CITY OF DOVER

PLANNING TECHNICAL REVIEW COMMITTEE –AGENDA

Meeting Type: Regular Meeting
Meeting Location: Council Conference Room – City Hall, Dover NH
Meeting Date: **Thursday, February 24, 2022**
Meeting Time: **10:30 AM**

1. 10:30 AM – 11:15 AM: Site Review for Equine Properties, LLC., Assessor's Map H, Lot 37A, zoned Commercial, located at 239 Knox Marsh Road. (Proposal is to construct a private roadway to provide access to two (2) mixed use buildings, each building consisting of commercial space on the first floor with 26 residential units on the second and third floor & construct twelve (12) single family dwellings). A related CUP application will also appear before the Planning Board. [*This item was previously heard on February 11, 2021 and June 24, 2021*] (P21-04)

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January 31, 2022

To: City of Dover
Attn: Director of Department of Planning and Community Development
Ms. Donna Benton
288 Central Ave
Dover, NH 03820

RE: "Residences and Shops at Kelly Brook" (P-21-04)
Equine Properties, LLC
239 Knox Marsh Road
Mixed Use Site Plan
Map H, Lot 37A

Ms. Benton and the Dover Planning Board,

Berry Surveying & Engineering (BS&E,) on behalf of Equine Properties, LLC respectfully requests the City of Dover Planning Board to accept the following Conditional Use Permit:

CUP Request #1:

- Disturbance within the 50' wetland buffer.

1. Identification of Conditional Use Permits

Regulations in the zoning ordinance do not allow for earth disturbance within the 50' wetland buffer. However, Section 170-27.1 (F) states that a conditional use permit may be granted by the planning board, given the following standards, as shown below, are met.
Below we show the project's compliance with the standards required to grant a Conditional Use Permit, and we provide justification for its approval.

2. Compliance with the following standards

a) Practicable Alternative: There is no practicable alternative that would have a less adverse impact on the area.

- **With respect to Impact Area #1 & #2, this area could not be avoided due to positioning of buildable areas for development, access and pedestrian use within the neighborhood. The slopes are designed at a 3:1 for pedestrian safety, slope stability and growth management.**

This area is proposed to impact a wetland buffer that has recently been impacted by logging activity and is currently de-vegetated. The area also includes a proposed underdrain to ensure there is no water trapped between the existing condo development and the proposed homes along Tibetan Drive. It protrudes into the buffer to allow for an elevation that will allow the area to drain.

- **With respect to Impact Area #3, this area is for the construction of a gravel wetland for the purposes of stormwater mitigation. The slopes are designed at a 3:1 for slope stability and growth management. This area is proposed to impact a wetland buffer that has recently been impacted by logging activity and is currently de-vegetated. Upon completion of the gravel wetland construction, a robust landscape buffer, featuring trees and shrubs will be installed along the edge of disturbance.**

b) Avoidance: The potential impacts have been avoided to the maximum extent practicable. The APPLICANT will demonstrate by plan and example that the proposed construction represents the least impacting alternative.

- **The proposed single family units on the left side of Tibetan Drive were held as close to the setback line as possible. As a result, the road and remaining units (on the right side) are held as far to south as practical, away from the wetlands. The proposed development was designed in order to avoid buffer disturbance as much as possible.**

c) Minimization: Any unavoidable impacts have been minimized. No reasonable Alternative to the proposed construction exists which does not impact a wetland or which has less detrimental impact on a wetland. Design, construction and maintenance methods will be prepared by a registered engineer to minimize detrimental impacts to the wetlands and will include restoration of the site as nearly as possible to its original grade.

- **The proposed project minimizes buffer disturbance through several design methods. The first being the use of closed drainage throughout the site. This negates the need for open water drainage, such as swales and limits the overall disturbance of the project, especially as it relates to buffer disturbance. This will further minimize buffer disturbance without compromising pedestrian safety or slope stability. The remaining buffer area and wetlands will be protected**

through the use of various erosion and control measures such as silt soxx and mulch berm.

d) Mitigation: If the APPLICANT is required by State rules to prepare a compensatory mitigation plan, the APPLICANT shall provide the Conservation Commission and PLANNING BOARD with one copy each of said plan for their review.
   - **Landscaping will be installed at the edge of disturbance. A mix of trees will be installed along the edge of disturbance to provide landscaped buffer. In addition, blueberry bushes will be staggered between the trees. Blueberry bushes tend to do well in wetland soil and will add additional buffer. Upon construction completion, the disturbed area within the buffer will be seeded with conservation seed mix in order to further stabilize the slopes and add additional vegetation to the buffer.**

e) Approval for the wetlands impact has been received from the NHDES Wetlands Bureau pursuant to Section G (3), below.
   - **There are no proposed impacts to the jurisdictional wetlands, only the buffer. No permit is required.**

3. Justification for approval of Conditional Use Permits

The proposed development will have 10,394 Sq.Ft. of buffer disturbance. All of this disturbance will be for the construction of the proposed road and relating grading through the buffer, as well as the construction of a gravel wetland for stormwater treatment. The remaining area of road and proposed units will be pulled towards the center of the lot and away from the wetland. There will be no other buffer disturbance on this project.

As part of the site plan development an intensive drainage analysis was done. The existing flows and volumes were calculated and analyzed against the proposed flows to make sure the proposed development would not increase flows offsite. Given the location of the parcel in relation to adjacent stream watersheds, gravel wetlands were chosen because they provide a level of treatment that removes nitrogen and phosphorus, which will greatly benefit the downstream discharge locations.
The site was also designed to be wildlife friendly and allow for small animal migration throughout the site. The design will feature the following elements: 3:1 side slopes, natural fiber matting, and outlet structures with crushed stone sumps, outlet structures positioned away from side slopes. All of these methods have been used for similar projects in the past. All proper erosion and sediment control methods will be taken to

ensure that no sediment is tracked onto Knox Marsh Road, abutting lots, or the wetlands. Upon start of construction, a construction entrance will be installed off Knox Marsh Road to prevent tracking. Perimeter control will be installed at the edge of construction to contain sediment within the construction zone.

An intensive landscaped buffer will be installed at the edge of disturbance to provide a buffer between the development and the remaining undisturbed buffer area. This landscaped buffer will feature highbush blueberries and ink berries. A mixture of evergreens and maples trees will also be planted along the buffer. Placards will also be installed to show where the buffer/edge of disturbance is to prevent future disturbance once the area is stabilized.

CUP Request #2:

- More than 20% impervious within the secondary groundwater protection zone.

1. Identification of Conditional Use Permits

Regulations in the zoning ordinance do not allow for more than 20% impervious cover in the secondary groundwater recharge zone. However, Section 170-28.E states that a conditional use permit may be granted by the planning board, given the following standards, as shown below, are met.

Below we show the project's compliance with the standards required to grant a Conditional Use Permit, and we provide justification for its approval.

2. Compliance with the following standards

a) The proposed development plan incorporates a stormwater drainage plan, approved by the Planning Board and prepared by a professional engineer certified to practice in the State of New Hampshire

- **A full drainage analysis was conducted as part of the application. The drainage analysis was designed to be not only compliant with the City of Dover regulations but also with Alteration of Terrain (AoT) regulations. Alteration of Terrain Standards do not allow for infiltration on this particular subject parcel due to restrictive soil conditions and standards put forth by Env-Wq 1500 Alteration of Terrain. A waiver for Ground Water Recharge Volume (GRV) has been requested at the state level. Please find the AoT waiver request, located after part B, for further justification. This Site Plan proposes 31.6% impervious.**

b) Groundwater Protection Zone of all development-generated stormwater runoff from a ten (10) year storm. Furthermore, the stormwater drainage

plan shall provide for the removal of oil and gasoline from parking LOT runoff by use of treatment swales, oil/gas separators or other device, prior to retention and percolation of the runoff.

- **Swales and sediment forebays will be constructed as part of the development. These are designed to capture the runoff and retain any debris, sediment, and oil/gasoline before the runoff gets into the proposed ponds. If anything gets through the swales/forebays, the ponds will act as a second level of protection, preventing anything from getting to the final discharge points. Subsurface gravel wetlands are proposed on site, which provide a high level of nitrogen and phosphorous treatment in addition to other common pollutants found on this type of site.**

  With a waiver to GRV being requested at the state level, no infiltration is to take place on site and all site generated stormwater is to be discharged as surface water. Infiltration of stormwater generated by the 10-YR 24 Hr storm event is not able to occur due to site soil restrictions. The following paragraphs are the language submitted for the GRV waiver request.

"Identification of Waivers Requested:

1. Waiver requested to not satisfy Ground Water Recharge (GRV) requirement as put forth by Env-Wq 1507.04(b).

1) Explanation:

This waiver request is being submitted to allow for the Ground Water Recharge requirements put forth by Env-Wq 1507.04(b) due to soil conditions on site as shown in the Site Specific Soils Map (SSSM).

1) Waiver Justification:

a. Granting the request will not result in an adverse impact on the environment, public health, public safety, or abutting properties that is more significant than the impact that would result from complying with the rule as written.

Granting this request will not result in adverse impact on the environment, public health, public safety, or abutting properties that is more significant than the impact of complying with the rules as written. This is due to site conditions not allowing for compliance. On-Site soils that are being replaced with impervious surfaces are; Winsdor Variant, Buxton, and Scantic. The Windsor Variant has limited recognition across the

state, primarily only being in Strafford County, which is why it is not found in the KSat Values for New Hampshire Soils (Ksat NH Manual). While the Windsor Variant experiences Ksat of 6-20 in/hr in the "B" horizon according the Ksat NH, a silt loam "C" horizon exists a silt loam "C" horizon exists with a significantly more restrictive Ksat.

Using the NH State-Wide Numerical Soil Legend (Key to the Soils of New Hampshire) 2011 Catena, the Windsor Variant is located within Section C, Marine or Glaciolacustrine Deposits, Soils Developed in Silt and Clay. From this section Eldridge soil contains similar textures and a restrictive "C" horizon. Using the Ksat NH Manual, Eldridge soil has a "C" horizon Ksat of 0.06-0.6 in/hr. By applying this restrictive "C" horizon to the Windsor Variant, infiltration would be prohibited in the proposed condition.

Buxton consists of restrictive "B" and "C" horizons of 0.1-0.6 in/hr and 0.0-0.2 in/hr, respectively. Scantic consists of restrictive "B" and "C" horizons as well, with 0.0-0.2 in/hr and 0.0-0.2 in/hr, respectively. With restrictive "B" and "C" horizons across the subject parcel, compliance with Env-Wq 1507.04(b) is not possible.

b. Granting the request is consistent with the intent and purposes of the rule being waived.

Utilizing the justification put forth in part a, granting this waiver request is consistent with the intent and purposes of the rule being waived. There is no location of site that is able to provide the minimum Ksat requirement of 0.5 in/hr in order to satisfy the GRV requirements of Env-Wq 1507.04(b)."

BERRY SURVEYING & ENGINEERING

Kevin R. Poulin, EIT
Project Engineer

Christopher R. Berry
Principal, President

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Equine Properties, LLC

McCrone Place
Dover, NH
August 11, 2021

THOMAS A. HOUSE No. 2380 LICENSED ARCHITECT THE STATE OF NEW HAMPSHIRE

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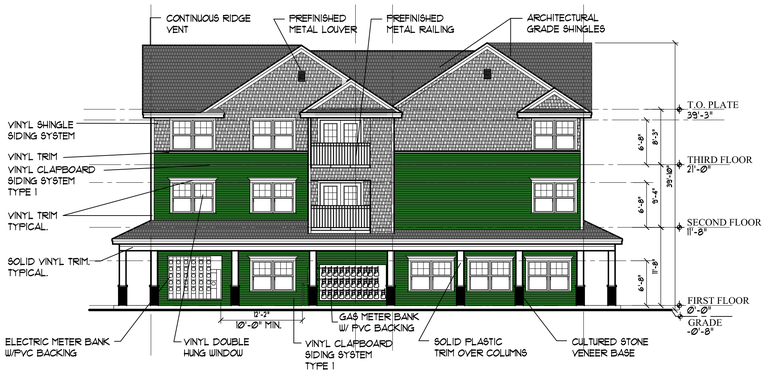
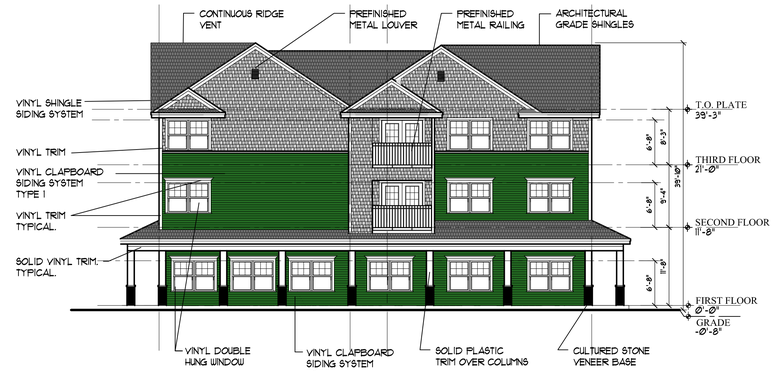
1 Front Elevation (Know Farm Road)
3/32"=1'-0"



2 Left Elevation
3/32"=1'-0"



3 Right Elevation
3/32"=1'-0"

4 Rear Elevation
3/32"=1'-0"

Equine Properties, LLC

McCrone Place
Dover, NH
August 11, 2021

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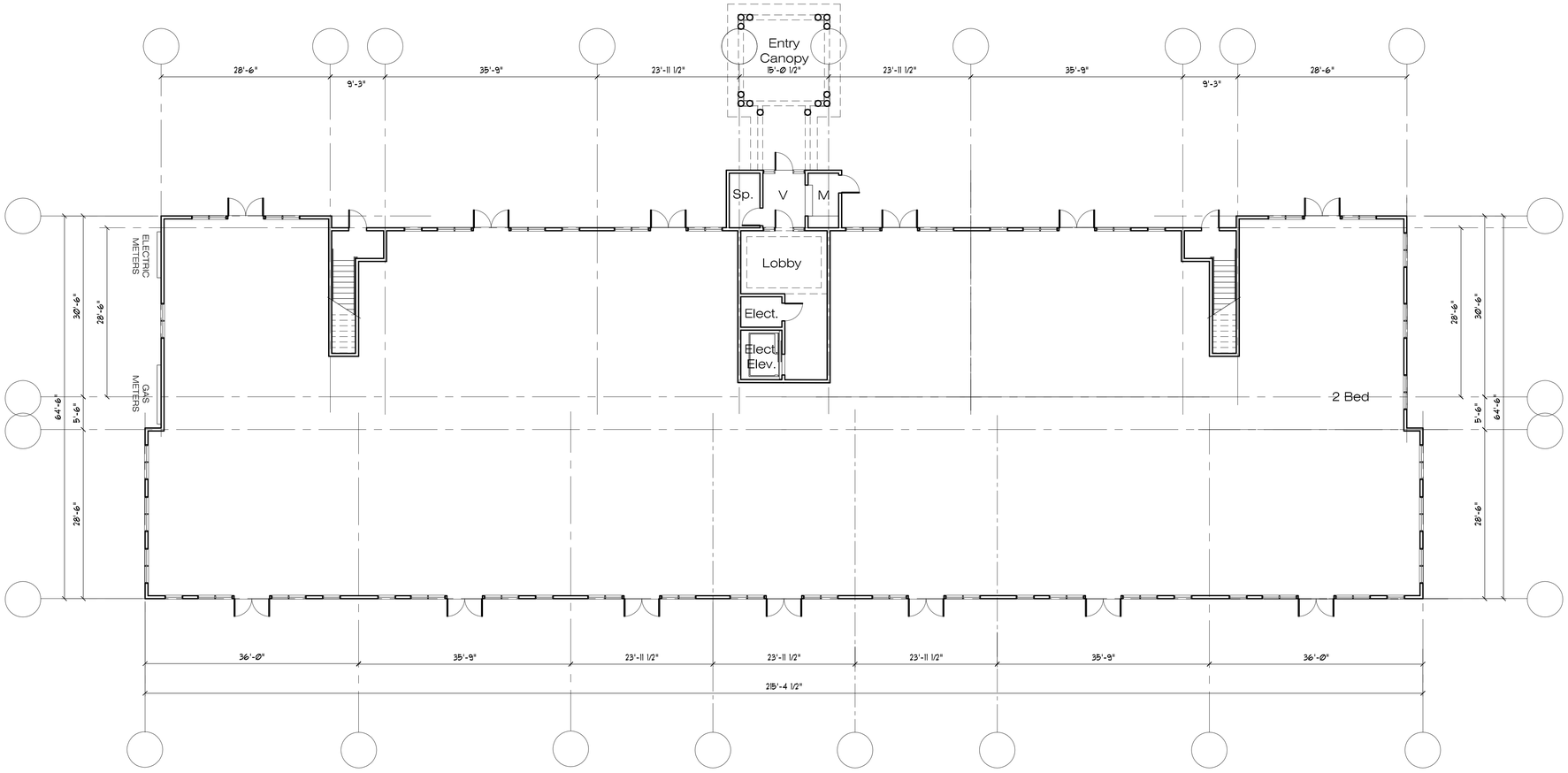

1 First Floor Plan
3/32"=1'-0"

Equine Properties, LLC

McCrone Place
Dover, NH
August 11, 2021

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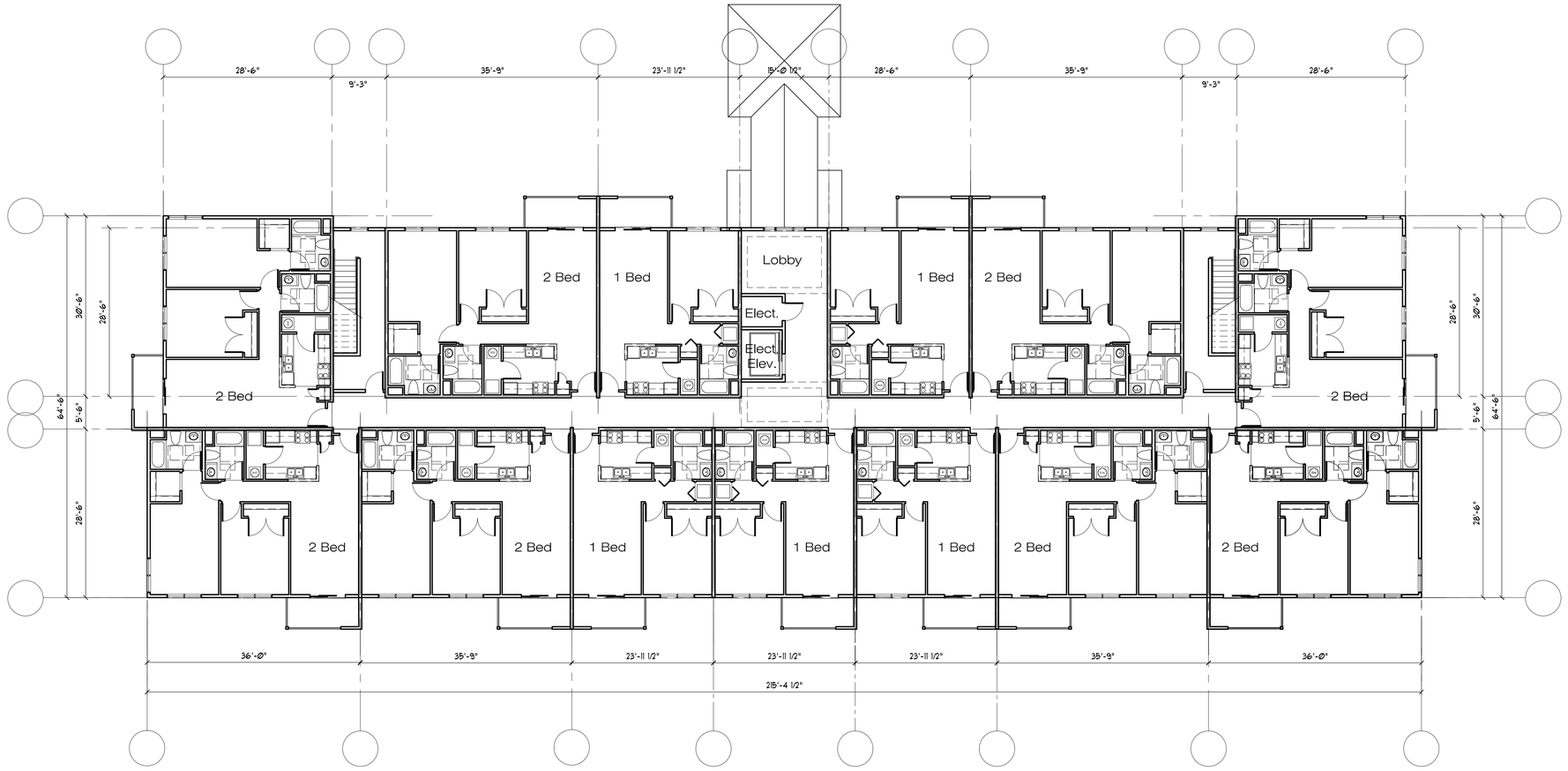

1 Second Floor Plan
3/32"=1'-0"

Equine Properties, LLC

McCrone Place
Dover, NH
August 11, 2021

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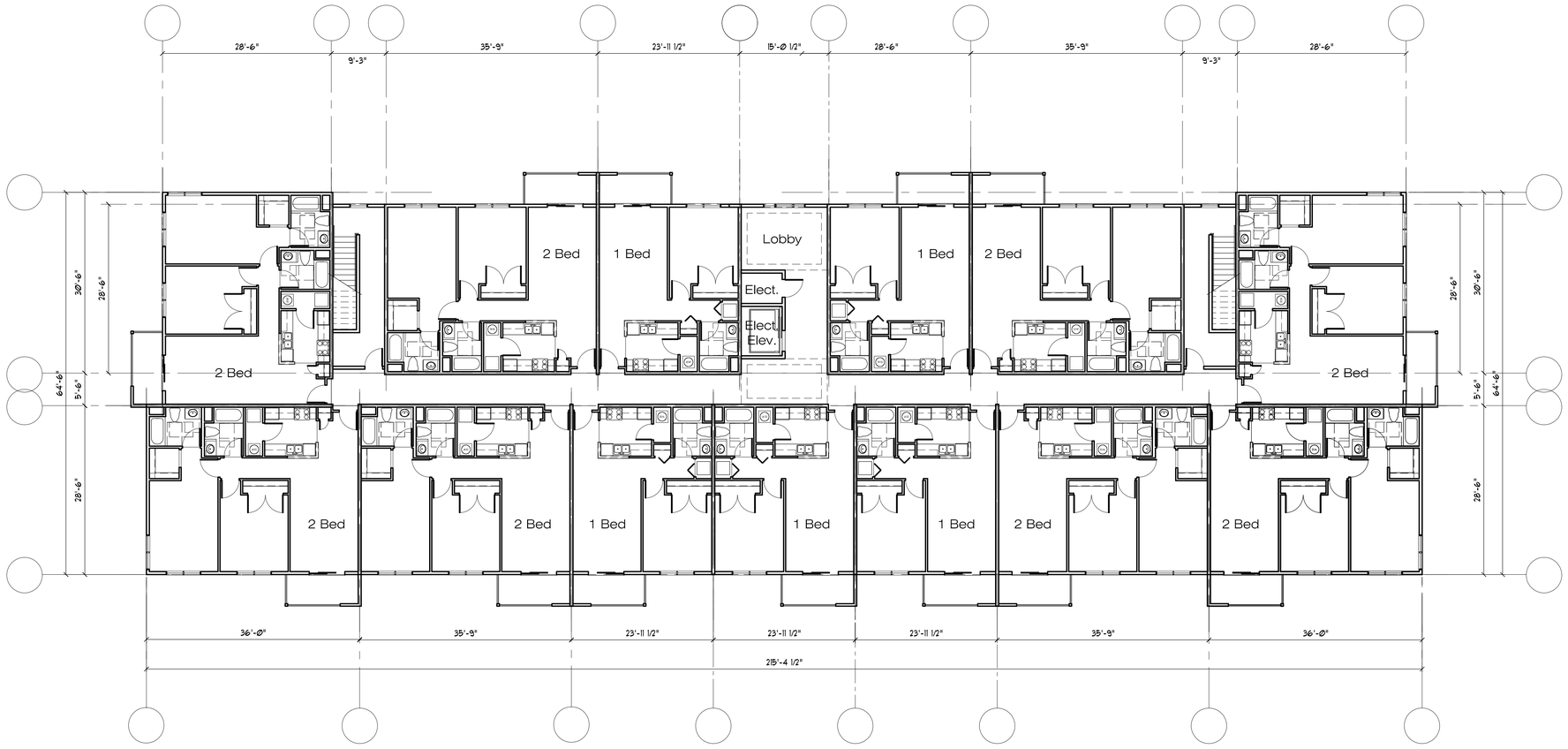

1 Third Floor Plan
3/32"=1'-0"

Equine Properties, LLC

McCrone Place
Dover, NH
August 11, 2021

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"RESIDENCES AND SHOPS AT KELLY BROOK"
MIXED USE SITE PLAN
FOR
EQUINE PROPERTIES, LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

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SURVEYOR OF RECORD: KENNETH A. BERRY, PE, LLS
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HOPKINTON, NH 03229

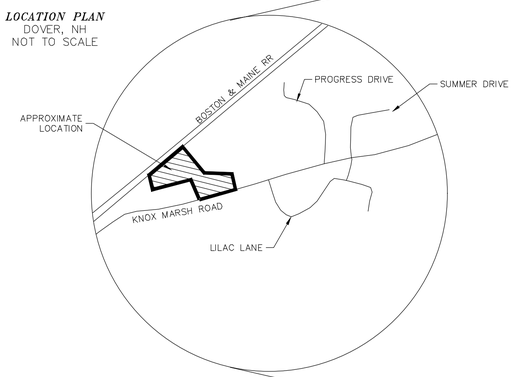
ARCHITECT: THOMAS A. HOUSE
THA ARCHITECTS LLC
P.O. BOX 88
STRATHAM, NH 03885

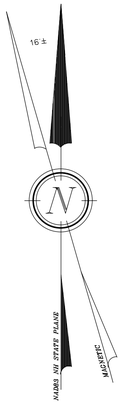
OWNER & APPLICANT: EQUINE PROPERTIES, LLC
P.O. BOX 190
EXETER, NH 03833-0190

NOTE:

BERRY SURVEYING & ENGINEERING HAS PREPARED AN INSPECTION & MAINTENANCE MANUAL AS PART OF THIS PROJECTS DOCUMENTATION. ALL USERS ARE BOUND TO THIS DOCUMENT AS PART OF THE APPROVAL OF THE PLANNING BOARD. COPIES OF THE YEARLY INSPECTIONS ARE TO BE DELIVERED TO THE CITY OF DOVER COMMUNITY SERVICES DEPARTMENT.

LOCATION PLAN
DOVER, NH
NOT TO SCALE





VICINITY SKETCH
DOVER, NH
SCALE: 1" = 200' ±

NEW HAMPSHIRE FISH AND GAME NOTES:

1.) ALL OBSERVATIONS OF THREATENED OR ENDANGERED SPECIES SHALL BE REPORTED IMMEDIATELY TO THE NEW HAMPSHIRE FISH AND GAME DEPARTMENT NONGAME AND ENDANGERED WILDLIFE ENVIRONMENTAL REVIEW PROGRAM BY PHONE AT 603-271-2461 AND BY EMAIL AT NHFGREVIEW@WILDLIFE.NH.GOV. EMAIL SUBJECT LINE: NHB20-2030, "RESIDENCES AND SHOPS AT KELLY BROOK". WILDLIFE SPECIES OBSERVATION. PHOTOGRAPHS SHALL BE PROVIDED FOR VERIFICATION AS FEASIBLE

2.) THE NEW HAMPSHIRE FISH AND GAME DEPARTMENT SHALL HAVE ACCESS TO THE PROPERTY DURING THE TERM OF THE PERMIT.

3.) ALL MANUFACTURED EROSION AND SEDIMENT CONTROL PRODUCTS, UTILIZED FOR, BUT NOT LIMITED TO, SLOPE PROTECTION, RUNOFF DIVERSION, SLOPE INTERRUPTION, PERIMETER CONTROL, AND INLET PROTECTION, CHECK DAMS, SEDIMENT TRAPS, AND SILT FENCE INSTALLED IN ACCORDANCE WITH ENV-WQ 1506.04, SHALL NOT CONTAIN WELDED PLASTIC, PLASTIC, OR MULTI-FILAMENT OR MONOFILAMENT POLYPROPYLENE NETTING OR MESH.

REQUIRED PERMITS:

~ NHDES SEWER DISCHARGE PERMIT	(PENDING)
~ NHDES ALTERATION OF TERRAIN PERMIT	(PENDING)
~ US EPA NOI & SWPPP	(PENDING)
~ NATURAL HERITAGE BUREAU	NHB20-0382
~ NH DIVISION OF HISTORICAL RESOURCES	DHR #10630
~ NHDOT DRIVEWAY PERMIT	(PENDING)

GENERAL PLAN SET NOTES:

1.) 11x17" PLANS ARE HALF THE PUBLISHED SCALE.

2.) ALL PLANS ARE CONSIDERED TO BE NOT FOR CONSTRUCTION UNLESS THEY CONTAIN THE APPROVAL STAMP OF THE CITY OF DOVER.

WHETHER OR NOT OTHERWISE EXPRESSLY RECITED ON THIS SITE PLAN, THE SITE PLAN APPROVAL GRANTED IS CONDITIONED ON FAITHFUL AND DILIGENT ADHERENCE BY THE OWNER/SUBDIVIDER/DEVELOPER OF ALL TERMS, CONDITIONS, PROVISIONS AND SPECIFICATIONS OF THE CITY OF DOVER LAND SITE PLAN REGULATIONS AS AMENDED OR AS MAY LATER BE AMENDED, IN EFFECT ON THE DATE OF APPROVAL, UNLESS OR EXCEPT INSOFAR AS EXPRESSLY WAIVED, IN ANY PARTICULAR, BELOW. NON – ADHERENCE MAY RESULT IN A REVOCATION OF APPROVAL. ANY VARIATION FROM THE APPROVED PLAN WILL REQUIRE A RESUBMISSION FOR SITE PLAN APPROVAL.

APPROVED DOVER

STATE OF NEW HAMPSHIRE LICENSED LAND SURVEYOR No. 805 KENNETH A. BERRY SIGNATURE

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

MIXED USE SITE PLAN
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : AS SHOWN
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE KENNETH A. BERRY No. 10475 LICENSED PROFESSIONAL ENGINEER

ABBREVIATION LEGEND:

E.O.P.	EDGE OF PAVEMENT
S.G.C.	SLOPED GRANITE CURB
V.G.C.	VERTICAL GRANITE CURB
A.C.P.	ASBESTOS CLAY PIPE
BITUM.	BITUMINOUS
E.S.H.W.T	ESTIMATE SEASONAL HIGH WATER TABLE
TYP.	TYPICAL
U.G.E	UNDER GROUND ELECTRIC / UTILITY
U.D.	UNDER DRAIN
C.O.	CLEAN OUT
INV.	INVERT
ELEV.	ELEVATION
F.E.S.	FLARED END SECTION
HDPE	HIGH DENSITY POLYETHYLENE
RCP	REINFORCED CONCRETE PIPE
RECB	ROLLED EROSION CONTROL BLANKET
F.G.	FINISHED GRADE
E.G.	EXISTING GRADE
E.T.W.	EDGE OF TRAVELED WAY
T.B.R.	TO BE REMOVED
PL	PROPERTY LINE
CL	CENTER LINE
CF	CUBIC FEET
P.C.	POINT OF CURVATURE
P.T.	POINT OF TANGENCY
P.V.P.	POINT OF VERTICAL CURVE
P.V.I.	POINT OF VERTICAL INTERSECTION
P.V.T.	POINT OF VERTICAL TANGENCY
EX.	EXISTING
PROP.	PROPOSED
STA.	STATION
'/.	FEET / FEET

{ } SSL ( ) ~ {SIZE} SINGLE SOLID LINE (COLOR W=WHITE, Y=YELLOW)
{ } DSL ( ) ~ {SIZE} DOUBLE SOLID LINE (COLOR W=WHITE, Y=YELLOW)
{ } SSB ( ) ~ {SIZE} SINGLE SOLID W/ BROKEN LINE (COLOR W=WHITE, Y=YELLOW)
{ } SBL ( ) ~ {SIZE} SINGLE BROKEN LINE (COLOR W=WHITE, Y=YELLOW)
{ } DBL ( ) ~ {SIZE} DOUBLE BROKEN LINE (COLOR W=WHITE, Y=YELLOW)

EXISTING LEGEND:

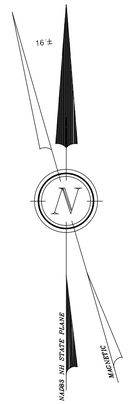
- IRON BOUND (FND)
- REBAR (FND)
- RAILROAD SPIKE (FND)
- UTILITY POLE / GUY WIRE
- SINGLE POST SIGN
- CURB STOP
- GATE VALVE
- GAS VALVE
- FIRE HYDRANT
- CATCH BASIN
- SEWER MANHOLE
- DRAIN MANHOLE
- TREE
- E113.83 EXISTING SPOT ELEVATION
- BUILDING SETBACK LINE
- GAS GAS GAS GAS EXISTING GAS LINE
- EWL EWL EXISTING WATER LINE
- S S EXISTING SEWER LINE
- D EXISTING DRAIN LINE
- OHU OHU OHU OHU OVERHEAD UTILITIES
- 116 EXISTING CONTOUR MINOR
- 115 EXISTING CONTOUR MAJOR

PROPOSED LEGEND:

- TEMPORARY BENCHMARK
- CURB STOP
- GATE VALVE
- GAS VALVE
- CATCH BASIN
- E101 / E6 SHEET DETAIL
- THRUST BLOCK
- LIGHTING
- P114.05 PROPOSED SPOT ELEVATION
- EASEMENT LINE
- GAS GAS GAS GAS PROPOSED GAS LINE
- W W PROPOSED WATER LINE
- S S PROPOSED SEWER LINE
- D PROPOSED DRAIN LINE
- U.D. U.D. PROPOSED UNDERDRAIN
- P41 PROPOSED CONTOUR MINOR
- P40 PROPOSED CONTOUR MAJOR
- SAW CUT LINE
- UGE UGE PROPOSED UNDERGROUND UTILITY
- SS SS SS FILTREXX SILT SOXX (8" or 12" AS NOTED)
- C C C ORANGE CONSTRUCTION PERIMETER FENCE
- ⊞ WETLAND BUFFER PLACARD

SIGN ID NUMBER	SIGN SIZE (WIDTH x HEIGHT)	SIGN	TEXT DIMENSIONS	NO. OF SIGNS	BACKGROUND	LEGEND	BORDER	POST SIZE & QUANTITY
R1-1	30"x30"	STOP	SEE STANDARD HIGHWAY SIGNS 2004 EDITION PUBLISHED BY USDOT – FHWA	5	RED	WHITE	WHITE	SQUARE (6)
R7-8	12"x18"	RESERVED PARKING	SEE STANDARD HIGHWAY SIGNS 2004 EDITION PUBLISHED BY USDOT – FHWA	8	WHITE	GREEN W/ WHITE SYMBOL ON BLUE	RED	SQUARE (8)
R7-8a	12"x6"	VAN ACCESSIBLE	SEE STANDARD HIGHWAY SIGNS 2004 EDITION PUBLISHED BY USDOT – FHWA	8	WHITE	GREEN	GREEN	SQUARE (0)
R8-31	12"x18"	NO PARKING FIRE LANE	SEE STANDARD HIGHWAY SIGNS 2004 EDITION PUBLISHED BY USDOT – FHWA	4	WHITE	RED	RED	SQUARE (4)
R2-1	24"x30"	SPEED LIMIT 25	SEE STANDARD HIGHWAY SIGNS 2004 EDITION PUBLISHED BY USDOT – FHWA	1	WHITE	GREEN	GREEN	SQUARE (1)

GIS SKETCH
DOVER, NH
SCALE: 1" = 200' ±



ABUTTERS WITHIN 200':

N/F NSA OPTIVEST ACQUISITION HOLDINGS
24901 DANA PT HARBOR DR #200
DANA POINT, CA 92629
TAX MAP H, LOT 36-B1
S.C.R.D. BOOK 4225, PAGE 631

N/F KNOX MARSH CONDOS
C/O KATHLEEN GOWDY
251 KNOX MARSH RD #9
DOVER, NH 03820
TAX MAP H, LOT 37

N/F KENNETH A BROWN
213 E LOCKHAVEN DR
FAYETTEVILLE, NC 26314
TAX MAP H, LOT 37-8
S.C.R.D. BOOK 3843, PAGE 420

N/F GARY P NOEL
29 S HAMPTON RD
AMESBURY, MA 01913
TAX MAP H, LOT 37-12
S.C.R.D. BOOK 1574, PAGE 770

N/F NATALIE HEBERT REV LIV TST
NATALIE HEBERT TSTEE
462 SIXTH ST
DOVER, NH 03820
TAX MAP H, LOT 37-14
S.C.R.D. BOOK, 4519, PAGE 327

N/F NANCY L. TAYLOR
251 KNOX MARSH RD UNIT 16
DOVER, NH 03820
TAX MAP H, LOT 37-16
S.C.R.D. BOOK, 4519, PAGE 327

N/F SETH PETERS
23 OLD MILL RD
LEE, NH 03861
TAX MAP H, LOT 37-6
S.C.R.D. BOOK, 4547, PAGE 449

N/F PATRICK J CRAGIN LIV REV TST
PATRICK J CRAGIN TSTEE
PO BOX 250
DOVER, NH 03820
TAX MAP H, LOT B
TAX MAP H, LOT 38
S.C.R.D. BOOK, 3497, PAGE 417

ABUTTERS WITHIN 200' CONT.:

N/F BOSTON & MAINE RR
IRON HOURSE PARK
HIGH ST
NORTH BILLERICA, MA 01862
TAX MAP G, LOT 5

N/F OLDE MADBURY LANE INC
PO BOX 250
DOVER, NH 03820
TAX MAP H, LOT 40-D
S.C.R.D. BOOK 3684, PAGE 740

N/F 237 ALBANY STREET INV. LLC
ABEL AND BRUNELLE ASSOC
160 MIDDLESEX TURNPIKE
BEDFORD, MA 01730
TAX MAP H, LOT 40-B
S.C.R.D. BOOK 4112, PAGE 770

TEST PIT DATA

TEST PIT #101
0–8" 10YR 3/3 DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
8–18 10YR 4/6 DARK YELLOWISH BROWN, LOAMY FINE SAND, GRANULAR, FRIABLE
18–26 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SAND, GRANULAR, FRIABLE
26–44 2.5Y 5/3 LIGHT OLIVE BROWN, VERY FINE SAND WITH REDOXIMORPHIC FEATURES PRESENT, GRANULAR, FRIABLE
42–72 5Y 5/3 OLIVE, SILT LOAM WITH REDOXIMORPHIC FEATURES PRESENT, BLOCKY, FIRM
TERMINATED: 72"
E.S.H.W.T.: 26"
RESTRICTIVE LAYER: 42"
REFUSAL: NONE
GROUND WATER OBSERVED: 64"
PERC RATE: 10 MIN./IN.

TEST PIT #101A
0–10" 10YR 3/3 DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
10–18" 10YR 4/6 DARK YELLOWISH BROWN, LOAMY FINE SAND, GRANULAR, FRIABLE
18–26" 2.5Y 5/4 LIGHT OLIVE BROWN, NFINE SAND, GRANULAR, FRIABLE
26–38" 2.5Y 5/3 LIGHT OLIVE BROWN, VERY FINE SAND WITH REDOXIMORPHIC FEATURES PRESENT, GRANULAR, FRIABLE
38–72" 5Y 5/3 OLIVE, SILT LOAM WITH REDOXIMORPHIC FEATURES PRESENT, BLOCKY, FIRM
TERMINATED: 72"
E.S.H.W.T.: 26"
RESTRICTIVE LAYER: 38"
REFUSAL: N/A
GROUND WATER OBSERVED: 50"
PERC RATE: 8 MIN./IN.

TEST PIT #102
0–10" 10YR 3/3 DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
10–18" 10YR 4/6 DARK YELLOWISH BROWN, LOAMY FINE SAND, GRANULAR, FRIABLE
18–24" 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SAND, GRANULAR, FRIABLE
24–46" 2.5Y 5/3 LIGHT OLIVE BROWN, VERY FINE SAND WITH REDOXIMORPHIC FEATURES PRESENT, GRANULAR, FRIABLE
46–72" 5Y 5/3 OLIVE, SILT LOAM WITH REDOXIMORPHIC FEATURES PRESENT, BLOCKY, FIRM
TERMINATED: 72"
E.S.H.W.T.: 24"
RESTRICTIVE LAYER: 46"
REFUSAL: N/A
GROUND WATER OBSERVED: 44"
PERC RATE: 10 MIN./IN.

TEST PIT #103
0–6" 10YR 3/3 DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6–18" 10YR 4/6 DARK YELLOWISH BROWN, LOAMY FINE SAND, GRANULAR, FRIABLE
18–24" 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SAND, GRANULAR, FRIABLE
24–48" 2.5Y 5/3 LIGHT OLIVE BROW, NVERY FINE SAND WITH REDOXIMORPHIC FEATURES PRESENT, GRANULAR, FRIABLE
48–72" 5Y 5/3 OLIVE, SILT LOAM WITH REDOXIMORPHIC FEATURES PRESENT, BLOCKY, FIRM
TERMINATED: 72"
E.S.H.W.T.: 24"
RESTRICTIVE LAYER: 48"
REFUSAL: NONE
GROUND WATER OBSERVED: 65"
PERC RATE: 10 MIN./IN.

TEST PIT DATA

TEST PIT #103A
0–6" 10YR 3/3 DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
6–18" 10YR 4/6 DARK YELLOWISH BROWN, LOAMY FINE SAND, GRANULAR, FRIABLE
18–24" 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SAND, GRANULAR, FRIABLE
24–50" 2.5Y 5/3 LIGHT OLIVE BROW, NVERY FINE SAND WITH REDOXIMORPHIC FEATURES PRESENT, GRANULAR, FRIABLE
50–72" 5Y 5/3 OLIVE, SILT LOAM WITH REDOXIMORPHIC FEATURES PRESENT, BLOCKY, FIRM
TERMINATED: 72"
E.S.H.W.T.: 24"
RESTRICTIVE LAYER: 50"
REFUSAL: N/A
GROUND WATER OBSERVED: 48"
PERC RATE: 10 MIN./IN.

TEST PIT #104
0–12" 10YR 3/3 DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
12–24" 10YR 5/6 YELLOWSH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24–28" 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
28–60" 2.5Y 5/3 LIGHT OLIVE BROWN, VERY FINE SANDY LOAM WITH REDOXIMORPHIC FEATURES PRESENT, MASSIVE, FRIABLE
60–70" 2.5Y 5/2 GRAYISH BROWN, GRAVELLY FINE SANDY LOAM WITH REDOXIMORPHIC FEATURES PRESENT, MASSIVE, FIRM
TERMINATED: 70"
E.S.H.W.T.: 28"
RESTRICTIVE LAYER: 60"
REFUSAL: LEDGE N/A
GROUND WATER OBSERVED: 55"
PERC RATE: 6 MIN./IN.

TEST PIT #104A
0–10" 10YR 3/3 DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
10–20" 10YR 4/6 DARK YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE
20–36" 2.5Y 5/4 LIGHT OLIVE BROWN, LOAMY FINE SAND, GRANULAR, FRIABLE
36–42" 5Y 4/3 OLIVE, VERY FINE SANDY LOAM WITH REDOXIMORPHIC FEATURES PRESENT, MASSIVE, FIRM
42–52" 2.5Y 6/3 LIGHT YELLOWISH BROWN, SAND WITH REDOXIMORPHIC FEATURES PRESENT, GRANULAR, FRIABLE
52–70" 5Y 5/3 OLIVE, SILT LOAM WITH REDOXIMORPHIC FEATURES PRESENT, BLOCKY, FIRM
TERMINATED: 70"
E.S.H.W.T.: 36"
RESTRICTIVE LAYER: 36"
REFUSAL: LEDGE N/A
GROUND WATER OBSERVED: N/A
PERC RATE: 6 MIN./IN.

TEST PIT #105
0–14" 10YR 3/2 VERY DARK GRAYISH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14–28" 10YR 5/6 YELLOWSH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
28–32" 2.5Y 5/4 LIGHT OLIVE BROWN, GRAVELLY FINE SANDY LOAM, GRANULAR, FRIABLE
32–64" 2.5Y 5/3 LIGHT OLIVE BROWN, GRAVELLY FINE SANDY LOAM WITH REDOXIMORPHIC FEATURES PRESENT, MASSIVE, FRIABLE
TERMINATED: 64"
E.S.H.W.T.:32"
RESTRICTIVE LAYER: N/A
REFUSAL: NONE
GROUND WATER OBSERVED: 40"
PERC RATE: 4 MIN./IN.

TEST PIT #106
0–14" 10YR 3/3 DARK BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
14–24" 10YR 5/6 YELLOWSH BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
24–30" 2.5Y 5/4 LIGHT OLIVE BROWN, FINE SANDY LOAM, GRANULAR, FRIABLE
30–62" 2.5Y 5/3 LIGHT OLIVE BROWN, VERY FINE SANDY LOAM WITH REDOXIMORPHIC FEATURES PRESENT, MASSIVE, FRIABLE
62–72" 2.5Y 5/2 GRAYISH BROWN, GRAVELLY FINE SANDY LOAM WITH REDOXIMORPHIC FEATURES PRESENT, MASSIVE, FIRM
TERMINATED: 72"
E.S.H.W.T.: 36"
RESTRICTIVE LAYER: 60"
REFUSAL: LEDGE N/A
GROUND WATER OBSERVED: 55"
PERC RATE: 4 MIN./IN.

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

NEIGHBORHOOD PLAN
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : AS SHOWN
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10143
LICENSED PROFESSIONAL ENGINEER

JURISDICTIONAL WETLANDS WERE DELINEATED BY DEIDRA BENJAMIN, CWS, IN SPRING OF 2020 UTILIZING THE FOLLOWING STANDARDS:

1) FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 7.0. 2010. L.M. VASILAS, G.W. HURT, AND C.V. NOBLE (EDS.). UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.
2) FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 3. APRIL 2004. NEIWPCC WETLANDS WORKGROUP. WILMINGTON, MA 01887.
3) NORTH AMERICAN DIGITAL FLORA: NATIONAL WETLAND PLANT LIST, VERSION 2.1.0 (HTTP://WETLAND_PLANTS.USACE.ARMY.MIL). U.S. ARMY CORPS OF ENGINEERS, ENGINEER RESEARCH AND DEVELOPMENT CENTER, COLD REGIONS RESEARCH AND ENGINEERING LABORATORY, HANOVER, NH, AND BONAP, CHAPEN HILL.
4) STATE OF NEW HAMPSHIRE 2014 WETLAND PLANT LIST. LICHVAR, R.W., M. BUTTERWICH, N.C. MELVIN, AND W.N. KIRCHNER. 2014. THE NATIONAL WETLAND PLANT LIST: 2014 UPDATE OF WETLAND RATINGS. PHYTONEURON 2014–41:1–42.
5) CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. JANUARY 1987. WETLANDS RESEARCH PROGRAM TECHNICAL REPORT Y–87–1.
6) REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION. JANUARY 2012, VERSION 2. U.S. ARMY CORPS OF ENGINEERS. ENVIRONMENTAL LABORATORY ERDC/EL TR–12–1.
7) CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES. DECEMBER 1979. L. COWARDIN, V. CARTER, F. GOLET, AND E. LAROE. US DEPARTMENT OF THE INTERIOR. FISH AND WILDLIFE SERVICE. FWS/OBS–79/31.

LEGEND:

- IRON BOUND ~FND~
- IRON PIPE ~FND~
- UTILITY POLE / GUY WIRE
- NRCS SOIL DELINEATION LINE
- BUILDING SETBACK LINE
- OVERHEAD UTILITIES LINE
- WATER LINE
- CONTOUR LINE, MINOR
- CONTOUR LINE, MAJOR
- WETLAND LINE
- WETLAND BUFFER
- SEWER LINE
- DRAINAGE LINE

BzB NRCS SOIL LABEL
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND

STATE OF NEW HAMPSHIRE — DEIDRA L. BENJAMIN — No. 295 — CERTIFIED WETLAND SCIENTIST

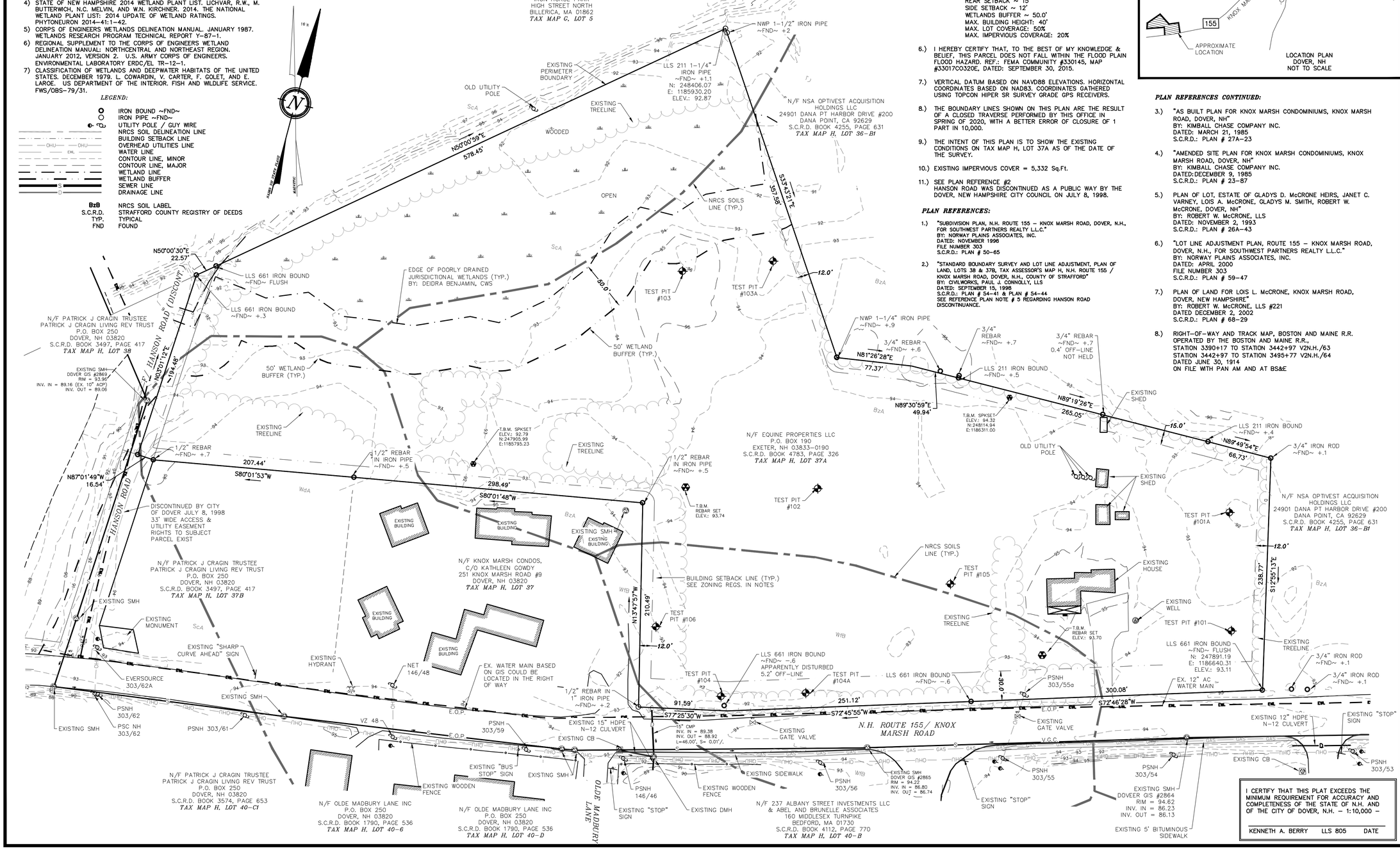
DEIDRA BENJAMIN, CWS #295

SOILS:

BzA – BUXTON SILT LOAM, 0 TO 3 PERCENT SLOPES
WfB – WINDSOR LOAMY SAND, 3 TO 8 PERCENT SLOPES
WdA – WINDSOR LOAMY SAND, 0 TO 3 PERCENT SLOPES
ScA – SCANTIC SILT LOAM, 0 TO 3 PERCENT SLOPES

SEE WEBSOIL USDA–NRCS

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.



NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833–0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) (C) COMMERCIAL SECONDARY GROUNDWATER RECHARGE
MINIMUM FRONTAGE ~ 125'
MINIMUM LOT SIZE ~ 20,000 Sq. Ft.
FRONT SETBACK ~ 30'
REAR SETBACK ~ 15'
SIDE SETBACK ~ 12'
WETLANDS BUFFER ~ 50.0'
MAX. BUILDING HEIGHT: 40'
MAX. LOT COVERAGE: 50%
MAX. IMPERVIOUS COVERAGE: 20%

6.) I HEREBY CERTIFY THAT, TO THE BEST OF MY KNOWLEDGE & BELIEF, THIS PARCEL DOES NOT FALL WITHIN THE FLOOD PLAIN FLOOD HAZARD. REF.: FEMA COMMUNITY #330145, MAP #33017C0320E, DATED: SEPTEMBER 30, 2015.

7.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING TOPCON HIPER SR SURVEY GRADE GPS RECEIVERS.

8.) THE BOUNDARY LINES SHOWN ON THIS PLAN ARE THE RESULT OF A CLOSED TRAVERSE PERFORMED BY THIS OFFICE IN SPRING OF 2020, WITH A BETTER ERROR OF CLOSURE OF 1 PART IN 10,000.

9.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING CONDITIONS ON TAX MAP H, LOT 37A AS OF THE DATE OF THE SURVEY.

10.) EXISTING IMPERVIOUS COVER = 5,332 Sq.Ft.

11.) SEE PLAN REFERENCE #2
HANSON ROAD WAS DISCONTINUED AS A PUBLIC WAY BY THE DOVER, NEW HAMPSHIRE CITY COUNCIL ON JULY 8, 1998.

PLAN REFERENCES:

1.) "SUBDIVISION PLAN, N.H. ROUTE 155 – KNOX MARSH ROAD, DOVER, N.H., FOR SOUTHWEST PARTNERS REALTY L.L.C."
BY: NORWAY PLAINS ASSOCIATES, INC.
DATED: NOVEMBER 1996
FILE NUMBER 303
S.C.R.D.: PLAN # 50–65

2.) "STANDARD BOUNDARY SURVEY AND LOT LINE ADJUSTMENT, PLAN OF LAND, LOTS 38 & 37B, TAX ASSESSOR'S MAP H, N.H. ROUTE 155 / KNOX MARSH ROAD, DOVER, N.H., COUNTY OF STRAFFORD"
BY: CIVILWORKS, PAUL J. CONNOLLY, LLS
DATED: SEPTEMBER 15, 1998
S.C.R.D.: PLAN # 54–41 & PLAN # 54–44
SEE REFERENCE PLAN NOTE # 5 REGARDING HANSON ROAD DISCONTINUANCE.

PLAN REFERENCES CONTINUED:

3.) "AS BUILT PLAN FOR KNOX MARSH CONDOMINIUMS, KNOX MARSH ROAD, DOVER, NH"
BY: KIMBALL CHASE COMPANY INC.
DATED: MARCH 21, 1985
S.C.R.D.: PLAN # 27A–23

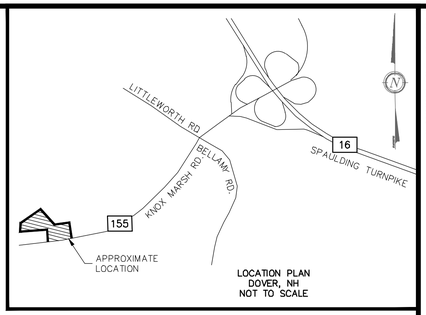
4.) "AMENDED SITE PLAN FOR KNOX MARSH CONDOMINIUMS, KNOX MARSH ROAD, DOVER, NH"
BY: KIMBALL CHASE COMPANY INC.
DATED:DECEMBER 9, 1985
S.C.R.D.: PLAN # 23–87

5.) PLAN OF LOT, ESTATE OF GLADYS D. McCRONE HEIRS, JANET C. VARNEY, LOIS A. McCRONE, GLADYS M. SMITH, ROBERT W. McCRONE, DOVER, NH"
BY: ROBERT W. McCRONE, LLS
DATED: NOVEMBER 2, 1993
S.C.R.D.: PLAN # 26A–43

6.) "LOT LINE ADJUSTMENT PLAN, ROUTE 155 – KNOX MARSH ROAD, DOVER, N.H., FOR SOUTHWEST PARTNERS REALTY L.L.C."
BY: NORWAY PLAINS ASSOCIATES, INC.
DATED: APRIL 2000
FILE NUMBER 303
S.C.R.D.: PLAN # 59–47

7.) PLAN OF LAND FOR LOIS L. McCRONE, KNOX MARSH ROAD, DOVER, NEW HAMPSHIRE"
BY: ROBERT W. McCRONE, LLS #221
DATED DECEMBER 2, 2002
S.C.R.D.: PLAN # 68–29

8.) RIGHT–OF–WAY AND TRACK MAP, BOSTON AND MAINE R.R. OPERATED BY THE BOSTON AND MAINE R.R., STATION 3390+17 TO STATION 3442+97 V2N.H./63 STATION 3442+97 TO STATION 3495+77 V2N.H./64 DATED JUNE 30, 1914 ON FILE WITH PAN AM AND AT BS&E



LOCATION PLAN
DOVER, NH
NOT TO SCALE

PLANNING FILE #21–04

REVISION	DATE	DESCRIPTION
#4	1–28–22	MULTIPLE PLAN SET REVISIONS
#3	8–16–21	REVISED PER TRC COMMENT
#2	7–27–21	REVISED PER TRC COMMENT
#1	5–24–21	REVISED PER TRC COMMENT

EXISTING CONDITIONS PLAN
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332–2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE — No. 805 — KENNETH A. BERRY — LICENSED LAND SURVEYOR — SIGNATURE

I CERTIFY THAT THIS PLAT EXCEEDS THE MINIMUM REQUIREMENT FOR ACCURACY AND COMPLETENESS OF THE STATE OF N.H. AND OF THE CITY OF DOVER, N.H. – 1:10,000 –

KENNETH A. BERRY LLS 805 DATE

S.S.S.M. SOILS LEGEND

SYMBOL	SOIL TAXONOMIC NAME	HYDROLOGIC SOIL GROUP
WfA	WINDSOR VARIANT	C
WfB	WINDSOR VARIANT	C
WfC	WINDSOR VARIANT	C
BzA	BUXTON MODERATELY DRAINED	C
BzB	BUXTON MODERATELY DRAINED	C
BzC	BUXTON MODERATELY DRAINED	C
ScA/P	SCANTIC POORLY DRAINED	D
ScB/P	SCANTIC POORLY DRAINED	D

SLOPE: A = 0–3% B = 3–8% C = 8–15% D = 15–25% E = 25–50% F = 50%+

DENOMINATOR: /VPD = VERY POORLY DRAINED /PD = POORLY DRAINED /SWPD = SOMEWHAT POORLY DRAINED /MWD = MODERATELY WELL DRAINED

NRCS SOILS LEGEND

SYMBOL	SOIL TAXONOMIC NAME	HYDROLOGIC SOIL GROUP
WdA	WINDSOR LOAMY SAND	A
WfB	WINDSOR LOAMY SAND	A
BzA	BUXTON SILT LOAM	C

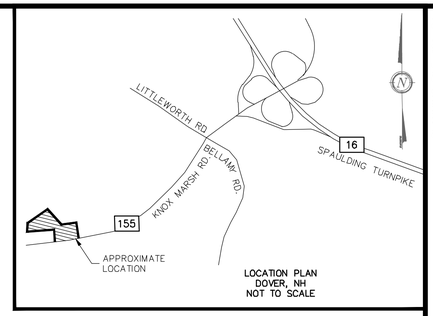
SLOPE: A = 0–3% B = 3–8% C = 8–15% D = 15–25% E = 25–50% F = 50%+

DENOMINATOR: /VPD = VERY POORLY DRAINED /PD = POORLY DRAINED /SWPD = SOMEWHAT POORLY DRAINED /MWD = MODERATELY WELL DRAINED

LEGEND:

- IRON BOUND ~FND~
- IRON PIPE ~FND~
- GRANITE BOUND ~FND~
- UTILITY POLE/GUY WIRE
- BENCHMARK
- MATCH LINE & POINT
- WETLAND LINE
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR
- OFF SITE NRCS SOIL LINE
- SITE SPECIFIC SOIL DELINEATION
- LIMIT OF SOIL SURVEY

BzA SOIL LABEL
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
TBA TO BE ABANDONED



LOCATION PLAN
DOVER, NH
NOT TO SCALE

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833–0190

2.) TAX MAP H, LOT 37A

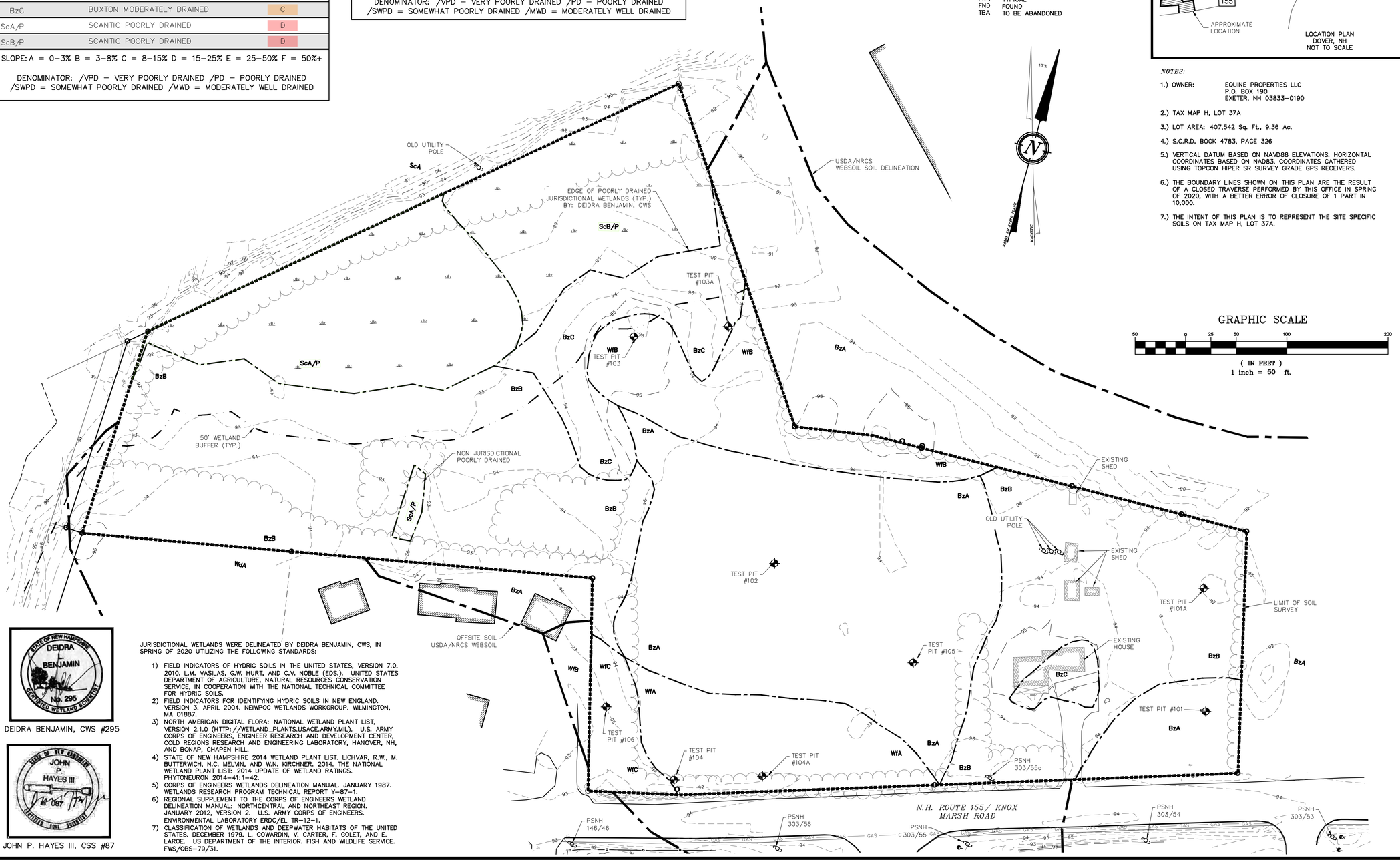
3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING TOPCON HIPER SR SURVEY GRADE GPS RECEIVERS.

6.) THE BOUNDARY LINES SHOWN ON THIS PLAN ARE THE RESULT OF A CLOSED TRAVERSE PERFORMED BY THIS OFFICE IN SPRING OF 2020, WITH A BETTER ERROR OF CLOSURE OF 1 PART IN 10,000.

7.) THE INTENT OF THIS PLAN IS TO REPRESENT THE SITE SPECIFIC SOILS ON TAX MAP H, LOT 37A.



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

JURISDICTIONAL WETLANDS WERE DELINEATED BY DEIDRA BENJAMIN, CWS, IN SPRING OF 2020 UTILIZING THE FOLLOWING STANDARDS:

1) FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 7.0. 2010. L.M. VASILAS, G.W. HURT, AND C.V. NOBLE (EDS.). UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.
2) FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 3. APRIL 2004. NEIWPCC WETLANDS WORKGROUP. WILMINGTON, MA 01887.
3) NORTH AMERICAN DIGITAL FLORA: NATIONAL WETLAND PLANT LIST, VERSION 2.1.0 (HTTP://WETLAND_PLANTS.USACE.ARMY.MIL). U.S. ARMY CORPS OF ENGINEERS, ENGINEER RESEARCH AND DEVELOPMENT CENTER, COLD REGIONS RESEARCH AND ENGINEERING LABORATORY, HANOVER, NH, AND BONAP, CHAPEN HILL.
4) STATE OF NEW HAMPSHIRE 2014 WETLAND PLANT LIST. LICHVAR, R.W., M. BUTTERWICH, N.C. MELVIN, AND W.N. KIRCHNER. 2014. THE NATIONAL WETLAND PLANT LIST: 2014 UPDATE OF WETLAND RATINGS. PHYTONEURON 2014–41:1–42.
5) CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. JANUARY 1987. WETLANDS RESEARCH PROGRAM TECHNICAL REPORT Y–87–1.
6) REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION. JANUARY 2012, VERSION 2. U.S. ARMY CORPS OF ENGINEERS. ENVIRONMENTAL LABORATORY ERDC/EL TR–12–1.
7) CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES. DECEMBER 1979. L. COWARDIN, V. CARTER, F. GOLET, AND E. LAROE. US DEPARTMENT OF THE INTERIOR. FISH AND WILDLIFE SERVICE. FWS/OBS–79/31.

STATE OF NEW HAMPSHIRE
DEIDRA L BENJAMIN
No. 295
CERTIFIED WETLAND SCIENTIST

DEIDRA BENJAMIN, CWS #295

STATE OF NEW HAMPSHIRE
JOHN P. HAYES III
No. 87
CERTIFIED SOIL SCIENTIST

JOHN P. HAYES III, CSS #87

PLANNING FILE #21–04

REVISION	DATE	DESCRIPTION
#4	1–28–22	MULTIPLE PLAN SET REVISIONS
#3	8–16–21	REVISED PER TRC COMMENT
#2	7–27–21	REVISED PER TRC COMMENT
#1	5–24–21	REVISED PER TRC COMMENT

SITE SPECIFIC SOILS MAP
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332–2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10415
LICENSED PROFESSIONAL ENGINEER

NOTES:

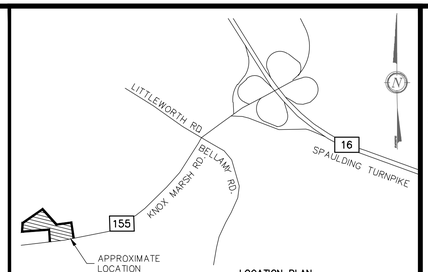
1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THE INTENT OF THIS PLAN IS TO SHOW THE PHASES FOR THE PROPOSED DEVELOPMENT.



LOCATION PLAN
DOVER, NH
NOT TO SCALE

DISTURBANCE PER PHASES:

PHASE 1: 198,500 Sq. Ft., 4.56 Ac. TOTAL DISTURBANCE

- CONSTRUCTION OF TIBETAN DRIVE STA.: 0+00 – 4+50
- CONSTRUCTION OF GRAVEL WETLAND 101, DETENTION POND 102, GRAVEL WETLANDS 103 & 104, & DETENTION POND 105
- CONSTRUCTION OF 2 MIXED USE BUILDINGS
- CONSTRUCTION OF ALL UTILITIES UP TO STATION 4+50.
- CONSTRUCTION OF ROUTE 155 SHOULDER WIDENING

PHASE 2: 104,000 Sq. Ft., 2.39 Ac. TOTAL DISTURBANCE

- CONSTRUCTION OF TIBETAN DRIVE STA.: 4+50 – END
- CONSTRUCTION OF SINGLE FAMILY UNITS
- CONSTRUCTION OF ALL REMAINING UTILITIES
- CONSTRUCTION OF ANY REMAINING DRAINAGE INFRASTRUCTURE

BS&E TO STAKEOUT THE LIMIT OF DISTURBANCE PER PHASE PRIOR TO PHASE CONSTRUCTION. AS PHASE IS STABILIZED AND COMPLETED, BS&E TO STAKEOUT THE NEXT PHASE PRIOR TO ADDITIONAL DISTURBANCE.

PHASE 2 WILL NOT BE DISTURBED UNTIL PHASE 1 IS STABILIZED. SEE DEFINITION OF STABLE.

TOTAL PROJECT DISTURBANCE: 302,500 Sq. Ft., 6.95 Ac

LEGEND:

- WETLAND DELINEATION
- PHASE LINE/LIMIT OF DISTURBANCE
- PHASE 1
- PHASE 2

PHASE 1

PHASE 2

PHASE 2

PHASE 1

LIMIT OF DISTURBANCE

GRAVEL WETLAND #103
SEE P-103 FOR DETAILS

TIBETAN DRIVE

UNIT 12 | UNIT 11 | UNIT 10 | UNIT 9 | UNIT 8 | UNIT 7 | UNIT 6 | UNIT 5 | UNIT 4 | UNIT 3 | UNIT 2 | UNIT 1

PROPOSED 26 UNIT MIXED USE BUILDING

PROPOSED 26 UNIT MIXED USE BUILDING

DETENTION POND #102
SEE P-102 FOR DETAILS

DETENTION POND #105
SEE P-105 FOR DETAILS

GRAVEL WETLAND #104
SEE P-104 FOR DETAILS

GRAVEL WETLAND #101
SEE P-101 FOR DETAILS

N.H. ROUTE 155/ KNOX MARSH ROAD

PHASE 1

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

PLANNING FILE #21-04

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#1	5-24-21	REVISED PER TRC COMMENT

CONSTRUCTION PHASING PLAN
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14043
LICENSED PROFESSIONAL ENGINEER

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) ZONING: (C) COMMERCIAL, SECONDARY GROUNDWATER RECHARGE
MINIMUM FRONTAGE ~ 125'
MINIMUM LOT SIZE ~ 20,000 Sq. Ft.
FRONT SETBACK ~ 30'
REAR SETBACK ~ 15'
SIDE SETBACK ~ 12'
WETLANDS BUFFER ~ 50.0'
MAX. BUILDING HEIGHT: 40'
MAX. LOT COVERAGE: 50%

6.) I HEREBY CERTIFY THAT, TO THE BEST OF MY KNOWLEDGE & BELIEF, THIS PARCEL DOES NOT FALL WITHIN THE FLOOD PLAIN FLOOD HAZARD. REF.: FEMA COMMUNITY #330145, MAP #33017C0320E, DATED: SEPTEMBER 30, 2015.

7.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING TOPCON HIPER SR SURVEY GRADE GPS RECEIVERS. TOPO SURVEY PREFORMED IN SPRING 2020, 1' CONTOURS PROVIDED.

8.) THE BOUNDARY LINES SHOWN ON THIS PLAN ARE THE RESULT OF A CLOSED TRAVERSE PERFORMED BY THIS OFFICE IN SPRING OF 2020, WITH AN ERROR OF CLOSURE BETTER THAN 1 PART IN 10,000.

9.) THE INTENT OF THIS PLAN IS TO SHOW THE PROPOSED OVERVIEW SITE PLAN FOR LOT 37A.

10.) LIST ANY VARIANCES OR SPECIAL EXCEPTIONS GRANTED BY THE ZONING BOARD OF ADJUSTMENT OR CONDITIONAL USE PERMITS GRANTED BY THE PLANNING BOARD FOR THE PROPOSED USE OR STRUCTURE:
-CASE Z19-20 WAS APPROVED ON DECEMBER 19, 2019 WITH THE FOLLOWING CONDITIONS:

1. SINGLE FAMILY DWELLINGS SHALL BE LIMITED TO NO MORE THAN 12 DWELLINGS. A NOTICE OF RESTRICTION SHALL BE RECORDED FOR EACH SINGLE-FAMILY DWELLING UNIT/LOT INDICATING THAT THE TOTAL LIVING SPACE IS LIMITED TO 1,400 Sq.Ft. PER DWELLING, WITH NO ADU'S.
2. MULTI FAMILY DWELLING UNITS SHALL BE LIMITED TO NO MORE THAN 53 UNITS TOTAL, WETHER LOCATED IN THE "L-SHAPED" BUILDING OR OTHER OFFICE BUILDINGS.
3. AS PART OF THE SITE PLAN APPROVAL, THE APPLICANT AND ASSISTANT CITY MANAGER SHALL PREPARE A SITE DEVELOPMENT PHASING PLAN, ENSURING AN APPROPRIATE BALANCE OF COMMERCIAL CONSTRUCTION PRIOR TO THE COMPLETION OF SINGLE FAMILY DWELLINGS, FOR THE PLANNING BOARD'S REVIEW AND APPROVAL.

NOTES CONTINUED:

11.) WETLANDS WERE DELINEATED BY DEIDRA BENJAMIN, CERTIFIED WETLANDS SCIENTIST, CERTIFICATION NUMBER 295, IN ACCORDANCE WITH CHAPTER 170-27.1 OF THE ZONING ORDINANCE, IN SPRING OF 2020.

12.) AS-BUILT PLANS OF THE SITE PLAN SHALL BE SUBMITTED ON PAPER AND IN DIGITAL FORMAT AUTOCAD DWG, AUTOCAD DXF OR ESRI FORMAT TO THE CITY OF DOVER ENGINEER'S OFFICE UPON COMPLETION OF PROJECT IF A STREET IS PROPOSED FOR CITY ACCEPTANCE. AS-BUILT PLANS SHALL BE PREPARED AND CERTIFIED CORRECT BY A L.L.S. OR P.E. DIGITAL FILES SHALL BE GEO-REFERENCED TO NEW HAMPSHIRE STATE PLANE COORDINATES NAD83 AND SHALL BE EXPRESSED IN FEET.

13.) THE INSTALLATION OF ELECTRIC POWER, CABLE TELEVISION AND TELEPHONE LINES SHALL BE UNDERGROUND THROUGHOUT THE SITE FOR WHICH DEVELOPMENT IS PROPOSED.

14.) THE SUBJECT PARCEL IS SERVED BY MUNICIPAL WATER AND SEWER.

15.) ALL CONSTRUCTION SHALL CONFORM WITH THE STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION (NHDOT) "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" AND WITH THE CITY OF DOVER COMMUNITY SERVICES REGULATIONS AND STANDARD SPECIFICATION FOR CONSTRUCTION. THE MORE STRINGENT SPECIFICATION SHALL APPLY.

16.) ALL EROSION CONTROL NOTES SHALL INCLUDE PROVISIONS FOR CONSTRUCTION SEQUENCING, TEMPORARY EROSION CONTROL MEASURES, AND PERMANENT STANDARDS SUCH AS LOAM SPREAD RATE FOR DISTURBED AREAS, RATES OF LIME, TYPE AND RATES FOR FERTILIZER, AND SEED AND MULCH MIXTURE WITH RATES OF APPLICATION.

17.) THE LIMITS OF CONSTRUCTION DISTURBANCE THAT ARE LOCATED IN OR WITHIN THE 50 FT. OF CONSERVATION AND WETLAND DISTRICTS SHALL BE STAKED, FLAGGED AND CLEARLY IDENTIFIED PRIOR ANY EARTH DISTURBING ACTIVITY OCCURS.

18.) ALL TREATMENT SWALES TO BE CONSTRUCTED SHALL HAVE SOD BOTTOMS.

19.) A LETTER OF CREDIT FOR THE COST OF REVEGETATING ALL DISTURBED AREAS ON THE SITE SHALL BE SUBMITTED, AND THE APPROVED CONSTRUCTION SIGN INSTALLED PRIOR TO ANY EARTH DISTURBING ACTIVITY OCCURS.

20.) A PRE-CONSTRUCTION CONFERENCE WITH THE DEVELOPER, THE DESIGN ENGINEER, THE EARTHWORK CONTRACTOR AND THE CITY ENGINEER SHALL OCCUR PRIOR TO ANY EARTH DISTURBING ACTIVITY.

NOTES CONTINUED:

21.) SITE CONSTRUCTION HOURS SHALL BE LIMITED TO MONDAY-FRIDAY 7 AM-6 PM, NO SATURDAY OR SUNDAY HOURS. HOURS OF CONSTRUCTION MUST BE DOCUMENTED ON A SITE CONSTRUCTION SIGN ALONG WITH THE CONTACT INFORMATION FOR THE GENERAL CONTRACTOR. SAID SIGNAGE MUST BE LOCATED AND APPROVED BY THE CITY ENGINEER OR ASSISTANT CITY MANAGER.

22.) BUILDING ADDRESSES SHALL BE ASSIGNED BY THE BUILDING OFFICIAL AT THE TIME OF ISSUANCE OF A BUILDING PERMIT.

23.) THE PROPOSED USE FOR THE SITE IS A MIXED USE RESIDENTIAL SITE, WITH 12 SINGLE FAMILY HOMES. SEE 170-28.3 AND NOTE 10 FOR PROHIBITED USES.

24.) THE FOLLOWING FEDERAL AND STATE PERMITS HAVE BEEN ISSUED FOR THE SUBJECT PROPERTY:

NHDES SEWER DISCHARGE PERMIT	(PENDING)
NHDES ALTERATION OF TERRAIN PERMIT	(PENDING)
US EPA NOI & SWPPP	(PENDING)
NATURAL HERITAGE BUREAU	NHB20-0382
NH DIVISION OF HISTORICAL RESOURCES	DHR#10630
NHDOT DRIVEWAY PERMIT	(PENDING)

25.) COMMERCIAL VEHICLE ROUTE DURING CONSTRUCTION SHALL CONFORM TO DOVER CITY CODE OR BE COORDINATED WITH THE COMMUNITY SERVICES DIRECTOR.

26.) ANY RETAINING WALL TALLER THAN FOUR FEET (4') REQUIRES ISSUANCE OF A BUILDING PERMIT FROM INSPECTION SERVICES.

27.) ANY FENCE TALLER THAN SEVEN FEET (7') REQUIRES THE ISSUANCE OF A BUILDING PERMIT FROM INSPECTION SERVICES.

28.) APPLICANT SHALL COMPLETE LAND USE DEVELOPMENT TRACKING FORM, MOST RECENTLY REVISED VERSION, UTILIZING THE ONLINE POLLUTION TRACKING AND ACCOUNTING PILOT PROJECT (PTAPP) PORTAL.

29.) THE OWNER OF RECORD SHALL RECORD AT THE REGISTRY OF DEEDS DOCUMENTATION SUFFICIENT TO PROVIDE NOTICE TO ALL PERSONS/ENTITIES THAT MAY ACQUIRE ANY PROPERTY SUBJECT TO THE REQUIREMENTS AND RESPONSIBILITIES DESCRIBED IN THE APPROVED STORMWATER MANAGEMENT PLAN. THE NOTICE SHALL COMPLY WITH THE APPLICABLE REQUIREMENTS FOR RECORDING CONTAINED IN RSA 477 AND 478. THE NOTICE NEED NOT SET FORTH THE REQUIREMENTS AT LENGTH, SO LONG AS IT IS SUFFICIENT TO PROVIDE NOTICE TO PROSPECTIVE PURCHASERS TO THE REQUIREMENTS FOR MAINTENANCE AND REPORTING.

NOTES CONTINUED:

30.) FIRE DEPARTMENT ACCESS ROAD SHALL BE INSTALLED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF FIRE APPARATUS IN ALL WEATHER CONDITIONS AT ALL TIMES.

31.) EXTERIOR LIGHTING SHALL BE CUT-OFF TYPE FIXTURES PER CHAPTER 153-14-E AND SHALL PROVIDE LIGHTING DIRECTED ON-SITE ONLY.

32.) A SECURITY SYSTEM SHALL BE INSTALLED AS REQUIRED BY CHAPTER 45, ARTICLE I, SECTION 45-2 OF THE CODE OF THE CITY OF DOVER.

33.) APPROVED BACKFLOW PREVENTERS SHALL BE PROVIDED FOR BOTH FIRE AND DOMESTIC WATER LINES.

34.) THE PROPOSED STRUCTURE SHALL BE SERVED BY A SPRINKLER SYSTEM AS REQUIRED BY CHAPTER 81- 30 OF THE CODE OF THE CITY OF DOVER AND THE ADOPTED STATE OF NH BUILDING AND FIRE CODES.

35.) SPRINKLER CONNECTIONS MUST BE FLUSHED IN ACCORDANCE WITH NFPA 24 AND A CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR UNDERGROUND PIPING FORM MUST BE COMPLETED AND APPROVED BY INSPECTION SERVICES PRIOR TO CONNECTION OF THE BACKFLOW DEVICE.

36.) FIRE DEPARTMENT CONNECTION(S) SHALL BE LOCATED ON THE STREET SIDE OF THE BUILDING PER NFPA 13. ACCESS TO THE FDC SHALL MAINTAIN A CLEAR AND UNOBSTRUCTED PATH AT ALL TIMES.

37.) THE SITE LAYOUT IS DESIGNED IN COMPLIANCE WITH APPLICABLE ACCESSIBILITY REGULATIONS. THE PROPOSED STRUCTURE WILL BE ALSO BE DESIGNED IN ACCORDANCE WITH APPLICABLE ACCESSIBILITY REGULATIONS. (I.E. IBC, ANSI-117.1) AND NH RSA 155-A:5.

38.) EXISTING DRIVEWAY ALONG KNOX MARSH ROAD TO BE SAW CUT AND REMOVED.

NOTES CONTINUED:

39.) EXISTING BUILDING IMPERVIOUS AREA: 2,831 Sq. Ft. (0.7%)
EXISTING PAVED IMPERVIOUS AREA: 2,701 Sq. Ft. (0.7%)
TOTAL EXISTING IMPERVIOUS COVER IS 5,532 Sq. Ft. (1.4%)
PROPOSED BUILDING IMPERVIOUS AREA: 47,254 Sq. Ft. (11.6%)
PROPOSED PAVED IMPERVIOUS AREA: 81,522 Sq. Ft. (20.0%)
TOTAL PROPOSED IMPERVIOUS COVER IS 128,776 Sq. Ft. (31.6%)

40.) THE PROPOSED 12 SINGLE FAMILY UNITS ARE PROPOSED TO BE CONDO UNITS.

41.) TRASH PICKUP FOR THE SINGLE FAMILY HOMES WILL BE THROUGH PRIVATE PICKUP.

42.) MAXIMUM BUILDING HEIGHT FOR THE MIXED USE BUILDINGS SHALL BE 40'.

43.) CONTRACTOR SPACE IS NOT A PERMITTED USE IN THE COMMERCIAL DISTRICT.

UNIT DENSITY CALCULATION:

COMMERCIAL DISTRICT ZONING TABLE
- DENSITY CALCULATION
  - LOT AREA = 407,542 Sq.Ft.
  - WETLANDS = 77,264 Sq.Ft.
  - UPLANDS = 327,583 Sq.Ft.
  - NUMBER OF UNITS = 327,583 Sq.Ft./5,000 Sq.Ft. PER UNIT = 66 UNITS

TOTAL ALLOWED = 66 UNITS
TOTAL PROPOSED = 64 UNITS (52 MULTI FAMILY & 12 SINGLE FAMILY) *SEE VARIANCE*

PARKING REQUIREMENTS:

CHAPTER 153-14D PARKING TABLE
- RESIDENTIAL
  - RESIDENTIAL (NON CBD-G) 1.4 SPACES PER UNIT:
    - VISITOR 0.5 SPACES PER UNIT:
    - 52 UNITS x 1.4 SPACES + 20 UNITS x 0.5 SPACES = 99 SPACES

TOTAL MAXIMUM = 99 SPACES
TOTAL PROPOSED = 99 SPACES

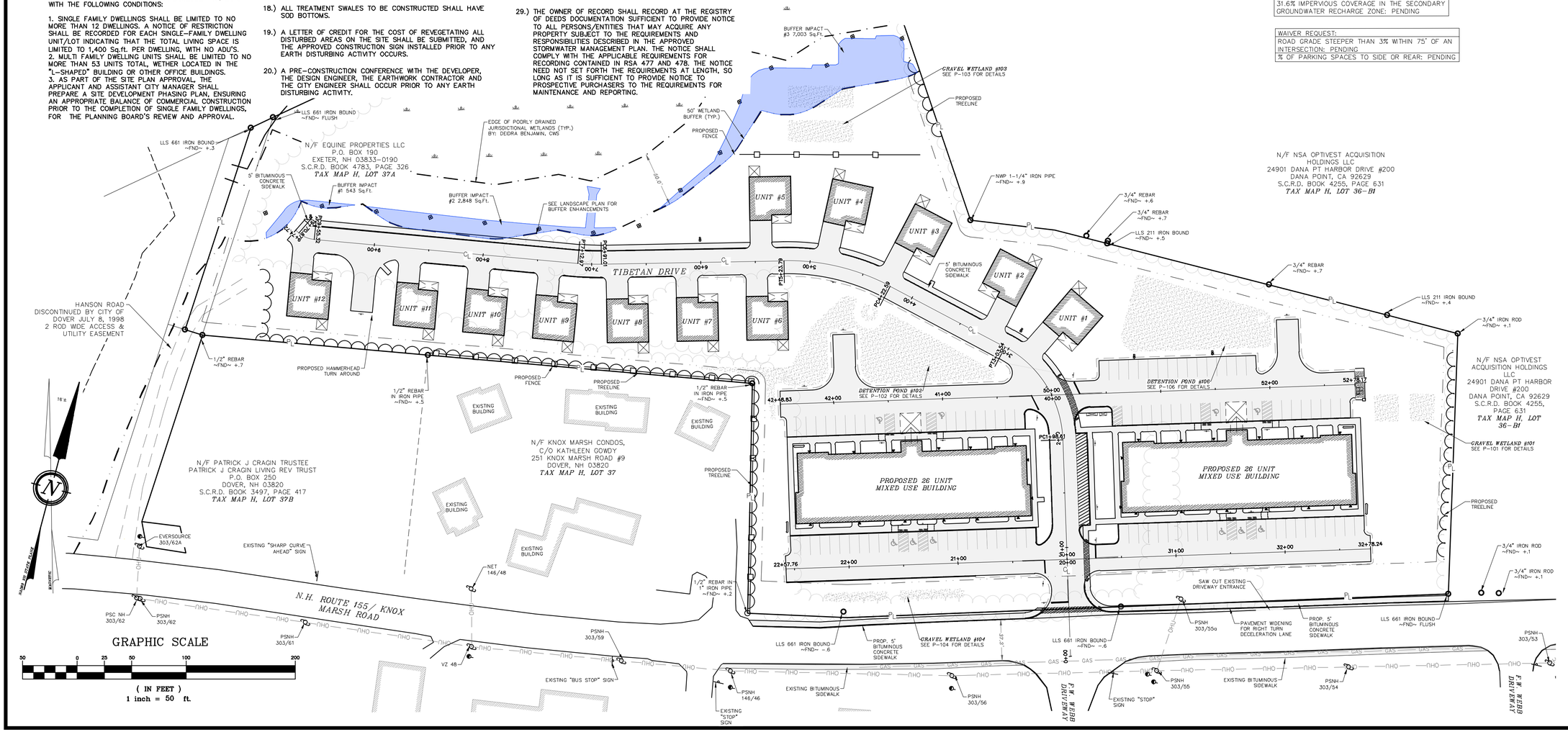
SNOW STORAGE:

- STORAGE CALCULATION (6:1 RATIO USED)
  - PAVED AREA = 81,522 Sq.Ft. / 6 = > 13,587 Sq.Ft. PROVIDED

RECREATION SPACE REQUIREMENTS (DOVER CODE ARTICLE V , 170-15.)
PROPOSED NUMBER OF BEDROOMS: 124
OPEN SPACE REQUIREMENT (100 SF PER BEDROOM): 12,400 SF
1 RECREATION SPACE FOR PASSIVE USE: 6,200 SF (SATISFIED ON SITE)
1 RECREATION SPACE FOR ACTIVE USE: 6,200 SF (SATISFIED OFF SITE)
RECREATION FEE REQUIRED

CONDITIONAL USE PERMIT:
CONSTRUCTION WITHIN THE 50' BUFFER (10,394 Sq. Ft. PROPOSED): PENDING
31.6% IMPERVIOUS COVERAGE IN THE SECONDARY GROUNDWATER RECHARGE ZONE: PENDING

WAIVER REQUEST:
ROAD GRADE STEEPER THAN 3% WITHIN 75' OF AN INTERSECTION: PENDING
% OF PARKING SPACES TO SIDE OR REAR: PENDING



PLANNING FILE #21-04

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OVERVIEW SITE PLAN
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY No. 14245 LICENSED PROFESSIONAL ENGINEER

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

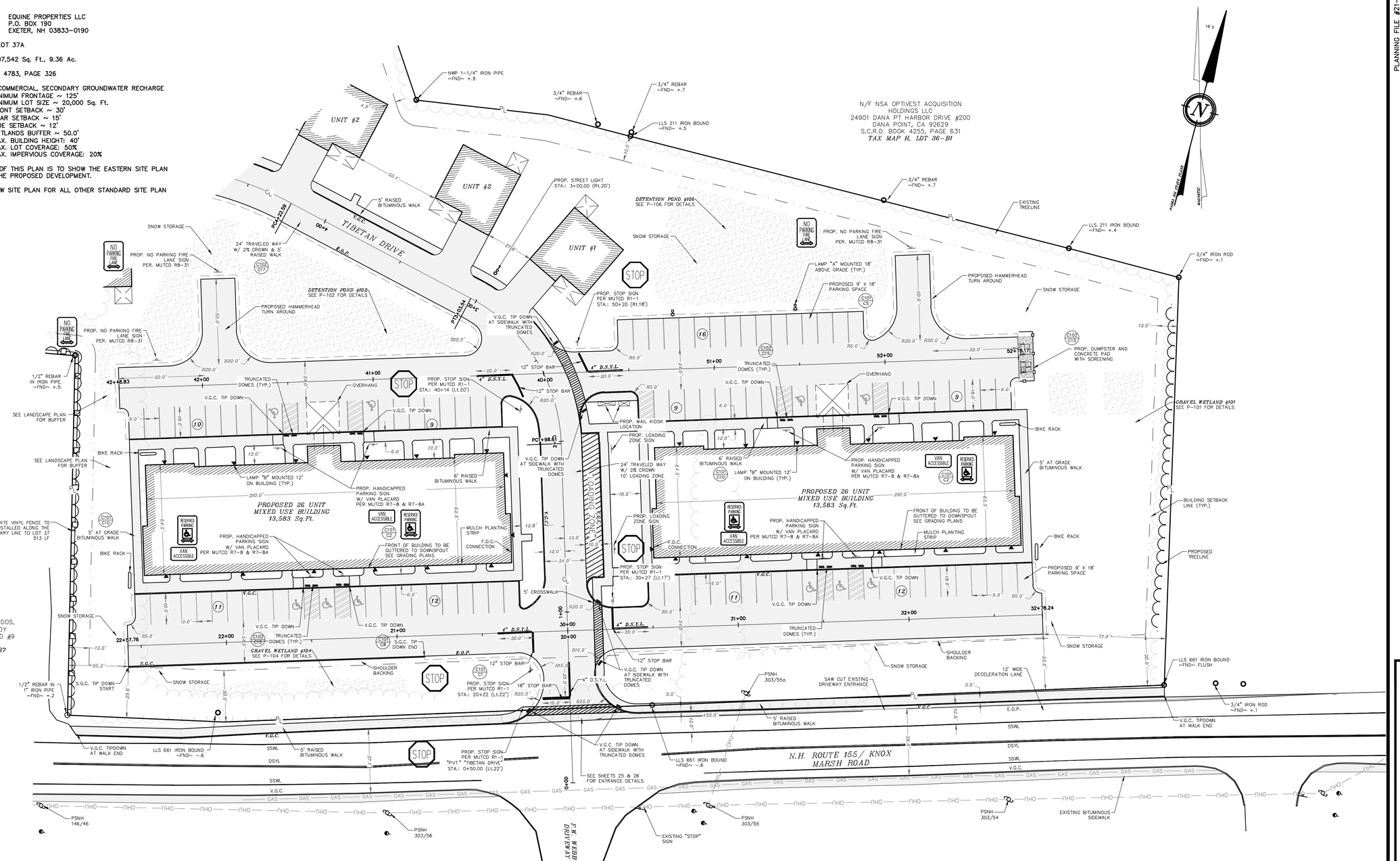
3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) ZONING: (C) COMMERCIAL, SECONDARY GROUNDWATER RECHARGE
MINIMUM FRONTAGE ~ 125'
MINIMUM LOT SIZE ~ 20,000 Sq. Ft.
FRONT SETBACK ~ 30'
REAR SETBACK ~ 15'
SIDE SETBACK ~ 12'
WETLANDS BUFFER ~ 50.0'
MAX. BUILDING HEIGHT: 40'
MAX. LOT COVERAGE: 50%
MAX. IMPERVIOUS COVERAGE: 20%

6.) THE INTENT OF THIS PLAN IS TO SHOW THE EASTERN SITE PLAN DETAIL OF THE PROPOSED DEVELOPMENT.

7.) SEE OVERVIEW SITE PLAN FOR ALL OTHER STANDARD SITE PLAN NOTES.



PLANNING FILE #21-04

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SITE PLAN EAST
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 30 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10793
LICENSED PROFESSIONAL ENGINEER

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833–0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) ZONING: (C) COMMERCIAL, SECONDARY GROUNDWATER RECHARGE
MINIMUM FRONTAGE ~ 125'
MINIMUM LOT SIZE ~ 20,000 Sq. Ft.
FRONT SETBACK ~ 30'
REAR SETBACK ~ 15'
SIDE SETBACK ~ 12'
WETLANDS BUFFER ~ 50.0'
MAX. BUILDING HEIGHT: 40'
MAX. LOT COVERAGE: 50%
MAX. IMPERVIOUS COVERAGE: 20%

6.) THE INTENT OF THIS PLAN IS TO SHOW THE WESTERN SITE PLAN DETAIL OF THE PROPOSED DEVELOPMENT.

7.) SEE OVERVIEW SITE PLAN FOR ALL OTHER STANDARD SITE PLAN NOTES.

N/F BOSTON & MAINE RAILROAD,
IRON HORSE PARK
HIGH STREET NORTH
BILLERICA, MA 01862
TAX MAP G, LOT 5

N/F PATRICK J CRAGIN TRUSTEE
PATRICK J CRAGIN LIVING REV TRUST
P.O. BOX 250
DOVER, NH 03820
S.C.R.D. BOOK 3497, PAGE 417
TAX MAP H, LOT 38

N/F PATRICK J CRAGIN TRUSTEE
PATRICK J CRAGIN LIVING REV TRUST
P.O. BOX 250
DOVER, NH 03820
S.C.R.D. BOOK 3497, PAGE 417
TAX MAP H, LOT 37B

N/F KNOX MARSH CONDOS,
C/O KATHLEEN GOWDY
251 KNOX MARSH ROAD #9
DOVER, NH 03820
TAX MAP H, LOT 37

HANSON ROAD
DISCONTINUED BY CITY OF
DOVER JULY 8, 1998
2 ROD WIDE ACCESS &
UTILITY EASEMENT.

TIBETAN DRIVE

N.H. ROUTE 155 / KNOX MARSH ROAD

PROPOSED 26 UNIT MIXED USE BUILDING 13,583 Sq.Ft.

DETENTION POND #102 SEE P-102 FOR DETAILS

GRAVEL WETLAND #103 SEE P-103 FOR DETAILS

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

PLANNING FILE #21-04

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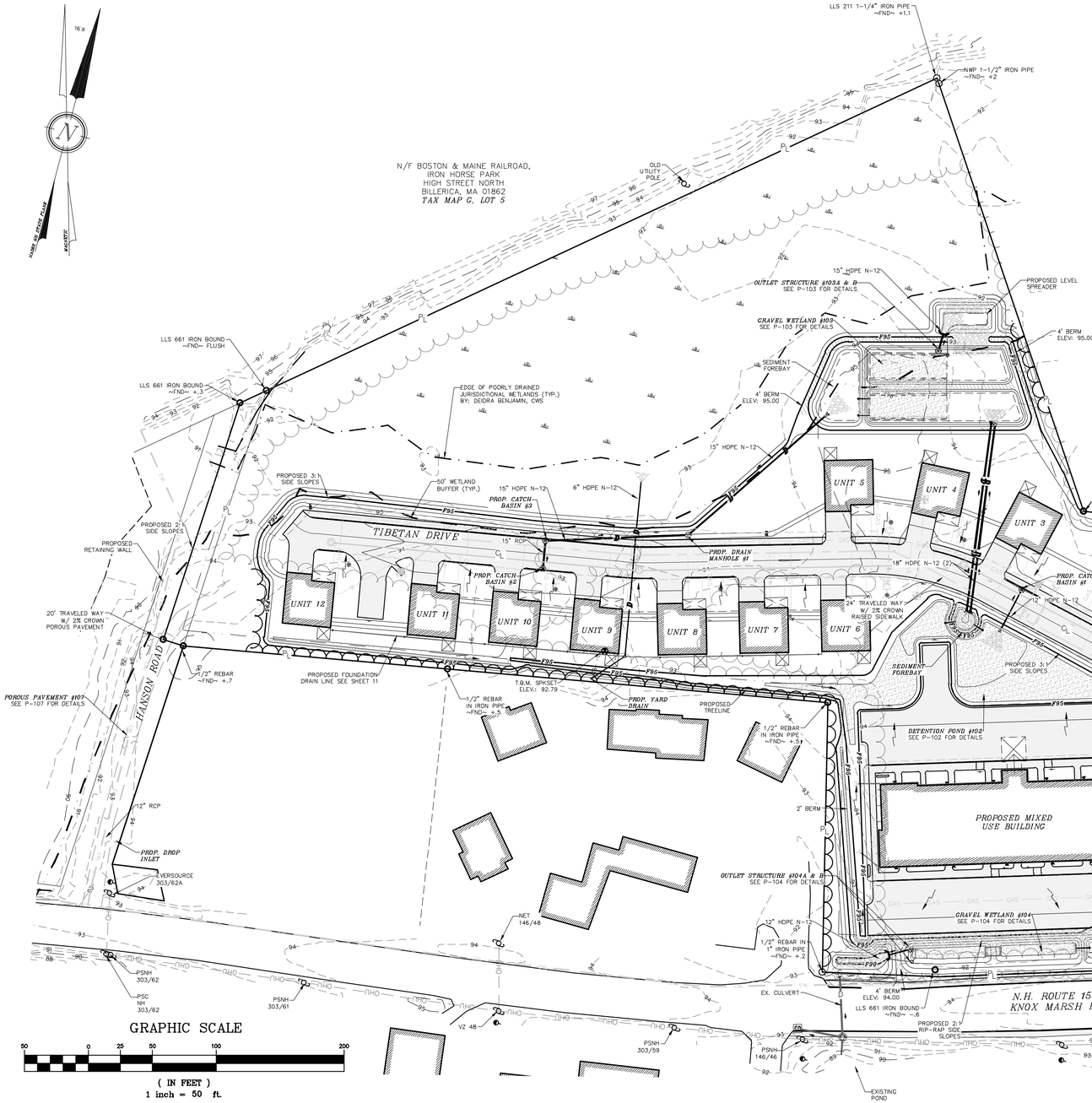
SITE PLAN WEST
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 30 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 7892
LICENSED PROFESSIONAL ENGINEER



NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37-A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THE INTENT OF THIS PLAN IS SHOW THE OVERVIEW GRADING AND DRAINAGE DESIGN FOR THE PROPOSED MIXED USE SITE DEVELOPMENT.

6.) THIS PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH NHDOT STANDARD SPECIFICATIONS DATED 2016. CURRENT STANDARD PLANS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS INCLUDED IN THE PROPOSAL.

7.) CONTRACTOR SHALL TAKE SPECIAL CARE IN NOT DISTURBING EXISTING MONUMENTS BOUNDS, AND OR BENCHMARKS WITHOUT FIRST MAKING PROVISIONS FOR RELOCATION

8.) THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO LOCATE EXACTLY AND TO PRESERVE ANY AND ALL UNDERGROUND UTILITIES CALL "DIG-SAFE" 1-888-DIGSAFE (344-7233) AT LEAST 72 HOURS BEFORE COMMENCING CONSTRUCTION

9.) WHERE AN EXISTING UNDERGROUND UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.

10.) THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES.

11.) AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE. LIMIT OF GRADING SHOULD NOT BE EXPANDED WITHOUT CONSULTING THE DESIGN ENGINEER. SEE ALSO E&SC PLAN.

12.) THE TERM "PROPOSED" (PROP.) MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS, OR, WHERE APPLICABLE, RE-USING EXISTING MATERIALS IDENTIFIED AS "REMOVE & RESET" (R & R).

13.) ALL SYMBOLS, WORDS, TRANSVERSE MARKINGS (STOP BARS, CROSSWALK LINES, AND RAILROAD SYMBOLS), LANE LINES, AND ALL OTHER MARKINGS NOTED WITH ‡†‡ SHALL BE THERMOPLASTIC.

14.) ALL DISTURBED AREAS NOT DESIGNATED TO BE PAVED SHALL HAVE LOAM PLACED AND SEEDED. THE LOAM SHALL HAVE A MINIMUM DEPTH OF 4 INCHES AND SHALL BE PLACED FLUSH WITH THE TOP OF THE ADJACENT CURB, EDGING, BERM OR PAVEMENT SURFACE.

NOTES CONTINUED:

15.) ALL ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. THE DESIGN ENGINEER IS TO BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY. TEMPORARY BENCHMARKS (T.B.M.) ARE TO BE PROVIDED BY THE DESIGN ENGINEER.

16.) NOTE THAT THE PROJECT IS SUBJECT TO THE EPA NPDES PHASE II. THE NOTICE OF INTENT (NOI) MUST BE FILED ALONG WITH A STORMWATER POLLUTION PREVENTION PLAN (SWPPP). BIWEEKLY INSPECTIONS WILL BE CONDUCTED BY THE DESIGN ENGINEER AND AFTER STORM EVENTS OF OVER 0.25".

17.) UPON FINAL COMPLETION AND 85% STABILIZATION THE DRAINAGE SYSTEM IS TO BE CLEANED OF ALL DEBRIS TO INCLUDE THE PUMPING OF THE BASIN SUMPS. SEE SHEET E102, DETAIL E18 FOR DEFINITION OF STABLE.

18.) ALL DRAINAGE PIPE IS TO BE HDPE N-12. INDIVIDUAL PIPE SIZES ARE SPECIFIED, RECYCLED PIPE IS APPROVED FOR PROJECT SITE. RECYCLED HDPE PIPE "GREEN PIPE" IS ACCEPTABLE FOR THIS PROJECT SITE.

19.) ALL BASINS AND DRAINS ARE TO HAVE BOOTS INSTALLED ON ALL INLETS AND OUTLETS.

20.) ALL TREATMENT SWALE TO BE CONSTRUCTED SHALL HAVE SOD BOTTOMS UNLESS OTHERWISE INSTRUCTED BY THE DESIGN ENGINEER DURING CONSTRUCTION.

21.) A LETTER OF CREDIT FOR THE COST OF RE-VEGETATING ALL DISTURBED AREAS ON THE SITE SHALL BE SUBMITTED PRIOR TO ANY EARTH DISTURBING ACTIVITY OCCURS, AS MAY BE APPLICABLE.

22.) A PRE-CONSTRUCTION CONFERENCE WITH THE DEVELOPER, THE DESIGN ENGINEER, THE EARTHWORK CONTRACTOR AND DOVER CITY STAGF SHALL OCCUR PRIOR TO ANY EARTH DISTURBING ACTIVITY.

23.) BUILDING ADDRESSES SHALL BE DETERMINED BY THE BUILDING OFFICIAL.

24.) THE PROPOSED PROJECT WILL CONSIST OF TWO PHASES. SEE PHASING PLAN FOR ADDITIONAL INFORMATION.
PHASE 1 (DRAINAGE & COMMERCIAL PAD SITE): 175,655 SqFt. OF DISTURBANCE
PHASE 2 (DRAINAGE & RESIDENTIAL): 134,129 Sq.Ft. OF DISTURBANCE

25.) WRITTEN DIMENSION ON THIS PLAN TAKE PRECEDENCE OVER SCALED DIMENSIONS. THE CONTRACTOR SHALL USE CAUTION WHEN SCALING REPRODUCED PLANS. IN THE EVENT OF A CONFLICT BETWEEN THIS PLAN SET AND ANY OTHER DRAWINGS AND/OR SPECIFICATIONS, THE ENGINEER SHALL BE NOTIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CONTRACTOR IS TO CONFIRM ALL ELEVATIONS. CONFLICTS WILL BE REPORTED TO THE DESIGN ENGINEER PRIOR TO CONSTRUCTION.

26.) COMMERCIAL VEHICLE ROUTE DURING CONSTRUCTION SHALL CONFORM WITH CITY OF DOVER CODE OR BE COORDINATED WITH THE COMMUNITY SERVICES DIRECTOR.

27.) THE CONTRACTOR SHALL CALL AND COORDINATE WITH DIGSAFE AT 1-888-344-7233 AT LEAST 72 HOURS PRIOR TO COMMENCING ANY EXCAVATION ON PUBLIC OR PRIVATE PROPERTY.

28.) SEE DETAILS CONCERNING SITE LAYOUT, DRAINAGE, UTILITY, AND SEDIMENT AND EROSION CONTROLS.

29.) GUTTERS FOR MIXED USE BUILDINGS ARE TO BE DESIGNED BY OTHERS. THE INTENT OF THE GUTTERS WILL BE TO DIRECT ROOF RUNOFF DIRECTLY INTO THE PROPOSED STORMWATER TREATMENT AREA, THUS LIMITING THE POTENTIAL FOR ICING ALONG THE SIDEWALKS. 10" DRAINS SHOULD BE USED.

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

OVERVIEW GRADING PLAN
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10613
LICENSED PROFESSIONAL ENGINEER

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37-A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THE INTENT OF THIS PLAN IS TO SHOW THE DETAIL GRADING PLAN FOR THE MIXED USE BUILDINGS.

6.) SEE OVERVIEW GRADING PLAN FOR ALL OTHER STANDARD NOTES.

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

DETAIL GRADING PLAN
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

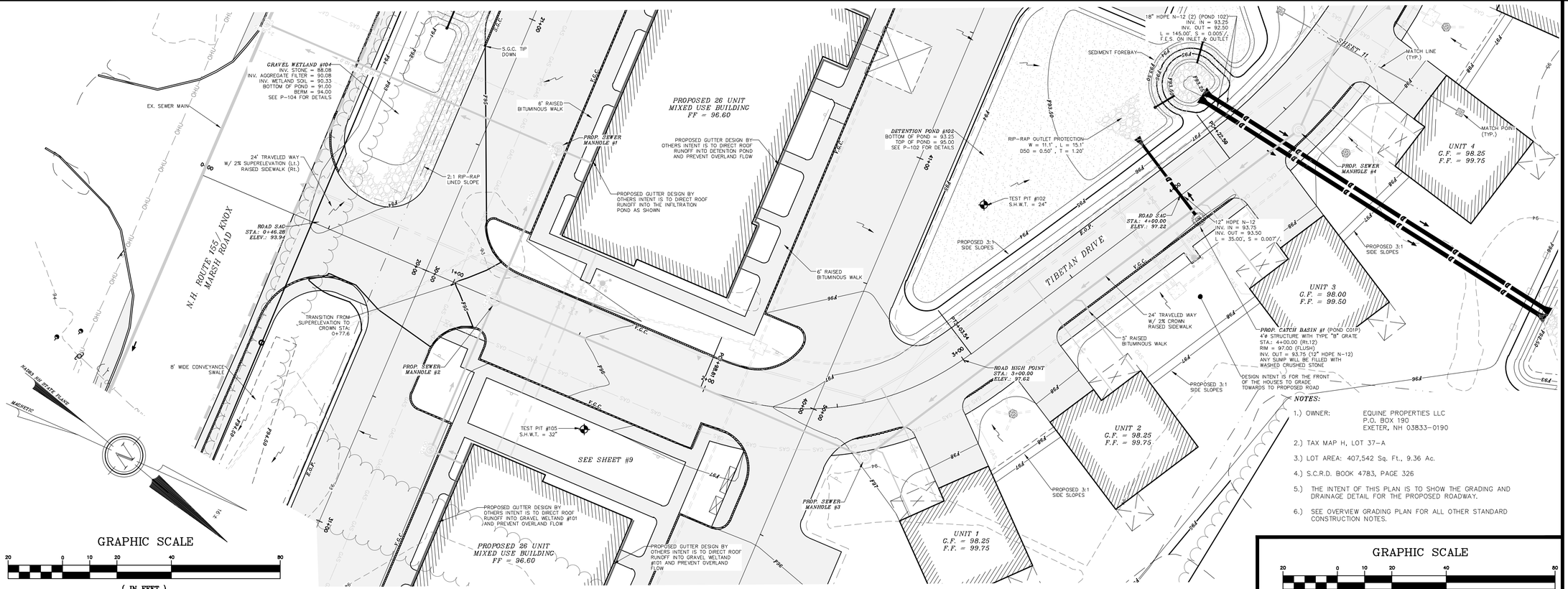
SCALE : 1 IN. EQUALS 30 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10213
LICENSED PROFESSIONAL ENGINEER

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

PLAN AND PROFILE TIBETAN DRIVE 0+00 TO 5+00
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37-A



PLAN VIEW TIBETAN DRIVE 0+00 TO 5+00

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37-A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

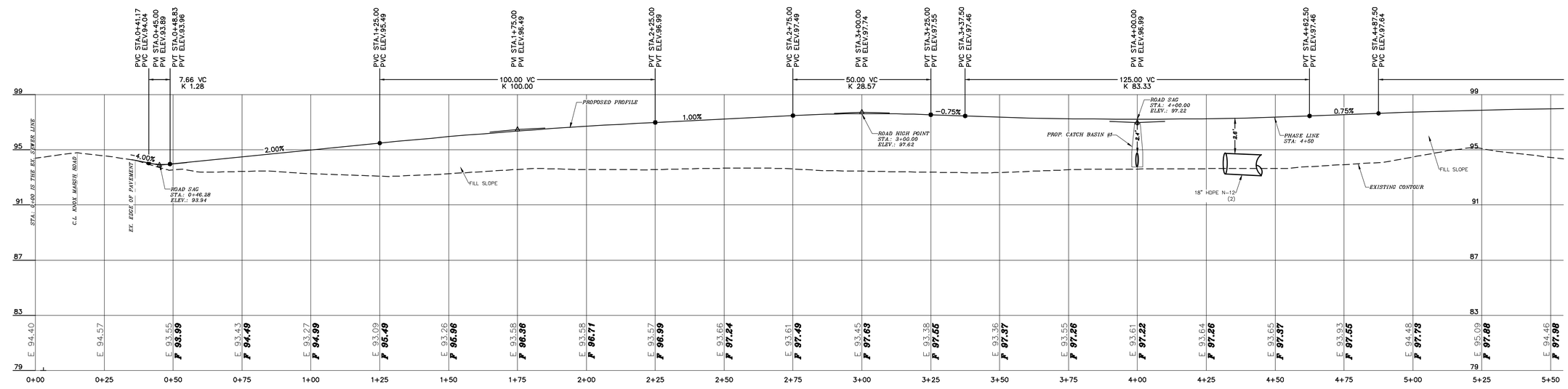
5.) THE INTENT OF THIS PLAN IS TO SHOW THE GRADING AND DRAINAGE DETAIL FOR THE PROPOSED ROADWAY.

6.) SEE OVERVIEW GRADING PLAN FOR ALL OTHER STANDARD CONSTRUCTION NOTES.

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

PROFILE VIEW TIBETAN DRIVE 0+00 TO 5+00

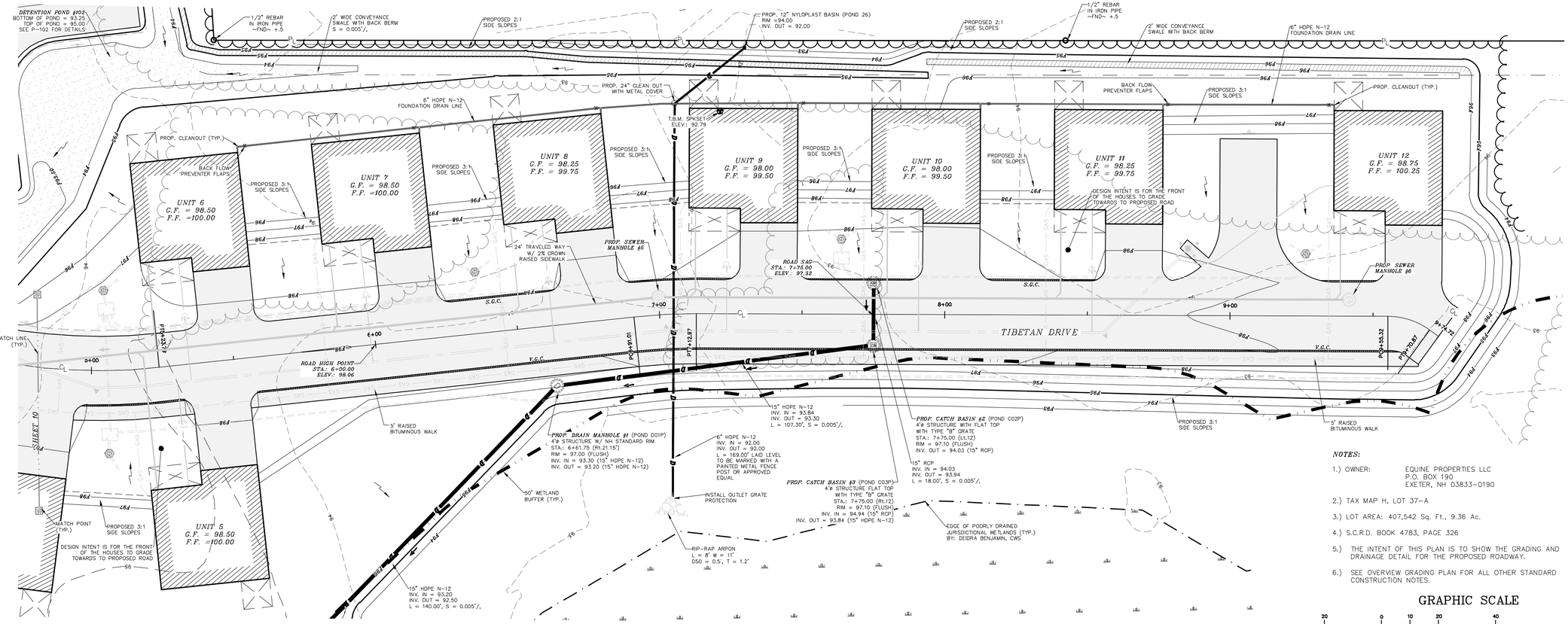
VERTICAL SCALE: 1" = 4'



BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10675
LICENSED PROFESSIONAL ENGINEER



NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37-A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THE INTENT OF THIS PLAN IS TO SHOW THE GRADING AND DRAINAGE DETAIL FOR THE PROPOSED ROADWAY.

6.) SEE OVERVIEW GRADING PLAN FOR ALL OTHER STANDARD CONSTRUCTION NOTES.

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

PLAN VIEW TIBETAN DRIVE 5+00 TO END

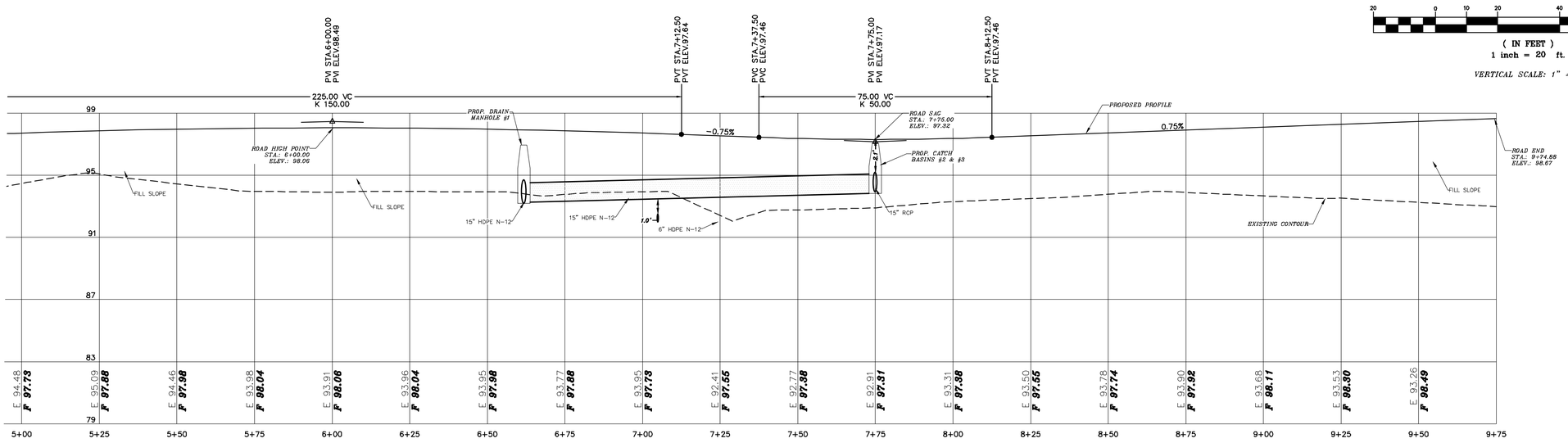
PROFILE VIEW TIBETAN DRIVE 5+00 TO END

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

VERTICAL SCALE: 1" = 4'



PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
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#1	5-24-21	REVISED PER TRC COMMENT

PLAN AND PROFILE TIBETAN DRIVE 5+00 TO END
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10043
LICENSED PROFESSIONAL ENGINEER

P1

MAINTENANCE REQUIREMENTS

ACTIVITY	FREQUENCY
CLOGGING AND SYSTEM PERFORMANCE	
INSPECT INLETS AND OUTLETS TO ENSURE GOOD CONDITION AND NO EVIDENCE OF DETERIORATION. CHECK TO SEE IF HIGH-FLOW BYPASS IS FUNCTIONING. REMEDY: REPAIR OR REPLACE ANY DAMAGED STRUCTUAL PARTS, INLETS AND OUTLETS. CLEAR OR REMOVE DEBRIS OR RESTRICTIONS.	ANNUALLY, MORE FREQUENTLY IN THE FIRST YEAR OF OPERATION
CHECK FOR INTERNAL EROSION, EVIDENCE OF SHORT-CIRCUITING, AND ANIMAL BURROWS. REMEDY: SOIL EROSION FROM SHORT-CIRCUITING OR ANIMAL BOROUGHS SHOULD BE REPAIRED WHEN THEY OCCUR.	
CHECK THAT THE SYSTEM IS FULLY DRAINING WITHIN A 24-48 HOUR PERIOD AFTER RAIN EVENTS. REMEDY: REPAIR OR RESTORE HYDRAULIC INLET OR OUTLET CONFIGURATION.	
VEGETATION	
CHECK FOR ROBUST VEGETATION COVERAGE THROUGHOUT THE SYSTEM AND DEAD OR DYING PLANTS REMEDY: VEGETATION SHOULD COVER > 75% OF THE SYSTEM AND SHOULD BE RESEEDED AND CARED FOR AS NEEDED	ANNUALLY, OR AS NEEDED
CUT AND REMOVE VEGETATION FROM GRAVEL WETLAND SYSTEM AND FOREBAY IN ORDER TO MAINTAIN NITROGEN REMOVAL PERFORMANCE REMEDY: THE VEGETATION SHOULD BE CUT AND REMOVED FROM THE SYSTEM TO PREVENT NITROGEN FROM CYCLING BACK INTO THE SYSTEM	ONCE EVERY 3 YEARS

3/8" WASHED CRUSHED STONE*

SIEVE SIZE	% PASSING BY WEIGHT
1/2"	100
3/8"	95 – 100
# 4	22 – 55
# 8	0 – 10

* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

1-1/2" WASHED CRUSHED STONE*

SIEVE SIZE	% PASSING BY WEIGHT
2"	100
1-1/2"	90 – 100
1"	20 – 55
1-1/2"	0 –15
3/8"	0 – 5

* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

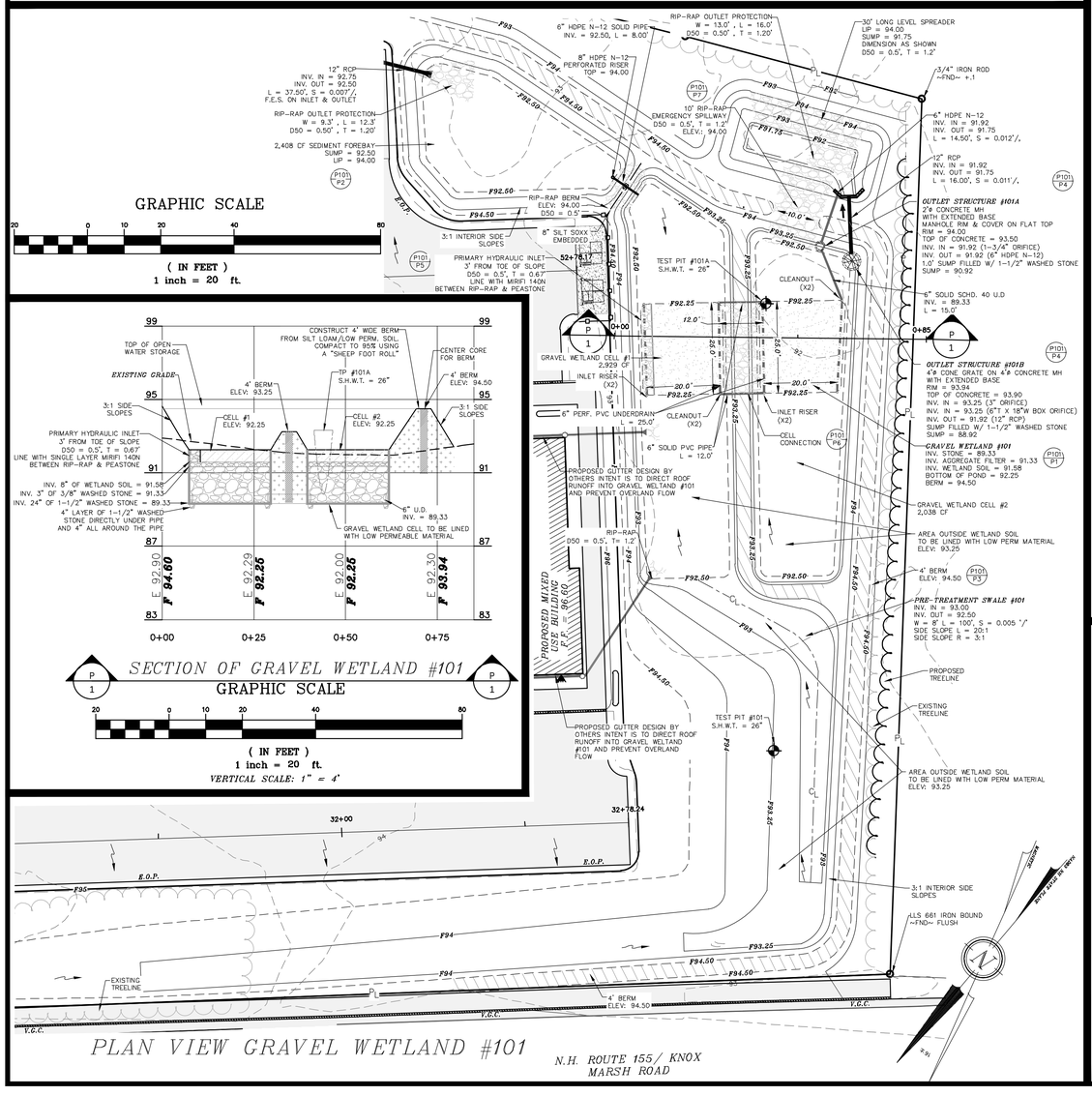
WETLAND SOIL

SIEVE SIZE	% PASSING BY WEIGHT
0.5	100
#10"	90 – 75
#100	40 – 50
#200	25 –50
SIEVE SIZE	% PASSING TOLERANCES
0.5	±10.0
#10	±5.0
#100	±5.0
#200	±5.0

DESIGN REFERENCES

1 UNH STORMWATER CENTER

CONSTRUCTION NOTE: THE DESIGN ENGINEER IS TO BE ON SITE PRIOR TO AND DURING THE PLACEMENT OF THE RESERVOIR STONE, AND TO WITNESS THE INSTALLATION OF THE UNDER-DRAIN AND INTER-CHAMBER PIPES. PLEASE PROVIDE 24 HOURS NOTICE PRIOR TO REQUESTED INSPECTION.



SECTION OF GRAVEL WETLAND #101

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)

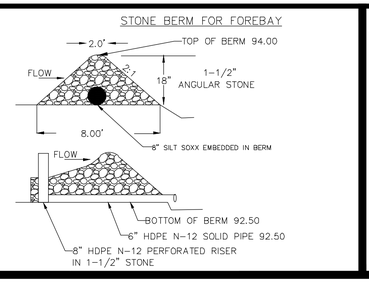
1 inch = 20 ft.

VERTICAL SCALE: 1" = 4'

PLAN VIEW GRAVEL WETLAND #101

P2

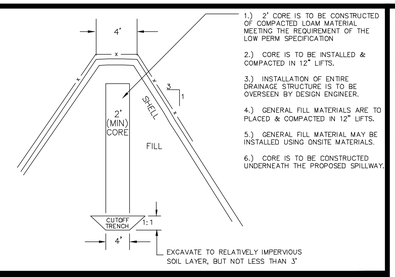
STONE BERM FOR FOREBAY



P3

LOW PERMEABILITY MATERIAL GRADATION

SIEVE SIZE	% PASSING BY WEIGHT
#4	95 – 100
#40	60 – 95
#100	40 – 60
#200	25 – 45



1.) 2" CORE IS TO BE CONSTRUCTED OF COMPACTED LOAM MATERIAL MEETING THE REQUIREMENT OF THE LOW PERM SPECIFICATION

2.) CORE IS TO BE INSTALLED & COMPACTED IN 12" LIFTS.

3.) INSTALLATION OF ENTIRE DRAINAGE STRUCTURE IS TO BE OVERSEEN BY DESIGN ENGINEER.

4.) GENERAL FILL MATERIALS ARE TO PLACED & COMPACTED IN 12" LIFTS.

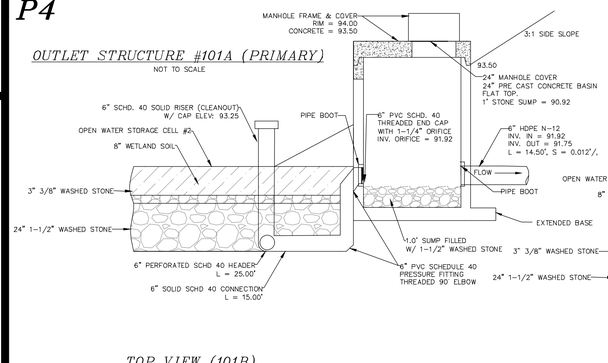
5.) GENERAL FILL MATERIAL MAY BE INSTALLED USING ONSITE MATERIALS.

6.) CORE IS TO BE CONSTRUCTED UNDERNEATH THE PROPOSED SPILLWAY.

P4

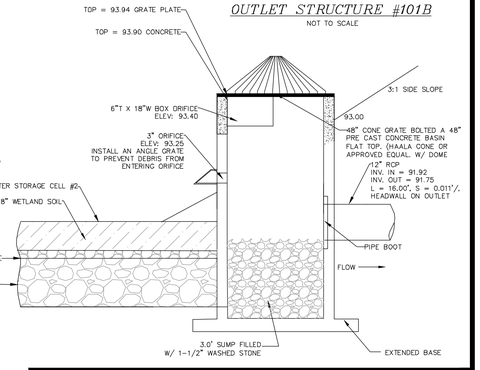
OUTLET STRUCTURE #101A (PRIMARY)

NOT TO SCALE



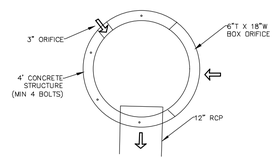
OUTLET STRUCTURE #101B

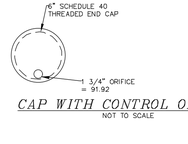
NOT TO SCALE



TOP VIEW (101B)

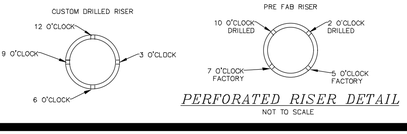
NOT TO SCALE





CAP WITH CONTROL ORIFICE

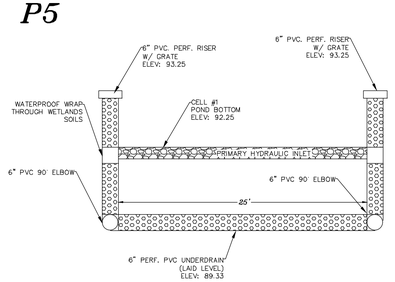
NOT TO SCALE



PERFORATED RISER DETAIL

NOT TO SCALE

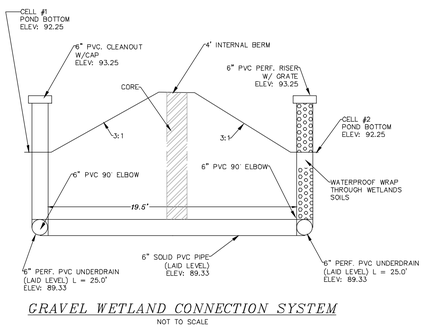
P5



GRAVEL WETLAND INLET SYSTEM

NOT TO SCALE

P6



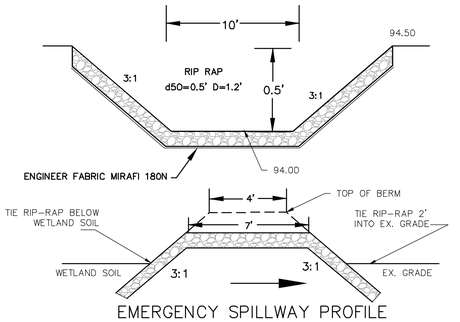
GRAVEL WETLAND CONNECTION SYSTEM

NOT TO SCALE

P7

SPILLWAY DETAILS

NOT TO SCALE



EMERGENCY SPILLWAY PROFILE

P-101

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

GRAVEL WETLAND #101
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

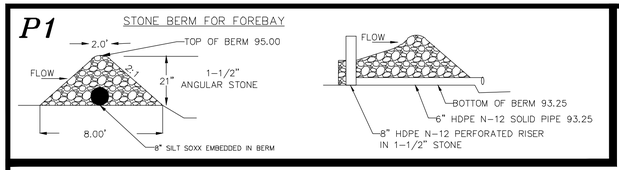
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

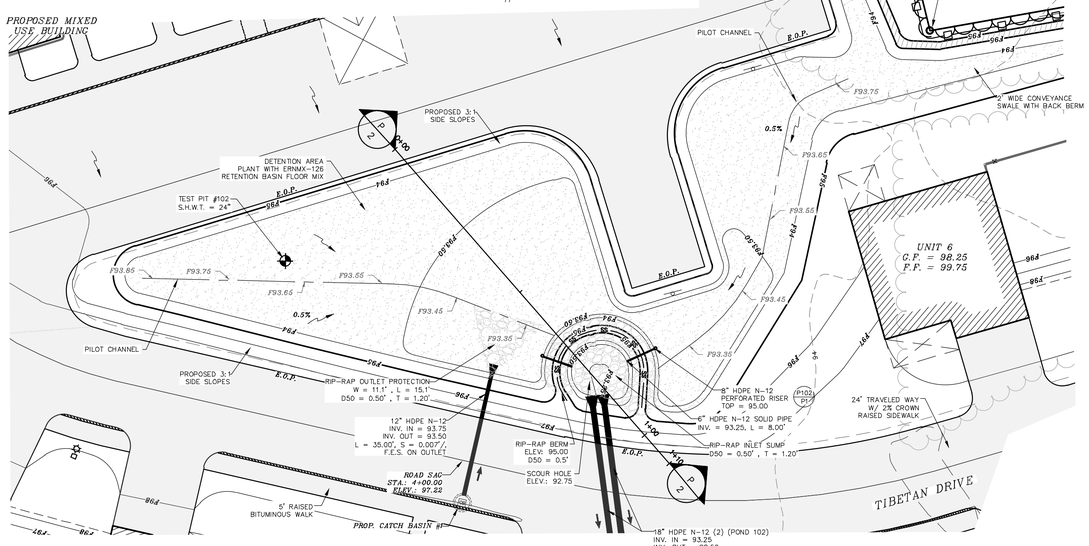
STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10171
LICENSED PROFESSIONAL ENGINEER

P1

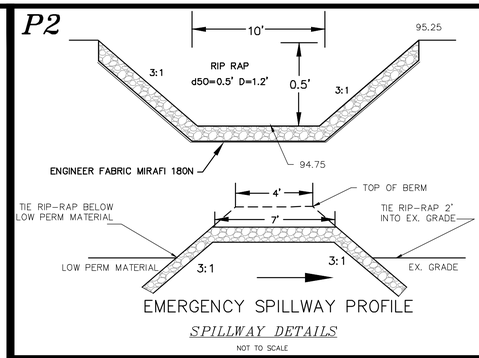
STONE BERM FOR FOREBAY



PLAN VIEW DETENTION POND #102



P2

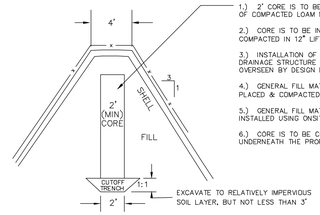


EMERGENCY SPILLWAY PROFILE

SPILLWAY DETAILS

NOT TO SCALE

P3



1.) 2' CORE IS TO BE CONSTRUCTED OF COMPACTED LOAM MATERIAL.

2.) CORE IS TO BE INSTALLED & COMPACTED IN 12" LIFTS.

3.) INSTALLATION OF ENTIRE DRAINAGE STRUCTURE IS TO BE OVERSEEN BY DESIGN ENGINEER.

4.) GENERAL FILL MATERIALS ARE TO PLACED & COMPACTED IN 12" LIFTS.

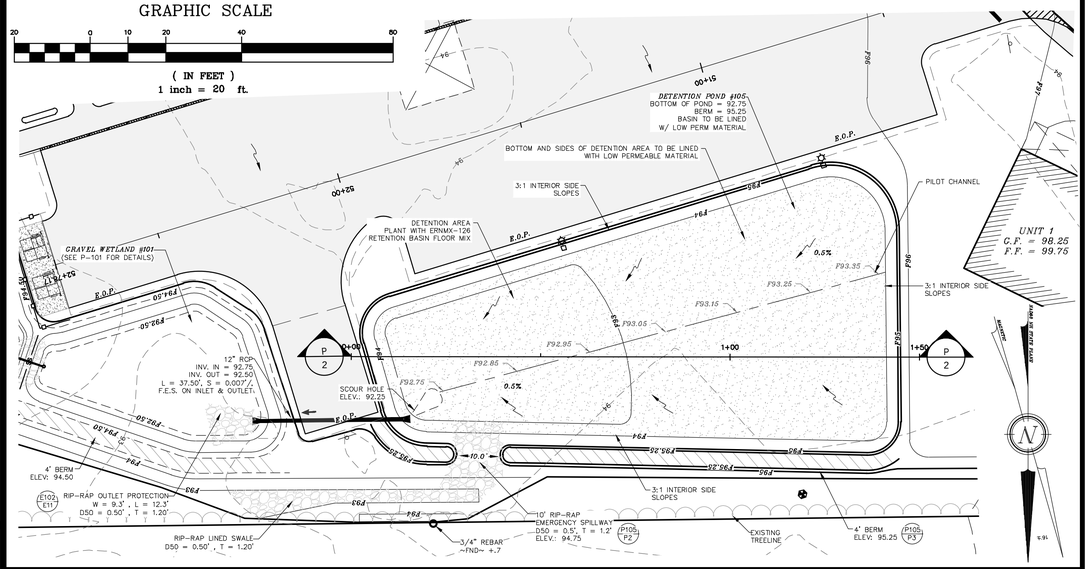
5.) GENERAL FILL MATERIAL MAY BE INSTALLED USING ONSITE MATERIALS.

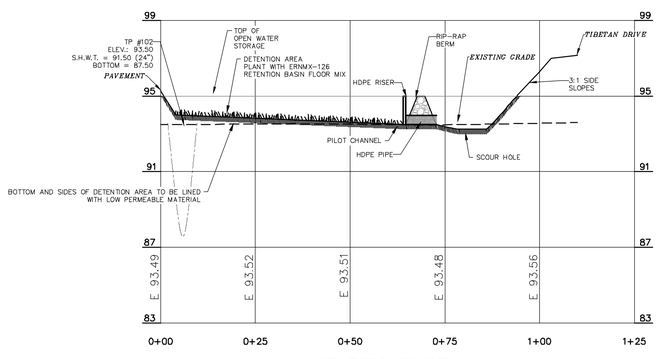
6.) CORE IS TO BE CONSTRUCTED UNDERNEATH THE PROPOSED SPILLWAY.

LOW PERMEABILITY MATERIAL GRADATION

SIEVE SIZE	% PASSING BY WEIGHT
#4	95 – 100
#40	60 – 95
#100	40 – 60
#200	25 – 45

PLAN VIEW DETENTION POND #105





LOW PERMEABILITY MATERIAL GRADATION

SIEVE SIZE	% PASSING BY WEIGHT
#4	95 – 100
#40	60 – 95
#100	40 – 60
#200	25 – 45

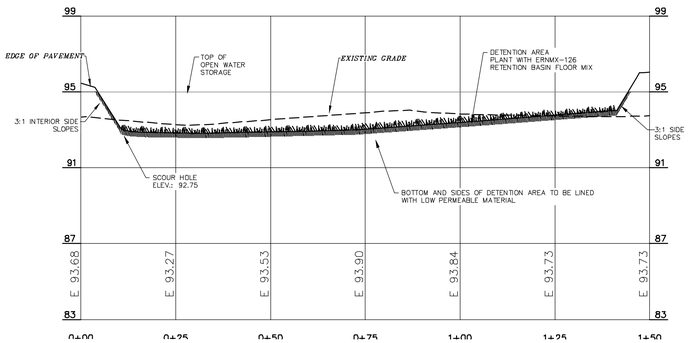
GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

VERTICAL SCALE: 1" = 4'

P 2 — *SECTION OF DETENTION POND #102* — P 2



P 6 — *SECTION OF DETENTION POND #106* — P 6

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

VERTICAL SCALE: 1" = 4'

P–102 & P–105

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

DETENTION POND #102 & DETENTION POND #105
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE — KENNETH A. BERRY No. 14043 LICENSED PROFESSIONAL ENGINEER

P1

MAINTENANCE REQUIREMENTS

ACTIVITY	FREQUENCY
CLOGGING AND SYSTEM PERFORMANCE	
INSPECT INLETS AND OUTLETS TO ENSURE GOOD CONDITION AND NO EVIDENCE OF DETERIORATION. CHECK TO SEE IF HIGH-FLOW BYPASS IS FUNCTIONING. REMEDY: REPAIR OR REPLACE ANY DAMAGED STRUCTUAL PARTS, INLETS AND OUTLETS. CLEAR OR REMOVE DEBRIS OR RESTRICTIONS.	ANNUALLY, MORE FREQUENTLY IN THE FIRST YEAR OF OPERATION
CHECK FOR INTERNAL EROSION, EVIDENCE OF SHORT-CIRCUITING, AND ANIMAL BURROWS. REMEDY: SOIL EROSION FROM SHORT-CIRCUITING OR ANIMAL BOROUGHS SHOULD BE REPAIRED WHEN THEY OCCUR.	
CHECK THAT THE SYSTEM IS FULLY DRAINING WITHIN A 24-48 HOUR PERIOD AFTER RAIN EVENTS. REMEDY: REPAIR OR RESTORE HYDRAULIC INLET OR OUTLET CONFIGURATION.	
VEGETATION	
CHECK FOR ROBUST VEGETATION COVERAGE THROUGHOUT THE SYSTEM AND DEAD OR DYING PLANTS REMEDY: VEGETATION SHOULD COVER > 75% OF THE SYSTEM AND SHOULD BE RESEEDED AND CARED FOR AS NEEDED	ANNUALLY, OR AS NEEDED
CUT AND REMOVE VEGETATION FROM GRAVEL WETLAND SYSTEM AND FOREBAY IN ORDER TO MAINTAIN NITROGEN REMOVAL PERFORMANCE REMEDY: THE VEGETATION SHOULD BE CUT AND REMOVED FROM THE SYSTEM TO PREVENT NITROGEN FROM CYCLING BACK INTO THE SYSTEM	ONCE EVERY 3 YEARS

3/8" WASHED CRUSHED STONE*	
SIEVE SIZE	% PASSING BY WEIGHT
1/2"	100
3/8"	95 – 100
# 4	22 – 55
# 8	0 – 10

* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

1-1/2" WASHED CRUSHED STONE*	
SIEVE SIZE	% PASSING BY WEIGHT
2"	100
1-1/2"	90 – 100
1"	20 – 55
1-1/2"	0 –15
3/8"	0 –5

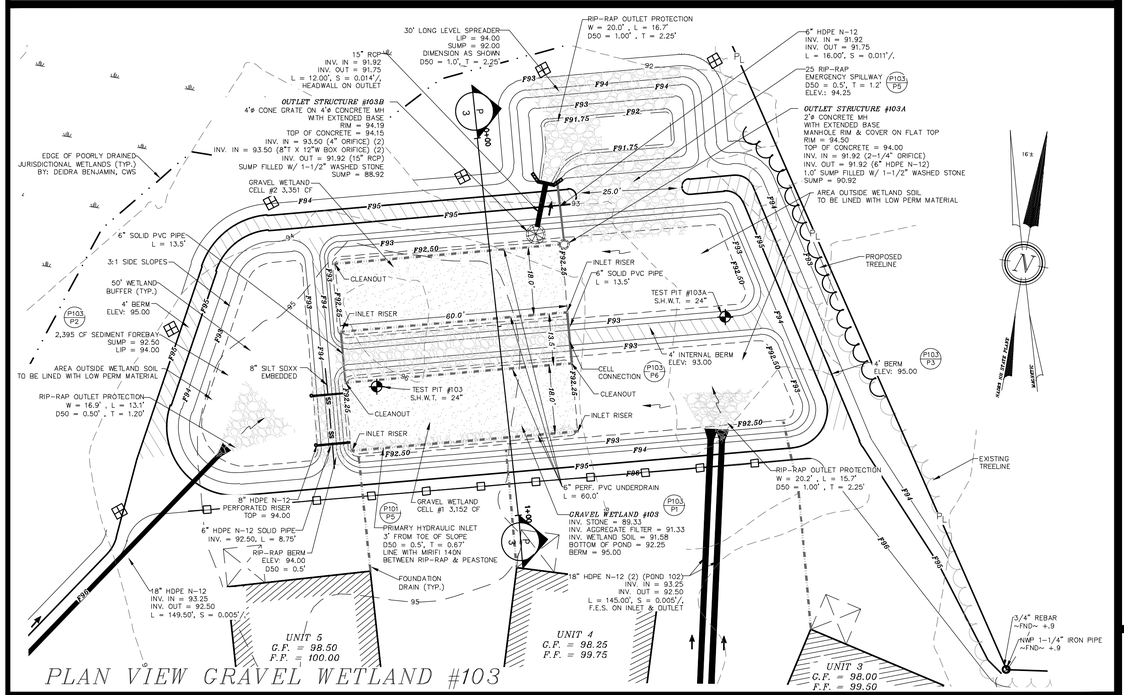
* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

WETLAND SOIL	
SIEVE SIZE	% PASSING BY WEIGHT
0.5	100
#10"	90 – 75
#100	40 – 50
#200	25 –50
SIEVE SIZE	% PASSING TOLERANCES
0.5	±10.0
#10	±5.0
#100	±5.0
#200	±5.0

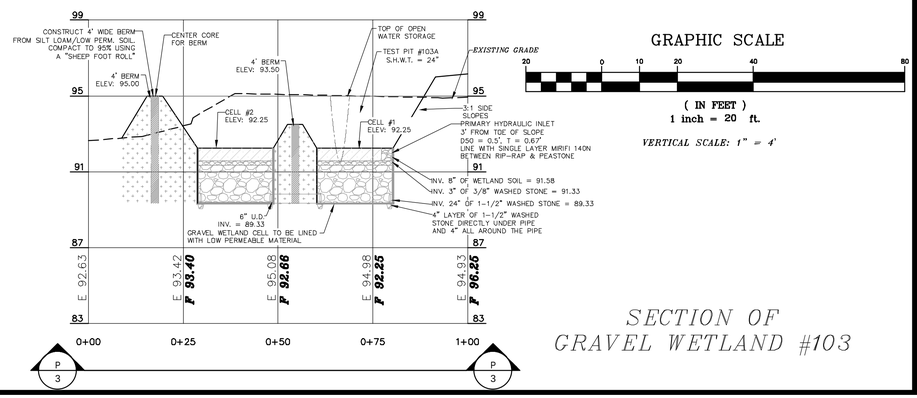
DESIGN REFERENCES

1 UNH STORMWATER CENTER

CONSTRUCTION NOTE: THE DESIGN ENGINEER IS TO BE ON SITE PRIOR TO AND DURING THE PLACEMENT OF THE RESERVOIR STONE, AND TO WITNESS THE INSTALLATION OF THE UNDER-DRAIN AND INTER-CHAMBER PIPES. PLEASE PROVIDE 24 HOURS NOTICE PRIOR TO REQUESTED INSPECTION.



PLAN VIEW GRAVEL WETLAND #103



SECTION OF GRAVEL WETLAND #103

GRAPHIC SCALE

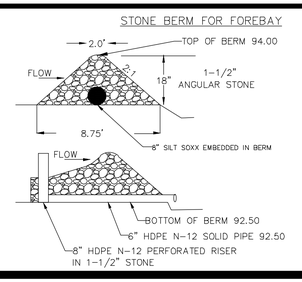
20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

VERTICAL SCALE: 1" = 4'

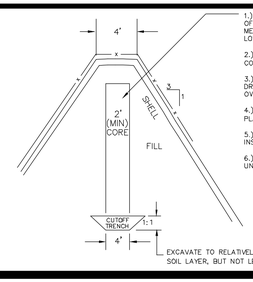
P2

STONE BERM FOR FOREBAY



P3

LOW PERMEABILITY MATERIAL GRADATION	
SIEVE SIZE	% PASSING BY WEIGHT
#4	95 – 100
#40	60 – 95
#100	40 – 60
#200	25 – 45



1.) 2" CORE IS TO BE CONSTRUCTED OF COMPACTED LOAM MATERIAL MEETING THE REQUIREMENT OF THE LOW PERM SPECIFICATION

2.) CORE IS TO BE INSTALLED & COMPACTED IN 12" LIFTS.

3.) INSTALLATION OF ENTIRE DRAINAGE STRUCTURE IS TO BE OVERSEEN BY DESIGN ENGINEER.

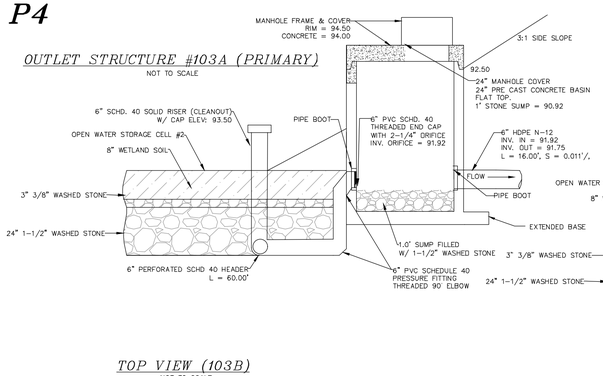
4.) GENERAL FILL MATERIALS ARE TO PLACED & COMPACTED IN 12" LIFTS.

5.) GENERAL FILL MATERIAL MAY BE INSTALLED USING ONSITE MATERIALS.

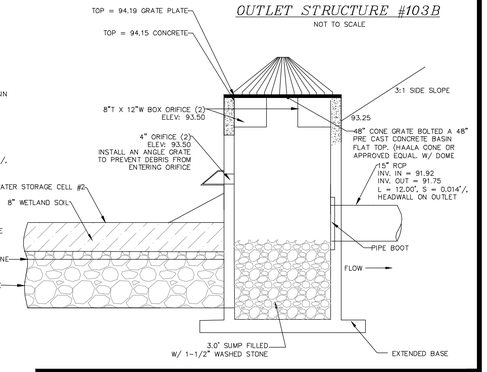
6.) CORE IS TO BE CONSTRUCTED UNDERNEATH THE PROPOSED SPILLWAY.

P4

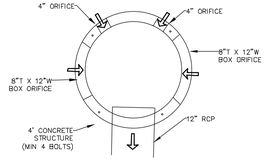
OUTLET STRUCTURE #103A (PRIMARY)
NOT TO SCALE

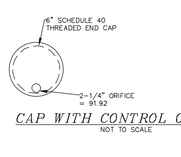


OUTLET STRUCTURE #103B
NOT TO SCALE

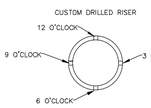


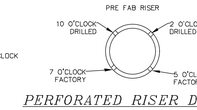
TOP VIEW (103B)
NOT TO SCALE





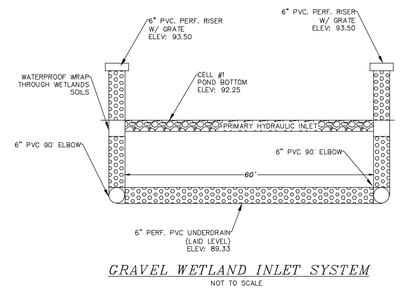
CAP WITH CONTROL ORIFICE
NOT TO SCALE





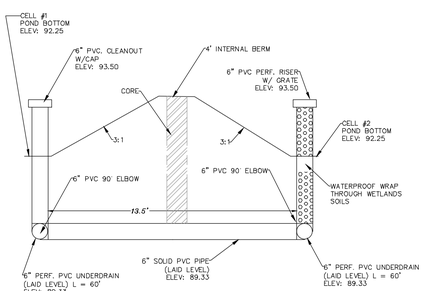
PERFORATED RISER DETAIL
NOT TO SCALE

P5



GRAVEL WETLAND INLET SYSTEM
NOT TO SCALE

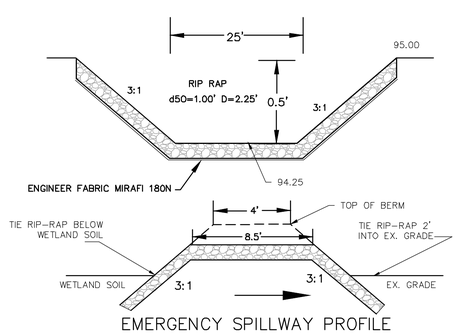
P6



GRAVEL WETLAND CONNECTION SYSTEM
NOT TO SCALE

P7

SPILLWAY DETAILS
NOT TO SCALE



EMERGENCY SPILLWAY PROFILE

P-103

PLANNING FILE #21-04

#	REVISION	DATE	DESCRIPTION
#4		1-28-22	MULTIPLE PLAN SET REVISIONS
#3		8-16-21	REVISED PER TRC COMMENT
#2		7-27-21	REVISED PER TRC COMMENT
#1		5-24-21	REVISED PER TRC COMMENT

GRAVEL WETLAND #103
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY & SURVEYING ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY No. 7814 LICENSED PROFESSIONAL ENGINEER

P1

MAINTENANCE REQUIREMENTS

ACTIVITY	FREQUENCY
CLOGGING AND SYSTEM PERFORMANCE	
INSPECT INLETS AND OUTLETS TO ENSURE GOOD CONDITION AND NO EVIDENCE OF DETERIORATION. CHECK TO SEE IF HIGH-FLOW BYPASS IS FUNCTIONING. REMEDY: REPAIR OR REPLACE ANY DAMAGED STRUCTURAL PARTS, INLETS AND OUTLETS. CLEAR OR REMOVE DEBRIS OR RESTRICTIONS.	ANNUALLY, MORE FREQUENTLY IN THE FIRST YEAR OF OPERATION
CHECK FOR INTERNAL EROSION, EVIDENCE OF SHORT-CIRCUITING, AND ANIMAL BURROWS. REMEDY: SOIL EROSION FROM SHORT-CIRCUITING OR ANIMAL BOROUGHS SHOULD BE REPAIRED WHEN THEY OCCUR.	
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VEGETATION	
CHECK FOR ROBUST VEGETATION COVERAGE THROUGHOUT THE SYSTEM AND DEAD OR DYING PLANTS REMEDY: VEGETATION SHOULD COVER > 75% OF THE SYSTEM AND SHOULD BE RESEEDED AND CARED FOR AS NEEDED	ANNUALLY, OR AS NEEDED
CUT AND REMOVE VEGETATION FROM GRAVEL WETLAND SYSTEM AND FOREBAY IN ORDER TO MAINTAIN NITROGEN REMOVAL PERFORMANCE REMEDY: THE VEGETATION SHOULD BE CUT AND REMOVED FROM THE SYSTEM TO PREVENT NITROGEN FROM CYCLING BACK INTO THE SYSTEM	ONCE EVERY 3 YEARS

3/8" WASHED CRUSHED STONE*

SIEVE SIZE	% PASSING BY WEIGHT
1/2"	100
3/8"	95 - 100
# 4	22 - 55
# 8	0 - 10

* EQUIVALENT TO STANDARD WASHED STONE - SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

1-1/2" WASHED CRUSHED STONE*

SIEVE SIZE	% PASSING BY WEIGHT
2"	100
1-1/2"	90 - 100
1"	20 - 55
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3/8"	0 -5

* EQUIVALENT TO STANDARD WASHED STONE - SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

WETLAND SOIL

SIEVE SIZE	% PASSING BY WEIGHT
0.5	100
#10"	90 - 75
#100	40 - 50
#200	25 -50

SIEVE SIZE	% PASSING TOLERANCES
0.5	±10.0
#10	±5.0
#100	±5.0
#200	±5.0

DESIGN REFERENCES

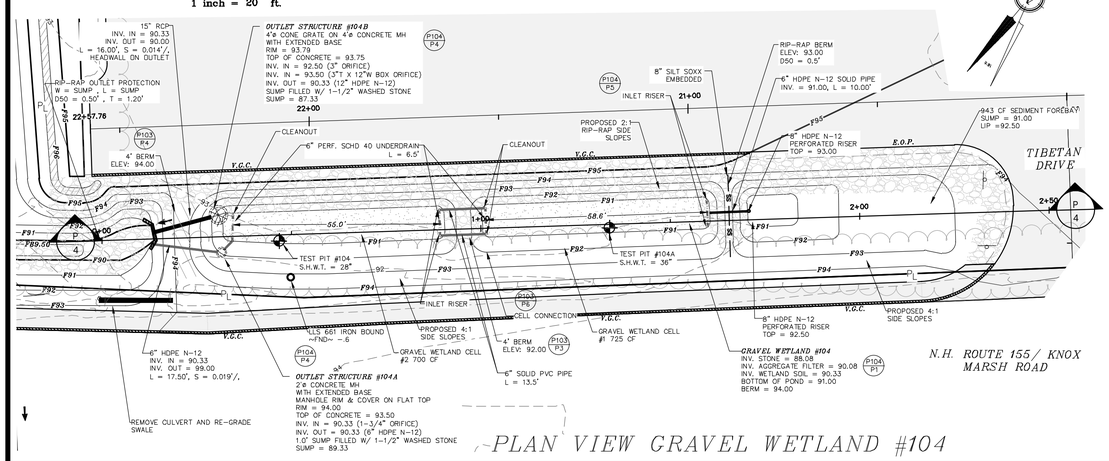
1 UNH STORMWATER CENTER

CONSTRUCTION NOTE: THE DESIGN ENGINEER IS TO BE ON SITE PRIOR TO AND DURING THE PLACEMENT OF THE RESERVOIR STONE, AND TO WITNESS THE INSTALLATION OF THE UNDER-DRAIN AND INTER-CHAMBER PIPES. PLEASE PROVIDE 24 HOURS NOTICE PRIOR TO REQUESTED INSPECTION.

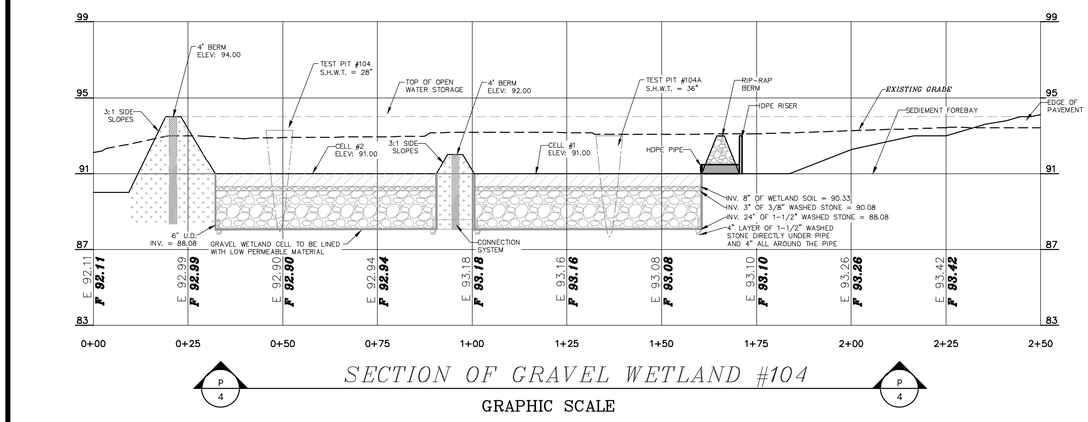
GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.



PLAN VIEW GRAVEL WETLAND #104



SECTION OF GRAVEL WETLAND #104

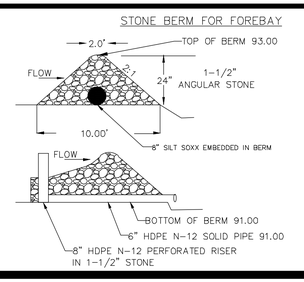
GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.
VERTICAL SCALE: 1" = 4'

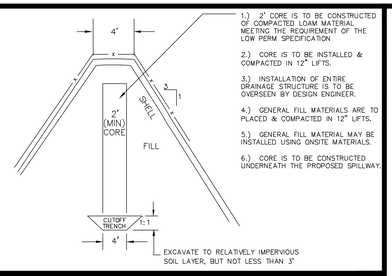
P2

STONE BERM FOR FOREBAY



P3

LOW PERMEABILITY MATERIAL GRADATION	
SIEVE SIZE	% PASSING BY WEIGHT
#4	95 - 100
#40	60 - 95
#100	40 - 60
#200	25 - 45



1.) 2" CORE IS TO BE CONSTRUCTED OF COMPACTED LOAM MATERIAL MEETING THE REQUIREMENT OF THE LOW PERM SPECIFICATION

2.) CORE IS TO BE INSTALLED & COMPACTED IN 12" LIFTS.

3.) INSTALLATION OF ENTIRE DRAINAGE STRUCTURE IS TO BE OVERSEEN BY DESIGN ENGINEER.

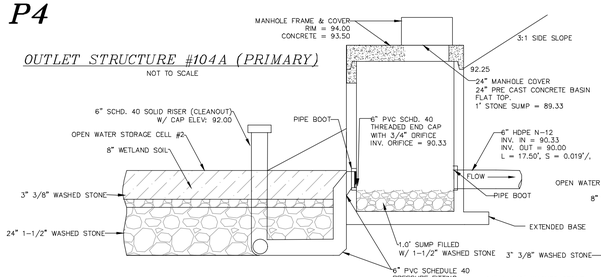
4.) GENERAL FILL MATERIALS ARE TO PLACED & COMPACTED IN 12" LIFTS.

5.) GENERAL FILL MATERIAL MAY BE INSTALLED USING ONSITE MATERIALS.

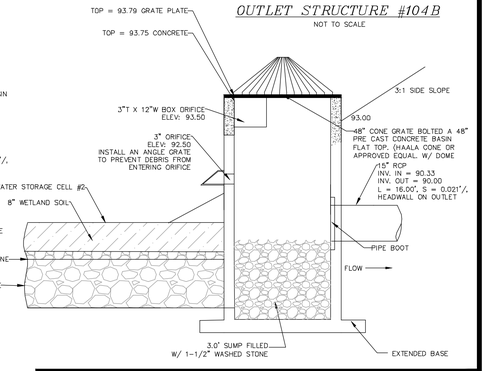
6.) CORE IS TO BE CONSTRUCTED UNDERNEATH THE PROPOSED SPILLWAY.

P4

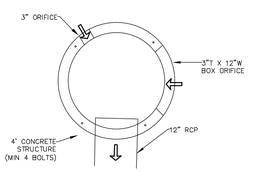
OUTLET STRUCTURE #104A (PRIMARY)
NOT TO SCALE

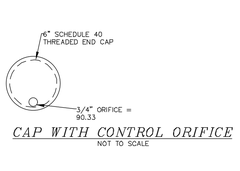


OUTLET STRUCTURE #104B
NOT TO SCALE

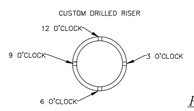


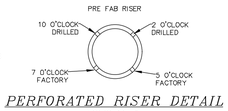
TOP VIEW (104B)
NOT TO SCALE





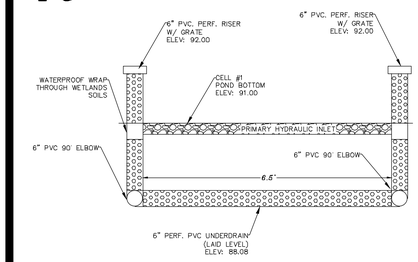
CAP WITH CONTROL ORIFICE
NOT TO SCALE





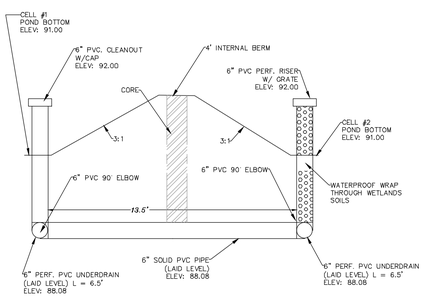
PERFORATED RISER DETAIL
NOT TO SCALE

P5



GRAVEL WETLAND INLET SYSTEM
NOT TO SCALE

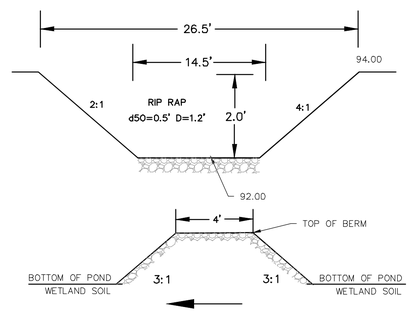
P6



GRAVEL WETLAND CONNECTION SYSTEM
NOT TO SCALE

P7

SPILLWAY DETAILS
NOT TO SCALE



GRAVEL WETLAND CELL SPILLWAY PROFILE

P-104

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

GRAVEL WETLAND #104
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10043
LICENSED PROFESSIONAL ENGINEER

SOILS & DEWATERING:

WfA	*WINDSOR*	*VARIANT*	*K= 0.17*
WfB	*WINDSOR*	*VARIANT*	*K= 0.17*
WfC	*WINDSOR*	*VARIANT*	*K= 0.17*
BtA	*BUXTON*	*SILT LOAM*	*K= 0.28*
BtB	*BUXTON*	*SILT LOAM*	*K= 0.49*
BtC	*BUXTON*	*SILT LOAM*	*K= 0.49*
ScA-P	*SCANTIC*	*POORLY DRAINED*	*K= 0.49*
ScB-P	*SCANTIC*	*POORLY DRAINED*	*K= 0.43*

SEE SITE SPECIFIC SOILS MAP (SSSM)
SEE WEBSOIL USDA–NRCS
ERODIBILITY FACTOR – K, CPESC MANUAL, ENVIROCERT INTERNATIONAL INC. & ROCKINGHAM COUNTTY SOIL SURVEY, ROCKWEB SOIL ATTRIBUTES.

CONTRACTOR TO BE AWARE OF THE SOIL PROFILES AND ENSURE THAT PROPER EROSION PREVENTION AND SEDIMENT CONTROL MEASURES ARE TAKEN AT ALL TIMES. ANY DEWATERING REQUIREMENTS IN NEW HAMPSHIRE REQUIRE SPECIAL PROVISIONS IN ACCORDANCE WITH THE "CLARIFICATION OF SECTION 9.1.2 (STATE OF NEW HAMPSHIRE CONDITIONS) AND OTHER NH SPECIFIC INFORMATION FOR THE U.S. EPA 2012 NPDES CONSTRUCTION GENERAL PERMIT (CGP)" DATED MAY 3, 2012 INCLUDED IN THE SWPPP.

COVER MANAGEMENT DURING CONSTRUCTION FOR EXPOSED SOIL WILL INCLUDE HAY / STRAW APPLIED AT A RATE OF 2.0 TONS PER ACRE, TEMPORARY SEEDING OF ANNUAL RYE GRASS, AND PERMANENT SEEDING AT THE EARLIES OPPORTUNITY. SEE ADDITIONAL REQUIREMENT FOR STABILIZATION ON THE EROSION AND SEDIMENT CONTROL DETAIL SHEETS, E–101 AND E–102.

THE CONSTRUCTION SCHEDULE WILL BE MANAGED SO THAT ALL STORMWATER STRUCTURES WILL BE BUILT AND STABILIZED PRIOR TO RECEIVING SURFACE WATER RUNOFF. CONTRACTOR TO BE RESPONSIBLE FOR ALL DIVERSIONS DURING CONSTRUCTION AND FOR INTERIM SEDIMENT AND EROSION CONTROL MEASURES.

LEGEND:

- (R) POND PROTECTION
- (P) PERIMETER CONTROL
- (C) RESIDENTIAL/ROADWAY CONSTRUCTION
- IRON PIPE (FND)
- IRON BOUND (FND)
- REBAR (FND)
- UTILITY POLE
- BENCHMARK
- P/C — PERIMETER CONTROL
- SS — SS — SS — FILTREXX SILTSOXX
- TREE LINE

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833–0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac..

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THE INTENT OF THIS PLAN IS TO SHOW THE EASTERN EROSION AND SEDIMENT CONTROL DETAIL.

5.) UNDERGROUND UTILITY LOCATIONS ARE BASED UPON BEST AVAILABLE EVIDENCE AND ARE NOT FIELD VERIFIED. LOCATING AND PROTECTING ANY ABOVE AND BELOW GROUND UTILITIES IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. ANY UTILITY CONFLICTS SHOULD BE REPORTED IMMEDIATELY TO THE DESIGN ENGINEER.

6.) THE CONTRACTOR SHALL CALL AND COORDINATE WITH DIGSAFE AT 1–888–344–7233 AT LEAST 72 HOURS PRIOR TO COMMENCING ANY EXCAVATION ON PUBLIC OR PRIVATE PROPERTY.

7.) ALL DRAINAGE PIPE IS TO BE HDPE N–12. INDIVIDUAL PIPE SIZES ARE SPECIFIED ON GRADING AND DETAIL PLAN SHEETS, GREEN PIPE.

8.) ALL ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. THE DESIGN ENGINEER IS TO BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY. TEMPORARY BENCHMARKS (T.B.M.) ARE TO BE PROVIDED BY THE DESIGN ENGINEER.

NOTES CONTINUED:

9.) UPON FINAL COMPLETION AND 85% STABILIZATION, THE DRAINAGE SYSTEM IS TO BE CLEANED OF ALL DEBRIS. SEDIMENT CONTROL PRACTICES REMOVED AND DISPOSED OF PROPERLY, AND ANNUAL MAINTENANCE PREFORMED ON ALL DRAINAGE PRACTICES.

10.) EROSION AND SEDIMENT CONTROL INSPECTIONS TO BE CONDUCTED ONCE PER EVERY SEVEN DAYS AND AT AN INCREASED FREQUENCY INCLUDING WITHIN 24–HOURS OF A 0.25 INCH RAIN EVENT. INSPECTIONS TO BE CONDUCTED BY A "QUALIFIED PERSON" AS DEFINED BY EPA CGP SECTION 6.3. PLEASE NOTE THAT SPECIFIC STORMWATER, EROSION PREVENTION AND SEDIMENT CONTROL TRAINING AND CERTIFICATION IS REQUIRED. INSPECTION REPORTS TO BE SUBMITTED TO THE CITY OF DOVER, NH, ENGINEERING DEPARTMENT WITHIN 24 HOURS IN ACCORDANCE WITH CGP 4.1.7 AND MAINTAINED BY THE OWNER FOR A PERIOD OF THREE YEARS AFTER THE PROJECT IS COMPLETED. SEE ALSO CITY OF DOVER ADDITIONAL INSPECTION REQUIREMENTS BELOW.

11.) CONTRACTOR AY USE SILT FENCE, SILT SOXX OR MULCH BERM FOR PERIMETER CONTROL.

12.) PER EPA CGP Z.1.2.2 (INSTALL PERIMETER CONTROL), "YOU MUST INSTALL SEDIMENT CONTROLS ALONG THOSE PERIMETER AREAS OF YOUR SITE THAT WILL RECEIVE STORMWATER FROM EARTH DISTURBING ACTIVITIES." AS A RESULT OF SWPPP INSPECTIONS, THE CONTRACTOR MAY HAVE TO EXPAND PERIMETER CONTROLS TO MEET THIS REQUIREMENT. THE E&SC PLAN IS INITIATING GUIDANCE AS TO THE ANTICIPATED REQUIREMENTS AND IT THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT STORMWATER VIOLATION DO NOT OCCUR.

13.) CONTRACTOR IS REQUIRED TO INSTALL A CONSTRUCTION ENTRANCE PRIOR TO ANY EARTH DISTURBING ACTIVITIES.

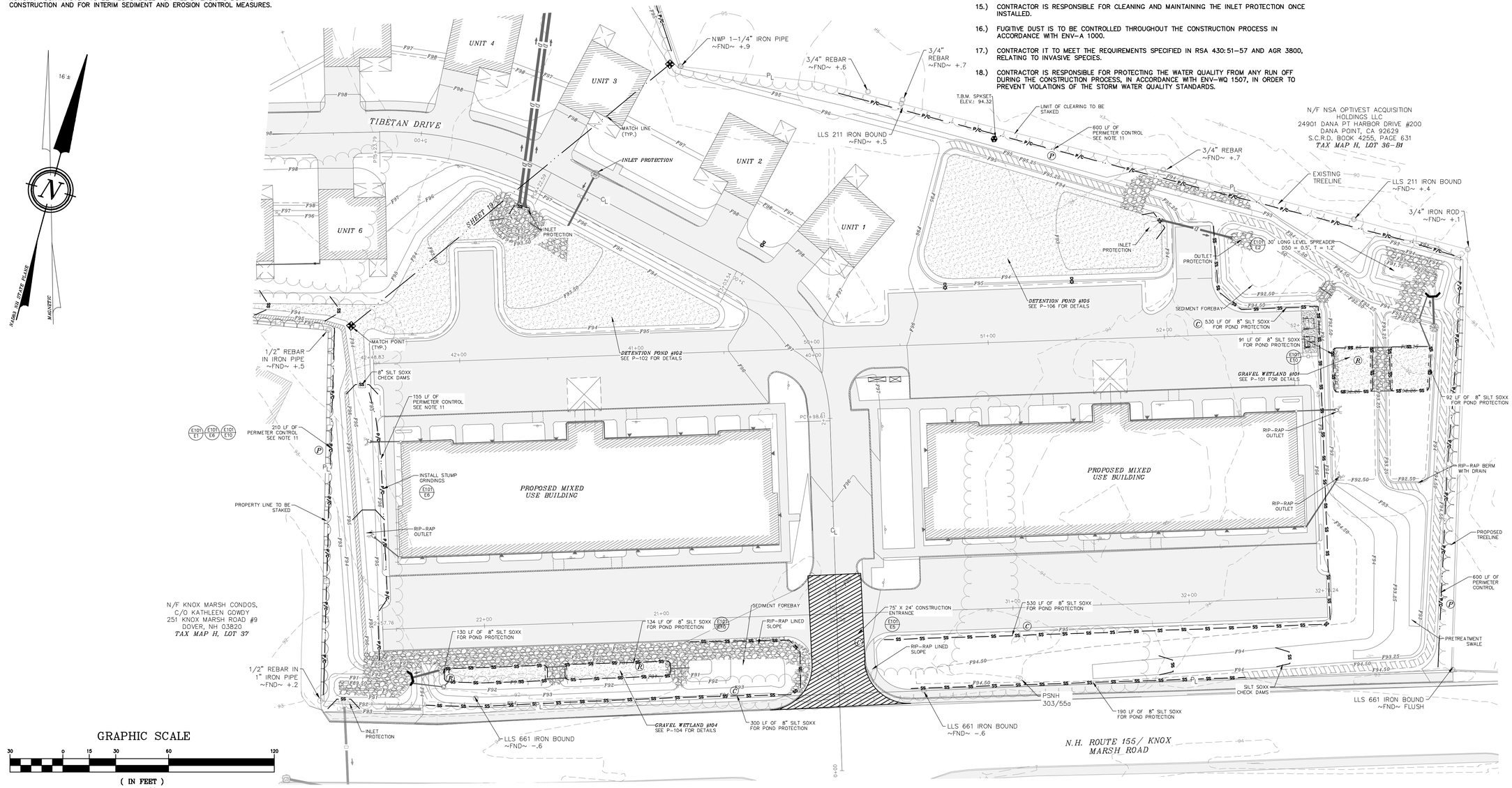
14.) CONTRACTOR IS RESPONSIBLE FOR SWEEPING THE PARKING LOT, SIDEWALKS AND ANYTHING DISTURBED, TO ENSURE THAT NO SEDIMENT IS BEING TRACKED ONTO KNOX MARSH ROAD.

15.) CONTRACTOR IS RESPONSIBLE FOR CLEANING AND MAINTAINING THE INLET PROTECTION ONCE INSTALLED.

16.) FUGITIVE DUST IS TO BE CONTROLLED THROUGHOUT THE CONSTRUCTION PROCESS IN ACCORDANCE WITH ENV–A 1000.

17.) CONTRACTOR IT TO MEET THE REQUIREMENTS SPECIFIED IN RSA 430:51–57 AND AGR 3800, RELATING TO INVASIVE SPECIES.

18.) CONTRACTOR IS RESPONSIBLE FOR PROTECTING THE WATER QUALITY FROM ANY RUN OFF DURING THE CONSTRUCTION PROCESS, IN ACCORDANCE WITH ENV–WQ 1507, IN ORDER TO PREVENT VIOLATIONS OF THE STORM WATER QUALITY STANDARDS.



GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

PLANNING FILE #21–04

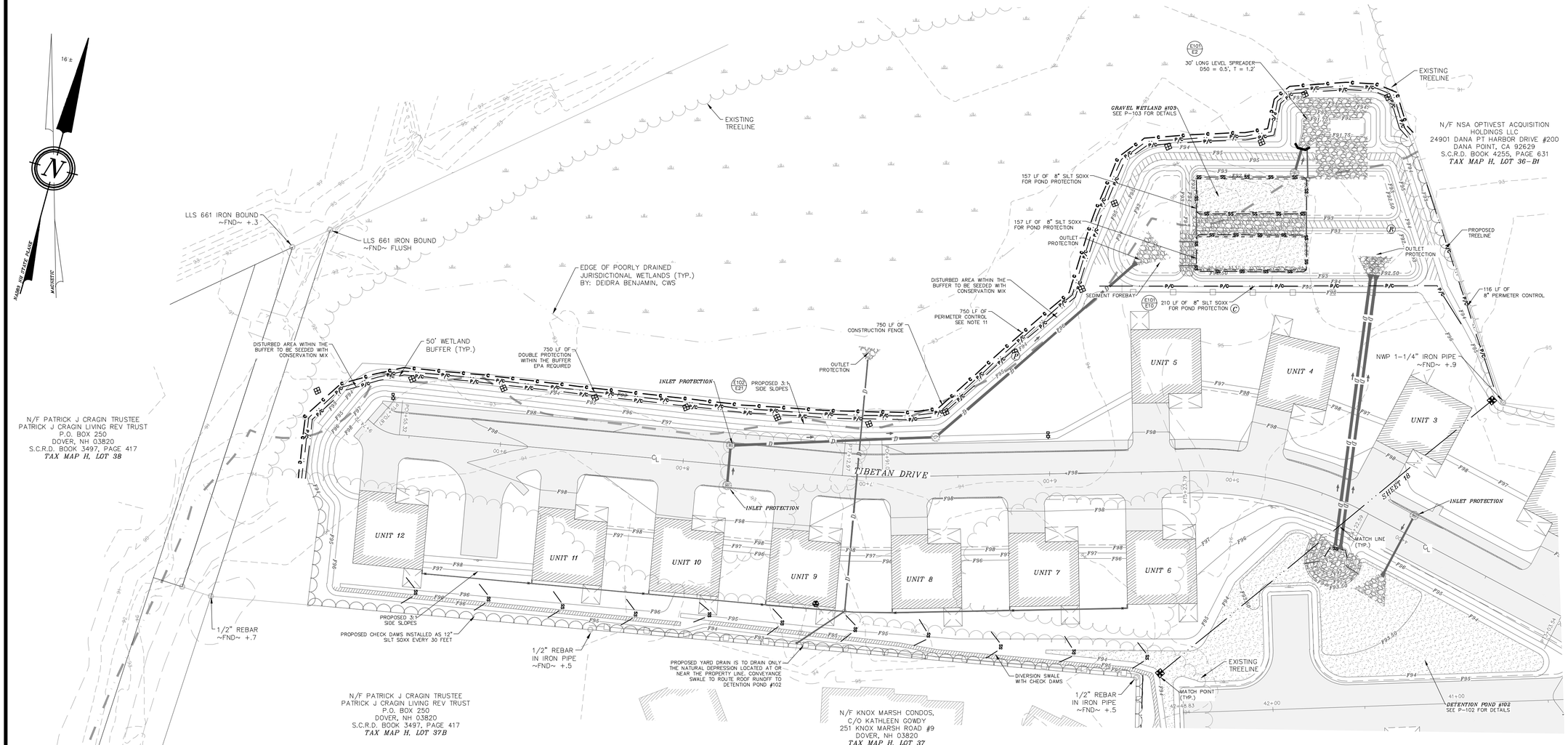
REVISION	DATE	DESCRIPTION
#4	1–28–22	MULTIPLE PLAN SET REVISIONS
#3	8–16–21	REVISED PER TRC COMMENT
#2	7–27–21	REVISED PER TRC COMMENT
#1	5–24–21	REVISED PER TRC COMMENT

EROSION AND SEDIMENT CONTROL PLAN EAST
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332–2863

SCALE : 1 IN. EQUALS 30 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10615
LICENSED PROFESSIONAL ENGINEER



SOILS & DEWATERING:

WfA	*WINDSOR*	*VARIANT*	*K= 0.17*
WfB	*WINDSOR*	*VARIANT*	*K= 0.17*
WfC	*WINDSOR*	*VARIANT*	*K= 0.17*
BmA	*BUXTON*	*SILT LOAM*	*K= 0.28*
BmB	*BUXTON*	*SILT LOAM*	*K= 0.49*
BmC	*BUXTON*	*SILT LOAM*	*K= 0.49*
ScA-P	*SCANTIC*	*POORLY DRAINED*	*K= 0.49*
ScB-P	*SCANTIC*	*POORLY DRAINED*	*K= 0.43*

SEE SITE SPECIFIC SOILS MAP (SSSM)
SEE WEBSOIL USDA-NRCS
ERODIBILITY FACTOR - K, CPESC MANUAL, ENVIROCERT INTERNATIONAL INC. & ROCKINGHAM COUNTTY SOIL SURVEY, ROCKWEB SOIL ATTRIBUTES.

CONTRACTOR TO BE AWARE OF THE SOIL PROFILES AND ENSURE THAT PROPER EROSION PREVENTION AND SEDIMENT CONTROL MEASURES ARE TAKEN AT ALL TIMES. ANY DEWATERING REQUIREMENTS IN NEW HAMPSHIRE REQUIRE SPECIAL PROVISIONS IN ACCORDANCE WITH THE "CLARIFICATION OF SECTION 9.1.2 (STATE OF NEW HAMPSHIRE CONDITIONS) AND OTHER NH SPECIFIC INFORMATION FOR THE U.S. EPA 2012 NPDES CONSTRUCTION GENERAL PERMIT (CGP)" DATED MAY 3, 2012 INCLUDED IN THE SWPPP.

COVER MANAGEMENT DURING CONSTRUCTION FOR EXPOSED SOIL WILL INCLUDE HAY / STRAW APPLIED AT A RATE OF 2.0 TONS PER ACRE, TEMPORARY SEEDING OF ANNUAL RYE GRASS, AND PERMANENT SEEDING AT THE EARLIES OPPORTUNITY. SEE ADDITIONAL REQUIREMENT FOR STABILIZATION ON THE EROSION AND SEDIMENT CONTROL DETAIL SHEETS, E-101 AND E-102.

THE CONSTRUCTION SCHEDULE WILL BE MANAGED SO THAT ALL STORMWATER STRUCTURES WILL BE BUILT AND STABILIZED PRIOR TO RECEIVING SURFACE WATER RUNOFF. CONTRACTOR TO BE RESPONSIBLE FOR ALL DIVERSIONS DURING CONSTRUCTION AND FOR INTERIM SEDIMENT AND EROSION CONTROL MEASURES.

LEGEND:

- (R) POND PROTECTION
- (P) PERIMETER CONTROL
- (C) RESIDENTIAL/ROADWAY CONSTRUCTION
- IRON PIPE (FND)
- IRON BOUND (FND)
- REBAR (FND)
- UTILITY POLE
- BENCHMARK
- SILT FENCE
- SS SILTSOXX / MULCH BERM
- TREE LINE

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THE INTENT OF THIS PLAN IS TO SHOW THE WESTERN EROSION AND SEDIMENT CONTROL DETAIL.

6.) SEE SHEET 15 FOR ALL OTHER STANDARD EROSION AND SEDIMENT CONTROL NOTES.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
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EROSION AND SEDIMENT CONTROL PLAN WEST
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

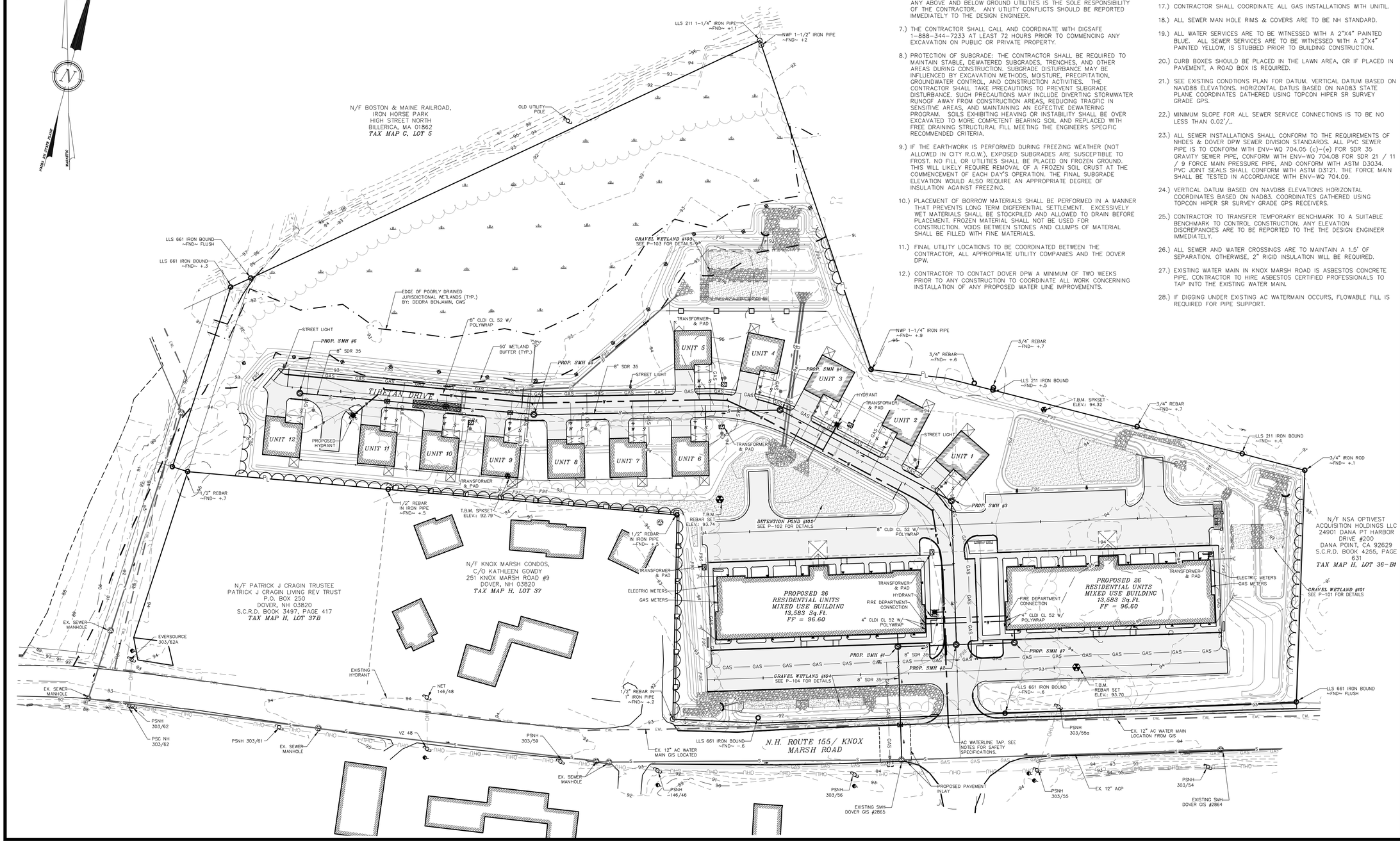
SCALE : 1 IN. EQUALS 30 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 7814
LICENSED PROFESSIONAL ENGINEER

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.



NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THE INTENT OF THIS PLAN IS TO SHOW THE PROPOSED OVERVIEW UTILITY DESIGN.

6.) UNDERGROUND UTILITY LOCATIONS ARE BASED UPON BEST AVAILABLE EVIDENCE AND ARE NOT FIELD VERIFIED. LOCATING AND PROTECTING ANY ABOVE AND BELOW GROUND UTILITIES IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. ANY UTILITY CONFLICTS SHOULD BE REPORTED IMMEDIATELY TO THE DESIGN ENGINEER.

7.) THE CONTRACTOR SHALL CALL AND COORDINATE WITH DIGSAFE 1-888-344-7233 AT LEAST 72 HOURS PRIOR TO COMMENCING ANY EXCAVATION ON PUBLIC OR PRIVATE PROPERTY.

8.) PROTECTION OF SUBGRADE: THE CONTRACTOR SHALL BE REQUIRED TO MAINTAIN STABLE, DEWATERED SUBGRADES, TRENCHES, AND OTHER AREAS DURING CONSTRUCTION. SUBGRADE DISTURBANCE MAY BE INFLUENCED BY EXCAVATION METHODS, MOISTURE, PRECIPITATION, GROUNDWATER CONTROL, AND CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL TAKE PRECAUTIONS TO PREVENT SUBGRADE DISTURBANCE. SUCH PRECAUTIONS MAY INCLUDE DIVERTING STORMWATER RUNOFF AWAY FROM CONSTRUCTION AREAS, REDUCING TRAGFIC IN SENSITIVE AREAS, AND MAINTAINING AN EGFECTIVE DEWATERING PROGRAM. SOILS EXHIBITING HEAVING OR INSTABILITY SHALL BE OVER EXCAVATED TO MORE COMPETENT BEARING SOIL AND REPLACED WITH FREE DRAINING STRUCTURAL FILL MEETING THE ENGINEERS SPEOIFIC RECOMMENDED CRITERIA.

9.) IF THE EARTHWORK IS PERFORMED DURING FREEZING WEATHER (NOT ALLOWED IN CITY R.O.W.), EXPOSED SUBGRADES ARE SUSCEPTIBLE TO FROST. NO FILL OR UTILITIES SHALL BE PLACED ON FROZEN GROUND. THIS WILL LIKELY REQUIRE REMOVAL OF A FROZEN SOIL CRUST AT THE COMMENCEMENT OF EACH DAY'S OPERATION. THE FINAL SUBGRADE ELEVATION WOULD ALSO REQUIRE AN APPROPRIATE DEGREE OF INSULATION AGAINST FREEZING.

10.) PLACEMENT OF BORROW MATERIALS SHALL BE PERFORMED IN A MANNER THAT PREVENTS LONG TERM DIGFERENTIAL SETTLEMENT. EXCESSIVELY WET MATERIALS SHALL BE STOCKPILED AND ALLOWED TO DRAIN BEFORE PLACEMENT. FROZEN MATERIAL SHALL NOT BE USED FOR CONSTRUCTION. VOIDS BETWEEN STONES AND CLUMPS OF MATERIAL SHALL BE FILLED WITH FINE MATERIALS.

11.) FINAL UTILITY LOCATIONS TO BE COORDINATED BETWEEN THE CONTRACTOR, ALL APPROPRIATE UTILITY COMPANIES AND THE DOVER DPW.

12.) CONTRACTOR TO CONTACT DOVER DPW A MINIMUM OF TWO WEEKS PRIOR TO ANY CONSTRUCTION TO COORDINATE ALL WORK CONCERNING INSTALLATION OF ANY PROPOSED WATER LINE IMPROVEMENTS.

NOTES CONTINUED:

13.) ALL WATER MAIN AND SERVICE INSTALLATIONS SHALL CONFORM TO CITY OF DOVER STANDARDS. ALL HIGHWAY CONSTRUCTION WILL MEET THE CITY OF DOVER STANDARDS.

14.) CONTRACTOR SHALL COORDINATE ALL ELECTRICAL INSTALLATIONS WITH EVERSOURCE AT (800) 662-7764. ALL ELECTRIC CONDUIT INSTALLATION SHALL BE INSPECTED BY EVERSOURCE PRIOR TO BACKFILL. A 48-HOUR MINIMUM NOTICE IS REQUIRED.

15.) CONTRACTOR SHALL COORDINATE ALL TELECOMMUNICATIONS INSTALLATIONS WITH FAIRPOINT COMMUNICATIONS AT (603) 427-5525.

16.) CONTRACTOR SHALL COORDINATE ALL CABLE INSTALLATIONS WITH COMCAST.

17.) CONTRACTOR SHALL COORDINATE ALL GAS INSTALLATIONS WITH UNITIL.

18.) ALL SEWER MAN HOLE RIMS & COVERS ARE TO BE NH STANDARD.

19.) ALL WATER SERVICES ARE TO BE WITNESSED WITH A 2"X4" PAINTED BLUE. ALL SEWER SERVICES ARE TO BE WITNESSED WITH A 2"X4" PAINTED YELLOW, IS STUBBED PRIOR TO BUILDING CONSTRUCTION.

20.) CURB BOXES SHOULD BE PLACED IN THE LAWN AREA, OR IF PLACED IN PAVEMENT, A ROAD BOX IS REQUIRED.

21.) SEE EXISTING CONDTIONS PLAN FOR DATUM. VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL DATUS BASED ON NAD83 STATE PLANE COORDINATES GATHERED USING TOPCON HIPER SR SURVEY GRADE GPS.

22.) MINIMUM SLOPE FOR ALL SEWER SERVICE CONNECTIONS IS TO BE NO LESS THAN 0.02'/'.

23.) ALL SEWER INSTALLATIONS SHALL CONFORM TO THE REQUIREMENTS OF NHDES & DOVER DPW SEWER DIVISION STANDARDS. ALL PVC SEWER PIPE IS TO CONFORM WITH ENV-WQ 704.05 (c)-(e) FOR SDR 35 GRAVITY SEWER PIPE, CONFORM WITH ENV-WQ 704.08 FOR SDR 21 / 11 / 9 FORCE MAIN PRESSURE PIPE, AND CONFORM WITH ASTM D3034. PVC JOINT SEALS SHALL CONFORM WITH ASTM D3121. THE FORCE MAIN SHALL BE TESTED IN ACCORDANCE WITH ENV-WQ 704.09.

24.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING TOPCON HIPER SR SURVEY GRADE GPS RECEIVERS.

25.) CONTRACTOR TO TRANSFER TEMPORARY BENCHMARK TO A SUITABLE BENCHMARK TO CONTROL CONSTRUCTION. ANY ELEVATION DISCREPANCIES ARE TO BE REPORTED TO THE THE DESIGN ENGINEER IMMEDIATELY.

26.) ALL SEWER AND WATER CROSSINGS ARE TO MAINTAIN A 1.5' OF SEPARATION. OTHERWISE, 2" RIGID INSULATION WILL BE REQUIRED.

27.) EXISTING WATER MAIN IN KNOX MARSH ROAD IS ASBESTOS CONCRETE PIPE. CONTRACTOR TO HIRE ASBESTOS CERTIFIED PROFESSIONALS TO TAP INTO THE EXISTING WATER MAIN.

28.) IF DIGGING UNDER EXISTING AC WATERMAIN OCCURS, FLOWABLE FILL IS REQUIRED FOR PIPE SUPPORT.

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
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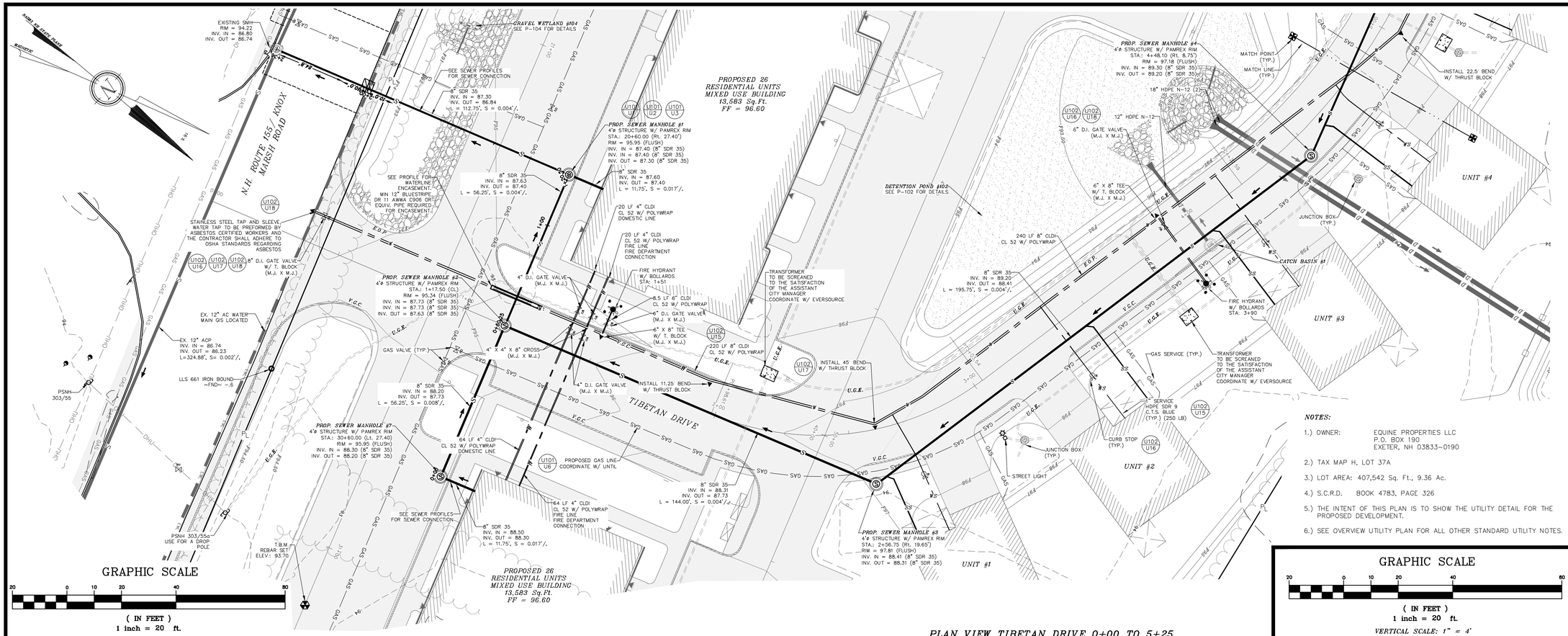
#1	5-24-21	REVISED PER TRC COMMENT

OVERVIEW UTILITY PLAN
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

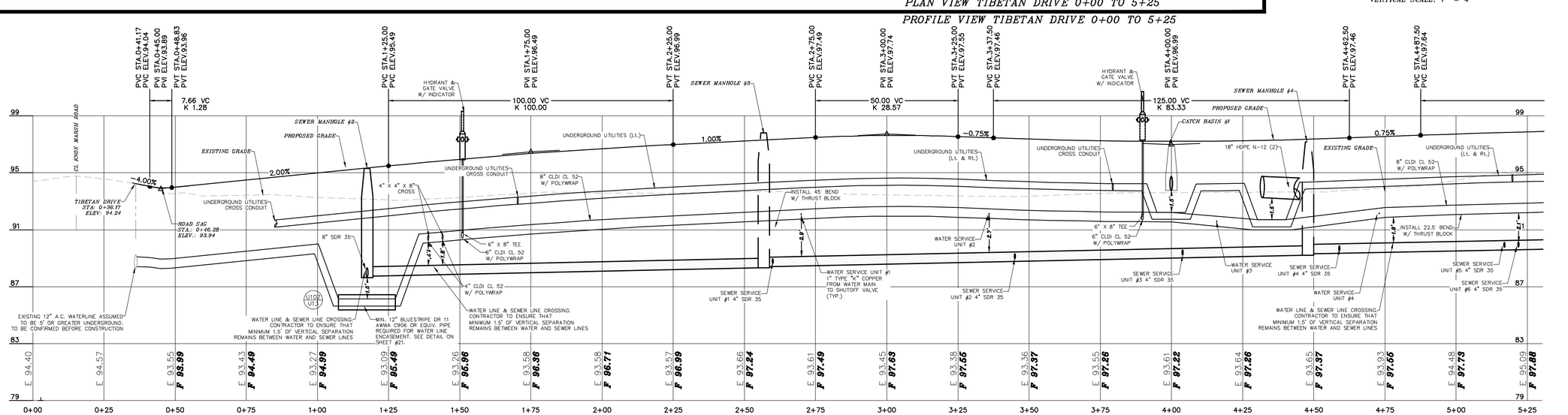
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY No. 10043
LICENSED PROFESSIONAL ENGINEER



PLAN VIEW TIBETAN DRIVE 0+00 TO 5+25



GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.
VERTICAL SCALE: 1" = 4'

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THE INTENT OF THIS PLAN IS TO SHOW THE UTILITY DETAIL FOR THE PROPOSED DEVELOPMENT.

6.) SEE OVERVIEW UTILITY PLAN FOR ALL OTHER STANDARD UTILITY NOTES.

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
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#1	5-24-21	REVISED PER TRC COMMENT

UTILITY PLAN AND PROFILE TIBETAN DRIVE 0+00 TO 5+25
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY No. 7892
LICENSED PROFESSIONAL ENGINEER

PLANNING FILE #21-04

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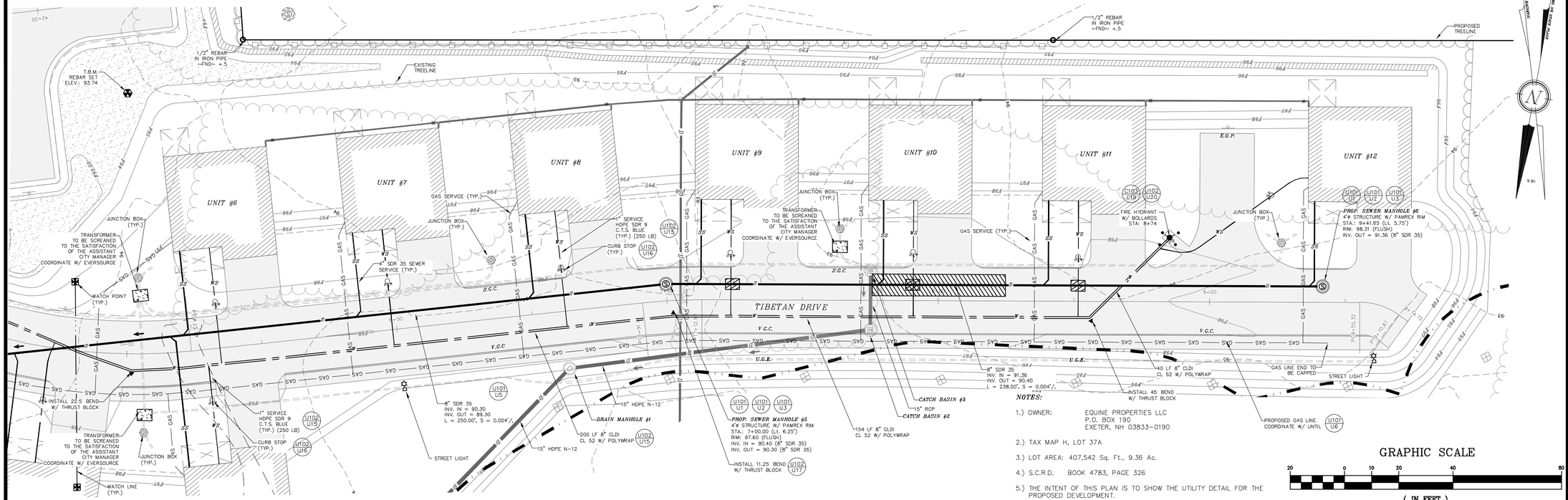
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

UTILITY PLAN AND PROFILE TIBETAN DRIVE 5+00 TO END
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A



PLAN VIEW TIBETAN DRIVE 5+00 TO 10+00

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

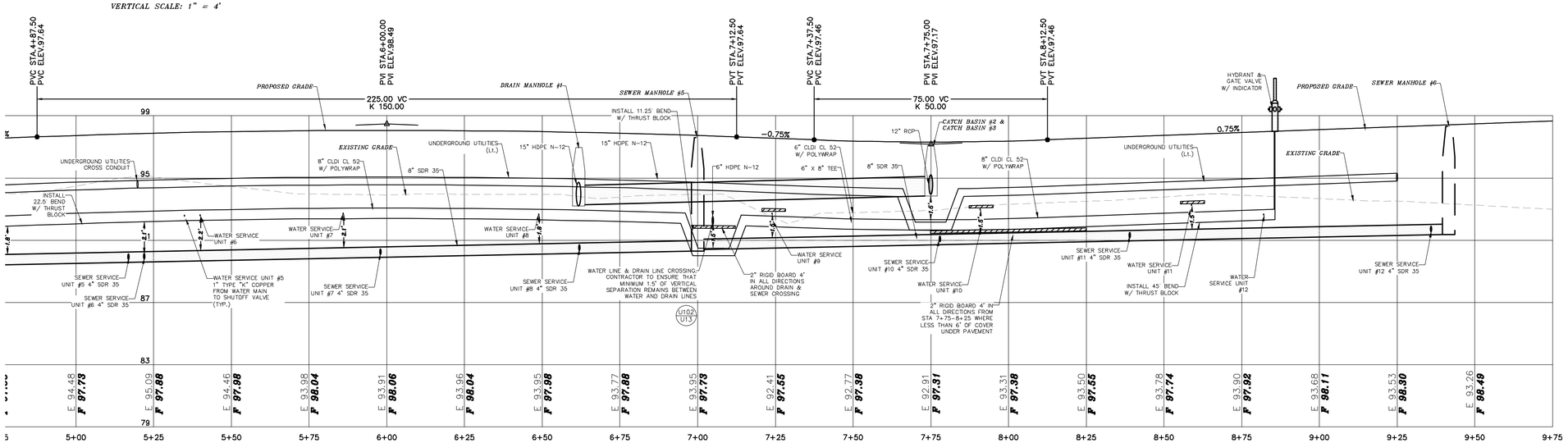
5.) THE INTENT OF THIS PLAN IS TO SHOW THE UTILITY DETAIL FOR THE PROPOSED DEVELOPMENT.

6.) SEE OVERVIEW UTILITY PLAN FOR ALL OTHER STANDARD UTILITY NOTES.

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

PROFILE VIEW TIBETAN DRIVE 5+00 TO 10+00

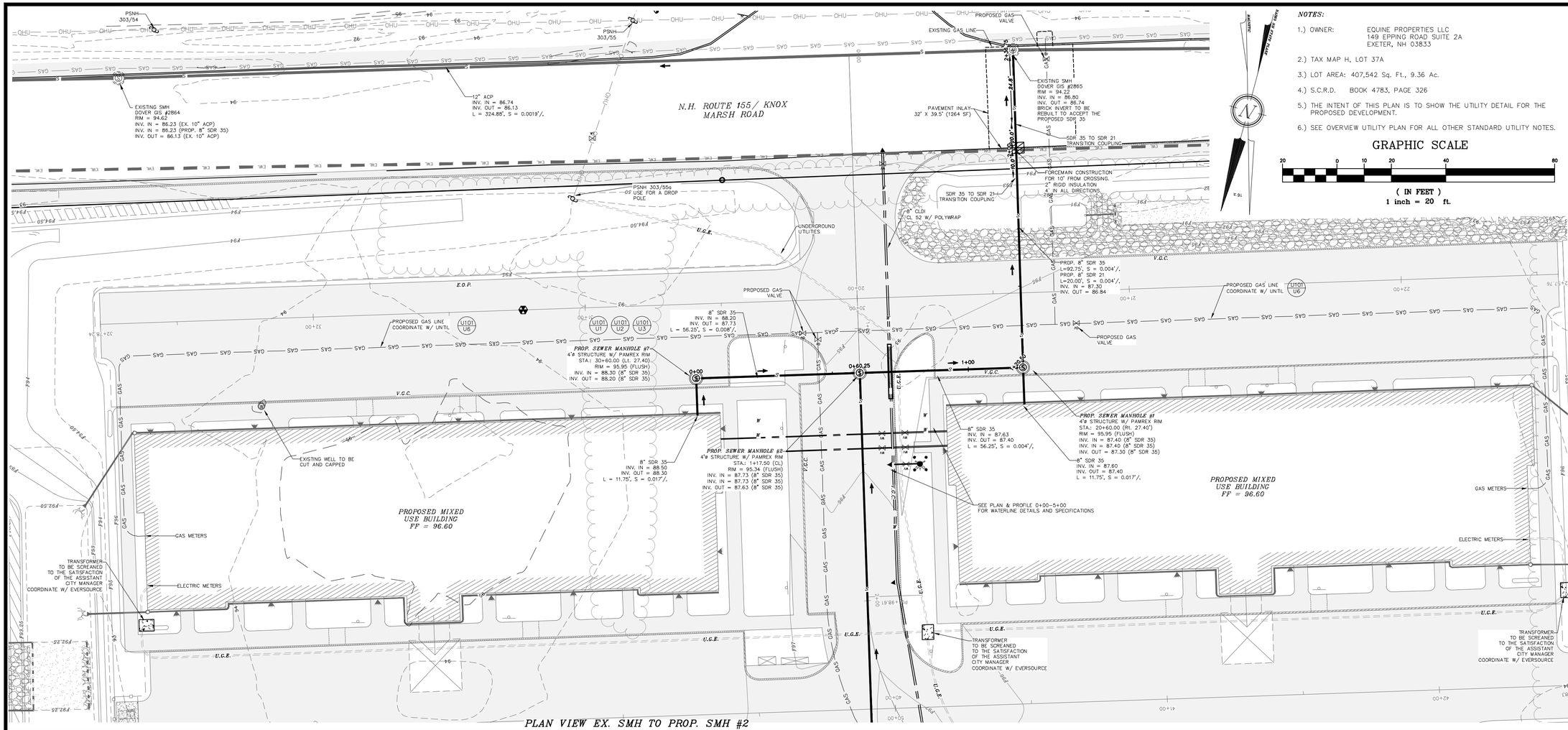
GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.
VERTICAL SCALE: 1" = 4'



BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY No. 14043
LICENSED PROFESSIONAL ENGINEER



PLAN VIEW EX. SMH TO PROP. SMH #2

PROFILE VIEW EX. SMH TO PROP. SMH #2

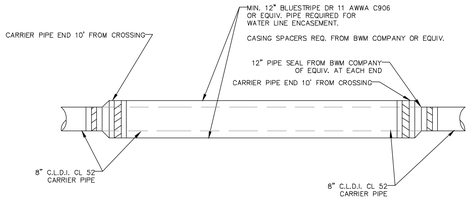
GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)

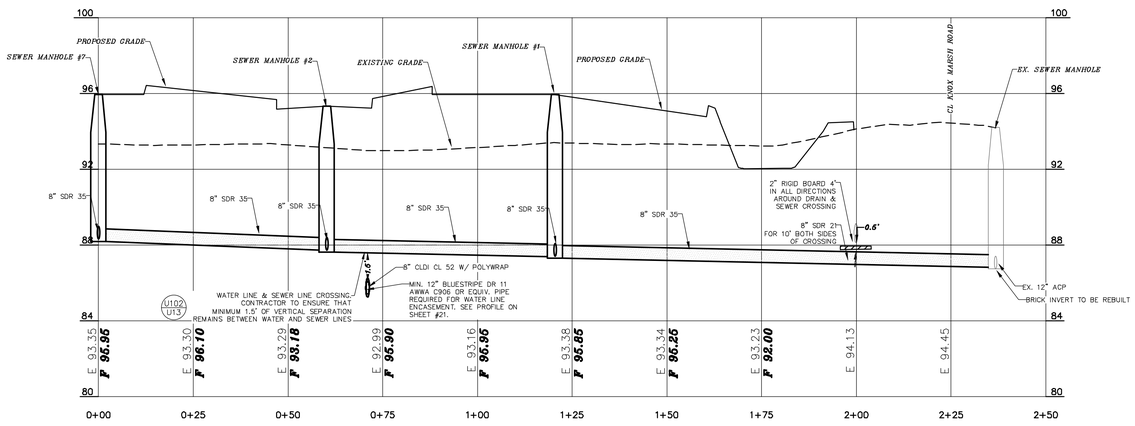
1 inch = 20 ft.

VERTICAL SCALE: 1" = 4'



WATERLINE SLEEVE DETAIL

NOT TO SCALE



PLANNING FILE #21-04

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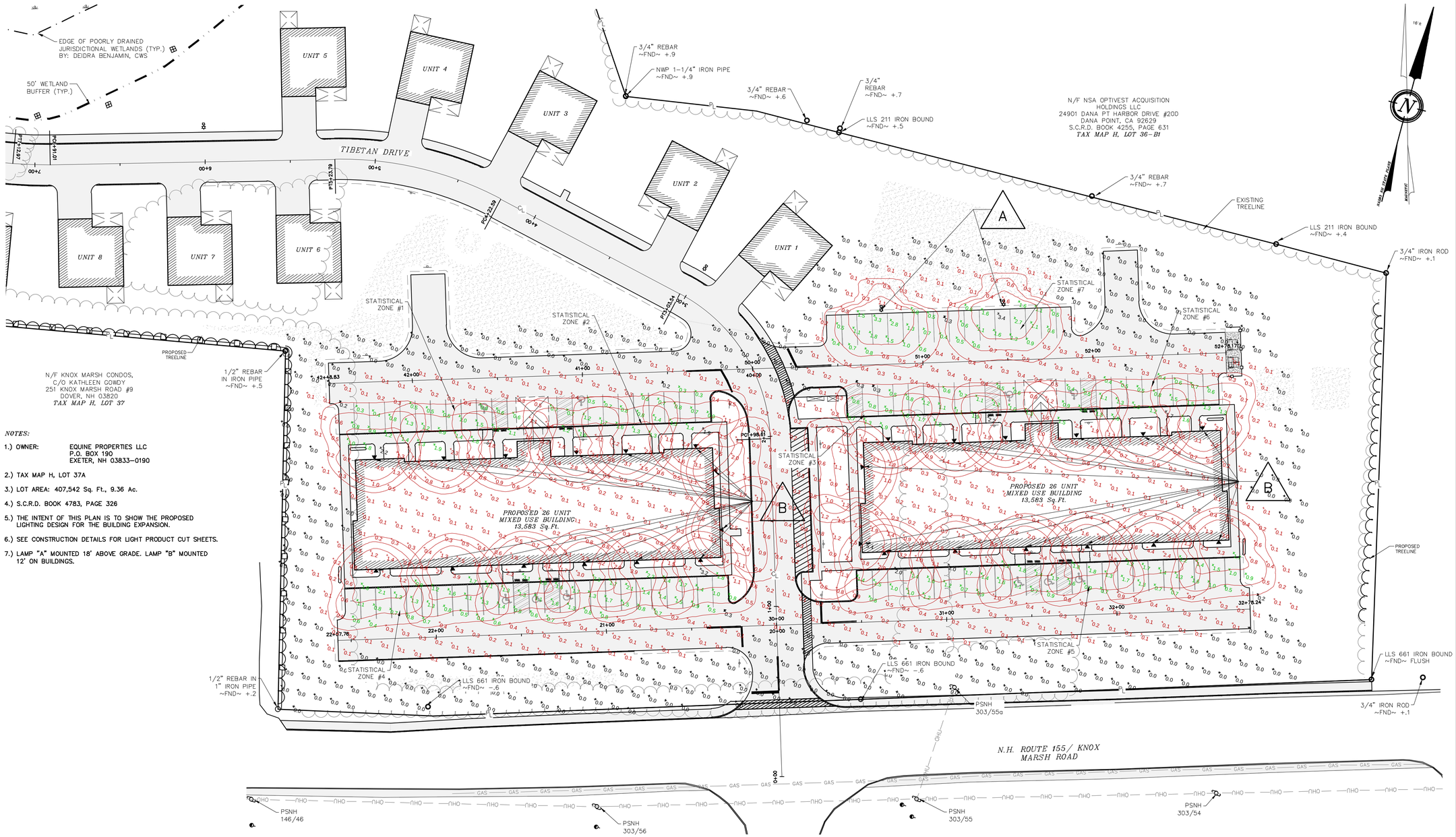
#1	5-24-21	REVISED PER TRC COMMENT

MIXED USE BUILDING UTILITY & SEWER PROFILE
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10213
LICENSED PROFESSIONAL ENGINEER



NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THE INTENT OF THIS PLAN IS TO SHOW THE PROPOSED LIGHTING DESIGN FOR THE BUILDING EXPANSION.

6.) SEE CONSTRUCTION DETAILS FOR LIGHT PRODUCT CUT SHEETS.

7.) LAMP "A" MOUNTED 18' ABOVE GRADE. LAMP "B" MOUNTED 12' ON BUILDINGS.

Schedule

Symbol	Label	QTY	Catalog Number	Description	Lamp	Number Lamps	Lumens per Lamp	LLF	Wattage
	A	2	ATB0 10BLEDE70 XXXXX R4 4K/5K	ATB0 SERIES LED 700MA TYPE 4 4000K/5000K CCT	LED Array	1	2992	1	25
	B	28	WSQ LED P2 SR4 40K MVOLT	WSQ LED WITH P2-PERFORMANCE PACKAGE, 4000K, AND SR4 OPTIC TYPE	LED	1	3053	1	29.17

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Stat Zone # 1	+	1.0 fc	2.3 fc	0.2 fc	11.5:1	5.0:1
Stat Zone # 2	+	1.0 fc	1.8 fc	0.2 fc	9.0:1	5.0:1
Stat Zone # 3	+	1.0 fc	2.2 fc	0.2 fc	7.3:1	5.0:1
Stat Zone # 4	+	1.5 fc	3.1 fc	0.3 fc	10.3:1	5.0:1
Stat Zone # 5	+	1.0 fc	2.0 fc	0.2 fc	10.0:1	5.0:1
Stat Zone # 6	+	1.0 fc	1.7 fc	0.2 fc	8.5:1	5.0:1
Stat Zone # 7	+	1.0 fc	3.4 fc	0.2 fc	17.0:1	5.0:1

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

PLANNING FILE #21-04

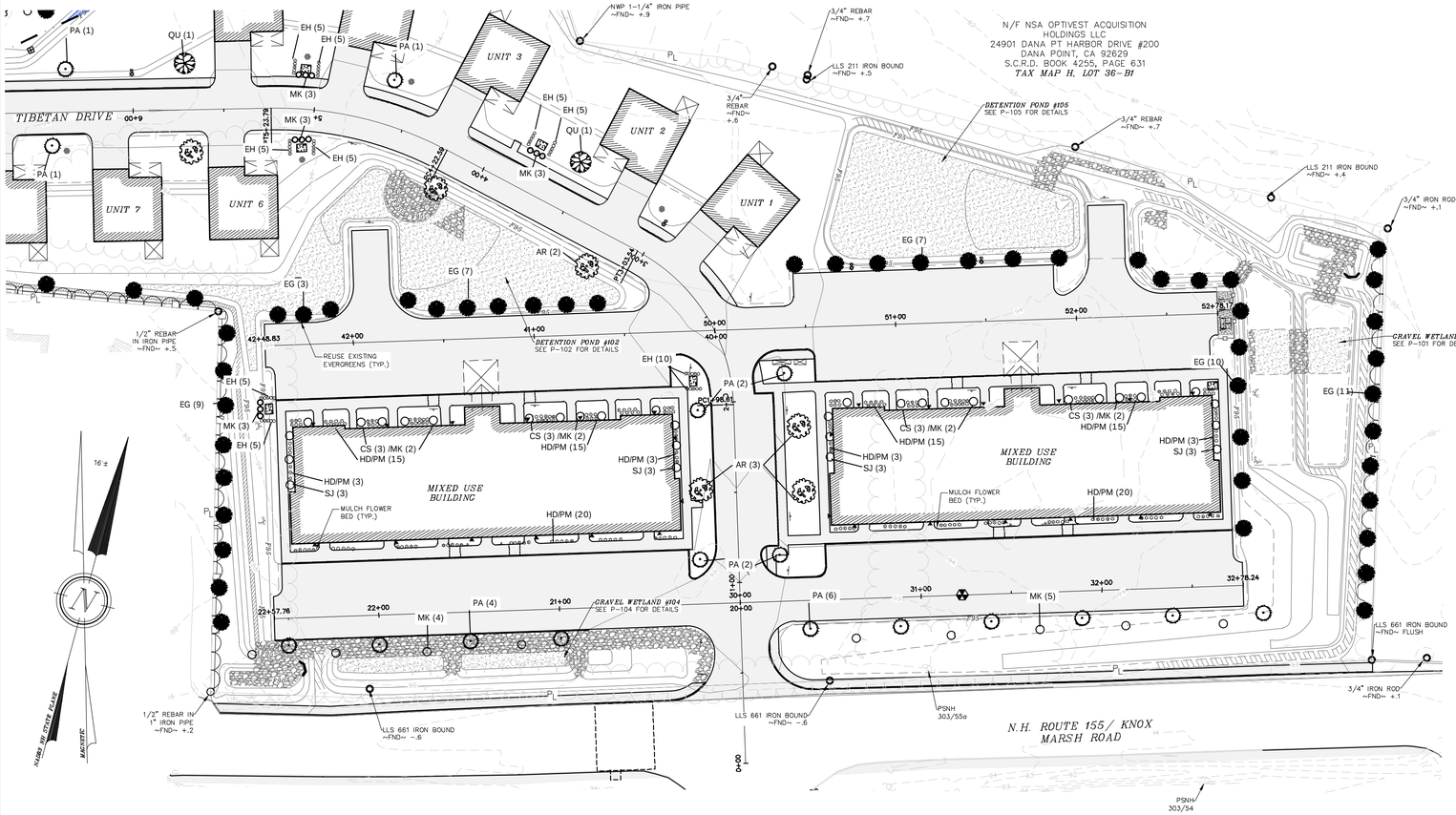
REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

LIGHTING PLAN
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 30 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 7824
LICENSED PROFESSIONAL ENGINEER



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2. CONTRACTOR SHALL THOROUGHLY FAMILIARIZE THEMSELVES WITH ALL SITE CONDITIONS PRIOR TO CONSTRUCTION BIDDING.
3. THE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIALS IN QUANTITIES SUFFICIENT TO COMPLETE THE PLANTINGS SHOWN ON THE DRAWINGS. VARIATIONS IN QUANTITIES ARE TO BE APPROVED BY THE DESIGN ENGINEER.
4. PROVIDED SMOOTH TRANSITION WHERE NEW WORK MEETS EXISTING CONDITIONS.
5. ALL PLANT MATERIAL INSTALLED SHALL MEET THE SPECIFICATIONS OF "AMERICAN STANDARD FOR NURSERY STOCK" BY THE AMERICAN ASSOCIATION OF NURSERYMEN
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8. ALL GRASS, OTHER VEGETATION AND DEBRIS SHALL BE REMOVED FROM ALL PLANTING AREAS PRIOR TO PLANTING.
9. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING AND NEWLY PLANTED TREES AND SHRUBS DURING THE CONSTRUCTION PROCESS. WHERE REQUIRED, THE CONTRACTOR SHALL INSTALL TEMPORARY FENCING (SNOW OR EQUAL) AROUND EXISTING TREES AND SHRUBS THAT COULD BE IMPACTED BY THE CONSTRUCTION PROCESS. STORAGE OF CONSTRUCTION EQUIPMENT, CONSTRUCTION MATERIALS, SNOW STORAGE AND OR VEHICLE PARKING SHALL NOT BE PERMITTED WITHIN THE DRIP LINE OF TREES OR TWENTY FEET WHICH EVER IS GREATER.
10. NEW PLANTINGS SHALL BE INSTALLED PER PROJECT DRAWINGS AND SPECIFICATION THAT INCLUDE FERTILIZATION AND MULCHING AS REQUIRED.
11. ALL SHRUB BEDS AND TREE PITS SHALL BE MULCHED WITH 3" CLEAN SHREDDED BLACK MULCH
12. WHERE INDICATED ON PLAN, PLANTING SOIL MIXTURE FOR GROUND COVER AND PERENNIAL BED AREAS SHALL CONSIST OF FOUR PARTS TOPSOIL, TWO PARTS SPHAGNUM PEAT MOSS, AND ONE PART HORTICULTURAL PERLITE BY VOLUME. PEAT MOSS MAY BE SUBSTITUTED WITH WELL-ROTTED OR DEHYDRATED MANURE OR COMPOST. ROTOTILL BEDS TO A DEPTH OF 8 INCHES.
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19. ALL REQUIRED LANDSCAPING SHALL BE INSTALLED BEFORE OCCUPANCY, OR WITHIN SIX MONTHS IF OCCUPANCY OCCURS DURING WINTER CONDITIONS.
20. TREES ARE TO BE 6' TALL AT PLANTING.
21. ALL PLANT STOCK SHALL CONFORM TO ANSI Z260.1 – NURSERY STOCK, LATEST EDITIONS (AMERICAN ASSOCIATION OF NURSERYMEN, INC.)
22. 4" AGED PINEBARK MULCH AND A WEED BARRIER (TY-PAR FABRIC OR APPROVED EQUAL) SHALL BE APPLIED TO ALL SHRUB AND GROUND COVER BEDS. INSTALL WEED BARRIER AS PER MANUFACTURERS RECOMMENDATIONS.
23. PLANT-PIT BACK-FILL SHALL BE MIXED AT A RATE OF 7 PARTS OF TOPSOIL TO 2 PARTS OF DEHYDRATED COW MANURE. SLOW RELEASE FERTILIZER SHALL BE APPLIED AS PER MANUFACTURERS RECOMMENDATIONS. USE EXISTING ON-SITE TOPSOIL AS PART OF BACK FILL WHEN AVAILABLE.
24. ALL LANDSCAPED AREAS NOT PLANTED WITH TREES, SHRUBS OR GROUNDCOVER SHALL BE RESTORED WITH SEED OR SOD AS INDICATED ON PLANS.
25. TOPSOIL WILL BE TESTED FOR FERTILIZATION REQUIREMENTS, AND SLOW RELEASE ENVIRONMENTALLY FRIENDLY FERTILIZER WILL BE APPLIED AT THE RECOMMENDED RATES.
26. ALL DISTURBED WETLAND BUFFER AREAS, EXCEPT FOR AREAS THAT ARE PART OF THE DRAINAGE SYSTEM, ARE TO BE RESEEDED WITH A CONSERVATION SEED MIX AND ONLY MOWED TWICE PER YEAR.
27. ALL PLANT SUBSTITUTIONS MUST BE APPROVED BY THE ENGINEER.
28. PLANTS SHALL BE SUBJECT TO INSPECTION AND APPROVAL AT THE PLACE OF GROWTH, UPON DELIVERY OR AT THE JOB SITE WHILE WORK IS ONGOING TO CONFORMITY TO SPECIFIED QUALITY, SIZE AND VARIETY.
29. PLANTS FURNISHED IN CONTAINERS SHALL HAVE THE ROOTS WELL ESTABLISHED IN THE SOIL MASS AND SHALL HAVE AT LEAST ONE (1) GROWING SEASON. ROOT-BOUND PLANTS OR INADEQUATELY SIZED CONTAINERS TO SUPPORT THE PLANT MAY BE DEEMED UNACCEPTABLE.
30. ALL PLANTS SHALL BE GUARANTEED BY THE CONTRACTOR FOR NO LESS THAN ONE FULL YEAR FROM THE TIME OF INSTALLATION. DURING THIS TIME, THE OWNER SHALL MAINTAIN ALL PLANT MATERIALS IN THE ABOVE MANNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSPECT THE PLANTS TO ENSURE PROPER CARE. IF THE CONTRACTOR IS DISSATISFIED WITH THE CARE GIVEN, HE SHALL IMMEDIATELY, AND IN SUFFICIENT TIME TO PERMIT THE CONDITION TO BE RECTIFIED, NOTIFY THE OWNER IN WRITING OR OTHERWISE FORFEIT HIS CLAIM.
31. BY THE END OF THE GUARANTEE PERIOD, THE CONTRACTOR SHALL HAVE REPLACED ANY PLANT MATERIAL THAT IS MISSING, NOT TRUE TO SIZE AS SPECIFIED, THAT HAS DIED, THAT HAS LOST NATURAL SHAPE DUE TO DEAD BRANCHES, EXCESS PRUNING OR INADEQUATE OR IMPROPER CARE, OR IS, IN THE OPINION OF THE OWNER, IN UNHEALTHY OR UNSIGHTLY CONDITION.
32. THE CONTRACTOR IS TO USE TEMPORARY MEASURES FOR WATERING PLANTS DURING THE ESTABLISHMENT PERIOD. INCLUDING CONNECTING TEMPORARY HOSES TO THE STRUCTURE WATER SUPPLY LINE AND UTILIZING SPRINKLERS UNTIL 85% GROWTH OCCURS.

PLANTING NOTES

1. CONTRACTOR SHALL OBTAIN APPROVAL FROM L.A. PRIOR TO PURCHASING &/OR INSTALLING SUBSTITUTE PLANT MATERIAL PRIOR TO PURCHASE OF ANY SUBSTITUTE MATERIALS.
2. CONSTRUCTION ACCESS WILL BE AS DIRECTED BY L.A. CONTRACTOR IS RESPONSIBLE FOR RESTORATION OF ACCESS ROUTE AND ALL AREAS DISTURBED BY PLANTING OPERATIONS UPON COMPLETION OF CONSTRUCTION OPERATIONS, AT NO ADDITIONAL COST TO THE OWNER.
3. LAYOUT OF ALL PLANTING BEDS AND LOCATION OF PLANTS TO BE APPROVED BY L.A. ON SITE PRIOR TO CONSTRUCTION AND INSTALLATION.
4. CONTRACTOR TO REMOVE ALL DEBRIS GENERATED BY PLANT INSTALLATION. DEBRIS TO BE DISPOSED OF IN A LEGAL MANNER.
5. ALL PLANT MATERIAL SHALL BE GUARANTEED TO BE IN GOOD, HEALTHY & FLOURISHING CONDITION FOR ONE YEAR FROM THE DATE OF FINAL INSTALLATION APPROVAL BY L.A. CONTRACTOR SHALL REPLACE, WITHOUT COST TO OWNER, AND AS SOON AS WEATHER CONDITIONS PERMIT, ALL DEAD AND NON-FLOURISHING PLANTS AS DETERMINED BY THE L.A. REPLACEMENT PLANTS SHALL BE BE GUARANTEED IDENTICALLY TO ORIGINAL PLANTS, TIME PERIOD COMMENCING FROM DATE OF REPLACEMENT PLANTING APPROVAL BY L.A.
6. ALL BEDS TO BE MULCHED WITH 3" DEPTH SHREDDED BARK MULCH UNLESS NOTED OTHERWISE.
7. CONTRACTOR TO PROVIDE NECESSARY TEMPORARY IRRIGATION IF NEEDED BASED ON TIME OF YEAR THE PROJECT IS IMPLEMENTED.
8. ALL PLANT MATERIAL TO COMPLY WITH THE CITY OF DOVER'S SITE REVIEW REGULATIONS, 149-14(G), SUCH THAT THERE SHALL BE DECIDUOUS SHADE TREES PLANTED 40 FEET O.C. ALONG THE PERIMTERE OF THE PARKING LOTS AND SHRUBS PLANTED 5 FEET O.C. WITHIN THE PERIMETER BUFFER. SEE PLANT LIST FOR SPECIES AND SIZE OF PLANTS.

TEMPORARY WATERING NOTES

1. CONTRACTOR IS RESPONSIBLE FOR MAKING SURE ALL PLANT MATERIAL HAS ADEQUATE WATER DURING THE ESTABLISHMENT PERIOD.
2. THE USE OF GATOR BAGS, SOAKER HOSE, HAND WATERING AND OTHER TECHNIQUES SHOULD BE USED TO ASSURE PROPER HYDRATION OF THE PLANTINGS IS MAINTAINED.
3. TEMPORARY IRRIGATION SYSTEMS CAN BE SET UP TO ASSIST IN WATERING ACTIVITIES.

Botanical Name/ Common Name	Size	Qty	Label
Trees			
Plantanus acerifolia/London Planetree	3.5" Cal.	19	PA
Acer Rubrum / Red maple	3.5" Cal.	15	AR
Resue Evergreens on site	3.5" Cal.	86	EG
Quercus/ White Oak	3.5" Cal.	5	QU
Shrubs			
Cornus sanguina 'Winter Flame' / Winter Flame Dogwood	2-3' B&B	12	CS
Spiraea japonica 'Neon Flash' / Neon Flash Spirea	#3	12	SJ
Syringa patula 'Miss Kim' / Miss Kim Lilac	2-3' B&B	32	MK
Vaccinium Corymbosum/Highbush blueberry	2-3' B&B	19	HB
Ilex Glabra / Ink berry	2-3' B&B	19	IG
Perennials			
Hemerocallis 'Big Time Happy' / Big Time Happy Daylily	#1	60	HD
Hemerocallis 'Pardon Me' / Pardon Me Daylily	#1	60	PM
Hemerocallis 'Happy Returns' / Big Time Happy Daylily	#1	60	EH

terrain
planning & design llc

General Plant Maintenance Guide

General Plant Bed Maintenance:
- All plant maintenance should be performed by a qualified horticulturalist or licensed arborist. Cleaning the dead material out of the planting bed in the fall helps keep litter from building up around the plants and in some cases killing the plants. Watering the first year during dry periods will help get the plants established. Mulching every year is not necessary. Raking the old mulch and turning it over is all that is needed. When necessary only install one inch of mulch and do not place the mulch closer than 3" to the trunks or stems of woody plants.

Trees
- The first year watering during dry periods will be necessary.
- 3" inches of mulch maybe used. The mulch should be kept 3 inches from the trunk.
- Fertilizing is not necessary for the first year. Fertilizing in subsequent years only when and if the foliage is looking weak.
- Fertilization should occur prior to Mat 31st or after trees have dropped their leaves for the year.
- Prune dead wood once a year.
- Depending on the amount of compaction the bed area receives, deep root aeration may be needed over time

Woody Shrubs
- The first year watering during dry periods will be necessary.
- 3" inches of mulch maybe used. The mulch should be kept 3 inches from the stems.
- Fertilizing is not necessary for the first year. Fertilizing in subsequent years only when and if the foliage is looking weak.
- Fertilization should occur prior to Mat 31st or after shrubs have dropped their leaves or gone dormant for the year.
- Prune dead wood once a year.

Grasses
- Grasses only need to be clipped back at the end of the growing season and all the clippings removed from the area.
- Do not over mulch. Too much mulch will prohibit the grass from developing into a strong clump.

Perennials
- All perennials need to be pruned back after the first or second hard frost. A two step method; first dead head all the flower heads and let drop to the ground for re-seeding. Second cut the stems back to 3" above the ground and remove the stem and leaf litter and place in compost. Do not over mulch. Too much mulch will prohibit the growth and development
- Fertilizing perennials once in the spring with a low phosphate fertilizer will help the plants to get started in the spring.

www.terrainplanning.com 311 kast hill road hopkinton nh 03229 T 603-491-2322

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hopkinton, nh 03229
603. 491. 2322
terrainplanning.com

239 KNOX MARSH ROAD

Site Location:
239 KNOX MARSH ROAD
Dover, NH
Tax Map: H, Lot 37-A

Prepared For:
Berry Surveying & Engineering
335 Second Crown Point Rd
Barrington, NH 03825

LANDSCAPE PLAN

DATE: JANUARY 21, 2021

SCALE: 1" = 40'

PROJECT #: 20-066

Drawn By: ID

Checked By: ERB

REVISIONS: DATE:
Issued for Client Review

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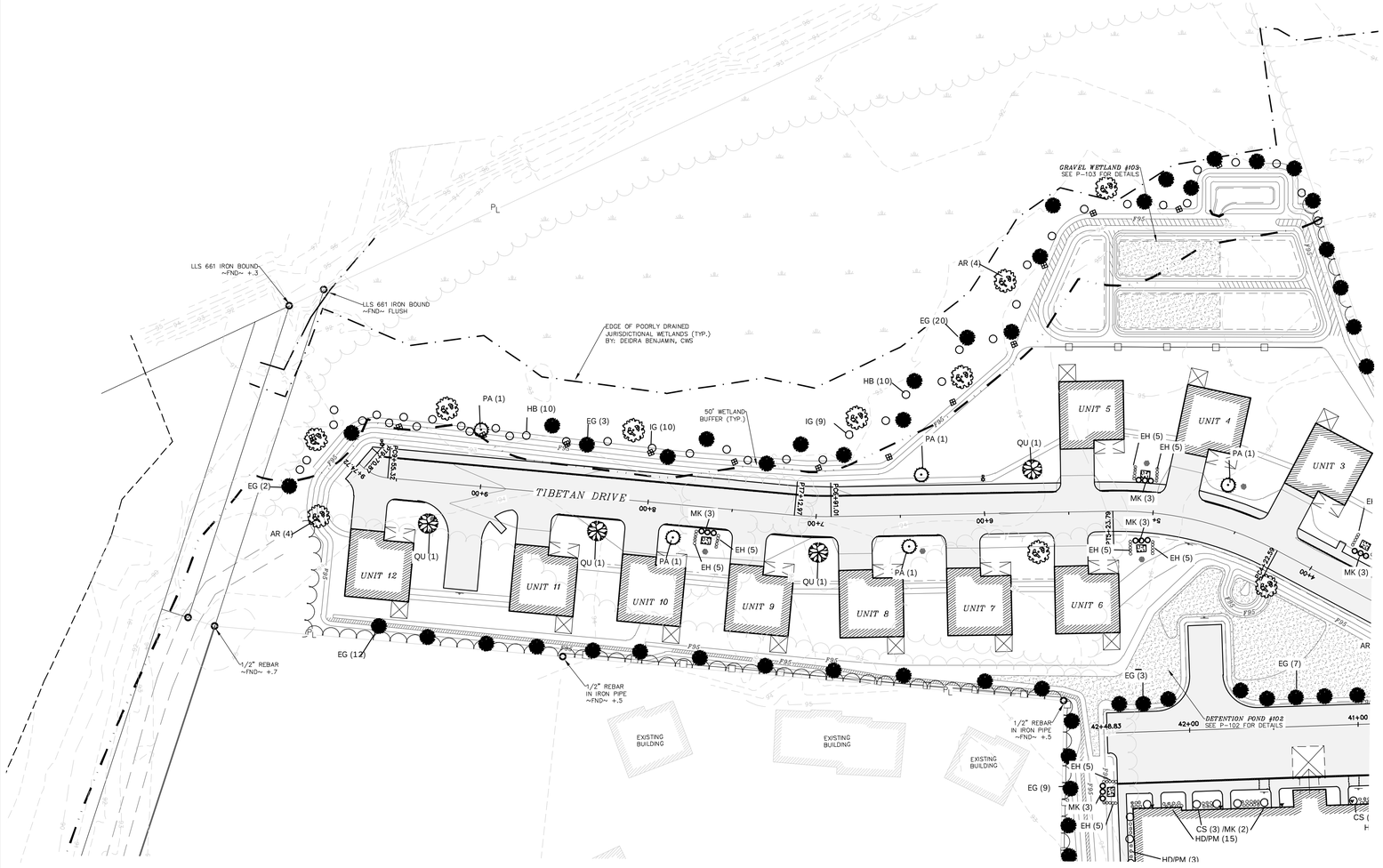
SHEET 23 OF 42

LICENSED LANDSCAPE ARCHITECT
ERIC R. BUCK
078
STATE OF NEW HAMPSHIRE



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20. TREES ARE TO BE 6' TALL AT PLANTING.
21. ALL PLANT STOCK SHALL CONFORM TO ANSI Z260.1 – NURSERY STOCK, LATEST EDITIONS (AMERICAN ASSOCIATION OF NURSERYMEN, INC.)
22. 4" AGED PINEBARK MULCH AND A WEED BARRIER (TY-PAR FABRIC OR APPROVED EQUAL) SHALL BE APPLIED TO ALL SHRUB AND GROUND COVER BEDS. INSTALL WEED BARRIER AS PER MANUFACTURERS RECOMMENDATIONS.
23. PLANT-PIT BACK-FILL SHALL BE MIXED AT A RATE OF 7 PARTS OF TOPSOIL TO 2 PARTS OF DEHYDRATED COW MANURE. SLOW RELEASE FERTILIZER SHALL BE APPLIED AS PER MANUFACTURERS RECOMMENDATIONS. USE EXISTING ON-SITE TOPSOIL AS PART OF BACK FILL WHEN AVAILABLE.
24. ALL LANDSCAPED AREAS NOT PLANTED WITH TREES, SHRUBS OR GROUNDCOVER SHALL BE RESTORED WITH SEED OR SOD AS INDICATED ON PLANS.
25. TOPSOIL WILL BE TESTED FOR FERTILIZATION REQUIREMENTS, AND SLOW RELEASE ENVIRONMENTALLY FRIENDLY FERTILIZER WILL BE APPLIED AT THE RECOMMENDED RATES.
26. ALL DISTURBED WETLAND BUFFER AREAS, EXCEPT FOR AREAS THAT ARE PART OF THE DRAINAGE SYSTEM, ARE TO BE RESEEDED WITH A CONSERVATION SEED MIX AND ONLY MOWED TWICE PER YEAR.
27. ALL PLANT SUBSTITUTIONS MUST BE APPROVED BY THE ENGINEER.
28. PLANTS SHALL BE SUBJECT TO INSPECTION AND APPROVAL AT THE PLACE OF GROWTH, UPON DELIVERY OR AT THE JOB SITE WHILE WORK IS ONGOING TO CONFORMITY TO SPECIFIED QUALITY, SIZE AND VARIETY.
29. PLANTS FURNISHED IN CONTAINERS SHALL HAVE THE ROOTS WELL ESTABLISHED IN THE SOIL MASS AND SHALL HAVE AT LEAST ONE (1) GROWNG SEASON. ROOT-BOUND PLANTS OR INADEQUATELY SIZED CONTAINERS TO SUPPORT THE PLANT MAY BE DEEMED UNACCEPTABLE.
30. ALL PLANTS SHALL BE GUARANTEED BY THE CONTRACTOR FOR NO LESS THAN ONE FULL YEAR FROM THE TIME OF INSTALLATION. DURING THIS TIME, THE OWNER SHALL MAINTAIN ALL PLANT MATERIALS IN THE ABOVE MANNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSPECT THE PLANTS TO ENSURE PROPER CARE. IF THE CONTRACTOR IS DISSATISFIED WITH THE CARE GIVEN, HE SHALL IMMEDIATELY, AND IN SUFFICIENT TIME TO PERMIT THE CONDITION TO BE RECTIFIED, NOTIFY THE OWNER IN WRITING OR OTHERWISE FORFEIT HIS CLAIM.
31. BY THE END OF THE GUARANTEE PERIOD, THE CONTRACTOR SHALL HAVE REPLACED ANY PLANT MATERIAL THAT IS MISSING, NOT TRUE TO SIZE AS SPECIFIED, THAT HAS DIED, THAT HAS LOST NATURAL SHAPE DUE TO DEAD BRANCHES, EXCESS PRUNING OR INADEQUATE OR IMPROPER CARE, OR IS, IN THE OPINION OF THE OWNER, IN UNHEALTHY OR UNSIGHTLY CONDITION.
32. THE CONTRACTOR IS TO USE TEMPORARY MEASURES FOR WATERING PLANTS DURING THE ESTABLISHMENT PERIOD. INCLUDING CONNECTING TEMPORARY HOSES TO THE STRUCTURE WATER SUPPLY LINE AND UTILIZING SPRINKLERS UNTIL 85% GROWTH OCCURS.

terrain
planning & design llc

General Plant Maintenance Guide

General Plant Bed Maintenance:

- All plant maintenance should be performed by a qualified horticulturalist or licensed arborist. Cleaning the dead material out of the planting bed in the fall helps keep litter from building up around the plants and in some cases killing the plants. Watering the first year during dry periods will help get the plants established. Mulching every year is not necessary. Raking the old mulch and turning it over is all that is needed. When necessary only install one inch of mulch and do not place the mulch closer than 3" to the trunks or stems of woody plants.

Trees

- The first year watering during dry periods will be necessary.
- 3" inches of mulch maybe used. The mulch should be kept 3 inches from the trunk.
- Fertilizing is not necessary for the first year. Fertilizing in subsequent years only when and if the foliage is looking weak.
- Fertilization should occur prior to Mat 21st or after trees have dropped their leaves for the year.
- Prune dead wood once a year.
- Depending on the amount of compaction the bed area receives, deep root aeration may be needed over time

Woody Shrubs

- The first year watering during dry periods will be necessary.
- 3" inches of mulch maybe used. The mulch should be kept 3 inches from the stems.
- Fertilizing is not necessary for the first year. Fertilizing in subsequent years only when and if the foliage is looking weak.
- Fertilization should occur prior to Mat 21st or after shrubs have dropped their leaves or gone dormant for the year.
- Prune dead wood once a year.

Grasses

- Grasses only need to be clipped back at the end of the growing season and all the clippings removed from the area.
- Do not over mulch. Too much mulch will prohibit the grass from developing into a strong clump.

Perennials

- All perennials need to be pruned back after the first or second hard frost. A two-step method; first dead head all the flower heads and let drop to the ground for re-seeding. Second cut the stems back to 3" above the ground and remove the stem and leaf litter and place in compost. Do not over mulch. Too much mulch will prohibit the growth and development
- Fertilizing perennials once in the spring with a low phosphate fertilizer will help the plants to get started in the spring.

www.terrainplanning.com 311 kast hill road hopkinton nh 03229 T:603-491-2322

terrain
planning & design llc
311 kast hill road
hopkinton, nh 03229
603. 491. 2322
terrainplanning.com

239 KNOX MARSH ROAD

Site Location:
239 KNOX MARSH ROAD
Dover, NH
Tax Map: H, Lot 37-A

Prepared For:
Berry Surveying & Engineering
335 Second Crown Point Rd
Barrington, NH 03825

LANDSCAPE PLAN

DATE: JANUARY 21, 2021

SCALE: 1" = 40'

PROJECT #: 20-066

Drawn By: ID

Checked By: ERB

REVISIONS: DATE:
Issued for Client Review

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L - 02

LICENSED LANDSCAPE ARCHITECT
ERIC R. BUCK
078
STATE OF NEW HAMPSHIRE

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THIS IS PROPOSED TO BE A RESIDENTIAL AND COMMERCIAL DRIVEWAY.

6.) EXISTING CONDITIONS INFORMATION IS BASED ON A SURVEY PERFORMED BY BERRY SURVEYING & ENGINEERING AND IS ENCLOSED IN THIS PACKAGE.

7.) THIS PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH NHDOT STANDARD SPECIFICATIONS DATED 2016. CURRENT STANDARD PLANS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS INCLUDED IN THE PROPOSAL.

8.) CONTRACTOR SHALL TAKE SPECIAL CARE IN NOT DISTURBING EXISTING MONUMENTS BOUNDS, AND OR BENCHMARKS WITHOUT FIRST MAKING PROVISIONS FOR RELOCATION.

NOTES CONT.:

9.) THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO LOCATE EXACTLY AND TO PRESERVE ANY AND ALL UNDERGROUND UTILITIES CALL "DIG-SAFE" 1-888-DIGSAFE (344-7233) AT LEAST 72 HOURS BEFORE COMMENCING CONSTRUCTION.

10.) WHERE AN EXISTING UNDERGROUND UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.

11.) THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES.

12.) AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.

13.) THE TERM "PROPOSED" (PROP.) MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS, OR, WHERE APPLICABLE, RE-USING EXISTING MATERIALS IDENTIFIED AS "REMOVE & RESET" (R & R)

NOTES CONT.:

14.) ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS NOTED OTHERWISE.

15.) ALL DISTURBED AREAS NOT DESIGNATED TO BE PAVED SHALL HAVE LOAM PLACED AND SEEDED. THE LOAM SHALL HAVE A MINIMUM DEPTH OF 4 INCHES AND SHALL BE PLACED FLUSH WITH THE TOP OF THE ADJACENT CURB, EDGING, BERM OR PAVEMENT SURFACE.

16.) THE SPEED LIMIT ON KNOX MARSH ROAD IS CURRENTLY 50MPH. IT IS REQUESTED BY THE CITY OF DOVER THAT THE SPEED LIMIT IN THE SECTION OF NH ROUTE 155 BE REDUCED TO 40 MPH.

17.) WORK WITHIN NHDOT R.O.W. WILL REQUIRE PROFESSIONAL FLAGGING SERVICES.

18.) DESIGN ENGINEER TO PROVIDE INSPECTION & OVERSIGHT OF ALL WORK WITHIN R.O.W.

CLEAR ZONE CALCULATION:

POSTED SPEED: 50 MPH / 85TH PERCENTILE 50 MPH (ACCURATE COUNTS)

WESTBOUND DESIGN ADT (2019): 6,273 (ACCURATE COUNTS)

FROM AASHTO ROADSIDE DESIGN GUIDE (2011) TABLE 3.1 PAGE 3-3

CLEAR ZONE REQUIRED TO BE 24-28 FEET (1V:6H OR FLATTER)
-24 FEET HAS BEEN SELECTED

TURN LANE CLEAR ZONE ASSUMED DECELERATION SPEED: 35 MPH

CLEAR ZONE REQUIRED TO BE 16-18 FEET (1V:4H OR FLATTER)
-16 FEET HAS BEEN SELECTED

SIGHT DISTANCE REQUIREMENT:

POSTED SPEED: 50 MPH / 85TH 50 MPH (ACCURATE COUNTS)

WESTBOUND: DOWNGRADE <3%, 423.8 FEET REQUIRED (425 FEET PROVIDED)
EASTBOUND: UPGRADE <3%, 423.8 FEET REQUIRED (425 FEET PROVIDED)

FROM AASHTO GEOMETRIC DESIGN OF HIGHWAYS AND STREETS (2011) EXHIBIT 3.1

400' REQUIRED BY NHDOT

GRAPHIC SCALE

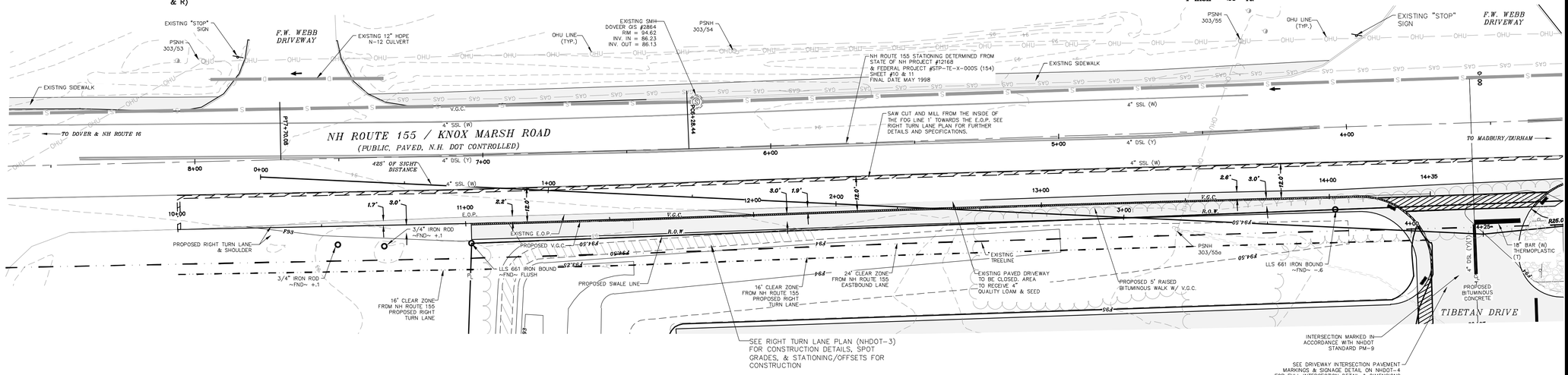
20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

LEGEND:

- PERIMETER BOUNDARY
- OHU — OHU — OVERHEAD UTILITIES LINE
- 236 — CONTOUR LINE, MINOR
- 235 — CONTOUR LINE, MAJOR
- D — EXISTING DRAIN LINE
- SAWCUT & MILL LINE
- SHOULDER
- CENTER LINE
- CLEAR ZONE LINE
- IRON BOUND ~FND~
- NHHD BOUND ~FND~
- UTILITY POLE
- SINGLE SIGN POST
- CATCH BASIN/DRAIN MANHOLE/SEWER MANHOLE W/ STRUCTURE

S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
PL PROPERTY LINE
R.O.W. RIGHT OF WAY
E.O.P. EDGE OF PAVEMENT
SSL (W) SINGLE SOLID LINE (WHITE)
DSL (Y) DOUBLE SOLID LINE (YELLOW)



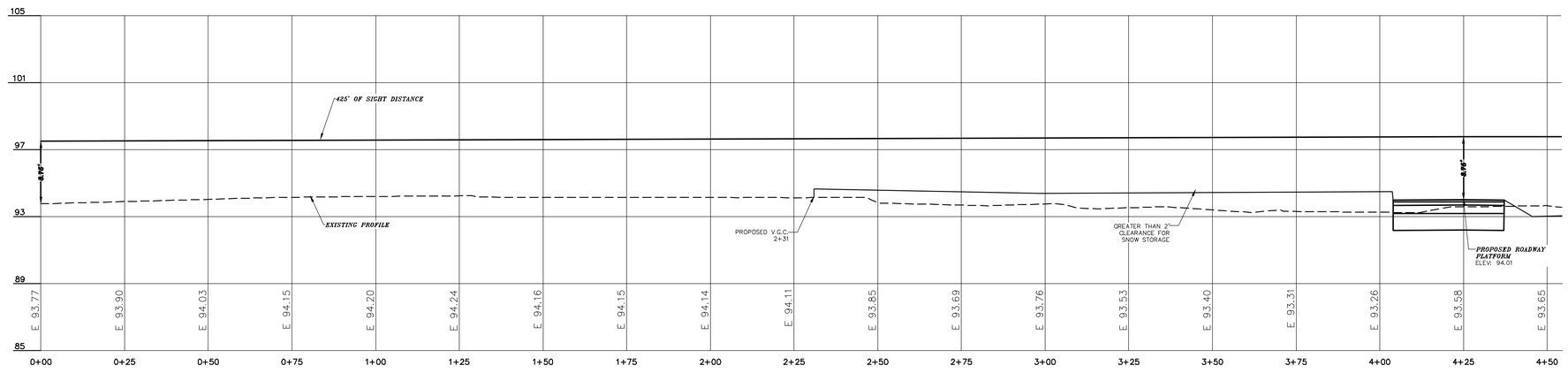
PLAN VIEW N.H. ROUTE 155 / KNOX MARSH ROAD

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.
VERTICAL SCALE: 1" = 4'

PROFILE VIEW SIGHT LINE



NHDOT-1

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

PLANNING FILE #21-04

SIGHT DISTANCE PLAN TIBETAN DRIVE (30') WESTBOUND
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10043
LICENSED PROFESSIONAL ENGINEER

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THIS IS PROPOSED TO BE A RESIDENTIAL AND COMMERCIAL DRIVEWAY.

6.) EXISTING CONDITIONS INFORMATION IS BASED ON A SURVEY PERFORMED BY BERRY SURVEYING & ENGINEERING AND IS ENCLOSED IN THIS PACKAGE.

7.) THIS PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH NHDOT STANDARD SPECIFICATIONS DATED 2016. CURRENT STANDARD PLANS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS INCLUDED IN THE PROPOSAL.

CLEAR ZONE CALCULATION:

POSTED SPEED: 50 MPH / 85TH PERCENTILE 50 MPH
(ACCURATE COUNTS)

WESTBOUND DESIGN ADT (2019): 6,273 (ACCURATE COUNTS)

FROM AASHTO ROADSIDE DESIGN GUIDE (2011) TABLE 3.1 PAGE 3-3

CLEAR ZONE REQUIRED TO BE 24-28 FEET (1V:6H OR FLATTER)
-24 FEET HAS BEEN SELECTED

SIGHT DISTANCE REQUIREMENT:

POSTED SPEED: 50 MPH / 85TH 50 MPH (ACCURATE COUNTS)

WESTBOUND: DOWNGRADE <3%, 423.8 FEET REQUIRED (425 FEET PROVIDED)
EASTBOUND: UPGRADE <3%, 423.8 FEET REQUIRED (425 FEET PROVIDED)

FROM AASHTO GEOMETRIC DESIGN OF HIGHWAYS AND STREETS (2011) EXHIBIT 3.1

400' REQUIRED BY NHDOT

LEGEND:

- PERIMETER BOUNDARY
- OHU — OHU — OVERHEAD UTILITIES LINE
- 236 — CONTOUR LINE, MINOR
- 235 — CONTOUR LINE, MAJOR
- D — EXISTING DRAIN LINE
- SAWCUT & MILL LINE
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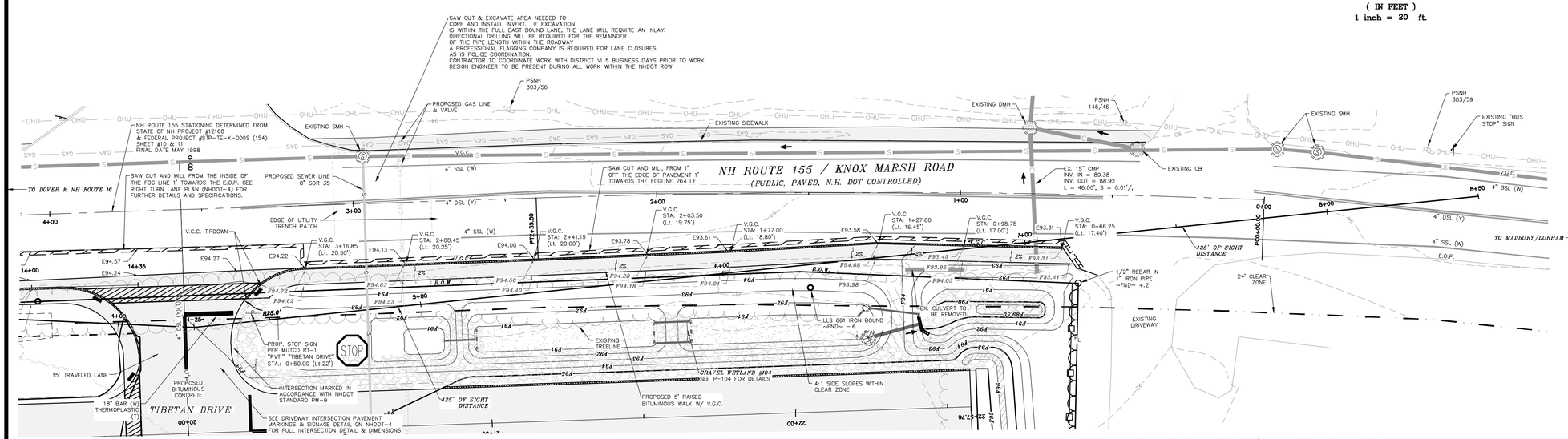
- SINGLE SIGN POST
- CATCH BASIN/DRAIN MANHOLE/SEWER MANHOLE W/ STRUCTURE
- S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS
- TYP. TYPICAL
- FND FOUND
- PL PROPERTY LINE
- R.O.W. RIGHT OF WAY
- E.O.P. EDGE OF PAVEMENT
- SSL (W) SINGLE SOLID LINE (WHITE)
- DSL (Y) DOUBLE SOLID LINE (YELLOW)

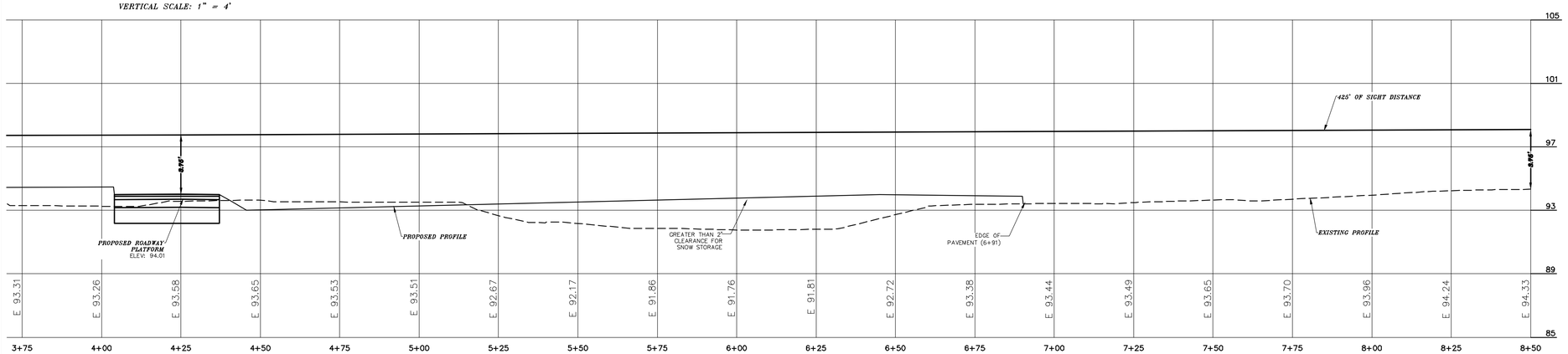
GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.



PLAN VIEW N.H. ROUTE 155 / KNOX MARSH ROAD

PROFILE VIEW SIGHT LINE

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.
VERTICAL SCALE: 1" = 4'



PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

SIGHT DISTANCE PLAN TIBETAN DRIVE (30') EASTBOUND
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10615
LICENSED PROFESSIONAL ENGINEER

NHDOT-2

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THIS IS PROPOSED TO BE A RESIDENTIAL AND COMMERCIAL DRIVEWAY.

6.) EXISTING CONDITIONS INFORMATION IS BASED ON A SURVEY PERFORMED BY BERRY SURVEYING & ENGINEERING AND IS ENCLOSED IN THIS PACKAGE.

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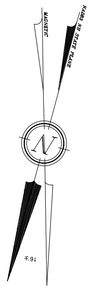
8.) CONTRACTOR SHALL TAKE SPECIAL CARE IN NOT DISTURBING EXISTING MONUMENTS BOUNDS, AND OR BENCHMARKS WITHOUT FIRST MAKING PROVISIONS FOR RELOCATION.

9.) SEE NHDOT-1 FOR STANDARD NOTES.



LEGEND:

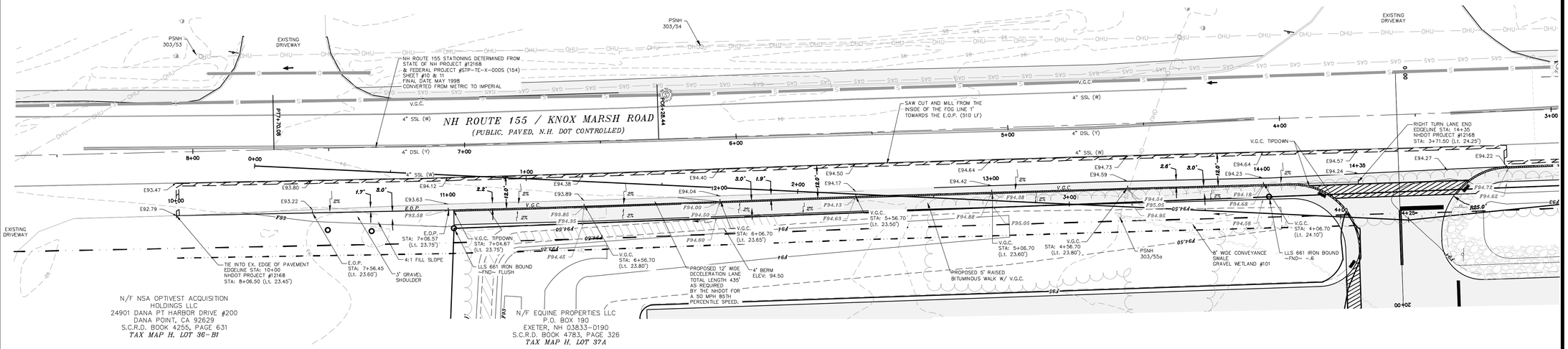
- PERIMETER BOUNDARY
- OVERHEAD UTILITIES LINE
- CONTOUR LINE, MINOR
- CONTOUR LINE, MAJOR
- EXISTING DRAIN LINE
- SAWCUT & MILL LINE
- SHOULDER
- CENTER LINE
- CLEAR ZONE LINE
- IRON BOUND ~FND~
- NHHD BOUND ~FND~
- UTILITY POLE
- SINGLE SIGN POST
- CATCH BASIN/DRAIN MANHOLE/SEWER MANHOLE W/ STRUCTURE

S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
PL PROPERTY LINE
R.O.W. RIGHT OF WAY
E.O.P. EDGE OF PAVEMENT
SSL (W) SINGLE SOLID LINE (WHITE)
DSL (Y) DOUBLE SOLID LINE (YELLOW)

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

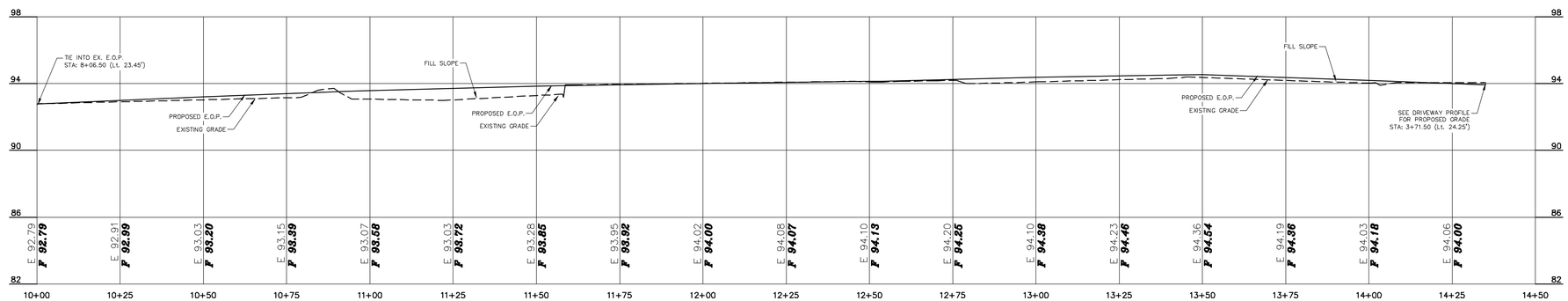


PLAN VIEW RIGHT TURN DECELERATION LANE

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.
VERTICAL SCALE: 1" = 4'



PROFILE VIEW RIGHT TURN DECELERATION LANE

NHDOT-3

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

RIGHT TURN LANE PLAN & PROFILE
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10213
LICENSED PROFESSIONAL ENGINEER

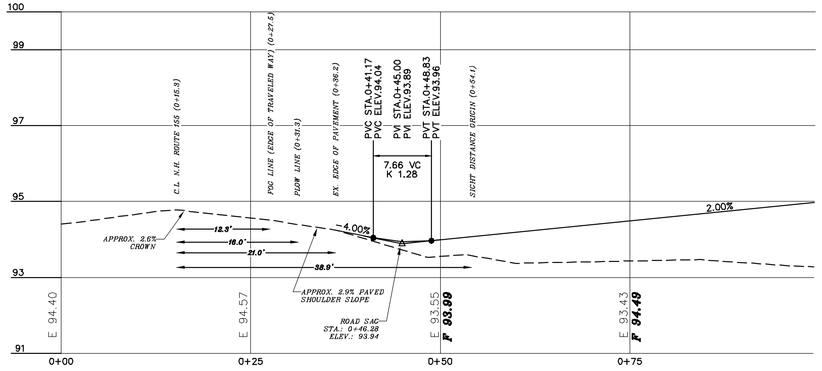
DETAIL–1

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.
VERTICAL SCALE: 1" = 2'

PROFILE VIEW TIBETAN DRIVE (30')



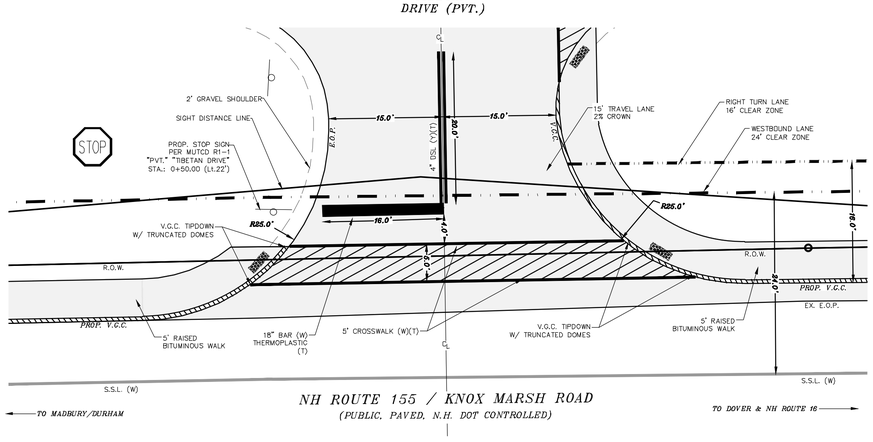
DETAIL–2

GRAPHIC SCALE

10 0 5 10 20 40

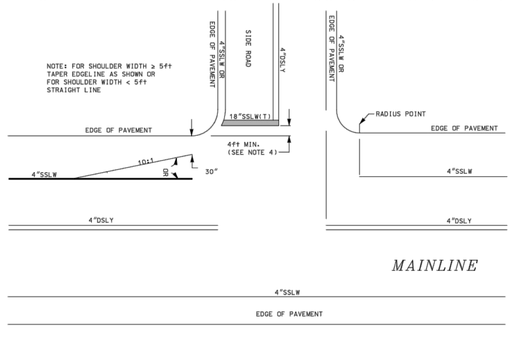
(IN FEET)
1 inch = 10 ft.

TIBETAN DRIVE (30') INTERSECTION PAVEMENT MARKINGS & SIGNAGE DETAILS



DETAIL–3

CENTERLINE AND EDGELINE "CUTS" AT SIDE ROAD



PM–9 GENERAL NOTES

1.) EDGELINE DETAILS ARE SHOWN FOR MAINLINE ROADWAYS WITHOUT TURN LANE. THE PRESENCE OF TURN LANES MAY REQUIRE DIFFERENT EDGELINE TREATMENTS,

2.) EDGELINES ON THE SIDE ROADS, WHEN CALLED FOR, SHALL FOLLOW THE ABOVE MAINLINE TYPICALS. EDGELINES SHALL NOT BE CONTINUOUS AROUND THE MAINLINE/SIDE ROAD RADIUS. EDGELINES SHALL END AT STOP BARS.

3.) CENTERLINE AND EDGELINE SHALL BE CONTINUOUS PAST RESIDENTIAL DRIVEWAYS. CENTERLINE AND EDGELINE SHALL BREAK FOR COMMERCIAL DRIVES W/TRAFFIC CONTROLS, MINOR SIDE ROADS, OR PRIVATE INTERSECTIONS.

4.) LOCATION OF THE STOP LINE MAY VARY DUE TO INTERSECTION SIGHT DISTANCE AND VEHICLE TURNING RADIUS AND MAY NOT ALWAYS COINCIDE WITH THE LOCATION OF THE STOP SIGN.

5.) IF THERE IS NO EDGELINE, END STOP BAR 12" FROM EDGE OF PAVEMENT.

6.) STOP BARS, WORDS, LANE LINES, SYMBOLS AND ARROWS SHALL BE THERMOPLASTIC (T).

NHDOT–4

PLANNING FILE #21–04

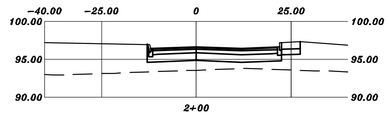
REVISION	DATE	DESCRIPTION
#4	1–28–22	MULTIPLE PLAN SET REVISIONS
#3	8–16–21	REVISED PER TRC COMMENT
#2	7–27–21	REVISED PER TRC COMMENT
#1	5–24–21	REVISED PER TRC COMMENT

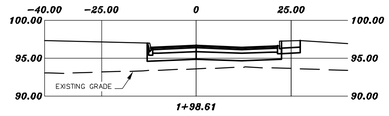
ROADWAY ACCESS DETAIL SHEET
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

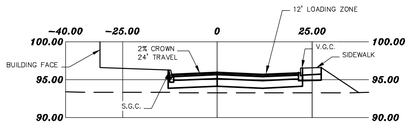
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332–2863

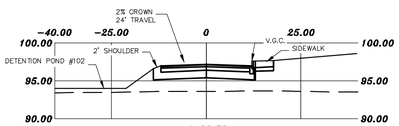
SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

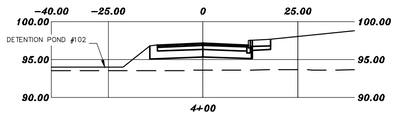
STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10043
LICENSED PROFESSIONAL ENGINEER

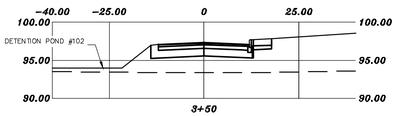


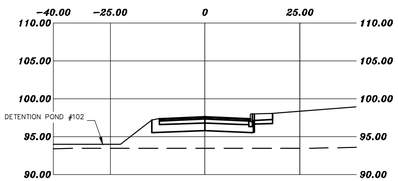


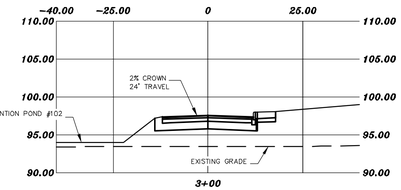


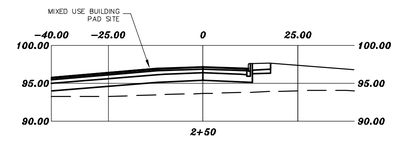


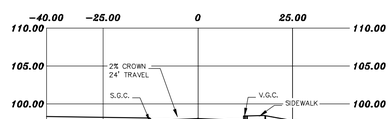


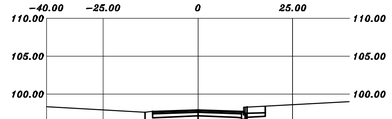


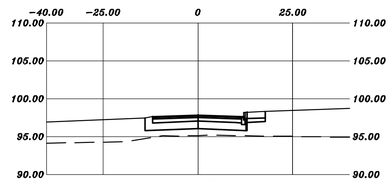


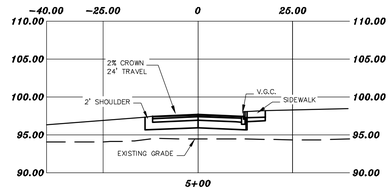


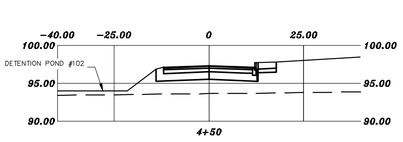


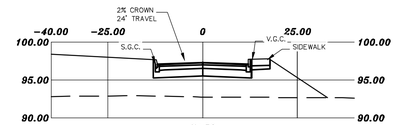


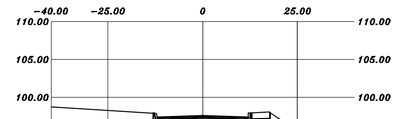


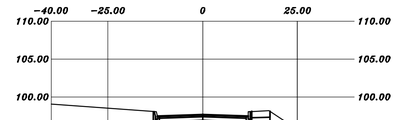


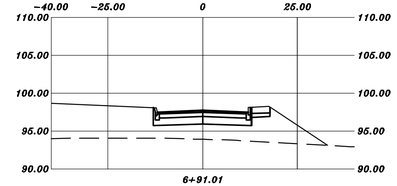


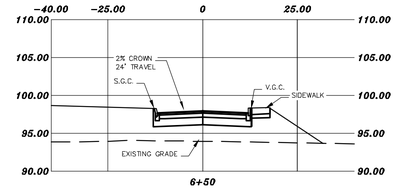


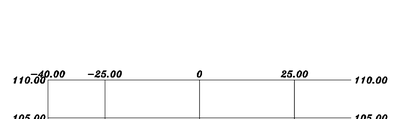


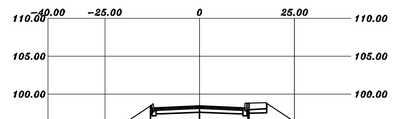


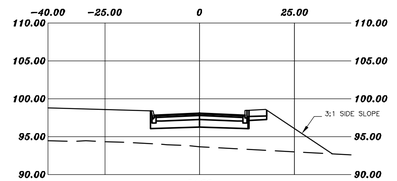


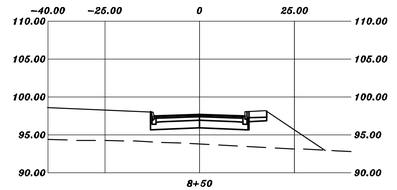


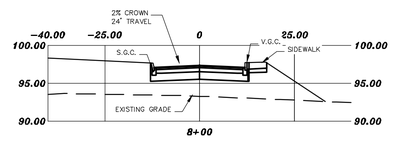












GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.
Vertical Scale 10

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

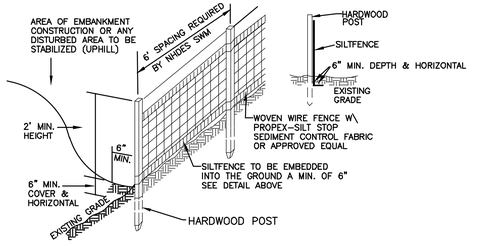
CROSS SECTIONS CONCOLOR DRIVE 0+00-9+74
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10043
LICENSED PROFESSIONAL ENGINEER

E1



SILT FENCE CONSTRUCTION SPECIFICATIONS

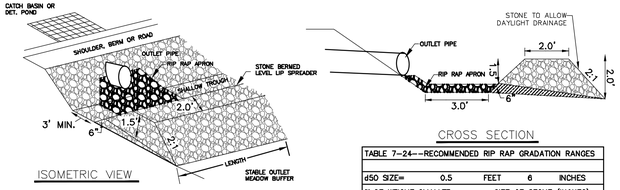
1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES AND FILTER CLOTH SHALL BE FASTENED TO WOVEN WIRE EVERY 24" AT TOP MID AND BOTTOM SECTIONS AND BE EMBEDDED INTO GROUND A MINIMUM OF 8" THE FENCE POSTS SHALL BE A MINIMUM 48" LONG, SPACED A MAXIMUM 6' APART, AND DRIVEN A MINIMUM OF 16" INTO THE GROUND.
2. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THE ENDS OF THE FABRIC SHALL BE OVERLAPPED BY SIX INCHES, FOLDED AND STAPLED TO PREVENT SEDIMENT FROM BY-PASSING.
3. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND SEDIMENT REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE AND PROPERLY DISPOSED OF. SEE MAINTENANCE NOTE BELOW.
4. REMOVAL OF SEDIMENT REQUIRED AT A DEPTH OF 6-INCHES.
4. PLACE THE ENDS OF THE SILT FENCE UP CONTOUR TO PROVIDE FOR SEDIMENT STORAGE.
5. SILT FENCES SHALL BE REMOVED WHEN NO LONGER NEEDED AND THE SEDIMENT COLLECTED SHALL BE DISPOSED AS DIRECTED BY THE ENGINEER.
6. THE AREA DISTURBED BY THE REMOVAL SHALL BE SMOOTHED AND RE-VEGETATED.
7. TO BE CONSTRUCTED IAW NH SWM #3 4-2 SEDIMENT CONTROL PRACTICES, SILT FENCE, PAGE 90.

SILT FENCE MAINTENANCE

1. SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REPAIRS THAT ARE REQUIRED SHALL BE MADE IMMEDIATELY.
2. IF THE FABRIC ON A SILT FENCE SHOULD DECOMPOSE OR BECOME INEFFECTIVE DURING THE EXPECTED LIFE OF THE FENCE, THE FABRIC SHALL BE REPLACED PROMPTLY.
3. SEDIMENT DEPOSITS SHOULD BE REMOVED WHEN THEY REACH SIX-INCHES IN DEPTH.
4. SEDIMENT DEPOSITS THAT ARE REMOVED OR LEFT IN PLACE AFTER THE FABRIC HAS BEEN REMOVED SHALL BE GRADED TO CONFORM WITH THE EXISTING TOPOGRAPHY AND VEGETATED.

SILT FENCE DETAIL
NOT TO SCALE

E2



ISOMETRIC VIEW

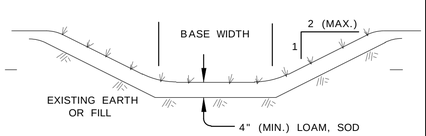
CROSS SECTION

TABLE 7-24--RECOMMENDED RIP RAP GRADATION RANGES				
d50 SIZE=	0.5	FEET	6	INCHES
% OF WEIGHT SMALLER THAN THE GIVEN d50 SIZE	SIZE OF STONE (INCHES) FROM		TO	
100%	9		12	
85%	8		11	
50%	6		9	
15%	2		3	

1. CONSTRUCT THE LEVEL SPREADER LIP ON A 0% GRADE TO INSURE UNIFORM SPREADING OF RUNOFF.
2. LEVEL SPREADER SHALL BE CONSTRUCTED ON UNDISTURBED SOIL AND NOT ON FILL.
3. THE ENTIRE LEVEL LIP AREA SHALL BE PROTECTED BY PLACING EXCELSIOR ENFORCER MATTING BENEATH THE STONE. EACH STRIP SHALL OVERLAP BY AT LEAST SIX INCHES.
4. THE FLOW FROM THE LEVEL SPREADER SHALL OUTLET ONTO STABILIZED AREAS. WATER SHOULD NOT RE-CONCENTRATE IMMEDIATELY BELOW THE SPREADER.
5. MAINTENANCE: THE LEVEL SPREADER SHOULD BE CHECKED PERIODICALLY AND AFTER EVERY MAJOR STORM TO DETERMINE IF THE LIP HAS BEEN DAMAGED AND THE DESIGN CONDITIONS HAVE NOT CHANGED. ANY DETRIMENTAL SEDIMENT ACCUMULATION SHOULD BE REMOVED. IF STONE REMOVAL HAS TAKEN PLACE ON THE LIP, THEN THE DAMAGE SHOULD BE REPAIRED.
6. REFERENCE IS MADE TO NHDES SWM VOL. 2, 4-6, STONE BERM LEVEL SPREADERS, PAGE 162

STONE BERM LEVEL SPREADER
NOT TO SCALE

E3



GRASS CONVEYANCE SWALE
NOT TO SCALE

INSPECT ANNUALLY FOR EROSION, SEDIMENT ACCUMULATIONS, VEGETATION LOSS, & INVASIVE SPECIES. REPAIR AS NECESSARY.

MOW GRASS ANNUALLY TO A DEPTH OF 4".

INSTALL STABILIZATION MATTING DURING CONSTRUCATION

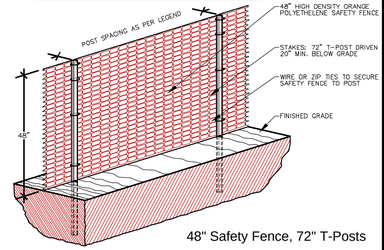
TO BE CONSTRUCTED IAW NH SWM #2 CHAPTER 4, #5 TREATMENT SWALES, PAGE 123.

E4

CONSTRUCTION SAFETY FENCE
NOT TO SCALE

LEGEND

SAF12	48" ORANGE FENCE, 12 FEET O.C.
SAF11	48" ORANGE FENCE, 11 FEET O.C..
SAF10	48" ORANGE FENCE, 10 FEET O.C.
SAF9	48" ORANGE FENCE, 9 FEET O.C.
SAF8	48" ORANGE FENCE, 8 FEET O.C..
SAF7	48" ORANGE FENCE, 7 FEET O.C.
SAF6	48" ORANGE FENCE, 6 FEET O.C.



48" Safety Fence, 72" T-Posts

1. ALL SENSITIVE AREAS SHALL BE PROTECTED AS PER PLAN.
2. ALL TREES IN THE CONSTRUCTION AREA NOT SPECIFICALLY DESIGNATED FOR REMOVAL SHALL BE PRESERVED AND PROTECTED WITH HIGH VISIBILITY FENCE AS PER PLAN.
3. WHEN PRACTICABLE, INSTALL HIGH VISIBILITY 3 FEET OUTSIDE OF THE DRIP LINE OF THE TREE.
4. SAFETY FENCE SHOULD BE FASTENED SECURELY TO THE T-POSTS.
5. THE FENCING MUST REMAIN IN PLACE DURING ALL PHASES OF CONSTRUCTION; ANY CHANGE OF THE PROTECTIVE FENCING MUST BE APPROVED.

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
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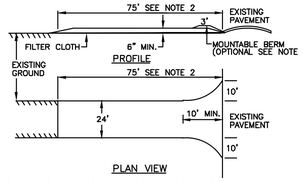
#1	5-24-21	REVISED PER TRC COMMENT

E5

STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE

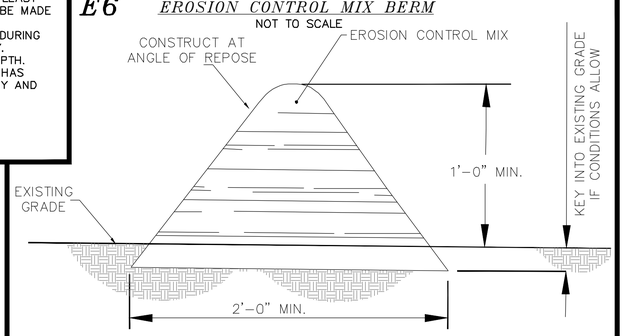


PLAN VIEW

1. STONE FOR A STABILIZED CONSTRUCTION ENTRANCE SHALL BE 3 INCH STONE, RECLAIMED STONE, OR RECYCLED CONCRETE EQUIVALENT.
2. THE LENGTH OF THE STABILIZED ENTRANCE SHALL NOT BE LESS THAN 75 FEET, EXCEPT THAT THE MINIMUM LENGTH MAY BE REDUCED TO 50 FEET IF A 3-INCH TO 6-INCH BERM IS INSTALLED AT THE ENTRANCE OF THE PROJECT SITE.
3. THE THICKNESS OF THE STONE FOR THE STABILIZED ENTRANCE SHALL NOT BE LESS THAN 6 INCHES.
4. THE WIDTH OF THE ENTRANCE SHALL NOT BE LESS THAN THE FULL WIDTH OF THE ENTRANCE WHERE INGRESS OR EGRESS OCCURS OR 10 FEET, WHICH EVER IS GREATER.
5. GEOTEXTILE FILTER CLOTH SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING
6. ALL SURFACE WATER THAT IS FLOWING TO OR DIVERTED TOWARD THE CONSTRUCTION ENTRANCE SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A BERM WITH 5:1 SLOPES THAT CAN BE CROSSED BY VEHICLES MAY BE SUBSTITUTED FOR THE PIPE.
7. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, WASHED, OR TRACKED ONTO PUBLIC RIGHT-OF-WAY MUST BE REMOVED PROMPTLY.
8. TO BE CONSTRUCTED IAW NH SWM #3 4-2 SEDIMENT CONTROL PRACTICES, TEMPORARY CONSTRUCTION EXIT, PAGE 124.

E6

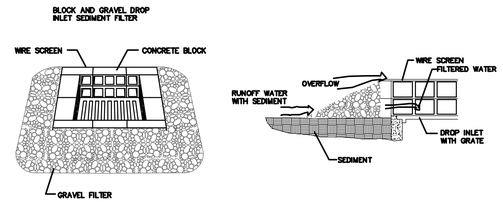
EROSION CONTROL MIX BERM
NOT TO SCALE



EROSION CONTROL MIX BERMS SHALL BE USED ONLY AS FOLLOWS:

1. BERMS SHALL BE USED IN AREAS WHERE EROSION WILL OCCUR ONLY IN THE FORM OF SHEET EROSION AND THERE IS NO CONCENTRATION OF WATER IN A CHANNEL OR DRAINAGE WAY ABOVE THE BERM.
2. THE BERMS SHALL BE INSTALLED FOLLOWING THE CONTOUR OF THE LAND AS CLOSLY AS POSSIBLE.
3. THE BERMS SHALL BE INSTALLED ON SLOPES LESS THAN 5%.
4. SUBJECT TO (E), BELOW, THE MIX SHALL HAVE AN ORGANIC PORTION BETWEEN 80 AND 100%, DRY WEIGHT BASIS, AND BE FIBROUS AND ELONGATED SUCH AS FROM SHREDDED BARK, STUMP GRINDINGS, COMPOSED BARK, OR EQUIVALENT MANUFACTURED PRODUCTS.
5. WOOD AND BARK CHIPS, GROUND CONSTRUCTION DEBRIS, OR REPROCESSED WOOD PRODUCTS SHALL NOT BE USED AS ORGANIC MATERIAL.
6. THE MIX SHALL NOT CONTAIN SILTS, CLAY, OR FINE SANDS.
7. THE MIX SHALL HAVE A PARTICLE SIZE BY WEIGHT OF 70 TO 85% PASSING A 6-INCH SCREEN AND A MAXIMUM OF 85% PASSING THE 0.75-INCH SCREEN.
8. THE MIX PH SHALL BE BETWEEN 5.0 AND 8.0.
9. THE BERM SHALL BE AT LEAST 12 INCHES HIGH AND AT LEAST 2 FEET WIDE.
10. TO BE CONSTRUCTED IAW NH SWM #3 4-2 SEDIMENT CONTROL PRACTICES, EROSION CONTROL MIX BERMS, PAGE 106.

E7



MAINTENANCE

ALL STRUCTURES SHOULD BE INSPECTED AFTER EVERY RAIN STORM AND REPAIRS MADE AS NECESSARY. SEDIMENT SHOULD BE REMOVED FROM TRAPPING DEVICES AFTER THE SEDIMENT HAS REACHED A MAXIMUM OF ONE HALF THE DEPTH OF THE TRAP. THE SEDIMENT SHOULD BE DISPOSED OF IN A SUITABLE AREA AND PROTECTED FROM EROSION BY EITHER STRUCTURE OR VEGETATIVE MEANS. THE TEMPORARY TRAPS SHOULD BE REMOVED AND THE AREA REPAIRED AS SOON AS THE CONTRIBUTING DRAINAGE AREA TO THE INLET HAS BEEN COMPLETELY STABILIZED.

BLOCK & GRAVEL DROP INLET SEDIMENT FILTER
NOT TO SCALE

TO BE USED IN ALL AREAS WHERE THERE WILL BE NO TRAFFIC.

TO BE CONSTRUCTED IAW NH SWM #3 4-2 SEDIMENT CONTROL PRACTICES, TEMPORARY STORM DRAIN INLET PROTECTION, PAGE 118.

E8

TEMPORARY EROSION CONTROL MEASURES

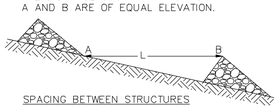
1. THE SMALLEST PRACTICAL AREA OF LAND SHALL BE EXPOSED AT ANY ONE TIME.
2. EROSION, SEDIMENT AND DETENTION MEASURES SHALL BE INSTALLED AS SHOWN ON THE PLANS AND AT LOCATIONS AS REQUIRED, DIRECTED BY THE ENGINEER.
3. ALL DISTURBED AREAS SHALL BE RETURNED TO ORIGINAL GRADES AND ELEVATIONS. DISTURBED AREAS SHALL BE LOAMED WITH A MINIMUM OF 4" OF LOAM AND SEEDED WITH NOT LESS THAN ONE POUND OF SEED PER 50 SQUARE YARDS OF AREA. (SEE SEED SPECIFICATIONS THIS SHEET)
4. ALL DISTURBED AREAS WILL BE RESTABILIZED WITHIN 45 DAYS. AT ANY ONE TIME, NO MORE THAN 5 ACRES, (217,800 Sq. Ft.) WILL BE DISTURBED.
5. SILT FENCES AND PERIMETER BARRIERS SHALL BE INSPECTED PERIODICALLY AND AFTER EVERY RAIN DURING THE LIFE OF THE PROJECT. ALL DAMAGED AREAS SHALL BE REPAIRED, SEDIMENT DEPOSITS SHALL PERIODICALLY BE REMOVED AND DISPOSED OF.
6. AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, THE TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE REMOVED AND THE AREA DISTURBED BY THE REMOVAL SMOOTHED AND RE-VEGETATED.
7. PER THE EPA CGP REQUIREMENTS THERE WILL BE REPORTS OF THE EROSION CONTROL INSPECTIONS IAW SWPPP PREPARED BY BS&E. ALL EROSION CONTROLS SHALL BE INSPECTED WEEKLY AND WITHIN 24 HOURS AFTER 0.25" OR GREATER RAIN EVENT.
8. DITCHES, SWALES, AND BASINS SHALL BE STABILIZED PRIOR TO DIRECTING RUNOFF TO THEM.
9. DO NOT TRAFFIC EXPOSED SOIL SURFACES WITH CONSTRUCTION EQUIPMENT. IF FEASIBLE, PERFORM EXCAVATIONS WITH EQUIPMENT POSITIONED OUTSIDE THE LIMITS OF THE INFILTRATION SYSTEM.
10. ROADWAYS, DRIVEWAYS AND CUT AND FILL SLOPES MUST BE STABILIZED WITHIN 72 HOURS OF ACHIEVING FINAL GRADE.
11. STABILIZATION MEANS:
    - 11.1. A MINIMUM OF 85% OF VEGETATIVE COVER HAS BEEN ESTABLISHED.
    - 11.2. A MINIMUM OF 3 INCHES OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIP RAP HAS BEEN INSTALLED, OR
    - 11.3. EROSION CONTROL BLANKETS HAVE BEEN INSTALLED.
12. THIS PROJECT IS TO BE MANAGED IN A MANNER THAT MEETS THE REQUIREMENTS AND INTENT OF RSA 430:53 AND CHAPTER AGR 3800 RELATIVE TO INVASIVE SPECIES.
13. THE NHDES STORMWATER MANUAL, IN THREE VOLUMES, DATED DECEMBER 2008, IS A PART OF THIS PLAN SET AND THE MORE RESTRICTIVE WILL GOVERN. (NH SWM)

EROSION & SEDIMENT CONTROL DETAILS
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

E9

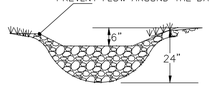
STONE CHECK DAM
NOT TO SCALE

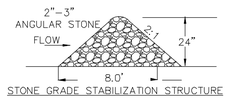
THE DISTANCE SUCH THAT POINTS A AND B ARE OF EQUAL ELEVATION.



SPACING BETWEEN STRUCTURES

NOTE: KEY STONE INTO CHANNEL BANKS AND EXTEND IT BEYOND THE ABUTMENTS A MINIUM OF 18" TO PREVENT FLOW AROUND THE DAM.

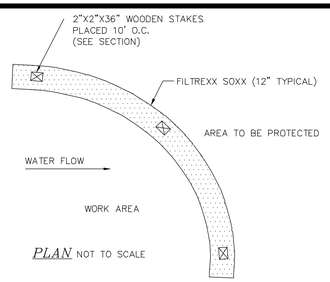




STONE GRADE STABILIZATION STRUCTURE

1.) CHECK DAMS SHOULD BE INSTALLED BEFORE RUNOFF IS DIRECTED TO THE SWALE OR DRAINAGE DITCH.
2.) THE MAXIMUM CONTRIBUTING DRAINAGE AREA TO THE DAM SHOULD BE LESS THEN ONE ACRE.
3.) THE MAXIMUM HEIGHT OF THE DAM SHOULD BE TWO FEET.
4.) THE CENTER OF THE DAM SHOULD BE AT LEAST SIX INCHES LOWER THAN THE OUTER EDGES.
5.) THE MAXIMUM SPACING IS AS SHOWN ON THE PROJECT SITE PLANS.
6.) CHECK DAMS WILL NOT BE USED IN A FLOWING STREAM.
7.) TEMPORARY CHECK DAMS WILL BE REMOVED ONCE THE SWALE OR DITCH IS DETERMINED STABLE.
8.) TO BE CONSTRUCTED IAW NH SWM #3 4-2 SEDIMENT CONTROL PRACTICES, TEMPORARY CHECK DAMS, PAGE 114.

E10

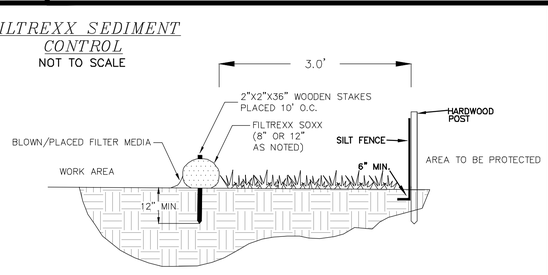


PLAN NOT TO SCALE

NOTES

1. ALL MATERIAL TO MEET FILTREXX SPECIFICATIONS.
2. FILTER MEDIA FILL TO MEET APPLICATION REQUIRMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.
4. SILTSOXX MAY BE USED IN PLACE OF SILT FENCE OR OTHER SEDIMENT BARRIERS.
5. SILTSOXX COMPOST/SOIL/ROCK/SEED FILL MATERIAL SHALL BE ADJUSTED AS NECESSARY TO MEET THE REQUIRMENTS OF THE SPECIFIC APPLICATION.
6. FILTREXX SOXX IS A REGISTERED TRADEMARK OF FILTREXXIN TERNATIONAL, LLC.
7. SILT FENCE IS NOT A SUBSTITUTION FOR SILT SOXX AND ANY EQUAL SUBSTITUTION TO BE APPROVED.
8. TO BE CONSTRUCTED IAW FILTREXX, SECTION 1:EROSION & SEDIMENT CONTROL (PAGE 323) - CONSTRUCTION ACTIVITIES, SWPPP CUT SHEET: FILTREXX SEDIMENT CONTROL

FILTREXX SEDIMENT CONTROL
NOT TO SCALE

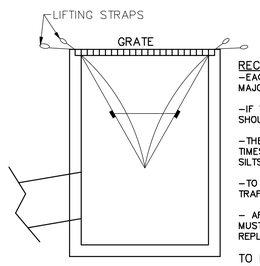


Filtrexx International, LLC
35481 Grafton Eastern Rd | Grafton, Oh 44044
440-926-2607 | fax: 440-926-4021
WWW.FILTREXX.COM
OR APPROVED EQUAL

NOTE: FOR AREAS REQUIRING DOUBLE PERIMETER CONTROL WITHIN 50' OF JURISDICTIONAL WETLANDS AND NOT FOR ALL SILT SOXX APPLICATIONS. THIS DUPLICATION MAY BE SPECIFIED AS 12" SILT SOXX OR ORANGE CONSTRUCTION FENCE AS NOTED.

SECTION NOT TO SCALE

E11



RECOMMENDED MAINTENANCE SCHEDULE

-EACH SILTSACK SHOULD BE INSPECTED AFTER EVERY MAJOR RAIN EVENT, AND MUST BE MAINTAINED.

-IF THERE HAVE BEEN NO MAJOR EVENTS, SILTSACK SHOULD BE INSPECTED EVERY 2-3 WEEKS.

-THE RESTRAINT CORD SHOULD BE VISIBLE AT ALL TIMES. IF CORD IS COVERED WITH SEDIMENT, THE SILTSACK SHOULD BE EMPTIED.

-TO BE USED IN ALL AREAS WHERE THERE WILL BE TRAFFIC.

- ARE SUBJECT TO DAMAGE BY SNOW PLOWS, AND MUST BE INSPECTED AFTER ANY SNOW EVENT AND REPLACED AS REQUIRED.

TO BE CONSTRUCTED IAW NH SWM #3 4-2 SEDIMENT CONTROL PRACTICES, TEMPORARY STORM DRAIN INLET PROTECTION, PAGE 118.

SILTSACK DETAIL
NOT TO SCALE

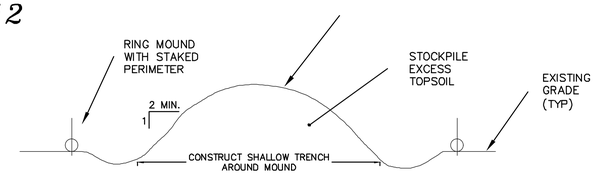
E-101

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

AS NOTED
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10043
LICENSED PROFESSIONAL ENGINEER

E12



TO BE CONSTRUCTED IAW NH SWM #3 4-1 EROSION CONTROL PRACTICES, SOIL STOCKPILE PRACTICES, PAGE 46.

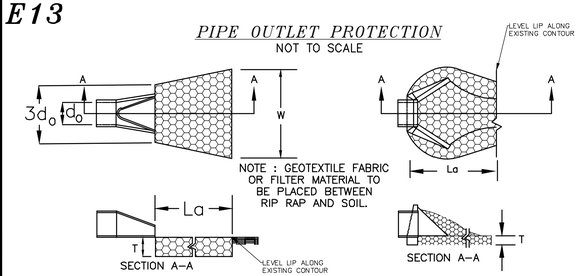
TOPSOIL STOCKPILE MOUND

NOT TO SCALE

E13

PIPE OUTLET PROTECTION

NOT TO SCALE



PIPE OUTLET TO FLAT AREA WITH NO DEFINED CHANNEL

PIPE OUTLET TO WELL-DEFINED CHANNEL

PIPE OUTLET PROTECTION CONSTRUCTION SPECIFICATIONS

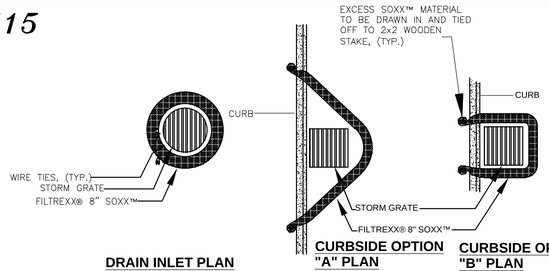
SPECIFIED GRADATION.

2. THE ROCK OR GRAVEL USED FOR FILTER OF RIP RAP SHALL CONFORM TO NHDOT SECTION 583.
3. GEOTEXTILE FABRICS SHALL BE PROTECTED FROM PUNCTURE OR TEARING DURING THE PLACEMENT OF THE ROCK RIP RAP DAMAGED AREAS IN THE FABRIC SHALL BE REPAIRED BY PLACING A PIECE OF FABRIC OVER THE DAMAGED AREA OR BY COMPLETE REPLACEMENT OF THE FABRIC. ALL OVERLAPS REQUIRED FOR REPAIRS OR JOINING TWO PIECES OF FABRIC SHALL BE A MINIMUM OF 12 INCHES.
4. STONE FOR THE RIP RAP MAY BE PLACED BY EQUIPMENT AND SHALL BE CONSTRUCTED TO THE FULL LAYER THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO PREVENT SEGREGATION OF THE STONE SIZES.
5. TO BE CONSTRUCTED IAW NH SWM #2 4-6 CONVEYANCE PRACTICES, 6. OUTLET PROTECTION, PAGE 172.

E14

TABLE 7-24--RECOMMENDED RIP RAP GRADATION RANGES		
d50 SIZE= 0.5	FEET 6	INCHES
% OF WEIGHT SMALLER THAN THE GIVEN d50 SIZE	SIZE OF STONE (INCHES) FROM	TO
100%	9	12
85%	8	11
50%	6	9
15%	2	3

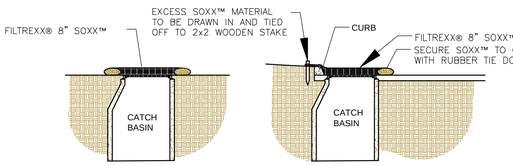
E15



DRAIN INLET PLAN

CURBSIDE OPTION "A" PLAN

CURBSIDE OPTION "B" PLAN



DRAIN INLET SECTION

CURBSIDE SECTION

NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. FILTER MEDIA™ FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

FILTREXX INLET PROTECTION

NOT TO SCALE

E16

NOTE: THIS PROJECT IS TO BE MANAGED IN A MANNER THAT MEETS THE REQUIREMENTS AND INTENT OF RSA 430:53 AND CHAPTER AGR 3800 RELATIVE TO INVASIVE SPECIES.

NOTE: Temporary seed mix for stabilization of turf shall be winter rye or oats at a rate of 2.5 lbs. per 1000 s.f. and shall be placed prior to OCT. 15, if permanent seeding not yet complete.

SEEDING GUIDE

USE	SEEDING MIXTURE 1/	DROUGHTY	WELL DRAINED	MODERATELY WELL DRAINED	POORLY DRAINED
STEEP CUTS AND FILLS, BORROW AND DISPOSAL AREAS	A	FAIR	GOOD	GOOD	FAIR
	B	POOR	GOOD	FAIR	FAIR
	C	POOR	GOOD	EXCELLENT	GOOD
	D	FAIR	FAIR	GOOD	EXCELLENT
	E	FAIR	EXCELLENT	EXCELLENT	POOR
WATERWAYS, EMERGENCY SPILLWAYS, AND OTHER CHANNELS WITH FLOWING WATER.	A	GOOD	GOOD	GOOD	FAIR
	C	GOOD	EXCELLENT	EXCELLENT	FAIR
	D	GOOD	EXCELLENT	EXCELLENT	FAIR
LIGHTLY USED PARKING LOTS, ODD AREAS, UNUSED LANDS, AND LOW INTENSITY USE RECREATION SITES.	A	GOOD	GOOD	GOOD	FAIR
	B	GOOD	GOOD	FAIR	POOR
	C	GOOD	EXCELLENT	EXCELLENT	FAIR
	D	FAIR	GOOD	GOOD	EXCELLENT
PLAY AREAS AND ATHLETIC FIELDS. (TOPSOIL IS ESSENTIAL FOR GOOD TURF.)	F	FAIR	EXCELLENT	EXCELLENT	2/
	G	FAIR	EXCELLENT	EXCELLENT	2/

GRAVEL PIT, SEE NH-PM-24 IN APPENDIX FOR RECOMMENDATION REGARDING RECLAMATION OF SAND AND GRAVEL PITS.

1/ REFER TO SEEDING MIXTURES AND RATES IN TABLE 7-36.
2/ POORLY DRAINED SOILS ARE NOT DESIRABLE FOR USE AS PLAYING AREA AND ATHLETIC FIELDS.

RECOMMENDED *

SEEDING RATES

MIXTURE	POUNDS PER ACRE	POUNDS PER 1,000 Sq. Ft.
A. TALL FESCUE	20	0.45
CREEPING RED FESCUE	20	0.45
RED TOP	2	0.05
TOTAL	42	0.95
B. TALL FESCUE	15	0.35
CREEPING RED FESCUE	10	0.25
CROWN VETCH	15	0.35
OR		
FLAT PEA	30	0.75
TOTAL	40 OR 55	0.95 OR 1.35
C. TALL FESCUE	24	0.55
CREEPING RED FESCUE	24	0.55
BIRDS FOOT TREFOIL	REMOVED	REMOVED
TOTAL	48	1.10
D. TALL FESCUE	20	0.45
FLAT PEA	30	0.75
TOTAL	50	1.20
E. CREEPING RED FESCUE 1/	50	1.15
KENTUCKY BLUEGRASS 1/	50	1.15
TOTAL	100	2.30
F. TALL FESCUE 1	150	3.60

CONSERVATION MIX	POUNDS PER ACRE	POUNDS PER 1,000 S.F.
TALL FESCUE (35%)	15	0.35
CREEPING RED FESCUE (25%)	15	0.35
ANNUAL RYEGRASS (12%)	5	0.12
PERENNIAL RYEGRASS (10%)	5	0.12
KENTUCKY BLUEGRASS (10%)	15	0.35
WHITE CLOVER (3%)	7	0.16

SEEDING SPECIFICATIONS

1. GRADING AND SHAPING
   A. SLOPES SHALL NOT BE STEEPER THAN 2:1;3:1 SLOPES OR FLATTER ARE PREFERRED.
   WHERE MOWING WILL BE DONE, 3:1 SLOPES OR FLATTER ARE RECOMMENDED.
2. SEEDBED PREPARATION
   A. SURFACE AND SEEPAGE WATER SHOULD BE DRAINED OR DIVERTED FROM THE SITE TO PREVENT DROWNING OR WINTER KILLING OF THE PLANTS.
   B. STONES LARGER THAN 4 INCHES AND TRASH SHOULD BE REMOVED BECAUSE THEY INTERFERE WITH SEEDING AND FUTURE MAINTENANCE OF THE AREA. WHERE FEASIBLE, THE SOIL SHOULD BE TILLED TO A DEPTH OF ABOUT 4 INCHES TO PREPARE A SEED BED AND MIX FERTILIZER AND LIME INTO THE SOIL. THE SEEDBED SHOULD BE LEFT IN REASONABLY FIRM AND SMOOTH CONDITION. THE LAST TILLAGE OPERATION SHOULD BE PERFORMED ACROSS THE SLOPE WHEREVER PRACTICAL.
3. ESTABLISHING A STAND
   A. LIME AND FERTILIZER SHOULD BE APPLIED PRIOR TO OR AT THE TIME OF SEEDING
   AND INCORPORATED INTO THE SOIL KINDS AND AMOUNTS OF LIME AND FERTILIZER SHOULD BE BASED ON AN EVALUATION OF SOIL TESTS. WHEN A SOIL TEST IS NOT AVAILABLE,
   THE FOLLOWING MINIMUM AMOUNTS SHOULD BE APPLIED:
   AGRICULTURAL LIMESTONE, 2 TONS PER ACRE OR 100LBS. PER 1,000 SQ.FT.
   NITROGEN(N), 50LBS. PER ACRE OR 1.1LBS. PER 1,000 SQ.FT.
   PHOSPHATE(P2O5), 100LBS. PER ACRE OR 2.2LBS. PER 1,000 SQ.FT.
   POTASH(K2O), 100LBS. PER ACRE OR 2.2LBS. PER 1,000 SQ.FT.
   (NOTE: THIS IS THE EQUIVALENT OF 500LBS. PER ACRE OF 10-20-20 FERTILIZER OR 1,000LBS. PER ACRE OF 5-10-10.)
   B. SEED SHOULD BE SPREAD UNIFORMLY BY THE METHOD MOST APPROPRIATE FOR THE SITE. METHODS INCLUDE BROADCASTING, DRILLING AND HYDROSEEDING. WHERE BROADCASTING IS USED, COVER SEED WITH .25 INCH OF SOIL OR LESS, BY CULTIPACKING OR RAKING.
   C. REFER TO TABLE(G-E1 THIS SHEET) FOR APPROPRIATE SEED MIXTURES AND TABLE(H-E1 THIS SHEET) FOR RATES OF SEEDING. ALL LEGUMES (CROWNVETCH, BIRDSFOOT TREFOIL, AND FLATPEA) MUST BE INOCULATED WITH THEIR SPECIFIC INOCULANT.
   D. WHEN SEEDED AREAS ARE MULCHED, PLANTINGS MAY BE MADE FROM EARLY SPRING TO EARLY OCTOBER. WHEN SEEDED AREAS ARE NOT MULCHED, PLANTINGS SHOULD BE MADE FROM EARLY SPRING TO MAY 20 OR FROM AUGUST 10 TO SEPTEMBER 1.
4. MULCH
   A. HAY, STRAW, OR OTHER MULCH, WHEN NEEDED, SHOULD BE APPLIED IMMEDIATELY AFTER SEEDING.
   B. MULCH WILL BE HELD IN PLACE USING APPROPRIATE TECHNIQUES FROM THE BEST MANAGEMENT PRACTICE FOR MULCHING. HAY OR STRAW MULCH SHALL BE PLACED AT A RATE OF 90LBS PER 1000 S.F.
5. MAINTENANCE TO ESTABLISH A STAND
   A. PLANTED AREA SHOULD BE PROTECTED FROM DAMAGE BY FIRE, GRAZING, TRAFFIC, AND DENSE WEED GROWTH.
   B. FERTILIZATION NEEDS SHOULD BE DETERMINED BY ONSITE INSPECTIONS. SUPPLEMENTAL FERTILIZER IS USUALLY THE KEY TO FULLY COMPLETE THE ESTABLISHMENT OF THE STAND BECAUSE MOST PERENNIAL STAKE 2 TO 3 YEARS TO BECOME ESTABLISHED.
   C. IN WATERWAYS, CHANNELS, OR SWALES WHERE UNIFORM FLOW CONDITIONS ARE ANTICIPATED, OCCASIONAL MOWING MAY BE NECESSARY TO CONTROL GROWTH OF WOODY VEGETATION.
6. TO BE CONSTRUCTED IAW NH SWM #3 4-1 EROSION CONTROL PRACTICES, PERMANENT VEGETATION, PAGE 60.
7. SEE RAIN GARDEN AND INFILTRATION DETAIL SHEETS FOR SPECIFIC PLANTING INSTRUCTIONS AND SEEDING.

E17

CONSTRUCTION SEQUENCE:

1.) CUT AND REMOVE TREES IN CONSTRUCTION AREA ONLY AS REQUIRED, RELOCATE ANY PROJECT T.B.M.

2.) CONSTRUCT AND/OR INSTALL TEMPORARY AND PERMANENT SEDIMENT EROSION AND DETENTION CONTROL FACILITIES AS SPECIFIED. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED PRIOR TO ANY SOIL LAND DISTURBANCE AND MUST BE REVIEWED AND APPROVED BY THE COMMUNITY SERVICES DEPARTMENT.

3.) EROSION, SEDIMENT AND DETENTION CONTROL FACILITY SHALL BE INSTALLED & STABILIZED PRIOR TO DIRECTING RUNOFF TO THEM.TEMPORARY DIVERSIONS MAY BE REQUIRED. POST CONSTRUCTION STORM WATER MANAGEMENT PRACTICES MUST BE INITIATED AND STABILIZED EARLY IN THE PROCESS. RUNOFF MUST BE DIRECTED TO TEMPORARY PRACTICES UNTIL STORMWATER BMPs ARE STABILIZED.

4.) CLEAR, CUT AND DISPOSE OF DEBRIS IN APPROVED FACILITY

5.) CONSTRUCT TEMPORARY CULVERTS AS REQUIRED, OR DIRECTED

6.) CONSTRUCT ROADWAYS FOR ACCESS TO DESIRED CONSTRUCTION AREAS. ALL ROADS SHALL BE STABILIZED IMMEDIATELY. SEE BEST MANAGEMENT PRACTICES FOR BLASTING ON SHEET C-102.

7.) START BUILDING CONSTRUCTION.

8.) INSTALL PIPE AND CONSTRUCTION ASSOCIATED APPURTENANCES AS REQUIRED OR DIRECTED. INSTALL RAIN GARDENS. ALL DISTURBED AREAS SHALL STABILIZED IMMEDIATELY AFTER GRADING.

9.) BEGIN PERMANENT AND TEMPORARY SEEDING AND MULCHING. ALL CUT AND FILL SLOPES AND DISTURBED AREAS SHALL BE SEEDED OR MULCHED AS REQUIRED, OR DIRECTED. NO AREA IS ALLOWED TO BE DISTURBED FOR A LENGTH OF TIME THAT EXCEEDS 45 DAYS BEFORE BEING STABILIZED, DAILY, OR AS REQUIRED. ALL ROADWAYS AND PARKING AREAS SHALL BE STABILIZED WITHIN 72 HOURS OF ACHIEVING FINISHED GRADES. ALL CUT AND FILL SLOPES SHALL BE STABILIZED WITHIN 72 HOURS OF ACHIEVING FINISHED GRADES. LIMIT THE LENGTH OF EXPOSURE OF UNSTABILIZED SOIL TO 45 DAYS OR LESS.

10.) CONSTRUCT TEMPORARY BERMS, DRAINS DITCHES, SILT FENCES, SEDIMENT TRAPS, ETC. MULCH AND SEED AS REQUIRED.

11.) INSPECT AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES DURING CONSTRUCTION. ALL SWPPP INSPECTIONS MUST BE CONDUCTED BY A QUALIFIED PROFESSIONAL SUCH AS A PROFESSIONAL ENGINEER (PE), A CERTIFIED PROFESSIONAL IN EROSION AND SEDIMENT CONTROL (CPESC), A CERTIFIED EROSION SEDIMENT AND STORM WATER INSPECTOR (CESSWI), OR A CERTIFIED PROFESSIONAL IN STORM WATER QUALITY (CPSWQ). INSPECTION REPORTS SHALL BE SUBMITTED TO THE COMMUNITY SERVICES DEPARTMENT. EROSION AND SEDITMENT CONTROL PRACTICES ARE TO BE INSPECTED WEEKLY AND AFTER 0.5" OF RAINFALL.

12.) COMPLETE PERMANENT SEEDING AND LANDSCAPING.

13.) REMOVE TEMPORARY EROSION CONTROL MEASURES AFTER SEEDING AREAS HAVE ESTABLISHED THEMSELVES AND SITE IMPROVEMENTS ARE COMPLETE.

14.) SMOOTH AND REVEGETATE ALL DISTURBED AREAS.

15.) FINISH PAVING ALL ROADWAYS.

16.) LOT DISTURBANCE, OTHER THAN THAT SHOWN ON THE APPROVED PLANS, SHALL NOT COMMENCE UNTIL AFTER THE ROADWAY HAS THE BASE COURSE TO DESIGN ELEVATION AND THE ASSOCIATED DRAINAGE IS COMPLETE AND STABLE.

E18

DEFINITION OF STABLE:

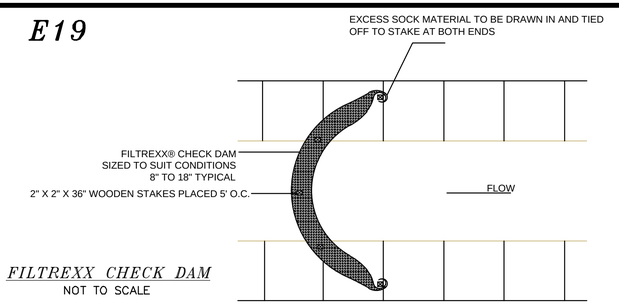
PER ENV-WQ 1500 ALTERATION OF TERRAIN

1. BASE COURSE GRAVELS HAVE BEEN INSTALLED IN AREAS TO BE PAVED.
2. A MINIMUM OF 85 PERCENT VEGETATED GROWTH HAS BEEN ESTABLISHED..
3. A MINIMUM OF 3 INCHES OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIP-RAP HAS BEEN INSTALLED.
4. OR, EROSION CONTROL BLANKETS HAVE BEEN PROPERLY INSTALLED.

ADDITION STABILIZATION NOTES:

5. HAY MULCH OR OTHER APPROVED METHODS SHALL BE USED TO CONTROL EROSION OF NEWLY GRADED AREAS. ALL CUT AND FILL SLOPES SHALL BE SEEDED AND MULCHED WITHIN 72 HOURS AFTER THEIR CONSTRUCTION.
6. DISTURBED SOIL AREAS SHALL BE EITHER TEMPORARILY OR PERMANENTLY STABILIZED. IN AREAS WHERE FINAL GRADING HAS NOT OCCURRED, TEMPORARY STABILIZATION MEASURES SHOULD BE IN PLACE WITHIN SEVEN (7) CALENDAR DAYS FOR EXPOSED SOIL AREAS THAT ARE WITHIN ONE HUNDRED (100) FEET OF A SURFACE WATER BODY OR A WETLAND AND NO MORE THAN 14 CALENDAR DAYS FOR ALL OTHER AREAS. PERMANENT STABILIZATION SHOULD BE IN PLACE WITHIN THREE (3) CALENDAR DAYS FOLLOWING COMPLETION OF FINAL GRADING OF EXPOSED SOIL AREAS.

E19

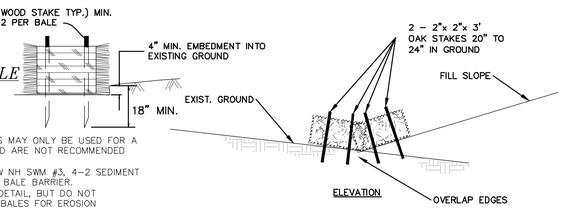


FILTREXX CHECK DAM

NOT TO SCALE

NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. CHECK DAM SHOULD BE USED IN AREAS THAT DRAIN 1 ACRE OR LESS.
3. SEDIMENT SHOULD BE REMOVED FROM BEHIND CHECK DAM ONCE THE ACCUMULATED HEIGHT HAS REACHED ½ THE HEIGHT OF THE CHECK DAM.
4. CHECK DAM CAN BE DIRECT SEEDED AT THE TIME OF INSTALLATION.
5. CONTRACTOR IS REQUIRED TO BE A FILTREXX CERTIFIED™ INSTALLER.

E20

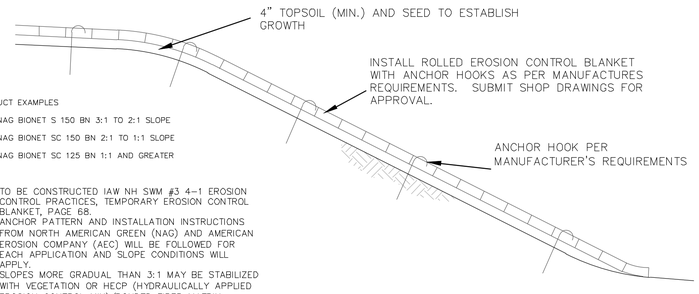


STAKED HAYBALE DETAIL

NOT TO SCALE

1.) HAY BALES BARRIERS MAY ONLY BE USED FOR A MAXIMUM OF 60 DAYS AND ARE NOT RECOMMENDED FOR PERIMETER CONTROL.
2.) TO BE INSTALLED IAW NH SWM #3, 4-2 SEDIMENT CONTROL, STRAW OR HAY BALE BARRIER.
3.) REQUIRED TO SHOW DETAIL, BUT DO NOT RECOMEND USE OF HAY BALES FOR EROSION CONTROL.

E21



PRODUCT EXAMPLES

1.) NAG BIONET S 150 BN 3:1 TO 2:1 SLOPE

2.) NAG BIONET SC 150 BN 2:1 TO 1:1 SLOPE

3.) NAG BIONET SC 125 BN 1:1 AND GREATER

1. TO BE CONSTRUCTED IAW NH SWM #3 4-1 EROSION CONTROL PRACTICES, TEMPORARY EROSION CONTROL BLANKET, PAGE 68.
2. ANCHOR PATTERN AND INSTALLATION INSTRUCTIONS FROM NORTH AMERICAN GREEN (NAG) AND AMERICAN EROSION COMPANY (AEC) WILL BE FOLLOWED FOR EACH APPLICATION AND SLOPE CONDITIONS WILL APPLY.
3. SLOPES MORE GRADUAL THAN 3:1 MAY BE STABILIZED WITH VEGETATION OR HECP (HYDRAULICALLY APPLIED EROSION CONTROL MIX)/BONDED FIBER MATRIX. HOWEVER THE ENGINEER RESERVES THE RIGHT TO REQUEST INCREASED RECB TO BE INSTALLED ON ANY SLOPE.
4. ALL RECB IS TO CONSIST OF ALL NATURAL MATERIAL WITH NO SYNTHETIC COMPONENTS (NO PHOTO BIODEGRADABLE NETTING)

ROLLED EROSION CONTROL BLANKET (RECB) SLOPE STABILIZATION DETAIL

E22

WINTER STABILIZATION NOTES

1. ALL DISTURBED AREAS THAT DO NOT HAVE AT LEAST 85% VEGETATIVE COVERAGE PRIOR TO OCTOBER 15TH SHALL BE STABILIZED BY APPLYING MULCH AT A RATE OF 3-4 TONS PER ACRE. ALL SIDE SLOPES, STEEPER THAN 4:1, THAT ARE NOT DIRECTED TO SWALES OR DETENTION BASINS, SHALL BE LINED WITH BIODEGRADABLE/PHOTODEGRADABLE "JUTE MATTING" (EXCELSIOR'S CURLEX II OR EQUAL). ALL OTHER SLOPES SHALL BE MULCHED AND TACKED AT A RATE OF 3-4 TONS PER ACRE. THE APPLICATION OF MULCH AND/OR JUTE MATTING SHALL NOT OCCUR OVER EXISTING SNOW COVER. IF THE SITE IS ACTIVE AFTER OCTOBER 15TH, ANY SNOW THAT ACCUMULATES ON DISTURBED AREAS SHALL BE REMOVED. PRIOR TO SPRING THAW ALL AREAS WILL BE STABILIZED, AS DIRECTED ABOVE.

2. ALL SWALES THAT DO NOT HAVE FULLY ESTABLISHED VEGETATION SHALL BE EITHER LINED WITH TEMPORARY JUTE MATTING OR TEMPORARY STONE CHECK DAMS (APPROPRIATELY SPACED). STONE CHECK DAMS WILL BE MAINTAINED THROUGHOUT THE WINTER MONTHS. IF THE SWALES ARE TO BE MATTED WITH PERMANENT LINERS OR RIPRAP WITH ENGINEERING FABRIC, THIS SHALL BE COMPLETED PRIOR TO WINTER SHUTDOWN OR AS SOON AS THEY ARE PROPERLY GRADED AND SHAPED.

3. PRIOR TO OCT. 15TH ALL ROADWAY AND PARKING AREAS SHALL BE BROUGHT UP TO AND THROUGH THE BANK RUN GRAVEL APPLICATION. IF THESE AREAS' ELEVATIONS ARE PROPOSED TO REMAIN BELOW THE PROPOSED SUBGRADE ELEVATION, THE SUBGRADE MATERIAL SHALL BE ROUGHLY CROWNED AND A 3" LAYER OF CRUSHED GRAVEL SHALL BE PLACED AND COMPACTED. THIS WILL ALLOW THE SUBGRADE TO SHED RUNOFF AND WILL REDUCE ROADWAY EROSION. THIS CRUSHED GRAVEL DOES NOT HAVE TO CONFORM TO NH DOT 304.3, BUT SHALL HAVE BETWEEN 15-25% PASSING THE #200 SIEVE AND THE LARGEST STONE SIZE SHALL BE 2". IF THE SITE IS ACTIVE AFTER OCTOBER 15TH, ANY ACCUMULATED SNOW SHALL BE REMOVED FROM ALL ROADWAY AND PARKING AREAS.

4. AFTER OCTOBER 15TH, THE END OF NEW HAMPSHIRE'S AVERAGE GROWING SEASON, NO ADDITIONAL LOAM SHALL BE SPREAD ON SIDE SLOPES AND SWALES. THE STOCKPILES THAT WILL BE LEFT UNDISTURBED UNTIL SPRING SHALL BE SEEDED BY THIS DATE. AFTER OCTOBER 15TH, ANY NEW OR DISTURBED PILES SHALL BE MULCHED AT A RATE OF 3-4 TONS PER ACRE. ALL STOCKPILES THAT WILL REMAIN THROUGHOUT THE WINTER SHALL BE SURROUNDED WITH SILT FENCING.

5. ENV-WQ 1505.06 COLD WEATHER SITE STABILIZATION (B)(1) LIMITS AREA OF EXPOSURE TO ONE ACRE OF UNSTABILIZED SOIL WITHOUT OBTAINING A WAIVER AND WINTER CONSTRUCTION PLAN.

E-102

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

EROSION & SEDIMENT CONTROL DETAILS
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

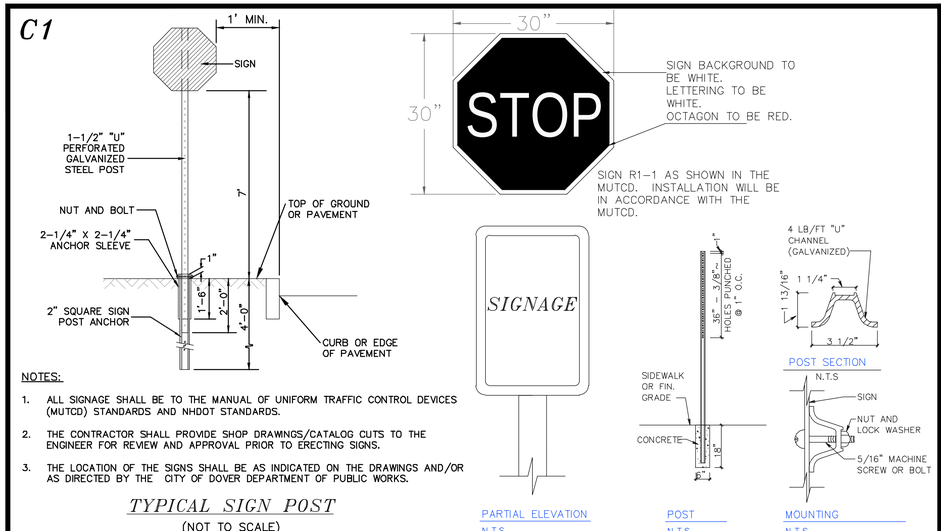
AS NOTED

DATE : JANUARY 21, 2021

FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 13243
LICENSED PROFESSIONAL ENGINEER

C1



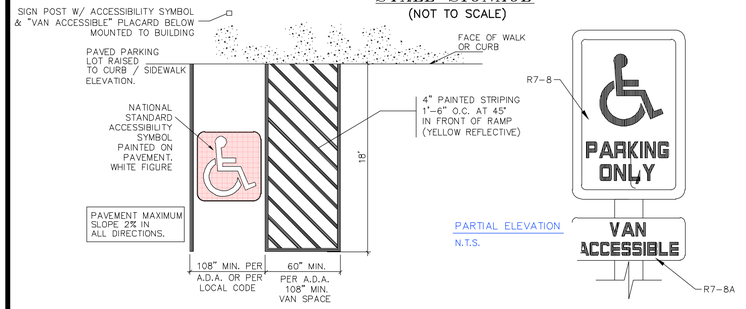
NOTES:

1. ALL SIGNAGE SHALL BE TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) STANDARDS AND NHDOT STANDARDS.
2. THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS/CATALOG CUTS TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO ERECTING SIGNS.
3. THE LOCATION OF THE SIGNS SHALL BE AS INDICATED ON THE DRAWINGS AND/OR AS DIRECTED BY THE CITY OF DOVER DEPARTMENT OF PUBLIC WORKS.

TYPICAL SIGN POST
(NOT TO SCALE)

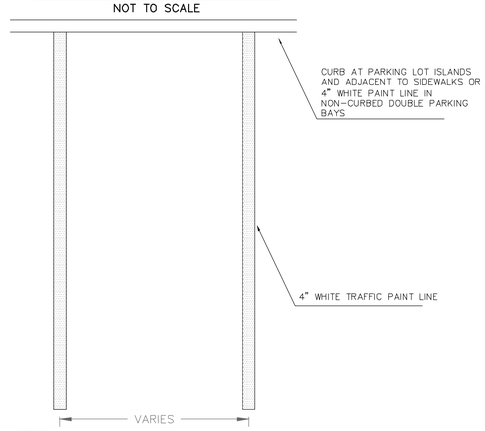
C2

ACCESSIBLE PARKING STALL SIGNAGE
(NOT TO SCALE)



C3

PARKING SPACE DETAIL
NOT TO SCALE



NOTES:

1.) PROVIDE TWO COATS OF PAINT ON ALL PARKING LINES.
2.) SEE PROPOSED SITE PLANS FOR LOCATION OF PARKING SPACES.
3.) PAINTED SPACES ONLY WHERE MARKED ON SITE PLAN

PLANNING FILE #21-04

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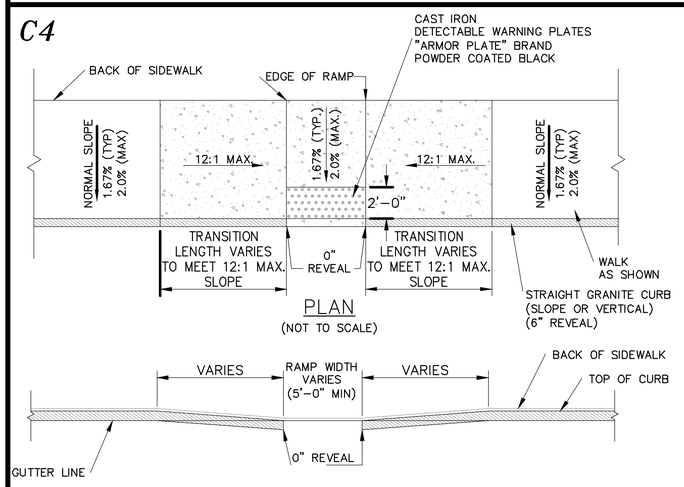
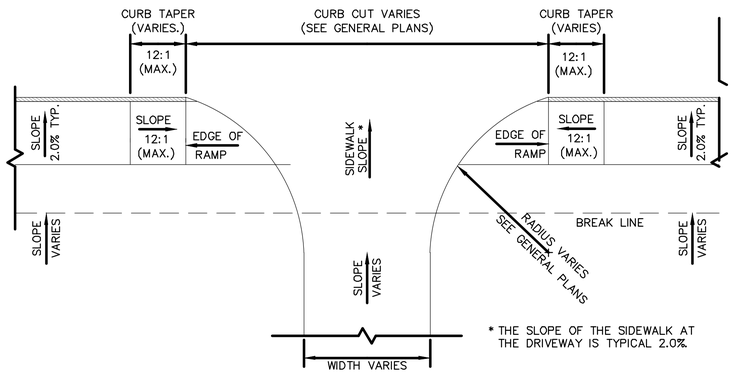
CONSTRUCTION DETAILS
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

C4



TYPICAL DETAIL FOR WHEELCHAIR RAMP

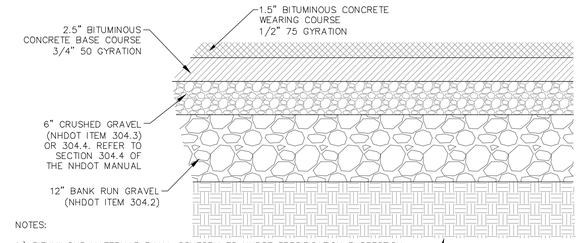
C5



* THE SLOPE OF THE SIDEWALK AT THE DRIVEWAY IS TYPICAL 2.0%

PLAN VIEW (DRIVEWAY & SIDEWALK)
NOT TO SCALE

C6



NOTES:

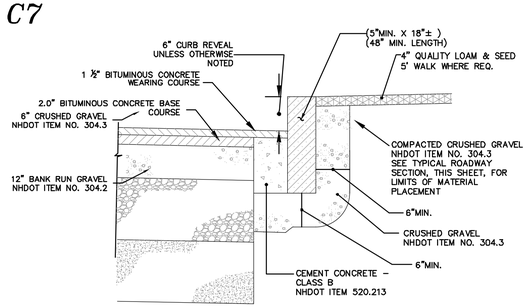
1.) BITUMINOUS MATERIALS SHALL CONFORM TO NHDOT SPECIFICATION SUBSECTION 401.3.6.

2.) PAVEMENT BASE COURSE AGGEGATE SHALL CONFORM TO NHDOT SPECIFICATION SECTION 304, ITEM 304.3 AND COMPACTED TO A MINIMUM OF 95% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY.

3.) PAVEMENT SUBBASE COURSE AGGREGATE AND AGGREGATE FOR SUBGRADE REPAIR AREAS SHALL BE SUITABLE FOR USE AS STRUCTURAL FILL AND BE PROOFROLLED AND COMPABED TO 95% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY. FOR NEW CONSTRUCTION AREAS ONLY. IN EXISTING PAVEMENT AREAS THE CONTRACTOR IS TO ENSURE THE BASE MATERIAL IS SUITABLE TO THE OWNER FOR RE-PAVING

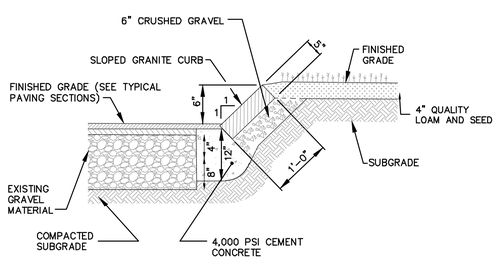
BITUMINOUS CONCRETE PAVEMENT SECTION
NOT TO SCALE

C7



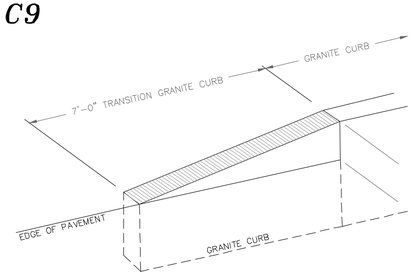
VERTICAL GRANITE CURB DETAIL
NOT TO SCALE

C8



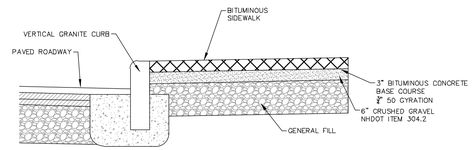
SLOPE GRANITE CURB DETAIL
NOT TO SCALE

C9



CURB TRANSITION DETAIL
NOT TO SCALE
TO BE USED FOR TRANSITION FROM GRANITE CURB TO EDGE OF PAVEMENT

C10



BITUMINOUS SIDEWALK RAISED

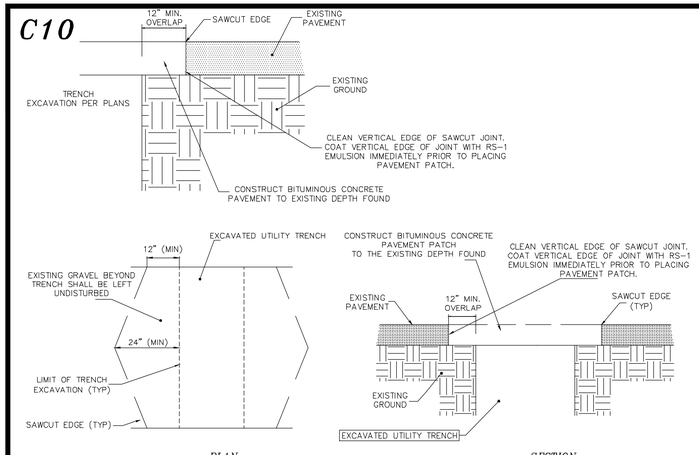
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

AS NOTED
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 19313
LICENSED PROFESSIONAL ENGINEER

C-101

C10

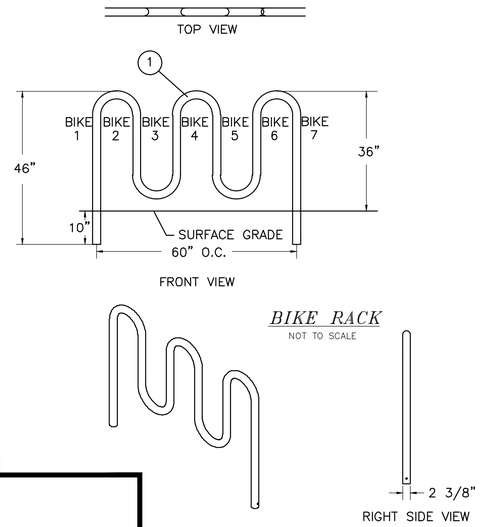


NOTES
1. MACHINE CUT EXISTING PAVEMENT.
2. ALL TEMPORARY, DAMAGED, OR DEFECTIVE PAVEMENT SHALL BE REMOVED PRIOR TO PLACEMENT OF PERMANENT TRENCH REPAIRS.
3. DIAMOND PATCHES, SHALL BE REQUIRED FOR ALL TRENCHES CROSSING ROADWAY. DIAMOND PATCHES SHALL MEET NHDOT REQUIREMENTS.

TYPICAL TRENCH PATCH
NOT TO SCALE

C11

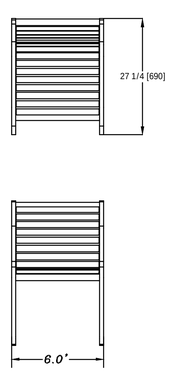
MATERIALS LIST
(1) .TUBING – ø 2 3/8" x .154" Wall Steel Tubing



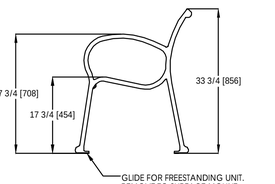
BIKE RACK
NOT TO SCALE

C12

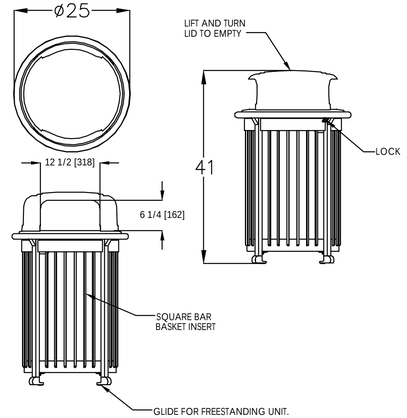
Scarborough™ Bench, 24" Backed, with Horizontal Strap Seat
Product Drawing
www.landscapeforms.com
Date: 5/19/2010
Ph: 800.521.2546



BENCH DETAIL
(NOT TO SCALE)



BIN DETAIL
(NOT TO SCALE)



landscapeforms Drawing: SC173-02 Dimensions are in inches [mm]

landscapeforms Drawing: SC173-02 Dimensions are in inches [mm]

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PLANNING FILE #21-04

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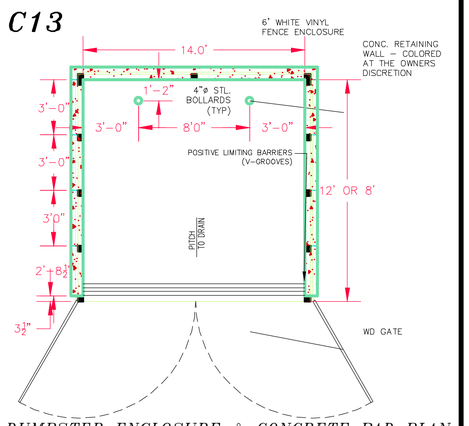
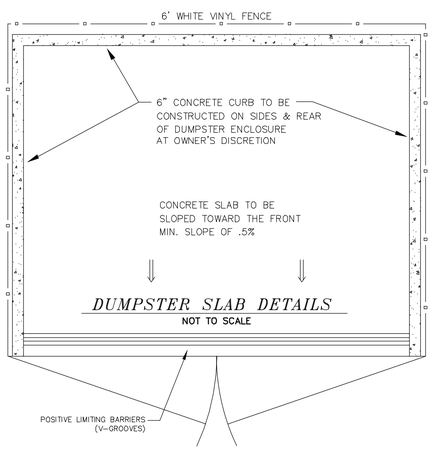
CONSTRUCTION DETAILS
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

C13

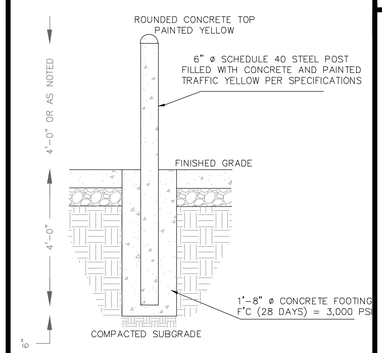


DUMPSTER ENCLOSURE & CONCRETE PAD PLAN
NOT TO SCALE



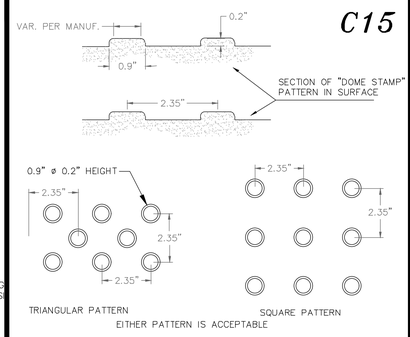
DUMPSTER SLAB DETAILS
NOT TO SCALE

C14



BOLLARD DETAIL
NOT TO SCALE

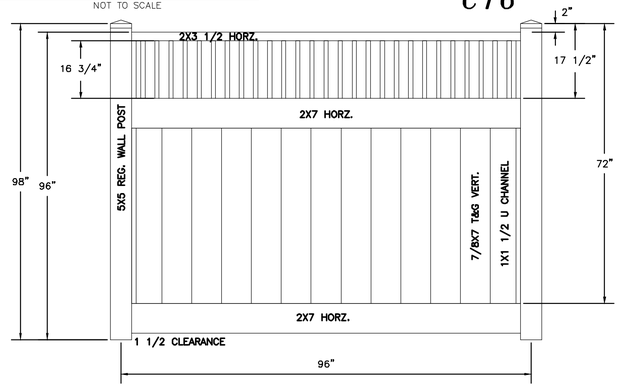
C15



DETECTABLE WARNING SURFACE
NOT TO SCALE

C16

WHITE VINYL FENCE DETAIL MONTAUK 72X96
NOT TO SCALE



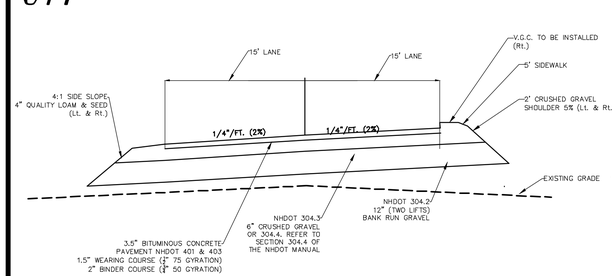
CROSS SECTION NOTES

1. ALL ROADWAY FILL TO BRING ROAD TO SUBGRADE SHALL BE INSTALLED IN LIFTS NO GREATER THAN 12".

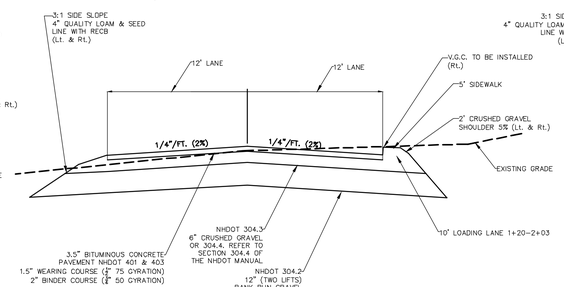
2. ALL FILL SHALL BE COMPACTED TO 95% MINIMUM. COMPACTION TESTS TO BE CONDUCTED AT THE START OF THE PROJECT AND NO FURTHER THAN 100 FEET APART.

COMPACTED SUBGRADE – CONTRACTOR SHALL SCARIFY SUBGRADE TO A DEPTH OF 30 INCHES BELOW F-GRADE. ALL STONES GREATER THAN 6" IN DIAMETER SHALL BE REMOVED FROM THE SCARIFIED LAYER. ANY IMPORTED FILL SHALL BE FREE OF ORGANICS AND FROST AND SHALL HAVE NO ROCKS LARGER THAN 6" IN DIAMETER. FILL MATERIAL SHALL BE APPROVED BY THE TOWNS AGENT AND/OR THE TOWNS ENGINEER.

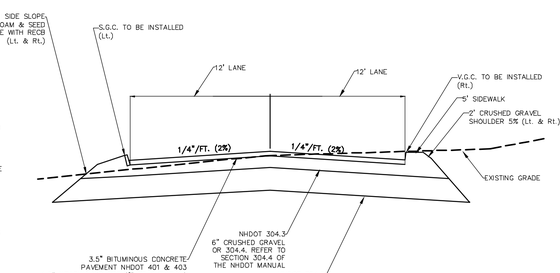
C17



TYPICAL ROADWAY SECTION TIBETAN DRIVE
0+35.17–0+77.60



TYPICAL ROADWAY SECTION TIBETAN DRIVE
0+77.60–6+00



TYPICAL ROADWAY SECTION TIBETAN DRIVE
6+00–9+74.72

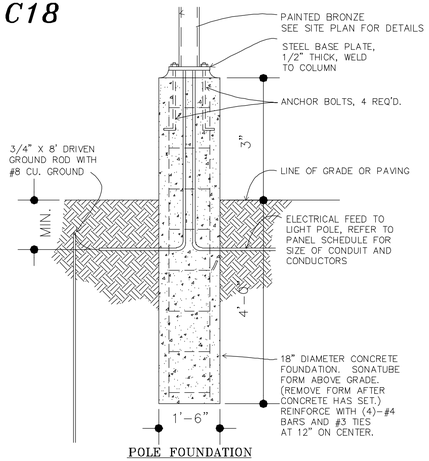
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

AS NOTED
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 7813
LICENSED PROFESSIONAL ENGINEER

C-102

C18



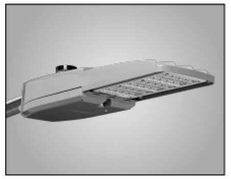
LIGHT BASE DETAIL

NOT TO SCALE

C19

Autobahn Series ATB0
Roadway Lighting

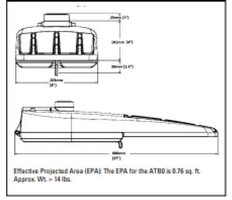
PRODUCT OVERVIEW



Applications:

Roadways
Off ramps
Residential streets
Parking lots

DIMENSIONS



Effective Projected Area (EPA): The EPA for the ATB0 is 0.76 sq. ft.
Approx. Wt. = 14 lbs.

Features:

OPTICAL

Same Light: Performance is comparable to 70-250W HPS roadway luminaires.

White Light: Correlated color temperature – 4000K, 70 CRI minimum, 3000K, 70 CRI minimum or optional 5000K, 70 CRI minimum.

Unique IP66 rated LED light engines provided 0% uplight and restrict backlight to within sidewalk depth, providing optimal application coverage and optimal pole spacing. Available in Type II, III, IV, and V roadway distributions.

ELECTRICAL

Expected Life: LED light engines are rated >100,000 hours at 25°C, L70. Electronic driver has an expected life of 100,000 hours at a 25°C ambient.

Lower Energy: Saves an expected of 40-60% over comparable HID luminaires.

Robust Surge Protection: Three different surge protection options provide a minimum of ANSI C136.2 10kV/5kA protection. 20kV/10kA protection is also available.

MECHANICAL

Includes standard AEL lineman-friendly features such as tool-less entry, 3 station terminal block and quick disconnects. Bubble level located inside the electrical compartment for easily leveling at installation.

Rugged die-cast aluminum housing and door are polyester powder-coated for durability and corrosion resistance. Rigorous five-stage pre-treating and painting process yields a finish that achieves a scribe creepage rating of 7 (per ASTM D1654) after over 5000 hours exposure to salt fog chamber (operated per ASTM B117).

Mast arm mount is adjustable for arms from 1-1/4" to 2" (1-5/8" to 2-3/8" O.D.) diameter. Provides a 3G vibration rating per ANSI C136.31

Wildlife shield is cast into the housing (not a separate piece).

CONTROLS

NEMA 3 pin photocontrol receptacle is standard, with the Acuity designed ANSI standard 7 pin receptacle optionally available.

Premium solid state locking style photocontrol - PCSS (10 year rated life) Extreme long life solid state locking style photocontrol - PCLL (20 year rated life).

Multi-level dimming available to provide scheduled dimming as specified by the customer.

Optional onboard Adjustable Output module allows the light output and input wattage to be modified to meet site specific requirements, and also can allow a single fixture to be flexibly applied in many different applications.

STANDARDS

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

Color temperatures of ≤ 3000K must be specified for International Dark-Sky Association certification.

Rated for -40°C to 40°C ambient
CSA Certified to U.S. and Canadian standards
Complies with ANSI: C136.2, C136.10, C136.14, C136.31, C136.15, C136.37

LAMP "A" MOUNTED 18'

C20

WSQ LED
Architectural Wall Sconce

Inverted available with WLU option only.

Catalog Number
Notes
Type

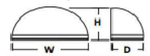
Introduction

Classic Architectural Wall Sconce with the LED technology. Long-life, maintenance-free product with typical energy savings of 80% compared to metal halide versions. The integral battery backup option provides emergency egress lighting, without the use of a back-box or remote gear, so installations maintain their aesthetic integrity. The WSQ LED is ideal for replacing existing 50 – 250W metal halide wall-mounted products. The expected service life is 20+ years of nighttime use.

Specifications

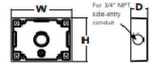
Luminaire

Height: 9-3/8" (23.8 cm)
Width: 18" (45.7 cm)
Depth: 9" (22.8 cm)
Weight: 17 lbs (7.7 kg)



Optional Back Box (BBW)

Height: 4" (10.2 cm)
Width: 5-1/2" (14.0 cm)
Depth: 1-1/2" (3.8 cm)



Ordering Information **EXAMPLE:** WSQ LED P2 40K SR3 MVOLT DDBTXD

WSQ LED

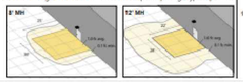
Series	Performance Package	Color Temperature	Distribution	Voltage	Mounting	Options	Finish (required)
WSQ LED	P1 P2 P3 P4	30K 40K 50K	SR2 Type II SR3 Type III SR4 Type IV	MVOLT [1] 120 208 240 277 347 480	**Shipped included** (blank) Surface mount **Shipped separately** [2] BBW Surface-mounted back box	**Shipped installed** PE Photoelectric cell, button type [3] SF Single fuse (120, 277, 347V) [4] DF Double fuse (208, 240, 480V) [5] DMG 0-10V dimming wires pulled outside fixture (for use with an external control, ordered separately) E20WC Emergency battery backup, Certified in CA Title 20 MAEDBS (20W, 3000K) [6] E10WH Emergency battery backup, Certified in CA Title 20 MAEDBS (10W, 5°C) [6] WLU Wet location door for up orientation [7] PIR Motion/ambient light sensor [8] DS Dual switching [9] SPD Separate Surge Protection [9] **Shipped separately** VG Vandal guard WG Wire guard	DDBXD Dark bronze DBLXD Black DNAXD Natural aluminum DWHXD White DSSXD Sandstone DDBTXD Textured dark bronze DBLBXD Textured black DNATXD Textured natural aluminum DWHGXD Textured white DSSTXD Textured sandstone

Emergency Battery Operation

The emergency battery backup (E20WC & E10WH options) is integral to the luminaire – no external housing required! This design provides reliable emergency operation while maintaining the aesthetics of the product. All E20WC & E10WH configurations include an independent secondary driver with an integral relay to immediately detect AC power loss.

The emergency battery will power the luminaire for a minimum duration of 90 minutes (maximum duration of three hours) from the time supply power is lost, per International Building Code Section 1008 and NFPA 101 Life Safety Code Section 7.9, provided luminaires are mounted at an appropriate height and illuminate an open space with no major obstructions.

The examples below show illuminance of 1 fc average and 0.1 fc minimum of the P1 power package "Type IV" product in emergency mode.



NOTES
1 MVOLT driver operates on any line voltage from 120-277V (50/60 Hz).
2 Not available with 480V option.
3 PE option is voltage specific.
4 Single fuse (SF) requires 120V, 277V or 347V options. Double fuse (DF) requires 208V, 240V or 480V options.
5 Not available with 347V or 480V. Not available with WLU.
6 WLU not available with PIR, E20WC or E10WH.
7 See PIR Table for default settings.
8 Only available with P3 & P4 packages. Provides 50/50 luminaire operation via two independent drivers and light engines on two separate circuit to. Not available with E20WC, E10WH, WLU, SF, or DF. When ordered with photocell (PE) or motion sensor (PIR), only the primary power source leads will be controlled.
9 See electrical section on page 2 for more details.

LAMP "B" MOUNTED 10'

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
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#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	

CONSTRUCTION DETAILS
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

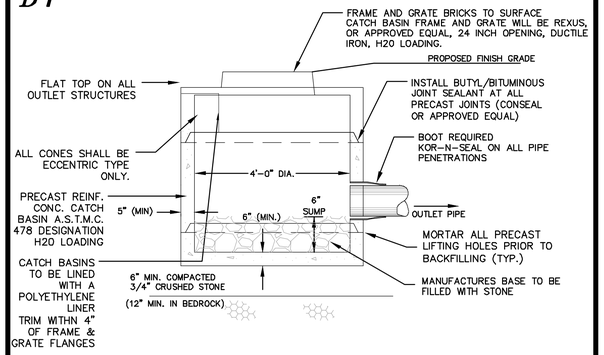
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

AS NOTED
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10832
LICENSED
PROFESSIONAL ENGINEER

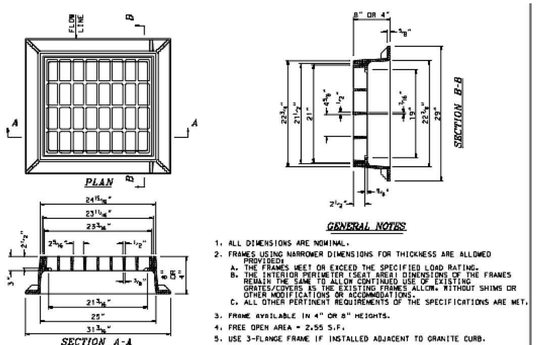
C–103

D1



CATCH BASIN DETAIL
NOT TO SCALE

D2



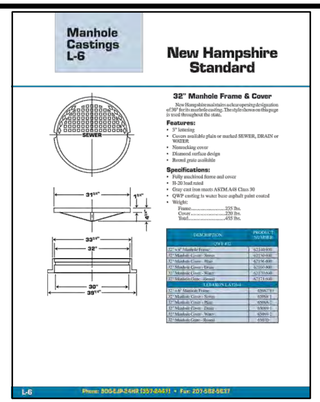
GENERAL NOTES:

1. ALL DIMENSIONS ARE NOMINAL.
2. FRAMES USING NARROWER DIMENSIONS FOR THICKNESS ARE ALLOWED PROVIDED:
   A. THE FRAMES MEET OR EXCEED THE SPECIFIED LOAD RATING.
   B. THE INTERIOR PERIMETER (SEAT AREA) DIMENSIONS OF THE FRAMES REMAIN THE SAME TO ALLOW CONTINUED USE OF EXISTING GRATES/COVERS AS THE EXISTING FRAMES ALLOW, WITHOUT SHIMS OR OTHER MODIFICATIONS OR ACCOMMODATIONS.
   C. ALL OTHER PERTINENT REQUIREMENTS OF THE SPECIFICATIONS ARE MET.
3. FRAME AVAILABLE IN 4" OR 8" HEIGHTS.
4. FREE OPEN AREA = 2.55 S.F.
5. USE 3-FLANGE FRAME IF INSTALLED ADJACENT TO GRANITE CURB.

NHDOT STANDARD PLANS	REV. DATE	PLATE
TYPE "B" GRATE & FRAME	04-16-2010	2
	08-14-2015	STANDARD DR-1

CATCH BASIN GRATE
NOT TO SCALE

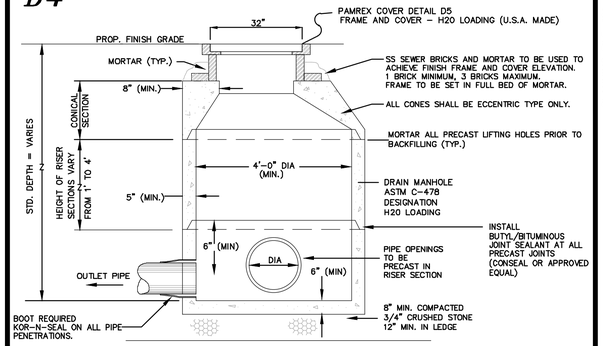
D3



DRAIN MANHOLE FRAME AND GRATE WILL BE NEW HAMPSHIRE STANDARD, OR APPROVED EQUAL, 32 INCH OPENING, CAST IRON, H20 LOADING.

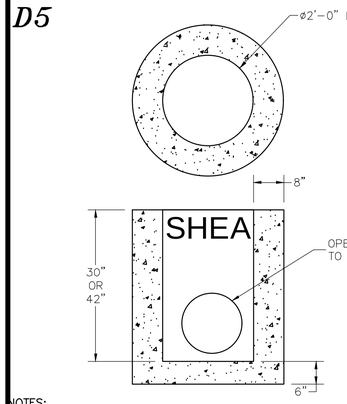
DRAIN MANHOLE COVER DETAIL
NOT TO SCALE

D4



PRECAST DRAIN MANHOLE DETAIL
NOT TO SCALE

D5

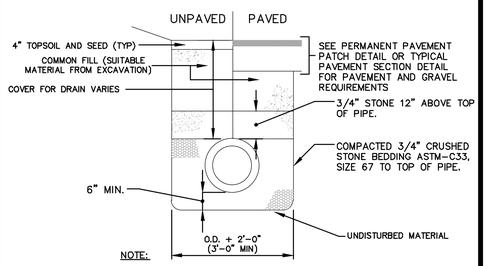


NOTES:

1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
2. DESIGNED FOR AASHTO HS-20 LOADING, 1 TO 5 FEET COVER.

GUTTER INLET DROP INLET TYPE B
NOT TO SCALE

D6



NOTE:

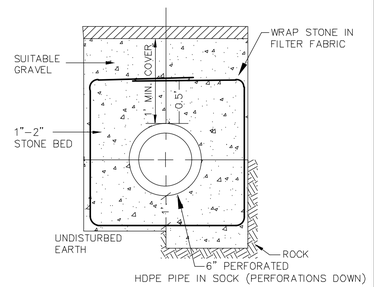
PLASTIC DRAIN PIPE (HDPE) SHALL BE ADS N-12 (CORRUGATED EXTERIOR/SMOOTH INTERIOR) OR EQUAL MEETING AASHTO M-252 AND H-20 LOADING.

DI DRAIN PIPE SHALL BE CL. 50.

RC DRAIN PIPE SHALL BE CLASS III UNLESS OTHERWISE NOTED.

TYPICAL DRAIN PIPE TRENCH
NOT TO SCALE

D7

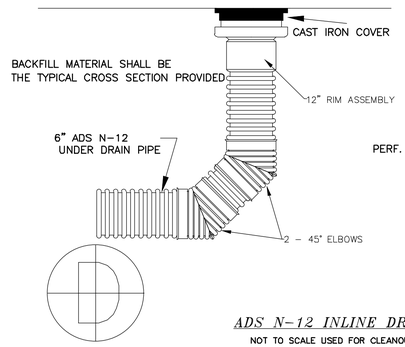


NOTE:

1. PAVEMENT REPAIR IN EXISTING ROADWAYS SHALL CONFORM TO STREET OPENING REGULATIONS.

UNDERDRAIN TRENCH DETAIL
NOT TO SCALE

D8A



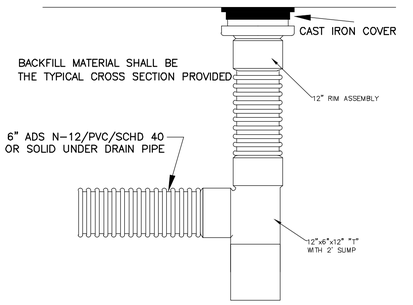
12" CAST IRON COVER
NOT TO SCALE

CASTINGS ARE RATED FOR H20 WHEEL LOAD TRAFFIC

PAINT: CASTINGS ARE FURNISHED WITH A BLACK PAINT

ADS N-12 INLINE DRAIN
NOT TO SCALE USED FOR CLEANOUTS

D8B

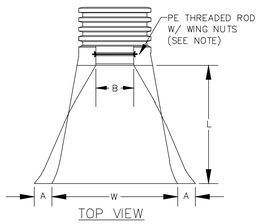


ADS N-12, PVC, SCHD. 40 INLINE DRAIN
NOT TO SCALE USED FOR GRAVEL WETLAND CLEANOUTS

D9

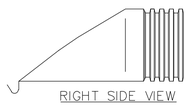
PART No.	PIPE SIZE	A	B(MAX)	H	L	W
1510-NP	15" 375 mm	6.5" 165 mm	10" 254 mm	6.5" 165 mm	25" 635 mm	29" 735 mm
1810-NP	18" 450 mm	7.5" 190 mm	15" 380 mm	6.5" 165 mm	32" 812 mm	35" 890 mm
2410-NP	24" 600 mm	7.5" 190 mm	18" 450 mm	6.5" 165 mm	36" 900 mm	45" 1140 mm
3010-NP	30" 750 mm	10.5" 266 mm	N/A	7.0" 178 mm	53" 1345 mm	68" 1725 mm
3610-NP	36" 900 mm	10.5" 266 mm	N/A	7.0" 178 mm	53" 1345 mm	68" 1725 mm

NOTE: PE THREADED ROD W/ WING NUTS PROVIDED FOR END SECTIONS 15"-24". 30" & 36" END SECTIONS TO BE WELDED PER MANUFACTURER'S RECOMMENDATIONS.

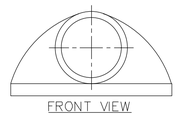


TOP VIEW

ADS N-12 FLARED END SECTIONS
NOT TO SCALE (ALL DIMENSIONS ARE NOMINAL)



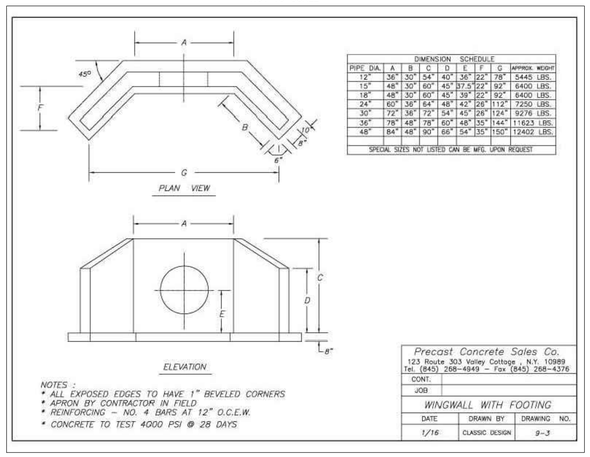
RIGHT SIDE VIEW



FRONT VIEW

D10

HEADWALL (CONCRETE)
NOT TO SCALE



DIMENSION SCHEDULE									
PIPE DIA.	A	B	C	D	E	F	G	APPROX. WEIGHT
12"	36"	30"	54°	40"	36"	22"	78"	5445 LBS.
15"	48"	30"	60°	45°	37.5"	22"	92"	6400 LBS.
18"	48"	30"	60°	45°	39"	22"	92"	6400 LBS.
24"	60"	36"	64°	48°	42"	28"	112"	7250 LBS.
30"	72"	36"	72°	54°	45"	28"	124"	9276 LBS.
36"	78"	48"	78°	60°	48"	35"	144"	11623 LBS.
48"	84"	48"	90°	66"	54"	35"	150"	12402 LBS.

SPECIAL SIZES NOT LISTED CAN BE MFG. UPON REQUEST

NOTES :

- ALL EXPOSED EDGES TO HAVE 1" BEVELED CORNERS
- APRON BY CONTRACTOR IN FIELD
- REINFORCING - NO. 4 BARS AT 12" O.C.E.W.
- CONCRETE TO TEST 4000 PSI @ 28 DAYS

Precast Concrete Sales Co.
123 Route 303 Valley Cottage , N.Y. 10989
Tel. (845) 268-4949 - Fax (845) 268-4376

CONT.		
JOB		
WINGWALL WITH FOOTING		
DATE	DRAWN BY	DRAWING NO.
1/16	CLASSIC DESIGN	9-3

REFERENCE IS MADE TO A LONG TERM MAINTENANCE MANUAL PREPARED BY BERRY SURVEYING & ENGINEERING, WHICH IS ON FILE AT THE CITY OF ROCHESTER PLANNING DEPARTMENT, AND CAN BE FOUND AT THE OFFICE OF BERRY SURVEYING & ENGINEERING. (603) 332-2863

D-101

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
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#3	8-16-21	REVISED PER TRC COMMENT
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#1	5-24-21	REVISED PER TRC COMMENT

DRAINAGE DETAILS
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

AS NOTED
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE - KENNETH A. BERRY No. 14AX LICENSED PROFESSIONAL ENGINEER

D11

CONE GRATE
NOT TO SCALE

NOTE:
MUST BE HAALA INDUSTRIES INC.
OR EQUAL.

Cone Grates Top Mount

CG12TM
Part No. CG12TM

Save Trees

Top Mount Cone Grates are designed to mount on the top of round manhole inlet or outlet structures to keep debris from entering the storm water system. Top mount cone grates are easy to install and allow for at grade manhole installations but can be used in a variety of applications. Grates 96" and larger are made as a two piece, bolt together design.

- Plate and bar hybrid design is both clean and cost effective
- Made from 1/2" plate with 3/4" or 1" round bars depending on grate size
- Anti vortex plate can be added upon request
- Hinged and lockable access doors can be added upon request
- Galvanized steel construction. Can be made from aluminum or stainless steel.

D12

ANGLE GRATE
NOT TO SCALE

NOTE:
MUST BE HAALA INDUSTRIES INC.
OR EQUAL

Angle Grates For Manholes

AG0808-58
Part No. AG0808-58

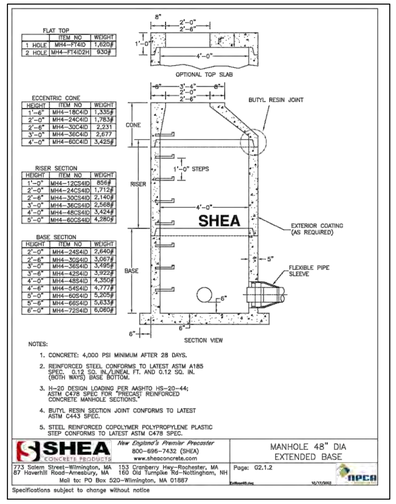
Save Trees

Angle Grates are designed to cover inlet orifices and prevent small to medium debris from passing through. The top angled design helps to minimize the amount of debris that settles on top after the water receeds. All grates are made from plate for a clean and smooth contact surface.

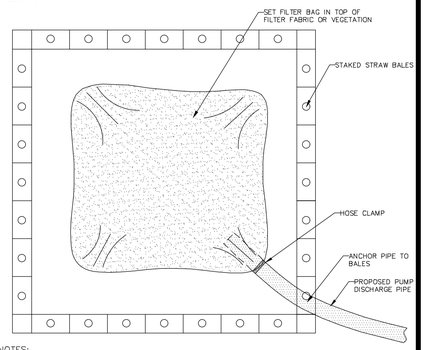
- Plate design for a clean appearance
- Standard 2" openings (other sizes can be made)
- Angled top/front plate to maximize debris deflection
- Mounting flanges on 3 sides allows grate to be mounted at floor level inverts
- Galvanized steel construction. Can be made from aluminum or stainless steel.

D13

48" MANHOLE ROUND EXTENDED BASE
NOT TO SCALE



D14



NOTES:

1.) ENSURE DISCHARGE POINT IS STABILIZED WITH VEGETATION OR PROPER EROSION AND SEDIMENT CONTROL PRACTICES.

2.) USE DIFFUSER NOZZLE OR LOW DISCHARGE RATE TO PREVENT SCOURING.

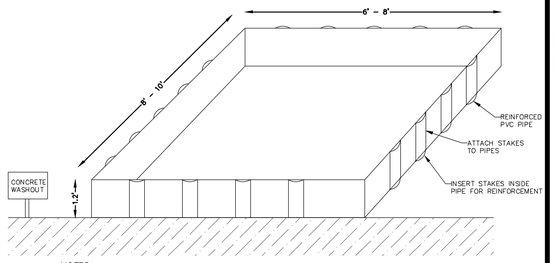
3.) TO BE PLACED AT AN UPLAND LOCATION THAT WILL ALLOW WATER TO DRAIN INTO THE GROUND.

4.) SIZE OF DE-WATERING AREA TO BE 10' X 10', ADJUST SIZE DEPENDING ON VOLUME AND USE.

5.) ADDITIONAL BALES MAY BE USED TO INCREASE RETENTION AND FILTERING.

DE-WATERING BASIN
NOT TO SCALE

D15



NOTES:

1.) CONCRETE WASHOUT SHALL BE INSTALLED PRIOR TO ANY CONCRETE POURS.

2.) SIGNS SHALL BE INSTILLED TO CLEARLY INDICATE WHERE THE LOCATION OF THE WASHOUT AREA IS.

3.) CONTRACTOR IS IRRESPONSIBLE TO MAINTAIN AND REPLACE WASHOUT AREA AS NEEDED.

4.) RESIDUE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF PROPERLY.

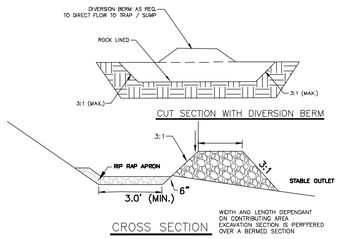
5.) DO NOT WASH CONCRETE TRUCKS OUT INTO DRAINAGE AREAS, SWALES, STREETS OR UNDISTURBED AREAS.

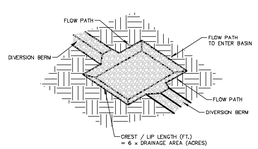
6.) WASHOUT AREA SHALL BE PLACED AWAY FROM DRAINAGE FEATURES AND OUTSIDE AND WETLAND BUFFERS.

CONCRETE WASHOUT
NOT TO SCALE

D16

1. TRAP TO BE INSTALLED AS CLOSE TO THE DISTURBED AREA OR SOURCE OF SEDIMENT AS POSSIBLE.
2. THE MAXIMUM CONTRIBUTING DRAINAGE AREA TO THE TRAP SHALL BE LESS THAN 5 ACRES.
3. THE MINIMUM VOLUME OF THE TRAP SHALL BE 3,600 CUBIC FEET OF STORAGE FOR EACH ACRE OF DRAINAGE AREA.
4. THE SIDE SLOPES OF THE TRAP SHALL BE 3:1 OR FLATTER AND SHALL BE STABILIZED IMMEDIATELY AFTER THEIR CONSTRUCTION.
5. THE OUTLET OF THE TRAP SHALL BE A MINIMUM OF ONE FOOT BELOW THE CREST OF THE TRAP AND SHALL DISCHARGE TO A STABILIZED AREA.
6. THE TRAP SHALL BE CLEANED WHEN 50 PERCENT OF THE ORIGINAL VOLUME IS FILLED.
7. THE MATERIALS REMOVED FROM THE TRAP SHALL BE PROPERLY DISPOSED OF AND STABILIZED.

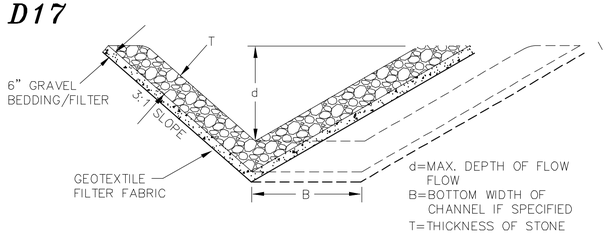




SIEVE DESIGNATION	SIZE OF STONE (INCHES)
100%	12
84-100%	6
68-83%	3
42-55%	1
8-12%	NO. 4

STONE LINED SEDIMENT TRAP
NOT TO SCALE

D17



TYPICAL SECTION FOR A RIPRAP LINED CHANNEL
NOT TO SCALE

PLANNING FILE #21-04

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TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

AS NOTED
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14747
LICENSED PROFESSIONAL ENGINEER

D-102

U1

NOTES ON MANHOLE AND SEWER CONSTRUCTION:

1) IT IS THE INTENTION THAT THE MANHOLE, INCLUDING ALL COMPONENT PARTS, HAVE ADEQUATE SPACE, STRENGTH AND LEAKPROOF QUALITIES CONSIDERED NECESSARY FOR THE INTENDED SERVICE. SPACE REQUIREMENTS AND CONFIGURATIONS, SHALL BE AS SHOWN ON THE DRAWING. MANHOLES SHALL BE AN ASSEMBLY OF PRECAST SECTIONS, WITH STEEL REINFORCEMENT AND ADEQUATE JOINTING. THE COMPLETE STRUCTURE SHALL BE OF SUCH MATERIAL AND QUALITY AS TO WITHSTAND HS-20-44 LOADING, INCLUDING THE COVER. ALL SMH CONSTRUCTION AND MATERIALS WILL BE IAW ENV.-WQ 704.13 ADOPTED OCTOBER 15, 2014

2) BARRELS AND CONE SECTIONS SHALL BE PRECAST REINFORCED CONCRETE. (IAW ENV.-WQ 704.12 (d))

3) SEWER MANHOLE DIAMETER SHALL BE AS INDICATED ON THE PLANS.

4) PRECAST CONCRETE BARREL SECTIONS, CONES AND BASES SHALL CONFORM TO ASTM C478.

5) GRAVITY SEWER PIPE TESTING WILL BE IN ACCORDANCE WITH ENV.-WQ 704.06 AND MAN HOLE TESTING IAW ENV.-WQ 704.17 DATED OCTOBER 15, 2014.

6) INVERTS AND SHELVES: MANHOLES SHALL HAVE A BRICK PAVED SHELF AND INVERT, CONSTRUCTED TO CONFORM TO THE SIZE OF THE PIPE AND FLOW. INVERT BRICKS SHALL BE LAID ON EDGE AND THE BASE SECTION SHALL BE FULL. AT CHANGES IN DIRECTIONS, THE INVERTS SHALL BE LAID OUT IN CURVES OF THE LONGEST RADIUS POSSIBLE TANGENT TO THE CENTER LINE OF THE SEWER PIPES. CARE SHALL BE TAKEN TO ENSURE THAT THE BRICK INVERT IS A SMOOTH CONTINUATION OF THE SEWER INVERT. SHELVES SHALL BE CONSTRUCTED TO THE ELEVATION OF THE HIGHEST PIPE CROWN AND SLOPE TO DRAIN TOWARD THE FLOWING THROUGH CHANNEL. UNDERLAYMENT OF INVERT AND SHELF SHALL CONSIST OF BRICK MASONRY. (IAW ENV.-WQ 704.13 (a) (9)), MORTAR SHALL CONFORM WITH REQUIREMENTS OF IAW ENV.-WQ 704.13 (c).

7) FRAMES AND COVERS: MANHOLES FRAMES AND COVERS SHALL BE OF HEAVY DUTY DESIGN AND PROVIDE A 30-INCH CLEAR OPENING. 3-INCH (MINIMUM HEIGHT) LETTERS WITH THE WORD "SEWER" SHALL BE PLAINLY CAST INTO THE CENTER OF EACH MANHOLE COVER. (IAW ENV.-WQ 704.13 (a) (4-6)) SEWER MAN HOLE COVERS ARE TO PAMREX.

8) SHALLOW MANHOLE: IN LIEU OF A CONE SECTION, WHEN MANHOLE DEPTH IS LESS THAN 6 FEET, A REINFORCED CONCRETE SLAB COVER MAY BE USED HAVING AN ECCENTRIC ENTRANCE OPENING AND CAPABLE OF SUPPORTING H-20 LOADS.

9) HORIZONTAL JOINTS BETWEEN SECTIONS OF PRECAST CONCRETE BARRELS SHALL BE OF A TYPE APPROVED BY THE DOVER DPW, WHICH TYPE SHALL, IN GENERAL, DEPEND FOR WATERTIGHTNESS UPON A DOUBLE ROW OF AN OVERLAPPING TYPE ELASTOMERIC OR MASTIC-LIKE GASKET. APPROVED ELASTOMERIC SEALANTS ARE: RAM-NEK, KENT SEAL NO. 2, EZ, OR EQUAL.

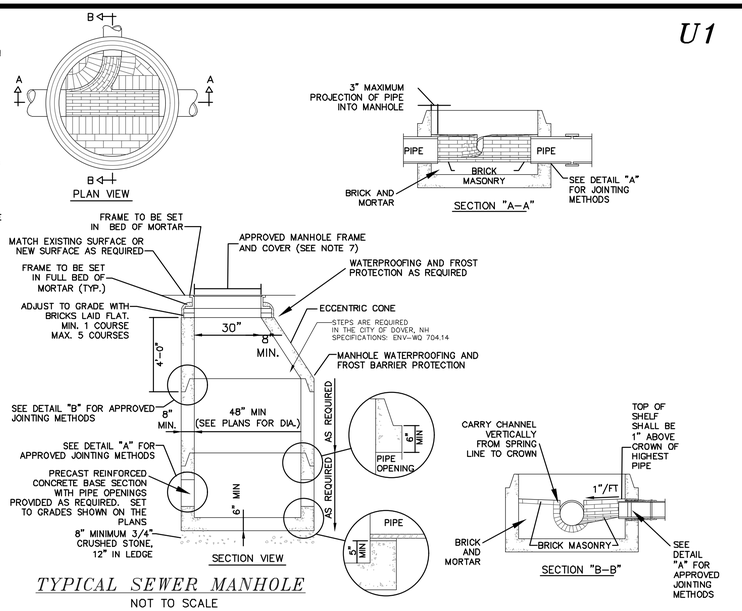
10) IN CROSS COUNTRY AREAS OUTSIDE OF THE PAVED ROADWAY SURFACE, THE MANHOLE FRAME ELEVATION SHALL BE A MINIMUM OF 6" ABOVE FINISHED GRADE. GRADE TO PROVIDE POSITIVE DRAINAGE AWAY FROM THE MANHOLE. SEE TYPICAL TRENCH DETAIL ON SHEET D-102.

11.) ALL FRAMES AND GRATES ARE TO BE U.S.A. MADE. MANHOLE STEPS ARE REQUIRED IN THIS MUNICIPALITY AND MUST CONFORM TO THE REQUIREMENTS OF ENV-WQ 704.14.

12.) THE CONTRACTOR TO WORK WITH CITY OF DOVER REVIEW ENGINEER AND SEWER DEPARTMENT ON THE MEANS AND METHODS USED TO INSTALL ALL SEWER STRUCTURES.

13.) ANY WORK INVOLVING THE CUTTING INTO THE EXISTING A.C. PIPE SHALL MEET THE REQUIREMENTS OF ENV-A 1800.

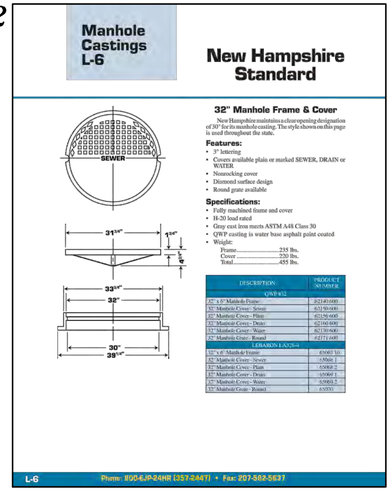
14.) THE "CITY OF DOVER, NEW HAMPSHIRE, DEPARTMENT OF COMMUNITY SERVICES, CONSTRUCTION GUIDELINES, PERMITS, RULES, AND REGULATIONS" (DATED MARCH 13, 2018) ARE A PART OF THE CONSTRUCTION DETAILS AND TO BE FOLLOWED.



TYPICAL SEWER MANHOLE

NOT TO SCALE

U2

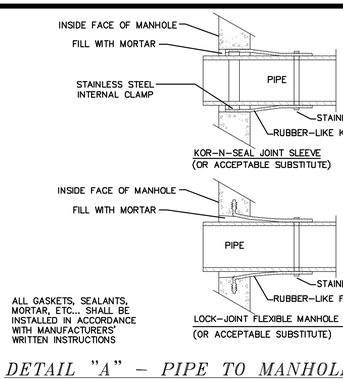


SEWER MANHOLE FRAME AND GRATE WILL BE NEW HAMPSHIRE STANDARD, OR APPROVED EQUAL, 32 INCH OPENING, CAST IRON, H20 LOADING.

SEWER MANHOLE COVER DETAIL

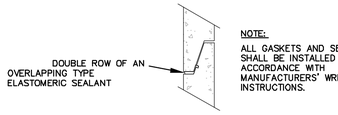
NOT TO SCALE

U3



DETAIL "A" - PIPE TO MANHOLE JOINTS

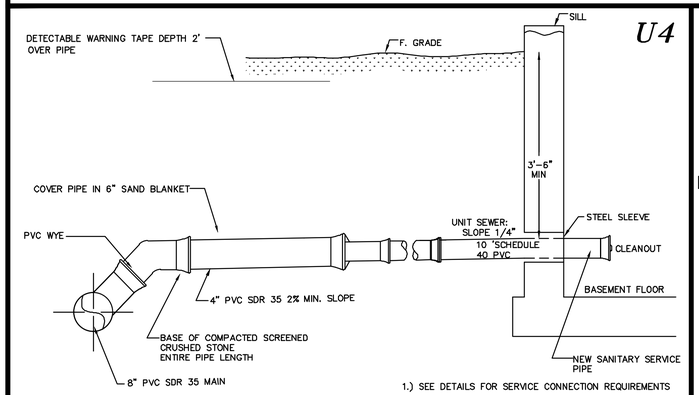
NOT TO SCALE



DETAIL "B" HORIZONTAL JOINTS

NOT TO SCALE

U4



DETAIL OF UNIT SEWER SERVICE

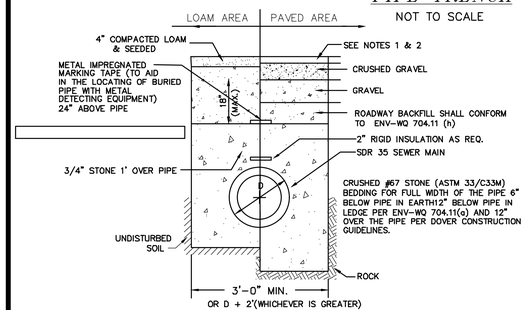
NOT TO SCALE

1.) SEE DETAILS FOR SERVICE CONNECTION REQUIREMENTS

2.) SERVICE CONNECTION SHALL BE INSTALLED BELOW WATER MAIN WHERE POSSIBLE.

3.) CLEANOUTS SHALL BE INSTALLED INSIDE EACH BUILDING EXIT POINT

U5

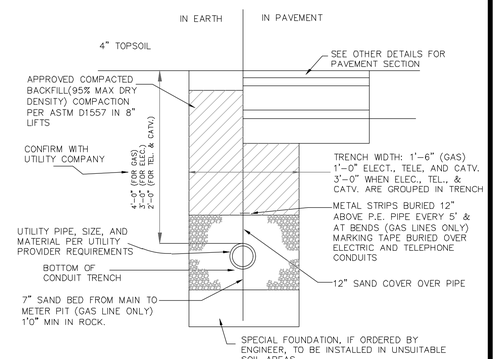


TYPICAL SEWER PIPE TRENCH

NOT TO SCALE

NOTE:
1. PAVEMENT REPAIR IN EXISTING ROADWAYS SHALL CONFORM TO STREET OPENING REGULATIONS.
2. NEW ROADWAY CONSTRUCTION SHALL CONFORM TO SUBDIVISION SPEC'S.
3. ANTI-SEEP COLLARS OR CLAY CHECK DAMS ON STEEP RUNS IN WET CONDITIONS.
4. ALL SEWER INSTALLATIONS SHALL CONFORM TO THE REQUIREMENTS OF NHDES & MUNICIPAL DPW SEWER DIVISION STANDARDS. ALL PVC SEWER PIPE IS TO CONFORM WITH ENV-WQ 704.05 (c)-(e) AND CONFORM WITH ASTM D3034. PVC JOINT SEALS SHALL CONFORM WITH ASTM D3121. SDR-21 PVC FORCE MAIN PIPE MATERIAL IS REQUIRED IN LOCATIONS AS SHOWN. SDR-21 PVC FORCEMAIN PIPE WILL CONFORM TO ENV-WQ 704.08.

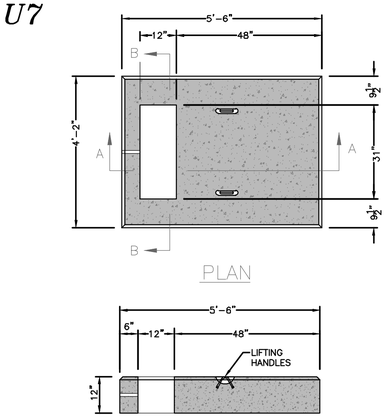
U6



ELECTRICAL, TELEPHONE, AND GAS TRENCH

NOT TO SCALE

U7



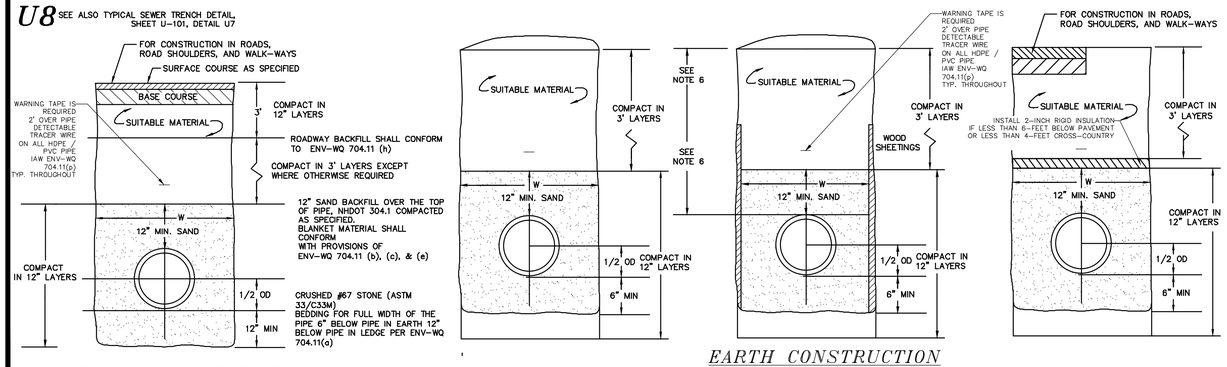
NOTES:
1. CONCRETE MINIMUM STRENGTH 4,000 PSI AFTER 28 DAYS
2. REINFORCEMENT STEEL CONFORMS TO ASTM A615 GRADE 60 #6 REBAR.
3. MEETS OR EXCEEDS EVERSOURCE SPECIFICATIONS.
4. MUST BE A SHEA CONCRETE PRODUCT OR EQUAL.

TRANSFORMER AND PAD DETAIL

NOT TO SCALE

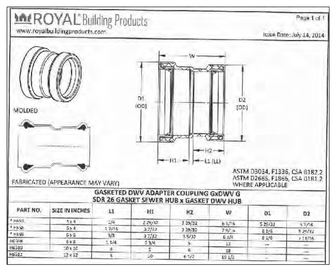
U8

SEE ALSO TYPICAL SEWER TRENCH DETAIL, SHEET U-101, DETAIL U7



NOT TO SCALE

U9



COUPLING DETAIL

NOT TO SCALE

U-101

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
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UTILITY DETAILS
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP 4X MAP H, LOT 37A

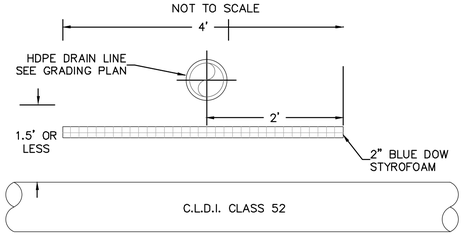
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

AS NOTED
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY No. 14743
LICENSED PROFESSIONAL ENGINEER

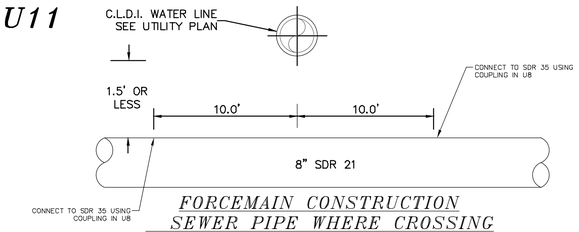
U10 INSULATE WATER PIPE WHERE CROSSING UNDER DRAIN LINE

NOT TO SCALE



NOTE: THIS ONLY APPLIES IF 1.5' OF VERTICAL SEPARATION CAN NOT BE OBTAINED THIS ALSO APPLIES FOR THE REVERSE SITUATION

U11



FORCEMAIN CONSTRUCTION
SEWER PIPE WHERE CROSSING
UNDER WATER LINE

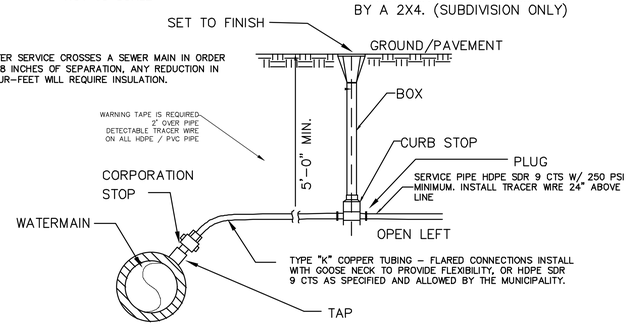
NOT TO SCALE

U12 TYPICAL WATER SERVICE CONNECTION

NOT TO SCALE

THE END OF THE INSTALLED WATER SERVICE TO BE MARKED BY A 2X4. (SUBDIVISION ONLY)

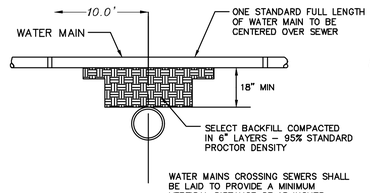
WHERE A WATER SERVICE CROSSES A SEWER MAIN IN ORDER TO PROVIDE 18 INCHES OF SEPARATION, ANY REDUCTION IN DEPTH TO FOUR-FEET WILL REQUIRE INSULATION.



U13

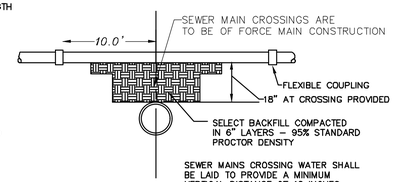
SEPERATION NOTES:

1. WATER MAIN SHALL BE IN ACCORDANCE WITH THE "RECOMMENDED STANDARDS FOR WATER WORKS" SO-CALLED TEN STATE STANDARDS AND NEW HAMPSHIRE WATER SUPPLY AND POLLUTION CONTROL DESIGN STANDARDS, ENV-WQ 700 ADOPTED OCTOBER 14, 2014.
2. WATER MAINS SHALL BE LAID AT LEAST 10 FEET HORIZONTALLY FROM ANY EXISTING OR PROPOSED SEWERS. THE DISTANCE SHALL BE MEASURED EDGE TO EDGE. IF THIS DISTANCE CANNOT BE OBTAINED, THEN THE PIPES SHALL BE INSTALLED IN A SEPARATE TRENCH AT AN ELEVATION SO THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER.
3. VERTICAL SEPARATION REQUIREMENTS APPLY TO WATER AND SEWER MAINS AND SERVICE LINES. WHERE SEWER CROSSES WATER MAIN AND WATER SERVICE CROSSES SEWER MAIN, 18 INCH VERTICAL CLEARANCE SHALL BE PROVIDED WITH WATER OVER SEWER.



WATER MAINS CROSSING SEWERS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF 18 INCHES BETWEEN PIPES. WATER MAIN JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER JOINTS

WATER MAIN ABOVE SEWER



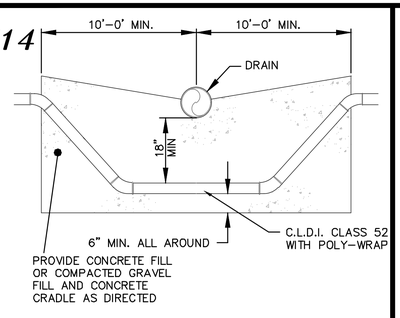
SEWER MAINS CROSSING WATER SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF 18 INCHES BETWEEN PIPES. SEWER MAIN JOINTS WILL BE EQUIDISTANT, A MINIMUM OF SIX FEET, AND AS FAR AS POSSIBLE FROM THE WATER JOINTS.

WATER MAIN BELOW SEWER

TYPICAL WATER/SEWER SEPERATION DETAILS

NOT TO SCALE

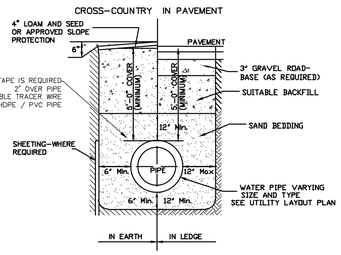
U14



WATER MAIN INSTALLATION - BELOW DRAIN & SEWER

NOT TO SCALE

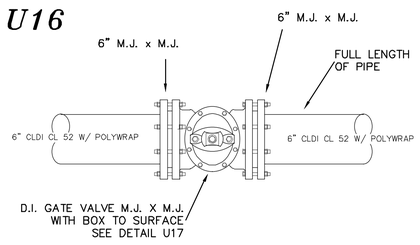
U15



TYPICAL TRENCH DETAIL FOR WATER SYSTEM

NOT TO SCALE

U16



SHUTOFF VALVE DETAIL

NOT TO SCALE

1.) ALL VALVES ARE TO OPEN RIGHT
2.) SEE CITY OF DOVER STANDARDS OF INFRASTRUCTURE DESIGN FOR POTABLE WATER DETAILS

U17 TYPICAL THRUST BLOCKS

NOT TO SCALE

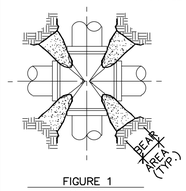


FIGURE 1
CROSS
(ONLY REQ'D IF ANY LEG IS LESS THAN 60 FT. LONG)

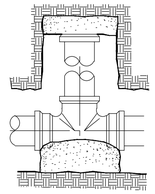


FIGURE 2
TEE, PLUG OR CAP

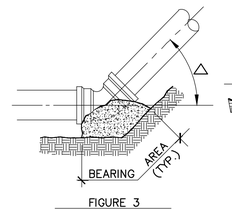


FIGURE 3
HORIZONTAL OR UPWARD VERTICAL BEND

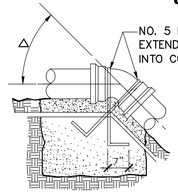


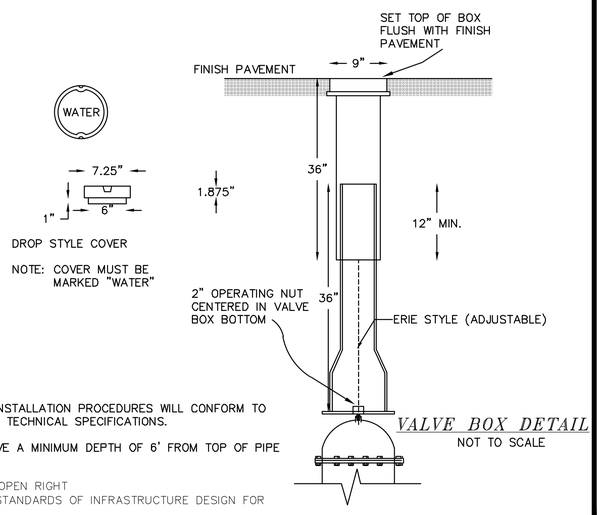
FIGURE 4
DOWNWARD VERTICAL BEND

PIPE I.D.	BEARING AREA, SQUARE FEET						VOLUME OF CONC. CU.YD		
	FIGURE 1	FIGURE 2	FIGURE 3, △				FIGURE 4, △		
			90°	45°	22-1/2°	11-1/4°	45°	22-1/2°	11-1/4°
4"	2	2	2	1	1	1	1.0	.5	.5
6"	2	3	3	2	1	1	1.5	1.0	.5
8"	2	5	6	3	2	1	2.0	1.0	.5
10"	3	7	10	5	3	1	4.0	2.0	1.0
12"	3	10	14	8	4	2			
14"	4	14	20	10	5	3			
16"	4	20	24	12	7	4			
18"	5	24	30	16	10	5			
20"	5	28	40	20	12	6			

GENERAL NOTES:

1. ALL FITTINGS & EXPOSED REBAR TO BE RAPPED W/ TWO LAYERS OF 6 MIL. POLYETHYLENE WHERE COVERED WITH CONCRETE.
2. ALL CONCRETE SHALL BE CLASS C 3000 P.S.I. MINIMUM 28 DAYS COMPRESSIVE STRENGTH.
3. PLACE CONCRETE AGAINST UNDISTURBED EARTH.
4. TABLE DENOTES MINIMUM BEARING AREA OR VOLUME OF THRUST BLOCK. SPECIAL DESIGN FOR EACH INSTALLATION IS REQUIRED IF ALLOWABLE SOIL BEARING CAPACITY IS LESS THAN 3000 P.S.F.
5. VERTICAL SURFACES NOT BEARING AGAINST UNDISTURBED EARTH SHALL BE FORMED.
6. KEEP CONCRETE AWAY FROM FLANGE BOLTS AND FITTINGS.
7. MECHANICAL JOINTS AT ALL FITTINGS IE: BENDS, TEES, CROSSES, AND VALVES SHALL BE THRUST RESTRAINT. (MEGA-LUG OR APPROVED EQUAL.

U18



NOTES:

1.) ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO LOCAL WATER WORKS TECHNICAL SPECIFICATIONS.

2.) ALL PIPE SHOULD HAVE A MINIMUM DEPTH OF 6' FROM TOP OF PIPE TO FINISH GRADE.

3.) ALL VALVES ARE TO OPEN RIGHT

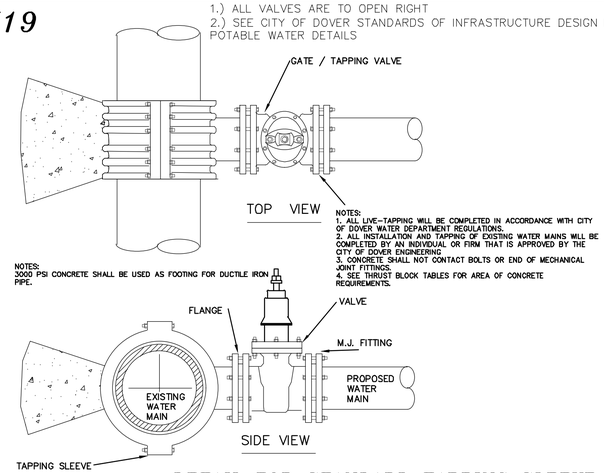
4.) SEE CITY OF DOVER STANDARDS OF INFRASTRUCTURE DESIGN FOR POTABLE WATER DETAILS

VALVE BOX DETAIL

NOT TO SCALE

U19

1.) ALL VALVES ARE TO OPEN RIGHT
2.) SEE CITY OF DOVER STANDARDS OF INFRASTRUCTURE DESIGN FOR POTABLE WATER DETAILS

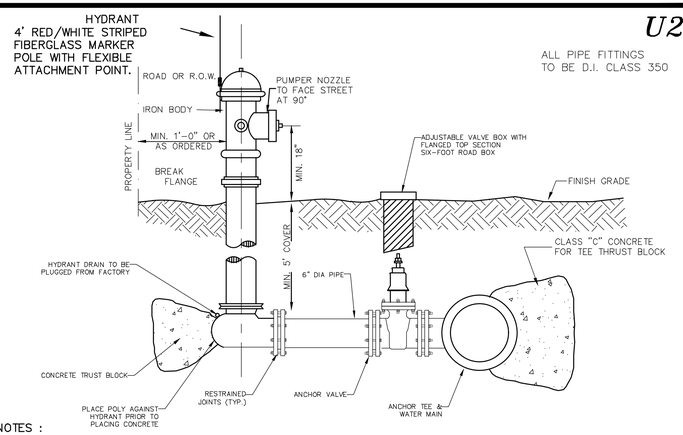


DETAIL FOR STANDARD TAPPING SLEEVE AND VALVE ASSEMBLY

NOT TO SCALE

U20

ALL PIPE FITTINGS TO BE D.I. CLASS 350



NOTES :

1.) THE FIRE HYDRANT IS TO BE PAINTED CITY OF DOVER STANDARD COLORS AND BE EQUIPPED WITH A HYDRANT LOCATOR.

2.) THE FIRE HYDRANT SHALL BE THE "EDDY" TYPE.

3.) GATE VALVES OPEN LEFT.

HYDRANT INSTALLATION DETAIL

NOT TO SCALE

U-102

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
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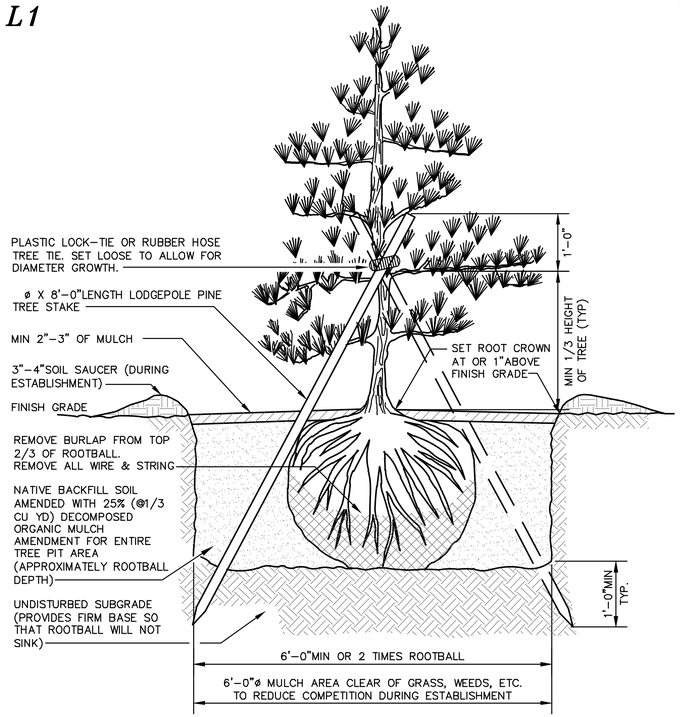
UTILITY DETAILS
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP 4X MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

AS NOTED
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

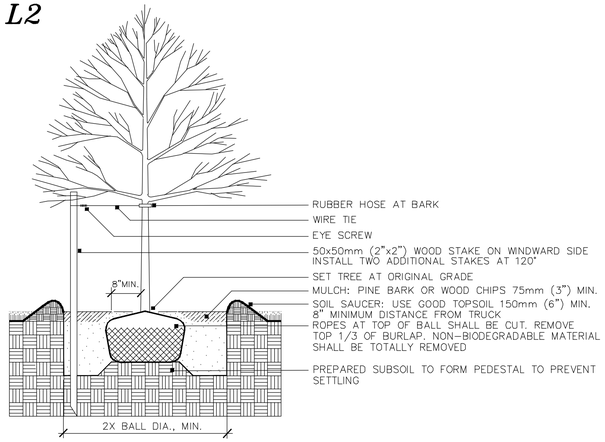
STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14747
LICENSED PROFESSIONAL ENGINEER

L1



CONIFEROUS TREE PLANTING

L2



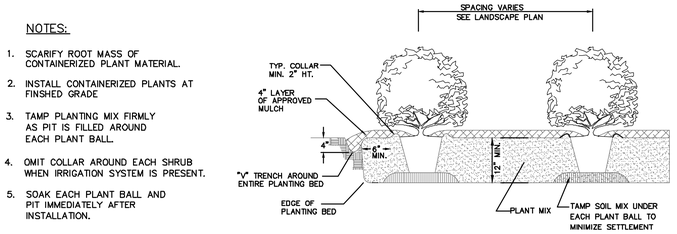
DECIDUOUS TREE PLANTING

NOTE: STAKING TO BE USED IN PARKING ISLANDS AND OTHER CONFINED AREAS AS NECESSARY TO AVOID CONFLICTS WITH PEDESTRIANS

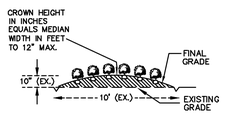
L3

NOTES:

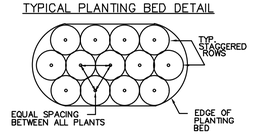
1. SCARIFY ROOT MASS OF CONTAINERIZED PLANT MATERIAL.
2. INSTALL CONTAINERIZED PLANTS AT FINSHED GRADE
3. TAMP PLANTING MIX FIRMLY AS PIT IS FILLED AROUND EACH PLANT BALL.
4. OMIT COLLAR AROUND EACH SHRUB WHEN IRRIGATION SYSTEM IS PRESENT.
5. SOAK EACH PLANT BALL AND PIT IMMEDIATELY AFTER INSTALLATION.



TYPICAL PLANTING BED DETAIL



TYPICAL BED CROWNING

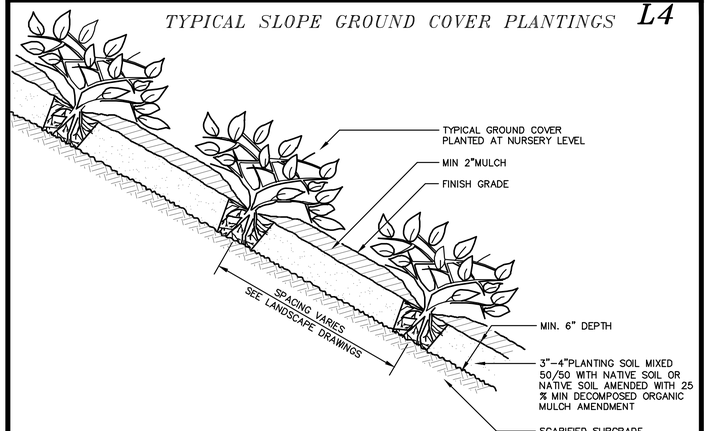


TYPICAL PLANTING BED PLAN

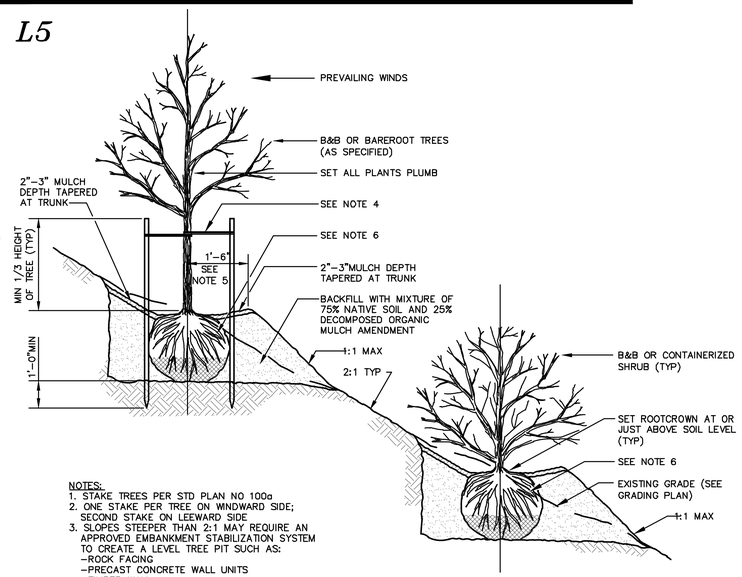
SHRUB & HEDGE PLANTING

L4

TYPICAL SLOPE GROUND COVER PLANTINGS



L5



NOTES:
1. STAKE TREES PER STD PLAN NO 100a
2. ONE STAKE PER TREE ON WINDWARD SIDE; SECOND STAKE ON LEEWARD SIDE
3. SLOPES STEEPER THAN 2:1 MAY REQUIRE AN APPROVED EMBANKMENT STABILIZATION SYSTEM TO CREATE A LEVEL TREE PIT SUCH AS:
   –ROCK FACING
   –PRECAST CONCRETE WALL UNITS
   –TIMBER WALL
   –MANUFACTURED SLOPE RETENTION UNITS
4. CHAINLOCK TREE TIE. LOOP EACH TIE AROUND TREE LOOSELY TO PROVIDE 1" SLACK FOR DIAMETER GROWTH.
5. SHAPE SOIL TO PROVIDE 3' DIAMETER OR ROOTBALL DIAMETER, WHICHEVER IS GREATER, WATERING RING.
6. REMOVE ALL WIRE AND STRING. REMOVE TOP 2/3 OF BURLAP.

TREE PLANTING ON SLOPES

L6

NOTES:

1.) CALL DIG SAFE PRIOR TO BEGINNING WORK. (1–888–344–7233). THE LANDSCAPE CONTRACTOR IS ADVISED OF THE PRESENCE OF UNDERGROUND UTILITIES AND SHALL VERIFY THE EXISTENCE AND LOCATION OF THE SAME BEFORE COMMENCING AND DIGGING OPERATIONS. THE LANDSCAPE CONTRACTOR SHALL REPLACE OR REPAIR UTILITIES, PAVING, WALKS, CURBING, ETC DAMAGED IN PERFORMANCE OF THIS JOB AT NO ADDITIONAL COST TO THE OWNER OR GENERAL CONTRACTOR.

2.) CONTRACTOR SHALL THOROUGHLY FAMILIARIZE THEMSELVES WITH ALL SITE CONDITIONS PRIOR TO CONSTRUCTION BIDDING.

3.) PROVIDED SMOOTH TRANSITION WHERE NEW WORK MEETS EXISTING CONDITIONS.

4.) ALL PLANT MATERIAL INSTALLED SHALL MEET THE SPECIFICATIONS OF "AMERICAN STANDARD FOR NURSERY STOCK" BY THE AMERICAN ASSOCIATION OF NURSERYMEN.

5.) ALL PLANT MATERIALS SHALL BE FREE FROM INSECTS AND DISEASE.

6.) ALL PLANTINGS SHALL BE DONE IN ACCORDANCE WITH ACCEPTABLE HORTICULTURAL PRACTICES. THIS IS TO INCLUDE PROPER PLANTING MIX, PLANT BED AND TREE PIT PREPARATION, PRUNING STAKING OR GUYING, WRAPPING, SPRAYING, FERTILIZATION, PLANTING AND ADEQUATE MAINTENANCE UNTIL ACCEPTANCE FROM OWNER.

7.) ALL GRASS, OTHER VEGETATION AND DEBRIS SHALL BE REMOVED FROM ALL PLANTING AREAS PRIOR TO PLANTING.

8.) THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF EXISTING AND NEWLY PLANTED TREES AND SHRUBS DURING THE CONSTRUCTION PROCESS. WHERE REQUIRED, THE CONTRACTOR SHALL INSTALL TEMPORARY FENCING (SNOW OR EQUAL) AROUND EXISTING TREES AND SHRUBS THAT COULD BE IMPACTED BY THE CONSTRUCTION PROCESS. STORAGE OF CONSTRUCTION EQUIPMENT, CONSTRUCTION MATERIALS, SNOW STORAGE AND OR VEHICLE PARKING SHALL NOT BE PERMITTED WITHIN THE DRIP LINE OF TREES OR TWENTY FEET WHICH EVER IS GREATER.

9.) NEW PLANTINGS SHALL BE INSTALLED PER PROJECT DRAWINGS AND SPECIFICATION THAT INCLUDE FERTILIZATION AND MULCHING AS REQUIRED.

10.) ALL SHRUB BEDS AND TREE PITS SHALL BE MULCHED WITH 3" CLEAN SHREDDED BLACK MULCH.

11.) WHERE INDICATED ON PLAN, PLANTING SOIL MIXTURE FOR GROUND COVER AND PERENNIAL BED AREAS SHALL CONSIST OF FOUR PARTS TOPSOIL, TWO PARTS SPHAGNUM PEAT MOSS, AND ONE PART HORTICULTURAL PERLITE BY VOLUME. PEAT MOSS MAY BE SUBSTITUTED WITH WELL–ROTTED OR DEHYDRATED MANURE OR COMPOST. ROTOTILL BEDS TO A DEPTH OF 8 INCHES.

12.) MAINTENANCE OF NEW PLANTINGS AND LAWNS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND OR LANDSCAPE SUBCONTRACTOR UNTIL ACCEPTANCE BY THE OWNER. RESPONSIBILITIES SHALL INCLUDE WATERING WEEDING AND MOWING AS NECESSARY. ALL PLANT MATERIAL SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE, REPLACEMENT MATERIAL SHALL BE GUARANTEED FOR AND ADDITIONAL YEAR FROM TIME OF INSTALLATION.

13.) THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL TEMPORARY EROSION CONTROL MEASURES DURING THE CONSTRUCTION PHASE AND UNTIL ALL AREAS HAVE BEEN STABILIZED AND ACCEPTED BY THE OWNER. THE GENERAL CONTRACTOR SHALL PROVIDE WEEKLY INSPECTIONS OF EROSION MEASURE AND IMMEDIATELY AFTER STORM EVENTS AND REPAIR AS NECESSARY.

14.) THE GENERAL CONTRACTOR AND OR THE LANDSCAPE SUBCONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL THREE GUYING MATERIAL ONCE PLANT MATERIAL HAS BEEN ESTABLISHED. (MINIMUM OF ONE GROWING SEASON). ALL TEMPORARY EROSION CONTROL MEASURE SHALL BE REMOVED ONCE STABILIZATION OF DISTURBANCE HAS BEEN ACCEPTED BY OWNER.

15.) THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR A MINIMUM OF TWO MOWINGS FOR ALL TURF AREAS OR UNTIL ACCEPTANCE BY THE OWNER. A MINIMUM UNIFORM 75% CATCH OF TURF IS REQUIRED FOR ACCEPTANCE.

16.) ALL PLANTINGS SHALL BE WATERED REGULARLY DURING THEIR FIRST YEAR AND MAINTAINED PERMANENTLY IN GOOD GROWING CONDITION AS AN EFFECTIVE VISUAL SCREEN.

17.) SHRUBS OR TREES WHICH DIE SHALL BE REPLACED WITHIN ONE GROWING SEASON WITH NEW SHRUBS OR TREES TO ENSURE CONTINUED COMPLIANCE WITH APPLICABLE LANDSCAPING REQUIREMENTS.

18.) ALL REQUIRED LANDSCAPING SHALL BE INSTALLED BEFORE OCCUPANCY, OR WITHIN SIX MONTHS IF OCCUPANCY OCCURS DURING WINTER CONDITIONS.

19.) TREES ARE TO BE 3.5" CALIPER 6" OFF THE ROOT BALL.

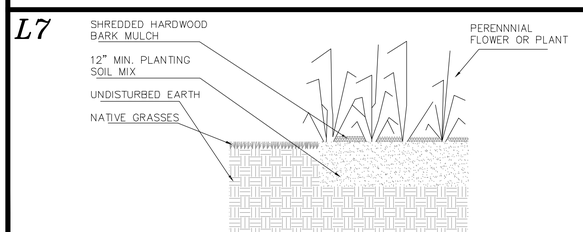
20.) ALL PLANT STOCK SHALL CONFORM TO ANSI Z260.1 – NURSERY STOCK, LATEST EDITIONS (AMERICAN ASSOCIATION OF NURSERYMEN, INC.)

21.) 4" AGED PINEBARK MULCH AND A WEED BARRIER (TY–PAR FABRIC OR APPROVED EQUAL) SHALL BE APPLIED TO ALL SHRUB AND GROUND COVER BEDS. INSTALL WEED BARRIER AS PER MANUFACTURERS RECOMMENDATIONS.

22.) PLANT–PIT BACK–FILL SHALL BE MIXED AT A RATE OF 7 PARTS OF TOPSOIL TO 2 PARTS OF DEHYDRATED COW MANURE. SLOW RELEASE FERTILIZER SHALL BE APPLIED AS PER MANUFACTURERS RECOMMENDATIONS. USE EXISTING ON–SITE TOPSOIL AS PART OF BACK FILL WHEN AVAILABLE.

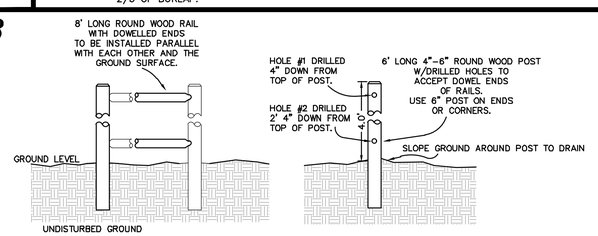
23.) ALL LANDSCAPED AREAS NOT PLANTED WITH TREES, SHRUBS OR GROUNDCOVER SHALL BE RESTORED WITH SEED OR SOD AS INDICATED ON PLANS.

L7



PERENNIAL PLANTING DETAIL

L8



TYPICAL POST & RAIL FENCE DETAIL

NOT TO SCALE

L–101

PLANNING FILE #21–04

REVISION	DATE	DESCRIPTION
#4	1–28–22	MULTIPLE PLAN SET REVISIONS
#3	8–16–21	REVISED PER TRC COMMENT
#2	7–27–21	REVISED PER TRC COMMENT
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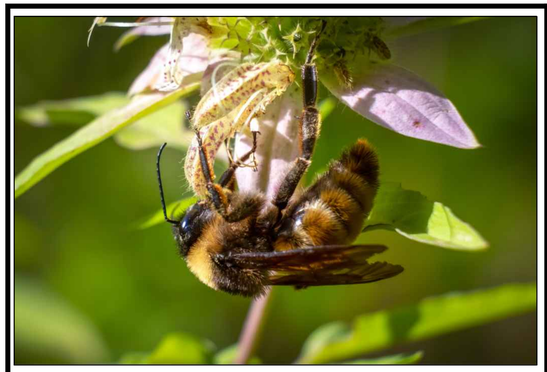
LANDSCAPING DETAILS
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332–2863

AS NOTED
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE – KENNETH A. BERRY No. 14747 LICENSED PROFESSIONAL ENGINEER



AMERICAN BUMBLE BEE

IDENTIFICATION/DESCRIPTION:

BOMBUS PENSYLVANICUS IS A LARGE BUMBLE BEE WITH THE QUEEN MEASURING 1 IN, THE WORKER FROM 0.5 IN, AND THE MALE FROM 0.75 IN IN LENGTH. THE QUEEN IS MOSTLY BLACK, INCLUDING THE LEGS, SPURS AND TEGULAE (BASE OF WING). TERGITE 1, OR THE MOST ANTERIOR BACK PORTION OF THE QUEEN IS OFTEN YELLOW ESPECIALLY IN THE MIDDLE. WORKER BEES' MIDDLE TERGITES ARE YELLOW, THE TAIL BLACK, AND FACE LONG. THEIR CHEEKS ARE SLIGHTLY LONGER THAN BROAD, AND THE CLYPEUS (NOSE) HAS LARGE PUNCTURES EXCEPT ON THE MID LINE. THE HAIR ON THE TOP OF THE HEAD IS BLACK, SHORT AND EVEN. MALES HAVE A YELLOW ABDOMEN WITH A BLACK HEAD AND BLACK STRIPING IN THE LOWER THORAX.

BLANDINGS TURTLE

IDENTIFICATION/DESCRIPTION:

A 7– TO 9–INCH TURTLE WITH YELLOW SPECKLES THAT OFTEN RUN TOGETHER TO FORM STREAKS ON THE CARAPACE. EASILY IDENTIFIED WHEN BASKING FROM ITS CHARACTERISTIC YELLOW THROAT AND CHIN.

NORTHERN BLACK RACER

IDENTIFICATION/DESCRIPTION:

A SLENDER BLACK SNAKE MEASURING 36–60 INCHES. BLACK RACERS ARE GLOSSY BLACK ON THE TOP AND BOTTOM WITH A WHITE THROAT AND CHIN. YOUNG RACERS ARE PATTERNED WITH BROWN OR REDDISH PATCHES ON A LIGHTER BASE OF GRAY.

SMOOTH GREEN SNAKE

IDENTIFICATION/DESCRIPTION:

A THIN, SLENDER BRIGHT–GREEN SNAKE MEASURING 10–20 INCHES. THE UNDERSIDE IS WHITE OR A PALE YELLOW.

LITTLE BROWN BAT

IDENTIFICATION/DESCRIPTION:

THE LITTLE BROWN BAT IS A SMALL MAMMAL WITH A BODY LENGTH OF 2 1/2 – 4" AND WEIGHING APPROXIMATELY 1/8 TO 1/2 AN OUNCE. THE WINGSPAN OF LITTLE BROWN BATS RANGE FROM 9 – 11". BATS ARE THE ONLY MAMMALS THAT ENGAGE IN TRULY ACTIVE FLIGHT. AS THEIR NAME SUGGESTS THEY ARE GLOSSY BROWN ABOVE WITH A LIGHTER GRAY COLOR BELOW. THESE BATS CAN LIVE 20 TO 30 YEARS.

NORTHERN LONG–EARED BAT

IDENTIFICATION/DESCRIPTION:

THE NORTHERN LONG–EARED BAT IS A MEDIUM–SIZED BAT WITH A BODY LENGTH OF 3 TO 3.7 INCHES BUT A WINGSPAN OF 9 TO 10 INCHES. THEIR FUR COLOR CAN BE MEDIUM TO DARK BROWN ON THE BACK AND TAWNY TO PALE–BROWN ON THE UNDERSIDE. AS ITS NAME SUGGESTS, THIS BAT IS DISTINGUISHED BY ITS LONG EARS, PARTICULARLY AS COMPARED TO OTHER BATS IN ITS GENUS, MYOTIS

EASTERN SMALL–FOOTED BAT

IDENTIFICATION/DESCRIPTION:

THE EASTERN SMALL–FOOTED BAT HAS BROWNISH FUR, OFTEN WITH A GOLDEN SHEEN, THAT CONTRASTS WITH ITS BLACKISH FACE AND EARS, AND BLACKISH–BROWN WINGS AND TAIL MEMBRANE. IT CAN BE DISTINGUISHED FROM OTHER MYOTIS SPECIES BY ITS BLACK MASK AND SMALL SIZE. THE BODY IS LITTLE MORE THAN 3½ INCHES LONG, INCLUDING A 1½–INCH TAIL. ITS SMALL FEET, WHICH PROVIDE THE COMMON NAME, ARE LESS THAN A HALF–INCH AND ITS WINGSPAN RANGES FROM 8¼ TO 9¾ INCHES. THIS SPECIES FLIES SLOWLY AND ERRATICALLY, USUALLY ABOUT ONE TO THREE YARDS ABOVE THE GROUND.

SILVER HAIRED BAT

IDENTIFICATION/DESCRIPTION:

THE SILVER–HAIRED BAT IS A MEDIUM–SIZED BAT WITH VERY DARK FUR TIPPED WITH SILVER OR WHITE. THE WINGS AND TAIL MEMBRANE ARE BLACK. EARS ARE SHORT AND ROUND WITH A SHORT, BLUNT–TIPPED TRAGUS. THE DORSAL SURFACE OF THE TAIL MEMBRANE IS PARTIALLY FURRED AND THE CALCAR LACKS A KEEL

TRI–COLORED BAT

IDENTIFICATION/DESCRIPTION:

THE TRICOLORED BAT, FORMERLY KNOWN AS THE EASTERN PIPISTRELLE (PIPISTRELLUS SUBFLAVUS), IS A SMALL BAT WEIGHING 0.2 TO 0.3 OUNCES (5 TO 8 GR) AND HAS A WINGSPAN OF 8 TO 10 INCHES. THE TERM "TRICOLORED" REFERS TO THE BAT'S YELLOWISHBROWN COAT THAT IS DARK AT THE BASE, YELLOWISH–BROWN IN THE MIDDLE, AND DARK AT THE TIPS. THE WING MEMBRANES ARE BLACKISH, BUT THE FACE AND EARS HAVE A PINKISH COLOR. AN OBVIOUS IDENTIFYING CHARACTERISTIC OF THIS SPECIES IS THE PINK COLOR OF THE SKIN ON THE RADIUS BONE. THE FEET ARE ALSO RELATIVELY LARGE COMPARED TO ITS BODY SIZE.

SPOTTED TURTLE

IDENTIFICATION/DESCRIPTION:

A SMALL 3–5 INCH TURTLE RECOGNIZED BY NUMEROUS YELLOW SPOTS COVERING A DARK CARAPACE. THE NUMBER OF SPOTS IS VARIABLE. SPOTS CAN ALSO BE FOUND ON THE HEAD AND LIMBS.

WOOD TURTLE

IDENTIFICATION/DESCRIPTION:

A 5–8 INCH TURTLE CHARACTERIZED BY ITS HIGHLY SCULPTED SHELL WHERE EACH LARGE SCUTE TAKES AN IRREGULAR PYRAMIDAL SHAPE. THE NECK AND FORELIMBS ARE ORANGE.

W–101

PLANNING FILE #21–04

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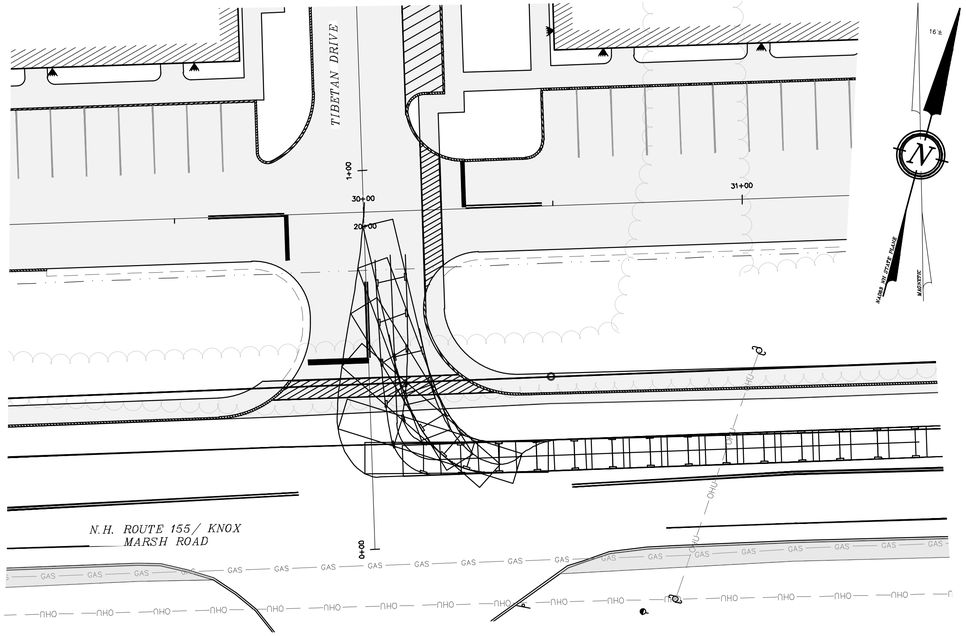
WILDLIFE IDENTIFICATION PLAN
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332–2863

AS NOTED
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE – KENNETH A. BERRY No. 7424 LICENSED PROFESSIONAL ENGINEER

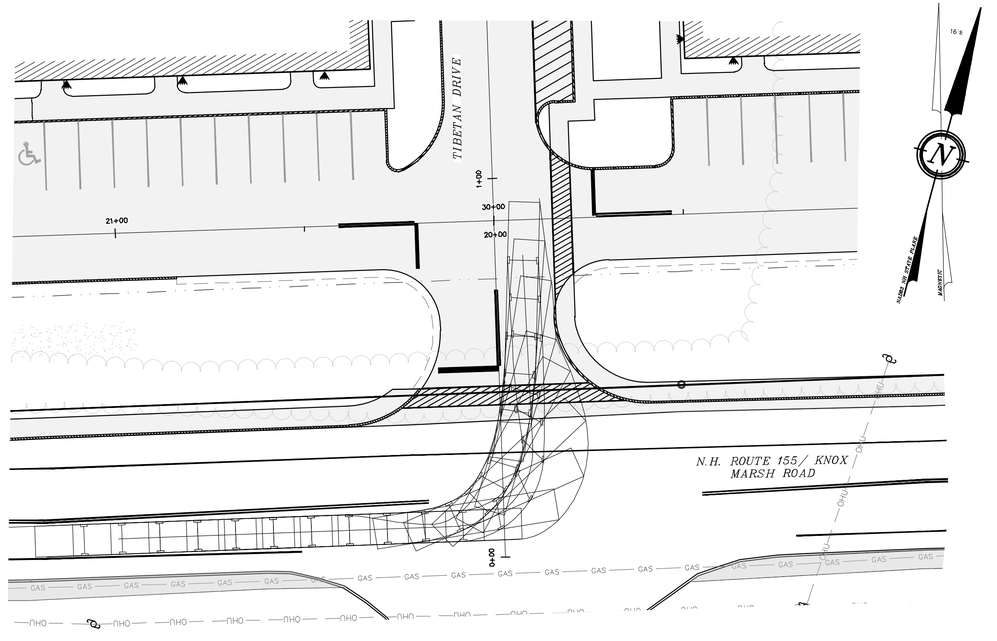


GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

TRUCK TURNING ENTRANCE RIGHT FROM EAST

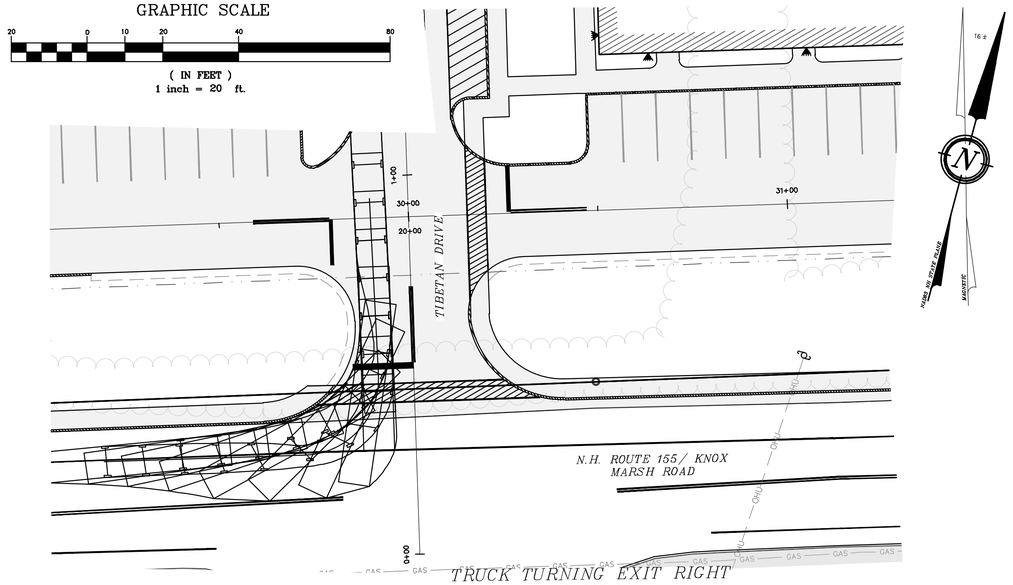


GRAPHIC SCALE

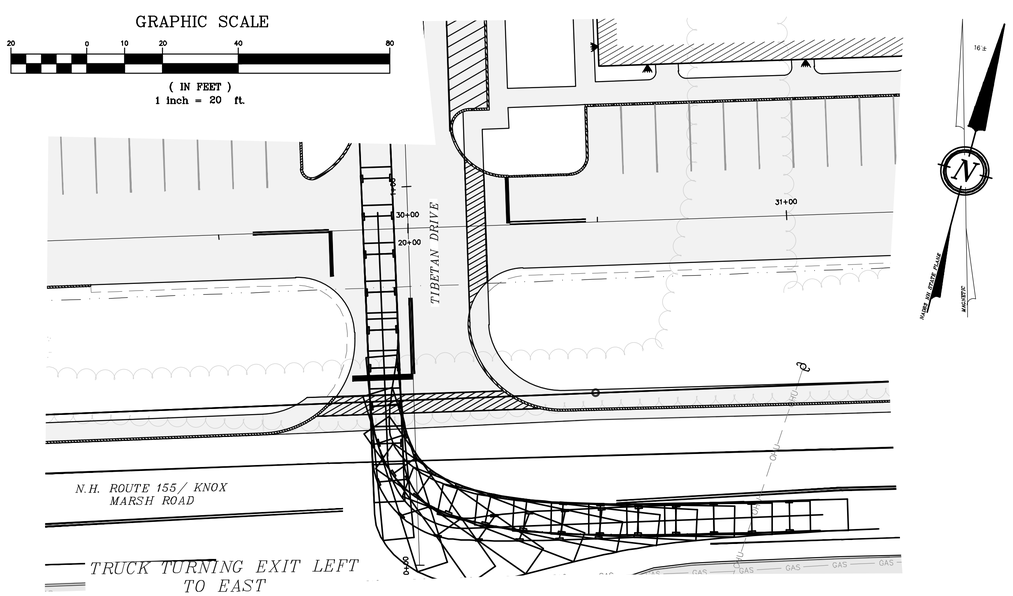
20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

TRUCK TURNING ENTRANCE LEFT FROM WEST



TRUCK TURNING EXIT RIGHT TO WEST



TRUCK TURNING EXIT LEFT TO EAST

PLANNING FILE #21-04

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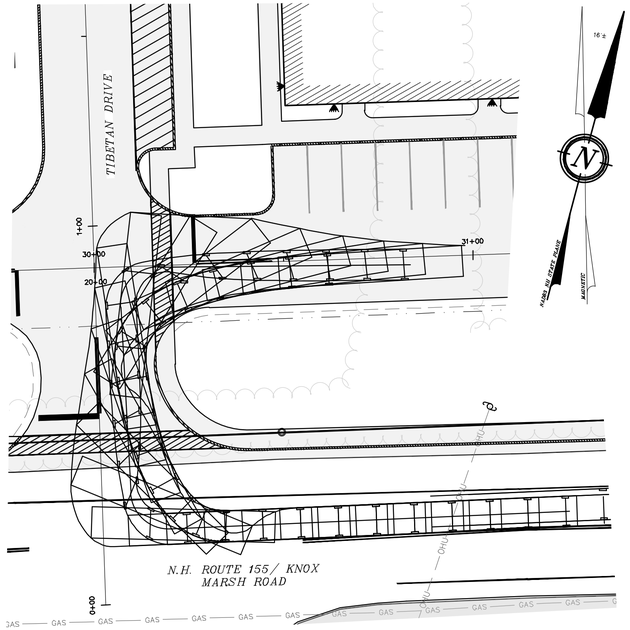
TRUCK TURNING ENTRANCE DOVER, NH FIRE T1 TEMPLATE
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY & SURVEYING ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10041
LICENSED PROFESSIONAL ENGINEER



GRAPHIC SCALE

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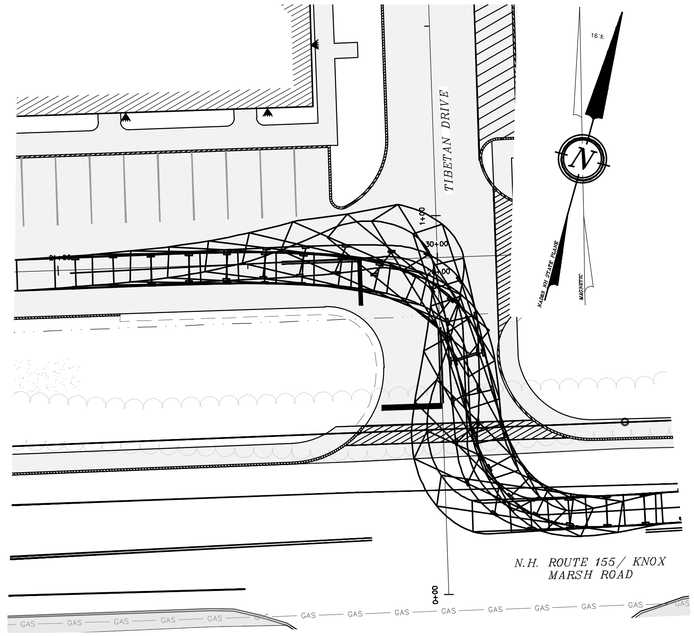
(IN FEET)
1 inch = 20 ft.

TRUCK TURNING RIGHT



GRAPHIC SCALE

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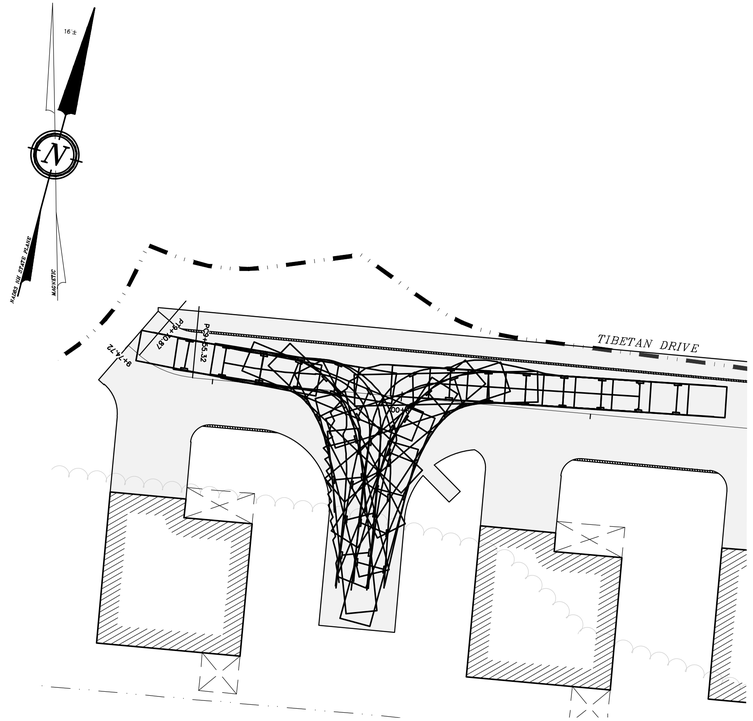
(IN FEET)
1 inch = 20 ft.

TRUCK TURNING LEFT

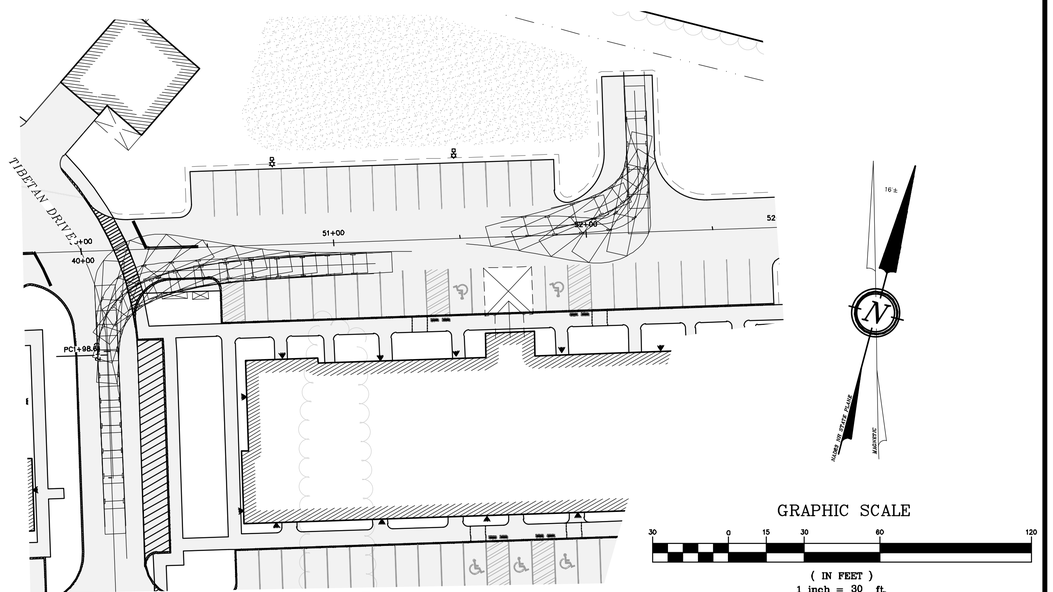


GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

TRUCK TURNING TURN AROUND

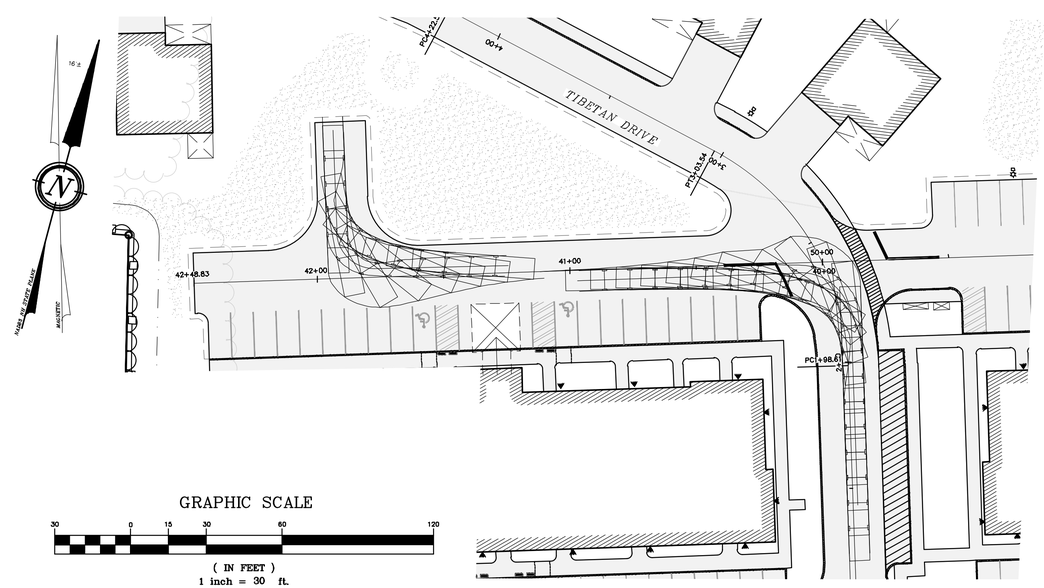


GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

TRUCK TURNING RIGHT



GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

TRUCK TURNING LEFT

PLANNING FILE #21-04

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TRUCK TURNING SITE CITY OF DOVER, NH FIRE T1 TEMPLATE

LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : AS SHOWN
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14242
LICENSED PROFESSIONAL ENGINEER

BERRY SURVEYING & ENGINEERING
335 Second Crown Point Road
Barrington, NH 03825
Phone: (603) 332-2863
Fax: (603) 335-4623
www.BerrySurveying.Com

January 31, 2022

Ms. Bethann McCarthy, PE
Alteration of Terrain Bureau
NHDES
PO Box 95
Concord, NH 03302

RE: Alteration of Terrain Permit Application AoT #210802-119
"Residences and Shops at Kelly Brook"
239 Knox Marsh Road
Dover, NH 03820
Tax Map H, Lot 37A

Dear Ms. McCarthy:

We are in receipt of your review of the above referenced project and offer the following responses to your observations. The response will appear in a Bold font. Thank you for your review and subsequent discussions regarding the proposal.

Comments:

1. The site is located within an area where contaminants are above ambient groundwater quality standards established in Env-Or 603.03. Infiltration (through the infiltration BMP at its proposed location, and through the porous pavement) is prohibited unless it can be demonstrated that infiltration will not mobilize contaminants and cause negative impacts to offsite properties and drinking water wells. This has not been demonstrated. AoT staff have forwarded your grading plan to the Hazardous Waste Remediation Bureau for further review of your request for a waiver from Env-Wq 1507.02 ©. We will inform you of the results of HWRB's review, but at this point is should be assumed that infiltration is prohibited.

   Infiltration is no longer being proposed as part of the project. A waiver request for GRV is included in this response. Please find justification in waiver request.

2. DES Does not grant a waiver to the requirements of Env-Wq 1503.11(i), relative to increasing phosphorus or nitrogen to an area of class A waters.

a. For treatment of the roof runoff, a gravel wetland or an enhanced bioretention system with an internal reservoir is recommended as these BMPs contain anaerobic storage that can effectively treat both nitrogen and phosphorus. Alternatively, a pollutant loading analysis must be submitted that demonstrates there is no increase in these pollutants.

This comment no longer applies due to the infiltration component being removed from the project and waiver requested for GRV.

b. Some recent designs reviewed by AoT staff have included an internal storage reservoir under the porous pavement. Consider whether this can be incorporated in to your design.

The porous pavement component has been removed from the project due to legal opinion that the applicant does not have the right to access Hanson Road.

3. Infiltration Basin: If, after addressing numbers 1 and 2 above, it is determined that infiltration may be used for stormwater treatment, the following must be addressed.

a. DES does not grant the waiver to Env-Wq 1508.07(i) relative to the depth of the filter media in a groundwater protection area.

Comment is N/A as a result of project revisions.

b. The SSSM indicates that the Windsor soils are a variant, and located on a clay subsoil. The seasonal high water table is 36" in the footprint of the proposed basin. Presumably this is the depth to clay. The Windsor default Ksat value would not apply in this map unit at the bottom of the filter media. Infiltration testing is required. If infiltration testing doesn't indicate a rate of 0.5 in/hr, this BMP may require an underdrain as it appears that the filter media is situated on clay soil.

Comment is N/A as a result of project revisions.

c. A spillway was modeled at 94.5 feet, but is not shown on the plans. The peak 50-year elevation was modeled at 94.63 feet. If the intent is to NOT construct an overflow spillway, remove it from the model.

Comment is N/A as a result of project revisions.

4. Gravel Wetlands, general:

   a. Some of the gravel wetlands are designed to treat the runoff in one cell, as opposed to the two cells recommended in the UNH Stormwater Center specification. Please comment on the purpose for this design modification and whether the same level of treatment is provided.

      Gravel wetlands have been revised to have two cells in all three BMPs.

   b. The UNH Stormwater Center recommends a riprap primary inlet to the subsurface stone. A 36" perforated riser has been provided. Please comment on the demonstrated performance of this type of structure for this purpose.

      The gravel wetland primary hydraulic inlet has been revised to be a rip-rap entrance per UNH Stormwater Center detail.

5. Gravel Wetland 101:

   a. If still proposed after addressing #4, clarify the location of the perforated inlet risers. Are they proposed to be adjacent to each other?

      The primary hydraulic inlets have been revised, comment no longer applicable.

   b. The gravel wetland must contain 100% of the WQV below the lowest bypass outlet. It is only storing 90%.

      Gravel wetland grading has been revised contain 100% of the WQV below the lowest bypass outlet.

   c. The stage/discharge table indicates that the discharge at the WQV is 0.1 cfs. A value of 0.06 cfs was used in the BMP worksheet.

      Please find revised stage/discharge table.

6. Gravel Wetland 103:

a. If still proposed, after addressing #4, clarify the location of the location of the perforated inlet riser. It is shown on the outside of the berm. Is this the intent?

   The primary hydraulic inlets have been revised, comment no longer applicable.

b. The gravel wetland must contain 100% of the WQV below the lowest bypass outlet. It is only storing 90%.

   Gravel wetland grading has been revised contain 100% of the WQV below the lowest bypass outlet.

c. The label and leader indicates that the forebay is part of the gravel wetland. Is this the intent? It appears this is the portion that is to be lined. If so, Please label this westerly side of the gravel wetland cell as you have labeled the easterly side.

   The label and leader have been repositioned to avoid confusion.

d. The lowest orifice is modeled at 91.9 feet in HydroCAD, but is shown as 92.1 feet in the plans.

   The lowest orifice elevation has been corrected.

7. <u>Gravel Wetland 104:</u>

a. We recommend extending the riprap on the slope at the forebay somewhat to the west of the end of the granite curbing.

   The rip-rap has now been extended further to the west of the end of the curbing.

b. The sediment forebay should be lined to prevent infiltration due to the presence of contaminated soils.

   The sediment forebay is now proposed to be lined with a low-perm material.

c. The runoff from the pavement underdrains enters the most downstream cell as a concentrated flow. It must be evenly distributed as required by the UNH

Stormwater Center's specification. Also address the UNH recommendation for a riprap inlet to the subsurface stone.

This reservoir has been removed, comment no longer applicable.

d. Provide riprap calculations to evaluate whether aprons are required at the outlets from the reservoir stone under the parking area.

This reservoir has been removed, comment no longer applicable.

e. On the riser detail, indicate the slot dimensions as 8"wx3"h to avoid confusion.

Please find the revised detail now annotated in this manner.

f. Review the entry for the cell storage volume in the BMP worksheet. It appears that the combined volume is 3,800 cf+/- (at elevation 92.0 feet).

Please find revised BMP worksheet for GW #104 and all other ponds.

8. The parking area on the south side of the eastern commercial building flows into a hydrologic soil group C soil. Infiltration could occur in this wide, flat gradient area. Adequate treatment is not being provided.

This area has been revised to become a pre-treatment swale and more pitch to the proposed grade so adequate treatment will be provided.

9. After any necessary revisions to the HydroCAD analysis to respond to the above, submit a revised summary table of the 2-year, 10-year and 50- year pre-and post-development flows, as well as the 2-year pre- and post-development runoff volumes or 1-year flow (pre) as necessary to show compliance with the requirements of Env-Wq 1507.059(b). Also, include a revision date on the HydroCAD analysis, such as I the file name or in the Project Notes screen.

BS&E understands this comment. Please find revised analyses as requested.

10. Grading Plans:

a. On Sheet 9, a note indicates that the SHWT at TP 104 is 36". The data pit data (Sheet1) indicates it is 28".

This leader has been corrected to 28".

b. If the intent is to drain the northwest commercial parking area to the north (Sub 12), provide additional grading flow arrows.

Additional flow arrows are now provided for clarification.

11. Please provide the data for TP 104A on Sheet 1.

Please find test pit data provided for TP #104A now on sheet #1.

12. The map delineating the wetlands must include the wetland scientist's seal and signature.

Please find the wetland scientist's stamp and signature on the Existing Conditions Plan & SSSM.

13. A study by a wildlife biologist relative to threatened and endangered species was not submitted as required by rule Env-Wq 1503.19(h). A study must be submitted for this project. It is highly recommended that you contact NHFG to discuss the scope of the study required for this site and proposed project. In addition to submitting the study report with your response to this RFMI, you should send a PDF of the study to Melissa.doperalski@wildlife.nh.gov Paper copies of large plan sheets pertinent to her review may be helpful. Once assessment is deemed complete and adequate, the plans must be revised as necessary to incorporate any recommendations from the NHFG resulting from their review of the wildlife biologist's assessment report. Please submit revised plans that do not address NHFG's comments, if they have not yet been received. Typically DES reviews the submittal well in advance of NHFG.

The wildlife study has been submitted to NHFG as part of this resubmission.

14. The Natural Heritage Bureau (NHB) identified threatened and/or endangered (T&E) species with the datacheck tool. Follow up with the NHB (Amy Lamb) at the Department of Natural and Cultural Resources (amy.lamb@dncr.nh.gov) to address

concerns associated with T&E species. Summarize how their comments are being addressed, and provide copies of correspondence to NHDES.

BS&E has enlisted to assistance of Gove Environmental to work with NHB to address comments and concerns associated with T&E species.

15. Please confirm that Equine Properties will be the responsible party *after* construction, and that the land in the residential area is to remain under the same ownership as the commercial buildings. If so, add "heirs, successors and assigns" to the Inspection & Maintenance Manual, under the responsible party description.

    This language has been added to the beginning of the fourth paragraph, page #2 of the I&M Manual.

16. Add detail for an erosion control blanket that consists of all natural material with no synthetic components (including no photo biodegradable netting).

    Detail E21, Sheet E102 has been revised to add this specific language and confirmed that NAG Bionet products do not have synthetic components and are biodegradable.

17. The total area of disturbance exceeds 5 acres. Include a plan sheet that shows the construction will be phased and clearly indicate that each area must be stabilized before advancing to a successive phase. (Env-Wq 1505.3 and Env-Wq 1504.06(I).

    Please find revised Phasing Plan, sheet #4.

18. Pursuant to Env-Wq 1503.15(b), changes to the revised plans are to be called out and a revision date must be added to each page that has been changed. Graphical revision call-outs should be included on the plans. If any changes to the plans or the hydrologic/hydraulic analysis were made other than those identified above, Please indicate what additional changes were made in your response letter. <u>Please only send copies of revised plan sheets.</u>

Please find attached requested documents. A summary of project changes that have occurred since prior review due to Municipal and legal comments is as follows:

- After a secondary legal opinion, it was determined that the applicant

does not have the right to use Hanson Road for access. The loop connection to NH Route 155 has been removed and now ends in a hammerhead. Porous pavement #107 is no longer needed and multiple grading changes have occurred as a result. House locations have been revised as a result.

- A sidewalk has been added to the subject parcel frontage along NH Route 155 at the request of the City of Dover.

- Modification of the SSSM has occurred after review of RFMI comments. It was found that the Windsor Variant is considered HSG C as opposed to HSG A due to the restrictive substratum. Please find revised SSS Report and letter from soil scientist.

- Final Reach #200 & #300 have been combined to a single final reach (now #200). This revision has occurred due to the analysis being conducted to the same common wetland line.

- Final Reach #600 has been removed from the analysis since disturbance is no longer taking place in this area.

- Gravel Wetland #101 has undergone several changes as a result of the RFMI comments and design consideration changes. The berm has gone from elevation 95.0 to 94.5 and emergency spillway from elevation 94.5 to 94.0. The addition of a second treatment cell, revision to by-pass outlets, and a pre-treatment swale are other new considerations.

- Gravel Wetland #103 has received a second treatment cell and revisions to the by-pass outlets and primary outlet pipe.

- Gravel Wetland #104 has changed footprint based upon sidewalk grading. The berm has gone from elevation 93.0 to 94.0 and revised by-pass outlets. In addition, the stone reservoir has been removed from the pond.

- Infiltration Rain Garden #105 has been removed from the analysis and converted to a conveyance swale/part of the open water storage for Detention Pond #102. Detention Pond #106 has been renumbered Detention Pond #105.

- Detention Pond #102 has a received a revised footprint and the dual outlets to Gravel Wetland #101 #103 has been replaced with a single **outlet (dual 18" HDPE**-N-12 pipes) and is now entirely routed to Gravel Wetland #103.

- Detention Pond #106 has received a revised footprint and no longer receives flow routed from Detention Pond #102. The outlet pipe has been revised and the berm has gone from 95.0 to 95.25 and spillway from 94.50 to 94.75.

- Drain Manhole #1 at station +/- 4+40 has been removed and catch basin #11 is now routed to Detention Pond #102.

- Concolor Drive has been changed to Tibetan Drive and the project **name has been changed from "McCrone Place to "R**esidences & Shops **at Kelly Brook".**

Thank you for your thorough review of this project.

Respectfully submitted,

BERRY SURVEYING & ENGINEERING

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January 31, 2022

Ms. Bethann McCarthy, PE
Alteration of Terrain Bureau
NHDES
PO Box 95
Concord, NH 03302

RE: Alteration of Terrain Permit Application AoT #210802-119
"Residences and Shops at Kelly Brook"
Tax Map H, Lot 37A
Dover, NH

Dear Ms. McCarthy:

The following waivers are hereby requested:

Identification of Waivers Requested:

1. Waiver requested to not satisfy Ground Water Recharge (GRV) requirement as put forth by Env-Wq 1507.04(b).

1) Explanation:

This waiver request is being submitted to allow for the Ground Water Recharge requirements put forth by Env-Wq 1507.04(b) due to soil conditions on site as shown in the Site Specific Soils Map (SSSM).

1) Waiver Justification:

a. Granting the request will not result in an adverse impact on the environment, public health, public safety, or abutting properties that is more significant than the impact that would result from complying with the rule as written.

Granting this request will not result in adverse impact on the environment, public health, public safety, or abutting properties that is more significant than the impact of complying with the rules as written. This is due to site conditions not allowing for compliance. On-Site soils that are being replaced with impervious surfaces are; Winsdor Variant, Buxton, and Scantic. The Windsor Variant has limited recognition across the state, primarily only being in Strafford County, which is why it is not found in the KSat Values for New Hampshire Soils (Ksat NH Manual). While the Windsor Variant

experiences Ksat of 6-20 in/hr in the "B" horizon according the Ksat NH, a silt loam "C" horizon exists with a significantly more restrictive Ksat.

Using the NH State-Wide Numerical Soil Legend (Key to the Soils of New Hampshire) 2011 Catena, the Windsor Variant is located within Section C, Marine or Glaciolacustrine Deposits, Soils Developed in Silt and Clay. From this section Eldridge soil contains similar textures and a restrictive "C" horizon. Using the Ksat NH Manual, Eldridge soil has a "C" horizon Ksat of 0.06-0.6 in/hr. By applying this restrictive "C" horizon to the Windsor Variant, infiltration would be prohibited in the proposed condition and is therefore limited in the existing condtion.

Buxton consists of restrictive "B" and "C" horizons of 0.1-0.6 in/hr and 0.0-0.2 in/hr, respectively. Scantic consists of restrictive "B" and "C" horizons as well, with 0.0-0.2 in/hr and 0.0-0.2 in/hr, respectively. With restrictive "B" and "C" horizons across the subject parcel, compliance with Env-Wq 1507.04(b) is not possible.

b. Granting the request is consistent with the intent and purposes of the rule being waived.

Utilizing the justification put forth in part a, granting this waiver request is consistent with the intent and purposes of the rule being waived. There is no location of site that is able to provide the minimum Ksat requirement of 0.5 in/hr in order to satisfy the GRV requirements of Env-Wq 1507.04(b).

Respectfully Submitted,
BERRY SURVEYING & ENGINEERING

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DRAINAGE ANALYSIS
&
EROSION & SEDIMENT
CONTROL PLAN

Prepared for:

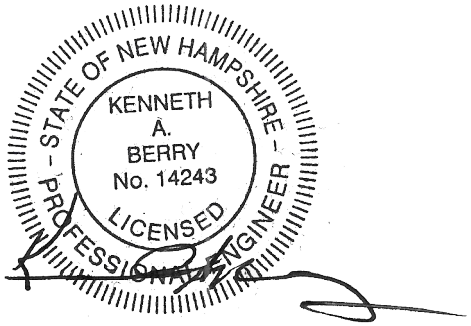
Equine Properties, LLC
P.O. Box 190
Exeter, NH 03833-0190

LOCATION

Proposed Mixed Use Site Plan
"Residences and Shops at Kelly Brook"
Tibetan Drive
Tax Map H, Lot 37A

Prepared by:

Berry Surveying & Engineering
335 Second Crown Point Road
Barrington, NH 03825



Project Number:
DB 2020-066

January 21, 2021
Revised: January 28, 2022

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2 Yr - 24 Hr. Node Listing
10 Yr - 24 Hr. Node Listing
25 Yr - 24 Hr. Node Listing
50 Yr - 24 Hr. Node Listing
100 Yr - 24 Hr. Node Listing

Appendix II - Proposed Conditions Analysis
25 Yr - 24 Hr. Full Summary
2 Y r -24 Hr. Node Listing
10 Yr - 24 Hr. Node Listing
25 Yr - 24 HR. Node Listing
50 Yr - 24 Hr. Node Listing
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Appendix III - Calculations, Charts, & Graphs
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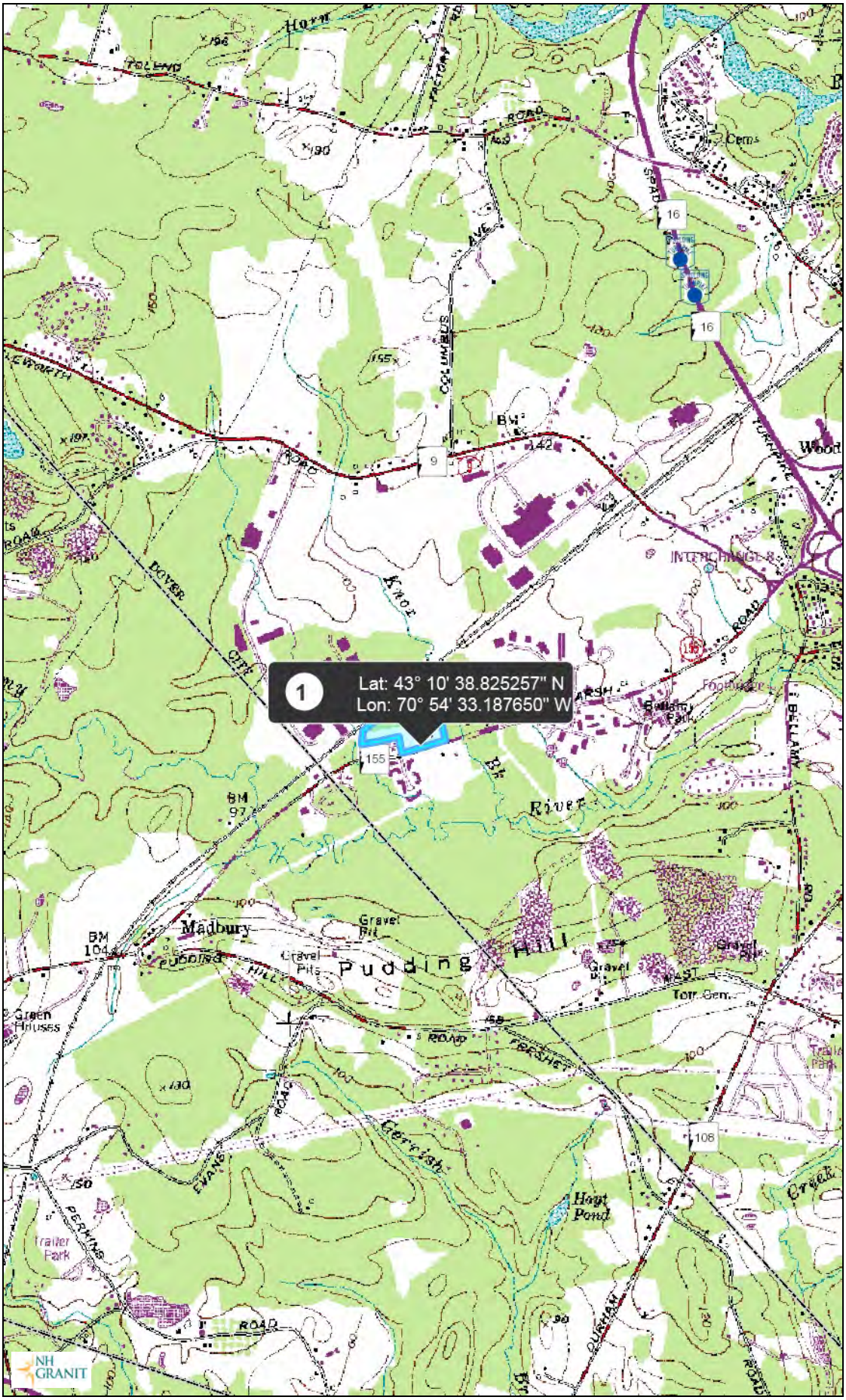
AoT Stormwater Treatment Spreadsheets
NCRS USDA Web-soil Map
Inspection and Maintenance Manual Stormwater System Management
Ksat Values in N.H., SSSNNE
Watershed Report Card, 303(d) List, & ORW List
Filtrexx Silt Soxx Specification Sheets

Enclosed: W-1 Sheet Existing Conditions Watershed Plan Sheet 1
W-2 Sheet Post Construction Watershed Plan Sheet 2
Erosion & Sediment Control Plan

Map by NH GRANIT



Legend

- State
- County
- City/Town

Map Scale

1: 24,000

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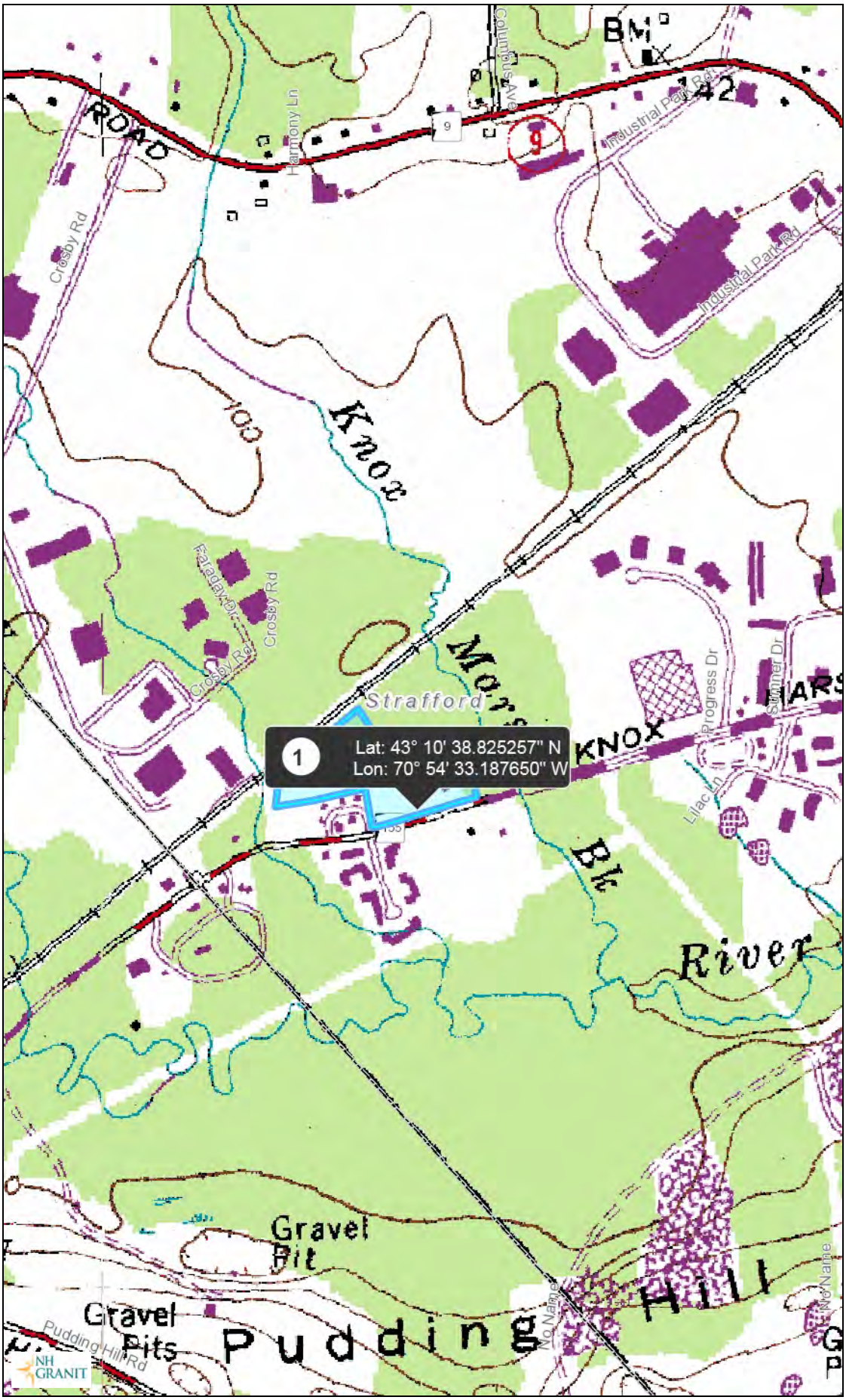
Map Generated: 12/19/2019

Notes

Map by NH GRANIT



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Notes

DESIGN METHOD OBJECTIVES

The owner / developer of Tax Map H, Lot 37A, Equine Properties, LLC is proposing to develop the property at 239 Knox Marsh Road. The site currently is the location of a single residential structure.

An Existing and Proposed Conditions analysis was conducted for the purpose of estimating the peak rate of stormwater run-off and to subsequently design adequate mitigation of drainage. There are three existing drainage discharge points which was identified in the existing analysis and duplicated in the proposed conditions analysis. There are also two depressions in the existing analysis that capture and hold surface water runoff. Designing two watershed models we have compared the differences in these rates of peak run-off and surface water volume. Sheet W1, Existing Conditions Watershed Plan, outlines the characteristics of the site in its existing or pre-construction conditions. The second analysis displays the proposed (post-construction) conditions (See Sheet W2). The analysis was conducted using data for; 2 Yr – 24 Hr (3.60″), 10 Yr – 24 Hr (5.44″), 25 Yr -24 Hr (6.88″), 50 Yr – 24 Hr (8.23″), and 100 YR-24 Hr (9.84″) storm events. Storm event analysis was accomplished using the USDA SCS TR-20 method within the HydroCAD Stormwater Modeling System environment. Rainfall quantities are based on the Extreme Precipitation Table for this location from the Northeast Regional Climate Center / Cornell University (http://precip.eas.cornell.edu). As Dover is considered a part of the Coastal Region, a 15% escalation on rain fall depths has been applied to this application.

1.0 Existing Conditions Analysis:

Reference: Sheet W1 - Existing Conditions Watershed Plan (Enclosed)
Existing Conditions Plan

The existing parcel of land is used for residential and Christmas Tree Farm purposes. The soils within the watershed are made up of multiple soil types, containing Hydrologic Soil Group (HSG) A, C & D. See Site Specific Soils Map and report for more information. The parcel consists of Windsor Variant Well Drained soils, Buxton Moderately Drained soils as well as Scantic Poorly Drained soils.

The land area analyzed consists of 10.72 acres. The parcel is naturally divided into four subcatchments by existing topography. Two of the four existing subcatchments are analyzed with an individual final reach. The other two each flow to separate depressions with one overflowing into the second and to a mutual final reach The limit of the poorly drained jurisdictional wetlands is the limit of the drainage analysis to the north. The property sits in between two separate watersheds with relating streams (the Kelly Brook and Knox Marsh Brook). The division between the two watersheds was not delineated in this analysis.

Final Reach #100

Subcatchment #1 is land area in the eastern portion of the property and drains off site. Final Reach #100 is a nonpoint reach to the north and east of the parcel, generally following the property line.

Final Reach #200

Subcatchment #2 is land area in the center portion of the property extending nearly to the edge of Knox Marsh Road and drains off site to the north. Final Reach #200 is a nonpoint reach to the north and northeast of the parcel, along the deliniated wetland line.

Final Reach #400

Subcatchment #4 is made up of a portion of Knox Marsh Road (NH Route 155) and the adjacent land extending just over the property line. Runoff flows toward a cross culvert near a southwestern corner of the parcel which flows to an inlet depression (Pond #4) and under Knox Marsh Road to an offsite outlet point being analyzed as Final Reach #400.

Subcatchment #6 is made up of a portion of Knox Marsh Road (NH Route 155) adjacent to the subject parcel and the two parcels to the west. Runoff flows towards a low point in the parking lot (Pond #6) which eventually flows to Final Reach #400.

2.0 Proposed Conditions Analysis:

Reference: Sheet W2 - Proposed Conditions Watershed Plan (Enclosed)
Proposed Grading & Drainage Plan

The proposal for development in the Open Space Subdivision includes 12 dwelling units, a road consisting of 938 feet of roadway, and two mixed use buildings with a total of 52 units and the associated parking. The proposal is supported by two detention ponds, and three subsurface gravel wetlands. A waiver for infiltration of the GRV will be requested in a separate letter.

Final Reach #100

Subcatchment #1 is the area remaining after the proposed construction of the roadway, Subsurface Gravel Wetland #101 (Pond #101), and the related discharge level spreader. The easterly multi-use building drains to the sediment forebay and subsequently to Pond #101. The related parking area sheets to a pretreatment swale directed toward Pond #101. A portion of the land area behind the easterly multi-use building drains to Detention Pond #105 (Pond #105) which outlets to Pond #101 and subsequently to Final Reach #100.

Final Reach #200

Subcatchment #2, from the Existing Condition Analysis is divided into multiple subcatchments again by the proposed roadway, proposed residential dwelling units, and infrastructure. This roadway and infrastructure drain into the closed drainage system, then into the sediment forebay and subsequently into Subsurface Gravel Wetland #103 (Pond #103). Also draining into Pond #103 is Detention Pond #102 (Pond #102) which captures runoff from the western mixed-use building and the paved area north of the building. Discharge from Pond #103 is routed through the outlet structure and subsequently to a level spreader directed toward Final Reach #200.

Final Reach #400

Subcatchment #6 remains unchanged as it is offsite, Subcatchment #4 is reduced in size due to the proposed development and construction. Subcatchment #14, consisting of the majority of the parking area in front of the multi-use buildings, is routed to Subsurface Gravel Wetland #104 (Pond #104) which discharges through an outlet structure and level spreader into Pond #4 prior to discharge through the existing NHDOT culvert and Final Reach #400.

Stormwater Treatment:

Treatment takes place within the subsurface gravel wetlands designed to support the development on site. Pre-treatment will be provided in the sediment forebay's of the subsurface gravel wetlands as well as a pre-treatment swale. The stormwater quality volume capability is treated within provided treatment area of the practice. A Groundwater Recharge Volume waiver is being requested.

3.0 FULL COMPARATIVE ANALYSIS

Peak Rate of Discharge

ANALYSIS COMPONENT PEAK RATE DISCHARGE (Cubic Feet / Second)

		2 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Final Reach #100	Existing	2.30	4.88	7.04	9.11	11.60
	Proposed	1.09	2.20	3.95	7.25	10.36
Final Reach #200	Existing	4.02	9.00	13.30	17.49	22.58
	Proposed	2.37	6.54	11.07	14.95	19.31
Final Reach #400	Existing	0.88	2.17	3.70	5.28	7.03
	Proposed	0.47	1.99	3.46	4.94	6.95

ANALYSIS COMPONENT VOLUME (ACRE FEET)

		2 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Final Reach #100	Existing	0.208	0.425	0.612	0.794	1.018
	Proposed	0.300	0.671	0.979	1.274	1.630
Final Reach #200	Existing	0.592	1.269	1.862	2.448	3.171
	Proposed	0.582	1.189	1.700	2.194	2.797
Final Reach #400	Existing	0.147	0.386	0.614	0.848	1.148
	Proposed	0.136	0.407	0.659	0.913	1.237

4.0 EROSION and SEDIMENT CONTROL PLAN & BEST MANAGEMENT **PRACTICES (BMP's)**

Reference: Proposed Site Plan and Grading Plan
Erosion & Sediment Control Plan
Erosion & Sediment Control Details

The proposed site development is protected from erosion and the abutting properties are protected from sediment by the use of Best Management Practices as outlined in the New Hampshire Stormwater Manual, Volume 2, Post-Construction Best Management Practices Selection & Design (December 2008, NHDES & US EPA). Any area disturbed by construction will be re-stabilized within 14 calendar days (City of Dover) and abutting properties will not be adversely affected by this development. All swales and drainage structures will be constructed and stabilized prior to having run-off directed to them. Reference is also made to the Stormwater System Operation and Maintenance Plan / Inspection & Maintenance Manual which has been written specifically for this project and available to the owner.

Perimeter Control (Silt Fence / SiltSoxx / Erosion Control Mix Berm)

The plan set demonstrates the location of perimeter sediment control. The Erosion and Sediment Control Details, Sheet E-101, has the specifications for installation and maintenance of the silt fence, Filtrexx mulch filled SiltSoxx (or approved equal), and Erosion Control Mix Berm. There are locations on the site, for example bio-media rain garden protection, where SiltSoxx protection is specified.

Detention Ponds

Description: Detention Ponds are also constructed ponds with the purpose of detaining runoff but not necessarily for infiltration purposes. During construction it is important that the ground surface not be exposed to traffic or construction equipment to preserve the infiltration capabilities of the existing soil. Construction specifications are included in the plan set and New Hampshire Stormwater Manual, Volume 2, 4-3 Treatment Practices, 3B, In-ground Infiltration Basin and Section 4-6, Conveyance Practices, 2. Detention Basins.

Maintenance Considerations:
Infiltration Basins and Detention Ponds should be inspected at least twice annually and following any rainfall event exceeding 0.25 inches in a twenty-four hour period. Maintenance rehabilitation will be conducted as warranted by each inspection. Trash and debris will be removed at each inspection.

On an annual basis the infiltration capabilities need to be confirmed by evaluation the drawdown time. If the infiltration system does not drain within 72-hours following a

rainfall event, a qualified professional will assess the condition of the basin to determine measures required to restore the infiltration function. This is normally the direct result of sediment accumulation which will be removed to restore the filter media ratio.

Also on an annual basis the vegetation should be inspected to ensure healthy condition. Invasive species need to be removed along with dead or diseased vegetation.

Subsurface Gravel Wetland

Description: A Gravel Wetland (NHDES SWM 4-3 Treatment Practice 2D) or Subsurface Gravel Wetland consists of a forebay and multiple flow-through treatment cells. During smaller rain events, the surface water runoff is intended to pass from the forebay, into the gravel media through perforated pipes and structures where it passes through an anaerobic environment where the Water Quality Volume will have 24-72 hours of contact time. The forebay is required to contain 10% of the WQV and each of the two cell must contain 45% of the WQV. During larger storm events, the system works as a detention pond. The design of a Subsurface Gravel Wetland will be constructed in accordance with the most current version of the Design Specifications provided by the UNH Stormwater Center and SWM Volume 2, Section 4-3 Treatment Practices, 2d Gravel Wetlands.

Maintenance Considerations: The outlet configuration of the anaerobic subsurface gravel consists of a small discharge orifice that is located in a threaded cap. This goose-neck feature is designed to be disassembled to allow cleaning. This outlet orifice is located within a concrete outlet structure that also contains a control stack used to control and detain runoff in the system. Although this is designed to be "clean water" after the filtering process, the outlet structure in general is going to require periodic maintenance to ensure that it is discharging runoff properly. If the Subsurface Gravel Wetland retains runoff on the surface for more than 72 hours the performance is not correct and maintenance is required.

Debris will need to be removed from the inlet and outlet structures as well as any buildup of sediment. The surface of the ponded area is intended to have wetland plants which may require periodic replanting, depending on the sediment loading. Sediment buildup in the forebay must be removed to maintain the minimum required volume. See also 9 and 10 of the attached UNHSC Subsurface Gravel Wetland Design Specifications 2009, and / or UNHSC Subsurface Gravel Wetland Design Specifications 2016 with Maintenance Guidelines and Checklist. See also Design and Maintenance of Subsurface Gravel Wetlands, (for NHDOT) by UNHSC. (Check List, Page 24 & 25, Attached)

Vegetated Stabilization

All areas that are disturbed during construction will be stabilized with vegetated material within 30 days of breaking ground. Construction will be managed in such a manner that erosion is prevented and that no abutter's property will be subjected to any siltation, unless otherwise permitted. All areas to be planted with grass for long-term cover will follow the specification and on Sheet E-102 using seeding mixture C, as follows:

Mixture	Pounds per Acre	Pounds per 1,000 Sq. Ft.
Tall Fescue	24	0.55
Creeping Red Fescue	24	0.55
Total	48	1.10

Conservation Mix

Tall Fescue	15	0.35
Creeping Red Fescue	15	0.35
Annual Ryegrass	5	0.12
Perennial Ryegrass	5	0.12
Kentucky Bluegrass	15	0.35
White Clover	7	0.16
Total	62	1.45

Conservation Mix will used to stabilize all 2:1 slopes and all land area disturbed within the wetland buffer. (If applicable).

Stabilized Construction Entrance

A temporary gravel construction entrance provides an area where mud can be dislodged from tires before the vehicle leaves the construction site to reduce the amount of mud and sediment transported onto paved municipal and state roads. The stone size for the pad should be 3" coarse aggregate, and the pad itself constructed to a minimum length of 75' for the full width of the access road. The aggregate should be placed at least six inches thick. A plan view and profile are shown on Sheet E-101- Erosion & Sediment Control Detail Plan. (If applicable).

Environmental Dust Control

Dust will be controlled on the site by the use of multiple Best Management Practices. Mulching and temporary seeding will be the first line of protection to be utilized where problems occur. If dust problems are not solved by these applications, the use of water and calcium chloride can be applied. Calcium chloride will be applied at a rate that will keep the surface moist but not cause pollution.

Drainage Swales / Stormwater Conveyance Channels

Drainage swales will be stabilized with vegetation for long term cover as outlined below, and on Sheet E-102 using seed mixture C. As a general rule, velocities in the swale should not exceed 3.0 feet per second for a vegetated swale although velocities as high as 4.5 FPS are allowed under certain soil conditions (If applicable).

Construction Sequence

1. Cut and remove trees in construction area only as required.

2. Construct and/or install temporary and permanent sediment erosion and detention control facilities as required.

3. Erosion, sediment and detention control facility shall be installed & stabilized prior to any earth moving operation & or directing runoff to them.

4. Clear, cut and dispose of debris in approved facility.

5. Construct temporary culverts as required, or directed.

6. Construct roadways for access to desired construction areas. All roads shall be stabilized immediately.

7. Install pipe and construction associated appurtenances as required or directed. Install rain gardens. All disturbed areas shall stabilized immediately after grading.

8. Begin permanent and temporary seeding and mulching. All cut and fill slopes and disturbed areas shall be seeded or mulched as required, or directed. No area is allowed to be disturbed for a length of time that exceeds 60 days before being stabilized. Daily, or as required. All roadways and parking areas shall be stabilized within 72 hours of achieving finished grades. All cut and fill slopes shall be stabilized within 72 hours of achieving finished grades.

9. Construct temporary berms, drains ditches, silt fences, sediment traps, etc. mulch and seed as required.

10. Inspect and maintain all erosion and sediment control measures during construction.

11. Complete permanent seeding and landscaping.

12. Remove temporary erosion control measures after seeding areas have established themselves and site improvements are complete.

13. Smooth and revegetate all disturbed areas.

14. Finish paving all roadways.

Temporary Erosion Control Measures

1. The smallest practical area of land shall be exposed at any one time.

2. Erosion, sediment control measures shall be installed as shown on the plans and at locations as required, or directed by the engineer.

3. All disturbed areas shall be returned to original grades and elevations. Disturbed areas shall be loamed with a minimum of 4" of loam and seeded with not less than 1.10 pound of seed per 1,000 square feet (48 pounds per acre) of area.

4. Silt fences and other barriers shall be inspected periodically and after every rainstorm during the life of the project. All damaged areas shall be repaired, sediment deposits shall periodically be removed and properly disposed of.

5. After all disturbed areas have been stabilized, the temporary erosion control measures are to be removed and the area disturbed by the removal smoothed and re-vegetated.

6. Areas must be seeded and mulched within 5 days of final grading, permanently stabilized within 15 days of final grading, or temporarily stabilized within 30 days of initial disturbance of soil.

Inspection and Maintenance Schedule

Fencing (if used) will be inspected during and after storm events to ensure that the fence still has integrity and is not allowing sediment to pass. Depending on SWPPP criteria, all controls will be inspected either once every 7 days and after storm events. Inspection reports must be submitted to City of Dover Engineering Department. See also Stormwater System Management: Inspection & Maintenance Manual published separately also by Berry Surveying & Engineering. See also Storm Water Pollution Prevention Plan (SWPPP) developed in accordance with EPA NPDES requirements & the City of Dover Stormwater regulations. Stabilization is required within 14 calendar days IAW Chapter 149-14, Site Development Criteria.

Corrective Action measures will be made in accordance with SWPPP requirements and records maintained on site by the Contractor.

5.0 CONCLUSION

At all five storm events peak rates of discharge are modeled to be reduced in the proposed analysis, as compared to the existing peak rates of discharge. A waiver to GRV has been requested. All stormwater discharged from the site is in the form of surface water.

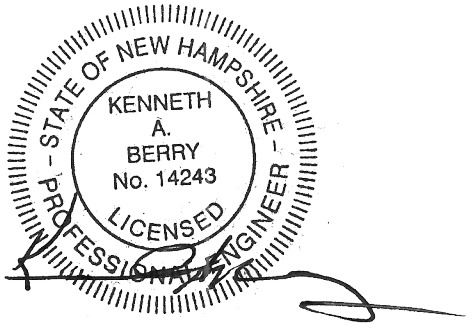
A Site Specific, Terrain Alteration Permit (RSA 485: A-17) is required for this site plan due to the area of disturbance being greater than 100,000 SF. The impact is approximately 302,000 square feet (2 phases), so that an EPA Notice of Intent will be required to be filed prior to construction and a Stormwater Pollution Prevention Plan prepared.

Respectfully Submitted,
BERRY SURVEYING & ENGINEERING

Christopher R. Berry, SIT 567
Principal, President

Kenneth A. Berry PE, LLS,
CPSWQ, CPESC, CESSWI
Principal, VP - Technical Operations

Kevin R. Poulin, EIT
Design Engineer / Project Manager



S.S.S.M. SOILS LEGEND

SYMBOL	SOIL TAXONOMIC NAME	HYDROLOGIC SOIL GROUP
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WfC	WINDSOR VARIANT	C
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ScA/P	SCANTIC POORLY DRAINED	D
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SLOPE: A = 0–3% B = 3–8% C = 8–15% D = 15–25% E = 25–50% F = 50%+

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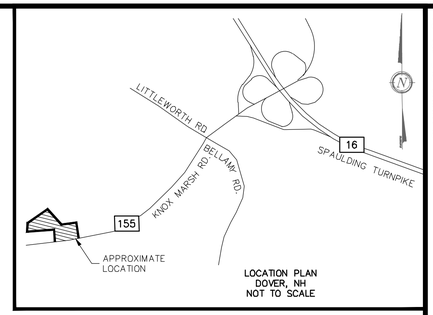

LOCATION PLAN
DOVER, NH
NOT TO SCALE

LEGEND:

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- IRON PIPE ~FND~
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- SPIKE ~FND~
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- BzB — NRCS SOIL LABEL
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- TYP. — TYPICAL
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NOTES:

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149 EPPING ROAD SUITE 2A
EXETER, NH 03833

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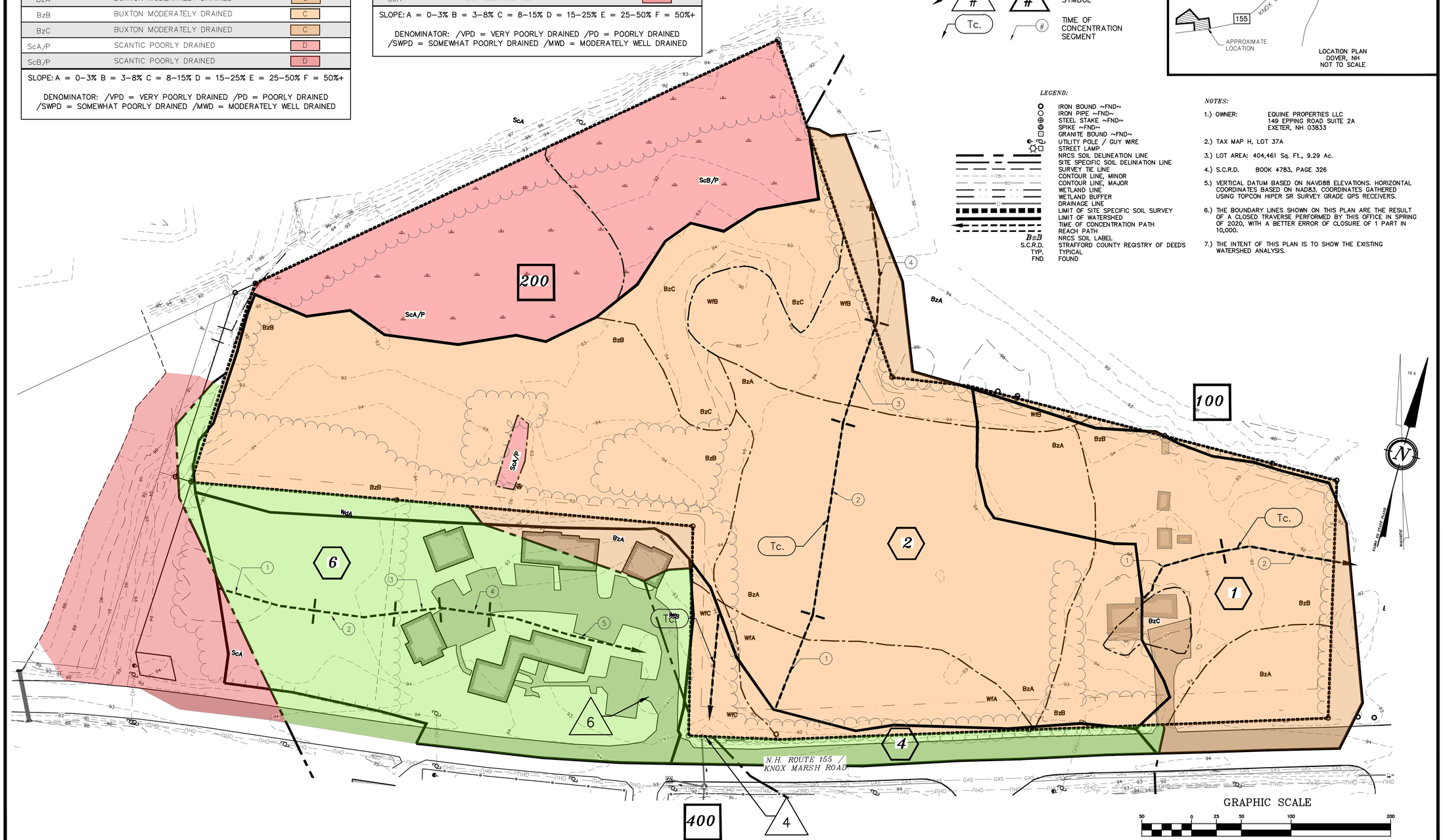

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PLANNING FILE #21-04

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LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14474
LICENSED PROFESSIONAL ENGINEER

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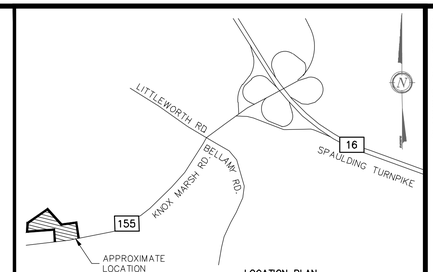

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DOVER, NH
NOT TO SCALE

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NOTES:

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149 EPPING ROAD SUITE 2A
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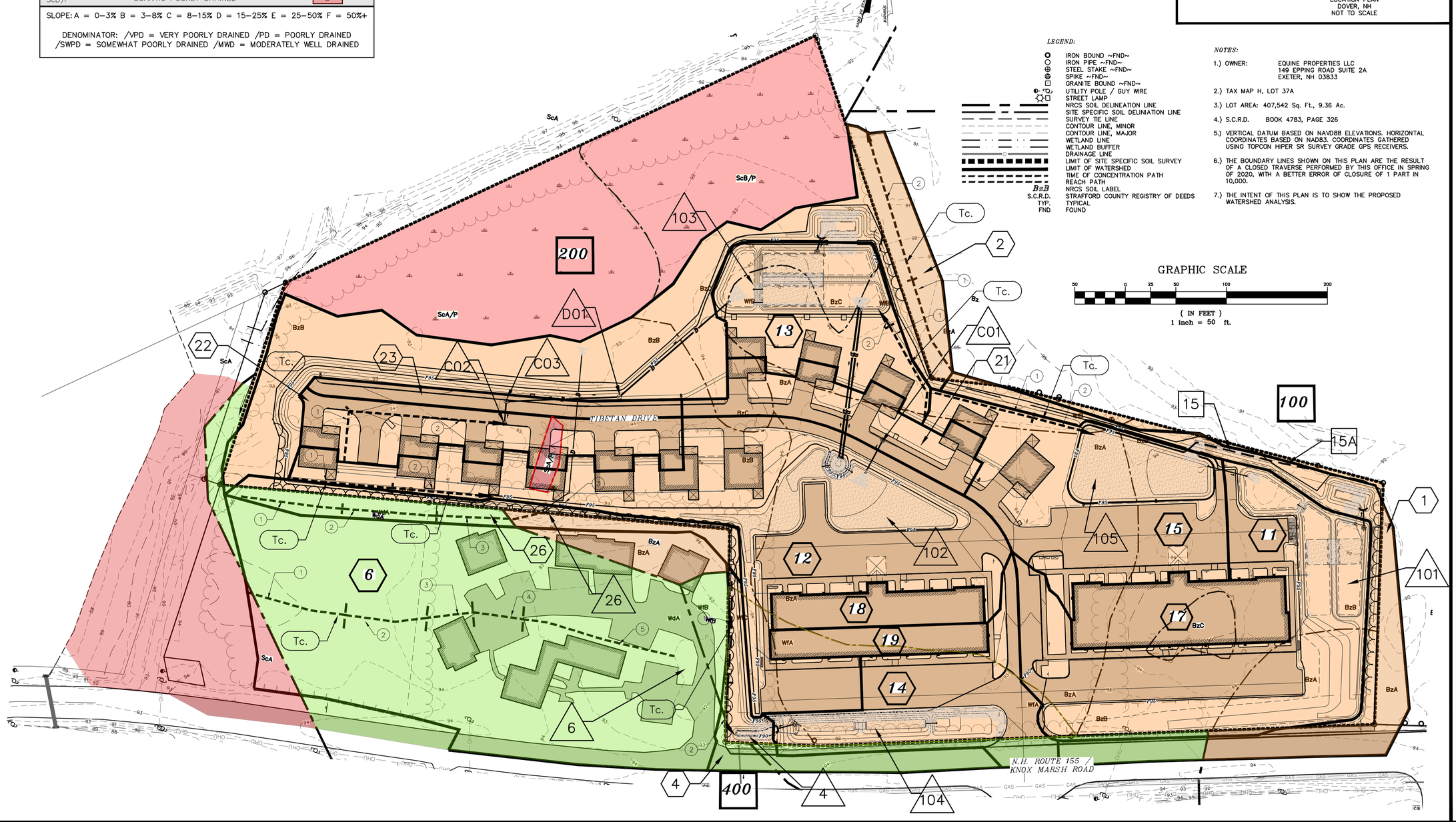

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LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14007
LICENSED PROFESSIONAL ENGINEER

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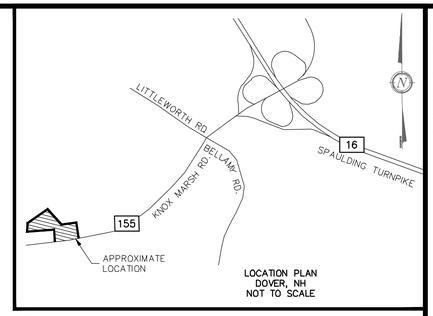

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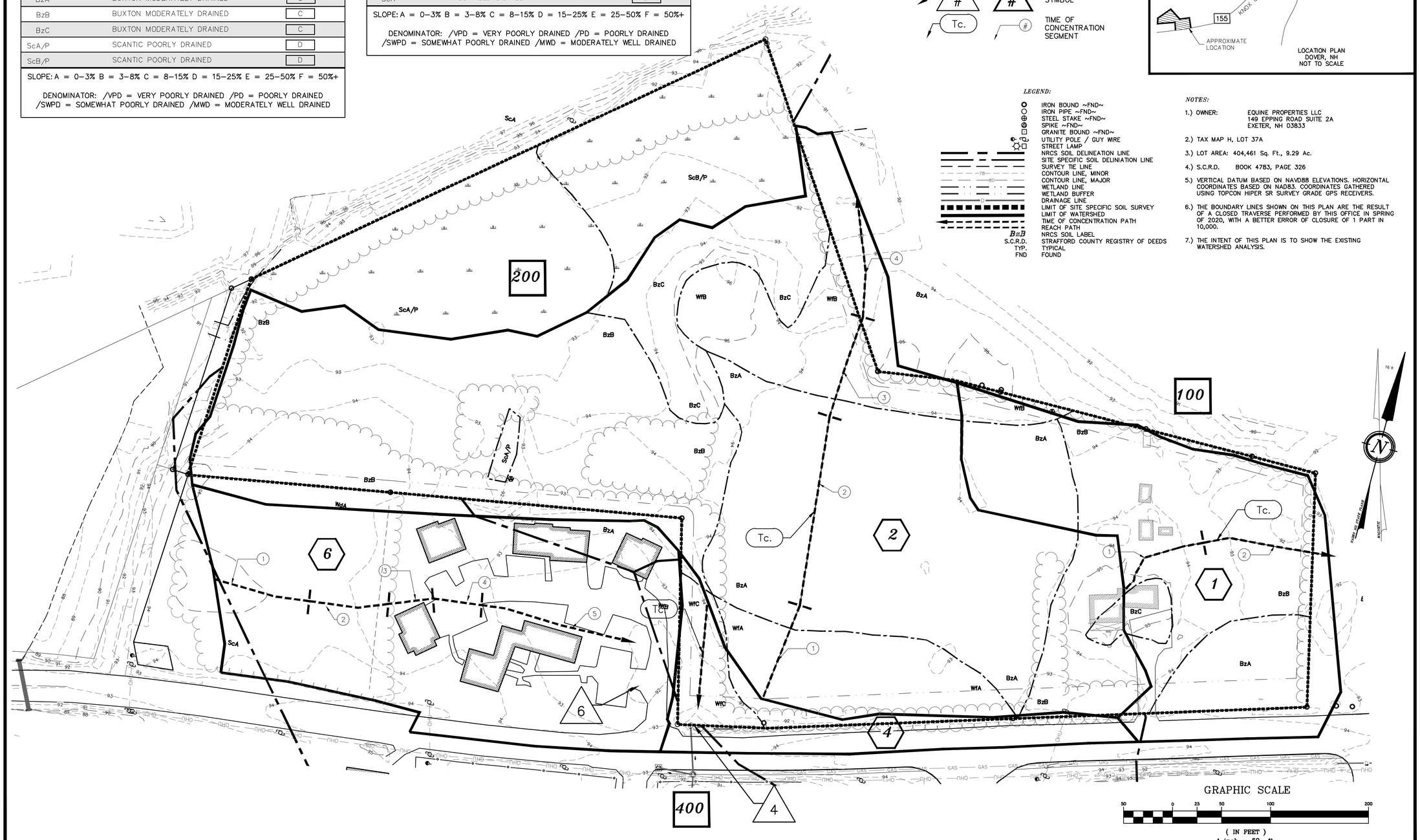

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BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
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STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 7474
LICENSED PROFESSIONAL ENGINEER

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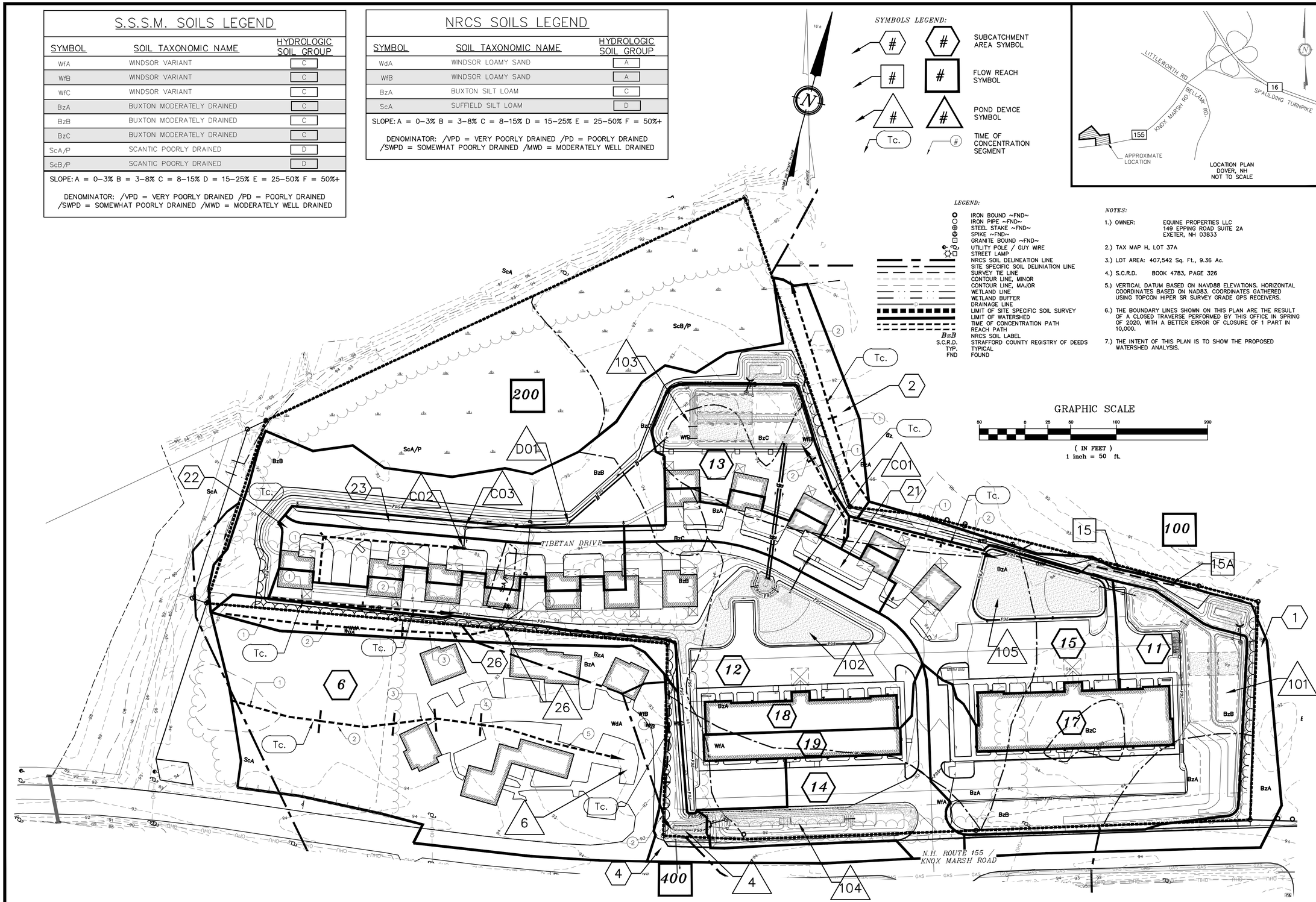

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SCALE : 1 IN. EQUALS 50 FT.
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STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10476
LICENSED PROFESSIONAL ENGINEER

SOILS & DEWATERING:

WfA	*WINDSOR*	*VARIANT*	*K= 0.17*
WfB	*WINDSOR*	*VARIANT*	*K= 0.17*
WfC	*WINDSOR*	*VARIANT*	*K= 0.17*
BtA	*BUXTON*	*SILT LOAM*	*K= 0.28*
BtB	*BUXTON*	*SILT LOAM*	*K= 0.49*
BtC	*BUXTON*	*SILT LOAM*	*K= 0.49*
ScA-P	*SCANTIC*	*POORLY DRAINED*	*K= 0.49*
ScB-P	*SCANTIC*	*POORLY DRAINED*	*K= 0.43*

SEE SITE SPECIFIC SOILS MAP (SSSM)
SEE WEBSOIL USDA–NRCS
ERODIBILITY FACTOR – K, CPESC MANUAL, ENVIROCERT INTERNATIONAL INC. & ROCKINGHAM COUNTTY SOIL SURVEY, ROCKWEB SOIL ATTRIBUTES.

CONTRACTOR TO BE AWARE OF THE SOIL PROFILES AND ENSURE THAT PROPER EROSION PREVENTION AND SEDIMENT CONTROL MEASURES ARE TAKEN AT ALL TIMES. ANY DEWATERING REQUIREMENTS IN NEW HAMPSHIRE REQUIRE SPECIAL PROVISIONS IN ACCORDANCE WITH THE "CLARIFICATION OF SECTION 9.1.2 (STATE OF NEW HAMPSHIRE CONDITIONS) AND OTHER NH SPECIFIC INFORMATION FOR THE U.S. EPA 2012 NPDES CONSTRUCTION GENERAL PERMIT (CGP)" DATED MAY 3, 2012 INCLUDED IN THE SWPPP.

COVER MANAGEMENT DURING CONSTRUCTION FOR EXPOSED SOIL WILL INCLUDE HAY / STRAW APPLIED AT A RATE OF 2.0 TONS PER ACRE, TEMPORARY SEEDING OF ANNUAL RYE GRASS, AND PERMANENT SEEDING AT THE EARLIES OPPORTUNITY. SEE ADDITIONAL REQUIREMENT FOR STABILIZATION ON THE EROSION AND SEDIMENT CONTROL DETAIL SHEETS, E–101 AND E–102.

THE CONSTRUCTION SCHEDULE WILL BE MANAGED SO THAT ALL STORMWATER STRUCTURES WILL BE BUILT AND STABILIZED PRIOR TO RECEIVING SURFACE WATER RUNOFF. CONTRACTOR TO BE RESPONSIBLE FOR ALL DIVERSIONS DURING CONSTRUCTION AND FOR INTERIM SEDIMENT AND EROSION CONTROL MEASURES.

LEGEND:

- (R) POND PROTECTION
- (P) PERIMETER CONTROL
- (C) RESIDENTIAL/ROADWAY CONSTRUCTION
- IRON PIPE (FND)
- IRON BOUND (FND)
- REBAR (FND)
- UTILITY POLE
- BENCHMARK
- P/C — PERIMETER CONTROL
- SS — FILTREXX SILTSOXX
- TREE LINE

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833–0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac..

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THE INTENT OF THIS PLAN IS TO SHOW THE EASTERN EROSION AND SEDIMENT CONTROL DETAIL.

5.) UNDERGROUND UTILITY LOCATIONS ARE BASED UPON BEST AVAILABLE EVIDENCE AND ARE NOT FIELD VERIFIED. LOCATING AND PROTECTING ANY ABOVE AND BELOW GROUND UTILITIES IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. ANY UTILITY CONFLICTS SHOULD BE REPORTED IMMEDIATELY TO THE DESIGN ENGINEER.

6.) THE CONTRACTOR SHALL CALL AND COORDINATE WITH DIGSAFE AT 1–888–344–7233 AT LEAST 72 HOURS PRIOR TO COMMENCING ANY EXCAVATION ON PUBLIC OR PRIVATE PROPERTY.

7.) ALL DRAINAGE PIPE IS TO BE HDPE N–12. INDIVIDUAL PIPE SIZES ARE SPECIFIED ON GRADING AND DETAIL PLAN SHEETS, GREEN PIPE.

8.) ALL ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. THE DESIGN ENGINEER IS TO BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY. TEMPORARY BENCHMARKS (T.B.M.) ARE TO BE PROVIDED BY THE DESIGN ENGINEER.

NOTES CONTINUED:

9.) UPON FINAL COMPLETION AND 85% STABILIZATION, THE DRAINAGE SYSTEM IS TO BE CLEANED OF ALL DEBRIS. SEDIMENT CONTROL PRACTICES REMOVED AND DISPOSED OF PROPERLY, AND ANNUAL MAINTENANCE PREFORMED ON ALL DRAINAGE PRACTICES.

10.) EROSION AND SEDIMENT CONTROL INSPECTIONS TO BE CONDUCTED ONCE PER EVERY SEVEN DAYS AND AT AN INCREASED FREQUENCY INCLUDING WITHIN 24–HOURS OF A 0.25 INCH RAIN EVENT. INSPECTIONS TO BE CONDUCTED BY A "QUALIFIED PERSON" AS DEFINED BY EPA CGP SECTION 6.3. PLEASE NOTE THAT SPECIFIC STORMWATER, EROSION PREVENTION AND SEDIMENT CONTROL TRAINING AND CERTIFICATION IS REQUIRED. INSPECTION REPORTS TO BE SUBMITTED TO THE CITY OF DOVER, NH, ENGINEERING DEPARTMENT WITHIN 24 HOURS IN ACCORDANCE WITH CGP 4.1.7 AND MAINTAINED BY THE OWNER FOR A PERIOD OF THREE YEARS AFTER THE PROJECT IS COMPLETED. SEE ALSO CITY OF DOVER ADDITIONAL INSPECTION REQUIREMENTS BELOW.

11.) CONTRACTOR AY USE SILT FENCE, SILT SOXX OR MULCH BERM FOR PERIMETER CONTROL.

12.) PER EPA CGP 2.1.2.2 (INSTALL PERIMETER CONTROL), "YOU MUST INSTALL SEDIMENT CONTROLS ALONG THOSE PERIMETER AREAS OF YOUR SITE THAT WILL RECEIVE STORMWATER FROM EARTH DISTURBING ACTIVITIES." AS A RESULT OF SWPPP INSPECTIONS, THE CONTRACTOR MAY HAVE TO EXPAND PERIMETER CONTROLS TO MEET THIS REQUIREMENT. THE E&SC PLAN IS INITIATING GUIDANCE AS TO THE ANTICIPATED REQUIREMENTS AND IT THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT STORMWATER VIOLATION DO NOT OCCUR.

13.) CONTRACTOR IS REQUIRED TO INSTALL A CONSTRUCTION ENTRANCE PRIOR TO ANY EARTH DISTURBING ACTIVITIES.

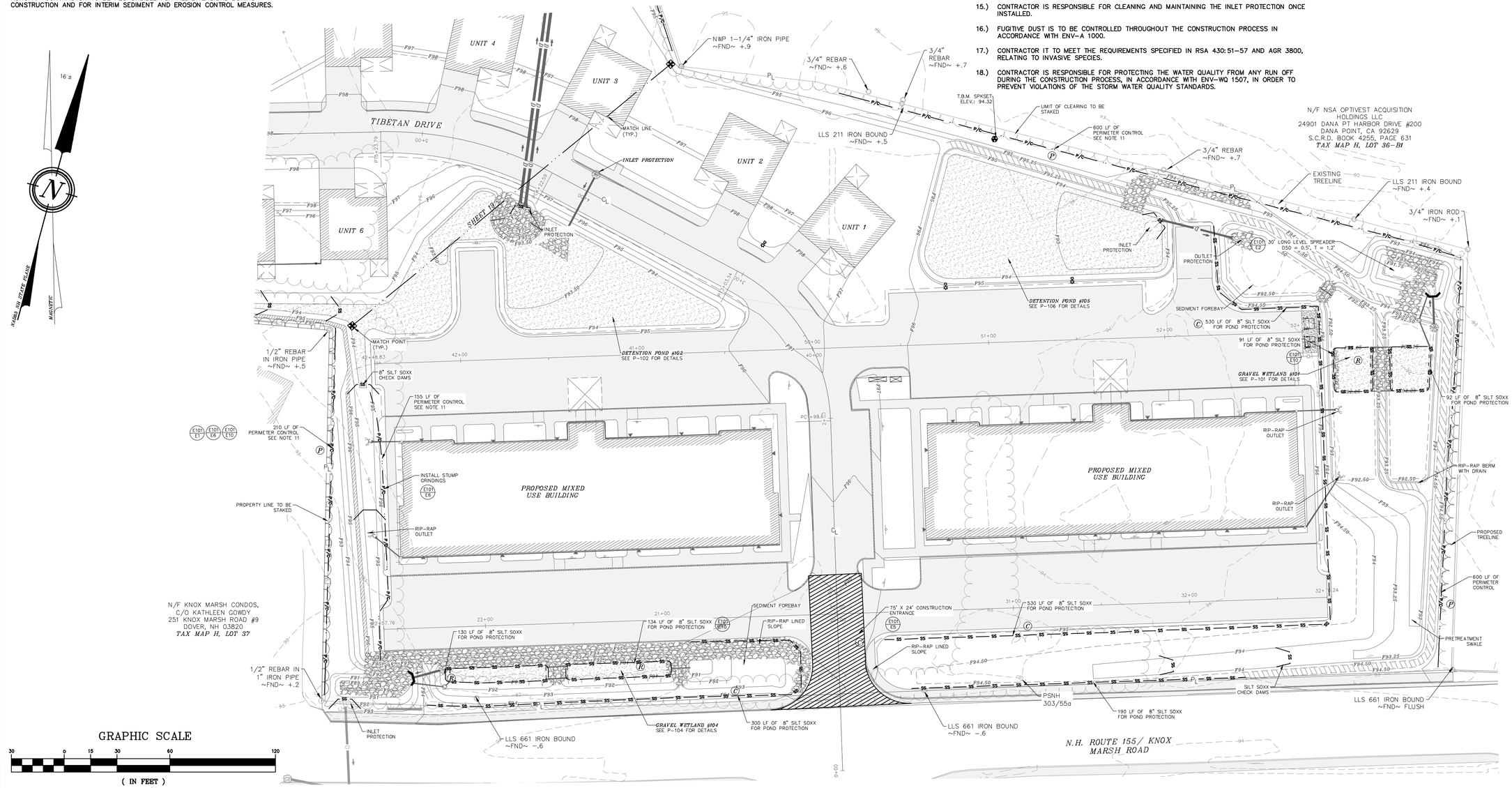
14.) CONTRACTOR IS RESPONSIBLE FOR SWEEPING THE PARKING LOT, SIDEWALKS AND ANYTHING DISTURBED, TO ENSURE THAT NO SEDIMENT IS BEING TRACKED ONTO KNOX MARSH ROAD.

15.) CONTRACTOR IS RESPONSIBLE FOR CLEANING AND MAINTAINING THE INLET PROTECTION ONCE INSTALLED.

16.) FUGITIVE DUST IS TO BE CONTROLLED THROUGHOUT THE CONSTRUCTION PROCESS IN ACCORDANCE WITH ENV–A 1000.

17.) CONTRACTOR IT TO MEET THE REQUIREMENTS SPECIFIED IN RSA 430:51–57 AND AGR 3800, RELATING TO INVASIVE SPECIES.

18.) CONTRACTOR IS RESPONSIBLE FOR PROTECTING THE WATER QUALITY FROM ANY RUN OFF DURING THE CONSTRUCTION PROCESS, IN ACCORDANCE WITH ENV–WQ 1507, IN ORDER TO PREVENT VIOLATIONS OF THE STORM WATER QUALITY STANDARDS.



GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

PLANNING FILE #21–04

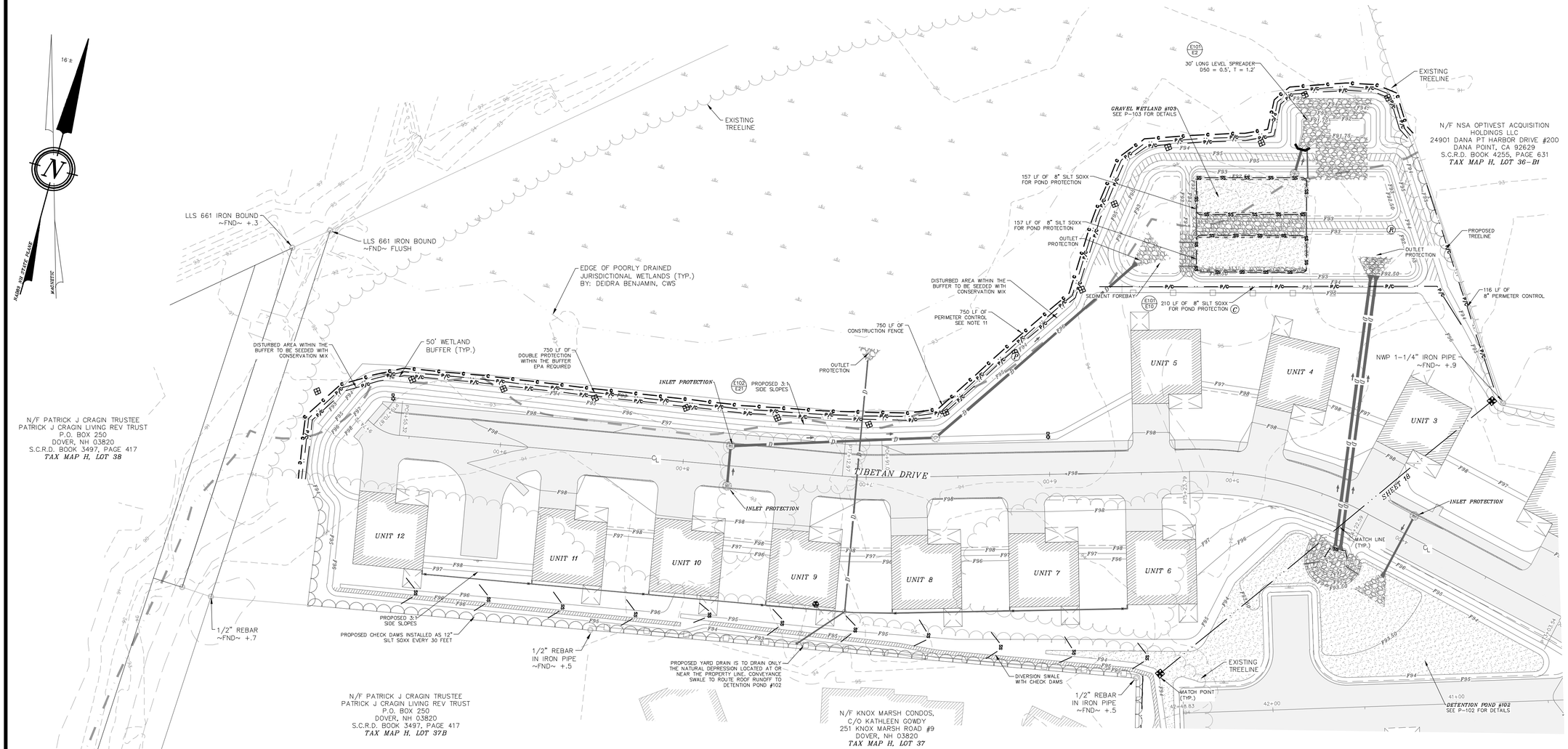
REVISION	DATE	DESCRIPTION
#4	1–28–22	MULTIPLE PLAN SET REVISIONS
#3	8–16–21	REVISED PER TRC COMMENT
#2	7–27–21	REVISED PER TRC COMMENT
#1	5–24–21	REVISED PER TRC COMMENT

EROSION AND SEDIMENT CONTROL PLAN EAST
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332–2863

SCALE : 1 IN. EQUALS 30 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE · KENNETH A. BERRY No. 14747 LICENSED PROFESSIONAL ENGINEER



SOILS & DEWATERING:

WfA	*WINDSOR*	*VARIANT*	*K= 0.17*
WfB	*WINDSOR*	*VARIANT*	*K= 0.17*
WfC	*WINDSOR*	*VARIANT*	*K= 0.17*
BwA	*BUXTON*	*SILT LOAM*	*K= 0.28*
BwB	*BUXTON*	*SILT LOAM*	*K= 0.49*
BwC	*BUXTON*	*SILT LOAM*	*K= 0.49*
ScA-P	*SCANTIC*	*POORLY DRAINED*	*K= 0.49*
ScB-P	*SCANTIC*	*POORLY DRAINED*	*K= 0.43*

SEE SITE SPECIFIC SOILS MAP (SSSM)
SEE WEBSOIL USDA-NRCS
ERODIBILITY FACTOR - K, CPESC MANUAL, ENVIROCERT INTERNATIONAL INC. & ROCKINGHAM COUNTTY SOIL SURVEY, ROCKWEB SOIL ATTRIBUTES.

CONTRACTOR TO BE AWARE OF THE SOIL PROFILES AND ENSURE THAT PROPER EROSION PREVENTION AND SEDIMENT CONTROL MEASURES ARE TAKEN AT ALL TIMES. ANY DEWATERING REQUIREMENTS IN NEW HAMPSHIRE REQUIRE SPECIAL PROVISIONS IN ACCORDANCE WITH THE "CLARIFICATION OF SECTION 9.1.2 (STATE OF NEW HAMPSHIRE CONDITIONS) AND OTHER NH SPECIFIC INFORMATION FOR THE U.S. EPA 2012 NPDES CONSTRUCTION GENERAL PERMIT (CGP)" DATED MAY 3, 2012 INCLUDED IN THE SWPPP.

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LEGEND:

- (R) POND PROTECTION
- (P) PERIMETER CONTROL
- (C) RESIDENTIAL/ROADWAY CONSTRUCTION
- IRON PIPE (FND)
- IRON BOUND (FND)
- REBAR (FND)
- UTILITY POLE
- BENCHMARK
- SF — SILT FENCE
- SS SS SS — FILTREXX SILTSOXX / MULCH BERM TREE LINE

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) THE INTENT OF THIS PLAN IS TO SHOW THE WESTERN EROSION AND SEDIMENT CONTROL DETAIL.

6.) SEE SHEET 15 FOR ALL OTHER STANDARD EROSION AND SEDIMENT CONTROL NOTES.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

EROSION AND SEDIMENT CONTROL PLAN WEST
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

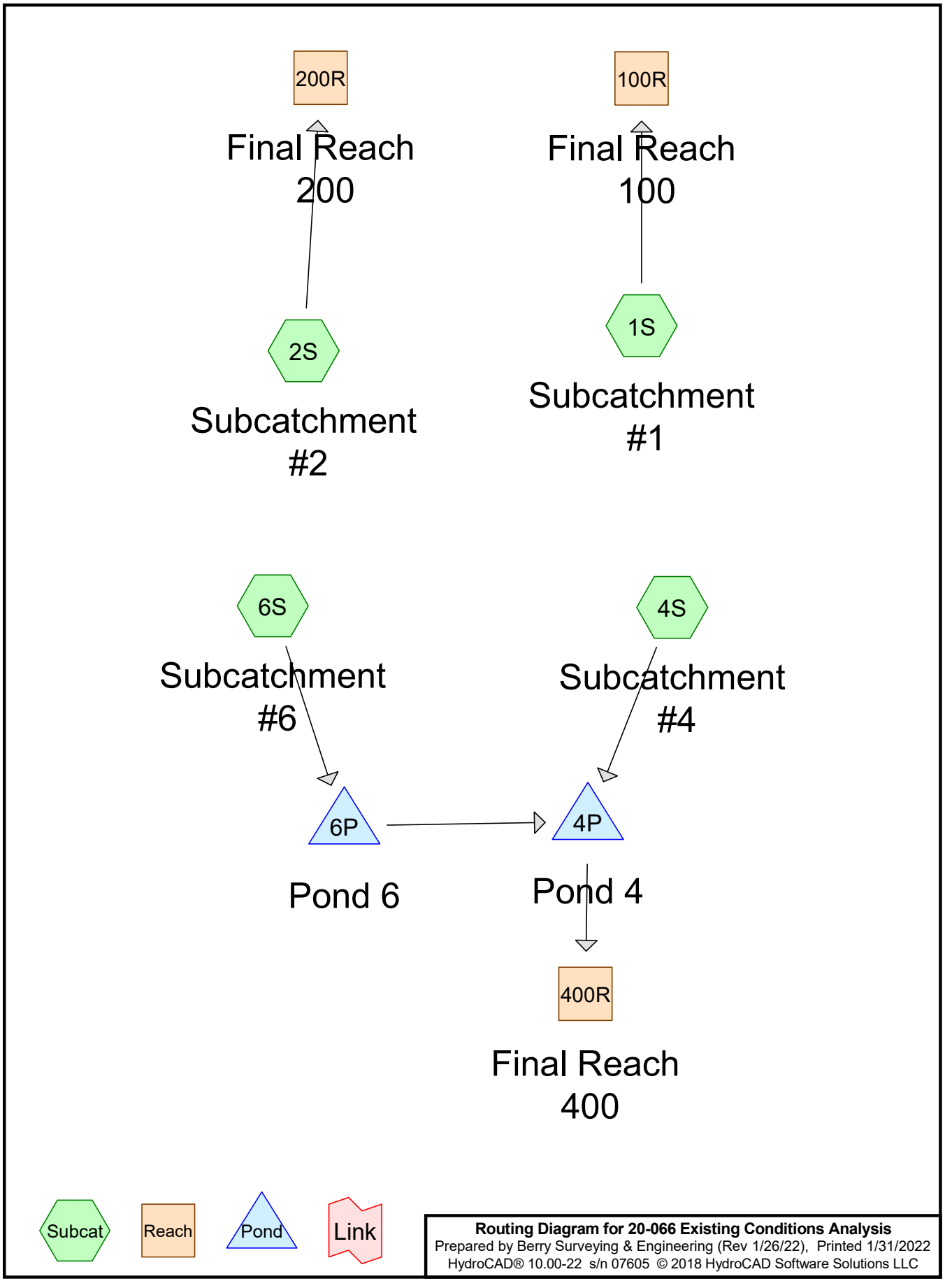
BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 30 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 3424
LICENSED PROFESSIONAL ENGINEER

Appendix I - Existing Conditions Analysis

25 Yr - 24 Hr. Full Summary
2 Yr - 24 Hr. Node Listing
10 Yr -24 Hr. Node Listing
25 Yr - 24 Hr. Node Listing
50 Yr - 24 Hr. Node Listing
100 Yr - 24 Hr. Node Listing



Routing Diagram for 20-066 Existing Conditions Analysis
Prepared by Berry Surveying & Engineering (Rev 1/26/22), Printed 1/31/2022
HydroCAD® 10.00-22 s/n 07605 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.901	39	>75% Grass cover, Good, HSG A (2S, 4S, 6S)
3.488	74	>75% Grass cover, Good, HSG C (1S, 2S, 4S, 6S)
0.036	80	>75% Grass cover, Good, HSG D (2S, 6S)
0.714	98	Paved parking, HSG A (4S, 6S)
0.162	98	Paved parking, HSG C (1S, 2S)
0.186	98	Roofs, HSG A (6S)
0.123	98	Roofs, HSG C (1S, 2S, 6S)
0.800	30	Woods, Good, HSG A (2S, 6S)
1.605	70	Woods, Good, HSG C (1S, 2S, 4S)
0.043	77	Woods, Good, HSG D (6S)
2.662	72	Woods/grass comb., Good, HSG C (1S, 2S)
10.720	**69**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.601	HSG A	2S, 4S, 6S
0.000	HSG B	
8.040	HSG C	1S, 2S, 4S, 6S
0.079	HSG D	2S, 6S
0.000	Other	
10.720		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.901	0.000	3.488	0.036	0.000	4.425	>75% Grass cover, Good	1S, 2S, 4S, 6S
0.714	0.000	0.162	0.000	0.000	0.876	Paved parking	1S, 2S, 4S, 6S
0.186	0.000	0.123	0.000	0.000	0.309	Roofs	1S, 2S, 6S
0.800	0.000	1.605	0.043	0.000	2.449	Woods, Good	1S, 2S, 4S, 6S
0.000	0.000	2.662	0.000	0.000	2.662	Woods/grass comb., Good	1S, 2S
2.601	**0.000**	**8.040**	**0.079**	**0.000**	**10.720**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	4P	89.38	88.00	46.0	0.0300	0.024	15.0	0.0	0.0

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

Subcatchment 1S: Subcatchment #1 Runoff Area=79,230 sf 10.42% Impervious Runoff Depth>4.04"
Flow Length=230' Tc=12.0 min CN=75 Runoff=7.04 cfs 0.612 af

Subcatchment 2S: Subcatchment #2 Runoff Area=263,231 sf 0.62% Impervious Runoff Depth>3.70"
Flow Length=300' Tc=38.1 min CN=72 Runoff=13.30 cfs 1.862 af

Subcatchment 4S: Subcatchment #4 Runoff Area=24,793 sf 38.52% Impervious Runoff Depth>4.25"
Flow Length=100' Slope=0.0210 '/' Tc=9.0 min CN=77 Runoff=2.51 cfs 0.202 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>2.21"
Flow Length=431' Tc=35.4 min CN=57 Runoff=2.96 cfs 0.422 af

Reach 100R: Final Reach 100 Inflow=7.04 cfs 0.612 af
Outflow=7.04 cfs 0.612 af

Reach 200R: Final Reach 200 Inflow=13.30 cfs 1.862 af
Outflow=13.30 cfs 1.862 af

Reach 400R: Final Reach 400 Inflow=3.70 cfs 0.614 af
Outflow=3.70 cfs 0.614 af

Pond 4P: Pond 4 Peak Elev=90.40' Storage=32 cf Inflow=3.70 cfs 0.614 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=3.70 cfs 0.614 af

Pond 6P: Pond 6 Peak Elev=92.12' Storage=766 cf Inflow=2.96 cfs 0.422 af
Outflow=2.95 cfs 0.412 af

Total Runoff Area = 10.720 ac Runoff Volume = 3.098 af Average Runoff Depth = 3.47"
88.95% Pervious = 9.536 ac 11.05% Impervious = 1.185 ac

Summary for Subcatchment 1S: Subcatchment #1

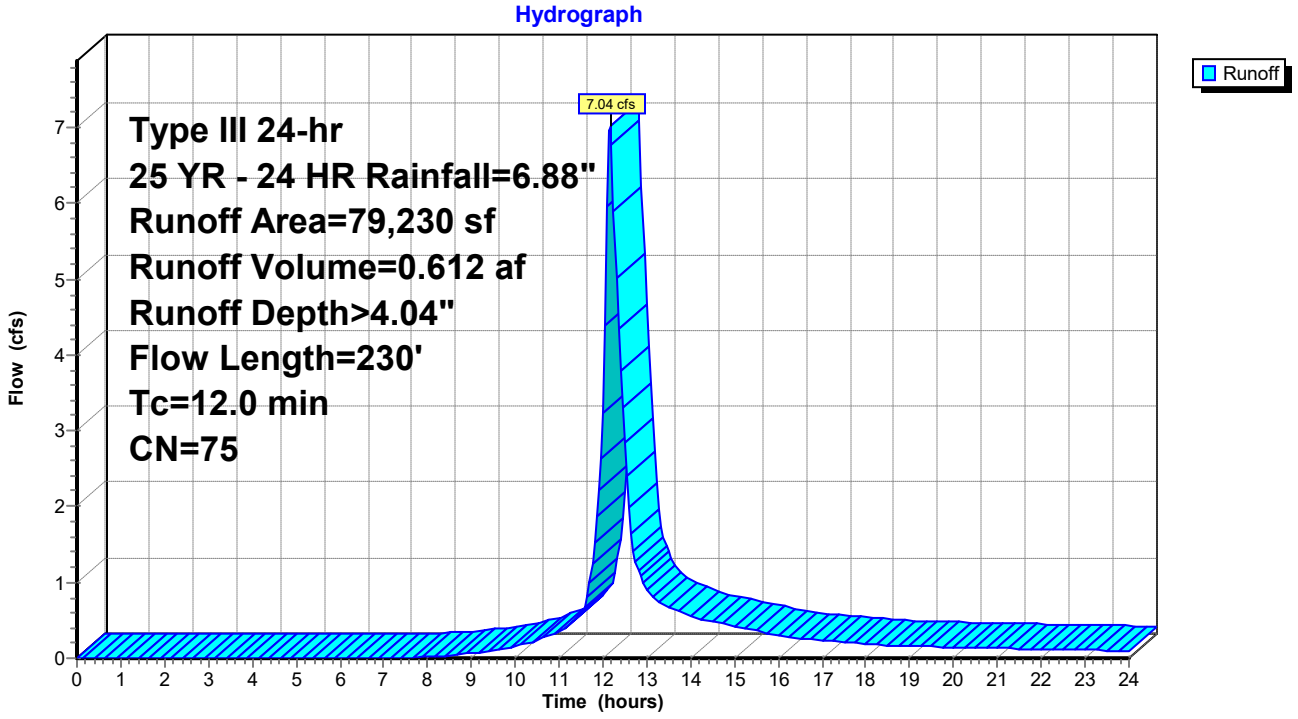
Runoff = 7.04 cfs @ 12.17 hrs, Volume= 0.612 af, Depth> 4.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
1,532	98	Roofs, HSG C
28,276	74	>75% Grass cover, Good, HSG C
6,722	98	Paved parking, HSG C
6,003	70	Woods, Good, HSG C
36,697	72	Woods/grass comb., Good, HSG C
79,230	75	Weighted Average
70,976		89.58% Pervious Area
8,254		10.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.0215	0.19		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.62"
3.1	130	0.0101	0.70		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
12.0	230	Total			

Subcatchment 1S: Subcatchment #1



Summary for Subcatchment 2S: Subcatchment #2

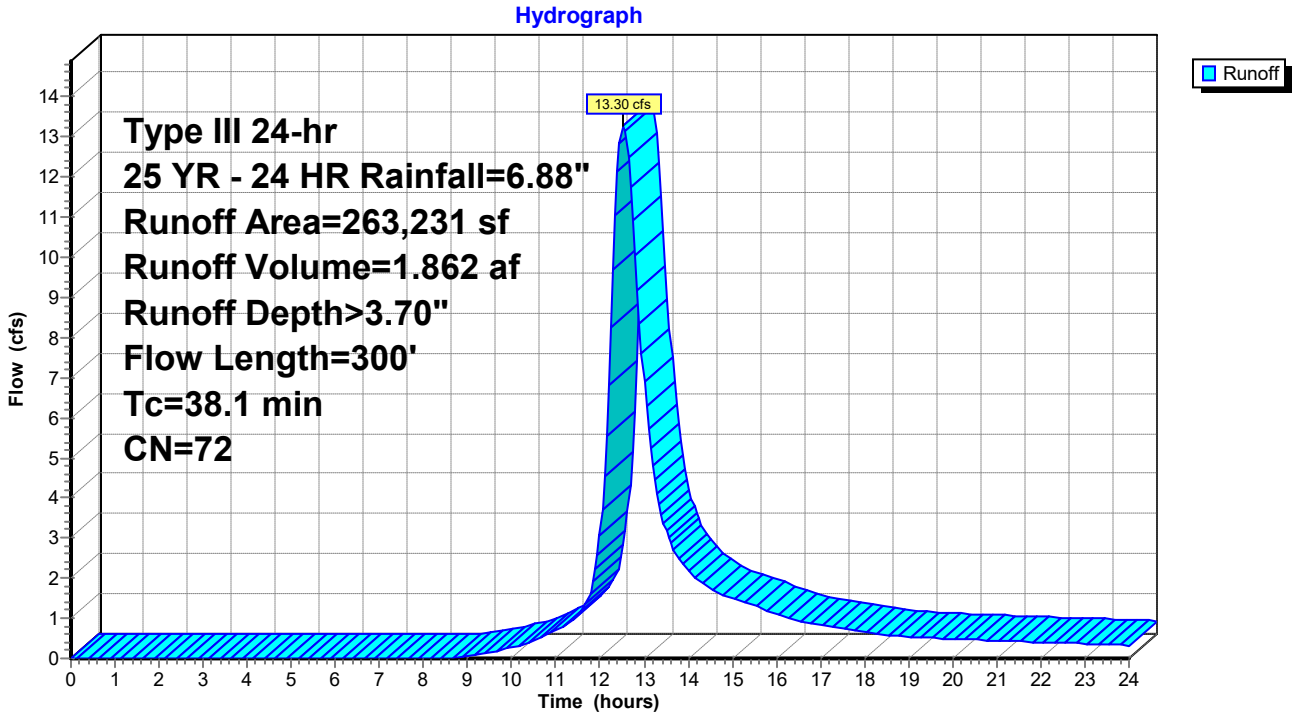
Runoff = 13.30 cfs @ 12.53 hrs, Volume= 1.862 af, Depth> 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

	Area (sf)	CN	Description
*	1,307	98	Roofs, HSG C
*	51,801	74	>75% Grass cover, Good, HSG C
*	338	98	Paved parking, HSG C
*	21,772	70	Woods, Good, HSG C
*	79,263	72	Woods/grass comb., Good, HSG C
*	1,330	80	>75% Grass cover, Good, HSG D
	4,248	39	>75% Grass cover, Good, HSG A
	4,054	30	Woods, Good, HSG A
	66,271	74	>75% Grass cover, Good, HSG C
	32,847	70	Woods, Good, HSG C
	263,231	72	Weighted Average
	261,586		99.38% Pervious Area
	1,645		0.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7	100	0.0065	0.05		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.62"
3.9	82	0.0049	0.35		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
2.5	118	0.0122	0.77		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
38.1	300	Total			

Subcatchment 2S: Subcatchment #2



Summary for Subcatchment 4S: Subcatchment #4

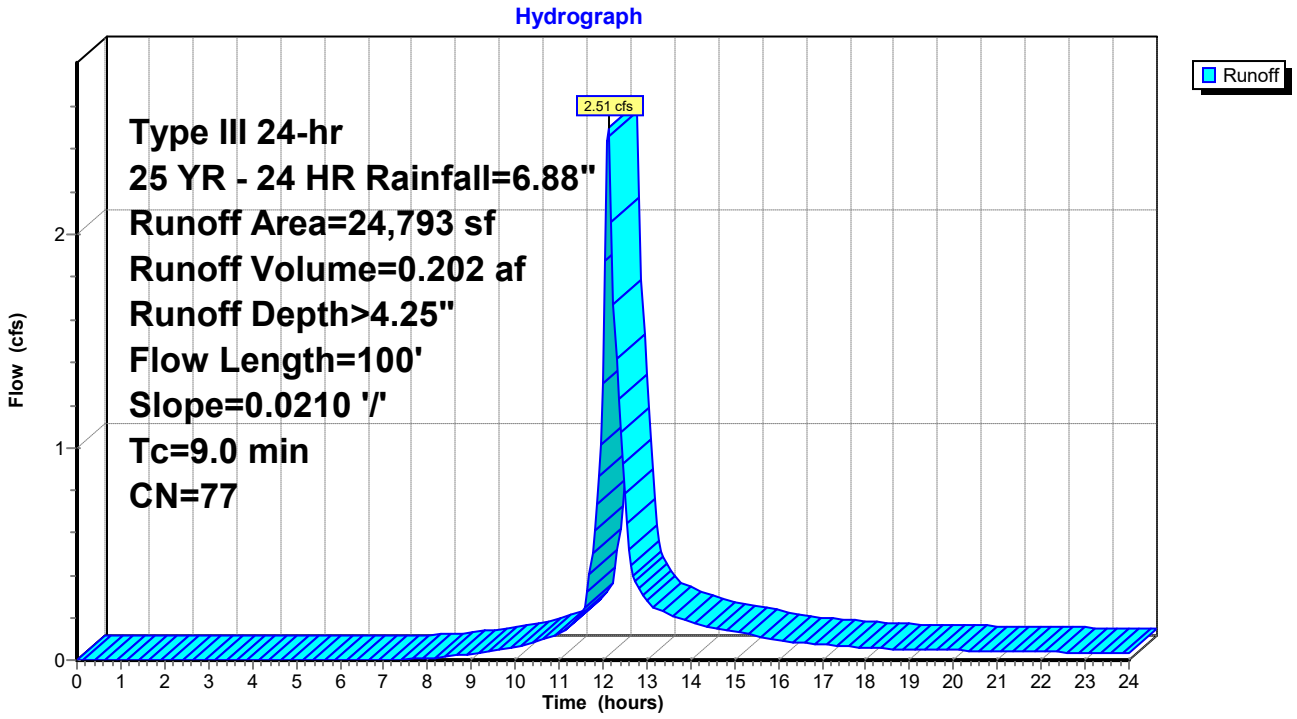
Runoff = 2.51 cfs @ 12.13 hrs, Volume= 0.202 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
3,524	39	>75% Grass cover, Good, HSG A
9,550	98	Paved parking, HSG A
9,302	70	Woods, Good, HSG C
2,417	74	>75% Grass cover, Good, HSG C
24,793	77	Weighted Average
15,243		61.48% Pervious Area
9,550		38.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0210	0.18		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.62"

Subcatchment 4S: Subcatchment #4



Summary for Subcatchment 6S: Subcatchment #6

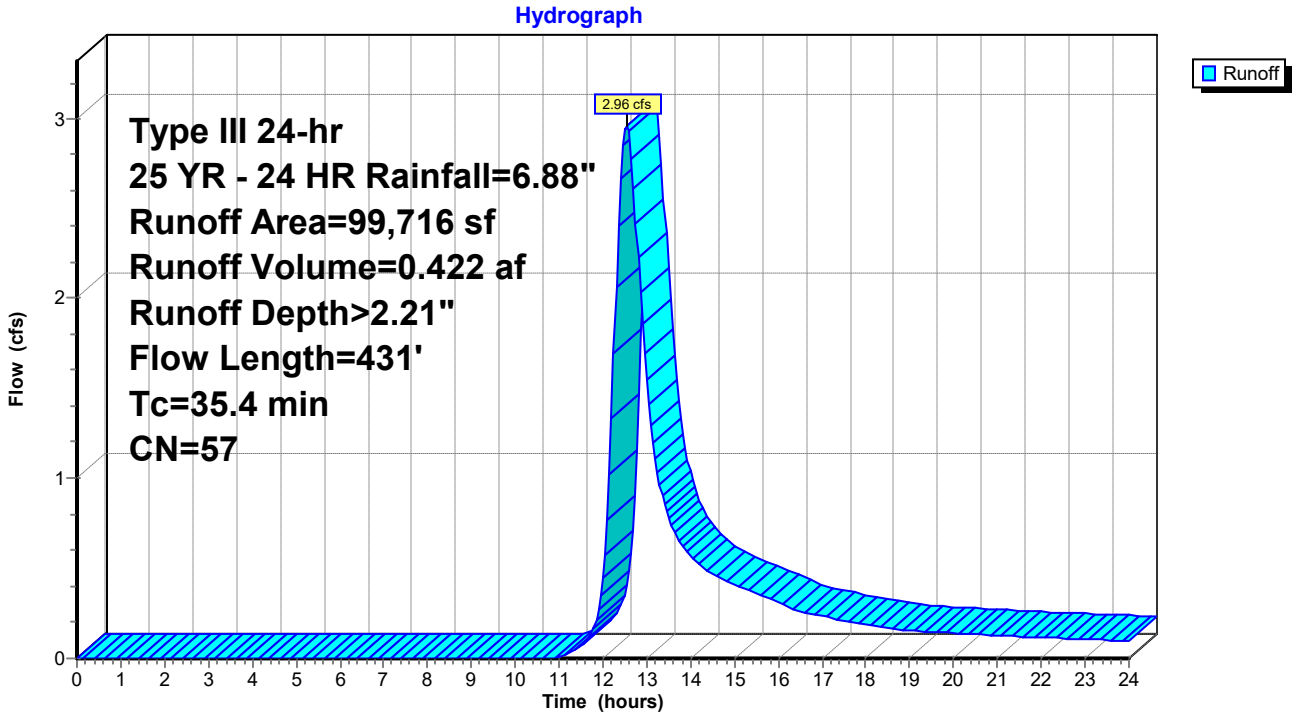
Runoff = 2.96 cfs @ 12.54 hrs, Volume= 0.422 af, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
8,104	98	Roofs, HSG A
21,545	98	Paved parking, HSG A
31,474	39	>75% Grass cover, Good, HSG A
30,806	30	Woods, Good, HSG A
2,499	98	Roofs, HSG C
3,161	74	>75% Grass cover, Good, HSG C
247	80	>75% Grass cover, Good, HSG D
1,880	77	Woods, Good, HSG D
99,716	57	Weighted Average
67,568		67.76% Pervious Area
32,148		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	100	0.0100	0.06		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.62"
2.7	81	0.0100	0.50		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
1.1	48	0.0100	0.70		**Shallow Concentrated Flow, Segment 3** Short Grass Pasture Kv= 7.0 fps
0.6	49	0.0050	1.44		**Shallow Concentrated Flow, Segment 4** Paved Kv= 20.3 fps
4.4	153	0.0070	0.59		**Shallow Concentrated Flow, Segment 5** Short Grass Pasture Kv= 7.0 fps
35.4	431	Total			

Subcatchment 6S: Subcatchment #6



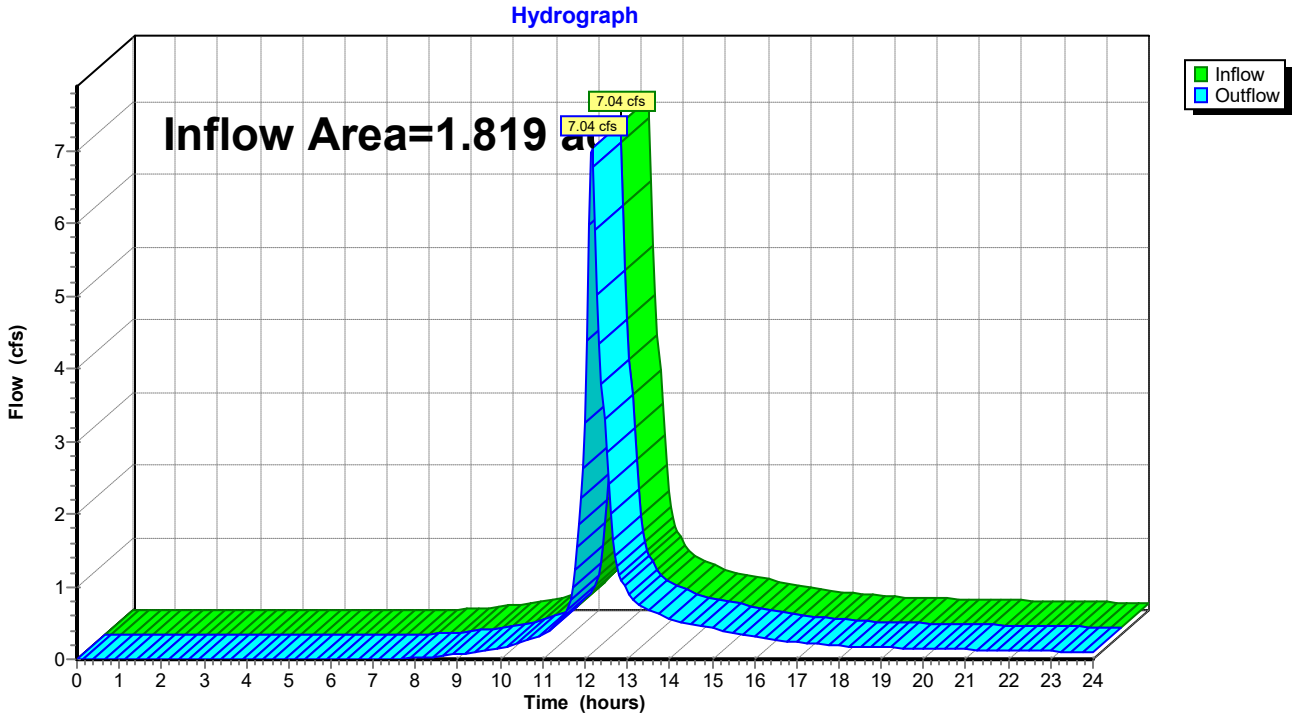
Summary for Reach 100R: Final Reach 100

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.819 ac, 10.42% Impervious, Inflow Depth > 4.04" for 25 YR - 24 HR event
Inflow = 7.04 cfs @ 12.17 hrs, Volume= 0.612 af
Outflow = 7.04 cfs @ 12.17 hrs, Volume= 0.612 af, Atten= 0%, Lag= 0.0 min

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

Reach 100R: Final Reach 100



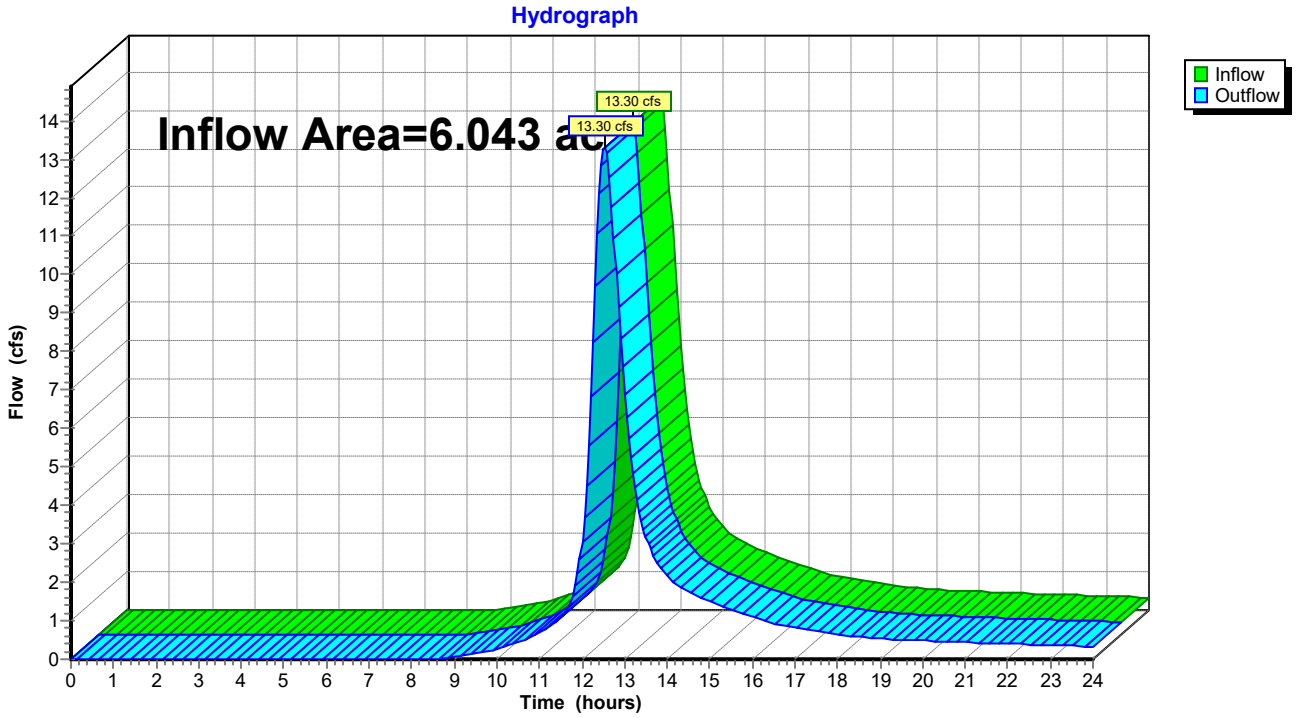
Summary for Reach 200R: Final Reach 200

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.043 ac, 0.62% Impervious, Inflow Depth > 3.70" for 25 YR - 24 HR event
Inflow = 13.30 cfs @ 12.53 hrs, Volume= 1.862 af
Outflow = 13.30 cfs @ 12.53 hrs, Volume= 1.862 af, Atten= 0%, Lag= 0.0 min

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

Reach 200R: Final Reach 200



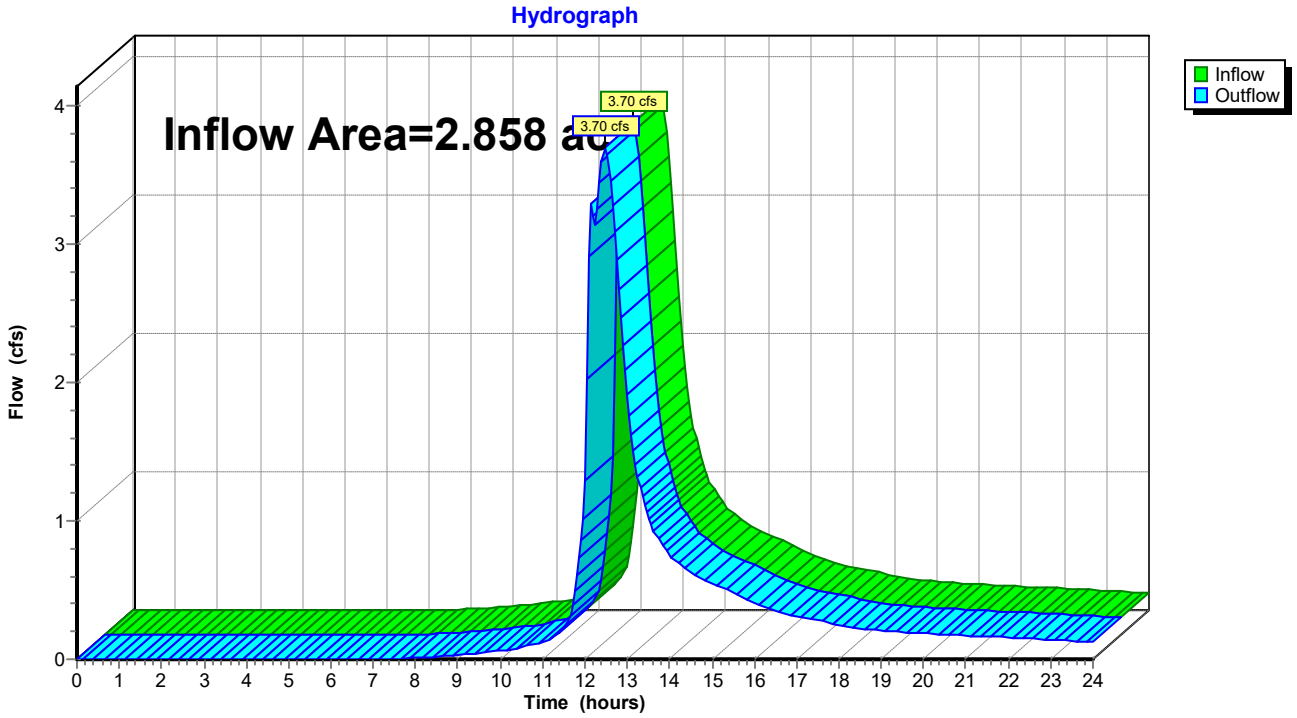
Summary for Reach 400R: Final Reach 400

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.858 ac, 33.49% Impervious, Inflow Depth > 2.58" for 25 YR - 24 HR event
Inflow = 3.70 cfs @ 12.48 hrs, Volume= 0.614 af
Outflow = 3.70 cfs @ 12.48 hrs, Volume= 0.614 af, Atten= 0%, Lag= 0.0 min

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

Reach 400R: Final Reach 400



Summary for Pond 4P: Pond 4

Inflow Area = 2.858 ac, 33.49% Impervious, Inflow Depth > 2.58" for 25 YR - 24 HR event
Inflow = 3.70 cfs @ 12.47 hrs, Volume= 0.614 af
Outflow = 3.70 cfs @ 12.48 hrs, Volume= 0.614 af, Atten= 0%, Lag= 0.3 min
Primary = 3.70 cfs @ 12.48 hrs, Volume= 0.614 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 90.40' @ 12.48 hrs Surf.Area= 86 sf Storage= 32 cf
Flood Elev= 93.50' Surf.Area= 819 sf Storage= 631 cf

Plug-Flow detention time= 0.2 min calculated for 0.612 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (866.5 - 866.4)

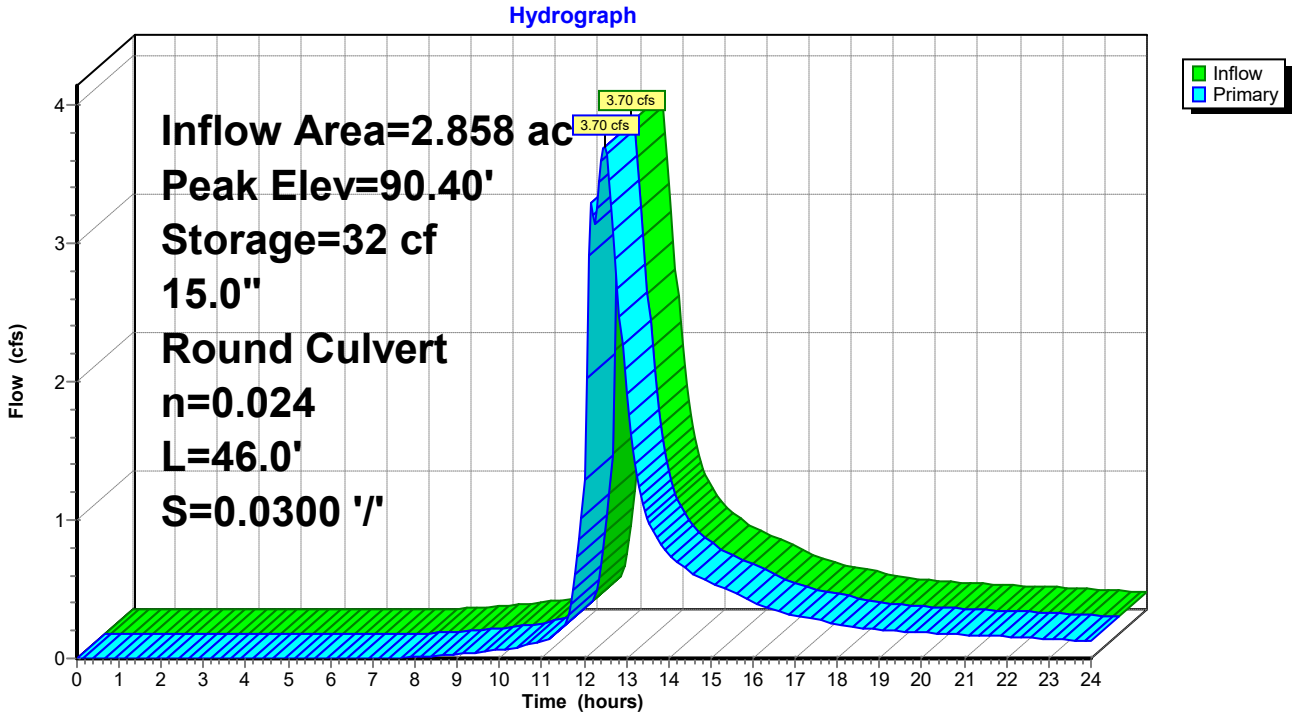
Volume	Invert	Avail.Storage	Storage Description
#1	89.38'	631 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
89.38	10	14.0	0	0	10
90.00	25	32.8	11	11	82
91.00	245	81.2	116	127	524
92.00	819	125.9	504	631	1,268

Device	Routing	Invert	Outlet Devices
#1	Primary	89.38'	**15.0" Round 15" CMP ?** L= 46.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 89.38' / 88.00' S= 0.0300 '/' Cc= 0.900 n= 0.024, Flow Area= 1.23 sf

Primary OutFlow Max=3.69 cfs @ 12.48 hrs HW=90.40' TW=0.00' (Dynamic Tailwater)
↑—**1=15" CMP ?** (Inlet Controls 3.69 cfs @ 3.44 fps)

Pond 4P: Pond 4



Summary for Pond 6P: Pond 6

Inflow Area = 2.289 ac, 32.24% Impervious, Inflow Depth > 2.21" for 25 YR - 24 HR event
Inflow = 2.96 cfs @ 12.54 hrs, Volume= 0.422 af
Outflow = 2.95 cfs @ 12.56 hrs, Volume= 0.412 af, Atten= 0%, Lag= 1.4 min
Primary = 2.95 cfs @ 12.56 hrs, Volume= 0.412 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 92.12' @ 12.56 hrs Surf.Area= 3,110 sf Storage= 766 cf
Flood Elev= 93.00' Surf.Area= 3,110 sf Storage= 3,515 cf

Plug-Flow detention time= 19.1 min calculated for 0.412 af (98% of inflow)
Center-of-Mass det. time= 6.3 min (890.2 - 883.8)

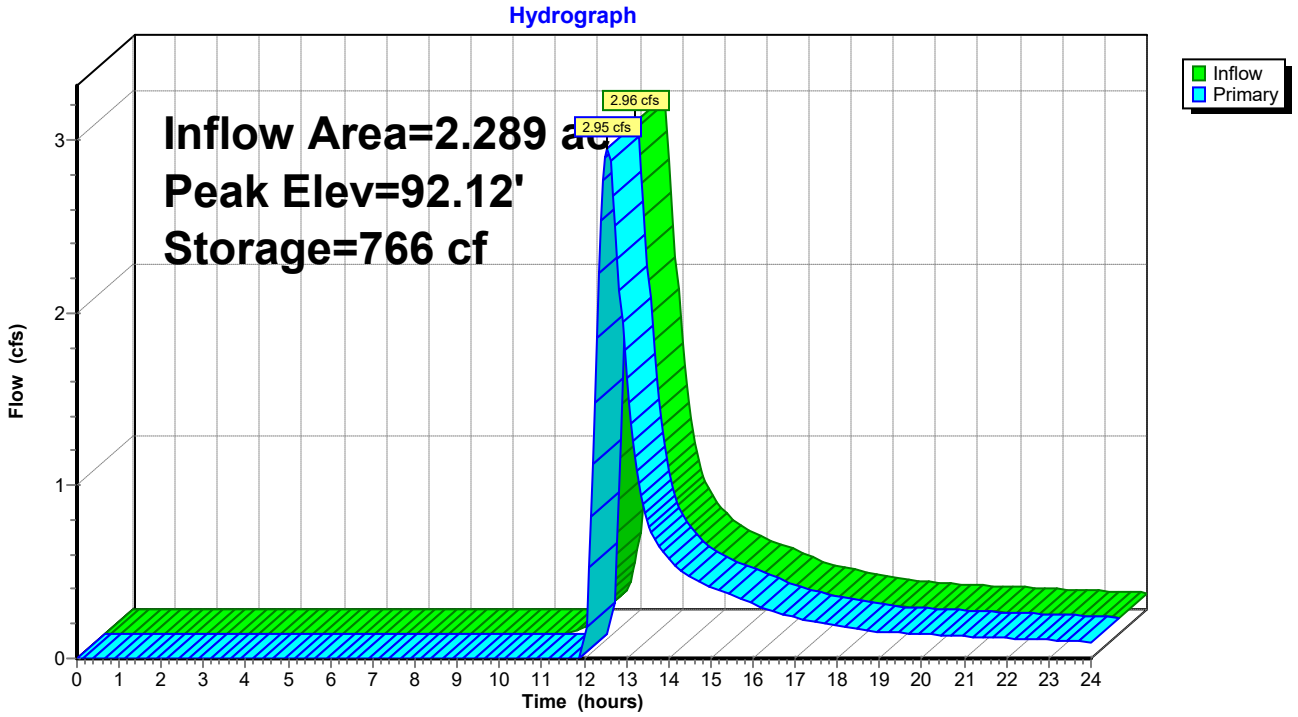
Volume	Invert	Avail.Storage	Storage Description
#1	91.75'	3,515 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
91.75	500	100.0	0	0	500
92.00	3,110	237.0	405	405	4,174
93.00	3,110	237.0	3,110	3,515	4,411

Device	Routing	Invert	Outlet Devices
#1	Primary	92.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=2.95 cfs @ 12.56 hrs HW=92.12' TW=90.38' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.95 cfs @ 0.85 fps)

Pond 6P: Pond 6



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

Subcatchment 1S: Subcatchment #1 Runoff Area=79,230 sf 10.42% Impervious Runoff Depth>1.37"
Flow Length=230' Tc=12.0 min CN=75 Runoff=2.30 cfs 0.208 af

Subcatchment 2S: Subcatchment #2 Runoff Area=263,231 sf 0.62% Impervious Runoff Depth>1.17"
Flow Length=300' Tc=38.1 min CN=72 Runoff=4.02 cfs 0.592 af

Subcatchment 4S: Subcatchment #4 Runoff Area=24,793 sf 38.52% Impervious Runoff Depth>1.50"
Flow Length=100' Slope=0.0210 '/' Tc=9.0 min CN=77 Runoff=0.88 cfs 0.071 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>0.45"
Flow Length=431' Tc=35.4 min CN=57 Runoff=0.41 cfs 0.085 af

Reach 100R: Final Reach 100 Inflow=2.30 cfs 0.208 af
Outflow=2.30 cfs 0.208 af

Reach 200R: Final Reach 200 Inflow=4.02 cfs 0.592 af
Outflow=4.02 cfs 0.592 af

Reach 400R: Final Reach 400 Inflow=0.88 cfs 0.147 af
Outflow=0.88 cfs 0.147 af

Pond 4P: Pond 4 Peak Elev=89.82' Storage=6 cf Inflow=0.88 cfs 0.147 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=0.88 cfs 0.147 af

Pond 6P: Pond 6 Peak Elev=92.03' Storage=497 cf Inflow=0.41 cfs 0.085 af
Outflow=0.38 cfs 0.076 af

Total Runoff Area = 10.720 ac Runoff Volume = 0.956 af Average Runoff Depth = 1.07"
88.95% Pervious = 9.536 ac 11.05% Impervious = 1.185 ac

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

Subcatchment 1S: Subcatchment #1 Runoff Area=79,230 sf 10.42% Impervious Runoff Depth>2.80"
Flow Length=230' Tc=12.0 min CN=75 Runoff=4.88 cfs 0.425 af

Subcatchment 2S: Subcatchment #2 Runoff Area=263,231 sf 0.62% Impervious Runoff Depth>2.52"
Flow Length=300' Tc=38.1 min CN=72 Runoff=9.00 cfs 1.269 af

Subcatchment 4S: Subcatchment #4 Runoff Area=24,793 sf 38.52% Impervious Runoff Depth>2.99"
Flow Length=100' Slope=0.0210 '/' Tc=9.0 min CN=77 Runoff=1.77 cfs 0.142 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>1.33"
Flow Length=431' Tc=35.4 min CN=57 Runoff=1.67 cfs 0.254 af

Reach 100R: Final Reach 100 Inflow=4.88 cfs 0.425 af
Outflow=4.88 cfs 0.425 af

Reach 200R: Final Reach 200 Inflow=9.00 cfs 1.269 af
Outflow=9.00 cfs 1.269 af

Reach 400R: Final Reach 400 Inflow=2.17 cfs 0.386 af
Outflow=2.17 cfs 0.386 af

Pond 4P: Pond 4 Peak Elev=90.11' Storage=14 cf Inflow=2.16 cfs 0.386 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=2.17 cfs 0.386 af

Pond 6P: Pond 6 Peak Elev=92.08' Storage=651 cf Inflow=1.67 cfs 0.254 af
Outflow=1.66 cfs 0.244 af

Total Runoff Area = 10.720 ac Runoff Volume = 2.090 af Average Runoff Depth = 2.34"
88.95% Pervious = 9.536 ac 11.05% Impervious = 1.185 ac

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

Subcatchment 1S: Subcatchment #1 Runoff Area=79,230 sf 10.42% Impervious Runoff Depth>4.04"
Flow Length=230' Tc=12.0 min CN=75 Runoff=7.04 cfs 0.612 af

Subcatchment 2S: Subcatchment #2 Runoff Area=263,231 sf 0.62% Impervious Runoff Depth>3.70"
Flow Length=300' Tc=38.1 min CN=72 Runoff=13.30 cfs 1.862 af

Subcatchment 4S: Subcatchment #4 Runoff Area=24,793 sf 38.52% Impervious Runoff Depth>4.25"
Flow Length=100' Slope=0.0210 '/' Tc=9.0 min CN=77 Runoff=2.51 cfs 0.202 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>2.21"
Flow Length=431' Tc=35.4 min CN=57 Runoff=2.96 cfs 0.422 af

Reach 100R: Final Reach 100 Inflow=7.04 cfs 0.612 af
Outflow=7.04 cfs 0.612 af

Reach 200R: Final Reach 200 Inflow=13.30 cfs 1.862 af
Outflow=13.30 cfs 1.862 af

Reach 400R: Final Reach 400 Inflow=3.70 cfs 0.614 af
Outflow=3.70 cfs 0.614 af

Pond 4P: Pond 4 Peak Elev=90.40' Storage=32 cf Inflow=3.70 cfs 0.614 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=3.70 cfs 0.614 af

Pond 6P: Pond 6 Peak Elev=92.12' Storage=766 cf Inflow=2.96 cfs 0.422 af
Outflow=2.95 cfs 0.412 af

Total Runoff Area = 10.720 ac Runoff Volume = 3.098 af Average Runoff Depth = 3.47"
88.95% Pervious = 9.536 ac 11.05% Impervious = 1.185 ac

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

Subcatchment 1S: Subcatchment #1 Runoff Area=79,230 sf 10.42% Impervious Runoff Depth>5.24"
Flow Length=230' Tc=12.0 min CN=75 Runoff=9.11 cfs 0.794 af

Subcatchment 2S: Subcatchment #2 Runoff Area=263,231 sf 0.62% Impervious Runoff Depth>4.86"
Flow Length=300' Tc=38.1 min CN=72 Runoff=17.49 cfs 2.448 af

Subcatchment 4S: Subcatchment #4 Runoff Area=24,793 sf 38.52% Impervious Runoff Depth>5.48"
Flow Length=100' Slope=0.0210 '/' Tc=9.0 min CN=77 Runoff=3.21 cfs 0.260 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>3.14"
Flow Length=431' Tc=35.4 min CN=57 Runoff=4.32 cfs 0.599 af

Reach 100R: Final Reach 100 Inflow=9.11 cfs 0.794 af
Outflow=9.11 cfs 0.794 af

Reach 200R: Final Reach 200 Inflow=17.49 cfs 2.448 af
Outflow=17.49 cfs 2.448 af

Reach 400R: Final Reach 400 Inflow=5.28 cfs 0.848 af
Outflow=5.28 cfs 0.848 af

Pond 4P: Pond 4 Peak Elev=90.80' Storage=84 cf Inflow=5.28 cfs 0.848 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=5.28 cfs 0.848 af

Pond 6P: Pond 6 Peak Elev=92.15' Storage=869 cf Inflow=4.32 cfs 0.599 af
Outflow=4.31 cfs 0.589 af

Total Runoff Area = 10.720 ac Runoff Volume = 4.100 af Average Runoff Depth = 4.59"
88.95% Pervious = 9.536 ac 11.05% Impervious = 1.185 ac

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

Subcatchment 1S: Subcatchment #1 Runoff Area=79,230 sf 10.42% Impervious Runoff Depth>6.72"
Flow Length=230' Tc=12.0 min CN=75 Runoff=11.60 cfs 1.018 af

Subcatchment 2S: Subcatchment #2 Runoff Area=263,231 sf 0.62% Impervious Runoff Depth>6.30"
Flow Length=300' Tc=38.1 min CN=72 Runoff=22.58 cfs 3.171 af

Subcatchment 4S: Subcatchment #4 Runoff Area=24,793 sf 38.52% Impervious Runoff Depth>6.98"
Flow Length=100' Slope=0.0210 '/' Tc=9.0 min CN=77 Runoff=4.06 cfs 0.331 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>4.34"
Flow Length=431' Tc=35.4 min CN=57 Runoff=6.06 cfs 0.827 af

Reach 100R: Final Reach 100 Inflow=11.60 cfs 1.018 af
Outflow=11.60 cfs 1.018 af

Reach 200R: Final Reach 200 Inflow=22.58 cfs 3.171 af
Outflow=22.58 cfs 3.171 af

Reach 400R: Final Reach 400 Inflow=7.03 cfs 1.148 af
Outflow=7.03 cfs 1.148 af

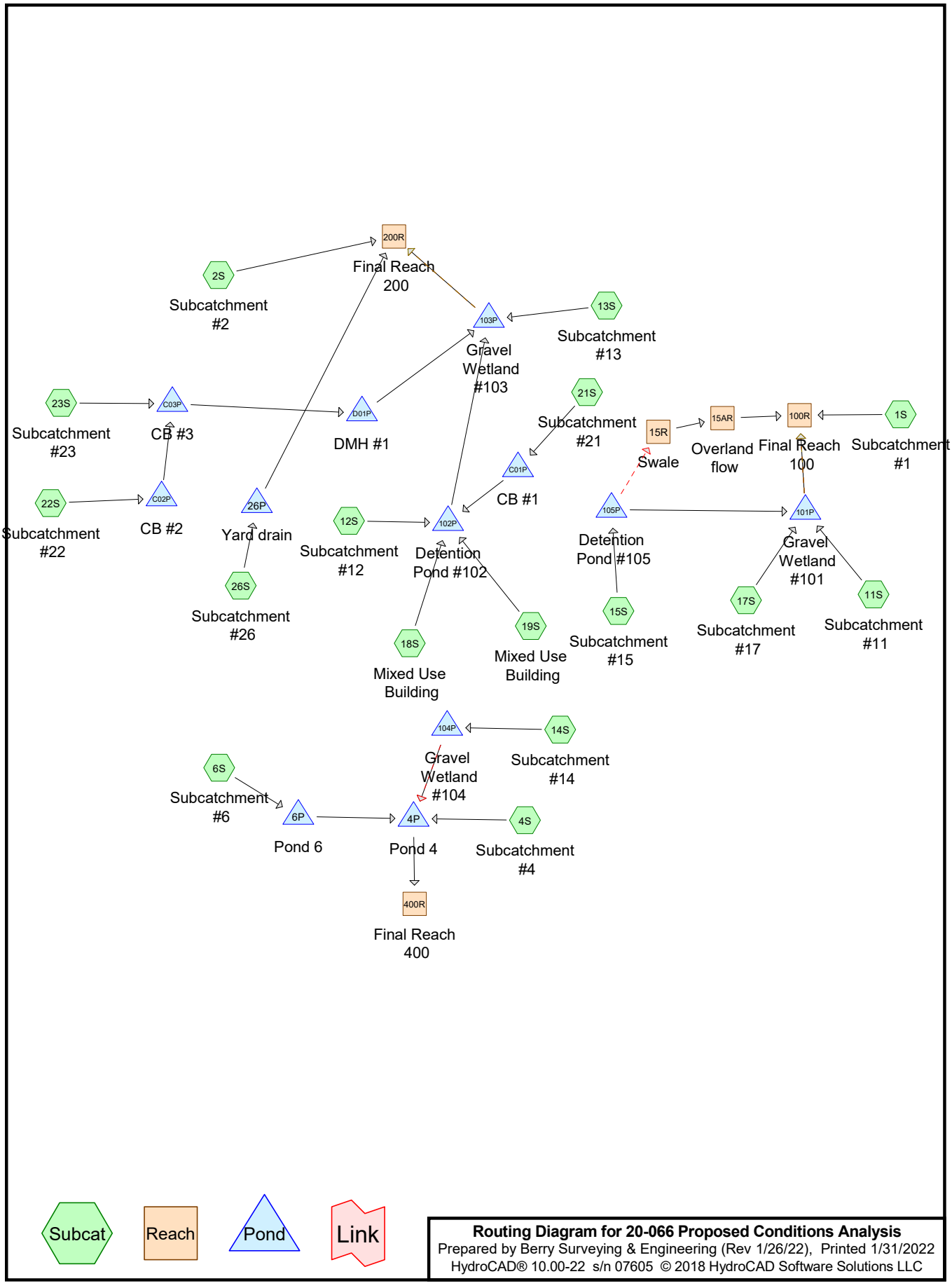
Pond 4P: Pond 4 Peak Elev=91.88' Storage=537 cf Inflow=7.30 cfs 1.148 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=7.03 cfs 1.148 af

Pond 6P: Pond 6 Peak Elev=92.19' Storage=987 cf Inflow=6.06 cfs 0.827 af
Outflow=6.05 cfs 0.817 af

Total Runoff Area = 10.720 ac Runoff Volume = 5.347 af Average Runoff Depth = 5.99"
88.95% Pervious = 9.536 ac 11.05% Impervious = 1.185 ac

Appendix II - Proposed Conditions Analysis

25 Yr - 24 Hr. Full Summary
2 Yr - 24 Hr. Node Listing
10 Yr - 24 Hr. Node Listing
25 Yr – 24 Hr. Node Listing
50 Yr - 24 Hr. Node Listing
100 Yr - 24 Hr. Ponds Only



Routing Diagram for 20-066 Proposed Conditions Analysis

Prepared by Berry Surveying & Engineering (Rev 1/26/22), Printed 1/31/2022

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.867	39	>75% Grass cover, Good, HSG A (1S, 4S, 6S, 26S)
4.215	74	>75% Grass cover, Good, HSG C (1S, 2S, 4S, 6S, 11S, 12S, 13S, 14S, 15S, 21S, 22S, 26S)
0.011	80	>75% Grass cover, Good, HSG D (6S, 12S, 22S)
0.044	96	Gravel surface, HSG C (12S, 15S)
0.748	98	Paved parking, HSG A (1S, 4S, 6S, 14S)
2.139	98	Paved parking, HSG C (1S, 11S, 12S, 14S, 15S, 21S, 22S, 23S)
0.006	98	Paved parking, HSG D (22S)
0.186	98	Roofs, HSG A (6S)
0.904	98	Roofs, HSG C (6S, 15S, 17S, 18S, 19S, 21S, 22S)
0.010	98	Roofs, HSG D (22S)
0.217	98	Unconnected roofs, HSG C (12S, 13S)
0.009	98	Unconnected roofs, HSG D (12S)
0.800	30	Woods, Good, HSG A (6S, 26S)
0.522	70	Woods, Good, HSG C (1S, 2S, 4S, 26S)
0.043	77	Woods, Good, HSG D (6S)
10.720	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.601	HSG A	1S, 4S, 6S, 14S, 26S
0.000	HSG B	
8.040	HSG C	1S, 2S, 4S, 6S, 11S, 12S, 13S, 14S, 15S, 17S, 18S, 19S, 21S, 22S, 23S, 26S
0.079	HSG D	6S, 12S, 22S
0.000	Other	
10.720		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.867	0.000	4.215	0.011	0.000	5.092	>75% Grass cover, Good	1S, 2S, 4S, 6S, 11S, 12S, 13S, 14S, 15S, 21S, 22S, 26S
0.000	0.000	0.044	0.000	0.000	0.044	Gravel surface	12S, 15S
0.748	0.000	2.139	0.006	0.000	2.892	Paved parking	1S, 4S, 6S, 11S, 12S, 14S, 15S, 21S, 22S, 23S
0.186	0.000	0.904	0.010	0.000	1.100	Roofs	6S, 15S, 17S, 18S, 19S, 21S, 22S
0.000	0.000	0.217	0.009	0.000	0.227	Unconnected roofs	12S, 13S
0.800	0.000	0.522	0.043	0.000	1.366	Woods, Good	1S, 2S, 4S, 6S, 26S
2.601	**0.000**	**8.040**	**0.079**	**0.000**	**10.720**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	4P	89.38	88.00	46.0	0.0300	0.024	15.0	0.0	0.0
2	26P	92.00	92.00	162.5	0.0000	0.012	6.0	0.0	0.0
3	101P	91.92	91.75	14.5	0.0117	0.010	6.0	0.0	0.0
4	101P	91.92	91.75	16.0	0.0106	0.010	12.0	0.0	0.0
5	102P	93.25	92.50	145.0	0.0052	0.012	18.0	0.0	0.0
6	103P	91.92	91.75	16.0	0.0106	0.012	6.0	0.0	0.0
7	103P	91.92	91.75	12.0	0.0142	0.012	15.0	0.0	0.0
8	104P	90.33	90.00	17.5	0.0189	0.012	6.0	0.0	0.0
9	104P	90.33	90.00	16.0	0.0206	0.012	12.0	0.0	0.0
10	105P	92.75	92.50	37.5	0.0067	0.012	12.0	0.0	0.0
11	C01P	93.75	93.50	35.0	0.0071	0.012	12.0	0.0	0.0
12	C02P	94.03	93.94	18.0	0.0050	0.012	15.0	0.0	0.0
13	C03P	93.84	93.30	107.3	0.0050	0.012	15.0	0.0	0.0
14	D01P	93.20	92.50	140.0	0.0050	0.012	15.0	0.0	0.0

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

Subcatchment 1S: Subcatchment #1 Runoff Area=21,582 sf 38.16% Impervious Runoff Depth>4.69"
Tc=6.0 min CN=81 Runoff=2.64 cfs 0.194 af

Subcatchment 2S: Subcatchment #2 Runoff Area=55,925 sf 0.00% Impervious Runoff Depth>3.81"
Flow Length=251' Tc=29.9 min CN=73 Runoff=3.26 cfs 0.408 af

Subcatchment 4S: Subcatchment #4 Runoff Area=10,745 sf 50.29% Impervious Runoff Depth>4.69"
Flow Length=150' Tc=9.0 min CN=81 Runoff=1.19 cfs 0.096 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>2.21"
Flow Length=431' Tc=35.4 min CN=57 Runoff=2.96 cfs 0.422 af

Subcatchment 11S: Subcatchment #11 Runoff Area=49,435 sf 36.91% Impervious Runoff Depth>4.91"
Tc=6.0 min CN=83 Runoff=6.28 cfs 0.464 af

Subcatchment 12S: Subcatchment #12 Runoff Area=67,086 sf 45.45% Impervious Runoff Depth>5.12"
Flow Length=186' Slope=0.0070 '/' Tc=16.4 min CN=85 Runoff=6.61 cfs 0.658 af

Subcatchment 13S: Subcatchment #13 Runoff Area=23,260 sf 11.09% Impervious Runoff Depth>4.04"
Flow Length=114' Slope=0.0100 '/' Tc=12.5 min UI Adjusted CN=75 Runoff=2.04 cfs 0.180 af

Subcatchment 14S: Subcatchment #14 Runoff Area=23,020 sf 56.11% Impervious Runoff Depth>5.36"
Tc=6.0 min CN=87 Runoff=3.13 cfs 0.236 af

Subcatchment 15S: Subcatchment #15 Runoff Area=37,000 sf 46.13% Impervious Runoff Depth>5.13"
Flow Length=149' Slope=0.0100 '/' Tc=13.4 min CN=85 Runoff=3.91 cfs 0.363 af

Subcatchment 17S: Subcatchment #17 Runoff Area=13,584 sf 100.00% Impervious Runoff Depth>6.64"
Tc=6.0 min CN=98 Runoff=2.06 cfs 0.172 af

Subcatchment 18S: Mixed Use Building Runoff Area=7,390 sf 100.00% Impervious Runoff Depth>6.64"
Tc=6.0 min CN=98 Runoff=1.12 cfs 0.094 af

Subcatchment 19S: Mixed Use Building Runoff Area=6,194 sf 100.00% Impervious Runoff Depth>6.64"
Tc=6.0 min CN=98 Runoff=0.94 cfs 0.079 af

Subcatchment 21S: Subcatchment #21 Runoff Area=14,270 sf 71.65% Impervious Runoff Depth>5.82"
Tc=6.0 min CN=91 Runoff=2.05 cfs 0.159 af

Subcatchment 22S: Subcatchment #22 Runoff Area=18,796 sf 68.35% Impervious Runoff Depth>5.70"
Flow Length=202' Tc=8.4 min CN=90 Runoff=2.48 cfs 0.205 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,434 sf 100.00% Impervious Runoff Depth>6.64"
Tc=6.0 min CN=98 Runoff=0.97 cfs 0.082 af

Subcatchment 26S: Subcatchment #26 Runoff Area=12,543 sf 0.00% Impervious Runoff Depth>1.41"
Flow Length=305' Slope=0.0100 '/' Tc=31.4 min CN=48 Runoff=0.22 cfs 0.034 af

Reach 15AR: Overland flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=30.0' S=0.0167 '/' Capacity=158.86 cfs Outflow=0.00 cfs 0.000 af

Reach 15R: Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=70.0' S=0.0071 '/' Capacity=31.36 cfs Outflow=0.00 cfs 0.000 af

Reach 100R: Final Reach 100 Inflow=3.95 cfs 0.979 af
Outflow=3.95 cfs 0.979 af

Reach 200R: Final Reach 200 Inflow=11.07 cfs 1.700 af
Outflow=11.07 cfs 1.700 af

Reach 400R: Final Reach 400 Inflow=3.46 cfs 0.659 af
Outflow=3.46 cfs 0.659 af

Pond 4P: Pond 4 Peak Elev=90.36' Storage=144 cf Inflow=3.46 cfs 0.659 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=3.46 cfs 0.659 af

Pond 6P: Pond 6 Peak Elev=92.12' Storage=766 cf Inflow=2.96 cfs 0.422 af
Outflow=2.95 cfs 0.412 af

Pond 26P: Yard drain Peak Elev=94.07' Storage=1 cf Inflow=0.22 cfs 0.034 af
Outflow=0.22 cfs 0.034 af

Pond 101P: Gravel Wetland #101 Peak Elev=94.01' Storage=14,945 cf Inflow=8.76 cfs 0.966 af
Primary=0.11 cfs 0.133 af Secondary=3.07 cfs 0.652 af Tertiary=0.02 cfs 0.000 af Outflow=3.20 cfs 0.785 af

Pond 102P: Detention Pond #102 Peak Elev=94.58' Storage=8,075 cf Inflow=9.14 cfs 0.989 af
18.0" Round Culvert x 2.00 n=0.012 L=145.0' S=0.0052 '/' Outflow=5.31 cfs 0.984 af

Pond 103P: Gravel Wetland #103 Peak Elev=94.32' Storage=15,656 cf Inflow=9.27 cfs 1.450 af
Primary=0.19 cfs 0.230 af Secondary=6.22 cfs 1.000 af Tertiary=1.19 cfs 0.028 af Outflow=7.60 cfs 1.258 af

Pond 104P: Gravel Wetland #104 Peak Elev=93.25' Storage=6,195 cf Inflow=3.13 cfs 0.236 af
Primary=0.02 cfs 0.027 af Secondary=0.19 cfs 0.123 af Outflow=0.21 cfs 0.151 af

Pond 105P: Detention Pond #105 Peak Elev=94.17' Storage=5,655 cf Inflow=3.91 cfs 0.363 af
Primary=1.21 cfs 0.329 af Secondary=0.00 cfs 0.000 af Outflow=1.21 cfs 0.329 af

Pond C01P: CB #1 Peak Elev=94.71' Storage=12 cf Inflow=2.05 cfs 0.159 af
12.0" Round Culvert n=0.012 L=35.0' S=0.0071 '/' Outflow=2.05 cfs 0.159 af

Pond C02P: CB #2 Peak Elev=95.33' Storage=16 cf Inflow=2.48 cfs 0.205 af
15.0" Round Culvert n=0.012 L=18.0' S=0.0050 '/' Outflow=2.47 cfs 0.205 af

Pond C03P: CB #3 Peak Elev=95.10' Storage=16 cf Inflow=3.41 cfs 0.287 af
15.0" Round Culvert n=0.012 L=107.3' S=0.0050 '/' Outflow=3.40 cfs 0.287 af

Pond D01P: DMH #1 Peak Elev=94.57' Storage=17 cf Inflow=3.40 cfs 0.287 af
15.0" Round Culvert n=0.012 L=140.0' S=0.0050 '/' Outflow=3.40 cfs 0.286 af

Total Runoff Area = 10.720 ac Runoff Volume = 3.845 af Average Runoff Depth = 4.30"
60.65% Pervious = 6.502 ac 39.35% Impervious = 4.219 ac

Summary for Subcatchment 1S: Subcatchment #1

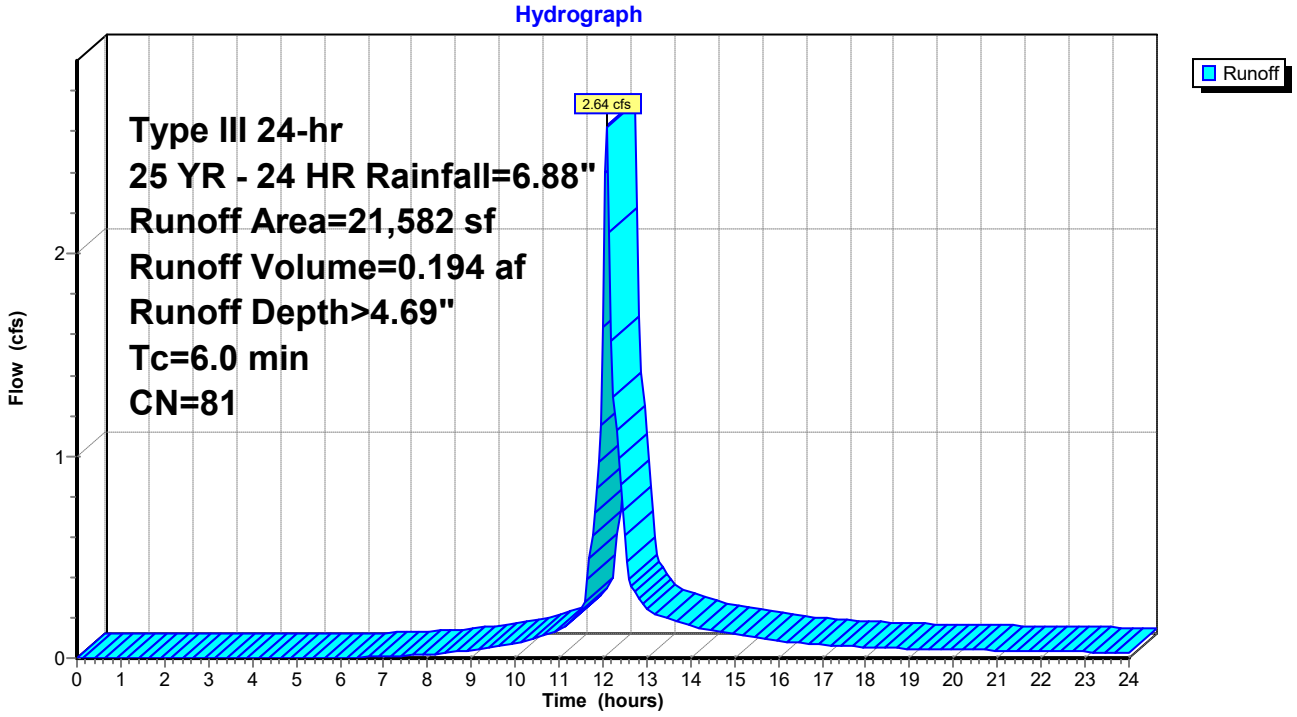
Runoff = 2.64 cfs @ 12.09 hrs, Volume= 0.194 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
3,348	98	Paved parking, HSG A
618	39	>75% Grass cover, Good, HSG A
4,888	98	Paved parking, HSG C
8,244	74	>75% Grass cover, Good, HSG C
4,484	70	Woods, Good, HSG C
21,582	81	Weighted Average
13,346		61.84% Pervious Area
8,236		38.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Segment #1**

Subcatchment 1S: Subcatchment #1



Summary for Subcatchment 2S: Subcatchment #2

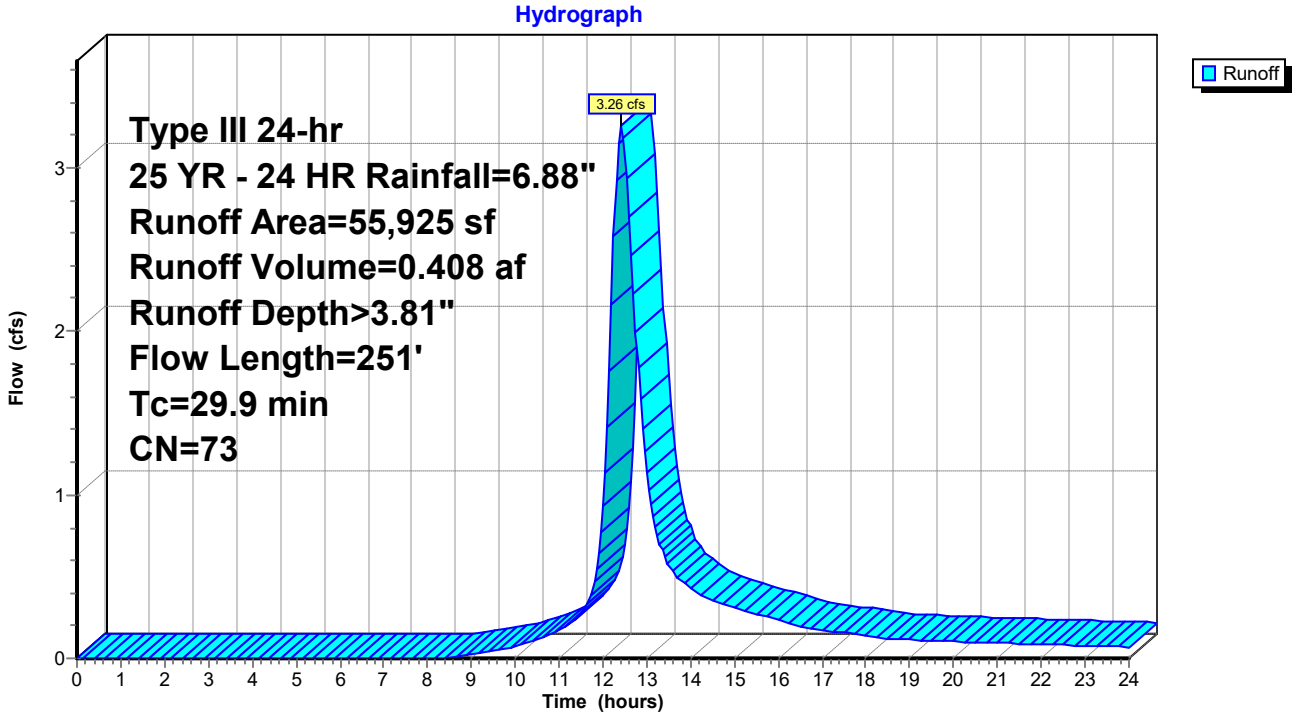
Runoff = 3.26 cfs @ 12.42 hrs, Volume= 0.408 af, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
38,091	74	>75% Grass cover, Good, HSG C
17,834	70	Woods, Good, HSG C
55,925	73	Weighted Average
55,925		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	100	0.0100	0.06		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.62"
3.3	151	0.0230	0.76		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
29.9	251	Total			

Subcatchment 2S: Subcatchment #2



Summary for Subcatchment 4S: Subcatchment #4

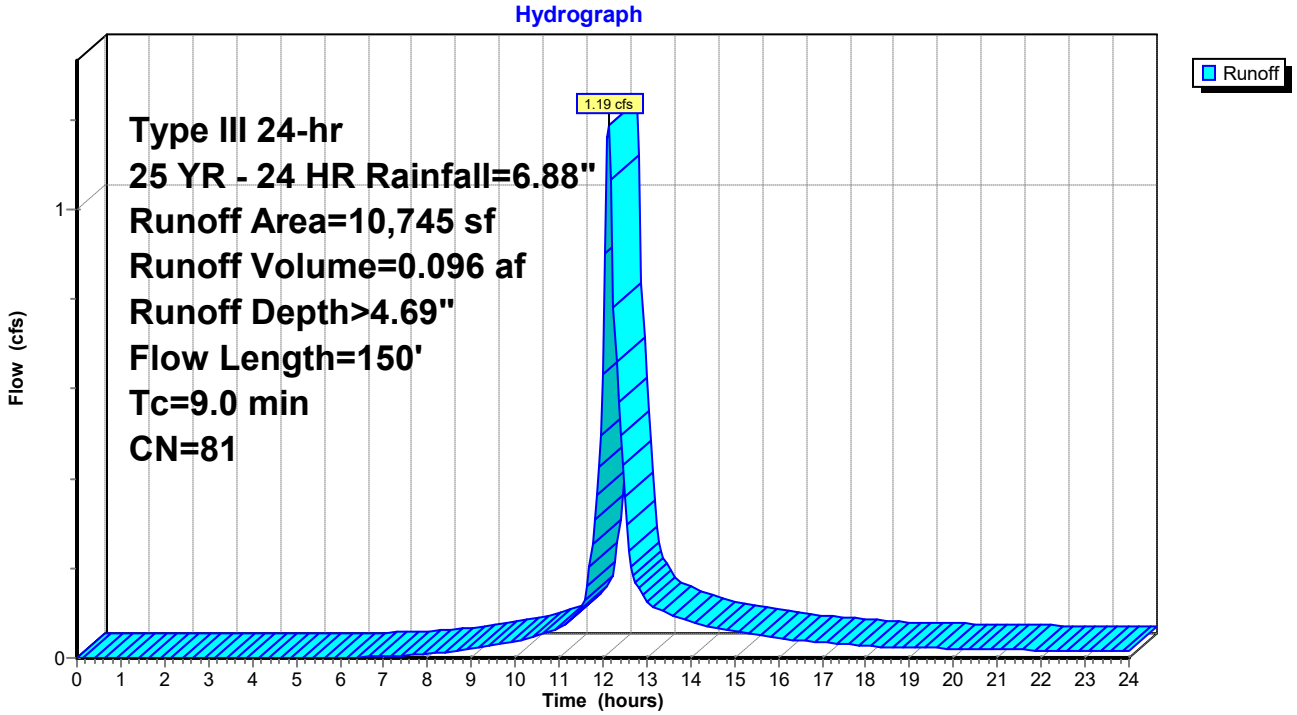
Runoff = 1.19 cfs @ 12.13 hrs, Volume= 0.096 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
1,426	39	>75% Grass cover, Good, HSG A
5,404	98	Paved parking, HSG A
3,855	74	>75% Grass cover, Good, HSG C
60	70	Woods, Good, HSG C
10,745	81	Weighted Average
5,341		49.71% Pervious Area
5,404		50.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0300	0.21		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.62"
1.2	50	0.0100	0.70		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
9.0	150	Total			

Subcatchment 4S: Subcatchment #4



Summary for Subcatchment 6S: Subcatchment #6

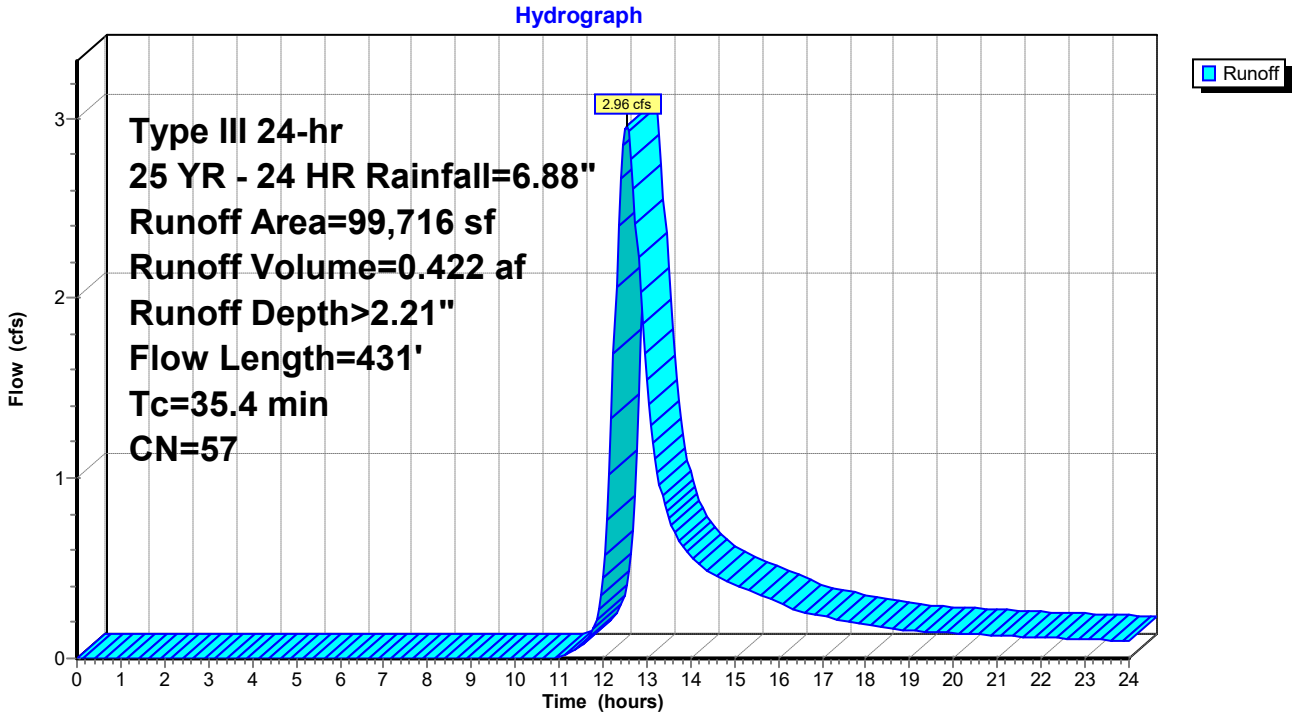
Runoff = 2.96 cfs @ 12.54 hrs, Volume= 0.422 af, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
8,104	98	Roofs, HSG A
21,545	98	Paved parking, HSG A
31,474	39	>75% Grass cover, Good, HSG A
30,806	30	Woods, Good, HSG A
2,499	98	Roofs, HSG C
3,161	74	>75% Grass cover, Good, HSG C
247	80	>75% Grass cover, Good, HSG D
1,880	77	Woods, Good, HSG D
99,716	57	Weighted Average
67,568		67.76% Pervious Area
32,148		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	100	0.0100	0.06		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.62"
2.7	81	0.0100	0.50		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
1.1	48	0.0100	0.70		**Shallow Concentrated Flow, Segment 3** Short Grass Pasture Kv= 7.0 fps
0.6	49	0.0050	1.44		**Shallow Concentrated Flow, Segment 4** Paved Kv= 20.3 fps
4.4	153	0.0070	0.59		**Shallow Concentrated Flow, Segment 5** Short Grass Pasture Kv= 7.0 fps
35.4	431	Total			

Subcatchment 6S: Subcatchment #6



Summary for Subcatchment 11S: Subcatchment #11

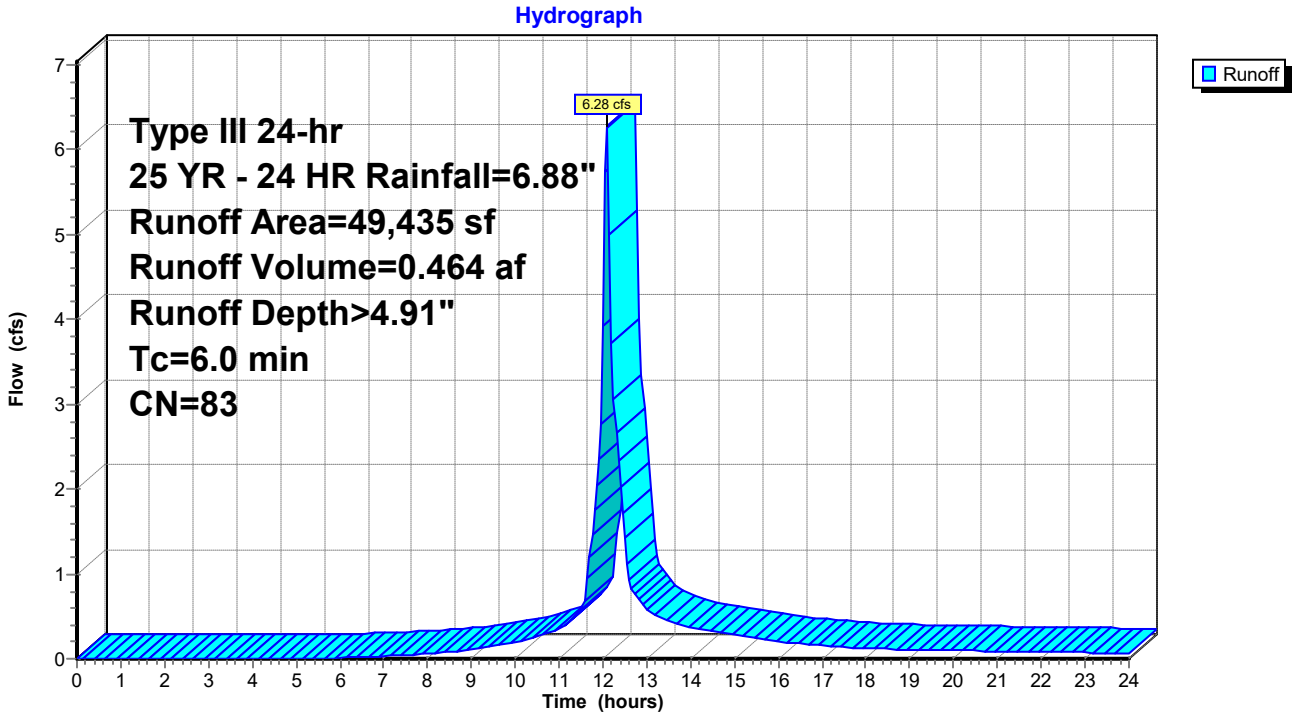
Runoff = 6.28 cfs @ 12.09 hrs, Volume= 0.464 af, Depth> 4.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
18,247	98	Paved parking, HSG C
31,188	74	>75% Grass cover, Good, HSG C
49,435	83	Weighted Average
31,188		63.09% Pervious Area
18,247		36.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Segment #1**

Subcatchment 11S: Subcatchment #11



Summary for Subcatchment 12S: Subcatchment #12

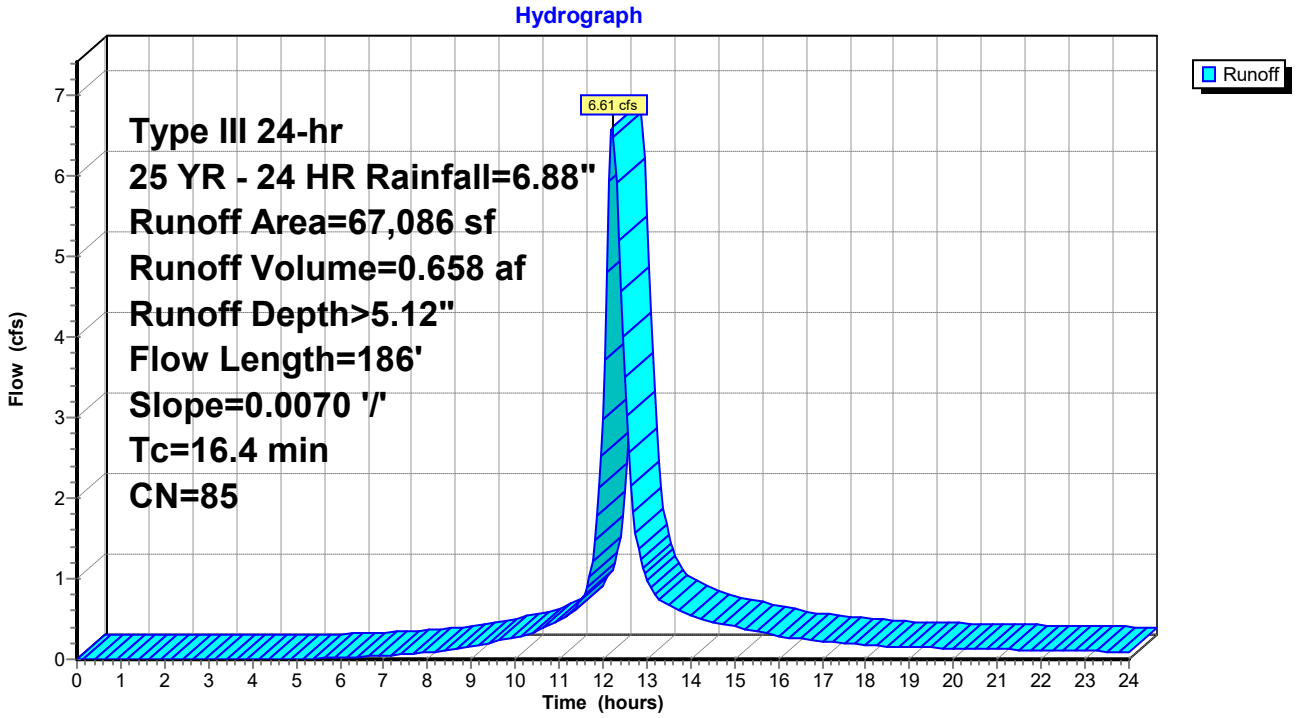
Runoff = 6.61 cfs @ 12.22 hrs, Volume= 0.658 af, Depth> 5.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
6,881	98	Unconnected roofs, HSG C
23,203	98	Paved parking, HSG C
35,205	74	>75% Grass cover, Good, HSG C
407	98	Unconnected roofs, HSG D
38	80	>75% Grass cover, Good, HSG D
1,352	96	Gravel surface, HSG C
67,086	85	Weighted Average
36,595		54.55% Pervious Area
30,491		45.45% Impervious Area
7,288		23.90% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0070	0.12		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.62"
2.4	86	0.0070	0.59		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
16.4	186	Total			

Subcatchment 12S: Subcatchment #12



Summary for Subcatchment 13S: Subcatchment #13

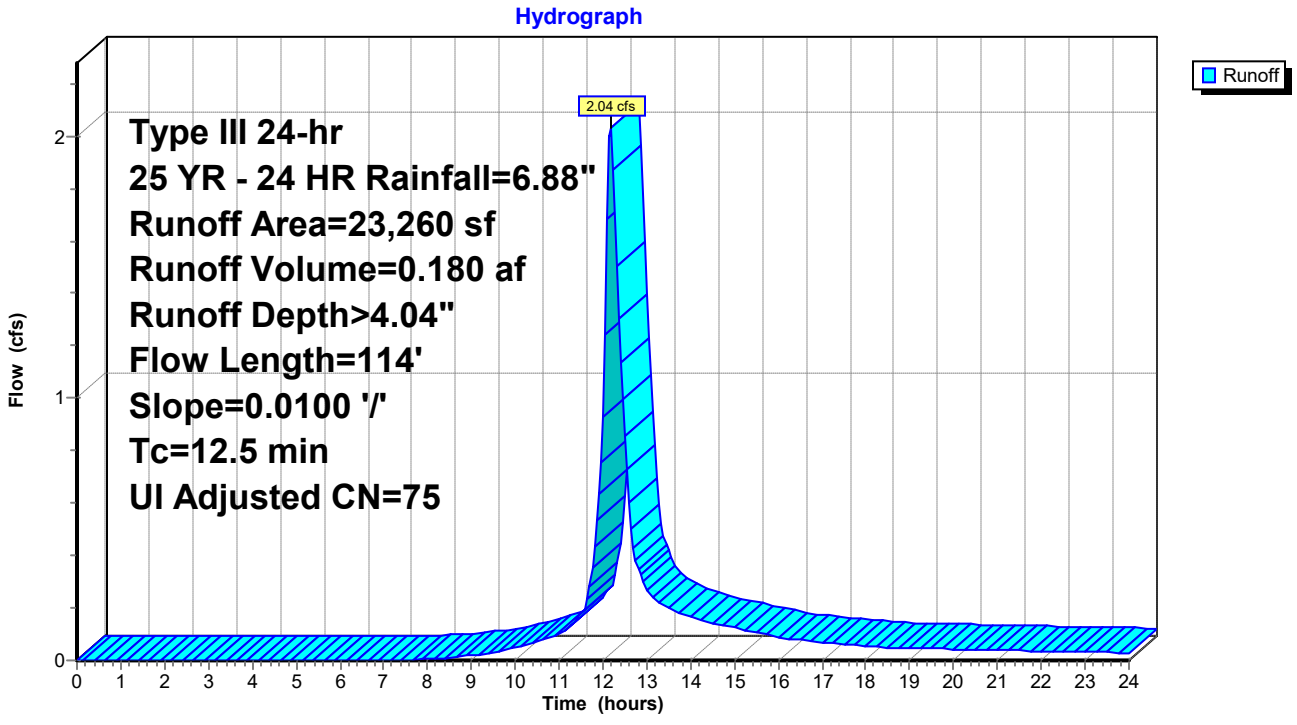
Runoff = 2.04 cfs @ 12.17 hrs, Volume= 0.180 af, Depth> 4.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Adj	Description
2,580	98		Unconnected roofs, HSG C
20,680	74		>75% Grass cover, Good, HSG C
23,260	77	75	Weighted Average, UI Adjusted
20,680			88.91% Pervious Area
2,580			11.09% Impervious Area
2,580			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	100	0.0100	0.14		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.62"
0.3	14	0.0100	0.70		**Shallow Concentrated Flow, Segmemt #2** Short Grass Pasture Kv= 7.0 fps
12.5	114	Total			

Subcatchment 13S: Subcatchment #13



Summary for Subcatchment 14S: Subcatchment #14

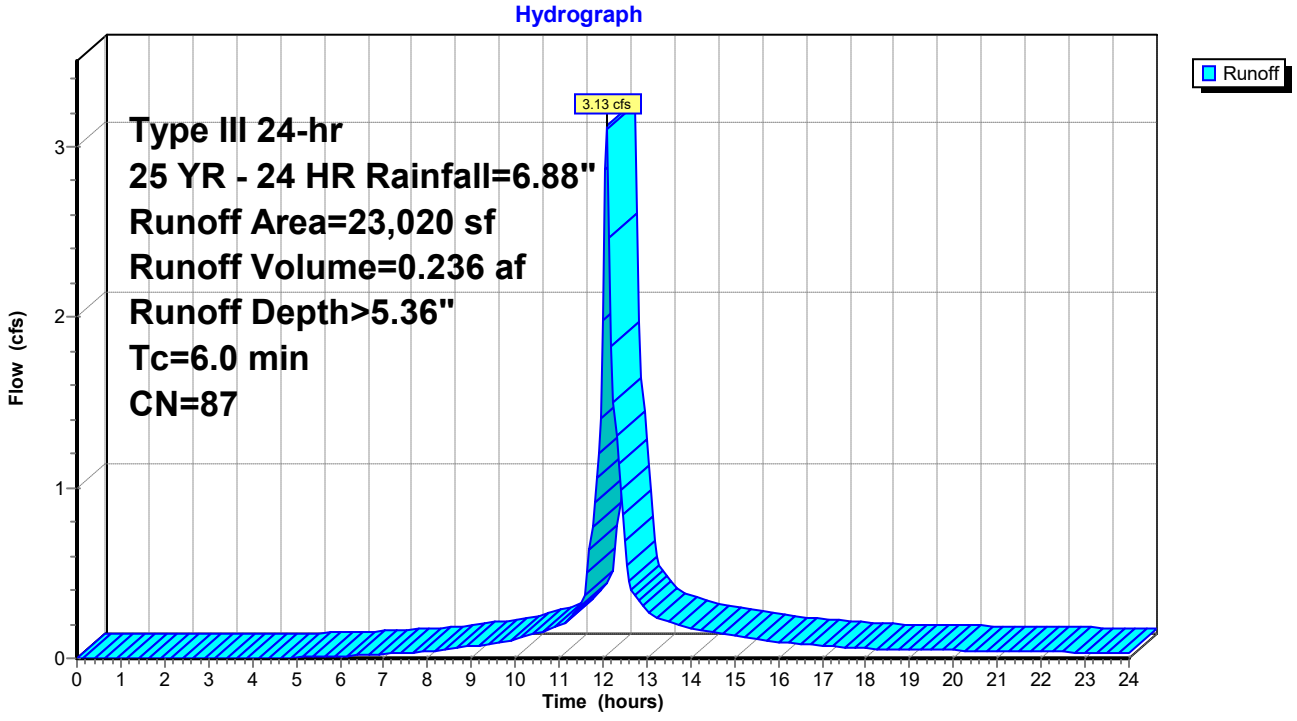
Runoff = 3.13 cfs @ 12.09 hrs, Volume= 0.236 af, Depth> 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
2,276	98	Paved parking, HSG A
10,640	98	Paved parking, HSG C
10,104	74	>75% Grass cover, Good, HSG C
23,020	87	Weighted Average
10,104		43.89% Pervious Area
12,916		56.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Segment #1**

Subcatchment 14S: Subcatchment #14



Summary for Subcatchment 15S: Subcatchment #15

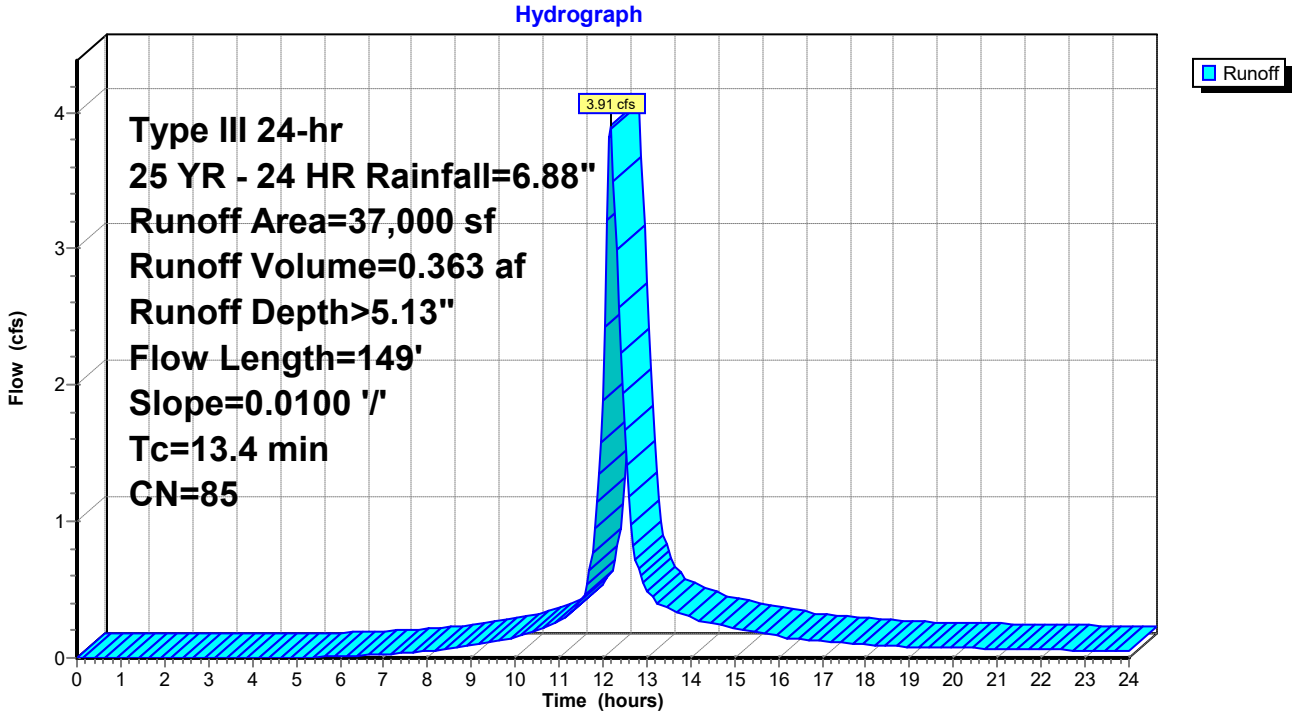
Runoff = 3.91 cfs @ 12.18 hrs, Volume= 0.363 af, Depth> 5.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
2,253	98	Roofs, HSG C
14,814	98	Paved parking, HSG C
19,381	74	>75% Grass cover, Good, HSG C
552	96	Gravel surface, HSG C
37,000	85	Weighted Average
19,933		53.87% Pervious Area
17,067		46.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	100	0.0100	0.14		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.62"
1.2	49	0.0100	0.70		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
13.4	149	Total			

Subcatchment 15S: Subcatchment #15



Summary for Subcatchment 17S: Subcatchment #17

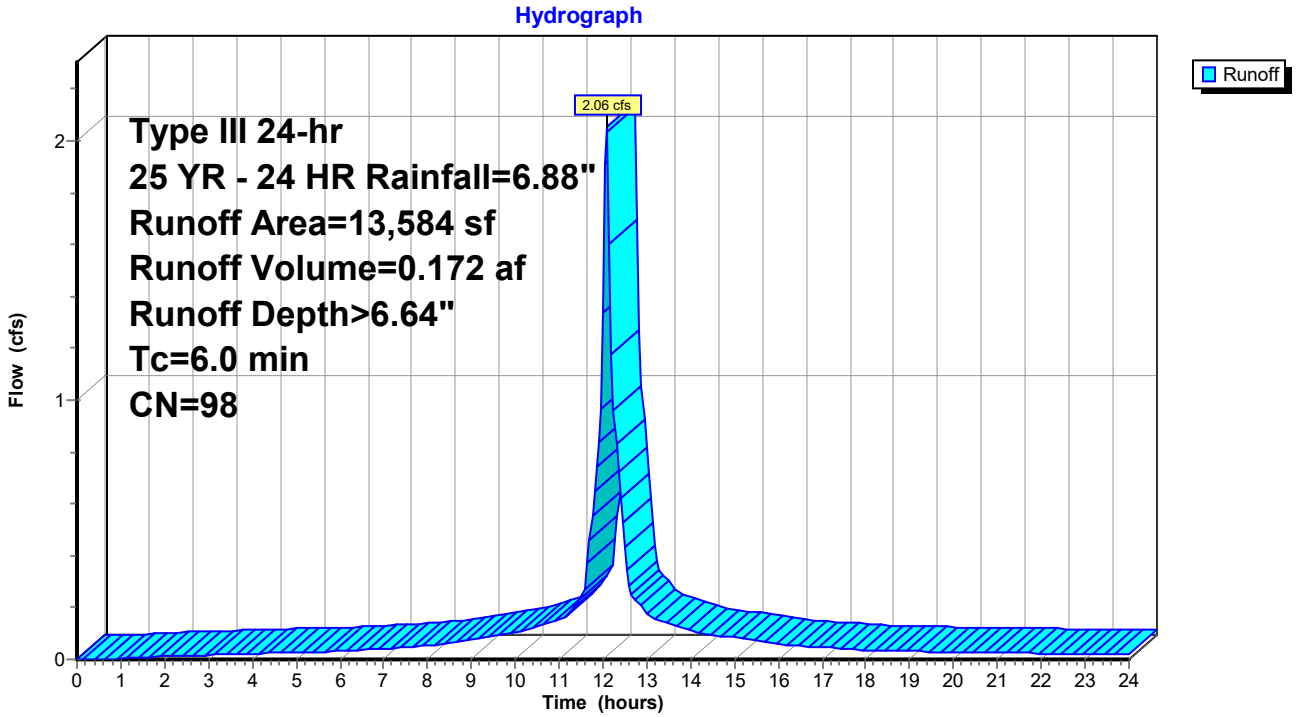
Runoff = 2.06 cfs @ 12.09 hrs, Volume= 0.172 af, Depth> 6.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
13,584	98	Roofs, HSG C
13,584		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Segment #1**

Subcatchment 17S: Subcatchment #17



Summary for Subcatchment 18S: Mixed Use Building

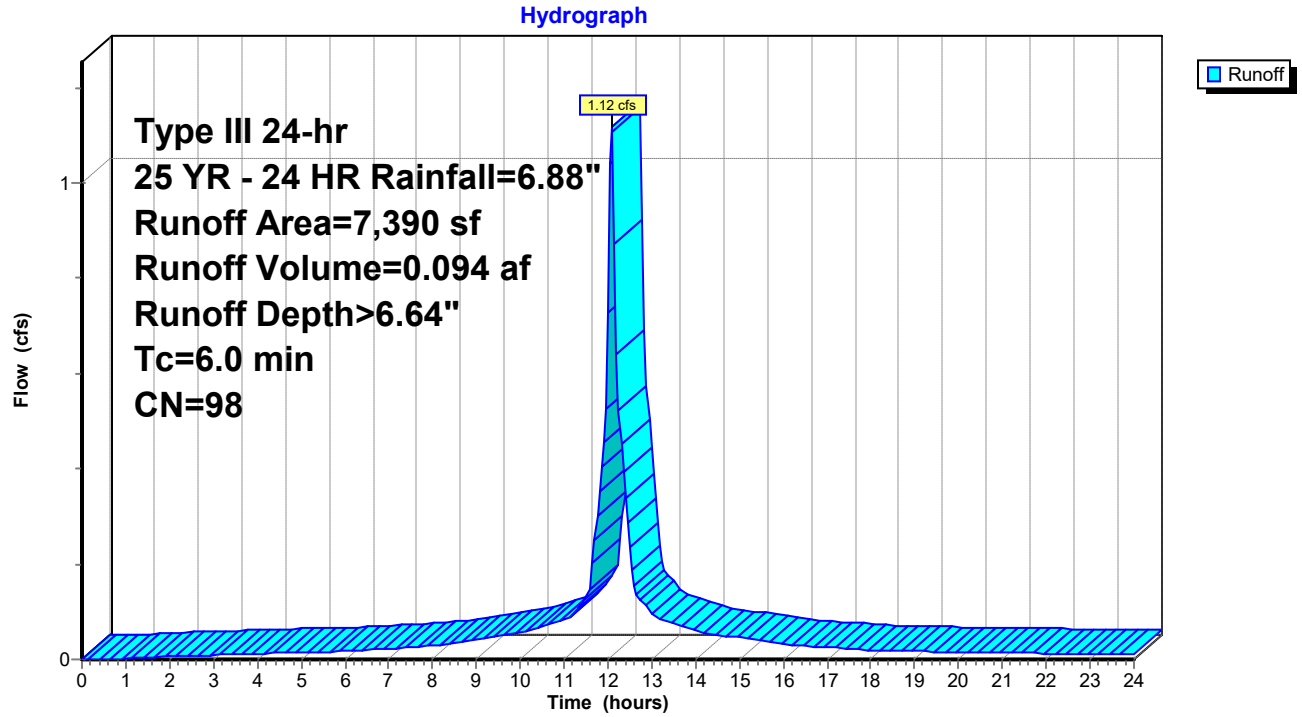
Runoff = 1.12 cfs @ 12.09 hrs, Volume= 0.094 af, Depth> 6.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
7,390	98	Roofs, HSG C
7,390		100.00% Impervious Area

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

Subcatchment 18S: Mixed Use Building



Summary for Subcatchment 19S: Mixed Use Building

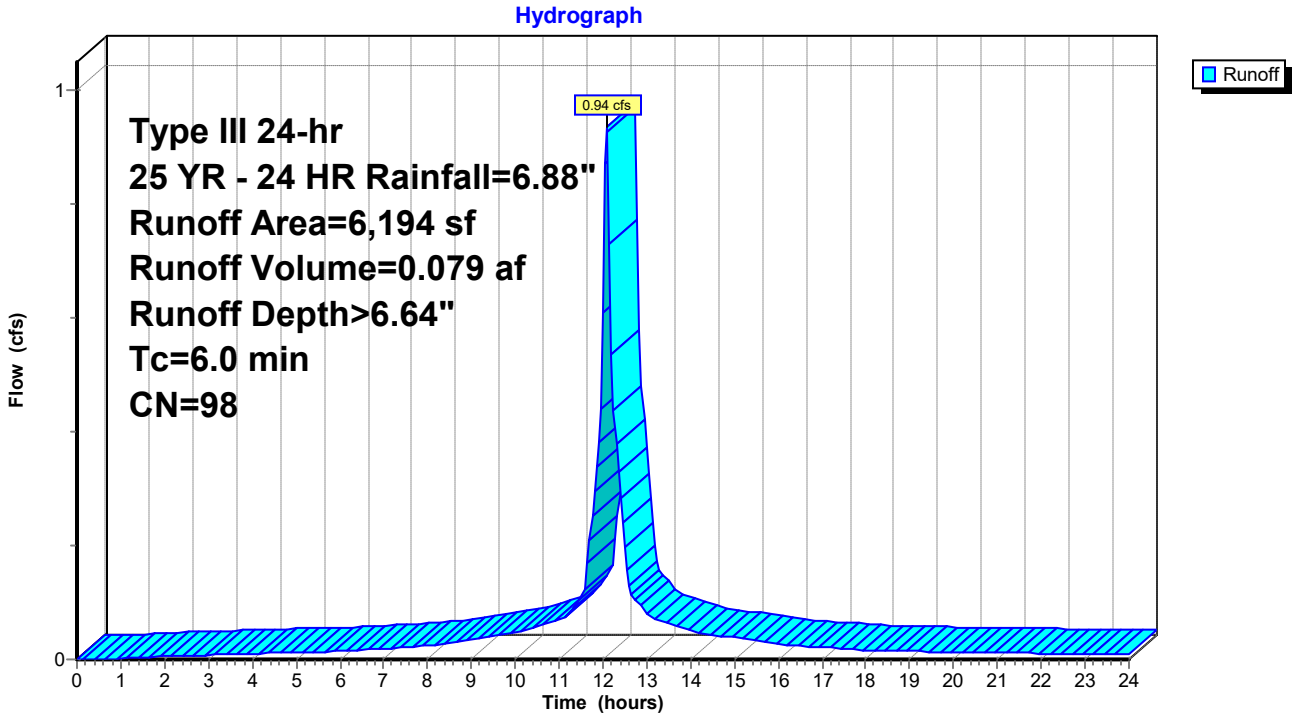
Runoff = 0.94 cfs @ 12.09 hrs, Volume= 0.079 af, Depth> 6.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
6,194	98	Roofs, HSG C
6,194		100.00% Impervious Area

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

Subcatchment 19S: Mixed Use Building



Summary for Subcatchment 21S: Subcatchment #21

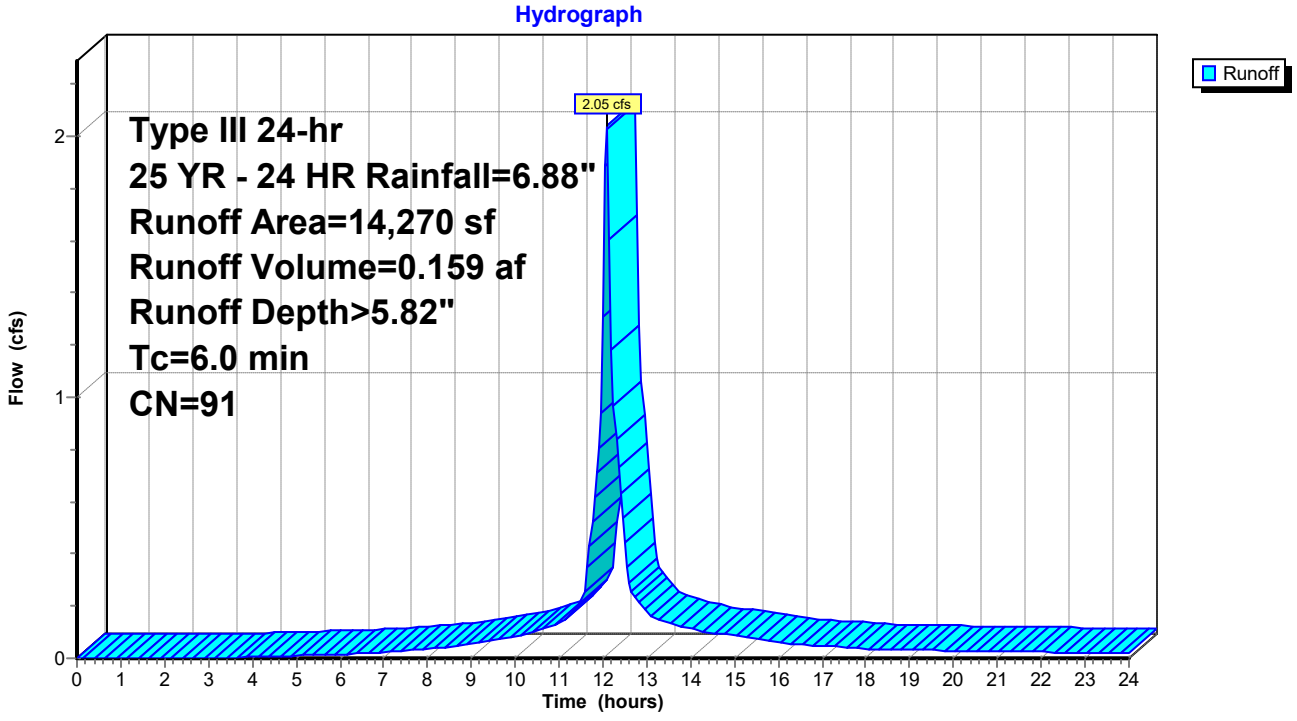
Runoff = 2.05 cfs @ 12.09 hrs, Volume= 0.159 af, Depth> 5.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
3,344	98	Roofs, HSG C
6,880	98	Paved parking, HSG C
4,046	74	>75% Grass cover, Good, HSG C
14,270	91	Weighted Average
4,046		28.35% Pervious Area
10,224		71.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Segment #1**

Subcatchment 21S: Subcatchment #21



Summary for Subcatchment 22S: Subcatchment #22

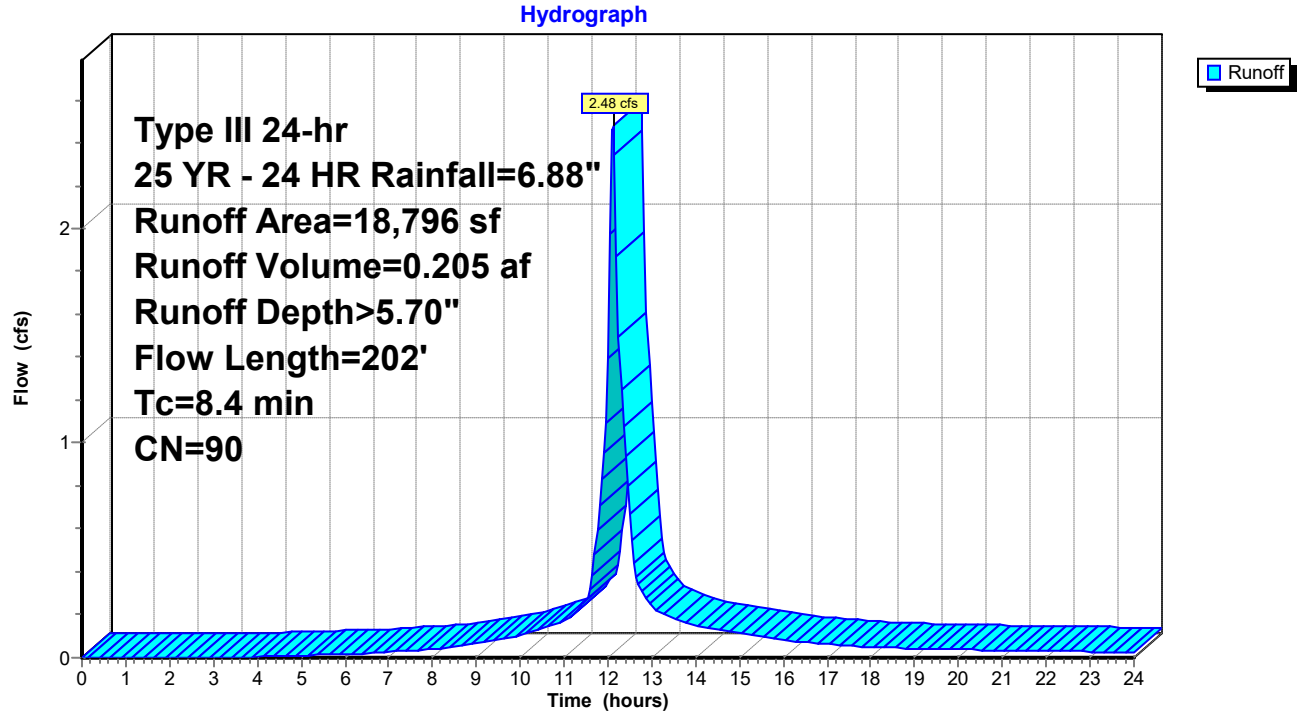
Runoff = 2.48 cfs @ 12.12 hrs, Volume= 0.205 af, Depth> 5.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
4,097	98	Roofs, HSG C
8,057	98	Paved parking, HSG C
5,773	74	>75% Grass cover, Good, HSG C
453	98	Roofs, HSG D
240	98	Paved parking, HSG D
176	80	>75% Grass cover, Good, HSG D
18,796	90	Weighted Average
5,949		31.65% Pervious Area
12,847		68.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0100	0.12		**Sheet Flow, Segment #1** Grass: Short n= 0.150 P2= 3.62"
1.4	152	0.0075	1.76		**Shallow Concentrated Flow, Segment #2** Paved Kv= 20.3 fps
8.4	202	Total			

Subcatchment 22S: Subcatchment #22



Summary for Subcatchment 23S: Subcatchment #23

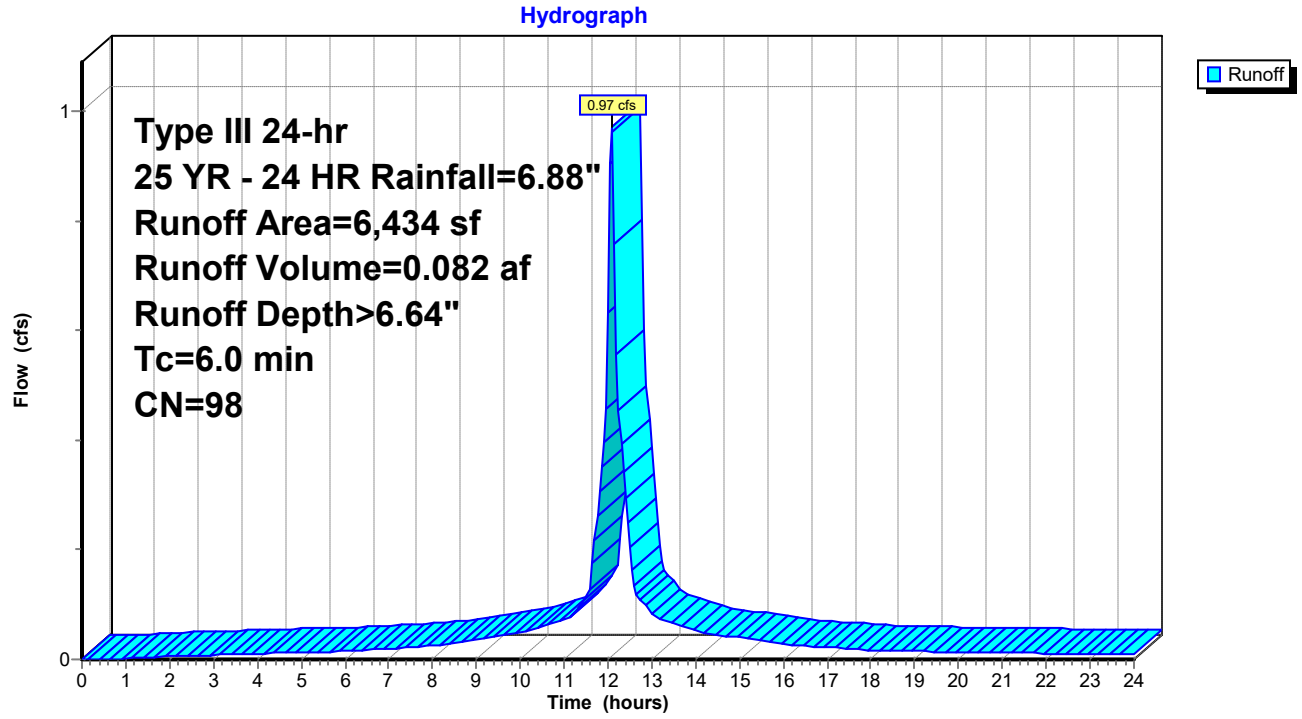
Runoff = 0.97 cfs @ 12.09 hrs, Volume= 0.082 af, Depth> 6.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
6,434	98	Paved parking, HSG C
6,434		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Segment #1**

Subcatchment 23S: Subcatchment #23



Summary for Subcatchment 26S: Subcatchment #26

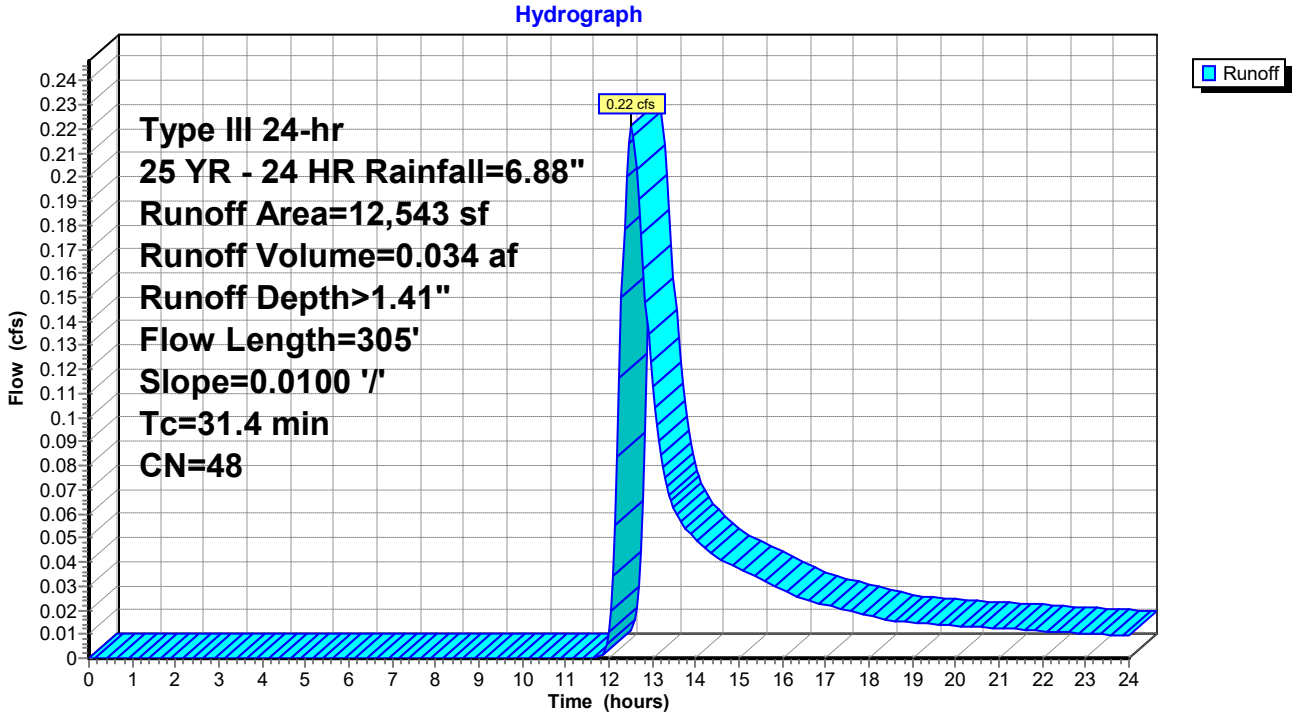
Runoff = 0.22 cfs @ 12.52 hrs, Volume= 0.034 af, Depth> 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR - 24 HR Rainfall=6.88"

Area (sf)	CN	Description
4,248	39	>75% Grass cover, Good, HSG A
4,054	30	Woods, Good, HSG A
3,864	74	>75% Grass cover, Good, HSG C
377	70	Woods, Good, HSG C
12,543	48	Weighted Average
12,543		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	100	0.0100	0.06		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.62"
2.2	94	0.0100	0.70		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
2.6	111	0.0100	0.70		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
31.4	305	Total			

Subcatchment 26S: Subcatchment #26



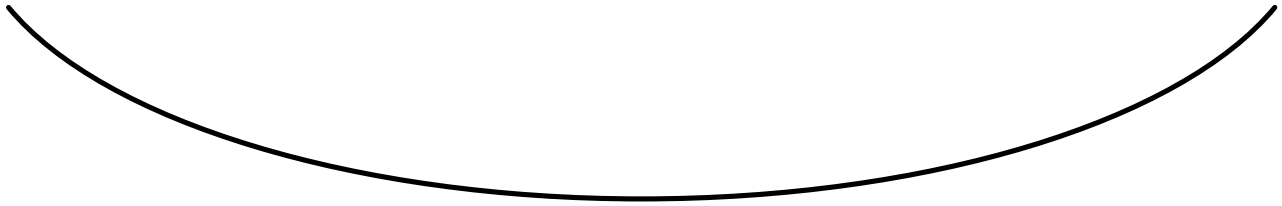
Summary for Reach 15AR: Overland flow

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 Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.50' Flow Area= 25.0 sf, Capacity= 158.86 cfs

25.00' x 1.50' deep Parabolic Channel, n= 0.030 Earth, dense weeds
Length= 30.0' Slope= 0.0167 '/'
Inlet Invert= 92.50', Outlet Invert= 92.00'



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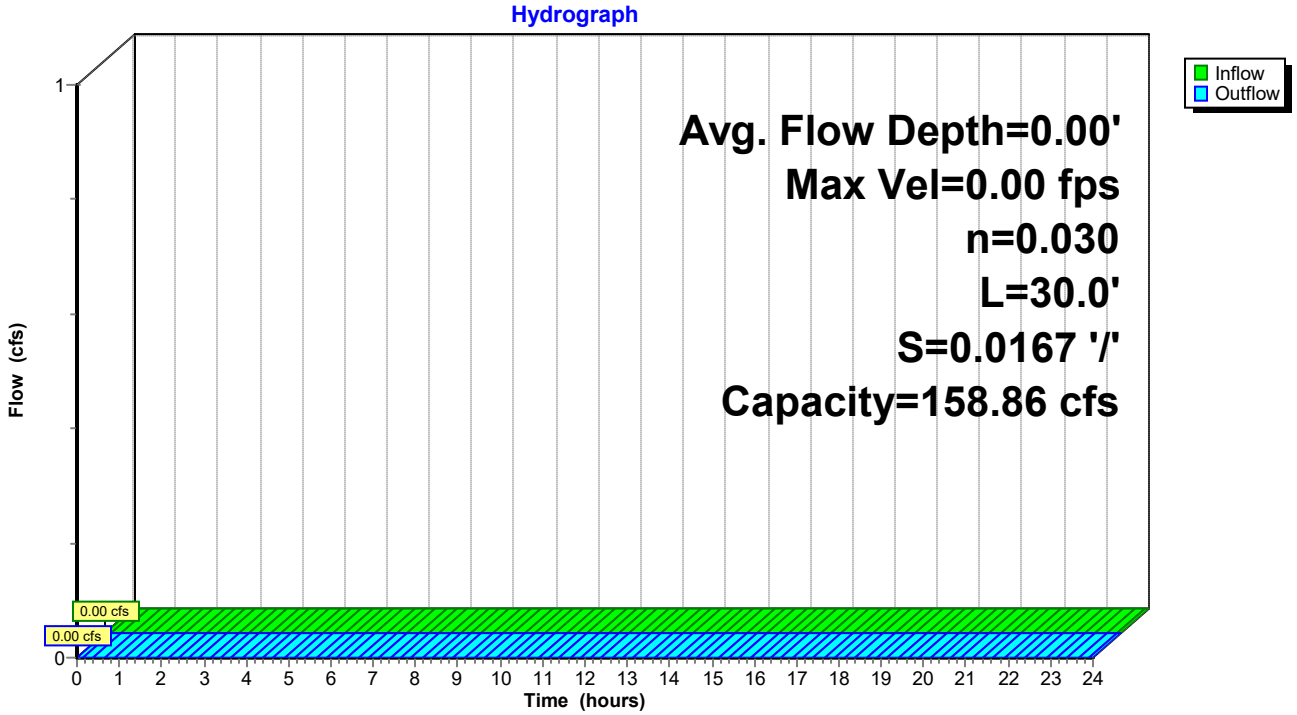
Reach 15AR: Overland flow



Summary for Reach 15R: Swale

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

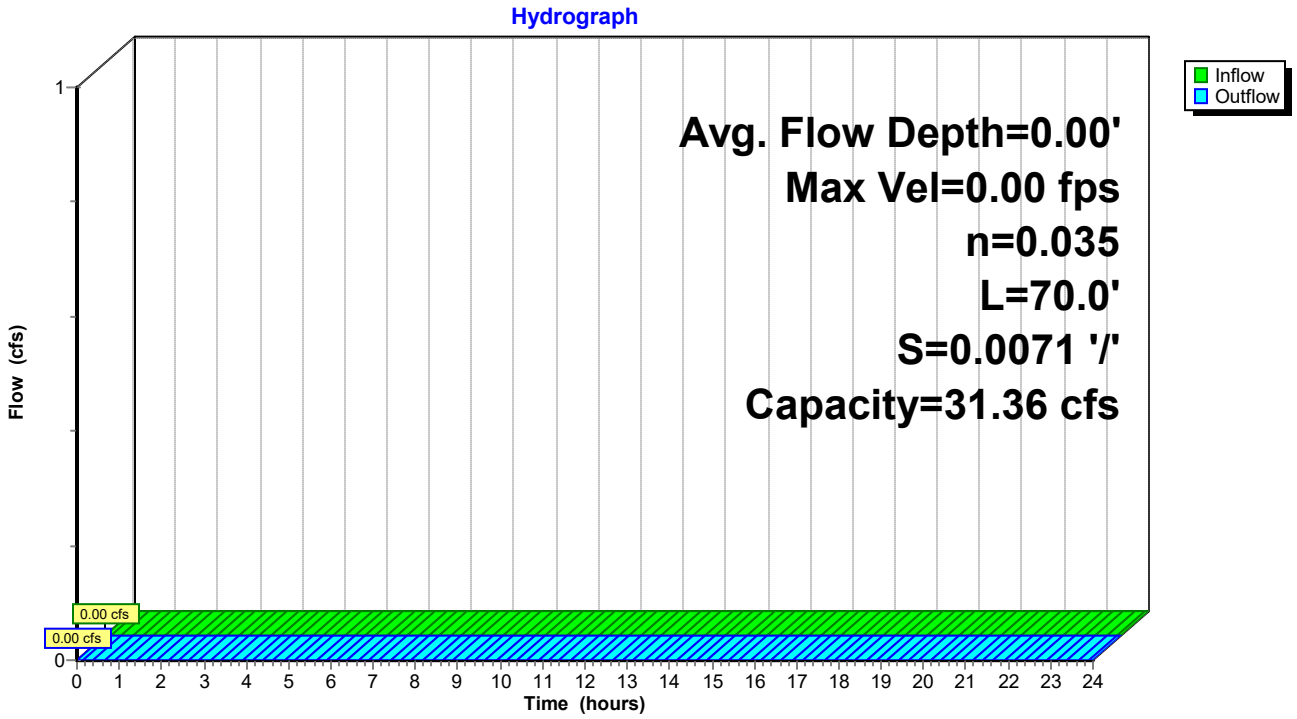
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 31.36 cfs

2.00' x 1.50' deep channel, n= 0.035 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 70.0' Slope= 0.0071 '/'
Inlet Invert= 93.00', Outlet Invert= 92.50'

‡

Reach 15R: Swale



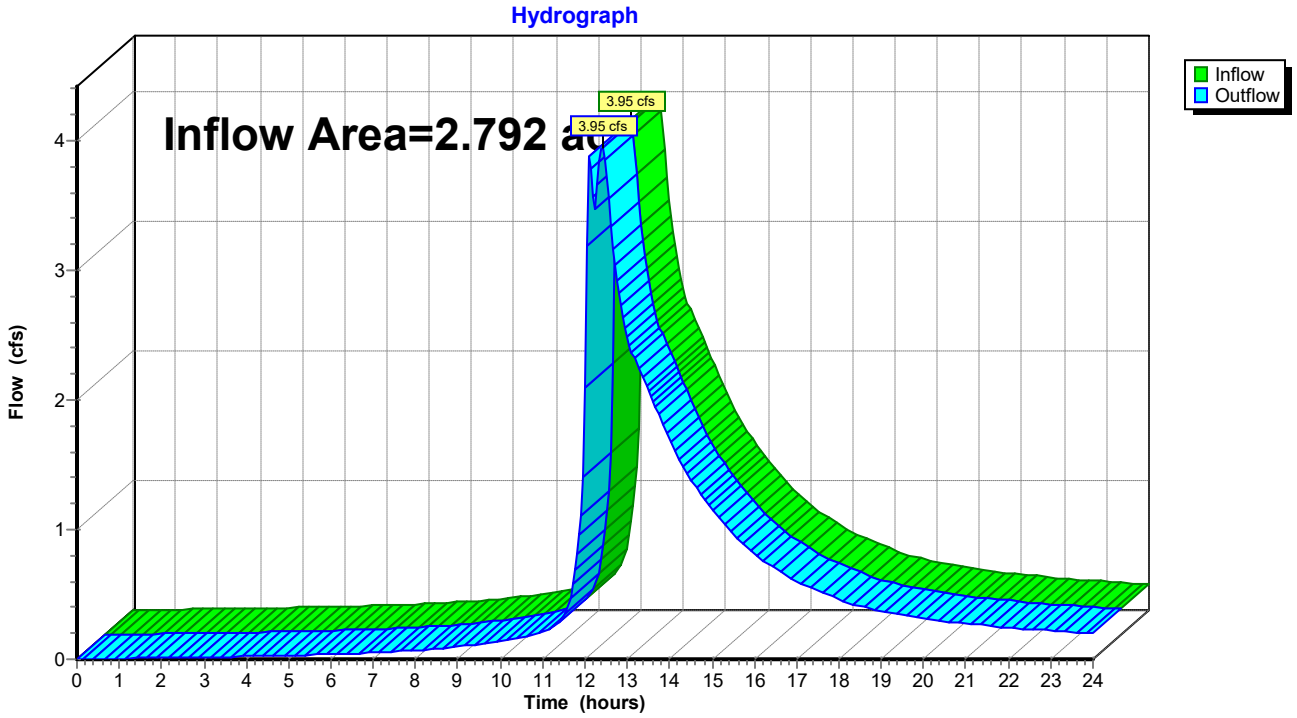
Summary for Reach 100R: Final Reach 100

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.792 ac, 46.98% Impervious, Inflow Depth > 4.21" for 25 YR - 24 HR event
Inflow = 3.95 cfs @ 12.42 hrs, Volume= 0.979 af
Outflow = 3.95 cfs @ 12.42 hrs, Volume= 0.979 af, Atten= 0%, Lag= 0.0 min

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

Reach 100R: Final Reach 100



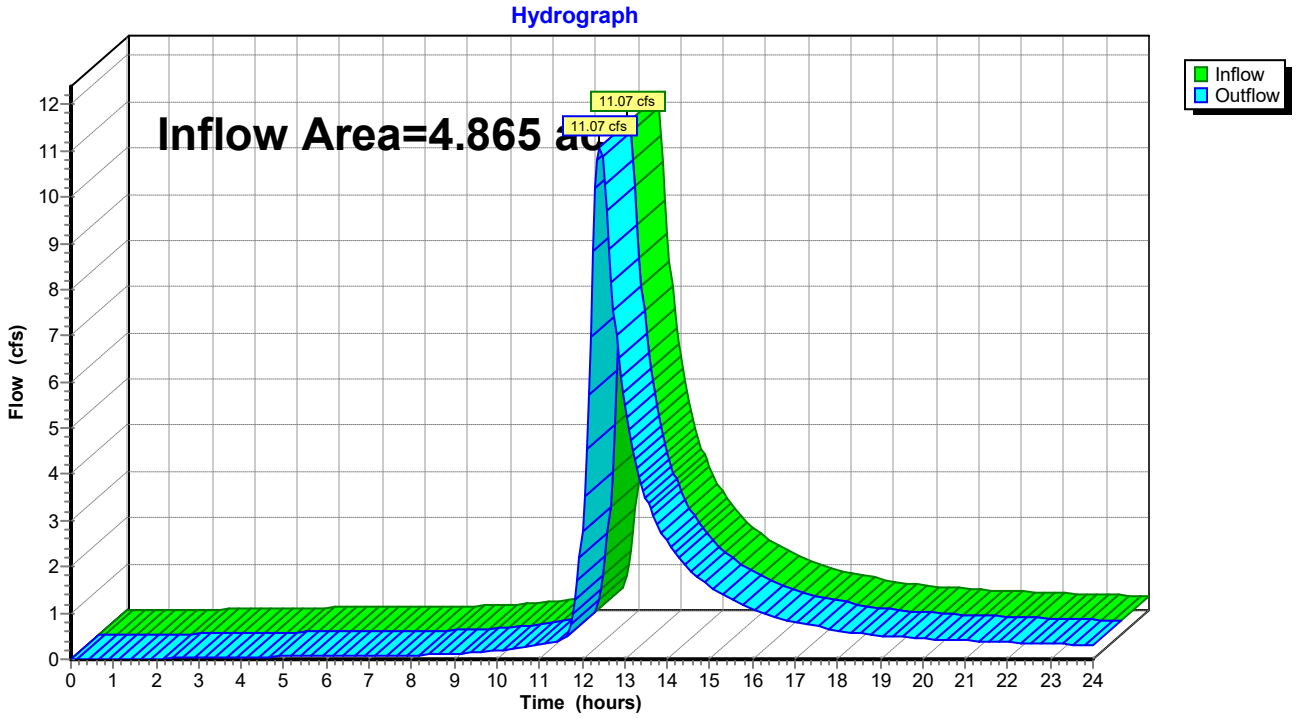
Summary for Reach 200R: Final Reach 200

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.865 ac, 35.94% Impervious, Inflow Depth > 4.19" for 25 YR - 24 HR event
Inflow = 11.07 cfs @ 12.42 hrs, Volume= 1.700 af
Outflow = 11.07 cfs @ 12.42 hrs, Volume= 1.700 af, Atten= 0%, Lag= 0.0 min

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

Reach 200R: Final Reach 200



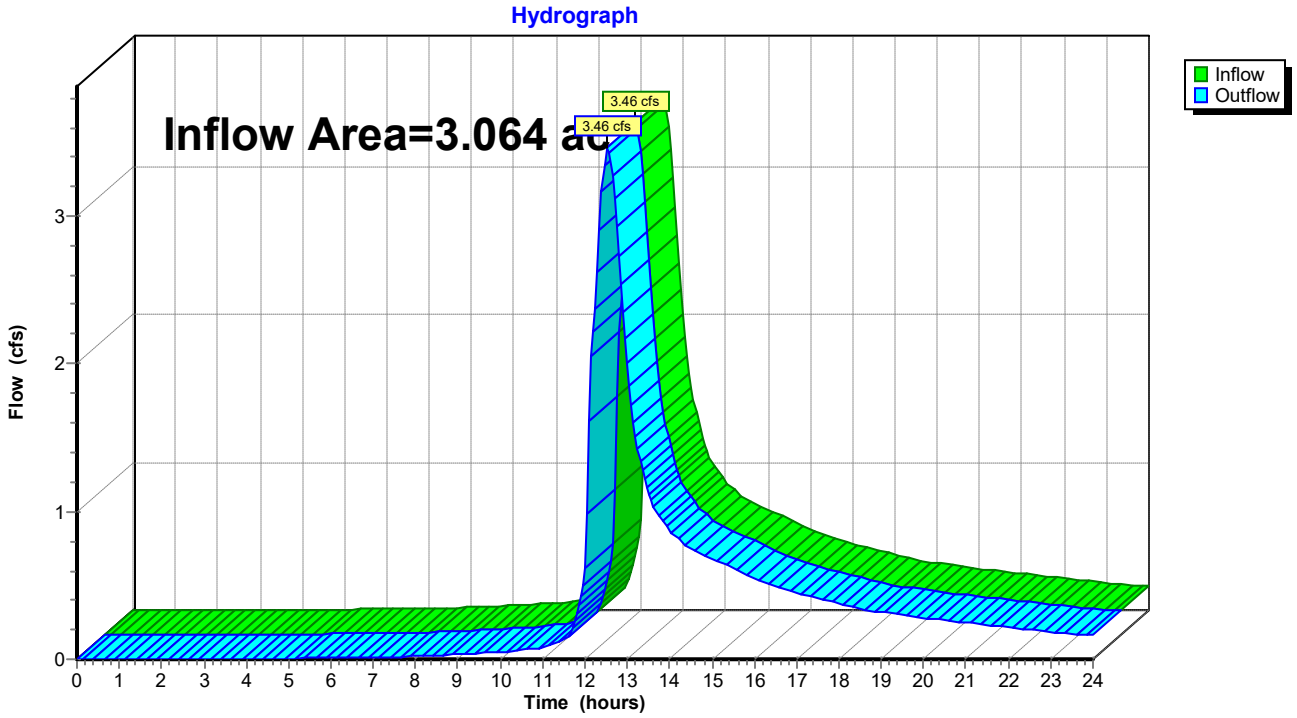
Summary for Reach 400R: Final Reach 400

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.064 ac, 37.81% Impervious, Inflow Depth > 2.58" for 25 YR - 24 HR event
Inflow = 3.46 cfs @ 12.53 hrs, Volume= 0.659 af
Outflow = 3.46 cfs @ 12.53 hrs, Volume= 0.659 af, Atten= 0%, Lag= 0.0 min

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

Reach 400R: Final Reach 400



Summary for Pond 4P: Pond 4

Inflow Area = 3.064 ac, 37.81% Impervious, Inflow Depth > 2.58" for 25 YR - 24 HR event
Inflow = 3.46 cfs @ 12.52 hrs, Volume= 0.659 af
Outflow = 3.46 cfs @ 12.53 hrs, Volume= 0.659 af, Atten= 0%, Lag= 0.9 min
Primary = 3.46 cfs @ 12.53 hrs, Volume= 0.659 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 90.36' @ 12.53 hrs Surf.Area= 270 sf Storage= 144 cf
Flood Elev= 93.50' Surf.Area= 1,117 sf Storage= 1,508 cf

Plug-Flow detention time= 0.7 min calculated for 0.659 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (901.7 - 901.1)

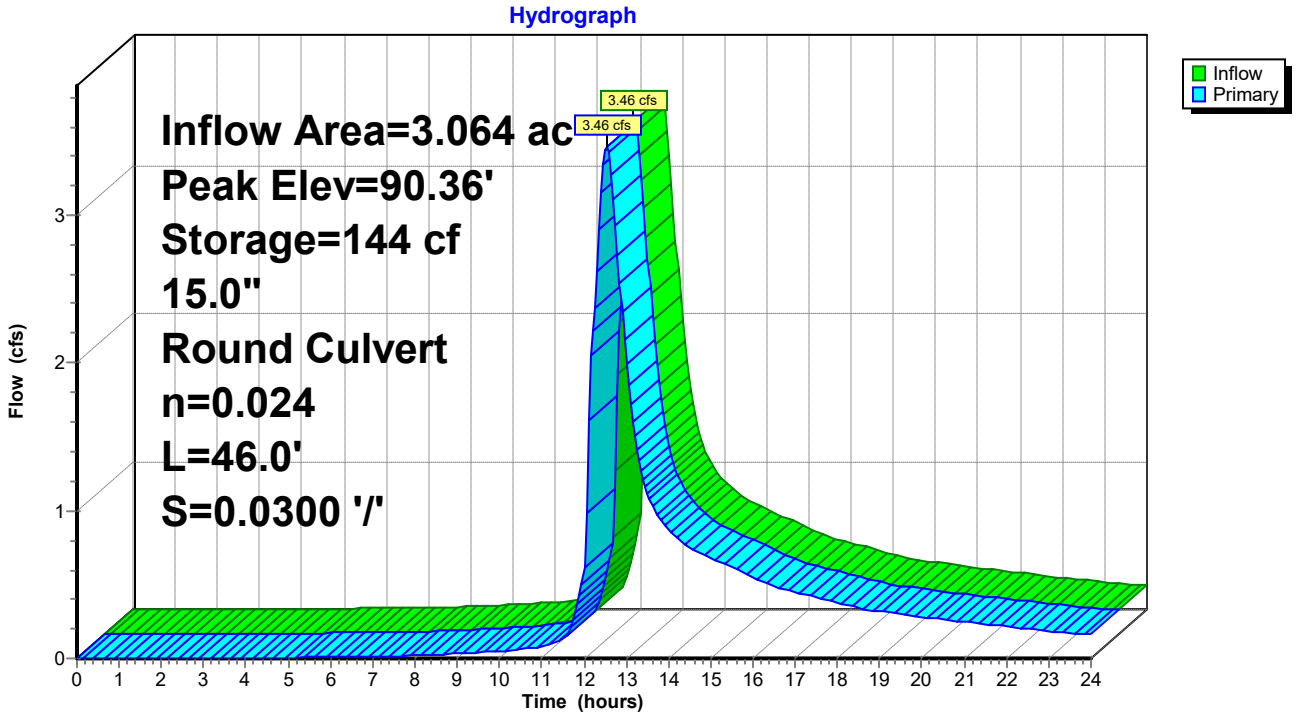
Volume	Invert	Avail.Storage	Storage Description
#1	89.38'	1,508 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
89.38	10	14.0	0	0	10
89.50	65	48.0	4	4	178
90.00	185	78.9	60	64	491
91.00	464	101.2	314	378	823
92.00	839	132.3	642	1,020	1,413
92.50	1,117	145.8	487	1,508	1,720

Device	Routing	Invert	Outlet Devices
#1	Primary	89.38'	**15.0" Round 15" CMP ?** L= 46.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 89.38' / 88.00' S= 0.0300 '/' Cc= 0.900 n= 0.024, Flow Area= 1.23 sf

Primary OutFlow Max=3.45 cfs @ 12.53 hrs HW=90.35' TW=0.00' (Dynamic Tailwater)
1=15" CMP ? (Inlet Controls 3.45 cfs @ 3.36 fps)

Pond 4P: Pond 4



Summary for Pond 6P: Pond 6

Inflow Area = 2.289 ac, 32.24% Impervious, Inflow Depth > 2.21" for 25 YR - 24 HR event
Inflow = 2.96 cfs @ 12.54 hrs, Volume= 0.422 af
Outflow = 2.95 cfs @ 12.56 hrs, Volume= 0.412 af, Atten= 0%, Lag= 1.4 min
Primary = 2.95 cfs @ 12.56 hrs, Volume= 0.412 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 92.12' @ 12.56 hrs Surf.Area= 3,110 sf Storage= 766 cf
Flood Elev= 93.00' Surf.Area= 3,110 sf Storage= 3,515 cf

Plug-Flow detention time= 19.1 min calculated for 0.412 af (98% of inflow)
Center-of-Mass det. time= 6.3 min (890.2 - 883.8)

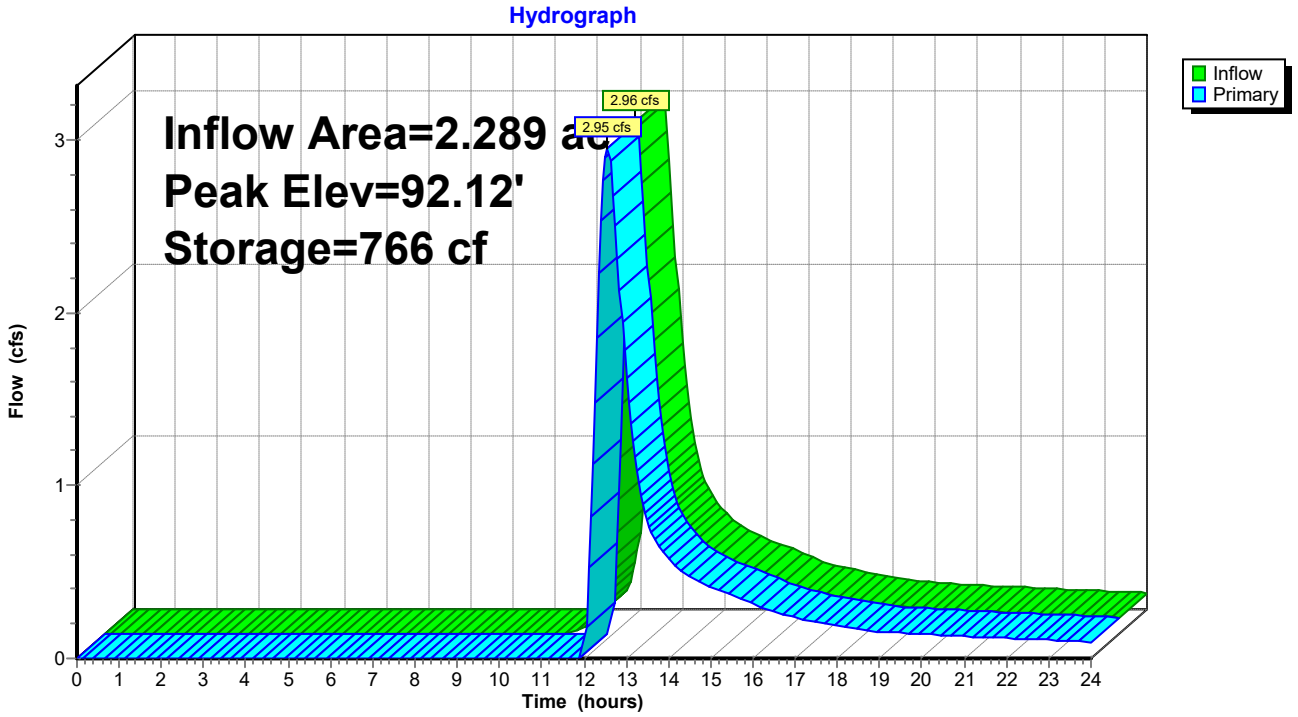
Volume	Invert	Avail.Storage	Storage Description
#1	91.75'	3,515 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
91.75	500	100.0	0	0	500
92.00	3,110	237.0	405	405	4,174
93.00	3,110	237.0	3,110	3,515	4,411

Device	Routing	Invert	Outlet Devices
#1	Primary	92.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=2.95 cfs @ 12.56 hrs HW=92.12' TW=90.35' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.95 cfs @ 0.85 fps)

Pond 6P: Pond 6



Summary for Pond 26P: Yard drain

[58] Hint: Peaked 0.07' above defined flood level

Inflow Area = 0.288 ac, 0.00% Impervious, Inflow Depth > 1.41" for 25 YR - 24 HR event
Inflow = 0.22 cfs @ 12.52 hrs, Volume= 0.034 af
Outflow = 0.22 cfs @ 12.52 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.1 min
Primary = 0.22 cfs @ 12.52 hrs, Volume= 0.034 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 94.07' @ 12.52 hrs Surf.Area= 22 sf Storage= 1 cf
Flood Elev= 94.00' Surf.Area= 20 sf Storage= 0 cf

Plug-Flow detention time= 0.2 min calculated for 0.034 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (907.2 - 907.1)

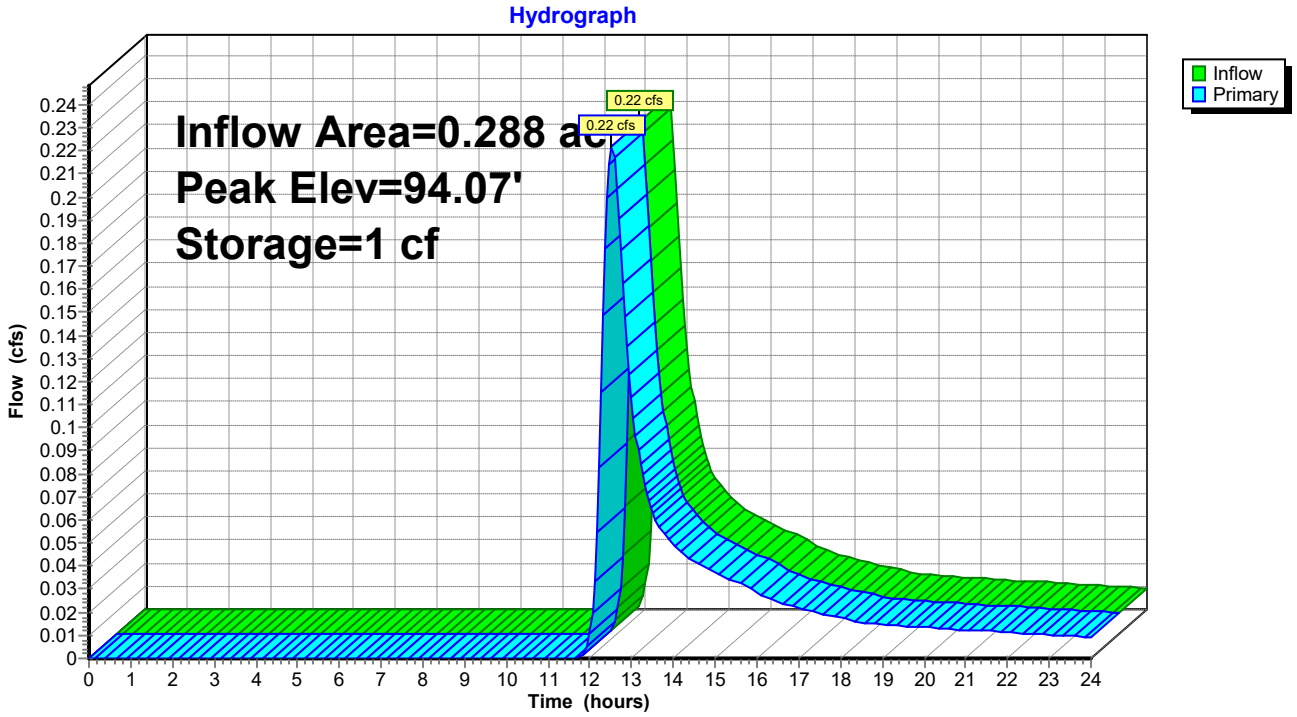
Volume	Invert	Avail.Storage	Storage Description
#1	94.00'	34 cf	**Open water storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
94.00	20	10.0	0	0	20
95.00	50	25.0	34	34	65

Device	Routing	Invert	Outlet Devices
#1	Primary	92.00'	**6.0" Round 6" HDPE N-12** L= 162.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 92.00' / 92.00' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf
#2	Device 1	94.00'	**12.0" x 12.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.22 cfs @ 12.52 hrs HW=94.07' TW=0.00' (Dynamic Tailwater)
↑**1=6" HDPE N-12** (Passes 0.22 cfs of 0.56 cfs potential flow)
↑**2=Grate** (Weir Controls 0.22 cfs @ 0.84 fps)

Pond 26P: Yard drain



Summary for Pond 101P: Gravel Wetland #101

[80] Warning: Exceeded Pond 105P by 0.09' @ 12.10 hrs (0.88 cfs 0.019 af)

Inflow Area = 2.296 ac, 48.89% Impervious, Inflow Depth > 5.05" for 25 YR - 24 HR event
Inflow = 8.76 cfs @ 12.09 hrs, Volume= 0.966 af
Outflow = 3.20 cfs @ 12.47 hrs, Volume= 0.785 af, Atten= 63%, Lag= 22.9 min
Primary = 0.11 cfs @ 12.47 hrs, Volume= 0.133 af
Secondary = 3.07 cfs @ 12.47 hrs, Volume= 0.652 af
Tertiary = 0.02 cfs @ 12.47 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 94.01' @ 12.47 hrs Surf.Area= 23,374 sf Storage= 14,945 cf
Flood Elev= 94.50' Surf.Area= 28,267 sf Storage= 22,830 cf

Plug-Flow detention time= 154.2 min calculated for 0.784 af (81% of inflow)
Center-of-Mass det. time= 79.9 min (890.3 - 810.4)

Volume	Invert	Avail.Storage	Storage Description
#1	91.92'	25 cf	**4.00'D x 1.98'H Outlet Structure**
#2	92.50'	2,408 cf	**Sediment Forebay (Irregular)** Listed below (Recalc)
#3	92.25'	2,929 cf	**Cell #1 (Irregular)** Listed below (Recalc)
#4	92.25'	2,038 cf	**Cell #2 (Irregular)** Listed below (Recalc)
#5	93.25'	15,430 cf	**Open water storage (Irregular)** Listed below (Recalc)
		22,830 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.50	1,240	147.0	0	0	1,240
93.00	1,487	157.0	681	681	1,494
94.00	1,980	175.7	1,728	2,408	2,016

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.25	550	90.8	0	0	550
92.50	2,399	249.3	341	341	4,840
93.00	3,643	453.0	1,500	1,841	16,225
93.25	5,101	523.7	1,088	2,929	21,722

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.25	565	92.1	0	0	565
92.50	2,052	221.3	308	308	3,787
93.00	2,393	231.4	1,110	1,418	4,168
93.25	2,567	235.9	620	2,038	4,346

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.25	8,163	533.5	0	0	8,163
94.00	11,719	822.5	7,416	7,416	39,352
94.01	13,712	974.5	127	7,543	61,088
94.50	18,606	1,157.5	7,887	15,430	92,140

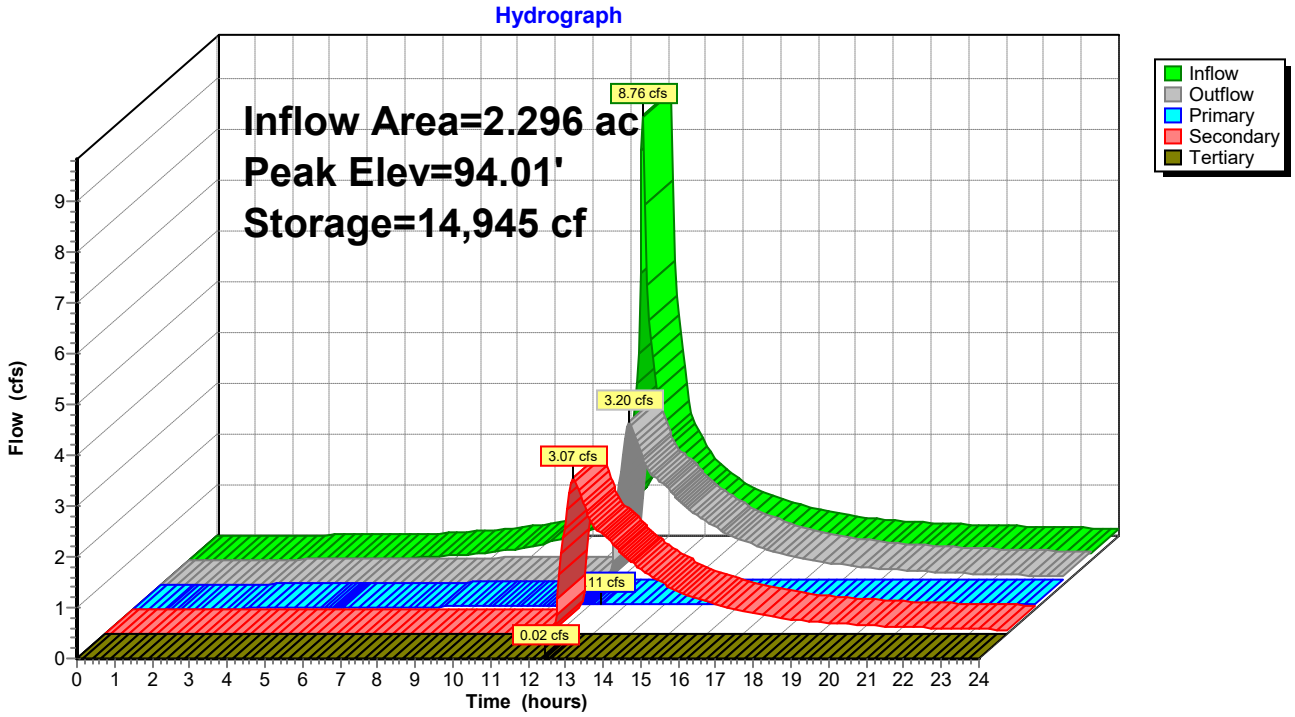
Device	Routing	Invert	Outlet Devices
#1	Primary	91.92'	**6.0" Round 6" HDPE N-12** L= 14.5' Ke= 0.500 Inlet / Outlet Invert= 91.92' / 91.75' S= 0.0117 '/' Cc= 0.900 n= 0.010 Concrete pipe, straight & clean, Flow Area= 0.20 sf
#2	Secondary	91.92'	**12.0" Round 12" RCP** L= 16.0' Ke= 0.500 Inlet / Outlet Invert= 91.92' / 91.75' S= 0.0106 '/' Cc= 0.900 n= 0.010 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#3	Device 1	91.92'	**1.7" Vert. 1.75" Orifice Goose Neck** C= 0.600
#4	Device 2	93.25'	**3.0" Vert. 3" Orifice** C= 0.600
#5	Device 2	93.40'	**18.0" W x 6.0" H Vert. 6"T X 18"W Box Orifice** C= 0.600
#6	Device 2	93.94'	**48.0" Horiz. 4' Structure** C= 0.600 Limited to weir flow at low heads
#7	Tertiary	94.00'	**10.0' long x 7.0' breadth 10' Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.40 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.66 2.68 2.70 2.73 2.78

Primary OutFlow Max=0.11 cfs @ 12.47 hrs HW=94.01' TW=0.00' (Dynamic Tailwater)
└─**1=6" HDPE N-12** (Passes 0.11 cfs of 1.28 cfs potential flow)
└─**3=1.75" Orifice Goose Neck** (Orifice Controls 0.11 cfs @ 6.84 fps)

Secondary OutFlow Max=3.06 cfs @ 12.47 hrs HW=94.01' TW=0.00' (Dynamic Tailwater)
└─**2=12" RCP** (Passes 3.06 cfs of 4.77 cfs potential flow)
├─**4=3" Orifice** (Orifice Controls 0.19 cfs @ 3.84 fps)
├─**5=6"T X 18"W Box Orifice** (Orifice Controls 2.12 cfs @ 2.82 fps)
└─**6=4' Structure** (Weir Controls 0.75 cfs @ 0.86 fps)

Tertiary OutFlow Max=0.02 cfs @ 12.47 hrs HW=94.01' TW=0.00' (Dynamic Tailwater)
└─**7=10' Emergency Spillway** (Weir Controls 0.02 cfs @ 0.23 fps)

Pond 101P: Gravel Wetland #101



Summary for Pond 102P: Detention Pond #102

Inflow Area = 2.180 ac, 57.19% Impervious, Inflow Depth > 5.45" for 25 YR - 24 HR event
Inflow = 9.14 cfs @ 12.15 hrs, Volume= 0.989 af
Outflow = 5.31 cfs @ 12.42 hrs, Volume= 0.984 af, Atten= 42%, Lag= 16.0 min
Primary = 5.31 cfs @ 12.42 hrs, Volume= 0.984 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 94.58' @ 12.44 hrs Surf.Area= 10,846 sf Storage= 8,075 cf
Flood Elev= 95.00' Surf.Area= 13,054 sf Storage= 13,068 cf

Plug-Flow detention time= 24.1 min calculated for 0.984 af (100% of inflow)
Center-of-Mass det. time= 21.2 min (809.9 - 788.7)

Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	12,688 cf	**Open water storage (Irregular)** Listed below (Recalc)
#2	93.25'	380 cf	**Inlet Sump (Irregular)** Listed below (Recalc)
		13,068 cf	Total Available Storage

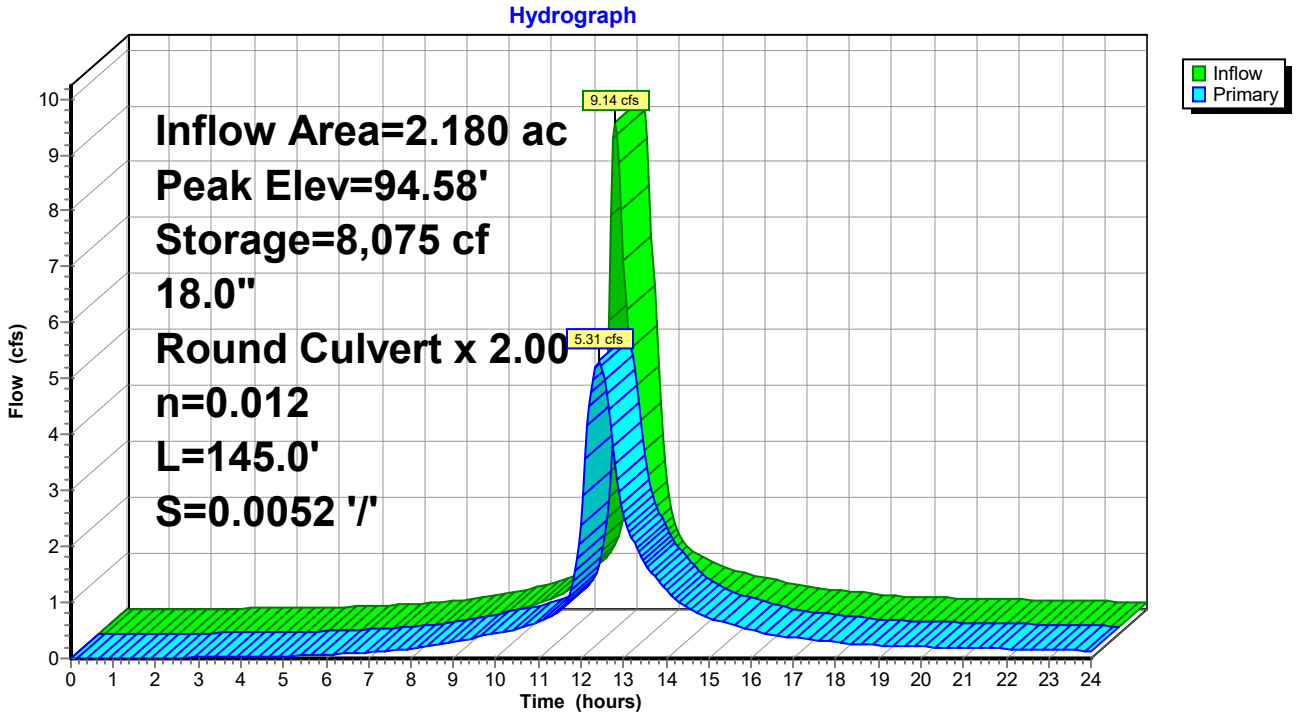
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.50	2,615	312.0	0	0	2,615
94.00	7,880	777.2	2,506	2,506	42,937
95.00	12,674	1,476.0	10,183	12,688	168,240

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.25	29	22.1	0	0	29
93.50	48	175.5	10	10	2,441
94.00	236	55.5	65	75	4,648
95.00	380	70.7	305	380	4,813

Device	Routing	Invert	Outlet Devices
#1	Primary	93.25'	**18.0" Round 18" HDPE N-12 (2) X 2.00** L= 145.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.25' / 92.50' S= 0.0052 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=5.27 cfs @ 12.42 hrs HW=94.58' TW=94.32' (Dynamic Tailwater)
↑—**1=18" HDPE N-12 (2)** (Outlet Controls 5.27 cfs @ 2.11 fps)

Pond 102P: Detention Pond #102



Summary for Pond 103P: Gravel Wetland #103

Inflow Area = 3.293 ac, 53.10% Impervious, Inflow Depth > 5.29" for 25 YR - 24 HR event
Inflow = 9.27 cfs @ 12.16 hrs, Volume= 1.450 af
Outflow = 7.60 cfs @ 12.42 hrs, Volume= 1.258 af, Atten= 18%, Lag= 15.4 min
Primary = 0.19 cfs @ 12.42 hrs, Volume= 0.230 af
Secondary = 6.22 cfs @ 12.42 hrs, Volume= 1.000 af
Tertiary = 1.19 cfs @ 12.42 hrs, Volume= 0.028 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 94.32' @ 12.42 hrs Surf.Area= 18,368 sf Storage= 15,656 cf
Flood Elev= 95.00' Surf.Area= 19,260 sf Storage= 22,733 cf

Plug-Flow detention time= 107.1 min calculated for 1.256 af (87% of inflow)
Center-of-Mass det. time= 49.5 min (853.6 - 804.2)

Volume	Invert	Avail.Storage	Storage Description
#1	91.92'	28 cf	**4.00'D x 2.23'H Outlet Structure**
#2	92.50'	2,395 cf	**Sediment Forebay (Irregular)** Listed below (Recalc)
#3	92.25'	3,351 cf	**Cell 1 (Irregular)** Listed below (Recalc)
#4	92.25'	3,152 cf	**Cell 2 (Irregular)** Listed below (Recalc)
#5	93.50'	13,808 cf	**Open Water Storage (Irregular)** Listed below (Recalc)
		22,733 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.50	1,217	144.1	0	0	1,217
93.00	1,501	157.3	678	678	1,542
94.00	1,941	174.6	1,716	2,395	2,029

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.25	1,197	156.7	0	0	1,197
92.50	2,481	270.1	450	450	5,049
93.00	2,905	280.3	1,345	1,795	5,516
93.50	3,322	289.4	1,556	3,351	5,953

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.25	1,197	156.9	0	0	1,197
92.50	2,265	250.5	426	426	4,232
93.00	2,768	263.3	1,256	1,682	4,771
93.50	3,115	271.9	1,470	3,152	5,161

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.50	6,952	346.4	0	0	6,952
94.00	7,478	355.8	3,607	3,607	7,506
94.01	9,582	419.5	85	3,692	11,436
95.00	10,869	438.4	10,117	13,808	12,794

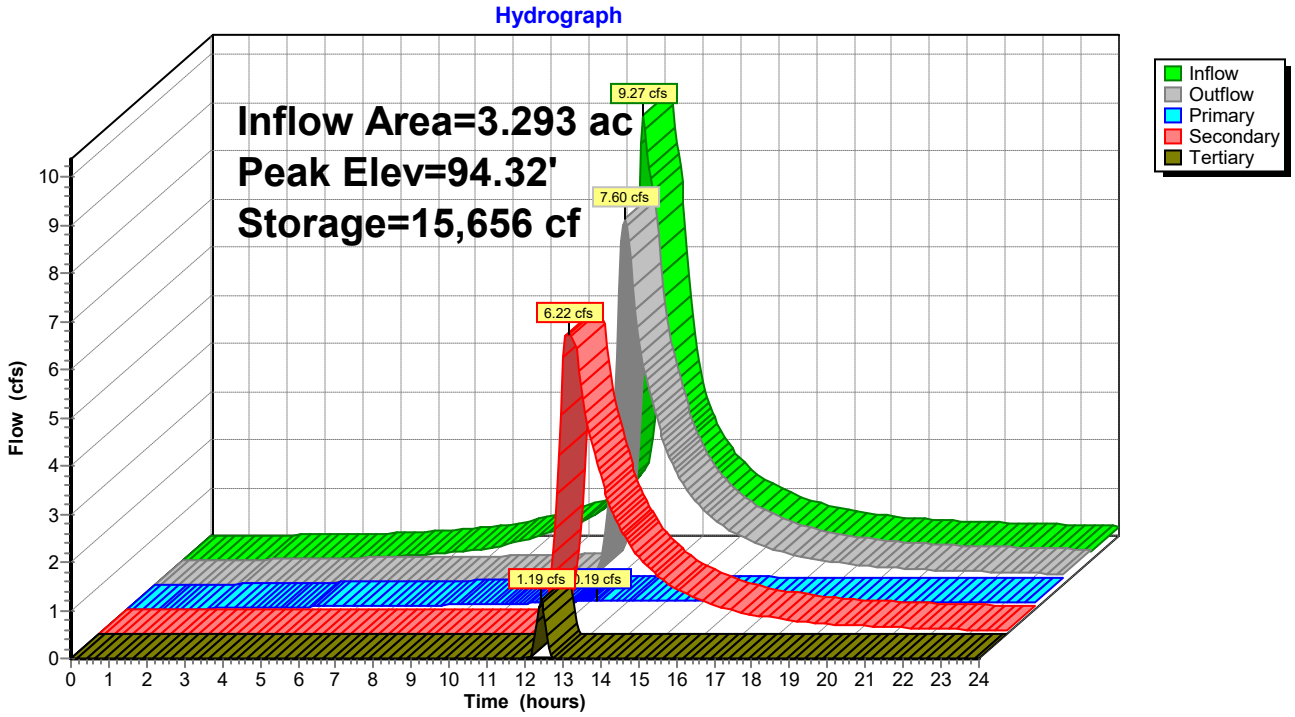
Device	Routing	Invert	Outlet Devices
#1	Primary	91.92'	**6.0" Round 6" HDPE N-12** L= 16.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 91.92' / 91.75' S= 0.0106 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Secondary	91.92'	**15.0" Round 15" RCP** L= 12.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 91.92' / 91.75' S= 0.0142 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 1	91.92'	**2.2" Vert. 2.25" Orifice Goose Neck** C= 0.600
#4	Device 2	93.50'	**4.0" Vert. 4" Orifice (2) X 2.00** C= 0.600
#5	Device 2	93.50'	**12.0" W x 8.0" H Vert. 8"T X 12" W Box Orifice (2) X 2.00** C= 0.600
#6	Device 2	94.19'	**48.0" Horiz. 4' Structure** C= 0.600 Limited to weir flow at low heads
#7	Tertiary	94.25'	**25.0' long x 11.0' breadth 25' Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Primary OutFlow Max=0.19 cfs @ 12.42 hrs HW=94.32' TW=0.00' (Dynamic Tailwater)
└─**1=6" HDPE N-12** (Passes 0.19 cfs of 1.09 cfs potential flow)
└─**3=2.25" Orifice Goose Neck** (Orifice Controls 0.19 cfs @ 7.32 fps)

Secondary OutFlow Max=6.22 cfs @ 12.42 hrs HW=94.32' TW=0.00' (Dynamic Tailwater)
└─**2=15" RCP** (Inlet Controls 6.22 cfs @ 5.06 fps)
├─**4=4" Orifice (2)** (Passes < 0.68 cfs potential flow)
├─**5=8"T X 12" W Box Orifice (2)** (Passes < 4.38 cfs potential flow)
└─**6=4' Structure** (Passes < 1.93 cfs potential flow)

Tertiary OutFlow Max=1.17 cfs @ 12.42 hrs HW=94.32' TW=0.00' (Dynamic Tailwater)
└─**7=25' Emergency Spillway** (Weir Controls 1.17 cfs @ 0.67 fps)

Pond 103P: Gravel Wetland #103



Summary for Pond 104P: Gravel Wetland #104

Inflow Area = 0.528 ac, 56.11% Impervious, Inflow Depth > 5.36" for 25 YR - 24 HR event
Inflow = 3.13 cfs @ 12.09 hrs, Volume= 0.236 af
Outflow = 0.21 cfs @ 13.63 hrs, Volume= 0.151 af, Atten= 93%, Lag= 92.2 min
Primary = 0.02 cfs @ 13.63 hrs, Volume= 0.027 af
Secondary = 0.19 cfs @ 13.63 hrs, Volume= 0.123 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 93.25' @ 13.63 hrs Surf.Area= 7,537 sf Storage= 6,195 cf
Flood Elev= 94.00' Surf.Area= 9,033 sf Storage= 10,116 cf

Plug-Flow detention time= 299.2 min calculated for 0.150 af (64% of inflow)
Center-of-Mass det. time= 201.1 min (990.6 - 789.5)

Volume	Invert	Avail.Storage	Storage Description
#1	90.33'	43 cf	**4.00'D x 3.42'H Outlet Structure**
#2	91.00'	943 cf	**Sediment Forebay (Irregular)** Listed below (Recalc)
#3	91.00'	708 cf	**Cell 1 (Irregular)** Listed below (Recalc)
#4	91.00'	691 cf	**Cell 2 (Irregular)** Listed below (Recalc)
#5	92.00'	7,730 cf	**Open water storage (Irregular)** Listed below (Recalc)
		10,116 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
91.00	106	39.5	0	0	106
92.00	361	75.3	221	221	438
93.00	1,159	150.0	722	943	1,782

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
91.00	505	135.1	0	0	505
92.00	933	155.0	708	708	987

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
91.00	492	129.8	0	0	492
92.00	912	149.2	691	691	945

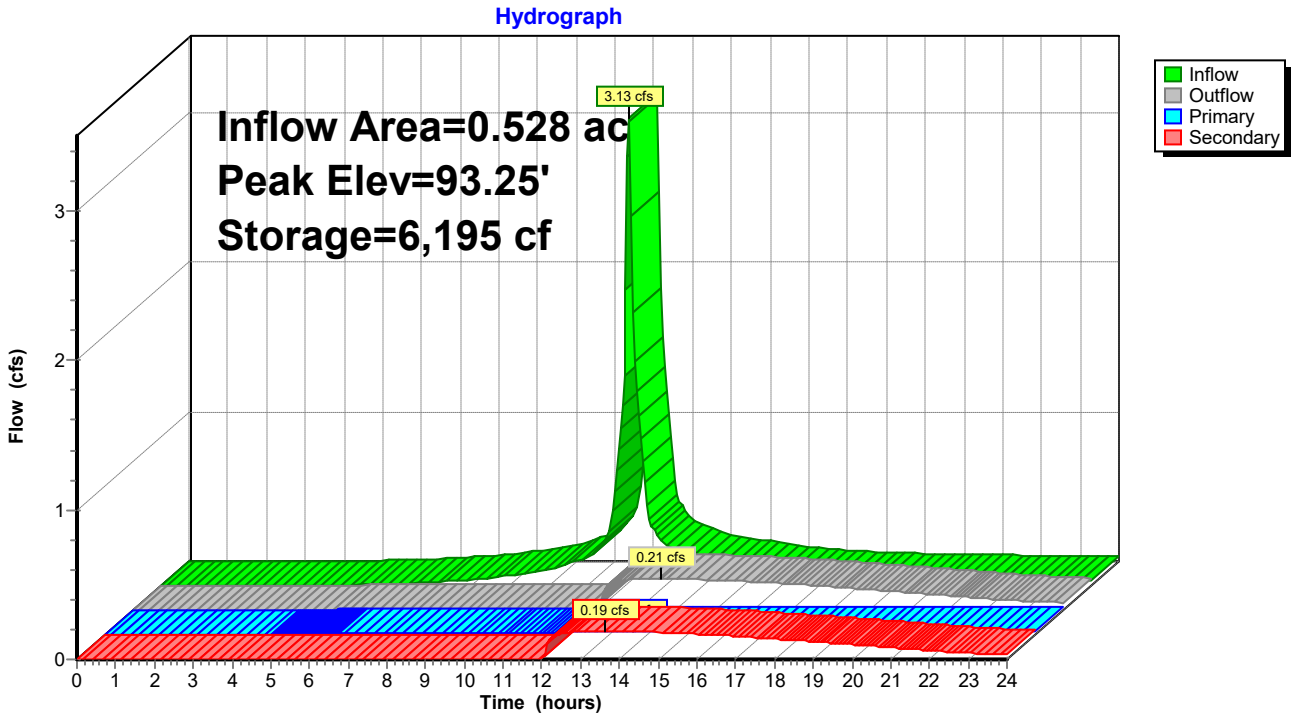
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.00	2,671	356.5	0	0	2,671
93.00	2,793	306.2	2,732	2,732	5,344
93.01	4,076	437.5	34	2,766	13,115
94.00	6,016	501.8	4,964	7,730	17,943

Device	Routing	Invert	Outlet Devices
#1	Primary	90.33'	**6.0" Round 6" HDPE N-12** L= 17.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 90.33' / 90.00' S= 0.0189 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Secondary	90.33'	**12.0" Round 12" HDPE N-12** L= 16.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 90.33' / 90.00' S= 0.0206 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 1	90.33'	**0.7" Vert. 0.75" Orifice Goose Neck** C= 0.600
#4	Device 2	92.50'	**3.0" Vert. 3" Orifice** C= 0.600
#5	Device 2	93.50'	**12.0" W x 3.0" H Vert. 3"T X 12"W Box Orifice** C= 0.600
#6	Device 2	93.79'	**48.0" Horiz. 4' Structure** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 13.63 hrs HW=93.25' TW=89.86' (Dynamic Tailwater)
└─**1=6" HDPE N-12** (Passes 0.02 cfs of 1.22 cfs potential flow)
└─**3=0.75" Orifice Goose Neck** (Orifice Controls 0.02 cfs @ 8.19 fps)

Secondary OutFlow Max=0.19 cfs @ 13.63 hrs HW=93.25' TW=89.86' (Dynamic Tailwater)
└─**2=12" HDPE N-12** (Passes 0.19 cfs of 4.65 cfs potential flow)
├─**4=3" Orifice** (Orifice Controls 0.19 cfs @ 3.82 fps)
├─**5=3"T X 12"W Box Orifice** (Controls 0.00 cfs)
└─**6=4' Structure** (Controls 0.00 cfs)

Pond 104P: Gravel Wetland #104



Summary for Pond 105P: Detention Pond #105

Inflow Area = 0.849 ac, 46.13% Impervious, Inflow Depth > 5.13" for 25 YR - 24 HR event
Inflow = 3.91 cfs @ 12.18 hrs, Volume= 0.363 af
Outflow = 1.21 cfs @ 12.67 hrs, Volume= 0.329 af, Atten= 69%, Lag= 29.1 min
Primary = 1.21 cfs @ 12.67 hrs, Volume= 0.329 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 94.17' @ 12.60 hrs Surf.Area= 7,134 sf Storage= 5,655 cf
Flood Elev= 95.25' Surf.Area= 8,342 sf Storage= 14,037 cf

Plug-Flow detention time= 103.6 min calculated for 0.329 af (91% of inflow)
Center-of-Mass det. time= 58.3 min (859.6 - 801.3)

Volume	Invert	Avail.Storage	Storage Description
#1	92.75'	14,037 cf	**Open water storage (Irregular)** Listed below (Recalc)

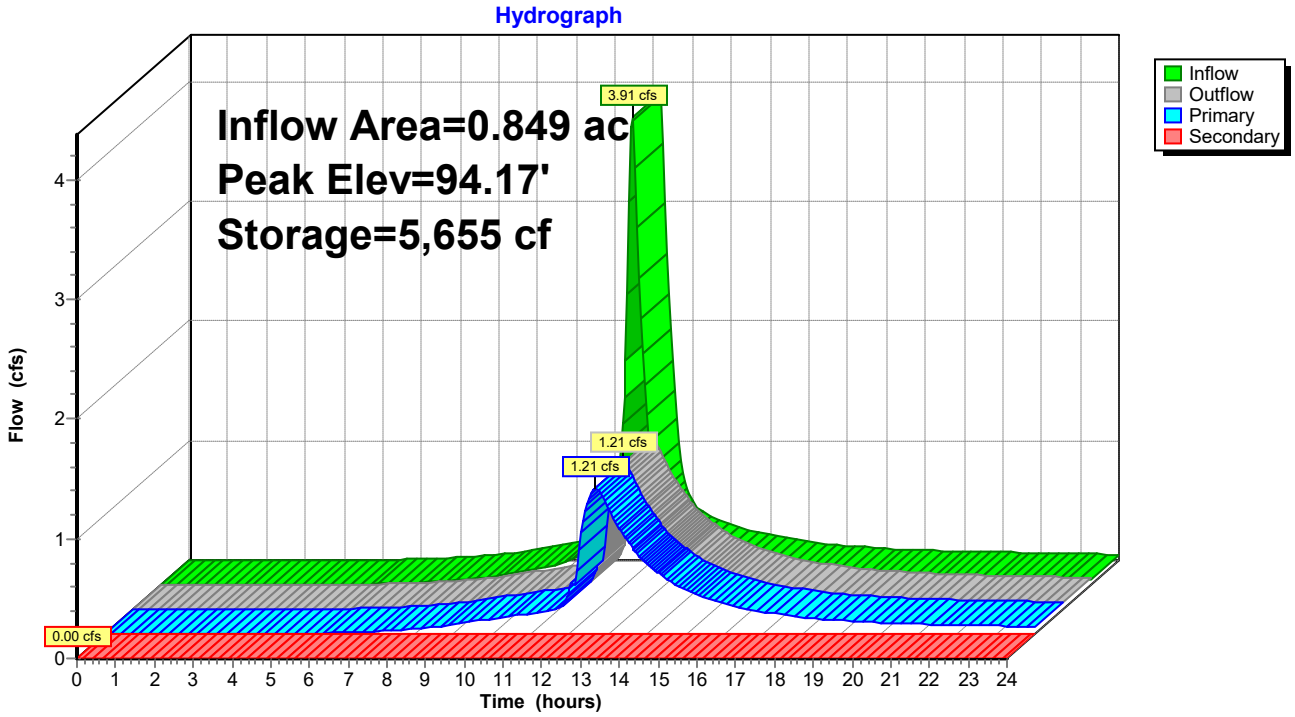
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.75	30	22.0	0	0	30
93.00	2,092	180.6	198	198	2,587
94.00	6,956	359.0	4,288	4,485	10,252
95.00	8,061	377.5	7,502	11,987	11,397
95.25	8,342	382.3	2,050	14,037	11,703

Device	Routing	Invert	Outlet Devices
#1	Primary	92.75'	**12.0" Round 12" RCP** L= 37.5' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 92.75' / 92.50' S= 0.0067 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	94.75'	**10.0' long x 7.0' breadth 10' Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.40 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.66 2.68 2.70 2.73 2.78

Primary OutFlow Max=1.24 cfs @ 12.67 hrs HW=94.16' TW=93.99' (Dynamic Tailwater)
↑—**1=12" RCP** (Inlet Controls 1.24 cfs @ 1.57 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=92.75' TW=93.00' (Dynamic Tailwater)
↑—**2=10' Emergency Spillway** (Controls 0.00 cfs)

Pond 105P: Detention Pond #105



Summary for Pond C01P: CB #1

Inflow Area = 0.328 ac, 71.65% Impervious, Inflow Depth > 5.82" for 25 YR - 24 HR event
Inflow = 2.05 cfs @ 12.09 hrs, Volume= 0.159 af
Outflow = 2.05 cfs @ 12.09 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.1 min
Primary = 2.05 cfs @ 12.09 hrs, Volume= 0.159 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 94.71' @ 12.09 hrs Surf.Area= 13 sf Storage= 12 cf
Flood Elev= 96.68' Surf.Area= 13 sf Storage= 37 cf

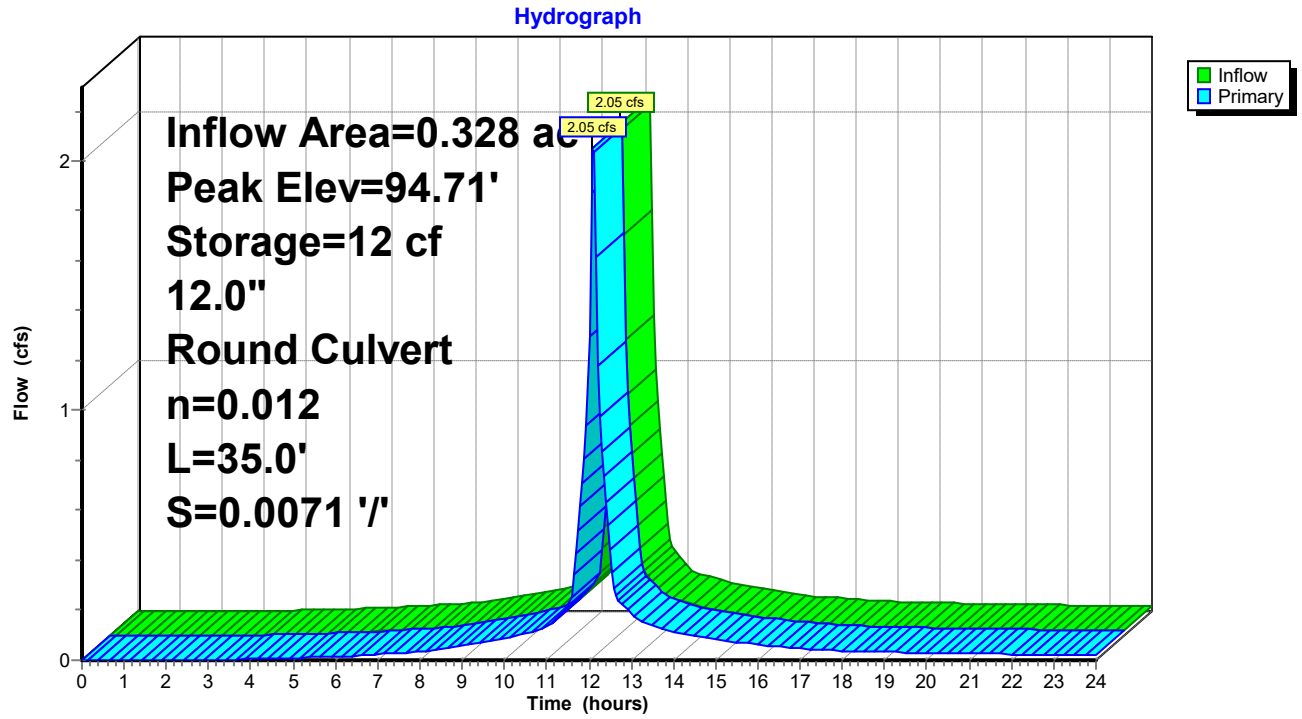
Plug-Flow detention time= 0.4 min calculated for 0.158 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (776.7 - 776.5)

Volume	Invert	Avail.Storage	Storage Description
#1	93.75'	41 cf	**4.00'D x 3.25'H 4' structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	93.75'	**12.0" Round 12" HDPE N-12** L= 35.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.75' / 93.50' S= 0.0071 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.00 cfs @ 12.09 hrs HW=94.69' TW=94.19' (Dynamic Tailwater)
↳**1=12" HDPE N-12** (Inlet Controls 2.00 cfs @ 2.61 fps)

Pond C01P: CB #1



Summary for Pond C02P: CB #2

Inflow Area = 0.431 ac, 68.35% Impervious, Inflow Depth > 5.70" for 25 YR - 24 HR event
Inflow = 2.48 cfs @ 12.12 hrs, Volume= 0.205 af
Outflow = 2.47 cfs @ 12.12 hrs, Volume= 0.205 af, Atten= 1%, Lag= 0.0 min
Primary = 2.47 cfs @ 12.12 hrs, Volume= 0.205 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 95.33' @ 12.16 hrs Surf.Area= 13 sf Storage= 16 cf
Flood Elev= 97.10' Surf.Area= 13 sf Storage= 39 cf

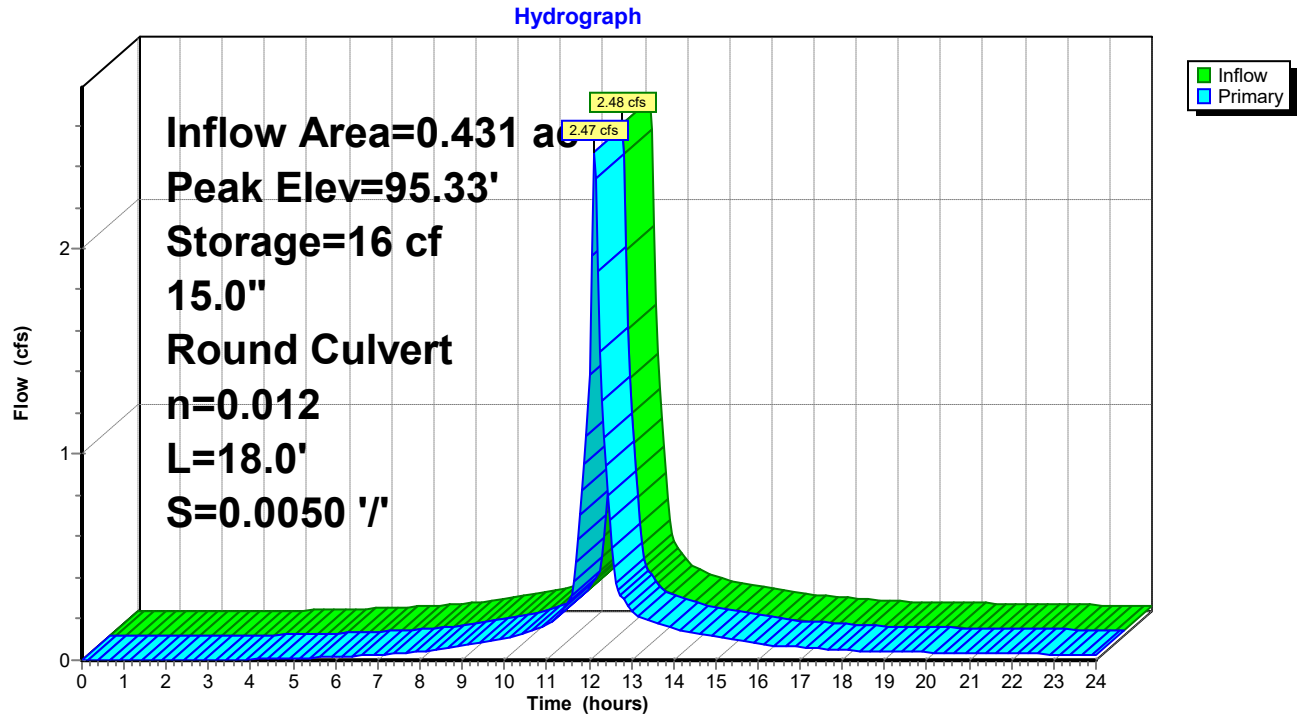
Plug-Flow detention time= 0.3 min calculated for 0.205 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (782.1 - 781.9)

Volume	Invert	Avail.Storage	Storage Description
#1	94.03'	39 cf	**4.00'D x 3.07'H 4' structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	94.03'	**15.0" Round 15" RCP** L= 18.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 94.03' / 93.94' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.80 cfs @ 12.12 hrs HW=95.24' TW=95.08' (Dynamic Tailwater)
1=15" RCP (Inlet Controls 1.80 cfs @ 1.48 fps)

Pond C02P: CB #2



Summary for Pond C03P: CB #3

Inflow Area = 0.579 ac, 76.42% Impervious, Inflow Depth > 5.94" for 25 YR - 24 HR event
Inflow = 3.41 cfs @ 12.11 hrs, Volume= 0.287 af
Outflow = 3.40 cfs @ 12.11 hrs, Volume= 0.287 af, Atten= 0%, Lag= 0.0 min
Primary = 3.40 cfs @ 12.11 hrs, Volume= 0.287 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 95.10' @ 12.13 hrs Surf.Area= 13 sf Storage= 16 cf
Flood Elev= 97.10' Surf.Area= 13 sf Storage= 41 cf

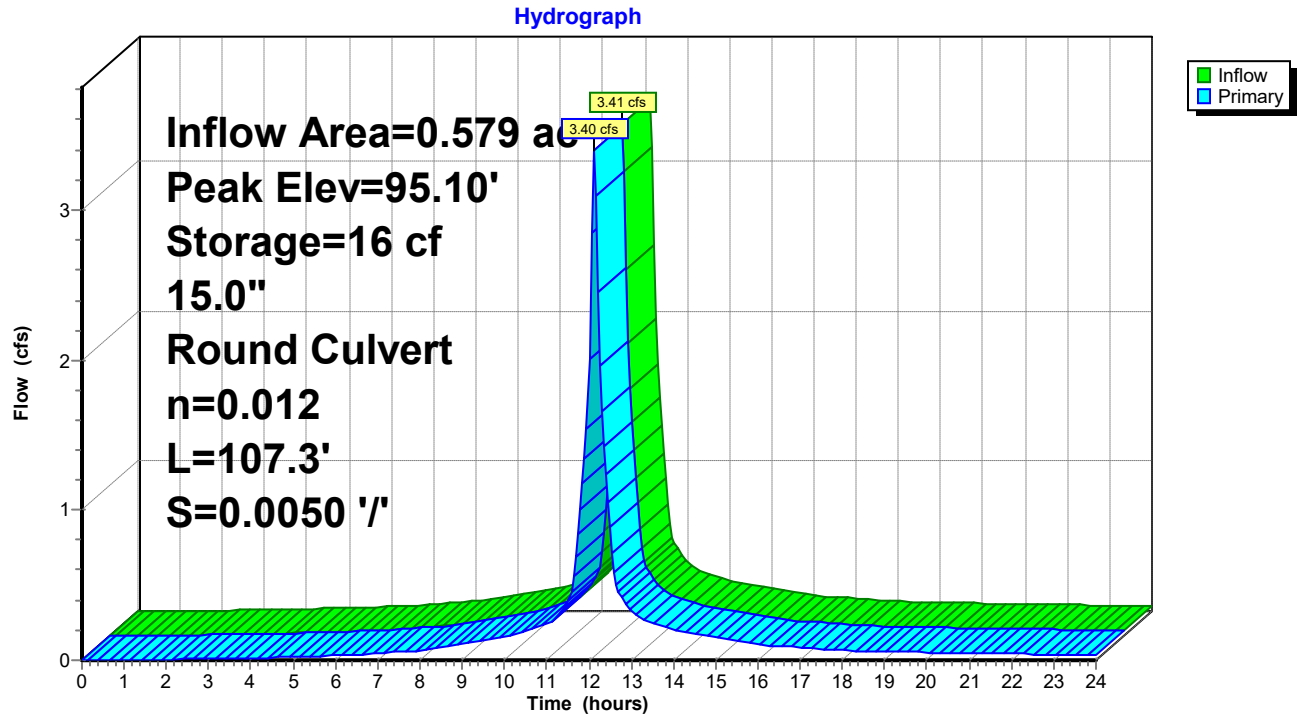
Plug-Flow detention time= 0.3 min calculated for 0.287 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (771.1 - 770.9)

Volume	Invert	Avail.Storage	Storage Description
#1	93.84'	41 cf	**4.00'D x 3.26'H 4' structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	93.84'	**15.0" Round 15" HDPE N-12** L= 107.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.84' / 93.30' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.01 cfs @ 12.11 hrs HW=95.08' TW=94.55' (Dynamic Tailwater)
1=15" HDPE N-12 (Outlet Controls 3.01 cfs @ 3.08 fps)

Pond C03P: CB #3



Summary for Pond D01P: DMH #1

Inflow Area = 0.579 ac, 76.42% Impervious, Inflow Depth > 5.94" for 25 YR - 24 HR event
Inflow = 3.40 cfs @ 12.11 hrs, Volume= 0.287 af
Outflow = 3.40 cfs @ 12.11 hrs, Volume= 0.286 af, Atten= 0%, Lag= 0.0 min
Primary = 3.40 cfs @ 12.11 hrs, Volume= 0.286 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 94.57' @ 12.12 hrs Surf.Area= 13 sf Storage= 17 cf
Flood Elev= 97.00' Surf.Area= 13 sf Storage= 48 cf

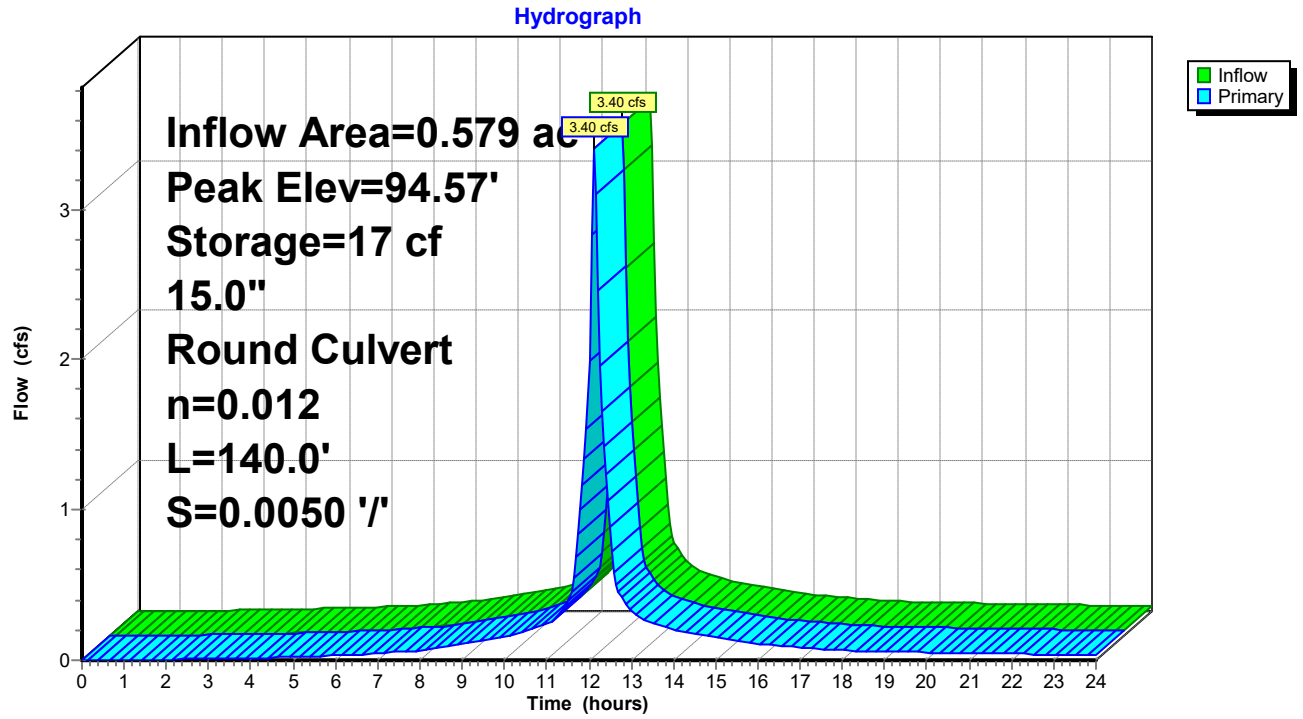
Plug-Flow detention time= 0.5 min calculated for 0.286 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (771.4 - 771.1)

Volume	Invert	Avail.Storage	Storage Description
#1	93.20'	48 cf	**4.00'D x 3.80'H 4' structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	93.20'	**15.0" Round 15" HDPE N-12** L= 140.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.20' / 92.50' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.06 cfs @ 12.11 hrs HW=94.55' TW=94.04' (Dynamic Tailwater)
1=15" HDPE N-12 (Outlet Controls 3.06 cfs @ 2.87 fps)

Pond D01P: DMH #1



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

Subcatchment 1S: Subcatchment #1 Runoff Area=21,582 sf 38.16% Impervious Runoff Depth>1.79"
Tc=6.0 min CN=81 Runoff=1.02 cfs 0.074 af

Subcatchment 2S: Subcatchment #2 Runoff Area=55,925 sf 0.00% Impervious Runoff Depth>1.24"
Flow Length=251' Tc=29.9 min CN=73 Runoff=1.02 cfs 0.132 af

Subcatchment 4S: Subcatchment #4 Runoff Area=10,745 sf 50.29% Impervious Runoff Depth>1.79"
Flow Length=150' Tc=9.0 min CN=81 Runoff=0.46 cfs 0.037 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>0.45"
Flow Length=431' Tc=35.4 min CN=57 Runoff=0.41 cfs 0.085 af

Subcatchment 11S: Subcatchment #11 Runoff Area=49,435 sf 36.91% Impervious Runoff Depth>1.94"
Tc=6.0 min CN=83 Runoff=2.53 cfs 0.184 af

Subcatchment 12S: Subcatchment #12 Runoff Area=67,086 sf 45.45% Impervious Runoff Depth>2.10"
Flow Length=186' Slope=0.0070 '/' Tc=16.4 min CN=85 Runoff=2.76 cfs 0.269 af

Subcatchment 13S: Subcatchment #13 Runoff Area=23,260 sf 11.09% Impervious Runoff Depth>1.37"
Flow Length=114' Slope=0.0100 '/' Tc=12.5 min UI Adjusted CN=75 Runoff=0.67 cfs 0.061 af

Subcatchment 14S: Subcatchment #14 Runoff Area=23,020 sf 56.11% Impervious Runoff Depth>2.27"
Tc=6.0 min CN=87 Runoff=1.37 cfs 0.100 af

Subcatchment 15S: Subcatchment #15 Runoff Area=37,000 sf 46.13% Impervious Runoff Depth>2.10"
Flow Length=149' Slope=0.0100 '/' Tc=13.4 min CN=85 Runoff=1.64 cfs 0.149 af

Subcatchment 17S: Subcatchment #17 Runoff Area=13,584 sf 100.00% Impervious Runoff Depth>3.36"
Tc=6.0 min CN=98 Runoff=1.07 cfs 0.087 af

Subcatchment 18S: Mixed Use Building Runoff Area=7,390 sf 100.00% Impervious Runoff Depth>3.36"
Tc=6.0 min CN=98 Runoff=0.58 cfs 0.048 af

Subcatchment 19S: Mixed Use Building Runoff Area=6,194 sf 100.00% Impervious Runoff Depth>3.36"
Tc=6.0 min CN=98 Runoff=0.49 cfs 0.040 af

Subcatchment 21S: Subcatchment #21 Runoff Area=14,270 sf 71.65% Impervious Runoff Depth>2.63"
Tc=6.0 min CN=91 Runoff=0.97 cfs 0.072 af

Subcatchment 22S: Subcatchment #22 Runoff Area=18,796 sf 68.35% Impervious Runoff Depth>2.54"
Flow Length=202' Tc=8.4 min CN=90 Runoff=1.15 cfs 0.091 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,434 sf 100.00% Impervious Runoff Depth>3.36"
Tc=6.0 min CN=98 Runoff=0.51 cfs 0.041 af

Subcatchment 26S: Subcatchment #26 Runoff Area=12,543 sf 0.00% Impervious Runoff Depth>0.16"
Flow Length=305' Slope=0.0100 '/' Tc=31.4 min CN=48 Runoff=0.01 cfs 0.004 af

Reach 15AR: Overland flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=30.0' S=0.0167 '/' Capacity=158.86 cfs Outflow=0.00 cfs 0.000 af

Reach 15R: Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=70.0' S=0.0071 '/' Capacity=31.36 cfs Outflow=0.00 cfs 0.000 af

Reach 100R: Final Reach 100 Inflow=1.09 cfs 0.300 af
Outflow=1.09 cfs 0.300 af

Reach 200R: Final Reach 200 Inflow=2.37 cfs 0.582 af
Outflow=2.37 cfs 0.582 af

Reach 400R: Final Reach 400 Inflow=0.47 cfs 0.136 af
Outflow=0.47 cfs 0.136 af

Pond 4P: Pond 4 Peak Elev=89.70' Storage=21 cf Inflow=0.47 cfs 0.136 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=0.47 cfs 0.136 af

Pond 6P: Pond 6 Peak Elev=92.03' Storage=497 cf Inflow=0.41 cfs 0.085 af
Outflow=0.38 cfs 0.076 af

Pond 26P: Yard drain Peak Elev=94.01' Storage=0 cf Inflow=0.01 cfs 0.004 af
Outflow=0.01 cfs 0.004 af

Pond 101P: Gravel Wetland #101 Peak Elev=93.51' Storage=8,763 cf Inflow=4.02 cfs 0.392 af
Primary=0.09 cfs 0.112 af Secondary=0.26 cfs 0.114 af Tertiary=0.00 cfs 0.000 af Outflow=0.36 cfs 0.226 af

Pond 102P: Detention Pond #102 Peak Elev=93.96' Storage=2,264 cf Inflow=4.03 cfs 0.429 af
18.0" Round Culvert x 2.00 n=0.012 L=145.0' S=0.0052 '/' Outflow=2.69 cfs 0.428 af

Pond 103P: Gravel Wetland #103 Peak Elev=93.81' Storage=10,766 cf Inflow=4.61 cfs 0.622 af
Primary=0.17 cfs 0.195 af Secondary=1.43 cfs 0.251 af Tertiary=0.00 cfs 0.000 af Outflow=1.60 cfs 0.446 af

Pond 104P: Gravel Wetland #104 Peak Elev=92.53' Storage=3,375 cf Inflow=1.37 cfs 0.100 af
Primary=0.02 cfs 0.022 af Secondary=0.00 cfs 0.001 af Outflow=0.02 cfs 0.023 af

Pond 105P: Detention Pond #105 Peak Elev=93.51' Storage=1,792 cf Inflow=1.64 cfs 0.149 af
Primary=0.68 cfs 0.121 af Secondary=0.00 cfs 0.000 af Outflow=0.68 cfs 0.121 af

Pond C01P: CB #1 Peak Elev=94.33' Storage=7 cf Inflow=0.97 cfs 0.072 af
12.0" Round Culvert n=0.012 L=35.0' S=0.0071 '/' Outflow=0.97 cfs 0.072 af

Pond C02P: CB #2 Peak Elev=94.73' Storage=9 cf Inflow=1.15 cfs 0.091 af
15.0" Round Culvert n=0.012 L=18.0' S=0.0050 '/' Outflow=1.15 cfs 0.091 af

Pond C03P: CB #3 Peak Elev=94.56' Storage=9 cf Inflow=1.63 cfs 0.133 af
15.0" Round Culvert n=0.012 L=107.3' S=0.0050 '/' Outflow=1.63 cfs 0.133 af

Pond D01P: DMH #1 Peak Elev=93.91' Storage=9 cf Inflow=1.63 cfs 0.133 af
15.0" Round Culvert n=0.012 L=140.0' S=0.0050 '/' Outflow=1.63 cfs 0.133 af

Total Runoff Area = 10.720 ac Runoff Volume = 1.474 af Average Runoff Depth = 1.65"
60.65% Pervious = 6.502 ac 39.35% Impervious = 4.219 ac

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

Subcatchment 1S: Subcatchment #1 Runoff Area=21,582 sf 38.16% Impervious Runoff Depth>3.37"
Tc=6.0 min CN=81 Runoff=1.92 cfs 0.139 af

Subcatchment 2S: Subcatchment #2 Runoff Area=55,925 sf 0.00% Impervious Runoff Depth>2.61"
Flow Length=251' Tc=29.9 min CN=73 Runoff=2.23 cfs 0.280 af

Subcatchment 4S: Subcatchment #4 Runoff Area=10,745 sf 50.29% Impervious Runoff Depth>3.37"
Flow Length=150' Tc=9.0 min CN=81 Runoff=0.86 cfs 0.069 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>1.33"
Flow Length=431' Tc=35.4 min CN=57 Runoff=1.67 cfs 0.254 af

Subcatchment 11S: Subcatchment #11 Runoff Area=49,435 sf 36.91% Impervious Runoff Depth>3.57"
Tc=6.0 min CN=83 Runoff=4.62 cfs 0.338 af

Subcatchment 12S: Subcatchment #12 Runoff Area=67,086 sf 45.45% Impervious Runoff Depth>3.77"
Flow Length=186' Slope=0.0070 '/' Tc=16.4 min CN=85 Runoff=4.92 cfs 0.483 af

Subcatchment 13S: Subcatchment #13 Runoff Area=23,260 sf 11.09% Impervious Runoff Depth>2.80"
Flow Length=114' Slope=0.0100 '/' Tc=12.5 min UI Adjusted CN=75 Runoff=1.40 cfs 0.125 af

Subcatchment 14S: Subcatchment #14 Runoff Area=23,020 sf 56.11% Impervious Runoff Depth>3.98"
Tc=6.0 min CN=87 Runoff=2.36 cfs 0.175 af

Subcatchment 15S: Subcatchment #15 Runoff Area=37,000 sf 46.13% Impervious Runoff Depth>3.77"
Flow Length=149' Slope=0.0100 '/' Tc=13.4 min CN=85 Runoff=2.91 cfs 0.267 af

Subcatchment 17S: Subcatchment #17 Runoff Area=13,584 sf 100.00% Impervious Runoff Depth>5.20"
Tc=6.0 min CN=98 Runoff=1.62 cfs 0.135 af

Subcatchment 18S: Mixed Use Building Runoff Area=7,390 sf 100.00% Impervious Runoff Depth>5.20"
Tc=6.0 min CN=98 Runoff=0.88 cfs 0.074 af

Subcatchment 19S: Mixed Use Building Runoff Area=6,194 sf 100.00% Impervious Runoff Depth>5.20"
Tc=6.0 min CN=98 Runoff=0.74 cfs 0.062 af

Subcatchment 21S: Subcatchment #21 Runoff Area=14,270 sf 71.65% Impervious Runoff Depth>4.41"
Tc=6.0 min CN=91 Runoff=1.58 cfs 0.120 af

Subcatchment 22S: Subcatchment #22 Runoff Area=18,796 sf 68.35% Impervious Runoff Depth>4.30"
Flow Length=202' Tc=8.4 min CN=90 Runoff=1.90 cfs 0.155 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,434 sf 100.00% Impervious Runoff Depth>5.20"
Tc=6.0 min CN=98 Runoff=0.77 cfs 0.064 af

Subcatchment 26S: Subcatchment #26 Runoff Area=12,543 sf 0.00% Impervious Runoff Depth>0.75"
Flow Length=305' Slope=0.0100 '/' Tc=31.4 min CN=48 Runoff=0.10 cfs 0.018 af

Reach 15AR: Overland flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=30.0' S=0.0167 '/' Capacity=158.86 cfs Outflow=0.00 cfs 0.000 af

Reach 15R: Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=70.0' S=0.0071 '/' Capacity=31.36 cfs Outflow=0.00 cfs 0.000 af

Reach 100R: Final Reach 100 Inflow=2.20 cfs 0.671 af
Outflow=2.20 cfs 0.671 af

Reach 200R: Final Reach 200 Inflow=6.54 cfs 1.189 af
Outflow=6.54 cfs 1.189 af

Reach 400R: Final Reach 400 Inflow=1.99 cfs 0.407 af
Outflow=1.99 cfs 0.407 af

Pond 4P: Pond 4 Peak Elev=90.07' Storage=78 cf Inflow=1.99 cfs 0.407 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=1.99 cfs 0.407 af

Pond 6P: Pond 6 Peak Elev=92.08' Storage=651 cf Inflow=1.67 cfs 0.254 af
Outflow=1.66 cfs 0.244 af

Pond 26P: Yard drain Peak Elev=94.04' Storage=1 cf Inflow=0.10 cfs 0.018 af
Outflow=0.10 cfs 0.018 af

Pond 101P: Gravel Wetland #101 Peak Elev=93.82' Storage=12,430 cf Inflow=6.72 cfs 0.708 af
Primary=0.10 cfs 0.125 af Secondary=1.46 cfs 0.407 af Tertiary=0.00 cfs 0.000 af Outflow=1.57 cfs 0.532 af

Pond 102P: Detention Pond #102 Peak Elev=94.34' Storage=5,589 cf Inflow=6.89 cfs 0.739 af
18.0" Round Culvert x 2.00 n=0.012 L=145.0' S=0.0052 '/' Outflow=3.72 cfs 0.736 af

Pond 103P: Gravel Wetland #103 Peak Elev=94.17' Storage=14,184 cf Inflow=7.07 cfs 1.079 af
Primary=0.19 cfs 0.216 af Secondary=4.13 cfs 0.675 af Tertiary=0.00 cfs 0.000 af Outflow=4.32 cfs 0.891 af

Pond 104P: Gravel Wetland #104 Peak Elev=92.89' Storage=4,673 cf Inflow=2.36 cfs 0.175 af
Primary=0.02 cfs 0.025 af Secondary=0.12 cfs 0.068 af Outflow=0.14 cfs 0.093 af

Pond 105P: Detention Pond #105 Peak Elev=93.88' Storage=3,717 cf Inflow=2.91 cfs 0.267 af
Primary=0.80 cfs 0.235 af Secondary=0.00 cfs 0.000 af Outflow=0.80 cfs 0.235 af

Pond C01P: CB #1 Peak Elev=94.54' Storage=10 cf Inflow=1.58 cfs 0.120 af
12.0" Round Culvert n=0.012 L=35.0' S=0.0071 '/' Outflow=1.58 cfs 0.120 af

Pond C02P: CB #2 Peak Elev=95.04' Storage=13 cf Inflow=1.90 cfs 0.155 af
15.0" Round Culvert n=0.012 L=18.0' S=0.0050 '/' Outflow=1.89 cfs 0.154 af

Pond C03P: CB #3 Peak Elev=94.85' Storage=13 cf Inflow=2.63 cfs 0.218 af
15.0" Round Culvert n=0.012 L=107.3' S=0.0050 '/' Outflow=2.63 cfs 0.218 af

Pond D01P: DMH #1 Peak Elev=94.28' Storage=14 cf Inflow=2.63 cfs 0.218 af
15.0" Round Culvert n=0.012 L=140.0' S=0.0050 '/' Outflow=2.63 cfs 0.218 af

Total Runoff Area = 10.720 ac Runoff Volume = 2.758 af Average Runoff Depth = 3.09"
60.65% Pervious = 6.502 ac 39.35% Impervious = 4.219 ac

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

Subcatchment 1S: Subcatchment #1 Runoff Area=21,582 sf 38.16% Impervious Runoff Depth>4.69"
Tc=6.0 min CN=81 Runoff=2.64 cfs 0.194 af

Subcatchment 2S: Subcatchment #2 Runoff Area=55,925 sf 0.00% Impervious Runoff Depth>3.81"
Flow Length=251' Tc=29.9 min CN=73 Runoff=3.26 cfs 0.408 af

Subcatchment 4S: Subcatchment #4 Runoff Area=10,745 sf 50.29% Impervious Runoff Depth>4.69"
Flow Length=150' Tc=9.0 min CN=81 Runoff=1.19 cfs 0.096 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>2.21"
Flow Length=431' Tc=35.4 min CN=57 Runoff=2.96 cfs 0.422 af

Subcatchment 11S: Subcatchment #11 Runoff Area=49,435 sf 36.91% Impervious Runoff Depth>4.91"
Tc=6.0 min CN=83 Runoff=6.28 cfs 0.464 af

Subcatchment 12S: Subcatchment #12 Runoff Area=67,086 sf 45.45% Impervious Runoff Depth>5.12"
Flow Length=186' Slope=0.0070 '/' Tc=16.4 min CN=85 Runoff=6.61 cfs 0.658 af

Subcatchment 13S: Subcatchment #13 Runoff Area=23,260 sf 11.09% Impervious Runoff Depth>4.04"
Flow Length=114' Slope=0.0100 '/' Tc=12.5 min UI Adjusted CN=75 Runoff=2.04 cfs 0.180 af

Subcatchment 14S: Subcatchment #14 Runoff Area=23,020 sf 56.11% Impervious Runoff Depth>5.36"
Tc=6.0 min CN=87 Runoff=3.13 cfs 0.236 af

Subcatchment 15S: Subcatchment #15 Runoff Area=37,000 sf 46.13% Impervious Runoff Depth>5.13"
Flow Length=149' Slope=0.0100 '/' Tc=13.4 min CN=85 Runoff=3.91 cfs 0.363 af

Subcatchment 17S: Subcatchment #17 Runoff Area=13,584 sf 100.00% Impervious Runoff Depth>6.64"
Tc=6.0 min CN=98 Runoff=2.06 cfs 0.172 af

Subcatchment 18S: Mixed Use Building Runoff Area=7,390 sf 100.00% Impervious Runoff Depth>6.64"
Tc=6.0 min CN=98 Runoff=1.12 cfs 0.094 af

Subcatchment 19S: Mixed Use Building Runoff Area=6,194 sf 100.00% Impervious Runoff Depth>6.64"
Tc=6.0 min CN=98 Runoff=0.94 cfs 0.079 af

Subcatchment 21S: Subcatchment #21 Runoff Area=14,270 sf 71.65% Impervious Runoff Depth>5.82"
Tc=6.0 min CN=91 Runoff=2.05 cfs 0.159 af

Subcatchment 22S: Subcatchment #22 Runoff Area=18,796 sf 68.35% Impervious Runoff Depth>5.70"
Flow Length=202' Tc=8.4 min CN=90 Runoff=2.48 cfs 0.205 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,434 sf 100.00% Impervious Runoff Depth>6.64"
Tc=6.0 min CN=98 Runoff=0.97 cfs 0.082 af

Subcatchment 26S: Subcatchment #26 Runoff Area=12,543 sf 0.00% Impervious Runoff Depth>1.41"
Flow Length=305' Slope=0.0100 '/' Tc=31.4 min CN=48 Runoff=0.22 cfs 0.034 af

Reach 15AR: Overland flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=30.0' S=0.0167 '/' Capacity=158.86 cfs Outflow=0.00 cfs 0.000 af

Reach 15R: Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=70.0' S=0.0071 '/' Capacity=31.36 cfs Outflow=0.00 cfs 0.000 af

Reach 100R: Final Reach 100 Inflow=3.95 cfs 0.979 af
Outflow=3.95 cfs 0.979 af

Reach 200R: Final Reach 200 Inflow=11.07 cfs 1.700 af
Outflow=11.07 cfs 1.700 af

Reach 400R: Final Reach 400 Inflow=3.46 cfs 0.659 af
Outflow=3.46 cfs 0.659 af

Pond 4P: Pond 4 Peak Elev=90.36' Storage=144 cf Inflow=3.46 cfs 0.659 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=3.46 cfs 0.659 af

Pond 6P: Pond 6 Peak Elev=92.12' Storage=766 cf Inflow=2.96 cfs 0.422 af
Outflow=2.95 cfs 0.412 af

Pond 26P: Yard drain Peak Elev=94.07' Storage=1 cf Inflow=0.22 cfs 0.034 af
Outflow=0.22 cfs 0.034 af

Pond 101P: Gravel Wetland #101 Peak Elev=94.01' Storage=14,945 cf Inflow=8.76 cfs 0.966 af
Primary=0.11 cfs 0.133 af Secondary=3.07 cfs 0.652 af Tertiary=0.02 cfs 0.000 af Outflow=3.20 cfs 0.785 af

Pond 102P: Detention Pond #102 Peak Elev=94.58' Storage=8,075 cf Inflow=9.14 cfs 0.989 af
18.0" Round Culvert x 2.00 n=0.012 L=145.0' S=0.0052 '/' Outflow=5.31 cfs 0.984 af

Pond 103P: Gravel Wetland #103 Peak Elev=94.32' Storage=15,656 cf Inflow=9.27 cfs 1.450 af
Primary=0.19 cfs 0.230 af Secondary=6.22 cfs 1.000 af Tertiary=1.19 cfs 0.028 af Outflow=7.60 cfs 1.258 af

Pond 104P: Gravel Wetland #104 Peak Elev=93.25' Storage=6,195 cf Inflow=3.13 cfs 0.236 af
Primary=0.02 cfs 0.027 af Secondary=0.19 cfs 0.123 af Outflow=0.21 cfs 0.151 af

Pond 105P: Detention Pond #105 Peak Elev=94.17' Storage=5,655 cf Inflow=3.91 cfs 0.363 af
Primary=1.21 cfs 0.329 af Secondary=0.00 cfs 0.000 af Outflow=1.21 cfs 0.329 af

Pond C01P: CB #1 Peak Elev=94.71' Storage=12 cf Inflow=2.05 cfs 0.159 af
12.0" Round Culvert n=0.012 L=35.0' S=0.0071 '/' Outflow=2.05 cfs 0.159 af

Pond C02P: CB #2 Peak Elev=95.33' Storage=16 cf Inflow=2.48 cfs 0.205 af
15.0" Round Culvert n=0.012 L=18.0' S=0.0050 '/' Outflow=2.47 cfs 0.205 af

Pond C03P: CB #3 Peak Elev=95.10' Storage=16 cf Inflow=3.41 cfs 0.287 af
15.0" Round Culvert n=0.012 L=107.3' S=0.0050 '/' Outflow=3.40 cfs 0.287 af

Pond D01P: DMH #1 Peak Elev=94.57' Storage=17 cf Inflow=3.40 cfs 0.287 af
15.0" Round Culvert n=0.012 L=140.0' S=0.0050 '/' Outflow=3.40 cfs 0.286 af

Total Runoff Area = 10.720 ac Runoff Volume = 3.845 af Average Runoff Depth = 4.30"
60.65% Pervious = 6.502 ac 39.35% Impervious = 4.219 ac

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

Subcatchment 1S: Subcatchment #1 Runoff Area=21,582 sf 38.16% Impervious Runoff Depth>5.96"
Tc=6.0 min CN=81 Runoff=3.32 cfs 0.246 af

Subcatchment 2S: Subcatchment #2 Runoff Area=55,925 sf 0.00% Impervious Runoff Depth>4.99"
Flow Length=251' Tc=29.9 min CN=73 Runoff=4.27 cfs 0.533 af

Subcatchment 4S: Subcatchment #4 Runoff Area=10,745 sf 50.29% Impervious Runoff Depth>5.95"
Flow Length=150' Tc=9.0 min CN=81 Runoff=1.50 cfs 0.122 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>3.14"
Flow Length=431' Tc=35.4 min CN=57 Runoff=4.32 cfs 0.599 af

Subcatchment 11S: Subcatchment #11 Runoff Area=49,435 sf 36.91% Impervious Runoff Depth>6.19"
Tc=6.0 min CN=83 Runoff=7.83 cfs 0.586 af

Subcatchment 12S: Subcatchment #12 Runoff Area=67,086 sf 45.45% Impervious Runoff Depth>6.42"
Flow Length=186' Slope=0.0070 '/' Tc=16.4 min CN=85 Runoff=8.20 cfs 0.824 af

Subcatchment 13S: Subcatchment #13 Runoff Area=23,260 sf 11.09% Impervious Runoff Depth>5.24"
Flow Length=114' Slope=0.0100 '/' Tc=12.5 min UI Adjusted CN=75 Runoff=2.64 cfs 0.233 af

Subcatchment 14S: Subcatchment #14 Runoff Area=23,020 sf 56.11% Impervious Runoff Depth>6.67"
Tc=6.0 min CN=87 Runoff=3.85 cfs 0.294 af

Subcatchment 15S: Subcatchment #15 Runoff Area=37,000 sf 46.13% Impervious Runoff Depth>6.42"
Flow Length=149' Slope=0.0100 '/' Tc=13.4 min CN=85 Runoff=4.85 cfs 0.455 af

Subcatchment 17S: Subcatchment #17 Runoff Area=13,584 sf 100.00% Impervious Runoff Depth>7.99"
Tc=6.0 min CN=98 Runoff=2.46 cfs 0.208 af

Subcatchment 18S: Mixed Use Building Runoff Area=7,390 sf 100.00% Impervious Runoff Depth>7.99"
Tc=6.0 min CN=98 Runoff=1.34 cfs 0.113 af

Subcatchment 19S: Mixed Use Building Runoff Area=6,194 sf 100.00% Impervious Runoff Depth>7.99"
Tc=6.0 min CN=98 Runoff=1.12 cfs 0.095 af

Subcatchment 21S: Subcatchment #21 Runoff Area=14,270 sf 71.65% Impervious Runoff Depth>7.15"
Tc=6.0 min CN=91 Runoff=2.48 cfs 0.195 af

Subcatchment 22S: Subcatchment #22 Runoff Area=18,796 sf 68.35% Impervious Runoff Depth>7.02"
Flow Length=202' Tc=8.4 min CN=90 Runoff=3.02 cfs 0.253 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,434 sf 100.00% Impervious Runoff Depth>7.99"
Tc=6.0 min CN=98 Runoff=1.17 cfs 0.098 af

Subcatchment 26S: Subcatchment #26 Runoff Area=12,543 sf 0.00% Impervious Runoff Depth>2.16"
Flow Length=305' Slope=0.0100 '/' Tc=31.4 min CN=48 Runoff=0.37 cfs 0.052 af

Reach 15AR: Overland flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=30.0' S=0.0167 '/' Capacity=158.86 cfs Outflow=0.00 cfs 0.000 af

Reach 15R: Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=70.0' S=0.0071 '/' Capacity=31.36 cfs Outflow=0.00 cfs 0.000 af

Reach 100R: Final Reach 100 Inflow=7.26 cfs 1.274 af
Outflow=7.26 cfs 1.274 af

Reach 200R: Final Reach 200 Inflow=14.95 cfs 2.194 af
Outflow=14.95 cfs 2.194 af

Reach 400R: Final Reach 400 Inflow=4.94 cfs 0.913 af
Outflow=4.94 cfs 0.913 af

Pond 4P: Pond 4 Peak Elev=90.70' Storage=255 cf Inflow=4.96 cfs 0.913 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=4.94 cfs 0.913 af

Pond 6P: Pond 6 Peak Elev=92.15' Storage=869 cf Inflow=4.32 cfs 0.599 af
Outflow=4.31 cfs 0.589 af

Pond 26P: Yard drain Peak Elev=94.09' Storage=2 cf Inflow=0.37 cfs 0.052 af
Outflow=0.37 cfs 0.052 af

Pond 101P: Gravel Wetland #101 Peak Elev=94.09' Storage=16,060 cf Inflow=10.72 cfs 1.213 af
Primary=0.11 cfs 0.139 af Secondary=4.89 cfs 0.869 af Tertiary=0.64 cfs 0.020 af Outflow=5.64 cfs 1.028 af

Pond 102P: Detention Pond #102 Peak Elev=94.76' Storage=10,068 cf Inflow=11.25 cfs 1.226 af
18.0" Round Culvert x 2.00 n=0.012 L=145.0' S=0.0052 '/' Outflow=7.13 cfs 1.220 af

Pond 103P: Gravel Wetland #103 Peak Elev=94.41' Storage=16,501 cf Inflow=11.56 cfs 1.804 af
Primary=0.20 cfs 0.241 af Secondary=6.36 cfs 1.232 af Tertiary=3.86 cfs 0.136 af Outflow=10.42 cfs 1.609 af

Pond 104P: Gravel Wetland #104 Peak Elev=93.56' Storage=7,683 cf Inflow=3.85 cfs 0.294 af
Primary=0.02 cfs 0.029 af Secondary=0.28 cfs 0.173 af Outflow=0.30 cfs 0.202 af

Pond 105P: Detention Pond #105 Peak Elev=94.39' Storage=7,254 cf Inflow=4.85 cfs 0.455 af
Primary=1.72 cfs 0.420 af Secondary=0.00 cfs 0.000 af Outflow=1.72 cfs 0.420 af

Pond C01P: CB #1 Peak Elev=94.96' Storage=15 cf Inflow=2.48 cfs 0.195 af
12.0" Round Culvert n=0.012 L=35.0' S=0.0071 '/' Outflow=2.49 cfs 0.195 af

Pond C02P: CB #2 Peak Elev=95.81' Storage=22 cf Inflow=3.02 cfs 0.253 af
15.0" Round Culvert n=0.012 L=18.0' S=0.0050 '/' Outflow=3.00 cfs 0.253 af

Pond C03P: CB #3 Peak Elev=95.54' Storage=21 cf Inflow=4.13 cfs 0.351 af
15.0" Round Culvert n=0.012 L=107.3' S=0.0050 '/' Outflow=4.11 cfs 0.351 af

Pond D01P: DMH #1 Peak Elev=94.93' Storage=22 cf Inflow=4.11 cfs 0.351 af
15.0" Round Culvert n=0.012 L=140.0' S=0.0050 '/' Outflow=4.09 cfs 0.351 af

Total Runoff Area = 10.720 ac Runoff Volume = 4.904 af Average Runoff Depth = 5.49"
60.65% Pervious = 6.502 ac 39.35% Impervious = 4.219 ac

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

Subcatchment 1S: Subcatchment #1 Runoff Area=21,582 sf 38.16% Impervious Runoff Depth>7.49"
Tc=6.0 min CN=81 Runoff=4.12 cfs 0.309 af

Subcatchment 2S: Subcatchment #2 Runoff Area=55,925 sf 0.00% Impervious Runoff Depth>6.44"
Flow Length=251' Tc=29.9 min CN=73 Runoff=5.48 cfs 0.689 af

Subcatchment 4S: Subcatchment #4 Runoff Area=10,745 sf 50.29% Impervious Runoff Depth>7.49"
Flow Length=150' Tc=9.0 min CN=81 Runoff=1.87 cfs 0.154 af

Subcatchment 6S: Subcatchment #6 Runoff Area=99,716 sf 32.24% Impervious Runoff Depth>4.34"
Flow Length=431' Tc=35.4 min CN=57 Runoff=6.06 cfs 0.827 af

Subcatchment 11S: Subcatchment #11 Runoff Area=49,435 sf 36.91% Impervious Runoff Depth>7.74"
Tc=6.0 min CN=83 Runoff=9.68 cfs 0.732 af

Subcatchment 12S: Subcatchment #12 Runoff Area=67,086 sf 45.45% Impervious Runoff Depth>7.98"
Flow Length=186' Slope=0.0070 '/' Tc=16.4 min CN=85 Runoff=10.08 cfs 1.024 af

Subcatchment 13S: Subcatchment #13 Runoff Area=23,260 sf 11.09% Impervious Runoff Depth>6.72"
Flow Length=114' Slope=0.0100 '/' Tc=12.5 min UI Adjusted CN=75 Runoff=3.36 cfs 0.299 af

Subcatchment 14S: Subcatchment #14 Runoff Area=23,020 sf 56.11% Impervious Runoff Depth>8.24"
Tc=6.0 min CN=87 Runoff=4.70 cfs 0.363 af

Subcatchment 15S: Subcatchment #15 Runoff Area=37,000 sf 46.13% Impervious Runoff Depth>7.98"
Flow Length=149' Slope=0.0100 '/' Tc=13.4 min CN=85 Runoff=5.96 cfs 0.565 af

Subcatchment 17S: Subcatchment #17 Runoff Area=13,584 sf 100.00% Impervious Runoff Depth>9.59"
Tc=6.0 min CN=98 Runoff=2.94 cfs 0.249 af

Subcatchment 18S: Mixed Use Building Runoff Area=7,390 sf 100.00% Impervious Runoff Depth>9.59"
Tc=6.0 min CN=98 Runoff=1.60 cfs 0.136 af

Subcatchment 19S: Mixed Use Building Runoff Area=6,194 sf 100.00% Impervious Runoff Depth>9.59"
Tc=6.0 min CN=98 Runoff=1.34 cfs 0.114 af

Subcatchment 21S: Subcatchment #21 Runoff Area=14,270 sf 71.65% Impervious Runoff Depth>8.74"
Tc=6.0 min CN=91 Runoff=3.00 cfs 0.239 af

Subcatchment 22S: Subcatchment #22 Runoff Area=18,796 sf 68.35% Impervious Runoff Depth>8.61"
Flow Length=202' Tc=8.4 min CN=90 Runoff=3.67 cfs 0.310 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,434 sf 100.00% Impervious Runoff Depth>9.59"
Tc=6.0 min CN=98 Runoff=1.39 cfs 0.118 af

Subcatchment 26S: Subcatchment #26 Runoff Area=12,543 sf 0.00% Impervious Runoff Depth>3.16"
Flow Length=305' Slope=0.0100 '/' Tc=31.4 min CN=48 Runoff=0.56 cfs 0.076 af

Reach 15AR: Overland flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=30.0' S=0.0167 '/' Capacity=158.86 cfs Outflow=0.00 cfs 0.000 af

Reach 15R: Swale Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=70.0' S=0.0071 '/' Capacity=31.36 cfs Outflow=0.00 cfs 0.000 af

Reach 100R: Final Reach 100 Inflow=10.36 cfs 1.630 af
Outflow=10.36 cfs 1.630 af

Reach 200R: Final Reach 200 Inflow=19.31 cfs 2.797 af
Outflow=19.31 cfs 2.797 af

Reach 400R: Final Reach 400 Inflow=6.95 cfs 1.237 af
Outflow=6.95 cfs 1.237 af

Pond 4P: Pond 4 Peak Elev=91.82' Storage=873 cf Inflow=7.30 cfs 1.237 af
15.0" Round Culvert n=0.024 L=46.0' S=0.0300 '/' Outflow=6.95 cfs 1.237 af

Pond 6P: Pond 6 Peak Elev=92.19' Storage=987 cf Inflow=6.06 cfs 0.827 af
Outflow=6.05 cfs 0.817 af

Pond 26P: Yard drain Peak Elev=94.12' Storage=3 cf Inflow=0.56 cfs 0.076 af
Outflow=0.56 cfs 0.076 af

Pond 101P: Gravel Wetland #101 Peak Elev=94.22' Storage=17,965 cf Inflow=13.14 cfs 1.510 af
Primary=0.11 cfs 0.145 af Secondary=5.07 cfs 1.087 af Tertiary=2.42 cfs 0.089 af Outflow=7.60 cfs 1.321 af

Pond 102P: Detention Pond #102 Peak Elev=94.94' Storage=12,271 cf Inflow=13.75 cfs 1.512 af
18.0" Round Culvert x 2.00 n=0.012 L=145.0' S=0.0052 '/' Outflow=9.09 cfs 1.504 af

Pond 103P: Gravel Wetland #103 Peak Elev=94.48' Storage=17,241 cf Inflow=14.42 cfs 2.231 af
Primary=0.20 cfs 0.252 af Secondary=6.49 cfs 1.489 af Tertiary=6.91 cfs 0.291 af Outflow=13.59 cfs 2.032 af

Pond 104P: Gravel Wetland #104 Peak Elev=93.79' Storage=8,879 cf Inflow=4.70 cfs 0.363 af
Primary=0.02 cfs 0.031 af Secondary=0.72 cfs 0.236 af Outflow=0.74 cfs 0.267 af

Pond 105P: Detention Pond #105 Peak Elev=94.65' Storage=9,223 cf Inflow=5.96 cfs 0.565 af
Primary=2.17 cfs 0.529 af Secondary=0.00 cfs 0.000 af Outflow=2.17 cfs 0.529 af

Pond C01P: CB #1 Peak Elev=95.43' Storage=21 cf Inflow=3.00 cfs 0.239 af
12.0" Round Culvert n=0.012 L=35.0' S=0.0071 '/' Outflow=3.01 cfs 0.239 af

Pond C02P: CB #2 Peak Elev=96.72' Storage=34 cf Inflow=3.67 cfs 0.310 af
15.0" Round Culvert n=0.012 L=18.0' S=0.0050 '/' Outflow=3.62 cfs 0.310 af

Pond C03P: CB #3 Peak Elev=96.33' Storage=31 cf Inflow=4.97 cfs 0.428 af
15.0" Round Culvert n=0.012 L=107.3' S=0.0050 '/' Outflow=4.91 cfs 0.428 af

Pond D01P: DMH #1 Peak Elev=95.42' Storage=28 cf Inflow=4.91 cfs 0.428 af
15.0" Round Culvert n=0.012 L=140.0' S=0.0050 '/' Outflow=4.90 cfs 0.428 af

Total Runoff Area = 10.720 ac Runoff Volume = 6.203 af Average Runoff Depth = 6.94"
60.65% Pervious = 6.502 ac 39.35% Impervious = 4.219 ac

Appendix III - Calculations, Charts, & Graphs

Extreme Precipitation Table
Rip Rap Calculations
NHDES AoT Spreadsheets
USDA / NRCS Websoil
Site Specific Soil Survey Report
Stormwater System Operation and Maintenance Plan
& Inspection and Maintenance Manual
Watershed Report Card, 303(d) List, & ORW List

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New Hampshire
Location	
Longitude	70.911 degrees West
Latitude	43.178 degrees North
Elevation	0 feet
Date/Time	Thu, 29 Oct 2020 14:25:29 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.50	0.65	0.81	1.03	**1yr**	0.70	0.98	1.20	1.54	1.99	2.60	2.85	**1yr**	2.30	2.74	3.14	3.87	4.44	**1yr**
2yr	0.32	0.49	0.61	0.81	1.01	1.28	**2yr**	0.87	1.17	1.50	1.91	2.44	3.13	3.48	**2yr**	2.77	3.35	3.84	4.57	5.21	**2yr**
5yr	0.37	0.57	0.72	0.96	1.23	1.58	**5yr**	1.06	1.44	1.85	2.38	3.06	3.96	4.46	**5yr**	3.50	4.29	4.90	5.78	6.54	**5yr**
10yr	0.40	0.63	0.80	1.09	1.41	1.84	**10yr**	1.22	1.69	2.17	2.82	3.65	4.73	5.38	**10yr**	4.19	5.17	5.90	6.90	7.77	**10yr**
25yr	0.46	0.73	0.94	1.29	1.72	2.26	**25yr**	1.48	2.09	2.69	3.51	4.59	5.98	6.90	**25yr**	5.30	6.64	7.54	8.73	9.76	**25yr**
50yr	0.51	0.82	1.06	1.48	1.99	2.65	**50yr**	1.72	2.45	3.17	4.17	5.47	7.16	8.33	**50yr**	6.33	8.01	9.08	10.43	11.61	**50yr**
100yr	0.58	0.93	1.20	1.70	2.31	3.11	**100yr**	1.99	2.88	3.73	4.94	6.51	8.56	10.07	**100yr**	7.57	9.68	10.94	12.47	13.81	**100yr**
200yr	0.64	1.04	1.35	1.94	2.69	3.65	**200yr**	2.32	3.39	4.41	5.87	7.77	10.24	12.17	**200yr**	9.06	11.70	13.18	14.91	16.44	**200yr**
500yr	0.75	1.24	1.61	2.34	3.28	4.51	**500yr**	2.83	4.20	5.47	7.34	9.79	12.98	15.64	**500yr**	11.49	15.04	16.87	18.91	20.72	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.24	0.37	0.45	0.60	0.74	0.90	**1yr**	0.64	0.88	0.91	1.25	1.55	2.04	2.48	**1yr**	1.81	2.38	2.92	3.35	4.05	**1yr**
2yr	0.31	0.49	0.60	0.81	1.00	1.18	**2yr**	0.86	1.16	1.36	1.83	2.36	3.04	3.38	**2yr**	2.69	3.25	3.73	4.45	5.06	**2yr**
5yr	0.35	0.54	0.67	0.91	1.16	1.40	**5yr**	1.00	1.37	1.61	2.15	2.78	3.70	4.11	**5yr**	3.27	3.96	4.58	5.40	6.10	**5yr**
10yr	0.38	0.59	0.73	1.02	1.32	1.60	**10yr**	1.14	1.57	1.82	2.45	3.14	4.26	4.78	**10yr**	3.77	4.59	5.31	6.24	7.01	**10yr**
25yr	0.44	0.67	0.83	1.18	1.55	1.91	**25yr**	1.34	1.87	2.11	2.85	3.67	5.04	5.79	**25yr**	4.46	5.57	6.48	7.56	8.43	**25yr**
50yr	0.48	0.73	0.91	1.31	1.77	2.19	**50yr**	1.53	2.14	2.36	3.21	4.12	5.78	6.69	**50yr**	5.11	6.44	7.53	8.74	9.68	**50yr**
100yr	0.54	0.81	1.02	1.47	2.02	2.51	**100yr**	1.74	2.46	2.64	3.59	4.61	6.61	7.73	**100yr**	5.85	7.43	8.76	10.09	11.08	**100yr**
200yr	0.60	0.90	1.14	1.65	2.30	2.88	**200yr**	1.99	2.81	2.93	4.02	5.16	7.57	8.93	**200yr**	6.70	8.58	10.19	11.67	12.72	**200yr**
500yr	0.70	1.04	1.34	1.94	2.77	3.47	**500yr**	2.39	3.39	3.40	4.67	6.01	9.01	10.78	**500yr**	7.97	10.37	12.44	14.15	15.20	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.43	0.53	0.71	0.87	1.08	**1yr**	0.75	1.05	1.23	1.74	2.21	2.83	3.05	**1yr**	2.50	2.93	3.37	4.17	4.76	**1yr**
2yr	0.33	0.51	0.62	0.84	1.04	1.24	**2yr**	0.90	1.22	1.48	1.95	2.50	3.25	3.59	**2yr**	2.87	3.45	3.96	4.72	5.39	**2yr**
5yr	0.39	0.60	0.75	1.03	1.31	1.58	**5yr**	1.13	1.54	1.85	2.49	3.19	4.22	4.80	**5yr**	3.73	4.61	5.23	6.17	6.94	**5yr**
10yr	0.46	0.70	0.87	1.21	1.57	1.92	**10yr**	1.35	1.87	2.23	3.04	3.84	5.19	5.98	**10yr**	4.59	5.75	6.55	7.58	8.46	**10yr**
25yr	0.55	0.84	1.05	1.49	1.96	2.47	**25yr**	1.69	2.41	2.87	3.95	4.92	6.93	8.02	**25yr**	6.13	7.71	8.73	9.96	11.02	**25yr**
50yr	0.64	0.97	1.21	1.74	2.34	2.98	**50yr**	2.02	2.91	3.48	4.80	5.97	8.55	10.03	**50yr**	7.57	9.64	10.87	12.25	13.47	**50yr**
100yr	0.74	1.12	1.40	2.03	2.78	3.59	**100yr**	2.40	3.51	4.21	5.87	7.24	10.55	12.55	**100yr**	9.34	12.07	13.52	15.08	16.47	**100yr**
200yr	0.86	1.29	1.63	2.37	3.30	4.35	**200yr**	2.85	4.26	5.12	7.18	8.78	13.06	15.72	**200yr**	11.56	15.11	16.83	18.54	20.18	**200yr**
500yr	1.05	1.56	2.00	2.91	4.13	5.59	**500yr**	3.57	5.46	6.61	9.39	11.34	17.35	21.17	**500yr**	15.36	20.36	22.49	24.42	26.41	**500yr**

Powered by ACIS Northeast Regional Climate Center

RIP RAP CALCULATIONS

20-066 Equine Properties, LLC

Barrington, NH

Berry Surveying & Engineering

335 Second Crown Point Road

Barrington, NH

Revised 1-27-22

Rip Rap equations were obtained from the *Stormwater Management and Erosion Control Handbook for Urban and Developing Areas in New Hampshire.* Rip Rap was sized for the 25 year storm event. (Some d50 sizes and T values have been modified)

TAILWATER < HALF THE Do

La = (1.8 x Q) / Do 3/2 + (7 x Do) Q = Peak Flow & Do is Pipe Diameter

W = La + 3*Do or defined channel width

d50 = (0.02 x Q4/3) / (Tw x Do) Tw = Tailwater Depth

T = Largest Stone Size x 1.5

Culvert or Catch Basin	Tailwater (Feet) Tw	Discharge (C.F.S.) Q	Diameter of Pipe Do	Length of Rip Rap La (feet)	Width of Rip Rap W (feet)	d50-Stone Rip Rap d50(ft.)	Actual Size	Thickness
15" HDPE (Pond #C01P)	0.25	2.05	1.25	11.4	15.1	0.17	0.50	1.20
15" HDPE (Pond #D01P)	0.25	3.40	1.25	13.1	16.9	0.33	0.50	1.20
12" RCP (Pond #101P)	0.20	3.33	1.00	13.0	16.0	0.50	0.50	1.20
18" HDPE (Pond #102P)	0.30	5.31	1.50	15.7	20.2	0.41	0.50	1.20
15" RCP (Pond #103P)	0.25	6.21	1.25	16.7	20.5	0.73	1.00	2.25
12" HDPE (Pond #104P)	0.20	0.19	1.00	7.3	10.3	0.01	0.50	1.20
12" RCP (Pond #105P)	0.20	1.27	1.00	9.3	12.3	0.14	0.50	1.20

Please note that the designer chose to use the 25 Year Event for the dimensional calculations.

GRAVEL WETLAND DESIGN CRITERIA
(Env-Wq 1508.05)

Type/Node Name: **Gravel Wetland #101 (Pond 101P)**

Enter the node name in the drainage analysis if applicable.

2.30 ac	A = Area draining to the practice	
1.12 ac	A_I = Impervious area draining to the practice	
0.49 decimal	I = Percent impervious area draining to the practice, in decimal form	
0.49 unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
1.13 ac-in	WQV= 1" x Rv x A	
4,084 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
408 cf	10% x WQV (check calc for sediment forebay)	
1,838 cf	45% x WQV (check calc for gravel wetland treatment bay volume)	
2,408 cf	V_{SED} = Sediment forebay volume	**≥ 10%WQV**
2,929 cf	V_{TB1} = Volume of treatment bay 1 [1]	**≥ 45%WQV**
2,038 cf	V_{TB2} = Volume of treatment bay 2 [1]	**≥ 45%WQV**
0.09 cfs	$2Q_{avg}$ = 2* WQV / 24 hrs * (1hr / 3600 sec) [2]	
93.01 ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
0.08 cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	**< $2Q_{avg}$**
28.36 hours	T_{ED} = Drawdown time of extended detention = 2WQV/Q_{WQV}	**≥ 24-hrs**
3.00 :1	Pond side slopes	**≥ 3:1**
89.83 ft	Elevation of SHWT	
87.83 ft	SHWT - 2 feet	
91.92 ft	Epp = Elevation of the permanent pool (elevation of lowest orifice) [3]	**≤ E_{SHWT} - 2 ft**
20, 20 ft	Length of the flow path between the inlet and outlet in each cell	**≥ 15 ft**
Angle Grate	What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of ≤6")?	
94.09 ft	Peak elevation of the 50-year storm event (E_{50})	
94.50 ft	Berm elevation of the pond	
YES	E_{50} ≤ the berm elevation?	**← yes**

Qualified professional that developed the planting plan
Name, Profession:

1. Volume stored above the wetland soil and below the high flow by-pass.
2. To ensure orifice is sized so that WQV is released at a relatively stable rate.
3. 4" to 8" below the wetland soil. If lowest orifice is higher than (SHWT - 2 feet), and saturated hydraulic conductivity (Ksat) is greater than 0.015 in/hr, the system must be lined.

Designer's Notes: Ksat Buxton > than 0.015 in/hr. System to be lined w/ low perm material

Summary for Pond 101P: Gravel Wetland #101

[80] Warning: Exceeded Pond 105P by 0.09' @ 12.10 hrs (0.91 cfs 0.026 af)

Inflow Area = 2.296 ac, 48.89% Impervious, Inflow Depth > 6.34" for 50 YR - 24 HR event
Inflow = 10.72 cfs @ 12.09 hrs, Volume= 1.213 af
Outflow = 5.64 cfs @ 12.28 hrs, Volume= 1.028 af, Atten= 47%, Lag= 11.5 min
Primary = 0.11 cfs @ 12.28 hrs, Volume= 0.139 af
Secondary = 4.89 cfs @ 12.28 hrs, Volume= 0.869 af
Tertiary = 0.64 cfs @ 12.28 hrs, Volume= 0.020 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 94.09' @ 12.28 hrs Surf.Area= 24,114 sf Storage= 16,060 cf
Flood Elev= 94.50' Surf.Area= 28,267 sf Storage= 22,830 cf

Plug-Flow detention time= 135.3 min calculated for 1.026 af (85% of inflow)
Center-of-Mass det. time= 70.8 min (875.9 - 805.1)

Volume	Invert	Avail.Storage	Storage Description
#1	91.92'	25 cf	**4.00'D x 1.98'H Outlet Structure**
#2	92.50'	2,408 cf	**Sediment Forebay (Irregular)** Listed below (Recalc)
#3	92.25'	2,929 cf	**Cell #1 (Irregular)** Listed below (Recalc)
#4	92.25'	2,038 cf	**Cell #2 (Irregular)** Listed below (Recalc)
#5	93.25'	15,430 cf	**Open water storage (Irregular)** Listed below (Recalc)
		22,830 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.50	1,240	147.0	0	0	1,240
93.00	1,487	157.0	681	681	1,494
94.00	1,980	175.7	1,728	2,408	2,016

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.25	550	90.8	0	0	550
92.50	2,399	249.3	341	341	4,840
93.00	3,643	453.0	1,500	1,841	16,225
93.25	5,101	523.7	1,088	2,929	21,722

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.25	565	92.1	0	0	565
92.50	2,052	221.3	308	308	3,787
93.00	2,393	231.4	1,110	1,418	4,168
93.25	2,567	235.9	620	2,038	4,346

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.25	8,163	533.5	0	0	8,163
94.00	11,719	822.5	7,416	7,416	39,352
94.01	13,712	974.5	127	7,543	61,088
94.50	18,606	1,157.5	7,887	15,430	92,140

Device	Routing	Invert	Outlet Devices
#1	Primary	91.92'	**6.0" Round 6" HDPE N-12** L= 14.5' Ke= 0.500 Inlet / Outlet Invert= 91.92' / 91.75' S= 0.0117 '/' Cc= 0.900 n= 0.010 Concrete pipe, straight & clean, Flow Area= 0.20 sf
#2	Secondary	91.92'	**12.0" Round 12" RCP** L= 16.0' Ke= 0.500 Inlet / Outlet Invert= 91.92' / 91.75' S= 0.0106 '/' Cc= 0.900 n= 0.010 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#3	Device 1	91.92'	**1.7" Vert. 1.75" Orifice Goose Neck** C= 0.600
#4	Device 2	93.25'	**3.0" Vert. 3" Orifice** C= 0.600
#5	Device 2	93.40'	**18.0" W x 6.0" H Vert. 6"T X 18"W Box Orifice** C= 0.600
#6	Device 2	93.94'	**48.0" Horiz. 4' Structure** C= 0.600 Limited to weir flow at low heads
#7	Tertiary	94.00'	**10.0' long x 7.0' breadth 10' Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.40 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.66 2.68 2.70 2.73 2.78

Primary OutFlow Max=0.11 cfs @ 12.28 hrs HW=94.09' TW=0.00' (Dynamic Tailwater)
- **1=6" HDPE N-12** (Passes 0.11 cfs of 1.31 cfs potential flow)
  - **3=1.75" Orifice Goose Neck** (Orifice Controls 0.11 cfs @ 6.97 fps)

Secondary OutFlow Max=4.89 cfs @ 12.28 hrs HW=94.09' TW=0.00' (Dynamic Tailwater)
- **2=12" RCP** (Inlet Controls 4.89 cfs @ 6.22 fps)
  - **4=3" Orifice** (Passes < 0.20 cfs potential flow)
  - **5=6"T X 18"W Box Orifice** (Passes < 2.36 cfs potential flow)
  - **6=4' Structure** (Passes < 2.36 cfs potential flow)

Tertiary OutFlow Max=0.64 cfs @ 12.28 hrs HW=94.09' TW=0.00' (Dynamic Tailwater)
- **7=10' Emergency Spillway** (Weir Controls 0.64 cfs @ 0.72 fps)

Stage-Area-Storage for Pond 101P: Gravel Wetland #101

Elevation (feet)	Storage (cubic-feet)
91.92	0
91.94	0
91.96	1
91.98	1
92.00	1
92.02	1
92.04	2
92.06	2
92.08	2
92.10	2
92.12	3
92.14	3
92.16	3
92.18	3
92.20	4
92.22	4
92.24	4
92.26	16
92.28	42
92.30	72
92.32	107
92.34	146
92.36	190
92.38	239
92.40	293
92.42	353
92.44	420
92.46	492
92.48	571
92.50	657
92.52	771
92.54	887
92.56	1,005
92.58	1,124
92.60	1,244
92.62	1,366
92.64	1,489
92.66	1,613
92.68	1,739
92.70	1,866
92.72	1,995
92.74	2,125
92.76	2,257
92.78	2,390
92.80	2,524
92.82	2,660
92.84	2,798
92.86	2,937
92.88	3,078
92.90	3,220
92.92	3,363
92.94	3,509
92.96	3,655
92.98	3,804
93.00	3,954
93.02	4,106
93.04	4,260
93.06	4,417
93.08	4,577
93.10	4,740
93.12	4,906
93.14	5,074
93.16	5,245
93.18	5,419
93.20	5,596
93.22	5,776
93.24	5,958
93.26	6,149
93.28	6,346
93.30	6,546
93.32	6,747
93.34	6,950
93.36	7,156
93.38	7,363
93.40	7,572
93.42	7,783
93.44	7,997
93.46	8,212
93.48	8,429
93.50	8,648
93.52	8,870
93.54	9,093
93.56	9,318
93.58	9,546
93.60	9,775
93.62	10,007
93.64	10,241
93.66	10,477
93.68	10,715
93.70	10,955
93.72	11,197
93.74	11,441
93.76	11,688
93.78	11,936
93.80	12,187
93.82	12,440
93.84	12,695
93.86	12,953
93.88	13,212
93.90	13,474
93.92	13,738
93.94	14,004
93.96	14,273
93.98	14,543
94.00	14,816
94.02	15,081
94.04	15,358
94.06	15,640
94.08	15,926
94.10	16,215
94.12	16,508
94.14	16,805
94.16	17,105
94.18	17,410
94.20	17,718
94.22	18,031
94.24	18,347
94.26	18,667
94.28	18,992
94.30	19,320
94.32	19,652
94.34	19,989
94.36	20,330
94.38	20,674
94.40	21,023
94.42	21,376
94.44	21,733
94.46	22,095
94.48	22,460
94.50	**22,830**

Linear Interpolation
4,084 CF Storage = 93.01'

Stage-Discharge for Pond 101P: Gravel Wetland #101

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
91.92	0.00	0.00	0.00
91.97	0.00	0.00	0.00
92.02	0.01	0.01	0.00
92.07	0.02	0.02	0.00
92.12	0.03	0.03	0.00
92.17	0.03	0.03	0.00
92.22	0.04	0.04	0.00
92.27	0.04	0.04	0.00
92.32	0.04	0.04	0.00
92.37	0.05	0.05	0.00
92.42	0.05	0.05	0.00
92.47	0.05	0.05	0.00
92.52	0.06	0.06	0.00
92.57	0.06	0.06	0.00
92.62	0.06	0.06	0.00
92.67	0.06	0.06	0.00
92.72	0.06	0.06	0.00
92.77	0.07	0.07	0.00
92.82	0.07	0.07	0.00
92.87	0.07	0.07	0.00
92.92	0.07	0.07	0.00
92.97	0.08	0.08	0.00
93.02	0.08	0.08	0.00
93.07	0.08	0.08	0.00
93.12	0.08	0.08	0.00
93.17	0.08	0.08	0.00
93.22	0.08	0.08	0.00
93.27	0.09	0.09	0.00
93.32	0.10	0.10	0.00
93.37	0.12	0.12	0.00
93.42	0.15	0.15	0.00
93.47	0.25	0.25	0.00
93.52	0.38	0.38	0.00
93.57	0.54	0.54	0.00
93.62	0.71	0.71	0.00
93.67	0.90	0.90	0.00
93.72	1.11	1.11	0.00
93.77	1.33	1.33	0.00
93.82	1.57	1.57	0.00
93.87	1.82	1.82	0.00
93.92	2.19	2.19	0.00
93.97	3.03	3.03	0.00
94.02	4.22	4.16	0.07
94.07	5.30	4.86	0.44
94.12	5.93	4.93	1.00
94.17	6.68	5.00	1.68
94.22	7.56	5.07	2.49
94.27	8.57	5.14	3.43
94.32	9.69	5.21	4.47
94.37	10.91	5.28	5.63
94.42	12.26	5.35	6.91
94.47	**13.74**	**5.41**	**8.32**

Elevation 93.01' = 0.08 CFS discharge

Summary for Pond 103P: Gravel Wetland #103

Inflow Area = 3.293 ac, 53.10% Impervious, Inflow Depth > 6.58" for 50 YR - 24 HR event
Inflow = 11.56 cfs @ 12.16 hrs, Volume= 1.804 af
Outflow = 10.42 cfs @ 12.35 hrs, Volume= 1.609 af, Atten= 10%, Lag= 11.5 min
Primary = 0.20 cfs @ 12.35 hrs, Volume= 0.241 af
Secondary = 6.36 cfs @ 12.35 hrs, Volume= 1.232 af
Tertiary = 3.86 cfs @ 12.35 hrs, Volume= 0.136 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 94.41' @ 12.35 hrs Surf.Area= 18,476 sf Storage= 16,501 cf
Flood Elev= 95.00' Surf.Area= 19,260 sf Storage= 22,733 cf

Plug-Flow detention time= 96.1 min calculated for 1.609 af (89% of inflow)
Center-of-Mass det. time= 45.4 min (844.5 - 799.2)

Volume	Invert	Avail.Storage	Storage Description
#1	91.92'	28 cf	**4.00'D x 2.23'H Outlet Structure**
#2	92.50'	2,395 cf	**Sediment Forebay (Irregular)** Listed below (Recalc)
#3	92.25'	3,351 cf	**Cell 1 (Irregular)** Listed below (Recalc)
#4	92.25'	3,152 cf	**Cell 2 (Irregular)** Listed below (Recalc)
#5	93.50'	13,808 cf	**Open Water Storage (Irregular)** Listed below (Recalc)
		22,733 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.50	1,217	144.1	0	0	1,217
93.00	1,501	157.3	678	678	1,542
94.00	1,941	174.6	1,716	2,395	2,029

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.25	1,197	156.7	0	0	1,197
92.50	2,481	270.1	450	450	5,049
93.00	2,905	280.3	1,345	1,795	5,516
93.50	3,322	289.4	1,556	3,351	5,953

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.25	1,197	156.9	0	0	1,197
92.50	2,265	250.5	426	426	4,232
93.00	2,768	263.3	1,256	1,682	4,771
93.50	3,115	271.9	1,470	3,152	5,161

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.50	6,952	346.4	0	0	6,952
94.00	7,478	355.8	3,607	3,607	7,506
94.01	9,582	419.5	85	3,692	11,436
95.00	10,869	438.4	10,117	13,808	12,794

Device	Routing	Invert	Outlet Devices
#1	Primary	91.92'	**6.0" Round 6" HDPE N-12** L= 16.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 91.92' / 91.75' S= 0.0106 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Secondary	91.92'	**15.0" Round 15" RCP** L= 12.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 91.92' / 91.75' S= 0.0142 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 1	91.92'	**2.2" Vert. 2.25" Orifice Goose Neck** C= 0.600
#4	Device 2	93.50'	**4.0" Vert. 4" Orifice (2) X 2.00** C= 0.600
#5	Device 2	93.50'	**12.0" W x 8.0" H Vert. 8"T X 12" W Box Orifice (2) X 2.00** C= 0.600
#6	Device 2	94.19'	**48.0" Horiz. 4' Structure** C= 0.600 Limited to weir flow at low heads
#7	Tertiary	94.25'	**25.0' long x 11.0' breadth 25' Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Primary OutFlow Max=0.20 cfs @ 12.35 hrs HW=94.40' TW=0.00' (Dynamic Tailwater)
- **1=6" HDPE N-12** (Passes 0.20 cfs of 1.12 cfs potential flow)
  - **3=2.25" Orifice Goose Neck** (Orifice Controls 0.20 cfs @ 7.45 fps)

Secondary OutFlow Max=6.36 cfs @ 12.35 hrs HW=94.40' TW=0.00' (Dynamic Tailwater)
- **2=15" RCP** (Inlet Controls 6.36 cfs @ 5.18 fps)
  - **4=4" Orifice (2)** (Passes < 0.72 cfs potential flow)
  - **5=8"T X 12" W Box Orifice (2)** (Passes < 4.78 cfs potential flow)
  - **6=4' Structure** (Passes < 4.09 cfs potential flow)

Tertiary OutFlow Max=3.86 cfs @ 12.35 hrs HW=94.40' TW=0.00' (Dynamic Tailwater)
- **7=25' Emergency Spillway** (Weir Controls 3.86 cfs @ 1.00 fps)

GRAVEL WETLAND DESIGN CRITERIA
(Env-Wq 1508.05)

Type/Node Name: **Gravel Wetland #103 (Pond 103P)**

Enter the node name in the drainage analysis if applicable.

3.29 ac	A = Area draining to the practice	
1.75 ac	A_I = Impervious area draining to the practice	
0.53 decimal	I = Percent impervious area draining to the practice, in decimal form	
0.53 unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
1.74 ac-in	WQV= 1" x Rv x A	
6,310 cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
631 cf	10% x WQV (check calc for sediment forebay)	
2,840 cf	45% x WQV (check calc for gravel wetland treatment bay volume)	
2,395 cf	V_{SED} = Sediment forebay volume	**≥ 10%WQV**
3,351 cf	V_{TB1} = Volume of treatment bay 1 [1]	**≥ 45%WQV**
3,152 cf	V_{TB2} = Volume of treatment bay 2 [1]	**≥ 45%WQV**
0.15 cfs	$2Q_{avg}$ = 2* WQV / 24 hrs * (1hr / 3600 sec) [2]	
93.29 ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
0.14 cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	**< $2Q_{avg}$**
25.04 hours	T_{ED} = Drawdown time of extended detention = 2WQV/Q_{WQV}	**≥ 24-hrs**
3.00 :1	Pond side slopes	**≥ 3:1**
93.75 ft	Elevation of SHWT	
91.75 ft	SHWT - 2 feet	
91.92 ft	Epp = Elevation of the permanent pool (elevation of lowest orifice) [3]	**≤ E_{SHWT} - 2 ft**
18, 18 ft	Length of the flow path between the inlet and outlet in each cell	**≥ 15 ft**
Angle Grate	What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of ≤6")?	
94.41 ft	Peak elevation of the 50-year storm event (E_{50})	
95.00 ft	Berm elevation of the pond	
YES	E_{50} ≤ the berm elevation?	**← yes**

Qualified professional that developed the planting plan

Name, Profession: KAB/KRP

1. Volume stored above the wetland soil and below the high flow by-pass.

2. To ensure orifice is sized so that WQV is released at a relatively stable rate.

3. 4" to 8" below the wetland soil. If lowest orifice is higher than (SHWT - 2 feet), and saturated hydraulic conductivity (Ksat) is greater than 0.015 in/hr, the system must be lined.

Designer's Notes: Ksat Buxton & Windsor > than 0.015 in/hr. System to be lined w/ low perm material

Stage-Area-Storage for Pond 103P: Gravel Wetland #103

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
91.92	0	92.96	3,883	94.00	12,530
91.94	0	92.98	4,026	94.02	12,711
91.96	1	93.00	4,169	94.04	12,904
91.98	1	93.02	4,313	94.06	13,096
92.00	1	93.04	4,458	94.08	13,290
92.02	1	93.06	4,604	94.10	13,484
92.04	2	93.08	4,750	94.12	13,678
92.06	2	93.10	4,897	94.14	13,873
92.08	2	93.12	5,045	94.16	14,068
92.10	2	93.14	5,194	94.18	14,264
92.12	3	93.16	5,343	94.20	14,460
92.14	3	93.18	5,493	94.22	14,657
92.16	3	93.20	5,644	94.24	14,854
92.18	3	93.22	5,796	94.26	15,052
92.20	4	93.24	5,949	94.28	15,250
92.22	4	93.26	6,102	94.30	15,449
92.24	4	93.28	6,256	94.32	15,648
92.26	29	93.30	6,411	94.34	15,848
92.28	80	93.32	6,567	94.36	16,048
92.30	135	93.34	6,723	94.38	16,249
92.32	192	93.36	6,881	94.40	16,450
92.34	254	93.38	7,039	94.42	16,652
92.36	319	93.40	7,198	94.44	16,855
92.38	388	93.42	7,357	94.46	17,058
92.40	460	93.44	7,518	94.48	17,261
92.42	537	93.46	7,679	94.50	17,465
92.44	617	93.48	7,841	94.52	17,669
92.46	701	93.50	8,004	94.54	17,874
92.48	790	93.52	8,178	94.56	18,080
92.50	883	93.54	8,352	94.58	18,286
92.52	1,003	93.56	8,527	94.60	18,492
92.54	1,124	93.58	8,703	94.62	18,699
92.56	1,246	93.60	8,879	94.64	18,907
92.58	1,369	93.62	9,056	94.66	19,115
92.60	1,492	93.64	9,233	94.68	19,324
92.62	1,617	93.66	9,411	94.70	19,533
92.64	1,743	93.68	9,590	94.72	19,742
92.66	1,869	93.70	9,769	94.74	19,953
92.68	1,997	93.72	9,949	94.76	20,163
92.70	2,125	93.74	10,129	94.78	20,375
92.72	2,254	93.76	10,310	94.80	20,586
92.74	2,385	93.78	10,492	94.82	20,799
92.76	2,516	93.80	10,674	94.84	21,012
92.78	2,648	93.82	10,857	94.86	21,225
92.80	2,782	93.84	11,041	94.88	21,439
92.82	2,916	93.86	11,225	94.90	21,653
92.84	3,051	93.88	11,409	94.92	21,868
92.86	3,187	93.90	11,594	94.94	22,084
92.88	3,325	93.92	11,780	94.96	22,300
92.90	3,463	93.94	11,967	94.98	22,516
92.92	3,602	93.96	12,154	95.00	**22,733**
92.94	3,742	93.98	12,342		

Linear Interpolation
6,310 CF Storage = 93.29'

Stage-Discharge for Pond 103P: Gravel Wetland #103

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
91.92	0.00	0.00	0.00
91.97	0.00	0.00	0.00
92.02	0.02	0.02	0.00
92.07	0.03	0.03	0.00
92.12	0.04	0.04	0.00
92.17	0.05	0.05	0.00
92.22	0.06	0.06	0.00
92.27	0.06	0.06	0.00
92.32	0.07	0.07	0.00
92.37	0.08	0.08	0.00
92.42	0.08	0.08	0.00
92.47	0.09	0.09	0.00
92.52	0.09	0.09	0.00
92.57	0.09	0.09	0.00
92.62	0.10	0.10	0.00
92.67	0.10	0.10	0.00
92.72	0.11	0.11	0.00
92.77	0.11	0.11	0.00
92.82	0.11	0.11	0.00
92.87	0.12	0.12	0.00
92.92	0.12	0.12	0.00
92.97	0.12	0.12	0.00
93.02	0.13	0.13	0.00
93.07	0.13	0.13	0.00
93.12	0.13	0.13	0.00
93.17	0.14	0.14	0.00
93.22	0.14	0.14	0.00
93.27	0.14	0.14	0.00
93.32	0.15	0.15	0.00
93.37	0.15	0.15	0.00
93.42	0.15	0.15	0.00
93.47	0.15	0.15	0.00
93.52	0.18	0.18	0.00
93.57	0.30	0.30	0.00
93.62	0.49	0.49	0.00
93.67	0.74	0.74	0.00
93.72	1.02	1.02	0.00
93.77	1.34	1.34	0.00
93.82	1.66	1.66	0.00
93.87	2.00	2.00	0.00
93.92	2.35	2.35	0.00
93.97	2.71	2.71	0.00
94.02	3.09	3.09	0.00
94.07	3.48	3.48	0.00
94.12	3.88	3.88	0.00
94.17	4.42	4.42	0.00
94.22	5.42	5.42	0.00
94.27	6.31	6.13	0.18
94.32	7.39	6.21	1.17
94.37	8.93	6.30	2.63
94.42	10.82	6.39	4.43
94.47	13.01	6.47	6.54
94.52	15.50	6.56	8.95
94.57	18.25	6.64	11.61
94.62	21.24	6.72	14.52
94.67	24.50	6.80	17.70
94.72	28.05	6.88	21.17
94.77	31.86	6.96	24.90
94.82	35.91	7.04	28.87
94.87	40.04	7.11	32.93
94.92	44.11	7.19	36.92
94.97	**48.32**	**7.26**	**41.06**

Elevation 93.29' = 0.14 CFS discharge

GRAVEL WETLAND DESIGN CRITERIA
(Env-Wq 1508.05)

Type/Node Name: **Gravel Wetland #104 (Pond 104P)**

Enter the node name in the drainage analysis if applicable.

0.53	ac	A = Area draining to the practice	
0.30	ac	A_I = Impervious area draining to the practice	
0.56	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.55	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.29	ac-in	WQV= 1" x Rv x A	
1,064	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
106	cf	10% x WQV (check calc for sediment forebay)	
479	cf	45% x WQV (check calc for gravel wetland treatment bay volume)	
943	cf	V_{SED} = Sediment forebay volume	**≥ 10%WQV**
708	cf	V_{TB1} = Volume of treatment bay 1 [1]	**≥ 45%WQV**
691	cf	V_{TB2} = Volume of treatment bay 2 [1]	**≥ 45%WQV**
0.02	cfs	$2Q_{avg}$ = 2* WQV / 24 hrs * (1hr / 3600 sec) [2]	
91.72	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
0.02	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	**< $2Q_{avg}$**
29.55	hours	T_{ED} = Drawdown time of extended detention = 2WQV/Q_{WQV}	**≥ 24-hrs**
3.00	:1	Pond side slopes	**≥ 3:1**
90.00	ft	Elevation of SHWT	
88.00	ft	SHWT - 2 feet	
90.33	ft	Epp = Elevation of the permanent pool (elevation of lowest orifice) [3]	**≤ E_{SHWT} - 2 ft**
58.6,55	ft	Length of the flow path between the inlet and outlet in each cell	**≥ 15 ft**
Angle Grate		What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of ≤6")?	
93.56	ft	Peak elevation of the 50-year storm event (E_{50})	
94.00	ft	Berm elevation of the pond	
YES		E_{50} ≤ the berm elevation?	**← yes**

Qualified professional that developed the planting plan

Name, Profession: KAB/KRP

1. Volume stored above the wetland soil and below the high flow by-pass.

2. To ensure orifice is sized so that WQV is released at a relatively stable rate.

3. 4" to 8" below the wetland soil. If lowest orifice is higher than (SHWT - 2 feet), and saturated hydraulic conductivity (Ksat) is greater than 0.015 in/hr, the system must be lined.

Designer's Notes: Ksat Windsor Variant > than 0.015 in/hr. System to be lined w/ low perm material

Summary for Pond 104P: Gravel Wetland #104

Inflow Area = 0.528 ac, 56.11% Impervious, Inflow Depth > 6.67" for 50 YR - 24 HR event
Inflow = 3.85 cfs @ 12.09 hrs, Volume= 0.294 af
Outflow = 0.30 cfs @ 13.16 hrs, Volume= 0.202 af, Atten= 92%, Lag= 64.1 min
Primary = 0.02 cfs @ 13.16 hrs, Volume= 0.029 af
Secondary = 0.28 cfs @ 13.16 hrs, Volume= 0.173 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 93.56' @ 13.16 hrs Surf.Area= 8,129 sf Storage= 7,683 cf
Flood Elev= 94.00' Surf.Area= 9,033 sf Storage= 10,116 cf

Plug-Flow detention time= 312.0 min calculated for 0.202 af (69% of inflow)
Center-of-Mass det. time= 219.0 min (1,002.6 - 783.6)

Volume	Invert	Avail.Storage	Storage Description
#1	90.33'	43 cf	**4.00'D x 3.42'H Outlet Structure**
#2	91.00'	943 cf	**Sediment Forebay (Irregular)** Listed below (Recalc)
#3	91.00'	708 cf	**Cell 1 (Irregular)** Listed below (Recalc)
#4	91.00'	691 cf	**Cell 2 (Irregular)** Listed below (Recalc)
#5	92.00'	7,730 cf	**Open water storage (Irregular)** Listed below (Recalc)
		10,116 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
91.00	106	39.5	0	0	106
92.00	361	75.3	221	221	438
93.00	1,159	150.0	722	943	1,782

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
91.00	505	135.1	0	0	505
92.00	933	155.0	708	708	987

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
91.00	492	129.8	0	0	492
92.00	912	149.2	691	691	945

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.00	2,671	356.5	0	0	2,671
93.00	2,793	306.2	2,732	2,732	5,344
93.01	4,076	437.5	34	2,766	13,115
94.00	6,016	501.8	4,964	7,730	17,943

Device	Routing	Invert	Outlet Devices
#1	Primary	90.33'	**6.0" Round 6" HDPE N-12** L= 17.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 90.33' / 90.00' S= 0.0189 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Secondary	90.33'	**12.0" Round 12" HDPE N-12** L= 16.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 90.33' / 90.00' S= 0.0206 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 1	90.33'	**0.7" Vert. 0.75" Orifice Goose Neck** C= 0.600
#4	Device 2	92.50'	**3.0" Vert. 3" Orifice** C= 0.600
#5	Device 2	93.50'	**12.0" W x 3.0" H Vert. 3"T X 12"W Box Orifice** C= 0.600
#6	Device 2	93.79'	**48.0" Horiz. 4' Structure** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 13.16 hrs HW=93.56' TW=90.12' (Dynamic Tailwater)
└─**1=6" HDPE N-12** (Passes 0.02 cfs of 1.29 cfs potential flow)
└─**3=0.75" Orifice Goose Neck** (Orifice Controls 0.02 cfs @ 8.62 fps)

Secondary OutFlow Max=0.28 cfs @ 13.16 hrs HW=93.56' TW=90.12' (Dynamic Tailwater)
└─**2=12" HDPE N-12** (Passes 0.28 cfs of 4.94 cfs potential flow)
├─**4=3" Orifice** (Orifice Controls 0.23 cfs @ 4.66 fps)
├─**5=3"T X 12"W Box Orifice** (Orifice Controls 0.05 cfs @ 0.80 fps)
└─**6=4' Structure** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 104P: Gravel Wetland #104

Elevation (feet)	Storage (cubic-feet)
90.33	0
90.38	1
90.43	1
90.48	2
90.53	3
90.58	3
90.63	4
90.68	4
90.73	5
90.78	6
90.83	6
90.88	7
90.93	8
90.98	8
91.03	42
91.08	101
91.13	161
91.18	224
91.23	290
91.28	357
91.33	428
91.38	501
91.43	577
91.48	655
91.53	736
91.58	820
91.63	906
91.68	996
91.73	1,089
91.78	1,184
91.83	1,283
91.88	1,384
91.93	1,489
91.98	1,597
92.03	1,733
92.08	1,887
92.13	2,043
92.18	2,201
92.23	2,361
92.28	2,523
92.33	2,686
92.38	2,852
92.43	3,020
92.48	3,191
92.53	3,363
92.58	3,538
92.63	3,716
92.68	3,896
92.73	4,078
92.78	4,263
92.83	4,450
92.88	4,640

Elevation (feet)	Storage (cubic-feet)
92.93	4,833
92.98	5,029
93.03	5,224
93.08	5,433
93.13	5,646
93.18	5,863
93.23	6,085
93.28	6,312
93.33	6,543
93.38	6,779
93.43	7,020
93.48	7,266
93.53	7,516
93.58	7,772
93.63	8,032
93.68	8,298
93.73	8,568
93.78	8,844
93.83	9,124
93.88	9,409
93.93	9,700
93.98	**9,996**

Linear Interpolation
1,064 CF Storage = 91.72'

Stage-Discharge for Pond 104P: Gravel Wetland #104

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
90.33	0.00	91.37	0.01	92.41	0.02	93.45	0.24
90.35	0.00	91.39	0.01	92.43	0.02	93.47	0.24
90.37	0.00	91.41	0.01	92.45	0.02	93.49	0.24
90.39	0.00	91.43	0.01	92.47	0.02	93.51	0.25
90.41	0.00	91.45	0.01	92.49	0.02	93.53	0.26
90.43	0.00	91.47	0.01	92.51	0.02	93.55	0.29
90.45	0.00	91.49	0.01	92.53	0.02	93.57	0.31
90.47	0.00	91.51	0.01	92.55	0.02	93.59	0.34
90.49	0.00	91.53	0.01	92.57	0.03	93.61	0.37
90.51	0.00	91.55	0.01	92.59	0.04	93.63	0.41
90.53	0.01	91.57	0.01	92.61	0.04	93.65	0.45
90.55	0.01	91.59	0.01	92.63	0.05	93.67	0.49
90.57	0.01	91.61	0.01	92.65	0.06	93.69	0.53
90.59	0.01	91.63	0.01	92.67	0.07	93.71	0.58
90.61	0.01	91.65	0.01	92.69	0.08	93.73	0.63
90.63	0.01	91.67	0.01	92.71	0.09	93.75	0.68
90.65	0.01	91.69	0.01	92.73	0.10	93.77	0.83
90.67	0.01	91.71	0.01	92.75	0.10	93.79	1.08
90.69	0.01	91.73	0.02	92.77	0.11	93.81	1.39
90.71	0.01	91.75	0.02	92.79	0.12	93.83	1.75
90.73	0.01	91.77	0.02	92.81	0.12	93.85	2.15
90.75	0.01	91.79	0.02	92.83	0.13	93.87	2.59
90.77	0.01	91.81	0.02	92.85	0.13	93.89	3.06
90.79	0.01	91.83	0.02	92.87	0.14	93.91	3.56
90.81	0.01	91.85	0.02	92.89	0.14	93.93	4.09
90.83	0.01	91.87	0.02	92.91	0.15	93.95	4.65
90.85	0.01	91.89	0.02	92.93	0.15	93.97	5.24
90.87	0.01	91.91	0.02	92.95	0.16	93.99	**5.31**
90.89	0.01	91.93	0.02	92.97	0.16		
90.91	0.01	91.95	0.02	92.99	0.16		
90.93	0.01	91.97	0.02	93.01	0.17		
90.95	0.01	91.99	0.02	93.03	0.17		
90.97	0.01	92.01	0.02	93.05	0.18		
90.99	0.01	92.03	0.02	93.07	0.18		
91.01	0.01	92.05	0.02	93.09	0.18		
91.03	0.01	92.07	0.02	93.11	0.19		
91.05	0.01	92.09	0.02	93.13	0.19		
91.07	0.01	92.11	0.02	93.15	0.19		
91.09	0.01	92.13	0.02	93.17	0.20		
91.11	0.01	92.15	0.02	93.19	0.20		
91.13	0.01	92.17	0.02	93.21	0.20		
91.15	0.01	92.19	0.02	93.23	0.21		
91.17	0.01	92.21	0.02	93.25	0.21		
91.19	0.01	92.23	0.02	93.27	0.21		
91.21	0.01	92.25	0.02	93.29	0.21		
91.23	0.01	92.27	0.02	93.31	0.22		
91.25	0.01	92.29	0.02	93.33	0.22		
91.27	0.01	92.31	0.02	93.35	0.22		
91.29	0.01	92.33	0.02	93.37	0.23		
91.31	0.01	92.35	0.02	93.39	0.23		
91.33	0.01	92.37	0.02	93.41	0.23		
91.35	0.01	92.39	0.02	93.43	0.23		

Elevation 91.72' = 0.02 CFS discharge

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Strafford County, New Hampshire

January 19, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,810 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Strafford County, New Hampshire
Survey Area Data: Version 20, May 29, 2020

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

Date(s) aerial images were photographed: Dec 31, 2009—Sep 9, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Be	Biddeford silty clay loam	3.6	5.9%
BzA	Buxton silt loam, 0 to 3 percent slopes	9.4	15.3%
DeB	Deerfield loamy fine sand, 3 to 8 percent slopes	2.1	3.4%
Ml	Mixed alluvial land, wet	0.0	0.0%
ScA	Scantic silt loam, 0 to 3 percent slopes	16.2	26.5%
SfC	Suffield silt loam, 8 to 15 percent slopes	2.0	3.2%
WdA	Windsor loamy sand, 0 to 3 percent slopes	20.0	32.6%
WfB	Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes	8.1	13.1%
Totals for Area of Interest		**61.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a

given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Strafford County, New Hampshire

Be—Biddeford silty clay loam

Map Unit Setting

National map unit symbol: 9d6m
Elevation: 0 to 200 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Biddeford and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Biddeford

Setting

Landform: Marine terraces
Parent material: Glaciomarine

Typical profile

H1 - 0 to 7 inches: silty clay loam
H2 - 7 to 26 inches: silty clay
H3 - 26 to 41 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Not named wet

Percent of map unit: 10 percent
Landform: Marine terraces
Hydric soil rating: Yes

Scantic

Percent of map unit: 5 percent
Landform: Marine terraces

Hydric soil rating: Yes

BzA—Buxton silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9d6n
Elevation: 0 to 280 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Buxton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Buxton

Setting

Parent material: Glaciomarine

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 28 inches: silty clay loam
H3 - 28 to 43 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F145XY006CT - Semi-Rich Moist Lake Plain
Hydric soil rating: No

Minor Components

Scantic

Percent of map unit: 10 percent
Landform: Marine terraces

Hydric soil rating: Yes

Not named

Percent of map unit: 5 percent
Hydric soil rating: No

DeB—Deerfield loamy fine sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2xfg9
Elevation: 0 to 1,190 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of local importance

Map Unit Composition

Deerfield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Deerfield

Setting

Landform: Kame terraces, outwash plains, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear, concave
Across-slope shape: Concave, linear, convex
Parent material: Sandy outwash derived from granite, gneiss, and/or quartzite

Typical profile

Ap - 0 to 9 inches: loamy fine sand
Bw - 9 to 25 inches: loamy fine sand
BC - 25 to 33 inches: fine sand
Cg - 33 to 60 inches: sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: About 15 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water capacity: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 7 percent
Landform: Outwash terraces, outwash deltas, kame terraces, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

Wareham

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sudbury

Percent of map unit: 2 percent
Landform: Outwash deltas, kame terraces, outwash plains, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave, convex
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

Ninigret

Percent of map unit: 1 percent
Landform: Kame terraces, outwash terraces, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear
Across-slope shape: Convex, concave
Hydric soil rating: No

MI—Mixed alluvial land, wet

Map Unit Setting

National map unit symbol: 9d86
Elevation: 300 to 1,800 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Mixed alluvial land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mixed Alluvial Land

Setting

Landform: Flood plains

Typical profile

H1 - 0 to 5 inches: loam
H2 - 5 to 72 inches: very gravelly silt loam

Properties and qualities

Slope: 0 to 2 percent
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: FrequentNone
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 15 percent
Available water capacity: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydric soil rating: Yes

ScA—Scantic silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9d8s
Elevation: 0 to 260 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of local importance

Map Unit Composition

Scantic and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Scantic

Setting

Landform: Marine terraces

Typical profile

H1 - 0 to 13 inches: silt loam
H2 - 13 to 23 inches: silty clay loam

H3 - 23 to 40 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Not named wet

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

Biddeford

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

Swanton

Percent of map unit: 5 percent
Landform: Marine terraces
Hydric soil rating: Yes

SfC—Suffield silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9d8v
Elevation: 0 to 250 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Suffield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Suffield

Typical profile

H1 - 0 to 19 inches: silt loam
H2 - 19 to 28 inches: silt loam
H3 - 28 to 41 inches: silty clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY017NH - Well Drained Lake Plain
Hydric soil rating: No

Minor Components

Not named

Percent of map unit: 9 percent
Hydric soil rating: No

Buxton

Percent of map unit: 5 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 1 percent
Hydric soil rating: No

WdA—Windsor loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svkg
Elevation: 0 to 990 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of local importance

Map Unit Composition

Windsor, loamy sand, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor, Loamy Sand

Setting

Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Deerfield, loamy sand

Percent of map unit: 10 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hinckley, loamy sand

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, eskers, kames

Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

WfB—Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9d9b
Elevation: 0 to 280 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Windsor variant and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor Variant

Typical profile

H1 - 0 to 26 inches: loamy fine sand
H2 - 26 to 30 inches: loamy sand
H3 - 30 to 42 inches: silt loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Not named

Percent of map unit: 15 percent
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

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603-205-4396
johnphayes@comcast.net

2/18/20

Christopher Berry
Berry Surveying and Engineering
335 Second Crown Point Road
Barrington NH 03825

Job # 20-004

Site Specific Soil Survey 2/17/20
239 Know Marsh Road Dover, NH

Dear Chris,

This letter report presents the findings of a Site Specific Soil Survey conducted on the referenced property by John P. Hayes III, 0n February 7, 2020. The soil survey was conducted in accordance with the New Hampshire Supplement of the Site-Specific Soil Mapping Standard For New Hampshire and Vermont, Version 5.0, December 2017, Special Publication # 3, published by the Society of Soil Scientist of Northern New England.

The portion of the property that is subject of the soil survey is located on the northwest side of Knox Marsh road, and southeast of the railroad line, in Dover NH. The parcel is 9.36 acres in size. The plans used for these soil maps are a 50 scale plan, where 1 inch equals 50 feet, with two foot contours.

The purpose of the soil survey is to provide the client with soils information for urban and suburban or rural land planning. Soil characteristics on the property were evaluated through observation of numerous test holes and hand auger probes conducted throughout the property. Slope phases were determined with the use of the topography provided on the plan. The Site-specific Soil Map Units identified are taken from the New Hampshire State-Wide Numerical Soils Legend, Issue #10 January 2011, and are briefly described below. Official Series Descriptions (OSD) for each of these soil series are enclosed with this report. The soil map units comply with the Range In Characteristics described in the OSD. Dissimilar inclusions are noted above. Limits of the Site Specific mapping units are highlighted on the plan. Portions of the soil map with the map unit denominator P, are poorly drained soils.

MAP UNIT #	SOIL TAXANOMIC NAME	DESCRIPTION
BzA (State No. 232)	**Buxton**	The Buxton series consists of very deep, moderately well drained soils that formed in glaciolacustrine or glaciomarine deposits on coastal lowlands and river valleys. Permeability is moderate or moderately slow in the surface horizon, moderately slow or slow in the upper part of the subsoil, and slow or very slow in the lower part of the subsoil and in the substratum. The hydrologic soil group is C. Slope ranges from 0% to 3%.
BzB (State No. 232)	**Buxton**	The Buxton series consists of very deep, moderately well drained soils that formed in glaciolacustrine or glaciomarine deposits on coastal lowlands and river valleys. Permeability is moderate or moderately slow in the surface horizon, moderately slow or slow in the upper part of the subsoil, and slow or very slow in the lower part of the subsoil and in the substratum. The hydrologic soil group is C. Slope ranges from 3% to 8%.
BzC (State No. 232)	**Buxton**	The Buxton series consists of very deep, moderately well drained soils that formed in glaciolacustrine or glaciomarine deposits on coastal lowlands and river valleys. Permeability is moderate or moderately slow in the surface horizon, moderately slow or slow in the upper part of the subsoil, and slow or very slow in the lower part of the subsoil and in the substratum. The hydrologic soil group is C. Slope ranges from 8% to 15%.
ScA P (State No. 233)	**Scantic**	The Scantic series consists of very deep, poorly drained soils formed in glaciomarine or glaciolacustrine deposits on coastal lowlands and river valleys.Saturated hydraulic conductivity of the surface and subsurface horizons is moderately high or high and low or moderately slow in the subsoil and substratum. The hydrologic soil group is D. Slope ranges from 0% to 3%.
ScB P (State No. 233)	**Scantic**	The Scantic series consists of very deep, poorly drained soils formed in glaciomarine or glaciolacustrine deposits on coastal lowlands and river valleys.Saturated hydraulic conductivity of the surface and subsurface horizons is moderately high or high and low or moderately slow in the subsoil and substratum. The hydrologic soil group is D. Slope ranges from 3% to 8%.
WfA (State No. 327)	**Windsor Variant (clay Subsoil)**	The Windsor Variant series consists of very deep, excessively drained soils formed in sandy outwash or eolian deposits, that have a clay subsoil. They are nearly level through very steep soils on glaciofluvial landforms. Saturated hydraulic conductivity is high or very high. Due to the resrtictive subsoil layer in these soils, the hydrologic soil group is C. Slope ranges from 0% to 3%.

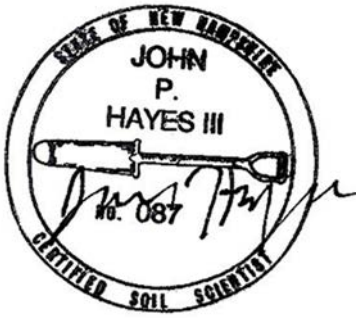
MAP UNIT #	SOIL TAXANOMIC NAME	DESCRIPTION
WfB (State No. 327)	**Windsor Variant (clay Subsoil)**	The Windsor Variant series consists of very deep, excessively drained soils formed in sandy outwash or eolian deposits, that have a clay subsoil. They are nearly level through very steep soils on glaciofluvial landforms. Saturated hydraulic conductivity is high or very high. Due to the resrtictive subsoil layer in these soils, the hydrologic soil group is C. Slope ranges from 3% to 8%.
WfC (State No. 327)	**Windsor Variant (clay Subsoil)**	The Windsor Variant series consists of very deep, excessively drained soils formed in sandy outwash or eolian deposits, that have a clay subsoil. They are nearly level through very steep soils on glaciofluvial landforms. Saturated hydraulic conductivity is high or very high. Due to the resrtictive subsoil layer in these soils, the hydrologic soil group is C. Slope ranges from 8% to 15%.

Slope Phases

Alpha Slope Symbol	Range
A	**0 – 3%**
B	**3 – 8%**
C	**8 – 15%**
D	**15 – 25%**
E	**25 – 50%**
F	**> 50%**

I trust that this Soil Survey and report meet your current planning needs. Please do not hesitate to contact me if you have any questions.

Sincerely:



John P. Hayes III CSS, CWS

S.S.S.M. SOILS LEGEND

SYMBOL	SOIL TAXONOMIC NAME	HYDROLOGIC SOIL GROUP
WfA	WINDSOR VARIANT	C
WfB	WINDSOR VARIANT	C
WfC	WINDSOR VARIANT	C
BzA	BUXTON MODERATELY DRAINED	C
BzB	BUXTON MODERATELY DRAINED	C
BzC	BUXTON MODERATELY DRAINED	C
ScA/P	SCANTIC POORLY DRAINED	D
ScB/P	SCANTIC POORLY DRAINED	D

SLOPE: A = 0–3% B = 3–8% C = 8–15% D = 15–25% E = 25–50% F = 50%+

DENOMINATOR: /VPD = VERY POORLY DRAINED /PD = POORLY DRAINED /SWPD = SOMEWHAT POORLY DRAINED /MWD = MODERATELY WELL DRAINED

NRCS SOILS LEGEND

SYMBOL	SOIL TAXONOMIC NAME	HYDROLOGIC SOIL GROUP
WdA	WINDSOR LOAMY SAND	A
WfB	WINDSOR LOAMY SAND	A
BzA	BUXTON SILT LOAM	C

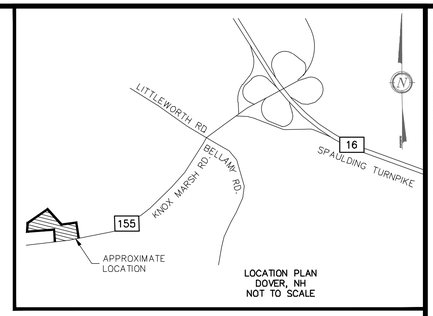
SLOPE: A = 0–3% B = 3–8% C = 8–15% D = 15–25% E = 25–50% F = 50%+

DENOMINATOR: /VPD = VERY POORLY DRAINED /PD = POORLY DRAINED /SWPD = SOMEWHAT POORLY DRAINED /MWD = MODERATELY WELL DRAINED

LEGEND:

- IRON BOUND ~FND~
- IRON PIPE ~FND~
- GRANITE BOUND ~FND~
- UTILITY POLE/GUY WIRE
- BENCHMARK
- MATCH LINE & POINT
- WETLAND LINE
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR
- OFF SITE NRCS SOIL LINE
- SITE SPECIFIC SOIL DELINEATION
- LIMIT OF SOIL SURVEY

BzA SOIL LABEL
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
TBA TO BE ABANDONED



LOCATION PLAN
DOVER, NH
NOT TO SCALE

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833–0190

2.) TAX MAP H, LOT 37A

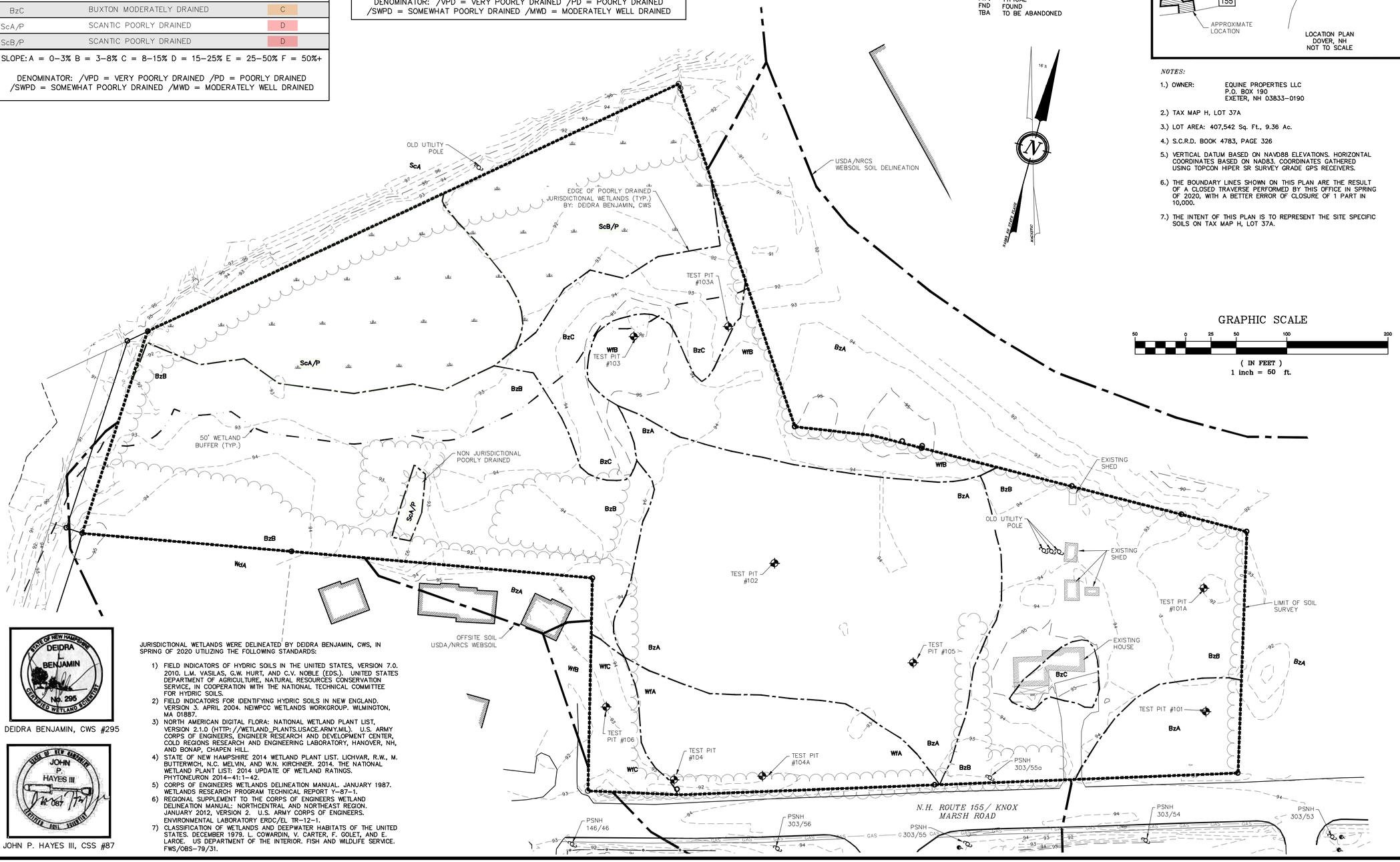
3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING TOPCON HIPER SR SURVEY GRADE GPS RECEIVERS.

6.) THE BOUNDARY LINES SHOWN ON THIS PLAN ARE THE RESULT OF A CLOSED TRAVERSE PERFORMED BY THIS OFFICE IN SPRING OF 2020, WITH A BETTER ERROR OF CLOSURE OF 1 PART IN 10,000.

7.) THE INTENT OF THIS PLAN IS TO REPRESENT THE SITE SPECIFIC SOILS ON TAX MAP H, LOT 37A.



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

JURISDICTIONAL WETLANDS WERE DELINEATED BY DEIDRA BENJAMIN, CWS, IN SPRING OF 2020 UTILIZING THE FOLLOWING STANDARDS:

1) FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 7.0. 2010. L.M. VASILAS, G.W. HURT, AND C.V. NOBLE (EDS.). UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.
2) FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 3. APRIL 2004. NEIWPCC WETLANDS WORKGROUP. WILMINGTON, MA 01887.
3) NORTH AMERICAN DIGITAL FLORA: NATIONAL WETLAND PLANT LIST, VERSION 2.1.0 (HTTP://WETLAND_PLANTS.USACE.ARMY.MIL). U.S. ARMY CORPS OF ENGINEERS, ENGINEER RESEARCH AND DEVELOPMENT CENTER, COLD REGIONS RESEARCH AND ENGINEERING LABORATORY, HANOVER, NH, AND BONAP, CHAPEN HILL.
4) STATE OF NEW HAMPSHIRE 2014 WETLAND PLANT LIST. LICHVAR, R.W., M. BUTTERWICH, N.C. MELVIN, AND W.N. KIRCHNER. 2014. THE NATIONAL WETLAND PLANT LIST: 2014 UPDATE OF WETLAND RATINGS. PHYTONEURON 2014–41:1–42.
5) CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. JANUARY 1987. WETLANDS RESEARCH PROGRAM TECHNICAL REPORT Y–87–1.
6) REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION. JANUARY 2012, VERSION 2. U.S. ARMY CORPS OF ENGINEERS. ENVIRONMENTAL LABORATORY ERDC/EL TR–12–1.
7) CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES. DECEMBER 1979. L. COWARDIN, V. CARTER, F. GOLET, AND E. LAROE. US DEPARTMENT OF THE INTERIOR. FISH AND WILDLIFE SERVICE. FWS/OBS–79/31.

STATE OF NEW HAMPSHIRE
DEIDRA L BENJAMIN
No. 295
CERTIFIED WETLAND SCIENTIST

DEIDRA BENJAMIN, CWS #295

STATE OF NEW HAMPSHIRE
JOHN P. HAYES III
087
CERTIFIED SOIL SCIENTIST

JOHN P. HAYES III, CSS #87

PLANNING FILE #21–04

REVISION	DATE	DESCRIPTION
#4	1–28–22	MULTIPLE PLAN SET REVISIONS
#3	8–16–21	REVISED PER TRC COMMENT
#2	7–27–21	REVISED PER TRC COMMENT
#1	5–24–21	REVISED PER TRC COMMENT

SITE SPECIFIC SOILS MAP
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332–2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 – 066

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 10773
LICENSED PROFESSIONAL ENGINEER

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335 Second Crown Point Road
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www.BerrySurveying.Com

Inspection and Maintenance Manual

Stormwater System Management

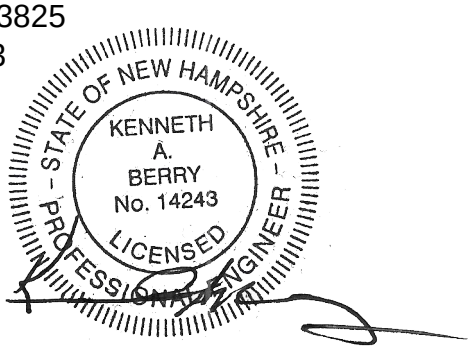
Proposed Mixed Use Site Plan
Tibetan Drive
"Residences and Shops at Kelly Brook"
Tax Map H, Lot 37A

Prepared For

Equine Properties, LLC
149 Epping Road Suite 2
PO Box 190
Exeter, NH 03833

Prepared By

Berry Surveying & Engineering
335 Second Crown Point Road
Barrington, NH 03825
603-332-2863



File Number
DB2020-066

January 21, 2021
Revised January 28, 2022

Inspection and Maintenance Manual

Stormwater System Management

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Owner Certification .....Page 17
Operation & Maintenance Plans Attached – 1 Page
Control of Invasive Plants, NH Department of Agriculture Attached – 4 Pages
NHDES Green SnoPro Utilization Chart Attached – 1 Page
UNH Stormwater Center Subsurface Gravel Wetland Design Specifications 10 Pages
NHDOT Design and Maintenance of Subsurface Gravel Wetlands, 2/2015 43 Pages

Introduction

The Best Management Practices (BMP) described in this manual are specified in more detail within the plan set giving design details and specifications. The New Hampshire Stormwater Manual, Volume 2, Post-Construction Best Management Practices Selection & Design (December 2008, NHDES & US EPA) is included by reference to this manual. Additional details, construction specifications, and example drawings are provided within this reference. (http://des.nh.gov/organization/divisions/water/stormwater/)

The BMP's are covered below in the general order in which the storm water flows. Each BMP has a description and maintenance consideration listed. A Check List table is proved after the narrative to summarize the maintenance responsibilities and schedule. A Log Form is also provided for the owners use.

For details regarding the design of the Storm Water System see also Drainage Analysis & Sediment and Erosion, January 21, 2021, as revised. See also plan set completed for Equine Properties, LLC, originally dated January 21, 2021, as revised.

Equine Properties, LLC, development company with Turner Porter, Managing Member as the operator, and heirs, successors, and assigns area responsible for the Operation, Inspection, and Maintenance of the Stormwater Management System. A significant step in this responsibility is the Inspection and Maintenance of each component of the system. Ongoing, semi-annual, and annual inspection and maintenance requirement are documented below and must be followed diligently. Failure of any component of the system can result in surface water run-off ponding and/or freezing in the roadway and parking lots, leaving the developed site untreated, and/or causing violations to issued permits. The owner / developer must maintain, and have available, plans of the Stormwater System in order properly inspect and maintain the system. (Reduced copies attached.) The responsible party will conduct the inspections, complete the required maintenance, and will maintain the Inspection & Maintenance Check Lists and Logs, and will provide copies with the Annual Report to the City of Dover, Community Services, DPW / Engineering Department and provided a copy to NHDES AoT by December 15th of each year. Equine Properties, LLC will initiate the Home Owners Association and act as the initial majority owner. When the HOA converts to be managed by elected home owners copies of the Inspection & Maintenance Manual complete with attachments and plans must be transferred to the incoming management / ownership team.

The owner of Tax Map H, Lot 37A, Equine Properties, LLC, are proposing a Mixed Use Site Development consisting of 12 detached residential units, two twenty-six unit mixed use buildings. This includes 938 linear feet of roadway, parking areas, three subsurface gravel wetlands, an infiltration pond, and detention areas.

The following practices and drainage features will all require periodic inspections and maintenance based on this manual and drainage layout:

Conveyance Swales & Treatment Swale

Culvert Pipes, Flared End Sections, and Headwalls.

Sediment Forebay to SGW #101, #103, and #104.

Subsurface Gravel Wetland #101 with inlets, clean-outs, outlet structure, and a spillway.

Subsurface Gravel Wetland #103 with inlets, clean-outs, outlet structure, and a spillway.

Subsurface Gravel Wetland #104 with inlets, clean-outs and outlet structure.

Detention Pond #102

Detention Pond #105

Rip Rap Level Spreaders

Neighborhood Foundation Drain System

Note: In addition to the inspection and maintenance requirements contained in this narrative, attached in the appendix is a NHDOT document entitled Design and Maintenance of Subsurface Gravel Wetlands, dated February 2015, which is a part of the inspection and maintenance requirements for the operation of a Subsurface Gravel Wetland.

Conveyance Swales & Treatment Swales

Description: "Swales are stabilized channels designed to convey runoff at non-erosive velocities." (NHDES SWM) They will be trapezoidal or parabolic in section view. A conveyance swale is intended to move surface water runoff from one point to another where as a treatment swale will slow the velocity to a point where sediment will settle out of the stormwater flow. A treatment swale will be constructed to a width of between four and eight feet and have a minimum length of 100 feet. The flow characteristics will also meet design criteria. See SWM Volume 2, 4.3 Treatment Practices, 5. Treatment Swales, page 123.

Project Intent: The swales are individually designed in the drainage analysis and specified on the design plans. The designed swales must have greater than 85% vegetated growth prior to receiving runoff. The bottom of a treatment swale must be above the seasonal high water table.

Maintenance Considerations: Grassed swales will be inspected twice annually, removing accumulated sediment and gross solids. Grass will be mowed periodically but to a depth of not less than 4 inches. Any damage to the vegetation will be repaired and woody vegetation and invasive vegetation will be removed.

Culvert Pipes, Flared End Sections / Headwalls

Description: Culvert pipes are placed to route surface water runoff from catch basins to drain manholes, and drain manholes to a discharge point conveying the runoff in such a manner that erosion does not take place. Culvert pipes are often terminated with flared end sections or headwalls.

Maintenance Considerations: The entrance and exit of the culvert pipe should be cleaned of any trash and sediment build-up. The culvert should be clear to let runoff pass through the culvert unobstructed. Flared end sections and headwalls should be inspected for erosion and destabilization, with repairs made as required.

Sediment Forebay

Description: A sediment forebay is designed to reduce the velocity of incoming surface water runoff allowing sediment to fall out of suspension initially pre-treating the runoff

before it is sent to a treatment structure. This earthen basin will have vegetated side-slopes and a check dam to further reduce and pretreat the runoff. At the point of incoming runoff, the basin will be protected by rip rap outlet protection construction and the outgoing edge will be protected with rip rap. The check dam will be constructed from one side of the basin to the other and cause runoff to either go through or over. The volume of the forebay is generally 10% the volume of the Water Quality Volume (WQV) for gravel wetlands, and 25% for rain gardens. A dewatering drain is designed into the two-foot berm of the forebay. Construction specifications are included in the plan set and New Hampshire Stormwater Manual, Volume 2, 4-4 Pretreatment Practices 1, Sediment Forebays.

Maintenance Considerations: The basin and slopes will be periodically mowed, at least twice per year ensuring that woody material does not get an opportunity to grow. Sediment accumulated in the basin will be removed and properly disposed of when it reaches half the height of the check dam. Erosion or other damage to the basin will be repaired and revegetated. (See Outlet Protection) Inspect and clean the dewatering drain to ensure runoff is not trapped for more than 72 hours in the forebay.

Detention Ponds

Description: Detention Ponds are also constructed ponds with the purpose of detaining runoff but not necessarily for infiltration purposes. During construction it is important that the ground surface not be exposed to traffic or construction equipment to preserve the infiltration capabilities of the existing soil. Construction specifications are included in the plan set and New Hampshire Stormwater Manual, Volume 2, 4-3 Treatment Practices, 3B, In-ground Infiltration Basin and Section 4-6, Conveyance Pracitces, 2. Detention Basins.

Maintenance Considerations:
Infiltration Basins and Detention Ponds should be inspected at least twice annually and following any rainfall event exceeding 0.25 inches in a twenty-four hour period. Maintenance rehabilitation will be conducted as warranted by each inspection. Trash and debris will be removed at each inspection.

On an annual basis the infiltration capabilities need to be confirmed by evaluation the drawdown time. If the infiltration system does not drain within 72-hours following a rainfall event, a qualified professional will assess the condition of the basin to determine

measures required to restore the infiltration function. This is normally the direct result of sediment accumulation which will be removed to restore the filter media ratio.

Also on an annual basis the vegetation should be inspected to ensure healthy condition. Invasive species need to be removed along with dead or diseased vegetation.

Subsurface Gravel Wetland

Description: A Gravel Wetland (NHDES SWM 4-3 Treatment Practice 2D) or Subsurface Gravel Wetland consists of a forebay and multiple flow-through treatment cells. During smaller rain events, the surface water runoff is intended to pass from the forebay, into the gravel media through perforated pipes and structures where it passes through an anaerobic environment where the Water Quality Volume will have 24-72 hours of contact time. The forebay is required to contain 10% of the WQV and each of the two cell must contain 45% of the WQV. During larger storm events, the system works as a detention pond. The design of a Subsurface Gravel Wetland will be constructed in accordance with the most current version of the Design Specifications provided by the UNH Stormwater Center and SWM Volume 2, Section 4-3 Treatment Practices, 2d Gravel Wetlands.

Maintenance Considerations: The outlet configuration of the anaerobic subsurface gravel consists of a small discharge orifice that is located in a threaded cap. This goose-neck feature is designed to be disassembled to allow cleaning. This outlet orifice is located within a concrete outlet structure that also contains a control stack used to control and detain runoff in the system. Although this is designed to be "clean water" after the filtering process, the outlet structure in general is going to require periodic maintenance to ensure that it is discharging runoff properly. If the Subsurface Gravel Wetland retains runoff on the surface for more than 72 hours the performance is not correct and maintenance is required.

Debris will need to be removed from the inlet and outlet structures as well as any buildup of sediment. The surface of the ponded area is intended to have wetland plants which may require periodic replanting, depending on the sediment loading. Sediment buildup in the forebay must be removed to maintain the minimum required volume. See also 9 and 10 of the attached UNHSC Subsurface Gravel Wetland Design Specifications 2009, and / or UNHSC Subsurface Gravel Wetland Design Specifications 2016 with Maintenance Guidelines and Checklist. See also Design and Maintenance of Subsurface Gravel Wetlands, dated February 2015, attached. Specifically Attachment B,

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device and Checklist for Inspection of Gravel Wetland.

Rip Rap Outlet Protection, Level Spreaders, & Emergency Spillways

Description: Outlet Protection consists of a riprap apron or preformed scour hole that is designed to provide velocity reduction of the surface water run-off that is leaving a culvert. The design is dependent on the culvert size, soil conditions, velocity, and quantity of the run-off. There are to be no bend or curves at the intersection of the conduit and apron. Level spreaders are intended to provide a level lip where surface water runoff is allowed to continue downhill closer to sheet flow. The level lip is to be constructed as level as possible for the entire length. Emergency Spillways are rip rap reinforced outlets near the top of the berm that allow runoff to leave a practice during periods of very high flow. Ref.: NHDES SWM Volume 2, Section 4-6 Conveyance Practices, 6. Outlet Protection and 1. Detention Ponds, Note 3, Page 158.

Maintenance Considerations: The riprap outlet protection will be inspected annually for damage, which must be corrected immediately. Any sediment buildup will be removed and disposed of correctly. Sediment and subsequent vegetation will build up in the Level Spreader. This material will be cleaned out along with any gross solids and disposed of properly. (See invasive species below) Any rip rap that has been displaced from the original construction will be repaired, especially recreating the level lip.

Catch Basins and Drain Manholes

Description: Catch Basins are used in select locations to collect runoff and route it to the forebay of a subsurface gravel wetland. Catch Basins will be designed without a sump and any sump required in the pre-casting process be filled with washed crushed stone and will include a vented hood. During construction the catch basins will be protected by inlet protection per the approved construction plans. The practice of street sweeping on a bi-annual basis will help reduce maintenance of these deep sumps.

Maintenance Considerations: Sediment must be removed from Catch Basins and Drain Manholes on a regular basis, at least twice a year and more often if culverts and hoods become blocked. Inspections should be conducted periodically. At a minimum they should be cleaned after snow-melt and after leaf-drop. Damaged outlet hoods must be

replaced. It is recommended that a vacuum truck be utilized as contrasted to a clam-shell method to avoid damage to the hood. Hydrocarbons found to be floating in the basin should be removed by skimming, absorbent materials, or other method. Disposal of all material, sediment, and debris must be done in accordance with state and federal regulations. Culvert pipes will be inspected to ensure that surface water runoff is capable of leaving the structures.

Stabilization for Long Term Cover

Vegetated Stabilization – Original Planting

All areas that are disturbed during construction will be stabilized with vegetated material within 14 calendar days (City of Dover) of breaking ground and within 3 calendar days of establishing finish grade. (See Chapter 149-17) Construction will be managed in such a manner that erosion is prevented and that no abutter's property will be subjected to any siltation, unless otherwise permitted. All areas to be planted with grass for long-term cover will follow the specification and on Sheet E-102 using seeding mixture C, as follows:

Mixture	Pounds per Acre	Pounds per 1,000 Sq. Ft.
Tall Fescue	24	0.55
Creeping Red Fescue	24	0.55
Total	48	1.10

Conservation Mix

Mixture	Pounds per Acre	Pounds per 1,000 Sq. Ft.
Tall Fescue	15	0.35
Creeping Red Fescue	15	0.35
Annual Ryegrass	5	0.12
Perennial Ryegrass	5	0.12
Kentucky Bluegrass	15	0.35
White Clover	7	0.16
Total	62	1.45

Conservation Mix will used to stabilize all 2:1 slopes and all land area disturbed within the wetland buffer. As the site is to be stabilized with erosion control mix as a mulch, the vegetation should be established with a high percentage of white clover for growth to be established.

Detention Pond mix

The grass that is planted within a detention pond will meet the provisions of Administrative Code Env-Wq 1508.17 (D) (7). "All areas of the detention basin, including the basin floors, side slopes, berms, impoundment structures, or other earth structures shall have vegetation suitable for the soil type, the moisture content, the amount of sun exposure, and the level of inundation to which it is exposed;" Planting specification will meet the requirements as outlined by Ernst Conservation Seeds Detention Pond Mix ERNMX-126; or approved equal.

Maintenance Considerations: Permanent seeded areas for long-term cover will be inspected on a periodic basis looking for signs of growth loss or erosion. Any areas found to be damaged will be repaired and replanted to reestablish the growth. The grass should be mowed at least twice per year and any dead material removed. Any woody growth that becomes established will need to be cut and removed.

Long-term maintenance of the land cover is critical and must be maintained at least 85% grass / vegetation coverage, must be inspected for concentrated flow, rills, and channels; and must be repaired as necessary to prevent erosion.

Neighborhood Foundation Drain System

Description: Units #6 through #12 have a foundation drain system consisting of unit connections and clean-outs, flapper valve back-flow preventors, and a connecting basin. This system drains to the environment and the termination is to be marked with a painted fence post.

Maintenance Considerations: The basin and outflow are to be inspected twice per year to ensure that groundwater is being routed from the units to the discharge point. As this drain system is going to be very flat, the lines may require that water pressure is used at the clean-outs to ensure viability. The gravity outlet should be cleaned of all vegetative over-growth and the fence post should be repainted at least annually. It is recommended that this inspection be done at the same time that the stormwater treatment practices are inspected, and as required by performance.

CONTROL OF INVASIVE PLANTS

During maintenance activities, check for the presence of invasive plants and remove in a safe manner as described on the following pages. They should be controlled as described on the following pages.

Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as "hitchhikers" among shipments of other plants, seeds, packing materials, or fresh produce. Some exotic plants become invasive and cause harm by:

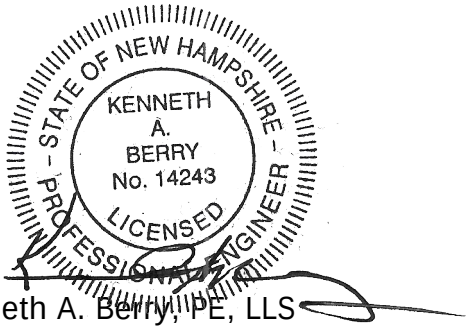
- becoming weedy and overgrown;
- killing established shade trees;
- obstructing pipes and drainage systems;
- forming dense beds in water;
- lowering water levels in lakes, streams, and wetlands;
- destroying natural communities;
- promoting erosion on stream banks and hillsides; and
- resisting control except by hazardous chemical.

Annual Report

Description: The owner is responsible to keep an I & M Activity Log that documents inspection, maintenance and repairs to the storm water management system, and a Deicing Log to track the amount and type of deicing material applied to the site. The original owner is responsible to ensure that any subsequent owner (s) have copies of the Inspection & Maintenance Manual, Stormwater System Management, copies of past logs and check lists. This includes any owner association that might become involved with the property. The Annual Report will be prepared and submitted to the City of Dover Community Services Engineering Department / DPW with copies of both logs and check lists no later than December 15th of each year and provided to NHDES on that same date. Upon an ownership change, the Annual Report will include the Transfer of Ownership Responsibility Forms duplicated from the form found below.

The plan that accompanies this manual includes one sheet, "Drainage Operation, Inspection, & Maintenance Plan". The owners and municipality will also maintain a complete set of the approved original design plans.

Respectfully,
BERRY SURVEYING & ENGINEERING



James F. Hayden
Project Engineer / Manager

Kenneth A. Berry, PE, LLS
CPSWQ, CPESC, CESSWI
Principal, VP – Technical Operations

STORMWATER SYSTEM: INSPECTION AND MAINTENANCE MANUAL

Inspection & Maintenance Manual Checklist

Proposed Mixed Use Site Plan
McCrone Place and Concolor Drive
Equine Properties, LLC
P.O. Box 190
Exeter, NH 03833-0190

☑	Date	BMP / System	Minimum Inspection Frequency	Minimum Inspection Requirements	Maintenance / Cleanout Threshold
		Pavement Sweeping	Three Times Per Year	N/A	N/A
		Litter/Trash Removal	Routinely	Inspect dumpsters, outdoor waste receptacles area, and yard areas.	Parcel will be free of litter/trash.
		Deicing Agents	N/A	N/A	Use salt as the primary agent for roadway safety during winter.
		Invasive Species	Two times per year.	Inspect for Invasive Species	Remove and dispose invasive species.
		Closed Drainage System:			
		Drainage Pipes & Inlet Sumps	2 times per year	Check for sediment accumulation & clogging.	Less than 2" sediment depth

☑	Date	BMP / System	Minimum Inspection Frequency	Minimum Inspection Requirements	Maintenance / Cleanout Threshold
		Subsurface Gravel Wetlands, & Detention Ponds	2 times per year	Check for sediment and debris accumulation buildup.	Remove sediment & debris when required. Remove Invasive Species
		Subsurface Gravel Wetland & bio-swale and system clean-outs.	Annually	72-Hour drawdown time evaluation and vegetation evaluation. Underdrain flushing.	Remove dead & diseased vegetation along with all debris, take corrective measures of filtration media if required. Flush underdrain clean-outs with a hose.
		Riprap Outlet Protection	Annually	Check for sediment buildup and structure damage.	Remove excess sediment and repair damage.
		Neighborhood Foundation Drain System	2 times per year	Check for sediment and debris accumulation buildup. Ensure viability.	Remove sediment & debris when required. Remove Invasive Species. Jet drainage lines as required.
		Winter Maintenance	Ongoing	Remove snow as directed.	Ongoing
		Post Winter Maintenance	Annually	Remove excess sand, gross solids, and repair vegetation and plantings	Parcel will be free of excess sand, litter/trash. Vegetation per approved plans.

		Annual Report	1 time per year	Submit Annual Report to Dover Engineering Dept. / DPW, NHDES AoT, and kept on file by the owner.	Report to be submitted on or before December 15th each year. Copies submitted to NHDES by that date.

See also Design and Maintenance of Subsurface Gravel Wetlands, dated February 2015, attached. Specifically Attachment B, Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device and Checklist for Inspection of Gravel Wetland.

The following practices and drainage features will all require periodic inspections and maintenance based on this manual and drainage layout:

Conveyance Swales & Treatment Swale

Culvert Pipes, Flared End Sections, and Headwalls.

Sediment Forebay to SGW #101, #103, and #104.

Subsurface Gravel Wetland #101 with inlets, clean-outs, outlet structure, and a spillway.

Subsurface Gravel Wetland #103 with inlets, clean-outs, outlet structure, and a spillway.

Subsurface Gravel Wetland #104 with inlets, clean-outs and outlet structure.

Detention Pond #102

Detention Pond #105

Rip Rap Level Spreaders

Neighborhood Foundation Drain System

STORMWATER SYSTEM OPERATION AND MAINTENANCE PLAN

Inspection & Maintenance Manual Log Form

Proposed Mixed Use Site Plan
McCrone Place and Concolor Drive
Equine Properties, LLC
P.O. Box 190
Exeter, NH 03833-0190

BMP / System	Date Inspected	Inspector	Cleaning/Repair (List Items & Comments)	Repair Date	Performed By:

STORMWATER SYSTEM OPERATION AND MAINTENANCE PLAN

Deicing Log Form

Proposed Mixed Use Site Plan
McCrone Place and Concolor Drive
Equine Properties, LLC
P.O. Box 190
Exeter, NH 03833-0190

Date	Amount Applied	Performed By:	Date	Amount Applied	Performed By:

STORMWATER SYSTEM OPERATION & MAINTENANCE PLAN CERTIFICATION

Owner	Responsibility
Name: Equine Properties, LLC Turner Porter, Managing Member Address: P.O. Box 190 Exeter, NH 03833-0190 Telephone: (603) 944-7530 (Mobile) E-mail Address: faireday@aol.com	The owner is responsible for the conduct of all construction activities, and ultimate compliance with all the provisions of the Stormwater System Operation & Maintenance Plan and the implementation of the Inspection and Maintenance Manual.

OWNER CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____ Date: _____

Printed Name:

Representing:

Control of Invasive Plants

New Hampshire
Department of Agriculture,
Markets & Food
Douglas Cygan
603-271-3488
doug.cygan@agr.nh.gov

This guide lists garden plants and weeds which are already causing significant changes to natural areas in the Mid-Atlantic. **Measures for controlling each species are indicated by number, e.g., (3), in the text with a full explanation at the end of this article.** Click on the word Control: to jump to that section. Then click your "back" button to return to the text. Following each section suggested alternative plants are given. These alternatives are native plants, well adapted and needing little care, attractive to birds and butterflies, and an important part of the food web for our indigenous species.

INVASIVE TREES

NORWAY MAPLE (*Acer platanoides*) has large leaves similar to sugar maple. To easily confirm that the plant is Norway maple, break off a leaf and if it's truly Norway maple it will exude milky white sap. Fall foliage is yellow. (Exception: cultivars such as 'Crimson King,' which have red leaves in spring or summer, may have red autumn leaves.) The leaves turn color late, usually in late October after native trees have dropped their foliage. This tree suppresses growth of grass, garden plants, and forest understory beneath it, at least as far as the drip-line. Its wind-borne seeds can germinate and grow in deep shade. The presence of young Norway maples in our woodlands is increasing.
Control: (1); (7), (8), (9), or (10); (11) in mid-October to early November, before the leaves turn color.

TREE OF HEAVEN (*Ailanthus altissima*), is incredibly tough and can grow in the poorest conditions. It produces huge quantities of wind-borne seeds, grows rapidly, and secretes a toxin that kills other plants. Its long compound leaves, with 11-25 lance-shaped leaflets, smell like peanut butter or burnt coffee when crushed. Once established, this tree cannot be removed by mechanical means alone.
Control: (1) - seedlings only. Herbicide - use Garlon 3a (9) with no more than a 1" gap between cuts, or (10); plus (11) on re-growth. Or paint bottom 12" of bark with Garlon 4 Ultra (in February or March to protect surrounding plants). USE MAXIMUM STRENGTH SPECIFIED ON LABEL for all herbicide applications on Ailanthus. Glyphosate is not effective against Ailanthus.

INVASIVE SHRUBS

AUTUMN OLIVE (*Eleagnus umbellata*): Formerly recommended for erosion control and wildlife value, these have proved highly invasive and diminish the overall quality of wildlife habitat.
Control: (1) - up to 4" diameter trunks; (7) or (10) or bury stump. Do not mow.
MULTIFLORA ROSE (*Rosa multiflora*), formerly recommended for erosion control, hedges, and wildlife habitat, becomes a huge shrub that chokes out all other vegetation and is too dense for many species of birds to nest in, though a few favor it. In shade, it grows up trees like a vine. It is covered with white flowers in June. (Our native roses have fewer flowers, mostly pink.) Distinguish multiflora by its size, and by the presence of very hard, curved thorns, and a fringed edge to the leaf stalk.
Control: (1) - pull seedlings, dig out larger plants at least 6" from the crown and 6" down; (4) on extensive infestations; (10) or (11). It may remain green in winter, so herbicide may *applied when other plants are dormant. For foliar application, mix Rodeo with extra sticker-spreader, or use Roundup Sure Shot Foam on small plants.*

BUSH HONEYSUCKLES (*Lonicera spp.*), including Belle, Amur, Morrow's, and Tatarian honeysuckle. (In our region, assume that any honeysuckle is exotic unless it is a scarlet-flowered vine). Bush honeysuckles create denser shade than native shrubs, reducing plant diversity and eliminating nest sites for many forest interior species.
Control: (2) on ornamentals; (1); on shady sites only, brush cut in early spring and again in early fall (3); (4) during the growing season; (7); or (10) late in the growing season.

BLUNT-LEAVED PRIVET (*Ligustrum* obtusifolium). *Control:* (1); (7) or (10); or trim off all flowers. Do not cut back or mow.

BURNING BUSH, WINGED EUONYMUS (*Euonymus alatus*), identified by wide, corky wings on the branches.
Control: (1); (7) or (10); or trim off all flowers.

JAPANESE BARBERRY (*Berberis thunbergii*), and all cultivars and varieties.
Control: (1); (7) or (10); or trim off all flowers.

INVASIVE WOODY VINES

All of these vines shade out the shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle. DO NOT PLANT NEXT TO OPEN SPACE.

JAPANESE HONEYSUCKLE (*Lonicera japonica*), including Hall's honeysuckle, has gold-and-white flowers with a heavenly scent and sweet nectar in June. This is probably the familiar honeysuckle of your childhood. It is a rampant grower that spirals around trees, often strangling them.
Control: (1); (3); (10); (11) in fall or early spring when native vegetation is dormant. Plan to re-treat repeatedly.

ORIENTAL BITTERSWEET (*Celastrus orbiculatus*) has almost completely displaced American bittersweet (*C. scandens*). The Asian plant has its flowers and bright orange seed capsules in clusters all along the stem, while the native species bears them only at the branch tips.
Control: (1); keep ornamental plants cut back, remove all fruits as soon as they open, and bag or burn fruits; to eradicate use Garlon 3a (10).

JAPANESE KNOTWEED, MEXICAN BAMBOO (*Polygonum cuspidatum*) can grow in shade. The stems have knotty joints, reminiscent of bamboo. It grows 6-10' tall and has large pointed oval or triangular leaves.
Control: Cut at least 3 times each growing season and/or treat with Rodeo (10) or (11). In gardens, heavy mulch or dense shade may kill it.

INVASIVE HERBACEOUS PLANTS

GARLIC MUSTARD (*Alliaria petiolata*, *A. officinalis*), a white-flowered biennial with rough, scalloped leaves (kidney-, heart- or arrow-shaped), recognizable by the smell of garlic and taste of mustard when its leaves are crushed. (The odor fades by fall.)
Control: Pull before it flowers in spring (1), removing crown and roots. Tamp down soil afterwards. Once it has flowered, cut (2), being careful not to scatter seed, then bag and burn or send to the landfill. (11) may be appropriate in some settings.

JAPANESE STILT GRASS (*Microstegium vimineum*) can be identified by its lime-green color and a line of silvery hairs down the middle of the 2-3" long blade. It tolerates sun or dense shade and quickly invades areas left bare or disturbed by tilling or flooding. An annual grass, it builds up a large seed bank in the soil.

Control: Easily pulled in early to mid-summer (1) - be sure to pull before it goes to seed. If seeds have formed, bag and burn or send to landfill. Mowing weekly or when it has just begun to flower may prevent it from setting seed (3). Use glyphosate (11) or herbicidal soap (less effective) on large infestations. Follow up with (5) in spring.

MILE-A-MINUTE VINE, DEVIL'S TAIL TEARTHUMB (*Polygonum perfoliatum*), a rapidly growing annual vine with triangular leaves, barbed stems, and turquoise berries in August which are spread by birds. It quickly covers and shades out herbaceous plants.
Control: same as for stilt grass.

SPOTTED KNAPWEED (*Centaurea maculosa*), a biennial with thistle-like flowers.
Control: Do NOT pull (1) unless the plant is young and the ground is very soft - the tap root will break off and produce several new plants. Wear sturdy gloves. (2); (6); (10) or (11).

CONTROL MEASURES

(1) PULL seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs.
(2) DEADHEAD to prevent spread of seeds of invasive plants. Cut off seeds or fruits before they ripen. Bag, and burn or send to a landfill.
(3) MOW or CUTTING at least 4 times a season to deplete plants' store of nutrients and carbohydrates, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year.
(4) CONTROLLED BURNING during the spring, repeated over several years, allows native vegetation to compete more effectively with the invasive species. This requires a permit. Spot treatment with glyphosate in late fall can be used to make this method more effective.
(5) Use a CORN-BASED PRE-EMERGENCE HERBICIDE on annual weeds. This product is also an organic fertilizer, i.e., it can stimulate growth of existing plants, including weeds, so it is appropriate for lawns and gardens but may not be appropriate in woodlands.
(6) In lawns, SPOT TREAT with BROAD-LEAF WEEDKILLER. Good lawn-care practices (test soil; use lime and fertilizer only when soil test shows a need; mow high and frequently; leave clippings on lawn) reduce weed infestations.
(7) CUT DOWN the tree. Grind out the stump, or clip off re-growth.
(8) GIRDLE tree: cut through the bark and growing layer (cambium) all around the trunk, about 6" above the ground. Girdling is most effective in spring when the sap is rising, and from middle to late summer when the tree is sending down food to the roots. Clip off sucker sprouts.
(9) FRILL: Using a machete, hatchet or similar device, hack scars (several holes in larger trees) downward into the cambium layer, and squirt in glyphosate (or triclopyr if recommended in text above). Follow label directions for Injection and Frill Applications. This is most effective from middle to late summer. Clip off any sucker sprouts or treat with glyphosate.
(10) CUT STEM / CUT STUMP WITH GLYPHOSATE (or triclopyr if specified above). Follow label directions for Cut Stump Application. Clip off sucker sprouts or paint with glyphosate. See Note on Herbicides.
(11) FOLIAR SPRAY WITH GLYPHOSATE herbicide (see Note on Herbicides). Use a backpack or garden sprayer or mist blower, following label directions. Avoid overspray and/or dripping onto non-target plants, because glyphosate kills most plants except moss. If it rolls off waxy or grass-like foliage, use additional sticker-spreader. Deciduous trees, shrubs, and perennials move nutrients down to the roots in late summer. Glyphosate is particularly effective at this time and when plants have just gone out of flowering. Several invasive species retain their foliage after native plants have lost theirs, and resume growth earlier in spring than most natives. This allows you to treat them without harming the natives. However, the plant must be actively growing for the herbicide to work. Retreatments may be necessary the following year if suckering occurs or the plant hasn't been entirely killed.

NOTE ON HERBICIDES: It is highly recommended that small populations try to be controlled using non-chemical methods wherever feasible. However, for large infestations, and for a few plants specified above, herbicide use is essential. Apply herbicides carefully to avoid non-target plants, glyphosate is the least environmentally damaging herbicide in most cases. Add food coloring for visibility, and a soap-based sticker such as Cide-Kick. Glyphosate is ineffective on some

plants; for these, triclopyr (Garlon) may be indicated. When using herbicides, read the entire label and observe all precautions listed, including proper disposal. If in doubt, call your local Cooperative Extension Service.

Pavement Temp. (°F) and Trend (↑ ↓)	Weather Condition	Maintenance Actions	Application Rate (lbs/per 1000 sq.ft.)			
			Salt Prewetted/Pretreated with salt brine	Salt Prewetted/Pretreated with other blends	Dry salt	Winter sand
>30 ↑	Snow	Plow, treat intersections only				Not recommended
	Frz. Rain	Apply chemical				Not recommended
30 ↓	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				Not recommended
25 - 30 ↑	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				Not recommended
25 - 30 ↓	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				3.25
20 - 25 ↑	Snow or frz. Rain	Plow and Apply chemical				3.25 for frz. Rain
20 - 25 ↓	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				3.25
15 - 20 ↑	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				3.25
15 - 20 ↓	Snow or Frz. Rain	Plow and apply chemical				3.25 for frz. Rain
0 to 15 ↑↓	Snow	Plow, treat with blends, sand hazardous areas	Not recommended		Not recommended	5.0 and spot-treat as needed
< 0	Snow	Plow, treat with blends, sand hazardous areas	Not recommended		Not recommended	5.0 and spot-treat as needed

Table 19. Application Rates for Deicing

These rates & table format are based on road application guidelines (Mn Snow & Ice Control Field Handbook, Manual 2005-1). Develop your own application rates by adjusting your current rates incrementally downward toward these guidelines. Where temperature categories overlap, select the rate most applicable to your situation.

N/F BOSTON & MAINE RAILROAD,
IRON HORSE PARK
HIGH STREET NORTH
BILLERICA, MA 01862
TAX MAP C, LOT 5

DRAIN MANHOLE

CATCH BASIN

50' WETLAND
BUFFER (TYP.)

EDGE OF POORLY DRAINED
JURISDICTIONAL WETLANDS (TYP.)
BY: DEIDRA BENJAMIN, CWS

RIP RAP LEVEL SPREADER

RIP RAP SPILLWAY

GRAVEL WETLAND #103
SEE P-103 FOR DETAILS

SEDIMENT
FOREBAY

OUTLET STRUCTURES #103
SEE P-103 FOR DETAILS

DRAIN MANHOLE

CATCH BASIN

DETENTION POND #102
SEE P-102 FOR DETAILS

DETENTION POND #105
SEE P-105 FOR DETAILS

RIP RAP SPILLWAY

RIP RAP LEVEL PREADER

SEDIMENT
FOREBAY

GRAVEL WETLAND #101
SEE P-101 FOR DETAILS

RIP RAP LEVEL PREADER

RIP RAP SPILLWAY

OUTLET STRUCTURES #101
SEE P-101 FOR DETAILS

TIBETAN DRIVE

UNIT 12 · UNIT 11 · UNIT 10 · UNIT 9 · UNIT 8 · UNIT 7 · UNIT 6 · UNIT 5 · UNIT 4 · UNIT 3 · UNIT 2 · UNIT 1

PROPOSED MIXED USE BUILDING

PROPOSED MIXED USE BUILDING

SEDIMENT
FOREBAY

N/F NSA OPTIVEST ACQUISITION
HOLDINGS LLC
24901 DANA PT HARBOR DRIVE #200
DANA POINT, CA 92629
S.C.R.D. BOOK 4255, PAGE 631
TAX MAP H, LOT 36-BI

NEIGHBORHOOD
UNDER-DRAIN LINE

YARD DRAIN WITH
CULVERT
DRAINAGE BASIN

CONVEYANCE SWALE &

GRAVEL WETLAND #104
SEE P-104 FOR DETAILS

OUTLET STRUCTURE #104
SEE P-104 FOR DETAILS

N.H. ROUTE 155/ KNOX
MARSH ROAD

CONVEYANCE SWALE &
TREATMENT SWALE

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

NOTES:

1.) OWNER: EQUINE PROPERTIES LLC
P.O. BOX 190
EXETER, NH 03833-0190

1.) APPLICANT:

2.) TAX MAP H, LOT 37A

3.) LOT AREA: 407,542 Sq. Ft., 9.36 Ac.

4.) S.C.R.D. BOOK 4783, PAGE 326

5.) EXISTING CONDITIONS INFORMATION IS BASED ON A SURVEY PERFORMED BY BERRY SURVEYING & ENGINEERING, FOR DETAILS SEE EXISTING CONDITIONS PLAN AND PLAN SET COMPLETED.

6.) THE INTENT OF THIS PLAN IS TO DEMONSTRATE THE DRAINAGE INFRASTRUCTURE THAT REQUIRES PERIODIC INSPECTION AND MAINTENANCE. IT IS TO ACCOMPANY A DOCUMENT ENTITLES "INSPECTION AND MAINTENANCE MANUAL, STORMWATER SYSTEM MANAGEMENT PUBLISHED BY BERRY SURVEYING & ENGINEERING ON THE SAME DATE.

NOTE: HALF SCALE PLANS, (11-INCHES X 17-INCHES) WILL HAVE A SCALE THAT IS TWICE THE PUBLISHED SCALE.

PLANNING FILE #21-04

REVISION	DATE	DESCRIPTION
#4	1-28-22	MULTIPLE PLAN SET REVISIONS
#3	8-16-21	REVISED PER TRC COMMENT
#2	7-27-21	REVISED PER TRC COMMENT
#1	5-24-21	REVISED PER TRC COMMENT

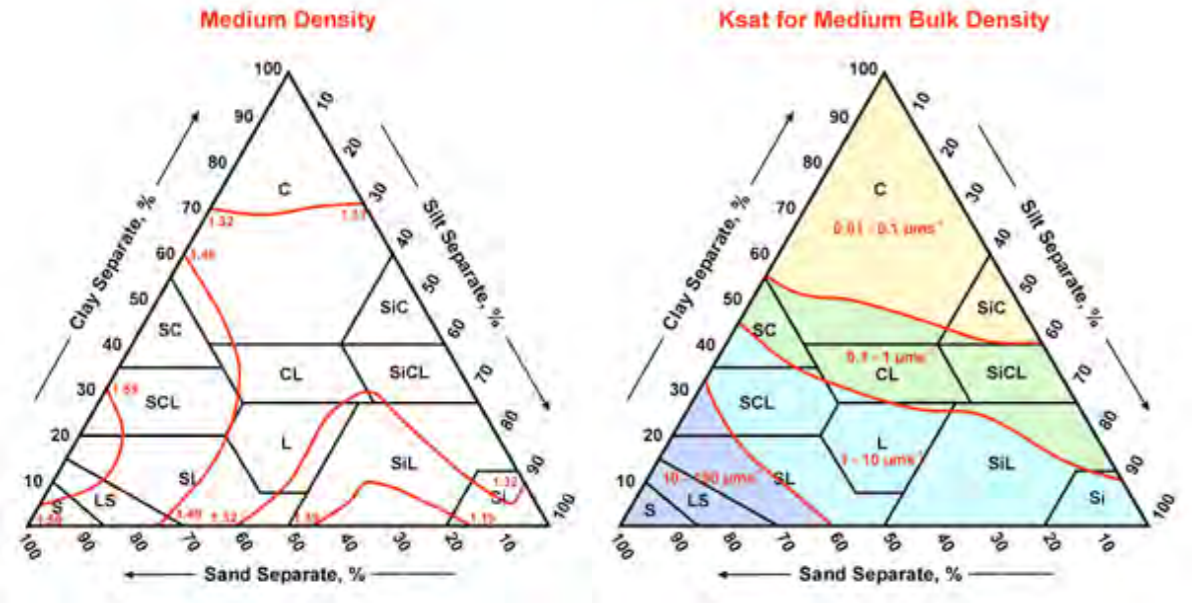
STORMWATER OPERATION: INSPECTION & MAINTENANCE PLAN
LAND OF
EQUINE PROPERTIES LLC
239 KNOX MARSH ROAD
DOVER, N.H.
TAX MAP H, LOT 37A

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : JANUARY 21, 2021
FILE NO. : DB 2020 - 066

STATE OF NEW HAMPSHIRE
KENNETH A BERRY
No. 10414
LICENSED PROFESSIONAL ENGINEER

K_{sat} VALUES
FOR
NEW HAMPSHIRE SOILS
(Including Hydrologic and DES Soil Lot Sizing Groups)



From: Guide for Estimating Ksat from Soil Properties (**Exhibit 618-9**). (http://soils.usda.gov/technical/handbook/contents/part618ex.html)

Sponsored by the Society of Soil Scientists of Northern New England
SSSNNE Special Publication No. 5
September, 2009

K_{sat} VALUES FOR NEW HAMPSHIRE SOILS

ABOUT THE SOCIETY OF SOIL SCIENTISTS OF NORTHERN NEW ENGLAND

The Society of Soil Scientists of Northern New England (SSSNNE) is a non-profit professional organization of soil scientists, both in the private and public sectors, which is dedicated to the advancement of soil science. The Society fosters the profession of soil classification, mapping and interpretation, and encourages the dissemination of information concerning soil science. With the intent of contributing to the general human welfare, the Society seeks to educate the public on the wise use of soils and the associated natural resources.

INTRODUCTION

The publication "K_{sat} Values for New Hampshire Soils" is designed to assist soil scientists, engineers, and other professionals by assembling tables of existing data for all soil series currently on the state soil legend with regard to K_{sat} values and hydrologic groupings (Hyd.Grp.). The need for this information has become more important since the adoption by the New Hampshire Department of Environmental Services of the revised Alteration of Terrain rules for stormwater management. Additional information has been provided for each soil series with regard to landform, temperature regime (Temp.), soil textures, NHDES Soil Lot Size Groupings (Group), whether the soil is a Spodosol (Spodosol?) and other information which will be valuable to a variety of soil information users.

The data for each soil series has been sorted 3 ways for ease of searching:

Table A-Sorted by Numerical Legend
Table B-Sorted by Soil Series Name
Table C-Sorted by NHDES Soil Group for Establishing Lot Size

The report represents cumulative efforts by private soil scientists and NHDES staff with assistance from the USDA Natural Resource Conservation Service.

Comments or inquires on the information in this publication may be directed to the Board of Directors at the following address:

Society of Soil Scientists
of Northern New England
PO Box 76
Durham, NH 03824

SATURATED HYDRAULIC CONDUCTIVITY (K_{SAT})

K_{sat} refers to the ease with which pores in a saturated soil transmit water. The estimates presented here are expressed in terms of inches per hour (NRCS official data presents K_{sat} in both micrometers per second and inches per hour). K_{sat} values are based on soil characteristics observed in the field, particularly structure, consistence, porosity, and texture. (USDA NRCS, Web Soil Survey)

Saturated flow occurs when the soil water pressure is positive; that is, when the soil matric potential is zero (satiated wet condition). In most soils this situation takes place when about 95 percent of the total pore space is filled with water. The remaining 5 percent is filled with entrapped air. Saturated hydraulic conductivity cannot be used to describe water movement under unsaturated conditions. (Soil Survey Manual, 1993)

It is commonly known that soil features (and thus data) for a certain soil series name may be slightly different from one county soil survey to the next and the range in characteristics (via the Typical Pedon) may be slightly different. For example – a Marlow soil (series) in Carroll County may have a higher sand content in its B horizon as opposed to a Marlow soil (series) in Coos County; resulting in a slightly different Ksat range for the B horizon.

The K_{sat} data for this publication was obtained from the USDA-NRCS Soil Data Mart using the Typical Pedon from the county that best reflected the soil and/or had the most acres of that soil. This data is presented in B and C horizons only as it is assumed that the topsoil (A or A_p horizon) will be removed in typical construction practices.

References:

Web Soil Survey. *Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/.*

Soil Data Mart. *http://soildatamart.nrcs.usda.gov/.*

Soil Survey Manual. *Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.*

HYDROLOGIC SOIL GROUPS

Hydrologic group is a group of soils having the same runoff potential under similar storm and cover conditions.

Hydrologic groups are used in equations that estimate runoff from rainfall. These estimates are needed for solving hydrologic problems that arise in planning stormwater management, watershed protection, and flood-prevention projects and for planning or designing structures for the use, control, and disposal of water.

Classifications assigned to soils were based on the use of rainfall-runoff data from small watersheds and infiltrometer plots. From these data, relationships between soil properties and hydrologic groups were established. Assignment of soils to hydrologic groups is based on the relationship between soil properties and hydrologic groups. Wetness characteristics, permeability after prolonged wetting, and depth to very slowly permeable layers are properties that assist in estimating hydrologic groups. Minimum annual steady ponded infiltration rate for a bare ground surface determines the hydrologic soil groups.

Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonally high water table, intake rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. (The influence of ground cover is treated independently, not in hydrologic soil groups.).

The soils in the United States are placed into four groups, A, B, C, and D, and three dual classes, *A/D, B/D,* and *C/D.* In the definitions of the classes, infiltration rate is the rate at which water enters the soil at the surface and is controlled by the surface conditions. Transmission rate is the rate at which water moves in the soil and is controlled by soil properties. Definitions of the classes are as follows:

Group A- Saturated hydraulic conductivity is very high or in the upper half of high and internal free water occurrence is very deep. Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil. Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures. Some soils having loamy sand, sandy loam, loam or silt loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group A are as follows. The saturated hydraulic conductivity of all soil layers exceeds 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer are in group A if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 10 micrometers per second (1.42 inches per hour).

Group B- Saturated hydraulic conductivity is in the lower half of high or in the upper half of moderately high and free water occurrence is deep or very deep. Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand and have loamy sand or sandy loam textures. Some soils having loam, silt loam, silt, or sandy clay loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group B are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] ranges from 10.0 micrometers per second (1.42 inches per hour) to 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer or water table are in group B if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 4.0 micrometers per second (0.57 inches per hour) but is less than 10.0 micrometers per second (1.42 inches per hour).

Group C- Saturated hydraulic conductivity is in the lower half of moderately high or in the upper half of moderately low and internal free water occurrence is deeper than shallow. Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted. Group C soils typically have between 20 percent and 40 percent clay and less than 50 percent sand and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures. Some soils having clay, silty clay, or sandy clay textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group C are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] is between 1.0 micrometers per second (0.14 inches per hour) and 10.0 micrometers per second (1.42 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a restriction or water table are in group C if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 0.40 micrometers per second (0.06 inches per hour) but is less than 4.0 micrometers per second (0.57 inches per hour). .

Group D- Saturated hydraulic conductivity is below the upper half of moderately low, and/or internal free water occurrence is shallow or very shallow and transitory through permanent. Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential. All soils with a depth to a water impermeable layer less than 50 centimeters [20 inches] and all soils with a water table within 60 centimeters [24 inches] of the surface are in this group, although some may have a dual classification, as described in the next section, if they can be adequately drained. The limits on the physical diagnostic characteristics of group D are as follows. For soils with a water impermeable layer at a depth between 50 centimeters and 100 centimeters [20 and 40 inches], the saturated hydraulic conductivity in the least transmissive soil layer is less than or equal to 1.0 micrometers per second (0.14 inches per hour). For soils that are deeper than 100 centimeters [40 inches] to a restriction or water table, the saturated hydraulic

conductivity of all soil layers within 100 centimeters [40 inches] of the surface is less than or equal to 0.40 micrometers per second (0.06 inches per hour).

Dual hydrologic soil groups-Certain wet soils are placed in group D based solely on the presence of a water table within 60 centimeters [24 inches] of the surface even though the saturated hydraulic conductivity may be favorable for water transmission. If these soils can be adequately drained, then they are assigned to dual hydrologic soil groups *(A/D, B/D,* and *C/D)* based on their saturated hydraulic conductivity and the water table depth when drained. The first letter applies to the drained condition and the second to the undrained condition. For the purpose of hydrologic soil group, adequately drained means that the seasonal high water table is kept at least 60 centimeters [24 inches] below the surface in a soil where it would be higher in a natural state.

References:

National Engineering Handbook, Natural Resource Conservation Service, U.S. Department of Agriculture.

Soil Data Mart. *http://soildatamart.nrcs.usda.gov/*.

Soil Survey Manual. *Soil Survey Division Staff. 1993. Soil survey manual. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 18.*

TABLE A

NUMERICAL LEGEND

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Occum	1	0.6	2.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Suncook	2	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Lim	3	0.6	2.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Pootatuck	4	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Rippowam	5	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Saco	6	0.6	2.0	6.00	20.0	D	6	Flood Plain (Bottom Land)	mesic	silty	no	strata
Hadley	8	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Winooski	9	0.6	6.0	0.60	6.0	B		Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Merrimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Gloucester	11	6.0	20.0	6.00	20.0	A	1	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Hinckley	12	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Sheepscot	14	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Searsport	15	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Saugatuck	16	0.06	0.2	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Colton, gravelly	21	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Colton	22	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Agawam	24	6.0	20.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Windsor	26	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	sandy	no	
Groveton	27	0.6	2.0	0.60	6.0	B	2	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Madawaska	28	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Woodbridge	29	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Unadilla	30	0.6	2.0	2.00	20.0	B	2	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Hartland	31	0.6	2.0	0.20	2.0	B	2	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Boxford	32	0.1	0.2	0.00	0.2	C	3	Silt and Clay Deposits	mesic	fine	no	silty clay loam
Scitico	33	0.0	0.2	0.00	0.2	C	5	Silt and Clay Deposits	mesic	fine	no	
Wareham	34	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Champlain	35	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	gravelly sand	no	
Adams	36	6.0	20.0	20.00	99.0	A	1	Outwash and Stream Terraces	frigid	sandy	yes	
Melrose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Eldridge	38	6.0	20.0	0.06	0.6	C	3	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Canton	42	2.0	6.0	6.00	20.0	B	2	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Henniker	46	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Madawaska, aquentic	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Whitman	49	0.0	0.2	0.00	0.2	D	6	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Hermon	55	2.0	20.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Becket	56	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Waumbeck	58	2.0	20.0	6.00	20.0	B	3	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Charlton	62	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Paxton	66	0.6	2.0	0.00	0.2	C	3	Firm, platy, loamy till	mesic	loamy	no	
Sutton	68	0.6	6.0	0.60	6.0	B	3	Loose till, loamy textures	mesic	loamy	no	
Berkshire	72	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Peru	78	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	
Thorndike	84	0.6	2.0	0.60	2.0	C/D	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Hollis	86	0.6	6.0	0.60	6.0	C/D	4	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Winnecook	88	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Chatfield	89	0.6	6.0	0.60	6.0	B	4	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Hogback	91	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Lyman	92	2.0	6.0	2.00	6.0	A/D	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Woodstock	93	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep
Rawsonville	98	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Tunbridge	99	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Ondawa	101	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Sunday	102	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Winooski	103	0.6	6.0	0.60	6.0	B	3	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Podunk	104	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Rumney	105	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	frigid	loamy	no	
Hadley	108	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Limerick	109	0.6	2.0	0.60	2.0	C	5	Flood Plain (Bottom Land)	mesic	silty	no	
Scarboro	115	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Finch	116					C	3	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)
Sudbury	118	2.0	6.0	2.00	20.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand
Telos	123	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Chesuncook	126	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Allagash	127	0.6	2.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Elliottsville	128	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Hitchcock	130	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Burnham	131	0.2	6.0	0.02	0.2	D	6	Firm, platy, silty till, schist & phylitte	frigid	loamy	no	organic over silt
Dartmouth	132	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Monson	133	0.6	2.0	0.60	2.0	D	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Maybid	134	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	mesic	fine	no	silt over clay
Shapleigh	136					C/D	4	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Monadnock	142	0.6	2.0	2.00	6.0	B	2	Loose till, sandy textures	frigid	loamy over sandy, sandy-skeletal	yes	gravelly loamy sand in C
Acton	146	2.0	20.0	2.00	20.0	B	3	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Vassalboro	150					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Success	154	2.0	6.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	cemented
Canterbury	166	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Sunapee	168	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	
Waskish	195					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Ondawa	201	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Sunday	202	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Fryeburg	208	0.6	2.0	2.00	6.0	B	2	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Charles	209	0.6	100.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	silty	no	
Warwick	210	2.0	6.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Naumburg	214	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Boscawen	220	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Bemis	224	0.6	0.2	0.00	0.2	C	5	Firm, platy, loamy till	cryic	loamy	no	
Bice	226	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	no	sandy loam
Lanesboro	228	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Poocham	230	0.6	2.0	0.20	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Buxton	232	0.1	0.6	0.00	0.2	C	3	Silt and Clay Deposits	frigid	fine	no	silty clay
Scantic	233	0.0	0.2	0.00	0.2	D	5	Silt and Clay Deposits	frigid	fine	no	
Biddeford	234	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	frigid	fine	no	organic over clay
Buckland	237	0.6	2.0	0.06	0.2	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Elmridge	238	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Brayton	240	0.6	2.0	0.06	0.6	C	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Lyme	246	0.6	6.0	0.60	6.0	C	5	Loose till, sandy textures	frigid	loamy	no	
Millsite	251	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Macomber	252	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Lombard	259	0.6	6.0	2.00	20.0	C/D	2	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Sunapee var	269	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	frigid dystrudept
Chatfield Var.	289	0.6	6.0	0.60	6.0	B	3	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Greenwood	295					A/D	6	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Catden	296					A/D	6	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Lovewell	307	0.6	2.0	0.60	2.0	B	3	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Quonset	310	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Deerfield	313	6.0	20.0	20.00	100.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	single grain in C

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Pipestone	314					B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Mashpee	315	6.0	20.0	6.00	20.0	B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Bernardston	330	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Roundabout	333	0.2	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Pittstown	334	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Elmwood	338	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Stissing	340	0.6	2.0	0.06	0.2	C	5	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Cardigan	357	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Kearsarge	359	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Dutchess	366	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Dixfield	378	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Timakwa	393			6.00	100.0	D	6	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Chocorua	395			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Ipswich	397					D	6	Tidal Flat	mesic	hemic/sapric	no	deep organic
Suncook	402	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Metallak	404	6.0	100.0	6.00	100.0	B	3	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Medomak	406	0.6	2.0	0.60	2.0	D	6	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Haven	410	0.6	2.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Duane	413	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Moosilauke	414	6.0	20.0	6.00	20.0	C	5	Loose till, sandy textures	frigid	sandy	no	
Grange	433	0.6	2.0	0.60	2.0	C	5	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Swanton	438	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Shaker	439	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Chichester	442	0.6	2.0	2.00	6.0	B		Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Newfields	444	0.6	2.0	0.60	2.0	B	3	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Scituate	448	0.6	2.0	0.06	0.2	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Metacomet	458	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Pennichuck	460	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Gilmanton	478	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Ossipee	495			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Natchaug	496			0.20	2.0	D	6	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Pawcatuck	497			20.00	100.0	D	6	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Abenaki	501	0.6	2.0	6.00	99.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Cohas	505	0.6	2.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Hoosic	510	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Ninigret	513	0.6	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Leicester	514	0.6	6.0	0.60	20.0	C	5	Loose till, loamy textures	mesic	loamy	no	
Au Gres	516					B	5	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Machias	520	2.0	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Stetson	523	0.6	6.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Caesar	526	20.0	100.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	coarse sand	no	
Scio	531	0.6	2.0	0.60	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Belgrade	532	0.6	2.0	0.06	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Raynham	533	0.2	2.0	0.06	0.2	C	5	Terraces and glacial lake plains	mesic	silty	no	
Binghamville	534	0.2	2.0	0.06	0.2	D	5	Terraces and glacial lake plains	mesic	silty	no	
Suffield	536	0.6	2.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Squamscott	538	6.0	20.0	0.06	0.6	C	5	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Raypol	540	0.6	2.0	6.00	100.0	D	5	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Walpole	546	2.0	6.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Peacham	549	0.6	2.0	0.00	0.2	D	6	Firm, platy, silty till, schist & phylitte	frigid	loamy	no	organic over loam
Skerry	558	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Plaisted	563	0.6	2.0	0.06	0.6	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Howland	566	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Monarda	569	0.2	2.0	0.02	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Bangor	572	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Dixmont	578	0.6	2.0	0.60	2.0	C	3	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Cabot	589	0.6	2.0	0.06	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Westbrook	597			0.00	2.0	D	6	Tidal Flat	mesic	loamy	no	organic over loam
Mundal	610	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	gravelly sandy loam in Cd
Croghan	613	20.0	100.0	20.00	100.0	B	3	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Kinsman	614	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Salmon	630	0.6	2.0	0.60	2.0	B	2	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Nicholville	632	0.6	2.0	0.60	2.0	C	3	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Pemi	633	0.6	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	
Pillsbury	646	0.6	2.0	0.06	0.2	C	5	Firm, platy, loamy till	frigid	silty	no	
Ridgebury	656	0.6	6.0	0.00	0.2	C	5	Firm, platy, loamy till	mesic	loamy	no	
Canaan	663	2.0	20.0	2.00	20.0	C	4	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Redstone	665	2.0	6.0	6.00	20.0	A	1	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Sisk	667	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Surplus	669	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Glebe	671	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Saddleback	673	0.6	2.0	0.60	2.0	C/D	4	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Ricker	674	2.0	6.0	2.00	6.0	A	4	Organic over bedrock (up to 4" of mineral)	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Houghtonville	795	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Matunuck	797			20.00	100.0	D	6	Tidal Flat	mesic	sandy	no	organic over sand
Meadowsedge	894					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Bucksport	895					D	6	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Colonel	927	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Pondicherry	992			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Wonsqueak	995			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Glover	NA	0.6	2.0	0.60	2	D	4	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep

no longer recognized

organic materials

TABLE B

SOIL SERIES

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Abenaki	501	0.6	2.0	6.00	99.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Acton	146	2.0	20.0	2.00	20.0	B	3	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Adams	36	6.0	20.0	20.00	99.0	A	1	Outwash and Stream Terraces	frigid	sandy	yes	
Agawam	24	6.0	20.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Allagash	127	0.6	2.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Au Gres	516					B	5	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Bangor	572	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam
Becket	56	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Belgrade	532	0.6	2.0	0.06	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Bemis	224	0.6	0.2	0.00	0.2	C	5	Firm, platy, loamy till	cryic	loamy	no	
Berkshire	72	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Bernardston	330	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Bice	226	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	no	sandy loam
Biddeford	234	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	frigid	fine	no	organic over clay
Binghamville	534	0.2	2.0	0.06	0.2	D	5	Terraces and glacial lake plains	mesic	silty	no	
Boscawen	220	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Boxford	32	0.1	0.2	0.00	0.2	C	3	Silt and Clay Deposits	mesic	fine	no	silty clay loam
Brayton	240	0.6	2.0	0.06	0.6	C	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Buckland	237	0.6	2.0	0.06	0.2	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Bucksport	895					D	6	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Burnham	131	0.2	6.0	0.02	0.2	D	6	Firm, platy, silty till, schist & phylitte	frigid	loamy	no	organic over silt
Buxton	232	0.1	0.6	0.00	0.2	C	3	Silt and Clay Deposits	frigid	fine	no	silty clay
Cabot	589	0.6	2.0	0.06	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Caesar	526	20.0	100.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	coarse sand	no	
Canaan	663	2.0	20.0	2.00	20.0	C	4	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Canterbury	166	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Canton	42	2.0	6.0	6.00	20.0	B	2	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Cardigan	357	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Catden	296					A/D	6	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Champlain	35	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	gravelly sand	no	
Charles	209	0.6	100.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	silty	no	
Charlton	62	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Chatfield	89	0.6	6.0	0.60	6.0	B	4	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Chatfield Var.	289	0.6	6.0	0.60	6.0	B	3	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Chesuncook	126	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Chichester	442	0.6	2.0	2.00	6.0	B		Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Chocorua	395			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Cohas	505	0.6	2.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Colonel	927	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Colton	22	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Colton, gravelly	21	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Croghan	613	20.0	100.0	20.00	100.0	B	3	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Dartmouth	132	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Deerfield	313	6.0	20.0	20.00	100.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	single grain in C
Dixfield	378	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Dixmont	578	0.6	2.0	0.60	2.0	C	3	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Duane	413	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Dutchess	366	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Eldridge	38	6.0	20.0	0.06	0.6	C	3	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Elliottsville	128	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Elmridge	238	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Elmwood	338	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Finch	116					C	3	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Fryeburg	208	0.6	2.0	2.00	6.0	B	2	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Gilmanton	478	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Glebe	671	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Gloucester	11	6.0	20.0	6.00	20.0	A	1	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Glover	NA	0.6	2.0	0.60	2	D	4	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep
Grange	433	0.6	2.0	0.60	2.0	C	5	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Greenwood	295					A/D	6	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Groveton	27	0.6	2.0	0.60	6.0	B	2	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Hadley	8	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Hadley	108	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Hartland	31	0.6	2.0	0.20	2.0	B	2	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Haven	410	0.6	2.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Henniker	46	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Hermon	55	2.0	20.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Hinckley	12	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Hitchcock	130	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Hogback	91	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Hollis	86	0.6	6.0	0.60	6.0	C/D	4	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Hoosic	510	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Houghtonville	795	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Howland	566	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Ipswich	397					D	6	Tidal Flat	mesic	hemic/sapric	no	deep organic
Kearsarge	359	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Kinsman	614	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Lanesboro	228	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Leicester	514	0.6	6.0	0.60	20.0	C	5	Loose till, loamy textures	mesic	loamy	no	
Lim	3	0.6	2.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Limerick	109	0.6	2.0	0.60	2.0	C	5	Flood Plain (Bottom Land)	mesic	silty	no	
Lombard	259	0.6	6.0	2.00	20.0	C/D	2	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Lovewell	307	0.6	2.0	0.60	2.0	B	3	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Lyman	92	2.0	6.0	2.00	6.0	A/D	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Lyme	246	0.6	6.0	0.60	6.0	C	5	Loose till, sandy textures	frigid	loamy	no	
Machias	520	2.0	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Macomber	252	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Madawaska	28	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Madawaska, aquer	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Mashpee	315	6.0	20.0	6.00	20.0	B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Matunuck	797			20.00	100.0	D	6	Tidal Flat	mesic	sandy	no	organic over sand
Maybid	134	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	mesic	fine	no	silt over clay
Meadowsedge	894					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Medomak	406	0.6	2.0	0.60	2.0	D	6	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Melrose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Merrimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Metacomet	458	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Metallak	404	6.0	100.0	6.00	100.0	B	3	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Millsite	251	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Monadnock	142	0.6	2.0	2.00	6.0	B	2	Loose till, sandy textures	frigid	oamy over sandy, sandy-skeleta	yes	gravelly loamy sand in C
Monarda	569	0.2	2.0	0.02	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Monson	133	0.6	2.0	0.60	2.0	D	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Moosilauke	414	6.0	20.0	6.00	20.0	C	5	Loose till, sandy textures	frigid	sandy	no	

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Mundal	610	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	gravelly sandy loam in Cd
Natchaug	496			0.20	2.0	D	6	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Naumburg	214	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Newfields	444	0.6	2.0	0.60	2.0	B	3	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Nicholville	632	0.6	2.0	0.60	2.0	C	3	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Ninigret	513	0.6	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Occum	1	0.6	2.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Ondawa	101	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Ondawa	201	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Ossipee	495			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Pawcatuck	497			20.00	100.0	D	6	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Paxton	66	0.6	2.0	0.00	0.2	C	3	Firm, platy, loamy till	mesic	loamy	no	
Peacham	549	0.6	2.0	0.00	0.2	D	6	Firm, platy, silty till, schist & phylitte	frigid	loamy	no	organic over loam
Pemi	633	0.6	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	
Pennichuck	460	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Peru	78	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	
Pillsbury	646	0.6	2.0	0.06	0.2	C	5	Firm, platy, loamy till	frigid	silty	no	
Pipestone	314					B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Pittstown	334	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Plaisted	563	0.6	2.0	0.06	0.6	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Podunk	104	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Pondicherry	992			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Poocham	230	0.6	2.0	0.20	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Pootatuck	4	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Quonset	310	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Rawsonville	98	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Raynham	533	0.2	2.0	0.06	0.2	C	5	Terraces and glacial lake plains	mesic	silty	no	
Raypol	540	0.6	2.0	6.00	100.0	D	5	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Redstone	665	2.0	6.0	6.00	20.0	A	1	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Ricker	674	2.0	6.0	2.00	6.0	A	4	rganic over bedrock (up to 4" of minera	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Ridgebury	656	0.6	6.0	0.00	0.2	C	5	Firm, platy, loamy till	mesic	loamy	no	
Rippowam	5	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Roundabout	333	0.2	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Rumney	105	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	frigid	loamy	no	
Saco	6	0.6	2.0	6.00	20.0	D	6	Flood Plain (Bottom Land)	mesic	silty	no	strata
Saddleback	673	0.6	2.0	0.60	2.0	C/D	4	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Salmon	630	0.6	2.0	0.60	2.0	B	2	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Saugatuck	16	0.06	0.2	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Scantic	233	0.0	0.2	0.00	0.2	D	5	Silt and Clay Deposits	frigid	fine	no	
Scarboro	115	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Scio	531	0.6	2.0	0.60	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Scitico	33	0.0	0.2	0.00	0.2	C	5	Silt and Clay Deposits	mesic	fine	no	
Scituate	448	0.6	2.0	0.06	0.2	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Searsport	15	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Shaker	439	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Shapleigh	136					C/D	4	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Sheepscot	14	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Sisk	667	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Skerry	558	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Squamscott	538	6.0	20.0	0.06	0.6	C	5	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Stetson	523	0.6	6.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Stissing	340	0.6	2.0	0.06	0.2	C	5	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Success	154	2.0	6.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	cemented
Sudbury	118	2.0	6.0	2.00	20.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Suffield	536	0.6	2.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Sunapee	168	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	
Sunapee var	269	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	frigid dystrudept
Suncook	2	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Suncook	402	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Sunday	102	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Sunday	202	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Surplus	669	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Sutton	68	0.6	6.0	0.60	6.0	B	3	Loose till, loamy textures	mesic	loamy	no	
Swanton	438	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Telos	123	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Thorndike	84	0.6	2.0	0.60	2.0	C/D	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Timakwa	393			6.00	100.0	D	6	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Tunbridge	99	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Unadilla	30	0.6	2.0	2.00	20.0	B	2	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Vassalboro	150					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Walpole	546	2.0	6.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Wareham	34	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Warwick	210	2.0	6.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Waskish	195					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Waumbeck	58	2.0	20.0	6.00	20.0	B	3	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Westbrook	597			0.00	2.0	D	6	Tidal Flat	mesic	loamy	no	organic over loam
Whitman	49	0.0	0.2	0.00	0.2	D	6	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Windsor	26	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	sandy	no	
Winnecook	88	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Winooski	9	0.6	6.0	0.60	6.0	B		Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Winooski	103	0.6	6.0	0.60	6.0	B	3	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Wonsqueak	995			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Woodbridge	29	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Woodstock	93	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep

no longer recognized
organic materials

TABLE C

NHDES SOIL GROUPINGS

SSSNNE
Special Publilcation No. 5
September, 2009

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Adams	36	1	6.0	20.0	20.00	99.0	A	Outwash and Stream Terraces	frigid	sandy	yes	
Boscawen	220	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Caesar	526	1	20.0	100.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	coarse sand	no	
Champlain	35	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	gravelly sand	no	
Colton	22	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Colton, gravelly	21	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Gloucester	11	1	6.0	20.0	6.00	20.0	A	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Hermon	55	1	2.0	20.0	6.00	20.0	A	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Hinckley	12	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Hoosic	510	1	2.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Masardis	23	1	6.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Merrimac	10	1	2.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Quonset	310	1	2.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Redstone	665	1	2.0	6.0	6.00	20.0	A	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Success	154	1	2.0	6.0	6.00	20.0	A	Sandy Till	frigid	sandy-skeletal	yes	cemented
Suncook	2	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Suncook	402	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Sunday	102	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Sunday	202	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Warwick	210	1	2.0	6.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Windsor	26	1	6.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	mesic	sandy	no	
Abenaki	501	2	0.6	2.0	6.00	99.0	B	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Agawam	24	2	6.0	20.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Allagash	127	2	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Bangor	572	2	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam
Berkshire	72	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Bice	226	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	no	sandy loam
Canton	42	2	2.0	6.0	6.00	20.0	B	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Charlton	62	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Dutchess	366	2	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Fryeburg	208	2	0.6	2.0	2.00	6.0	B	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Groveton	27	2	0.6	2.0	0.60	6.0	B	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Hadley	8	2	0.6	2.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Hadley	108	2	0.6	2.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Hartland	31	2	0.6	2.0	0.20	2.0	B	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Haven	410	2	0.6	2.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Houghtonville	795	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Lombard	259	2	0.6	6.0	2.00	20.0	C/D	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Monadnock	142	2	0.6	2.0	2.00	6.0	B	Loose till, sandy textures	frigid	oamy over sandy, sandy-skeleta	yes	gravelly loamy sand in C
Occum	1	2	0.6	2.0	6.00	20.0	B	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Ondawa	101	2	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Ondawa	201	2	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Salmon	630	2	0.6	2.0	0.60	2.0	B	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Stetson	523	2	0.6	6.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Unadilla	30	2	0.6	2.0	2.00	20.0	B	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Chichester	442	2	0.6	2.0	2.00	6.0	B	Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Acton	146	3	2.0	20.0	2.00	20.0	B	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Becket	56	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Belgrade	532	3	0.6	2.0	0.06	2.0	B	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Bernardston	330	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Boxford	32	3	0.1	0.2	0.00	0.2	C	Silt and Clay Deposits	mesic	fine	no	silty clay loam

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Buckland	237	3	0.6	2.0	0.06	0.2	C	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Buxton	232	3	0.1	0.6	0.00	0.2	C	Silt and Clay Deposits	frigid	fine	no	silty clay
Canterbury	166	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Chatfield Var.	289	3	0.6	6.0	0.60	6.0	B	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Chesuncook	126	3	0.6	2.0	0.02	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Colonel	927	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Croghan	613	3	20.0	100.0	20.00	100.0	B	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Dartmouth	132	3	0.6	2.0	0.06	0.6	B	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Deerfield	313	3	6.0	20.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	sandy	no	single grain in C
Dixfield	378	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Dixmont	578	3	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Duane	413	3	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Eldridge	38	3	6.0	20.0	0.06	0.6	C	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Elmridge	238	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Elmwood	338	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Finch	116	3					C	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)
Gilmanton	478	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Henniker	46	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Hitchcock	130	3	0.6	2.0	0.06	0.6	B	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Howland	566	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Lanesboro	228	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Lovewell	307	3	0.6	2.0	0.60	2.0	B	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Machias	520	3	2.0	6.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Madawaska	28	3	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Madawaska, aquer	48	3	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Marlow	76	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Melrose	37	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Metacomet	458	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Metallak	404	3	6.0	100.0	6.00	100.0	B	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Millis	39	3					C	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Montauk	44	3	0.6	6.0	0.06	0.6	C	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Mundal	610	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	gravelly sandy loam in Cd
Newfields	444	3	0.6	2.0	0.60	2.0	B	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Nicholville	632	3	0.6	2.0	0.60	2.0	C	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Ninigret	513	3	0.6	6.0	6.00	20.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Paxton	66	3	0.6	2.0	0.00	0.2	C	Firm, platy, loamy till	mesic	loamy	no	
Peru	78	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	
Pittstown	334	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Plaisted	563	3	0.6	2.0	0.06	0.6	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Podunk	104	3	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Poocham	230	3	0.6	2.0	0.20	2.0	B	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Pootatuck	4	3	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Scio	531	3	0.6	2.0	0.60	2.0	B	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Scituate	448	3	0.6	2.0	0.06	0.2	C	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Sheepscot	14	3	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Sisk	667	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Skerry	558	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Sudbury	118	3	2.0	6.0	2.00	20.0	B	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand
Suffield	536	3	0.6	2.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Sunapee	168	3	0.6	2.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	
Sunapee var	269	3	0.6	2.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	frigid dystrudept
Surplus	669	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Sutton	68	3	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	mesic	loamy	no	
Telos	123	3	0.6	2.0	0.02	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Waumbeck	58	3	2.0	20.0	6.00	20.0	B	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Winooski	103	3	0.6	6.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Woodbridge	29	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Winooski	9	3	0.6	6.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Canaan	663	4	2.0	20.0	2.00	20.0	C	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Cardigan	357	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Chatfield	89	4	0.6	6.0	0.60	6.0	B	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Elliottsville	128	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Glebe	671	4	2.0	6.0	2.00	6.0	C	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Glover	NA	4	0.6	2.0	0.60	2	D	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep
Hogback	91	4	2.0	6.0	2.00	6.0	C	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Hollis	86	4	0.6	6.0	0.60	6.0	C/D	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Kearsarge	359	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Lyman	92	4	2.0	6.0	2.00	6.0	A/D	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Macomber	252	4	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Millsite	251	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Monson	133	4	0.6	2.0	0.60	2.0	D	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Pennichuck	460	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Rawsonville	98	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Ricker	674	4	2.0	6.0	2.00	6.0	A	rganic over bedrock (up to 4" of minera	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Saddleback	673	4	0.6	2.0	0.60	2.0	C/D	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Shapleigh	136	4					C/D	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Thorndike	84	4	0.6	2.0	0.60	2.0	C/D	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Tunbridge	99	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Winnecook	88	4	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Woodstock	93	4	2.0	6.0	2.00	6.0	C/D	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep
Au Gres	516	5					B	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Bemis	224	5	0.6	0.2	0.00	0.2	C	Firm, platy, loamy till	cryic	loamy	no	
Binghamville	534	5	0.2	2.0	0.06	0.2	D	Terraces and glacial lake plains	mesic	silty	no	
Brayton	240	5	0.6	2.0	0.06	0.6	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Cabot	589	5	0.6	2.0	0.06	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Charles	209	5	0.6	100.0	0.60	100.0	C	Flood Plain (Bottom Land)	frigid	silty	no	
Cohas	505	5	0.6	2.0	0.60	100.0	C	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Grange	433	5	0.6	2.0	0.60	2.0	C	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Kinsman	614	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	frigid	sandy	yes	
Leicester	514	5	0.6	6.0	0.60	20.0	C	Loose till, loamy textures	mesic	loamy	no	
Lim	3	5	0.6	2.0	6.00	20.0	C	Flood Plain (Bottom Land)	mesic	loamy	no	
Limerick	109	5	0.6	2.0	0.60	2.0	C	Flood Plain (Bottom Land)	mesic	silty	no	
Lyme	246	5	0.6	6.0	0.60	6.0	C	Loose till, sandy textures	frigid	loamy	no	
Mashpee	315	5	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	mesic	sandy	yes	
Monarda	569	5	0.2	2.0	0.02	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Moosilauke	414	5	6.0	20.0	6.00	20.0	C	Loose till, sandy textures	frigid	sandy	no	
Naumburg	214	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	frigid	sandy	yes	
Pemi	633	5	0.6	2.0	0.06	0.6	C	Terraces and glacial lake plains	frigid	silty	no	
Pillsbury	646	5	0.6	2.0	0.06	0.2	C	Firm, platy, loamy till	frigid	silty	no	
Pipestone	314	5					B	Outwash and Stream Terraces	mesic	sandy	yes	
Raynham	533	5	0.2	2.0	0.06	0.2	C	Terraces and glacial lake plains	mesic	silty	no	
Raypol	540	5	0.6	2.0	6.00	100.0	D	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Ridgebury	656	5	0.6	6.0	0.00	0.2	C	Firm, platy, loamy till	mesic	loamy	no	
Rippowam	5	5	0.6	6.0	6.00	20.0	C	Flood Plain (Bottom Land)	mesic	loamy	no	
Roundabout	333	5	0.2	2.0	0.06	0.6	C	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Rumney	105	5	0.6	6.0	6.00	20.0	C	Flood Plain (Bottom Land)	frigid	loamy	no	

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Saugatuck	16	5	0.06	0.2	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Scantic	233	5	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	frigid	fine	no	
Scitico	33	5	0.0	0.2	0.00	0.2	C	Silt and Clay Deposits	mesic	fine	no	
Shaker	439	5	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Squamscott	538	5	6.0	20.0	0.06	0.6	C	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Stissing	340	5	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Swanton	438	5	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Walpole	546	5	2.0	6.0	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	no	
Wareham	34	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	no	
Biddeford	234	6	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	frigid	fine	no	organic over clay
Bucksport	895	6					D	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Burnham	131	6	0.2	6.0	0.02	0.2	D	Firm, platy, silty till, schist & phylitte	frigid	loamy	no	organic over silt
Catden	296	6					A/D	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Chocorua	395	6			6.00	20.0	D	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Greenwood	295	6					A/D	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Ipswich	397	6					D	Tidal Flat	mesic	hemic/sapric	no	deep organic
Matunuck	797	6			20.00	100.0	D	Tidal Flat	mesic	sandy	no	organic over sand
Maybid	134	6	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	mesic	fine	no	silt over clay
Meadowsedge	894	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Medomak	406	6	0.6	2.0	0.60	2.0	D	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Natchaug	496	6			0.20	2.0	D	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Ossipee	495	6			0.20	2.0	D	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Pawcatuck	497	6			20.00	100.0	D	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Peacham	549	6	0.6	2.0	0.00	0.2	D	Firm, platy, silty till, schist & phylitte	frigid	loamy	no	organic over loam
Pondicherry	992	6			6.00	20.0	D	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Saco	6	6	0.6	2.0	6.00	20.0	D	Flood Plain (Bottom Land)	mesic	silty	no	strata
Scarboro	115	6	6.0	20.0	6.00	20.0	D	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Searsport	15	6	6.0	20.0	6.00	20.0	D	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Timakwa	393	6			6.00	100.0	D	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Vassalboro	150	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Waskish	195	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Westbrook	597	6			0.00	2.0	D	Tidal Flat	mesic	loamy	no	organic over loam
Whitman	49	6	0.0	0.2	0.00	0.2	D	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Wonsqueak	995	6			0.20	2.0	D	Organic Materials - Freshwater	frigid	loamy	no	organic over loam

no longer recognized

organic materials

denotes break betweenSoil Group

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Welcome to New Hampshire's Watershed Report Cards built from the 2018, 305(b)/303(d)

Each Watershed Report Card covers a single 12 digit Hydrologic Unit Code (HUC12), on average a 34 square mile area. Each Watershed Report Card has three components;

1. REPORT CARD - A one page card that summarizes the overall use support for Aquatic Life Integrity, Primary Contact (i.e. Swimming), and Secondary Contact (i.e. Boating) Designated Uses on every Assessment Unit ID (AUID) within the HUC12.
2. HUC 12 MAP - A map of the watershed with abbreviated labels for each AUID within the HUC12.
3. ASSESSMENT DETAILS - Anywhere from one to forty pages with the detailed assessment information for each and every AUID in the Report Card and Map.

How are the Surface Water Quality Assessment determinations made?

All readily available data with reliable Quality Assurance/Quality Control is used in the biennial surface water quality assessments. For a full understanding of how the Surface Water Quality Standards (Env-Wq 1700) are translated into surface water quality assessments we urge the reader to review the 2018 Consolidated Assessment and Listing Methodology (CALM) at https://www.des.nh.gov/organization/divisions/water/wmb/swqa/2018/documents/r-wd-19-04.pdf.

Where can I find more advanced mapping resources?

GIS files are available by assessment cycle at ftp://pubftp.nh.gov/DES/wmb/WaterQuality/SWQA/2018/GIS

I'd like to see the more raw water quality data?

The web mapping tool allows you to download the data used in the assessment of the primary contact and aquatic life designated uses by clicking on the "Data Access Waterbody Data (Aquatic Life and Swimming Uses)" link for any assessment unit. (https://www.des.nh.gov/organization/divisions/water/wmb/swqa/assessment-viewers.htm)

How are assessments coded in the report card?

Assessment outcomes are displayed on a color scale as well as an alpha numeric scale that provides additional distinctions for the designated use and parameter level assessments as outlined in the table below.

		Severe Not Supporting, Severe	**Poor** Not Supporting, Marginal	**Likely Bad** Insufficient Information – Potentially Not Supporting	**No Data** No Data	**Likely Good** Insufficient Information – Potentially Full Supporting	**Marginal** Full Support, Marginal	**Good** Full Support, Good
CATEGORY	**Description**							
Category 2	Meets standards						2-M or 2-OBS	2-G
Category 3	Insufficient Information			3-PNS	3-ND	3-PAS		
Category 4	Does not Meet Standards;							
4A	TMDL* Completed	4A-P	4A-M or 4A-T					
4B	Other enforceable measure will correct the issue.	4B-P	4B-M or 4B-T					
4C	Non-pollutant (i.e. exotic weeds)	4C-P	4C-M					
Category 5	TMDL^ Needed	5-P	5-M or 5-T					

* TMDL stands for Total Maximum Daily Load studies (http://des.nh.gov/organization/divisions/water/wmb/tmdl/index.htm)

WATERSHED 305(b) ASSESSMENT SUMMARY REPORT:

HUC 12 010600030903

HUC 12 NAME BELLAMY RIVER

(Locator map on next page only applies to this HUC12)

Assessment Cycle 2018

Good	Full Support Good
Marginal	Full Support Marginal
Likely Good	Insufficient Information – Potentially Full Support
No Data	No Data
Likely Bad	Insufficient Information – Potentially Not Support
Poor	Not Support Marginal
Severe	Not Support Severe

ASSESSMENT UNIT ID	MAP LABEL	ASSESSMENT UNIT NAME	AQUATIC LIFE	SWIMMING	BOATING	FISH CONSUMP.
NHEST600030903-01-01	E*01-01	BELLAMY RIVER NORTH	5-P	2-G	2-G	5-M
NHEST600030903-01-03	E*01-03	BELLAMY RIVER SOUTH CLEMENT POINT	5-P	2-G	2-G	5-M
NHEST600030903-01-04	E*01-04	BELLAMY RIVER SOUTH	5-P	2-G	2-G	5-M
NHIMP600030903-01	I*01	BELLAMY RIVER	3-ND	3-ND	3-ND	4A-M
NHIMP600030903-02	I*02	BELLAMY RIVER - SAWYERS MILL DAM POND	5-M	5-M	3-ND	4A-M
NHIMP600030903-03	I*03	CANNEY BROOK - WILDLIFE POND	3-ND	3-ND	3-ND	4A-M
NHIMP600030903-04	I*04	BELLAMY RIVER IV DAM	3-ND	3-ND	3-ND	4A-M
NHIMP600030903-05	I*05	KNOX MARSH BROOK	3-ND	3-ND	3-ND	4A-M
NHIMP600030903-06	I*06	UNNAMED BROOK - THORNWOOD COMMONS POND	3-ND	3-ND	3-ND	4A-M
NHIMP600030903-07	I*07	UNNAMED BROOK - BELLAMY RIVER WILDLIFE POND	3-ND	3-ND	3-ND	4A-M
NHIMP600030903-08	I*08	UNNAMED BROOK - FARM POND	3-ND	3-ND	3-ND	4A-M
NHIMP600030903-09	I*09	UNNAMED BROOK - WEBSTER BROOK DAM	3-ND	3-ND	3-ND	4A-M
NHIMP600030903-10	I*10	UNNAMED BROOK - FARM POND	3-ND	3-ND	3-ND	4A-M
NHLAK600030903-01	L*01	BARBADOES POND	3-ND	3-ND	3-ND	4A-M
NHLAK600030903-02	L*02	BELLAMY RESERVOIR	5-M	3-ND	3-ND	4A-M
NHLAK600030903-03	L*03	SWAINS LAKE	5-P	3-PNS	3-ND	4A-M
NHLAK600030903-04	L*04	WINKLEY POND	5-P	3-ND	3-ND	4A-M
NHLAK600030903-05	L*05	BRANCH MALLEGO BROOK POND	3-ND	3-ND	3-ND	4A-M
NHLAK600030903-06	L*06	FARM POND	3-ND	3-ND	3-ND	4A-M
NHLAK600030903-07	L*07	UNNAMED POND	3-ND	3-ND	3-ND	4A-M
NHRIV600030903-01	R*01	MADLA BROOK	5-P	3-ND	3-ND	4A-M
NHRIV600030903-02	R*02	MALLEGO BROOK	5-P	3-ND	3-ND	4A-M
NHRIV600030903-03	R*03	CALEF BROOK	3-ND	3-PAS	3-PAS	4A-M
NHRIV600030903-05	R*05	UNNAMED BROOK - TO SWAINS LAKE	3-ND	3-ND	3-ND	4A-M
NHRIV600030903-06	R*06	BELLAMY RIVER - UNNAMED BROOK	5-M	3-ND	3-ND	4A-M
NHRIV600030903-07	R*07	BELLAMY RIVER	5-P	4A-P	4A-P	4A-M
NHRIV600030903-08	R*08	BELLAMY RIVER - KELLY BROOK - KNOX MARSH BROOK	5-P	4A-P	3-PNS	4A-M
NHRIV600030903-09	R*09	BELLAMY RIVER - UNNAMED BROOK	5-M	4A-P	3-ND	4A-M

WATERSHED 305(b) ASSESSMENT SUMMARY REPORT:

HUC 12 010600030903

HUC 12 NAME BELLAMY RIVER

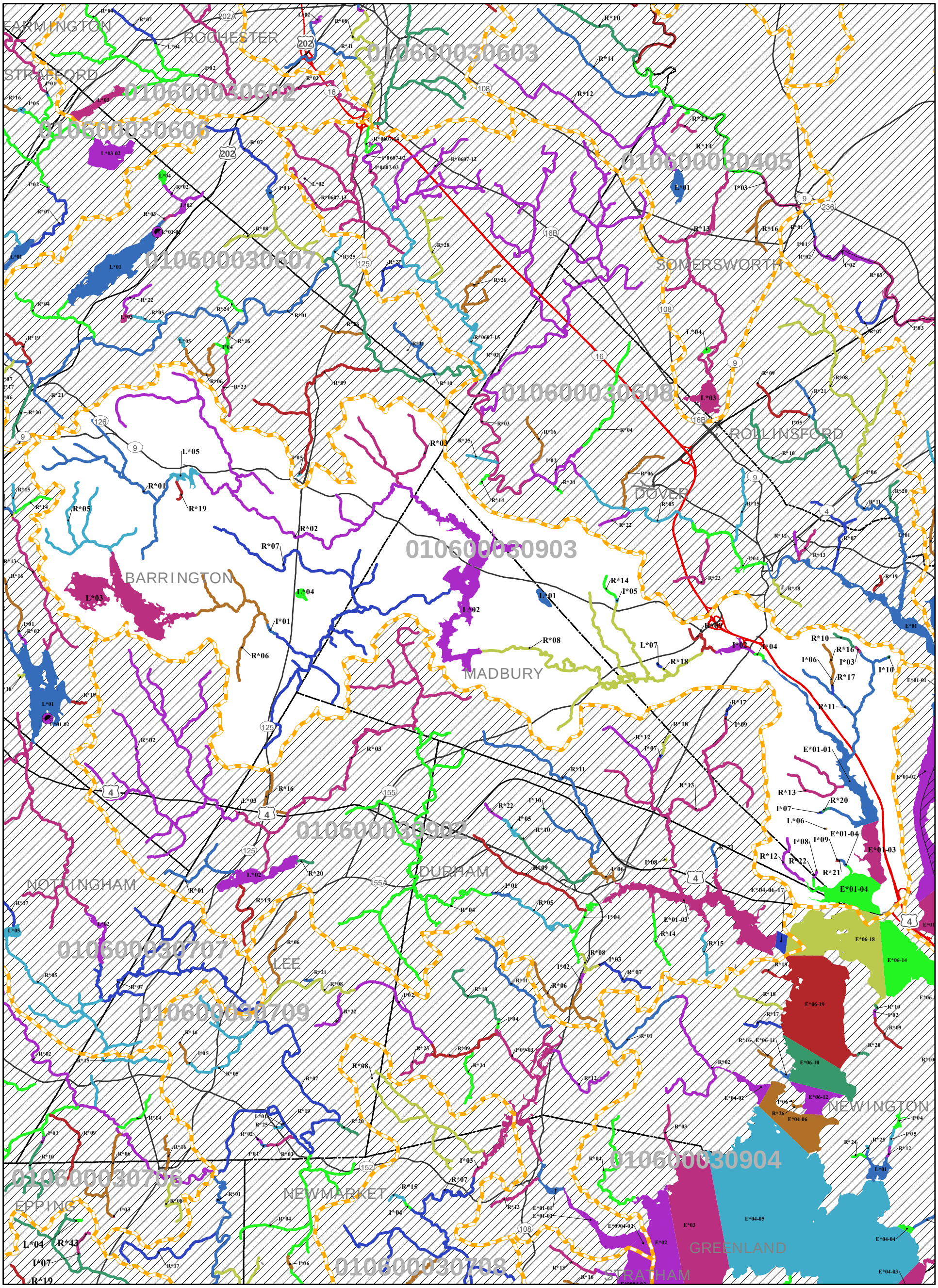
(Locator map on next page only applies to this HUC12)

Assessment Cycle 2018

Good		Full Support Good
Marginal		Full Support Marginal
Likely Good		Insufficient Information – Potentially Full Support
No Data		No Data
Likely Bad		Insufficient Information – Potentially Not Support
Poor		Not Support Marginal
Severe		Not Support Severe

ASSESSMENT UNIT ID	MAP LABEL	ASSESSMENT UNIT NAME	AQUATIC LIFE	SWIMMING	BOATING	FISH CONSUMP.
NHRIV600030903-10	R*10	CANNEY BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV600030903-11	R*11	VARNEY BROOK - CANNEY BROOK	3-ND	4A-P	4A-M	4A-M
NHRIV600030903-12	R*12	UNNAMED BROOK - TO BELLAMY RIVER ROYALLS COVE	3-ND	3-ND	3-ND	4A-M
NHRIV600030903-13	R*13	GARRISON BROOK	3-ND	4A-P	3-ND	4A-M
NHRIV600030903-14	R*14	KNOX MARSH BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV600030903-16	R*16	UNNAMED BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV600030903-17	R*17	VARNEY BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV600030903-18	R*18	UNNAMED BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV600030903-19	R*19	UNNAMED BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV600030903-20	R*20	UNNAMED BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV600030903-21	R*21	UNNAMED BROOK	3-ND	3-ND	3-ND	4A-M
NHRIV600030903-22	R*22	UNNAMED BROOK	3-ND	3-ND	3-ND	4A-M

AUIDs For HUC12: 010600030903 - Bellamy River



Assessment Unit IDs are derived from the HUC12 they reside within. The labels have been shortened on this map for presentation purposes.
Example: the Label "L*03" in HUC12 = 010700060201 represents AUID = "NHLAK700060201-03"
In rare cases where an AUID extends beyond the boundary of a single HUC12, additional portions of the end of the HUC 12 number have also been replaced.

S:\WD-Watershed\WQ_Planning\305b_303d\2018\AUIDs\HUC12Maps

Assessment Unit ID NHRIV600030903-08 Size 9.4540 MILES

Assessment Unit Name BELLAMY RIVER - KELLY BROOK - KNOX MARSH Beach N

Primary Town MADBURY Assessment Unit Category*~ 5-P

2018, 305(b)/303(d) - All Reviewed Parameters by Assessment Unit

Designated Use Description	*Desig. Use Category	Parameter Name	Parameter Threatened (Y/N)	Last Sample	Last Exceed	Parameter Category*	TMDL Priority
Aquatic Life Integrity	5-P	ALKALINITY, CARBONATE AS CACO3	N	1990	1990	3-ND	
		AMMONIA (TOTAL)	N	1997	N/A	3-ND	
		ARSENIC	N	1990	N/A	3-ND	
		Aluminum	N	2017	2017	5-M	LOW
		Benthic-Macroinvertebrate Bioassessments (Streams)	N	2000	2000	5-P	LOW
		CADMIUM	N	1990	N/A	3-ND	
		CHLORIDE	N	2018	N/A	3-PAS	
		COPPER	N	2016	2016	3-PNS	
		DISSOLVED OXYGEN SATURATION	N	2018	2007	3-PAS	
		Fishes Bioassessments (Streams)	N			3-PAS	
		Habitat Assessment (Streams)	N	2000	2000	4C-P	
		IRON	N	1997	N/A	3-ND	
		LEAD	N	2000	2000	3-ND	
		NICKEL	N	1990	N/A	3-ND	
		OXYGEN, DISSOLVED	N	2018	2016	2-M	
		PHOSPHORUS (TOTAL)	N	2017	NLV	3-PAS	
		SELENIUM	N	1990	N/A	3-ND	
		TURBIDITY	N	2017	2008	3-PAS	
		ZINC	N	2016	1998	3-PAS	
		pH	N	2018	2017	5-M	LOW
Fish Consumption	4A-M	ARSENIC	N	1990	1990	3-ND	
		COPPER	N	2016	N/A	3-PNS	
		MANGANESE	N	1990	N/A	3-ND	
		Mercury	N			4A-M	
		NICKEL	N	1990	N/A	3-ND	
		SELENIUM	N	1990	N/A	3-ND	
		ZINC	N	2016	N/A	3-PNS	
Potential Drinking Water Supply	2-G	ARSENIC	N	1990	1990	3-ND	
		COPPER	N	2016	N/A	3-PAS	

Severe	Poor	Likely Bad	No Data	Likely Good	Marginal	Good
Not Supporting, Severe	Not Supporting, Marginal	Insufficient Information – Potentially Full Supporting	No Data	Insufficient Information – Potentially Full Supporting	Full Support, Marginal	Full Support, Good

*DES Categories; 2-G = Supports Parameter well above criteria, 2-M = Supports Parameter marginally above criteria, 2-OBS = Exceeds WQ criteria but natural therefore not a WQ exceedence, 3-ND = Insufficient Information/No data, 3-PAS= Insufficient Information/Potentially Attaining Standard, 3-PNS= Insufficient Information/Potentially Not Attaining Standard, (4A=Impaired/TMDL Completed, 4B=Impaired/Other Measure will rectify Impairment, 4C=Impaired/Non-Pollutant, 5=Impaired/TMDL needed) M=Marginal Impairment, P=Severe Impairment, T=Threatened (http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm)

Assessment Unit ID NHRIV600030903-08 Size 9.4540 MILES

Assessment Unit Name BELLAMY RIVER - KELLY BROOK - KNOX MARSH Beach N

Primary Town MADBURY Assessment Unit Category*~ 5-P

2018, 305(b)/303(d) - All Reviewed Parameters by Assessment Unit

Designated Use Description	*Desig. Use Category	Parameter Name	Parameter Threatened (Y/N)	Last Sample	Last Exceed	Parameter Category*	TMDL Priority
Potential Drinking Water Supply	2-G	ESCHERICHIA COLI	N	2017	2017	3-PNS	
		FECAL COLIFORM	N	1990	1990	3-ND	
		FLUORIDE	N	1997	N/A	3-ND	
		IRON	N	1997	1997	3-ND	
		MANGANESE	N	1990	N/A	3-ND	
		NICKEL	N	1990	N/A	3-ND	
		SELENIUM	N	1990	N/A	3-ND	
		SULFATES	N	2016	N/A	3-PAS	
		ZINC	N	2016	N/A	3-PAS	
Primary Contact Recreation	4A-P	CHLOROPHYLL-A	N	1990	N/A	3-ND	
		Escherichia coli	N	2017	2017	4A-P	
Secondary Contact Recreation	3-PNS	ESCHERICHIA COLI	N	2017	2016	3-PNS	
Wildlife	3-ND						

Severe	Poor	Likely Bad	No Data	Likely Good	Marginal	Good
Not Supporting, Severe	Not Supporting, Marginal	Insufficient Information – Potentially Full Supporting	No Data	Insufficient Information – Potentially Full Supporting	Full Support, Marginal	Full Support, Good

*DES Categories; 2-G = Supports Parameter well above criteria, 2-M = Supports Parameter marginally above criteria, 2-OBS = Exceeds WQ criteria but natural therefore not a WQ exceedence, 3-ND = Insufficient Information/No data, 3-PAS= Insufficient Information/Potentially Attaining Standard, 3-PNS= Insufficient Information/Potentially Not Attaining Standard, (4A=Impaired/TMDL Completed, 4B=Impaired/Other Measure will rectify Impairment, 4C=Impaired/Non-Pollutant, 5=Impaired/TMDL needed) M=Marginal Impairment, P=Severe Impairment, T=Threatened (http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm)

List of ORW and Impaired (4A and 5) Waters for CGP NOIs 5/10/12							
(Outstanding Resource Waters and Impairments on the 2010 305(b)/303(d) that need, or have a completed, TMDL. File last update May 10, 2012.)							
Assessment Unit ID	**Assessment Unit Name**	**Impairment Name**	**Pollutant allocated in TMDL (if different than "Impairment Name")**	**CGP eNOI Equivalent (to Impairment Name)**	**TMDl Approval Date**	**TMDL Name**	**Outstanding Resource Water (ORW) (AUIDs not shown are non ORWs) {See http://www2.des.state.nh.us/gis/onestop/ if your AUID says "Review OneStop GIS ORW Layer"}**
NHRIV600030902-16	WENDYS BROOK	pH		PH/ACIDITY/CAUSTIC CONDITIONS			Non-ORW
NHRIV600030903-01	MADLA BROOK	pH		PH/ACIDITY/CAUSTIC CONDITIONS			Non-ORW
NHRIV600030903-02	MALLEGO BROOK	pH		PH/ACIDITY/CAUSTIC CONDITIONS			Non-ORW
NHRIV600030903-06	BELLAMY RIVER - UNNAMED BROOK	Oxygen, Dissolved		ORGANIC ENRICHMENT/OXYGEN DEPLETION			Non-ORW
NHRIV600030903-06	BELLAMY RIVER - UNNAMED BROOK	pH		PH/ACIDITY/CAUSTIC CONDITIONS			Non-ORW
NHRIV600030903-07	BELLAMY RIVER	Dissolved oxygen saturation		ORGANIC ENRICHMENT/OXYGEN DEPLETION			Non-ORW
NHRIV600030903-07	BELLAMY RIVER	Escherichia coli		PATHOGENS	21-Sep-10	NEW HAMPSHIRE STATEWIDE BACTERIA	Non-ORW
NHRIV600030903-07	BELLAMY RIVER	Oxygen, Dissolved		ORGANIC ENRICHMENT/OXYGEN DEPLETION			Non-ORW
NHRIV600030903-07	BELLAMY RIVER	pH		PH/ACIDITY/CAUSTIC CONDITIONS			Non-ORW
NHRIV600030903-08	BELLAMY RIVER - KELLY BROOK - KNOX MARSH BROOK	Aluminum		METALS (OTHER THAN MERCURY)			Non-ORW
NHRIV600030903-08	BELLAMY RIVER - KELLY BROOK - KNOX MARSH BROOK	Benthic-Macroinvertebrate Bioassessments (Streams)		CAUSE UNKNOWN - IMPAIRED BIOTA			Non-ORW
NHRIV600030903-08	BELLAMY RIVER - KELLY BROOK - KNOX MARSH BROOK	Escherichia coli		PATHOGENS	21-Sep-10	NEW HAMPSHIRE STATEWIDE BACTERIA	Non-ORW
NHRIV600030903-08	BELLAMY RIVER - KELLY BROOK - KNOX MARSH BROOK	pH		PH/ACIDITY/CAUSTIC CONDITIONS			Non-ORW
NHRIV600030903-09	BELLAMY RIVER - UNNAMED BROOK	Escherichia coli		PATHOGENS	21-Sep-10	NEW HAMPSHIRE STATEWIDE BACTERIA	Non-ORW
NHRIV600030903-09	BELLAMY RIVER - UNNAMED BROOK	pH		PH/ACIDITY/CAUSTIC CONDITIONS			Non-ORW
NHRIV600030903-11	VARNEY BROOK - CANNEY BROOK	Escherichia coli		PATHOGENS	21-Sep-10	NEW HAMPSHIRE STATEWIDE BACTERIA	Non-ORW

Cycle	Assessment Unit ID (AUID)	Assessment Unit Name	Town(s) Primary Town is Listed First	Water Size	Size Unit	Designated Use Description	Parameter Name	NHDES Category	Threatened	TMDL Priority
2018	NHRIV600030903-07	BELLAMY RIVER	BARRINGTON, LEE, MADBURY	11.507	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P	N	LOW
2018	NHRIV600030903-07	BELLAMY RIVER	BARRINGTON, LEE, MADBURY	11.507	MILES	Aquatic Life Integrity	pH	5-P	N	LOW
2018	NHRIV600030903-08	BELLAMY RIVER - KELLY BROOK - KNOX	MADBURY, DOVER	9.454	MILES	Aquatic Life Integrity	Aluminum	5-M	N	LOW
2018	NHRIV600030903-08	BELLAMY RIVER - KELLY BROOK - KNOX	MADBURY, DOVER	9.454	MILES	Aquatic Life Integrity	Benthic-Macroinvertebrate Bioassessments	5-P	N	LOW
2018	NHRIV600030903-08	BELLAMY RIVER - KELLY BROOK - KNOX	MADBURY, DOVER	9.454	MILES	Aquatic Life Integrity	pH	5-M	N	LOW
2018	NHRIV600030903-09	BELLAMY RIVER - UNNAMED BROOK	DOVER	0.756	MILES	Aquatic Life Integrity	pH	5-M	N	LOW
2018	NHRIV600030904-06	PICKERING BROOK	PORTSMOUTH, GREENLAND	6.432	MILES	Aquatic Life Integrity	Chloride	5-M	N	LOW
2018	NHRIV600030904-06	PICKERING BROOK	PORTSMOUTH, GREENLAND	6.432	MILES	Aquatic Life Integrity	Copper	5-P	N	LOW
2018	NHRIV600030904-06	PICKERING BROOK	PORTSMOUTH, GREENLAND	6.432	MILES	Aquatic Life Integrity	Iron	5-P	N	LOW
2018	NHRIV600030904-06	PICKERING BROOK	PORTSMOUTH, GREENLAND	6.432	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P	N	LOW
2018	NHRIV600030904-06	PICKERING BROOK	PORTSMOUTH, GREENLAND	6.432	MILES	Aquatic Life Integrity	pH	5-M	N	LOW
2018	NHRIV600030904-09	KNIGHT BRANCH	NEWINGTON	0.565	MILES	Aquatic Life Integrity	Aluminum	5-M	N	LOW
2018	NHRIV600030904-11	MCINTYRE BROOK - PEASE AIR FORCE	NEWINGTON	0.621	MILES	Aquatic Life Integrity	Manganese	5-M	N	LOW
2018	NHRIV600030904-12	PEVERLY BROOK - PEASE AIR FORCE BASE	NEWINGTON	0.131	MILES	Aquatic Life Integrity	Arsenic	5-M	N	LOW
2018	NHRIV600030904-12	PEVERLY BROOK - PEASE AIR FORCE BASE	NEWINGTON	0.131	MILES	Aquatic Life Integrity	Cadmium	5-M	N	LOW
2018	NHRIV600030904-12	PEVERLY BROOK - PEASE AIR FORCE BASE	NEWINGTON	0.131	MILES	Aquatic Life Integrity	Manganese	5-M	N	LOW
2018	NHRIV600030904-12	PEVERLY BROOK - PEASE AIR FORCE BASE	NEWINGTON	0.131	MILES	Aquatic Life Integrity	Zinc	5-M	N	LOW
2018	NHRIV600031001-01	PICKERING BROOK -FLAGSTONE BROOK	NEWINGTON	2.720	MILES	Aquatic Life Integrity	Aluminum	5-M	N	LOW
2018	NHRIV600031001-01	PICKERING BROOK -FLAGSTONE BROOK	NEWINGTON	2.720	MILES	Aquatic Life Integrity	Iron	5-M	N	LOW
2018	NHRIV600031001-03	SAGAMORE CREEK	PORTSMOUTH	0.975	MILES	Aquatic Life Integrity	Chloride	5-M	N	LOW
2018	NHRIV600031001-03	SAGAMORE CREEK	PORTSMOUTH	0.975	MILES	Aquatic Life Integrity	pH	5-M	N	LOW
2018	NHRIV600031001-04	LOWER HODGSON BROOK	PORTSMOUTH	0.951	MILES	Aquatic Life Integrity	Benthic-Macroinvertebrate Bioassessments	5-P		LOW
2018	NHRIV600031001-04	LOWER HODGSON BROOK	PORTSMOUTH	0.951	MILES	Aquatic Life Integrity	Chloride	5-P	N	LOW
2018	NHRIV600031001-04	LOWER HODGSON BROOK	PORTSMOUTH	0.951	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P	N	LOW
2018	NHRIV600031001-04	LOWER HODGSON BROOK	PORTSMOUTH	0.951	MILES	Aquatic Life Integrity	pH	5-M	N	LOW
2018	NHRIV600031001-05	UPPER HODGSON BROOK	PORTSMOUTH	1.572	MILES	Aquatic Life Integrity	Benthic-Macroinvertebrate Bioassessments	5-P	N	LOW
2018	NHRIV600031001-05	UPPER HODGSON BROOK	PORTSMOUTH	1.572	MILES	Aquatic Life Integrity	Chloride	5-M	N	LOW
2018	NHRIV600031001-05	UPPER HODGSON BROOK	PORTSMOUTH	1.572	MILES	Aquatic Life Integrity	Manganese	5-M	N	LOW
2018	NHRIV600031001-05	UPPER HODGSON BROOK	PORTSMOUTH	1.572	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-M	N	LOW
2018	NHRIV600031001-05	UPPER HODGSON BROOK	PORTSMOUTH	1.572	MILES	Aquatic Life Integrity	pH	5-M	N	LOW
2018	NHRIV600031001-06	GRAFTON DITCH	PORTSMOUTH	1.305	MILES	Aquatic Life Integrity	Aluminum	5-M	N	LOW
2018	NHRIV600031001-06	GRAFTON DITCH	PORTSMOUTH	1.305	MILES	Aquatic Life Integrity	Arsenic	5-M	N	LOW
2018	NHRIV600031001-06	GRAFTON DITCH	PORTSMOUTH	1.305	MILES	Aquatic Life Integrity	Chromium (total)	5-M	N	LOW
2018	NHRIV600031001-06	GRAFTON DITCH	PORTSMOUTH	1.305	MILES	Aquatic Life Integrity	Copper	5-M	N	LOW
2018	NHRIV600031001-06	GRAFTON DITCH	PORTSMOUTH	1.305	MILES	Aquatic Life Integrity	Iron	5-M	N	LOW
2018	NHRIV600031001-06	GRAFTON DITCH	PORTSMOUTH	1.305	MILES	Aquatic Life Integrity	Lead	5-M	N	LOW
2018	NHRIV600031001-06	GRAFTON DITCH	PORTSMOUTH	1.305	MILES	Aquatic Life Integrity	Manganese	5-M	N	LOW
2018	NHRIV600031001-06	GRAFTON DITCH	PORTSMOUTH	1.305	MILES	Aquatic Life Integrity	Zinc	5-M	N	LOW
2018	NHRIV600031001-07	PAULS BROOK - PEASE AIR FORCE BASE	NEWINGTON	0.515	MILES	Aquatic Life Integrity	Benthic-Macroinvertebrate Bioassessments	5-M	N	LOW
2018	NHRIV600031001-07	PAULS BROOK - PEASE AIR FORCE BASE	NEWINGTON	0.515	MILES	Aquatic Life Integrity	Chloride	5-P	N	LOW
2018	NHRIV600031001-07	PAULS BROOK - PEASE AIR FORCE BASE	NEWINGTON	0.515	MILES	Aquatic Life Integrity	DDD	5-M	N	LOW
2018	NHRIV600031001-07	PAULS BROOK - PEASE AIR FORCE BASE	NEWINGTON	0.515	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P	N	LOW
2018	NHRIV600031001-08	RAILWAY BROOK - PEASE AIR FORCE BASE	NEWINGTON	0.638	MILES	Aquatic Life Integrity	Iron	5-M	N	LOW
2018	NHRIV600031001-09	BORTHWICK AVE TRIBUTARY	PORTSMOUTH	1.340	MILES	Aquatic Life Integrity	Chloride	5-M	N	LOW
2018	NHRIV600031001-09	BORTHWICK AVE TRIBUTARY	PORTSMOUTH	1.340	MILES	Aquatic Life Integrity	Iron	5-M	N	LOW
2018	NHRIV600031001-09	BORTHWICK AVE TRIBUTARY	PORTSMOUTH	1.340	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P	N	LOW
2018	NHRIV600031001-09	BORTHWICK AVE TRIBUTARY	PORTSMOUTH	1.340	MILES	Aquatic Life Integrity	pH	5-M	N	LOW
2018	NHRIV600031001-10	NEWFILEDS DITCH	PORTSMOUTH	1.315	MILES	Aquatic Life Integrity	Chloride	5-M	N	LOW
2018	NHRIV600031001-10	NEWFILEDS DITCH	PORTSMOUTH	1.315	MILES	Aquatic Life Integrity	pH	5-M	N	LOW
2018	NHRIV600031002-01	BERRYS BROOK	PORTSMOUTH, GREENLAND, RYE	9.372	MILES	Aquatic Life Integrity	Oxygen, Dissolved	5-P	N	LOW
2018	NHRIV600031002-01	BERRYS BROOK	PORTSMOUTH, GREENLAND, RYE	9.372	MILES	Aquatic Life Integrity	pH	5-M	N	LOW

SWPPP Cut Sheet:

Filtrexx® Sediment Control

Sediment & Perimeter Control Technology

PURPOSE & DESCRIPTION

Filtrexx® Sediment control is a three-dimensional tubular sediment control and storm water runoff filtration device typically used for **perimeter control** of sediment and other soluble pollutants (such as phosphorus and petroleum hydrocarbons), on and around construction activities.

APPLICATION

Filtrexx® Sediment control is to be installed down slope of any disturbed area requiring erosion and sediment control and filtration of soluble pollutants from runoff. Sediment control is effective when installed perpendicular to sheet or low concentrated flow. Acceptable applications include:

- Site perimeters
- Above and below disturbed areas subject to sheet runoff, interrill and rill erosion
- Above and below exposed and erodable slopes
- Around area drains or inlets located in a 'sump'
- On compacted soils where trenching of silt fence is difficult or impossible
- Around sensitive trees where trenching of silt fence is not beneficial for tree survival or may unnecessarily disturb established vegetation.
- On frozen ground where trenching of silt fence is impossible.
- On paved surfaces where trenching of silt fence is impossible.

INSTALLATION

1. Sediment control used for perimeter control of sediment and soluble pollutants in storm runoff shall meet Filtrexx® Soxx™ Material Specifications and use Certified Filtrexx® FilterMedia™.
2. Contractor is required to be Filtrexx® Certified™, or use pre-filled Filtrexx® Sediment control products manufactured by a Filtrexx® Certified Manufacturer™ as determined by Filtrexx® International, LLC (440-926-2607 or visit www.filtrexx.com). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application. Look for the Filtrexx® Certified™ Seal.
3. Sediment control will be placed at locations indicated on plans as directed by the Engineer.
4. Sediment control should be installed parallel to the base of the slope or other disturbed area. In extreme conditions (i.e., 2:1 slopes), a second Sediment control shall be constructed at the top of the slope.
5. Effective Soxx™ height in the field should be as follows: 8" Diameter Sediment control = 6.5" high, 12" Diameter Sediment control = 9.5" high, 18" Diameter SiltSoxx™ = 14.5" high, 24" Diameter Sediment control = 19" high.
6. Stakes shall be installed through the middle of the Sediment control on 10 ft (3m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) hard wood stakes. In the event staking is not possible, i.e., when Sediment control is used on pavement, heavy concrete blocks shall be used behind the Sediment control to help stabilize during rainfall/runoff events.
7. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.
8. Loose compost may be backfilled along the upslope side of the Sediment control, filling the seam between the soil surface and the device, improving filtration and sediment retention.
9. If the Sediment control is to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for

establishment of permanent vegetation. The Engineer will specify seed requirements.

10. Filtrexx® Sediment control is not to be used in perennial, ephemeral, or intermittent streams.

See design drawing schematic for correct Filtrexx® Sediment control installation (Figure 1.1).

INSPECTION AND MAINTENANCE

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. Sediment control should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional Sediment control may be required to reduce effective slope length or sediment removal may be necessary. Sediment control shall be inspected until area above has been permanently stabilized and construction activity has ceased

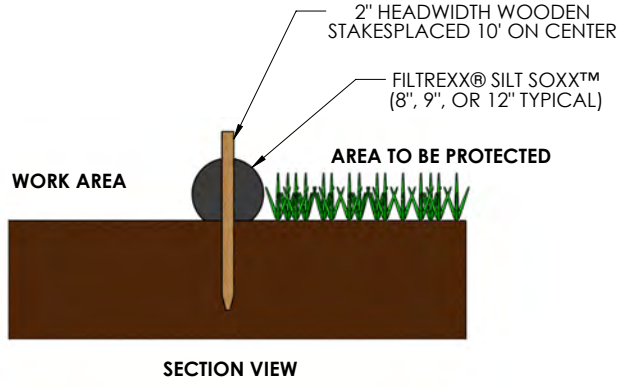
1. The Contractor shall maintain the Sediment control in a functional condition at all times and it shall be routinely inspected.
2. If the Sediment control has been damaged, it shall be repaired, or replaced if beyond repair.
3. The Contractor shall remove sediment at the base of the upslope side of the Sediment control when accumulation has reached 1/2 of the effective height of the Sediment control, or as directed by the Engineer. Alternatively, a new Sediment control can be placed on top of and slightly behind the original one creating more sediment storage capacity without soil disturbance.
4. Sediment control shall be maintained until disturbed area above the device has been permanently stabilized and construction activity has ceased.
5. The FilterMedia™ will be dispersed on site once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.
6. For long-term sediment and pollution control applications, Sediment control can be seeded at the time of installation to create a vegetative filtering system for prolonged and increased filtration of sediment and soluble pollutants (contained vegetative filter strip). The appropriate seed mix shall be determined by the Engineer.

Slope Percent	Maximum Slope Length Above Sediment Control in Feet (meters)*				
	8 in (200 mm) Sediment control	12 in (300 mm) Sediment control	18 in (450 mm) Sediment control	24 in (600mm) Sediment control	32 in (800mm) Sediment control
	6.5 in (160 mm)**	9.5 in (240 mm) **	14.5 in (360 mm) **	19 in (480 mm) **	26 in (650 mm) **
2 (or less)	600 (180)	750 (225)	1000 (300)	1300 (400)	1650 (500)
5	400 (120)	500 (150)	550 (165)	650 (200)	750 (225)
10	200 (60)	250 (75)	300 (90)	400 (120)	500 (150)
15	140 (40)	170 (50)	200 (60)	325 (100)	450 (140)
20	100 (30)	125 (38)	140 (42)	260 (80)	400 (120)
25	80 (24)	100 (30)	110 (33)	200 (60)	275 (85)
30	60 (18)	75 (23)	90 (27)	130 (40)	200 (60)
35	60 (18)	75 (23)	80 (24)	115 (35)	150 (45)
40	60 (18)	75 (23)	80 (24)	100 (30)	125 (38)
45	40 (12)	50 (15)	60 (18)	80 (24)	100 (30)
50	40 (12)	50 (15)	55 (17)	65 (20)	75 (23)

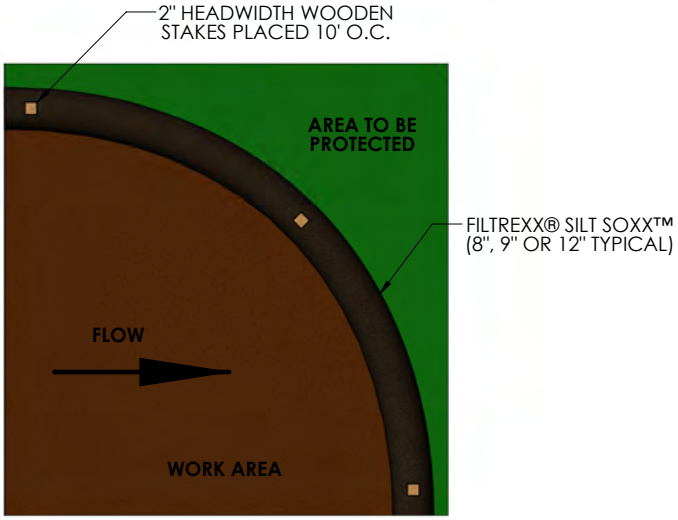
* Based on a failure point of 36 in (0.9 m) super silt fence (wire reinforced) at 1000 ft (303 m) of slope, watershed width equivalent to receiving length of sediment control device, 1 in/ 24 hr (25 mm/24 hr) rain event.

** Effective height of Sediment control after installation and with constant head from runoff as determined by Ohio State University.

FILTREXX® SILT SOXX™

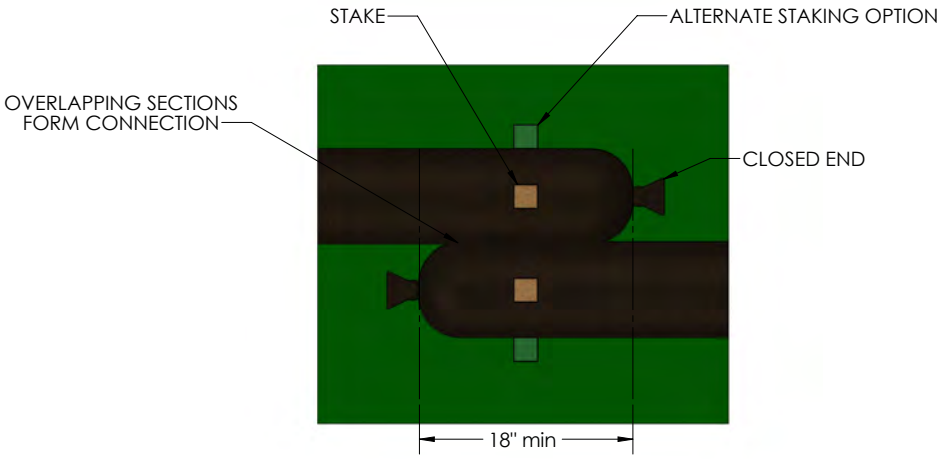


SECTION VIEW

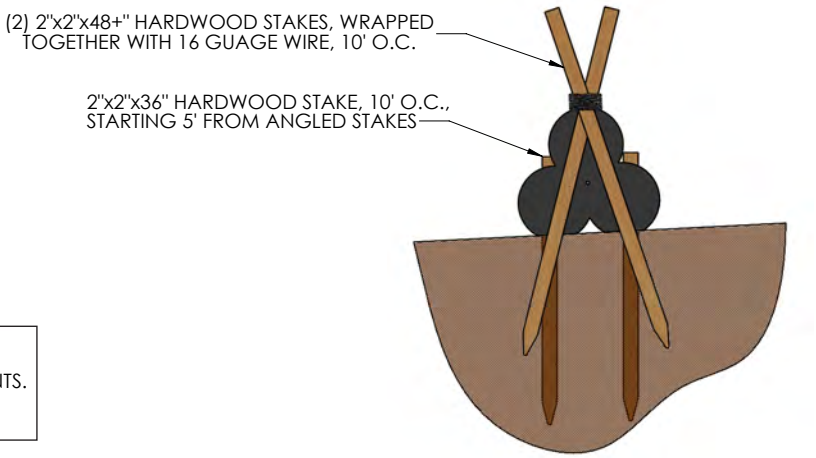


TOP VIEW

COMPOST SOCK CONNECTION/ATTACHMENT DETAIL



FILTREXX® PYRAMID STAKING DETAIL



NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. SILT SOXX™ FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

SWPPP Cut Sheet:

Filtrexx® Inlet Protection

Sediment & Perimeter Control Technology

PURPOSE & DESCRIPTION

Filtrexx® Inlet protection is a three-dimensional tubular sediment control and storm water runoff filtration device typically used for storm drain **inlet protection** of sediment and soluble pollutants (such as phosphorus and petroleum hydrocarbons) on and around construction activities.

APPLICATION

Drain inlets are located in areas that receive runoff from surrounding lands, often exposed and disturbed soils, and are located at a low point, or in a sump. Inlet protection used around drain inlets (or *Drain* Inlet protection) should completely enclose the circumference of the drain and where possible should not be placed on a grade or slope. Inlet protection used around drain inlets should never be the only form of site sediment control and should be accompanied by erosion control/slope stabilization practices, such as Slope protection or rolled erosion control blankets (RECB). Inlet protection should never be placed where they divert runoff flow from the drain inlet, or on top of the inlet, which can cause flooding. Under high runoff and sediment loading conditions placement of 1-2 in (25-50 mm) diameter rock (AASHTO #2) may be placed around the outer circumference of the Inlet protection up to ½ the height of the Inlet protection. This will slow runoff velocity as it contacts the Inlet protection and will reduce sediment build-up and clogging of the Inlet protection.

Curb inlets are generally located on paved surfaces and are designed to rapidly drain storm runoff from roadways to prevent flooding that poses a hazard to vehicular traffic. Inlet protection devices should be placed in a manner which intercepts runoff prior to entering the inlet, but does not block or divert runoff from the inlet. To prevent diversion of runoff, Inlet protection used around curbs (or *Curb* Inlet protection) should be used in low points, or sumps, and minor slopes or grades. Inlet protection should never be placed in or on the curb inlet drain, or placed in a manner than obstructs vehicular traffic. Inlet protection height should be at least 1 in (25 mm) lower than top of curb inlet to allow for overflow into the drain and not over the curb. Maximum sediment removal efficiency occurs when minor ponding exists behind Inlet protection but should never lead to flooding.

Curb sediment containment systems are used to reduce the sediment and pollutant load flowing to a curb inlet. They are generally placed on paved surfaces perpendicular to runoff flow and should be lower than the height of the curb. Curb sediment containment systems should never cause flooding or placed where they are a hazard to vehicular traffic. Inlet protection used for curb sediment containment (or *Curb Sediment Containment* Inlet protection) can be placed on a grade but should never be placed directly upslope from curb inlet where it may inadvertently divert runoff from entering curb inlet.

INSTALLATION

1. Inlet protection used for inlet protection to reduce sediment and soluble pollutants entering storm drains shall meet Filtrexx® FilterSoxx™ Material Specifications and use Certified Filtrexx® FilterMedia™.
2. Contractor is required to be a Filtrexx® Certified™ Installer as determined by Filtrexx® International, LLC (440-926-2607 or visit web site at Filtrexx.com). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application (current list of installers can be found at www.filtrexx.com). Look for the Filtrexx® Certified™ Installer Seal.

3. Filtrexx® Inlet protection shall be placed at locations indicated on plans as directed by the Engineer. Inlet protection should be installed in a pattern that allows complete protection of the inlet area.
4. Installation of curb Inlet protection will ensure a minimal overlap of at least 1 ft (300mm) on either side of the opening being protected. The Inlet protection will be anchored to the soil behind the curb using staples, stakes or other devices capable of holding the Inlet protection in place.
5. Standard Inlet protection for curb inlet protection and curb sediment containment will use 8 in (200mm) diameter Inlet protection, and drain inlets on soil will use 12 in (300mm) or 18 in (450mm) diameter Inlet protection. In severe flow situations, larger Inlet protection may be specified by the Engineer. During curb installation, Inlet protection shall be compacted to be slightly shorter than curb height.
6. If Inlet protection becomes clogged with debris and sediment, they shall be maintained so as to assure proper drainage and water flow into the storm drain. In severe storm events, overflow of the Inlet protection may be acceptable in order to keep the area from flooding.
7. Curb and drain Inlet protection shall be positioned so as to provide a permeable physical barrier to the drain itself, allowing sediment to collect on the outside of the Inlet protection.
8. For drains and inlets that have only curb cuts, without street grates, a spacer is required in order to keep the Inlet protection away from the drain opening. This spacer should be a hog wire screen bent to overlap the grate opening and keep the sock from falling into the opening. Use at least one spacer for every 4 ft (1.2m) of curb drain opening. The wire grid also prevents other floatable waste from passing over the Inlet protection.
9. Stakes shall be installed through the middle of the drain Inlet protection on 5 ft (1.5m) centers, using 2 in (50mm) x 2 in (50mm) x 3 ft (1m) wood stakes.
10. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.

INSPECTION AND MAINTENANCE

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. Inlet protection should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional Inlet protection may be required or sediment removal may be necessary. Inlet protection shall be inspected until contributing drainage area has been permanently stabilized and construction activity has ceased

1. The Contractor shall maintain the Inlet protection in a functional condition at all times and it shall be routinely inspected.
2. If the Inlet protection has been damaged, it shall be repaired, or replaced if beyond repair.
3. The Contractor shall remove sediment at the base of the upslope side of the Inlet protection when accumulation has reached 1/2 of the effective height of the Inlet protection, or as directed by the Engineer. Alternatively, for drain Inlet protection a new Soxx™ may be placed on top of the original increasing the sediment storage capacity without soil disturbance.
4. Inlet protection shall be maintained until disturbed area above or around the device has been permanently stabilized and construction activity has ceased.
5. Regular maintenance includes lifting the Inlet protection and cleaning around and under them as sediment collects.
6. The FilterMedia™ will be removed from paved areas or dispersed on site soil or behind curb once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.

Table 2.4 Spacing for Curb Sediment Containment Systems.

Grade (%)	Spacing (ft)	Spacing (mm)
0.5	100	30
1.0	50	15
2.0	25	8
3.0	16	5
4.0	13	4
5.0	10	3

Source: Fifield, 2001.

Figure 2.1. Engineering Design Drawing for Curb and Drain Inlet Protection

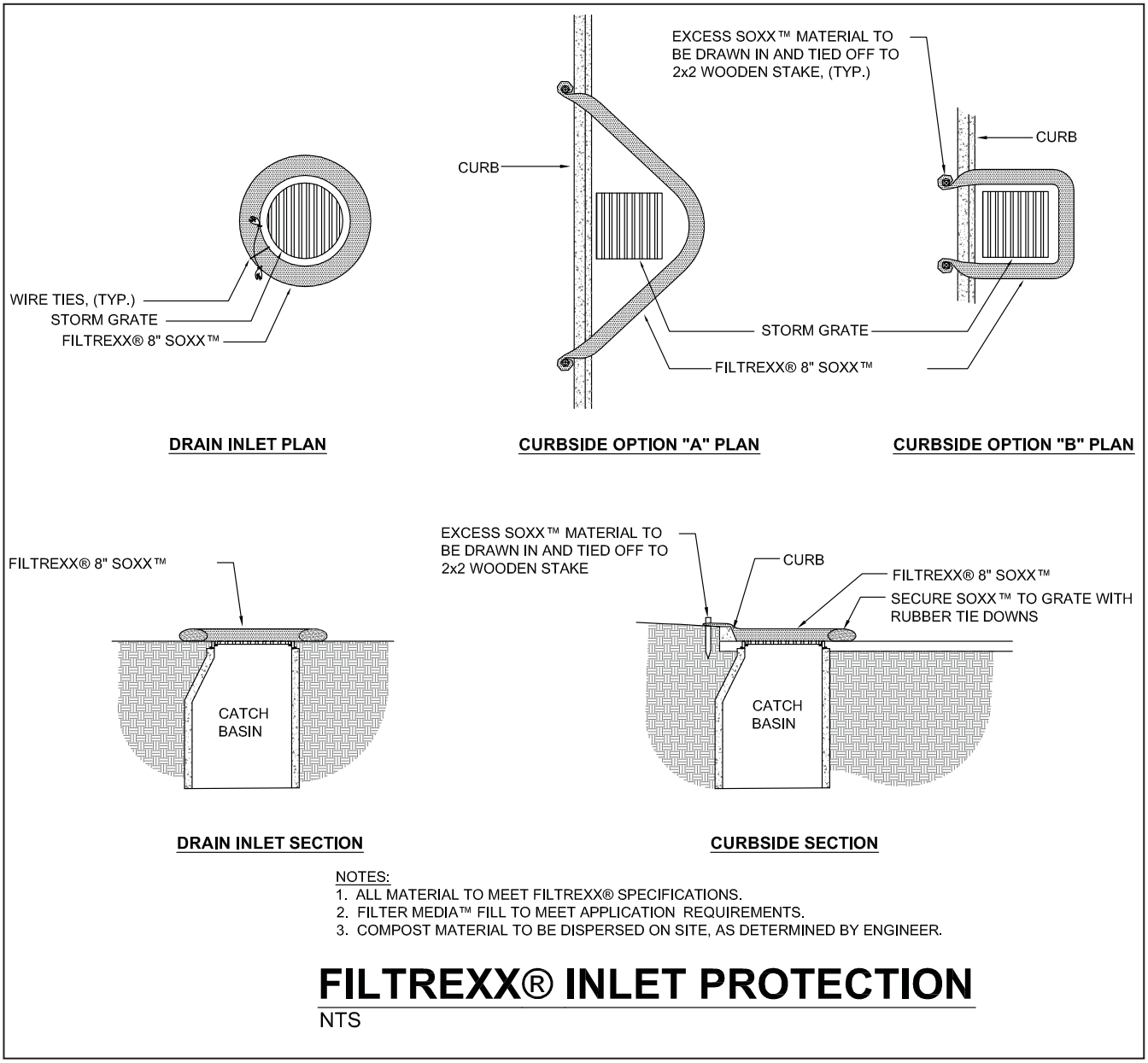
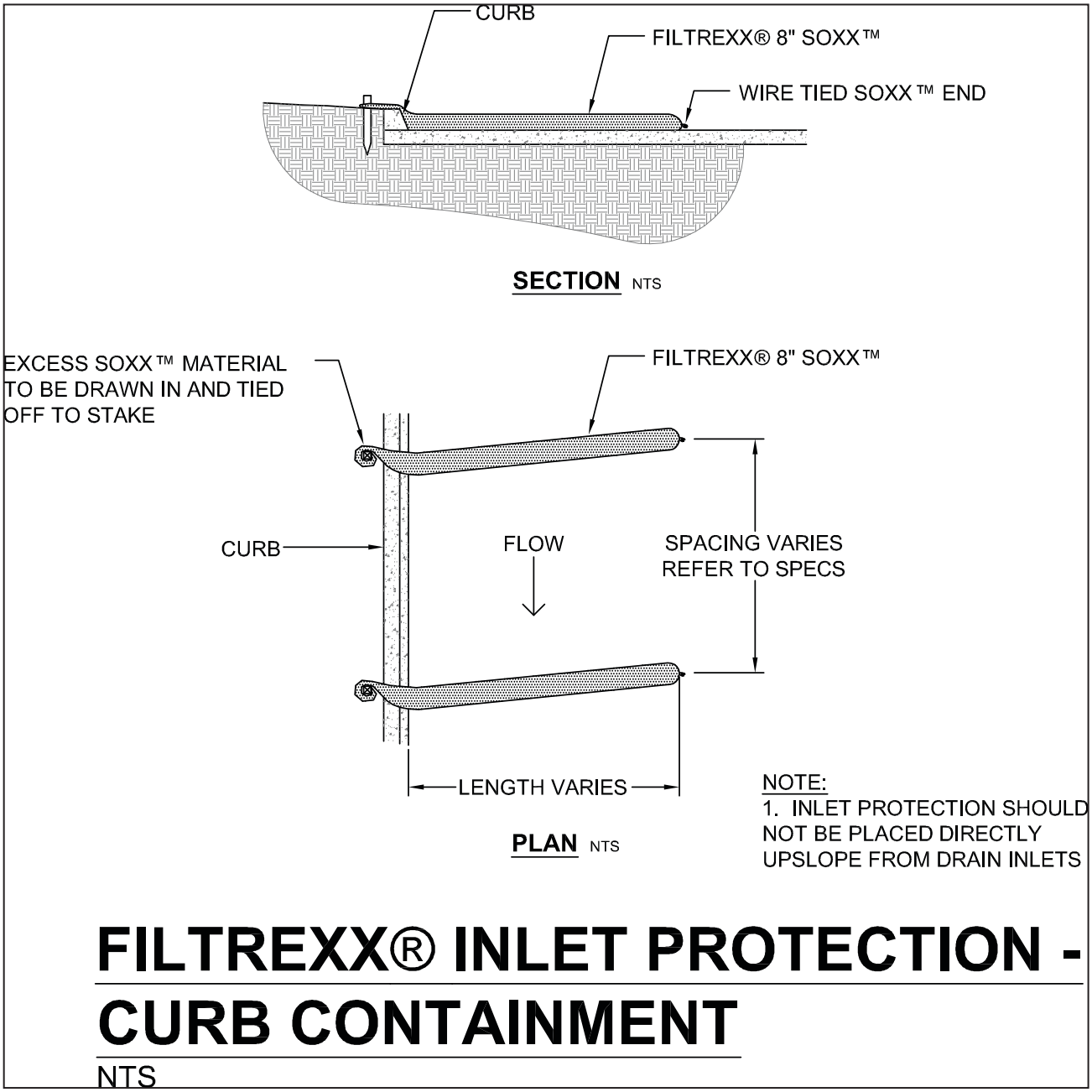


Figure 2.2. Engineering Design Drawing for Curb Sediment Containment Inlet Protection



Design and Maintenance of Subsurface Gravel Wetlands

February 4, 2015

The University of New Hampshire Stormwater Center conducted a design and maintenance review of subsurface gravel wetland systems for the New Hampshire Department of Transportation. The UNHSC utilized various NHDOT site and construction plans, construction photo documentation, cost and material specification sheets, and the NHDOT subsurface gravel wetland (SGW) design specification dated December 20, 2013. The UNHSC also conducted inspections of subsurface gravel wetland systems that were designed and installed by the NHDOT or its contractors in order to determine maintenance needs. The UNHSC prepared this report as a resource for SGW designers and installers to assist in the design, cost and material specification, and maintenance requirements to ensure a properly functioning SGW system.

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1.0 Introduction

The UNHSC appreciates the opportunity to provide Design and Maintenance Review services for the New Hampshire Department of Transportation. We have completed our review and site visits of NHDOT SGW installations and offer the following summary.

Information Reviewed:

- Various Site Plans prepared by NHDOT and various assisting engineering firms
- Construction Management photos provided by NHDOT
- Costs and material specifications compiled by NHDOT
- NHDOT Subsurface Gravel Wetland Design, dated December 20, 2013

2.0 Background

The subsurface gravel wetland (SGW) stormwater management system has been around for almost 20 years. It approximates the look and function of a natural wetland, effectively removing sediments and other pollutants commonly found in runoff while enhancing the visual appeal of the landscape by adding buffers or greenscape to urban areas. The SGW specification used by NHDOT represents the original specification developed by the University of New Hampshire Stormwater Center (UNHSC) and documented in the UNHSC SGW Design Specifications published in June of 2009. These specifications reflect findings from five years of study of the SGW originally designed and evaluated at UNHSC. The SGW is a horizontal-flow filtration system and should not be confused with stormwater wetlands that function more like ponds. Instead, the SGW includes a dense root mat in a wetland soil that forms a cover over crushed stone. The subsurface crushed stone is the primary flow path for stormwater and is an anaerobic microbe-rich environment for improving water quality. Like other filtration systems, it demonstrates a tremendous capacity to reduce runoff peak flows and improve water quality.

3.0 Implementation

Subsurface gravel wetlands can be used in many regions, with the exception of those that are too arid to support a wetland system. SGW systems have demonstrated exceptional stormwater quality treatment, in particular for nutrients, for a range of land uses including linear transportation environments. It should be noted that as implementation has progressed and coupled with an additional five years of research at the UNHSC, additional findings and design modifications have arisen. The initial design of the UNHSC SGW was to handle runoff from a commuter parking area, best represented by a high density commercial use. In such applications SGW systems are space intensive; however for linear transportation environments some flexibility is expected. Recommendations and comments provided herein reflect additional learning and research findings gathered since the original publication of the UNHSC 2009 SGW specification.

1.) The purpose of the NHDOT underdrain systems is to intercept and provide drainage for seasonal high ground water levels where deemed to be within 0.5' of the wetland soil surface elevation. The rationale is not well defined and requires justification. For systems that are installed within proximity to seasonal high groundwater (SHGW) it is unclear how the benefits of the flushing basins justify overall costs (average cost savings: $1,069 per system). The SGW low flow orifice not only controls the stormwater flow through the system, by this hydraulic control will also ultimately control SHGW elevation in the vicinity of the SGW in the same manner. An SGW may have a portion of the system built below the SHGW. The original SGW at the UNHSC site in Durham, NH is a case in point. A caution is noted in that groundwater flows should not be significant compared to the stormwater flows. Significant groundwater inflows could prevent the formation of the anaerobic zone in the crushed stone.

2.) Overall system sizing for NHDOT systems appears to be based on the UNHSC 2009 SGW drainage design guidance with respect to overall length to width (L:W) ratio. In some locations L:W ratio dominates design orientation. UNHSC researchers recommend that this design criterion not be considered the most critical design element. The critical design element with respect to configuration is to size the system to treat the desired design rainfall depth from the contributing drainage area (1" Water Quality Volume). Linear systems are fine (higher L:W), provided the minimum WQV: Internal Storage Reservoir (ISR) capacity ratio is 4:1 or 25% (WQV:ISR) and the minimum flow path in the crushed stone in each cell is 15 feet.

3.) Most inspected forebays appear to function as wet basins rather than the more desirable dry basin. Dry forebays promote aerobic transformations of nitrogen which is an important first step prior to the anaerobic zone. It is recommended that if forebays cannot be economically installed to operate dry then concrete inlet structures such as off-line deep sump catch basins be used for pre-treatment as opposed to a forebay structure. A deep sump catch basin or other precast inlet structure may also be easier to maintain. A very important function of any SGW forebay is that it be aerobic in order to convert most forms of nitrogen to nitrate or nitrite.

4.) Most forebay outlets lack low flow conveyance which causes them to function as wet basins as opposed to dry basins. It is important that regardless of the configuration of the pretreatment structure that the SGW system forebay contain an outlet with an invert at the same level as the wetland surface to eliminate ponding behind the forebay berm such that obligate wetland plant colonization (cattails) and the potential for anaerobic conditions do not occur. Other options are to design the forebays to convey low flows that draw the fore bay water level down between storm events.

5.) Hydraulic inlets (leaching chambers) appear to be oversized. There are many hydraulic inlet design configurations that may be able to replace existing designs with better function and maintenance capacity and diminished costs. NHDOT SGW systems observed in this study, small and large, seem to use similar hydraulic inlet configurations

with the same number of structures regardless of watershed area size or design treatment volume. UNHSC research indicates the hydraulic inlet configuration can be flexible provided it has a greater hydraulic capacity/efficiency than the primary outlet orifice control. Recent experience in UNHSC designs have used slotted hydraulic inlet pipes as a backup inlet with a primary inlet composed of woven geotextile laid on the subsurface pea stone and covered in 6”-8“ diameter stone around the outfall of the inlet pipe (see figures 1 and 2). This configuration protects the stone filter in the subsurface of the wetland system while also providing a more accessible and maintainable surface hydraulic inlet feature that will inevitably be easier and less costly to construct.

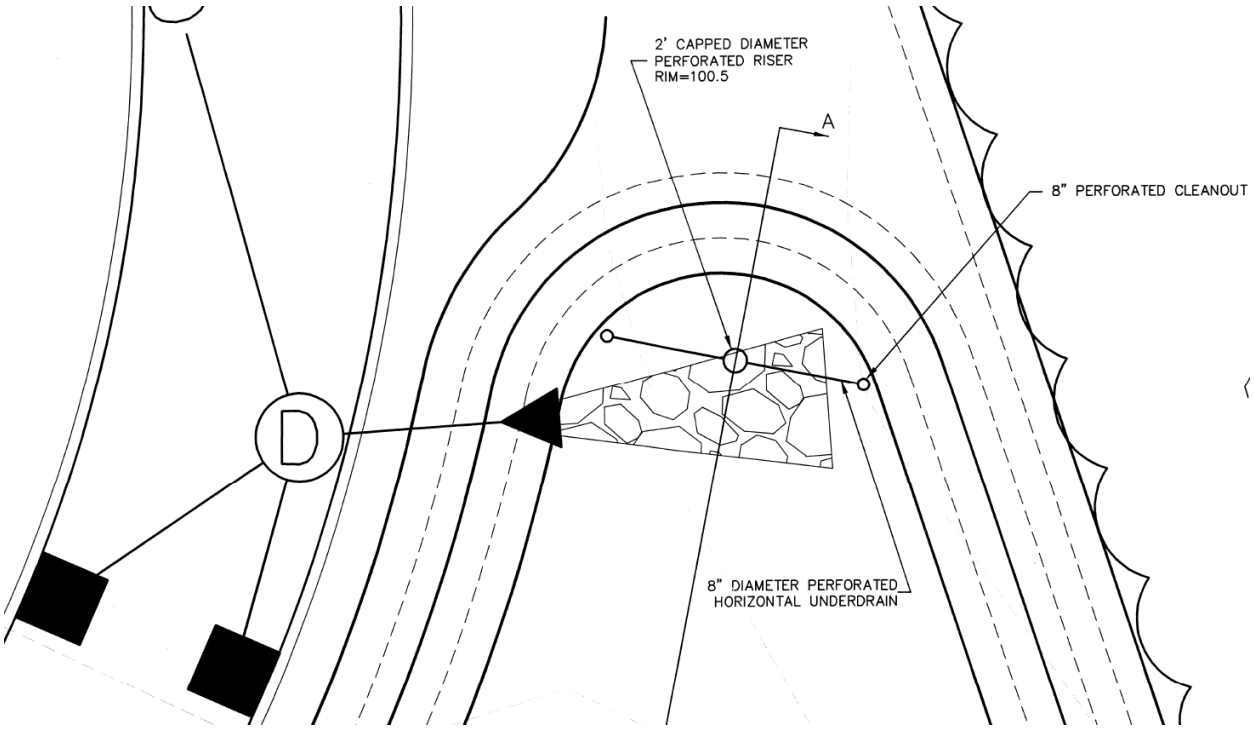

Figure 1: Typical plan view of multi-inlet configuration of a SGW system

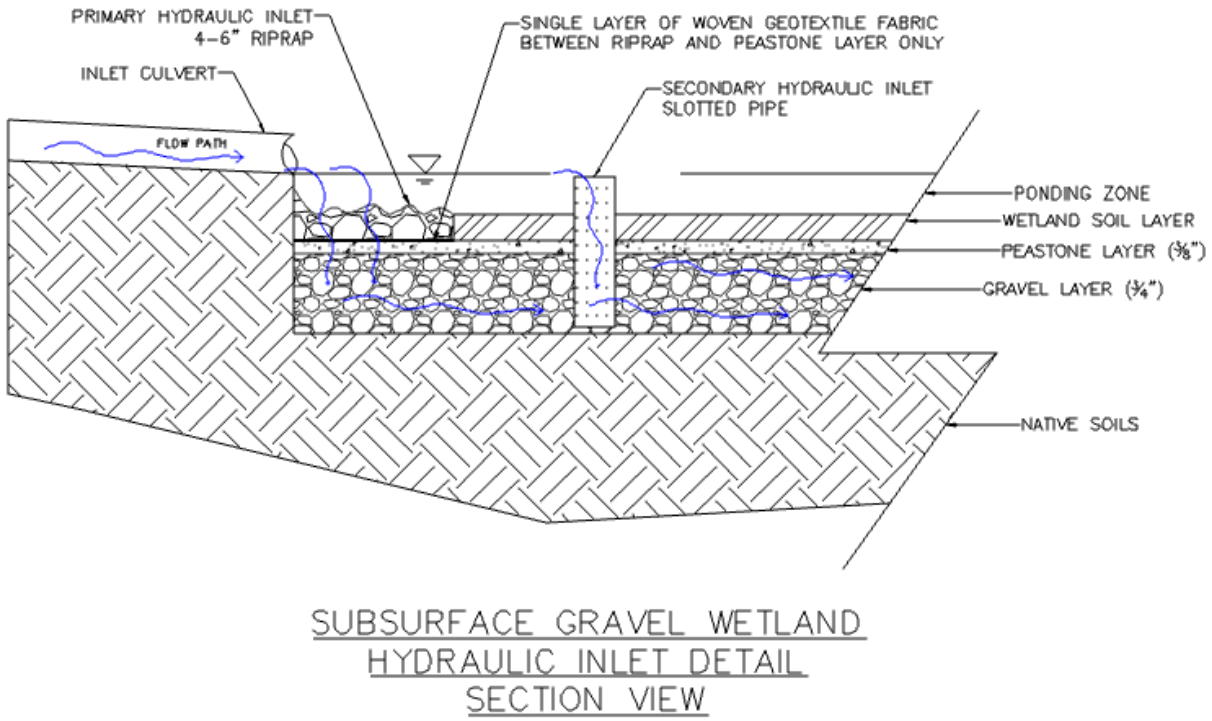

Figure 2: Typical profile view of multi-inlet configuration of a SGW system.

6.) Cleanout structures (leaching chambers) need not be as large since their primary function is for emergency access to the subsurface header pipe that directs flow either to the second wetland chamber or the outlet structure. Cleanout structures can be capped or be installed at the wetland surface grade with a manhole cover to ensure that the cleanouts are accessible, water tight, and does not short circuit system hydraulics.

7.) Some of the outlet control structures have slotted inlets (4" high by 12" wide) to allow for drainage of high flows. These slots need to be protected by covering them with 6-8" stone or some type of trash screen. This will prevent trash, leaves, or other debris from clogging the outlet orifice.

4.0 Costs

For this project NHDOT produced itemized costs associated with the bid prices for the materials and installation of thirteen SGW systems. In meetings with NHDOT personnel several items were determined to be irrelevant to this project and were thus eliminated from the spreadsheet. These items are itemized in the list below:

- 206.1 (Common Structure Excavation) and 206.2 (Rock Structure Excavation) were determined to be unique and not standard items and eliminated

- 209.1 (Granular Backfill) was determined to reflect typical stabilization for bedding material and were eliminated
- 593.331 (Geotextile, Stabilization, Class 3, Non-woven) was determined to be no longer used, and was replaced with Item 585.7 (Stone Fill, Class G) and thus eliminated
- 593.411 (Geotextile, Permeability Control, Class 1, Non-woven), 593.421 (Geotextile, Permeability Control, Class 2, Non-woven), 593.431 (Geotextile, Permeability Control, Class 3, Non-woven) were determined to be erosion control items and were eliminated
- 603.83206 (6" Plastic Pipe, Smooth Interior), 605.906 (6" Pipe Underdrain, Contractors' Option) were determined to be irrelevant to the SGW construction costs and were thus eliminated.

To compare costs, all original capital construction costs were converted to 2014 dollars using consumer price index inflation rates (USDOL, 2014). Average SGW materials and installation costs from the range of assessed projects (see attachment A for the raw costs) was $32,462 per impervious acre treated ($0.75/sf) with a maximum cost of $68,893 per impervious acre treated ($1.47/sf) and a minimum cost of $12,210 per impervious acre treated ($0.28/sf). As a comparison, for the SGW studied at the UNH field facility, costs were calculated at $28,079 per impervious acre treated ($0.64/sf). Cost details are illustrated in Table 1.

Table 1: Comparison of unit costs from all reviewed NHDOT SGW materials cost data and reference information documented by UNHSC. Note all costs are in 2014 dollars

Total Price Statistics	Contributing Impervious Area (A)	Construction Cost per Impervious Area ($/A)	Construction Cost per Impervious Area ($/sf)	UNHSC Costs ($/A)	UNHSC Costs ($/sf)
Minimum	1.90	$ 12,210	$ 0.28	-	-
Average	4.56	$ 32,462	$ 0.75	$28,079	$ 0.64
Maximum	8.40	$ 63,893	$ 1.47	-	-

Results of the cost assessment indicate room for potential savings with respect to design. In light of the detailed recommendations outlined in the Implementation section of this report, cost adjustments and justifications include:

Eliminate items 605.79 and 605.82251-24 (perimeter dewatering controls) for use if SHGW is within 0.5' of SGW surface. There is no data or clear rationale for any threat from SHGW in SGW systems. SHGW levels are often intermittent and would ultimately be controlled by the outlet orifice which is typically 0.5 to 0.67' below SGW surface. Therefore this item is redundant and further justification is necessary to validate the additional expense. Cost savings is estimated at 3.3% or $1,069 per system.

Reduce the number of item numbers 604.921 and 604.922 (alt: 604.193, 604.393, and 604.912) leaching chambers. Hydraulic inlet controls could be reduced if not eliminated in the future as linear routing through the system is adapted in future designs. Other hydraulic inlet controls such as suggested in the Implementation section of this report may be less expensive and offer

greater maintainability. There is no clear rationale for these structures at the end of each wetland cell as their only function is to provide access to the perforated header pipe in the subsurface as a potential clean out. At the end of the wetland cell these can simply be solid risers capped at the wetland surface. At the upstream end of each wetland cell, hydraulic inlets should be reduced to two if not eliminated and replaced with alternative inlet structures. Hydraulic inlet capacity need only exceed that of the outlet orifice. Cost savings is estimated at 10% or $3,201 per system.

Items 647.1 (Humus) and 647.29 (Wetland Humus) incurred high variability with respect to cost and in some systems had some of the largest percent costs (>12%) than any additional line items. There is no specification for the wetland humus in the NHDOT SGW design guidelines dated December 20, 2013 and the wetland soil specification in the UNHSC 2009 guidance is weak without sufficient detail to allow for accurate and cost effective bidding. Subsequent to this report UNHSC has worked to develop a particle size distribution for use in specifying wetland humus in future SGW systems. The proposed PSD for wetland humus is provided in Table 2 and reflects a poorly drained soil with a d50 of 0.15 mm and is a clay or silt loam in the soil textural triangle. We feel that this will allow for more cost effective bidding of appropriate soil types with the potential to even employ appropriate onsite excavated materials into select humus mixes thereby further reducing costs. We believe with these additional specifications it is not unrealistic to assume a future price of $15/CY, which represents the 25% quartile cost of the original line item. Cost savings is estimated at 0.5% or $164 per system.

Table 2: Particle size distribution and testing tolerances for wetland humus for the subsurface gravel wetland system

US Standard Sieve Size in/mm	Percent Passing	Percent Passing Testing Tolerances
0.5/12.5	100	± 10.0
#10/2.00	90 - 75	± 5.0
#100/0.15	40-50	± 5.0
#200/0.75	25-50	± 5.0

Relative cost savings are summarized in table 3.

Table 3: Comparison of unit costs from all reviewed SGW materials cost data with projected cost savings from recommended itemized design modifications. Note all costs are amortized to reflect 2014 dollars.

Total Price Statistics	Contributing Impervious Area (A)	Construction Cost per Impervious Area ($/A)	Construction Cost per Impervious Area ($/sf)	UNHSC Costs ($/A)	UNHSC Costs ($/sf)
Minimum	1.90	$ 7,895	$ 0.18	-	-
Average	4.56	$ 27,320	$ 0.63	$28,079	$0.64
Maximum	8.40	$ 53,780	$ 1.23	-	-

5.0 Maintenance

Inspection and maintenance is a critical component of the long term function and effectiveness of any stormwater control measure. Overall the UNHSC inspections of the facilities proved that the SGW systems were largely functioning properly and were well designed and constructed. The UNHSC has produced operation and maintenance guidelines as well as an inspection checklist which have been provided in attachment A of this report. Inspection is critical to assess as built functionality in addition to identifying unique maintenance tasks that may be less general in nature and more site specific. Overall the inspections conducted and provided as an attachment to this report (attachment B) indicates that routine biannual inspection (annual as a minimum) should be initiated at these facilities as a standard of practice. Post construction inspections are critical just after newly constructed SGW system is placed online. While some long-term maintenance items are due to system aging and processing of polluted runoff, some operation issues are a result of construction and installation practices not fully aligned with design specifications. These items are often quickly identifiable. In our assessment of eight NHDOT SGW systems two main issues were identified associated with installation or construction. First numerous pre-treatment forebays in observed systems held ponding water. This impacts the overall chemical function and processing of dissolved inorganic nitrogen species as these ponded forebay areas often turn into anaerobic areas of obligate wetland plants. Second on one particular system (NHDOT # 14633F BMP 19) three to five inches of standing water was observed within the entire system. The final water elevation was being controlled by an outlet pipe invert that was installed above the overall wetland soil elevation. This has resulted in sparse vegetation and likely was not part of the original design.

Beyond construction and installation issues the primary maintenance need identified through these inspections is simple maintenance of the established wetland vegetation. Numerous facilities are in need of this type of maintenance which involves cutting the existing plants down to the base and removing it from the system to prevent breakdown and rerelease of nitrogen.

Attachment A: Raw Item Costs

P. Salo 12/3/2013

SUBSURFACE GRAVEL WETLANDS (13933C/ DB 920)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	16,603	$4.75	$78,864.25
Item 203.6 - Embankment-in-Place (CY)	245	$8.95	$2,192.75
Item 203. 52 - Impervious Material (CY)	500	$14.00	$7,000.00
Item 585.3- Stone Fill, Class C (CY)	83	$18.00	$1,494.00
Item 585.5 - Stone Fill, Class E (CY)	900	$18.00	$16,200.00
Item 585.7 - Stone Fill, Class G (CY)	120	$24.00	$2,880.00
Item 593.411 - Geotextile, Perm. Control, Cl. 1, Non-woven (SY)	215	$2.10	$451.50
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	283	$33.00	$9,339.00
Item 604.91X - Outlet Control Structure (U)	2	$5,800.00	$11,600.00
Item 604.193 - Special Catch Basin (3' Dia) (U)	8	$3,300.00	$26,400.00
Item 604.393 - Specia Drain Manhole 3'x 3' (U)	3	$2,600.00	$7,800.00
Item 605.508 - 8" Perf. Corr. Poly. Pipe Underdrain (LF)	592	$22.00	$13,024.00
Item 605.79 - Underdrain Flushing Basins (EA)	10	$660.00	$6,600.00
Item 605.906 - 6" Pipe Underdrain (Contractor's Option)	506	$16.00	$8,096.00
Item 646.3 - Turf Establishment w/ Mulch & Tackifiers (A)	0.48	$1,650.00	$792.00
Item 647.1 - Humus (CY)	1,900	$15.00	$28,500.00
Item 647.29 - Wetland Humus (CY)	330	$15.00	$4,950.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$225.00	$225.00
Total			**$226,408.50**

P. Salo 12/2/2013

SUBSURFACE GRAVEL WETLANDS (13455A/ GW)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	5,776	$9.75	$56,316.00
Item 203.2 - Rock Excavation (CY)	2,241	$29.00	$64,989.00
Item 203.6 - Embankment-in-Place (CY)	317	$6.25	$1,981.25
Item 203. 53 - Low Permeability Fill (CY)	255	$8.80	$2,244.00
Item 520.1 - Concrete Class A (CY)	6	$375.00	$2,250.00
Item 585.3- Stone Fill, Class C (CY)	131	$34.50	$4,519.50
Item 585.5 - Stone Fill, Class E (CY)	370	$31.00	$11,470.00
Item 585.7 - Stone Fill, Class G (CY)	62	$34.25	$2,123.50
Item 593.421 - Geotextile, Perm. Control, Cl. 2, Non-woven (SY)	502	$2.00	$1,004.00
Item 603.80012 - 12" Plastic Pipe (LF)	31	$40.00	$1,240.00
Item 604.91X - Outlet Control Structure (U)	1	$4,850.00	$4,850.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$1,700.00	$10,200.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$1,850.00	$9,250.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	204	$19.50	$3,978.00
Item 647.1 - Humus (CY)	244	$14.00	$3,416.00
Item 647.29 - Wetland Humus (CY)	123	$16.00	$1,968.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$250.00	$250.00
Total			**$182,049.25**

P. Salo 12/2/2013

SUBSURFACE GRAVEL WETLANDS (10620L/ GW)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203. 52 - Impervious Material (CY)	1,919	$18.05	$34,637.95
Item 585.2 - Stone Fill, Class B (CY)	56	$19.15	$1,072.40
Item 585.3- Stone Fill, Class C (CY)	278	$40.25	$11,189.50
Item 585.5 - Stone Fill, Class E (CY)	46	$45.90	$2,111.40
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	200	$6.00	$1,200.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	50	$32.15	$1,607.50
Item 604.91X - Outlet Control Structure (U)	1	$2,045.00	$2,045.00
Item 604.921 - Leaching Chamber, Type 1 (U)	4	$3,080.00	$12,320.00
Item 604.922 - Leaching Chamber, Type 2 (U)	4	$2,950.00	$11,800.00
Item 605.512 - 12" Perf. Corr. Poly. Pipe Underdrain (LF)	187	$15.75	$2,945.25
Item 647.29 - Wetland Humus (CY)	93	$35.00	$3,255.00
Total			**$84,184.00**

There was no earthwork specifcally attributable to the gravel wetland. It is essentially constructed on top of the existing ground between the Rte. 16 NB slope work and the Exit 15 on ramp slope work.

P. Salo 12/2/2013

SUBSURFACE GRAVEL WETLANDS (10418G/ GW)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	5,978	$8.00	$47,824.00
Item 203.6 - Embankment-in-Place (CY)	8	$5.00	$40.00
Item 203. 52 - Impervious Material (CY)	1,415	$18.00	$25,470.00
Item 206.1 - Common Structure Excavation (CY)	1,225	$16.00	$19,600.00
Item 585.3- Stone Fill, Class C (CY)	21	$30.00	$630.00
Item 585.5 - Stone Fill, Class E (CY)	1,141	$30.00	$34,230.00
Item 593.331 - Geotextile, Stabilization, Cl. 3, Non-woven (SY)	1,711	$3.00	$5,133.00
Item 603.83206 - 6" Plastic Pipe (Smooth Interior) (LF)	55	$24.00	$1,320.00
Item 604.91X - Outlet Control Structure (U)	1	$2,400.00	$2,400.00
Item 604.921 - Leaching Chamber, Type 1 (U)	4	$3,000.00	$12,000.00
Item 604.922 - Leaching Chamber, Type 2 (U)	2	$3,000.00	$6,000.00
Item 605.906 - 6" Pipe Underdrain (Contractors Option) (LF)	602	$16.00	$9,632.00
Item 605.79 - Underdrain Flushing Basins (EA)	8	$600.00	$4,800.00
Item 647.29 - Wetland Humus (CY)	380	$25.00	$9,500.00
Total			**$178,579.00**

P. Salo 12/3/2013

SUBSURFACE GRAVEL WETLANDS (11238L/ BMP 1590)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	3,933	$4.00	$15,732.00
Item 203.6 - Embankment-in-Place (CY)	184	$2.00	$368.00
Item 203. 52 - Impervious Material (CY)	1,530	$15.00	$22,950.00
Item 206.2- Rock Structure Excavation (CY)	27	$30.00	$810.00
Item 520.1 - Concrete Class A (CY)	5	$500.00	$2,700.00
Item 585.3- Stone Fill, Class C (CY)	90	$30.00	$2,700.00
Item 585.5 - Stone Fill, Class E (CY)	182	$28.00	$5,096.00
Item 585.7 - Stone Fill, Class G (CY)	30	$40.00	$1,200.00
Item 593.411 - Geotextile, Perm. Control, Cl. 1, Non-woven (SY)	192	$2.25	$432.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	20	$32.00	$640.00
Item 604.91X - Outlet Control Structure (U)	1	$3,000.00	$3,000.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$1,250.00	$7,500.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$1,250.00	$6,250.00
Item 605.512 - 12" Perf. Corr. Poly. Pipe Underdrain (LF)	125	$25.00	$3,125.00
Item 646.31 - Turf Establishment w/ Mulch & Tackifiers (SY)	1,482	$0.35	$518.70
Item 647.1 - Humus (CY)	78	$20.00	$1,560.00
Item 647.29 - Wetland Humus (CY)	103	$35.00	$3,605.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$500.00	$500.00
Total			**$78,686.70**

P. Salo 12/3/2013

SUBSURFACE GRAVEL WETLANDS (11238L/ BMP 922)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	3,822	$4.00	$15,288.00
Item 203.6 - Embankment-in-Place (CY)	467	$2.00	$934.00
Item 206.1 - Common Structure Excavation (CY)	5	$30.00	$150.00
Item 520.1 - Concrete Class A (CY)	4	$500.00	$2,000.00
Item 585.3- Stone Fill, Class C (CY)	22	$30.00	$660.00
Item 585.5 - Stone Fill, Class E (CY)	420	$28.00	$11,760.00
Item 585.7 - Stone Fill, Class G (CY)	69	$40.00	$2,760.00
Item 593.411 - Geotextile, Perm. Control, Cl. 1, Non-woven (SY)	96	$2.25	$216.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	41	$32.00	$1,312.00
Item 604.91X - Outlet Control Structure (U)	1	$3,000.00	$3,000.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$1,250.00	$7,500.00
Item 604.922 - Leaching Chamber, Type 2 (U)	6	$1,250.00	$7,500.00
Item 605.512 - 12" Perf. Corr. Poly. Pipe Underdrain (LF)	306	$25.00	$7,650.00
Item 605.79 - Underdrain Flushing Basins (EA)	2	$500.00	$1,000.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	565	$25.00	$14,125.00
Item 646.31 - Turf Establishment w/ Mulch & Tackifiers (SY)	3,262	$0.35	$1,141.70
Item 647.1 - Humus (CY)	89	$20.00	$1,780.00
Item 647.29 - Wetland Humus (CY)	304	$35.00	$10,640.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$500.00	$500.00
Total			**$89,916.70**

SUBSURFACE GRAVEL WETLANDS (14633F/ BMP 19)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	2,396	$4.00	$9,584.00
Item 203.6 - Embankment-in-Place (CY)	468	$3.15	$1,474.20
Item 203. 52 - Impervious Material (CY)	582	$15.00	$8,730.00
Item 520.1 - Concrete Class A (CY)	10	$180.00	$1,800.00
Item 585.3- Stone Fill, Class C (CY)	108	$26.00	$2,808.00
Item 585.5 - Stone Fill, Class E (CY)	267	$25.00	$6,675.00
Item 585.7 - Stone Fill, Class G (CY)	44	$35.00	$1,540.00
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	281	$3.00	$843.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	50	$21.00	$1,050.00
Item 604.91X - Outlet Control Structure (U)	1	$4,000.00	$4,000.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$980.00	$5,880.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$960.00	$4,800.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	192	$15.00	$2,880.00
Item 605.79 - Underdrain Flushing Basins (EA)	2	$300.00	$600.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	429	$20.00	$8,580.00
Item 647.1 - Humus (CY)	233	$20.00	$4,660.00
Item 647.29 - Wetland Humus (CY)	292	$12.50	$3,650.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$110.00	$110.00
Total			**$69,664.20**

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SUBSURFACE GRAVEL WETLANDS (14633E/ BMP 17)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	7,638	$3.75	$28,642.50
Item 203.2 - Rock Excavation (CY)	1,923	$10.75	$20,672.25
Item 203.6 - Embankment-in-Place (CY)	4,211	$4.90	$20,633.90
Item 203. 52 - Impervious Material (CY)	1,746	$12.00	$20,952.00
Item 520.1 - Concrete Class A (CY)	23	$525.00	$12,075.00
Item 585.3- Stone Fill, Class C (CY)	194	$25.00	$4,850.00
Item 585.5 - Stone Fill, Class E (CY)	317	$30.00	$9,510.00
Item 585.7 - Stone Fill, Class G (CY)	52	$40.00	$2,080.00
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	580	$2.00	$1,160.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	38	$24.00	$912.00
Item 604.91X - Outlet Control Structure (U)	1	$2,900.00	$2,900.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$1,115.00	$6,690.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$1,070.00	$5,350.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	369	$10.50	$3,874.50
Item 605.79 - Underdrain Flushing Basins (EA)	6	$240.00	$1,440.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	718	$21.00	$15,078.00
Item 647.29 - Wetland Humus (CY)	289	$20.00	$5,780.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$500.00	$500.00
Total			**$163,100.15**

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SUBSURFACE GRAVEL WETLANDS (14633F/ BMP 16)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	3,498	$4.00	$13,992.00
Item 203.2 - Rock Excavation (CY)	3,532	$9.00	$31,788.00
Item 203.6 - Embankment-in-Place (CY)	25	$3.15	$78.75
Item 203. 52 - Impervious Material (CY)	3,435	$15.00	$51,525.00
Item 206.2- Rock Structure Excavation (CY)	39	$17.00	$663.00
Item 209.1 - Granular Backfill (CY)	7	$28.00	$196.00
Item 520.1 - Concrete Class A (CY)	7	$180.00	$1,260.00
Item 585.2 - Stone Fill, Class B (CY)	202	$20.00	$4,040.00
Item 585.3- Stone Fill, Class C (CY)	106	$26.00	$2,756.00
Item 585.5 - Stone Fill, Class E (CY)	667	$25.00	$16,675.00
Item 585.7 - Stone Fill, Class G (CY)	111	$35.00	$3,885.00
Item 593.411 - Geotextile, Perm. Control, Cl. 1, Non-woven (SY)	222	$3.00	$666.00
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	273	$3.00	$819.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	72	$21.00	$1,512.00
Item 604.91X - Outlet Control Structure (U)	2	$4,000.00	$8,000.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$980.00	$5,880.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$960.00	$4,800.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	360	$15.00	$5,400.00
Item 605.79 - Underdrain Flushing Basins (EA)	6	$300.00	$1,800.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	1,016	$20.00	$20,320.00
Item 647.1 - Humus (CY)	434	$20.00	$8,680.00
Item 647.29 - Wetland Humus (CY)	314	$12.50	$3,925.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$110.00	$110.00
Total			**$188,770.75**

SUBSURFACE GRAVEL WETLANDS (14633E/ BMP 14)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	4,570	$3.75	$17,137.50
Item 203.2 - Rock Excavation (CY)	572	$10.75	$6,149.00
Item 203.6 - Embankment-in-Place (CY)	23	$4.90	$112.70
Item 203. 52 - Impervious Material (CY)	1,049	$12.00	$12,588.00
Item 520.1 - Concrete Class A (CY)	16	$525.00	$8,400.00
Item 585.3- Stone Fill, Class C (CY)	183	$25.00	$4,575.00
Item 585.5 - Stone Fill, Class E (CY)	210	$30.00	$6,300.00
Item 585.7 - Stone Fill, Class G (CY)	35	$40.00	$1,400.00
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	550	$2.00	$1,100.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	34	$24.00	$816.00
Item 604.91X - Outlet Control Structure (U)	1	$2,900.00	$2,900.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$1,115.00	$6,690.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$1,070.00	$5,350.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	296	$10.50	$3,108.00
Item 605.79 - Underdrain Flushing Basins (EA)	2	$240.00	$480.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	256	$21.00	$5,376.00
Item 647.29 - Wetland Humus (CY)	106	$20.00	$2,120.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$500.00	$500.00
Total			**$85,102.20**

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SUBSURFACE GRAVEL WETLANDS (14633F/ BMP 13)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	8,865	$4.00	$35,460.00
Item 203.2 - Rock Excavation (CY)	1,679	$9.00	$15,111.00
Item 203.6 - Embankment-in-Place (CY)	568	$3.15	$1,789.20
Item 203. 52 - Impervious Material (CY)	4,102	$15.00	$61,530.00
Item 206.2- Rock Structure Excavation (CY)	64	$17.00	$1,088.00
Item 209.1 - Granular Backfill (CY)	9	$28.00	$252.00
Item 520.1 - Concrete Class A (CY)	8	$180.00	$1,440.00
Item 585.3- Stone Fill, Class C (CY)	159	$26.00	$4,134.00
Item 585.5 - Stone Fill, Class E (CY)	922	$25.00	$23,050.00
Item 585.7 - Stone Fill, Class G (CY)	165	$35.00	$5,775.00
Item 593.431 - Geotextile, Perm. Control, Cl. 3, Non-woven (SY)	447	$3.00	$1,341.00
Item 603.83212 - 12" Plastic Pipe (Smooth Interior) (LF)	72	$21.00	$1,512.00
Item 604.91X - Outlet Control Structure (U)	2	$4,000.00	$8,000.00
Item 604.921 - Leaching Chamber, Type 1 (U)	6	$980.00	$5,880.00
Item 604.922 - Leaching Chamber, Type 2 (U)	5	$960.00	$4,800.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	384	$15.00	$5,760.00
Item 605.79 - Underdrain Flushing Basins (EA)	5	$300.00	$1,500.00
Item 605.82251 - 24" Agg. Und. Type 2 w/ 6" Perf. Corr. PE Pipe (LF)	994	$20.00	$19,880.00
Item 647.1 - Humus (CY)	640	$20.00	$12,800.00
Item 647.29 - Wetland Humus (CY)	467	$12.50	$5,837.50
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$110.00	$110.00
Total			**$217,049.70**

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SUBSURFACE GRAVEL WETLANDS (13742B/ GW #2)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	2,172	$5.00	$10,860.00
Item 203.6 - Embankment-in-Place (CY)	51	$5.00	$255.00
Item 203. 52 - Impervious Material (CY)	462	$14.00	$6,468.00
Item 585.3- Stone Fill, Class C (CY)	93	$27.00	$2,511.00
Item 585.5 - Stone Fill, Class E (CY)	82	$34.00	$2,788.00
Item 585.7 - Stone Fill, Class G (CY)	14	$51.00	$714.00
Item 593.421 - Geotextile, Perm. Control, Cl. 2, Non-woven (SY)	314	$2.50	$785.00
Item 603.80012 - 12" Plastic Pipe (LF)	36	$27.00	$972.00
Item 604.91X - Outlet Control Structure (U)	1	$4,000.00	$4,000.00
Item 604.921 - Leaching Chamber Type 1 (U)	6	$1,350.00	$8,100.00
Item 604.912 - Leaching Chamber Type 2 (U)	5	$1,350.00	$6,750.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	109	$15.50	$1,689.50
Item 646.3 - Turf Establishment w/ Mulch & Tackifiers (A)	0.50	$1,775.00	$887.50
Item 647.29 - Wetland Humus (CY)	256	$19.00	$4,864.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$170.00	$170.00
Total			**$51,814.00**

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SUBSURFACE GRAVEL WETLANDS (13742B/ GW #1)			
Item	**Quantity**	**Bid Price**	**Total**
Item 203.1 - Common Excavation (CY)	1,150	$5.00	$5,750.00
Item 203.6 - Embankment-in-Place (CY)	831	$5.00	$4,155.00
Item 203. 52 - Impervious Material (CY)	924	$14.00	$12,936.00
Item 585.3- Stone Fill, Class C (CY)	98	$27.00	$2,646.00
Item 585.5 - Stone Fill, Class E (CY)	178	$34.00	$6,052.00
Item 585.7 - Stone Fill, Class G (CY)	30	$51.00	$1,530.00
Item 593.421 - Geotextile, Perm. Control, Cl. 2, Non-woven (SY)	333	$2.50	$832.50
Item 603.80012 - 12" Plastic Pipe (LF)	28	$27.00	$756.00
Item 604.91X - Outlet Control Structure (U)	1	$4,000.00	$4,000.00
Item 604.921 - Leaching Chamber Type 1 (U)	6	$1,350.00	$8,100.00
Item 604.912 - Leaching Chamber Type 2 (U)	5	$1,350.00	$6,750.00
Item 605.506 - 6" Perf. Corr. Poly. Pipe Underdrain (LF)	188	$15.50	$2,914.00
Item 646.3 - Turf Establishment w/ Mulch & Tackifiers (A)	0.40	$1,775.00	$710.00
Item 647.1 - Humus (CY)	330	$18.00	$5,940.00
Item 647.29 - Wetland Humus (CY)	60	$19.00	$1,140.00
Item 670.01 - Sediment Sump Measuring Post (EA)	1	$170.00	$170.00
Total			**$64,381.50**

Attachment B: Subsurface Gravel Wetland Inspection and Maintenance Guidance

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Gravel Wetland systems. It is the responsibility of the owner to maintain the Gravel Wetland in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and any changes or redevelopment in the upstream land use.

ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: Inspector:

Date: Time: Site Conditions:

Date Since Last Rain Event:

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	**S**	**U**	
Vegetation is established and thriving	**S**	**U**	
No evidence of holes in the wetland soil causing short-circuiting	**S**	**U**	
No evidence of erosion at inlet and outlet structures	**S**	**U**	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	**S**	**U**	
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	**S**	**U**	
No evidence of erosion	**S**	**U**	
3. Drought Conditions (As needed)			
Water plants as needed	**S**	**U**	
Dead or dying plants	**S**	**U**	
4. Sedimentation Chamber or Forebay Inlet Inspection			
No evidence of sediment accumulation, trash, and debris.	**S**	**U**	
Good condition, no need for repair	**S**	**U**	
5. Vegetation Coverage			
50 % coverage established throughout system by first year	**S**	**U**	
Robust coverage by year 2 or later	**S**	**U**	
6. Inlet and Outlet Controls			
Flow is unobstructed in openings (grates, orifices, etc)	**S**	**U**	
Structures are operational with no evidence of deterioration	**S**	**U**	
7. Vegetation removal (once every 3 years)			
Prune dead, diseased, or decaying plants	**S**	**U**	

Corrective Action Needed	Due Date
1.	
2.	
3.	

Attachment C: Results of Subsurface Gravel Wetland Inspections

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Gravel Wetland systems. It is the responsibility of the owner to maintain the Gravel Wetland in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and any changes or redevelopment in the upstream land use.

ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 NB & SB Exit 5 Area DOT#: 14633F BMP 19 Inspector: Tim Puls
Date: 7/18/14 Time: 1:00PM Site Conditions: Poor
Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	**S**	**U**	Constructed 2013-2014
Vegetation is established and thriving	**S**	**U**	
No evidence of holes in the wetland soil causing short-circuiting	**S**	**U**	
No evidence of erosion at inlet and outlet structures	**S**	**U**	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	**S**	**U**	Standing water in fore bay & both cells, approx. 3-5”
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	**S**	**U**	
No evidence of erosion	**S**	**U**	
3. Drought Conditions (As needed)			Too much water. Plants are thin in areas where water has been pooling.
Water plants as needed	**S**	**U**	
Dead or dying plants	**S**	**U**	
4. Sedimentation Chamber or Forebay Inlet Inspection			
No evidence of sediment accumulation, trash, and debris.	**S**	**U**	
Good condition, no need for repair	**S**	**U**	
5. Vegetation Coverage			
50 % coverage established throughout system by first year	**S**	**U**	NA
Robust coverage by year 2 or later	**S**	**U**	
6. Inlet and Outlet Controls:			
Flow is unobstructed in openings (grates, orifices, etc)	**S**	**U**	
Structures are operational with no evidence of deterioration	**S**	**U**	
7. Vegetation removal (once every 3 years)			
Prune dead, diseased, or decaying plants	**S**	**U**	NA

Corrective Action Needed	Due Date
1. Outlet pipe invert is above the wetland soil elevation which keeps the system flooded. Could bring the soil up another 6-8”.	ASAP
COMMENT: Area of system is smaller than other BMPs but has the same number of structures.	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Gravel Wetland systems. It is the responsibility of the owner to maintain the Gravel Wetland in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and any changes or redevelopment in the upstream land use.

ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 NB, East side DOT#: 14633F BMP 18 Inspector: Tim Puls
Date: 7/18/14 Time: 1:45PM Site Conditions: Fair, Draining
Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)	Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)		
Plants are stable, roots not exposed	**S** U	Constructed 2013-2014
Vegetation is established and thriving	**S** U	
No evidence of holes in the wetland soil causing short-circuiting	**S** U	
No evidence of erosion at inlet and outlet structures	**S** U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)		
1. Standing Water		
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	S **U**	Standing water in fore bay & both cells, approx. 3-5”
2. Short Circuiting & Erosion		
No evidence of animal burrows or other holes	**S** U	
No evidence of erosion	**S** U	
3. Drought Conditions (As needed)		Too much water. Plants are thin in areas where water has been pooling.
Water plants as needed	S **U**	
Dead or dying plants	S **U**	
4. Sedimentation Chamber or Forebay Inlet Inspection		
No evidence of sediment accumulation, trash, and debris.	**S** U	
Good condition, no need for repair	**S** U	
5. Vegetation Coverage		
50 % coverage established throughout system by first year	S **U**	NA
Robust coverage by year 2 or later	S U	
6. Inlet and Outlet Controls:		A piece of trash was blocking outlet orifice. Blockage cleared and system began to drain.
Flow is unobstructed in openings (grates, orifices, etc)	S **U**	
Structures are operational with no evidence of deterioration	**S** U	
7. Vegetation removal (once every 3 years)		
Prune dead, diseased, or decaying plants	S U	NA

Corrective Action Needed	Due Date
1. Outlet control structure has slotted inlets (4” x 12”) that are unprotected. Bring rip rap up over the inlet slots to keep trash out of structure.	ASAP
COMMENT: Area of system is smaller than other BMPs but has the same number of structures.	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

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ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 Exit 5 NB Off Ramp Area DOT#: 14633F | Inspector: Tim Puls

Date: 7/18/14 | Time: 12:30AM | Site Conditions: Very Good

Date of Last Rain Event: 7/16/14 | Two systems – BMP 13, BMP 16

Inspection Items	Satisfactory (S) or Unsatisfactory (U)	Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)		
Plants are stable, roots not exposed	S U	New systems – BMP 13 approx. 1.5 years old and BMP 16 is approx. 6 months. GC is Severino Construction
Vegetation is established and thriving	S U	
No evidence of holes in the wetland soil causing short-circuiting	S U	
No evidence of erosion at inlet and outlet structures	S U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)		
1. Standing Water		
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	S U	None
2. Short Circuiting & Erosion		
No evidence of animal burrows or other holes	S U	
No evidence of erosion	S U	
3. Drought Conditions (As needed)		
Water plants as needed	S U	
Dead or dying plants	S U	
4. Sedimentation Chamber or Forebay Inlet Inspection		
No evidence of sediment accumulation, trash, and debris.	S U	
Good condition, no need for repair	S U	
5. Vegetation Coverage		
50 % coverage established throughout system by first year	S U	
Robust coverage by year 2 or later	S U	
6. Inlet and Outlet Controls:		
Flow is unobstructed in openings (grates, orifices, etc)	S U	
Structures are operational with no evidence of deterioration	S U	
7. Vegetation removal (once every 3 years)		
Prune dead, diseased, or decaying plants	S U	

Corrective Action Needed	Due Date
COMMENT: Both BMPs drain to a central 48" line. Could reduce number of hydraulic inlets and cleanout structures.	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

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ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 Exit 5 NB On Ramp DOT#: 14633E BMP 17 Inspector: Tim Puls
Date: 7/18/14 Time: 1:30PM Site Conditions: Good
Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	**S**	**U**	NA System constructed in 2008-2009
Vegetation is established and thriving	**S**	**U**	
No evidence of holes in the wetland soil causing short-circuiting	**S**	**U**	
No evidence of erosion at inlet and outlet structures	**S**	**U**	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	**S**	**(U)**	Fore bay has pooled water. Full of cattails.
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	**(S)**	**U**	
No evidence of erosion	**(S)**	**U**	
3. Drought Conditions (As needed)			
Water plants as needed	**(S)**	**U**	
Dead or dying plants	**(S)**	**U**	
4. Sedimentation Chamber or Forebay Inlet Inspection			
No evidence of sediment accumulation, trash, and debris.	**(S)**	**U**	
Good condition, no need for repair	**(S)**	**U**	
5. Vegetation Coverage			
50 % coverage established throughout system by first year	**(S)**	**U**	
Robust coverage by year 2 or later	**(S)**	**U**	
6. Inlet and Outlet Controls:			
Flow is unobstructed in openings (grates, orifices, etc)	**(S)**	**U**	
Structures are operational with no evidence of deterioration	**(S)**	**U**	
7. Vegetation removal (once every 3 years)			No maintenance has been done to date.
Prune dead, diseased, or decaying plants	**S**	**(U)**	

Corrective Action Needed	Due Date
1. Cut vegetation down to base and remove from system.	ASAP
COMMENT: Area of system is larger than other BMPs but has the same number of structures. 6 hydraulic inlets, 5 leach basins, 1 outlet	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Gravel Wetland systems. It is the responsibility of the owner to maintain the Gravel Wetland in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and any changes or redevelopment in the upstream land use.

ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 Exit 5 SB On Ramp DOT#: 14633E BMP 14 Inspector: Tim Puls

Date: 7/18/14 Time: 1:20PM Site Conditions: Good

Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	**S**	**U**	NA System constructed in 2008-2009
Vegetation is established and thriving	**S**	**U**	
No evidence of holes in the wetland soil causing short-circuiting	**S**	**U**	
No evidence of erosion at inlet and outlet structures	**S**	**U**	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	**S**	**U**	Fore bay is dry
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	**S**	**U**	
No evidence of erosion	**S**	**U**	
3. Drought Conditions (As needed)			
Water plants as needed	**S**	**U**	
Dead or dying plants	**S**	**U**	
4. Sedimentation Chamber or Forebay Inlet Inspection			
No evidence of sediment accumulation, trash, and debris.	**S**	**U**	
Good condition, no need for repair	**S**	**U**	
5. Vegetation Coverage			
50 % coverage established throughout system by first year	**S**	**U**	
Robust coverage by year 2 or later	**S**	**U**	
6. Inlet and Outlet Controls:			
Flow is unobstructed in openings (grates, orifices, etc)	**S**	**U**	
Structures are operational with no evidence of deterioration	**S**	**U**	
7. Vegetation removal (once every 3 years)			No maintenance has been done to date.
Prune dead, diseased, or decaying plants	**S**	**U**	

Corrective Action Needed	Due Date
1. Cut vegetation down to base and remove from system.	ASAP
COMMENT: Area of system is smaller than other BMPs but has the same number of structures. 6 hydraulic inlets, 5 leach basins, 1 outlet	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

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ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 Exit 1 NB Off Ramp DOT#: 13933C | Inspector: Tim Puls

Date: 7/18/14 | Time: 11:00AM | Site Conditions: Very Good

Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	S	U	NA – This system was constructed in 2007
Vegetation is established and thriving	S	U	
No evidence of holes in the wetland soil causing short-circuiting	S	U	
No evidence of erosion at inlet and outlet structures	S	U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	**S**	U	None
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	**S**	U	
No evidence of erosion	**S**	U	
3. Drought Conditions (As needed)			
Water plants as needed	**S**	U	
Dead or dying plants	**S**	U	
4. Sedimentation Chamber or Forebay Inlet Inspection			Some trash has accumulated
No evidence of sediment accumulation, trash, and debris.	**S**	U	
Good condition, no need for repair	**S**	U	
5. Vegetation Coverage			Plants are in good condition. Treatment cells are densely vegetated.
50 % coverage established throughout system by first year	**S**	U	
Robust coverage by year 2 or later	**S**	U	
6. Inlet and Outlet Controls:			Concrete outlet structure 8' x 10'
Flow is unobstructed in openings (grates, orifices, etc)	**S**	U	
Structures are operational with no evidence of deterioration	**S**	U	
7. Vegetation removal (once every 3 years)			No maintenance has been done to date.
Prune dead, diseased, or decaying plants	S	**U**	

Corrective Action Needed	Due Date
1. Maintain vegetation = cut down to base of plant and remove vegetation from system	
COMMENT: This is an extremely large system. RRoseen advised them to replace "E Stone" with 3/8" pea stone during construction.	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

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ACTIVITIES

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1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: Rt. 16 NB Exit 5 Inspector: Jamie Houle, Tim Puls

Date: 6/20/14 Time: 10:00AM Site Conditions: Good

Date of Last Rain Event: 6/13/14 (0.75")

Inspection Items	Satisfactory (S) or Unsatisfactory (U)		Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)			
Plants are stable, roots not exposed	S	U	NA System constructed in 2010-2011
Vegetation is established and thriving	S	U	
No evidence of holes in the wetland soil causing short-circuiting	S	U	
No evidence of erosion at inlet and outlet structures	S	U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)			
1. Standing Water			
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	(S)	U	Fore bay has pooled water. Some cattails.
2. Short Circuiting & Erosion			
No evidence of animal burrows or other holes	(S)	U	
No evidence of erosion	(S)	U	
3. Drought Conditions (As needed)			
Water plants as needed	(S)	U	
Dead or dying plants	(S)	U	
4. Sedimentation Chamber or Forebay Inlet Inspection			Wet fore bay w/ evidence of anaerobic conditions, i.e. standing water, cattails, and algae.
No evidence of sediment accumulation, trash, and debris.	S	(U)	
Good condition, no need for repair	S	(U)	
5. Vegetation Coverage			
50 % coverage established throughout system by first year	(S)	U	
Robust coverage by year 2 or later	(S)	U	
6. Inlet and Outlet Controls:			Inlet is obstructed due to high elevation of fore bay control. Need low flow outlet from fore bay.
Flow is unobstructed in openings (grates, orifices, etc)	(S)	U	
Structures are operational with no evidence of deterioration	(S)	U	
7. Vegetation removal (once every 3 years)			
Prune dead, diseased, or decaying plants	(S)	U	

Corrective Action Needed	Due Date
1. Fore bay needs to be drained. 2.2ft of standing water.	ASAP
COMMENT:	

Regular Inspection and Maintenance Guidance for Gravel Wetland Stormwater Management Device

Regular inspection and maintenance is critical to the effective operation of Gravel Wetland systems. It is the responsibility of the owner to maintain the Gravel Wetland in accordance with the minimum design standards. This page provides guidance on maintenance activities that are typically required for these systems, along with the suggested frequency for each activity. Individual systems may have more, or less, frequent maintenance needs, depending on a variety of factors including the occurrence of large storm events, overly wet or dry (I.E., drought), regional hydrologic conditions, and any changes or redevelopment in the upstream land use.

ACTIVITIES

Visual inspections are routine for system maintenance. This includes looking for standing water, accumulated leaves, holes in the soil media, signs of plant distress, and debris and sediment accumulation in the system. Vegetation coverage is integral to the performance of the system and vegetation care is important to system productivity and health. A gravel wetland is a subsurface horizontal filtration system and does not rely upon the surface soils for treatment. As such, surface infiltration rates are expected to be low and not a criterion for cleaning. Rather, stormwater access to subsurface treatment is by way of inlet standpipes. It is important to ensure these inlets are performing properly.

1ST YEAR POST-CONSTRUCTION ACTIVITY	FREQUENCY
1. Check that plants have adequate water, are well established and healthy. **Remedy:** Water plants as necessary, remove or treat diseased vegetation as necessary and re-vegetate poorly established plants as necessary	After every major storm in the first few months, then biannually.
2. Check for erosion in the system and short circuiting (holes) in the surface wetland soils. **Remedy:** Soil piping, erosion, and holes should be filled, lightly compacted, and reseeded.	
POST-CONSTRUCTION ACTIVITY	**FREQUENCY**
3. Check inlets outlets and stand pipes for leaves and debris. **Remedy**: Rake in and around the system to clear it of debris. Also, clear the inlet, outlets and standpipes if obstructed.	Quarterly initially, biannually, frequency adjusted as needed after 3 inspections
4. Check for animal burrows and short circuiting in the system. **Remedy:** Soil erosion from short circuiting or animal boroughs should be repaired when they occur. The holes should be filled and lightly compacted	
5. Check that the depth of accumulated sediment in the sedimentation chamber is less than 12 inches or 10 percent of the pretreatment volume. **Remedy:** The sedimentation chamber, forebay, and treatment cells outlet devices should be cleaned when drawdown times exceed 36 hours. Remove material with rakes where possible rather than heavy construction equipment to avoid compaction of the gravel wetland surface. Heavy equipment could be used if the system is designed with dimensions that allow equipment to be located outside the gravel wetland, while a backhoe shovel reaches inside the gravel wetland to remove sediment. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.	
6. Inspect inlets and outlets to ensure good condition and no evidence of deterioration. Check to see if high-flow bypass is functioning. **Remedy:** Repair or replace any damaged structural parts, inlets and outlets.	Annually
7. Check for robust vegetation coverage throughout the system. **Remedy:** If at least 50 % vegetation coverage is not established after 2 years, reinforcement planting should be performed.	
8. Cut and remove vegetation from the Gravel Wetland System and forebay in order to maintain nitrogen removal performance. **Remedy:** The vegetation should be cut and removed from the system to prevent nitrogen from cycling back into the system.	Once every 3 years

CHECKLIST FOR INSPECTION OF GRAVEL WETLAND

Location: I93 Exit 2 Park & Ride. DOT#: 10418G | Inspector: Tim Puls

Date: 7/18/14 | Time: 10:30AM | Site Conditions: Very Good

Date of Last Rain Event: 7/16/14

Inspection Items	Satisfactory (S) or Unsatisfactory (U)	Comments/Corrective Action
1st Year Post-Construction Monitoring (After every major storm for the first three months)		
Plants are stable, roots not exposed	S U	NA – This system was constructed in 2007
Vegetation is established and thriving	S U	
No evidence of holes in the wetland soil causing short-circuiting	S U	
No evidence of erosion at inlet and outlet structures	S U	
Post-Construction Routine Monitoring (at least every 6 months thereafter as per USEPA Good House-Keeping Requirements. Inspection frequency can be reduced to annual following 2 years of monitoring indicating the rate of sediment accumulation is less than cleaning criteria listed below.)		
1. Standing Water		
Gravel wetland surface is free of standing water or other evidence of clogging, such as discolored or accumulated sediments	(S) U	Plunge pools around the 3 inlet locations
2. Short Circuiting & Erosion		
No evidence of animal burrows or other holes	(S) U	
No evidence of erosion	(S) U	
3. Drought Conditions (As needed)		
Water plants as needed	(S) U	
Dead or dying plants	(S) U	
4. Sedimentation Chamber or Forebay Inlet Inspection		Some trash has accumulated
No evidence of sediment accumulation, trash, and debris.	(S) U	
Good condition, no need for repair	(S) U	
5. Vegetation Coverage		Plants are in good condition. Forebay is >95% cattails. Treatment cells are densely vegetated.
50 % coverage established throughout system by first year	(S) U	
Robust coverage by year 2 or later	(S) U	
6. Inlet and Outlet Controls		
Flow is unobstructed in openings (grates, orifices, etc)	(S) U	
Structures are operational with no evidence of deterioration	(S) U	
7. Vegetation removal (once every 3 years)		No maintenance has been done to date.
Prune dead, diseased, or decaying plants	S (U)	

Corrective Action Needed	Due Date
1. Maintain vegetation = cut down to base of plant and remove vegetation from system	
COMMENT: Perimeter ground water drainage is a 6" PUD in 2'x3' stone trench. Flow is directed to inlets.	