

January 4, 2024

Salisbury Inland Wetlands & Watercourses Commission  
Salisbury Town Hall  
27 Main Street  
P.O. Box 548  
Salisbury, CT 06068

**Re: Dresser Woods, Railroad Street, Salisbury**  
**Project 4010271.23137**

Dear Commissioners

We are in receipt of peer review comments from Thomas D. Grimaldi dated December 22, 2023. Below we cite the original comment and our responses. The original comments are in italics.

**Site Plan & Utility Plan-**

1. *The existing 16-inch tree to be saved has proposed water and sewer laterals through the tree. It appears that the tree shall be removed. Please revise note.*

The plans have been revised to show the tree being removed.

2. *Provide flowlines for the PRETX Light drainage structure.*

The plans have been revised to show a PRETX Curb Structure in lieu of the PRETX Light. The elevations are shown on Sheets 03, 04, and 10.

3. *Revise overlapping notes in the utility plan (e.g. Air valve & R-Tank).*

The overlapping notes have been corrected.

4. *All proposed retaining walls over three (3) feet in height shall be designed by a Ct Licensed P.E. Provide safety railing as required.*

Final design of the retaining walls will be provided as part of the building permit submission. We anticipate that the walls will be included in the foundation design for Building 4 since they are connected to the building. See Note 5 on Sheet 04.



5. *Are full basements or frost walls proposed for the buildings? Please revise the footing drain elevations for Building #1 & #2.*

Only Building 4 will have a full basement. The footing drains for Buildings #1 and #2 area four feet deep in accordance with the Architect's recommendations.

6. *Indicate pipe slopes on all storm drainage and sanitary sewer pipes.*

The pipe slopes are shown on Sheet 04.

#### Layout Plan-

1. *Label the Privacy Fence on all plan sheets for clarity.*

The privacy fence has been labeled on all sheets.

2. *Provide dimensions for handicap parking. Spaces # 17 & # 18 do not appear to be adequately sized. Provide handicap signage.*

The handicap parking space dimensions have been revised and the signage shown on the Layout Plan. A sign detail is shown on Sheet 09.

#### Erosion Control Plan, Narrative and Details-

1. *Provide outlet protection for all point source discharges.*

Outlet protection has been provided.

#### Site Details-

1. *Provide a detail of the R-Tank Subsurface Detention System.*

A separate detail package for the Focal Point, Pretx, and R-Tank has been provided.

2. *Provide a detail for the Focal Point Treatment System.*

A separate detail package for the Focal Point, Pretx, and R-Tank has been provided.

3. *Provide a detail for the PRETX Light drainage structure. Include flowlines for structure.*

A separate detail package for the Focal Point, Pretx, and R-Tank has been provided.

4. *Provide a detail for the level spreader.*

A detail for the level spreader is on Sheet 10.

5. *Provide Pump Station Details and Computations.*

The final design of the pump station along with relevant calculations will be provided after land use approvals, but prior to construction with sufficient time for review by the Salisbury WPCA.



6. *Provide Handicap parking bollard/signage detail.*

A sign detail is shown on Sheet 09.

7. *Provide base and subbase material specifications for the pavement and sidewalk details.*

Material specifications are included in the notes near the detail on Sheet 09.

8. *Bituminous Concrete Pavement Detail conflicts with the Bituminous Concrete Pavement, Curb, and Sidewalk Detail with regard to depths and make-up for base/subbase material.*

The details have been revised as requested. See Sheet 09.

#### Stormwater Profiles and Details

1. *Provide pipe slopes for all pipes.*

Pipe slopes have been shown on the plans.

#### Drainage Analysis:

1. *R-Tank #1 appears to outlet into both the Easterly and the Vernal Pool Watersheds, however the drainage analysis indicates that R-Tank #1 will outlet into the Easterly watershed only. Recommend overflow to be relocated entirely within the Easterly Watershed or the analysis should be revised to indicate the proper split between the watersheds.*

The plans have been revised to show grading that will direct the outflow to the Easterly Watershed.

2. *The cumulative results for the Developed peak flows indicate a negligible decrease overall, however, we have concerns related to the increase in flow to the Eastern Watershed point of Analysis. Is there a way to modify the analysis to reduce the Peak flows discharging to the Easterly Watershed to reduce potential erosion to the downslope swale?*

The goal of the stormwater management plan is to maintain the hydrology to the vernal pool as close as possible and to minimize the flow to the southern watershed since it flows toward some existing buildings. The easterly area is a broad swale that eventually reaches Spruce Swamp Creek.

3. *In order to combine the drainage areas, they will need to be analyzed to a common intersecting point, where all the drainage areas meet at a downslope point. Please expand the drainage mapping to analyze to this common point.*

There is no common drainage point until each of the watersheds reach Spruce Swamp Creek. At that point, Spruce Swamp Creek has a watershed area of 10.2 square miles. Our site represents 0.08% of the watershed at that point. We have attached flow path maps.



4. *Is it appropriate to reduce the run-off to the existing vernal pool? Will it adversely affect the functionality of the vernal pool?*

The flow to the vernal pool under post-development conditions is identical to the pre-development flow for all storm levels except the 100-year storm. At this point there is a slight reduction, but this reduction is not expected to be harmful.

**Recommended Conditions of Approval:**

We do not object to the recommended conditions of approval. We have attached a bond estimate in the amount of \$42,000.

1. *Submit revised Engineering Plans to the Town Engineer for review/approval.*
2. *Final approved plans shall have live signature and embossed seal of the Engineer and Surveyor of record. These shall be submitted to the Town of Salisbury Land Use Administrator prior to any construction.*
3. **The Applicant's Engineer shall provide an Erosion and Sedimentation Control Measures Bond Estimate, which shall be reviewed and approved by the Town Engineer. The Town Engineer shall set the final bond amount. The Bond shall be a cash bond payable to the Town of Salisbury.**
4. *A Pre-Construction Meeting is recommended with the Town staff prior to the start of construction to inspect E & S control measures and to discuss construction sequencing/phasing.*
5. *We recommend that a Third-Party State of Connecticut Licensed Professional Engineer or a Certified Professional in Erosion & Sedimentation Control, inspect all phases of the Site work and provide a monthly report with photographs to the Land Use Administrator.*
6. *During the construction process, the Owner/Developer/Contractor shall add erosion and sedimentation control measures as deemed necessary by the Town of Salisbury staff and/or the Consulting Town Engineer.*
7. *Daily inspections and required maintenance of all erosion & sedimentation control measures shall be completed by the General Contractor until a permanent vegetated cover is established. Repairs shall be made immediately after inspections.*
8. *Inspection requirements, by the Consulting Town Engineer, shall be determined by the Commission.*
9. *Town of Salisbury WPCA review/approval required.*
10. *Connecticut Water Company review/approval required.*





11. *Fire marshal shall review plans with regard to public safety access for Fire Apparatus.*
12. *An As-Built Site Improvement and Grading Plan, prepared by a State of Connecticut Registered Land Surveyor, shall be submitted to the Land Use Administrator after all the site work is completed, and prior to requesting a Certificate of Occupancy.*
13. *A final site inspection shall be completed by the Land Use Administrator and/or the Town Engineer prior to the release of the Erosion & Sedimentation Control Bond and/or the issuance of a Certificate of Occupancy.*

We also made a few other minor changes to the plans in response to recommendations from George Logan of REMA Ecological Services. These include:

1. Adding silt fence around the entire perimeter to block access from turtles during construction.
2. Moving the permanent exclusion fence uphill.

We also want to note that we consider the planting of the shrubs adjacent to the wetlands to be an enhancement and allowed as a use of right as a conservation measure since it will not disturb the natural and indigenous character of the wetlands.

We have attached the following documents in support of our responses:

- Plan Set "Salisbury Housing Committee, Dresser Woods, Railroad Street, Salisbury, CT" consisting of 10 sheets, dated November 20, 2023, revised to January 4, 2024.
- Details Package for Focal Point System Pretx Curb Unit, and R-Tank System prepared by Ferguson Waterworks.
- Dresser Woods Bond Estimate dated January 4, 2024.
- Flow Path Verification Maps prepared by Haley Ward.

Sincerely,  
Haley Ward, Inc.

Todd Parsons, PE  
Senior Project Manager

cc: Project Team

**OPINION OF PROBABLE CONSTRUCTION COST - FOR BOND PURPOSES**  
**Dresser Woods, Salisbury**  
**Erosion Control Cost**  
**January 4, 2024**

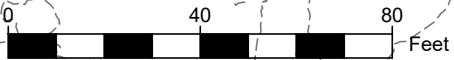
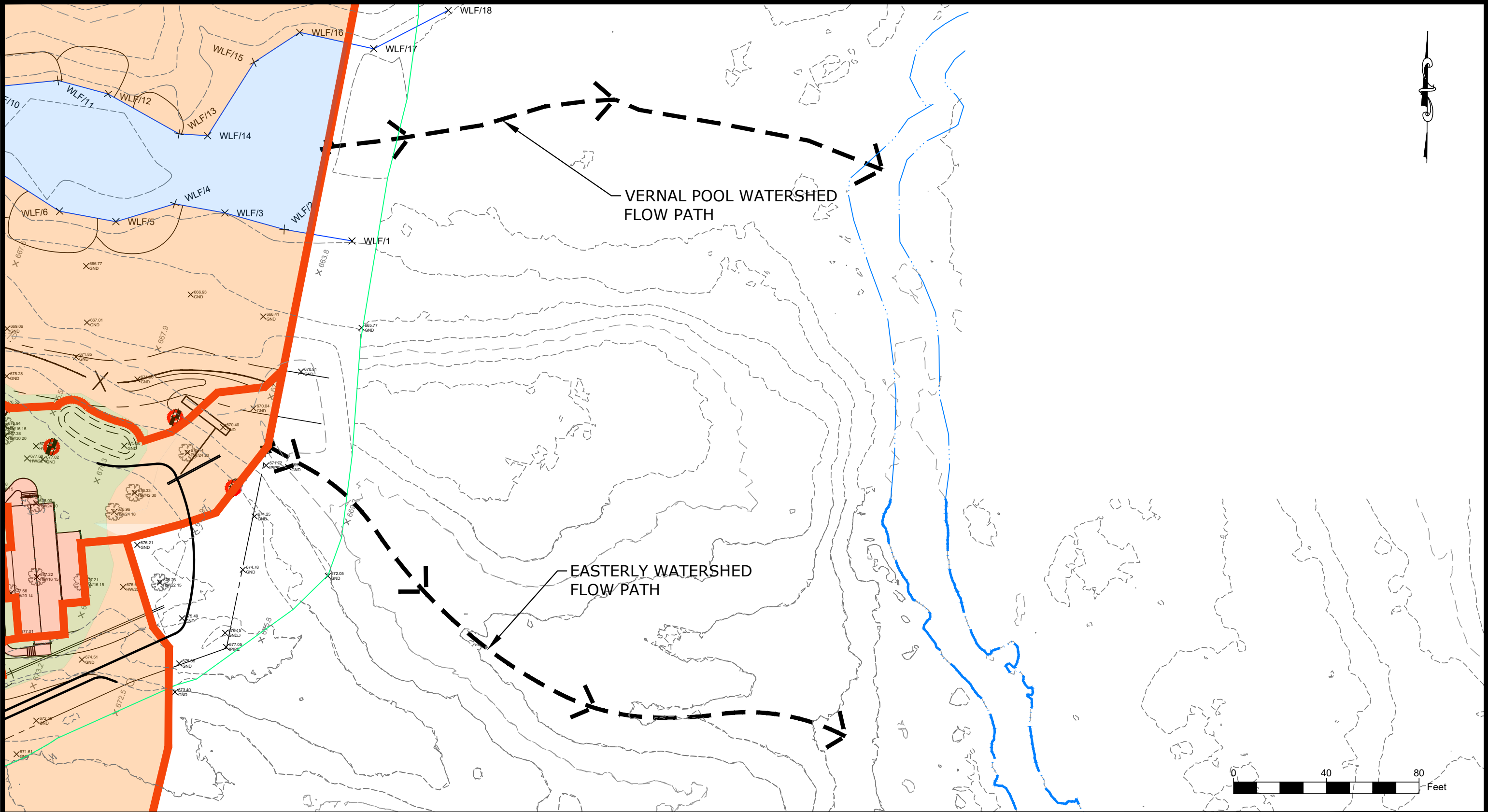
	UNITS	QUANTITY	UNIT PRICE	EXTENSION
Filter Sock	LF	800	\$6.00	\$4,800.00
Silt Fence	LF	1,400	\$6.00	\$8,400.00
Erosion Control Blanket	SY	930	\$3.00	\$2,790.00
Riprap	CY	12	\$130.00	\$1,560.00
Turf Establishment (includes seed bed preparation, seeding, mulching)	SY	7,700	\$2.50	\$19,250.00
Crushed Stone for Construction Entrance	CY	11	\$100.00	\$1,100.00
<b>Subtotal</b>				<b>\$37,900.00</b>
Maintenance	%	1	10%	\$3,790.00
<b>Total</b>				<b>\$41,690.00</b>

**Bond Recommendation \$42,000**



1

FILE LOCATION: P:\CT\4010271-QUISENBERRY ARCAI MALIK ARCHITECTS, LLC\23137 - RAILROAD STREET SALISBURY- TAP\02-CAD\_FILES\CIVIL\H&H-UNDERGROUND DETENTION DWG, 2024.01.03, 4:18 PM



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140 Willow Street  
Winsted, Connecticut 06098  
860.379.6669

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PROJECT

DRESSER WOODS - RAILROAD ST. SALISBURY

TITLE

FLOW PATH VERIFICATIONS

DRAWING ISSUE STATUS

NOT FOR CONSTRUCTION

DATE

2024-01-03

SCALE

AS NOTED

CHECKED BY

TAP

DESIGNED BY

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DRAWN BY

CG

PROJECT No.

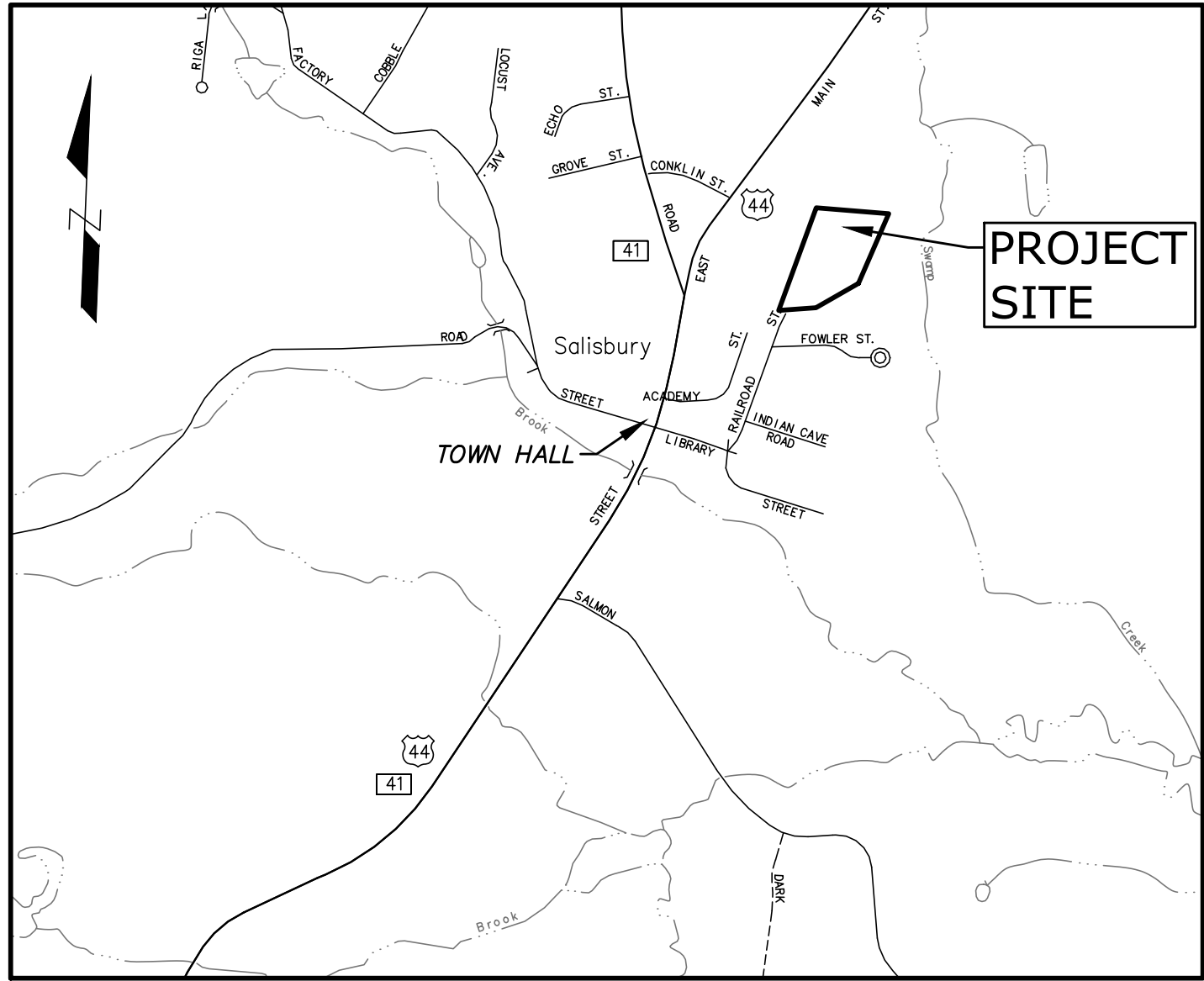
4010271.23137

DRAWING No.

2



FILE LOCATION: P:\CT\4010271-QUISENBERRY ARCARI MALIK ARCHITECTS, LLC\23137 - RAILROAD STREET SALISBURY-TAP\02-CAD\_FILES\CIVIL\COVER SHEET.DWG, 2024.01.04, 7:44 AM



VICINITY MAP

0 1000 2000

GRAPHIC SCALE (FEET)

**OWNER/APPLICANT**

**Salisbury Housing Committee, Inc.**  
**P.O. Box 10**  
**Salisbury, CT 06068**

**SURVEYOR**

**Stephen M Giudice, L.S.**  
**Harry E. Cole & Son**  
**876 South Man Street**  
**P.O. Box 44**  
**Plantsville, CT 06479**  
**Phone: (860) 628-4484**

**ENGINEER**

**Todd Parsons, P.E.**  
**Haley Ward, Inc.**  
**140 Willow Street, Suite 8**  
**Winsted, CT 06098**  
**Tel. (860) 379-6669**  
**e-mail: tparsons@haleyward.com**

**ARCHITECT**

**Erin Benken, AIA**  
**Quisenberry Arcari Malik Architects, LLC**  
**195 Scott Swamp Road**  
**Farmington CT 06032**  
**Tel. (860) 677-4594**  
**e-mail: ebenken@qamarch.com**

# SALISBURY HOUSING COMMITTEE

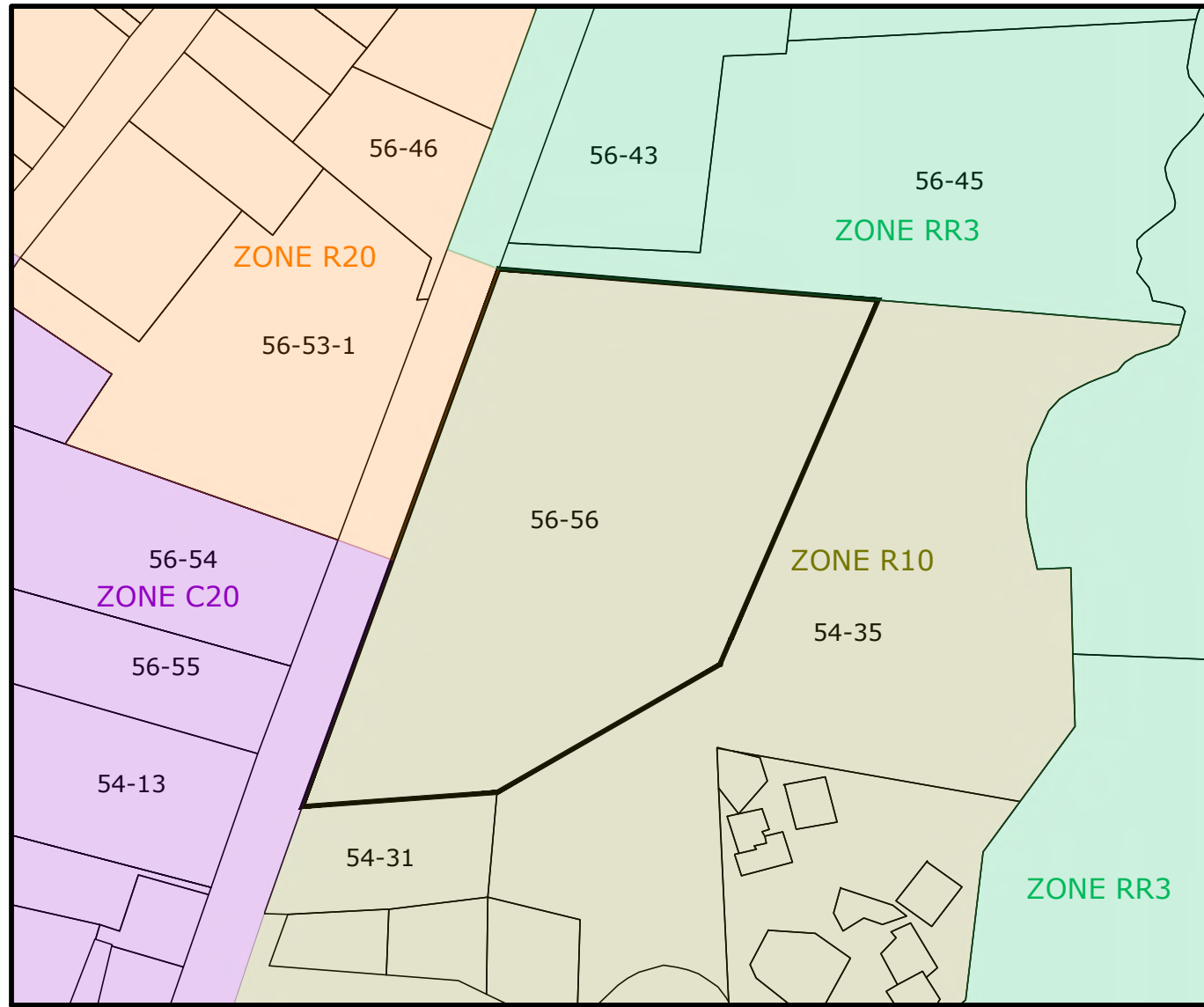
## DRESSER WOODS

## RAILROAD STREET

SALISBURY, CONNECTICUT

NOVEMBER 20, 2023

REVISED: January 4, 2024



0 200 400



Feet

GRAPHIC SCALE (FEET)

List of abutters as of November 15, 2023			
Map	Lot	Owner Name	Address
North			
56	45	PRIVATE TRUST CO TRUSTEE ETAL	P.O. BOX 1627, LAKEVILLE CT 06039
West - Across Street			
56	46	MCGARRY, JANE L	P.O. BOX 176, SALISBURY CT 06068
56	53-1	HARNEY, ELYSE D TRUSTEE	P.O. BOX 628, SALISBURY CT 06068
56	54	HARNEY, ELYSE D TRUSTEE	P.O. BOX 628, SALISBURY CT 06068
56	55	HURLBUTT, DANIEL J & DAVID M	P.O. BOX 477, SALISBURY CT 06068
54	13	KONG STEPHEN SURV & REBECCA SURV	200 MERCER ST APT 1E, NEW YORK NY 10012
South			
54	31	SPILLANE, SALLY K E	P.O. BOX 121, LAKEVILLE CT 06039
East			
54	35	SALISBURY VILLAGE OPEN SPACE ASN	P.O. BOX 17, SALISBURY CT 06068

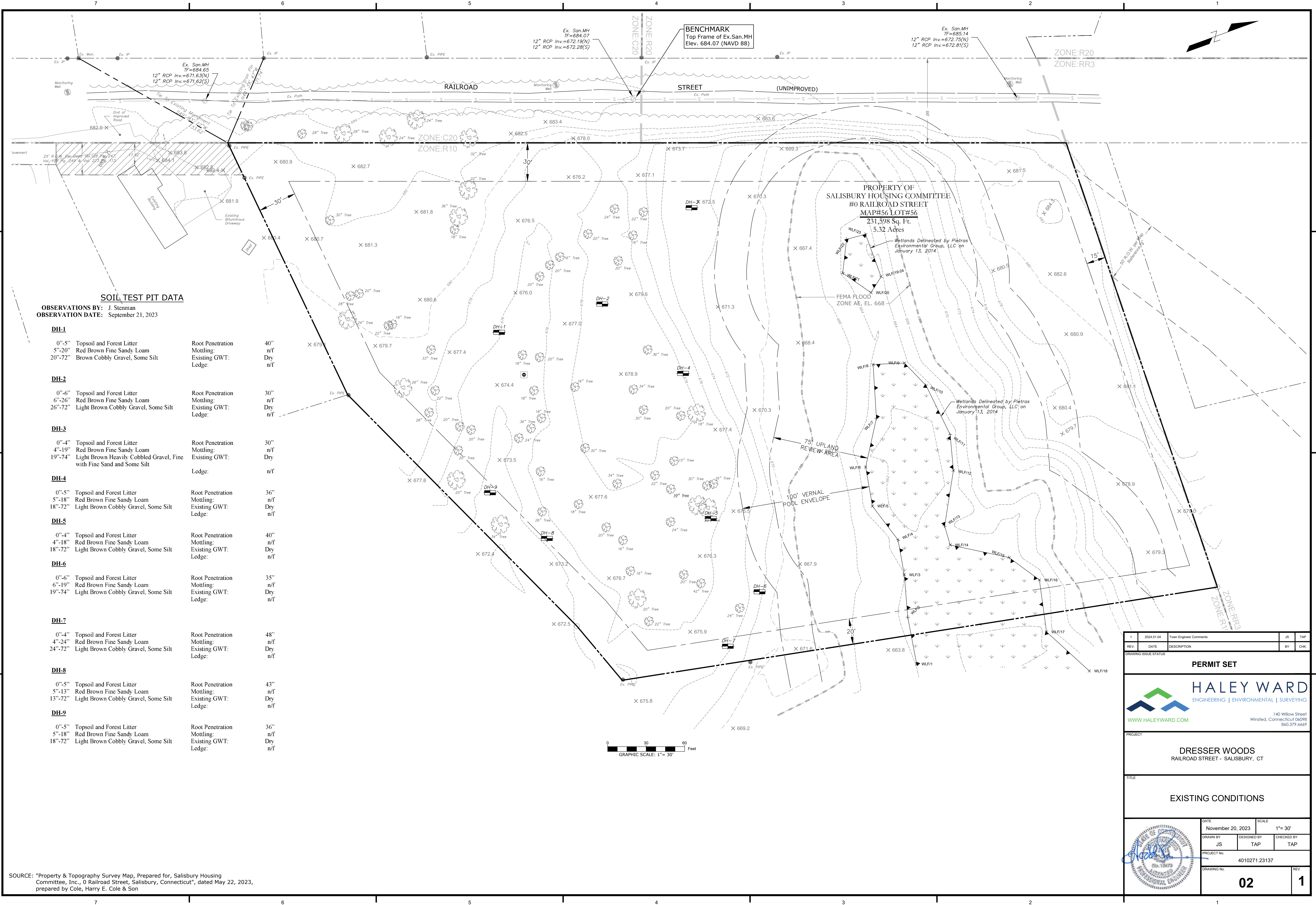
### LIST OF DRAWINGS

SHEET #	SHEET NAME
01	COVER SHEET
02	EXISTING CONDITIONS
03	SITE PLAN
04	UTILITY PLAN
05	LAYOUT PLAN
06	PLANTING PLAN
07	FOUNDATION PLANTING PLAN
08	EROSION CONTROL PLAN NARRATIVE AND DETAILS
09	SITE DETAILS
10	STORMWATER PROFILES AND DETAILS

1	2024.01.04	Town Engineer Comments	JS	TAP		
REV.	DATE	DESCRIPTION	BY	CHK.		
DRAWING ISSUE STATUS						
PERMIT SET						
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PROJECT						
DRESSER WOODS RAILROAD STREET - SALISBURY, CT						
TITLE						
COVER SHEET						
		DATE	November 20, 2023	SCALE	AS NOTED	
		DRAWN BY	JS	DESIGNED BY	TAP	
		CHECKED BY	TAP	CHECKED BY	TAP	
		PROJECT No.	4010271.23137			
DRAWING No.		01			REV.	1



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SOIL TEST PIT DATA

OBSERVATIONS BY: J. Stenman  
OBSERVATION DATE: September 21, 2023

DH-1

0'-5" Topsoil and Forest Litter  
5"-20" Red Brown Fine Sandy Loam  
20"-72" Brown Cobbly Gravel, Some Silt

Root Penetration  
Mottling:  
Existing GWT:  
Ledge:

40"  
n/f  
Dry  
n/f

DH-2

0'-6" Topsoil and Forest Litter  
6"-26" Red Brown Fine Sandy Loam  
26"-72" Light Brown Cobbly Gravel, Some Silt

Root Penetration  
Mottling:  
Existing GWT:  
Ledge:

30"  
n/f  
Dry  
n/f

DH-3

0'-4" Topsoil and Forest Litter  
4"-19" Red Brown Fine Sandy Loam  
19"-74" Light Brown Heavily Cobbled Gravel, Fine  
with Fine Sand and Some Silt

Root Penetration  
Mottling:  
Existing GWT:  
Ledge:

30"  
n/f  
Dry

DH-4

0'-5" Topsoil and Forest Litter  
5"-18" Red Brown Fine Sandy Loam  
18"-72" Light Brown Cobbly Gravel, Some Silt

Root Penetration  
Mottling:  
Existing GWT:  
Ledge:

36"  
n/f  
Dry  
n/f

DH-5

0'-4" Topsoil and Forest Litter  
4"-18" Red Brown Fine Sandy Loam  
18"-72" Light Brown Cobbly Gravel, Some Silt

Root Penetration  
Mottling:  
Existing GWT:  
Ledge:

40"  
n/f  
Dry  
n/f

DH-6

0'-6" Topsoil and Forest Litter  
6"-19" Red Brown Fine Sandy Loam  
19"-74" Light Brown Cobbly Gravel, Some Silt

Root Penetration  
Mottling:  
Existing GWT:  
Ledge:

35"  
n/f  
Dry  
n/f

DH-7

0'-4" Topsoil and Forest Litter  
4"-24" Red Brown Fine Sandy Loam  
24"-72" Light Brown Cobbly Gravel, Some Silt

Root Penetration  
Mottling:  
Existing GWT:  
Ledge:

48"  
n/f  
Dry  
n/f

DH-8

0'-5" Topsoil and Forest Litter  
5"-13" Red Brown Fine Sandy Loam  
13"-72" Light Brown Cobbly Gravel, Some Silt

Root Penetration  
Mottling:  
Existing GWT:  
Ledge:

43"  
n/f  
Dry  
n/f


DH-9

0'-5" Topsoil and Forest Litter  
5"-18" Red Brown Fine Sandy Loam  
18"-72" Light Brown Cobbly Gravel, Some Silt

Root Penetration  
Mottling:  
Existing GWT:  
Ledge:

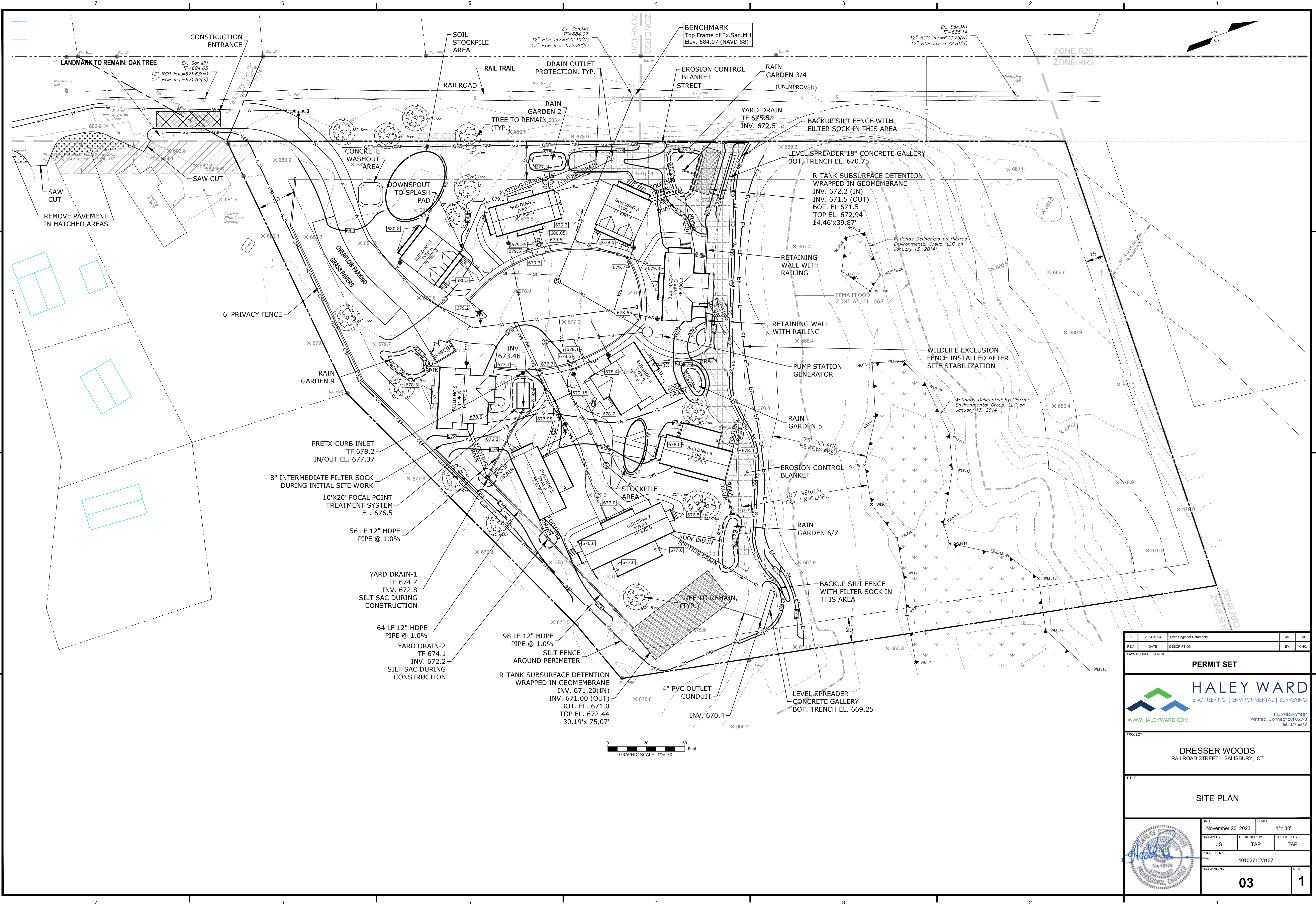
36"  
n/f  
Dry  
n/f


SOURCE: "Property & Topography Survey Map, Prepared for, Salisbury Housing Committee, Inc., 0 Railroad Street, Salisbury, Connecticut", dated May 22, 2023, prepared by Cole, Harry E. Cole & Son

1	2024.01.04	Town Engineer Comments	JS	TAP
REV	DATE	DESCRIPTION	BY	CHK
DRAWING ISSUE STATUS				
PERMIT SET				
 HALEY WARD ENGINEERING   ENVIRONMENTAL   SURVEYING 140 Willow Street Winsted, Connecticut 06098 860.379.6669				
PROJECT DRESSER WOODS RAILROAD STREET - SALISBURY, CT				
TITLE EXISTING CONDITIONS				
DATE November 20, 2023		SCALE 1"= 30'		
DRAWN BY JS	DESIGNED BY TAP	CHECKED BY TAP		
PROJECT No. 4010271.23137				
DRAWING No. 02				REV. 1



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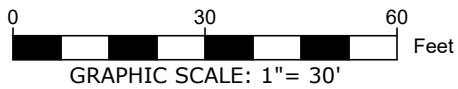
1	2024.01.04	Town Engineer Comments	JS	TAP
REV	DATE	DESCRIPTION	BY	CHK
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<b>PERMIT SET</b>				
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PROJECT <b>DRESSER WOODS</b> RAILROAD STREET - SALISBURY, CT				
TITLE <b>SITE PLAN</b>				
DATE November 20, 2023		SCALE 1"= 30'		
DRAWN BY JS	DESIGNED BY TAP	CHECKED BY TAP		
PROJECT No. 4010271.23137				
DRAWING No. <b>03</b>				REV. <b>1</b>




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UTILITY NOTES

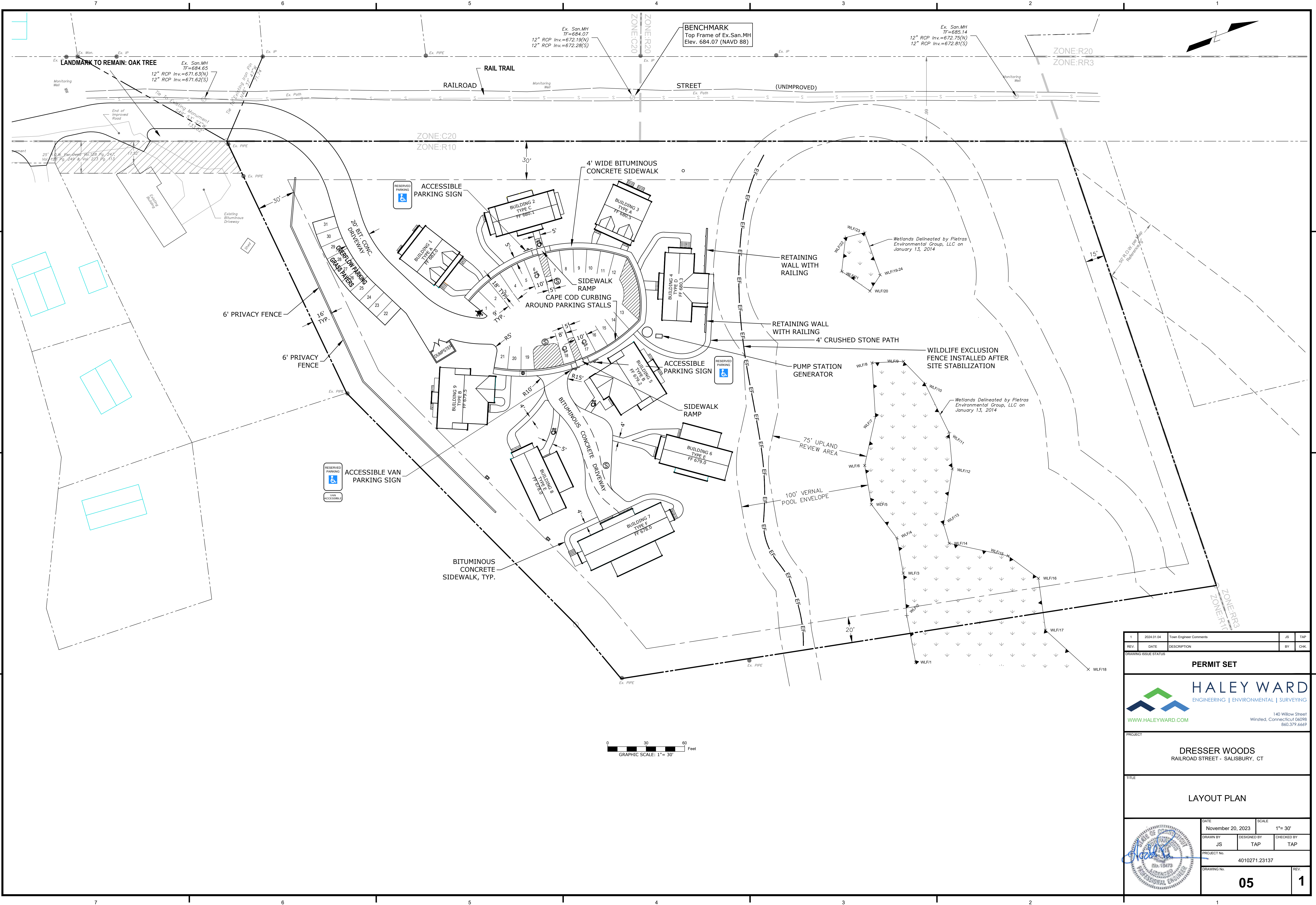
1. Contact Call-Before-You-Dig prior to any excavation.
2. All sanitary sewer system work shall comply with the Town of Salisbury Water Pollution Control Authority standards and specifications.
3. All water system work shall comply with Aquarion Water Company standards and specifications.
4. Footing and roof drain discharge pipes shall have a minimum 1% slope.
5. Retaining walls over three feet high shall be designed by a Connecticut Licensed Professional Engineer.
6. Final sewer pump station design shall be approved by the Salisbury Water Pollution Control Authority.




1	2024.01.04	Town Engineer Comments	JS	TAP
REV	DATE	DESCRIPTION	BY	CHK
DRAWING ISSUE STATUS				
PERMIT SET				
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PROJECT <b>DRESSER WOODS</b> RAILROAD STREET - SALISBURY, CT				
TITLE <b>UTILITY PLAN</b>				
DATE November 20, 2023		SCALE 1"= 30'		
DRAWN BY JS	DESIGNED BY TAP	CHECKED BY TAP		
PROJECT No. 4010271.23137		DRAWING No. <b>04</b>		
		REV. <b>1</b>		



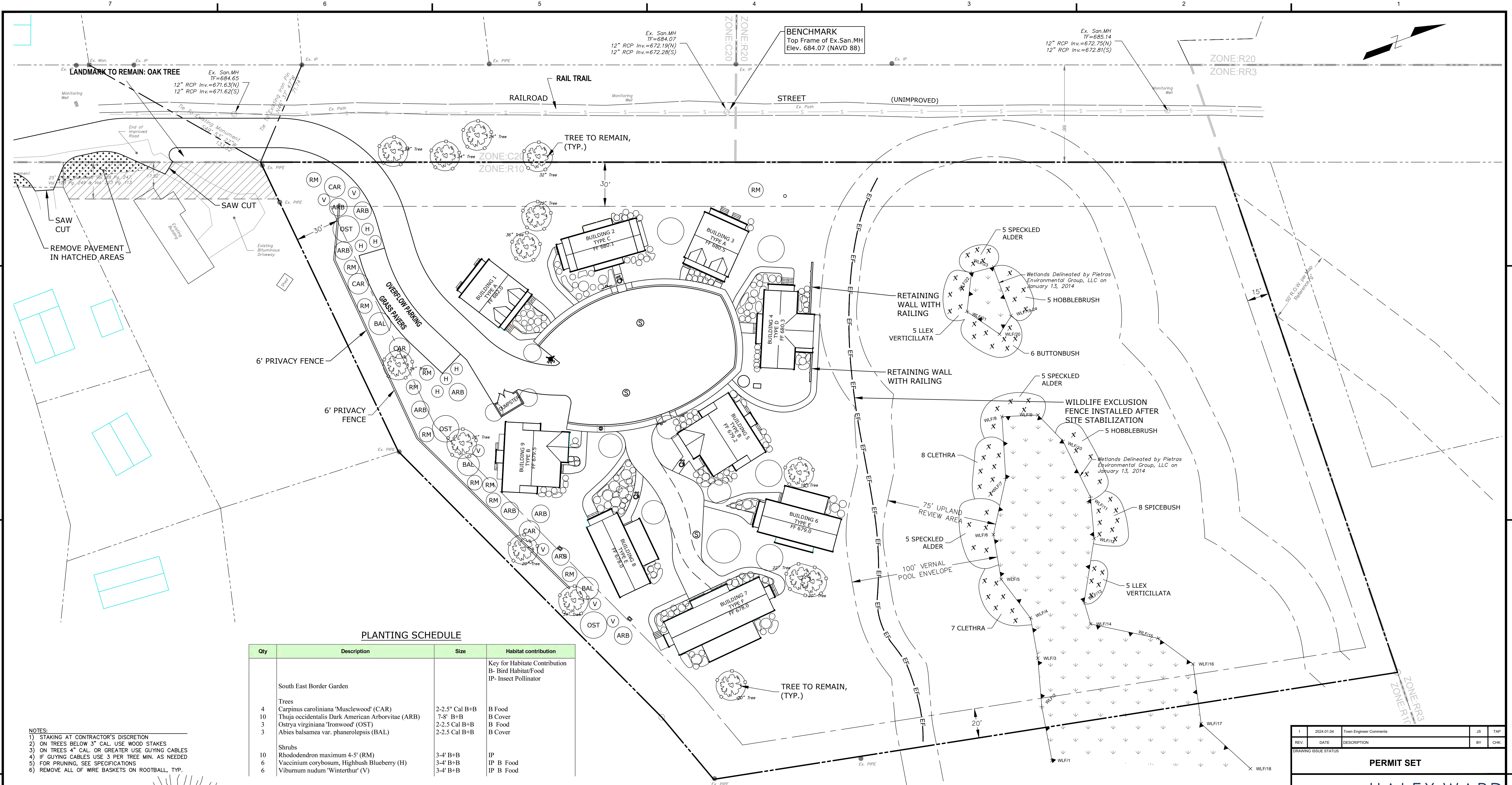
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1	2024.01.04	Town Engineer Comments	JS	TAP
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DRAWING ISSUE STATUS				
PERMIT SET				
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PROJECT DRESSER WOODS RAILROAD STREET - SALISBURY, CT				
TITLE LAYOUT PLAN				
DATE November 20, 2023		SCALE 1"= 30'		
DRAWN BY JS	DESIGNED BY TAP	CHECKED BY TAP		
PROJECT No. 4010271.23137				
DRAWING No. 05				REV. 1



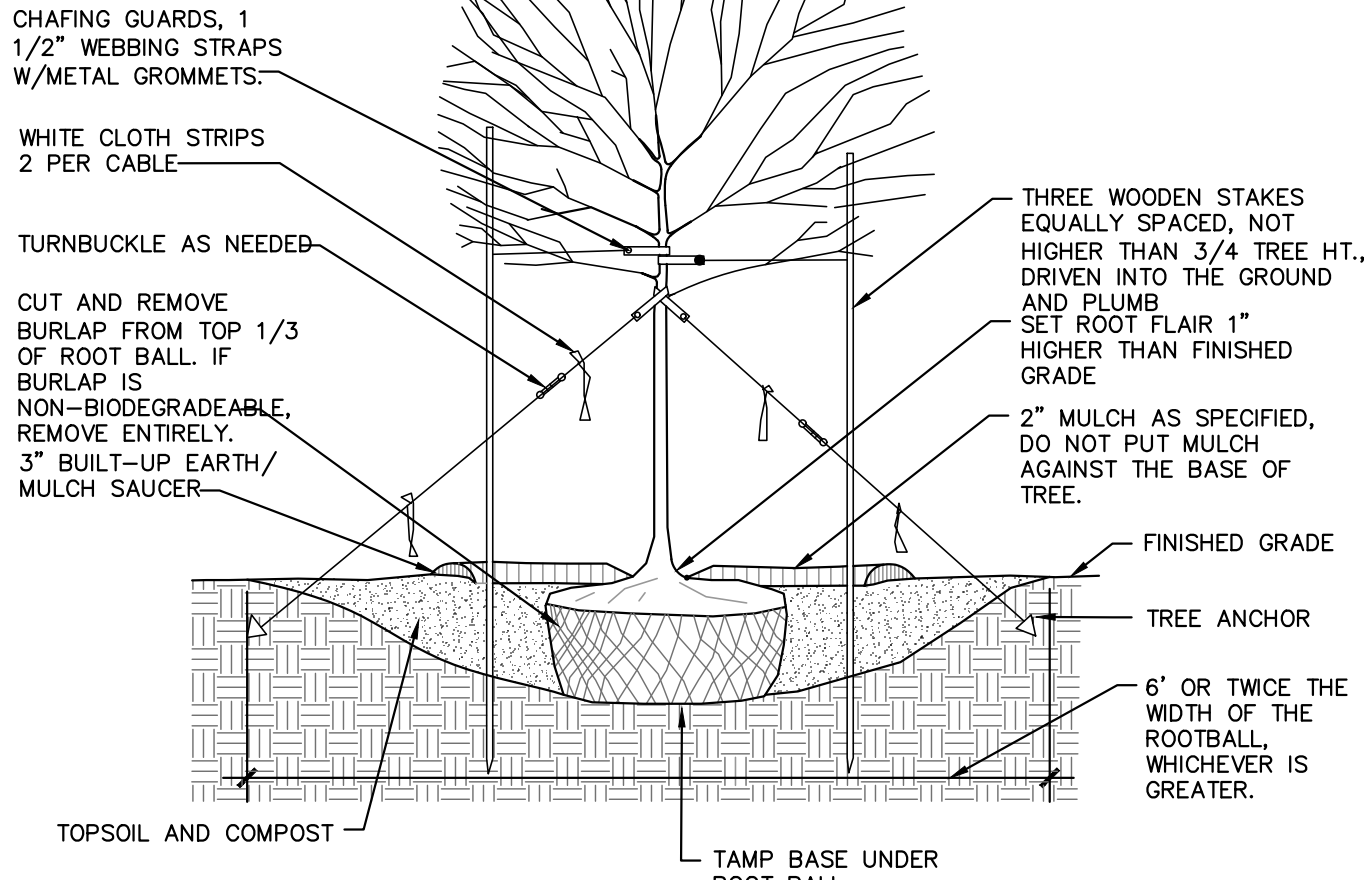
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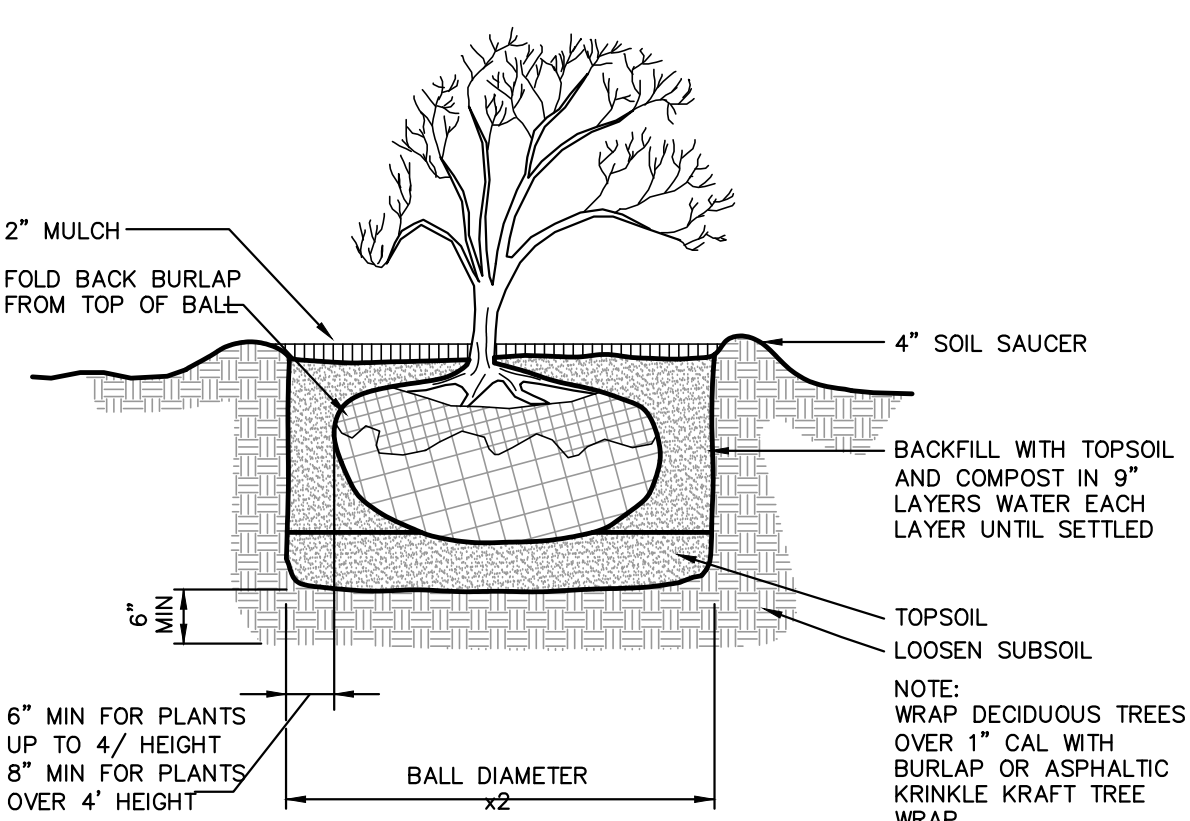
PLANTING SCHEDULE

Qty	Description	Size	Habitat contribution
South East Border Garden			Key for Habitat Contribution B- Bird Habitat/Food IP- Insect Pollinator
4	Trees Carpinus caroliniana 'Musclewood' (CAR)	2-2.5" Cal B+B	B Food
10	Thuja occidentalis Dark American Arborvitae (ARB)	7-8" B+B	B Cover
3	Ostrya virginiana 'Ironwood' (OST)	2-2.5 Cal B+B	B Food
3	Abies balsamea var. phanerolepis (BAL)	2-2.5 Cal B+B	B Cover
Shrubs			
10	Rhododendron maximum 4-5' (RM)	3-4" B+B	IP
6	Vaccinium corybosum, Highbush Blueberry (H)	3-4" B+B	IP B Food
6	Viburnum nudum 'Winterthur' (V)	3-4" B+B	IP B Food

- NOTES:
- 1) STAKING AT CONTRACTOR'S DISCRETION
  - 2) ON TREES BELOW 3" CAL, USE WOOD STAKES
  - 3) ON TREES 4" CAL OR GREATER USE GUYING CABLES
  - 4) IF GUYING CABLES USE 3 PER TREE MIN. AS NEEDED
  - 5) FOR PRUNING, SEE SPECIFICATIONS
  - 6) REMOVE ALL OF WIRE BASKETS ON ROOTBALL, TYP.



TREE DETAIL



SHRUB DETAIL

PLANTING SCHEDULE

Qty	Description	Size	Habitat contribution
Wetland Enhancement.			Key for Habitat Contribution B- Bird Habitat/Food IP- Insect Pollinator
10	Shrubs		
15	Ilex verticillata 'Winter Red'	3g	B Food
15	Alnus incana 'Speckled Alder'	3g	B Food
10	Viburnum lantanoides 'Hobblebush Viburnum'	1g	B Food
8	Cephalanthus occidentalis 'Button Bush'	3g	IP
8	Lindera benzoin 'Spicebush'	3g	IP B Food
15	Clethra alnifolia 'Summer Sweet'	3g	IP

1	2024.01.04	Town Engineer Comments	JS	TAP
REV.	DATE	DESCRIPTION	BY	CHK.

DRAWING ISSUE STATUS

**PERMIT SET**

**HALEY WARD**  
ENGINEERING | ENVIRONMENTAL | SURVEYING

140 Willow Street  
Winsted, Connecticut 06098  
860.379.6669

PROJECT

**DRESSER WOODS**  
RAILROAD STREET - SALISBURY, CT

**PLANTING PLAN**

DATE: November 20, 2023  
SCALE: 1"= 30'

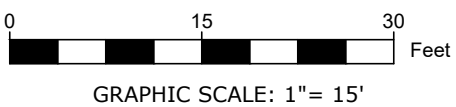
DRAWN BY: JS  
DESIGNED BY: TAP  
CHECKED BY: TAP


PROJECT No.: 4010271.23137

DRAWING No.: **06**  
REV: **1**



Key Habitat Contribution: B- Bird Habitat/Food  
IP- Insect Pollinator



7		2024.01.04	Town Engineer Comments	1'S		TAP	
REV.		DATE	DESCRIPTION	BY		CHK.	
DRAWING ISSUE STATUS							
PERMIT SET							
<div><div>HALEY WARD</div><div>ENGINEERING   ENVIRONMENTAL   SURVEYING</div><div>140 Willow Street Winsted, Connecticut 06098 860.379.6669</div><div>WWW.HALEYWARD.COM</div></div>							
PROJECT							
<div>DRESSER WOODS</div> <div>RAILROAD STREET - SALISBURY, CT</div>							
TITLE							
FOUNDATION PLANTING PLAN							
DATE				SCALE			
November 20, 2023				1"= 15'			
DRAWN BY		DESIGNED BY		CHECKED BY			
JS		TAP		TAP			
PROJECT No.				4010271.23137			
DRAWING No.						REV.	
07						1	



FILE LOCATION: P:\CT\4010271-LOUISEBERRY ARCARI MALIK ARCHITECTS, LLC\02317 - RAILROAD STREET SALISBURY-TAP\02-CAD\_FILES\CIVIL\PROJECT.DWG, 2024.01.04, 7:46 AM

SOIL EROSION AND SEDIMENT CONTROL PLAN NARRATIVE

1. INTRODUCTION AND PERMIT COMPLIANCE

Pursuant to Connecticut P.A. 83-388, this project requires a Soil Erosion and Sediment Control Plan and Narrative. This narrative describes the **minimum** measures required to control soil erosion during and after construction of the sitework shown on this plan. The soil erosion and sediment control measures shown on this plan are designed in accordance with a document entitled "Connecticut Guidelines for Soil Erosion and Sediment Control" published by the Connecticut Council on Soil and Water Conservation in 2002. The Contractor may be required to implement additional measures to prevent site erosion and sedimentation of downstream waterways. The Contractor is required to obtain copies of, and comply with the conditions of all permits for this project, including but not limited to:

- Municipal Inland Wetlands Permit
- Municipal Planning & Zoning Permit

The Contractor's activities and operations include all site work and work incidental to the project including, but not limited to haul roads, waste and disposal areas, staging areas, and field offices. If any of his activities require approvals above and beyond those already accounted for by the Owner's permits, the Contractor shall apply for and obtain such permits prior to conducting those operations. If incidental work such as haul roads, waste and disposal areas, staging areas, and field offices are not shown on the plans, and require additional erosion control, the Contractor shall provide such controls.

2. PROJECT DESCRIPTION AND SITE CHARACTERISTICS

This project involves the construction of nine buildings containing 20 apartments along with associated site work. Activities include:

- Tree clearing
- Earthwork
- Utility installation
- Construction of parking and sidewalks
- Stormwater system installation
- Site restoration and replanting

The total site area is 5.32 acres and is predominately wooded. There are wetlands and vernal pools on the north side of the property. The topography generally slopes to the east. Runoff from the site flows overland and eventually reaches Spruce Swamp Creek. Approximately 2.5 acres will be disturbed.

3. CONSTRUCTION SEQUENCING

1. Confirm all permits are in place. Contact Call-Before-You-Dig for utility markout.
2. Stake out clearing limits and wildlife exclusion fence. Flag trees to remain.
3. Hold preconstruction conference.
4. Install wildlife exclusion fence.
5. Install perimeter filter sock.
6. Install protection around trees to remain.
7. Cut trees and grub site.
8. Strip and stockpile topsoil.
9. Perform rough site grading.
10. Begin foundation work and building construction.
11. Install subsurface detention areas and FocalPoint system and protect from damage.
12. Install utilities.
13. Perform final grading.
14. Construct rain gardens.
15. Construct parking area and sidewalks.
16. Install final landscaping.

4. RESPONSIBILITY

4.1 RESPONSIBILITIES OF OWNER/PERMITEE

The Owner/Permittee is The Salisbury Housing Committee, P.O. Box 10, Salisbury, CT 06068. Contact Jocelyn Ayer, Vice President. 475-273-9808. The Owner/Permittee shall:

- A. Provide the Contractor with copies of land-use permits that Owner has acquired.
- B. Inform all parties involved with the proposed site work of this plan's objectives and requirements.

4.2 RESPONSIBILITIES OF CONTRACTOR

The Contractor is responsible for preventing erosion of the site and for protecting adjacent waterways from sedimentation. The Contractor shall:

- A. Install, monitor, and maintain the soil erosion and sediment control measures as shown on this plan.
- B. Comply with all permit requirements.
- C. Provide the Owner, Engineer, and the municipality with 24 hour phone numbers in the event of an emergency at the site.

5. PRECONSTRUCTION CONFERENCE

The Contractor shall initiate a preconstruction conference with the Permittee, Contractor, Engineer, and a municipal representative to review the proposed soil erosion and sediment control measures.

6. DESCRIPTION AND MAINTENANCE OF EROSION CONTROL MEASURES

6.1 TEMPORARY STABILIZATION MEASURES

Temporary Grass Cover:

Provide temporary grass cover where indicated on the plans or where temporary land grading will be unaltered for more than one month but less than 12 months. The Contractor shall loosen the soil to a depth of two inches before seeding. If existing soil is not capable of growing grass, the Contractor shall spread at least two inches of topsoil over the loosened surface. If seeding commences during the summer or early autumn, the annual or perennial ryegrass seed shall be used. If seeding commences in spring or late autumn, the winter ryegrass seed shall be used. Seeding rates shall be 5 lbs./1000 sq. ft. Hay mulch shall be spread at the rate of 100 lbs./1000 sq. ft. The Contractor shall irrigate the grass until an acceptable stand of grass is established.

Filter Sock:

Install filter sock as shown on the plans and details. Socks shall consist of a filter media inside of a mesh tube. Stake the filter sock at four-foot intervals or as called for by the manufacturer. Filter socks less than 12 inches in diameter shall be installed in a shallow depression. Where the filter sock is not continuous, it shall be overlapped a minimum of three feet. Remove sediment once levels have reached 1/4 of the effective sock. Repair and/or replace filter sock immediately if damaged or deteriorated. See table below for more information.

Project Duration	Mesh Material
Up to 5 years	Multi-Filament Polypropylene
Up to 12 months	Biodegradable Cotton Fiber
Up to 18 Months	Biodegradable Wood Fiber

Stockpiling or Storage of Excavated Materials:

Completely surround all temporary (2-4 weeks) material stockpiles with haybales or silt fence to prevent transportation of sediment. Seed stockpiles that will remain for a longer duration with a quick-growing rye grass.

Fabric Slope Protection (Erosion Control Blanket):

Install fabric slope protection on the sloping areas shown on the plan. The Contractor shall select a fabric from the Connecticut Department of Transportation's Approved Product List. The fabric shall meet the requirements of *Class 1 Type B Slope Protection*. The fabric shall be installed in accordance with the manufacturers instructions and guidelines. The Contractor shall maintain the fabric until a stand of grass, acceptable to the Owner, is established.

Temporary Mulch:

Mulch all disturbed areas with hay or straw at the rate of 2 tons per acre. Spread mulch by hand or mulch blower to provide a uniform distribution. Anchor the mulch by tracking with tracked construction equipment so clear marks are parallel to the contour. Mulch nettings, applied in accordance with the manufacturer's recommendations, may be used as an alternate to tracking. Restore any areas where mulch is washed away or blown away by the wind.

This activity shall be used to stabilize areas where construction is suspended during the winter months. Once the appropriate dates for seeding are reached, the Contractor shall complete the seeding operations.

Dust Control:

Take precautions to prevent dust from becoming a nuisance to abutting property owners. Broom off pavements adjoining the excavation on a daily basis. Cover and/or keep all earth stockpiles moist at all times. Use calcium chloride to control dust over certain areas of the site, as directed by the Engineer or shown on the plans. Calcium chloride shall conform to ASTM D-98, Type I. The Contractor shall maintain and inspect, on a daily basis, the adequacy of dust control measures and correct any deficiencies immediately.

Tree Protection:

Trees to remain are shown on the plans. The Contractor shall provide snow fencing, board fencing, or cord fencing around trees or groups of trees to protect them against damage. The Contractor shall be responsible for selecting and installing the protection measures most appropriate for the conditions present. The Contractor shall repair and/or replace tree protection measures immediately if damaged during construction.

6.2 TEMPORARY STRUCTURAL MEASURES

Catch Basin Protection, Silt Sack:

Use Silt Sack or approved equal for protection of catch basins as shown on the plans. Install a "silt sack" per manufacturer's instructions. Remove sediment from "silt sack" once the sack reaches half full. Replace the "silt sack" immediately if it becomes damaged or the permeability is impeded by sediment.

6.3 PERMANENT STABILIZATION MEASURES

Implement stabilization measure within three days of final grading.

Loam, Seed and Mulch:

Immediately following rough grading activities, bring all disturbed areas to final grade with four inches of loam.

Loam shall be free of large stones and roots and other deleterious materials such as wood, pieces of pavement, metals, trash, etc. and shall be of such quality as to readily promote germination of grass seed.

Prior to seeding, lime and fertilize according to soil nutrient analysis test. Such soil test must have been performed on soil no more than 180 days prior to application. Do not, in any case, apply fertilizer within 25 feet of a waterbody. Work lime and fertilizer into soil.

Apply the following seed mix:

- Viking Hard Fescue 40%
- Zig Zag Rhizomatous Tall Fescue 30%
- Creeping Red Fescue 15%
- Deschutes Perennial Ryegrass 15%

Immediately after seeding operations, cover the seedbed with hay or straw mulch at a rate of 100 lbs./1000 sq. ft. Mulch must be free of weeds and coarse matter. Spread mulch by hand or by mulch blower. Mulch anchoring is required by tractor drawn anchoring device along contour, or by tracking with a bulldozer (cleats parallel to contour) on slopes flatter than 3H:1V. If not specifically required herein, anchored jute mesh or equal is preferred by the Engineer but not required on slopes steeper than 3H:1V.

The Contractor shall irrigate all seeded areas until a stand of grass, acceptable to the Owner, is established.

The Contractor shall be responsible for all seeded areas. If topsoil, seed, and/or mulch is washed away by rainfall, the Contractor shall restore the area.

Landscape Plantings:

Provide plantings to control erosion, as indicated on the plans. This work includes furnishing and planting trees, shrubs, and groundcover plants of the types and sizes indicated on the drawings. The Contractor may also be required to: 1) furnish and place topsoil, 2) guy or stake trees or shrubs, 3) fertilize, 4) water, 5) prune, 6) spray, 7) install mulch, and 8) establish all groundcover prior to the end of the period of acceptance. The Contractor is responsible for the above activities until final acceptance by the Owner.

6.4 PERMANENT STRUCTURAL MEASURES (POST CONSTRUCTION STORMWATER MANAGEMENT)

Land Grading:

Proposed grades are shown in detail on the plan.

In general, the Contractor shall properly stockpile earth, move it to fill areas, or export it from the site. Place and compact fill in shallow lifts, proceeding uphill from the toe area. Create large but shallow runoff collection areas at the end of each working day to help collect and prevent runoff from running down the fill face.

Bring all excavated, filled, or disturbed areas to final grade as soon as possible and stabilize areas with loam, seed and mulch immediately. Keep erosion control measures in place until the site is stabilized with pavement and/or vegetation.

Outlet Protection:

Construct outlet protection, in the form of a riprap apron, at storm sewer outfalls as shown on the plans and details. The aprons dissipate energy and reduce runoff velocity. Remove accumulated sediment from the apron after the site is stabilized with grass and/or pavement.

Rain Gardens/Bioretention Areas:

Minimize disturbance of the areas planned for raingarden/bio retention areas. Avoid unnecessary compaction. Construct bioretention areas where shown on the plans. Construct the bioretention areas according to the requirements shown on the plans and details.

Subsurface Detention:

Subsurface detention is required, as shown on the plans and details, to reduce the peak rate of runoff leaving the site. Construct the detention chamber according to the plans and details and stabilize the cover as quickly as possible.

6.5 OTHER CONTROLS

Waste Disposal:

Provide an adequate number of covered waste containers to ensure that no litter, debris, building materials, or similar materials are discharged to wetlands or watercourses. Instruct subcontractors to use the containers for waste material. Empty the containers promptly when full.

Construction Entrance:

Place clean washed stone (CONNDOT No.3 stone) at the site entrance(s) to the length, width and depth indicated on the plans and details to help remove mud and/or clods of soil from construction vehicles exiting from the site. Add stone as necessary to maintain adequate serviceability.

Pavement Maintenance:

The Contractor shall sweep paved roadways adjacent to the site on a routine basis to prevent tracking of mud onto public roadways and washing of mud into waterways. If the Contractor's schedule for cleaning the pavement is found to be inadequate by the Owner, Owner's Representative, or the municipality, the Contractor shall increase the frequency at no additional cost to the Owner.

Cleaning of Stormwater Structures:

Clean all stormwater structures, including, but not limited to pipes, swales, detention basins, sediment traps, and riprap aprons of sediment upon completion of the project.

Concrete Washout Area:

Washout of equipment for concrete shall be conducted in the designated area. Such washout shall be conducted: (1) outside of any buffers and at least 50 feet from any stream, wetland or other sensitive resource; or (2) in an entirely self-contained washout system. The Contractor shall direct all washwater into a container or pit designed such that no overflows can occur during rainfall or after snowmelt.

At least once per week, the Contractor shall inspect all of the containers or pits used for washout to ensure structural integrity, adequate holding capacity, and to check for leaks or overflows. If there are signs of leaks, holes or overflows in the containers or pits that could lead to a discharge, the Contractor shall repair them prior to further use.

The Contractor shall remove hardened concrete waste whenever the hardened concrete has accumulated to a height of ½ of the container or pit or as necessary to avoid overflows.

Construction Dewatering:

This item includes methods and equipment necessary to maintain, in a dry condition, any areas in which construction is to be conducted. These methods include pumping, draining, installing well-points and/or cofferdams. Whatever the methods or equipment used, dispose of the discharge water in such a manner to avoid pollution of existing watercourses, injury to persons or public or private property.

The Contractor shall develop a dewatering program designed to ensure that disposal of all dewatering wastewaters will not cause scouring or erosion or contain suspended solids in amounts which could reasonably be expected to cause pollution of wetlands or waterways. Discharge wastewaters in a manner which minimizes the discoloration of receiving waters.

The Contractor shall construct a silt fence/haybale barrier at the outlet of the dewatering system. The wastewater must pass through this barrier prior to discharge to any storm sewer or watercourse. The Contractor shall continually monitor the discharge to ensure the barrier is functioning properly. The barrier shall be maintained in working condition until dewatering operations are complete.

7. GENERAL CONDITIONS

7.1 If erosion control measures are damaged by construction vehicles, acts of vandalism, or severe weather conditions, the Contractor shall immediately remove sediment in the vicinity of the erosion control measures and repair these measures to a functional condition.

7.2 If, during or after construction, it becomes apparent that existing erosion control measures are incapable of controlling erosion, the Owner, the Engineer, or the municipality may require additional control measures including, but not limited to; additional haybales, silt fence, sediment basins, or mechanically anchored mulch.

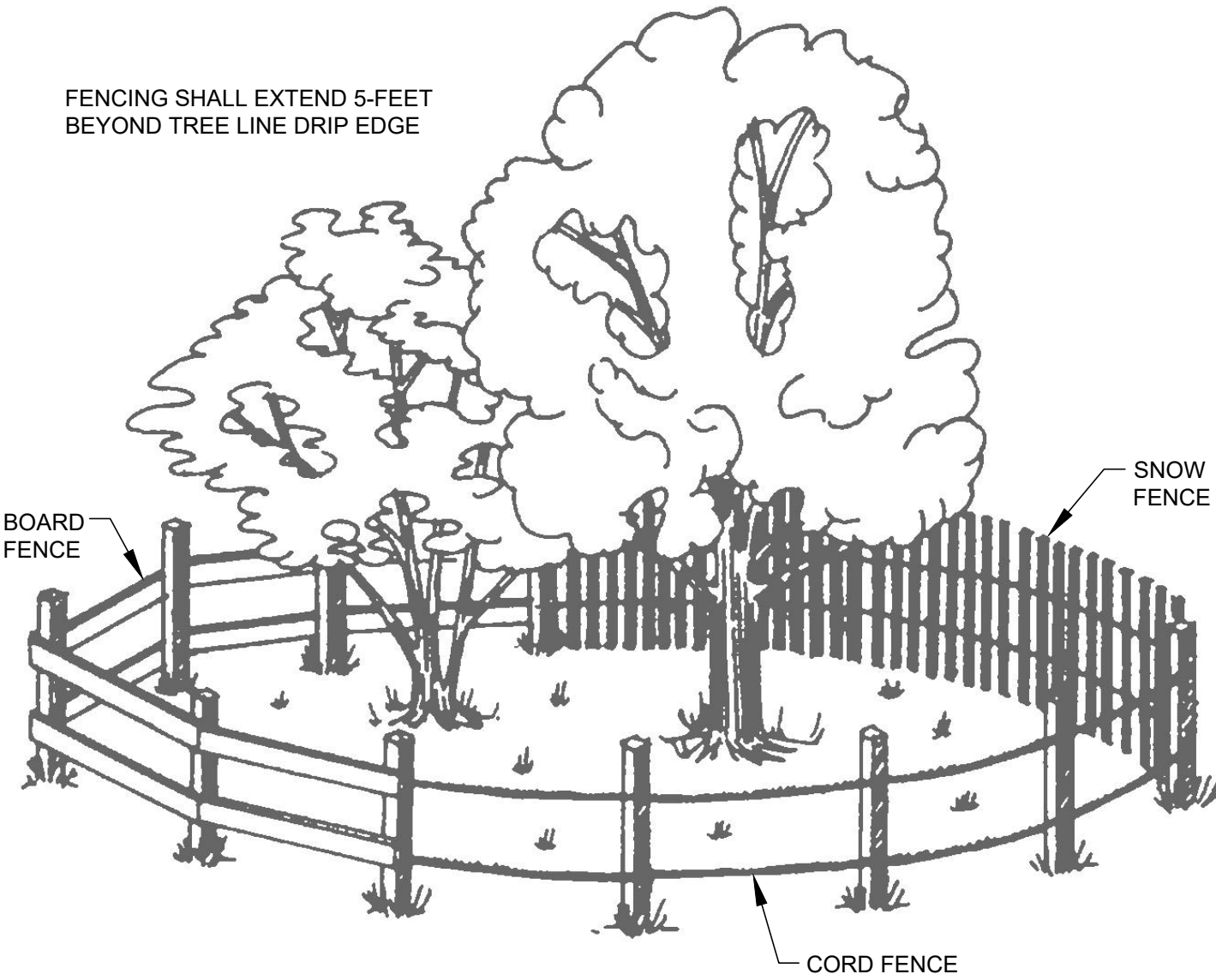
7.3 Refueling of equipment or machinery within 75 feet of any wetland or watercourse is prohibited.

7.4 No materials resulting from construction activities shall be placed in or allowed to contribute to the degradation of an adjacent wetland or watercourse. Disposal of any material shall be in accordance with Connecticut General Statutes, including, but not limited to, Sections 22a-207 through 22a-209.

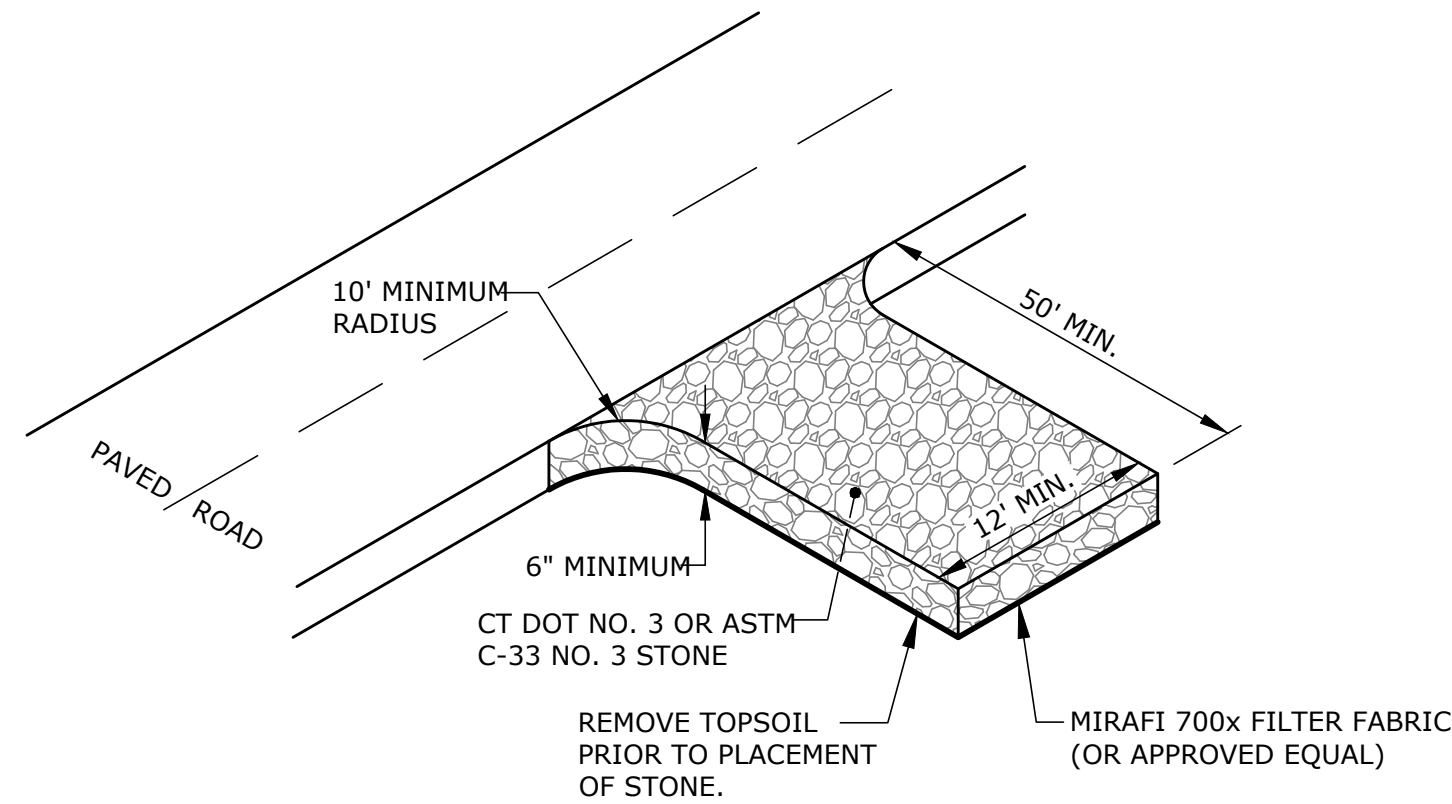
7.5 Stabilize all temporary fill to prevent erosion and to prevent sediment or other particulate matter from reentering a wetland or watercourse. Restore and revegetate all areas affected by temporary fills to their original contours or as directed by the Owner. Confine the extent of temporary fill or excavation to that area necessary to perform the work, as approved by the Owner.

7.6 Dumping of oil, chemicals or other deleterious materials on the ground is forbidden. The Contractor shall provide a means of catching, retaining, and properly disposing of drained oil, removed oil filters, or other deleterious material. All spills of such materials shall be reported immediately by the Contractor to the DEEP.

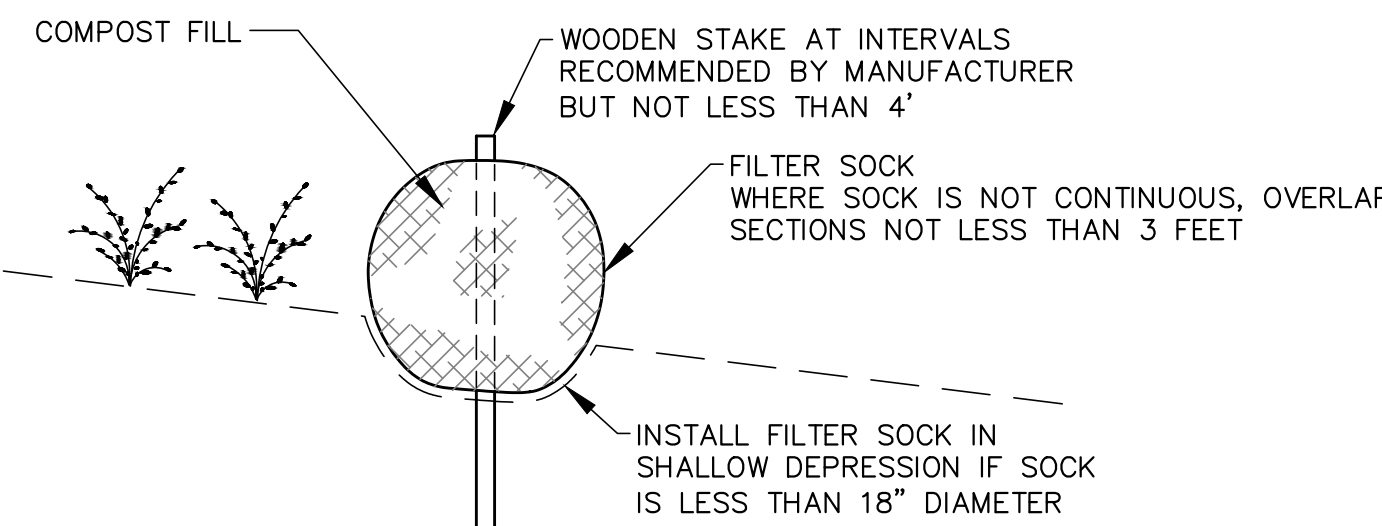
7.7 No application of herbicides or pesticides within 75 feet of any wetland or watercourse will be allowed. All such applications must be done by a Connecticut licensed applicator. The Contractor shall submit to the Owner the proposed applicator's name and license number, and must receive the Owner's approval of the proposed applicator, before such application is carried out.



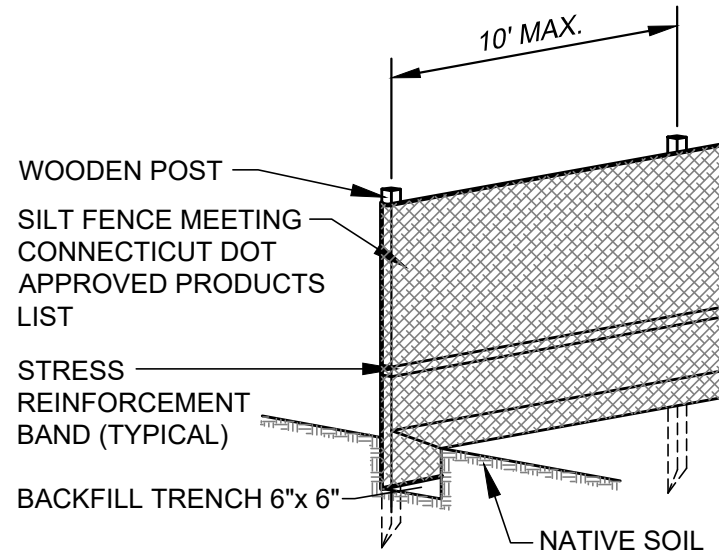
TREE PROTECTION  
NOT TO SCALE



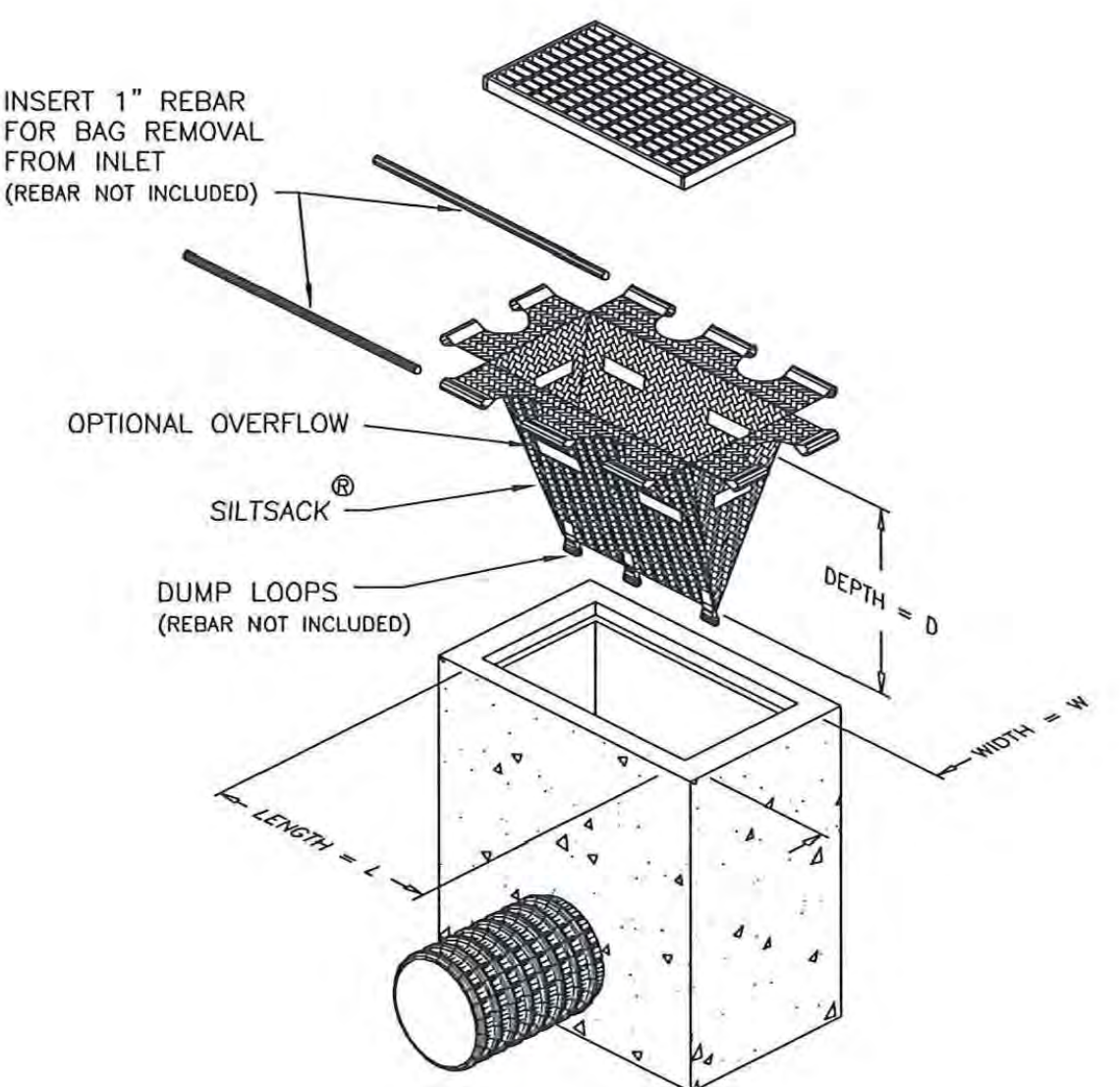
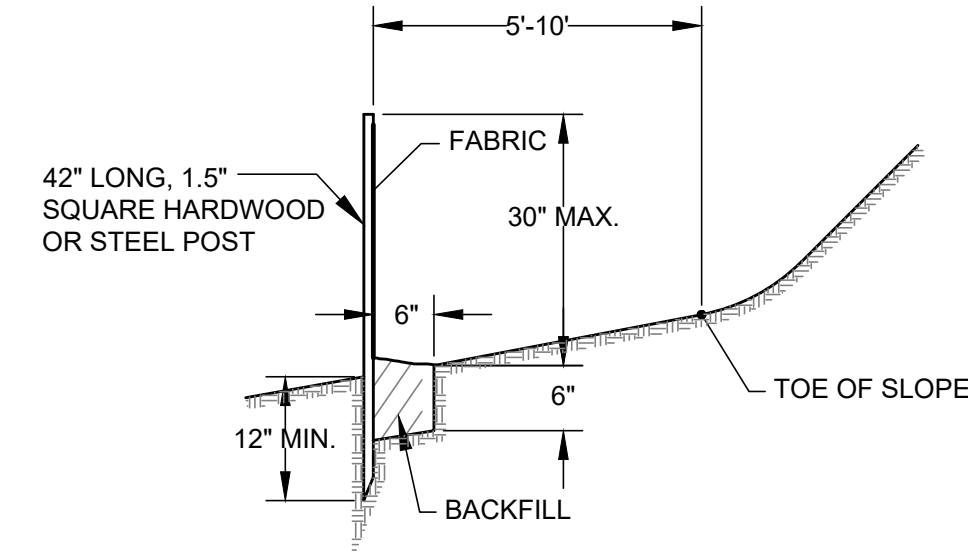
CONSTRUCTION ENTRANCE  
NOT TO SCALE




FILTER SOCK  
NOT TO SCALE



SILT FENCE  
NOT TO SCALE

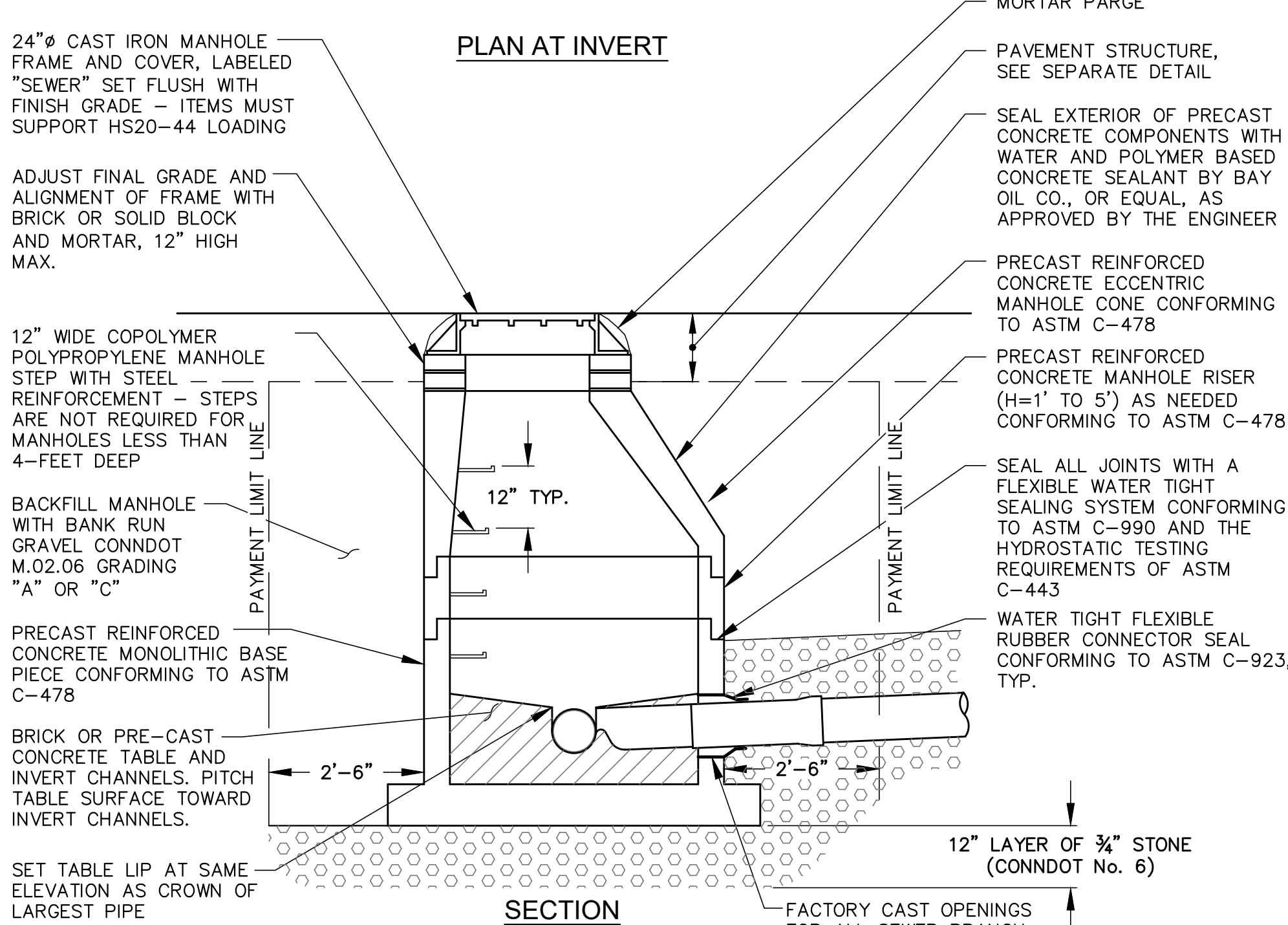
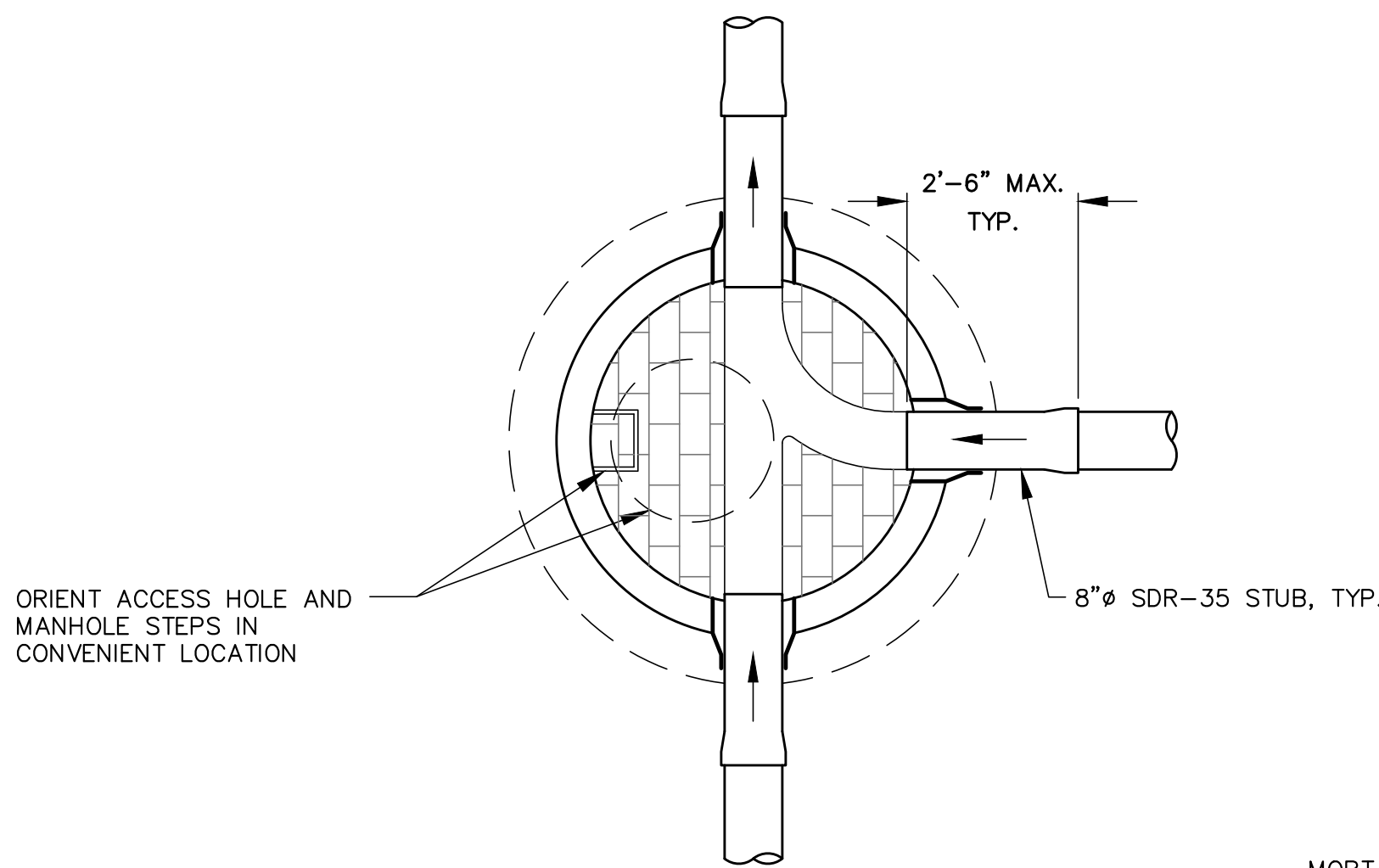


DRAIN OUTLET PROTECTION  
NOT TO SCALE

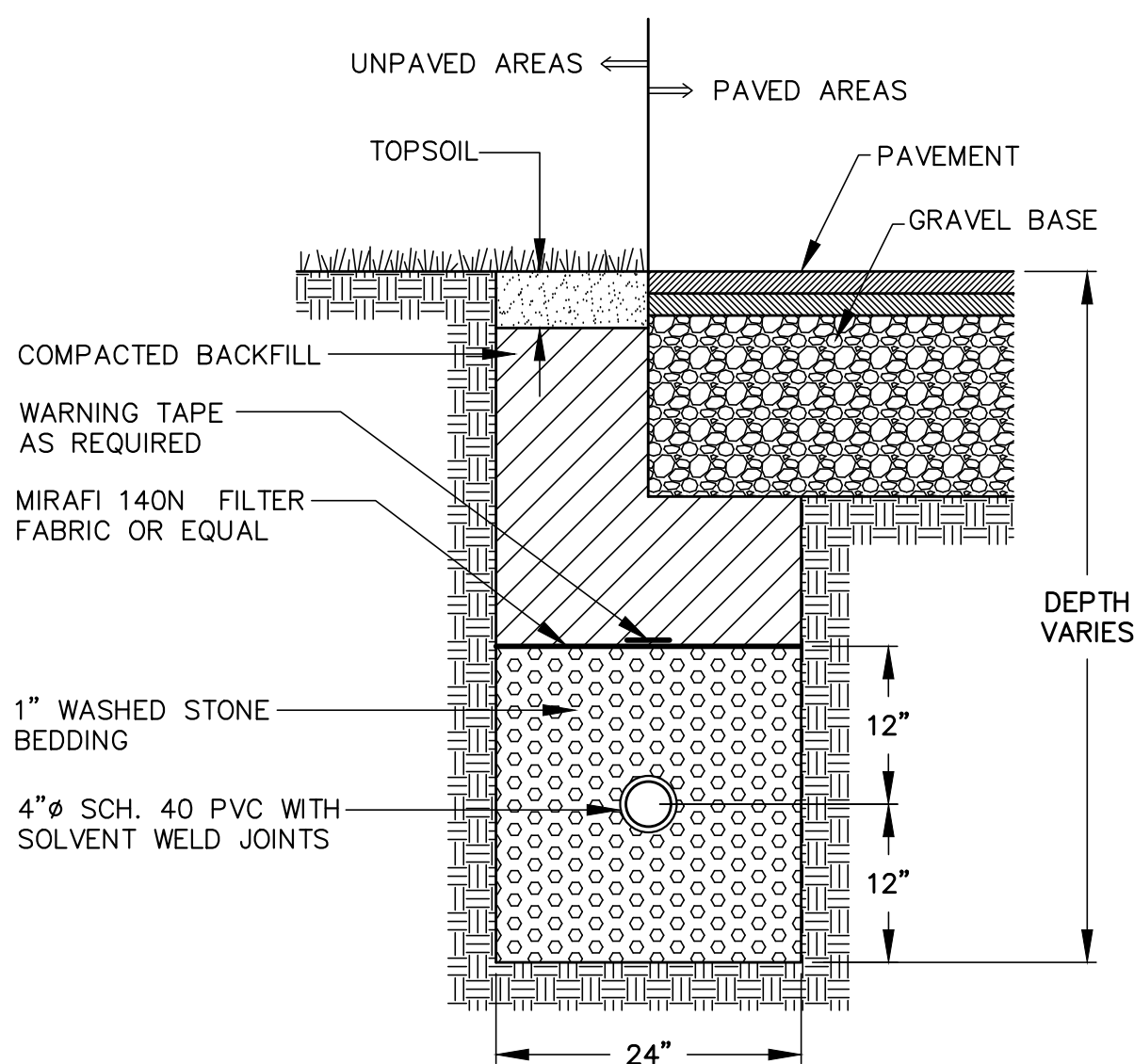
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DRAWING ISSUE STATUS				
PERMIT SET				
<div><div>HALEY WARD</div><div>ENGINEERING   ENVIRONMENTAL   SURVEYING</div><div>140 Willow Street Winsted, Connecticut 06098 860.379.6669</div><div>WWW.HALEYWARD.COM</div></div>				
PROJECT				
DRESSER WOODS RAILROAD STREET - SALISBURY, CT				
TITLE				
EROSION CONTROL PLAN NARRATIVE AND DETAILS				
DATE		SCALE		
November 20, 2023		As Noted		
DRAWN BY		DESIGNED BY		CHECKED BY
JS		TAP		TAP
PROJECT No.		4010271.23137		
DRAWING No.		REV.		
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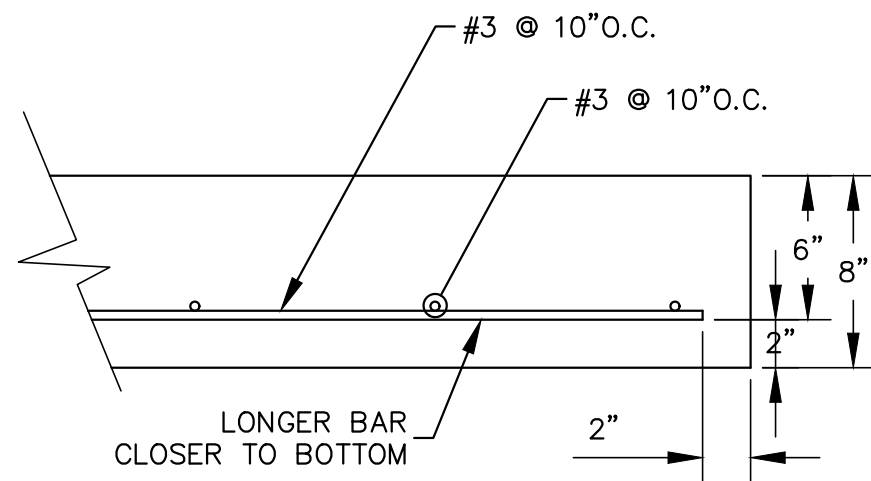
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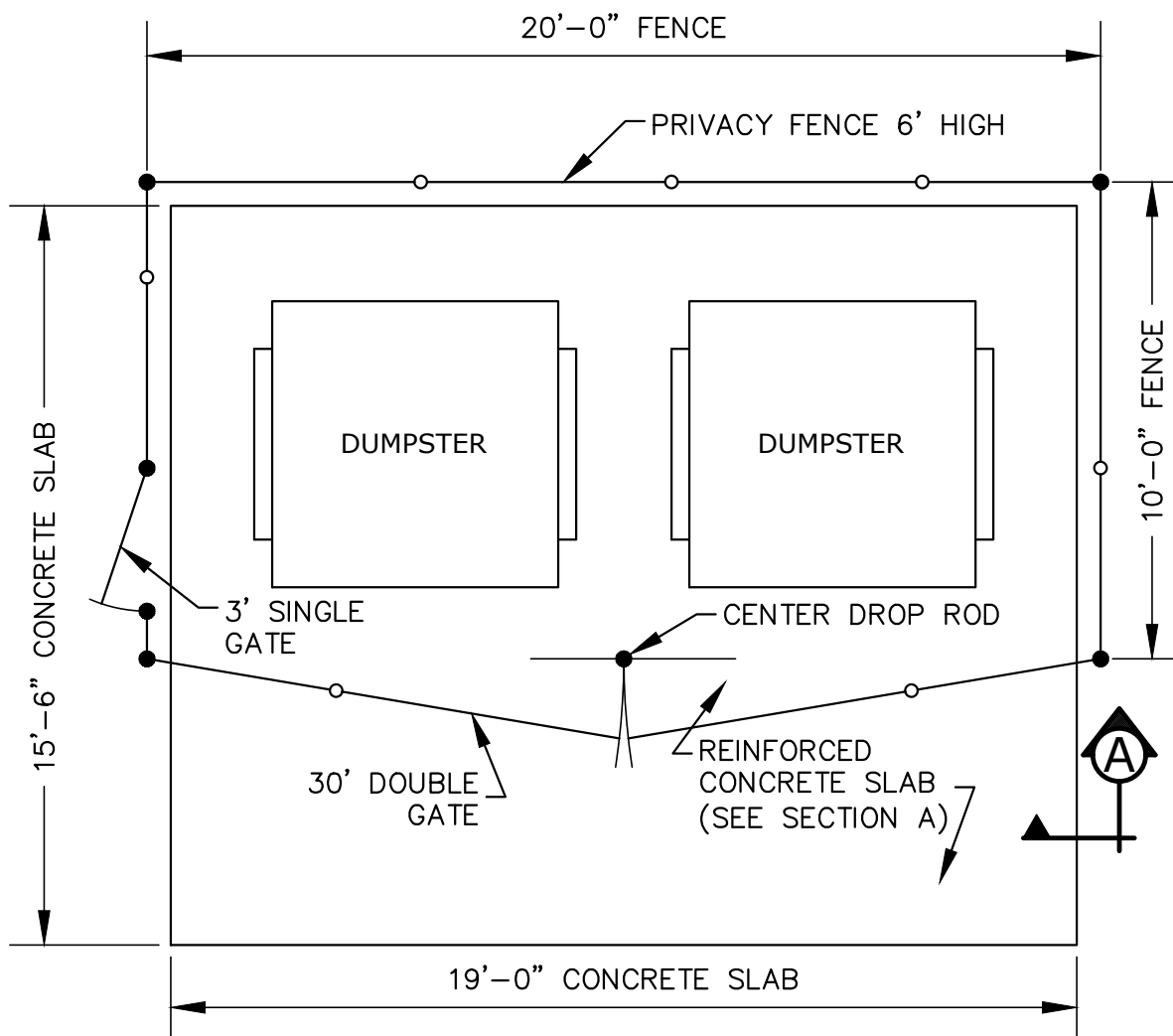
SANITARY SEWER MANHOLE  
NOT TO SCALE



SANITARY SEWER TRENCH  
NOT TO SCALE



DUMPSTER PAD SECTION A  
SCALE: 1 1/2"=1'-0"



DUMPSTER PAD DETAIL  
SCALE: 3/4"=1'-0"

TECHNICAL SPECIFICATION



AGTEC HEAVY DUTY DRIVEWAY & PARKING GRID PAVERS

THE INTERLOCKING SOLUTION FOR TRUCK PARKING, REST AREAS & ACCESS ROUTES

SPECIFICATIONS

Length	23 1/4"
Width	15 1/4"
Height	3 1/4"
Weight/piece	19.84 lbs
Coverage	2.58 ft²
Quantity/pallet	135 pieces
Area/pallet	348 ft²
Material	100% recycled plastic
Color	Gray

KEY FACTS

- High compressive strength
- Flexible and resistant to cracking
- Harmless to flora and fauna
- Meet SLW60 loading category (vehicle up to 60 metric tonnes / 66 tons gross weight)
- Within NIOSH manual handling guidelines

Permeable design

A rigid but open cellular design allows the grids to provide both exceptional support and water management.

Lightweight

Complies with HSE manual handling guidelines.

Flexible

Polymer construction is semi flexible and resistant to cracking unlike concrete.

Application options

Open cells can be filled with either gravel or soil and used depending on your application.

Environmentally friendly

Manufactured from 100% recycled plastic.

High load

Meets high SLW vehicle design specifications, up to 60 metric tonnes DIN 1072.

Stable

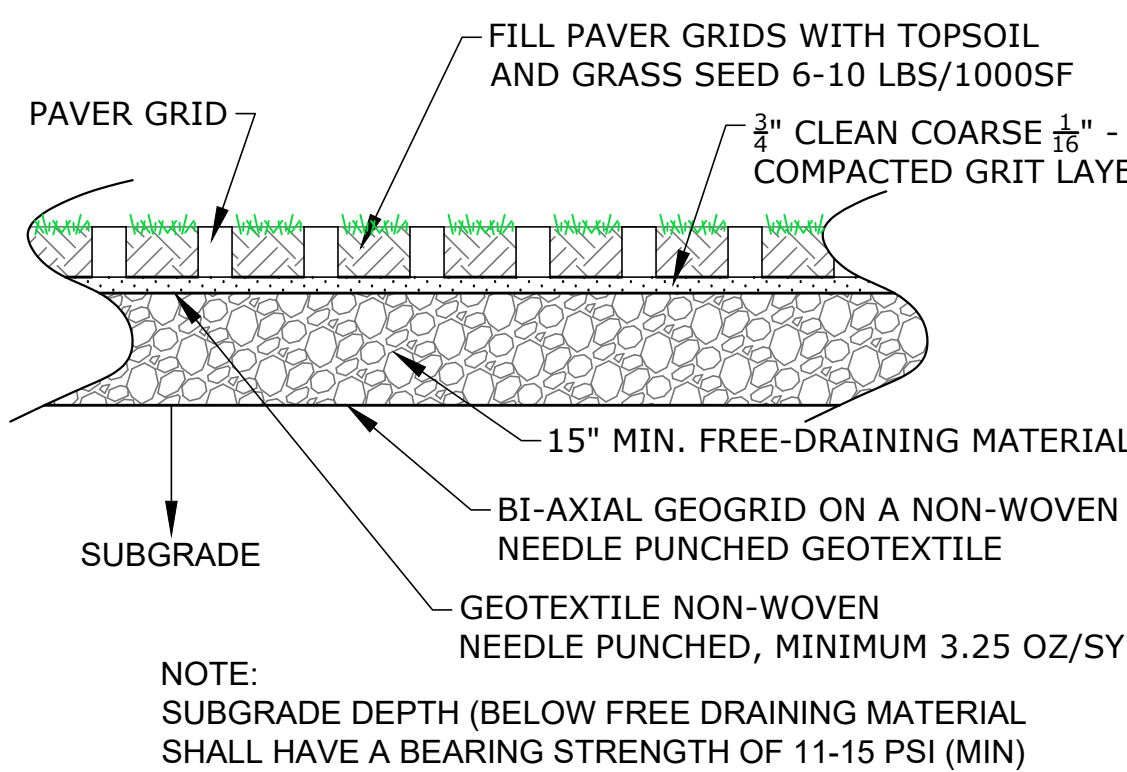
Location fit connection improves stability once units are in position.



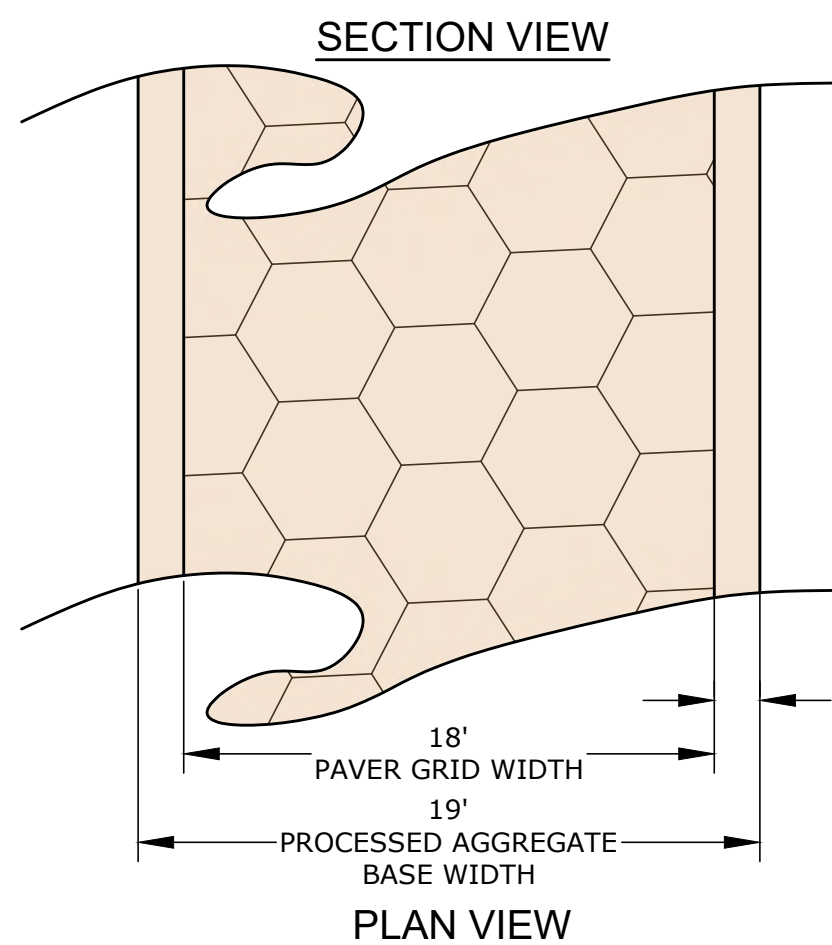
AgTec LLC  
125 Main Road,  
Hamden, Maine 04444

1-207-692-0700  
sales@agtec.com  
www.agtec.com

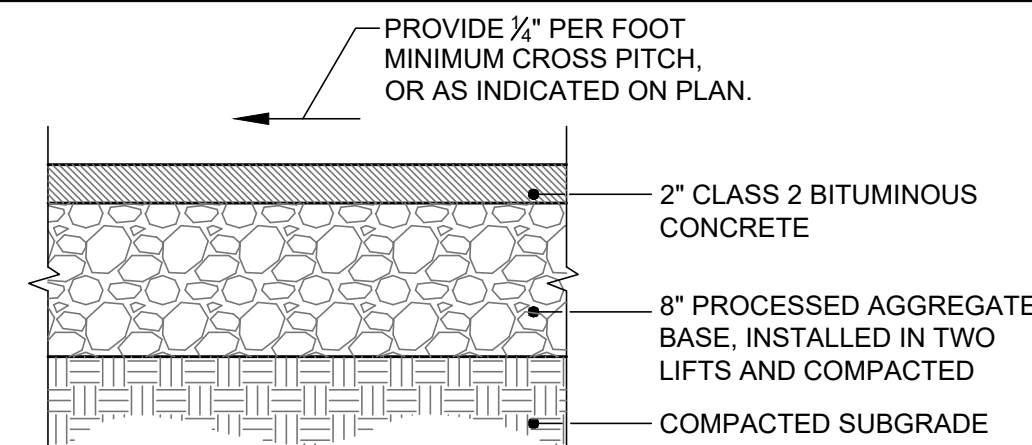
100% recycled  
100% recyclable



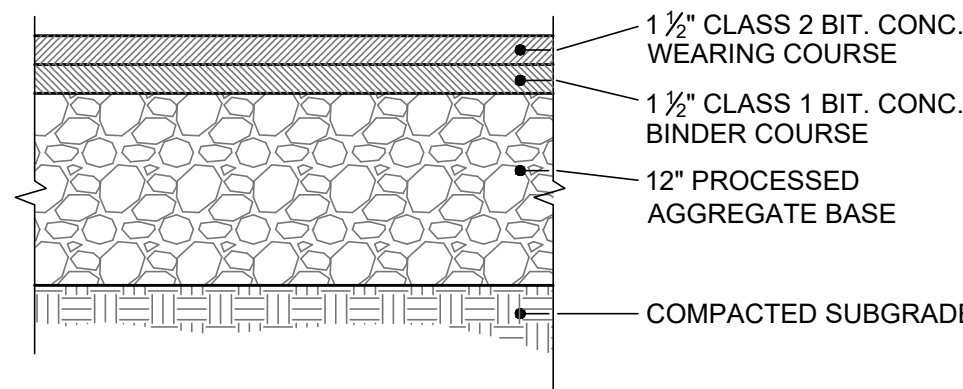
NOTE: SUBGRADE DEPTH (BELOW FREE DRAINING MATERIAL) SHALL HAVE A BEARING STRENGTH OF 11-15 PSI (MIN)



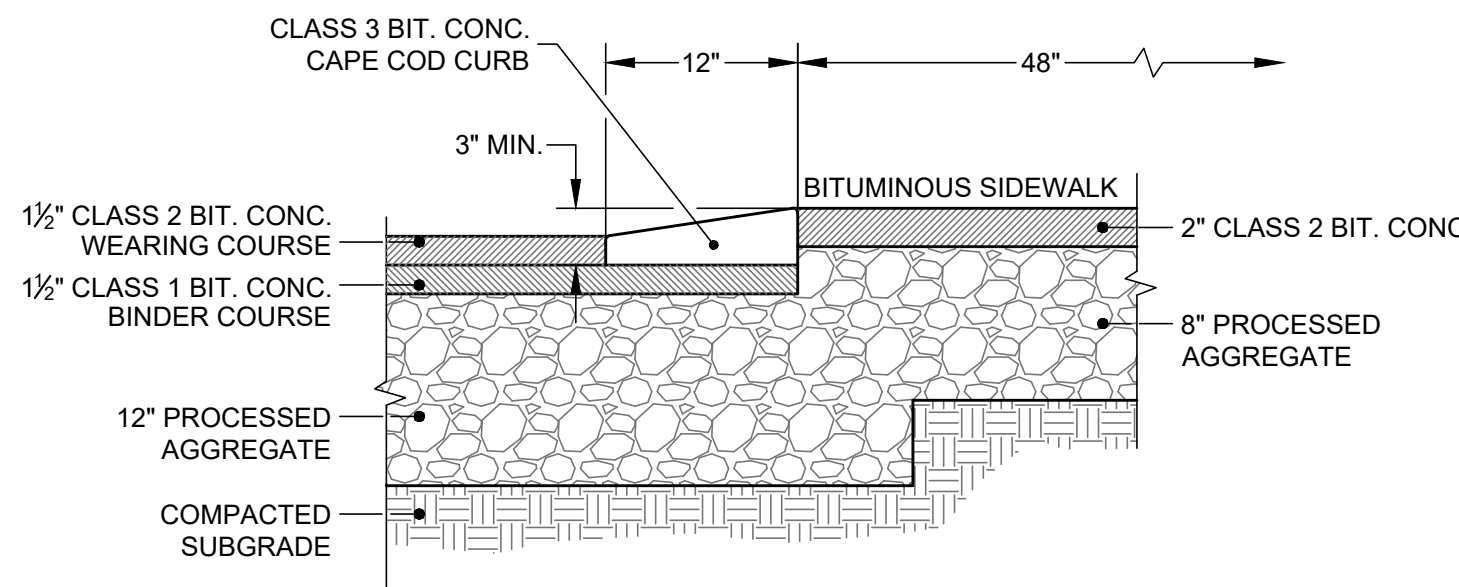
GRASS PAVER OVERFLOW PARKING  
NTS



BITUMINOUS CONCRETE SIDEWALK  
NOT TO SCALE



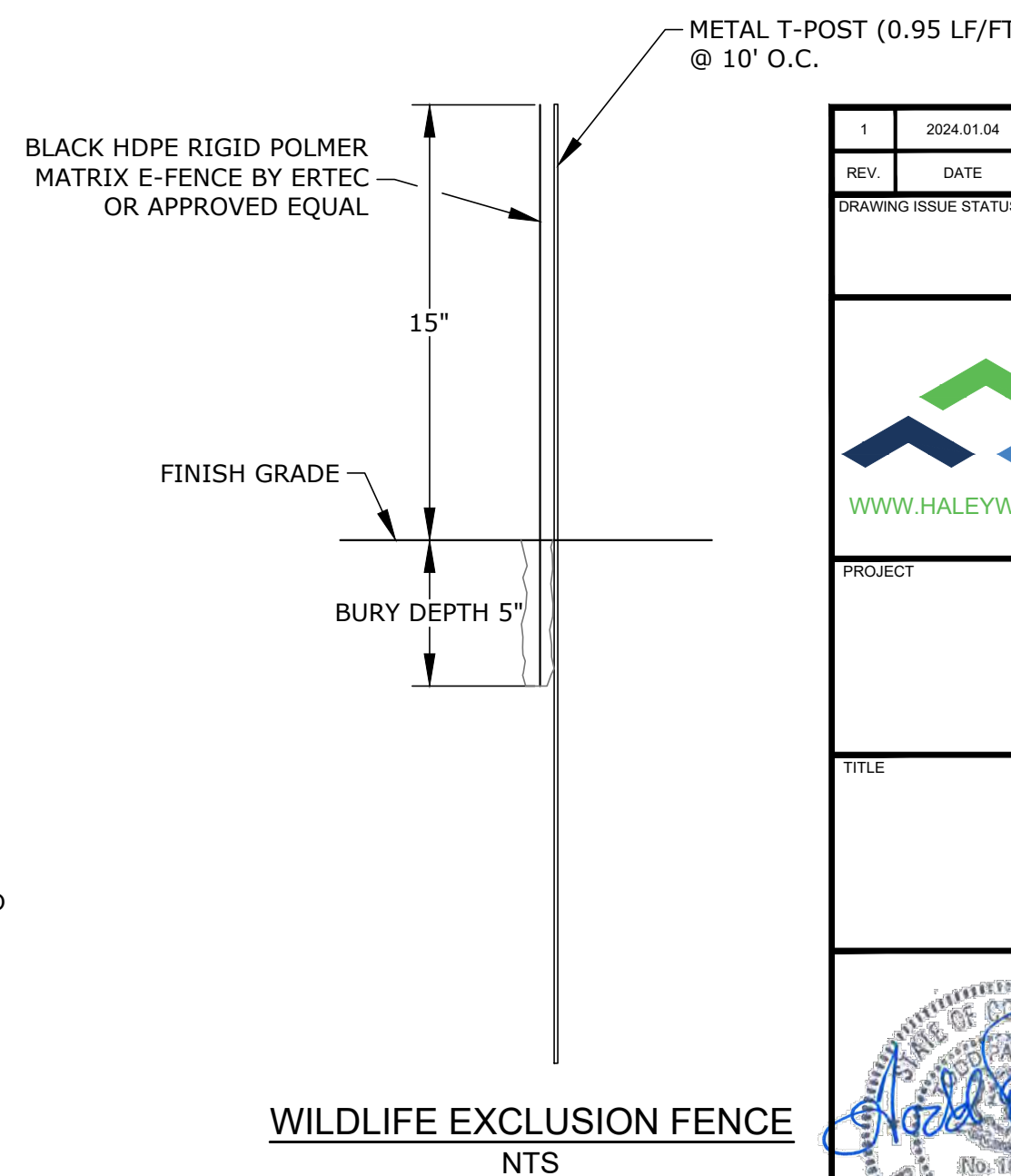
BITUMINOUS CONCRETE PAVEMENT  
NOT TO SCALE



BITUMINOUS CONCRETE PAVEMENT, CURB, AND SIDEWALK  
NOT TO SCALE

NOTES

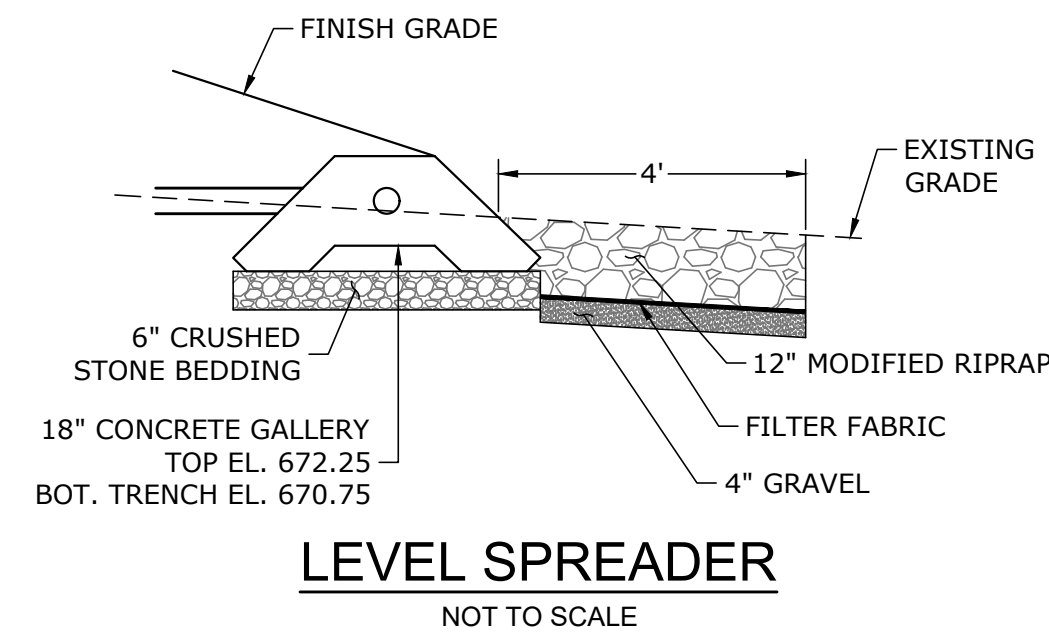
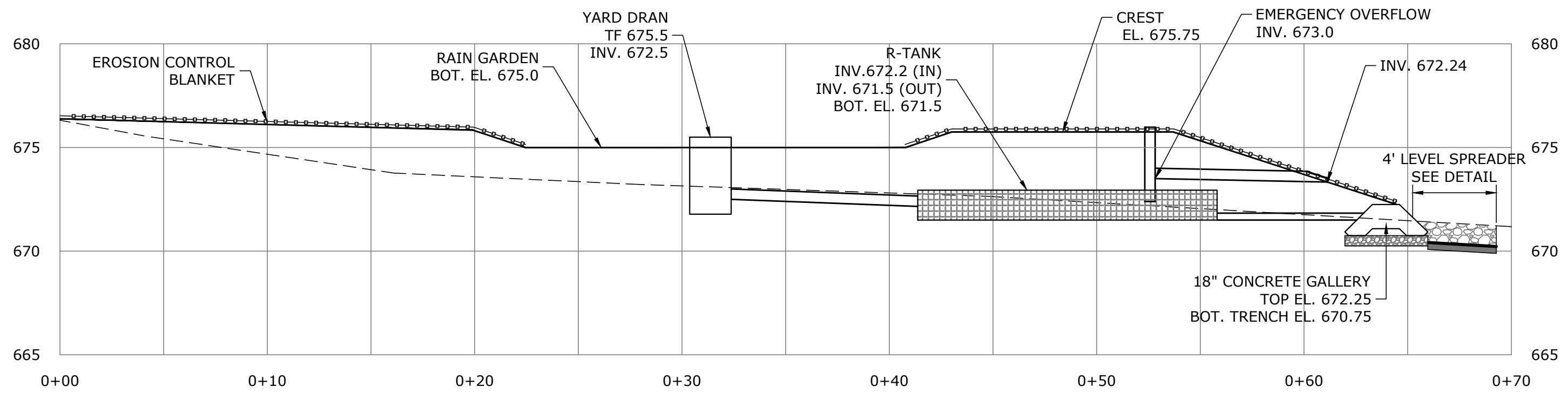
- Processed aggregate base shall conform to CTDOT Form 818 Article M.05.01 compacted to 95% maximum dry density.
- Bituminous concrete shall conform to CTDOT Form 818 Article 4.06.02 and be installed in accordance with Article 4.06.03



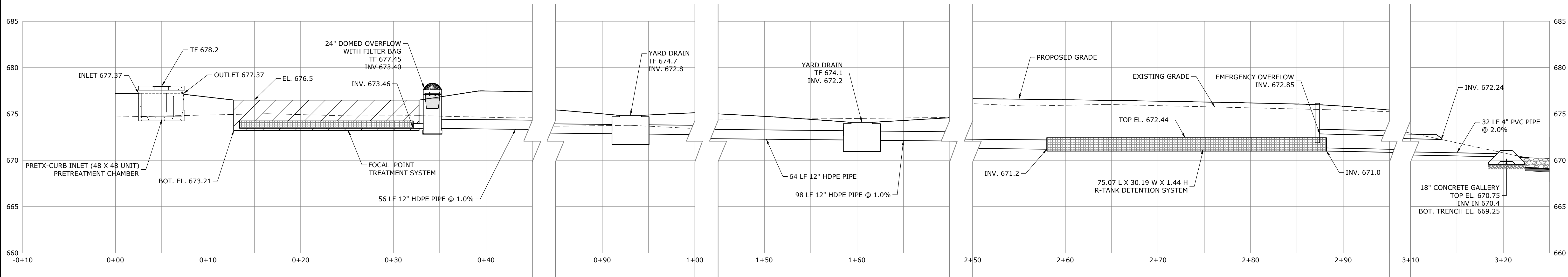
WILDLIFE EXCLUSION FENCE  
NTS

1	2024.01.04	Town Engineer Comments	JS	TAP
REV	DATE	DESCRIPTION	BY	CHK
DRAWING ISSUE STATUS				
PERMIT SET				
HALEY WARD ENGINEERING   ENVIRONMENTAL   SURVEYING WWW.HALEYWARD.COM 140 Willow Street Windsor, Connecticut 06098 860.379.6669				
PROJECT				
DRESSER WOODS RAILROAD STREET - SALISBURY, CT				
TITLE				
SITE DETAILS				
DATE	November 20, 2023	SCALE	As Noted	
DRAWN BY	JS	DESIGNED BY	TAP	CHECKED BY
PROJECT No.	4010271.23137			
DRAWING No.	09			1

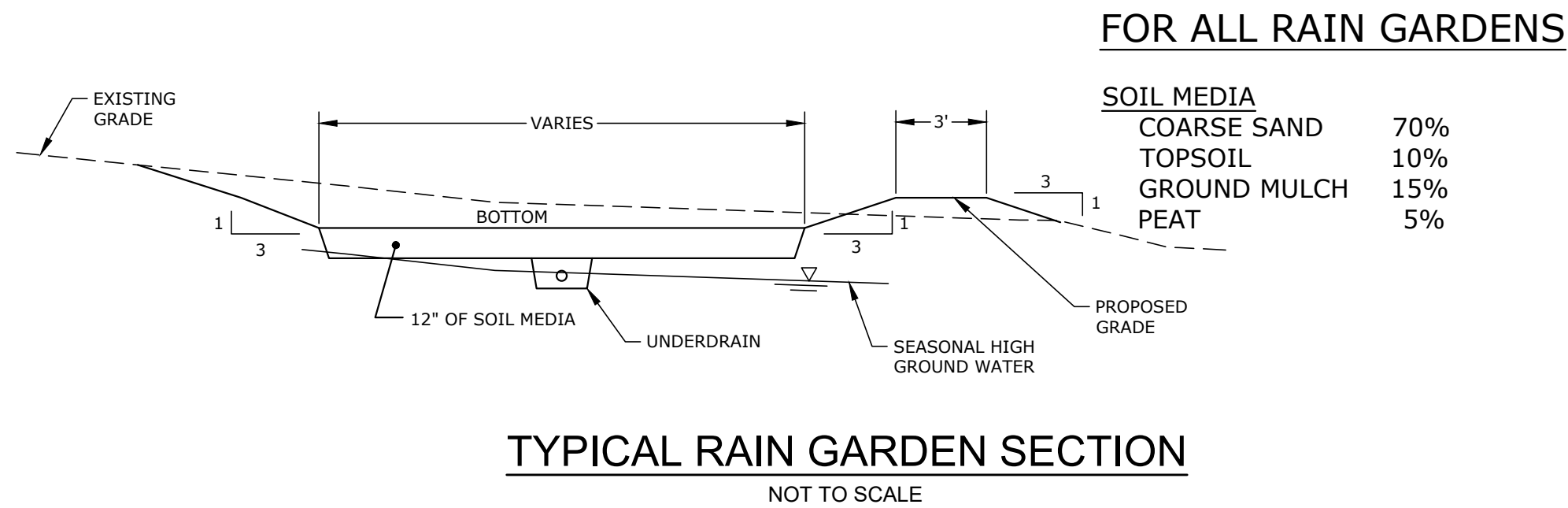




SECTION THROUGH RAIN GARDEN 3/4 AND R-TANK  
NOT TO SCALE



SECTION THROUGH STORM WATER SYSTEM (PRETX, FOCAL POINT, R-TANK)  
NOT TO SCALE



FOR ALL RAIN GARDENS

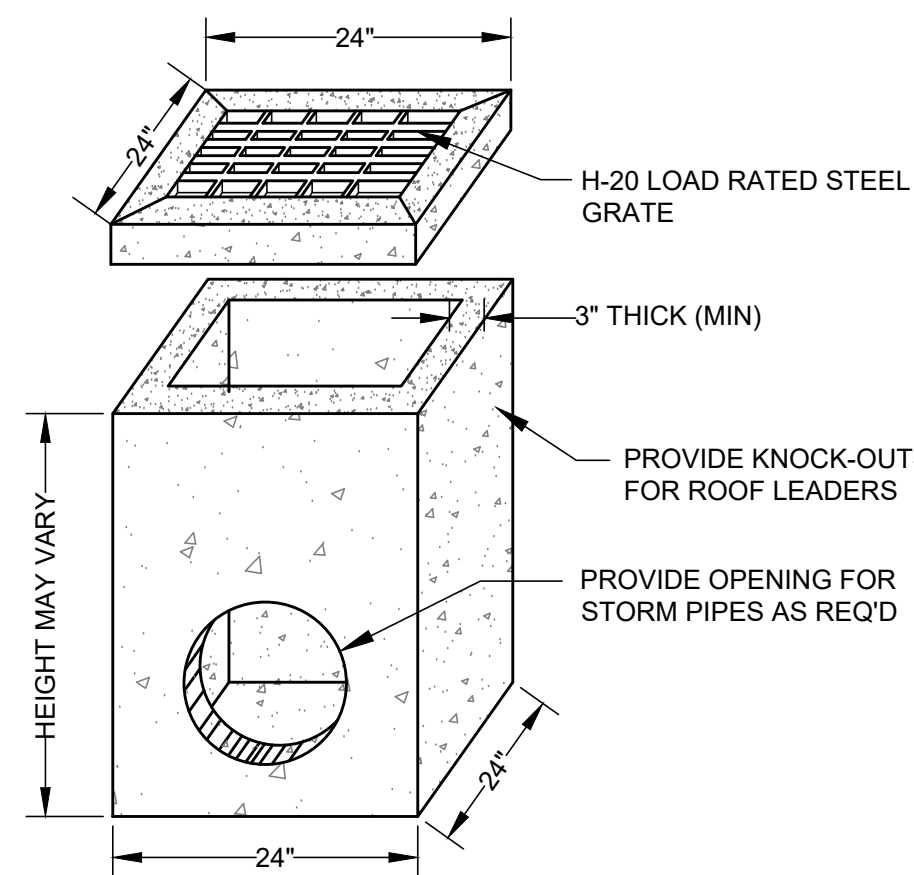
SOIL MEDIA	
COARSE SAND	70%
TOPSOIL	10%
GROUND MULCH	15%
PEAT	5%

RAIN GARDEN PLANTING SCHEDULE

Contractor shall select a mixture of the plants in the table and plant them in the rain gardens.

Plants


Wild red columbine	(Aquilegia canadensis)
New England aster	(Symphyotrichum novae-angliae, syn.Aster
Marsh marigold	(Caltha palustris)
Cardinal flower	(Lobelia cardinalis)
Partridgeberry	(Mitchella repens)
Wild blue phlox	(Phlox divaricata)
Bloodroot	(Sanguinaria canadensis)
Foamflower	(Tiarella cordifolia)



PRODUCT NOTES:

- CATCH BASIN AND TOP SHALL BE MANUFACTURED TO ACCOMMODATE H-20 VEHICLE LOADING.
- MINIMUM CONCRETE STRENGTH SHALL BE 4,000 PSI AT 28 DAYS.
- MINIMUM REINFORCING BAR SIZE SHALL BE #4.
- PRODUCT SHALL BE PRECAST WITH REINFORCING HOLES OR HOOKS.
- SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL. ALTERNATE PRODUCTS MAY BE CONSIDERED AT THE SOLE DISCRETION OF THE OWNER AND ENGINEER.

YARD DRAIN  
NOT TO SCALE

1	2024 01 04	Town Engineer Comments	JS	TAP
REV	DATE	DESCRIPTION	BY	CHK
DRAWING ISSUE STATUS				
PERMIT SET				
 140 Willow Street Windsor, Connecticut 06098 860.379.6669				
PROJECT DRESSER WOODS RAILROAD STREET - SALISBURY, CT				
TITLE STORMWATER PROFILES AND DETAILS				
DATE November 20, 2023		SCALE As Noted		
DRAWN BY JS		DESIGNED BY TAP		CHECKED BY TAP
PROJECT No. 4010271.23137				
DRAWING No. 10				REV. 1





**R-TANK<sup>HD</sup> SYSTEM OVERLAY**  
**DRESSER WOODS**  
**SALISBURY, CT**

SCALE  
1" = 50'

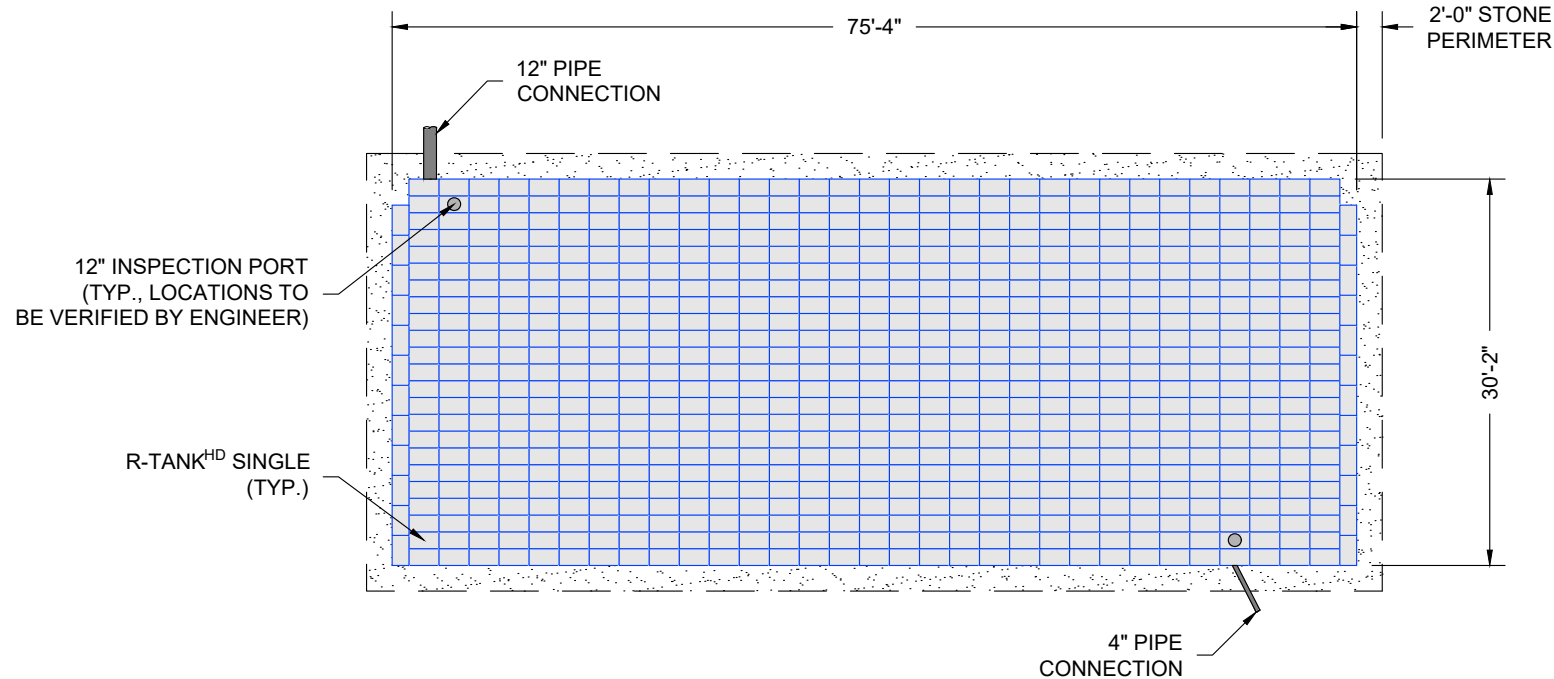
DRAWN BY  
BMK

DATE  
11/24/2023

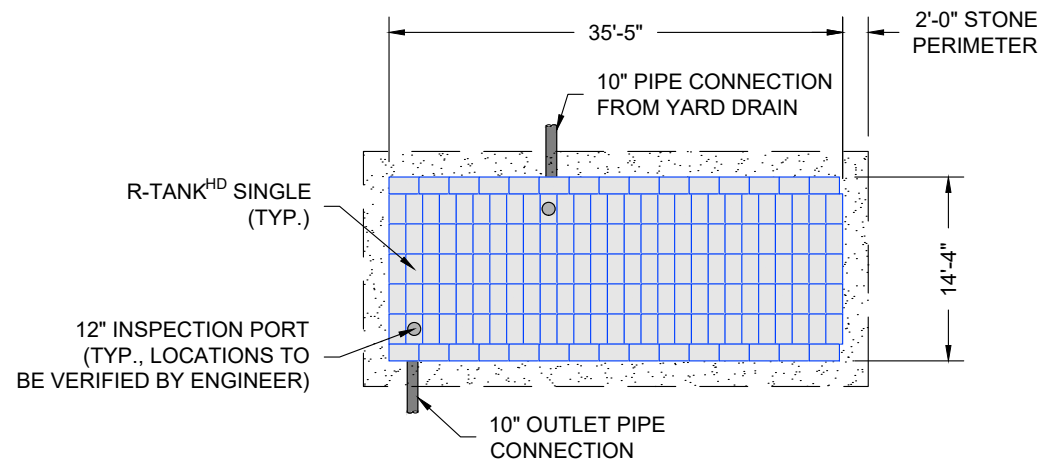
SHEET NO.  
**1** of **6**

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SYSTEM 1

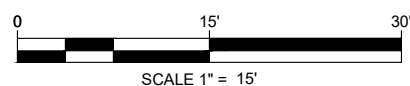


SYSTEM 2

R-TANK QUANTITIES

	SYSTEM 1	SYSTEM 2
SYSTEM DESIGNATION	SYSTEM 1	SYSTEM 2
R-TANK <sup>HD</sup> MODULE TYPE	SINGLE	SINGLE
TRAFFIC LOAD	HS-20	HS-20
# OF SINGLE R-TANKS	737	165
TOTAL SYSTEM STORAGE	3,111 CF	697 CF
R-TANK STORAGE VOLUME	3,111 CF	697 CF
STONE STORAGE VOLUME (40% VOID RATIO)	0 CF	0 CF
STONE BED FOOTPRINT	2,713 SF	724 SF
STONE QUANTITY	149 CY	45 CY
N080 NON-WOVEN GEOTEXTILE TANK WRAP	619 SY	148 SY
N080 NON-WOVEN GEOTEXTILE EXCAVATION WRAP	1,197 SY	357 SY
30 MIL. PVC LINER	425 SY	132 SY
12" INSPECTION PORTS	2	2
GEOTEXTILE PIPE BOOTS (8"   12")	(3   3)	(0   6)
30 MIL. PVC PIPE BOOTS (8"   12")	(1   1)	(0   2)
STORMRING CPS (10"   12")	(1   0)	(1   0)
NOTE: STONE QUANTITY INCLUDES 12" OF COVER AND 3" OF BASE.		
NOTE: GEOTEXTILE / LINER QUANTITIES INCLUDE A 15% WASTE FACTOR.		
SEE SHEETS 3 - 6 FOR DETAILS AND ADDITIONAL INFORMATION		

GRAPHIC SCALE



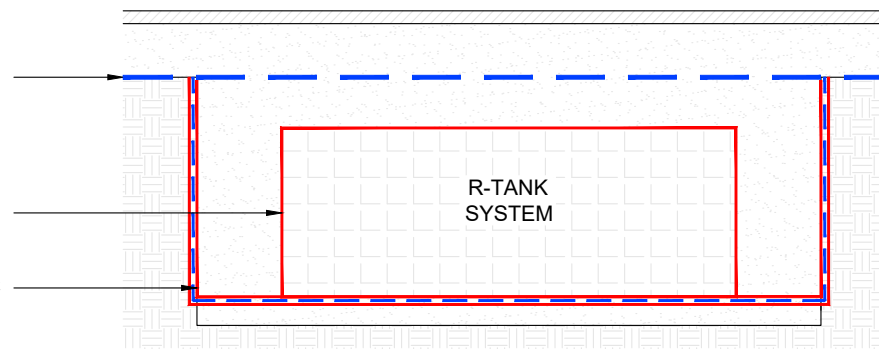
R-TANK ELEVATIONS

SYSTEM DESIGNATION	SYSTEM 1	SYSTEM 2
BASE INV.	670.95	671.25
TANK INV.	671.20	671.50
TOP OF TANK	672.64	672.94
GEOGRID	673.64	673.94
MIN. ALLOW. FINAL GRADE	674.31	674.61
MAX. ALLOW. FINAL GRADE	679.63	679.93

GEOGRID (ACF BX-12) PLACED 12" ABOVE THE R-TANK<sup>HD</sup> SYSTEM. OVERLAP ADJACENT PANELS BY 18" MIN. GEOGRID SHOULD EXTEND 3' BEYOND THE EXCAVATION FOOTPRINT.

R-TANK<sup>HD</sup> UNITS WRAPPED WITH N080 NON-WOVEN GEOTEXTILE (OR EQUAL)

EXCAVATION WRAPPED WITH 30 MIL. PVC BETWEEN TWO LAYERS OF N080 NON-WOVEN GEOTEXTILE (OR EQUAL)



R-TANK<sup>HD</sup> TANK WRAP & EXCAVATION ENVELOPE DETAIL



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R-TANK<sup>HD</sup> SYSTEM LAYOUT  
DRESSER WOODS  
SALISBURY, CT

SCALE  
1" = 15'

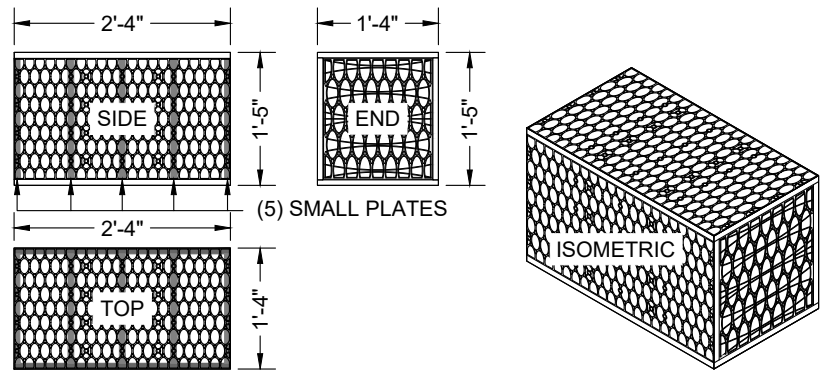
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#### MODULE DATA

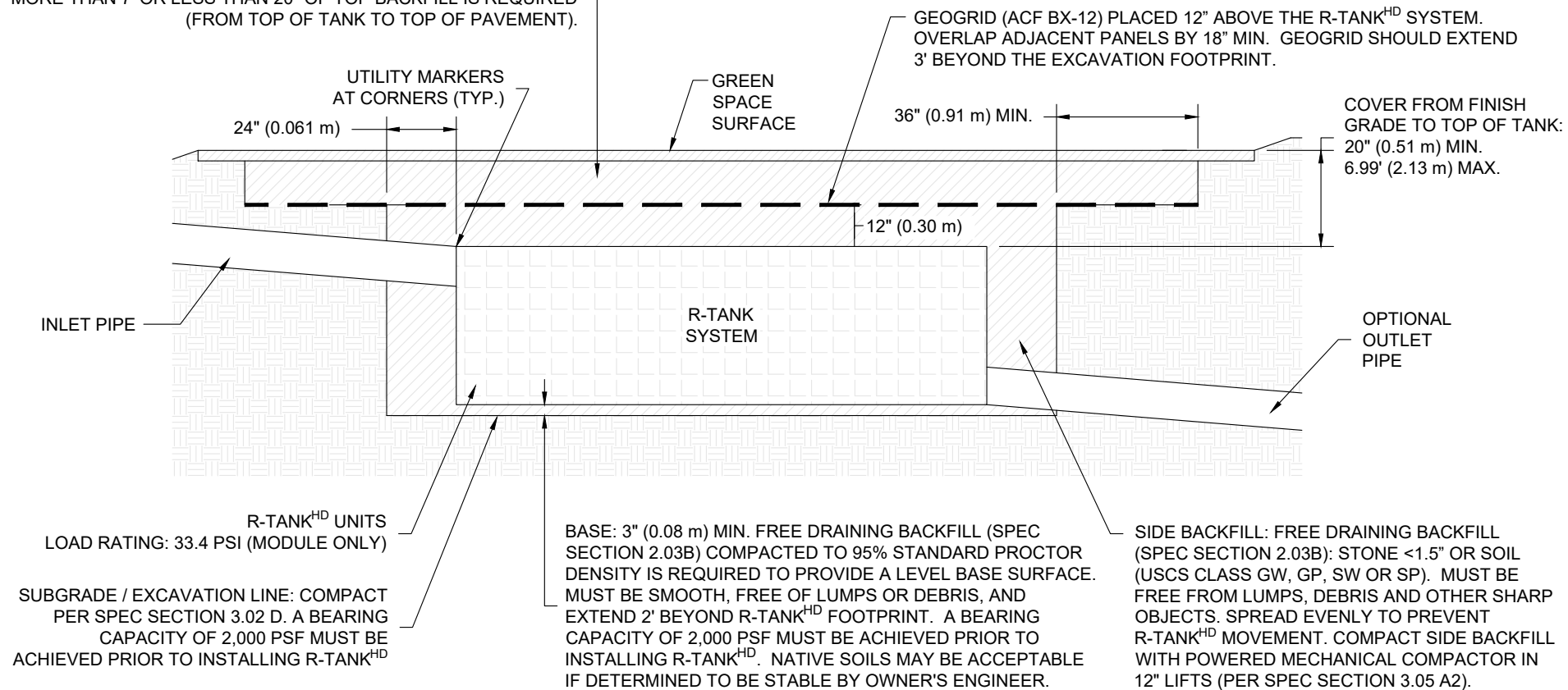
GEOMETRY:	LOAD RATING:
LENGTH = 28.15 IN. (715 MM)	33.4 PSI, (MODULE ONLY)
WIDTH = 15.75 IN. (400 MM)	HS20/HS25 - SEE SPEC FOR COVER REQUIREMENTS
HEIGHT = 17.32 IN. (440 MM)	<b>MATERIAL:</b>
TANK VOLUME = 4.44 CF	100% RECYCLED POLYPROPYLENE
STORAGE VOLUME = 4.22 CF	<b>SMALL PLATES REQUIRED:</b>
VOID INTERNAL VOLUME: 95%	5/SEGMENT, 5/MODULE
VOID SURFACE AREA: 90%	

#### SINGLE R-TANK<sup>HD</sup> - MODULE DETAIL

TOTAL COVER: 20" MINIMUM AND 84" MAXIMUM. FIRST 12" MUST BE FREE DRAINING BACKFILL (SPEC SECTION 2.03B): STONE <1.5" OR SOIL (USCS CLASS GW, GP, SW OR SP). ADDITIONAL FILL MAY BE STRUCTURAL FILL (SPEC SECTION 2.03C): STONE OR SOIL (USCS CLASS SM, SP, SW, GM, GP OR GW) WITH MAX CLAY CONTENT <10%, MAX 25% PASSING NO. 200 SIEVE, AND MAX PLASTICITY INDEX OF 4. A MIN. 12" COVER MUST BE MAINTAINED BETWEEN BACKFILL EQUIPMENT AND THE TOP OF THE R-TANK<sup>TM</sup> SYSTEM AT ALL TIMES. TOTAL HEIGHT OF TOP BACKFILL SHOULD NOT EXCEED 7'. CONTACT FERGUSON WATERWORKS IF MORE THAN 7' OR LESS THAN 20" OF TOP BACKFILL IS REQUIRED (FROM TOP OF TANK TO TOP OF PAVEMENT).

#### NOTES:

1. FOR COMPLETE MODULE DATA, SEE APPROPRIATE R-TANK<sup>HD</sup> MODULE SHEET .
2. INSTALLATIONS PER THIS DETAIL MEET GUIDELINES OF HL-93 LOADING PER THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, CUSTOMARY U.S. UNITS, 7TH EDITION, 2014 WITH 2015 AND 2016 INTERIM REVISIONS.
3. PRE-TREATMENT STRUCTURES NOT SHOWN.
4. FOR INFILTRATION APPLICATIONS, GEOTEXTILE ENVELOPING R-TANK SHALL BE ACF M200 (PER SPEC SECTION 2.02A) AND BASE SHALL BE 4" MIN. UNCOMPACTED FREE DRAINING BACKFILL (SPEC SECTION 2.03A) TO PROVIDE A LEVEL BASE. SURFACE MUST BE SMOOTH, FREE OF LUMPS OR DEBRIS, AND EXTEND 2' BEYOND R-TANK<sup>HD</sup> FOOTPRINT.

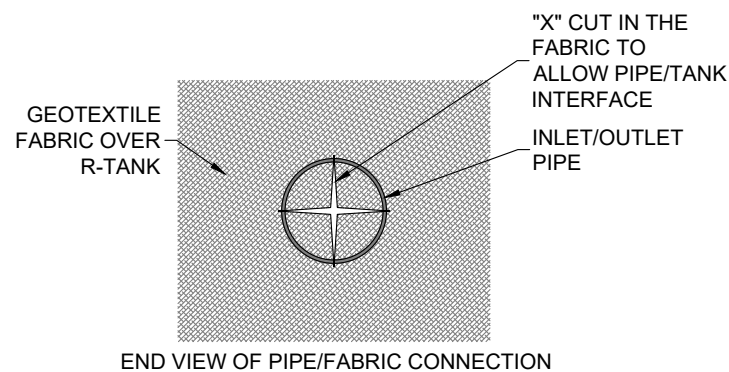


#### R-TANK<sup>HD</sup> & HS-20 LOADS - SECTION VIEW

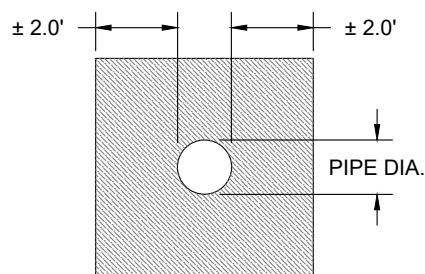
#### NOTE:

- PIPE BOOTS ARE AVAILABLE IN THE FOLLOWING STANDARD SIZES: 8" | 12" | 15" | 18" | 24".
- LARGER SPECIAL ORDER, CUSTOM SIZES ARE AVAILABLE.

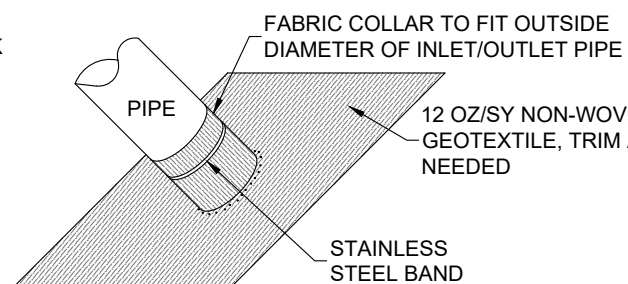
CUT AN "X" IN THE FABRIC ENVELOPE THAT IS SLIGHTLY LARGER THAN THE PIPE. PULL THE FABRIC FLAPS AROUND THE PIPE, AND SEAL WITH A STAINLESS STEEL BAND.



END VIEW OF PIPE/FABRIC CONNECTION

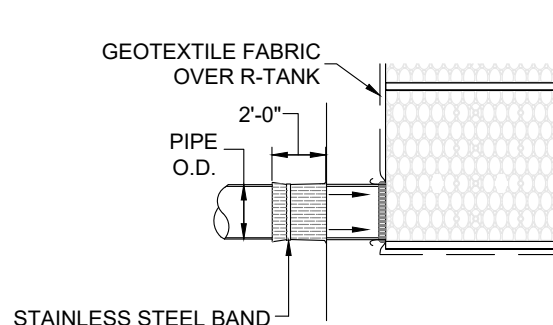


FRONT VIEW OF GEOTEXTILE BOOT

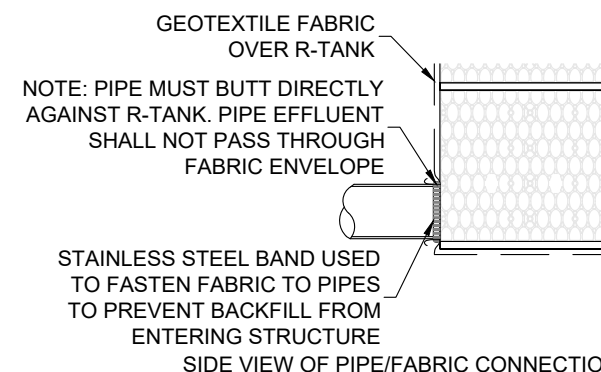


GEOTEXTILE BOOT

AFTER TANK WRAP IS SECURED TO PIPE, SLIDE BOOT AGAINST R-TANK AND SECURE WITH SECOND STAINLESS STEEL BAND, THEN ATTACH BOOT FLAP TO TANK ENVELOPE FABRIC WITH DUCT TAPE OR OTHER ADHESIVE.

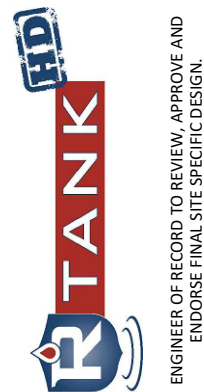


SIDE VIEW OF GEOTEXTILE BOOT



SIDE VIEW OF PIPE/FABRIC CONNECTION

#### R-TANK TYPICAL TANK INLET/OUTLET W/ GEOTEXTILE PIPE BOOT DETAIL



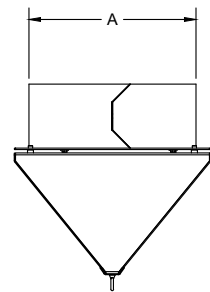
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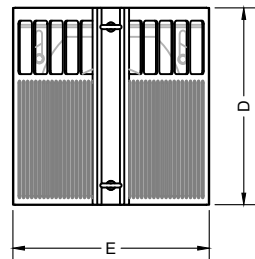
R-TANK<sup>HD</sup> SYSTEM DETAILS  
DRESSER WOODS  
SALISBURY, CT

SCALE  
NTS  
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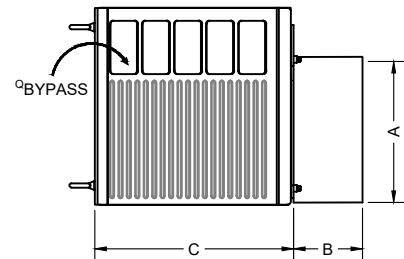
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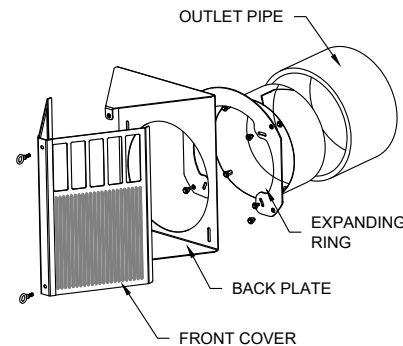
PLAN VIEW



FRONT VIEW



SIDE VIEW

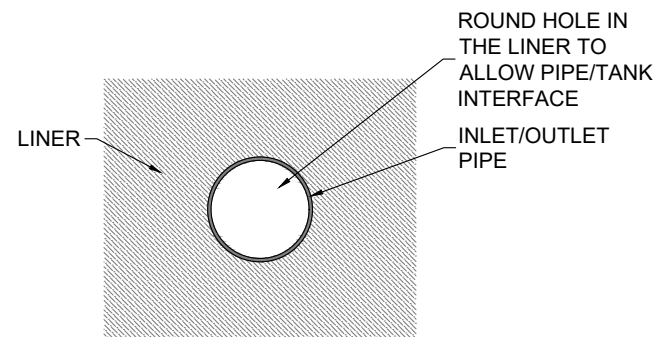


REFERENCE VIEW

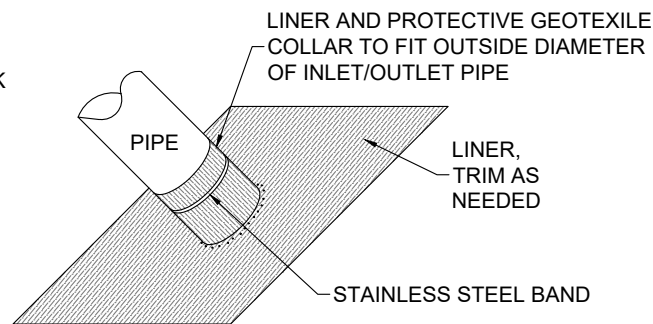
PART NUMBER	NOMINAL PIPE DIA.	EXPANDING COLLAR DIA. (A)		STUB LENGTH (B)	CPS DEPTH (C)	CPS HEIGHT (D)	CPS WIDTH (E)
		MIN.	MAX.				
SCA6-1	6"	5.63"	6.50"	6.00"	10.00"	10.13"	10.13"
SCA8-1	8"	7.50"	8.50"	6.00"	13.00"	11.88"	11.38"
SCA10-1	10"	9.50"	10.50"	8.00"	13.50"	13.50"	13.25"
SCA12-1	12"	11.38"	12.63"	8.00"	15.50"	15.38"	15.38"
SCA15-1	15"	14.25"	15.50"	8.00"	15.50"	21.38"	18.38"
SCA18-1	18"	17.38"	18.63"	8.00"	15.75"	28.00"	21.38"
SCA24-1	24"	23.25"	24.50"	9.00"	17.00"	40.00"	28.38"

STORMING CPS PRETREATMENT DETAIL

CUT A ROUND HOLE IN THE LINER ENVELOPE AND GEOTEXTILE PROTECTION FABRIC THAT IS SLIGHTLY LARGER THAN THE PIPE.

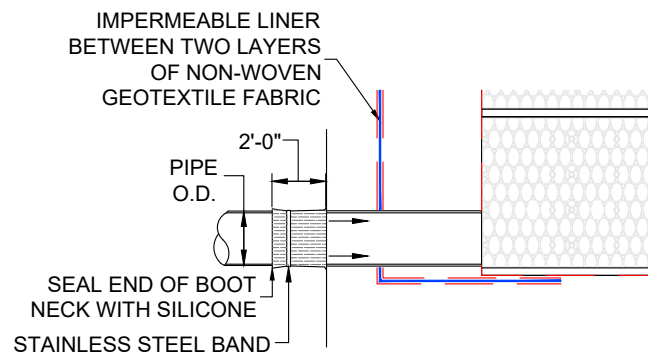


END VIEW OF PIPE/LINER CONNECTION

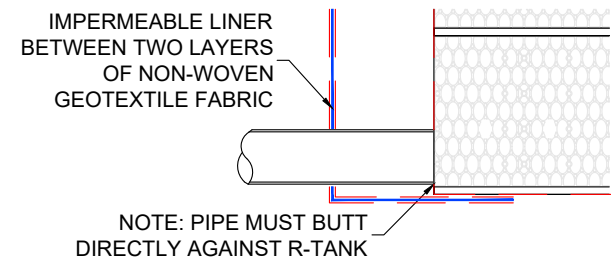


LINER BOOT W/ PROTECTIVE GEOTEXTILE FABRIC LAYER

AFTER LINER IS CUT AND PIPE INSTALLED, SLIDE BOOT AGAINST LINER AND SECURE WITH STAINLESS STEEL BAND, THEN BOND BOOT TO LINER AND SEAL END OF BOOT WITH SILICONE. REPLACE ANY GEOTEXTILE PROTECTION FABRIC REMOVED DURING BOOT INSTALLATION PROCESS.



SIDE VIEW OF LINER BOOT

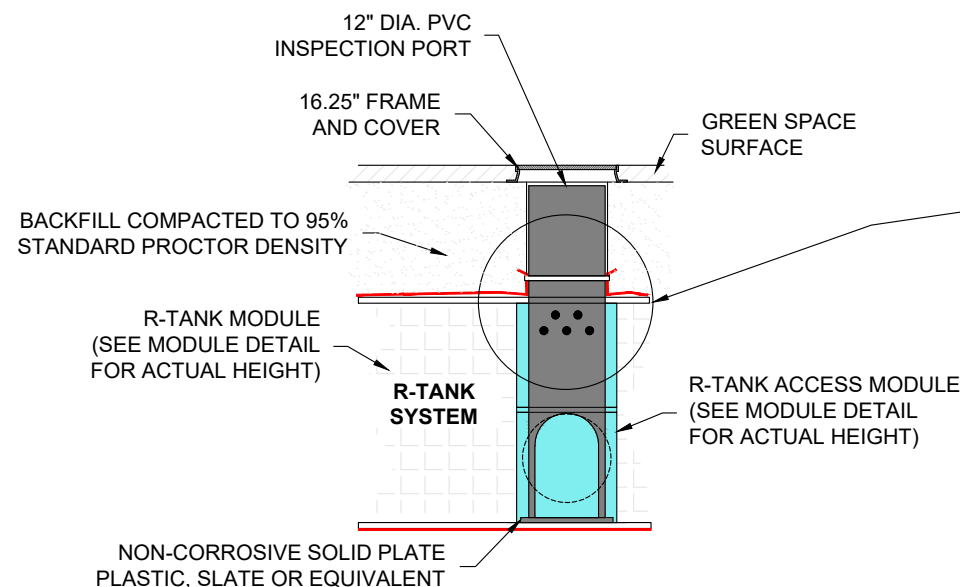
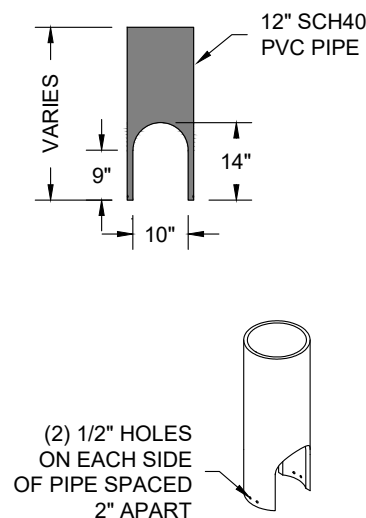


SIDE VIEW OF PIPE/LINER CONNECTION

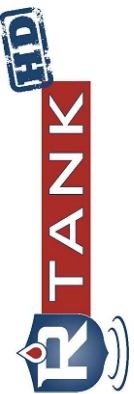
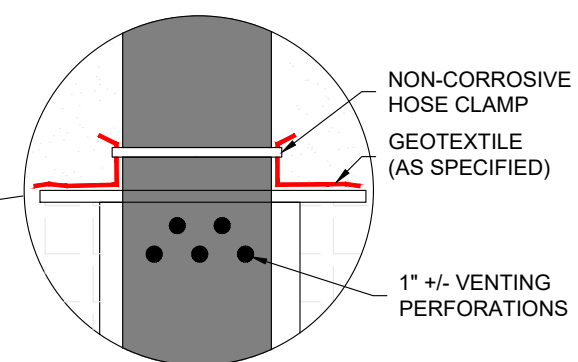
R-TANK TYPICAL EXCAVATION INLET/OUTLET W/ LINER PIPE BOOT DETAIL

#### NOTES

1. THE INSPECTION PORT IS USED IN THE ACCESS MODULE TO INSPECT THE LEVEL OF SEDIMENT ACCUMULATION.
2. MINIMUM REQUIRED MAINTENANCE INCLUDES A QUARTERLY INSPECTION DURING THE FIRST YEAR OF OPERATION AND A YEARLY INSPECTION THEREAFTER. FLUSH AS NEEDED.
3. R-TANK<sup>HD</sup>, R-TANK<sup>SD</sup>, R-TANK<sup>UD</sup> AND R-TANK<sup>XD</sup> MAY BE USED IN TRAFFIC APPLICATIONS.
4. SEE TRAFFIC LOADING DETAIL FOR MINIMUM & MAXIMUM COVER REQUIREMENTS.
5. IF INSPECTION PORT IS LOCATED IN A NON-TRAFFIC AREA, A PLASTIC CAP CAN BE USED IN LIEU OF A FRAME AND COVER WITH CONCRETE COLLAR.



R-TANK TYPICAL NON-VEHICULAR LOAD RATED INSPECTION PORT



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R-TANK<sup>HD</sup> SYSTEM DETAILS  
DRESSER WOODS  
SALISBURY, CT

SCALE  
NTS

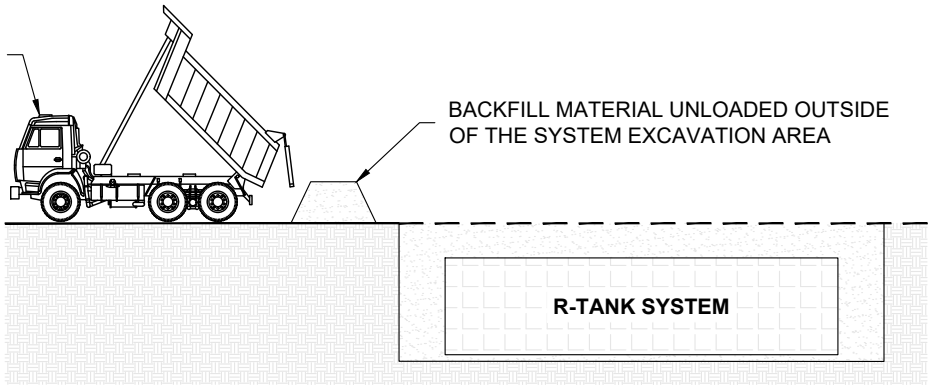
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DUMP TRUCKS AND PANS SHALL NOT OPERATE OVER THE SYSTEM EXCAVATION AREA



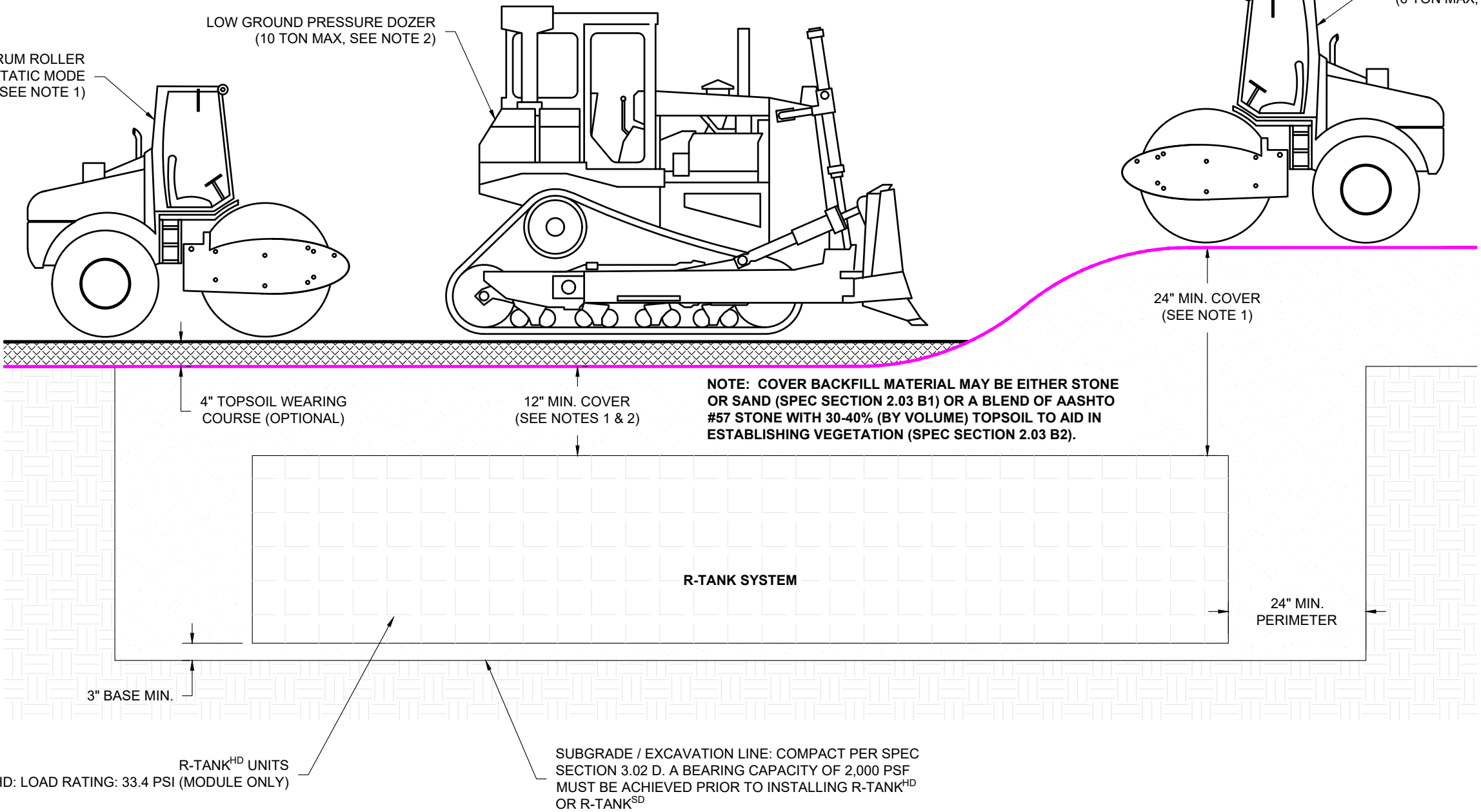
DUMP TRUCK DETAIL (SEE NOTE 3)

- NOTES:
1. FOLLOWING PLACEMENT OF SIDE BACKFILL, A UNIFORM 12" LIFT OF THE FREELY DRAINING MATERIAL (SPEC SECTION 2.03 B2) SHALL BE PLACED OVER THE R-TANK AND LIGHTLY COMPACTED USING A WALK-BEHIND TRENCH ROLLER. ALTERNATELY, A ROLLER (MAXIMUM GROSS VEHICLE WEIGHT OF 6 TONS) MAY BE USED. ROLLER MUST REMAIN IN STATIC MODE UNTIL A MINIMUM OF 24" OF COVER HAS BEEN PLACED OVER THE MODULES. SHEEP FOOT ROLLERS SHOULD NOT BE USED. **SPEC SECTION 3.05 A5**
  2. ONLY LOW PRESSURE TIRE OR TRACK VEHICLES (LESS THAN 7 PSI AND OPERATING WEIGHT OF LESS THAN 20,000 LBS) SHALL BE OPERATED OVER THE R-TANK SYSTEM DURING CONSTRUCTION. **SPEC SECTION 3.05 A5**
  3. DUMP TRUCKS AND PANS SHALL NOT BE OPERATED WITHIN THE R-TANK SYSTEM AT ANY TIME. WHERE NECESSARY, THE HEAVY EQUIPMENT SHOULD UNLOAD IN AN AREA ADJACENT TO THE R-TANK SYSTEM AND THE MATERIAL SHOULD BE MOVED OVER THE SYSTEM WITH TRACKED EQUIPMENT. **SPEC SECTION 3.05 A5**
  4. ENSURE THAT ALL UNRELATED CONSTRUCTION TRAFFIC IS KEPT AWAY FROM THE LIMITS OF EXCAVATION UNTIL THE PROJECT IS COMPLETE AND FINAL SURFACE MATERIALS ARE IN PLACE. NO NON-INSTALLATION RELATED LOADING SHOULD BE ALLOWED OVER THE R-TANK SYSTEM UNTIL THE FINAL DESIGN SECTION HAS BEEN CONSTRUCTED (INCLUDING PAVEMENT). **SPEC SECTION 3.05 B**
  5. SEE R-TANK INSTALLATION GUIDE OR CONTACT YOUR LOCAL FERGUSON REPRESENTATIVE FOR ADDITIONAL INFORMATION.

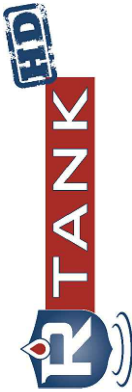
SMOOTH DRUM ROLLER  
STATIC MODE  
(6 TON MAX, SEE NOTE 1)

LOW GROUND PRESSURE DOZER  
(10 TON MAX, SEE NOTE 2)

SMOOTH DRUM ROLLER  
VIBRATORY MODE  
(6 TON MAX, SEE NOTE 1)



CONSTRUCTION EQUIPMENT COVER DETAIL - GREEN SPACE



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R-TANK<sup>HD</sup> CONSTRUCTION EQUIPMENT  
COVER DETAIL  
DRESSER WOODS  
SALISBURY, CT

SCALE  
NTS

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R-TANK SPECIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, technical specification and general provisions of the Contract as modified herein apply to this section.

1.02 DESCRIPTION OF WORK INCLUDED

- A. Provide excavation and base preparation per geotechnical engineer's recommendations and/or as shown on the design drawings, to provide adequate support for project design loads and safety from excavation sidewall collapse. Excavations shall be in accordance with the owner's and OSHA requirements.
- B. Provide and install R-TankLD/, R-TankHD/, R-TankSD/, or R-TankUD/ system (hereafter called R-Tank) and all related products including fill materials, geotextiles, geogrids, inlet and outlet pipe with connections per the manufacturer's installation guidelines provided in this section.
- C. Provide and construct the cover of the R-Tank system including; stone backfill, structural fill cover, and pavement section as specified.
- D. Protect R-Tank system from construction traffic after installation until completion of all construction activity in the installation area.

1.03 QUALITY CONTROL

- A. All materials shall be manufactured in ISO certified facilities.
- B. Installation Contractor shall demonstrate the following experience:
1. A minimum of three R-Tank or equivalent projects completed within 2 years; and,
  2. A minimum of 25,000 cubic feet of storage volume completed within 2 years.
- C. Contractor experience requirement may be waived if the manufacturer's representative provides on-site training and review during construction.
- C. Installation Personnel: Performed only by skilled workers with satisfactory record of performance on bulk earthworks, pipe, chamber, or pond/landfill construction projects of comparable size and quality.
- D. Contractor must have manufacturer's representative available for site review if requested by Owner.

1.04 SUBMITTALS

- A. Submit proposed R-Tank layout drawings. Drawings shall include typical section details as well as the required base elevation of stone and tanks, minimum cover requirements and tank configuration.
- B. Submit manufacturer's product data, including compressive strength and unit weight.
- C. Submit manufacturer's installation instructions.
- D. Submit R-Tank sample for review. Reviewed and accepted samples will be returned to the Contractor.
- E. Submit material certificates for geotextile, geogrid, base course and backfill materials.
- F. Submit required experience and personnel requirements as specified in Section 1.03.
- G. Any proposed equal alternative product substitution to this specification must be submitted for review and approved prior to bid opening. Review package should include third party reviewed performance data that meets or exceeds criteria in Table 2.01 B.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect R-Tank and other materials from damage during delivery, and store UV sensitive materials under tarp to protect from sunlight when time from delivery to installation exceeds two weeks. Storage of materials should be on smooth surfaces, free from dirt, mud and debris.
- B. Handling is to be performed with equipment appropriate to the materials and site conditions, and may include hand, handcart, forklifts, extension lifts, etc.
- C. Cold weather:
1. Care must be taken when handling plastics when air temperature is 40 degrees or below as plastic becomes brittle.
  2. Do not use frozen materials or materials mixed or coated with ice or frost.
  3. Do not build on frozen ground or wet, saturated or muddy subgrade.

1.06 PREINSTALLATION CONFERENCE.

- A. Prior to the start of the installation, a preinstallation conference shall occur with the representatives from the design team, the general contractor, the excavation contractor, the R-Tank installation contractor, and the manufacturer's representative.

1.07 PROJECT CONDITIONS

- A. Coordinate installation for the R-Tank system with other on-site activities to eliminate all non-installation related construction traffic over the completed R-Tank system. No loads heavier than the design loads shall be allowed over the system, and in no case shall loads higher than a standard AASHTO HS20 (or HS25, depending on design criteria) load be allowed on the system at any time.
- B. Protect adjacent work from damage during R-Tank system installation.
- C. All pre-treatment systems to remove debris and heavy sediments must be in place and functional prior to operation of the R-Tank system. Additional pretreatment measures may be needed if unit is operational during construction due to increased sediment loads.
- D. Contractor is responsible for any damage to the system during construction.

PART 2 - PRODUCTS

2.01 R-TANK UNITS

- A. R-Tank - Injection molded plastic tank plates assembled to form a 95% void modular structure of predesigned height (custom for each project).
- B. R-Tank units shall meet the following Physical & Chemical Characteristics:

PROPERTY	DESCRIPTION	R-Tank <sup>LD</sup> VALUE	R-Tank <sup>HD</sup> VALUE	R-Tank <sup>SD</sup> VALUE	R-Tank <sup>UD</sup> VALUE
Void Area	Volume available for water storage	95%	95%	95%	95%
Surface Void Area	Percentage of exterior available for infiltration	90%	90%	90%	90%
Vertical Compressive Strength	ASTM D 2412 / ASTM F 2418	30.0 psi	33.4 psi	42.9 psi	134.2 psi
Lateral Compressive Strength	ASTM D 2412 / ASTM F 2418	20.0 psi	22.4 psi	28.9 psi	N/A
HS-20 Minimum Cover	Cover required to support HS-20 loads	N/A	20"	18"	12" (STONE BACKFILL)
HS-25 Minimum Cover	Cover required to support HS-25 loads	N/A	24"	19"	15" (STONE BACKFILL)
Maximum Cover	Maximum allowable cover depth	3 feet	< 7 feet	< 10 feet	5 feet
Unit Weight	Weight of plastic per cubic foot of tank	3.29 lbs / cf	3.62 lbs/cf	3.96 lbs / cf	4.33 lbs / cf
Rib Thickness	Thickness of load-bearing members	0.18 inches	0.18 inches	0.18 inches	N/A
Service Temperature	Safe temperature range for use	-14 – 167° F	-14 – 167° F	-14 – 167° F	-14 – 167° F

- C. Supplier: Ferguson Waterworks 2831 Cardwell Road Richmond, VA 23234 (T): 800-448-3636; (F): 804-743-7779 [www.ferguson.com](http://www.ferguson.com)

2.02 GEOSYNTHETICS

- A. Geotextile. A geotextile envelope is required to prevent backfill material from entering the R-Tank modules.
1. Standard Application: The standard geotextile shall be an 8 oz per square yard nonwoven geotextile (ACF N080 or equivalent).
  2. Infiltration Applications: When water must infiltrate/exfiltrate through the geotextile as a function of the system design, a woven monofilament (ACF M200 or equivalent) shall be used.
- B. Geogrid. For installations subject to traffic loads and/or when required by project plans, install geogrid (ACF BX12 or equivalent) to reinforce backfill above the R-Tank system. Geogrid is not always required for R-TankUD/ installations, and is often not required for non-traffic load applications.

2.03 BACKFILL & COVER MATERIALS

- A. Bedding Materials: Stone (angular and smaller than 1.5" in diameter) or soil (GW, GP, SW, or SP as classified by the Unified Soil Classification System) shall be used below the R-Tank system (3" minimum). Material must be free from lumps, debris, and any sharp objects that could cut the geotextile. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation. For infiltration applications bedding material shall be free draining.
- B. Side and Top Backfill: Material must be free from lumps, debris and any sharp objects that could cut the geotextile. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation.
1. Traffic Applications - Free draining material shall be used adjacent to (24" minimum) and above (for the first 12") the R-Tank system.
    - a. For HD, and SD modules, backfill materials shall be free draining stone (angular and smaller than 1.5" in diameter) or soil (GW, GP, SW, or SP as classified by the Unified Soil Classification System).
    - b. For UD modules with less than 14" of top cover, backfill materials shall be free draining stone (angular and smaller than 1.5" in diameter). The use of soil backfill on the sides and top of the UD module is not permitted unless the modules are installed outside of traffic areas or with cover depths of 14" or more. Top backfill material (from top of module to bottom of pavement base or 12" maximum) must be consistent with side backfill.
  2. Non-Traffic / Green Space Applications - For all R-Tank modules installed in green spaces and not subjected to vehicular loads, backfill materials may either follow the guidelines for Traffic Applications above, or the top backfill layer (12" minimum) may consist of AASHTO #57 stone blended with 30-40% (by volume) topsoil to aid in establishing vegetation.
- C. Additional Cover Materials: Structural Fill shall consist of granular materials meeting the gradational requirements of SM, SP, SW, GM, GP or GW as classified by the Unified Soil Classification System. Structural fill shall have a maximum of 25 percent passing the No. 200 sieve, shall have a maximum clay content of 10 percent and a maximum Plasticity Index of 4. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation.

2.04 OTHER MATERIALS

- A. Utility Marker: Install metallic tape at corners of R-Tank system to mark the area for future utility detection.

PART 3 - EXECUTION

3.01 ASSEMBLY OF R-TANK UNITS

- A. Assembly of modules shall be performed in accordance with the R-Tank Installation Manual, Section 2.

3.02 LAYOUT AND EXCAVATION

- A. Installer shall stake out, excavate, and prepare the subgrade area to the required plan grades and dimensions, ensuring that the excavation is at least 2 feet greater than R-Tank dimensions in each direction allowing for installation of geotextile filter fabric, R-Tank modules, and free draining backfill materials.
- B. All excavations must be prepared with OSHA approved excavated sides and sufficient working space.
- C. Protect partially completed installation against damage from other construction traffic by establishing a perimeter with high visibility construction tape, fencing, barricades, or other means until construction is complete.
- D. Base of the excavation shall be uniform, level, and free of lumps or debris and soft or yielding subgrade areas. A minimum 2,000 pounds per square foot bearing capacity is required.
1. Standard Applications: Compact subgrade to a minimum of 95% of Standard Proctor (ASTM D698) density or as required by the Owner's engineer.
  2. Infiltration Applications: Subgrade shall be prepared in accordance with the contract documents. Compaction of subgrade should not be performed in infiltration applications.
- E. Unsuitable Soils or Conditions: All questions about the base of the excavation shall be directed to the owner's engineer, who will approve the subgrade conditions prior to placement of stone. The owner's engineer shall determine the required bearing capacity of the R-Tank subgrade; however in no case shall a bearing capacity of less than 2,000 pounds per square foot be provided.
1. If unsuitable soils are encountered at the subgrade, or if the subgrade is pumping or appears excessively soft, repair the area in accordance with contract documents and/or as directed by the owner's engineer.
  2. If indications of the water table are observed during excavation, the engineer shall be contacted to provide recommendations.
  3. Do not start installation of the R-Tank system until unsatisfactory subgrade conditions are corrected and the subgrade conditions are accepted by the owner's engineer.

3.03 PREPARATION OF BASE

- A. Place a thin layer (3" unless otherwise specified) of bedding material (Section 2.03 A), over the subgrade to establish a level working platform for the R-Tank modules. Level to within 1/8" (+/- 1/4") or as shown on the plans. Native subgrade soils or other materials may be used if determined to meet the requirements of 2.03 A and are accepted by the owner's engineer.
1. Standard Applications: Static roll or otherwise compact bedding materials until they are firm and unyielding.
  2. Infiltration Applications: Bedding materials shall be prepared in accordance with the contract documents.
- B. Outline the footprint of the R-Tank system on the excavation floor using spray paint or chalk line to ensure a 2' perimeter is available around the R-Tank system for proper installation and compaction of backfill.

3.04 INSTALLATION OF THE R-TANKS

- A. Where a geotextile wrap is specified on the stone base, cut strips to length and install in excavation, removing wrinkles so material lays flat. Overlap geotextile a minimum 12" or as recommended by manufacturer. Use tape, special adhesives, sandbags or other ballast to secure overlaps. As geotextiles can be damaged by extreme heat, smoking is not permissible on/near the geotextile, and tools using a flame to tack the overlaps, such as propane torches, are prohibited.
- B. Where an impervious liner (for containment) is specified, install the liner per manufacturer's recommendations and the contract documents. The R-Tank units shall be separated from impervious liner by a non-woven geotextile fabric installed accordance with Section 3.04A.
- C. Install R-Tank modules by placing side by side, in accordance with the design drawings. No lateral connections are required. It is advisable to use a string line to form square corners and straight edges along the perimeter of the R-Tank system. The modules are to be oriented as per the design drawing with required depth as shown on plans.
1. For LD, HD, and SD installations, the large side plate of the tank should be placed on the perimeter of the system. This will typically require that the two ends of the tank area will have a row of tanks placed perpendicular to all other tanks. If this is not shown in the construction drawings, it is a simple field adjustment that will have minimal effect on the overall system footprint. Refer to R-Tank Installation Guide for more details
  2. For UD installations, there is no perpendicular end row required.
- D. Wrap the R-Tank top and sides in specified geotextile. Cut strips of geotextile so that it will cover the sides and top, encapsulating the entire system to prevent backfill entry into the system. Overlap geotextile 12" or as recommended by manufacturer. Take great care to avoid damage to geotextile (and, if specified, impervious liner) during placement.
- E. Identify locations of inlet, outlet and any other penetrations of the geotextile (and optional liner). These connections should be installed flush (buted up to the R-Tank) and the geotextile fabric shall be cut to enable hydraulic continuity between the connections and the R-Tank units. These connections shall be secured using pipe boots with stainless steel pipe clamps. Support pipe in trenches during backfill operations to prevent pipe from settling and damaging the geotextile, impervious liner (if specified) or pipe. Connecting pipes at 90 degree angles facilitates construction, unless otherwise specified. Ensure end of pipe is installed snug against R-Tank system.
- F. Install Inspection and Maintenance Ports in locations noted on plans. At a minimum one maintenance port shall be installed within 10' of each inlet & outlet connection, and with a maximum spacing of one maintenance port for every 2,500 square feet. Install all ports as noted in the R-Tank Installation Guide.
- G. If required, install ventilation pipes and vents as specified on drawings to provide ventilation for proper hydraulic performance. The number of pipes and vents will depend on the size of the system. Vents are often installed using a 90 degree elbow with PVC pipe into a landscaped area with "U" bend or venting bollard to inhibit the ingress of debris. A ground level concrete or steel cover can be used.

3.05 BACKFILLING OF THE R-TANK UNITS

- A. Backfill and fill with recommended materials as follows:
1. Place freely draining backfill materials (Section 2.03 B) around the perimeter in lifts with a maximum thickness of 12". Each lift shall be placed around the entire perimeter such that each lift is no more than 24" higher than the side backfill along any other location on the perimeter of the R-Tank system. No fill shall be placed over top of tanks until the side backfill has been completed.
  2. Each lift shall be compacted at the specified moisture content to a minimum of 95% of the Standard Proctor Density until no further densification is observed (for self-compacting stone materials). The side lifts must be compacted with walk behind compaction equipment. Even when "self-compacting" backfill materials are selected, a walk behind vibratory compactor must be used.
  3. Take care to ensure that the compaction process does not allow the machinery to come into contact with the modules due to the potential for damage to the geotextile and R-Tank units.
  4. No compaction equipment is permissible to operate directly on the R-Tank modules.
  5. Top Backfill: Only low pressure track vehicles shall be operated over the R-Tank system during construction. Dump Trucks and Pans shall not be operated within the R-Tank system footprint at any time. Heavy equipment should unload in an area adjacent to the R-Tank system and the material should be moved over the system using tracked equipment with an operating weight of less than 10 tons.
    - a. Typical Applications: Install a 12" (or as shown on plans) lift of freely draining material (Section 2.03 B) over the R-Tank Units, maintaining 12" between equipment tracks and R-Tank System. Lightly compacted using a walk-behind trench roller. Alternately, a roller (maximum gross vehicle weight of 6 tons) may be used. Roller must remain in static mode until a minimum of 24" of cover has been placed over the modules. Sheep foot rollers should not be used.
    - b. Shallow Applications (< 18" total cover): Install top backfill in accordance with plans.
  6. If required, install a geogrid as shown on plans. Geogrid shall extend a minimum of 3 feet beyond the limits of the excavation wall.
  7. Following placement and compaction of the initial cover, subsequent lifts of structural fill (Section 2.03 C) shall be placed at the specified moisture content and compacted to a minimum of 95% of the Standard Proctor Density and shall cover the entire footprint of the R-Tank system. During placement of fill above the system, unless otherwise specified, a uniform elevation of fill shall be maintained to within 12" across the footprint of the R-Tank system. Do not exceed maximum cover depths listed in Table 2.01 B.
  8. Place additional layers of geotextile and/or geogrid at elevations as specified in the design details. Each layer of geosynthetic reinforcement placed above the R-Tank system shall extend a minimum of 3 feet beyond the limits of the excavation wall.
- B. Ensure that all unrelated construction traffic is kept away from the limits of excavation until the project is complete and final surface materials are in place. No non-installation related loading should be allowed over the R-Tank system until the final design section has been constructed (including pavement).
- C. Place surfacing materials, such as groundcovers (no large trees), or paving materials over the structure with care to avoid displacement of cover fill and damage to surrounding areas.
- D. Backfill depth over R-Tank system must be within the limitations shown in the table in Section 2.01 B. If the total backfill depth does not comply with this table, contact engineer or manufacturer's representative for assistance.

3.06 MAINTENANCE REQUIREMENTS

- A. A routine maintenance effort is required to ensure proper performance of the R-Tank system. The Maintenance program should be focused on pretreatment systems. Ensuring these structures are clean and functioning properly will reduce the risk of contamination of the R-Tank system and stormwater released from the site. Pre-treatment systems shall be inspected yearly, or as directed by the regulatory agency and by the manufacturer (for proprietary systems). Maintain as needed using acceptable practices or following manufacturer's guidelines (for proprietary systems).
- B. All inlet pipes and Inspection and/or Maintenance Ports in the R-Tank system will need to be inspected for accumulation of sediments at least quarterly through the first year of operation and at least yearly thereafter.
- C. If sediment has accumulated to the level noted in the R-Tank Maintenance Guide or beyond a level acceptable to the Owner's engineer, the R-Tank system should be flushed.
- D. All inspection and maintenance activities should be performed in accordance with the R-Tank Operation, Inspection & Maintenance Manual.

R-TANK<sup>HD</sup> SPECIFICATION  
DRESSER WOODS  
SALISBURY, CT

SCALE  
NTS  
DRAWN BY  
BMK  
DATE  
11/24/2023  
SHEET NO.

6 of 6

FERGUSON  
WATERWORKS

FOR ADDITIONAL INFORMATION PLEASE CONTACT:  
FERGUSON WATERWORKS,  
1-800-448-3636, [www.ferguson.com](http://www.ferguson.com)



ENGINEER OF RECORD TO REVIEW, APPROVE AND  
ENDORSE FINAL SITE SPECIFIC DESIGN.

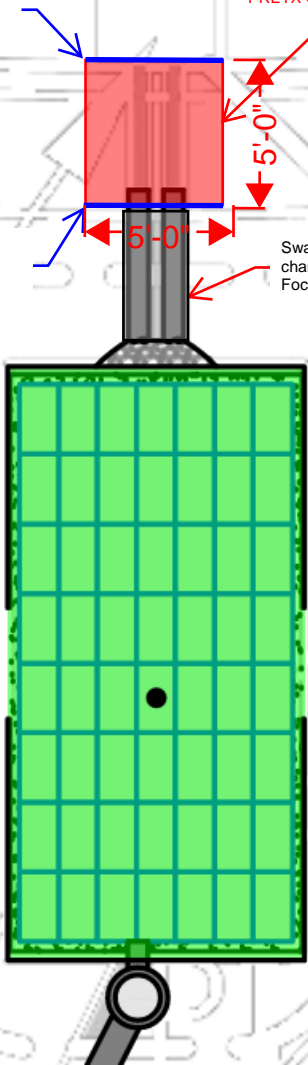
## Option 1

vertical screen  
covering inlet  
opening

PRETX Curb

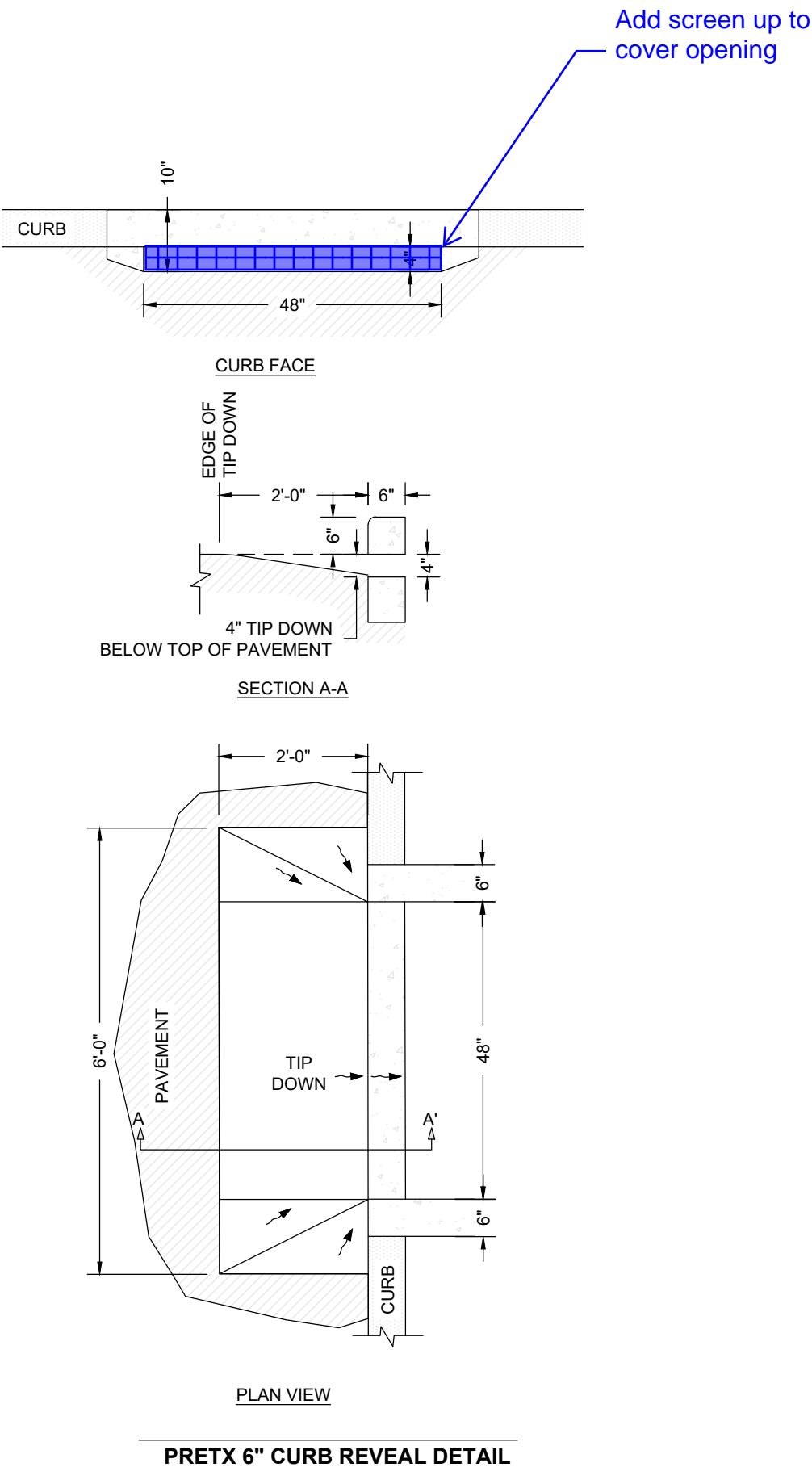
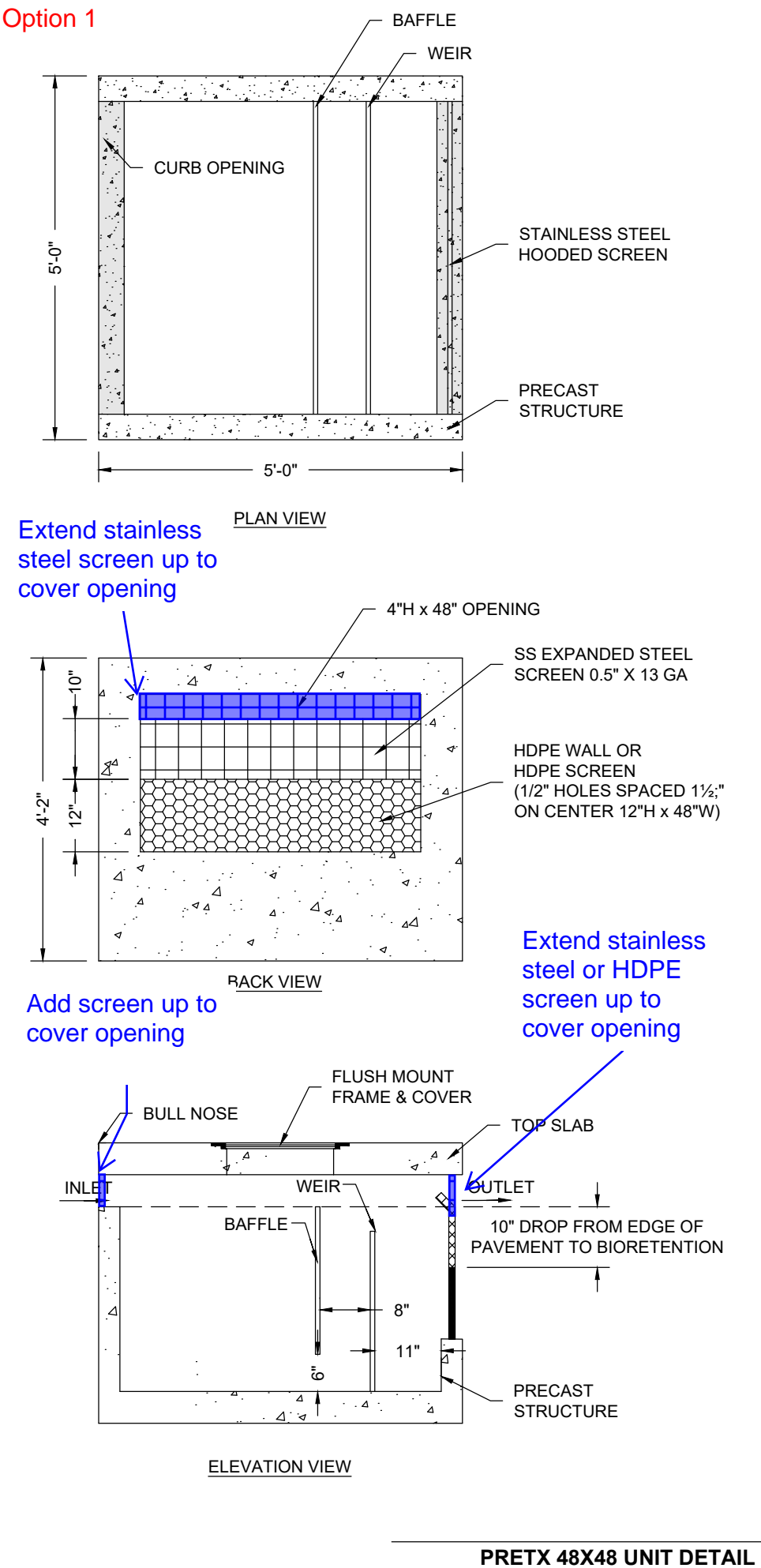
vertical screen  
covering outlet  
opening

Swale/rip rap  
channel to  
FocalPoint





Option 1



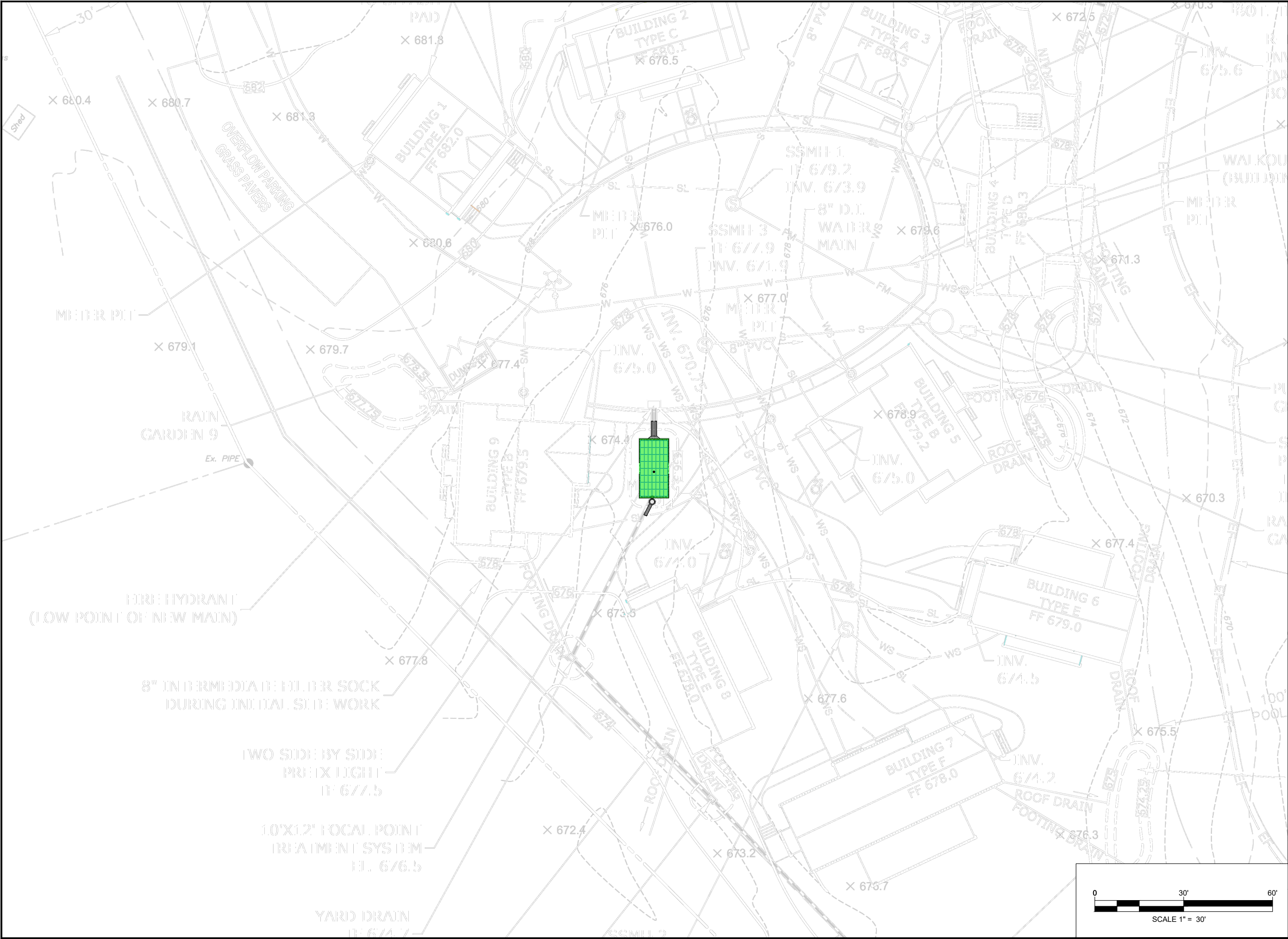
ENGINEER OF RECORD  
TO REVIEW, APPROVE  
AND ENDORSE FINAL  
SITE SPECIFIC DESIGN.

U.S. PATENT NO(S):  
10,704,248B2

**FERGUSON**  
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FERGUSON WATERWORKS,  
1-800-448-3636, www.ferguson.com

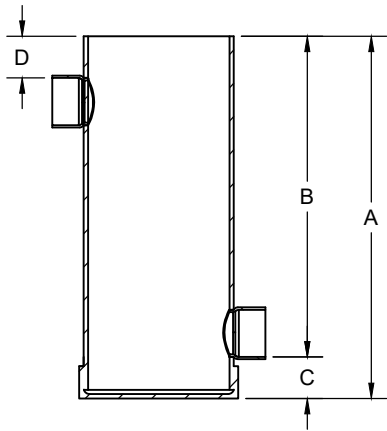
PRETX - CURB INLET (48 x 48 UNIT)  
PRETREATMENT CHAMBER  
TYPICAL DETAIL



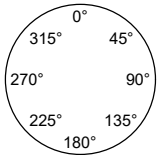
FOCALPOINT SYSTEM OVERLAY  
DRESSER WORDS  
SALISBURY, CT

SCALE  
1" = 30'  
DRAWN BY  
BMK  
DATE  
11/24/2023  
SHEET NO.

BASIN LOCATION	DRAIN BASIN DIA (")	GRATE TYPE	"A" BASIN HEIGHT
FOCALPOINT 1	24	DOMED	TBD



SIDE VIEW



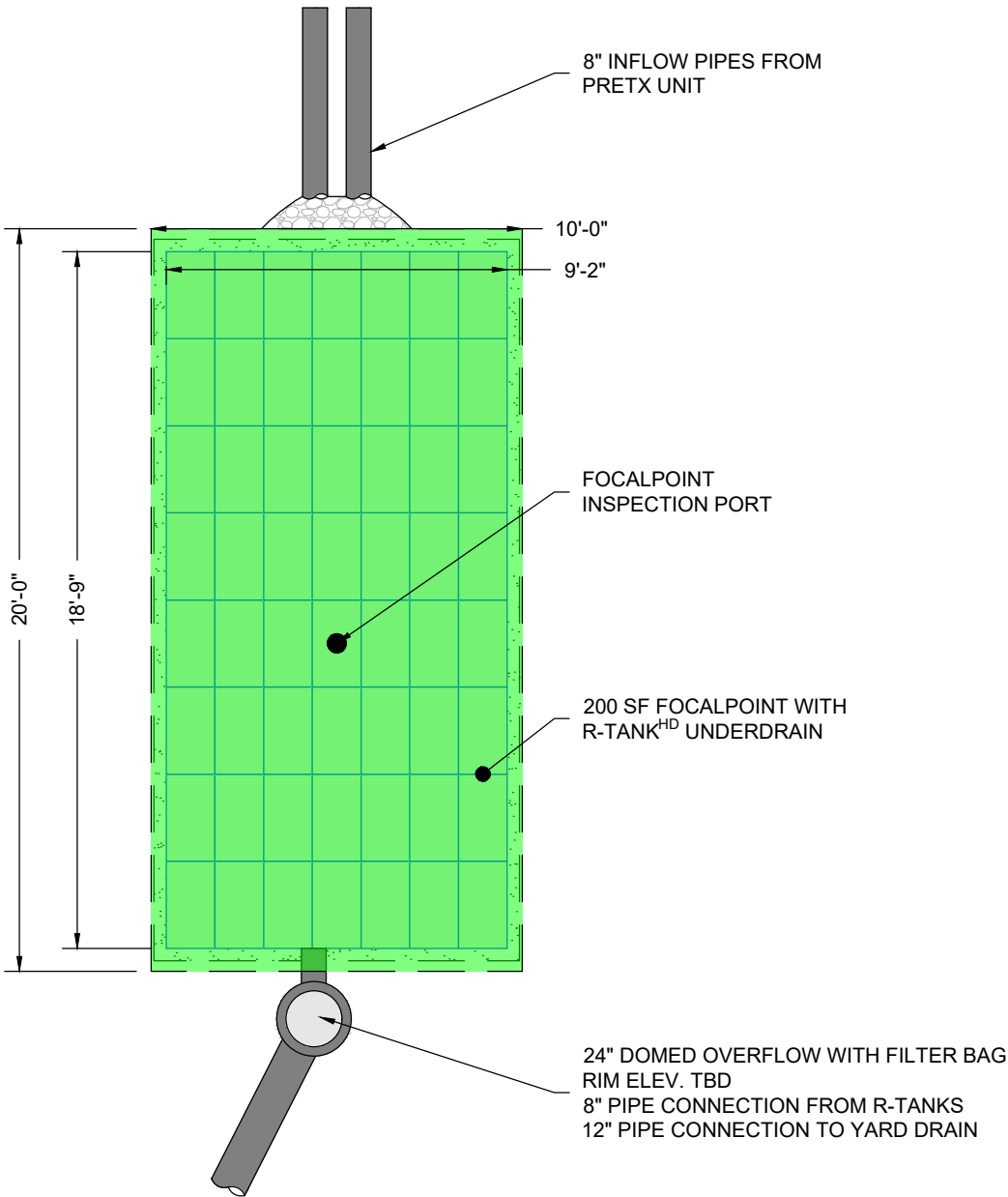
TOP VIEW

MIN. SUMP "C" AND MIN. TOP OF BASIN TO TOP OF STUB "D"	
8" BASIN	4"
10"-18" BASIN	6"
24" BASIN	8"
30" BASIN	10"
36" BASIN	14"

**NOTES:**  
A - OVERALL DRAIN BASIN HEIGHT  
B - TOP OF BASIN TO INVERT OF STUB (FLOW LINE)  
C - SUMP - REFER TO CHART FOR MINIMUMS  
D - TOP OF BASIN TO TOP OF STUB - REFER TO CHART FOR MINIMUMS

	STUB DIA. (IN.)	LOCATION (DEGREES)	"B" INVERT HEIGHT	TYPE OF PIPE	PIPE MANUFACTURER
STUB #1	8	0	TBD	SDR-35	PLEASE VERIFY
STUB #2	12	225	TBD	SDR-35	PLEASE VERIFY

DRAIN BASIN STUB DETAIL



FOCALPOINT QUANTITIES

R-TANK <sup>HD</sup> MODULE TYPE	MINI
LOAD RATING	HS-20
# OF MINI R-TANKS	56
TOTAL SYSTEM STORAGE	192 CF
R-TANK STORAGE VOLUME	129 CF
STONE STORAGE VOLUME (40% VOID RATIO)	63 CF
FOCALPOINT FILTER SURFACE AREA	200 SF
STONE BED FOOTPRINT	192 SF
STONE QUANTITY	6 CY
SR-18 MICROGRID TANK WRAP	50 SY
N080 NON-WOVEN GEOTEXTILE EXCAVATION WRAP	121 SY
30 MIL. PVC LINER	36 SY
6" FOCALPOINT INSPECTION PORT	1
PIPE BOOTS (8")	3
30 MIL PVC PIPE BOOTS (8")	1

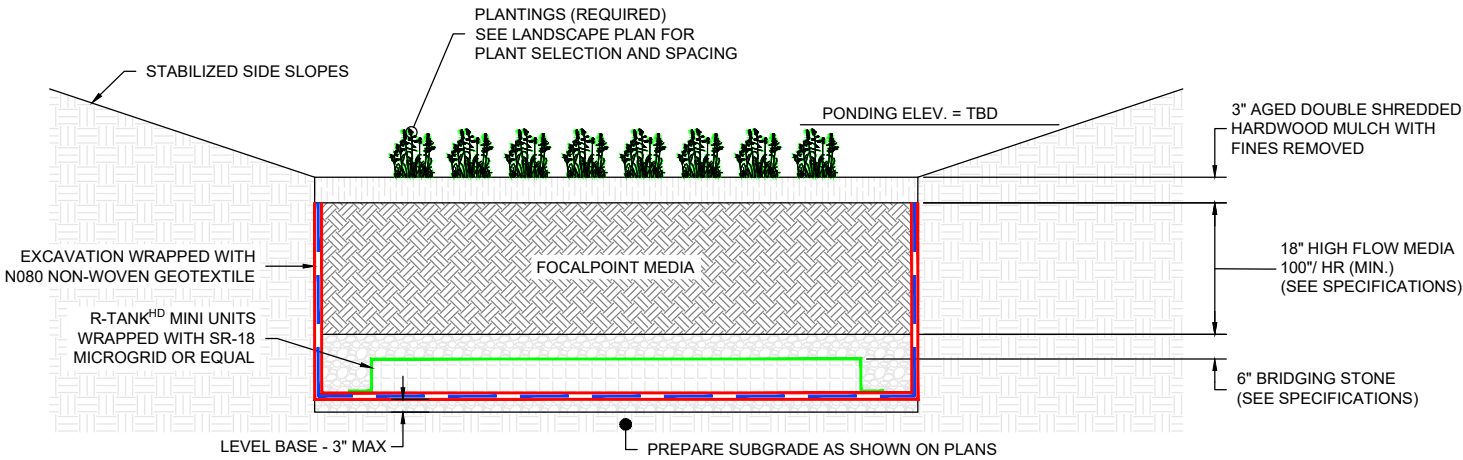
NOTE: STONE QUANTITY INCLUDES 6" OF COVER AND # OF BASE.  
NOTE: GEOTEXTILE / LINER QUANTITIES INCLUDE A 15% WASTE FACTOR.

GRAPHIC SCALE



R-TANK ELEVATIONS

DESCRIPTION	ELEVATION
TOP OF MULCH ELEVATION	676.50
TOP OF MEDIA ELEVATION	676.25
DEPTH OF MEDIA	18"
TOP OF BRIDGING STONE ELEVATION	674.75
TOP OF R-TANK UNDERDRAIN ELEV.	674.25
R-TANK UNDERDRAIN INVERT	673.46
INVERT OF STONE BASE (3")	673.21

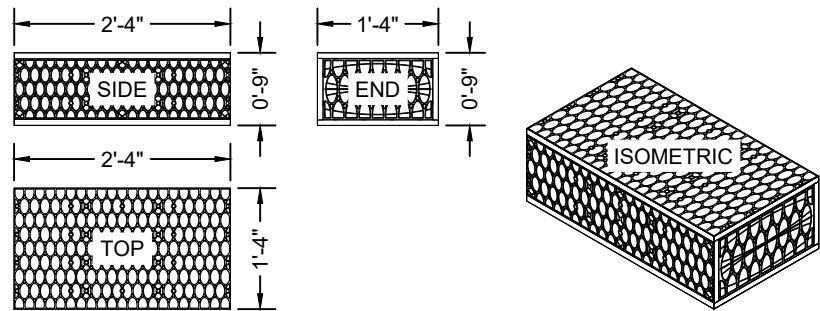


TYPICAL FOCALPOINT DETAIL

FOCALPOINT SYSTEM LAYOUT  
DRESSER WORDS  
SALISBURY, CT

SCALE  
1" = 5'  
DRAWN BY  
BMK  
DATE  
11/24/2023  
SHEET NO.



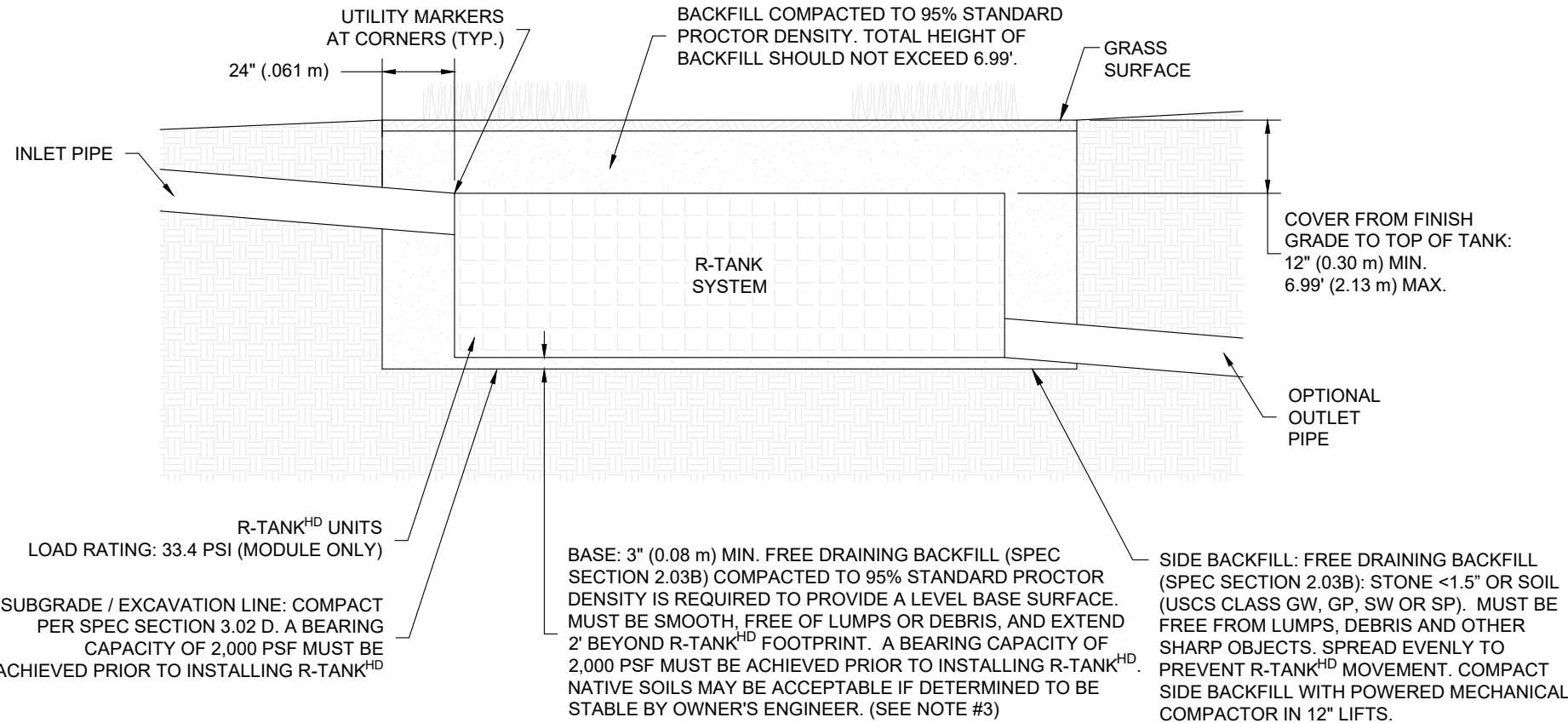


MODULE DATA

<b>GEOMETRY:</b>	<b>LOAD RATING:</b>
LENGTH = 28.15 IN. (715 MM)	42.9 PSI, (MODULE ONLY)
WIDTH = 15.75 IN. (400 MM)	HS25, (WITH ACF COVER SYSTEM)
HEIGHT = 9.45 IN. (240 MM)	<b>MATERIAL:</b>
TANK VOLUME = 2.42 CF	100% RECYCLED POLYPROPYLENE
STORAGE VOLUME = 2.30 CF	<b>SMALL PLATES PER</b>
VOID INTERNAL VOLUME: 95%	<b>SEGMENT/TOTAL:</b>
VOID SURFACE AREA: 90%	5/5

MINI R-TANK<sup>HD</sup> - MODULE DETAIL

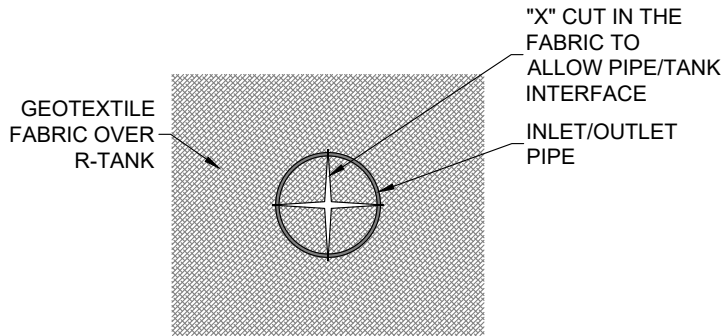
- NOTES:
- FOR COMPLETE MODULE DATA, SEE APPROPRIATE R-TANK<sup>HD</sup> SHEET.
  - PRE-TREATMENT STRUCTURES NOT SHOWN.
  - FOR INFILTRATION APPLICATIONS, GEOTEXTILE ENVELOPING R-TANK SHALL BE ACF M200 (PER SPEC SECTION 2.02A) AND BASE SHALL BE 4" MIN. UNCOMPACTED FREE DRAINING BACKFILL (SPEC SECTION 2.03A) TO PROVIDE A LEVEL BASE. SURFACE MUST BE SMOOTH, FREE OF LUMPS OR DEBRIS, AND EXTEND 2' BEYOND R-TANK<sup>HD</sup> FOOTPRINT.



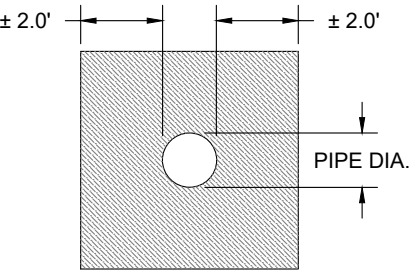
R-TANK<sup>HD</sup> GREEN SPACE - SECTION VIEW

- NOTE:
- PIPE BOOTS ARE AVAILABLE IN THE FOLLOWING STANDARD SIZES: 8" | 12" | 15" | 18" | 24".
  - LARGER SPECIAL ORDER, CUSTOM SIZES ARE AVAILABLE.

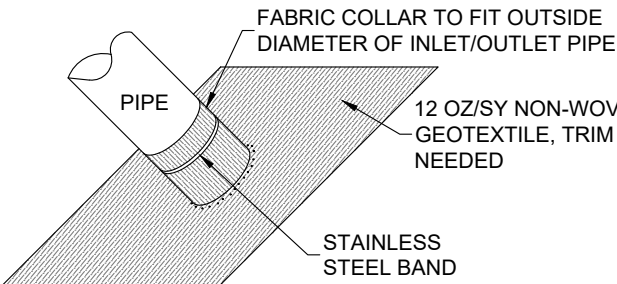
CUT AN "X" IN THE FABRIC ENVELOPE THAT IS SLIGHTLY LARGER THAN THE PIPE. PULL THE FABRIC FLAPS AROUND THE PIPE, AND SEAL WITH A STAINLESS STEEL BAND.



END VIEW OF PIPE/FABRIC CONNECTION

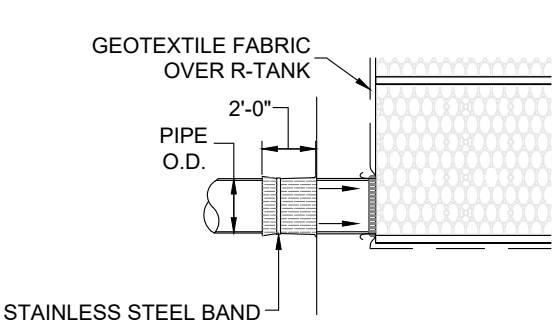


FRONT VIEW OF GEOTEXTILE BOOT

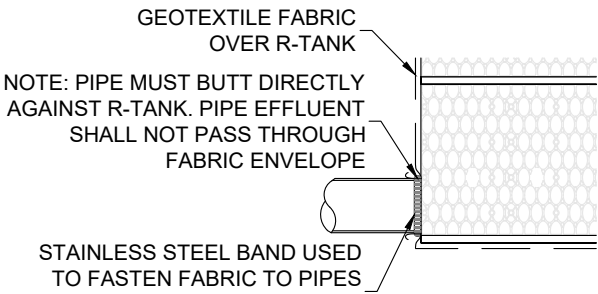


GEOTEXTILE BOOT

AFTER TANK WRAP IS SECURED TO PIPE, SLIDE BOOT AGAINST R-TANK AND SECURE WITH SECOND STAINLESS STEEL BAND, THEN ATTACH BOOT FLAP TO TANK ENVELOPE FABRIC WITH DUCT TAPE OR OTHER ADHESIVE.



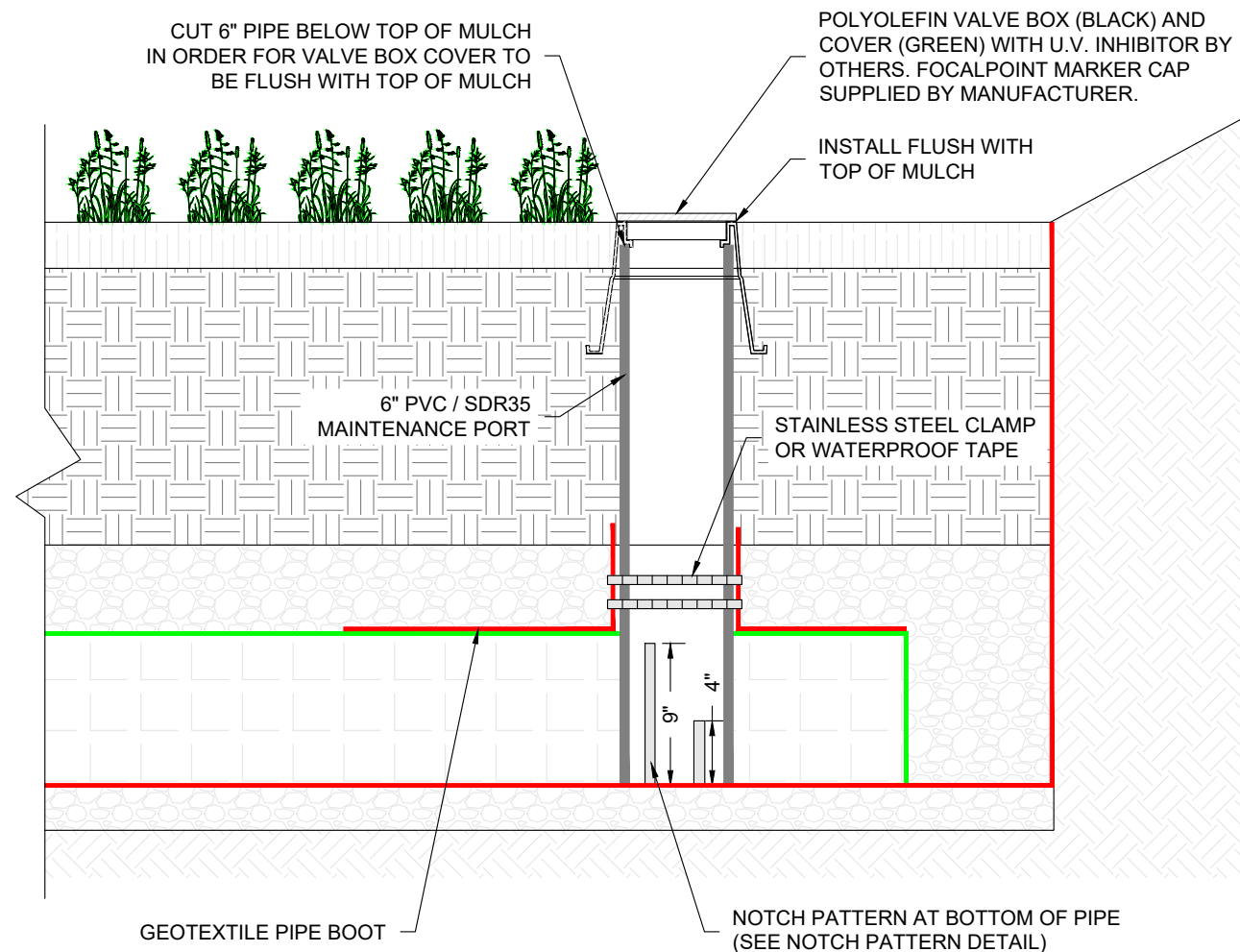
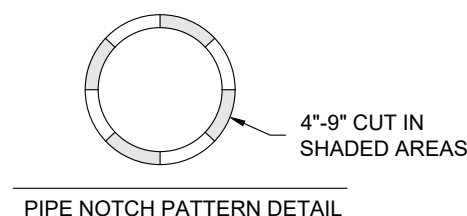
SIDE VIEW OF GEOTEXTILE BOOT



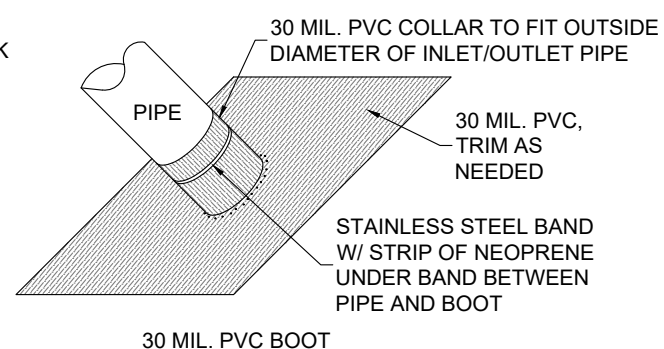
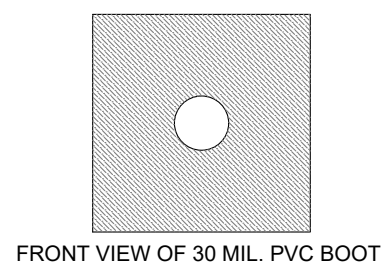
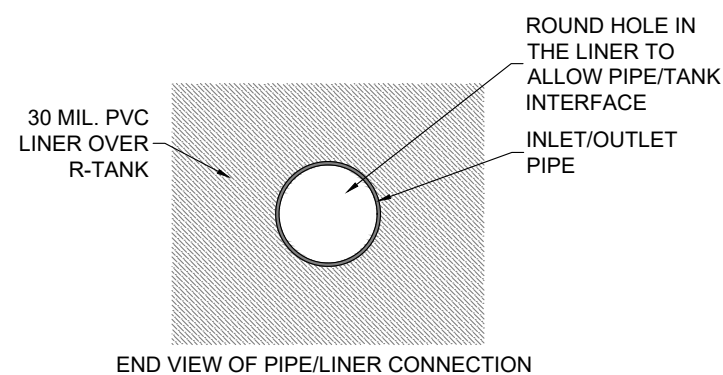
SIDE VIEW OF PIPE/FABRIC CONNECTION

R-TANK<sup>HD</sup> TYPICAL TANK INLET/OUTLET W/ GEOTEXTILE PIPE BOOT DETAIL

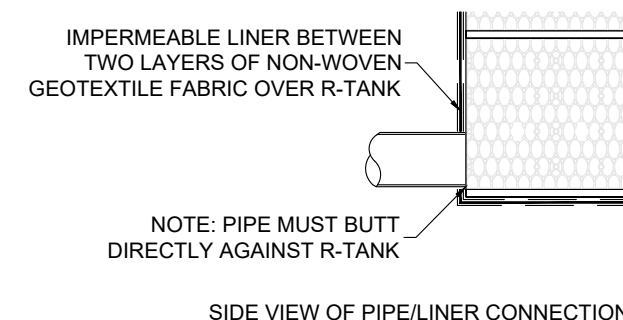
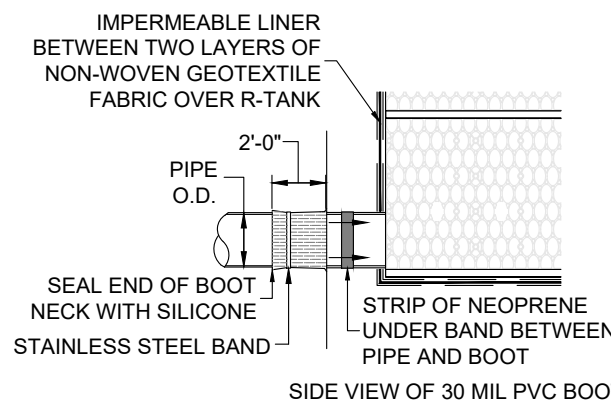
FOCALPOINT SYSTEM DETAILS  
DRESSER WORDS  
SALISBURY, CT

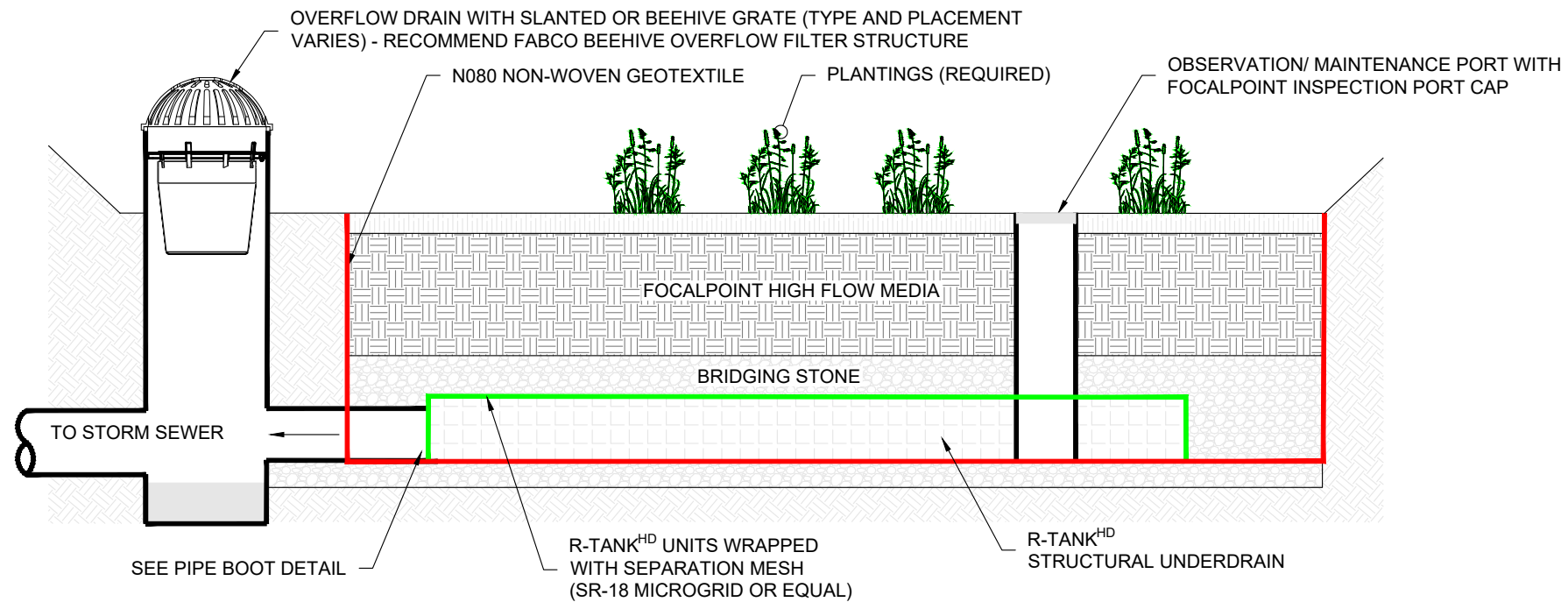


CUT A ROUND HOLE IN THE LINER ENVELOPE AND GEOTEXTILE  
PROTECTION FABRIC THAT IS SLIGHTLY LARGER THAN THE PIPE.



AFTER LINER IS CUT AND PIPE INSTALLED, SLIDE BOOT  
AGAINST TANK AND SECURE WITH STAINLESS STEEL BAND,  
THEN BOND BOOT TO TANK LINER AND SEAL END OF BOOT  
WITH SILICONE. REPLACE ANY GEOTEXTILE PROTECTION  
FABRIC REMOVED DURING BOOT INSTALLATION PROCESS.





TYPICAL FOCALPOINT SECTION WITH OVERFLOW STRUCTURE

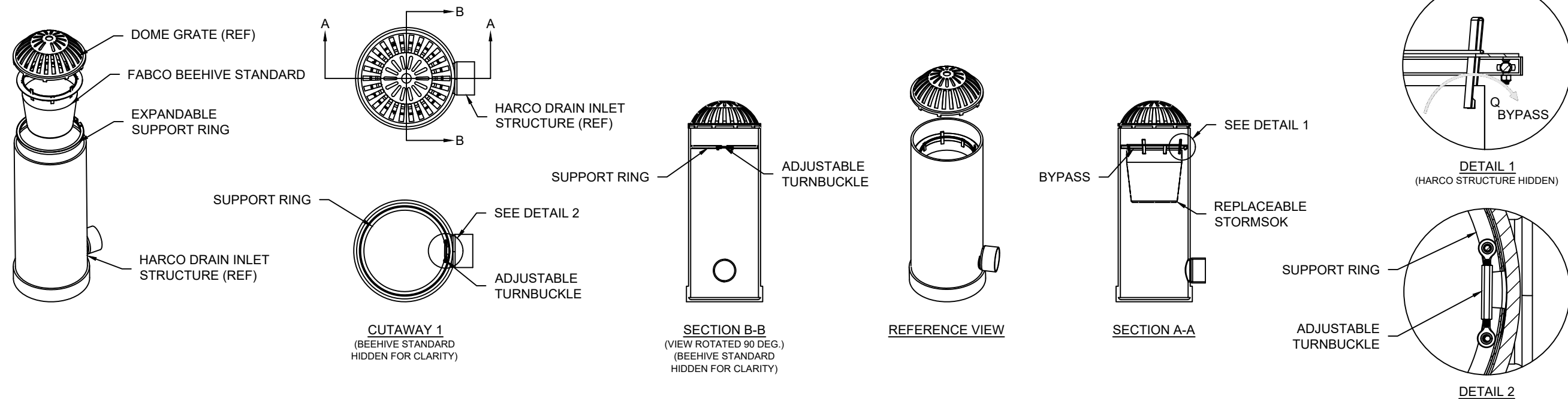
NOTES:

- MATERIAL:
  - SUPPORT FLANGE: ALUMINUM ALLOY PLATE, 5000 SERIES
  - STORMSOK: WOVEN POLYPROPYLENE GEOTEXTILE
  - EXPANSION RING: ALUMINUM ALLOY CHANNEL, 6000 SERIES
  - HARDWARE: STAINLESS STEEL
- RECOMMENDED MINIMUM VAULT DEPTH: 2-IN BELOW STORMSOK
- USE ONLY WITH FABCO REPLACEABLE STORMSOK

GENERAL INSTALLATION:

ADJUST THE TURNBUCKLE DOWN TO GIVE THE SMALLEST RING DIAMETER AND LOCATE THE EXPANSION RING INTO THE HARCO STRUCTURE MINIMUM OF 6-IN DOWN FROM THE TOP OPENING AS SHOWN. BEGIN OPENING THE TURNBUCKLE UNTIL THE EXPANSION RING IS SELF SUPPORTING, THEN VERIFY THE RING IS LEVEL AND PLUMB TO THE HARCO STRUCTURE. USING A CALIBRATED TORQUE WRENCH, CONTINUE TO OPEN THE TURNBUCKLE TO GIVEN TORQUE (MODEL-SPECIFIC). DO NOT OVER TIGHTEN. INSTALL THE STORMSACK ASSEMBLY DIRECTLY ON THE SUPPORT RING.

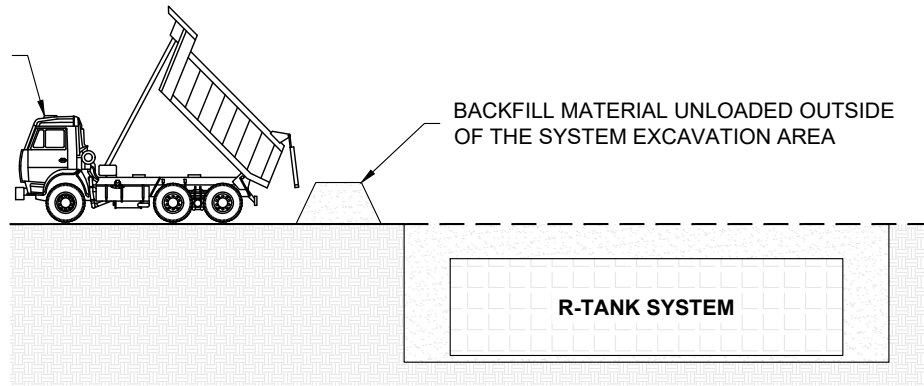
STRUCTURE DIA. (IN.)	DEBRIS CAPACITY (CU. FT.)	FILTERED FLOWRATE (CFS)	BYPASS FLOWRATE (CFS)
12	0.66	1.70	1.00
15	1.00	2.10	1.30
18	1.20	2.30	1.40
24	2.80	3.90	2.20
30	2.80	3.90	2.22



FABCO BEEHIVE STANDARD OVERFLOW FILTER STRUCTURE



DUMP TRUCKS AND PANS SHALL NOT OPERATE OVER THE SYSTEM EXCAVATION AREA



DUMP TRUCK DETAIL (SEE NOTE 3)

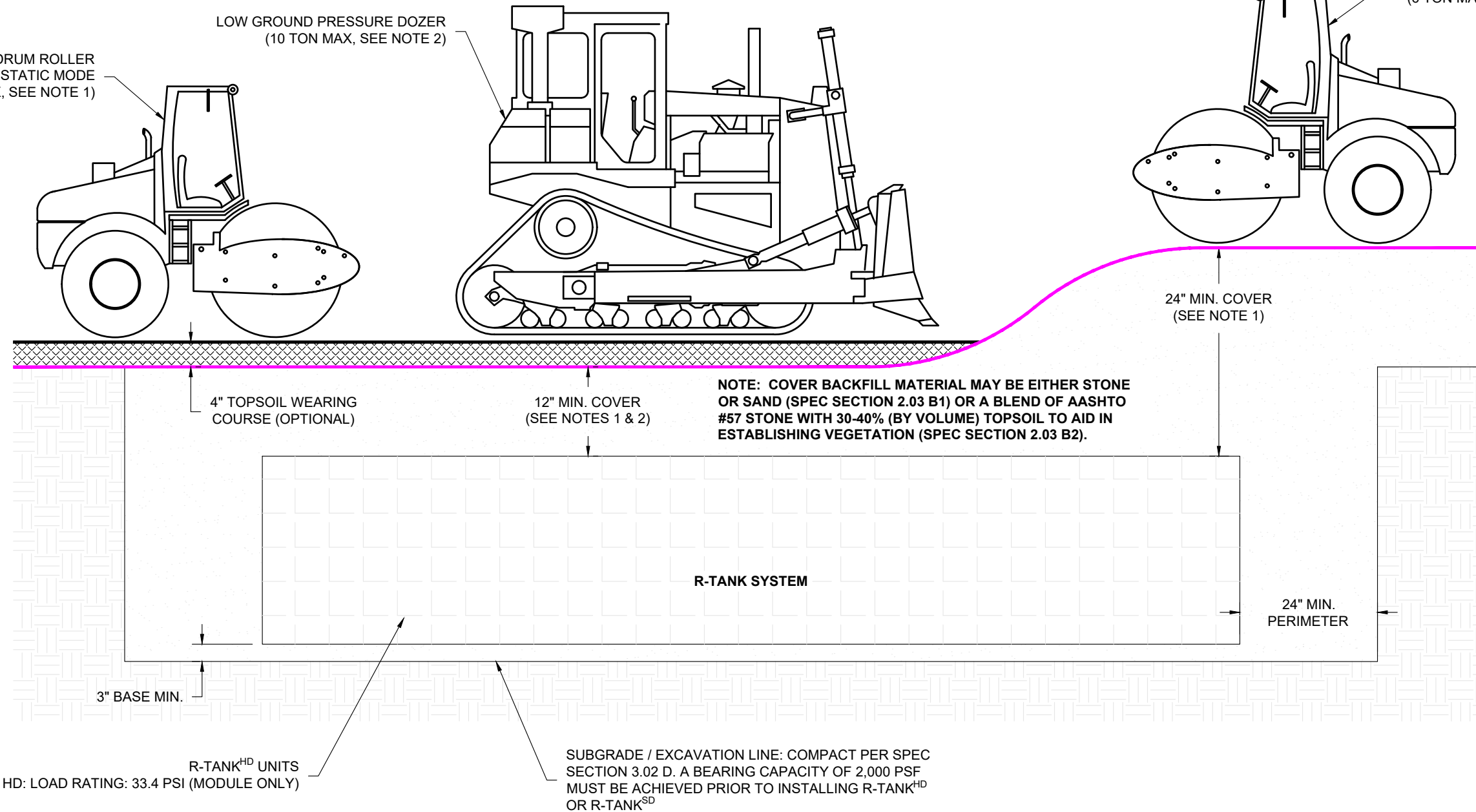
NOTES:

1. FOLLOWING PLACEMENT OF SIDE BACKFILL, A UNIFORM 12" LIFT OF THE FREELY DRAINING MATERIAL (SPEC SECTION 2.03 B2) SHALL BE PLACED OVER THE R-TANK AND LIGHTLY COMPACTED USING A WALK-BEHIND TRENCH ROLLER. ALTERNATELY, A ROLLER (MAXIMUM GROSS VEHICLE WEIGHT OF 6 TONS) MAY BE USED. ROLLER MUST REMAIN IN STATIC MODE UNTIL A MINIMUM OF 24" OF COVER HAS BEEN PLACED OVER THE MODULES. SHEEP FOOT ROLLERS SHOULD NOT BE USED. **SPEC SECTION 3.05 A5**
2. ONLY LOW PRESSURE TIRE OR TRACK VEHICLES (LESS THAN 7 PSI AND OPERATING WEIGHT OF LESS THAN 20,000 LBS) SHALL BE OPERATED OVER THE R-TANK SYSTEM DURING CONSTRUCTION. **SPEC SECTION 3.05 A5**
3. DUMP TRUCKS AND PANS SHALL NOT BE OPERATED WITHIN THE R-TANK SYSTEM AT ANY TIME. WHERE NECESSARY, THE HEAVY EQUIPMENT SHOULD UNLOAD IN AN AREA ADJACENT TO THE R-TANK SYSTEM AND THE MATERIAL SHOULD BE MOVED OVER THE SYSTEM WITH TRACKED EQUIPMENT. **SPEC SECTION 3.05 A5**
4. ENSURE THAT ALL UNRELATED CONSTRUCTION TRAFFIC IS KEPT AWAY FROM THE LIMITS OF EXCAVATION UNTIL THE PROJECT IS COMPLETE AND FINAL SURFACE MATERIALS ARE IN PLACE. NO NON-INSTALLATION RELATED LOADING SHOULD BE ALLOWED OVER THE R-TANK SYSTEM UNTIL THE FINAL DESIGN SECTION HAS BEEN CONSTRUCTED (INCLUDING PAVEMENT). **SPEC SECTION 3.05 B**
5. SEE R-TANK INSTALLATION GUIDE OR CONTACT YOUR LOCAL FERGUSON REPRESENTATIVE FOR ADDITIONAL INFORMATION.

SMOOTH DRUM ROLLER  
STATIC MODE  
(6 TON MAX, SEE NOTE 1)

LOW GROUND PRESSURE DOZER  
(10 TON MAX, SEE NOTE 2)

SMOOTH DRUM ROLLER  
VIBRATORY MODE  
(6 TON MAX, SEE NOTE 1)





FOCALPOINT SPECIFICATION

I. SUMMARY

THE FOLLOWING GENERAL SPECIFICATIONS DESCRIBE THE COMPONENTS AND INSTALLATION REQUIREMENTS FOR A VOLUME BASED HIGH PERFORMANCE MODULAR BIOFILTRATION SYSTEM (HPMBS) THAT UTILIZES PHYSICAL, CHEMICAL AND BIOLOGICAL MECHANISMS OF A SOIL, PLANT AND MICROBE COMPLEX TO REMOVE POLLUTANTS TYPICALLY FOUND IN URBAN STORM WATER RUNOFF. THE MODULAR TREATMENT SYSTEM IN WHICH THE BIOLOGICALLY ACTIVE BIOFILTRATION MEDIA IS USED SHALL BE A COMPLETE, INTEGRATED SYSTEM DESIGNED TO BE PLACED IN SQUARE FOOT OR LINEAR FOOT INCREMENTS PER THE APPROVED DRAWINGS TO TREAT CONTAMINATED RUNOFF FROM IMPERVIOUS SURFACES.

THE HIGH PERFORMANCE MODULAR BIOFILTRATION SYSTEM (HPMBS) IS COMPRISED OF THE FOLLOWING COMPONENTS:

A. PLANT COMPONENT

- MANUFACTURER SHALL PROVIDE A REGIONALIZED LIST OF ACCEPTABLE PLANTS.
- PLANTS, AS SPECIFIED IN THE APPROVED DRAWINGS/MANUFACTURER'S PLANT LIST, SHALL BE INSTALLED AT THE TIME THE HPMBS IS COMMISSIONED FOR USE.
- PLANTS AND PLANTING ARE TYPICALLY INCLUDED IN LANDSCAPE CONTRACT.

B. BIOFILTER COMPONENT

- THIS COMPONENT EMPLOYS A HIGH PERFORMANCE CROSS-SECTION IN WHICH EACH ELEMENT IS HIGHLY DEPENDENT ON THE OTHERS TO MEET THE PERFORMANCE SPECIFICATION FOR THE COMPLETE SYSTEM. IT IS IMPORTANT THAT THIS ENTIRE CROSS-SECTION BE PROVIDED AS A COMPLETE SYSTEM AND INSTALLED AS SUCH.
- AS INDICATED IN THE APPROVED DRAWINGS, THE ELEMENTS OF THE BIOFILTER INCLUDE:

A. A MULCH PROTECTIVE LAYER (IF SPECIFIED).

B. AN ADVANCED HIGH INFILTRATION RATE BIOFILTRATION PLANTING MEDIA BED WHICH UTILIZES PHYSICAL, CHEMICAL AND BIOLOGICAL MECHANISMS OF THE SOIL, PLANT, AND MICROBE COMPLEX, TO REMOVE POLLUTANTS FOUND IN STORM WATER RUNOFF.

C. A SEPARATION LAYER WHICH UTILIZES THE CONCEPT OF 'BRIDGING' TO SEPARATE THE BIOFILTRATION MEDIA FROM THE UNDERDRAIN WITHOUT THE USE OF GEOTEXTILE FABRICS.

D. A WIDE APERTURE MESH LAYER UTILIZED TO PREVENT BRIDGING STONE FROM ENTERING THE UNDERDRAIN/STORAGE ELEMENT.

E. A MODULAR, HIGH INFILTRATION RATE 'FLAT PIPE' STYLE UNDERDRAIN/STORAGE SYSTEM WHICH IS DESIGNED TO DIRECTLY INFILTRATE OR EXFILTRATE WATER THROUGH ITS SURFACE. THE MODULAR UNDERDRAIN MUST PROVIDE A MINIMUM OF 95% VOID SPACE.

C. ENERGY DISSIPATION COMPONENT

- AN ENERGY DISSIPATION COMPONENT IS TYPICALLY SPECIFIED TO SLOW AND SPREAD OUT WATER AS IT ENTERS THE SYSTEM. THIS COMPONENT IS DEPENDENT UPON THE DESIGN IN THE APPROVED DRAWINGS, BUT TYPICALLY CONSISTS OF A ROCK GABION, ROCK FILTER DAM OR DENSE VEGETATION ELEMENT, SUCH AS NATIVE GRASSES, EITHER SURROUNDING THE BIOFILTRATION COMPONENT OR LOCATED IMMEDIATELY UPSTREAM OF IT.

D. PRETREATMENT COMPONENT

- PRETREATMENT, WHEN SPECIFIED, IS TYPICALLY ACCOMPLISHED BY LOCATING THE BIOFILTRATION COMPONENT DOWNSTREAM OF A SWALE, CURB CUT/ROCK APRON, SEDIMENT FOREBAY, DEEP OR SHALLOW SUMP WATER QUALITY MANHOLE, ETC. THESE BMPs SHOULD TARGET TRASH AND DEBRIS AND MEDIUM TO COARSE SEDIMENT.

E. OBSERVATION AND MAINTENANCE COMPONENT

- AN OBSERVATION AND MAINTENANCE PORT SHALL BE INSTALLED PER THE APPROVED DRAWINGS TO PROVIDE FOR EASY INSPECTION OF THE UNDERDRAIN/STORAGE ELEMENT, AND CLEANOUT ACCESS IF NEEDED.

F. EXTREME EVENT OVERFLOW (BY OTHERS)

- AN EXTREME EVENT OVERFLOW SHOULD BE LOCATED EXTERNAL TO, BUT NEAR THE BIOFILTRATION ELEMENT TO PROVIDE BYPASS WHEN NEEDED. THIS MAY BE AN OVERLAND FLOW BYPASS STRUCTURE, BEEHIVE OVERFLOW GRATE STRUCTURE, OR EQUIVALENT THAT SERVES THE PURPOSE. IF A BEEHIVE OVERFLOW STRUCTURE IS UTILIZED IT SHOULD INCLUDE A REMOVABLE FILTER INSERT TO PROVIDE A MINIMUM OF 50% TSS REMOVAL AND CONTROL OF GROSS POLLUTANTS, TRASH AND FLOATABLES.

II. QUALITY ASSURANCE AND PERFORMANCE SPECIFICATIONS

THE QUALITY AND COMPOSITION OF ALL SYSTEM COMPONENTS AND ALL OTHER APPURTENANCES AND THEIR ASSEMBLY PROCESS SHALL BE SUBJECT TO INSPECTION UPON DELIVERY OF THE SYSTEM TO THE WORK SITE.

INSTALLATION IS TO BE PERFORMED ONLY BY SKILLED WORK PEOPLE WITH SATISFACTORY RECORD OF PERFORMANCE ON EARTHWORKS, PIPE, CHAMBER, OR POND/LANDFILL CONSTRUCTION PROJECTS OF COMPARABLE SIZE AND QUALITY.

A. PLANTS

- PLANTS MUST BE COMPATIBLE WITH THE HPMBS MEDIA AND THE ASSOCIATED HIGHLY VARIABLE HYDROLOGIC REGIME. PLANTS ARE TYPICALLY FACULTATIVE WITH FIBROUS ROOTS SYSTEMS SUCH AS NATIVE GRASSES AND SHRUBS.
- MANUFACTURER SHALL PROVIDE A REGIONALIZED LIST OF ACCEPTABLE PLANTS.
- ALL PLANT MATERIAL SHALL COMPLY WITH THE TYPE AND SIZE REQUIRED BY THE APPROVED DRAWINGS AND SHALL BE ALIVE AND FREE OF OBVIOUS SIGNS OF DISEASE.

B. MULCH

- MULCH, TYPICALLY DOUBLE SHREDDED HARDWOOD (NON-FLOATABLE), SHALL COMPLY WITH THE TYPE AND SIZE REQUIRED BY THE APPROVED DRAWINGS, AND SHALL BE SCREENED TO MINIMIZE FINES. ROCK MULCH IS AN ALTERNATIVE TO WOOD-BASED MULCH AND TYPICALLY CONSISTS OF CLEAN, ROUNDED RIVER ROCK (3-4" DIAM IN SIZE).

C. BIOFILTRATION MEDIA

- BIOLOGICALLY ACTIVE BIOFILTRATION MEDIA SHALL BE VISUALLY INSPECTED TO ENSURE APPROPRIATE VOLUME, TEXTURE AND CONSISTENCY WITH THE APPROVED DRAWINGS, AND MUST BEAR A BATCH NUMBER MARKING FROM THE MANUFACTURER WHICH CERTIFIES PERFORMANCE TESTING OF THE BATCH TO MEET OR EXCEED THE REQUIRED INFILTRATION RATE (100 IN/HR). A THIRD-PARTY LABORATORY TEST MUST BE PROVIDED TO CERTIFY THE 100 IN/HR RATE.
- AT NO ADDITIONAL COST AND WITHIN THE FIRST YEAR FOLLOWING INSTALLATION, AUTHORIZED VALUE-ADDED RESELLER SHALL PROVIDE ONE SITE VISIT/MAINTENANCE TRAINING AT THE REQUEST OF OWNER OR OWNER'S REPRESENTATIVE.
- POLLUTANT REMOVAL PERFORMANCE, COMPOSITION AND CHARACTERISTICS OF THE BIOFILTRATION MEDIA MUST MEET OR EXCEED THE FOLLOWING MINIMUM STANDARDS AS DEMONSTRATED BY TESTING ACCEPTABLE TO THE PROJECT ENGINEER:

Pollutant	Removal Efficiency
TSS	91%
Phosphorus	66%
Nitrogen	48%
Composition and Characteristics	
Sand - Fine	< 5%
Sand – Medium	10% - 15%
Sand – Coarse	15% - 25%
Sand – Very Coarse	40% - 45%
Gravel	10% - 20%
Infiltration Rate	>100 inches per hour
Peat Moss*	5% - 15%
* Peat Moss Specification	
Listed by Organic Materials Review Institute	
100% natural peat (no composted, sludge, yard or leaf waste)	
Total Carbon >85%	
Carbon to Nitrogen Ratio 15:1 to 23:1	
Lignin Content 49% to 52%	
Humic Acid >18%	
pH 6.0 to 7.0	
Moisture Content 30% to 50%	
95% to 100% passing 2.0mm sieve	
> 80% passing 1.0mm sieve	

D. UNDERDRAIN/STORAGE SYSTEM

- UNDERDRAIN/STORAGE COMPONENTS SHALL BE MANUFACTURED IN AN ISO CERTIFIED FACILITY AND BE MANUFACTURED FROM AT LEAST 90% RECYCLED MATERIALS.
- UNDERDRAIN/STORAGE COMPONENTS SHALL MEET OR EXCEED THE FOLLOWING CHARACTERISTICS:

Property	Value
Surface Void Area	≥ 85%
Unit Weight	3.25 lbs/cf
Service Temperature	-14° to 167°
Unconfined Crush Strength	32.48 psi
180 Day Creep Test	
Load Applied – Initial and Sustained	11.16 psi
* Creep Sustained – After 180 Days	0.20 inches
* Creep Sustained – After 180 Days	1.13%
* Projected Creep – 40 years	1.72%

G. SEPARATION MESH

- SEPARATION MESH SHALL BE COMPOSED OF HIGH-TENACITY MONOFILAMENT POLYPROPYLENE YARNS THAT ARE WOVEN TOGETHER TO PRODUCE AN OPEN MESH GEOTEXTILE WHICH SHALL BE INERT TO BIOLOGICAL DEGRADATION AND RESISTANT TO NATURALLY ENCOUNTERED CHEMICALS, ALKALIS AND ACIDS. THE MESH SHALL MEET OR EXCEED THE FOLLOWING CHARACTERISTICS:

Properties	Test Method	Unit	Min Avg Roll Value	
			MD	CD
Tensile Strength	ASTM D4595	kN/m (lbs/ft)	21 (1440)	25.3 (1733)
Creep Reduced Strength	ASTM D5262	kN/m (lbs/ft)	6.9 (471)	8.3 (566)
Long Term Allowable Design Load	GRI GG-4	kN/m (lbs/ft)	5.9 (407)	7.2 (490)
UV Resistance (at 500 hours)	-	% strength retained	90.00	
Aperture Size (machine direction)	-	mm (in)	2 (0.08)	
Aperture Size (cross machine direction)	-	mm (in)	2 (0.08)	
Mass/Unit Area	ASTM D5261	g/m2 (oz/yd2)	197 (5.8)	

F. BRIDGING STONE

- BRIDGING STONE SHALL BE 3/8" PEA GRAVEL, OR OTHER DIAMETER SIZED TO PREVENT MIGRATION OF FILTER MEDIA, AS SPECIFIED BY MANUFACTURER.
- STONE MUST BE WASHED AND FREE FROM SEDIMENT, SOIL AND CONTAMINANTS.

III. DELIVERY, STORAGE AND HANDLING

A. PROTECT ALL MATERIALS FROM DAMAGE DURING DELIVERY AND STORE UV SENSITIVE MATERIALS UNDER TARP TO PROTECT FROM SUNLIGHT INCLUDING ALL PLASTICS. WHEN TIME FROM DELIVERY TO INSTALLATION EXCEEDS ONE WEEK, STORAGE SHOULD OCCUR ON SMOOTH SURFACES, FREE FROM DIRT, MUD AND DEBRIS.

B. BIOFILTRATION MEDIA SHALL BE SEGREGATED FROM ANY OTHER AGGREGATE MATERIALS AND SHALL BE PROTECTED AGAINST CONTAMINATION, INCLUDING CONTAMINATION FROM ANY STORMWATER RUNOFF FROM AREAS OF THE SITE WHICH ARE NOT STABILIZED.

IV. SUBMITTALS

A. PRODUCT DATA

- SUBMIT MANUFACTURER'S PRODUCT DATA AND APPROVED INSTALLATION MANUAL AS WELL AS MANUFACTURER'S OPERATIONS AND MAINTENANCE MANUAL FOR THE SYSTEM. IT WILL BE THE RESPONSIBILITY OF THE SYSTEM OWNER/OPERATOR OR THEIR CONTRACTOR TO ENSURE THE SYSTEM IS OPERATED AND MAINTAINED IN ACCORDANCE WITH THE MANUAL.

B. CERTIFICATION

- MANUFACTURER SHALL SUBMIT A LETTER OF CERTIFICATION THAT THE COMPLETE SYSTEM MEETS OR EXCEEDS ALL TECHNICAL AND PACKAGING REQUIREMENTS. BIOFILTRATION MEDIA PACKAGING MUST BEAR A BATCH NUMBER MARKING FROM THE MANUFACTURER WHICH MATCHES A LETTER FROM THE MANUFACTURER CERTIFYING PERFORMANCE TESTING OF THE BATCH TO MEET OR EXCEED THE REQUIRED INFILTRATION RATE.

C. DRAWINGS

- MANUFACTURER SHALL PROVIDE DIMENSIONAL DRAWINGS INCLUDING DETAILS FOR CONSTRUCTION, MATERIALS, SPECIFICATIONS, AND PIPE CONNECTIONS. THESE DIMENSIONAL DRAWINGS SHALL INDICATE THE HPMBS FILTER BED AREA (SQ. FT) AND CORRESPOND WITH AN APPROVED SET PLANS OR DRAINAGE/STORMWATER MANAGEMENT REPORT STAMPED BY THE ENGINEER OF RECORD.

D. MANUFACTURER'S WARRANTY

- MANUFACTURER SHALL PROVIDE A WARRANTY FOR ALL COMPONENTS OF THE HPMBS FOR A PERIOD OF ONE YEAR PROVIDED THE UNIT IS INSTALLED, OPERATED AND MAINTAINED IN ACCORDANCE WITH THE MANUAL. IMPROPER OPERATION, MAINTENANCE OR ACCIDENTAL OR ILLEGAL ACTIVITIES (I.E. DUMPING OF POLLUTANTS, VANDALISM, ETC.) WILL VOID THE WARRANTY.

E. DESIGN COMPUTATIONS

- THE HPMBS MUST BE SIZED USING A VOLUME-BASED SIZING CRITERIA AND DEMONSTRATE, USING AN SCS STORMWATER MODELLING SOFTWARE/SPREADSHEET CALCULATOR THAT THE REQUIRED WATER QUALITY VOLUME (DEFINED BY THE ENGINEER OF RECORD) PASSES THROUGH THE HPMBS PRIOR TO ACTIVATION OF THE OVERFLOW DEVICE (SET NO HIGHER THAN TWELVE (12) INCHES ABOVE THE TOP ELEVATION OF THE HPMBS (TYPICALLY DEFINED AS TOP OF MULCH). DESIGN COMPUTATIONS MUST BE PROVIDED AS PART OF THE SUBMITTAL PROCESS. IF LOCAL REGULATIONS HAVE THE SYSTEM APPROVED BASED ON AN ALTERNATIVE SIZING CRITERION THE LARGER OF THE TWO COMPUTED SIZES WILL GOVERN.

F. SUBSTITUTIONS

- ANY PROPOSED EQUAL ALTERNATIVE PRODUCT SUBSTITUTION TO THIS SPECIFICATION MUST BE SUBMITTED FOR REVIEW AND APPROVED PRIOR TO BID OPENING. REVIEW PACKAGE SHOULD INCLUDE THIRD PARTY REVIEWED PERFORMANCE DATA FOR BOTH FLOW RATE AND POLLUTANT REMOVAL OF BIOFILTRATION MEDIA. POLLUTANT REMOVAL DATA MUST FOLLOW SPECIFIED PROTOCOLS. ALL COMPONENTS MUST MEET OR EXCEED QUALITY ASSURANCE AND PERFORMANCE CRITERIA INDICATED HEREIN.

VI. PROJECT CONDITIONS

A. REVIEW MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES AND COORDINATE INSTALLATION WITH OTHER WORK AFFECTED, SUCH AS GRADING, EXCAVATION, UTILITIES, CONSTRUCTION ACCESS AND EROSION CONTROL TO PREVENT ALL NON-INSTALLATION RELATED CONSTRUCTION TRAFFIC OVER THE COMPLETED HPMBS.

B. COLD WEATHER

- DO NOT USE FROZEN MATERIALS OR MATERIALS MIXED OR COATED WITH ICE OR FROST.
- DO NOT BUILD ON FROZEN GROUND OR WET, SATURATED OR MUDDY SUBGRADE.
- CARE MUST BE TAKEN WHEN HANDLING PLASTICS WHEN AIR TEMPERATURE IS AT 40 DEGREES FAHRENHEIT OR BELOW AS PLASTIC BECOMES BRITTLE.

C. PROTECT PARTIALLY COMPLETED INSTALLATION AGAINST DAMAGE FROM OTHER CONSTRUCTION TRAFFIC WHEN WORK IS IN PROGRESS AND FOLLOWING COMPLETION OF BACKFILL BY ESTABLISHING A PERIMETER WITH HIGHLY VISIBLE CONSTRUCTION TAPE, FENCING, OR OTHER MEANS UNTIL CONSTRUCTION IS COMPLETE.

D. SOIL STABILIZATION OF THE SURROUNDING SITE MUST BE COMPLETE BEFORE THE BIOFILTRATION SYSTEM CAN BE BROUGHT ONLINE. SOIL STABILIZATION OCCURS WHEN 90% OF THE SITE HAS BEEN PAVED OR VEGETATED. TEMPORARY EROSION CONTROL AND/OR SEDIMENTATION PREVENTION MEASURES SHALL BE IMPLEMENTED TO REDUCE THE POSSIBILITY OF SEDIMENTS BEING TRANSPORTED INTO THE BIOFILTRATION SYSTEM PRIOR TO FULL STABILIZATION OF THE SITE. SIGNIFICANT SEDIMENT LOADS CAN DAMAGE THE HPMBS AND LEAD TO FAILURE IF NOT PREVENTED OR REMEDIATED PROMPTLY.

VI. PRODUCTS

- ACCEPTABLE HPMBS
- FOCALPOINT HIGH PERFORMANCE BIOFILTRATION SYSTEM
- ACCEPTABLE BEEHIVE OVERFLOW GRATE STRUCTURE (OPTIONAL)
- BEEHIVE OVERFLOW GRATE STRUCTURE WITH REMOVABLE STORMSACK

C. ACCEPTABLE MANUFACTURER

MANUFACTURER:  
CONVERGENT WATER TECHNOLOGIES, INC.  
(800) 711-5428  
WWW.CONVERGENTWATER.COM

D. AUTHORIZED VALUE ADDED RESELLER

FERGUSON WATERWORKS  
(800) 448-3636  
WWW.FERGUSON.COM

VII. PACKAGING

A. HPMBS IS ASSEMBLED ON SITE.

B. MODULAR UNDERDRAIN/STORAGE UNIT IS SHIPPED FLAT AND MODULES ARE ASSEMBLED PRIOR TO INSTALLATION.

C. BIOFILTRATION MEDIA IS DELIVERED IN ONE TON SUPER SACKS EACH LABELED WITH MANUFACTURER'S BATCH NUMBER AND/OR IN BULK WITH ACCOMPANYING MANUFACTURER'S CERTIFICATION.

D. OTHER COMPONENTS ARE DELIVERED IN BULK OR SUPER SACKS

VIII. EXECUTION

A. EXCAVATION AND BACKFILL

- BASE OF EXCAVATION SHALL BE SMOOTH, LEVEL AND FREE OF LUMPS OR DEBRIS, AND COMPACTED UNLESS INFILTRATION OF STORM WATER INTO SUBGRADE IS DESIRED. A THIN LAYER (3") OF COMPACTED BASE MATERIAL IS RECOMMENDED TO ESTABLISH A LEVEL WORKING PLATFORM (MAY NOT BE NEEDED IN SANDY SOILS). IF THE BASE OF THE EXCAVATION IS PUMPING OR APPEARS EXCESSIVELY SOFT, A GEOTECHNICAL ENGINEER SHOULD BE CONSULTED FOR ADVICE. IN MANY CASES, A STABILIZATION GEOTEXTILE AND 6" OF COMPACTABLE MATERIAL THAT DRAINS WELL WILL BE SUFFICIENT TO AMEND THE BEARING CAPACITY OF THE SOIL.

- MOST APPLICATIONS REQUIRE 8 OZ NON-WOVEN GEOTEXTILE OR EQUIVALENT NONWOVEN GEOTEXTILE WITH A NOMINAL WEIGHT OF 8 OZ PER SQUARE YARD TO LINE THE EXCAVATION TO SEPARATE IN SITU SOILS AND THE HPMBS. (APPLICATIONS REQUIRING WATER TO INFILTRATE THE IN SITU SUB-SOILS SHOULD USE A BRIDGING STONE RATHER THAN GEOTEXTILE TO PROVIDE A SEPARATION LAYER BETWEEN THE HPMBS AND THE IN SITU SOILS). GEOTEXTILE, WHEN UTILIZED, SHOULD BE PLACED ON THE BOTTOM AND UP THE SIDES OF THE EXCAVATION. ABSOLUTELY NO GEOTEXTILES SHOULD BE USED IN THE WATER COLUMN. IF AN IMPERMEABLE LINER IS SPECIFIED, IT SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.

- SPECIFIED BACKFILL MATERIAL MUST BE FREE FROM LUMPS, DEBRIS AND ANY SHARP OBJECTS THAT COULD PENETRATE THE GEOTEXTILE. MATERIAL IS USED FOR BACKFILL ALONG THE SIDES OF THE SYSTEM AS INDICATED IN ENGINEERING DETAIL DRAWINGS.

B. INSPECTION

- EXAMINE PREPARED EXCAVATION FOR SMOOTHNESS, COMPACTION AND LEVEL. CHECK FOR PRESENCE OF HIGH WATER TABLE, WHICH MUST BE KEPT AT LEVELS BELOW THE BOTTOM OF THE UNDERDRAIN STRUCTURE AT ALL TIMES. IF THE BASE IS PUMPING OR APPEARS EXCESSIVELY SOFT, A GEOTECHNICAL ENGINEER SHOULD BE CONSULTED FOR ADVICE.
- INSTALLATION COMMENCEMENT CONSTITUTES ACCEPTANCE OF EXISTING CONDITIONS AND RESPONSIBILITY FOR SATISFACTORY PERFORMANCE. IF EXISTING CONDITIONS ARE FOUND TO BE UNSATISFACTORY, CONTACT PROJECT MANAGER OR ENGINEER FOR RESOLUTION PRIOR TO INSTALLATION.

IX. CLEANUP AND PROTECTION DURING ONGOING CONSTRUCTION ACTIVITY

A. PERFORM CLEANING DURING THE INSTALLATION AND UPON COMPLETION OF THE WORK.

B. REMOVE FROM SITE ALL EXCESS MATERIALS, DEBRIS, AND EQUIPMENT. REPAIR ANY DAMAGE TO ADJACENT MATERIALS AND SURFACES RESULTING FROM INSTALLATION.

C. IF SURROUNDING DRAINAGE AREA IS NOT FULLY STABILIZED, A PROTECTIVE COVERING OF GEOTEXTILE FABRIC SHOULD BE SECURELY PLACED TO PROTECT THE BIOFILTRATION MEDIA.

D. CONSTRUCTION PHASE EROSION AND SEDIMENTATION CONTROLS SHALL BE PLACED TO PROTECT THE INLET(S) TO THE BIOFILTRATION SYSTEM. EXCESSIVE SEDIMENTATION, PARTICULARLY PRIOR TO ESTABLISHMENT OF PLANTS MAY DAMAGE THE HPMBS.

E. STRICTLY FOLLOW MANUFACTURER'S GUIDELINES WITH RESPECT TO PROTECTION OF THE HPMBS BETWEEN INSTALLATION AND COMMISSIONING PHASES.

X. COMMISSIONING

A. COMMISSIONING SHOULD ONLY BE CARRIED OUT ONCE THE CONTRIBUTING DRAINAGE AREA IS FULLY STABILIZED. IF COMMISSIONING MUST BE CARRIED OUT SOONER, IT IS IMPERATIVE THAT APPROPRIATE EROSION AND SEDIMENT CONTROLS BE PLACED TO PREVENT THE ENTRY OF EXCESSIVE SEDIMENT/POLLUTANT LOADS INTO THE SYSTEM.

B. COMMISSIONING ENTAILS REMOVING THE PROTECTIVE COVERING FROM THE BIOFILTRATION MEDIA, PLANTING THE PLANT MATERIAL IN ACCORDANCE WITH THE APPROVED DRAWINGS, AND PLACING MULCH IF SPECIFIED.

- DIG PLANTING HOLES THE DEPTH OF THE ROOT BALL AND TWO TO THREE TIMES AS WIDE AS THE ROOT BALL. WIDE HOLES ENCOURAGE HORIZONTAL ROOT GROWTH THAT PLANTS NATURALLY PRODUCE.

- WITH TREES, YOU MUST ENSURE YOU ARE NOT PLANTING TOO DEEP. DON'T DIG HOLES DEEPER THAN ROOT BALLS. THE MEDIA SHOULD BE PLACED AT THE ROOT COLLAR, NOT ABOVE THE ROOT COLLAR, OTHERWISE THE STEM WILL BE VULNERABLE TO DISEASE.

- STRICTLY FOLLOW MANUFACTURER'S PLANTING GUIDANCE.

C. COVER THE EXPOSED ROOT BALL TOP WITH MULCH. MULCH SHOULD NOT TOUCH THE PLANT BASE BECAUSE IT CAN HOLD TOO MUCH MOISTURE AND INVITE DISEASE AND INSECTS. EVENLY PLACE 3 INCHES OF DOUBLE-SHREDDED HARDWOOD MULCH (IF SPECIFIED) ON THE SURFACE OF THE MEDIA.

D. PLANTINGS SHALL BE WATERED-IN AT INSTALLATION AND TEMPORARY IRRIGATIONS SHALL BE PROVIDED, IF SPECIFIED.

XI. USING THE HPMBS

A. MAINTENANCE REQUIREMENTS

- ANNUAL MAINTENANCE GENERALLY CONSISTS OF TWO (2) SCHEDULED VISITS UNLESS OTHERWISE SPECIFIED.
- EACH MAINTENANCE VISIT CONSISTS OF THE FOLLOWING:

2.1. COMPLETE SYSTEM INSPECTION

2.2. REMOVAL OF FOREIGN DEBRIS, SILT, PLANT MATERIAL, TRASH AND MULCH (IF NEEDED)

2.3. EVALUATION OF BIOFILTRATION MEDIA

2.4. EVALUATION OF PLANT HEALTH

2.5. INSPECTION OF UNDERDRAIN/STORAGE SYSTEM VIA OBSERVATION/MAINTENANCE PORT

2.6. PROPERLY DISPOSE OF ALL MAINTENANCE REFUSE ITEMS (TRASH, MULCH, ETC.)

2.7. TAKE PHOTOGRAPHS DOCUMENTING PLANT GROWTH AND GENERAL SYSTEM HEALTH

2.8. UPDATE AND STORE MAINTENANCE RECORDS

2.9. TO ENSURE LONG TERM PERFORMANCE OF THE HPMBS, CONTINUING ANNUAL MAINTENANCE SHOULD BE PERFORMED PER THE MANUFACTURER'S OPERATIONS AND MAINTENANCE MANUAL.

- IF SEDIMENT ACCUMULATES BEYOND AN ACCEPTABLE LEVEL IN THE UNDERDRAIN/STORAGE SYSTEM, IT WILL BE NECESSARY TO FLUSH THE UNDERDRAIN. THIS CAN BE DONE BY PUMPING WATER INTO THE OBSERVATION/MAINTENANCE PORT OR ADJACENT OVERFLOW STRUCTURE, ALLOWING THE TURBULENT FLOWS THROUGH THE UNDERDRAIN TO RE-SUSPEND THE FINE SEDIMENTS. IF MULTIPLE OBSERVATION/MAINTENANCE PORTS HAVE BEEN INSTALLED, WATER SHOULD BE PUMPED INTO EACH PORT TO MAXIMIZE FLUSHING EFFICIENCY.

SEDIMENT-LADEN WATER CAN BE PUMPED OUT AND EITHER CAPTURED FOR DISPOSAL OR FILTERED THROUGH A DIRTBAG FILTER BAG, IF PERMITTED BY THE LOCALITY.

XII. MEASUREMENT AND PAYMENT

GIVEN THE INTEGRATED NATURE OF THE HPMBS, MEASUREMENT AND PAYMENT WILL BE BASED NOT ON THE INDIVIDUAL COMPONENT PRICES, BUT ON THE SIZE OF THE BIOFILTRATION MEDIA BED. THE EXTERNAL DIMENSION AS INDICATED IN THE APPROVED PLANS AND EXECUTED IN THE INSTALLATION WILL BE MEASURED IN SQUARE FEET AND PAYMENT WILL BE MADE PER HPMBS SYSTEM.

MEASUREMENT AND PAYMENT OF BEEHIVE OVERFLOW GRATE STRUCTURE WITH REMOVABLE FILTER INSERT WILL BE BASED ON PER UNIT PRICE.



ENGINEER OF RECORD TO REVIEW, APPROVE AND ENDORSE FINAL SITE SPECIFIC DESIGN.



FOR ADDITIONAL INFORMATION PLEASE CONTACT:  
FERGUSON WATERWORKS,  
1-800-448-3636, www.ferguson.com

FOCALPOINT SPECIFICATION  
DRESSER WORDS  
SALISBURY, CT

SCALE  
NTS

DRAWN BY  
BMK

DATE  
11/24/2023

SHEET NO.

7 of 8

R-TANK SPECIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, technical specification and general provisions of the Contract as modified herein apply to this section.

1.02 DESCRIPTION OF WORK INCLUDED

- A. Provide excavation and base preparation per geotechnical engineer's recommendations and/or as shown on the design drawings, to provide adequate support for project design loads and safety from excavation sidewall collapse. Excavations shall be in accordance with the owner's and OSHA requirements.
- B. Provide and install R-TankLD/, R-TankHD/, R-TankSD/, or R-TankUD/ system (hereafter called R-Tank) and all related products including fill materials, geotextiles, geogrids, inlet and outlet pipe with connections per the manufacturer's installation guidelines provided in this section.
- C. Provide and construct the cover of the R-Tank system including; stone backfill, structural fill cover, and pavement section as specified.
- D. Protect R-Tank system from construction traffic after installation until completion of all construction activity in the installation area.

1.03 QUALITY CONTROL

- A. All materials shall be manufactured in ISO certified facilities.
- B. Installation Contractor shall demonstrate the following experience:
1. A minimum of three R-Tank or equivalent projects completed within 2 years; and,
  2. A minimum of 25,000 cubic feet of storage volume completed within 2 years.
- C. Contractor experience requirement may be waived if the manufacturer's representative provides on-site training and review during construction.
- C. Installation Personnel: Performed only by skilled workers with satisfactory record of performance on bulk earthworks, pipe, chamber, or pond/landfill construction projects of comparable size and quality.
- D. Contractor must have manufacturer's representative available for site review if requested by Owner.

1.04 SUBMITTALS

- A. Submit proposed R-Tank layout drawings. Drawings shall include typical section details as well as the required base elevation of stone and tanks, minimum cover requirements and tank configuration.
- B. Submit manufacturer's product data, including compressive strength and unit weight.
- C. Submit manufacturer's installation instructions.
- D. Submit R-Tank sample for review. Reviewed and accepted samples will be returned to the Contractor.
- E. Submit material certificates for geotextile, geogrid, base course and backfill materials.
- F. Submit required experience and personnel requirements as specified in Section 1.03.
- G. Any proposed equal alternative product substitution to this specification must be submitted for review and approved prior to bid opening. Review package should include third party reviewed performance data that meets or exceeds criteria in Table 2.01 B.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect R-Tank and other materials from damage during delivery, and store UV sensitive materials under tarp to protect from sunlight when time from delivery to installation exceeds two weeks. Storage of materials should be on smooth surfaces, free from dirt, mud and debris.
- B. Handling is to be performed with equipment appropriate to the materials and site conditions, and may include hand, handcart, forklifts, extension lifts, etc.
- C. Cold weather:
1. Care must be taken when handling plastics when air temperature is 40 degrees or below as plastic becomes brittle.
  2. Do not use frozen materials or materials mixed or coated with ice or frost.
  3. Do not build on frozen ground or wet, saturated or muddy subgrade.

1.06 PREINSTALLATION CONFERENCE.

- A. Prior to the start of the installation, a preinstallation conference shall occur with the representatives from the design team, the general contractor, the excavation contractor, the R-Tank installation contractor, and the manufacturer's representative.

1.07 PROJECT CONDITIONS

- A. Coordinate installation for the R-Tank system with other on-site activities to eliminate all non-installation related construction traffic over the completed R-Tank system. No loads heavier than the design loads shall be allowed over the system, and in no case shall loads higher than a standard AASHTO HS20 (or HS25, depending on design criteria) load be allowed on the system at any time.
- B. Protect adjacent work from damage during R-Tank system installation.
- C. All pre-treatment systems to remove debris and heavy sediments must be in place and functional prior to operation of the R-Tank system. Additional pretreatment measures may be needed if unit is operational during construction due to increased sediment loads.
- D. Contractor is responsible for any damage to the system during construction.

PART 2 - PRODUCTS

2.01 R-TANK UNITS

- A. R-Tank - Injection molded plastic tank plates assembled to form a 95% void modular structure of predesigned height (custom for each project).
- B. R-Tank units shall meet the following Physical & Chemical Characteristics:

PROPERTY	DESCRIPTION	R-Tank <sup>LD</sup> VALUE	R-Tank <sup>HD</sup> VALUE	R-Tank <sup>SD</sup> VALUE	R-Tank <sup>UD</sup> VALUE
Void Area	Volume available for water storage	95%	95%	95%	95%
Surface Void Area	Percentage of exterior available for infiltration	90%	90%	90%	90%
Vertical Compressive Strength	ASTM D 2412 / ASTM F 2418	30.0 psi	33.4 psi	42.9 psi	134.2 psi
Lateral Compressive Strength	ASTM D 2412 / ASTM F 2418	20.0 psi	22.4 psi	28.9 psi	N/A
HS-20 Minimum Cover	Cover required to support HS-20 loads	N/A	20"	18"	12" (STONE BACKFILL)
HS-25 Minimum Cover	Cover required to support HS-25 loads	N/A	24"	19"	15" (STONE BACKFILL)
Maximum Cover	Maximum allowable cover depth	3 feet	< 7 feet	< 10 feet	5 feet
Unit Weight	Weight of plastic per cubic foot of tank	3.29 lbs / cf	3.62 lbs/cf	3.96 lbs / cf	4.33 lbs / cf
Rib Thickness	Thickness of load-bearing members	0.18 inches	0.18 inches	0.18 inches	N/A
Service Temperature	Safe temperature range for use	-14 – 167° F	-14 – 167° F	-14 – 167° F	-14 – 167° F

- C. Supplier: Ferguson Waterworks 2831 Cardwell Road Richmond, VA 23234 (T): 800-448-3636; (F): 804-743-7779 [www.ferguson.com](http://www.ferguson.com)

2.02 GEOSYNTHETICS

- A. Geotextile. A geotextile envelope is required to prevent backfill material from entering the R-Tank modules.
1. Standard Application: The standard geotextile shall be an 8 oz per square yard nonwoven geotextile (ACF N080 or equivalent).
  2. Infiltration Applications: When water must infiltrate/exfiltrate through the geotextile as a function of the system design, a woven monofilament (ACF M200 or equivalent) shall be used.
- B. Geogrid. For installations subject to traffic loads and/or when required by project plans, install geogrid (ACF BX12 or equivalent) to reinforce backfill above the R-Tank system. Geogrid is not always required for R-TankUD/ installations, and is often not required for non-traffic load applications.

2.03 BACKFILL & COVER MATERIALS

- A. Bedding Materials: Stone (angular and smaller than 1.5" in diameter) or soil (GW, GP, SW, or SP as classified by the Unified Soil Classification System) shall be used below the R-Tank system (3" minimum). Material must be free from lumps, debris, and any sharp objects that could cut the geotextile. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation. For infiltration applications bedding material shall be free draining.
- B. Side and Top Backfill: Material must be free from lumps, debris and any sharp objects that could cut the geotextile. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation.
1. Traffic Applications - Free draining material shall be used adjacent to (24" minimum) and above (for the first 12") the R-Tank system.
    - a. For HD, and SD modules, backfill materials shall be free draining stone (angular and smaller than 1.5" in diameter) or soil (GW, GP, SW, or SP as classified by the Unified Soil Classification System).
    - b. For UD modules with less than 14" of top cover, backfill materials shall be free draining stone (angular and smaller than 1.5" in diameter). The use of soil backfill on the sides and top of the UD module is not permitted unless the modules are installed outside of traffic areas or with cover depths of 14" or more. Top backfill material (from top of module to bottom of pavement base or 12" maximum) must be consistent with side backfill.
  2. Non-Traffic / Green Space Applications - For all R-Tank modules installed in green spaces and not subjected to vehicular loads, backfill materials may either follow the guidelines for Traffic Applications above, or the top backfill layer (12" minimum) may consist of AASHTO #57 stone blended with 30-40% (by volume) topsoil to aid in establishing vegetation.
- C. Additional Cover Materials: Structural Fill shall consist of granular materials meeting the gradational requirements of SM, SP, SW, GM, GP or GW as classified by the Unified Soil Classification System. Structural fill shall have a maximum of 25 percent passing the No. 200 sieve, shall have a maximum clay content of 10 percent and a maximum Plasticity Index of 4. Material shall be within 3 percent of the optimum moisture content as determined by ASTM D698 at the time of installation.

2.04 OTHER MATERIALS

- A. Utility Marker: Install metallic tape at corners of R-Tank system to mark the area for future utility detection.

PART 3 - EXECUTION

3.01 ASSEMBLY OF R-TANK UNITS

- A. Assembly of modules shall be performed in accordance with the R-Tank Installation Manual, Section 2.

3.02 LAYOUT AND EXCAVATION

- A. Installer shall stake out, excavate, and prepare the subgrade area to the required plan grades and dimensions, ensuring that the excavation is at least 2 feet greater than R-Tank dimensions in each direction allowing for installation of geotextile filter fabric, R-Tank modules, and free draining backfill materials.
- B. All excavations must be prepared with OSHA approved excavated sides and sufficient working space.
- C. Protect partially completed installation against damage from other construction traffic by establishing a perimeter with high visibility construction tape, fencing, barricades, or other means until construction is complete.
- D. Base of the excavation shall be uniform, level, and free of lumps or debris and soft or yielding subgrade areas. A minimum 2,000 pounds per square foot bearing capacity is required.
1. Standard Applications: Compact subgrade to a minimum of 95% of Standard Proctor (ASTM D698) density or as required by the Owner's engineer.
2. Infiltration Applications: Subgrade shall be prepared in accordance with the contract documents. Compaction of subgrade should not be performed in infiltration applications.
- E. Unsuitable Soils or Conditions: All questions about the base of the excavation shall be directed to the owner's engineer, who will approve the subgrade conditions prior to placement of stone. The owner's engineer shall determine the required bearing capacity of the R-Tank subgrade; however in no case shall a bearing capacity of less than 2,000 pounds per square foot be provided.
1. If unsuitable soils are encountered at the subgrade, or if the subgrade is pumping or appears excessively soft, repair the area in accordance with contract documents and/or as directed by the owner's engineer.
  2. If indications of the water table are observed during excavation, the engineer shall be contacted to provide recommendations.
  3. Do not start installation of the R-Tank system until unsatisfactory subgrade conditions are corrected and the subgrade conditions are accepted by the owner's engineer.

3.03 PREPARATION OF BASE

- A. Place a thin layer (3" unless otherwise specified) of bedding material (Section 2.03 A), over the subgrade to establish a level working platform for the R-Tank modules. Level to within ½" (+/- ¼") or as shown on the plans. Native subgrade soils or other materials may be used if determined to meet the requirements of 2.03 A and are accepted by the owner's engineer.
1. Standard Applications: Static roll or otherwise compact bedding materials until they are firm and unyielding.
  2. Infiltration Applications: Bedding materials shall be prepared in accordance with the contract documents.
- B. Outline the footprint of the R-Tank system on the excavation floor using spray paint or chalk line to ensure a 2' perimeter is available around the R-Tank system for proper installation and compaction of backfill.

3.04 INSTALLATION OF THE R-TANKS

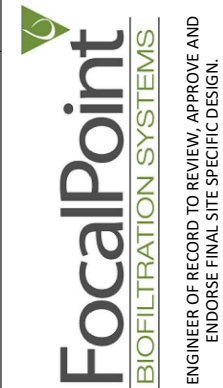
- A. Where a geotextile wrap is specified on the stone base, cut strips to length and install in excavation, removing wrinkles so material lays flat. Overlap geotextile a minimum 12" or as recommended by manufacturer. Use tape, special adhesives, sandbags or other ballast to secure overlaps. As geotextiles can be damaged by extreme heat, smoking is not permissible on/hear the geotextile, and tools using a flame to tack the overlaps, such as propane torches, are prohibited.
- B. Where an impervious liner (for containment) is specified, install the liner per manufacturer's recommendations and the contract documents. The R-Tank units shall be separated from impervious liner by a non-woven geotextile fabric installed accordance with Section 3.04A.
- C. Install R-Tank modules by placing side by side, in accordance with the design drawings. No lateral connections are required. It is advisable to use a string line to form square corners and straight edges along the perimeter of the R-Tank system. The modules are to be oriented as per the design drawing with required depth as shown on plans.
1. For LD, HD, and SD installations, the large side plate of the tank should be placed on the perimeter of the system. This will typically require that the two ends of the tank area will have a row of tanks placed perpendicular to all other tanks. If this is not shown in the construction drawings, it is a simple field adjustment that will have minimal effect on the overall system footprint. Refer to R-Tank Installation Guide for more details
  2. For UD installations, there is no perpendicular end row required.
- D. Wrap the R-Tank top and sides in specified geotextile. Cut strips of geotextile so that it will cover the sides and top, encapsulating the entire system to prevent backfill entry into the system. Overlap geotextile 12" or as recommended by manufacturer. Take great care to avoid damage to geotextile (and, if specified, impervious liner) during placement.
- E. Identify locations of inlet, outlet and any other penetrations of the geotextile (and optional liner). These connections should be installed flush (buted up to the R-Tank) and the geotextile fabric shall be cut to enable hydraulic continuity between the connections and the R-Tank units. These connections shall be secured using pipe boots with stainless steel pipe clamps. Support pipe in trenches during backfill operations to prevent pipe from settling and damaging the geotextile, impervious liner (if specified) or pipe. Connecting pipes at 90 degree angles facilitates construction, unless otherwise specified. Ensure end of pipe is installed snug against R-Tank system.
- F. Install Inspection and Maintenance Ports in locations noted on plans. At a minimum one maintenance port shall be installed within 10' of each inlet & outlet connection, and with a maximum spacing of one maintenance port for every 2,500 square feet. Install all ports as noted in the R-Tank Installation Guide.
- G. If required, install ventilation pipes and vents as specified on drawings to provide ventilation for proper hydraulic performance. The number of pipes and vents will depend on the size of the system. Vents are often installed using a 90 degree elbow with PVC pipe into a landscaped area with "U" bend or venting bollard to inhibit the ingress of debris. A ground level concrete or steel cover can be used.

3.05 BACKFILLING OF THE R-TANK UNITS

- A. Backfill and fill with recommended materials as follows:
1. Place freely draining backfill materials (Section 2.03 B) around the perimeter in lifts with a maximum thickness of 12". Each lift shall be placed around the entire perimeter such that each lift is no more than 24" higher than the side backfill along any other location on the perimeter of the R-Tank system. No fill shall be placed over top of tanks until the side backfill has been completed.
  2. Each lift shall be compacted at the specified moisture content to a minimum of 95% of the Standard Proctor Density until no further densification is observed (for self-compacting stone materials). The side lifts must be compacted with walk behind compaction equipment. Even when "self-compacting" backfill materials are selected, a walk behind vibratory compactor must be used.
  3. Take care to ensure that the compaction process does not allow the machinery to come into contact with the modules due to the potential for damage to the geotextile and R-Tank units.
  4. No compaction equipment is permissible to operate directly on the R-Tank modules.
  5. Top Backfill: Only low pressure track vehicles shall be operated over the R-Tank system during construction. Dump Trucks and Pans shall not be operated within the R-Tank system footprint at any time. Heavy equipment should unload in an area adjacent to the R-Tank system and the material should be moved over the system using tracked equipment with an operating weight of less than 10 tons.
    - a. Typical Applications: Install a 12" (or as shown on plans) lift of freely draining material (Section 2.03 B) over the R-Tank Units, maintaining 12" between equipment tracks and R-Tank System. Lightly compacted using a walk-behind trench roller. Alternately, a roller (maximum gross vehicle weight of 6 tons) may be used. Roller must remain in static mode until a minimum of 24" of cover has been placed over the modules. Sheep foot rollers should not be used.
    - b. Shallow Applications (< 18" total cover): Install top backfill in accordance with plans.
  6. If required, install a geogrid as shown on plans. Geogrid shall extend a minimum of 3 feet beyond the limits of the excavation wall.
  7. Following placement and compaction of the initial cover, subsequent lifts of structural fill (Section 2.03 C) shall be placed at the specified moisture content and compacted to a minimum of 95% of the Standard Proctor Density and shall cover the entire footprint of the R-Tank system. During placement of fill above the system, unless otherwise specified, a uniform elevation of fill shall be maintained to within 12" across the footprint of the R-Tank system. Do not exceed maximum cover depths listed in Table 2.01 B.
  8. Place additional layers of geotextile and/or geogrid at elevations as specified in the design details. Each layer of geosynthetic reinforcement placed above the R-Tank system shall extend a minimum of 3 feet beyond the limits of the excavation wall.
- B. Ensure that all unrelated construction traffic is kept away from the limits of excavation until the project is complete and final surface materials are in place. No non-installation related loading should be allowed over the R-Tank system until the final design section has been constructed (including pavement).
- C. Place surfacing materials, such as groundcovers (no large trees), or paving materials over the structure with care to avoid displacement of cover fill and damage to surrounding areas.
- D. Backfill depth over R-Tank system must be within the limitations shown in the table in Section 2.01 B. If the total backfill depth does not comply with this table, contact engineer or manufacturer's representative for assistance.

3.06 MAINTENANCE REQUIREMENTS

- A. A routine maintenance effort is required to ensure proper performance of the R-Tank system. The Maintenance program should be focused on pretreatment systems. Ensuring these structures are clean and functioning properly will reduce the risk of contamination of the R-Tank system and stormwater released from the site. Pre-treatment systems shall be inspected yearly, or as directed by the regulatory agency and by the manufacturer (for proprietary systems). Maintain as needed using acceptable practices or following manufacturer's guidelines (for proprietary systems).
- B. All inlet pipes and Inspection and/or Maintenance Ports in the R-Tank system will need to be inspected for accumulation of sediments at least quarterly through the first year of operation and at least yearly thereafter.
- C. If sediment has accumulated to the level noted in the R-Tank Maintenance Guide or beyond a level acceptable to the Owner's engineer, the R-Tank system should be flushed.
- D. All inspection and maintenance activities should be performed in accordance with the R-Tank Operation, Inspection & Maintenance Manual.



ENGINEER OF RECORD TO REVIEW, APPROVE AND ENDORSE FINAL SITE SPECIFIC DESIGN.



FOR ADDITIONAL INFORMATION PLEASE CONTACT:  
FERGUSON WATERWORKS,  
1-800-448-3636, [www.ferguson.com](http://www.ferguson.com)

R-TANK SPECIFICATION  
DRESSER WORDS  
SALISBURY, CT

SCALE  
NTS

DRAWN BY  
BMK

DATE  
11/24/2023

SHEET NO.

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