HANCOCK ASSOCIATES

Stormwater Report

In Support Of

A Site Plan Approval Application

For

57 Perkins Row

(Parcel ID #58-25)

Topsfield, Ma

PREPARED BY:
Hancock Associates
#27296

PREPARED FOR:
Kevin Whelan
March 2024
Revised March 2024

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Introduction

Kevin Whelan proposes to construct a four (4) bedroom residential house on 57 Perkins Row, Topsfield, MA. Associated improvements will include paved driveway, a stormwater management system, and a new septic system. The project area is currently comprised of a developed residential yard with a single-story house. The project area is accessed by Perkins Row and consists of 8.2± acres. The property is bounded by undeveloped wooded land owned by Natalie M. Whalen to the east and northwest and west, residential land owned by Joseph John Dubinski and Alicia Mercedes Keating Dubinski to the southwest, undeveloped wooded land owned by the Mass Audubon Society to the south, and the Ipswich River to the south.

The project site is located to the north of the Ipswich River and to the south of bordering vegetated wetlands. In the existing condition, stormwater flows overland to both the wetlands and Ipswich River. The proposed stormwater system was designed to mimic the existing drainage pattern.

The proposed stormwater management system will include infiltration trenches along the proposed driveway and three subsurface infiltration fields. The proposed subsurface infiltration fields will collect roof runoff and will reduce peak rates of runoff by promoting infiltration. Overflow from the infiltration fields will drain to the wetlands or the Ipswich River via overland flow through an emergency flow area drain, mimicking existing drainage patterns.

The subject property is located within a red soil zone, indicating sever-slow percolation, according to the Topsfield, MA Map of Areas of Severe Soil Limitation (Appendix II)

The proposed stormwater management system was designed to meet the Stormwater Management Standards described in the Massachusetts Stormwater Handbook. The following report describes the system's compliance with these standards.

March 2024 Revision

This report has been revised based on comments from Gerry McDonald, the Topsfield Stormwater Consultant, dated March 8, 2024. The changes made are comprised of matching elevations in HydroCAD to the Site Plans, modifying the infiltration trench outlet device, and relocating AD2.

Standard 1: No New Untreated Discharges

The Massachusetts Stormwater Handbook states that no new stormwater conveyances may discharge untreated stormwater directly to or cause erosions in wetlands or waters of the Commonwealth. The project does not include new stormwater conveyances.

Standard 2: Peak Rate Attenuation

The Massachusetts Stormwater Handbook states that stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. A summary of the existing and proposed discharge rates follows. The proposed condition discharge rates of runoff are at or below the existing rates to the same discharge points. Please see the attached "Existing Drainage Figure" and "Proposed Drainage Figure" (Appendix IV) and HydroCAD output (Appendix V) for more information.

For the purpose of these calculations the following assumptions were made:

- The same total watershed area of the drainage areas is used to compare the existing and proposed.
- The Natural Resources Conservation Service (NRCS) Web Soil Survey of Essex County defines soils in the project area as:
    - 405B, Charlton fine sandy loam, 3 to 8 percent slopes, Hydrologic Soil Group B
    - 405C, Charlton fine sandy loam, 8 to 15 percent slopes, Hydrologic Soil Group B
    - 406D, Charlton fine sandy loam, 15 to 25 percent slopes, very stony, Hydrologic Soil Group B

  On-site soil testing confirmed that all soils are sandy loam. For the purposes of this calculation, all soils are assumed to be Hydrologic Soil Group B.

Two drainage areas have been modeled to represent the existing condition:

- Drainage Area EX1 consists of a developed residential yard, paved area, and roof area. Stormwater runoff from EX1 drains via overland flow to the wetlands and Ipswich River along the southern property line (Discharge Point DP1).
- Drainage Area EX2 consists of a developed residential yard, paved area, and roof area. Stormwater runoff from EX2 drains via overland flow to the wetlands in the northern portion of the property (Discharge Point DP2).

In the proposed condition a stormwater management system will collect and treat stormwater runoff from the project site. This system will include a system of roof drains doing to subsurface infiltration fields as well as surficial infiltration trenches. Four main drainage areas have been modeled to represent the proposed condition:

- Drainage Area PR1A will consist of landscaped area. Stormwater flow from PR1A will drain via overland flow to the wetlands and Ipswich River along the southern property line (Discharge Point DP1).
- Drainage Area PR1B will consist of roof area. Stormwater flow from PR1B will drain to the subsurface infiltration field IF3, via a network of pipes. Overflow from IF3 will discharge from AD3 and drain via overland flow to the wetlands and Ipswich River along the southern property line (Discharge Point DP1).
- Drainage Area PR2A will consist of landscaped area. Stormwater flow from PR2A will drain via overland flow to the wetlands in the northern portion of the property (Discharge Point DP2).
- Drainage Area PR2B will consist of paved driveway area. Stormwater flow from PR2B will drain overland to the infiltration trenches. Overflow from infiltration trenches will drain via overland flow to the wetlands in the northern portion of the property (Discharge Point DP2).
- Drainage Area PR2C will consist of roof area. Stormwater flow from PR2C will drain to the subsurface infiltration field IF1, via a network of pipes. Overflow from IF1 will discharge from AD1 and drain via overland flow to the wetlands in the northern portion of the property (Discharge Point DP2).
- Drainage Area PR2D will consist of roof area. Stormwater flow from PR2D will drain to the subsurface infiltration field IF2, via a network of pipes. Overflow from IF2 will discharge from AD2 and drain via overland flow to the wetlands in the northern portion of the property (Discharge Point DP2).

The following table compares the peak rates of runoff under the existing and proposed conditions using the latest Atlas-14 Precipitation Data:

Table 1: Peak Rates of Runoff

Discharge Point	Peak Rate (cfs)					
	2-Year Storm (3.27" Rainfall Depth)		10-Year Storm (5.17" Rainfall Depth)		100-Year Storm (8.17" Rainfall Depth)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
DP1	0.29	0.21	1.07	0.84	2.65	2.12
DP2	0.33	0.13	0.99	0.57	2.26	2.12

cfs – Cubic Feet per Second

Standard 3: Recharge

The Massachusetts Stormwater Handbook states that loss of annual recharge to groundwater shall be eliminated or minimized. The annual recharge from the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type. Recharge volumes are provided for all of the proposed impervious areas. For the purpose of these calculations, all of the development areas are considered to be Hydrologic Soil Group B. The required recharge volume is 0.35" multiplied by the area of impervious surfaces. Please see the attached Hydrocad summaries for the recharge volumes provided within the infiltration basin (Appendix VI). The volumes is as follows:

Required Recharge Volume, HSG B = Target Depth * Impervious Area = 0.35" * 7,180 SF = 209 CF

The recharge volume is provided below the top of the infiltration trenches and the rim of the overflow drains in the infiltration trenches. The total volume provided is 1,574 cubic feet. Since the volume provided is greater than the required recharge volume, the standard is met.

The Massachusetts Stormwater Handbook states that the recharge volume must drain within 72 hours. Observations in deep hole soil testing performed on-site indicate that the soil that the chamber system will be installed upon is sandy loam. Please see the soil testing logs in Appendix IV. The following "drawdown" calculation assumes a Rawl's Rate of 1.02 inches per hour, corresponding to texture class "Sandy Loam".

Infiltration Trenches:
Drawdown Time = Storage Volume / (Rawl's Rate * Bottom Area)
= 928 CF / (1.02 in/hr * 1,160 SF) = 9.4 Hour

Infiltration Field IF1:
Drawdown Time = Storage Volume / (Rawl's Rate * Bottom Area)
= 220 CF / (1.02 in/hr * 320 SF) = 8.1 Hour

Infiltration Field IF2:
Drawdown Time = Storage Volume / (Rawl's Rate * Bottom Area)
= 206 CF / (1.02 in/hr * 300 SF) = 8.1 Hour

Infiltration Field IF3:
Drawdown Time = Storage Volume / (Rawl's Rate * Bottom Area)
= 220 CF / (1.02 in/hr * 320 SF) = 8.1 Hour

Since the design drawdown times are less than 72 hours, the requirement is met.

Standard 4: Water Quality

The Massachusetts Stormwater Handbook states that systems shall be designed to remove 80% of the average annual post-development construction load of Total Suspended Solids (TSS). The treatment BMP's have been sized to provide at least 80% TSS removal and measures will be taken for long-term pollution prevention.

According to the Massachusetts Stormwater Handbook, the proposed infiltration basin is the be sized to treat 1" of stormwater volume over the contributing impervious areas. The water quality volume calculation is as follows:

Required Water Quality Volume = 1" * Impervious Area = 1" *8,179 SF = 682 CF

The water quality volume is provided below the top of the infiltration trenches and the rim of the overflow drains in the infiltration fields. The volume provided is 1,574 cubic feet. Since the volume provided is greater than the required water quality volume, the standard is met.

Standard 5: Land Uses with Higher Potential Pollutant Loads

The proposed project is not a Land Use with Higher Potential Pollutant Load (LUHPPL).

Standard 6: Critical Area

The proposed project discharges to wetlands which are a tributary to the Ipswich River. The infiltration systems have been sized to treat 1" of stormwater volume over the contributing impervious areas as described under Standard 4.

Standard 7: Redevelopment

The proposed project is not a redevelopment.

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

Best management practices (BMP) for erosion and sedimentation control are staked, silt fences, compost wood fiber sock, hydro seeding, and phased development. Many stormwater BMP technologies (e.g., infiltration technologies) are not designed to handle the high concentrations of sediments typically found in construction runoff and must be protected from construction-related sediment loadings. Construction BMP's **must** be maintained. In developing the proposed project certain measures will be implemented to minimize impacts erosion and sedimentation could have on surrounding areas. This section addresses items that involve proper construction techniques, close surveillance of workmanship, and immediate response to emergency situations. The developer must be prepared to provide whatever reasonable measures are necessary to protect the environment during construction and to stabilize all disturbed areas as soon as construction ends. Construction period pollution prevention and erosion and sediment control shall meet the requirements for the 2022 EPA Construction General Permit for all projects requiring coverage under the CGP.

Pre-Construction

1. The contractor shall have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. These materials shall include, but are not limited to compost wood fiber sock, silt fence, compost wood fiber sock and crushed stone.
2. The contractor is responsible for erosion control on site and shall utilize erosion control measures where needed, regardless of whether the measures are specified on the plan or in the order of conditions.

Preliminary Site Work

1. Excavated materials should be stockpiled, separating the topsoil for future use on the site. Erosion control shall be utilized along the down slope side of the piles and side slopes shall not exceed 2:1.
2. If intense rainfall is anticipated, the installation of supplemental straw bale dikes, silt fences, or armored dikes shall be considered.
3. Unsuitable excavated material shall be removed from the site.
4. Construction entrance shall be installed.
5. Existing catch basins shall be protected with silt sacks.

Ongoing Site Work

1. Erosion control measures shall be regularly inspected and replaced as needed.
2. Dewatering shall be done in a manner so as not to transmit silt, sand or particulate matter to the receiving water or existing drainage system.

Landscaping

1. Landscaping shall occur as soon as possible to provide permanent stabilization of disturbed surfaces.
2. If the season or adverse weather conditions do not allow the establishment of vegetation, temporary mulching with straw, wood chips weighted with snow fence or branches, or other methods shall be provided.
3. A minimum of 4 inches of topsoil shall be placed and its surface smoothed to the specified grades.
4. The use of herbicides is strongly discouraged.
5. Hydro seeding is encouraged for steep slopes. Application rates on slopes greater than 3:1 shall have a minimum seeding rate of 5-lbs/1000 SF. A latex or fiber tackifier shall be used on these slopes at a minimum rate of 50 lbs. of tackifier per 500 gallons of water used.

57 Perkins Row – Construction Phase Maintenance

Operations and Maintenance Log
Inspections for Year:_____

Structural Best Management Practice (Frequency)	Action	Date Completed	Completed By	Comments
Compost Wood Fiber Sock and Silt Fence Inspect weekly and after major storm event.	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
Proposed Catch Basin Silt Sock Inspect weekly and after major storm event.	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
	Inspect/ Clean			
Vegetated Areas Inspect weekly and after major storm event.	Inspect			
	Inspect			
Construction Entrance Inspect weekly and after major storm event.	Inspect/Clean			
	Inspect/Clean			
Soil Stock Pile Area Inspect weekly and after major storm event.	Inspect			
	Inspect			

Standard 9: Operations and Maintenance Plan

The information provided herein is intended to provide the base information for operation and maintenance of the site in perpetuity subject to updates and revisions as required at a future date. As such all future property owners must be notified in writing of this plan and be provided with a copy of this plan, a complete set of the design drawings and/or a completed as-built plan showing all the drainage features as they were constructed, which are considered part of this document. Please see the attached Operations and Maintenance Log (Appendix IX).

Stormwater management system owner:	Kevin Whelan (978-500-9729)
The party responsible for operation and maintenance:	Kevin Whelan (978-500-9729)

Preliminary Stormwater Operation and Maintenance Budget

Quarterly Inspection and Maintenance x $2,500 per visit = $10,000 annually

Illicit Discharge - Practices to Minimize Storm Water Contamination

- All waste materials will be collected and stored in a securely lidded metal dumpster.
- All trash and debris from the site will be deposited in the dumpster. The dumpster will be emptied on a regular schedule prior to being over full.
- All personnel will be instructed regarding the correct procedure for waste disposal.
- Good housekeeping and spill control practices will be followed to minimize storm water contamination from petroleum products, paints, and cleaning products.
- All site vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage.
- Spill kits will be provided with any activity that could provide contamination.
- All paint containers and curing compounds will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewers, but will be properly disposed according to the manufacturer's instructions.
- All spills will be cleaned up immediately upon discovery. Spills large enough to reach the storm sewers will be reported to the Massachusetts Department of Environmental Protection Northeast Regional Office at 1-888-304-1133.

Infiltration Fields

The infiltration fields shall be inspected after every major storm for the first few months to ensure it is stabilized and functioning properly. If necessary, corrective action shall be taken until the system functions properly. Inspectors should note how long water remains standing in the inspection port after a storm; standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated. If the ponding is due to clogging, immediately address the reasons for the clogging. Thereafter, inspect the infiltration BMP at least twice per year.

Infiltration Trenches

The infiltration trenches shall be inspected in early May and the second half of October. Any accumulated silt, trash, or debris shall be removed from the infiltration trenches. Crushed stone shall be replenished as needed. If silt reaches halfway up the crushed stone, it shall be removed, and the stone replaced or replenished as needed.

Roof Drain Leaders

Routine roof inspections shall be performed two times per year. The roof shall be kept clean and free of debris, and the roof drainage systems shall be kept clear. Gutters and downspouts shall be cleaned at least twice per year, or more frequently as necessary.

Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the functioning of stormwater management practices. This includes the health/density of vegetative cover and

activities such as the application and disposal of lawn and garden care products, disposal of leaves and yard trimmings.

Initial Post-Construction Inspection

During the initial period of vegetation establishment pruning and weeding are required twice in first year by contractor or owner. Any dead vegetation/plantings found after the first year will be replaced. Proper mulching is mandatory and regular watering may be required initially to ensure proper establishment of new vegetation.

Long-Term Maintenance

The planted areas shall be inspected on a semi-annual basis and any litter removed. Weeds and invasive plant species shall be removed by hand. Maintain planted areas adjacent to pavement to prevent soil washout. Immediately clean any soil deposits on pavement. Leaf litter and other detritus shall be removed twice per year. If needed to maintain aesthetic appearance, perennial plantings may be trimmed at the end of the growing season.

Trees and shrubs shall be inspected twice per year to evaluate health and attended to as necessary. Seeded ground cover or grass areas shall not receive mulching. Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming. Plant alternative mixtures of grass species in the event of unsuccessful establishment. The grass vegetation should not be cut to a height less than four inches.

Pesticide/Herbicide Usage

No pesticides are to be used unless a single spot treatment is required for a specific control application.

57 Perkins Row – Post Construction Maintenance

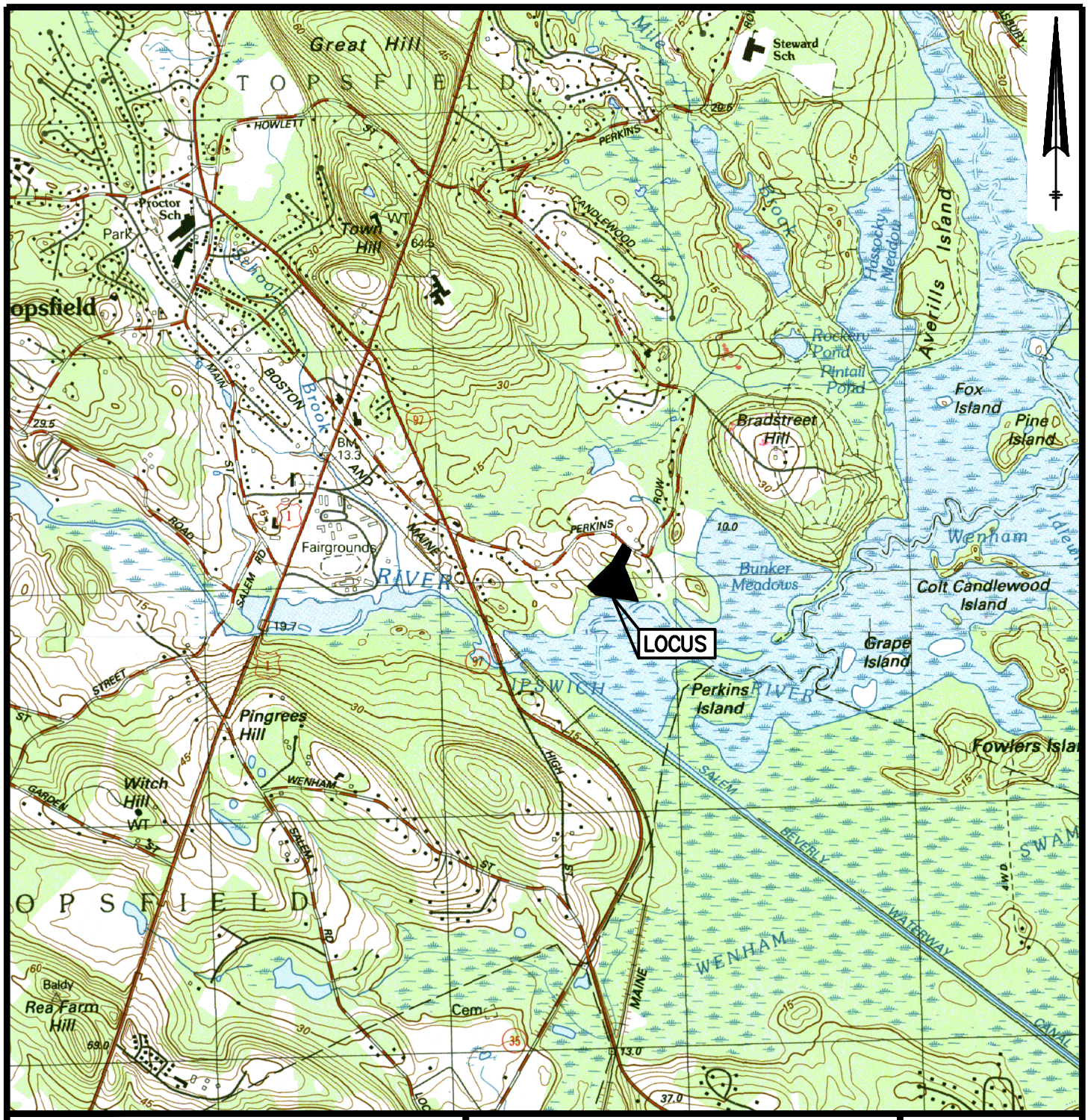
Operations and Maintenance Log
Inspections for Year:_____

Structural Best Management Practice (Frequency)	Action	Date Completed	Completed By	Comments
Infiltration Fields – Inspect twice per year. Clean as required	Inspect			
	Inspect			
Infiltration Trenches – Inspect twice per year. Clean as required	Inspect			
	Inspect			
Roof Drain Leaders – Inspect/clean twice per year.	Inspect/Clean			
	Inspect/Clean			
Vegetated Areas Maintenance – Inspect twice per year. Maintain as required.	Inspect			
	Inspect			

Standard 10: Prohibition of Illicit Discharges

No illicit discharges currently exist and no future illicit discharges will be allowed including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, soil, or grease.

Appendix I Locus Map



USGS LOCUS MAP

57 PERKINS ROW
TOPSFIELD, MA

HANCOCK ASSOCIATES

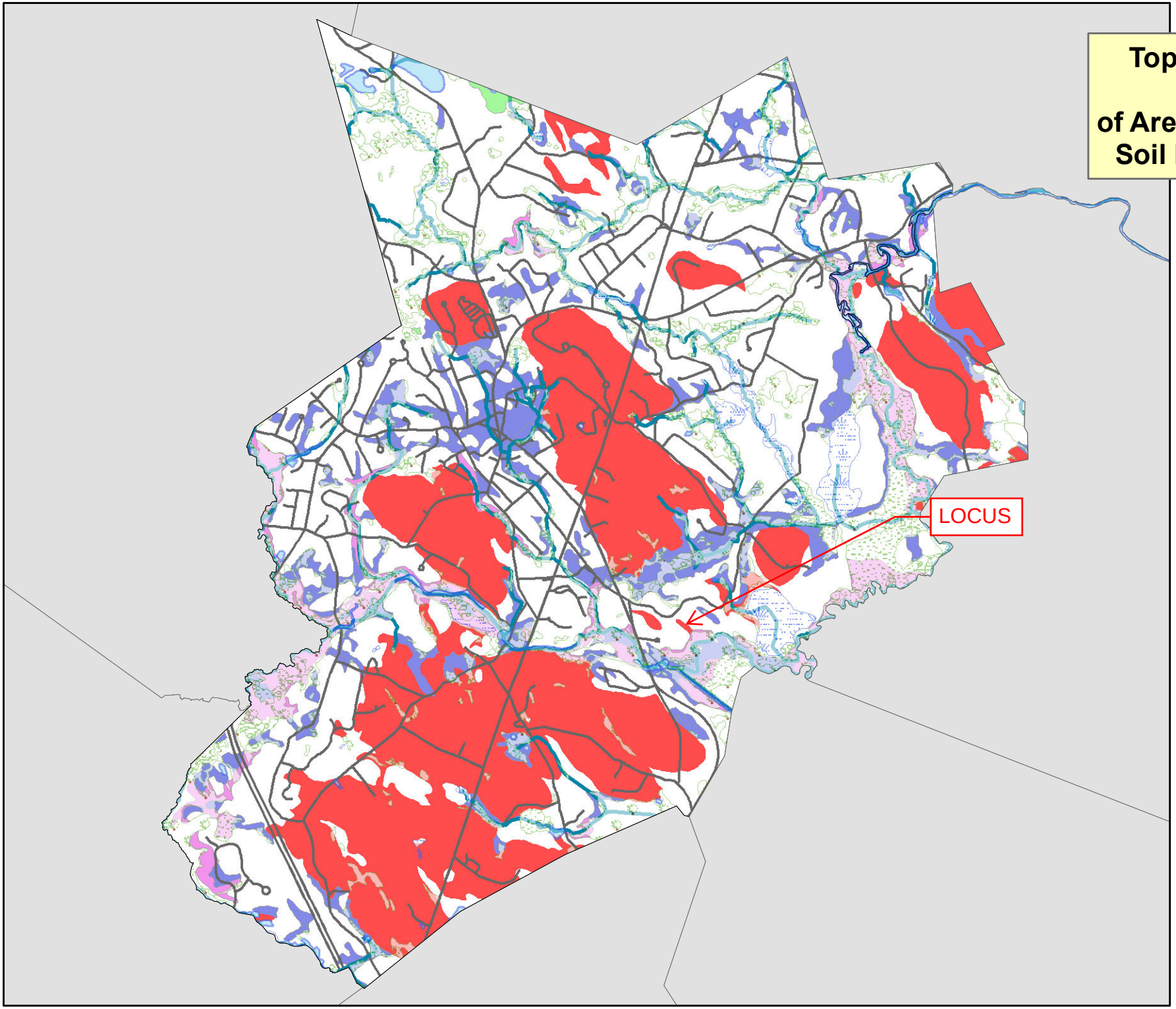
185 CENTRE STREET, DANVERS, MA. 01923
VOICE (978) 777-3050, FAX (978) 774-7816

DATE:	3/4/24
SCALE:	1"=2,000'
DESIGN:	JJP
DRAWN:	JJP
LAYOUT:	LOCUS
JOB NO.:	27296

PATH: F:\Civil 3D Projects\27296-Whelan-Topsfield\Eng\DWG\ PLOT DATE: Mar 04, 2024 DWG: 27296locus.dwg

Appendix II Topsfield, MA Map of Areas of Severe Limitations

Topsfield, MA
Map
of Areas of Severe
Soil Limitations



Legend

Soils NRDC

SepticLeach

- Severe-flood
- Severe-slow perc
- Severe-wet

Wetlands DEP

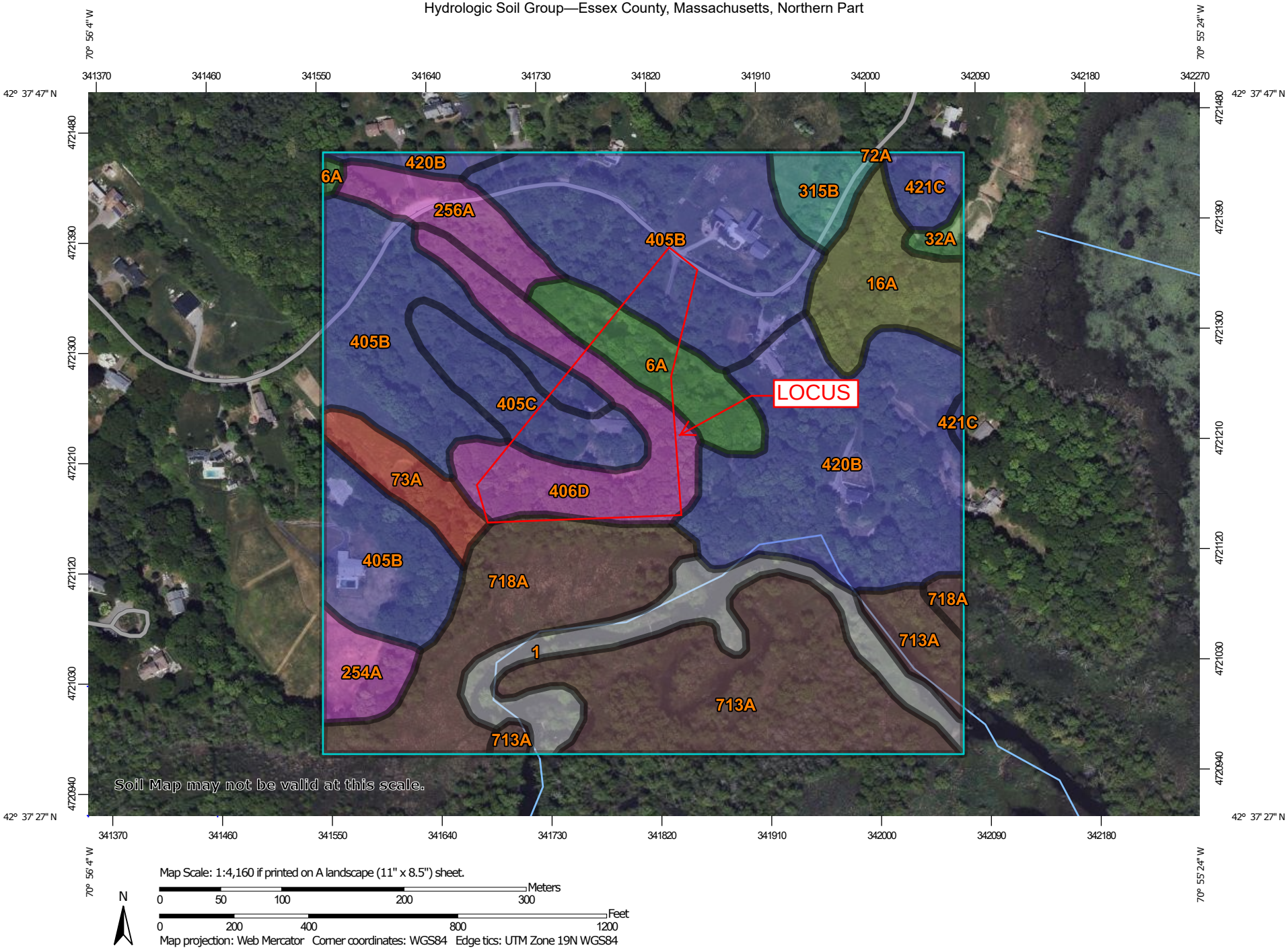
- BOG
- DEEP MARSH
- OPEN WATER
- SHALLOW MARSH MEADOW OR FEN
- SHRUB SWAMP
- WOODED SWAMP CONIFEROUS
- WOODED SWAMP DECIDUOUS
- WOODED SWAMP MIXED TREES
- Streams
- Roads

1 in = 3,500 ft

N

Date: 5/11/2012

Appendix III NRCS Soils Map



Map Scale: 1:4,160 if printed on A landscape (11" x 8.5") sheet.

N

0 50 100 200 300 Meters

0 200 400 800 1200 Feet

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 19, Sep 10, 2023

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		3.7	5.8%
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	A/D	2.5	4.0%
16A	Scantic silt loam, 0 to 3 percent slopes	C/D	2.9	4.6%
32A	Wareham loamy sand, 0 to 3 percent slopes	A/D	0.3	0.5%
72A	Whitman fine sandy loam, 0 to 3 percent slopes	D	0.0	0.0%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	1.5	2.3%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	A	1.3	2.0%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	A	1.9	2.9%
315B	Scituate fine sandy loam, 3 to 8 percent slopes	C	1.2	1.8%
405B	Charlton fine sandy loam, 3 to 8 percent slopes	B	16.3	25.5%
405C	Charlton fine sandy loam, 8 to 15 percent slopes	B	2.5	3.9%
406D	Charlton fine sandy loam, 15 to 25 percent slopes, very stony	A	4.4	6.8%
420B	Canton fine sandy loam, 3 to 8 percent slopes	B	9.8	15.2%
421C	Canton fine sandy loam, 8 to 15 percent slopes, very stony	B	1.0	1.5%
713A	Limerick and Rumney soils, 0 to 3 percent slopes, frequently flooded	B/D	9.0	14.1%
718A	Saco variant silt loam, frequently ponded, 0 to 1 percent slopes, frequently flooded	B/D	5.9	9.2%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Totals for Area of Interest			**64.0**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix IV Soil Testing Logs

NOTES:

1.) ELEVATIONS BASED ON NAVD88.
2.) TOPOGRAPHIC FEATURES AND LOCATIONS ARE THE RESULT OF AN ACTUAL FIELD SURVEY PERFORMED BY THE MORIN–CAMERON GROUP SEPTEMBER OF 2014.
3.) WETLAND RESOURCE AREAS WERE FLAGGED BY DEROSA ENVIRONMENTAL CONSULTING AND LOCATED BY THE MORIN–CAMERON GROUP.
4.) MEAN ANNUAL HIGH WATER DETERMINED IN FIELD BY OBSERVATIONS OF STAINING ON TREES AS DETERMINED BY DEROSA ENVIRONMENTAL CONSULTING.
5.) IPSWICH RIVER LOCATION TAKEN FROM THE TOWN OF TOPSFIELD GIS MAP.
6.) PROPERTY LINE INFORMATION COMPILED FROM VARIOUS PLANS AND DEEDS AND SHOULD BE CONSIDERED APPROXIMATE ONLY.
7.) WETLAND RESOURCE AREAS WITHIN THE SURVEYED PREMISES INCLUDE THE FOLLOWING:
- –LIMIT OF MEAN HIGH WATER
- –APPROXIMATE BANK FULL RIVER CHANNEL
- –WETLAND FLAG NUMBERS A3 TO A20, B5 TO B13 AND C1 TO C10
- *ALL OTHER WETLAND RESOURCE AREAS DEPICTED OUTSIDE THE PREMISES AND ILLUSTRATED HERON ARE TO DETERMINE THE EXTENT OF JURISDICTIONAL BUFFER ZONE IMPACTS ON THE SUBJECT PREMISE ONLY.

8.) THIS PLAN HAS BEEN PREPARED FOR OUR CLIENTS USE ONLY FOR THE SPECIFIC PURPOSE OF A PRELIMINARY SUBDIVISION PLAN. IT IS NOT TO BE USED OR RELIED UPON AS A CONSTRUCTION DOCUMENT OR ANY OTHER USE BY OTHERS WITHOUT THE WRITTEN CONSENT OF THE MORIN–CAMERON GROUP, INC.

PLAN & DEED REFERENCES:

1.) LAND COURT CERTIFICATE NO. 87747.
2.) LAND COURT PLAN 21476–B.
3.) DOCUMENT NO. 107106

PERKINS ROW
(PUBLIC – VARIABLE WIDTH)

N/F
ESTATE OF RITA CHITRO
53 PERKINS ROW
MAP 58 LOT 26
DOC. 359101

N/F
ESTATE OF RITA CHITRO
61 PERKINS ROW
MAP 58 LOT 24
DOC. 359101

N/F
ESTATE OF RITA CHITRO
45 PERKINS ROW
MAP 58 LOT 27
DOC. 359101

N/F
ESTATE OF RITA CHITRO
43 PERKINS ROW
MAP 58 LOT 28
DOC. 359101

N/F
PAUL L. HARDING
31 PERKINS ROW
MAP 58 LOT 29
30990/566

N/F
KEITH H. SHERWOOD
291 PERKINS ROW
MAP 58 LOT 30
27984/602

N/F
MASS AUDOBON SOCIETY
87 PERKINS ROW
MAP 51 LOT 21
6199/368

LOT B
356,838± S.F.
8.2 ± ACRES
(AS SHOWN ON LAND COURT PLAN NO. 21476–B)

EXISTING HOUSE NO. 57

PAVED DRIVEWAY

BIT. DRIVE

WOOD FENCE

POST & WIRE FENCE

EDGE OF BVW

EDGE LAWN

EDGE WATER

TREE LINE

TREE/SHRUB LINE

WELL HOUSE

SHED

FIRE PIT

100' BUFFER TO BVW

LIMIT OF BORDERING VEGETATED WETLAND (BVW)

200' RIVERFRONT AREA (3.3± ACRES WITHIN THE PARCEL BOUNDARY) (TOPSFIELD BY–LAW)

100' SETBACK TO INLAND BANK (TOPSFIELD BY–LAW)

MEAN ANNUAL HIGH WATER (INLAND BANK)

N 43°58'08" W 26.23'

N 28°07'25" E 150.00'

N 45°01'46" E 556.45'

N 43°06'23" W 189.91'

N 85°52'12" W 693.56'

S 23°30'51" E 372.16'

S 28°20'04" W 207.73'

N 58°37'43" W 70.01'

S 12°19'43" W 89.17'

N 39°19'32" W 214.16'

PLAN
SCALE: 1" = 40'
0 20 40 80

TO IPSWICH RIVER

NAD83

DIMENSIONAL TABLE FOR INNER RESIDENTIAL & AGRICULTURAL ZONING DISTRICT (IRA)

SETBACK	REQUIRED
AREA	40,000 SF
FRONTAGE	150 FT.
DEPTH	150 FT
WIDTH	120 FT. AT BUILDING LINE
FRONT	20 FT.
SIDE	15 FT.
REAR	40 FT.
HEIGHT/STORIES	35 FT./2.5
MAXIMUM BUILDING AREA	25%
MINIMUM OPEN SPACE	50%

ZONING TABLE NOTE:

1. EACH LOT MUST FIT A 100' DIAMETER CIRCLE WHERE ONLY 10% OF THE CIRCLE IS WITHIN THE BUFFER ZONE TO A WETLAND RESOURCE AREA.

The Morin-Cameron GROUP, INC.
CIVIL ENGINEERS I ENVIRONMENTAL CONSULTANTS
LAND SURVEYORS I LAND USE PLANNERS
447 BOSTON STREET, TOPSFIELD, MASSACHUSETTS 01983
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COMMONWEALTH OF MASSACHUSETTS – SCOTT P. CAMERON – No. 47691 – REGISTERED PROFESSIONAL ENGINEER

SURVEY BY: DY/RR
DRAFTED BY: PY/SPC
CHECKED BY: SPC
APPROVED BY: SPC
SCALE: 1"=40'
DATE: MARCH 10, 2015

NO.	DESCRIPTION	DATE
–	–	–

PROPOSED DEFINITIVE SUBDIVISION PLAN OF LAND

LOCATED AT
57 PERKINS ROW
(ASSESSOR'S MAP 58, LOT 25)
TOPSFIELD, MASSACHUSETTS

EXISTING SITE CONDITIONS

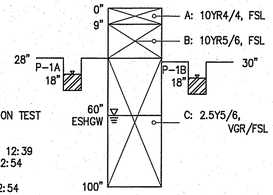
DRAWING NO. 3 OF 4

PROJ. #3274

SOIL LOGS

DATE PERFORMED: JULY 21ST – JULY 31ST, 2014
PERFORMED BY: SCOTT P. CAMERON, SE #3024
WITNESSED BY: JOHN COULON, TOPSFIELD BOH

TP 01–14



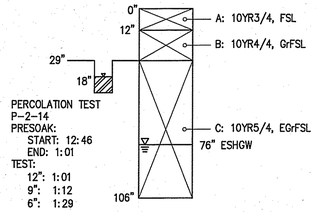
PERCOLATION TEST
P–1A–14
PRESOAK:
START: 9:45
END: 10:00
TEST:
12": 10:00
9": 10:30
6": 11:25

RATE: 19 MPI

PERCOLATION TEST
P–1B–14
PRESOAK:
START: 12:39
END: 12:54
TEST:
12": 12:54
9": 1:30
6": 2:25

RATE: 20 MPI

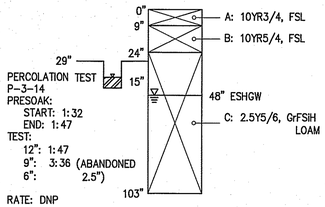
TP 02–14



PERCOLATION TEST
P–2–14
PRESOAK:
START: 12:46
END: 1:01
TEST:
12": 1:01
9": 1:12
6": 1:29

RATE: 6 MPI

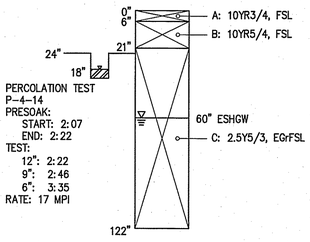
TP 03–14



PERCOLATION TEST
P–3–14
PRESOAK:
START: 1:32
END: 1:47
TEST:
12": 1:47
9": 3:36 (ABANDONED 2.5")
6":

RATE: DNP

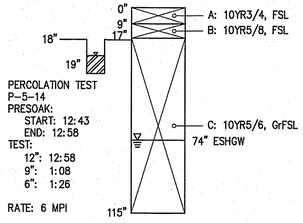
TP 04–14



PERCOLATION TEST
P–4–14
PRESOAK:
START: 2:07
END: 2:22
TEST:
12": 2:22
9": 2:46
6": 3:35

RATE: 17 MPI

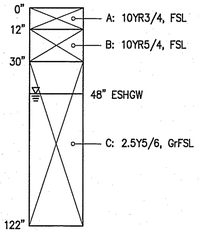
TP 05–14



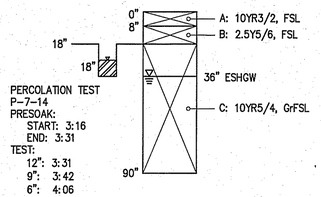
PERCOLATION TEST
P–5–14
PRESOAK:
START: 12:43
END: 12:58
TEST:
12": 12:58
9": 1:08
6": 1:26

RATE: 6 MPI

TP 06–14



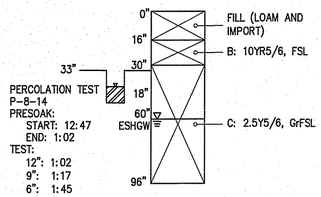
TP 07–14



PERCOLATION TEST
P–7–14
PRESOAK:
START: 3:16
END: 3:31
TEST:
12": 3:31
9": 3:42
6": 4:06

RATE: 8 MPI

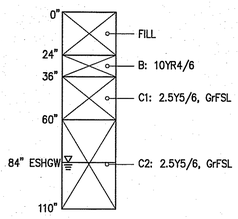
TP 08–14



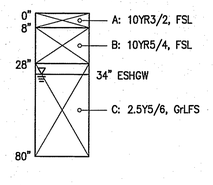
PERCOLATION TEST
P–8–14
PRESOAK:
START: 12:47
END: 1:02
TEST:
12": 1:02
9": 1:17
6": 1:45

RATE: 10 MPI

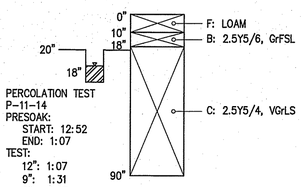
TP 09–14



TP 10–14



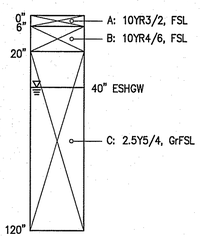
TP 11–14



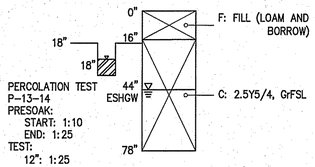
PERCOLATION TEST
P–11–14
PRESOAK:
START: 12:52
END: 1:07
TEST:
12": 1:07
9": 1:31
6": 2:17

RATE: 16 MPI

TP 12–14



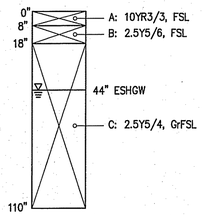
TP 13–14



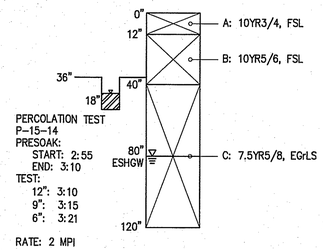
PERCOLATION TEST
P–13–14
PRESOAK:
START: 1:10
END: 1:25
TEST:
12": 1:25
9": 1:46
6": 2:28

RATE: 14 MPI

TP 14–14



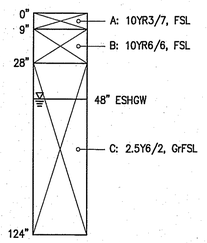
TP 15–14



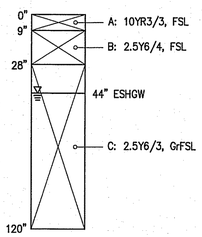
PERCOLATION TEST
P–15–14
PRESOAK:
START: 2:55
END: 3:10
TEST:
12": 3:10
9": 3:15
6": 3:21

RATE: 2 MPI

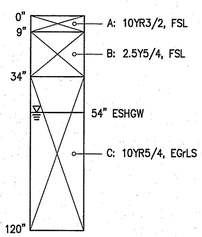
TP 16–14



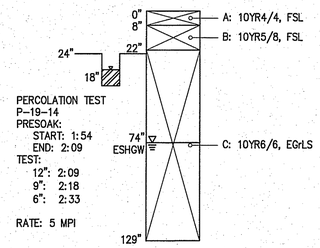
TP 17–14



TP 18–14



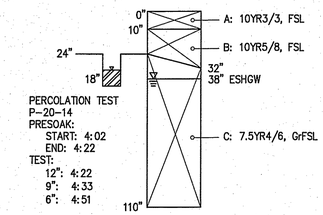
TP 19–14



PERCOLATION TEST
P–19–14
PRESOAK:
START: 1:54
END: 2:09
TEST:
12": 2:09
9": 2:18
6": 2:33

RATE: 5 MPI

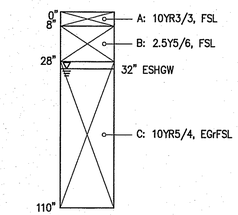
TP 20–14



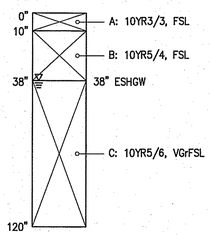
PERCOLATION TEST
P–20–14
PRESOAK:
START: 4:02
END: 4:22
TEST:
12": 4:22
9": 4:33
6": 4:51

RATE: 6 MPI

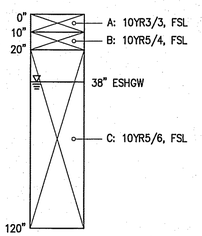
TP 21–14



TP 22–14



TP 23–14



The Morin-Cameron GROUP, INC.
CIVIL ENGINEERS | ENVIRONMENTAL CONSULTANTS
LAND SURVEYORS | LAND USE PLANNERS
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COMMONWEALTH OF MASSACHUSETTS – SCOTT P. CAMERON – 24781 – REGISTERED PROFESSIONAL ENGINEER

SURVEY BY: DY/RR
DRAFTED BY: PY/SPC
CHECKED BY: SPC
APPROVED BY: SPC
SCALE: 1"=40'
DATE: MARCH 10, 2015

REVISIONS

NO.	DESCRIPTION	DATE
-	-	-

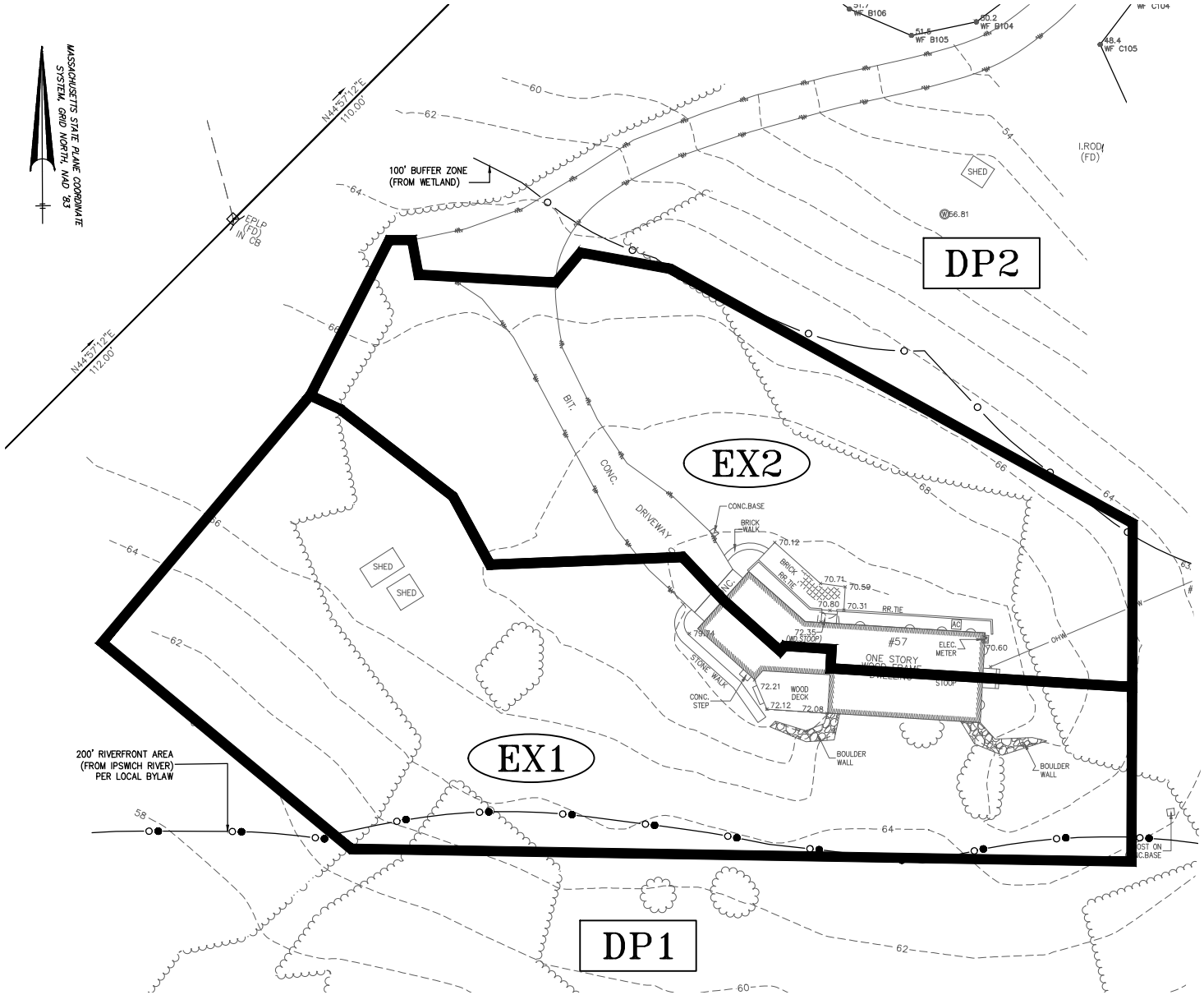
PRELIMINARY SUBDIVISION PLAN OF LAND
LOCATED AT
57 PERKINS ROW
(ASSESSOR'S MAP 58, LOT 25)
TOPSFIELD, MASSACHUSETTS

SOIL LOGS

DRAWING NO. 4 OF 4

PROJ. #3274

Appendix V Existing and Proposed Drainage Figures



F:\Civil 3D Projects\27296-Whelan-Topsfield\Eng\DWG\27296psp.dwg Mar 21, 2024

57 PERKINS ROW

TOPSFIELD, MA

HANCOCK ASSOCIATES

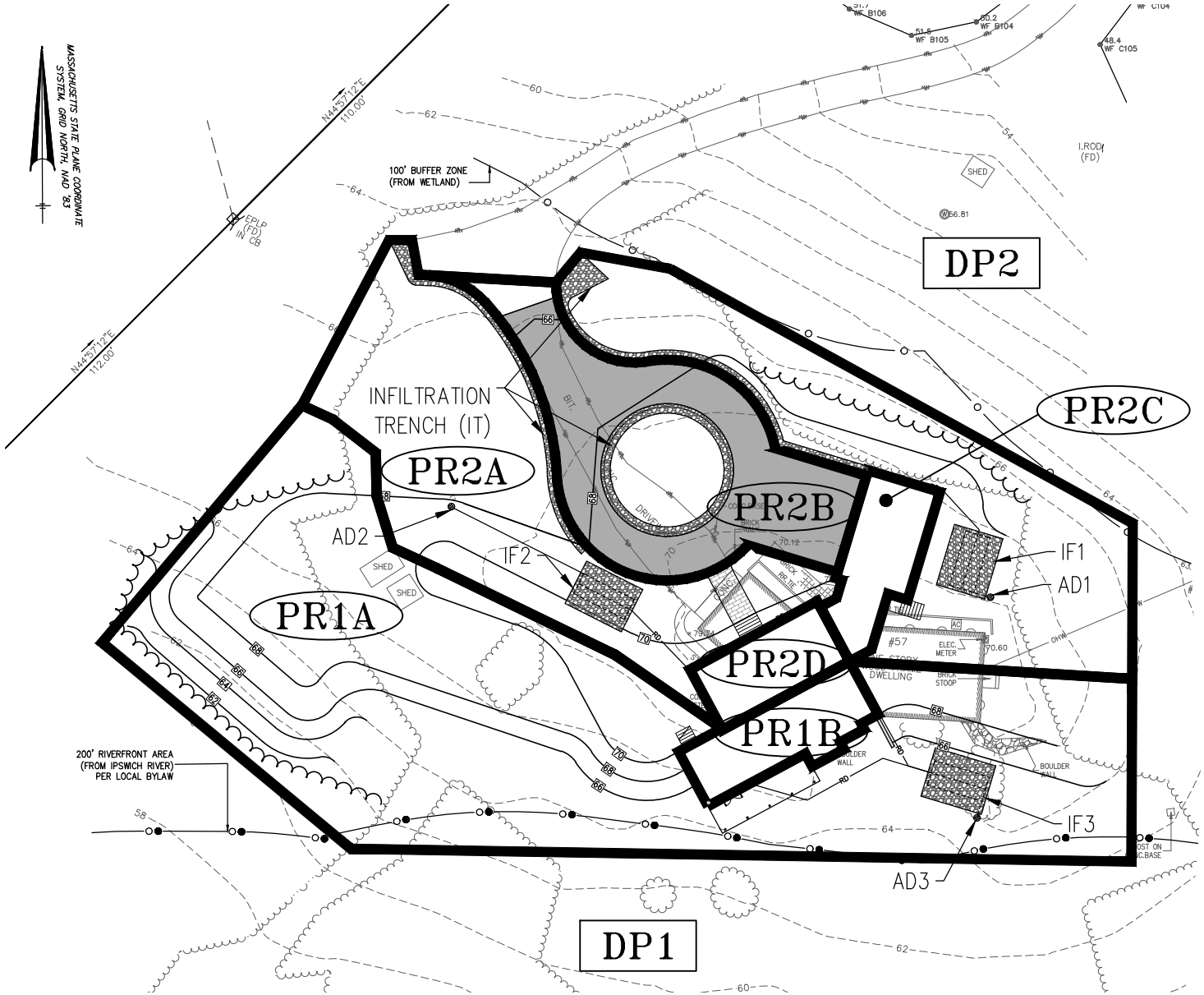
Civil Engineers
Land Surveyors
Wetland Scientists

185 CENTRE STREET
DANVERS, MA. 01923
VOICE (978) 777-3050
FAX (978) 774-7816

EXISTING DRAINAGE FIGURE

DATE:	3/2/24
DWG:	27296psp.dwg
SCALE:	1"=50'
DESIGN:	JJP
LAYOUT:	EX
DRAWN:	JJP
SHEET:	1 OF 2
JOB NO.:	26104

EX



F:\Civil 3D Projects\27296-Whelan-Topsfield\Eng\DWG\27296psp.dwg Mar 21, 2024

57 PERKINS ROW

TOPSFIELD, MA

HANCOCK ASSOCIATES

Civil Engineers
Land Surveyors
Wetland Scientists

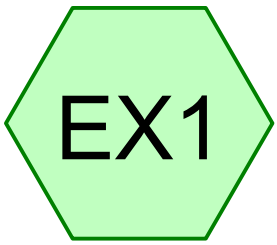
185 CENTRE STREET
DANVERS, MA. 01923
VOICE (978) 777-3050
FAX (978) 774-7816

PROPOSED DRAINAGE FIGURE

DATE:	3/2/24
DWG:	27296psp.dwg
SCALE:	1"=50'
DESIGN:	JJP
LAYOUT:	PR
DRAWN:	JJP
SHEET:	2 OF 2
JOB NO.:	26104

PR

Appendix VI Hydrocad Output



Existing

Existing

Subcat Reach Pond Link

Routing Diagram for 27296 HydroCAD

Prepared by {enter your company name here}, Printed 3/18/2024

Summary for Subcatchment EX1: Existing

Runoff = 0.29 cfs @ 12.10 hrs, Volume= 0.027 af, Depth> 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (sf)	CN	Description
24,300	61	>75% Grass cover, Good, HSG B
1,291	98	Roofs, HSG B
397	98	Paved parking, HSG B
25,988	63	Weighted Average
24,300		93.50% Pervious Area
1,688		6.50% Impervious Area

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

Summary for Subcatchment EX2: Existing

Runoff = 0.33 cfs @ 12.10 hrs, Volume= 0.027 af, Depth> 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (sf)	CN	Description
16,502	61	>75% Grass cover, Good, HSG B
1,079	98	Roofs, HSG B
2,112	98	Paved parking, HSG B
19,693	67	Weighted Average
16,502		83.80% Pervious Area
3,191		16.20% Impervious Area

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

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

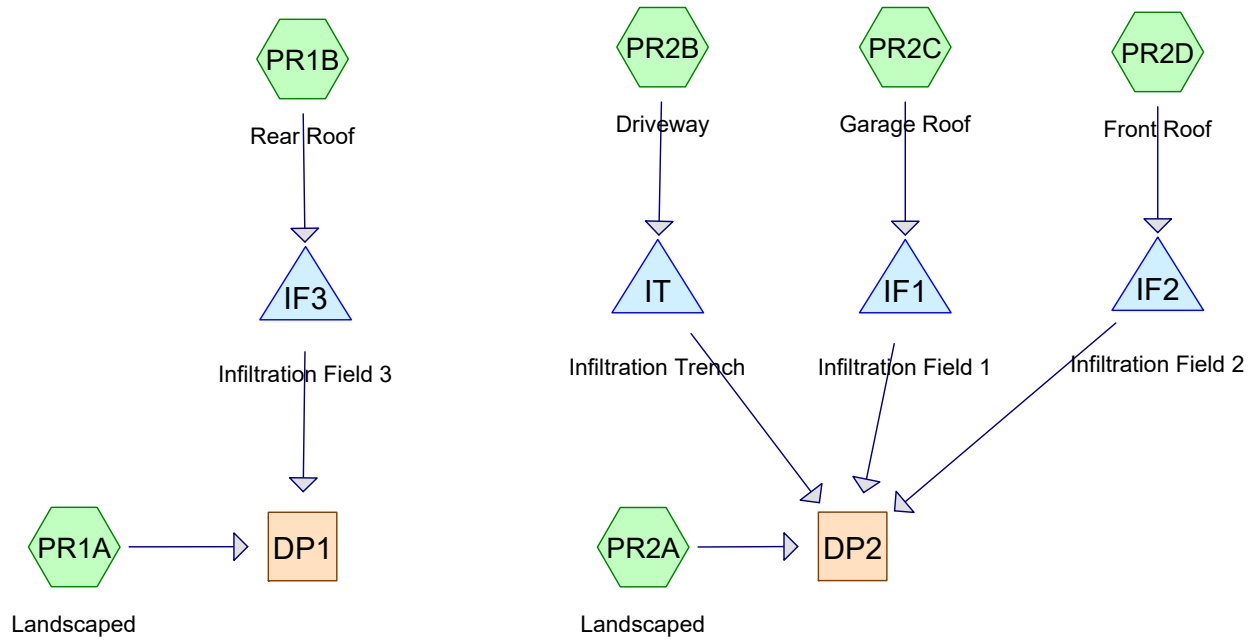
Subcatchment EX1: Existing Runoff Area=25,988 sf 6.50% Impervious Runoff Depth>1.62"
Tc=5.0 min CN=63 Runoff=1.07 cfs 0.080 af

Subcatchment EX2: Existing Runoff Area=19,693 sf 16.20% Impervious Runoff Depth>1.92"
Tc=5.0 min CN=67 Runoff=0.99 cfs 0.072 af

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX1: Existing Runoff Area=25,988 sf 6.50% Impervious Runoff Depth>3.80"
Tc=5.0 min CN=63 Runoff=2.65 cfs 0.189 af

Subcatchment EX2: Existing Runoff Area=19,693 sf 16.20% Impervious Runoff Depth>4.26"
Tc=5.0 min CN=67 Runoff=2.26 cfs 0.160 af



Subcat Reach Pond Link

Routing Diagram for 27296 HydroCAD
Prepared by {enter your company name here}, Printed 3/21/2024

Summary for Subcatchment PR1A: Landscaped

Runoff = 0.21 cfs @ 12.11 hrs, Volume= 0.021 af, Depth> 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (sf)	CN	Description
20,954	61	>75% Grass cover, Good, HSG B
39	98	Unconnected pavement, HSG B
459	98	Roofs, HSG B
21,452	62	Weighted Average
20,954		97.68% Pervious Area
498		2.32% Impervious Area
39		7.83% Unconnected

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

Summary for Subcatchment PR1B: Rear Roof

Runoff = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (sf)	CN	Description
946	98	Roofs, HSG B
946		100.00% Impervious Area

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

Summary for Subcatchment PR2A: Landscaped

Runoff = 0.13 cfs @ 12.11 hrs, Volume= 0.014 af, Depth> 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (sf)	CN	Adj	Description
15,163	61		>75% Grass cover, Good, HSG B
256	98		Unconnected pavement, HSG B
15,419	62	61	Weighted Average, UI Adjusted
15,163			98.34% Pervious Area
256			1.66% Impervious Area
256			100.00% Unconnected

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

Summary for Subcatchment PR2B: Driveway

Runoff = 0.33 cfs @ 12.07 hrs, Volume= 0.023 af, Depth> 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (sf)	CN	Description
4,315	98	Paved parking, HSG B
1,385	61	>75% Grass cover, Good, HSG B
5,700	89	Weighted Average
1,385		24.30% Pervious Area
4,315		75.70% Impervious Area

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

Summary for Subcatchment PR2C: Garage Roof

Runoff = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (sf)	CN	Description
1,171	98	Roofs, HSG B
1,171		100.00% Impervious Area

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

Summary for Subcatchment PR2D: Front Roof

Runoff = 0.07 cfs @ 12.07 hrs, Volume= 0.006 af, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (sf)	CN	Description
993	98	Roofs, HSG B
993		100.00% Impervious Area

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

Summary for Reach DP1:

Inflow Area = 0.514 ac, 6.45% Impervious, Inflow Depth > 0.49" for 2-year event
Inflow = 0.21 cfs @ 12.11 hrs, Volume= 0.021 af
Outflow = 0.21 cfs @ 12.11 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach DP2:

Inflow Area = 0.535 ac, 28.93% Impervious, Inflow Depth > 0.31" for 2-year event
Inflow = 0.13 cfs @ 12.11 hrs, Volume= 0.014 af
Outflow = 0.13 cfs @ 12.11 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond IF1: Infiltration Field 1

Inflow Area = 0.027 ac,100.00% Impervious, Inflow Depth > 3.04" for 2-year event
Inflow = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af
Outflow = 0.01 cfs @ 11.35 hrs, Volume= 0.007 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.35 hrs, Volume= 0.007 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 67.24' @ 12.94 hrs Surf.Area= 320 sf Storage= 106 cf

Plug-Flow detention time= 100.7 min calculated for 0.007 af (100% of inflow)
Center-of-Mass det. time= 100.0 min (854.7 - 754.7)

Volume	Invert	Avail.Storage	Storage Description
#1	66.50'	220 cf	**Subsurface Trench ST1 (Prismatic)** Listed below (Recalc) 489 cf Overall x 45.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
66.50	320	0	0
67.50	320	320	320
68.55	1	169	489

Device	Routing	Invert	Outlet Devices
#1	Discarded	66.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	68.50'	**6.0" x 6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.35 hrs HW=66.52' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=66.50' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond IF2: Infiltration Field 2

Inflow Area = 0.023 ac,100.00% Impervious, Inflow Depth > 3.04" for 2-year event
Inflow = 0.07 cfs @ 12.07 hrs, Volume= 0.006 af
Outflow = 0.01 cfs @ 11.50 hrs, Volume= 0.006 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.50 hrs, Volume= 0.006 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 66.94' @ 12.84 hrs Surf.Area= 300 sf Storage= 86 cf

Plug-Flow detention time= 85.1 min calculated for 0.006 af (100% of inflow)
Center-of-Mass det. time= 84.2 min (838.9 - 754.7)

Volume	Invert	Avail.Storage	Storage Description
#1	66.30'	206 cf	**Subsurface Trench ST1 (Prismatic)**Listed below (Recalc) 458 cf Overall x 45.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
66.30	300	0	0
67.30	300	300	300
68.35	1	158	458

Device	Routing	Invert	Outlet Devices
#1	Discarded	66.30'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	68.30'	**6.0" x 6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.50 hrs HW=66.32' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=66.30' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond IF3: Infiltration Field 3

Inflow Area = 0.022 ac,100.00% Impervious, Inflow Depth > 3.04" for 2-year event
Inflow = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af
Outflow = 0.01 cfs @ 11.60 hrs, Volume= 0.005 af, Atten= 89%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.60 hrs, Volume= 0.005 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 63.95' @ 12.72 hrs Surf.Area= 320 sf Storage= 79 cf

Plug-Flow detention time= 70.2 min calculated for 0.005 af (100% of inflow)
Center-of-Mass det. time= 69.4 min (824.1 - 754.7)

Volume	Invert	Avail.Storage	Storage Description
#1	63.40'	220 cf	**Subsurface Trench ST1 (Prismatic)**Listed below (Recalc) 489 cf Overall x 45.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
63.40	320	0	0
64.40	320	320	320
65.45	1	169	489

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.40'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	65.40'	**6.0" x 6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.60 hrs HW=63.42' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=63.40' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond IT: Infiltration Trench

Inflow Area = 0.131 ac, 75.70% Impervious, Inflow Depth > 2.14" for 2-year event
Inflow = 0.33 cfs @ 12.07 hrs, Volume= 0.023 af
Outflow = 0.03 cfs @ 11.55 hrs, Volume= 0.023 af, Atten= 92%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.55 hrs, Volume= 0.023 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 64.87' @ 13.11 hrs Surf.Area= 1,160 sf Storage= 405 cf

Plug-Flow detention time= 125.3 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 124.5 min (933.4 - 808.9)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	951 cf	**Infiltration Trench (Prismatic)**Listed below (Recalc) 2,378 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	1,160	0	0
66.05	1,160	2,378	2,378

Device	Routing	Invert	Outlet Devices
#1	Discarded	64.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	66.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.03 cfs @ 11.55 hrs HW=64.02' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.00' (Free Discharge)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR1A: Landscaped Runoff Area=21,452 sf 2.32% Impervious Runoff Depth>1.54"
Tc=5.0 min CN=62 Runoff=0.84 cfs 0.063 af

Subcatchment PR1B: Rear Roof Runoff Area=946 sf 100.00% Impervious Runoff Depth>4.93"
Tc=5.0 min CN=98 Runoff=0.11 cfs 0.009 af

Subcatchment PR2A: Landscaped Runoff Area=15,419 sf 1.66% Impervious Runoff Depth>1.47"
Tc=5.0 min UI Adjusted CN=61 Runoff=0.57 cfs 0.043 af

Subcatchment PR2B: Driveway Runoff Area=5,700 sf 75.70% Impervious Runoff Depth>3.93"
Tc=5.0 min CN=89 Runoff=0.59 cfs 0.043 af

Subcatchment PR2C: Garage Roof Runoff Area=1,171 sf 100.00% Impervious Runoff Depth>4.93"
Tc=5.0 min CN=98 Runoff=0.14 cfs 0.011 af

Subcatchment PR2D: Front Roof Runoff Area=993 sf 100.00% Impervious Runoff Depth>4.93"
Tc=5.0 min CN=98 Runoff=0.12 cfs 0.009 af

Reach DP1: Inflow=0.84 cfs 0.063 af
Outflow=0.84 cfs 0.063 af

Reach DP2: Inflow=0.57 cfs 0.044 af
Outflow=0.57 cfs 0.044 af

Summary for Pond IF1: Infiltration Field 1

Inflow Area = 0.027 ac,100.00% Impervious, Inflow Depth > 4.93" for 10-year event
Inflow = 0.14 cfs @ 12.07 hrs, Volume= 0.011 af
Outflow = 0.01 cfs @ 13.36 hrs, Volume= 0.006 af, Atten= 90%, Lag= 77.7 min
Discarded = 0.01 cfs @ 10.50 hrs, Volume= 0.006 af
Primary = 0.01 cfs @ 13.37 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 68.51' @ 13.35 hrs Surf.Area= 12 sf Storage= 220 cf

Plug-Flow detention time= 137.9 min calculated for 0.006 af (55% of inflow)
Center-of-Mass det. time= 18.9 min (765.1 - 746.2)

Volume	Invert	Avail.Storage	Storage Description
#1	66.50'	220 cf	**Subsurface Trench ST1 (Prismatic)**Listed below (Recalc) 489 cf Overall x 45.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
66.50	320	0	0
67.50	320	320	320
68.55	1	169	489

Device	Routing	Invert	Outlet Devices
#1	Discarded	66.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	68.50'	**6.0" x 6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 10.50 hrs HW=66.52' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.01 cfs @ 13.37 hrs HW=68.51' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.01 cfs @ 0.39 fps)

Summary for Pond IF2: Infiltration Field 2

Inflow Area = 0.023 ac,100.00% Impervious, Inflow Depth > 4.93" for 10-year event
Inflow = 0.12 cfs @ 12.07 hrs, Volume= 0.009 af
Outflow = 0.01 cfs @ 10.70 hrs, Volume= 0.008 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.01 cfs @ 10.70 hrs, Volume= 0.008 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 67.73' @ 15.26 hrs Surf.Area= 178 sf Storage= 181 cf

Plug-Flow detention time= 246.8 min calculated for 0.008 af (89% of inflow)
Center-of-Mass det. time= 193.4 min (939.6 - 746.2)

Volume	Invert	Avail.Storage	Storage Description
#1	66.30'	206 cf	**Subsurface Trench ST1 (Prismatic)**Listed below (Recalc) 458 cf Overall x 45.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
66.30	300	0	0
67.30	300	300	300
68.35	1	158	458

Device	Routing	Invert	Outlet Devices
#1	Discarded	66.30'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	68.30'	**6.0" x 6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 10.70 hrs HW=66.32' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=66.30' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond IF3: Infiltration Field 3

Inflow Area = 0.022 ac,100.00% Impervious, Inflow Depth > 4.93" for 10-year event
Inflow = 0.11 cfs @ 12.07 hrs, Volume= 0.009 af
Outflow = 0.01 cfs @ 11.00 hrs, Volume= 0.009 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.00 hrs, Volume= 0.009 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 64.46' @ 13.49 hrs Surf.Area= 302 sf Storage= 152 cf

Plug-Flow detention time= 154.9 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 154.2 min (900.5 - 746.2)

Volume	Invert	Avail.Storage	Storage Description
#1	63.40'	220 cf	**Subsurface Trench ST1 (Prismatic)**Listed below (Recalc) 489 cf Overall x 45.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
63.40	320	0	0
64.40	320	320	320
65.45	1	169	489

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.40'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	65.40'	**6.0" x 6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.00 hrs HW=63.42' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=63.40' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond IT: Infiltration Trench

Inflow Area = 0.131 ac, 75.70% Impervious, Inflow Depth > 3.93" for 10-year event
Inflow = 0.59 cfs @ 12.07 hrs, Volume= 0.043 af
Outflow = 0.03 cfs @ 10.70 hrs, Volume= 0.034 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.03 cfs @ 10.70 hrs, Volume= 0.034 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 65.99' @ 14.65 hrs Surf.Area= 1,160 sf Storage= 924 cf

Plug-Flow detention time= 267.6 min calculated for 0.034 af (79% of inflow)
Center-of-Mass det. time= 192.3 min (984.2 - 791.9)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	951 cf	**Infiltration Trench (Prismatic)**Listed below (Recalc) 2,378 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	1,160	0	0
66.05	1,160	2,378	2,378

Device	Routing	Invert	Outlet Devices
#1	Discarded	64.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	66.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.03 cfs @ 10.70 hrs HW=64.02' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.00' (Free Discharge)
2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR1A: Landscaped Runoff Area=21,452 sf 2.32% Impervious Runoff Depth>3.69"
Tc=5.0 min CN=62 Runoff=2.12 cfs 0.151 af

Subcatchment PR1B: Rear Roof Runoff Area=946 sf 100.00% Impervious Runoff Depth>7.93"
Tc=5.0 min CN=98 Runoff=0.18 cfs 0.014 af

Subcatchment PR2A: Landscaped Runoff Area=15,419 sf 1.66% Impervious Runoff Depth>3.57"
Tc=5.0 min UI Adjusted CN=61 Runoff=1.47 cfs 0.105 af

Subcatchment PR2B: Driveway Runoff Area=5,700 sf 75.70% Impervious Runoff Depth>6.85"
Tc=5.0 min CN=89 Runoff=0.99 cfs 0.075 af

Subcatchment PR2C: Garage Roof Runoff Area=1,171 sf 100.00% Impervious Runoff Depth>7.93"
Tc=5.0 min CN=98 Runoff=0.22 cfs 0.018 af

Subcatchment PR2D: Front Roof Runoff Area=993 sf 100.00% Impervious Runoff Depth>7.93"
Tc=5.0 min CN=98 Runoff=0.18 cfs 0.015 af

Reach DP1: Inflow=2.12 cfs 0.153 af
Outflow=2.12 cfs 0.153 af

Reach DP2: Inflow=2.12 cfs 0.134 af
Outflow=2.12 cfs 0.134 af

Summary for Pond IF1: Infiltration Field 1

Inflow Area = 0.027 ac,100.00% Impervious, Inflow Depth > 7.93" for 100-year event
Inflow = 0.22 cfs @ 12.07 hrs, Volume= 0.018 af
Outflow = 0.03 cfs @ 12.47 hrs, Volume= 0.010 af, Atten= 88%, Lag= 24.1 min
Discarded = 0.01 cfs @ 9.00 hrs, Volume= 0.007 af
Primary = 0.03 cfs @ 12.47 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 4
Peak Elev= 68.52' @ 12.47 hrs Surf.Area= 9 sf Storage= 220 cf

Plug-Flow detention time= 141.2 min calculated for 0.010 af (57% of inflow)
Center-of-Mass det. time= 23.5 min (763.2 - 739.7)

Volume	Invert	Avail.Storage	Storage Description
#1	66.50'	220 cf	**Subsurface Trench ST1 (Prismatic)**Listed below (Recalc) 489 cf Overall x 45.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
66.50	320	0	0
67.50	320	320	320
68.55	1	169	489

Device	Routing	Invert	Outlet Devices
#1	Discarded	66.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	68.50'	**6.0" x 6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 9.00 hrs HW=66.52' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.02 cfs @ 12.47 hrs HW=68.52' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.02 cfs @ 0.51 fps)

Summary for Pond IF2: Infiltration Field 2

Inflow Area = 0.023 ac,100.00% Impervious, Inflow Depth > 7.93" for 100-year event
Inflow = 0.18 cfs @ 12.07 hrs, Volume= 0.015 af
Outflow = 0.01 cfs @ 12.94 hrs, Volume= 0.008 af, Atten= 93%, Lag= 51.9 min
Discarded = 0.01 cfs @ 9.30 hrs, Volume= 0.006 af
Primary = 0.01 cfs @ 12.94 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 68.31' @ 12.94 hrs Surf.Area= 11 sf Storage= 206 cf

Plug-Flow detention time= 149.6 min calculated for 0.008 af (53% of inflow)
Center-of-Mass det. time= 21.9 min (761.6 - 739.7)

Volume	Invert	Avail.Storage	Storage Description
#1	66.30'	206 cf	**Subsurface Trench ST1 (Prismatic)** Listed below (Recalc) 458 cf Overall x 45.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
66.30	300	0	0
67.30	300	300	300
68.35	1	158	458

Device	Routing	Invert	Outlet Devices
#1	Discarded	66.30'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	68.30'	**6.0" x 6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 9.30 hrs HW=66.32' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.01 cfs @ 12.94 hrs HW=68.31' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.01 cfs @ 0.39 fps)

Summary for Pond IF3: Infiltration Field 3

Inflow Area = 0.022 ac,100.00% Impervious, Inflow Depth > 7.93" for 100-year event
Inflow = 0.18 cfs @ 12.07 hrs, Volume= 0.014 af
Outflow = 0.01 cfs @ 12.91 hrs, Volume= 0.008 af, Atten= 93%, Lag= 50.6 min
Discarded = 0.01 cfs @ 9.70 hrs, Volume= 0.006 af
Primary = 0.01 cfs @ 12.91 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 65.41' @ 12.91 hrs Surf.Area= 12 sf Storage= 220 cf

Plug-Flow detention time= 143.7 min calculated for 0.008 af (54% of inflow)
Center-of-Mass det. time= 19.3 min (759.0 - 739.7)

Volume	Invert	Avail.Storage	Storage Description
#1	63.40'	220 cf	**Subsurface Trench ST1 (Prismatic)** Listed below (Recalc) 489 cf Overall x 45.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
63.40	320	0	0
64.40	320	320	320
65.45	1	169	489

Device	Routing	Invert	Outlet Devices
#1	Discarded	63.40'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	65.40'	**6.0" x 6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 9.70 hrs HW=63.42' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.01 cfs @ 12.91 hrs HW=65.41' (Free Discharge)
2=Orifice/Grate (Weir Controls 0.01 cfs @ 0.39 fps)

Summary for Pond IT: Infiltration Trench

Inflow Area = 0.131 ac, 75.70% Impervious, Inflow Depth > 6.85" for 100-year event
Inflow = 0.99 cfs @ 12.07 hrs, Volume= 0.075 af
Outflow = 0.73 cfs @ 12.12 hrs, Volume= 0.061 af, Atten= 27%, Lag= 2.8 min
Discarded = 0.03 cfs @ 9.20 hrs, Volume= 0.038 af
Primary = 0.70 cfs @ 12.12 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 66.05' @ 12.10 hrs Surf.Area= 1,160 sf Storage= 949 cf

Plug-Flow detention time= 162.8 min calculated for 0.061 af (82% of inflow)
Center-of-Mass det. time= 91.4 min (868.5 - 777.2)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	951 cf	**Infiltration Trench (Prismatic)**Listed below (Recalc) 2,378 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	1,160	0	0
66.05	1,160	2,378	2,378

Device	Routing	Invert	Outlet Devices
#1	Discarded	64.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	66.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

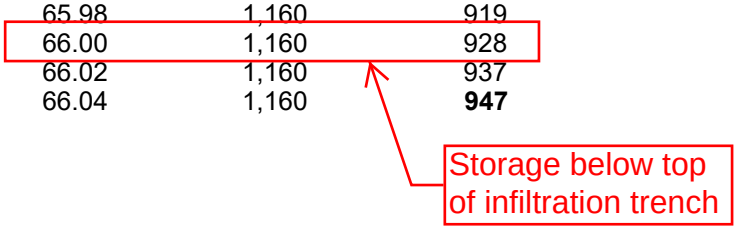
Discarded OutFlow Max=0.03 cfs @ 9.20 hrs HW=64.02' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.60 cfs @ 12.12 hrs HW=66.04' (Free Discharge)
2=Sharp-Crested Rectangular Weir (Weir Controls 0.60 cfs @ 0.69 fps)

Appendix VII Hydrocad Output for Recharge Volume

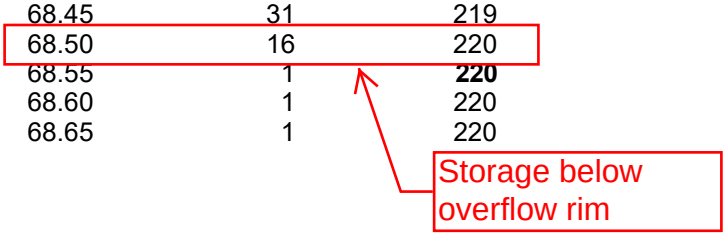
Stage-Area-Storage for Pond IT: Infiltration Trench

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
64.00	**1,160**	0	65.06	1,160	492
64.02	1,160	9	65.08	1,160	501
64.04	1,160	19	65.10	1,160	510
64.06	1,160	28	65.12	1,160	520
64.08	1,160	37	65.14	1,160	529
64.10	1,160	46	65.16	1,160	538
64.12	1,160	56	65.18	1,160	548
64.14	1,160	65	65.20	1,160	557
64.16	1,160	74	65.22	1,160	566
64.18	1,160	84	65.24	1,160	575
64.20	1,160	93	65.26	1,160	585
64.22	1,160	102	65.28	1,160	594
64.24	1,160	111	65.30	1,160	603
64.26	1,160	121	65.32	1,160	612
64.28	1,160	130	65.34	1,160	622
64.30	1,160	139	65.36	1,160	631
64.32	1,160	148	65.38	1,160	640
64.34	1,160	158	65.40	1,160	650
64.36	1,160	167	65.42	1,160	659
64.38	1,160	176	65.44	1,160	668
64.40	1,160	186	65.46	1,160	677
64.42	1,160	195	65.48	1,160	687
64.44	1,160	204	65.50	1,160	696
64.46	1,160	213	65.52	1,160	705
64.48	1,160	223	65.54	1,160	715
64.50	1,160	232	65.56	1,160	724
64.52	1,160	241	65.58	1,160	733
64.54	1,160	251	65.60	1,160	742
64.56	1,160	260	65.62	1,160	752
64.58	1,160	269	65.64	1,160	761
64.60	1,160	278	65.66	1,160	770
64.62	1,160	288	65.68	1,160	780
64.64	1,160	297	65.70	1,160	789
64.66	1,160	306	65.72	1,160	798
64.68	1,160	316	65.74	1,160	807
64.70	1,160	325	65.76	1,160	817
64.72	1,160	334	65.78	1,160	826
64.74	1,160	343	65.80	1,160	835
64.76	1,160	353	65.82	1,160	844
64.78	1,160	362	65.84	1,160	854
64.80	1,160	371	65.86	1,160	863
64.82	1,160	380	65.88	1,160	872
64.84	1,160	390	65.90	1,160	882
64.86	1,160	399	65.92	1,160	891
64.88	1,160	408	65.94	1,160	900
64.90	1,160	418	65.96	1,160	909
64.92	1,160	427	65.98	1,160	919
64.94	1,160	436	66.00	1,160	928
64.96	1,160	445	66.02	1,160	937
64.98	1,160	455	66.04	1,160	**947**
65.00	1,160	464			
65.02	1,160	473			
65.04	1,160	483			



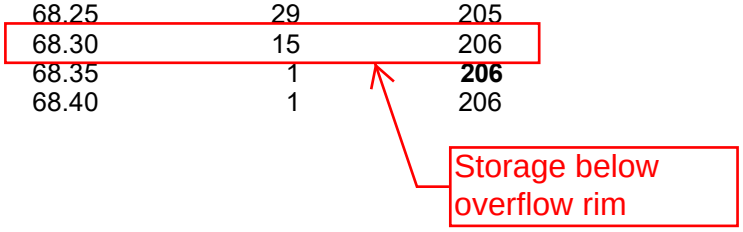
Stage-Area-Storage for Pond IF1: Infiltration Field 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
66.50	**320**	0
66.55	320	7
66.60	320	14
66.65	320	22
66.70	320	29
66.75	320	36
66.80	320	43
66.85	320	50
66.90	320	58
66.95	320	65
67.00	320	72
67.05	320	79
67.10	320	86
67.15	320	94
67.20	320	101
67.25	320	108
67.30	320	115
67.35	320	122
67.40	320	130
67.45	320	137
67.50	320	144
67.55	305	151
67.60	290	158
67.65	274	164
67.70	259	170
67.75	244	176
67.80	229	181
67.85	214	186
67.90	198	191
67.95	183	195
68.00	168	199
68.05	153	203
68.10	138	206
68.15	123	209
68.20	107	211
68.25	92	214
68.30	77	215
68.35	62	217
68.40	47	218
68.45	31	219
68.50	16	220
68.55	1	**220**
68.60	1	220
68.65	1	220



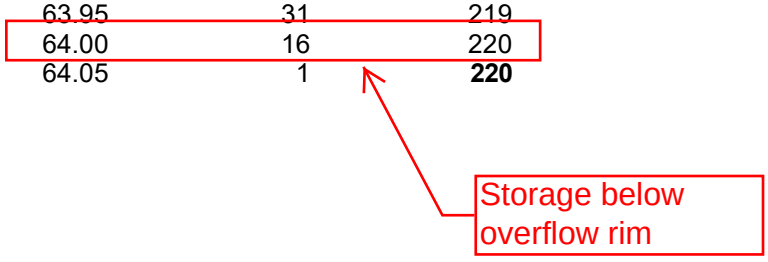
Stage-Area-Storage for Pond IF2: Infiltration Field 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
66.30	**300**	0
66.35	300	7
66.40	300	13
66.45	300	20
66.50	300	27
66.55	300	34
66.60	300	40
66.65	300	47
66.70	300	54
66.75	300	61
66.80	300	68
66.85	300	74
66.90	300	81
66.95	300	88
67.00	300	95
67.05	300	101
67.10	300	108
67.15	300	115
67.20	300	122
67.25	300	128
67.30	300	135
67.35	286	142
67.40	272	148
67.45	257	154
67.50	243	159
67.55	229	165
67.60	215	170
67.65	200	174
67.70	186	179
67.75	172	183
67.80	158	186
67.85	143	190
67.90	129	193
67.95	115	196
68.00	101	198
68.05	86	200
68.10	72	202
68.15	58	203
68.20	44	205
68.25	29	205
68.30	15	206
68.35	1	**206**
68.40	1	206



Stage-Area-Storage for Pond IF3: Infiltration Field 3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
62.00	**320**	0
62.05	320	7
62.10	320	14
62.15	320	22
62.20	320	29
62.25	320	36
62.30	320	43
62.35	320	50
62.40	320	58
62.45	320	65
62.50	320	72
62.55	320	79
62.60	320	86
62.65	320	94
62.70	320	101
62.75	320	108
62.80	320	115
62.85	320	122
62.90	320	130
62.95	320	137
63.00	320	144
63.05	305	151
63.10	290	158
63.15	274	164
63.20	259	170
63.25	244	176
63.30	229	181
63.35	214	186
63.40	198	191
63.45	183	195
63.50	168	199
63.55	153	203
63.60	138	206
63.65	123	209
63.70	107	211
63.75	92	214
63.80	77	215
63.85	62	217
63.90	47	218
63.95	31	219
64.00	16	220
64.05	1	**220**



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