

November 29, 2022

25052

Lori Capone, Administrator  
Sudbury Conservation Commission  
275 Old Lancaster Road  
Sudbury, MA 01776

RE: DEP File 301-1378 Rudenberg, Wayside Inn Road, Sudbury  
Revised Plans and Stormwater Report

Dear Lori and Commissioners:

As discussed during the continued hearing on October 31, 2022, attached please find two sets of the revised Site Plan (11/29/2022) and the revised Stormwater Management Report (11/29/2022). Electronic copies of these documents are being sent separately by email.

The revisions incorporate the "Sketch Plan 2" that was reviewed at the October 31 hearing. The plans and report have also been sent to the Planning Department for their review under the Stormwater General Permit review.

We look forward to discussing this information with you at the hearing continuance on December 12, 2022. Please contact me if you have any questions or need additional information.

Sincerely,  
**DGT Associates**



Fredric W. King, P.E.  
Senior Engineer  
Senior Wetland Specialist

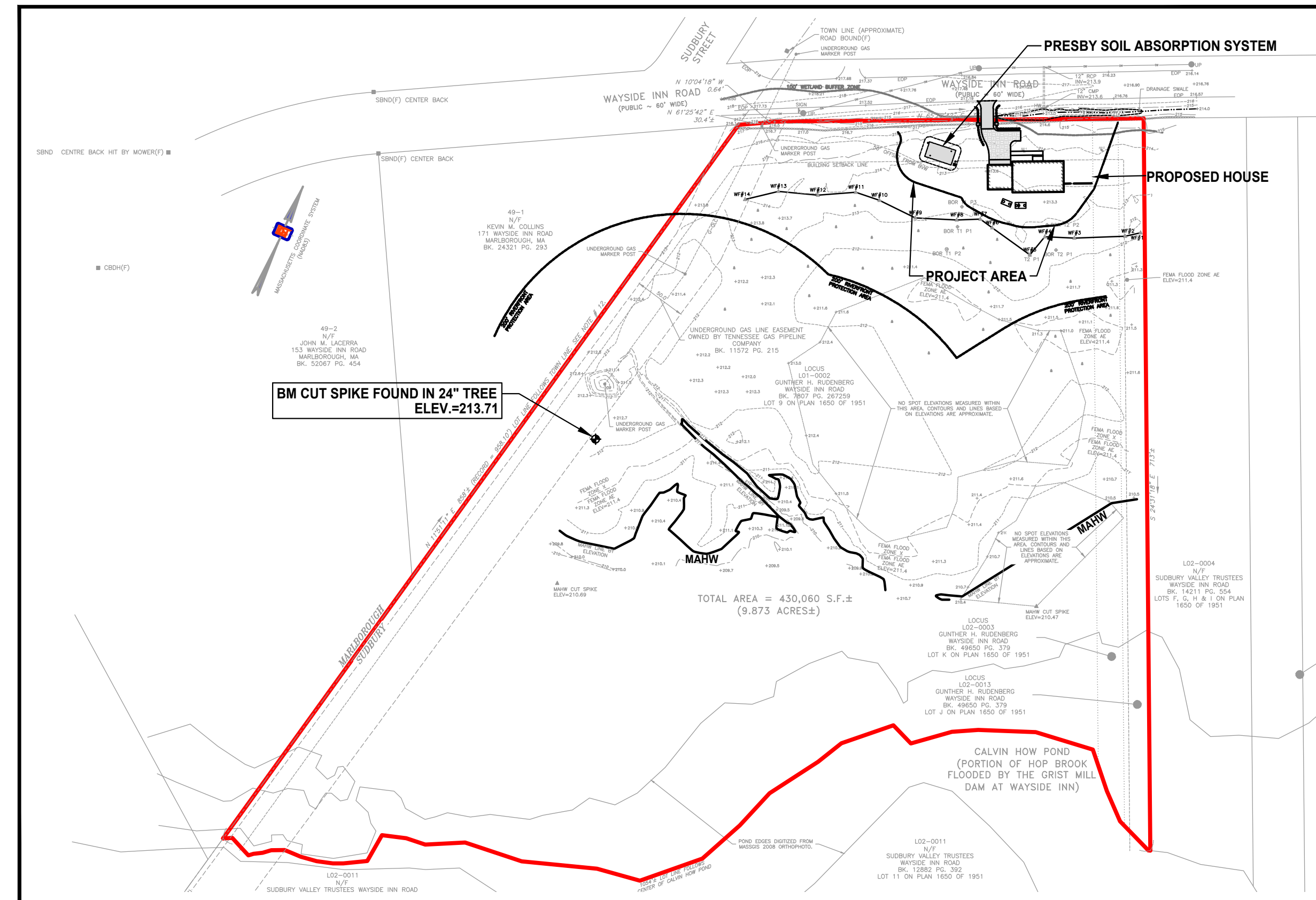
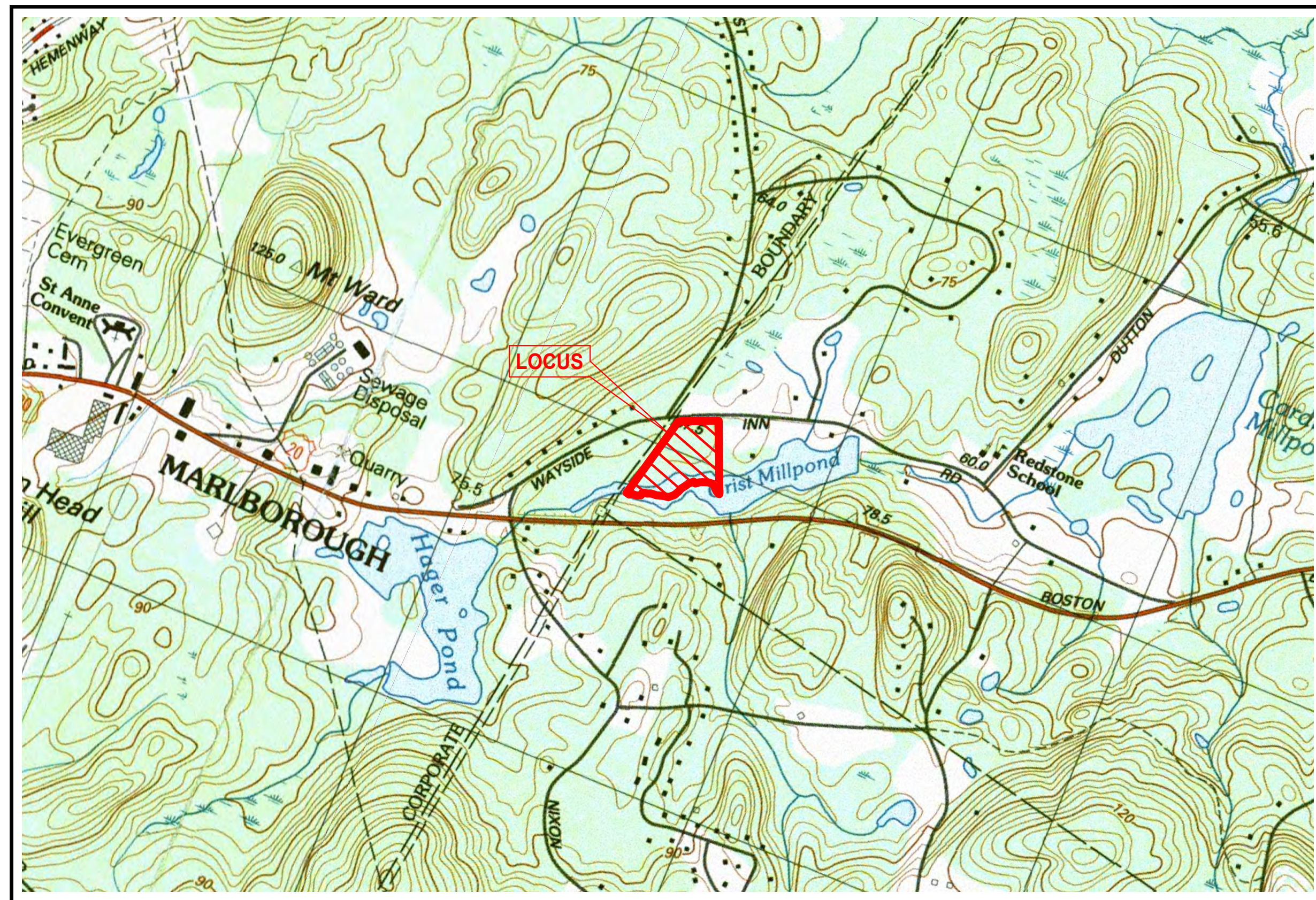
Attachments: 2 Sets each of the following:

- Plan Entitled "Site Plan, H. Gunther Rudenberg Estate..." dated revised 11/29/2022.
- "Stormwater Management Design and Runoff Calculations Report" revised 11/26/2022.



# SITE PLAN

## H. GUNTHER RUDENBERG ESTATE Wayside Inn Road Sudbury, Massachusetts



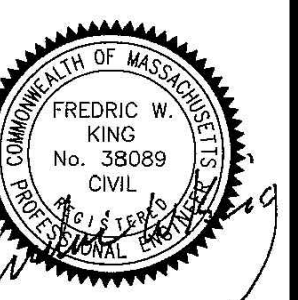
### SHEET INDEX

C-1	TITLE SHEET
C-2	EXISTING CONDITIONS PLAN
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C-4	PROPOSED SITE PLAN
C-5	LANDSCAPE PLANTING SCHEME
C-6	SITE DETAILS

ASSESSORS' PARCEL:

L01-0002  
L02-0003  
L02-0013

RECORD OWNER AND APPLICANT:  
**H. GUNTHER RUDENBERG ESTATE**  
**ELIZABETH RUDENBERG P.R.**  
**249 FORESIDE ROAD**  
**FALMOUTH, MAINE 04105**



1	FWK	11/29/22	REVISED LAYOUT
NO.	APP	DATE	DESCRIPTION

DATE: **AUGUST 8, 2022**

SCALE: **AS NOTED**

DESIGN:	DRAFTED:	CHECKED:
FWK	LTV/FJS	FWK

PROJECT TITLE:

**PROPOSED  
RESIDENTIAL  
SITE PLAN**

**219\* WAYSIDE INN ROAD**  
**SUDBURY, MA 01776**  
**\*ADDRESS NUMBER NOT OFFICIAL**

SHEET TITLE:

**TITLE SHEET**

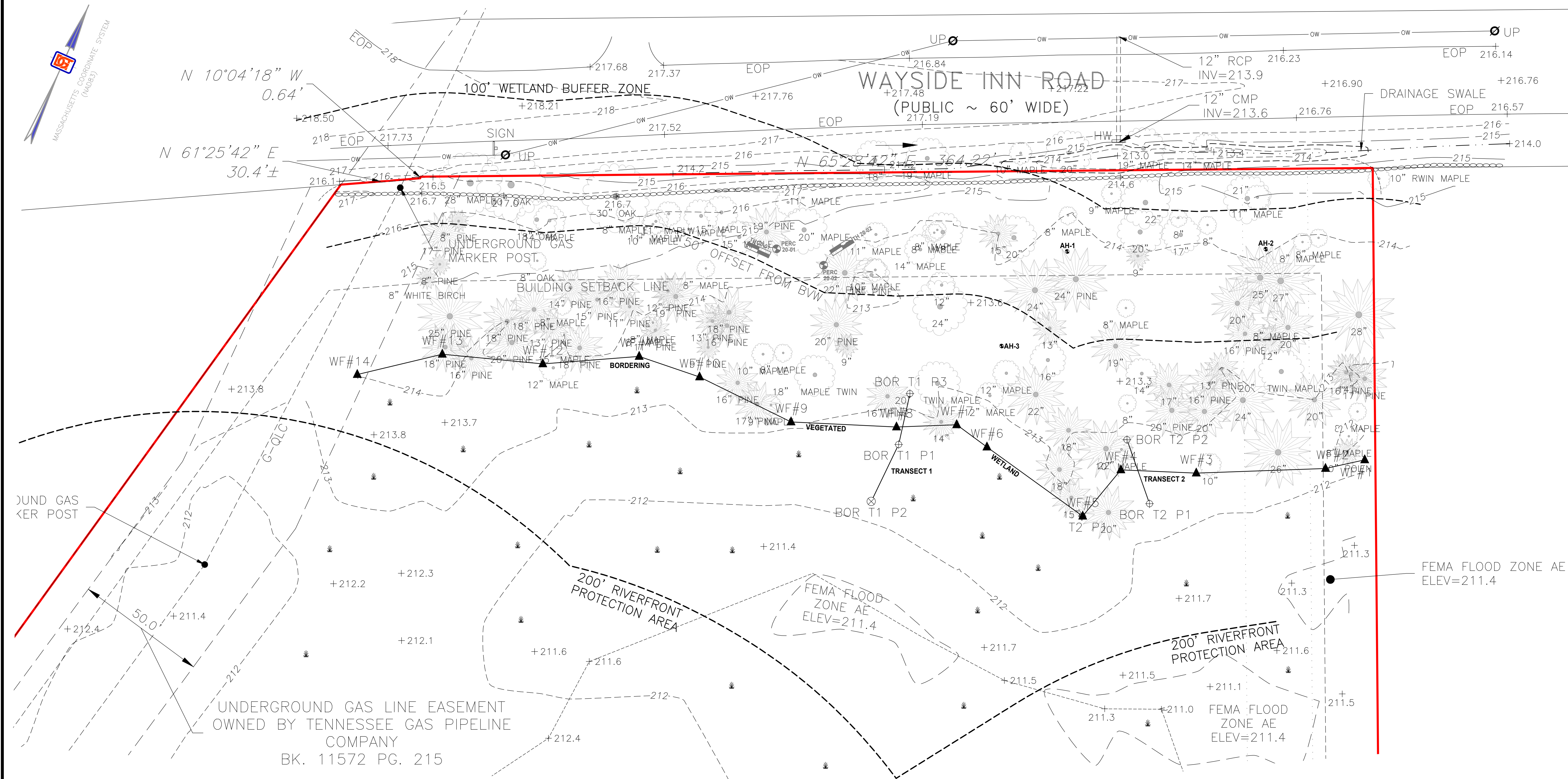
SHEET:  
**1 OF 6**

PROJECT NO.:  
**25052**

**C-1**

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## NOTES

- ASSESSOR'S PARCEL  
L01-0002  
L02-0003  
L02-0013  
RECORD OWNER  
GUNTHER H. RUDENBERG  
GUNTHER H. RUDENBERG  
GUNTHER H. RUDENBERG  
DEED  
BK. 7807 PG. 267  
BK. 49650 PG. 379  
BK. 49650 PG. 379
- ELEVATIONS REFER TO THE NAVD88 DATUM, DETERMINED BY GPS OBSERVATIONS USING GEOID 12B.
- THIS PARCEL FALLS WITHIN ZONING DISTRICT WAYSIDE IN HISTORIC PRESERVATION (WII) AND ALSO WITHIN THE WATER RESOURCE PROTECTION DISTRICT ZONE III.
- OWNERS OF ADJOINING PROPERTIES ARE ACCORDING TO CURRENT ASSESSOR'S RECORDS.
- SEE MIDDLESEX SOUTH DISTRICT REGISTRY OF DEEDS FOR RECORD DOCUMENTS.
- TOPOGRAPHIC FEATURES, SITE DETAILS AND SIGNIFICANT IMPROVEMENTS DEPICTED HEREON, WERE OBTAINED FROM A FIELD SURVEY CONDUCTED BY DGT ASSOCIATES DURING APRIL 2020.
- THIS TOPOGRAPHIC SURVEY BY DGT ASSOCIATES WAS PREPARED TO MEET NATIONAL MAP ACCURACY STANDARDS AT A SCALE OF 1"=20' HORIZONTALLY AND A 1 FOOT CONTOUR INTERVAL VERTICALLY. ANY REPRODUCTIONS OR RESCALING MAY AFFECT THE MAP ACCURACY.
- WETLAND FLAGGING WAS CONDUCTED ON MARCH 12, 2020 BY FREDRIC KING OF DGT ASSOCIATES, INC. 1071 WORCESTER ROAD, FRAMINGHAM, MA 01701.
- THIS PARCEL LIES IN ZONE "X-UNSHADED" (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN) AND ZONE AE (SPECIAL FLOOD HAZARD AREA WITH A 1% ANNUAL CHANCE OF FLOODING) AT ELEVATION 211.4 AS DETERMINED BY TOPOGRAPHIC SURVEY AND COMPARISON TO THE FLOOD PROFILE DATA CONTAINED IN FEMA FLOOD INSURANCE STUDY NUMBER 25017CV001C DATED JULY 6, 2016.

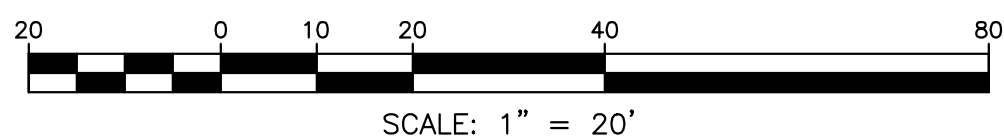
- LEGAL STATUS OF EASEMENTS, WAYS, AND RESTRICTIONS NOT DETERMINED BY THIS SURVEY.
- LOCATION OF UNDERGROUND UTILITIES SHOWN HEREON ARE BASED ON FIELD LOCATION OF VISIBLE STRUCTURES AND COMPILING INFORMATION FROM UTILITY RECORDS. THE LOCATION SHOWN SHALL BE CONSIDERED APPROXIMATE. BEFORE ANY CONSTRUCTION, THE LOCATION OF UNDERGROUND UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR IN ACCORDANCE WITH CH. 82, SEC. 40 AS AMENDED, ALL UTILITY COMPANIES AND APPLICABLE GOVERNMENT AGENCIES MUST BE CONTACTED CONTACT "DIG-SAFE" AT 1-888-344-7233 OR 811.
- THE LOCATION OF THE TOWN LINE, AND THEREFORE THE WESTERLY LOT LINE OF LOCUS, IS TAKEN FROM THE CALCULATED POSITIONS OF THE TOWN CORNERS PROVIDED BY THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION. THESE TOWN CORNER POSITIONS ARE APPROXIMATE ONLY, AND SHOULD NOT BE USED FOR PRECISE POSITIONING.
- THIS PLAN SHEET SHOWS THE EXISTING CONDITIONS AT THE NORTH PORTION OF THE SITE. ALL EXISTING TREES 8" DBH AND LARGER ARE SHOWN WITHIN THE UPLAND AREA OF THE SITE, NORTH OF THE WETLAND LINE. THIS INCLUDES THE AREA WITHIN THE ROAD RIGHT OF WAY ON THE SOUTH SIDE OF THE ROAD. EXISTING TREES SOUTH OF THE WETLAND LINE ARE NOT SHOWN.

## PLAN REFERENCES

- PLAN 1650 OF 1951
- PLAN 1204 OF 1958
- PLAN 1621 OF 1958
- PLAN 1897 OF 1960
- PLAN 495 OF 1968
- PLAN 690 OF 1974
- 1897 STATE HIGHWAY LAYOUT OF BOSTON AND WORCESTER STAGE ROAD (LAYOUT NO. 257)
- 1897 STATE HIGHWAY LAYOUT OF NORTHBOROUGH ROAD (LAYOUT NO. 260)
- 1930 STATE HIGHWAY DISCONTINUANCE OF BOSTON POST ROAD (LAYOUT NO. 2675)
- 1930 STATE HIGHWAY DISCONTINUANCE OF BOSTON POST ROAD (LAYOUT NO. 2676)

## LEGEND

- EXISTING CONTOUR ELEVATION  
BENCH MARK  
BORING  
BOLLARD OR GUARD POST  
EDGE OF PAVEMENT  
HEAD WALL  
MEAN ANNUAL HIGH WATER FLAG  
SIGN  
SPOT ELEVATION  
SOIL TEST HOLE  
PERCOLATION TEST  
WETLAND TRANSECT BORING  
UTILITY POLE  
WITH  
WETLAND FLAG  
STONEWALL  
OVERHEAD WIRE
- BOUNDARY MONUMENTS OR MARKERS  
(F)  
(S)  
CBDH  
CBND  
DH  
SBDH  
SBND  
SSM
- FOUND  
SET  
CONCRETE BOUND WITH DRILL HOLE  
CONCRETE BOUND  
DRILL HOLE  
STONE BOUND WITH DRILL HOLE  
STONE BOUND  
STEEL SURVEY MARKER

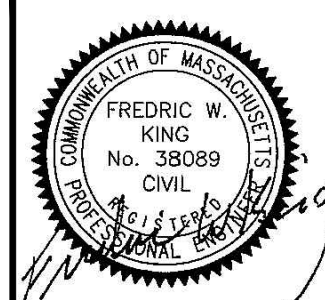


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FALMOUTH, MAINE 04105



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## PROPOSED RESIDENTIAL SITE PLAN

**219\* WAYSIDE INN ROAD  
SUDBURY, MA 01776  
\*ADDRESS NUMBER NOT OFFICIAL**

SHEET TITLE:

## EXISTING CONDITIONS PLAN

SHEET:  
**2 OF 6**

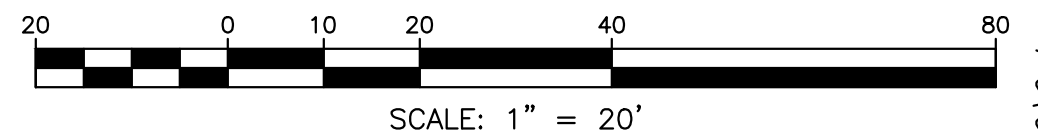
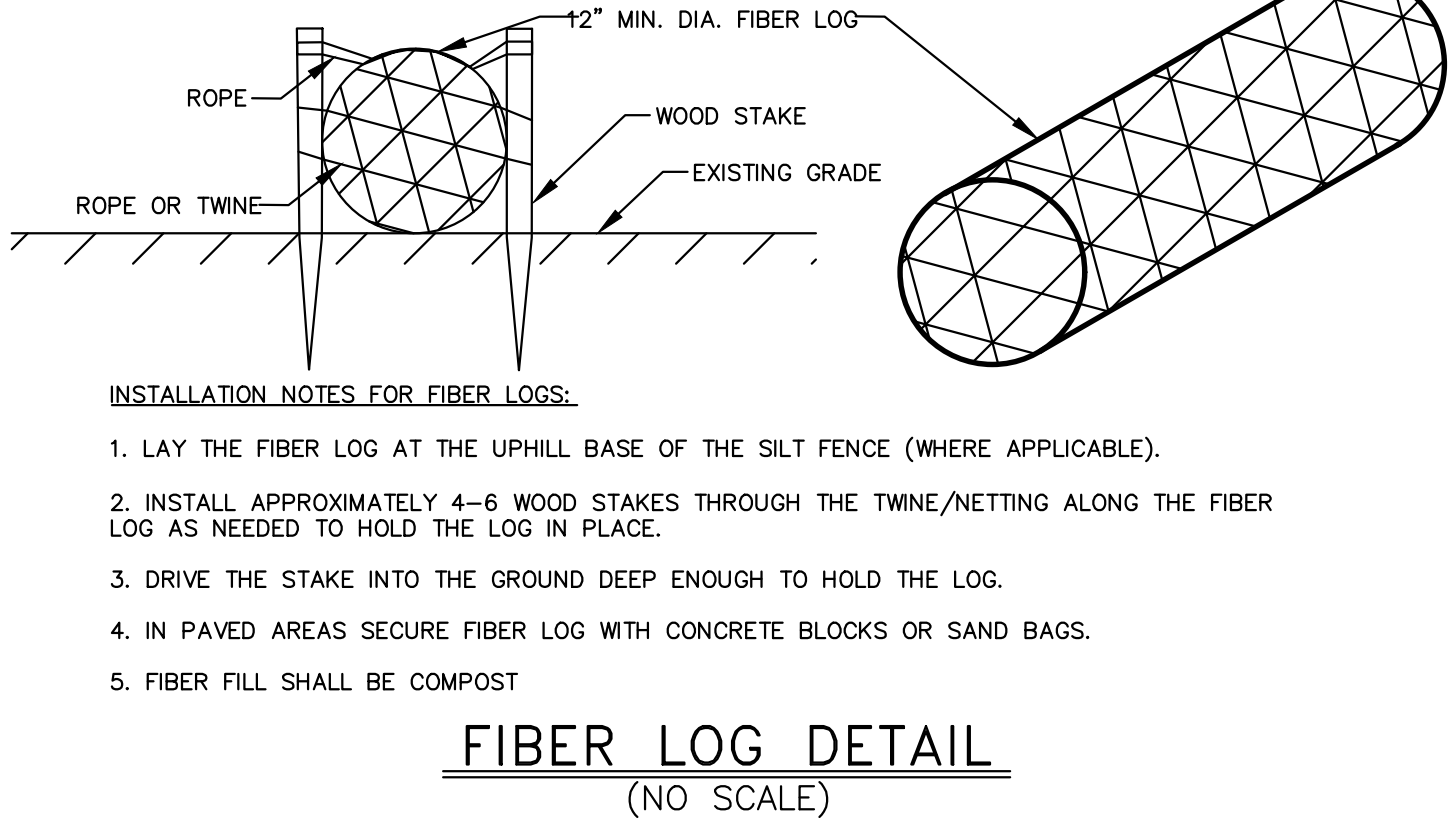
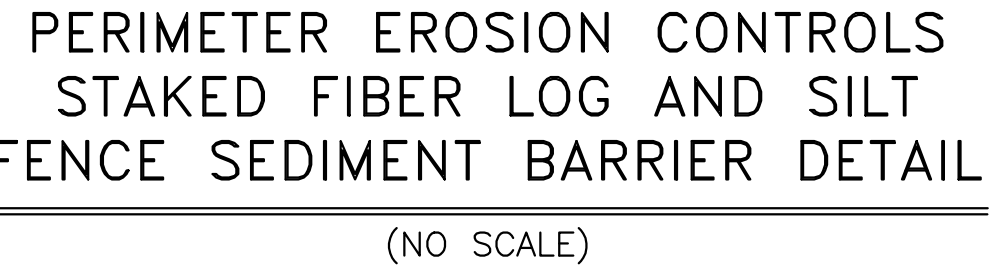
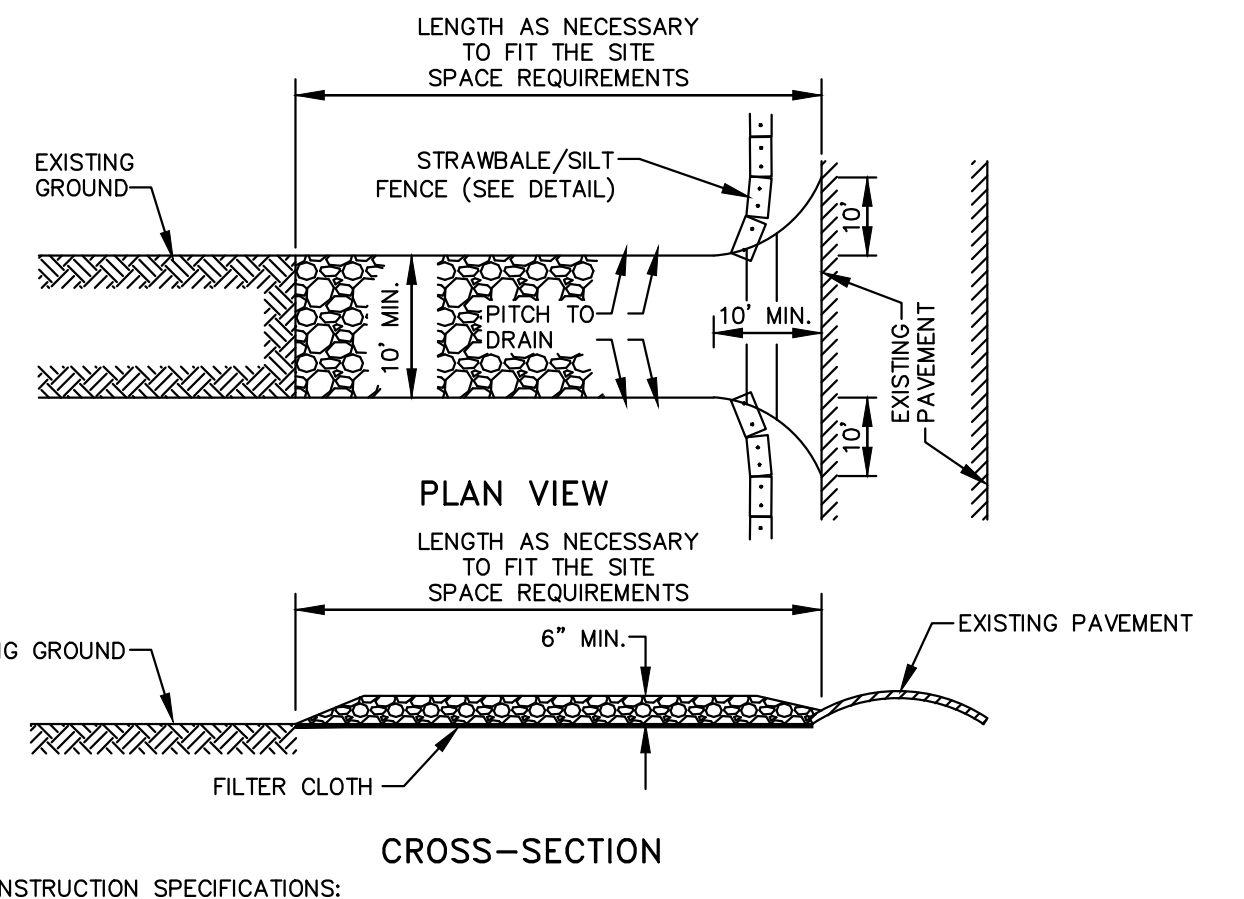
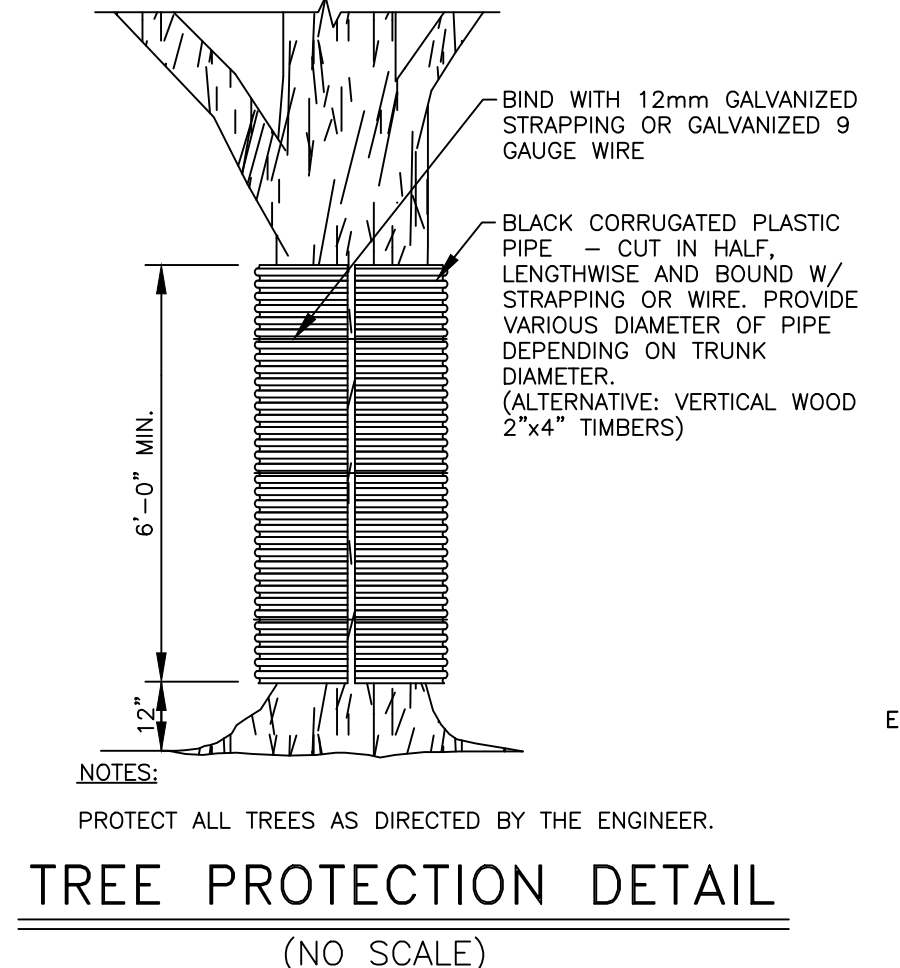
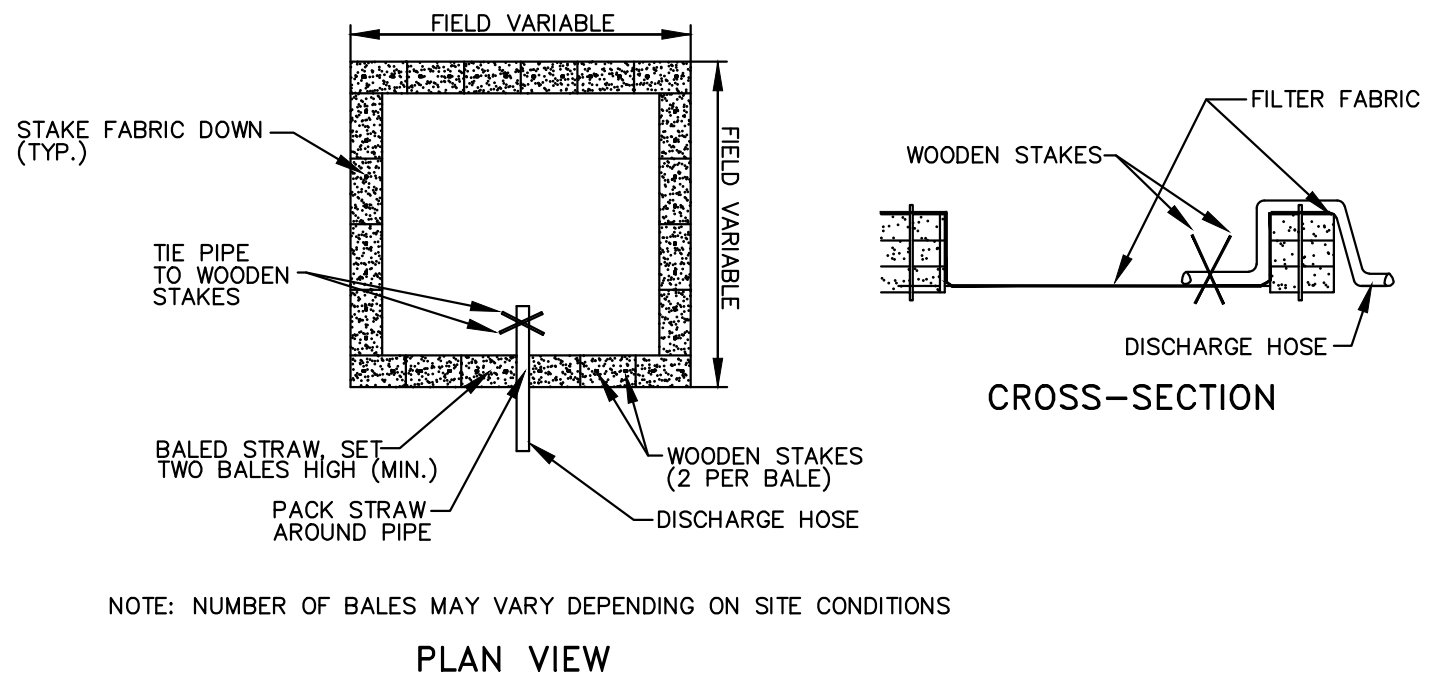
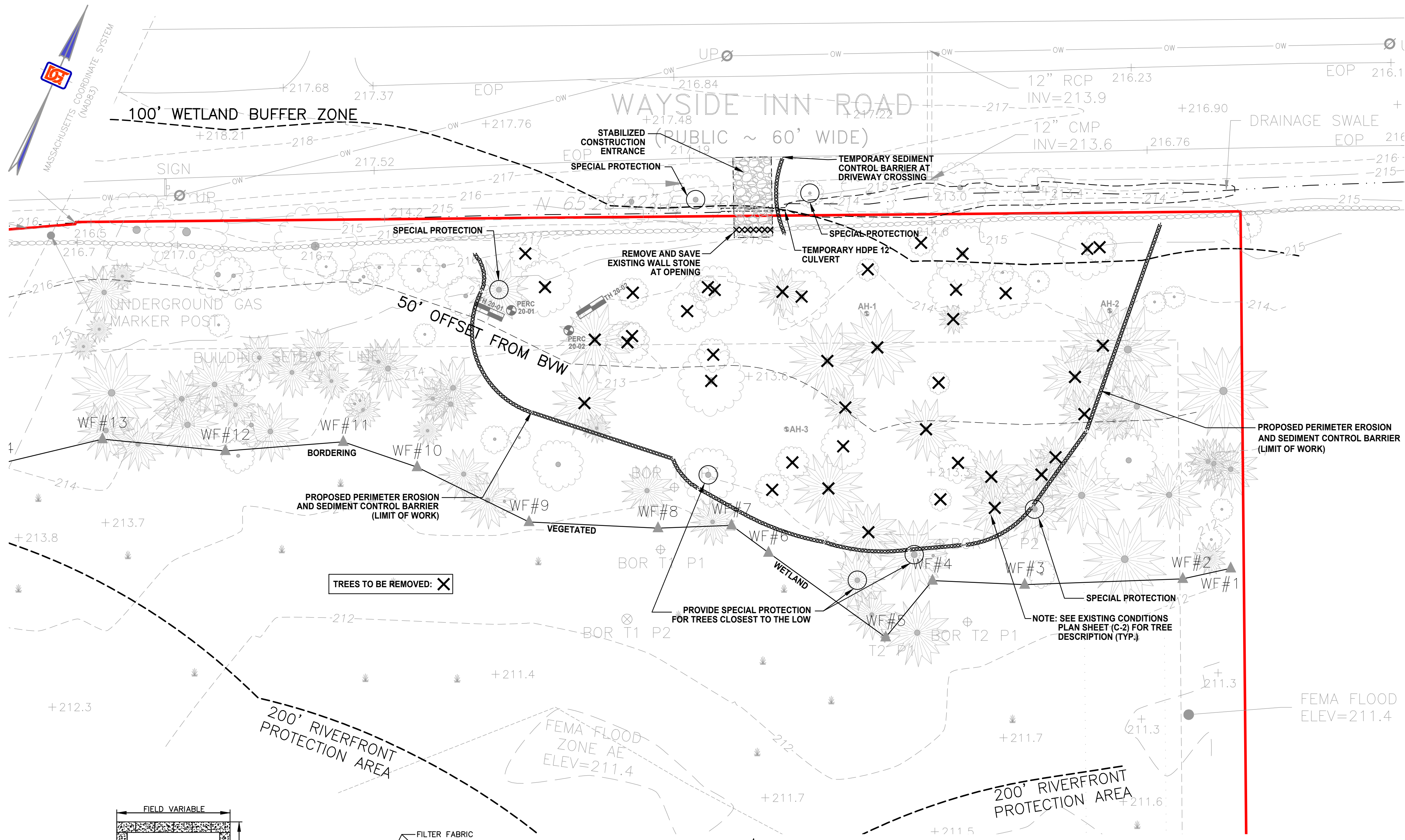
PROJECT NO.:  
**25052**

**C-2**



EROSION & SEDIMENT CONTROL  
NOTES & PERFORMANCE STANDARDS

1. CONSTRUCTION PERIOD EROSION AND SEDIMENT CONTROL
- 1.1 THE PURPOSE OF THE CONSTRUCTION PERIOD EROSION AND SEDIMENT CONTROL PLAN IS TO MINIMIZE THE INTRODUCTION OF SEDIMENTS ONTO PUBLIC RIGHT OF WAYS, WETLAND RESOURCE AREAS, ADJUTING PROPERTIES, AND TO POST-DEVELOPMENT STORMWATER BMP'S RESULTING FROM THE LAND DISTURBANCE ACTIVITIES DURING CONSTRUCTION.
- 1.2 THE EROSION AND SEDIMENT CONTROL NOTES AND PERFORMANCE STANDARDS LISTED ON THIS SHEET SHALL BE IMPLEMENTED.
- 1.3 INSPECTIONS SHALL BE CONDUCTED BY THE GENERAL CONTRACTOR ON A WEEKLY BASIS, OR FOLLOWING SIGNIFICANT STORM EVENTS (RAINFALL OF 0.5" OR MORE) THAT CAN AFFECT THE EROSION AND SEDIMENT CONTROL PRACTICES IMPLEMENTED AT THE SITE. THE PURPOSE OF THE INSPECTIONS IS TO EVALUATE THE EFFECTIVENESS OF THE CONTROLS AND ANY REQUIRED MAINTENANCE ACTIVITIES. IF AN EROSION/SEDIMENT CONTROL MEASURE IS FOUND TO BE INADEQUATE FOR PROPERLY CONTROLLING SEDIMENT, AN ADEQUATE MEASURE SHALL BE DESIGNED AND IMPLEMENTED. A COPY OF THE WRITTEN INSPECTIONS SHALL BE KEPT ON FILE AT THE CONSTRUCTION SITE.
- 1.4 DURING CONSTRUCTION, PROPOSED STORMWATER MANAGEMENT STRUCTURES SHALL BE PROTECTED FROM SEDIMENT. ALL PROPOSED NEW STORMWATER MANAGEMENT FEATURES THAT INFILTRATE RUNOFF ARE PARTICULARLY SENSITIVE TO DAMAGE BY SEDIMENT. INFILTRATION TECHNOLOGIES ARE NOT DESIGNED TO HANDLE THE HIGH CONCENTRATIONS OF SEDIMENTS TYPICALLY FOUND IN CONSTRUCTION SITE RUNOFF, AND MUST BE PROTECTED FROM CONSTRUCTION RELATED SEDIMENT LOADINGS. SITE RUNOFF FROM UNSTABILIZED AREAS SHALL NOT BE DISCHARGED INTO THE PROPOSED INFILTRATION SYSTEMS UNTIL THE TRIBUTARY DRAINAGE AREA IS STABLE OR THE RUNOFF IS TREATED TO BE ESSENTIALLY FREE FROM SEDIMENT TO THE SATISFACTION OF THE ENGINEER. THE CONTRACTOR SHALL PROVIDE TEMPORARY BY-PASS SYSTEMS AS NECESSARY TO PREVENT CONSTRUCTION SITE RUNOFF FROM ENTERING THE INFILTRATION SYSTEMS. THE INFILTRATION SYSTEMS SHALL REMAIN OFF-LINE AND PROTECTED. CLEAN ROOF RUNOFF MAY DISCHARGE INTO THE INFILTRATION SYSTEMS IF IT IS PIPED DIRECTLY TO THE SYSTEM AND NOT DIRECTED OVER DISTURBED AREAS. IN THIS CASE INFILTRATION SYSTEMS INCLUDE THE PROPOSED RAIN GARDEN AND PERMEABLE PAVER SYSTEM.
- 1.5 NO STOCKPILING IS ALLOWED WITHIN THE FOOTPRINT OF THE PROPOSED INFILTRATION SYSTEM OR THE FOOTPRINT OF THE PROPOSED SOIL ABSORPTION FIELD. CONTRACTOR IS TO LOCATE AND STAKE THE PROPOSED AREAS FOR THESE SYSTEMS PRIOR TO THE START OF CONSTRUCTION.
- 1.6 NO PARKING IS ALLOWED OVER THE FOOTPRINT OF THE PROPOSED SOIL ABSORPTION SYSTEM AT ANYTIME DURING THE CONSTRUCTION PROCESS.
2. GENERAL PERFORMANCE STANDARDS
- 2.1 THE CONTRACTOR SHALL INSTALL, ROUTINELY INSPECT, AND MAINTAIN ALL EROSION AND SEDIMENT CONTROLS SUCH THAT THEY ARE IN PROPER WORKING ORDER DURING THE CONSTRUCTION PROJECT UNTIL SUCH TIME AS ALL AREAS OF THE SITE TRIBUTARY TO THOSE CONTROLS ARE IN A PERMANENTLY STABILIZED CONDITION.
- 2.2 THE CONTRACTOR SHALL MANAGE THE SITE SUCH THAT EROSION AND SEDIMENT FROM RUNOFF AND WIND BLOWN DUST ARE CONTROLLED AND ALWAYS MINIMIZED. THE CONTROLS SHOWN ON THIS PLAN INCLUDE THE INITIAL SETUP AND BASIC INFORMATION. TO MEET THE REQUIREMENT OF BEST MANAGEMENT PRACTICES, THE CONTRACTOR MUST MANAGE THE SITE PROPERLY WHICH MAY INCLUDE, BUT NOT BE LIMITED TO: MINIMIZING AREAS OF EXPOSED SOILS; INSTALLING TEMPORARY COVER; MAKE NECESSARY ADJUSTMENTS TO THE EROSION CONTROL INSTALLATIONS TO IMPROVE FUNCTION; PROVIDE TEMPORARY SEDIMENT BASINS; INSTALL ADDITIONAL EROSION CONTROLS WHERE NECESSARY.
- 2.3 DESIGN, INSTALLATION AND MAINTENANCE OF SEDIMENT AND EROSION CONTROLS SHALL BE IN ACCORDANCE WITH BEST MANAGEMENT PRACTICES FOLLOWING THE GUIDELINES INCLUDED IN THE FOLLOWING:
- "STORMWATER MANAGEMENT FOR CONSTRUCTION ACTIVITIES, DEVELOPING POLLUTION PREVENTION PLANS AND BEST MANAGEMENT PRACTICES" U.S. ENVIRONMENTAL PROTECTION AGENCY, OCTOBER 1992.
  - "MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, A GUIDE FOR PLANNERS, DESIGNERS AND MUNICIPAL OFFICIALS", MASS. EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS, MAY 2003.
  - U.S.D.A. NATURAL RESOURCES AND CONSERVATION SERVICES (NRCS) GUIDELINES.
- 2.4 THE EROSION CONTROL WORK SHOWN ON THIS PLAN MAY ALSO BE SUBJECT TO PERMITS AND APPROVALS BY OTHER STATE AND LOCAL AGENCIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH THE CONDITIONS AND REQUIREMENTS OF THOSE PERMITS AND APPROVALS.
3. FEDERAL NPDES PHASE II COMPLIANCE
- 3.1 THIS PROJECT IS NOT SUBJECT TO THE FEDERAL CLEAN WATER ACT REQUIREMENTS FOR CONSTRUCTION SITES ADMINISTERED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA).
4. PERIMETER EROSION CONTROL BARRIER AND LIMIT OF WORK
- 4.1 PRIOR TO ANY DISTURBANCE OR ALTERATIONS OF ANY AREA ON THE SITE, A SEDIMENT BARRIER SHALL BE INSTALLED IN THE LOCATIONS SHOWN ON THE PLAN.
- 4.2 INSTALL THE FIBER LOGS IN THE LOCATIONS AS SHOWN ON THE PLANS. IN THOSE AREAS WHERE THE TOPOGRAPHY INDICATES THAT STORMWATER RUNOFF WILL BE CONCENTRATED (AT LOW POINTS), ADDITIONAL FIBER LOGS OR SILT FENCES AS NECESSARY SHALL BE STAKED ON THE UPGRADIENT SIDE OF THE BARRIER FOR ADDED FILTRATION AND PROTECTION. THE REQUIRED LOCATIONS FOR THE ADDED BARRIER INSTALLATION WILL BE SELECTED BY THE ENGINEER AND / OR THE AUTHORIZED INSPECTOR UPON COMPLETION OF THE PERIMETER EROSION CONTROL INSTALLATION.
- 4.3 ONCE INSTALLED, THE EROSION CONTROL BARRIER SHALL BE MAINTAINED IN PLACE UNTIL ALL AREAS UPGRADIENT FROM THE BARRIERS HAVE BEEN PERMANENTLY STABILIZED.
- 4.4 ALL DISTURBED AREAS NOT OTHERWISE DEVELOPED OR WHERE SPECIAL STABILIZATION MEASURES OR LANDSCAPE PLANTINGS ARE PROPOSED SHALL BE LOAMED AND SEEDED. SIX INCHES OF LOAM TOPSOIL (MIN. COMPACTED DEPTH) SHALL BE APPLIED UNLESS, OTHERWISE SPECIFIED.
- 4.5 THE PERIMETER EROSION CONTROL BARRIER IS ALSO A LIMIT OF WORK. ALL AREAS OUTSIDE THE LIMIT ARE TO BE LEFT UNDISTURBED. DURING THE SITE WORK, ALL PERSONS AND EQUIPMENT SHALL STAY OUT OF THESE AREAS TO PRESERVE THE EXISTING VEGETATION AND SOIL COVER.
- 5.0 CONSTRUCTION ENTRANCE
- 5.1 AT THE START OF SITE WORK, A STONE CONSTRUCTION ENTRANCE SHALL BE INSTALLED AT THE ACCESS TO THE SITE FROM THE ROADWAY TO CONTROL THE TRACKING OF MUD OFF THE SITE. THE ENTRANCE SHALL BE MAINTAINED UNTIL THE SITE IS IN A STABILIZED CONDITION WHEN THE POSSIBILITY OF VEHICLES TRACKING MUD OFF SITE HAS BEEN ELIMINATED. PRIOR TO INSTALLATION OF THE STONE CONSTRUCTION ENTRANCE, A TEMPORARY CULVERT AND PRELIMINARY DRIVEWAY SHALL BE INSTALLED AS SHOWN. ALTERNATIVELY, THE PERMANENT OPEN BOX CULVERT AND DRIVEWAY WORK MAY BE INSTALLED FIRST AND FILL INSTALLED TO PROVIDE THE ACCESS WAY. INSTALL THE STONE CONSTRUCTION ENTRANCE ON THAT PREPARED DRIVEWAY SURFACE.
- 5.2 THE CONTRACTOR SHALL SWEEP THE ADJACENT ROADWAYS WHEN MUD, DUST, DIRT, DEBRIS, ETC. HAS SHOWN SIGNS OF BUILDUP ON THE ROADWAYS EXITING THE SITE. THE CONTRACTOR SHALL PAY PARTICULAR ATTENTION TO THIS MATTER AND IMMEDIATE ATTENTION IS ALWAYS REQUIRED.
- 6.0 DEWATERING OF EXCAVATIONS
- 6.1 DISCHARGE FROM DEWATERING PUMPS OR TEMPORARY TRENCH OR EXCAVATION DRAINS SHALL NOT BE DISCHARGED DIRECTLY TO THE ON-SITE DRAINAGE SYSTEM. DISCHARGES SHALL BE DIRECTED TO A TREATMENT SYSTEM CONSISTING OF A SEDIMENT BASIN, STRAW BALE SEDIMENT BASIN, FILTER BAG SYSTEM OR OTHER APPROVED METHOD TO FILTER THE DISCHARGE WATER AND PREVENT EROSION. TREATMENT SYSTEM SHALL BE AT LEAST 50 FEET FROM THE WETLAND.
- 7.0 SOIL STOCKPILES
- 7.1 STOCKPILES OF SOIL MATERIALS SHALL BE PLACED WITHIN THE LIMIT OF WORK AND IN AREAS THAT ARE PROTECTED BY PERIMETER EROSION CONTROLS.
- 7.2 STOCKPILES THAT ARE TO BE IN PLACE FOR EXTENDED PERIODS OF TIME (MORE THAN 30 DAYS) SHALL BE COVERED OR OTHERWISE TEMPORARILY STABILIZED IN ACCORDANCE WITH BEST MANAGEMENT PRACTICES.
- 8.0 DUST CONTROL
- 8.1 THE CONTRACTOR SHALL TAKE APPROPRIATE MEASURES DURING SITE WORK TO MINIMIZE WIND BLOWN DUST FROM EXPOSED SOIL SURFACES. MEASURES INCLUDE BUT ARE NOT LIMITED TO:
- SPRINKLING WATER ON EXPOSED SURFACES
  - APPLICATION OF TEMPORARY COVER SUCH AS HYDRO MULCH AND TACKIFIER, STRAW MATTING, JUTE NETTING ETC.



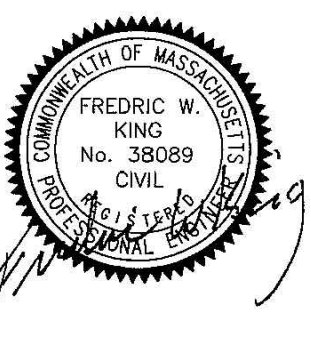
Framingham  
Boston • Worcester

1071 Worcester Road  
Framingham, MA 01701  
508-879-0030

www.DGTassociates.com

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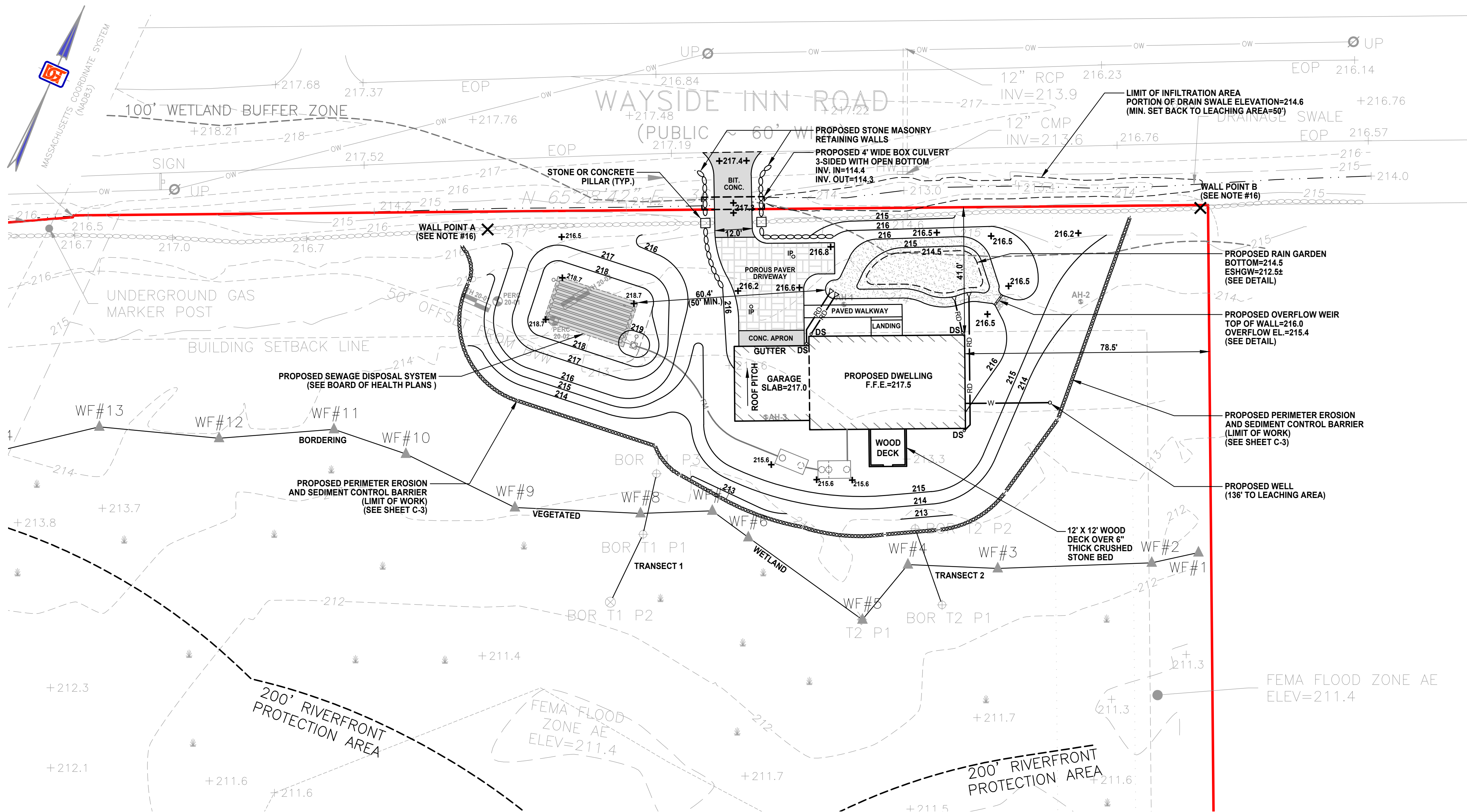
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EROSION & SEDIMENT  
CONTROL, NOTES,  
AND SITE CLEARING  
PLAN

SHEET:  
3 OF 6  
PROJECT NO.:  
25052  
C-3

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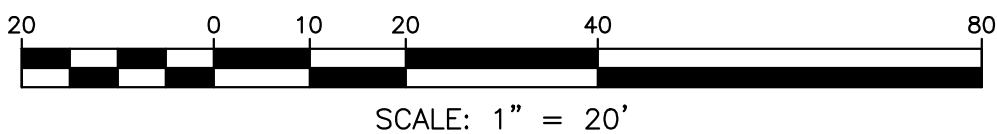


### GENERAL NOTES

- SEE SHEET C-2 FOR EXISTING CONDITIONS NOTES AND INFORMATION.
- THE CONTRACTOR SHALL VERIFY THE LOCATION AND RELATIVE ELEVATION OF THE BENCHMARKS PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. ANY DISCREPANCY SHALL BE REPORTED TO THE ENGINEER.
- IN CASES WHERE LEDGE, BURIED FOUNDATIONS OR BOULDERS ARE PRESENT, DGT ASSOCIATES SHALL NOT BE RESPONSIBLE FOR THE AMOUNT OF ROCK OR CONCRETE ENCOUNTERED.
- DGT ASSOCIATES SHALL BE NOTIFIED OF ANY SIGNIFICANT DIFFERENCES IN THE EXISTING CONDITIONS OR UTILITIES THAT MAY AFFECT THE CONSTRUCTION SHOWN ON THIS PLAN FOR ANY NECESSARY PLAN REVISIONS.
- THIS PLAN IS NOT INTENDED TO SHOW AN ENGINEERED BUILDING FOUNDATION DESIGN WHICH WOULD INCLUDE DETAILS AND ELEVATIONS FOR FOOTINGS, FOUNDATION WALL DESIGN, COORDINATE WITH THE ARCHITECTURAL AND STRUCTURAL PLANS.
- THE PROPOSED BUILDING CONFIGURATION AS SHOWN HEREON SHALL BE CONSIDERED CONCEPTUAL AND SHALL BE VERIFIED WITH THE FINAL ARCHITECTURAL PLANS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR AND/OR REPLACEMENT OF ANY EXISTING FEATURES DAMAGED DURING CONSTRUCTION THAT ARE NOT INTENDED FOR DEMOLITION AND/OR REMOVAL HEREON.
- SAFETY MEASURES, CONSTRUCTION METHODS AND CONTROL OF WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- THE CONTRACTOR SHALL MAINTAIN A PASSABLE ROADWAY (WAYSIDE INN ROAD) AT ALL TIMES FOR PEDESTRIAN AND VEHICULAR TRAFFIC.
- RIM ELEVATIONS SHOWN HEREON FOR NEW STRUCTURES ARE PROVIDED TO ASSIST THE CONTRACTOR WITH MATERIAL TAKEOFFS. FINAL RIM ELEVATIONS SHALL MATCH PAVEMENT, GRADING, LANDSCAPING, UNLESS SPECIFICALLY INDICATED OTHERWISE.
- PERIMETER ROOF DRAIN LEADERS ARE TO BE 6" HDPE (ADS-12, DOUBLE WALL).
- WHERE NEW PAVING MEETS EXISTING PAVING, MEET LINE AND GRADE OF EXISTING.
- CONSTRUCTION ACTIVITIES SHALL CONFORM TO THE RULES AND REGULATIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).
- ALL WATER, AND SEWER WORK OUTSIDE OF THE BUILDING SHALL BE PERFORMED BY A CONTRACTOR QUALIFIED TO PERFORM THE WORK IN THE TOWN OF SUDBURY. UTILITY WORK SHALL BE IN COMPLIANCE WITH THE TOWN OF SUDBURY CONSTRUCTION STANDARDS.
- FOR INFORMATION ON THE PROPOSED SEPTIC SYSTEM, SEE SEPARATE PLAN ENTITLED "PROPOSED SEWAGE DISPOSAL SYSTEM" DATED REVISED 11/10/2021, DGT ASSOCIATES.
- FRONT STONE WALL: REPAIR AND REALIGN EXISTING STONE WALL FOR A UNIFORM APPEARANCE AT THE FRONT OF THE SITE IN THE SAME LOCATION SHOWN ON THIS PLAN FROM WALL POINT "A" TO WALL POINT "B". STONES REMOVED FOR THE DRIVEWAY ARE TO BE SAVED AND USED IN THE DRIVEWAY BORDER.

### LEGEND

EXISTING	PROPOSED
100' WETLAND BUFFER ZONE	100'
CONTOUR ELEVATION	CONC.
UNDERGROUND ROOF DRAIN LINE	BIT.
UNDERGROUND WATER LINE	TC=0.0
UNDERGROUND SEWER FORCE MAIN	LS
OVERHEAD WIRES	CMP
UTILITY POLE	HDPE
DOWNSPOUT	F.F.E.
PERCOLATION TEST	RCP
AUGER HOLE	INV.
TEST PIT	PVC
WETLAND FLAG	MIN.
SPOT GRADE	TYP.
CONC.	ESTIMATED SEASON HIGH GROUNDWATER
BIT.	EROSION AND SEDIMENT CONTROL BARRIER
	IP

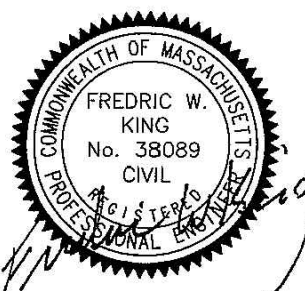


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**H. GUNTHER RUDENBERG ESTATE**  
**ELIZABETH RUDENBERG P.R.**  
249 FORESIDE ROAD  
FALMOUTH, MAINE 04105



NO.	APP.	DATE	DESCRIPTION
1	FWK	11/29/22	REVISED LAYOUT

DATE: **AUGUST 8, 2022**

SCALE: **1" = 20'**

DESIGN: **FWK** DRAFTED: **LTV/FJS** CHECKED: **FWK**

PROJECT TITLE:

## PROPOSED RESIDENTIAL SITE PLAN

**219\* WAYSIDE INN ROAD**  
**SUDBURY, MA 01776**  
**\*ADDRESS NUMBER NOT OFFICIAL**

SHEET TITLE:

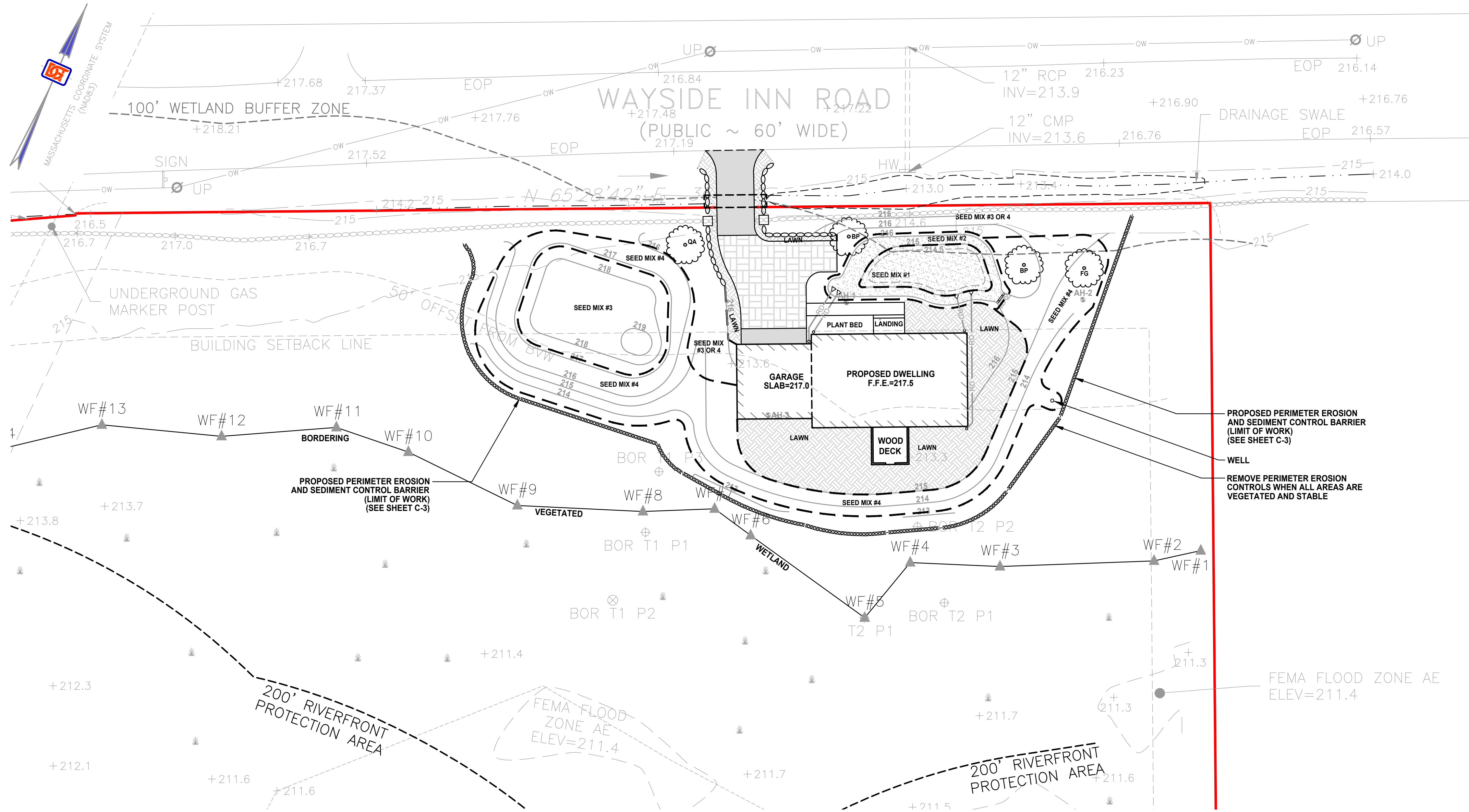
## PROPOSED SITE PLAN

SHEET:  
**4 OF 6**

PROJECT NO.:  
**25052**

**C-4**





### SEED MIXES

- #1 NEW ENGLAND WET MIX..... WETLAND SPECIES FOR THE BOTTOM OF THE RAIN GARDEN
- #2 NEW ENGLAND EROSION CONTROL-RESTORATION MIX FOR..... FOR INSIDE SLOPES OF THE RAIN GARDEN DETENTION BASIN AND MOIST SITE ALONG WITH SHRUB PLANTING
- #3 NEW ENGLAND SHOWY WILDFLOWER MIX..... PROVIDE AN OPEN FLOWERING MEADOW
- #4 NEW ENGLAND CONSERVATION WILDLIFE MIX..... SLOPE STABILITY AND NO MAINTENANCE GROUND COVER FOR GENERAL AREA WITH SHRUB PLANTINGS AND FOR WILDLIFE HABITAT.

### TREES

- BP PAPER BIRCH BETULA Papyrifera  
FG AMERICAN BEECH FAGUS GRANDIFOLIA  
QA WHITE OAK QUERCUS ALBA

### TYPICAL UPLAND SHRUBS

- KL MOUNTAIN LAUREL KALMIA LATIFOLIA  
RM ROSEBAY RHODODENDRON RHODODENDRON MAXIMUM  
RV VIRGINIA ROSE ROSA VIRGINIANA  
CR GRAY DOGWOOD CORNUS RACEMOSA  
HV WITCH HAZEL HAMAMELIS VIRGINIANA  
AC SERVICEBERRY AMELANCHIER CANADENSIS  
CA AMERICAN HAZELNUT CORYLUS AMERICANA  
VA MAPLE LEAVED VIBURNUM VIBURNUM ACERIFOLIUM

### SHRUBS FOR INSIDE SLOPE OF RAIN GARDEN

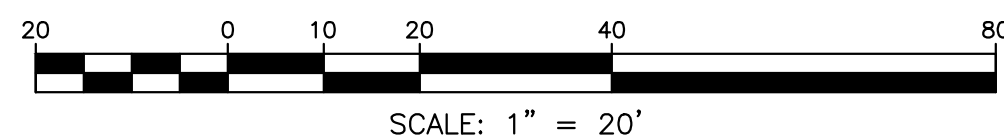
- CAM SILKY DOGWOOD CORNUS AMOMUM  
IV WINTER BERRY HOLLY ILEX VERTICILLATA  
VC HIGH BUSH BLUEBERRY VACCINIUM CORYMBOSUM

### PURPOSE

- WETLAND SPECIES FOR THE BOTTOM OF THE RAIN GARDEN
- FOR INSIDE SLOPES OF THE RAIN GARDEN ALONG WITH SHRUB PLANTING
- PROVIDE AN OPEN FLOWERING MEADOW
- SLOPE STABILITY AND NO MAINTENANCE GROUND COVER FOR GENERAL AREA WITH SHRUB PLANTINGS AND FOR WILDLIFE HABITAT.

### PLANTING NOTES

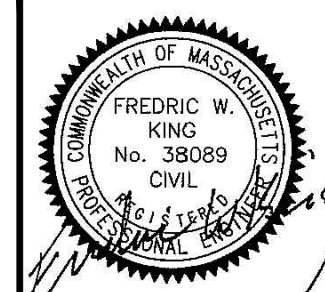
- SHRUB PLANTING IN AREAS NOT TO BE MAINTAINED IN AN OPEN CONDITION. THE INTENT IS TO PROVIDE AN ATTRACTIVE MIX OF NATIVE SHRUBS TO FORM A TRANSITION BORDER WITH WILDLIFE HABITAT VALUE IN BETWEEN THE AREAS TO BE MAINTAINED IN OPEN (LAWN AND OPEN WILDFLOWERS) CONDITION AND THE SURROUNDING UNDISTURBED WOODLAND.
- ALL SHRUBS AND TREE SPECIES ARE TO BE NATIVE SPECIES THAT GROW WELL IN UPLANDS AND WETLAND BUFFER.
- IT IS RECOMMENDED THAT SHRUB PLANTINGS BE PLANT PLUGS OR ONE GALLON SIZE INSTALLED AT TWICE THE DESIRED DENSITY. THIS IS TO ENSURE SURVIVAL AT THE DESIRED DENSITY.



ASSESSORS' PARCEL:

L01-0002  
L02-0003  
L02-0013

RECORD OWNER AND APPLICANT:  
**H. GUNTHER RUDENBERG ESTATE**  
**ELIZABETH RUDENBERG P.R.**  
**249 FORESIDE ROAD**  
**FALMOUTH, MAINE 04105**



NO.	APP	DATE	DESCRIPTION
1	FWK	11/29/22	REVISED LAYOUT

DATE: **AUGUST 8, 2022**

SCALE: **1" = 20'**

DESIGN:	DRAFTED:	CHECKED:
<b>FWK</b>	<b>LTV/FJS</b>	<b>FWK</b>

PROJECT TITLE:

## PROPOSED RESIDENTIAL SITE PLAN

**219\* WAYSIDE INN ROAD**  
**SUDBURY, MA 01776**  
**\*ADDRESS NUMBER NOT OFFICIAL**

SHEET TITLE:

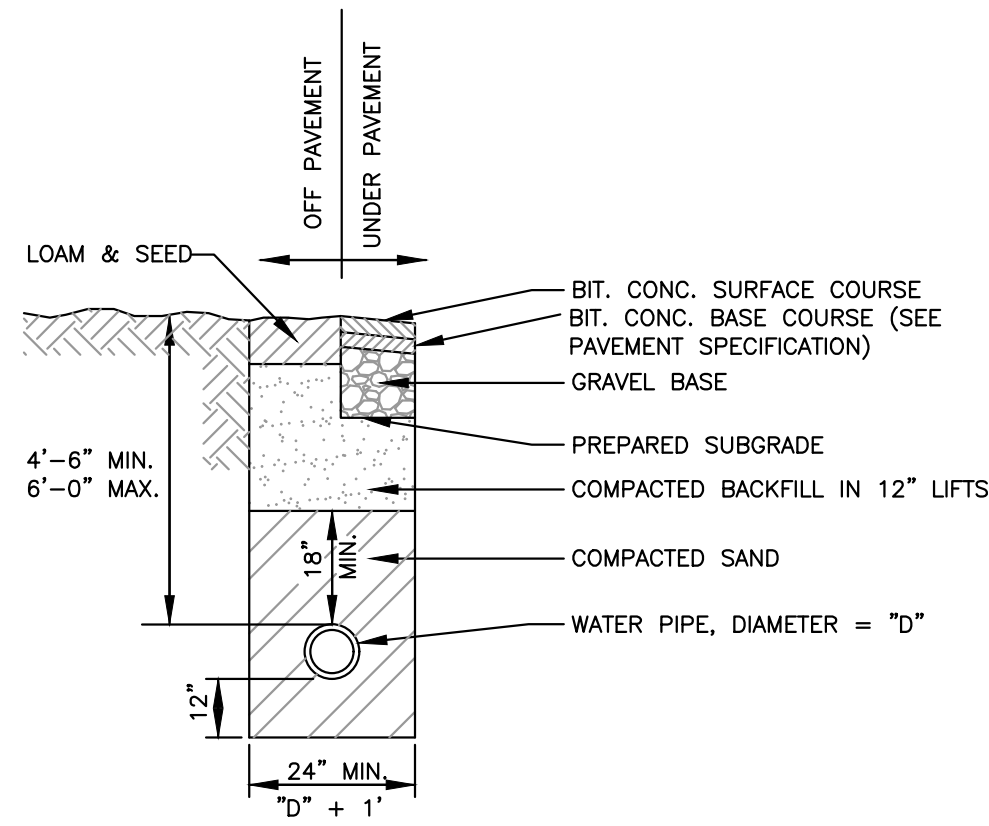
## LANDSCAPE PLANTING SCHEME

SHEET:  
**5 OF 6**

PROJECT NO.:  
**25052**

**C-5**



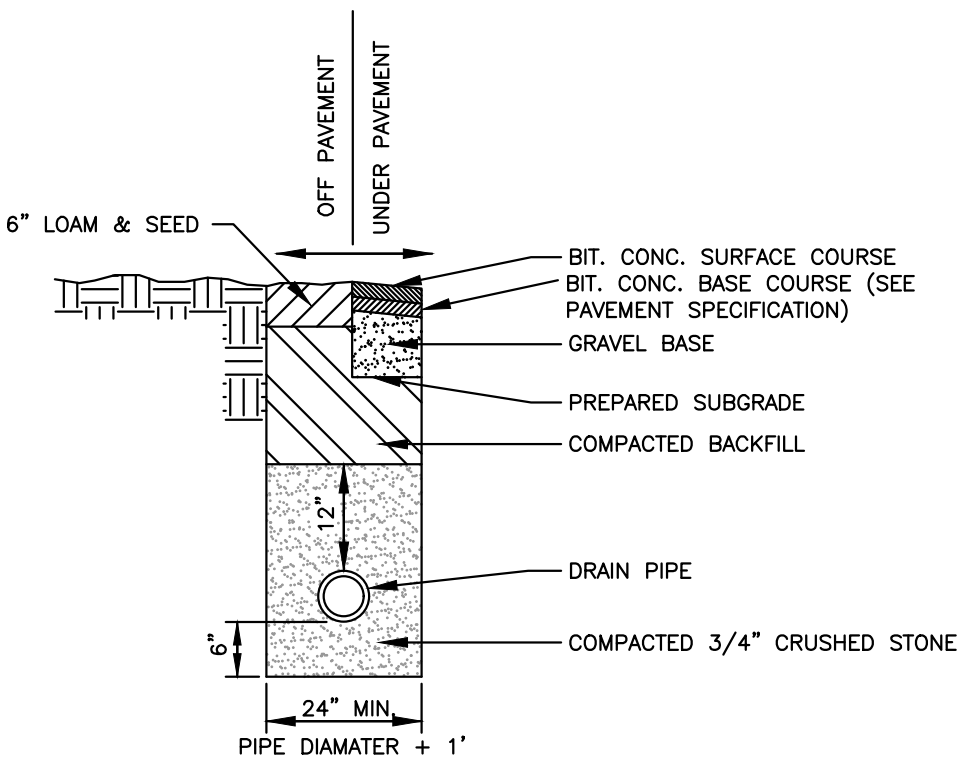


NOTES:

1. TRENCH BACKFILL SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS AS CONTAINED IN MASSACHUSETTS HIGHWAY DEPARTMENT, STANDARDS AND SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, 1988.

TYPICAL WATER PIPE BEDDING DETAIL

(NO SCALE)

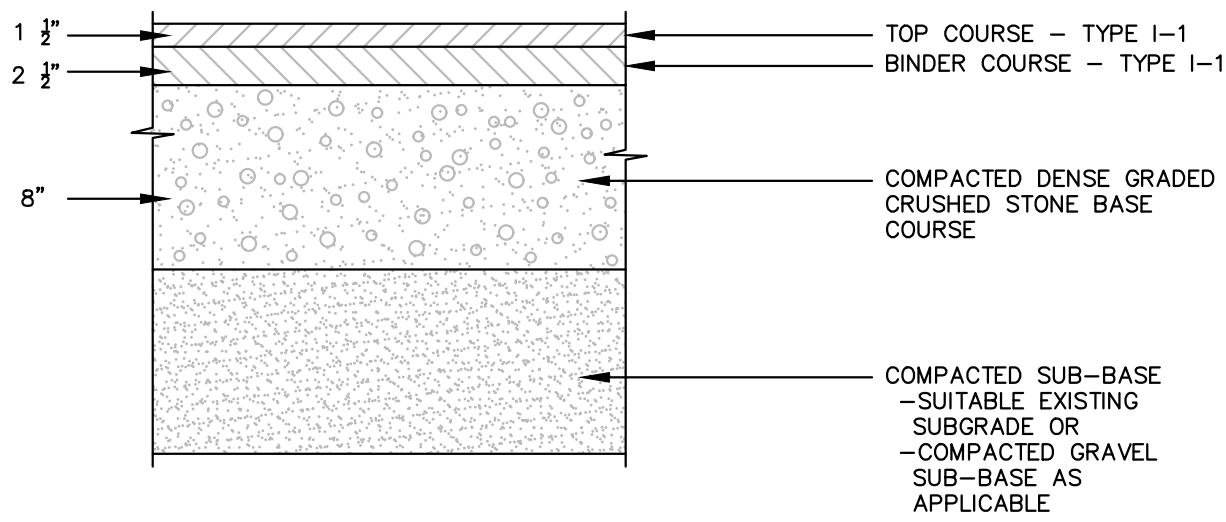


NOTES:

1. TRENCH BACKFILL SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS AS CONTAINED IN MASSACHUSETTS HIGHWAY DEPARTMENT, STANDARDS AND SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, 1988.

TYPICAL DRAIN PIPE BEDDING

(NO SCALE)

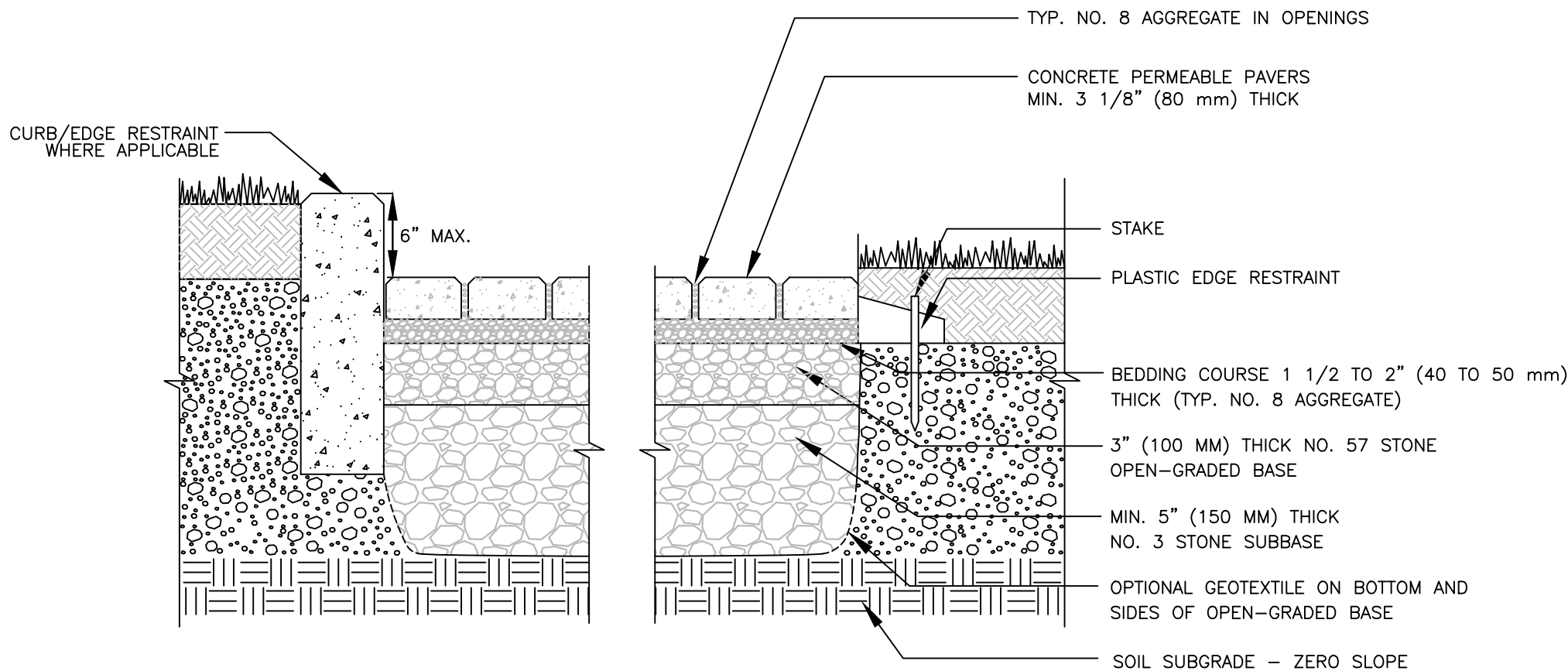


NOTES:

1. COMPACTED DENSE GRADED CRUSHED STONE BASE COURSE TO CONFORM TO MASS. HIGHWAY DEPT. SPEC. M 2.01.7
2. COMPACTED BORROW TO CONFORM TO MASS. HIGHWAY DEPT. SPEC. M 1.01.0 WITH NO STONES LARGER THAN 6 INCHES.
3. BITUMINOUS CONCRETE SHALL BE CLASS 1, TYPE 1-1.
4. AT AREAS OF LEDGE/BEDROCK, REMOVE LEDGE TO A DEPTH OF 18 INCHES MINIMUM BELOW PAVEMENT COURSE.
5. COMPACTED BASE TO EXTEND 12 INCHES MINIMUM BEYOND THE EDGE OF PAVEMENT.

DRIVEWAY BITUMINOUS CONCRETE PAVEMENT

(NO SCALE)

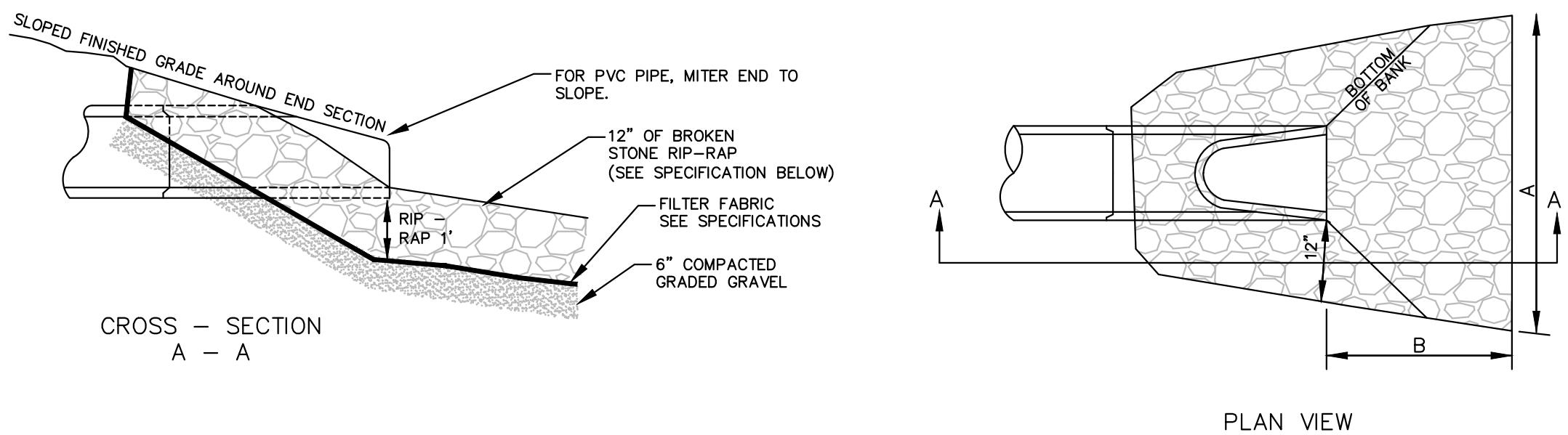


NOTES:

1. 2 3/8" (60 mm) THICK PAVERS MAY BE USED IN PEDESTRIAN APPLICATIONS.
2. STONE SIZES REFER TO ASTM/AASHTO STONE SIZES

PERMEABLE PAVERS WITH FULL EXFILTRATION TO SOIL SUBGRADE DETAIL

(NO SCALE)



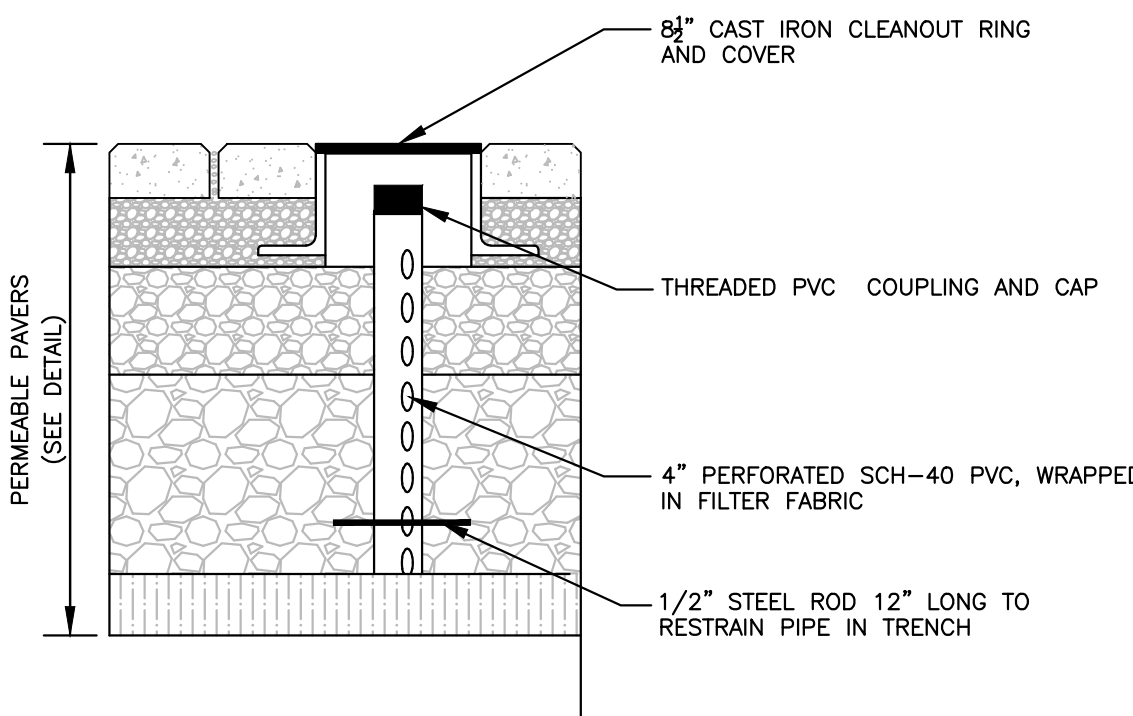
PIPE SIZE (IN.)	A (MIN.)	B" (MIN.)
6" OR LESS	4'	3'

NOTE:

1. RIP-RAP SHALL CONSIST OF EVENLY GRADED 2" TO 4" ANGULAR BROKEN STONE, (AVG. STONE SIZE = 3") WITH A THICKNESS OF 12 INCHES. SIZE DESIGNATION REFERS TO MEAN SPHERICAL DIAMETER.
2. LENGTH OF RIP-RAP TO BE PER THIS DETAIL UNLESS OTHERWISE SHOWN ON THE PLANS.

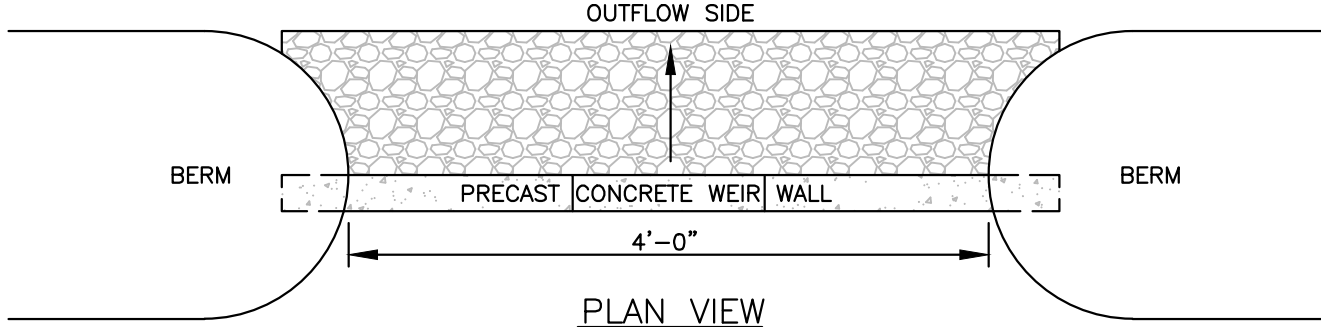
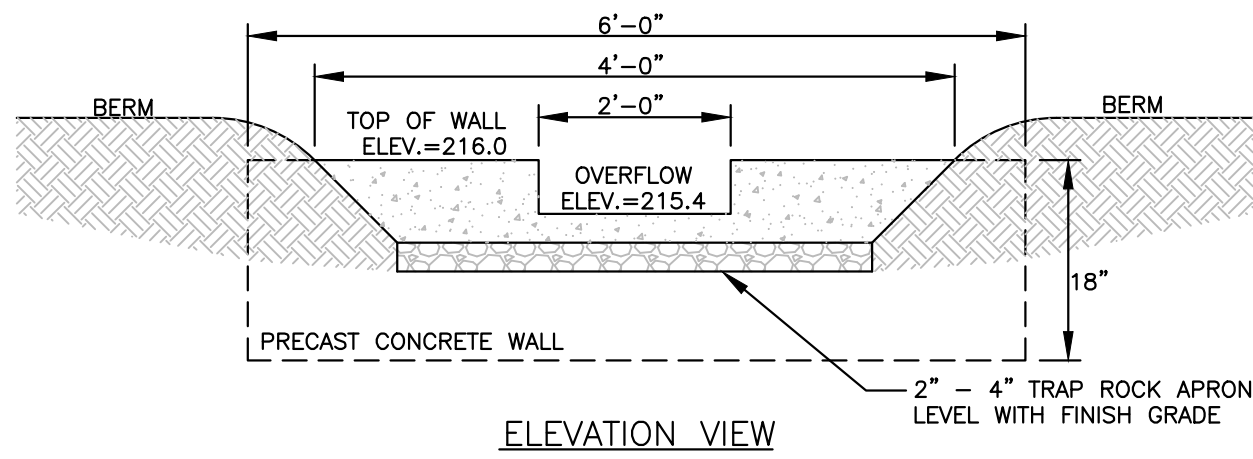
PIPE END SECTION WITH RIP - RAP APRON

(NO SCALE)



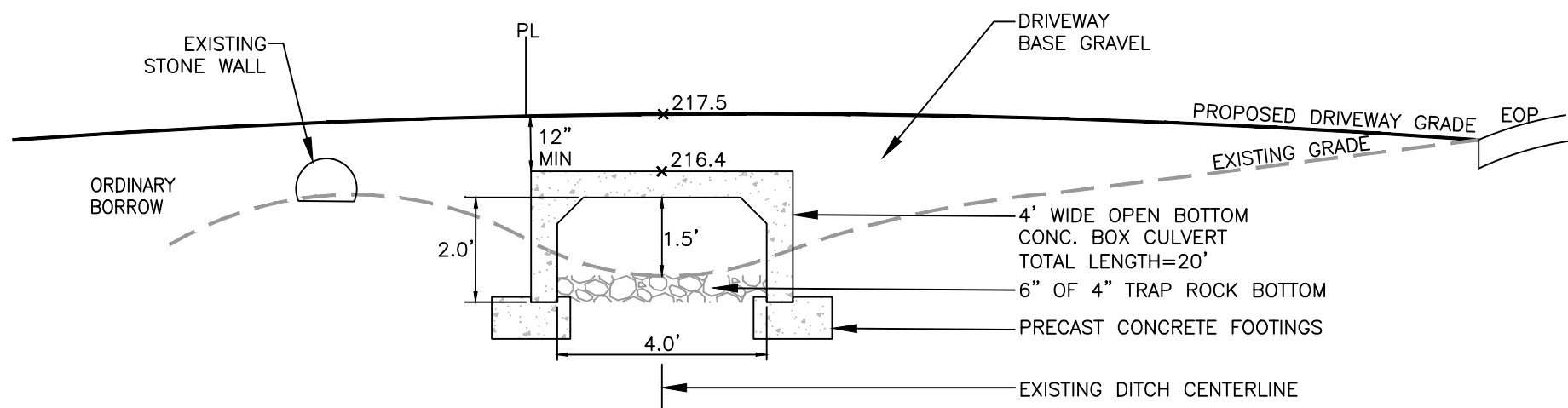
OBSERVATION WELL IN PERMEABLE PAVER DRIVEWAY

(NO SCALE)



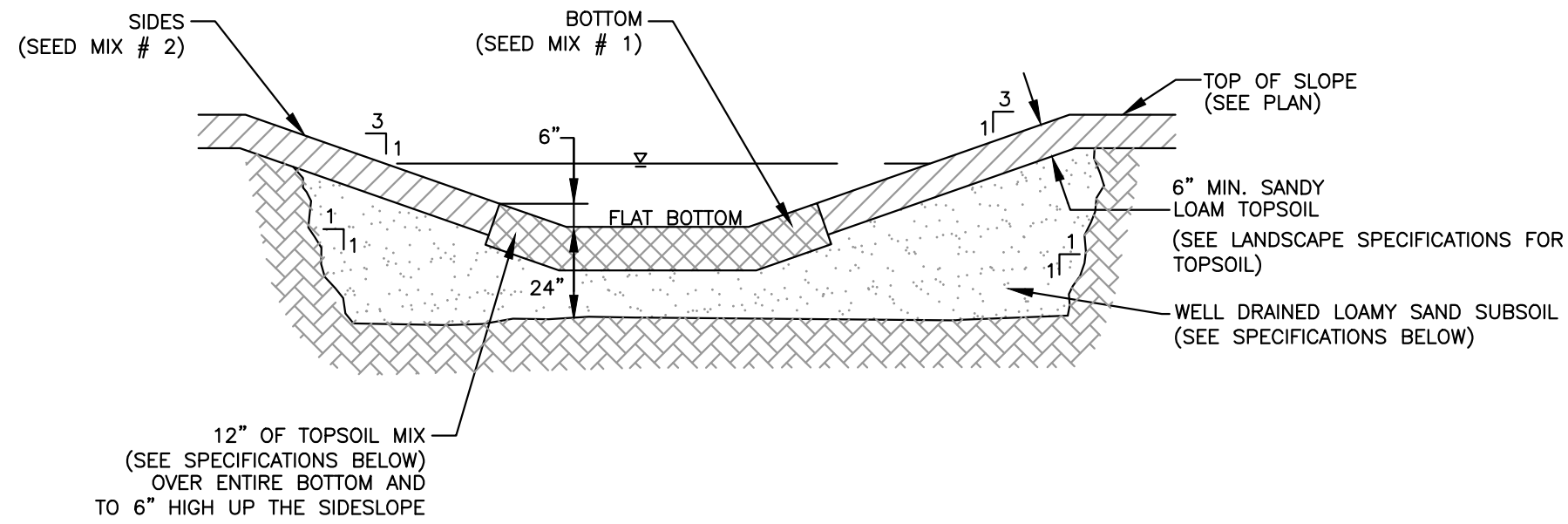
OVERFLOW WEIR DETAIL

(NO SCALE)



CULVERT SECTION

(NO SCALE)



NOTES:

1. REMOVE EXISTING TOPSOIL AND SUBSOIL TO THE ELEVATION OF THE FINISHED SUBGRADE BELOW THE PROPOSED LOAM. IF THE NATURAL MATERIAL MEETS THE REQUIREMENTS FOR LOAMY SAND IN NOTE 2 BELOW, THE EXCAVATION IS NOT NECESSARY. OTHERWISE REMOVE THE UNSUITABLE SOIL TO THE DEPTHS SHOWN AND BACKFILL WITH THE MATERIAL PER NOTE 2.
2. LOAMY SAND SHALL CONSIST OF WELL DRAINING MINERAL SOIL CONSISTING OF 80 TO 90 PERCENT FINE TO MEDIUM SAND, AND 10 TO 20 PERCENT SILT AND CLAY WITH NOT MORE THAN 5 PERCENT CLAY. USDA TEXTURAL CLASS.
3. SEE LANDSCAPE PLANS FOR OTHER PLANTINGS.
4. RAIN GARDEN TOPSOIL MIX SHALL MEET THE FOLLOWING SPECIFICATIONS.
  - A. THE ENGINEERED SOIL MIX FOR THE BOTTOM OF RAIN GARDEN SHOULD BE A MIXTURE OF 40% SAND, 20-30% TOPSOIL, AND 30-40% COMPOST.
  - B. THE SOIL MIX MUST BE UNIFORM, FREE OF STONES, STUMPS, ROOTS OR SIMILAR OBJECTS LARGER THAN 2 INCHES. CLAY CONTENT SHOULD NOT EXCEED 5%.
  - C. SOIL PH SHOULD GENERALLY BE BETWEEN 5.5-6.5, A RANGE THAT IS OPTIMAL FOR MICROBIAL ACTIVITY AND ADSORPTION OF NITROGEN, PHOSPHOROUS, AND OTHER POLLUTANTS.
  - D. USE SOILS WITH 1.5% TO 3% ORGANIC CONTENT AND MAXIMUM 600-PPM SOLUBLE SALTS.
  - E. THE SAND COMPONENT SHOULD BE GRAVELY SAND THAT MEETS ASTM D 422.
 

SIEVE SIZE	PERCENT PASSING
2-INCH	100
3/4-INCH	70-100
1/2-INCH	50-80
U.S. NO. 40	15-40
U.S. NO. 200	0-3
  - F. THE TOPSOIL COMPONENT SHALL BE A SANDY LOAM, LOAMY SAND OR LOAM TEXTURE.
  - G. THE COMPOST COMPONENT MUST BE PROCESSED FROM YARD WASTE IN ACCORDANCE WITH MASSDEP GUIDELINES (SEE: [HTTP://WWW.MASS.GOV/DEP/RECYCLE/REDUCE/LEAFGUID.DOC](http://www.mass.gov/dep/recycle/reduce/leafguid.doc)). THE COMPOST SHALL NOT CONTAIN BIOSOLIDS.
5. SHRUB PLANTINGS FOR THE RAIN GARDEN, IF DESIRED BY THE OWNER, SHALL BE WET-TOLERANT SPECIES THAT ARE NATIVE TO MASSACHUSETTS.

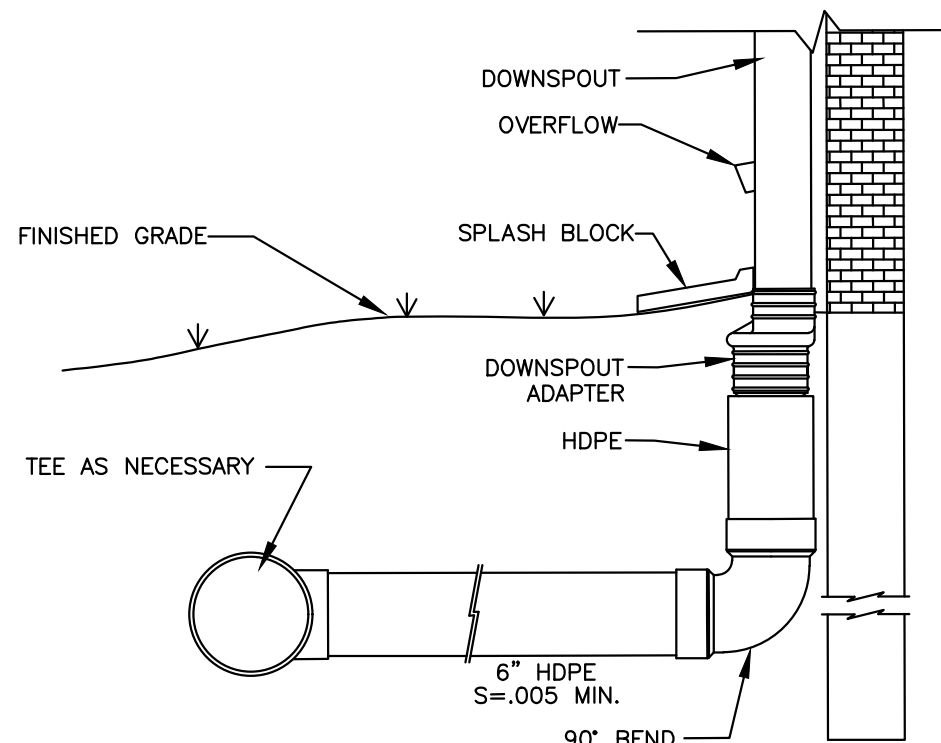
SEED MIX #1 - NEW ENGLAND WETLAND SEED MIX.

SEED MIX #2 - NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR DETENTION BASINS.

NOTE THAT THE ABOVE SEED MIXES IDENTIFIED FOR USE ON THIS PROJECT ARE BY NEW ENGLAND WETLANDS PLANTS, INC. AND INDICATE THE PLANT SPECIES MIX AND INTENT OF FINISHED COVER. SEED MIXES BY OTHER PRODUCERS MEETING THE INTENT OF THE LISTED MIXES MAY BE USED IF APPROVED AS EQUAL BY THE LANDSCAPE ARCHITECT.

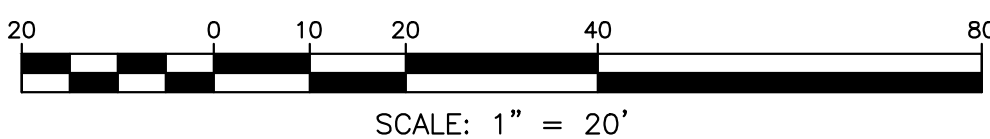
RAIN GARDEN DETAIL

(NO SCALE)



ROOF DRAIN DETAIL

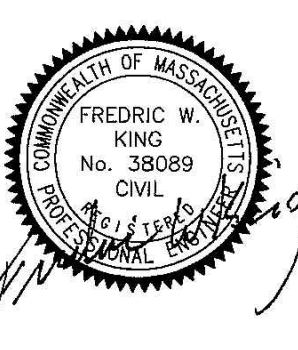
(NO SCALE)



ASSESSORS' PARCEL:

L01-0002  
L02-0003  
L02-0013

RECORD OWNER AND APPLICANT:  
**H. GUNTHER RUDENBERG ESTATE**  
**ELIZABETH RUDENBERG P.R.**  
**249 FORESIDE ROAD**  
**FALMOUTH, MAINE 04105**



1	FWK	11/29/22	REVISED LAYOUT
NO.	APP	DATE	DESCRIPTION

DATE: **AUGUST 8, 2022**

SCALE: **AS NOTED**

DESIGN:	DRAFTED:	CHECKED:
<b>FWK</b>	<b>LTV/FJS</b>	<b>FWK</b>

PROJECT TITLE:

**PROPOSED RESIDENTIAL SITE PLAN**

**219\* WAYSIDE INN ROAD**  
**SUDBURY, MA 01776**  
**\*ADDRESS NUMBER NOT OFFICIAL**

SHEET TITLE:

**SITE DETAILS**

SHEET:  
**6 OF 6**

PROJECT NO.:  
**25052**

**C-6**

# STORMWATER MANAGEMENT DESIGN AND RUNOFF CALCULATIONS REPORT

for

## PROPOSED SINGLE FAMILY HOUSE PROJECT

Estate of Gunther Rudenberg  
Wayside Inn Road  
Sudbury, MA 01776

### Report Prepared for:

Estate of Gunther Rudenberg  
(Elizabeth Rudenberg)  
259 Foreside Road  
Falmouth, Maine 04105

### Report Prepared by:

DGT Associates – Project Civil Engineer  
1071 Worcester Road  
Framingham, MA 01701  
508-879-0030



August 30, 2022  
Revised November 29, 2022



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<b>Section 3</b>	<b>Existing and Proposed Conditions Stormwater Model</b> showing Stormwater Flows and Flood Routing Computations using HydroCAD version 10.10 Existing Conditions Watershed Map Proposed Conditions Watershed Map	<b>29 pages</b>

## APPENDICES

<b>Appendix 1</b>	<b>Soils Data</b> 1. NRCS Soils Information 2. Soil Test Data	<b>14 pages</b>
<b>Appendix 2</b>	<b>Stormwater BMP Operation and Maintenance Plan And Long Term Pollution Prevention</b>	<b>14 pages</b>



# **ESTATE OF H.G. RUDENBERG SINGLE FAMILY HOME PROJECT STORMWATER MANAGEMENT NARRATIVE SUMMARY (As revised November 29, 2022)**

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This revised Stormwater Report is relative to the revised layout for the project as discussed with the Conservation Commission at the October 31, 2022 hearing. This incorporates the concept as shown on the “Sketch Plan 2”, which was determined by the Commission as being the preferred option. The project plans have been revised accordingly. The differences from the previous 8/28/2022 Site Plan include the following:

- The driveway will enter the front of the garage rather than the side.
- The house is moved to the west to consolidate the development and the house size remains the same.
- The area of proposed alteration is reduced by 2,040 sq. ft. (From 18,700 sq. ft. to 16,660 sq. ft.)
- The two rain gardens for stormwater management have been consolidated into a single rain garden (required due to the reduction in space at the front of the site.
- The proposed driveway with permeable paver section had been reduced from 1,580 sq. ft. to 960 sq. ft.
- The reduced footprint saves an additional eight of the existing trees.
- The area of alteration (grading) is slightly closer to the wetland at one area (Wetland Flag 6 and 7) to within 5 feet.

This report contains the hydrologic computations and design information relative to the existing and proposed stormwater runoff conditions for the proposed single family home site and associated site improvements at Wayside Inn Road in Sudbury, MA. It includes information on the stormwater management system design, assessment of stormwater impacts and compliance with the Massachusetts Department of Environmental Protection (Mass. DEP) Stormwater Management Regulations and the Town of Sudbury Stormwater Management Bylaw and Regulations for the proposed project.

## **Existing Property Description**

The site is a 9.9 acre parcel of land at Wayside Inn Road in Sudbury, MA. The property is on the south side of Wayside Inn Road and the western property boundary is the Sudbury /Town Line with the City of Marlborough. The property includes three parcels identified on the Sudbury Assessors Maps as Map L01- Parcel 0002; Map L02 – Parcel 0003; and Map L02 – Parcel 0013. The rear (southerly) boundary is the centerline of Hop Brook. The eastern property boundary abuts protected open space land owned by the Sudbury Valley Trustees.



The major portion of the property is forested with a dense stand of mature second growth White Pine. The rear (southern) portion of the site is open shallow marsh and shrub swamp adjacent to Hop Brook that flows easterly into the Gristmill Pond just off the southeast corner of the property. Hop Brook is a perennial stream that qualifies as a River under the Mass. Wetlands Protection Act and the Sudbury Wetlands Administration Bylaw.

The land is relatively flat with a very gradual slope from the road to the brook in the rear. The central and rear portion of the site is within the Flood Plain of Hop Brook. The boundary of the 100-year flood plain is at elevation 211.4 from the latest Federal Emergency Management Agency (FEMA) flood profile information and mapping. The central portion of the site is interspersed with low areas that have a predominance of wetland vegetation in the understory and two of the low areas have evidence of shallow temporary ponding.

Relative to existing stormwater runoff, the entire property drains to Hop Brook through the wooded wetland. There is a narrow drain ditch in the rear portion of the site that drains to Hop Brook. Two of the shallow depressions within the wetlands mentioned above intercept some runoff. Seasonal groundwater is very shallow in the wetland. Due to the sandy underlying soils, any ponding in the depressions is very short term in the spring season, shrinking to small puddles withing a few weeks.

There is a roadside drainage ditch within the Wayside Inn Road layout along the front of the site that drains this section of the Town roadway. The ditch drains east along the roadway into wetland areas on properties to the east.

### **Soils and Groundwater**

The NRCS Soil Survey of Middlesex County indicates that the near-surface soils (within about 70 inches from ground surface) at the site are in an area of glacial outwash (sand and gravel) soils. The soils along the brook in the southern portion of the site are classified as Freetown Muck. The soils in the remainder of the site are classified Deerfield Loamy Sand. The latter soils can have hydric inclusions along streams and low-lying areas that consist of Sudbury soils, which appears to be the case at this site.

The upland Deerfield soils have moderately well-draining loamy sand topsoil and subsoil, underlain by sand and gravels. The Deerfield soils typically have seasonal groundwater between 18 inches to 3 feet below the surface. These soils are classified as being in Hydrologic Soil Group B for stormwater management calculations.

Soil testing was performed by DGT at the site in the recent past, including:

- Auger testing of the soils performed during our wetland delineation work on June 9, 2017 and March 12, 2020.
- Soil testing for septic system design purposes were conducted on July 2, 2020.
- Hand dug and auger soil testing for stormwater management designs on April 1, 2022.

Based on the testing and observed site conditions, DGT will use Hydrologic Soil Group B for runoff calculations for this site. For determination of infiltration rates for infiltrating stormwater



management BMPs, the Rawls Rate of 2.4 inches per hour (for Loamy Sand) will be used. Complete information on the soils is contained in Appendix 1 of this report.

### **Project Description**

The proposed project is the construction of one single family house with attached garage and associated driveway, septic system, water supply well, utilities and stormwater best management practices (BMPs) in the northeast portion of the site. Due to the limited space available and required setbacks to the wetlands and drainage ditch for the septic system, the project is limited to a 3-bedroom house.

Per the current plans (11/29/2022), the project has been designed to be as compact as reasonable and keeps the proposed alterations as far as possible from the wetland resource areas. The closest proposed alteration to the BVW is 5 feet and generally varies from 5 to 40 feet from the worksite to the wetland.

The project will result in approximately 16,660 sq. ft. of alteration on the 9.9 acre parcel (3.9% of the parcel). The area of alterations within the Buffer Zone/AURA is 15,500 sq. ft. Proposed impervious surfaces include 2,076 sq. ft. of house and 1,130 sq. ft. of driveway and walkways. 760 sq. ft. of the driveway will be a porous paver system. The house shown on the plan is a conceptual design at this time. The actual house has not yet been designed but will be substantially within the footprint shown and no larger in area. The current concept for the landscape plantings and stabilization of the disturbed area includes the following:

- Lawn area will be limited to approximately 2,500 sq. ft. of area in the rear of the house and small areas around the side for foot access.
- The remaining 10,354 sq. ft. of disturbed area will be vegetated with native plantings.
- Stormwater BMPs to mitigate stormwater impacts to the wetlands include a rain garden for the roof runoff and porous pavers for the main portion of the driveway.
- The proposed driveway will cross a Town drainage ditch at Wayside Inn Road. A four-foot wide open bottom box culvert will bridge the drainage ditch to not interfere with the function of the ditch.

### **Stormwater Management Objectives**

For organizational purposes, the descriptions and design calculations for the components of the stormwater management system are contained in Section 2 of this report. The hydrologic and flood routing computer modeling calculations and watershed maps for the existing and proposed conditions are included in Section 3. The watershed modeling was performed using computer software “HydroCAD” version 10.1 by Applied Microcomputer Systems.

The intent of the design is to provide stormwater management improvements that will meet the requirements of the Sudbury Stormwater Management Bylaw and Regulations, and the Sudbury Wetlands Administration Bylaw. Per the requirements, the design utilizes Limited Impact Design (LID) Best Management Practices (BMPs). The basis of designs are in accordance with the Mass. Stormwater Management Handbook.



The stormwater system as designed will assure that there will be no significant stormwater impacts to the wetland resource area by providing proper water quality treatment and mitigation of both the peak rates of runoff and volumes for all storm events up to a 100-year storm.

Compliance with Applicable Stormwater Regulations:

- **Massachusetts Stormwater Management Regulations:** This project is exempt from these regulations as a Single-Family House.
- **Sudbury Stormwater Bylaw and Regulations:** This is a Single-Family House Project that alters less than 40,000 sq. ft. of area. It therefore qualifies for a “General Stormwater Permit” under Section 5.B. of the Bylaw. As demonstrated in this Report, the project has been designed to meet the Standard Conditions of the Bylaw Regulation under Section 6.0 J. 1. Also, Attachment 2 of this report contains the Stormwater BMP Operation and Maintenance Plan that deals with the long-term maintenance required for the owners to comply with the Standard Conditions.
- **Sudbury Wetlands Administration Bylaw and Regulations:**  
Section 7.11 of the Regulations requires that “All stormwater runoff systems shall at a minimum conform the best management practices as specified in the Stormwater Management Bylaw and Regulations.” These would be subject to more stringent conditions as may be required by the Conservation Commission where warranted. As stated above, this report demonstrates compliance with the Stormwater Management Bylaw and Regulations.  
Section 9.6 of these Regulations also discusses stormwater discharges. Due to the BMPs designed into this project, there will be no point discharges to the wetland resource areas. Any runoff will generally be overland sheet flow from adjacent terrain as occurs under existing conditions.

The existing drainage patterns for the watersheds for this project are maintained. The subject site drains from the front of the site, southerly to the wetlands and Hop Brook. The proposed project area is small and there are no point discharges to the wetland from this area. The project as designed will maintain this drain pattern.

The results of the hydrologic analysis for the existing and proposed conditions have been computed for the 1 inch, and the 2, 10, 25 and 100-year storm events and the rainfall depths used in the analysis are as specified in the Stormwater Management Bylaw Regulations Section 8.0 A. 3. f.

The following describes how the project meets the Design and Performance Criteria for a General Permit per Section 6.0 J.1. of the Stormwater Bylaw Regulations. The paraphrased text of the Bylaw Regs is included in Italics for context:

6.0 J.1.a.    *The activity shall not increase either the rate or volume of stormwater runoff leaving the site, nor shall it alter the stormwater flow to any adjoining properties, public ways, or any wetland resource areas unless otherwise permitted based on improvement over existing conditions.*

RESPONSE: The design includes the following features that address this requirement:



- The summary of stormwater volumes and peak flows from the project site is shown on the table at the end of this section. As can be seen, there will be no increase in the volume of runoff and peak flows and there will also be no point discharges as is the case under existing conditions.
- The project will not drain to any abutting private property which is also the existing condition.
- The only part of the project that will drain to the public roadway is the first 15 feet of the driveway. This area presently drains to the ditch at the front of the site and will continue to do so. The difference will be that the driveway apron will be paved with a minimal 200 sq. ft. of pavement instead of the vegetated roadside ditch. A 4 foot wide – open bottom culvert will be installed so that the ditch flow will not be interrupted in any way.

6.0 J.1.b. *The activity shall, to the maximum extent feasible, treat all stormwater runoff from the site using recommended Best Management Practices (BMPs) in accordance with the latest edition of the Massachusetts DEP Stormwater Handbook.*

RESPONSE: The project includes a rain garden for the roof runoff and a porous paver system for the major portion of the driveway. These are classified as LID stormwater infiltration practices and appropriate for the scope of the project. The roof runoff is considered as clean, and the rain garden will be primarily for recharge purposes in this case. The porous paver (concrete pavers) driveway will provide a minimum of 80% TSS removal and recharge for up to a 100-year storm event.

The rear wood deck will be underlain with a 6-inch thick crushed stone bed that will infiltrate runoff so that the structure will behave as a permeable surface.

6.0 J.1.c. *The activity to the maximum extent feasible, minimizes impervious surfaces and provides on-site infiltration of stormwater in accordance with the latest edition of the Massachusetts DEP Stormwater Handbook.*

RESPONSE: The stormwater BMPs will infiltrate in excess of the minimum one inch of runoff from the impervious surfaces. As can be seen in the table at the end of this section, the project will not increase the volume of runoff for all storms up to a 100-year event. Essentially the property will generate no more runoff than the existing forested land.

6.0 J.1.d. *The Applicant shall provide and maintain Erosion and Sediment Controls in accordance with the latest edition of the Massachusetts DEP Stormwater Handbook as necessary until the site is permanently stabilized. BMPs selected for erosion control shall be chosen to minimize site disturbance from erosion control installation. Once the site is stabilized, such measures shall be removed.*

RESPONSE: A complete erosion and sediment control plan is included in the plan set that details compliance with the standard condition.



6.0 J.1.e.     *The Applicant shall ensure that the site and stormwater management systems are perpetually inspected and maintained to function as designed.*

RESPONSE: A complete Stormwater Operation and Maintenance Plan is included in Appendix 2 at the end of this report. That document is to be followed to assure the system operates as required to comply with this section.

6.0 J.1.f.     *The following source control and pollution prevention measures shall be employed on the site to prevent contamination of stormwater runoff. (see listing in the Regulations).*

RESPONSE: A Long Term Pollution Prevention Plan (LTPPP) is included with the O&M plan that addresses each of the listed requirements of this standard conditions

## **SUMMARY TABLE OF STORMWATER RUNOFF**

STORM	EXISTING CONDITIONS		PROPOSED CONDITIONS	
	Peak Rate (cfs)	Volume (ac-ft)	Peak Rate (cfs)	Volume (ac-ft)
1 inch	0	0	0	0
2 year = 3.2"	0.04	0.008	0.04	0.007
10 year = 4.8"	0.31	0.028	0.25	0.021
25 year = 6.0"	0.60	0.048	0.46	0.039
100 year = 8.0"	1.39	0.102	1.34	0.088

### **Watershed Modeling and Best Management Practices Design**

The hydrologic analysis of the existing conditions and proposed watershed is based on the nationally recognized watershed modeling techniques developed by the USDA, Soil Conservation Service (SCS). The techniques and runoff models are described in the following SCS publications:

- “Urban Hydrology for Small Watersheds, Technical Release Number 55”, 1986 and Technical Release 20.
- National Engineering Handbook, Hydrology, Section 4, 1972.
- “A Method for Estimating Volume and Rate of Runoff in Small Watersheds, Technical Release No. 149” 1973.
- “Hydrology Handbook for Conservation Commissions” March 2002, Mass. DEP.



- The watershed modeling was performed using computer software “HydroCAD” version 10.1 by Applied Microcomputer Systems, which is based on the publications referenced above.
- Best Management Practices were designed based on the guidance provided in the DEP “Stormwater Management Standards Handbook”, February, 2008.



## **SECTION 2**

### **COMPLIANCE CALCULATIONS**

---

Stormwater Standards Compliance Summary  
MassDEP "Checklist for Stormwater Report"  
Illicit Discharge Statement  
Standard 3 – Recharge Design Calculations  
And Drawdown Time

for

### **PROPOSED SINGLE FAMILY HOUSE PROJECT**

Estate of Gunther Rudenberg  
Wayside Inn Road  
Sudbury, MA 01776



**STORMWATER STANDARDS COMPLIANCE SUMMARY**  
**MASS. STORMWATER MANAGEMENT REGULATIONS**  
**AND**  
**SUDBURY STORMWATER BYLAW**

**PROPOSED SINGLE FAMILY HOME PROJECT**  
**Estate of Gunther Rudenberg**  
**Wayside Inn Road**  
**Sudbury, MA**

**Standard 1: (Untreated Discharges)**

---

There are no new stormwater conveyances proposed that discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The stormwater will discharge to the same locations as the existing conditions at less than or the same rates and volumes. The receiving areas are existing wetlands via non-point sources and stormwater ditches with no erosion issues. As such, there will be no impacts at the discharge locations. The runoff from the proposed building is classified as clean, not requiring any pre-treatment prior to discharge. The driveway will drain to via a porous paver system with no surface discharge.

**Standard 2: (Peak Rate Control and Flood Protection)**

---

There will be no increase in peak rate of discharge and volumes for all storms up to and including the 100-year storm event due to the stormwater BMPs designed into the project.

The computations have been made for the 1 inch, 2, 10, 25, and 100-year storms. The computations for the peak rates of runoff and volumes are contained in Section 3 of this report and a summary table is included in Section 1 Narrative.

**Standard 3: (Recharge to Groundwater)**

---

To meet the current DEP Stormwater Regulations, Standard 3 requires that a minimum 0.35 inches of runoff from the impervious surfaces must be recharged to the ground for hydrologic soil groups (HSG) B for the subject site. This is the minimum amount required for impervious surfaces to maintain the natural recharge hydrology of the area.

The BMPs for this project are infiltration BMPs. The project is not within a critical area however, it is within the watershed of a Town water supply (Zone III). Although not required, the recharge / water quality volume of 1 inch is being used as a design minimum.



The runoff from the entire roof area and most of the driveway and paved walks will discharge to BMPs that are designed to infiltrate a minimum of 1 inch of runoff from the area of the roof infiltrating at least 3 times the minimum required for this Standard.

The project as designed meets this standard. Detailed calculations demonstrating compliance with this standard are included at the end of this section.

**Standard 4: (80% TSS Removal)**

---

The runoff from the proposed house roof is classified as clean and does not require pre-treatment.

The porous concrete paver systems include pre-treatment as the filter course setting bed below the pavers. All runoff runs through the filter course, meeting this standard to achieve the minimum 80% TSS removal for the system.

A small area of walkway at the front of the building will sheet flow through a vegetated area for any pre-treatment to the Rain Garden. The rain garden is rated for a minimum of 90% TSS removal.

In compliance with Standard 4, a long-term Stormwater Operation and Maintenance Plan is included in Appendix 2.

**Standard 5: (Land Use with Higher Potential Pollutant Load, LUHPPL)**

---

Not Applicable. This site and project are not classified as a LUHPPL.

**Standard 6: (Critical Areas)**

The site is not within a "Critical Area" per the Regulations.

**Standard 7: (Redevelopment)**

---

Not Applicable. This project is not considered a redevelopment.

**Standard 8: (Erosion, Sediment Control)**

---

Erosion and sediment control BMPs are included in the Erosion and Sediment Control Plan contained in the plan set. This plan includes details and information regarding the responsibilities for the Contractor in managing the site in compliance with applicable permits.

This project will alter less than one acre, so it is not subject to the NPDES Phase II requirements for construction sites. Coverage under the NPDES Construction General Permit and preparation of a full Stormwater Pollution Prevention Plan are not required.

**Standard 9: (Operation & Maintenance)**

---

An Operation and Maintenance Plan for the stormwater system is included in Appendix 2 to meet this Standard.

**Standard 10: (Illicit Discharges)**

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There are no illicit discharges designed or proposed for this project. No illicit discharges are known to exist. An Illicit Discharge Statement to that effect is included in this section.

This project is being designed by the present owner in preparation of sell the property to another party who will build the project. An Illicit Discharge Statement also needs to be prepared and signed by the future owner prior to construction. It is requested that the preparation and execution of an Illicit Discharge Statement prior to any site alterations be made as a condition of permitting.

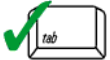




# Checklist for Stormwater Report

## 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.<sup>1</sup> 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<sup>2</sup>
- 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.

<sup>1</sup> 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.

<sup>2</sup> 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.



# 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.

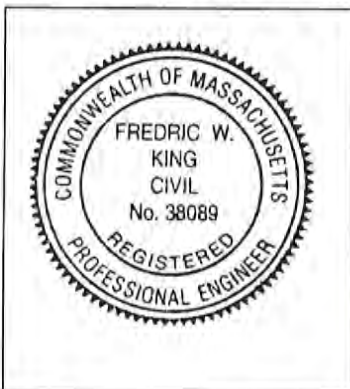
*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that 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



*Fredric W. King* 8/23/2022  
Signature and Date FWK 11/10/2022

## 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

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## 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): Porous concrete paver system

## 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

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## 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<sup>1</sup>
- ☒ 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.

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<sup>1</sup> 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.





# Checklist for Stormwater Report

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## 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

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## 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

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## 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

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## 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.



November 10, 2022

25052

Sudbury Planning & Community Development  
278 Old Sudbury Road  
Sudbury, MA 01776

RE: Illicit Discharge Compliance Statement

In accordance with Standard 10 of the Massachusetts Stormwater Regulations, the following statement is made regarding the proposed residential house project at Wayside Inn Road in Sudbury, MA (Assessors Map L01- Parcel 0002; Map L02 – Parcel 0003; and Map L02 – Parcel 0013):

- There are no illicit discharges designed or proposed for this project. No illicit discharges are known to exist.

Please feel free to contact me if you have any questions.

Sincerely yours,  
**DGT Associates**

*Fredric W. King*

Fredric W. King, P.E.  
Senior Engineer



DGT Associates, Inc.  
Surveying & Engineering  
Boston / Framingham / Worcester / Connecticut  
www.dgtassociates.com

JOB 25052 RUDENBERG  
SHEET NO. 1 OF 7  
CALCULATED BY FWK DATE 11/10/2022  
CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
SCALE \_\_\_\_\_

## RECHARGE CALCULATIONS

STANDARD 3

HSG = B

MIN. RECHARGE = 0.35 INCHES OVER THE  
IMPERVIOUS SURFACES

PROVIDE - 1.0" MIN. PER STORMWATER BYLAW  
AND TO MITIGATE (IMPROVE) RECHARGE  
CONDITIONS FOR THE WATER RESOURCES  
PROTECTION DISTRICT ZONE III.





### RECHARGE DESIGN CALCULATIONS

- CRITERIA:
- CAPACITY TO INFILTRATE 1 INCH (MINIMUM) OF RUNOFF FROM THE TRIBUTARY AREA OF IMPERVIOUS SURFACES.
  - SOIL INFILTRATION RATE (LOAMY SAND) = 2.4 INCH/HR. - RAWLS RATE.
  - USE STATIC METHOD

### BIO-RETENTION (RAIN GARDEN)

ROOF AREA	= 2,076 SF
PAVED WALK AND LANDING	= 170 SF
TOTAL	2,246 SF

OVERFLOW ELEV. = 215.4

$$1" \text{ VOLUME} = \frac{2,246 \text{ ft}^2}{12 \text{ in./ft}} = 187.2 \text{ ft}^3$$

POND ELEV @  $187.2 \text{ ft}^3 = 215.0 < 215.4$  OK

POND CAPACITY IS LARGER THAN REQUIRED CAPTURE VOLUME.

DRAIN TIME - FROM HYDROCAD AT FULL CAPACITY = 25 HOURS FROM BEGINNING OF A 100 YEAR STORM  $< 72 \text{ HRS}$  OK  
SEE PRINTOUT AT THE END OF THIS SECTION

**25052 Proposed rev 1**

Type III 24-hr 25 Year Rainfall=6.00"

Prepared by {enter your company name here}

Printed 11/10/2022

HydroCAD® 10.00-26 s/n 01078 © 2020 HydroCAD Software Solutions LLC

**Stage-Area-Storage for Pond 1P: Rain Garden 1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
214.50	267	0	215.54	745	519
214.52	275	5	215.56	755	534
214.54	283	11	215.58	765	549
214.56	290	17	215.60	776	565
214.58	299	23	215.62	786	580
214.60	307	29	215.64	797	596
214.62	315	35	215.66	808	612
214.64	323	41	215.68	818	628
214.66	332	48	215.70	829	645
214.68	340	55	215.72	840	662
214.70	349	61	215.74	851	678
214.72	358	69	215.76	862	696
214.74	367	76	215.78	873	713
214.76	376	83	215.80	884	731
214.78	385	91	215.82	896	748
214.80	394	99	215.84	907	766
214.82	404	107	215.86	918	785
214.84	413	115	215.88	930	803
214.86	423	123	215.90	941	822
214.88	432	132	215.92	953	841
214.90	442	140	215.94	965	860
214.92	452	149	215.96	976	879
214.94	462	158	215.98	988	899
214.96	472	168	216.00	1,000	919
214.98	483	177			
215.00	493	187			
215.02	501	197			
215.04	510	207			
215.06	518	217			
215.08	527	228			
215.10	536	239			
215.12	544	249			
215.14	553	260			
215.16	562	271			
215.18	571	283			
215.20	580	294			
215.22	589	306			
215.24	598	318			
215.26	608	330			
215.28	617	342			
215.30	626	355			
215.32	636	367			
215.34	645	380			
215.36	655	393			
215.38	665	406			
215.40	675	420			
215.42	684	433			
215.44	694	447			
215.46	704	461			
215.48	714	475			
215.50	724	490			
215.52	734	504			

1" RUNOFF

OVERFLOW

**25052 Proposed rev 1**

Type III 24-hr 100 Year Rainfall=8.60"

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**Hydrograph for Pond 1P: Rain Garden 1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	214.50	0.00	0.00	0.00
1.00	0.00	0	214.50	0.00	0.00	0.00
2.00	0.00	0	214.50	0.00	0.00	0.00
3.00	0.00	0	214.50	0.00	0.00	0.00
4.00	0.00	0	214.50	0.00	0.00	0.00
5.00	0.00	0	214.50	0.00	0.00	0.00
6.00	0.00	0	214.50	0.00	0.00	0.00
7.00	0.00	1	214.50	0.00	0.00	0.00
8.00	0.01	2	214.51	0.01	0.01	0.00
9.00	0.01	3	214.51	0.01	0.01	0.00
10.00	0.02	11	214.54	0.02	0.02	0.00
11.00	0.04	54	214.68	0.02	0.02	0.00
12.00	<b>0.40</b>	<b>360</b>	<b>215.31</b>	<b>0.04</b>	<b>0.04</b>	<b>0.00</b>
13.00	<b>0.06</b>	<b>440</b>	<b>215.43</b>	<b>0.07</b>	<b>0.04</b>	<b>0.03</b>
14.00	0.04	424	215.41	0.04	0.04	0.00
15.00	0.03	405	215.38	0.04	0.04	0.00
16.00	0.02	363	215.31	0.04	0.04	0.00
17.00	0.02	305	215.22	0.03	0.03	0.00
18.00	0.01	243	215.11	0.03	0.03	0.00
19.00	0.01	181	214.99	0.03	0.03	0.00
20.00	0.01	127	214.87	0.02	0.02	0.00
21.00	0.01	81	214.75	0.02	0.02	0.00
22.00	0.01	42	214.64	0.02	0.02	0.00
23.00	0.01	9	214.53	0.02	0.02	0.00
24.00	0.01	2	214.51	0.01	0.01	0.00
25.00	0.00	0	214.50	0.00	0.00	0.00
26.00	0.00	0	214.50	0.00	0.00	0.00
27.00	0.00	0	214.50	0.00	0.00	0.00
28.00	0.00	0	214.50	0.00	0.00	0.00
29.00	0.00	0	214.50	0.00	0.00	0.00
30.00	0.00	0	214.50	0.00	0.00	0.00

POND EMPTY AT 25 HOURS

100 YR STORM





## POROUS PAVER AREA

TOTAL PAVED AREA = 960 SF

OVERFLOW ELEV = 216.2

$$1'' \text{ VOLUME} = \frac{960 \text{ ft}^2}{12 \text{ in./ft.}} = 80 \text{ ft}^3 \Rightarrow \text{PONDING ELEV.} = 215.4$$

PONDING CAPACITY (CAPTURE VOLUME) IS LARGER  
THAN REQUIRED

DRAIN TIME - FROM HYDROCAD AT FULL  
CAPACITY = 18 HOURS FROM THE  
BEGINNING OF A 100 YEAR STORM

< 72 HOURS OK

SEE PRINTOUT AT END OF THIS SECTION

**25052 Proposed rev 1**

Type III 24-hr 25 Year Rainfall=6.00"

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**Stage-Area-Storage for Pond 2P: Porous Pavement**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
215.10	760	0	216.14	1,520	306
215.12	760	6	216.16	1,520	310
215.14	760	12	216.18	1,520	315
215.16	760	18	216.20	1,620	319 <i>OVERFLOW</i>
215.18	760	24	216.22	1,643	321
215.20	760	30	216.24	1,669	324
215.22	760	36	216.26	1,697	327
215.24	760	43	216.28	1,727	331
215.26	760	49	216.30	1,760	336
215.28	760	55	216.32	1,795	341
215.30	760	61	216.34	1,833	347
215.32	760	67	216.36	1,873	353
215.34	760	73	216.38	1,915	361
215.36	760	79	216.40	1,960	369
215.38	760 <i>1" RUNOFF</i>	85	216.42	2,007	378
215.40	760	91	216.44	2,057	389
215.42	760	97	216.46	2,109	400
215.44	760	103	216.48	2,163	412
215.46	760	109	216.50	2,220	426
215.48	760	116			
215.50	760	122			
215.52	760	128			
215.54	760	134			
215.56	760	140			
215.58	760	146			
215.60	760	152			
215.62	760	158			
215.64	760	164			
215.66	760	170			
215.68	760	176			
215.70	760	182			
215.72	760	188			
215.74	760	195			
215.76	760	201			
215.78	760	207			
215.80	760	213			
215.82	760	219			
215.84	760	225			
215.86	760	231			
215.88	760	237			
215.90	760	243			
215.92	760	249			
215.94	760	255			
215.96	760	261			
215.98	760	268			
216.00	1,520	274			
216.02	1,520	278			
216.04	1,520	283			
216.06	1,520	287			
216.08	1,520	292			
216.10	1,520	296			
216.12	1,520	301			

*100 YR PEAK ELEV.*

**25052 Proposed rev 1**

Type III 24-hr 100 Year Rainfall=8.60"

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**Hydrograph for Pond 2P: Porous Pavement**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Discarded (cfs)
0.00	0.00	0	215.10	0.00
1.00	0.00	0	215.10	0.00
2.00	0.00	0	215.10	0.00
3.00	0.00	0	215.10	0.00
4.00	0.00	0	215.10	0.00
5.00	0.00	0	215.10	0.00
6.00	0.00	0	215.10	0.00
7.00	0.00	0	215.10	0.00
8.00	0.00	0	215.10	0.00
9.00	0.01	1	215.10	0.01
10.00	0.01	1	215.10	0.01
11.00	0.01	1	215.10	<b>0.01</b>
12.00	<b>0.14</b>	<b>45</b>	<b>215.25</b>	<b>0.04</b>
13.00	<b>0.02</b>	<b>159</b>	<b>215.62</b>	0.04
14.00	0.01	61	215.30	0.04
15.00	0.01	1	215.10	0.01
16.00	0.01	1	215.10	0.01
17.00	0.01	1	215.10	0.01
18.00	0.00	0	215.10	0.00
19.00	0.00	0	215.10	0.00
20.00	0.00	0	215.10	0.00
21.00	0.00	0	215.10	0.00
22.00	0.00	0	215.10	0.00
23.00	0.00	0	215.10	0.00
24.00	0.00	0	215.10	0.00
25.00	0.00	0	215.10	0.00
26.00	0.00	0	215.10	0.00
27.00	0.00	0	215.10	0.00
28.00	0.00	0	215.10	0.00
29.00	0.00	0	215.10	0.00
30.00	0.00	0	215.10	0.00

POROUS PAVER SYSTEM DRAINED BY 18 hours  
100 YR STORM



# **SECTION 3**

## **EXISTING AND PROPOSED STORMWATER MODEL**

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### **ROUTING DIAGRAM**

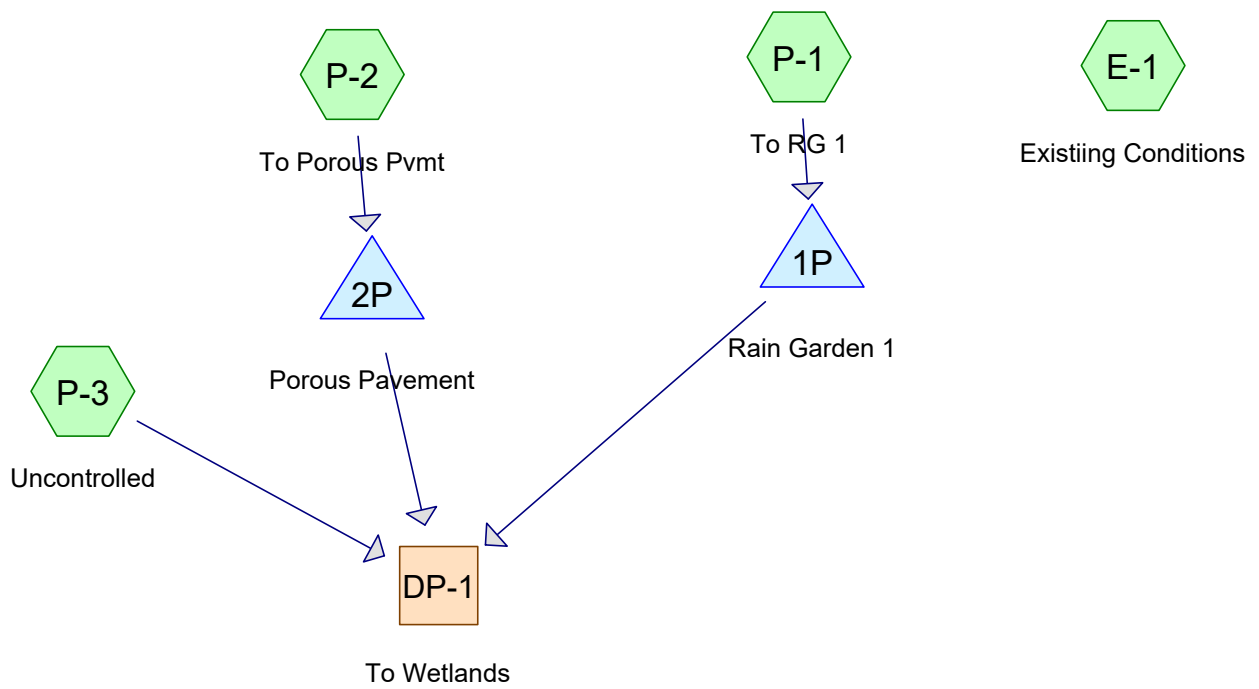
### **EXISTING AND PROPOSED HYDROCAD MODEL CALCULATIONS FOR THE 1 INCH, 2, 10, 25 AND 100 YEAR STORMS**

### **EXISTING AND PROPOSED WATERSHED MAPS**

for

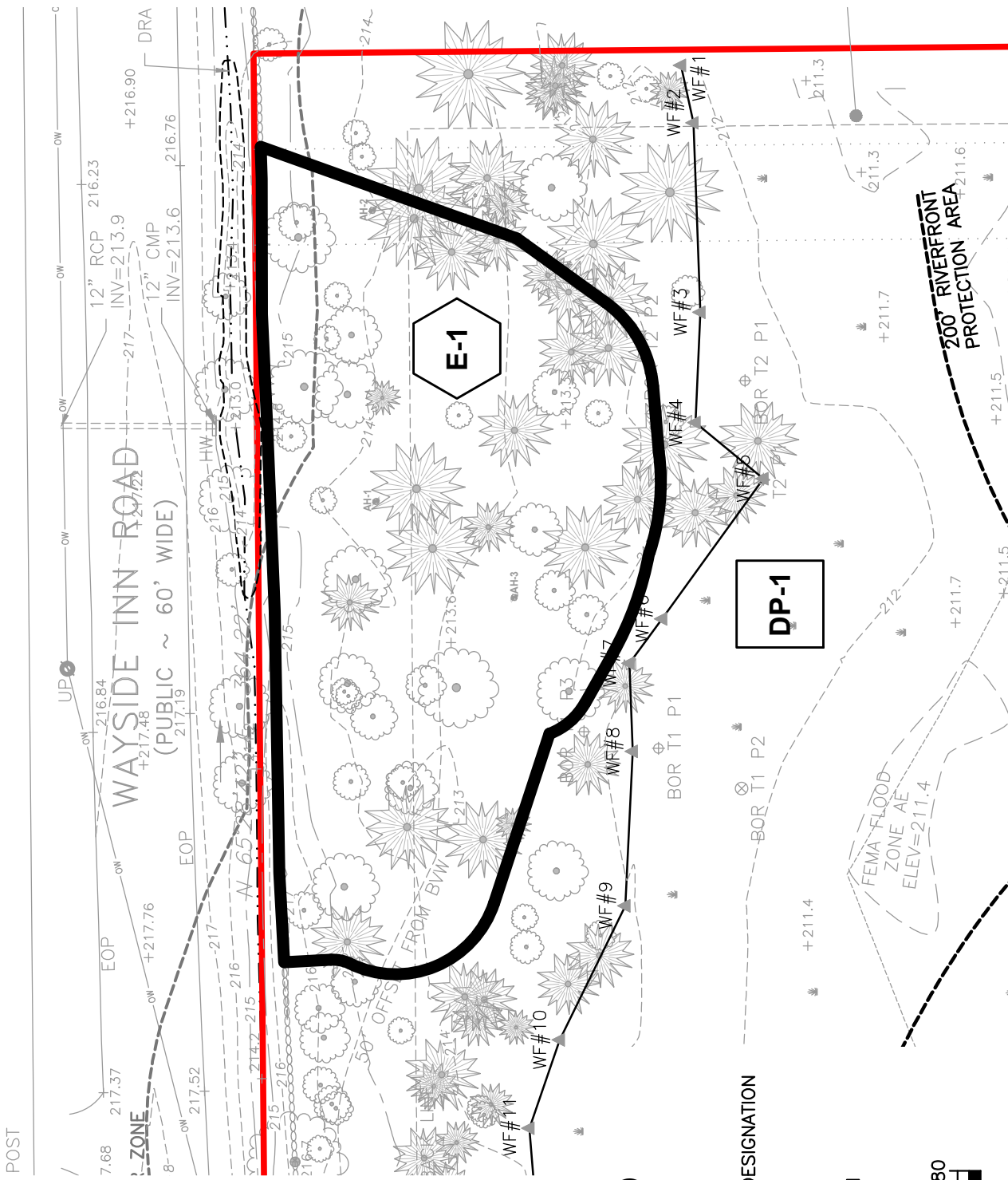
## **PROPOSED SINGLE FAMILY HOUSE PROJECT**

Estate of Gunther Rudenberg  
Wayside Inn Road  
Sudbury, MA 01776



**Routing Diagram for 25052 Proposed rev 1**

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(EXISTING CONDITIONS WATERSHED MAP)



DP-1

Age Group	Percentage
0-10	15
11-20	10
21-30	20
31-40	40
41-50	60
51-60	70
61-70	75
71-80	78
81-90	79
91-100	80

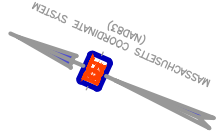
**DGT Associates**  
1071 Worcester Road  
Framingham, MA 01701  
508-879-0030  
[www.DGTAssociates.com](http://www.DGTAssociates.com)

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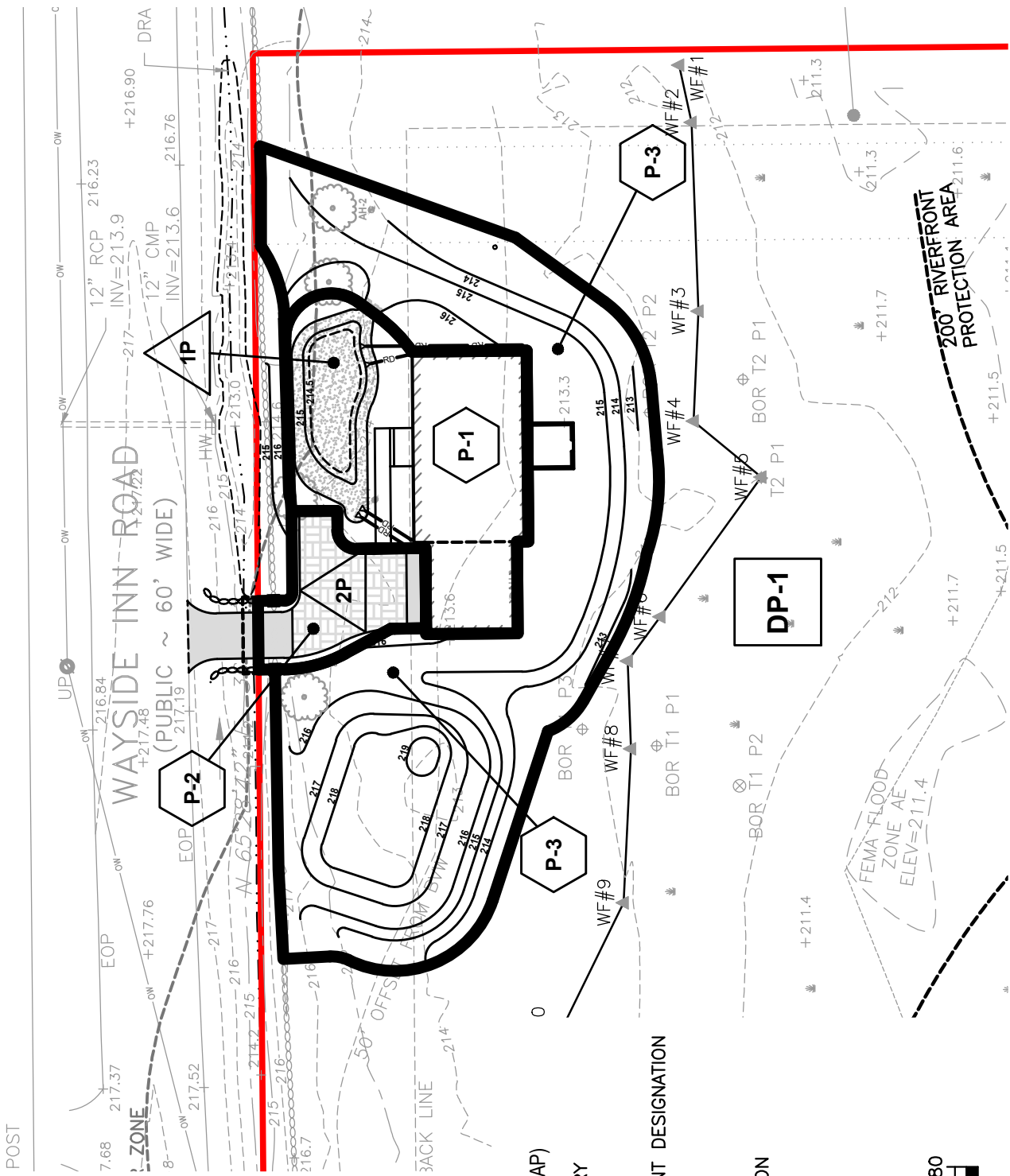
SCALE: 1" = 40'

25052





POST



## LEGEND

(PROPOSED CONDITIONS WATERSHED MAP)

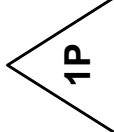
— SUBCATCHMENT BOUNDARY



PROPOSED SUBCATCHMENT DESIGNATION



DESIGN POINT DESIGNATION



POND DESIGNATION



SCALE: 1"=40'

**DGT Associates**  
1071 Worcester Road  
Framingham, MA 01701  
508-879-0030  
[www.DGTassociates.com](http://www.DGTassociates.com)

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PROPOSED CONDITIONS WATERSHED MAP

AT

219 WAYSIDE INN ROAD

IN

SUDBURY, MA 01776

DATE: 11/29/2022

DRAFTED BY: FJS

SCALE: 1" = 40'

WSD-PR

25052

**25052 Proposed rev 1**

Type III 24-hr 1 Inch Rainfall=1.00"

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Page 1

**Summary for Subcatchment E-1: Existing Conditions**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1 Inch Rainfall=1.00"

Area (sf)	CN	Description
16,660	55	Woods, Good, HSG B
16,660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Subcatchment P-1: To RG 1**

House and front are to Rain Garden

Runoff = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1 Inch Rainfall=1.00"

Area (sf)	CN	Description
2,076	98	Roofs, HSG B
170	98	Unconnected pavement, HSG B
1,697	61	>75% Grass cover, Good, HSG B
3,943	82	Weighted Average
1,697		43.04% Pervious Area
2,246		56.96% Impervious Area
170		7.57% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Subcatchment P-2: To Porous Pvmt**

Runoff = 0.01 cfs @ 12.09 hrs, Volume= 0.001 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1 Inch Rainfall=1.00"

Area (sf)	CN	Description
960	98	Paved parking, HSG B
240	61	>75% Grass cover, Good, HSG B
1,200	91	Weighted Average
240		20.00% Pervious Area
960		80.00% Impervious Area

**25052 Proposed rev 1**

Type III 24-hr 1 Inch Rainfall=1.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Subcatchment P-3: Uncontrolled**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1 Inch Rainfall=1.00"

Area (sf)	CN	Description
2,500	61	>75% Grass cover, Good, HSG B
8,657	56	Brush, Fair, HSG B
11,157	57	Weighted Average
11,157		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Reach DP-1: To Wetlands**

Inflow Area = 0.374 ac, 19.67% Impervious, Inflow Depth = 0.00" for 1 Inch event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

**Summary for Pond 1P: Rain Garden 1**

Inflow Area = 0.091 ac, 56.96% Impervious, Inflow Depth = 0.11" for 1 Inch event  
Inflow = 0.01 cfs @ 12.14 hrs, Volume= 0.001 af  
Outflow = 0.01 cfs @ 12.30 hrs, Volume= 0.001 af, Atten= 14%, Lag= 9.6 min  
Discarded = 0.01 cfs @ 12.30 hrs, Volume= 0.001 af  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Peak Elev= 214.51' @ 12.30 hrs Surf.Area= 269 sf Storage= 1 cf

Plug-Flow detention time= 4.5 min calculated for 0.001 af (100% of inflow)  
Center-of-Mass det. time= 4.5 min ( 932.5 - 928.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	214.50'	919 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)



**25052 Proposed rev 1**

Type III 24-hr 1 Inch Rainfall=1.00"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
214.50	267	76.0	0	0	267
215.00	493	100.0	187	187	606
216.00	1,000	125.0	732	919	1,068

Device	Routing	Invert	Outlet Devices
#1	Primary	215.40'	<b>2.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	214.50'	<b>2.400 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.01 cfs @ 12.30 hrs HW=214.51' (Free Discharge)↑**2=Exfiltration** (Exfiltration Controls 0.01 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=214.50' (Free Discharge)↑**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)**Summary for Pond 2P: Porous Pavement**

Inflow Area = 0.028 ac, 80.00% Impervious, Inflow Depth = 0.36" for 1 Inch event  
 Inflow = 0.01 cfs @ 12.09 hrs, Volume= 0.001 af  
 Outflow = 0.01 cfs @ 12.12 hrs, Volume= 0.001 af, Atten= 5%, Lag= 1.6 min  
 Discarded = 0.01 cfs @ 12.12 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Peak Elev= 215.10' @ 12.12 hrs Surf.Area= 760 sf Storage= 1 cf

Plug-Flow detention time= 1.7 min calculated for 0.001 af (100% of inflow)

Center-of-Mass det. time= 1.7 min ( 857.4 - 855.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	215.10'	274 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 684 cf Overall x 40.0% Voids
#2	216.00'	46 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc) 152 cf Overall x 30.0% Voids
#3	216.20'	106 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)
		426 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
215.10	760	0	0
216.00	760	684	684

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
216.00	760	130.0	0	0	760
216.20	760	130.0	152	152	786

**25052 Proposed rev 1**

Type III 24-hr 1 Inch Rainfall=1.00"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
216.20	100	40.0	0	0	100
216.50	700	105.0	106	106	850

Device	Routing	Invert	Outlet Devices
#1	Discarded	215.10'	<b>2.400 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.04 cfs @ 12.12 hrs HW=215.10' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

**25052 Proposed rev 1**

Type III 24-hr 2 Year Rainfall=3.20"

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**Summary for Subcatchment E-1: Existing Conditions**

Runoff = 0.04 cfs @ 12.33 hrs, Volume= 0.008 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
16,660	55	Woods, Good, HSG B
16,660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Subcatchment P-1: To RG 1**

House and front are to Rain Garden

Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.012 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
2,076	98	Roofs, HSG B
170	98	Unconnected pavement, HSG B
1,697	61	>75% Grass cover, Good, HSG B
3,943	82	Weighted Average
1,697		43.04% Pervious Area
2,246		56.96% Impervious Area
170		7.57% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Subcatchment P-2: To Porous Pvmt**

Runoff = 0.07 cfs @ 12.09 hrs, Volume= 0.005 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
960	98	Paved parking, HSG B
240	61	>75% Grass cover, Good, HSG B
1,200	91	Weighted Average
240		20.00% Pervious Area
960		80.00% Impervious Area

**25052 Proposed rev 1**

Type III 24-hr 2 Year Rainfall=3.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Subcatchment P-3: Uncontrolled**

Runoff = 0.04 cfs @ 12.28 hrs, Volume= 0.007 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
2,500	61	>75% Grass cover, Good, HSG B
8,657	56	Brush, Fair, HSG B
11,157	57	Weighted Average
11,157		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Reach DP-1: To Wetlands**

Inflow Area = 0.374 ac, 19.67% Impervious, Inflow Depth = 0.21" for 2 Year event  
Inflow = 0.04 cfs @ 12.28 hrs, Volume= 0.007 af  
Outflow = 0.04 cfs @ 12.28 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

**Summary for Pond 1P: Rain Garden 1**

Inflow Area = 0.091 ac, 56.96% Impervious, Inflow Depth = 1.54" for 2 Year event  
Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.012 af  
Outflow = 0.03 cfs @ 12.60 hrs, Volume= 0.012 af, Atten= 84%, Lag= 30.8 min  
Discarded = 0.03 cfs @ 12.60 hrs, Volume= 0.012 af  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Peak Elev= 214.96' @ 12.60 hrs Surf.Area= 470 sf Storage= 165 cf

Plug-Flow detention time= 54.7 min calculated for 0.012 af (100% of inflow)  
Center-of-Mass det. time= 54.6 min ( 890.9 - 836.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	214.50'	919 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)



**25052 Proposed rev 1**

Type III 24-hr 2 Year Rainfall=3.20"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
214.50	267	76.0	0	0	267
215.00	493	100.0	187	187	606
216.00	1,000	125.0	732	919	1,068

Device	Routing	Invert	Outlet Devices
#1	Primary	215.40'	<b>2.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	214.50'	<b>2.400 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.03 cfs @ 12.60 hrs HW=214.96' (Free Discharge)↑**2=Exfiltration** (Exfiltration Controls 0.03 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=214.50' (Free Discharge)↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond 2P: Porous Pavement**

Inflow Area = 0.028 ac, 80.00% Impervious, Inflow Depth = 2.26" for 2 Year event  
 Inflow = 0.07 cfs @ 12.09 hrs, Volume= 0.005 af  
 Outflow = 0.04 cfs @ 12.03 hrs, Volume= 0.005 af, Atten= 41%, Lag= 0.0 min  
 Discarded = 0.04 cfs @ 12.03 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Peak Elev= 215.15' @ 12.20 hrs Surf.Area= 760 sf Storage= 16 cf

Plug-Flow detention time= 2.5 min calculated for 0.005 af (100% of inflow)

Center-of-Mass det. time= 2.5 min ( 804.9 - 802.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	215.10'	274 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 684 cf Overall x 40.0% Voids
#2	216.00'	46 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc) 152 cf Overall x 30.0% Voids
#3	216.20'	106 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)
		426 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
215.10	760	0	0
216.00	760	684	684

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
216.00	760	130.0	0	0	760
216.20	760	130.0	152	152	786

**25052 Proposed rev 1***Type III 24-hr 2 Year Rainfall=3.20"*

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
216.20	100	40.0	0	0	100
216.50	700	105.0	106	106	850

Device	Routing	Invert	Outlet Devices
#1	Discarded	215.10'	<b>2.400 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.04 cfs @ 12.03 hrs HW=215.12' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

**25052 Proposed rev 1**

Type III 24-hr 10 Year Rainfall=4.80"

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**Summary for Subcatchment E-1: Existing Conditions**

Runoff = 0.31 cfs @ 12.11 hrs, Volume= 0.028 af, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 Year Rainfall=4.80"

Area (sf)	CN	Description
16,660	55	Woods, Good, HSG B
16,660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Subcatchment P-1: To RG 1**

House and front are to Rain Garden

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 Year Rainfall=4.80"

Area (sf)	CN	Description
2,076	98	Roofs, HSG B
170	98	Unconnected pavement, HSG B
1,697	61	>75% Grass cover, Good, HSG B
3,943	82	Weighted Average
1,697		43.04% Pervious Area
2,246		56.96% Impervious Area
170		7.57% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Subcatchment P-2: To Porous Pvmt**

Runoff = 0.12 cfs @ 12.08 hrs, Volume= 0.009 af, Depth= 3.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 Year Rainfall=4.80"

Area (sf)	CN	Description
960	98	Paved parking, HSG B
240	61	>75% Grass cover, Good, HSG B
1,200	91	Weighted Average
240		20.00% Pervious Area
960		80.00% Impervious Area

**25052 Proposed rev 1**

Type III 24-hr 10 Year Rainfall=4.80"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Subcatchment P-3: Uncontrolled**

Runoff = 0.25 cfs @ 12.11 hrs, Volume= 0.021 af, Depth= 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10 Year Rainfall=4.80"

Area (sf)	CN	Description
2,500	61	>75% Grass cover, Good, HSG B
8,657	56	Brush, Fair, HSG B
11,157	57	Weighted Average
11,157		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Reach DP-1: To Wetlands**Inflow Area = 0.374 ac, 19.67% Impervious, Inflow Depth = 0.68" for 10 Year event  
Inflow = 0.25 cfs @ 12.11 hrs, Volume= 0.021 af  
Outflow = 0.25 cfs @ 12.11 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

**Summary for Pond 1P: Rain Garden 1**Inflow Area = 0.091 ac, 56.96% Impervious, Inflow Depth = 2.90" for 10 Year event  
Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af  
Outflow = 0.04 cfs @ 12.82 hrs, Volume= 0.022 af, Atten= 88%, Lag= 43.9 min  
Discarded = 0.04 cfs @ 12.82 hrs, Volume= 0.022 af  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 afRouting by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Peak Elev= 215.33' @ 12.82 hrs Surf.Area= 639 sf Storage= 371 cfPlug-Flow detention time= 101.8 min calculated for 0.022 af (100% of inflow)  
Center-of-Mass det. time= 101.8 min ( 919.8 - 818.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	214.50'	919 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)



**25052 Proposed rev 1**

Type III 24-hr 10 Year Rainfall=4.80"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
214.50	267	76.0	0	0	267
215.00	493	100.0	187	187	606
216.00	1,000	125.0	732	919	1,068

Device	Routing	Invert	Outlet Devices
#1	Primary	215.40'	<b>2.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	214.50'	<b>2.400 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.04 cfs @ 12.82 hrs HW=215.33' (Free Discharge)↑**2=Exfiltration** (Exfiltration Controls 0.04 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=214.50' (Free Discharge)↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond 2P: Porous Pavement**

Inflow Area = 0.028 ac, 80.00% Impervious, Inflow Depth = 3.79" for 10 Year event  
 Inflow = 0.12 cfs @ 12.08 hrs, Volume= 0.009 af  
 Outflow = 0.04 cfs @ 11.91 hrs, Volume= 0.009 af, Atten= 64%, Lag= 0.0 min  
 Discarded = 0.04 cfs @ 11.91 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Peak Elev= 215.27' @ 12.34 hrs Surf.Area= 760 sf Storage= 53 cf

Plug-Flow detention time= 6.3 min calculated for 0.009 af (100% of inflow)

Center-of-Mass det. time= 6.3 min ( 794.5 - 788.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	215.10'	274 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 684 cf Overall x 40.0% Voids
#2	216.00'	46 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc) 152 cf Overall x 30.0% Voids
#3	216.20'	106 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)
		426 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
215.10	760	0	0
216.00	760	684	684

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
216.00	760	130.0	0	0	760
216.20	760	130.0	152	152	786

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Type III 24-hr 10 Year Rainfall=4.80"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
216.20	100	40.0	0	0	100
216.50	700	105.0	106	106	850

Device	Routing	Invert	Outlet Devices
#1	Discarded	215.10'	<b>2.400 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.04 cfs @ 11.91 hrs HW=215.11' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

**25052 Proposed rev 1**

Type III 24-hr 25 Year Rainfall=6.00"

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**Summary for Subcatchment E-1: Existing Conditions**

Runoff = 0.60 cfs @ 12.10 hrs, Volume= 0.048 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25 Year Rainfall=6.00"

Area (sf)	CN	Description
16,660	55	Woods, Good, HSG B
16,660		100.00% Pervious Area

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

**Summary for Subcatchment P-1: To RG 1**

House and front are to Rain Garden

Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.030 af, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25 Year Rainfall=6.00"

Area (sf)	CN	Description
2,076	98	Roofs, HSG B
170	98	Unconnected pavement, HSG B
1,697	61	>75% Grass cover, Good, HSG B
3,943	82	Weighted Average
1,697		43.04% Pervious Area
2,246		56.96% Impervious Area
170		7.57% Unconnected

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

**Summary for Subcatchment P-2: To Porous Pvmnt**

Runoff = 0.15 cfs @ 12.08 hrs, Volume= 0.011 af, Depth= 4.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25 Year Rainfall=6.00"

Area (sf)	CN	Description
960	98	Paved parking, HSG B
240	61	>75% Grass cover, Good, HSG B
1,200	91	Weighted Average
240		20.00% Pervious Area
960		80.00% Impervious Area

**25052 Proposed rev 1**

Type III 24-hr 25 Year Rainfall=6.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Subcatchment P-3: Uncontrolled**

Runoff = 0.46 cfs @ 12.10 hrs, Volume= 0.036 af, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25 Year Rainfall=6.00"

Area (sf)	CN	Description
2,500	61	>75% Grass cover, Good, HSG B
8,657	56	Brush, Fair, HSG B
11,157	57	Weighted Average
11,157		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Min Tc</b>

**Summary for Reach DP-1: To Wetlands**

Inflow Area = 0.374 ac, 19.67% Impervious, Inflow Depth = 1.24" for 25 Year event  
 Inflow = 0.46 cfs @ 12.10 hrs, Volume= 0.039 af  
 Outflow = 0.46 cfs @ 12.10 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

**Summary for Pond 1P: Rain Garden 1**

Inflow Area = 0.091 ac, 56.96% Impervious, Inflow Depth = 3.99" for 25 Year event  
 Inflow = 0.42 cfs @ 12.09 hrs, Volume= 0.030 af  
 Outflow = 0.13 cfs @ 12.41 hrs, Volume= 0.030 af, Atten= 68%, Lag= 19.1 min  
 Discarded = 0.04 cfs @ 12.41 hrs, Volume= 0.027 af  
 Primary = 0.09 cfs @ 12.41 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
 Peak Elev= 215.47' @ 12.41 hrs Surf.Area= 707 sf Storage= 465 cf

Plug-Flow detention time= 103.5 min calculated for 0.030 af (100% of inflow)  
 Center-of-Mass det. time= 103.5 min ( 912.4 - 808.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	214.50'	919 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)



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Type III 24-hr 25 Year Rainfall=6.00"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
214.50	267	76.0	0	0	267
215.00	493	100.0	187	187	606
216.00	1,000	125.0	732	919	1,068

Device	Routing	Invert	Outlet Devices
#1	Primary	215.40'	<b>2.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	214.50'	<b>2.400 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.04 cfs @ 12.41 hrs HW=215.47' (Free Discharge)↑**2=Exfiltration** (Exfiltration Controls 0.04 cfs)**Primary OutFlow** Max=0.09 cfs @ 12.41 hrs HW=215.47' (Free Discharge)↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.09 cfs @ 0.71 fps)**Summary for Pond 2P: Porous Pavement**

Inflow Area = 0.028 ac, 80.00% Impervious, Inflow Depth = 4.96" for 25 Year event  
 Inflow = 0.15 cfs @ 12.08 hrs, Volume= 0.011 af  
 Outflow = 0.04 cfs @ 11.82 hrs, Volume= 0.011 af, Atten= 72%, Lag= 0.0 min  
 Discarded = 0.04 cfs @ 11.82 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Peak Elev= 215.40' @ 12.43 hrs Surf.Area= 760 sf Storage= 91 cf

Plug-Flow detention time= 10.8 min calculated for 0.011 af (100% of inflow)

Center-of-Mass det. time= 10.8 min ( 791.9 - 781.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	215.10'	274 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 684 cf Overall x 40.0% Voids
#2	216.00'	46 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc) 152 cf Overall x 30.0% Voids
#3	216.20'	106 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)
		426 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
215.10	760	0	0
216.00	760	684	684

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
216.00	760	130.0	0	0	760
216.20	760	130.0	152	152	786

**25052 Proposed rev 1**

Type III 24-hr 25 Year Rainfall=6.00"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
216.20	100	40.0	0	0	100
216.50	700	105.0	106	106	850

Device	Routing	Invert	Outlet Devices
#1	Discarded	215.10'	<b>2.400 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.04 cfs @ 11.82 hrs HW=215.11' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

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Type III 24-hr 100 Year Rainfall=8.60"

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**Summary for Subcatchment E-1: Existing Conditions**

Runoff = 1.39 cfs @ 12.09 hrs, Volume= 0.102 af, Depth= 3.20"

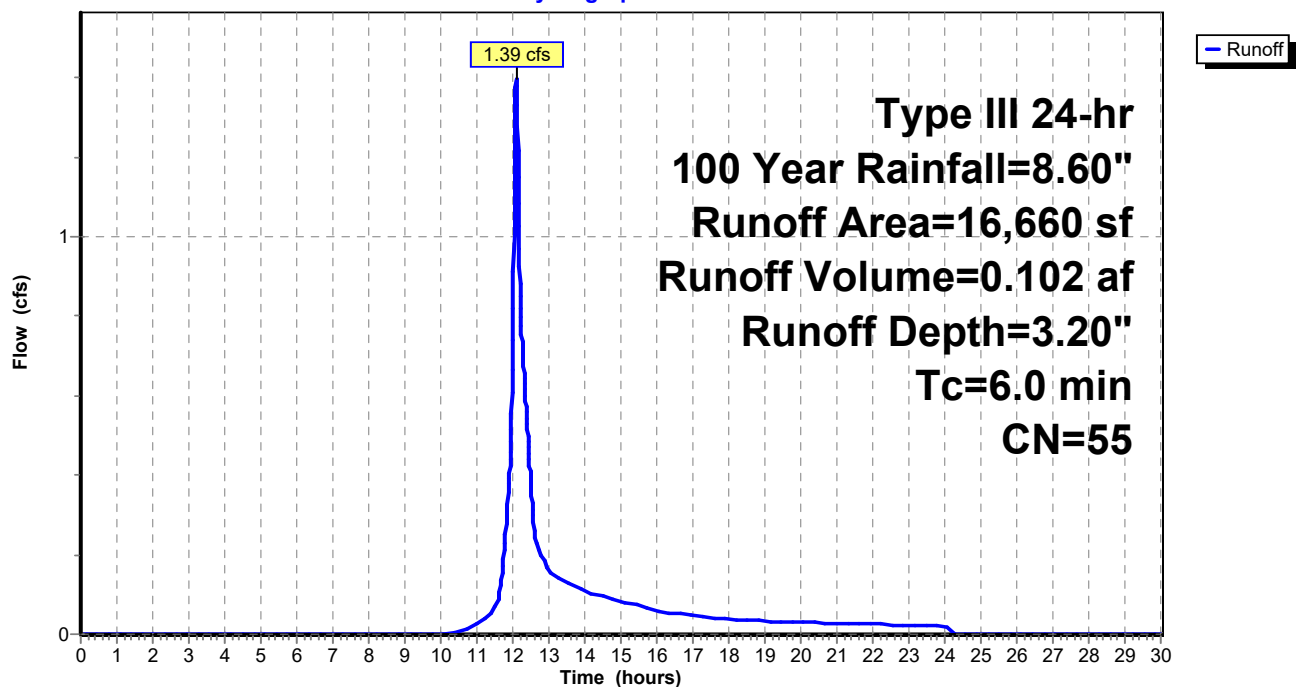
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100 Year Rainfall=8.60"

Area (sf)	CN	Description
16,660	55	Woods, Good, HSG B
16,660		100.00% Pervious Area

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

**Subcatchment E-1: Existing Conditions**

Hydrograph



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Type III 24-hr 100 Year Rainfall=8.60"

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**Summary for Subcatchment P-1: To RG 1**

House and front are to Rain Garden

Runoff = 0.66 cfs @ 12.09 hrs, Volume= 0.049 af, Depth= 6.43"

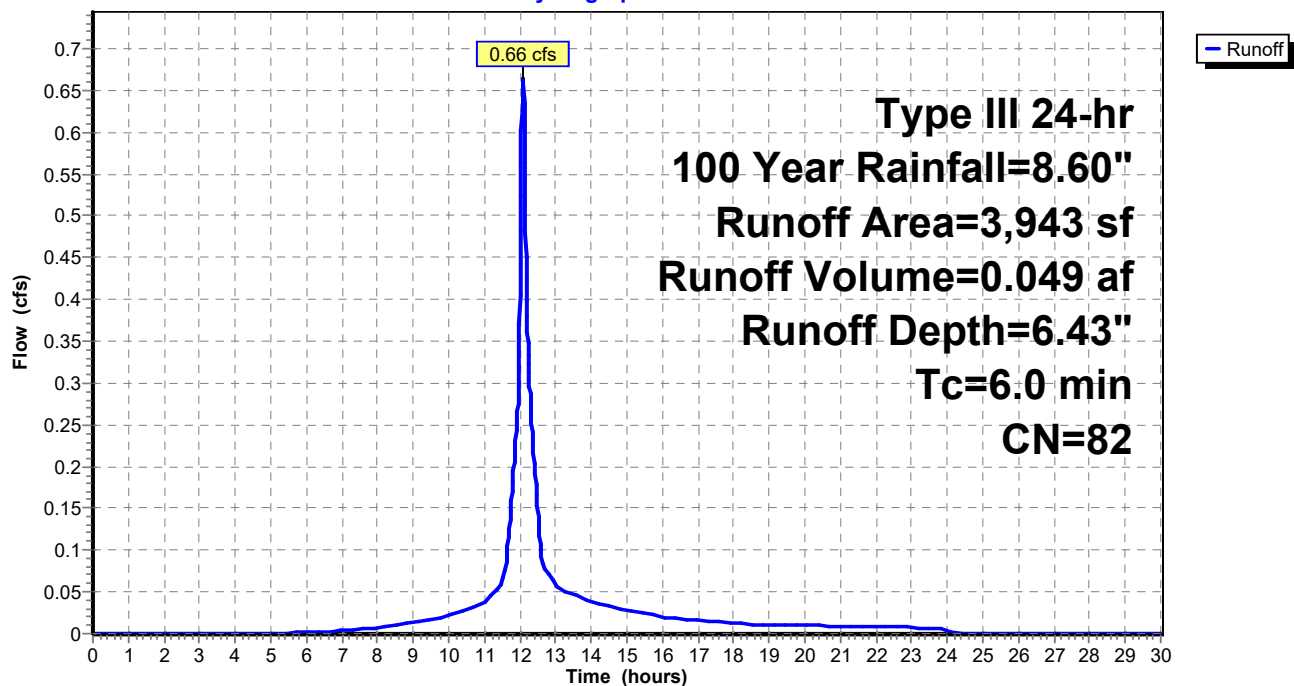
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100 Year Rainfall=8.60"

Area (sf)	CN	Description
2,076	98	Roofs, HSG B
170	98	Unconnected pavement, HSG B
1,697	61	>75% Grass cover, Good, HSG B
3,943	82	Weighted Average
1,697		43.04% Pervious Area
2,246		56.96% Impervious Area
170		7.57% Unconnected

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

**Subcatchment P-1: To RG 1**

Hydrograph



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Type III 24-hr 100 Year Rainfall=8.60"

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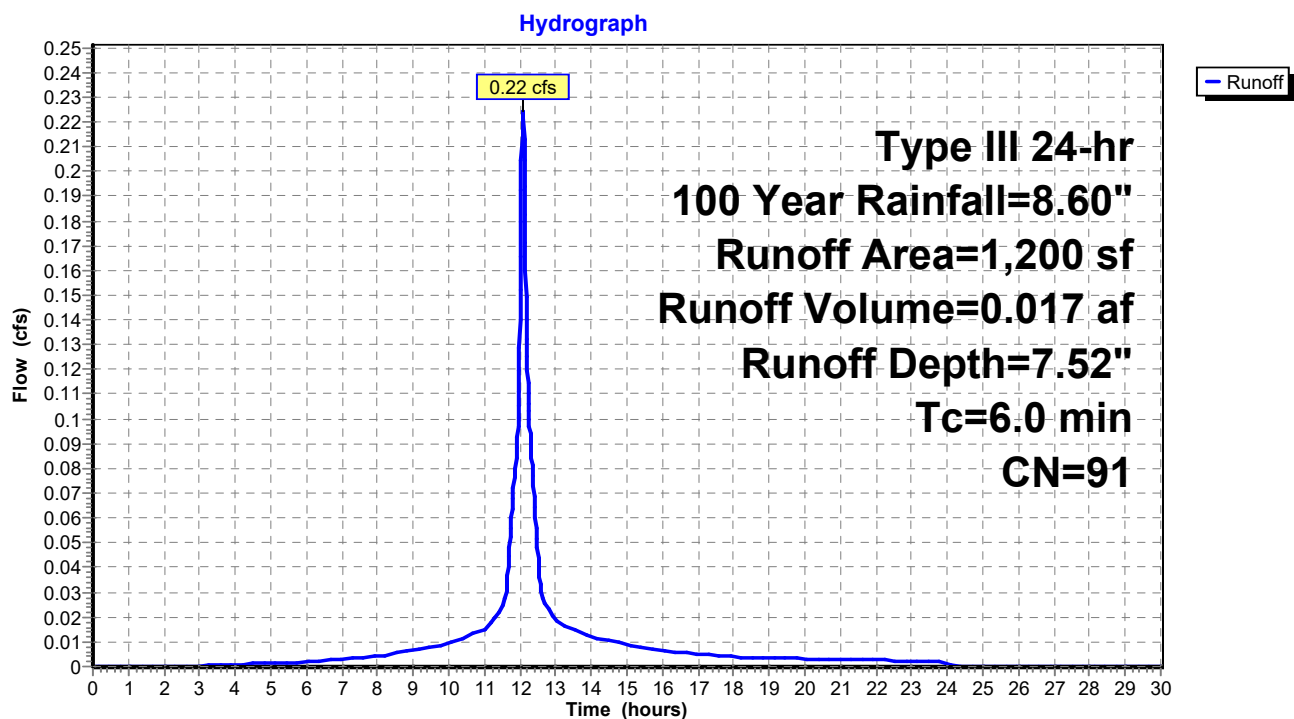
**Summary for Subcatchment P-2: To Porous Pvmt**

Runoff = 0.22 cfs @ 12.08 hrs, Volume= 0.017 af, Depth= 7.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100 Year Rainfall=8.60"

Area (sf)	CN	Description
960	98	Paved parking, HSG B
240	61	>75% Grass cover, Good, HSG B
1,200	91	Weighted Average
240		20.00% Pervious Area
960		80.00% Impervious Area

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

**Subcatchment P-2: To Porous Pvmt**



**25052 Proposed rev 1**

Type III 24-hr 100 Year Rainfall=8.60"

Prepared by {enter your company name here}

Printed 11/10/2022

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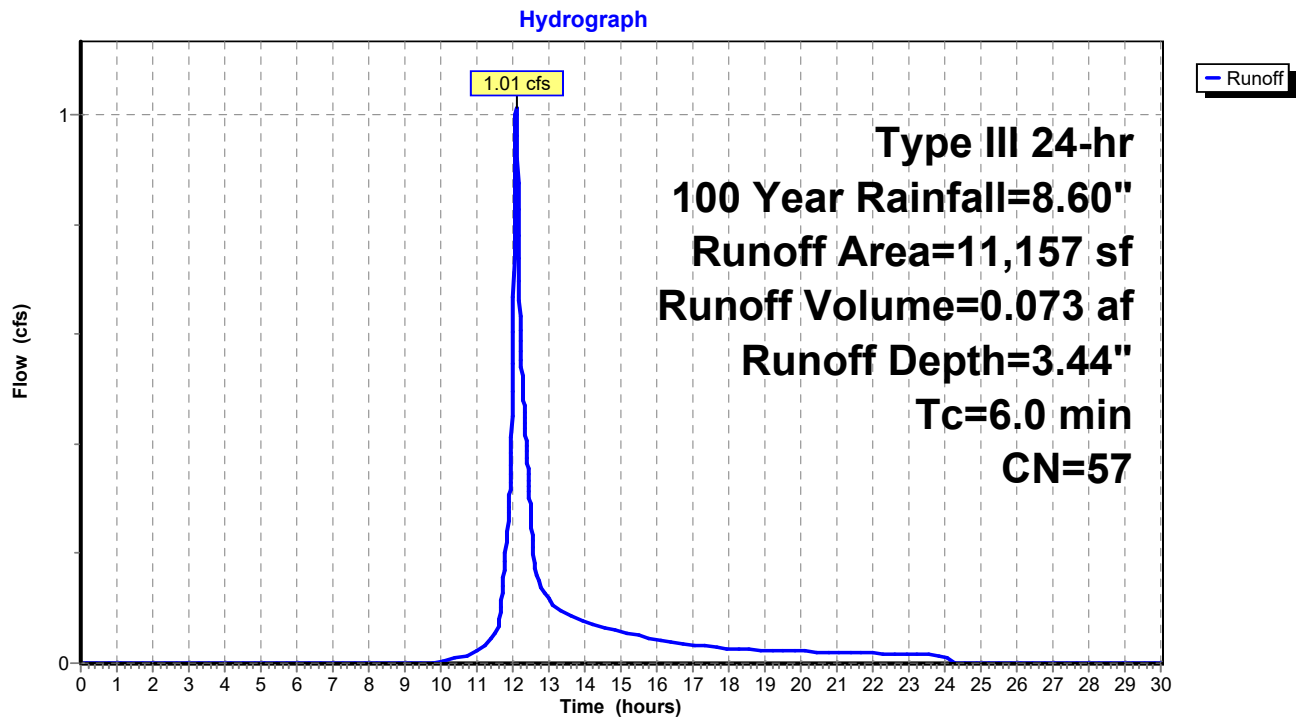
**Summary for Subcatchment P-3: Uncontrolled**

Runoff = 1.01 cfs @ 12.09 hrs, Volume= 0.073 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100 Year Rainfall=8.60"

Area (sf)	CN	Description
2,500	61	>75% Grass cover, Good, HSG B
8,657	56	Brush, Fair, HSG B
11,157	57	Weighted Average
11,157		100.00% Pervious Area

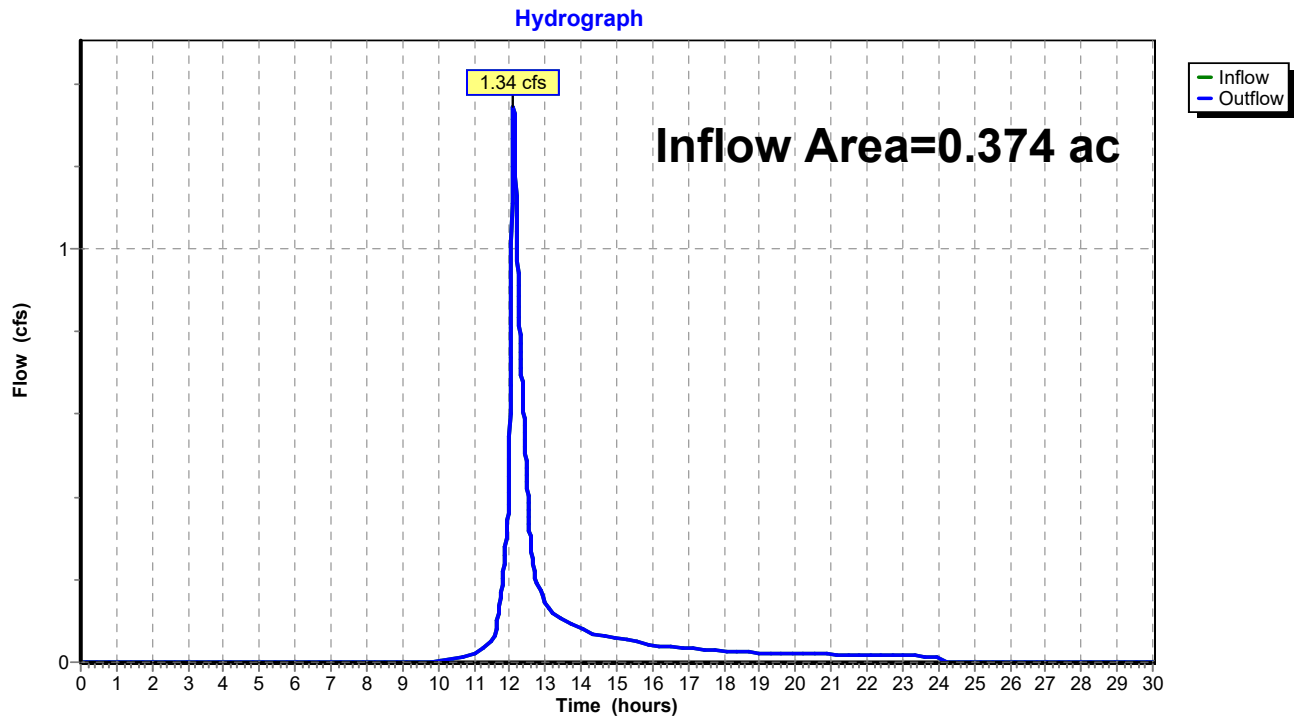
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min Tc

**Subcatchment P-3: Uncontrolled**

**Summary for Reach DP-1: To Wetlands**

Inflow Area = 0.374 ac, 19.67% Impervious, Inflow Depth = 2.81" for 100 Year event  
Inflow = 1.34 cfs @ 12.12 hrs, Volume= 0.088 af  
Outflow = 1.34 cfs @ 12.12 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

**Reach DP-1: To Wetlands**

**25052 Proposed rev 1**

Type III 24-hr 100 Year Rainfall=8.60"

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**Summary for Pond 1P: Rain Garden 1**

Inflow Area = 0.091 ac, 56.96% Impervious, Inflow Depth = 6.43" for 100 Year event  
 Inflow = 0.66 cfs @ 12.09 hrs, Volume= 0.049 af  
 Outflow = 0.48 cfs @ 12.16 hrs, Volume= 0.049 af, Atten= 28%, Lag= 4.5 min  
 Discarded = 0.04 cfs @ 12.16 hrs, Volume= 0.034 af  
 Primary = 0.44 cfs @ 12.16 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
 Peak Elev= 215.58' @ 12.16 hrs Surf.Area= 767 sf Storage= 551 cf

Plug-Flow detention time= 86.6 min calculated for 0.048 af (100% of inflow)  
 Center-of-Mass det. time= 86.6 min ( 882.1 - 795.5 )

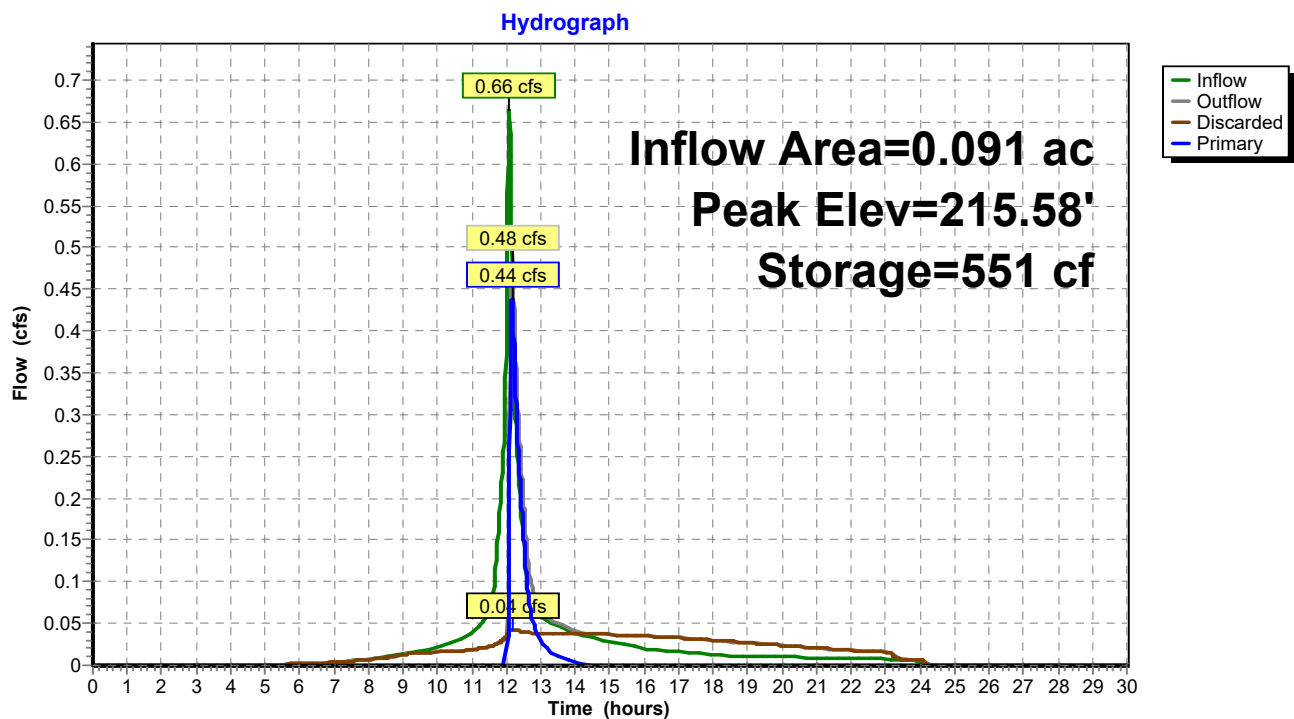
Volume	Invert	Avail.Storage	Storage Description		
#1	214.50'	919 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
214.50	267	76.0	0	0	267
215.00	493	100.0	187	187	606
216.00	1,000	125.0	732	919	1,068

Device	Routing	Invert	Outlet Devices
#1	Primary	215.40'	<b>2.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Discarded	214.50'	<b>2.400 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.04 cfs @ 12.16 hrs HW=215.58' (Free Discharge)  
 ↑ **2=Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.44 cfs @ 12.16 hrs HW=215.58' (Free Discharge)  
 ↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 0.44 cfs @ 1.20 fps)

## Pond 1P: Rain Garden 1



**25052 Proposed rev 1**

Type III 24-hr 100 Year Rainfall=8.60"

Prepared by {enter your company name here}

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**Summary for Pond 2P: Porous Pavement**

Inflow Area = 0.028 ac, 80.00% Impervious, Inflow Depth = 7.52" for 100 Year event  
 Inflow = 0.22 cfs @ 12.08 hrs, Volume= 0.017 af  
 Outflow = 0.04 cfs @ 11.71 hrs, Volume= 0.017 af, Atten= 81%, Lag= 0.0 min  
 Discarded = 0.04 cfs @ 11.71 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs  
 Peak Elev= 215.72' @ 12.52 hrs Surf.Area= 760 sf Storage= 187 cf

Plug-Flow detention time= 24.1 min calculated for 0.017 af (100% of inflow)  
 Center-of-Mass det. time= 24.1 min ( 794.7 - 770.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	215.10'	274 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 684 cf Overall x 40.0% Voids
#2	216.00'	46 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc) 152 cf Overall x 30.0% Voids
#3	216.20'	106 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)
		426 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
215.10	760	0	0
216.00	760	684	684

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
216.00	760	130.0	0	0	760
216.20	760	130.0	152	152	786

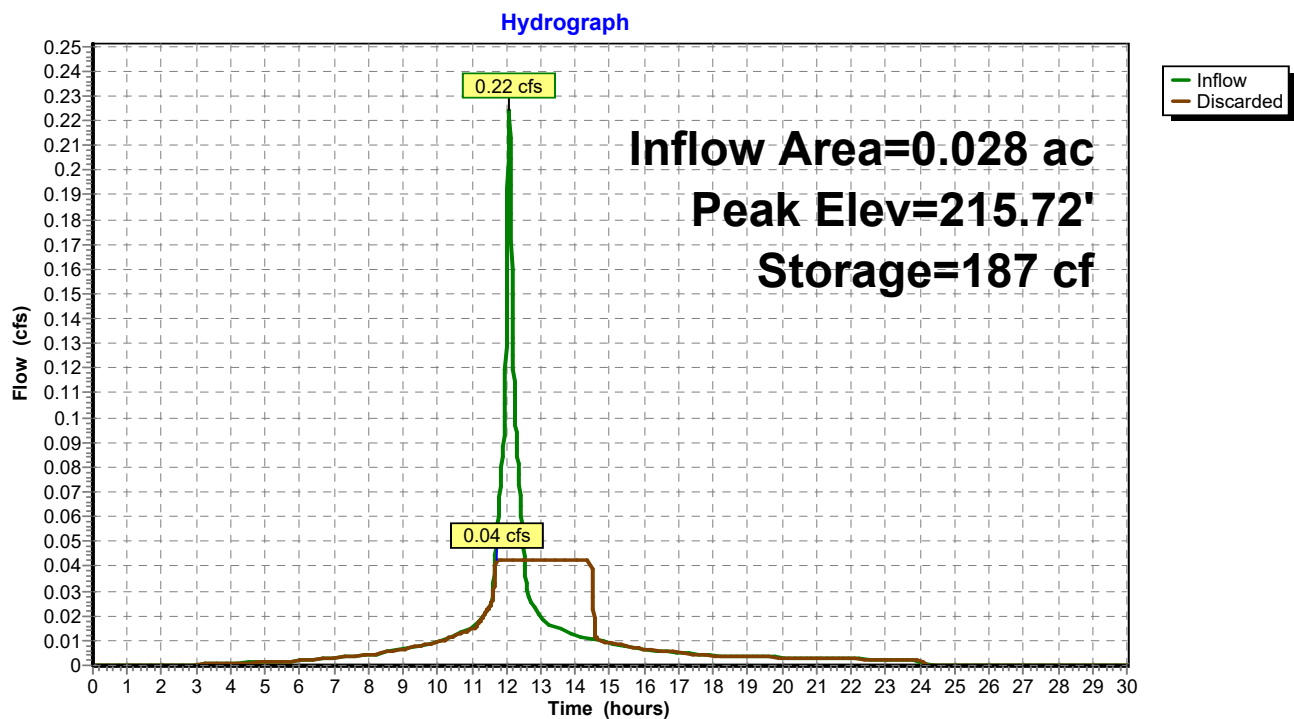
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
216.20	100	40.0	0	0	100
216.50	700	105.0	106	106	850

Device	Routing	Invert	Outlet Devices
#1	Discarded	215.10'	<b>2.400 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.04 cfs @ 11.71 hrs HW=215.11' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)



**Pond 2P: Porous Pavement**

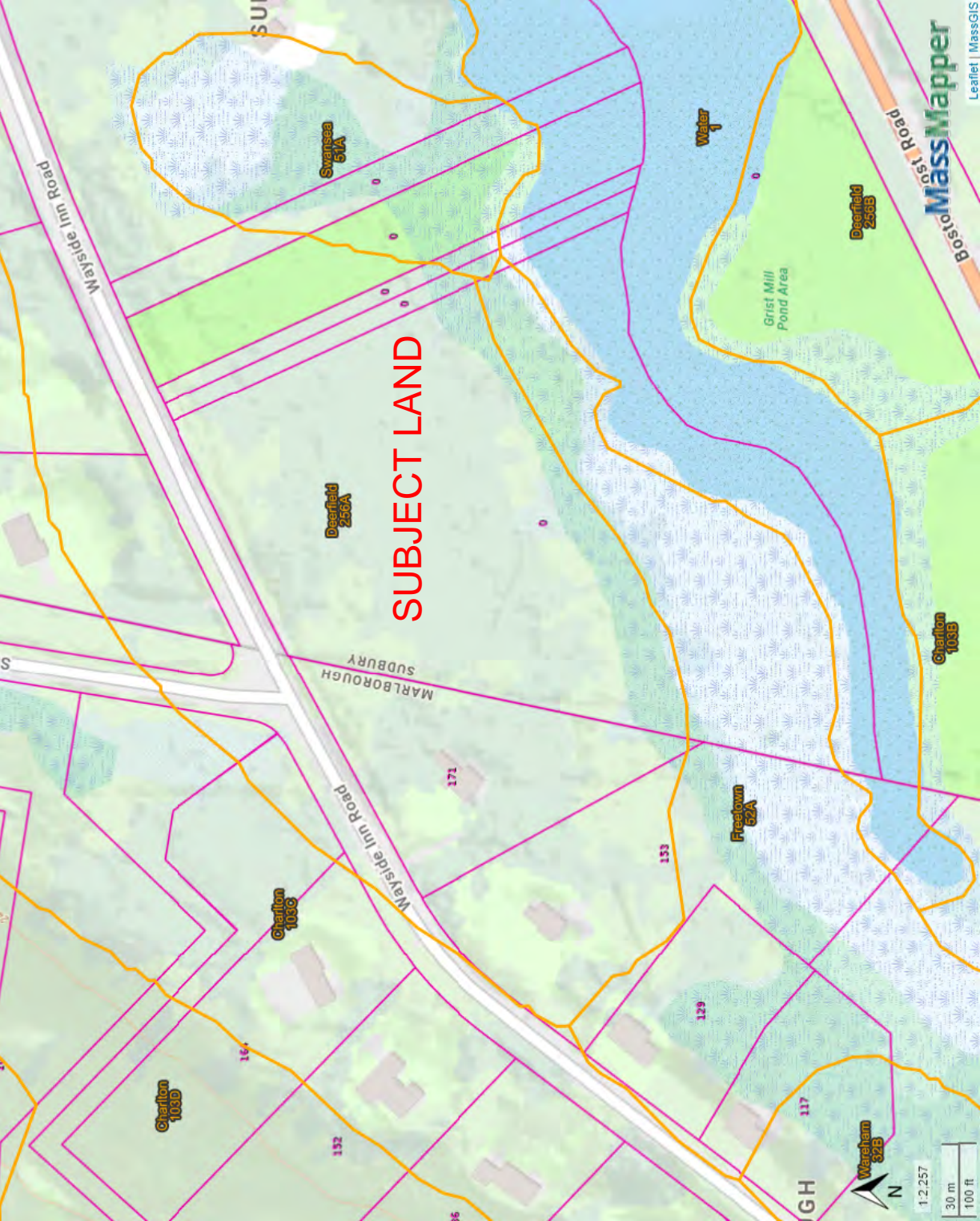
# **APPENDIX 1**

## **SOILS INFORMATION**

- NRCS SOILS MAP and DESCRIPTION**
- SOILS REPORT FOR SEPTIC Dated 7/6/2020**
- STORMWATER MGT - SOIL DATA 4/1/2022**  
(see Site Plan for test locations).

# Soils Map

- Soils Outlines    NRCS
- Property Tax Parcels



## 256A—Deerfield loamy sand, 0 to 3 percent slopes

This very deep, nearly level, moderately well drained soil is in depressions on glacial stream terraces and deltas. The areas of this soil are irregular in shape and range from 6 to 450 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

*Surface layers:*

0 to 1 inch, slightly decomposed leaf litter

1 to 11 inches, very dark gray loamy sand

*Subsoil:*

11 to 17 inches, yellowish brown loamy sand

17 to 25 inches, yellowish brown sand with distinct strong brown masses of iron accumulation

*Substratum:*

25 to 65 inches, light brownish gray coarse sand with prominent strong brown masses of iron accumulation

Included with this soil in mapping are areas, generally smaller than 6 acres each, of Sudbury soils in similar landscape positions as the Deerfield soils, and Wareham soils at slightly lower elevations. Minor soils comprise about 10 percent of the map unit.

### ***Major soil properties—***

*Permeability:* moderate to rapid in the surface layers, rapid in the subsoil, very rapid in the substratum

*Available water capacity:* moderate

*Soil reaction:* very strongly acid to moderately acid

*Depth to bedrock:* more than 60 inches

*Depth to seasonal high water table:* 1.5 to 3 feet, December-April

*Hydrologic group:* B

Most areas of this soil are woodland. A few small areas are used for commercial and industrial development.

This soil is suited for the cultivation of silage corn, well suited for the production of sweet corn, and limited in its use for hay and pasture. The seasonal high water table delays farming and limits root growth in the spring. This soil must be irrigated during dry periods for optimal crop growth. The main management concern is the prevention of overgrazing, particularly during droughty periods, as this reduces the hardiness and density of desirable plants. Proper stocking rates, timely grazing, and restricting use during adverse moisture periods help maintain plant densities.

Potential productivity for both eastern white pine and northern red oak is moderate. Seedling mortality is moderate because of moisture stress caused by the droughtiness of the soil. Minimizing disturbance to retain leaf cover and designing regeneration cuts to optimize shade and reduce evapotranspiration will help to retain the limited soil moisture. Thinning crowded stands to standard stocking levels will allow more vigorous new growth. Diseased, poorly formed, and otherwise undesirable trees should receive priority for removal during thinning. Shelterwood cutting, seed-tree cutting, and clearcutting may be used to establish regeneration or to provide suitable planting sites. Removal or control of competing vegetation may be necessary for optimum growth of newly established seedlings.

This map unit has moderate limitations as a site for dwellings without basements, due to wetness. It has severe limitations for dwellings with basements. Constructing buildings with basement floors above the seasonal high water table will help to avoid

interior damage caused by wetness. Footing drains around foundations will help to remove excess subsurface water. Landscaping designed to drain surface water away from buildings will provide added protection from moisture. Constructing roads on raised, coarse-textured base material and providing adequate side ditches and culverts will help to overcome the moderate wetness limitation and protect the roads from frost damage.

This map unit has severe limitations for septic tank absorption fields, as the soil readily absorbs but may not adequately filter sewage effluent, which can lead to pollution of ground water. Shallow depth to the saturated zone is a further severe limitation; placing distribution lines in a mound of more suitable fill material will help to overcome the wetness limitation.

This map unit has poor potential for woodland wildlife habitat.

Capability subclass: 3w

## **256B—Deerfield loamy sand, 3 to 8 percent slopes**

This very deep, gently sloping, moderately well drained soil is in depressions on glacial stream terraces and deltas. The areas of this soil are irregular in shape and range from 6 to 60 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

*Surface layers:*

0 to 1 inch, slightly decomposed leaf litter

1 to 11 inches, very dark gray loamy sand

*Subsoil:*

11 to 17 inches, yellowish brown loamy sand

17 to 25 inches, yellowish brown sand with distinct strong brown masses of iron accumulation

*Substratum:*

25 to 65 inches, light brownish gray coarse sand with prominent strong brown masses of iron accumulation

Included with this soil in mapping are areas, generally smaller than 6 acres each, of Sudbury soils in similar landscape positions as the Deerfield soils, and Wareham soils at slightly lower elevations. Minor soils comprise about 10 percent of the map unit.

### ***Major soil properties—***

*Permeability:* moderate to rapid in the surface layers, rapid in the subsoil, very rapid in the substratum

*Available water capacity:* moderate

*Soil reaction:* very strongly acid to moderately acid

*Depth to bedrock:* more than 60 inches

*Depth to seasonal high water table:* 1.5 to 3 feet, December-April

*Hydrologic group:* B

Most areas of this map unit are woodland. A few small areas are used for commercial and industrial development.

This map unit is suited for the cultivation of silage corn, well suited for sweet corn, and of limited use for hay and pasture. The seasonal high water table delays farming and limits root growth in the spring. This map unit must be irrigated during dry periods for optimal crop growth. The main management concern is the prevention of overgrazing, particularly during droughty periods, as this reduces the hardiness and



# FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot No. 219 Wayside Inn Road, Sudbury, MA

## **On-site Review**

Test By: Fredric King, PE, SE

Test Hole Number AH-01 Date: 4/1/2022 Time: Morning Weather Fair

Location (identify on site plan) see plan

Land Use Vacant Woodland Slope (%) 1 to 3 Surface Stones None

Vegetation Wooded

Landform Outwash Terrace

Position on landscape (sketch on the back) see sketch

Distances from:

Open Water Body	<u>450+</u>	Feet	Drainageway	<u>Dry ditch 33 ft</u>	Feet
Possible Wet Area	<u>80 feet</u>	Feet	Property Line	<u>28 ft. (front)</u>	Feet
Drinking Water Well	<u>None</u>	Feet	Other	<u></u>	

## **DEEP OBSERVATION HOLE LOG\***

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 11	A	Fine SL	10 YR 3/2	None	
11 – 16	Bw	Loamy Sand	10 YR 5/4	10 YR 5/8	Massive, friable
16 – 20	C	Sand (m-c)	10 YR 4/3	Start @ 14" Com 10 YR 5/8 Many	Gravelly w/ cobbles

\* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Outwash Depth to Bedrock: ND

Depth to Groundwater: Standing Water in the Hole: Saturated @18 Weeping from Pit Face: None

Estimated Seasonal High Ground Water: At 14 inches (elev. 212.5)



# FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot No. 219 Wayside Inn Road, Sudbury, MA

## **On-site Review**

Test By: Fredric King, PE, SE

Test Hole Number AH-02 Date: 4/1/2022 Time: Morning Weather Fair

Location (identify on site plan) see plan

Land Use Vacant Woodland Slope (%) 1 to 3 Surface Stones None

Vegetation Wooded

Landform Outwash Terrace

Position on landscape (sketch on the back) see sketch

Distances from:

Open Water Body	<u>450+</u>	Feet	Drainageway	<u>Dry ditch 32 ft</u>	Feet
Possible Wet Area	<u>85 feet</u>	Feet	Property Line	<u>27 ft. (front)</u>	Feet
Drinking Water Well	<u>None</u>	Feet	Other	<u></u>	

## DEEP OBSERVATION HOLE LOG\*

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 14	A	Fine SL	10 YR 3/2	None	
14 – 21	Bw	Loamy Sand	10 YR 5/6	10 YR 5/8	Massive, friable
21 – 23	C	Sand (m-c)	10 YR 4/3	Start @ 20" Com 10 YR 5/8 Many	Gravelly w/ cobbles

\* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Outwash Depth to Bedrock: ND

Depth to Groundwater: Standing Water in the Hole: None Weeping from Pit Face: None

Estimated Seasonal High Ground Water: At 20 inches (elev. 212.4)



DEP APPROVED FORM - 12/07/95

# FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot No. 219 Wayside Inn Road, Sudbury, MA

## **On-site Review**

Test By: Fredric King, PE, SE

Test Hole Number AH-03 Date: 4/1/2022 Time: Morning Weather Fair

Location (identify on site plan) see plan

Land Use Vacant Woodland Slope (%) 1 to 3 Surface Stones None

Vegetation Wooded

Landform Outwash Terrace

Position on landscape (sketch on the back) see sketch

Distances from:

Open Water Body	<u>450+</u>	Feet	Drainageway	<u>Dry ditch 63 ft</u>	Feet
Possible Wet Area	<u>40 feet</u>	Feet	Property Line	<u>60 ft. (front)</u>	Feet
Drinking Water Well	<u>None</u>	Feet	Other	<u></u>	

## **DEEP OBSERVATION HOLE LOG\***

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 15	A	Fine SL	10 YR 3/2	None	
15 – 18	A2	Fine SL	10 YR 2/1	None	Massive, friable
18 – 24	C	Sand (m-c)	10 YR 4/4	Low chroma 10 YR 5/8 Many	Gravelly w/ cobbles

\* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Outwash Depth to Bedrock: ND

Depth to Groundwater: Standing Water in the Hole: 18" Weeping from Pit Face: None

Estimated Seasonal High Ground Water: At 15 inches (elev. 212.4)



July 6, 2020

25052

William Murphy, Director  
Sudbury Health Department  
275 Old Lancaster Road  
Sudbury, MA 01776

SENT VIA E-MAIL

RE: 219 Wayside Inn Road, Sudbury – Soil Test Report

Dear Bill:

Attached for your records

The soil testing at the subject parcel of land was completed on July 2, 2020. The testing was performed by myself and was witnessed by Bob Landry for your office. The backhoe was provided by D. J. Morris.

The testing consisted of two deep hole tests and two percolations tests. Attached for your records is a copy of the soil test report and the sketch plan showing the approximate locations of the tests. At this time we are scheduling the survey of the location and elevations of the tests.

Note that we found that the subsoil (B horizon) consisted of a clean, fine to medium sand that varied in thickness. The C horizon is a gravelly sand with cobbles. As expected, the estimated seasonal high groundwater was relatively shallow. Since the B horizon was very good material, we performed a perc test in each of the B horizon and the C horizon so that the B horizon can stay in place, rather than have it excavated and replaced with Title 5 sand.

Thank you for your assistance in scheduling the testing. Contact me if you have any questions. We will also send a hard copy to your office by mail.

Sincerely,  
**DGT Associates**

*Fredric W. King*

Fredric W. King, P.E.  
Senior Engineer

Enclosure: Soil Test Report

CC: Elizabeth Rudenberg

Job No.

No. \_\_\_\_\_

Date: \_\_\_\_\_

Commonwealth of Massachusetts

Sudbury, Massachusetts

**Soil Suitability Assessment for On-site Sewage Disposal**

Performed By:

Date:

Witnessed By:

Location Address or Lot #  New Construction <input type="checkbox"/> Repair <input type="checkbox"/>	Owner's Name, Address, and Telephone #
---	--

**Office Review**Published Soil Survey Available : No ☐ Yes ☐

Year Published

Publication Scale

Soil Map Unit

Drainage Class

Soil Limitations

Surficial Geologic Report Available: No ☐ Yes ☐

Year Published

Publication Scale

Geologic Material (Map Unit)

Landform

Flood Insurance Rate Map:

Above 500 year flood boundary No ☐ Yes ☐Within 500 year flood boundary No ☐ Yes ☐Within 100 year flood boundary No ☐ Yes ☐

Rear portion of parcel

Wetland Area:

National Wetland Inventory Map (map unit)

Wetlands Conservancy Program Map (map unit)

Current Water Resource Conditions (USGS): Month

Range: Above Normal ☐ Normal ☐ Below Normal ☐

Other References Reviewed:





Location Address or Lot No. 219 Wayside Inn Road, Sudbury, MA**On-site Review**Deep Hole Number TH-01 Date: July 2, 2020 Time: Morning Weather FairLocation (identify on site plan) see sketchLand Use Vacant Woodland Slope (%) 1 to 3 Surface Stones NoneVegetation WoodedLandform Outwash TerracePosition on landscape (sketch on the back) see sketch

Distances from:

Open Water Body 250 Feet Drainageway Dry ditch 25 ft FeetPossible Wet Area 60 feet Feet Property Line 25 ft. FeetDrinking Water Well None Feet Other \_\_\_\_\_**DEEP OBSERVATION HOLE LOG\***

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 8	A	Loamy Sand	10 YR 3/2	None	
8 – 23	Bw	Sand (f-m)	10 YR 5/6	None	Massive, friable
23 – 77	C	Sand (m-c)	10 YR 4/3	10 YR 5/8 Many begin at 23 inches	Gravelly w/ cobbles

\* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Outwash Depth to Bedrock: + 77Depth to Groundwater: \_\_\_\_\_ Standing Water in the Hole: 37 inches Weeping from Pit Face: NoneEstimated Seasonal High Ground Water: At 23 inches

Location Address or Lot No. 219 Wayside Inn Road, Sudbury, MA**On-site Review**Deep Hole Number TH-02 Date: July 2, 2020 Time: Morning Weather FairLocation (identify on site plan) see sketchLand Use Vacant Woodland Slope (%) 1 to 3 Surface StonesVegetation Wooded with some underbLandform Outwash Terrace

Position on landscape (sketch on the back)

Distances from (Approximate):

Open Water Body 250 Feet Drainageway Dry ditch 25 ftPossible Wet Area 70 feet Feet Property Line 25 ft.Drinking Water Well None Feet Other**DEEP OBSERVATION HOLE LOG\***

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)	
0 – 9	A	Loamy Sand	10 YR 3/2	None		
9 – 20	Bw	Sand (f-m)	10 YR 5/2	None	Massive, friable	
20 – 77	C	Sand (m-c)	10 YR 4/3	10 YR 5/6 Many begin at 20 inches	Gravelly w/ cobbles	

\* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Outwash Depth to Bedrock: + 77Depth to Groundwater: Standing Water in the Hole: 37 inches Weeping from Pit Face: NoneEstimated Seasonal High Ground Water: At 20 inches

Location Address or Lot No. 219 Wayside Inn Road, Sudbury, MA

## COMMONWEALTH OF MASSACHUSETTS

Sudbury Massachusetts

Percolation Test*		
Date: <u>July 2, 2020</u> Time: <u>10:00 am</u>		
Observation Hole #	Perc 01	Perc 02
Depth of Perc (to top of 12" of water)	16 inches	18 inches
Start Pre-soak	10:05	10:22
End Pre-soak	10:15 (25 gal)	10:37
Time at 12"	10:15	10:37
Time at 9"	10:16:30	10:45
Time at 6"	10:18	10:57
Time (9"-6")	1.5 minutes	12 minutes
Rate Min./Inch	< 2 MPI	4 MPI

\* Minimum of 1 percolation test must be performed in both the primary area AND reserve area.

Site Passed ☒ Site Failed ☐Performed By: Fredric KingWitnessed By: Bob LandryComments: Perc 01 in the B Horizon. Perc 02 is in the C Horizon

Job No.

Location Address or Lot No. 219 Wayside Inn Road, Sudbury, Ma**Determination for Seasonal High Water Table****Method Used:**

- ☐ Depth observed standing in observation hole inches
- ☐ Depth weeping from side of observation hole inches
- ☒ Depth to soil mottles TH 01 = 23" Inches TH 02 = 20 inches
- ☐ Ground water adjustment feet

Index Well Number

Reading Date

Index well level

Adjustment factor

Adjusted ground water level

**Depth of naturally Occurring Pervious Material**

Does at least four feet of naturally occurring pervious material exist in all areas  
observed throughout the area proposed for the soil absorption system? Yes

If not, what is the depth of naturally occurring pervious material? \_\_\_\_\_

**Certification**

I certify that on Lic # 1232 (date) I have passed the soil evaluator examination  
approved by the Department of Environmental Protection and that the above analysis  
was performed by me consistent with the required training, expertise and experience  
described in 310 CMR 15.017.

Signature Fredric W. King Date July 6, 2020



## **APPENDIX 2**

# **STORMWATER OPERATION & MAINTENANCE And POLLUTION SOURCE CONTROL**



# **STORMWATER MANAGEMENT SYSTEM OPERATION AND MAINTENANCE PLAN and LONG TERM POLLUTION PREVENTION**

**Rudenberg Estate – Single Family House Project  
Wayside Inn Road, in Sudbury, MA  
Revised 11/11/2022**

## **INTRODUCTION**

The Stormwater Management System for the proposed single family house project at Wayside Inn Road in Sudbury, MA contains “Stormwater Best Management Practices” (BMP’s) that have been designed to protect the environment from stormwater related impacts to surface waters and groundwater. Stormwater Best Management Practices are defined as devices that temporarily store, treat and convey stormwater runoff to reduce flooding, remove pollutants, and provide other amenities for the protection of surface and groundwater resources and the general environment.

As with any stormwater BMPs, they must be inspected and maintained on a regular basis in order for the system to function properly as designed. Good maintenance practices help ensure that the stormwater BMP’s are in proper working order when they are needed to perform under storm conditions and will maximize the useful life of the facilities. BMP’s that are not properly maintained soon become less effective and may lead to costly repairs to bring the BMP’s back to a good condition. Proper maintenance also helps avoid failures of the systems and resulting environmental damage or long-term degradation of valuable natural resource areas.

This manual has been prepared for the operation and maintenance of the planned stormwater management system. At the completion of the project, the responsibility for the maintenance and operation of the system will be the Owner / Operator of the property. This project is being designed and permitted to prepare the property for sale. The current owners, (Estate of Gunther Rudenberg, will not be building the project. The future owners will be responsible for the operation and maintenance of the planned stormwater management systems. The future owners have not been determined at this time.

The Stormwater BMP proposed for this single-family home site includes the following:

- One Rain Gardens (aka Bioretention Basin) located off the front of the house, that will receive stormwater runoff and snow melt from the roof area and the front walk and entry pad to the house.
- Pervious Paver system for the driveway runoff.

Routine inspections and some of the routine maintenance tasks will be performed by the owner. Outside contractors may be hired for some items, such as vacuum sweeping and major repairs and replacement of the pervious pavers.

This manual is intended to be used as the management document for the system. It contains specific plans of the components of the stormwater management system. These include descriptions of the purpose and function of each component, inspection and maintenance requirements and check lists and report forms for record keeping. The manual also contains background information, descriptions of environmental concerns and information necessary for an understanding of the reasons for the proper management of the stormwater management system.

The first step in the process of implementing the operation and maintenance requirements needs to include the following:

1. Training of the Owner
2. Administration Tasks: Budget Planning, Resource Allocation, etc.
3. Preparation of an as-built plan or site map that shows the built location of the completed facility.

#### **TOWN OF SUDBURY REQUIREMENTS**

Note that the Town of Sudbury Planning Board or its designee shall be allowed to enter the property at reasonable times and in a reasonable manner for the purpose of inspection. A copy of this O&M Manual shall remain on file with the Planning Board and Conservation Commission.

A copy of the regular inspection reports shall be submitted to and maintained by the Planning Board or its designated Reviewing Agent as may be required under the various permits and approvals issued for the project.

The owner of the stormwater management system must notify the Planning Board or its designated Reviewing Agent of any changes in ownership or assignment of financial responsibility as may be required under the various permits and approvals issued for the Project.

#### **MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS**

Following construction of the Stormwater Management System, the Operation and Maintenance Plan must be implemented for the system to remain in compliance with the Massachusetts Stormwater Management Standards and Town of Sudbury requirements.

#### **STORMWATER BEST MANAGEMENT PRACTICES (BMP's)**

The Stormwater BMP's designed into the project include the following:

<u>STORMWATER BMP's</u>	<u># Units</u>
Rain Garden	1
Pervious Paver System	1

The following pages describe the inspection, routine maintenance and non routine maintenance which are required for each BMP. The inspection and maintenance requirements are based on the recommendations from the Stormwater Management Standards Handbook, Volume 1, 2, 3, February 2008, MassDEP.

**BUDGET:**

Due to the simple nature of the system, the routine O& M costs for this item can be part of the regular site maintenance for the property with no significant additional cost.

**STORMWATER MANAGEMENT SYSTEM OPERATION & MAINTENANCE**

The stormwater management systems designed for the proposed house project are passive systems that do not require any operational procedures to be followed during a storm event to operate as intended. There are no valves to turn, weirs to set, pumps to be turned on, or other manual activity required. What is necessary to assure that the system functions properly are the performance of regular inspections and maintenance tasks.

The Best Management Practice for this project consists of one Rain Garden located off the front of the house with associated gutters and downspouts from the roof drain system, and a Pervious Paver System that covers 760 sq. ft. of the driveway. The rain garden will receive runoff from the roof area and the front walkway. and the precipitation that falls directly into the basin. The pervious paver system will receive the precipitation that falls onto the pervious paver system and some runoff from the adjacent paved driveway. The Operation and Maintenance requirements for these systems involve the following:

Inspections	A process by which you can evaluate if the BMP's are in acceptable condition and are still effective.
Maintenance	Tasks required for the upkeep and repair of the BMP's to keep them in good working order. This is broken down into routine maintenance tasks, and non-routine maintenance and repairs.
Record Keeping	Documentation of the Inspections and Maintenance that has been performed. This is important and useful for: 1.) Proving that the tasks are performed. 2.) Use in scheduling and planning of repairs and maintenance. 3.) Documenting possible future problems and recommending corrective measures. 4.) Planning manpower and equipment needs. 5.) Making adjustments to the O&M Plan where warranted for the stormwater system to function as intended.

The inspection and maintenance requirements for each stormwater BMP are based on the recommendations contained in the MassDEP Stormwater Management Handbook, Volume Two, Chapter 2, Structural BMP Specifications; February 2008. It is recommended that the procedures described for each BMP be followed strictly for the

first two years of operation. During that initial two-year period, the observations and experience gained from monitoring this stormwater management system will provide the information necessary to adjust the O&M procedures for the most efficient management of the system. Adjustment of the Operation and Maintenance Procedures may require the approval from the Town of Sudbury.

Note that the descriptions of the maintenance requirements include the basic items needed or required for the tasks. The inspectors and maintenance personnel must also be made aware of other work-related safety precautions and regulations such as OSHA confined space rules, traffic safety, protective clothing, and safety equipment that must be utilized in the performance of the prescribed tasks.

## **INSPECTION AND MAINTENANCE REQUIREMENTS FOR BMP's**

### **BIORETENTION BASINS (RAIN GARDENS) WITH ROOF DRAINS**

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#### **DESCRIPTION AND FUNCTION**

Bioretention is a technique that uses soils, plants, and microbes to treat stormwater before it is infiltrated and/or discharged. Bioretention cells are shallow depressions filled with sandy soil topped with a thick layer of special bioretention soil and planted with dense native vegetation. The runoff percolates through the soil media that acts as a filter. The root systems of the vegetation keep the soil pores open to allow the infiltration into the soil media.

There are two types of bioretention cells: those that are designed solely as organic filtering bioretention areas and those configured to recharge groundwater in addition to acting as a filter/exfiltrating bioretention area. This project contains the latter type and there is to be one basin on this site.

**ROOF DRAINS:** In this case, the main runoff draining to the Rain Garden is from the roof of the house. So the O&M for this facility also includes the roof drain system that drains to the Rain Garden.

#### **INSPECTIONS**

Bioretention areas require careful attention while plants are being established and seasonal landscaping maintenance thereafter. Inspect pretreatment devices, roof drain gutters and downspouts, and bioretention cells regularly for sediment build-up, structural damage, and standing water. Overall, the bioretention system should be inspected monthly in a general manner by brief observation. Thorough inspections with report forms shall be twice per year. The areas should be inspected for trash and debris, vegetative health, stability, and soil erosion. The overflow area must be inspected for condition.

#### **ROUTINE MAINTENANCE**

Remove and replace dead vegetation semi-annually or as needed based on the inspections. Removal of trash and debris should take place monthly with replacement of the mulch occurring when infiltration is blocked, and extended ponding is occurring (more than 72 hours following a rain event). Mow the basin and prune the vegetation 1-2 times per year. Other tasks include fertilizing (only when necessary), liming, watering, pruning, and weed and pest control if necessary, to maintain the health of the vegetated cover. Keep overflow area clear of debris.

**ROOF DRAINS AND DOWNSPOUTS:** As part of the routine maintenance, the roof drain system for the house is to be inspected to make sure it is functioning properly. The gutters, downspouts and drain leaders discharging to the Rain Garden is to be free of leaves, sediment and debris to be free draining. It is recommended that the system be cleaned at least twice per year (late fall after leaves have fallen and early spring) and additionally as determined by the routine inspections. Removal of clogs in the roof drain piping and usually be accomplished by flushing with a hose.

#### **NON-ROUTINE MAINTENANCE**

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Major repairs to vegetation

Stormwater Operation & Maintenance Plan for  
H. Gunther Rudenberg Estate

- Replace the bioretention soil media and vegetation. (3-5 years unless draining satisfactorily)
- Repair erosion of areas creating an improperly functioning BMP
- Rototilling of the surface to break up surface compaction and replanting (rarely required if well maintained).
- Repairs to the roof drain system.

**MAINTENANCE EQUIPMENT**

- Typical lawn and vegetation maintenance equipment (mower, rakes, pruners, etc.)
- Shovels, trash bags, and wheelbarrow for removal of sediment, leaf litter and debris.
- Ladders for access to the roof gutters for cleaning.
- Hose from the water supply for flushing of drain piping.



## **PERVIOUS PAVER SYSTEM**

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### **TYPES**

1. Access Drive - “Uni-Eco-Stone”

### **INSPECTIONS**

The pervious pavers system should be inspected on a monthly basis or one to two days after a rainfall event to ensure that there is no ponding, upheaval of the pavers, and check of the structural integrity of the pavers.

### **MAINTENANCE**

Proper design and installation, including the use of the specific size aggregates to fill in the voids, coupled with a scheduled maintenance program can minimize the loss of porosity over time. The amount and type of traffic the pavement is subject to influences how often cleaning is required. The pavement should be kept clean of leaves and dirt and debris. For winter traction control, sand must not be used as the sand will clog the pores. It is recommended that snow be plowed off the surface and the surface may be treated with an “ice melt” product or brine solution for ice control. Typically if the system is draining properly, icing is not a common problem. No sodium based salts may be used for ice control. Calcium chloride or magnesium chloride or pre-treatment brine solution are acceptable.

The pervious paver system is only 760 sq. ft in area. So, routine sweeping with a stiff bristle broom and or leaf blower can be used to keep the surface pores from clogging. This should be done at least twice per year. Once or more in the fall after leaf-fall when necessary, and then again in the springtime after the melting of snow to clean the sand and mud tracked in from winter roads.

When necessary to restore infiltration rate, hire a contractor sweeper to clean the pavement with a hydro-vac. This should be done in the springtime after the melting of snow to clean the sand tracked in from winter roads. And then refill the stone gaps with the fine stone that is removed during vacuuming. It is recommended to plan to hydro-vac the surface once every 3 to 5 years.

### **MAINTENANCE EQUIPMENT**

Grounds equipment  
(rakes, brooms, leaf blower, etc.)  
Hydro-vac when necessary to restore infiltration capacity.

### **NON-ROUTINE MAINTENANCE**

These are repairs and replacement of system paving stones as necessary and may include the following.

- Removing the surface pavers and remove any clogged setting bed stone. Add new setting bed stone as necessary and reset the pavers.
- Repairs to curbing and edging.

## LONG TERM POLLUTION PREVENTION (SOURCE CONTROL)

In accordance with the standards for a General Stormwater Permit under the Sudbury Stormwater Bylaw Regulations, the following pollution source control measures are required to be employed on the site. Specific reference is made to Section 6.0 J.1.f. We have included the listing of Items in italics and have added specific information as necessary for the specific project.

1. *Store lawn and deicing chemicals under cover.*
  - For this project, it is recommended to keep these materials within the garage. See also Item 10 below.
2. *Apply fertilizers and pesticides sparingly to prevent wash-off.*
  - Note that the lawn areas have been kept to a minimum. All other areas are to be planted with native trees, shrubs and ground cover that should not require any fertilization after the initial planting period when the areas are in full cover.
3. *Use of slow-release nitrogen and low phosphorus fertilizers is encouraged.*
4. *No fertilization or pesticide application in or near any wetland resource area.*
  - Note that the planting areas near the wetlands are to be planted with native shrubs and groundcovers to provide a natural buffer between the developed area and the wetlands. These areas will not need any fertilization following initial establishment as described in Item 2 above.
5. *Pick up pet waste, dispose of in the toilet or trash.*
6. *Store, use and dispose of household hazardous wastes properly.*
7. *Limit exterior washing of vehicles to locations that drain to pervious surfaces and away from storm drains.*

For this project, the driveway area will consist of a pervious paver system. A short section of driveway will also drain to this paver system. Washing of vehicles on this surface is not recommended as the detergents in the rinse water will eventually drain to groundwater. It is recommended that outdoor car washing at this site be avoided and the owner should use off-site car washing facilities.
8. *Maintain vehicles and clean up fluid spills/drips from pavement areas.*
  - The owner needs to regularly check their vehicles for fluid leaks and have the vehicles regularly maintained.
9. *Pump and maintain septic system.*
  - The owner must regularly maintain the septic system per the recommendations of the Board of Health.
10. *Use alternative deicers such as calcium chloride and magnesium chloride in lieu of sodium based deicers.*
  - This is particularly important at this site due to the pervious paver system. Non-sodium based brine pretreatment solution is also acceptable.
11. *No coal tar based pavement sealants are to be used on any site subject to the General Stormwater Management Permit (GSMP).*

### **SPECIAL SNOW REMOVAL REQUIREMENTS**

In addition to the information on snow removal contained in the pervious paver O&M section and in the foregoing Source Control section, the following conditions shall apply.

Plow or snow-blow snow to the sides of the driveway and the turn-around area with the following conditions:

- Do not deposit snow into the Town drain ditch along Wayside Inn Road.
- Do not plow or throw snow into the wetland area or onto buffer plantings off the end of the driveway.

# STORMWATER MANAGEMENT SYSTEM

## INSPECTION AND MAINTENANCE FORMS

### CONTENTS:

#### INSPECTION FORMS

- Bioretention Basins (Rain Garden)
- Pervious Pavers

#### MAINTENANCE / REPAIR RECORD FORM

BIORETENTION BASINS WITH ROOF DRAIN SYSTEM  
 Routine Inspection Checklist

- Inspection semi-annually

Rain Garden #1	Slope Integrity	Sediment Depth	Vegetation	Erosion	Ponding	Date
						Comments

ROOF DRAIN SYSTEM

	Debris?	Clogs	Condition	Comments
Gutters				
Down Spouts				
Drain Pipes				

PERVIOUS PAVER SYSTEM

**Routine Inspection Checklist**

- Inspected monthly or two to three days after a rainfall.

Date \_\_\_\_\_

Structural Integrity	Draining Properly	Ponding	Debris	Comments
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

"Uni-Eco-Stone"

\* Presence of hydrocarbons is a clearly visible layer of oil, gasoline, grease, hydraulic fluid, etc., floating on the surface or a strong odor of gas or oil



