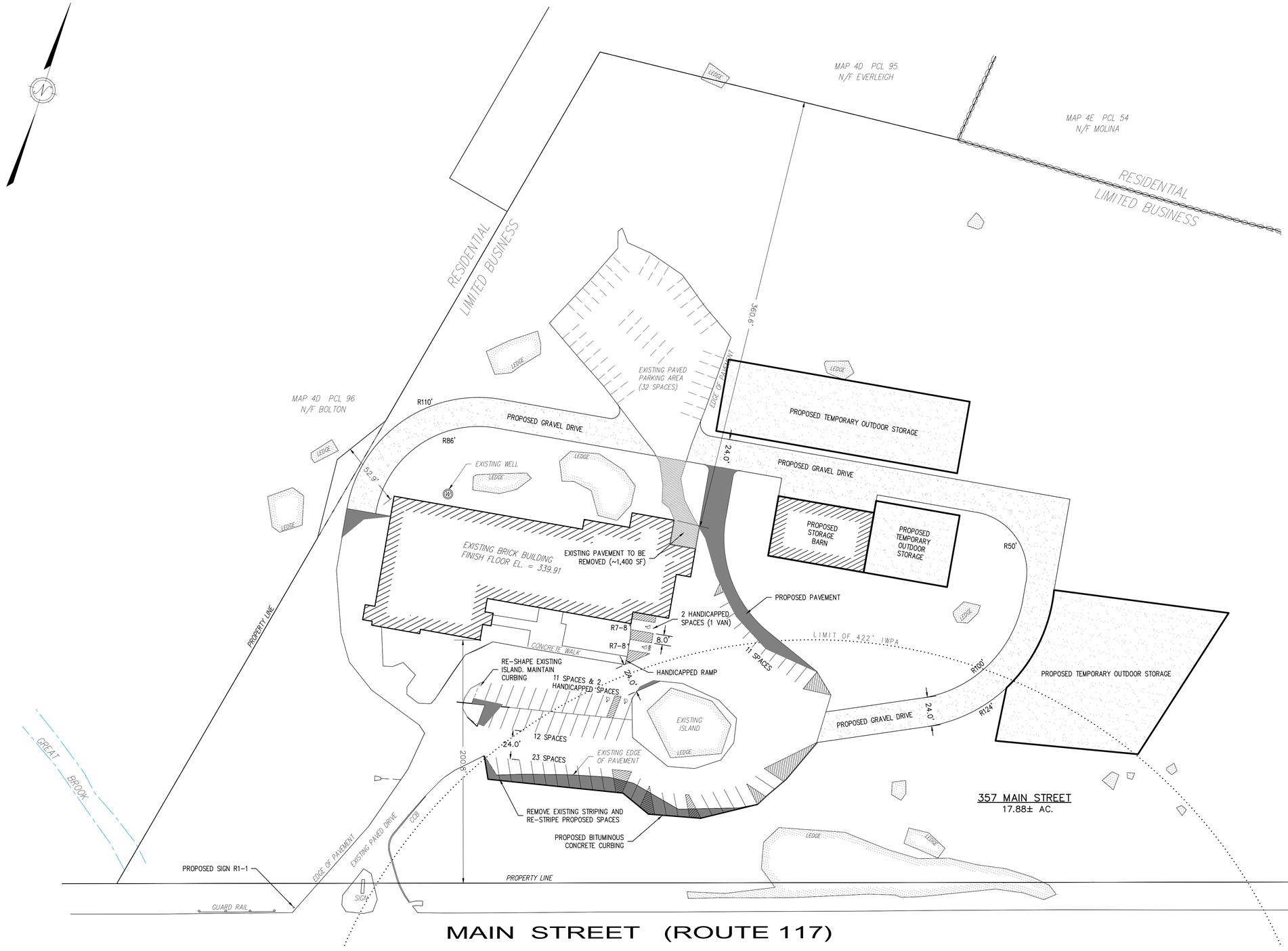
SCALE:
50 0 25 50 100 200
1 in. = 50 ft.

COMMONWEALTH OF MASSACHUSETTS
FRANCIS M McPARTLAN
CIVIL
No. 49572
REGISTERED PROFESSIONAL ENGINEER
3/3/2021

EXISTING CONDITIONS PLAN
357 MAIN STREET
BOLTON, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

DATE: 2/3/2021	JOB NO. 3571-E
DESIGN BY: JPL	DRAWING NO. 3571-E-EXIST
DRAWN BY: JPL	SHEET NO. C1.1
CHECKED BY: FMM	



NOTES:

1. SEE GENERAL NOTES (SHEET C1.0) FOR ADDITIONAL INFORMATION APPLICABLE TO ALL PLAN SHEETS.
2. DIMENSIONS OF PARKING SPACES AND DRIVEWAYS ARE MEASURED FROM FACE OF CURB.
3. HANDICAP ACCESSIBLE PARKING SPACES SHALL BE IDENTIFIED BY A SIGN LOCATED AT THE HEAD OF EACH SPACE. THE SIGN(S) SHALL SHOW THE INTERNATIONAL SYMBOL OF ACCESSIBILITY (MUTCD CODE R7-8)

PARKING TABLE

PARKING SPACES SHALL BE 9' WIDE x 18' DEEP. ALL PROPOSED PARKING SPACES AT A 75° ANGLE AND ARE REQUIRED TO BE AT LEAST 9.3' WIDE x 19' DEEP WITH A 22' TRAVEL LANE WIDTH PER THE BOLTON PARKING REGULATIONS. NUMBER OF REQUIRED SPACES BASED ON BOLTON ZONING BYLAW, SECTION 250-17C(7)(c) SCHEDULE OF MINIMUM PARKING, USING AN OFFICE BUILDING USE; 1 SPACE PER 250 SQUARE FEET OF GROSS FLOOR AREA. THERE IS NO STRIPING WITHIN THE EXISTING PAVED PARKING AREA. THE DASHED LINES REPRESENT THE AMOUNT OF SPACES THAT THE AREA COULD PRODUCE.

BUILDING SQUARE FOOTAGE = 21,295 SF

USE CATEGORY	REQUIRED SPACES	PROPOSED
OFFICE BUILDING	21,295 SF/250 = 86 SPACES	89 SPACES
HANDICAPPED	4 SPACES (1 VAN)	4 SPACES (1 VAN)

SIGN SCHEDULE

FOR SIGNS WITHIN SITE PARKING AND ACCESS DRIVE AREAS. SIGNS SHALL CONFORM TO STANDARDS OF FWHA "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) (2003 EDITION) AND "STANDARD HIGHWAY SIGNS" (2004 EDITION)

SIGN CODE	SIGN SIZE	LEGEND
R1-1	30"X30"	STOP (SEE DETAIL SHEET 8 OF 10)
R7-8	18"X12"	RESERVED PARKING* *MOUNT R7-8s BELOW R7-8 ON SIGN POST INDICATING "VAN ACCESSIBLE" PARKING SPACE.

PREPARED BY:
DILLIS & ROY
CIVIL DESIGN GROUP
CIVIL ENGINEERS LAND SURVEYORS WETLAND CONSULTANTS
1 MAIN STREET, SUITE 1
LUNENBURG, MA 01462
PHONE: (978) 779-6091
www.dillisandroy.com

OWNER:
ANDREW & JILL EVERLEIGH
184R RIVERNECK ROAD
CHELMSFORD, MASSACHUSETTS

APPLICANT:
ENVIRONMENTAL POOLS
184R RIVERNECK ROAD
CHELMSFORD, MASSACHUSETTS

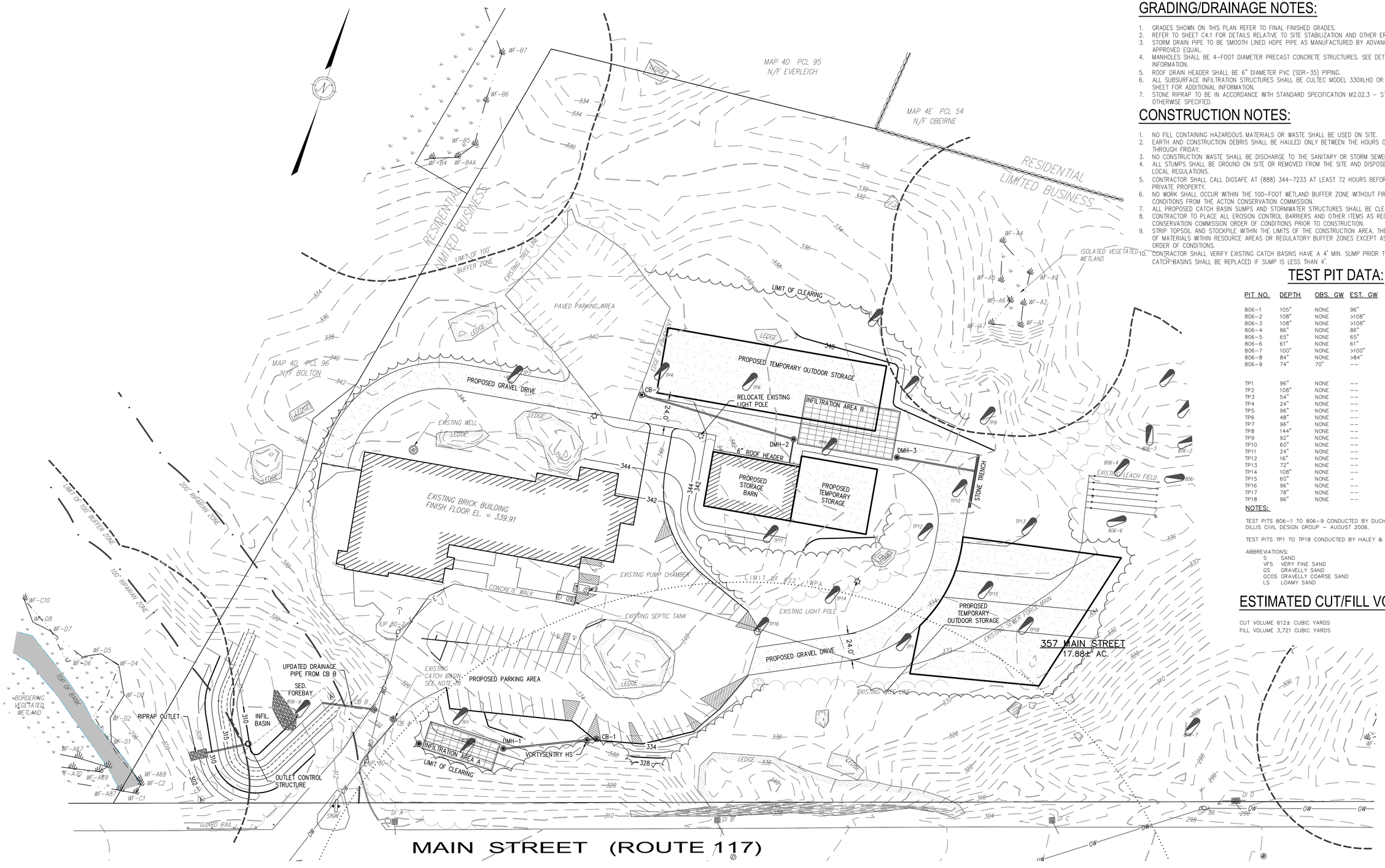
SCALE:
40 0 20 40 80 160
1 in. = 40 ft.

COMMONWEALTH OF MASSACHUSETTS
FRANCIS M McPARTLAN
CIVIL
No. 49572
REGISTERED PROFESSIONAL ENGINEER
3/3/2021

SITE LAYOUT PLAN
357 MAIN STREET
BOLTON, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

DATE: 2/3/2021
JOB NO. 3571-E
DESIGN BY: JPL
DRAWING NO. 3571-E-SITE
DRAWN BY: JPL
SHEET NO. C2.1
CHECKED BY: FMM



GRADING/DRAINAGE NOTES:

1. GRADES SHOWN ON THIS PLAN REFER TO FINAL FINISHED GRADES.
2. REFER TO SHEET C4.1 FOR DETAILS RELATIVE TO SITE STABILIZATION AND OTHER EROSION CONTROL DETAILS.
3. STORM DRAIN PIPE TO BE SMOOTH LINED HDPE PIPE AS MANUFACTURED BY ADVANCED DRAINAGE SYSTEMS, INC. OR APPROVED EQUAL.
4. MANHOLES SHALL BE 4-FOOT DIAMETER PRECAST CONCRETE STRUCTURES. SEE DETAIL SHEET FOR ADDITIONAL INFORMATION.
5. ROOF DRAIN HEADER SHALL BE 6" DIAMETER PVC (SDR-35) PIPING.
6. ALL SUBSURFACE INFILTRATION STRUCTURES SHALL BE CULTEC MODEL 330XLHD OR APPROVED EQUAL. SEE DETAIL SHEET FOR ADDITIONAL INFORMATION.
7. STONE RIPRAP TO BE IN ACCORDANCE WITH STANDARD SPECIFICATION M2.02.3 – STONE FOR PIPE ENDS UNLESS OTHERWISE SPECIFIED.

CONSTRUCTION NOTES:

1. NO FILL CONTAINING HAZARDOUS MATERIALS OR WASTE SHALL BE USED ON SITE.
2. EARTH AND CONSTRUCTION DEBRIS SHALL BE HAULED ONLY BETWEEN THE HOURS OF 9 AM AND 4 PM, MONDAY THROUGH FRIDAY.
3. NO CONSTRUCTION WASTE SHALL BE DISCHARGE TO THE SANITARY OR STORM SEWER SYSTEMS.
4. ALL STUMPS SHALL BE GROUND ON SITE OR REMOVED FROM THE SITE AND DISPOSED OF IN ACCORDANCE WITH LOCAL REGULATIONS.
5. CONTRACTOR SHALL CALL DIGSAFE AT (888) 344-7233 AT LEAST 72 HOURS BEFORE EXCAVATING ON PUBLIC OR PRIVATE PROPERTY.
6. NO WORK SHALL OCCUR WITHIN THE 100-FOOT WETLAND BUFFER ZONE WITHOUT FIRST OBTAINING AN ORDER OF CONDITIONS FROM THE ACTON CONSERVATION COMMISSION.
7. ALL PROPOSED CATCH BASIN SUMPS AND STORMWATER STRUCTURES SHALL BE CLEANED FOLLOWING CONSTRUCTION.
8. CONTRACTOR TO PLACE ALL EROSION CONTROL BARRIERS AND OTHER ITEMS AS REQUIRED BY THE BOLTON CONSERVATION COMMISSION ORDER OF CONDITIONS PRIOR TO CONSTRUCTION.
9. STRIP TOPSOIL AND STOCKPILE WITHIN THE LIMITS OF THE CONSTRUCTION AREA. THERE SHALL BE NO STOCKPILING OF MATERIALS WITHIN RESOURCE AREAS OR REGULATORY BUFFER ZONES EXCEPT AS EXPRESSLY PERMITTED BY THE ORDER OF CONDITIONS.
10. CONTRACTOR SHALL VERIFY EXISTING CATCH BASINS HAVE A 4' MIN. SUMP PRIOR TO CONSTRUCTION. EXISTING CATCH BASINS SHALL BE REPLACED IF SUMP IS LESS THAN 4'.

TEST PIT DATA:

PIT NO.	DEPTH	OBS. GW	EST. GW	SOIL DESC.
806-1	105"	NONE	96"	C1-S, C2-VFS
806-2	108"	NONE	>108"	C1-S, C2-VFS, C3-LS
806-3	108"	NONE	>108"	C1-S, C2-VFS
806-4	86"	NONE	86"	C1-FS, C2-LS
806-5	65"	NONE	65"	LS
806-6	61"	NONE	61"	LS
806-7	100"	NONE	>100"	S
806-8	84"	NONE	>84"	GS
806-9	74"	NONE	--	S
TP1	96"	NONE	--	GCOS
TP2	108"	NONE	--	GCOS
TP3	54"	NONE	--	REF 18"-54"
TP4	24"	NONE	--	REF 24"
TP5	96"	NONE	--	GS
TP6	48"	NONE	--	GS
TP7	96"	NONE	--	GS
TP8	144"	NONE	--	FILL(114"), S
TP9	92"	NONE	--	GS
TP10	60"	NONE	--	GS
TP11	24"	NONE	--	REF 6"-24"
TP12	16"	NONE	--	REF 6"-16"
TP13	72"	NONE	--	GS REF 48"-72"
TP14	108"	NONE	--	GS
TP15	60"	NONE	-	GS
TP16	96"	NONE	--	GS
TP17	78"	NONE	--	GS
TP18	96"	NONE	--	GS REF 60"-96"

NOTES:

TEST PITS 806-1 TO 806-9 CONDUCTED BY DUCHARME & DILLIS CIVIL DESIGN GROUP – AUGUST 2006.

TEST PITS TP1 TO TP18 CONDUCTED BY HALEY & ALDRICH

ABBREVIATIONS:
S SAND
VFS VERY FINE SAND
GS GRAVELLY SAND
GCOS GRAVELLY COARSE SAND
LS LOAMY SAND

ESTIMATED CUT/FILL VOLUMES

CUT VOLUME 612± CUBIC YARDS
FILL VOLUME 3,721 CUBIC YARDS

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CHELMSFORD, MASSACHUSETTS

APPLICANT:
ENVIRONMENTAL POOLS
184R RIVERNECK ROAD
CHELMSFORD, MASSACHUSETTS

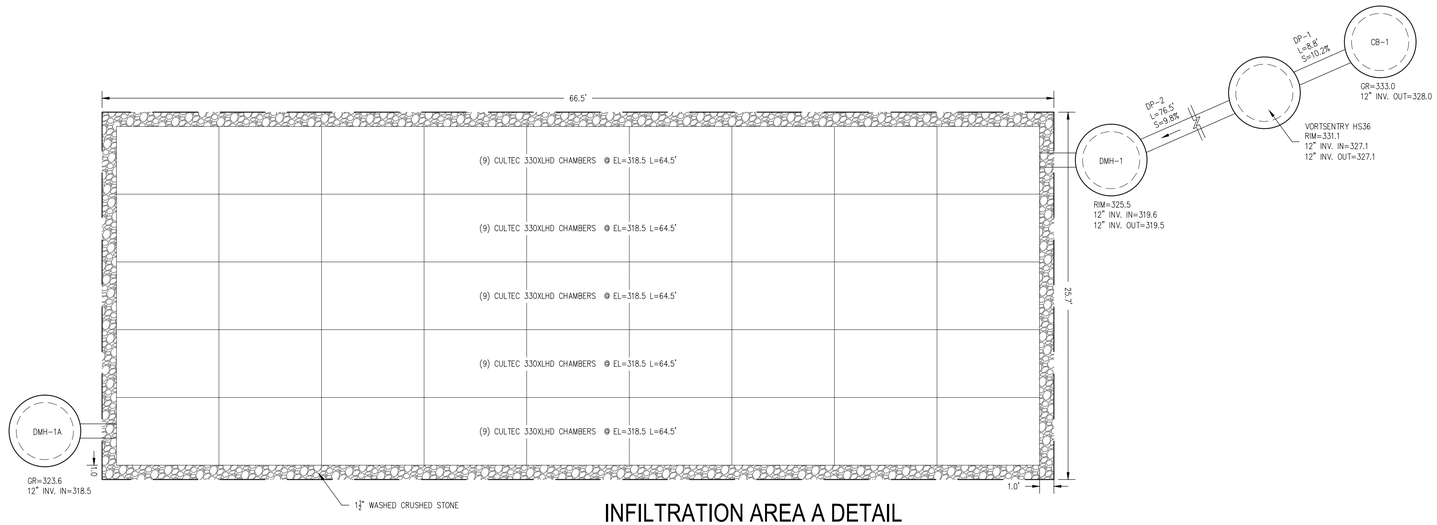
SCALE:
40 0 20 40 80 160
1 in. = 40 ft.

COMMONWEALTH OF MASSACHUSETTS
FRANCIS M McPARTLAN
CIVIL
No. 49572
REGISTERED PROFESSIONAL ENGINEER
3/3/2021

GRADING, DRAINAGE & UTILITY PLAN
357 MAIN STREET
BOLTON, MASSACHUSETTS

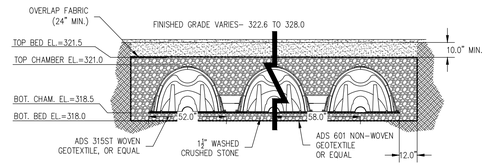
NO.	DATE	DESCRIPTION	BY

DATE: 2/3/2021
JOB NO. 3571-E
DESIGN BY: JPL
DRAWING NO. 3571-E-GRADE
DRAWN BY: JPL
CHECKED BY: FMM
SHEET NO. C3.1



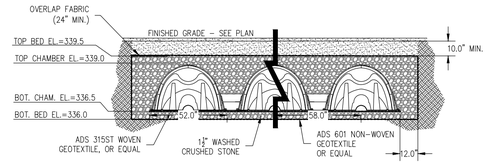
INFILTRATION AREA A DETAIL

NOT TO SCALE



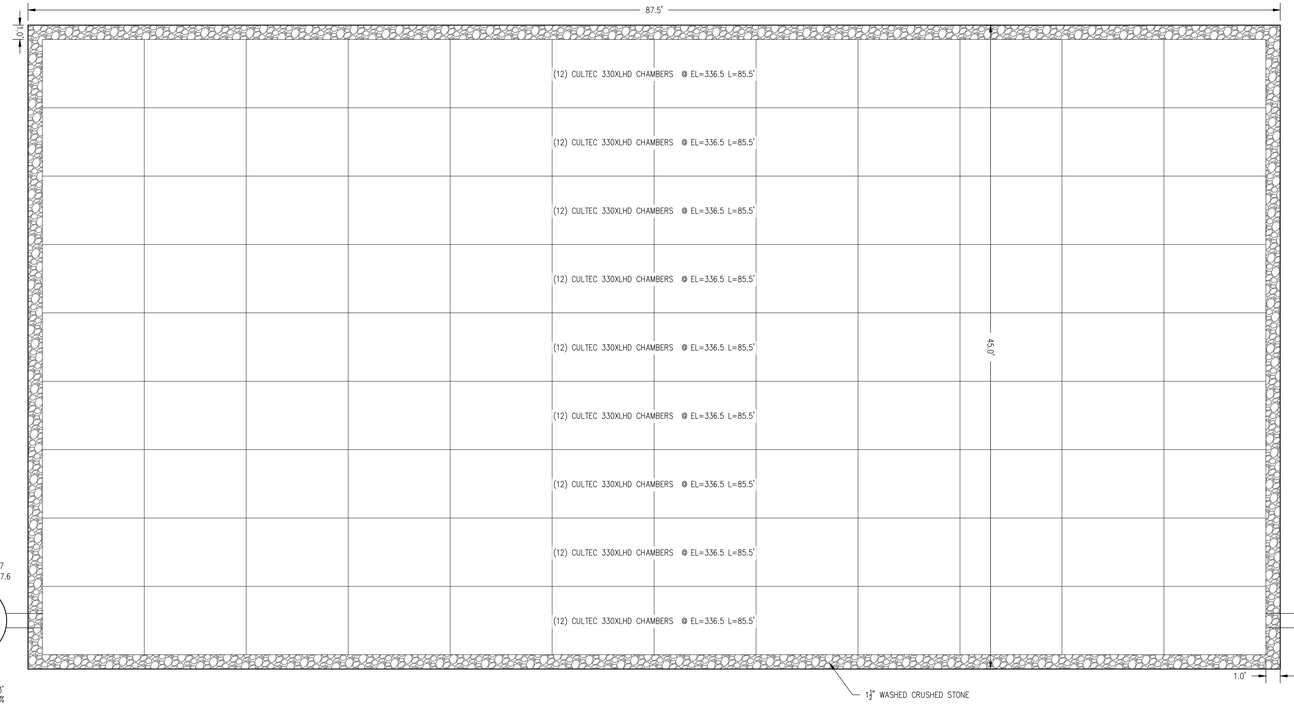
INFILTRATION AREA A CROSS SECTION

NOT TO SCALE



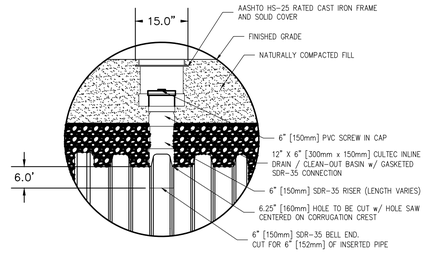
INFILTRATION AREA B CROSS SECTION

NOT TO SCALE



INFILTRATION AREA B DETAIL

NOT TO SCALE



INSPECTION PORT DETAIL

NOT TO SCALE

PREPARED BY:
DILLIS & ROY CIVIL DESIGN GROUP
CIVIL ENGINEERS LAND SURVEYORS WETLAND CONSULTANTS
1 MAIN STREET, SUITE 1
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APPLICANT:
ENVIRONMENTAL POOLS
184R RIVERNECK ROAD
CHELMSFORD, MASSACHUSETTS

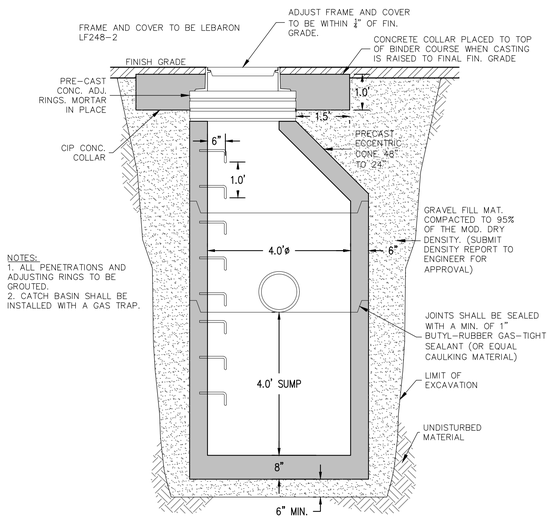
SCALE:

COMMONWEALTH OF MASSACHUSETTS
FRANCIS M McPARTLAN
CIVIL
No. 49572
REGISTERED PROFESSIONAL ENGINEER
3/3/2021

GRADING & DRAINAGE DETAILS 1
357 MAIN STREET
BOLTON, MASSACHUSETTS

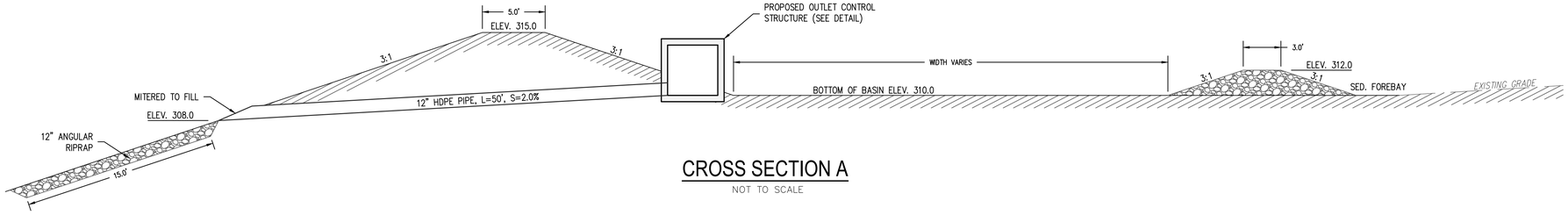
NO.	DATE	DESCRIPTION	BY

DATE: 2/3/2021	JOB NO. 3571-E
DESIGN BY: JPL	DRAWING NO. 3571-E-GRADE
DRAWN BY: JPL	SHEET NO. C3.2
CHECKED BY: FMM	



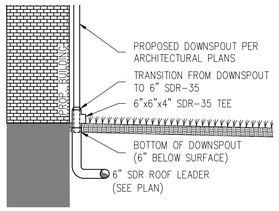
CATCH BASIN DETAIL

NOT TO SCALE



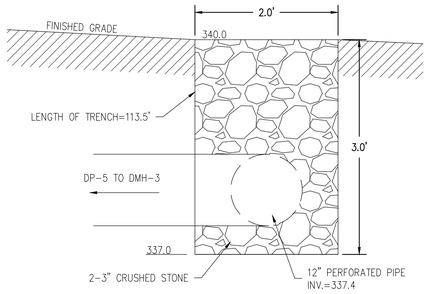
CROSS SECTION A

NOT TO SCALE



ROOF DRAIN DETAIL

NOT TO SCALE



STONE TRENCH DETAIL

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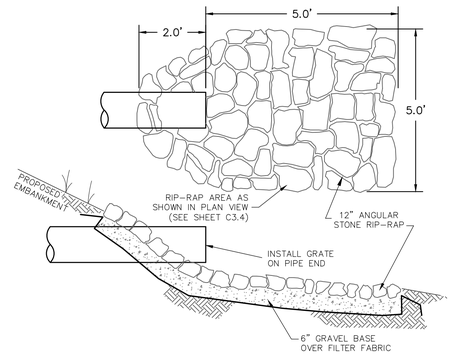
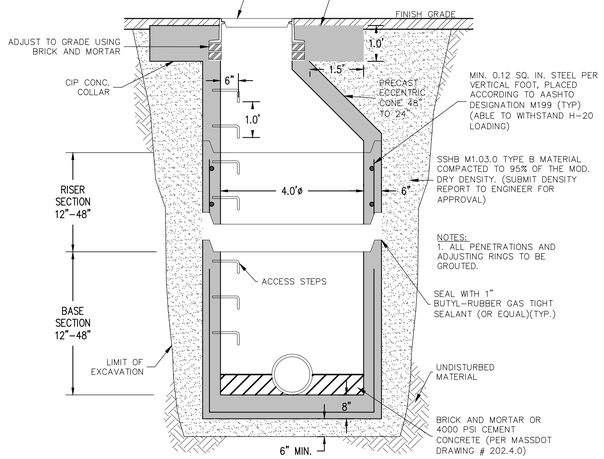


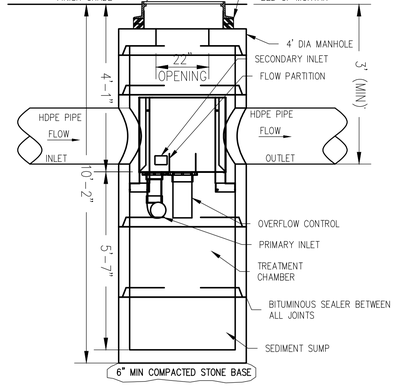
PIPE END DETAIL

NOT TO SCALE



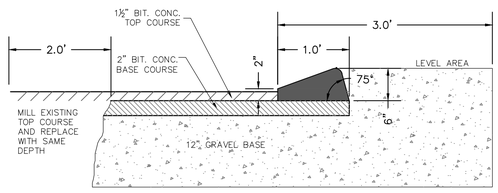
DRAIN MANHOLE DETAIL

NOT TO SCALE

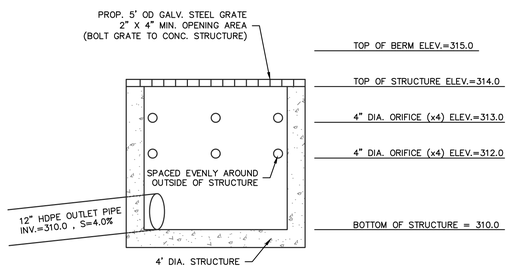


CONTECH VORTSENTRY HS36 DETAIL

NOT TO SCALE



BITUMINOUS CONCRETE CURB DETAIL



OUTLET CONTROL STRUCTURE

NOT TO SCALE

PREPARED BY:
DILLIS & ROY CIVIL DESIGN GROUP
CIVIL ENGINEERS LAND SURVEYORS WETLAND CONSULTANTS
1 MAIN STREET, SUITE 1
LUNENBURG, MA 01462
PHONE: (978) 779-6091
www.dillisandroy.com

OWNER:
ANDREW & JILL EVERLEIGH
184R RIVERNECK ROAD
CHELMSFORD, MASSACHUSETTS

APPLICANT:
ENVIRONMENTAL POOLS
184R RIVERNECK ROAD
CHELMSFORD, MASSACHUSETTS

SCALE:

COMMONWEALTH OF MASSACHUSETTS
FRANCIS M McPARTLAN CIVIL No. 49572 REGISTERED PROFESSIONAL ENGINEER
3/3/2021

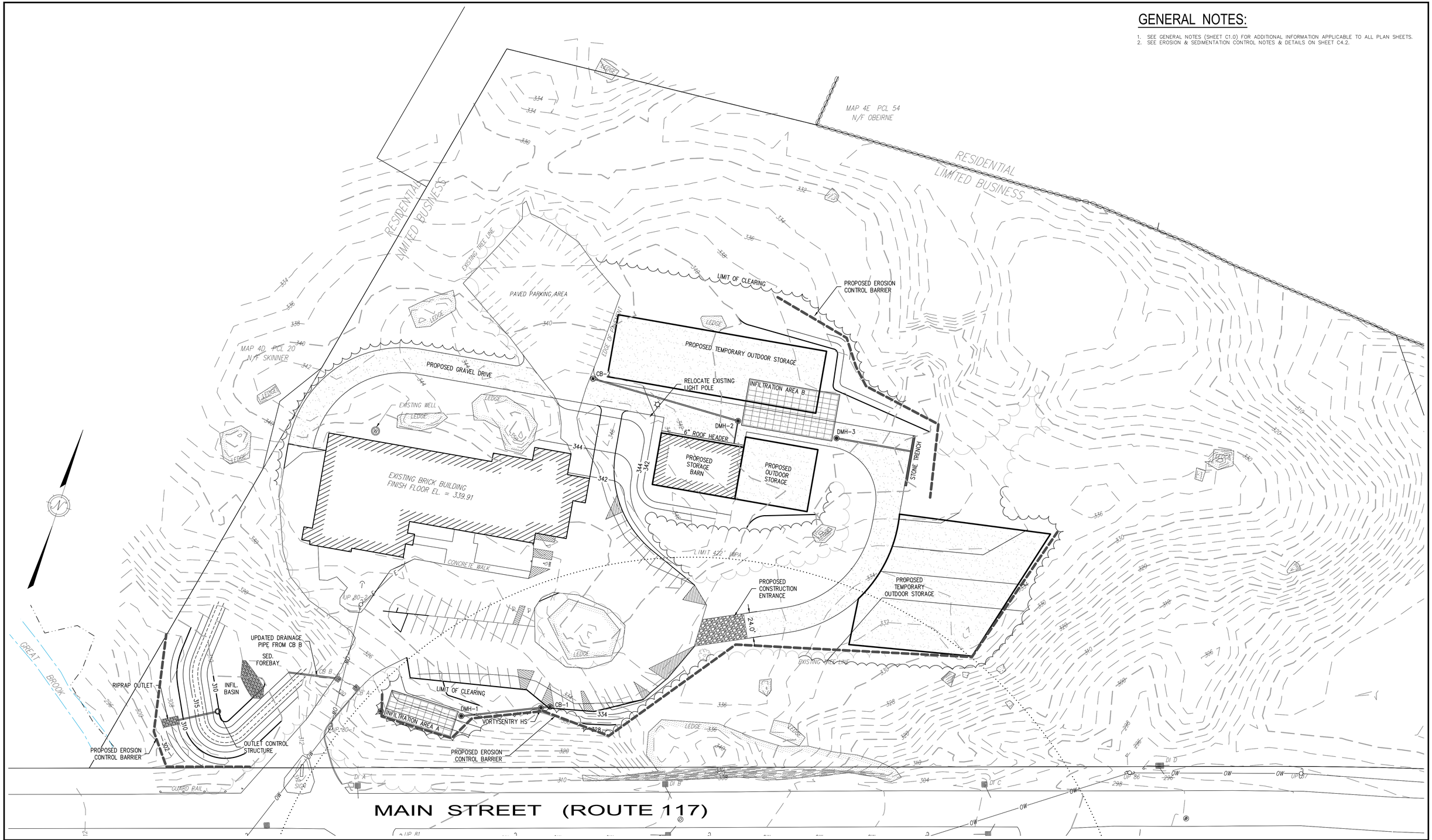
GRADING & DRAINAGE DETAILS 2
357 MAIN STREET
BOLTON, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

DATE: 2/3/2021
JOB NO. 3571-E
DESIGN BY: JPL
DRAWING NO. 3571-E-GRADE
DRAWN BY: JPL
SHEET NO. C3.3
CHECKED BY: FMM

GENERAL NOTES:

1. SEE GENERAL NOTES (SHEET C1.0) FOR ADDITIONAL INFORMATION APPLICABLE TO ALL PLAN SHEETS.
2. SEE EROSION & SEDIMENTATION CONTROL NOTES & DETAILS ON SHEET C4.2.



PREPARED BY:

DILLIS & ROY CIVIL DESIGN GROUP

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LUNENBURG, MA 01462

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APPLICANT:
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184R RIVERNECK ROAD
CHELMSFORD, MASSACHUSETTS

SCALE:
40 0 20 40 80 160
1 in. = 40 ft.

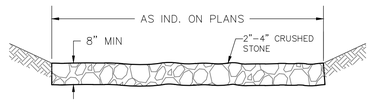
COMMONWEALTH OF MASSACHUSETTS
FRANCIS M McPARTLAN
CIVIL
No. 49572
REGISTERED PROFESSIONAL ENGINEER
3/3/2021

EROSION & SEDIMENT CONTROL PLAN
357 MAIN STREET
BOLTON, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

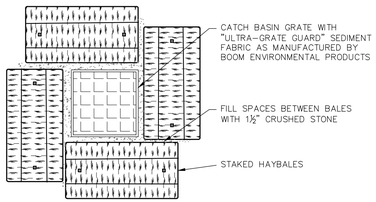
DATE: 2/3/2021	JOB NO. 3571-E
DESIGN BY: JPL	DRAWING NO. 3571-E-EROSION
DRAWN BY: JPL	SHEET NO. C4.1
CHECKED BY: FMM	

NOTE:
LENGTH = 40' MINIMUM
SEE PLAN FOR LOCATION(S)



TEMP. CONSTRUCTION ENTRANCE DETAIL

NOT TO SCALE

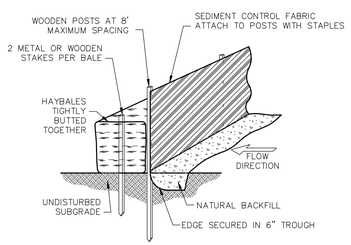


PLAN VIEW

NOT TO SCALE

CATCH BASIN SEDIMENT TRAP

NOT TO SCALE



SILTATION BARRIER

NOT TO SCALE

EROSION & SEDMIENTATION CONTROL NOTES:

GENERAL NOTES:

1. CONTRACTOR SHALL INSTALL SEDIMENT AND EROSION CONTROL MEASURES PRIOR TO CONSTRUCTION AND NOTIFY THE BOLTON CONSERVATION COMMISSION FOR FOR INSPECTION OF THE BARRIERS PRIOR TO BEGINNING CONSTRUCTION OR DEMOLITION ACTIVITIES.
2. CONTRACTOR SHALL COMPLY WITH ALL CONDITIONS OF THE ORDER OF CONDITIONS FORM THE BOLTON CONSERVATION COMMISSION.
3. CONTRACTOR SHALL MAINTAIN EROSION CONTROL MEASURES THROUGHOUT THE CONSTRUCTION PROCESS. EROSION CONTROL MEASURES SHOULD BE REGULARLY INSPECTED BY THE CONTRACTOR TO ENSURE THAT THEY ARE FUNCTIONING PROPERLY.
4. CONTRACTOR SHALL MAINTAIN, REPAIR, OR REPLACE EROSION CONTROL MEASURES AS NEEDED DURING CONSTRUCTION.
5. CONTRACTOR SHALL REMOVE EROSION CONTROL MEASURES AFTER SITE HAS BEEN STABLIZED FOR A PERIOD OF NOT LESS THAN 2 WEEKS.
6. CONTRACTOR SHALL RESTORE AREAS AS INDICATED ON THE PLAN WITHIN 1-WEEK OF COMPLETION OF FINAL GRADING AND SHALL MAINTAIN RESTORED AREAS DURING THE CONSTRUCTION PERIOD.
7. CONTRACTOR SHALL MONITOR THE GROWTH OF ALL PLANTINGS INCLUDING SEEDED GROUNDCOVERS AND SHALL PROVIDE WATER, FERTILIZER AND OTHER MEANS AS

TEMPORARY:

SILT FENCE AND HAY BALES ARE PROPOSED TO REDUCE THE MIGRATION OF SOILS TO AND FROM THE SITE. SILT FENCE AND HAY BALES HAVE BEEN SHOWN AROUND ALL PROPOSED STOCKPILE AREAS, AND IN AREAS WHERE THERE IS THE POTENTIAL FOR SOILS FROM THE CONSTRUCTION ACTIVITY TO MIGRATE INTO WETLANDS AND/OR WATERWAYS. A STORM WATER POLLUTION PREVENTION PLAN(SWPPP) AS PER THE ENVIRONMENTAL PROTECTION AGENCY REQUIREMENTS WILL BE REQUIRED BY THE SITE CONTRACTOR FOR THIS PROJECT.

THROUGHOUT THE DEVELOPMENT PROJECT, A LINE OF HAYBALES AND SILTATION FENCING WILL BE INSTALLED UP GRADIENT OF WETLAND SYSTEMS TO PREVENT SEDIMENTATION FROM DISTURBED AREAS FROM IMPACTING THE RESOURCE AREAS. THE LINE OF HAYBALES AND OTHER EROSION AND SEDIMENTATION CONTROL DEVICES, WILL BE INSTALLED AS DEPICTED IN THE EROSION AND SEDIMENTATION CONTROL PLANS AND WILL BE INSTALLED PRIOR TO ANY LAND DISTURBANCE ON THE PROJECT SITE. THE CONTROLS WILL BE INSPECTED AND MONITORED ON A WEEKLY BASIS. THE INTEGRITY OF THE SILT FENCE AND HAY BALES WILL BE INSPECTED BY THE SITE CONTRACTOR WEEKLY. IF SILT OR SEDIMENT IS ACCUMULATED TO A DEPTH OF 4 INCHES OR MORE, THE MATERIAL SHALL BE REMOVED IMMEDIATELY. THE CONDITION OF THE SILT FENCE AND HAY BALES SHALL ALSO BE INSPECTED WEEKLY. IF THE SILT FENCE IS TORN, DETERIORATED OR UNDERMINED IT SHALL BE REPLACED. IF THE HAY BALES ARE LOOSE, DECAYED OR UNDERMINED, THEY SHALL BE REPLACED. THE SITE CONTRACTOR IS RESPONSIBLE FOR PROVIDING AN ADEQUATE SUPPLY OF EROSION CONTROL MATERIALS SUCH AS HAY BALES AND SILT FENCE. FOR THE CATCH BASIN GRATES A SILT SAK, OR FILTER FABRIC WILL BE UTILIZED AND KEPT FREE OF ACCUMULATED SILT & SEDIMENT. ADDITIONAL FILTER FABRIC SHALL BE A STORED ONSITE AND AVAILABLE FOR IMMEDIATE REPAIRS ARE REQUIRED. EXISTING AND PROPOSED CATCH BASINS AND STORM DRAIN INLETS WILL BE PROTECTED FROM ADDITIONAL SEDIMENTATION VIA SILT SACK INSERTS OR FILTER FABRIC INSERTS IN THE GRATES WITH GRAVEL AROUND THE PERIMETER. THE TEMPORARY MEASURES WILL NOT BE REMOVED UNTIL PERMANENT STABILIZATION HAS OCCURRED.

DURING CONSTRUCTION THE SITE CONTRACTOR SHALL PROVIDE THE FOLLOWING OPERATION & MAINTENANCE:

- THE DRAINAGE SYSTEM SHALL BE MONITORED WEEKLY BY THE CONTRACTOR
- CATCH BASINS SHALL BE INSPECTED WEEKLY TO ENSURE THAT THEY ARE WATER TIGHT, HAVE ADEQUATE SUMP CAPACITY, THAT OIL AND GAS TRAPS ARE IN PLACE
- DEEP SUMP CATCH BASINS SHALL BE INSPECTED AFTER EVERY SIGNIFICANT RAINFALL EVENT (I.E. A TWO-YEAR STORM EVENT OR GREATER) DURING THE FIRST THREE (3) MONTHS OF BEING PLACED IN SERVICE TO ENSURE THAT THEY ARE FUNCTIONING IN AN ADEQUATE FASHION. THE BASINS SHALL BE CLEANED WITH A VACUUM TRUCK WHEN ⅓ OF THE SUMP IS FILLED WITH SEDIMENT BUT NOT LESS THAN TWO (2) TIMES PER YEAR. AFTER THE FIRST THREE (3) MONTHS OF SERVICE THE BASINS SHALL BE INSPECTED NOT LESS THAN ONE (1) TIME PER YEAR TO ENSURE ADEQUATE FUNCTIONALITY. OIL/GAS TRAPS SHALL BE CLEANED WITH A VACUUM TRUCK AND MONITORED FOR HYDROCARBON BUILD UP SEMIANNUALLY
- THE STORMWATER INFILTRATION BASIN SHALL BE INSPECTED MONTHLY DURING CONSTRUCTION FOR EROSION, SEDIMENT ACCUMULATION AND LEAF BUILDUP. ALL ERODED AREAS SHALL BE STABILIZED. SEDIMENT SHALL BE REMOVED AND LEAF LITTER REMOVED.
- DEWATERING OF EXCAVATIONS DURING CONSTRUCTION SHALL BE ADDRESSED ON AN INDIVIDUAL BASIS AS NEEDED. IF TEMPORARY DEWATERING IS REQUIRED AT REMOTE LOCATIONS ON THE SITE OR IN CLOSE PROXIMITY TO THE 100 FT BUFFER ZONE, ADDITIONAL SEDIMENT BASINS SHALL BE CONSTRUCTED OR SILT TRAPS SHALL BE UTILIZED. SILT TRAPS AND SEDIMENT BASINS SHALL BE MAINTAINED DURING THE DEWATERING OPERATION.

SOIL STOCKPILES STORED FOR TWENTY-FOUR (24) HOURS OR LONGER SHALL BE PROVIDED WITH ANY NECESSARY EROSION CONTROL TO PREVENT EROSION AND SEDIMENTATION, INCLUDING INSTALLATION OF PERIMETER HAY BALES/SILT FENCE, SILT FABRIC LINER AND PLASTIC SHEETING, AS SHOWN ON THE EROSION AND SEDIMENTATION CONTROL PLANS.

A GRAVEL CONSTRUCTION ENTRY PAD (TEMPORARY CONSTRUCTION ENTRANCE) SHALL BE INSTALLED AT THE BEGINNING OF THE GRAVEL DRIVEWAY TO REDUCE ANY OFFSITE TRACKING. THE SITE CONTRACTOR SHALL BE RESPONSIBLE FOR STREET SWEEPING TO BE PERFORMED IN AN EFFORT TO REDUCE POLLUTANTS IN THE STORMWATER. AREAS THAT WILL NOT BE CONSTRUCTED FOR SOME TIME SHOULD NOT BE CLEARED UNTIL THE AREA IS READY FOR DEVELOPMENT.

PERMANENT:

ALL DISTURBED AREAS SHALL BE RESTORED WITH EITHER GRASS, VEGETATION, TREES/SHRUBS OR GRAVEL TO MINIMIZE OR ELIMINATE THE FUTURE POTENTIAL FOR POLLUTION ONCE THE PROJECT IS COMPLETED. AREAS THAT HAVE BEEN COMPLETED OR THAT WILL NOT BE WORKED-ON FOR MORE THAT 14 DAYS SHOULD BE STABILIZED WITH PERMANENT VEGETATIVE COVER AS SOON AS POSSIBLE BUT NOT MORE THAN 14 DAYS AFTER THE LAST CONSTRUCTION ACTIVITY. SURFACES THAT ARE DISTURBED BY ONGOING CONSTRUCTION ACTIVITIES OR EROSION PROCESSES SHALL BE STABILIZED AS SOON AS POSSIBLE. LOAM WILL NOT BE PLACED UNLESS IT IS TO BE SEEDED OR OTHERWISE STABILIZED IN AN APPROPRIATE MANNER DIRECTLY THEREAFTER. ALL DISTURBED AREAS WILL HAVE A MINIMUM OF 4" OF LOAM PLACED BEFORE BEING SEEDED AND MULCHED. CONSIDERATION WILL BE GIVEN TO HYDRO-MULCHING, ESPECIALLY ON SLOPES IN EXCESS OF 3 TO 1. LOAMED AND SEEDED SLOPES WILL BE PROTECTED FROM WASHOUT BY MULCHING OR OTHER ACCEPTABLE SLOPE PROTECTION UNTIL VEGETATION BEGINS TO GROW. ALL LANDSCAPING AND PLANTINGS SHALL BE CONDUCTED IN ACCORDANCE WITH APPROVED PLANS.

SOLID WASTE:

WASTE DISPOSAL RECEPTACLES AND TRAILERS WILL BE USED FOR THE DISPOSAL OF CONSTRUCTION DEBRIS, WHICH WILL BE REMOVED FROM SITE ACCORDING TO STATE, LOCAL AND FEDERAL GUIDELINES. CONSTRUCTION DEBRIS WILL INCLUDE PAVEMENT, UTILITY, EARTH AND BUILDING MATERIALS THAT CANNOT BE REUSED. THE RECEPTACLES WILL BE LOCATED ON-SITE, COVERED, AND PLACED WELL AWAY FROM THE WETLAND RESOURCE AREAS AND CATCH BASINS AS POSSIBLE. ALL MACHINERY WILL BE OPERATED AND MAINTAINED SO AS TO LIMIT IMPACTS TO WETLAND AREAS AND ASSOCIATED BUFFER ZONES BY AVOIDING LEAKAGE OF FUEL. IF STOCKPILES OF DEBRIS MATERIALS ARE NECESSARY, PERIMETER CONTROLS OR PLASTIC SHEETING/COVERING WILL BE USED IF DEEMED NECESSARY DURING REGULAR SITE INSPECTIONS.PORTABLE SANITARY UNITS WILL BE PLACED ON-SITE DURING CONSTRUCTION AND WILL BE SERVICED REGULARLY. THEY WILL BE PLACED OVER 100-FEET FROM WETLAND RESOURCE AREAS.

DUST CONTROL:

TO AVOID SEDIMENT TRACKING AND/OR FUGITIVE DUST FROM LEAVING THE SITE, A VARIETY OF MITIGATION MEASURES SHALL BE EMPLOYED. A RIPRAP ENTRANCE FOR CONSTRUCTION VEHICLES SHALL BE ESTABLISHED. ALSO, AS NECESSARY, WATER TRUCKS SHALL BE USED TO WET DRY, DUSTY SOIL IF IT BECOMES AN ISSUE. STREET SWEEPING SHALL BE PERFORMED AS NEEDED TO REDUCE THE BUILD-UP OF DUST AND SEDIMENT ON ROADWAYS AND PARKING AREAS.

PROJECT-RELATED WHEEL WASHES ARE NOT ANTICIPATED. SHOULD WHEEL WASHED BE REQUIRED, THE CONTRACTOR SHALL PROVIDE THEM AS DIRECTED BY THE OWNER THE LOCATION OF WHEEL WASHES SHALL BE LOCATED OUTSIDE THE 100-FOOT BUFFER ZONE AND IN AN APPROPRIATE LOCATION SO THAT THE WASH-WATER WILL NOT GET INTO CATCH BASINS OR THE DETENTION BASIN.

MATERIAL STORAGE:

MATERIAL STORAGE YARDS MUST BE MANAGED APPROPRIATELY. AT THIS TIME, IT IS ANTICIPATED THAT ALL STORAGE OF MATERIALS WILL OCCUR ON SITE. THE STORAGE AREA WILL ALSO INCLUDE SUPPLIES OF ADDITIONAL EROSION CONTROL MATERIALS SUCH AS HAYBALES. NO STOCKPILING OF MATERIALS OR STORAGE OF EQUIPMENT SHALL OCCUR IN THE WETLAND RESOURCE AREAS, OR WITHIN 100 FEET OF THE RESOURCE AREA.

HAZARDOUS MATERIALS NECESSARY FOR CONSTRUCTION WILL BE STORED IN WATER TIGHT CONTAINERS OR BUILDINGS IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS AND THE MANUFACTURER'S RECOMMENDATIONS, WITH APPROPRIATELY SIZED SPILL KITS ON HAND. THE STORAGE SITE WILL BE INSPECTED FOR SIGNS OF LEAKAGE OR UNSAFE STORAGE AND TRANSFER PRACTICES. ANY HEAVY EQUIPMENT PERMITTED TO WORK ADJACENT TO WETLAND AREAS, SHALL BE EQUIPPED WITH EMERGENCY SPILL KITS. REFUELING OF MOBILE HEAVY EQUIPMENT SHALL BE CONDUCTED OUTSIDE OF ALL WETLAND AREAS AND BUFFER ZONES.

PREPARED BY:
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APPLICANT:
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184R RIVERNECK ROAD
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SCALE:

COMMONWEALTH OF MASSACHUSETTS
FRANCIS M McPARTLAN
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3/3/2021

EROSION & SEDIMENT CONTROL DETAILS
357 MAIN STREET
BOLTON, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

DATE: 2/3/2021	JOB NO. 3571-E
DESIGN BY: JPL	DRAWING NO. 3571-E-EROSION
DRAWN BY: JPL	SHEET NO. C4.2
CHECKED BY: FMM	

APPLICANT for SPECIAL PERMIT

ANDREW EVERLEIGH, OWNER
ENVIRONMENTAL POOLS, INC.
184R RIVERNECK ROAD
CHELMSFORD, MA 01824

REGISTERED ARCHITECT
DENNIS M. WILSON
No. 8759
MAGNOLIA
MASSACHUSETTS
COMMONWEALTH OF MASSACHUSETTS

ARCHITECT :

WILSON ARCHITECTURAL SERVICES
100 CUMMINGS CENTER, SUITE 322B
BEVERLY, MA 01915
(978) 927-5499

PROJECT LOCATION :

357 MAIN STREET
MAP 4D, PCL #21
BOLTON, MASS, 01740

PROJECT DESCRIPTION :

1. THE EXISTING BUILDING AT 357 MAIN STREET IS PREDOMINANTLY A SINGLE STORY STRUCTURE WITH 20,446 SF ON THE FIRST FLOOR AND 2,086 SF ON THE SECOND FLOOR. THE BUILDING IS PRESENTLY VACANT AND THE PROPERTY IS IN A 'LIMITED BUSINESS' (LB) ZONING DISTRICT.

2. THESE DRAWINGS ARE BEING SUBMITTED AS PART OF A SPECIAL PERMIT APPLICATION WHICH IS REQUIRED BY TOWN OF BOLTON REGULATIONS. SAID APPLICATION IS AN EFFORT TO OBTAIN APPROVAL FOR MULTI-TENANT MIXED-USE OCCUPANCIES IN THE EXISTING BUILDING. APPROXIMATELY 60% OF THE MULTI-TENANT FLOOR AREA OF THE EXISTING BUILDING WILL BE OCCUPIED BY THE OWNER'S COMPANY WHICH IS NAMED ' ENVIRONMENTAL POOLS'. IT IS UNDERSTOOD THAT SAID COMPANY AND OTHER PROSPECTIVE TENANTS WOULD BE LIMITED TO THE TYPES OF USE AS LISTED IN THE TOWN OF BOLTON 'SCHEDULE OF PERMITTED USES'. MANY OF THE PERMITTED USES ARE CONTINGENT UPON REVIEW BY THE PLANNING BOARD PURSUANT TO ARTICLE #250-23E. FOR CLARIFICATION PURPOSES IT IS UNDERSTOOD THAT IN ADDITION TO THE PERMIITED USES ALLOWED BY RIGHT IN A 'LIMITED BUSINESS DISTRICT' THAT OTHER TYPES OF TENANTS ARE ALLOWED BY SPECIAL PERMIT INCLUDING (BUT NOT LIMITED TO) TYPES OF COMPANIES AS LISTED BELOW :
   - RETAIL AND WHOLESALE MERCANTILE WHOLLY OR PARTIALLY OUTSIDE THE BUILDING
   - CONSTRUCTION CONTRACTORS WITH PARTIAL STORAGE OUTSIDE THE BUILDING
   - BUSINESS OFFICES

3. FUTURE ALTERATIONS TO THE EXISTING BUILDING AND SITE INCLUDE (BUT ARE NOT LIMITED TO) ITEMS AS LISTED BELOW :
   - REPAIR OF EXTERIOR WALL SHEATHING, INSULATION AND SIDING AS NEEDED FOR FULL BUILDING CODE COMPLIANCE
   - GENERAL UPGRADE OF EXTERIOR FACADE AND INSTALLATION OF AWNINGS AS SHOWN ON RENDERING
   - MODIFICATIONS TO EXISTING FIRE ALARM SYSTEM PER BUILDING CODE AND FIRE DEPARTMENT REQUIREMENTS INCLUDING FEASABILITY STUDY OF SPRINKLER SYSTEM INSTALLATION PER STATE AND BOLTON FIRE DEPARTMENT REQUIREMENTS
   - REPAIR OF EXISTING ROOFING AND ROOF INSULATION AS NEEDED FOR FULL BUILDING CODE COMPLIANCE
   - REPAIR OF EXISTING MECHANICAL, ELECTRICAL AND PLUMBING SYSTEMS AS NEEDED FOR FULL BUILDING CODE COMPLIANCE
   - DEMOLITION OF INTERIOR PARTITIONS AS NEEDED
   - INSTALLATION OF NEW INTERIOR PARTITIONS PER MULTI-TENANT SPACE REQUIREMENTS
   - REPAIR OF EXISTING PAVING, LANDSCAPING AND EXTERIOR LIGHTING

4. ALL BUILDING AND SITE ALTERATIONS AS HEREIN SHOWN ARE FOR SCHEMATIC PURPOSES ONLY. UPON RECEIVING A SPECIAL PERMIT FROM THE TOWN, IT IS THE INTENT OF THE APPLICANT TO IDENTIFY THE SPECIFICS OF ALL PROPOSED ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION ALTERATIONS TO THE BUILDING AND THE SITE, BY SUBMITTING FULL CONSTRUCTION DRAWINGS TO THE BUILDING INSPECTOR'S OFFICE FOR A BUILDING PERMIT.