

Bristol Subsurface Infiltration Chamber Design Project

School 001 Site (Bristol Elementary School)

100% Design Narrative

02/16/2022

Purpose

A stormwater master plan was developed for the Town of Bristol in 2019. Section 5 of this report included several proposed stormwater best management practices intended to reduce stormwater runoff and sediment discharge to the New Haven River, with a particular interest in reducing phosphorous discharge. The master plan included 30% concept designs for two stormwater systems within the playground areas of the town's elementary school.

The purpose of this project is to advance the 30% conceptual design documents to construction level documents for the Town of Bristol. Construction documents developed can then be used to secure funding for installation of the proposed School Street chamber system.

Contents

- Site Assessment & Preliminary Design
- Final Design
- Performance Report
- Permit Evaluation & Summary
- Opinion of Probable Cost
- Operation and Maintenance Manual

Attachments

1. School 001 Site Performance Report
2. School 001 Operation & Maintenance Manual
3. School 001 Opinion of Probable Cost
4. School 001 Site Construction Plan Set
5. School 001 Site Civil Construction Specifications

Site Assessment & Preliminary System Designs

The following work has been completed:

A topographic site survey was conducted by Latitudes Land Surveying, LLC for the site locating existing features and visible utilities. This information was used to generate an existing conditions plan for use in stormwater design.

Existing Available Mapping available either online from the Vermont Center for Geographic Information, by School Facilities Staff or on the ANR Wastewater Permit database, was reviewed for each of the sites. Original design plans for the school indicate three existing leach fields; which are shown on the attached existing conditions plan. Any proposed stormwater treatment practice would need to be located 35-ft upgradient or 75-feet downgradient of these septic areas. The leach field located west of the central portion of the building has recently failed and the school is in the process of permitting a replacement system with Green Mountain Engineering. The location of this replacement system has been taken into consideration and does not interfere with the location of the proposed chamber system for the School 001 site.

Soil Borings and Soil Infiltration Testing was performed by Randy Rhodes, PE of M&W Soils Engineering, Inc. This consisted of (2) borings to a depth of 12-feet below grade and a series of infiltration tests approximately 10-ft below existing grade. Material gradations were performed for samples retrieved from B-1 at the 8-9-ft depth, 9-9.5-ft depth and 10.5-12-ft depth.

Results indicate 4-5ft of fill with sands and gravelly native material below. Material gradations differ between the depths sampled. Finer material was found at the 9-9.5-ft depth than depth below 10.5-ft which indicates the presence of tighter soil layers that would produce a lower infiltration rate. Given these findings if during installation of the chamber system a tighter soil layer is encountered near the bottom of the system, this layer will need to be excavated and replaced with suitable native or imported backfill. Evidence of seasonal high groundwater table was noted at a depth of 10.25-ft for Boring B1.

Infiltration rates varied between testing locations. The lowest of the infiltration field rates has been used for the chamber system design. This rate of 9 inches per hour varies only slightly from the 6 inches per hour applied for the 30% design iteration.

Review of the 30% Design Information provided in the RFP and by the Town was completed by our office once the existing conditions and soil investigation work concluded. Our review found areas where we believe the 30% design to be overly optimistic in terms of capacity and performance. We also found an existing wastewater disposal field on prior site plans for the school that would interfere with installation of the chamber system as outlined in the 30% plans. Due to this conflict, the School 002 (southern) system was not advanced.

The 30% design for the School 001 site included directing nearly 50-acres of upland wooded area to the proposed chamber system. In our opinion, this is too large of a collection area for the chamber system proposed, and would be regularly overloaded, resulting in bypassing of the chamber system. Given that the school relies on an on-site wastewater disposal system, increasing the watershed area discharging toward the school site should be carefully considered.

It should also be noted that the school site is considerably lower than the elevation of Mountain Street and the school site does not have a defined outfall. This means that any runoff reaching the school parcel that does not infiltrate into the ground would continue across school property to adjacent residential properties.

Given the considerations outlined above, the School 001 30% design was modified to focus treatment on a smaller area that more directly benefits the school and reduces the risk of bypassing runoff to adjacent properties. The new configuration will provide significant stormwater treatment and flow control while minimizing impacts to the school property.

Another modification involves the chamber system selected. The 30% design proposed installation of stormtech MC-4500 chamber units. The final design proposes MC-3500 chambers be installed to provide adequate separation to seasonal high-water table, as identified during the geotechnical investigation. A single MC-3500 chamber provides a larger storage volume and overall footprint than the MC-4500 unit, but a shorter vertical dimension. Use of the MC-3500 chambers increases the storage volume while keeping the bottom of the proposed system 15-inches higher.

Final Design

The School 001 final design is comprised of (9) stormtech MC-3500 chambers arranged in (3) rows. Details are provided in the attached plan set. The system is sized to infiltrate the 1-inch water quality storm and reduce peak flows for the 1-year and 5-year storm events:

Storm Event	School Site, Mountain Road Peak Flows		
	Pre Development	Post Development	Percent Reduced
1" WQ	0.94 cfs	0.13 cfs	86%
1-year	2.16 cfs	1.44 cfs	33%
5-year	3.20 cfs	3.07 cfs	4%

Pretreatment is provided for 50% of the water quality volume by a series of tanks at the eastern inlet and a deep sump catch basin at the west inlet. These structures will prevent sediment from entering the chamber system, improving performance and increasing system durability. The deep sump catch basin which will replace an existing drywell structure.

The orientation of this system is largely based on providing the required 35-ft horizontal separation to adjacent leach field systems, both on the school property and adjacent residential properties. The chamber system layout minimize impact to existing playground features and the paved parking area. As indicated on the attached plan set, there will be some amount of pavement replacement required to enable installation of the pretreatment tanks which will require excavations roughly 13-ft below existing grade.

System Performance Report – STP Calculator

The system performance report estimates 1.7 kg/year phosphorus loading reduction. See the full report (attached) for details.

Permit Evaluation & Summary

No state permits are anticipated as being required as part of this project. Earth disturbance will be below the 1-acre threshold for which a Stormwater Construction General Permit is required. No expansion or substantial redevelopment of impervious surface is proposed; therefore an operational stormwater permit is not required. The ANR DEC Stormwater and Rivers Departments were contacted to review the proposed projects. Both agencies declined to provide comment given the non-jurisdictional nature of the project.

Opinion of Probable Cost

An opinion of probable cost has been developed for the final design and is based on the Vermont Agency of Transportation 2-year average price list from January 2018-January 2020, available bid pricing from similar projects, and budget estimates provided by both CAMP Precast and ADS Stormtech. Details are provided in the attached Opinion of Probable Cost. Final prices would be determined by direct quotes from a general contractor and are subject to change based on market rates, availability and distribution.

Operation and Maintenance Manual

In general, the system should be inspected twice a year, once after snow-melt and once before leaf-drop and after rainfall events of at least 2.5-inches in a 24-hour period. Structured pretreatment devices should be cleaned annually with a vac truck to remove collected sediments. The chamber system should also be cleared of sediment accumulation reaches a depth of 6-inches at the isolator row inlet. A detailed Operation & Maintenance Manual is included as an attachment to this report.

Stormwater Treatment Practice Calculator

Identification

Date	2/1/2022
WPD ID	
STP Name	

Loading Information

Drainage Area	4 - Otter Creek	
Impervious Area	0.859	acres
Pervious Area	2.734	acres

STP Information

STP Type	Subsurface Infiltration	
Storage Volume	2071	ft ³
Infiltration Rate	8.27 (Sand, HSG - A)	in/hr
Filter Course Depth		in

Estimated Phosphorus Reduction

Load	1.79	kg/year
STP Capacity	0.46	in
Efficiency	95.3	%
Reduction	1.7	kg/year

Stormwater Operation & Maintenance Manual

SCHOOL 001 (Bristol Elementary School) SUBSURFACE INFILTRATION CHAMBER SYSTEM

This project features stormwater appurtenances which require inspection and maintenance on a regular basis.

These features include:

- (2) underground pretreatment tanks
- (1) deep sump catch basin used for pretreatment
- (1) underground infiltration chamber systems

Bristol Elementary School shall be responsible for providing ongoing site inspections and maintenance to provide long-term functionality of the stormwater system. It is recommended that, at minimum, the site be inspected on a semi-annual basis, once after snow-melt and once before leaf-drop.

This document identifies the inspection and maintenance requirements of each of the stormwater features.

1. The owner shall be responsible for conducting the required inspection, reporting and maintenance activities outlined by this document:

Bristol Elementary School
57 Mountain Street
Bristol, VT 05443

2. An inspection checklist (attached) shall be completed during each inspection.
3. An Operation & Maintenance Log shall be completed to track each inspection as well as maintenance activities. The Log can be found attached to this document.
4. An Operation & Maintenance Plan identifies on-site stormwater appurtenances and is attached to this document.
5. The frequency of the inspections and maintenance requirements shall be as follows:

Systems shall be inspected in the spring and fall and also following storm events exceeding 2.5-inches of rainfall in a 24-hour period, with maintenance and rehabilitation conducted as warranted by such inspection.

CB – Deep Sump Pretreatment Catch Basin:

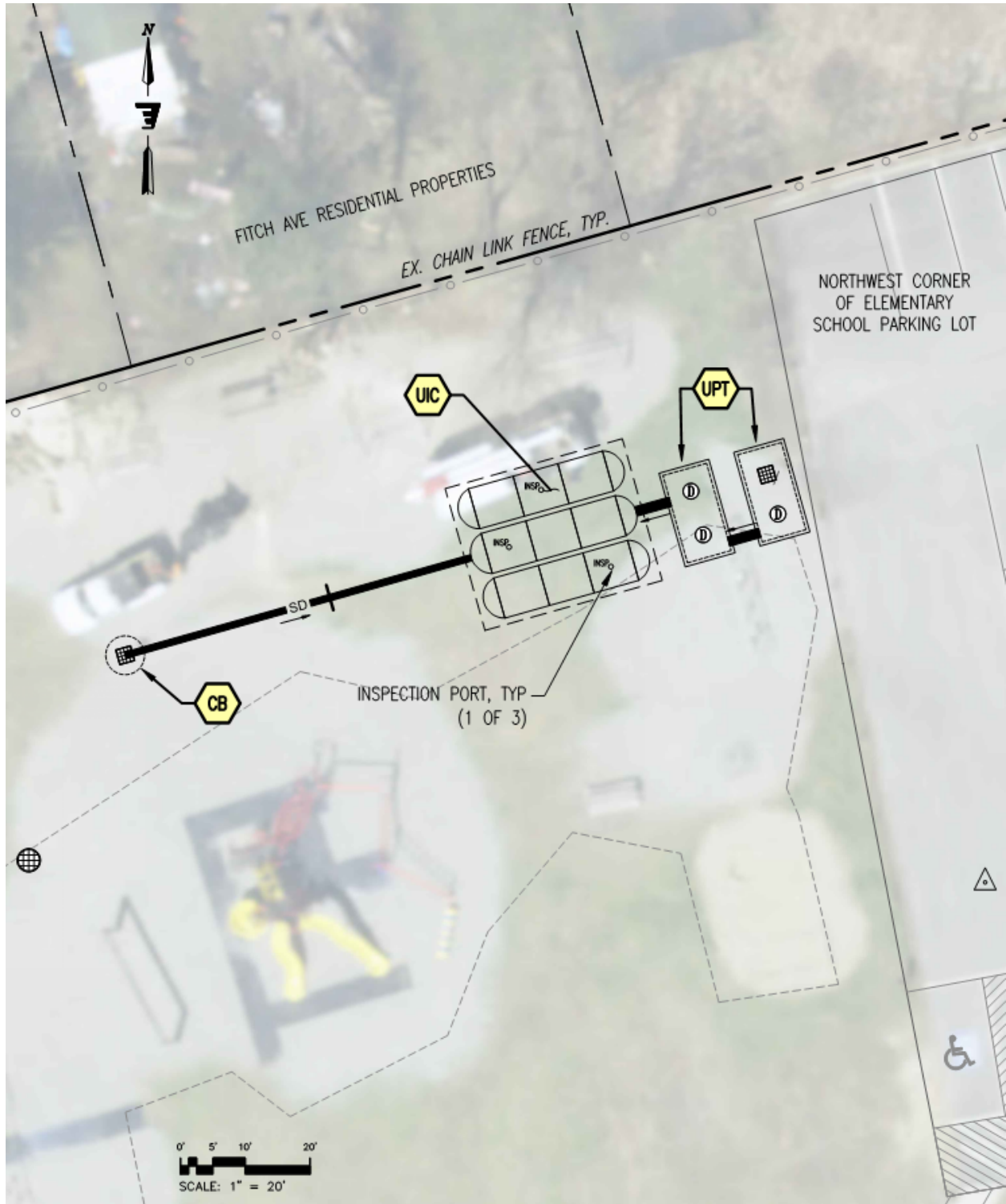
- Systems shall be inspected twice annually
- Structures shall be cleaned annually (by use of vacuum truck or “clam-shell”) and when inspection indicates sediment accumulation is approaching a depth of 3 to 6-inches.
- Replace damaged hoods when present on inlet pipes.
- All floating debris shall be removed and disposed of in an acceptable manner.
- Remove floating hydrocarbons immediately whenever detected by inspection.

UPT – Underground Pretreatment Tanks or Forebays:

- Systems shall be inspected twice annually
- Structures shall be cleaned annually (by use of vacuum truck or “clam-shell”) and when inspection indicates sediment accumulation is approaching a depth of 3 to 6-inches.
- All floating debris shall be removed and disposed of in an acceptable manner.
- Remove floating hydrocarbons immediately whenever detected by inspection.

UIC – Underground Infiltration Chambers:

- During the first growing season, bi-weekly inspections shall be conducted to assess vegetation health until the vegetation is established.
- Systems shall be inspected after the initial two storm events to ensure proper function and that no erosion or sour is occurring.
- Systems shall be inspected at twice annually, and following storm events exceeding 2.5-inches of rainfall in a 24-hour period, with maintenance and rehabilitation conducted as warranted by such inspection.
- Vegetation health, density and diversity shall be conducted at least twice annually during both the growing and non-growing season.
- Isolator Row shall be cleaned when inspection indicates sediment accumulation is approaching a depth of 6-inches at the inlet.
- Infiltration area shall not be used as snow storage during the winter months. Disposal of sediments and other wastes shall be in conformance with applicable local, state and federal laws.



O&M Checklist

Inspector:	Date:
Current Weather:	Time:
Rainfall in the Last 24 Hours (in): Can be checked here: http://www.nrcc.cornell.edu/page_nowdata.html	

Deep Sump Catch Basin/Manhole: Inspection Required Twice Annually. Cleaning Required Annually.

Items Inspected (Frequency)	Checked		Maintenance Needed		Maintenance Performed	
	Y	N	Y	N	Y	N
DEBRIS CLEANOUT						
1. Contributing areas clean of debris.						
2. Litter (trash, debris, etc.) have been removed						
SEDIMENTATION TANK						
3. All Floating debris removed and disposed of.						
4. Sediment removed when accumulation approaches a depth of 3 to 6-inches.						
5. Structure cleaned out at least once annually.						
6. Floating hydrocarbons removed immediately.						
INLET / OUTLET STRUCTURES						
7. No evidence of damaged hood, no need for repair						
8. No evidence of sediment build-up.						
9. No evidence of any blockages.						

O&M Checklist (continued)

Inspector:	Date:
Current Weather:	Time:
Rainfall in the Last 24 Hours (in): Can be checked here: http://www.nrcc.cornell.edu/page_nowdata.html	

Underground Pretreatment Tanks: Inspection Required Twice Annually. Cleaning Required Annually.
 ***Inspections Required after rainfall events of at least 1-inch during six months after installation

Items Inspected (Frequency)	Checked		Maintenance Needed		Maintenance Performed	
	Y	N	Y	N	Y	N
DEBRIS CLEANOUT						
1. Contributing areas clean of debris.						
2. Litter (trash, debris, etc.) have been removed						
SEDIMENTATION TANK						
3. All Floating debris removed and disposed of.						
4. Sediment removed when accumulation approaches a depth of 3 to 6-inches.						
5. Tank cleaned out at least once annually.						
6. Floating hydrocarbons removed immediately.						
INLET / OUTLET STRUCTURES						
7. Good condition, no need for repair						
8. No evidence of sediment build-up.						
9. No evidence of any blockages.						

O&M Checklist (continued)

Inspector:	Date:
Current Weather:	Time:
Rainfall in the Last 24 Hours (in): Can be checked here: http://www.nrcc.cornell.edu/page_nowdata.html	

Underground Infiltration Chamber System Components: Inspection Required Twice Annually

***Inspection Required after at least two initial storm events to ensure proper drainage

***Inspections Required Bi-weekly during first growing season to ensure vegetation health

***Inspections Required after rainfall events of at least 2.5-inches in a 24-hour period

Items Inspected (Frequency)	Checked		Maintenance Needed		Maintenance Performed	
	Y	N	Y	N	Y	N
DEBRIS CLEANOUT						
1. Infiltration areas and contributing areas clean of debris						
2. No dumping of yard wastes into infiltration area						
3. Litter (trash, debris, etc.) have been removed						
VEGETATION (where applicable)						
4. No evidence of erosion.						
5. Vegetative density exceeds a 90% cover.						
6. No evidence of invasive species or woody vegetation.						
DEWATERING AND SEDIMENTATION						
7. Infiltration system dewateres within 72 hours of storms.						
8. No evidence of standing water.						
9. No evidence of accumulated sediment.						
10. Sediment removed from the isolator row when accumulation approaches a depth of 6-inches at the inlet.						
OUTLETS/OVERFLOW						
11. Good condition, no need for repair.						
12. No evidence of sedimentation build-up.						
13. No evidence of any blockages.						

Opinion of Probable Cost for:
 School 001 Site Subsurface Stormwater Infiltration System
 Bristol Elementary School, Bristol, Vermont



Civil Site Work

Date: February 2022

By: HKW/PB

Item	Quantity	Unit Price	Total
Erosion Prevention & Sediment Control Allowance	Lump Sum	\$ 2,500.00	\$ 2,500

Traffic Control & Barrier Allowance	Lump Sum	\$ 2,500.00	\$ 2,500
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Site Demolition & Preparation			
Saw Cut Pavement	100 LF	\$ 5.00 /LF	\$ 500
Excavation: Existing Pavement & Concrete, assumed 4" depth	14 CY	\$ 32.00 /CY	\$ 435
Excavation: Existing Surface Treatment Subbase, assumed 8" depth	27 CY	\$ 20.00 /CY	\$ 543
Excavation: Existing Subgrade Material for Tank Installation	310 CY	\$ 20.00 /CY	\$ 6,200
Storm Structure Removal	2 EA	\$ 200.00 EA	\$ 400
Storm Line Removal	103 FT	\$ 10.00 /LF	\$ 1,030
Site Demolition Subtotal			\$ 9,108

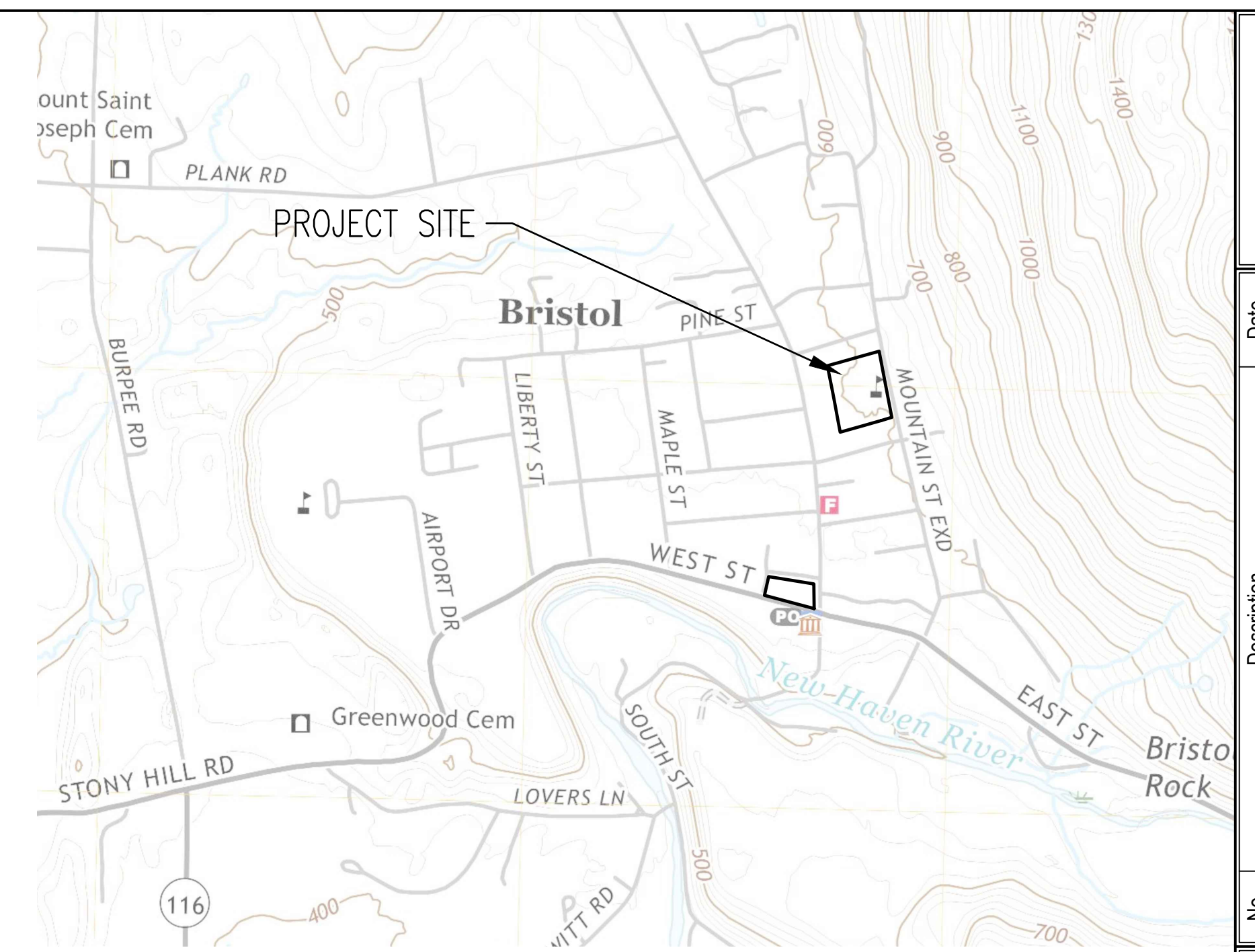
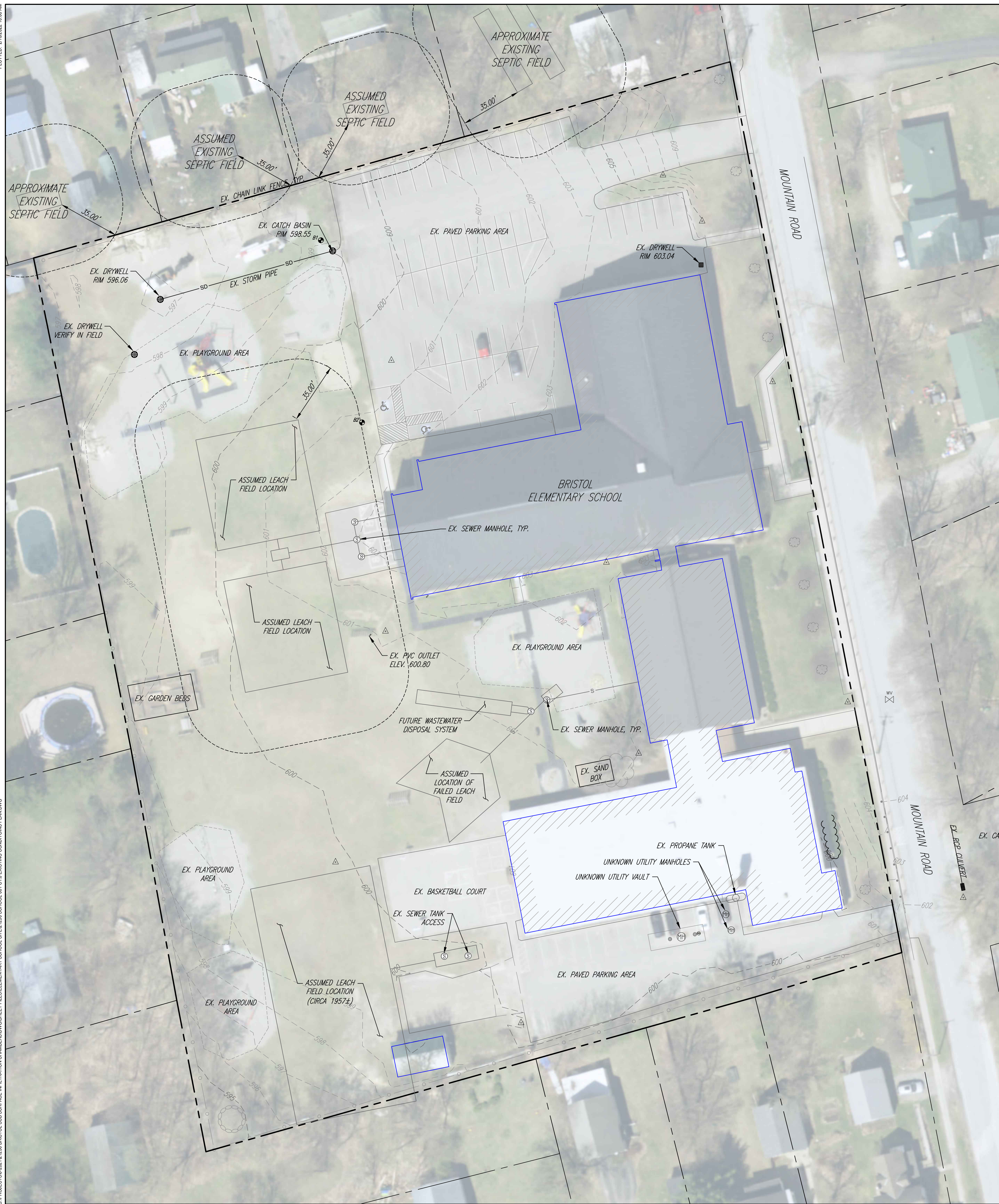
Stormwater System Components			
6-FT ID Precast Reinforced Concrete Structure with frame and grate	1 EA	\$ 3,900.00 EA	\$ 3,900
8ft x 15ft Heavy Duty Precast Concrete Tank with Internal Weir & (2) Frames with Solid Covers (Pretreatment Tank)	2 EA	\$ 14,750.00 EA	\$ 29,500
18-inch PVC Storm Pipe	10 LF	\$ 75.00 /LF	\$ 750
12-inch PVC Storm Pipe	56 LF	\$ 68.00 /LF	\$ 3,808
Chamber System Components			
MC3500 Stormtech Chamber Units	9 EA	\$ 816.00 EA	\$ 7,344
MC3500 Stormtech Chamber Plain End Caps	4 EA	\$ 592.00 EA	\$ 2,368
MC3500 Stormtech Chamber End Caps with Bottom Outlet	2 EA	\$ 708.00 EA	\$ 1,416
Chamber Stone (plus 10% for pipe and tanks)	92 CY	\$ 50.00 /CY	\$ 4,600
6" Inspection Port	3 EA	\$ 155.00 EA	\$ 465
Mirafi 180N, Filter Fabric Blanket Surrounding Chamber Stone	284 SY	\$ 1.50 /SY	\$ 427
Woven Geotextile for Isolator Row	32 SY	\$ 1.00 /SY	\$ 32
Stormwater System Installation Equipment and Labor	5 DAYS	\$ 4,000.00 /DAY	\$ 20,000
Stormwater System Subtotal			\$ 74,610

Pavement Replacement			
12" Coarse Crushed Gravel Pavement Subbase	41 CY	\$ 42.00 /CY	\$ 1,711
6" Fine Crushed Gravel Pavement Subbase	20 CY	\$ 43.00 /CY	\$ 876
Geotextile for Pavement Subgrade (outside limits of chamber system)	122 SY	\$ 1.50 /SY	\$ 183
1.5" Bituminous Concrete Pavement Base Course, Type III	10 TONS	\$ 175.00 /TON	\$ 1,745
2.5" Bituminous Concrete Pavement Wearing Course, Type II	17 TONS	\$ 175.00 /TON	\$ 2,908
Emulsified Asphalt	4 CWT	\$ 22.00 /CWT	\$ 89
Site Work Subtotal			\$ 7,512

Project Subtotal	\$ 96,229
10% Contingency	\$ 9,623
15% Overhead	\$ 14,434
Total Project Construction Cost	\$ 120,287

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S:\PROJECTS\2021\0210 BRISTOL SUB SURFACE INFILTRATION CHAMBERS\DWG SHEET FILE\ELEMENTARY SCHOOL SITE\210210 SCHOOL_001_C1.0 EXISTING CONDITIONS PLAN DWG



LOCATION MAP

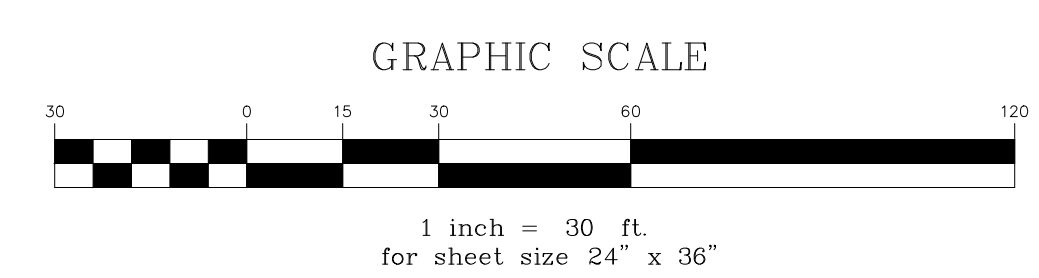
SCALE: 1" = 1,000'

EXISTING CONDITIONS LEGEND

- APPROXIMATE PROPERTY LINE
- - - 769 1-FT CONTOUR INTERVAL
- - - 770 5-FT CONTOUR INTERVAL
- EDGE OF PAVEMENT/CURB
- APPROXIMATE LINE STRIPING
- SD [Symbol] STORMLINE/CATCH BASIN/DRAINAGE MANHOLE
- S [Symbol] SEWERLINE/SANITARY MANHOLE
- W [Symbol] WATERLINE/VALVE/HYDRANT
- OHE [Symbol] OVERHEAD POWERLINE/POWEROLE/LIGHTPOLE
- [Symbol] EXISTING TREE
- [Symbol] EXISTING SIGN
- B1 [Symbol] SOIL BORING LOCATION

SURVEY NOTES

1. EXISTING PHYSICAL FEATURES AND TOPOGRAPHY SHOWN HERE HAS BEEN TAKEN FROM A SURVEY PERFORMED BY LATITUDES LAND SURVEYING, LLC IN JUNE/JULY OF 2021.
2. PROPERTY LINES ARE BASED ON INFORMATION PROVIDED BY VERMONT CENTER FOR GEOGRAPHIC INFORMATION AND ARE APPROXIMATE ONLY.
3. UTILITIES SHOWN DO NOT PURPORT TO CONSTITUTE OR REPRESENT ALL UTILITIES LOCATED UPON OR ADJACENT TO THE SURVEYED PREMISES.
4. NORTH ORIENTATION IS REFERENCED TO APPROXIMATE VERMONT GRID NORTH DERIVED FROM GPS READINGS OBSERVED BY OTHERS.
5. ELEVATIONS ARE REFERENCED TO APPROXIMATE NAVD 88 DERIVED FROM GPS READINGS OBSERVED BY OTHERS.
6. EXISTING UTILITIES SHOWN ON PLANS WERE TAKEN FROM FIELD OBSERVATIONS OF VISIBLE UTILITIES AND PAINTED MARKINGS. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING UTILITY LOCATIONS PRIOR TO COMMENCING WORK. NOTIFY ENGINEER OF ANY DISCREPANCY BETWEEN UTILITIES AS SHOWN AND AS FOUND. THE CONTRACTOR SHALL CONTACT DIG SAFE (811 or 888-344-7233) A MINIMUM OF 72 HOURS, BUT NOT INCLUDING SATURDAYS, SUNDAYS AND LEGAL HOLIDAYS, PRIOR TO ANY CONSTRUCTION.



No.	Description	Date	Stamp

ENGINEERING VENTURES PC
 208 Flynn Avenue, Suite 2A, Burlington, VT 05401 • 802-863-6225
 85 Mechanic Street, Suite E2-3, Lebanon, NH 03766 • 603-442-9333
 414 Union Street, Schenectady, NY 12305 • 518-630-9614
 www.engineeringventures.com

Town of Bristol
 c/o Valerie Caples, Town Administrator
 1 South Street, PO Box 249
 Bristol, Vermont, 05443
 802-453-2410 ext. 1

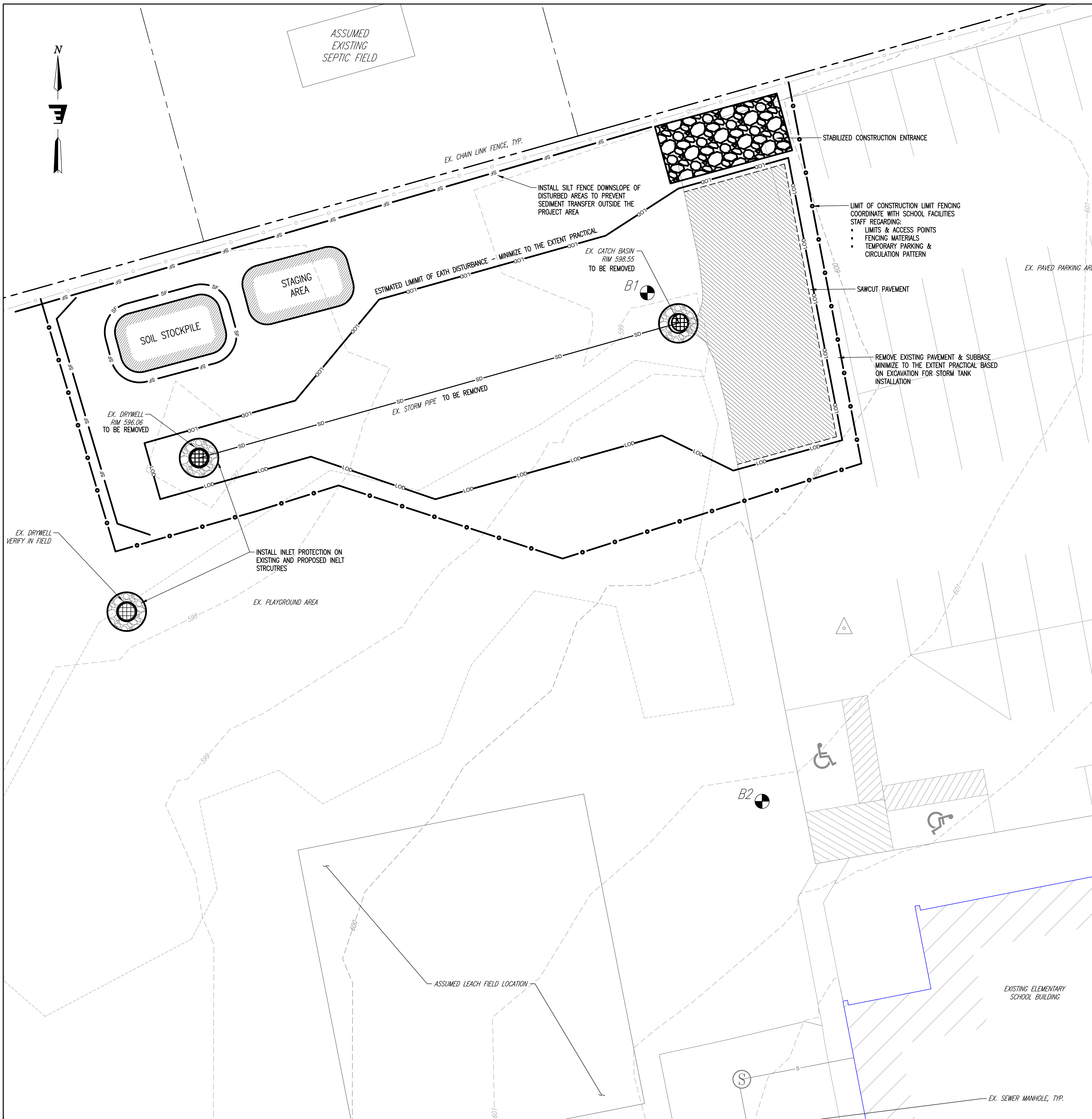
Existing Conditions Plan
 School 001 Site
 Subsurface Infiltration Chamber Project
 Town of Bristol, Addison County, Vermont

Sheet Title:	EV Project #	21230
Drawn By:	Checked By:	HKW
Scale:	Date:	1" = 30' 02/10/2022

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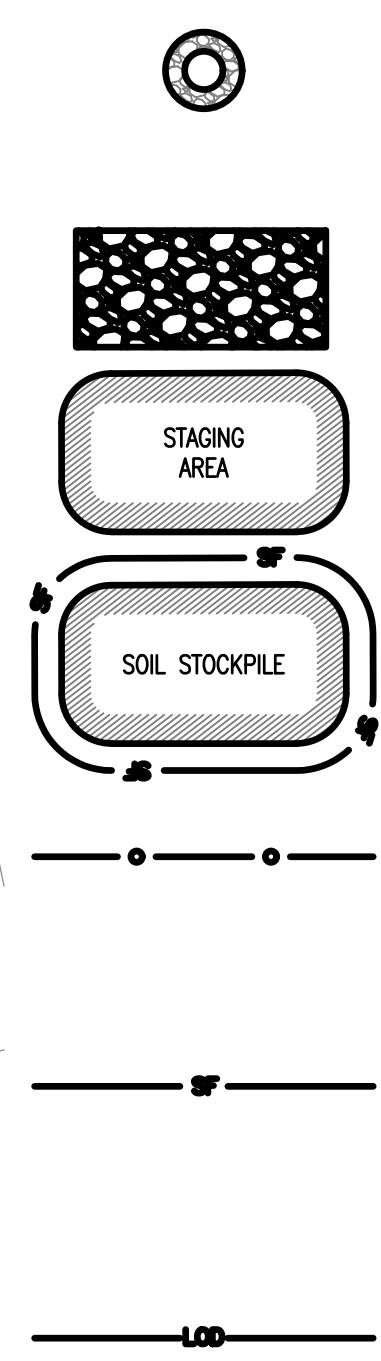
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EROSION CONTROL LEGEND

REFER TO NOTES AND DETAILS ON SHEET C3.2



TEMPORARY INLET PROTECTION - INSTALL AS INDICATED ON PLANS. MANUFACTURED FABRIC INLET PROTECTION INSTALLED PER MANUFACTURER REQUIREMENTS OR FIBER ROLL WRAPPED AROUND RIM AND STAKED TO PREVENT BYPASSING.

TEMPORARY STABILIZED CONSTRUCTION ENTRANCE
THIS STRUCTURAL MEASURE IS A STABILIZED PAD OF AGGREGATE UNDERLAIN WITH FILTER FABRIC LOCATED AT ANY POINT WHERE TRAFFIC WILL BE ENTERING OR LEAVING A CONSTRUCTION SITE TO OR FROM A PUBLIC RIGHT-OF-WAY, STREET, ALLEY, SIDEWALK, OR PARKING AREA. THE PURPOSE OF A STABILIZED CONSTRUCTION ENTRANCE IS TO REDUCE OR ELIMINATE THE TRACKING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY OR STREETS. THIS WILL REMAIN IN PLACE AND BE MAINTAINED UNTIL THE PROJECT SITE HAS BEEN PERMANENTLY STABILIZED. ONCE REMOVED, THE IMPACTED AREA SHALL BE SEEDED AND MULCHED.

TEMPORARY STAGING AND WASTE AREAS (APPROXIMATE)
THESE ARE APPROVED LOCATIONS WHERE NON-SOIL, NON-ERODIBLE MATERIALS MAY BE STORED. SOILS SHALL NOT BE STORED IN THESE AREAS.

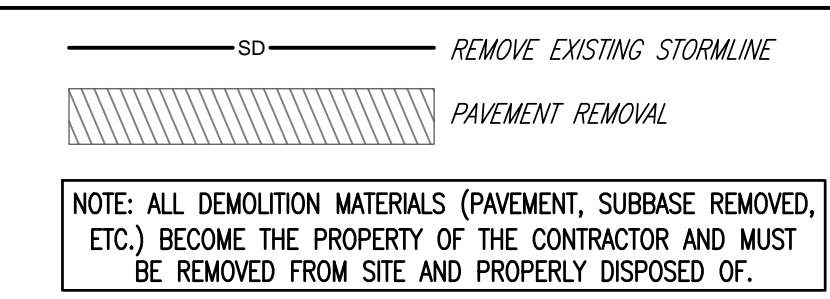
TEMPORARY SOIL STOCKPILE AREAS (APPROXIMATE)
THESE ARE APPROVED LOCATIONS WHERE TOPSOIL AND OTHER SOIL MATERIALS MAY BE STORED. THESE STOCKPILES WILL BE PROTECTED FROM EROSION BY A NUMBER OF METHODS, INCLUDING INSTALLING SILT FENCING AROUND THE DOWN GRADIENT PERIMETER OF THE STOCKPILE AND SEEDING AND MULCHING THE STOCKPILE WHEN NOT IN USE FOR MORE THAN FIVE DAYS. FIRMLY ANCHORED TARPES MAY BE USED IN PLACE OF MULCH.

CHAIN LINK (C) CONSTRUCTION LIMIT FENCING
THIS STRUCTURAL MEASURE IS INSTALLED ALONG THE PERIMETER OF THE PROJECT AREA. IN MANY CASES THE LIMIT OF CONSTRUCTION WILL COINCIDE WITH THE FENCING OR INDICATE BUFFER AREAS TO BE PROTECTED. THE FENCING IS EFFECTIVE WHEN USED TO SEPARATE THE PROJECT AREA FROM ADJACENT AREAS USED BY THE PUBLIC. THESE WILL REMAIN IN PLACE AND BE MAINTAINED UNTIL THE PROJECT SITE HAS BEEN PERMANENTLY STABILIZED. CONFIRM LOCATION, EXTENTS AND GATES WITH OWNER. FENCE LOCATION AND GATES TO BE RE-ADJUSTED AS NECESSARY BASED ON OWNER REQUIREMENTS AND COORDINATION.

TEMPORARY SILT FENCING OR STRAW WATTLES
THIS STRUCTURAL MEASURE IS A TEMPORARY BARRIER OF GEOTEXTILE FABRIC OR FIBER ROLL USED TO INTERCEPT SEDIMENT LADEN RUNOFF FROM SMALL DRAINAGE AREAS OF DISTURBED SOIL. IT IS INSTALLED ALONG THE PERIMETER OF IMPACTED AREAS AND ALONG THE BASE OF THE FILL SLOPES. ADDITIONALLY, WHEN DESIGNATED ALONG THE LIMITS OF DISTURBANCE, INSTALL CONSTRUCTION FENCE BEHIND THE SILT FENCE. SILT FENCING IS EFFECTIVE IN REDUCING STORMWATER RUNOFF VELOCITIES, ASSIST IN THE DEPOSITION OF TRANSPORTED SEDIMENT LOAD AND PREVENT EROSION OF SOILS ONTO ADJACENT AREAS. THESE WILL REMAIN IN PLACE AND BE MAINTAINED UNTIL THE PROJECT SITE HAS BEEN PERMANENTLY STABILIZED.

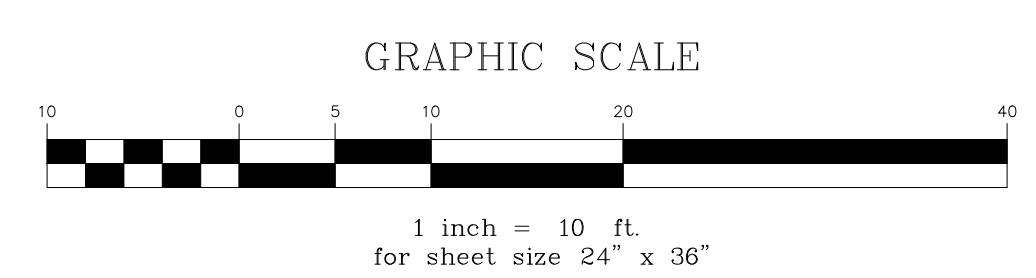
LIMITS OF DISTURBANCE
THE CONTRACTOR SHALL CONTAIN ANY EARTH MOVING ACTIVITIES WITHIN THE DESIGNATED LIMITS SHOWN ON THIS PLAN. THE ENGINEER SHALL REVIEW THE SITE TO MAKE ANY ADJUSTMENTS TO ACCOUNT FOR ENVIRONMENTALLY SENSITIVE AREAS, SPECIMEN TREES AND SPECIAL AREAS OF CONCERN.

DEMOLITION LEGEND



GENERAL NOTES

1. EXACT OBJECT LOCATIONS MAY DIFFER FROM THAT AS SHOWN, AND ADDITIONAL SUB-SURFACE AND SURFACE UTILITIES AND STRUCTURES MAY EXIST. THE CONTRACTOR IS TO PROCEED WITH CARE IN EXECUTING ANY WORK AND TO CALL DIG SAFE 72 HOURS PRIOR TO ANY DIGGING, DRILLING OR BLASTING.
2. THE ENGINEER SHALL BE NOTIFIED IN WRITING OF ANY CONDITIONS THAT VARY FROM THOSE SHOWN ON THE PLANS. THE CONTRACTOR'S WORK SHALL NOT VARY FROM THE PLANS WITHOUT THE EXPRESSED APPROVAL FROM THE ENGINEER AND PROJECT MANAGER (OWNER).
3. THE CONTRACTOR IS INSTRUCTED TO COOPERATE WITH ANY AND ALL OTHER CONTRACTORS PERFORMING WORK ON THIS JOB SITE DURING THE PERFORMANCE OF THIS CONTRACT.
4. THE CONTRACTOR SHALL RESTORE LAWNS, DRIVEWAYS, CULVERTS, SIGNS AND OTHER PUBLIC OR PRIVATE PROPERTY DAMAGED OR REMOVED TO EXISTING CONDITIONS OR BETTER AS DETERMINED BY THE ENGINEER. ANY DAMAGED TREES, SHRUBS AND/OR HEDGES SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE, UNLESS NOTED OTHERWISE.
5. THE CONTRACTOR WILL PROTECT EXISTING PROPERTY LINE MONUMENTATION. ANY MONUMENTATION DISTURBED OR DESTROYED, AS JUDGED BY THE ENGINEER OR OWNER SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE UNDER THE SUPERVISION OF A VERMONT STATE LICENSED LAND SURVEYOR.
6. IT IS THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE ALL PLAN SHEETS AND SPECIFICATIONS, AND COORDINATE WORK WITH ALL CONTRACTS FOR THE SITE.
7. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONDUCT EXPLORATORY TEST PITS AS MAY BE REQUIRED TO DETERMINE UNDERGROUND CONDITIONS.
8. ALL TRENCH EXCAVATION AND ANY REQUIRED SHEETING AND SHORING SHALL BE DONE IN ACCORDANCE WITH THE LATEST OSHA REGULATIONS FOR CONSTRUCTION. TEMPORARY SHORING WHERE NEEDED TO PREVENT DAMAGE TO EXISTING SITE FEATURE NOT SLATED FOR REMOVAL IS THE RESPONSIBILITY OF THE CONTRACTOR.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR DEWATERING AND THE MAINTENANCE OF SURFACE DRAINAGE DURING THE COURSE OF WORK.
10. MAINTAIN FLOW FOR ALL EXISTING UTILITIES, UNLESS NOTED OTHERWISE.
11. ALL SITE FILL SHALL MEET SELECTED FILL STANDARDS UNLESS NOTED OTHERWISE ON THE DRAWINGS.
12. CONTRACTOR TO GRADE ALL AREAS ON THE SITE TO PROVIDE POSITIVE DRAINAGE AWAY FROM BUILDINGS AND IMPERVIOUS SURFACES.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL FIELD LAYOUT. THE CONTRACTOR SHALL PROVIDE MARKED-UP AS-BUILT PLANS WITH TIES AND DIMENSIONS FOR ALL UTILITIES SHOWING CONNECTIONS, BENDS, VALVES, LENGTHS OF LINES AND INVERTS. AS-BUILT PLANS SHALL BE REVIEWED BY THE OWNER AND HIS REPRESENTATIVES BEFORE UTILITIES WILL BE ACCEPTED.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER INSTALLATION, MONITORING, MAINTENANCE AND REMOVAL OF ALL TEMPORARY EROSION CONTROL MEASURES AND TAKING PRECAUTIONARY STEPS TO AVOID ANY SEDIMENT TRANSFER TO NEIGHBORING SITES OR WATERS OF THE STATE. THIS INCLUDES DUST CONTROL AND SWEEPING TO REMOVE TRACKED SEDIMENT FROM PAVED AREAS ADJACENT TO THE WORK AREA AT THE END OF EACH WORK DAY.
15. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN A CLEAN WORK SITE. THE CONTRACTOR SHALL REVIEW THE SITE AT THE END OF EACH WORK DAY AND PERFORM TASKS AS NECESSARY TO MAINTAIN THE CLEANLINESS OF THE SITE.
16. THE CONTRACTOR SHALL WORK IN ACCORDANCE WITH VOSH REGULATIONS.



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Description	
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ENGINEERING VENTURES PC
208 Pym Avenue, Suite 2A, Burlington, VT 05401 • 802-883-8225
85 Mechanic Street, Suite E2-3, Lebanon, NH 03766 • 603-442-9333
414 Union Street, Schenectady, NY 12305 • 518-630-9814
www.engineeringventures.com

Town of Bristol
c/o Valerie Caples, Town Administrator
1 South Street, PO Box 249
Bristol, Vermont 05443
802-453-2410 ext. 1

Demolition & EPSC Plan

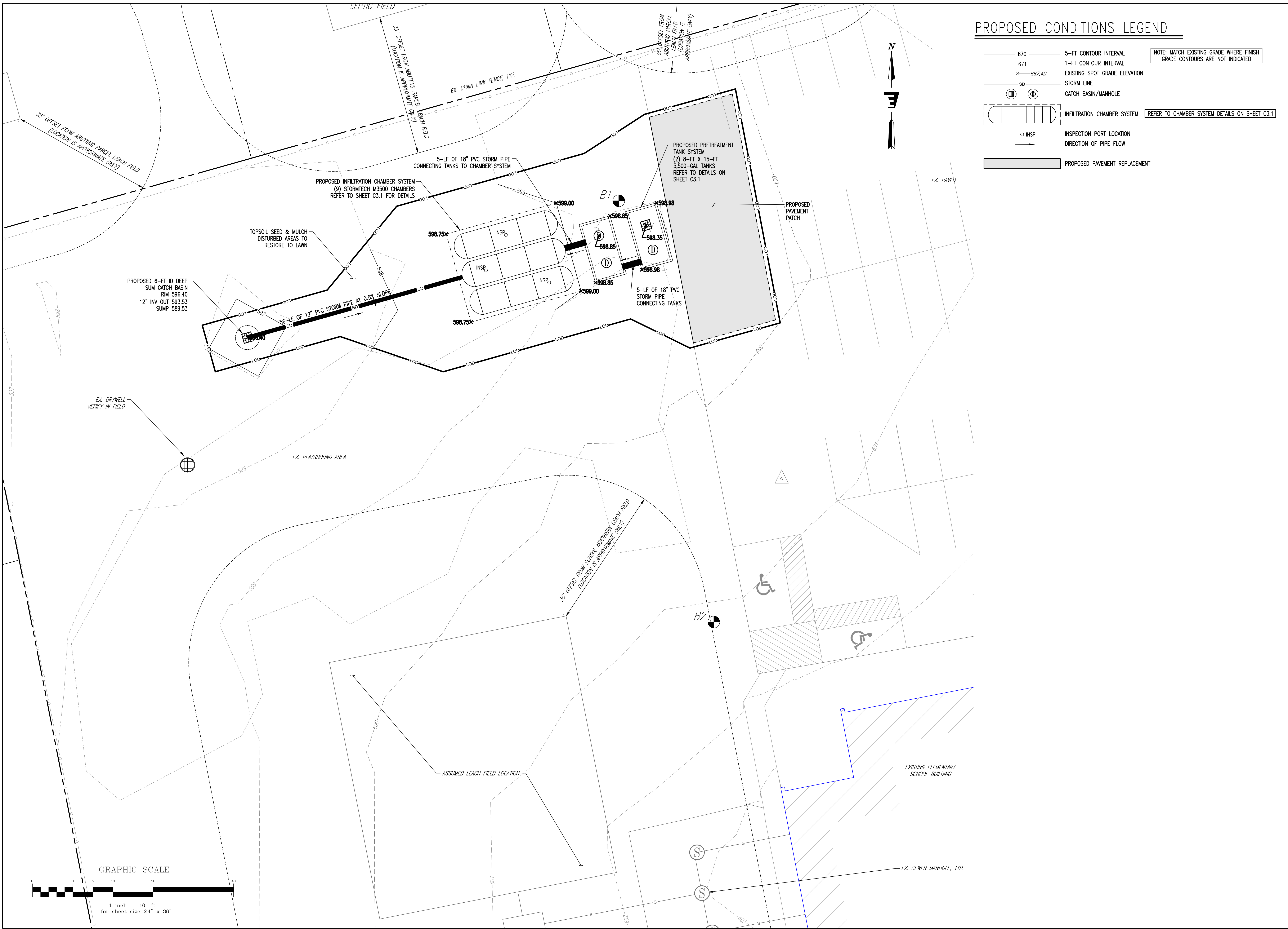
School 001 Site
Subsurface Infiltration Chamber Project
Town of Bristol, Addison County, Vermont

Sheet Title: EV Project # 21230
Drawn By: HKW
Checked By: PB
Scale: 1" = 10'
Date: 02/11/2022

C1.1

PLOTTED: 2/10/2022 1:43 AM

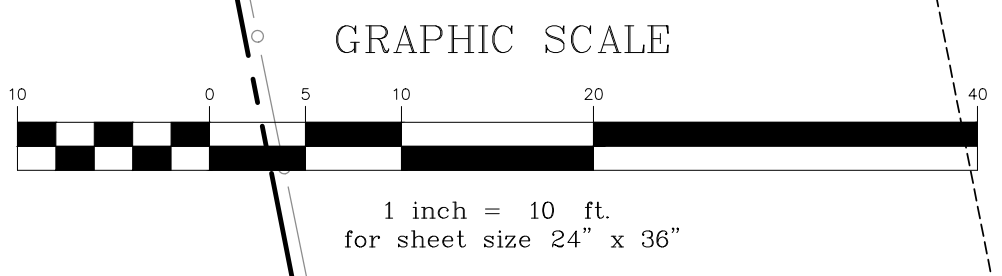
S:\PROJECTS\2021\02\20 BRISTOL SUB SURFACE INFILTRATION CHAMBERS\DWGSHEET FILES\ELEMENTARY SCHOOL SITE\2120 SCHOOL_001_C2.0 SITE PLAN.DWG



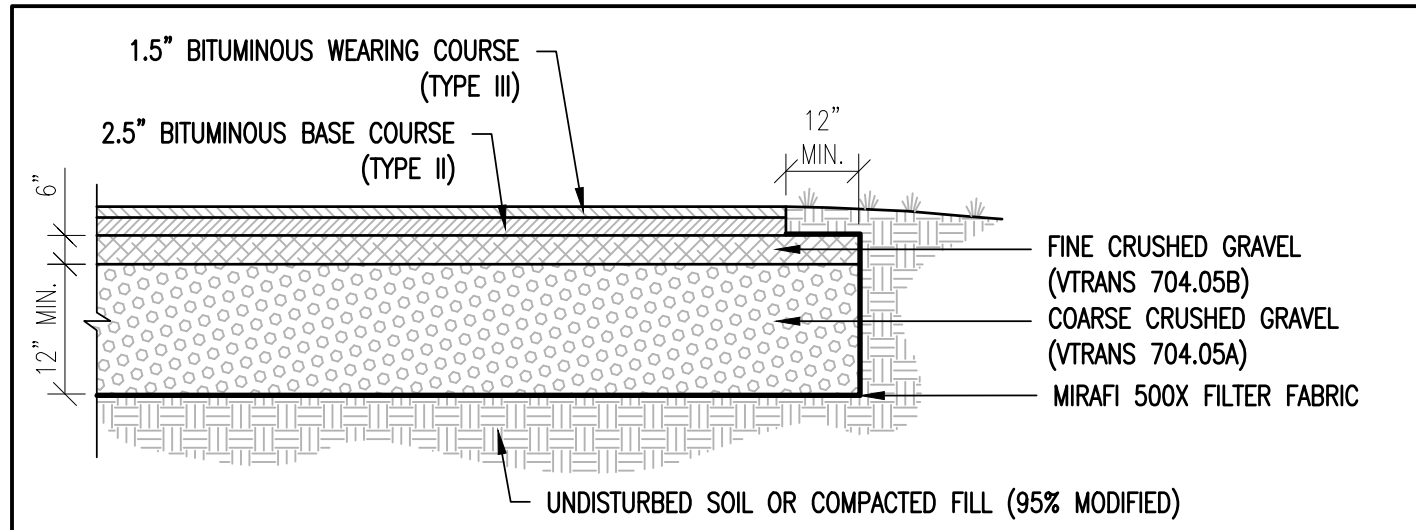
PROPOSED CONDITIONS LEGEND

- 670 — 5-FT CONTOUR INTERVAL
- 671 — 1-FT CONTOUR INTERVAL
- x 667.40 — EXISTING SPOT GRADE ELEVATION
- SD — STORM LINE
- (Circles with 'D') — CATCH BASIN/MANHOLE
- (Rectangles with 'I') — INFILTRATION CHAMBER SYSTEM (REFER TO CHAMBER SYSTEM DETAILS ON SHEET C3.1)
- (Circles with 'I') — INSPECTION PORT LOCATION
- (Arrows) — DIRECTION OF PIPE FLOW
- (Shaded Area) — PROPOSED PAVEMENT REPLACEMENT

NOTE: MATCH EXISTING GRADE WHERE FINISH GRADE CONTOURS ARE NOT INDICATED

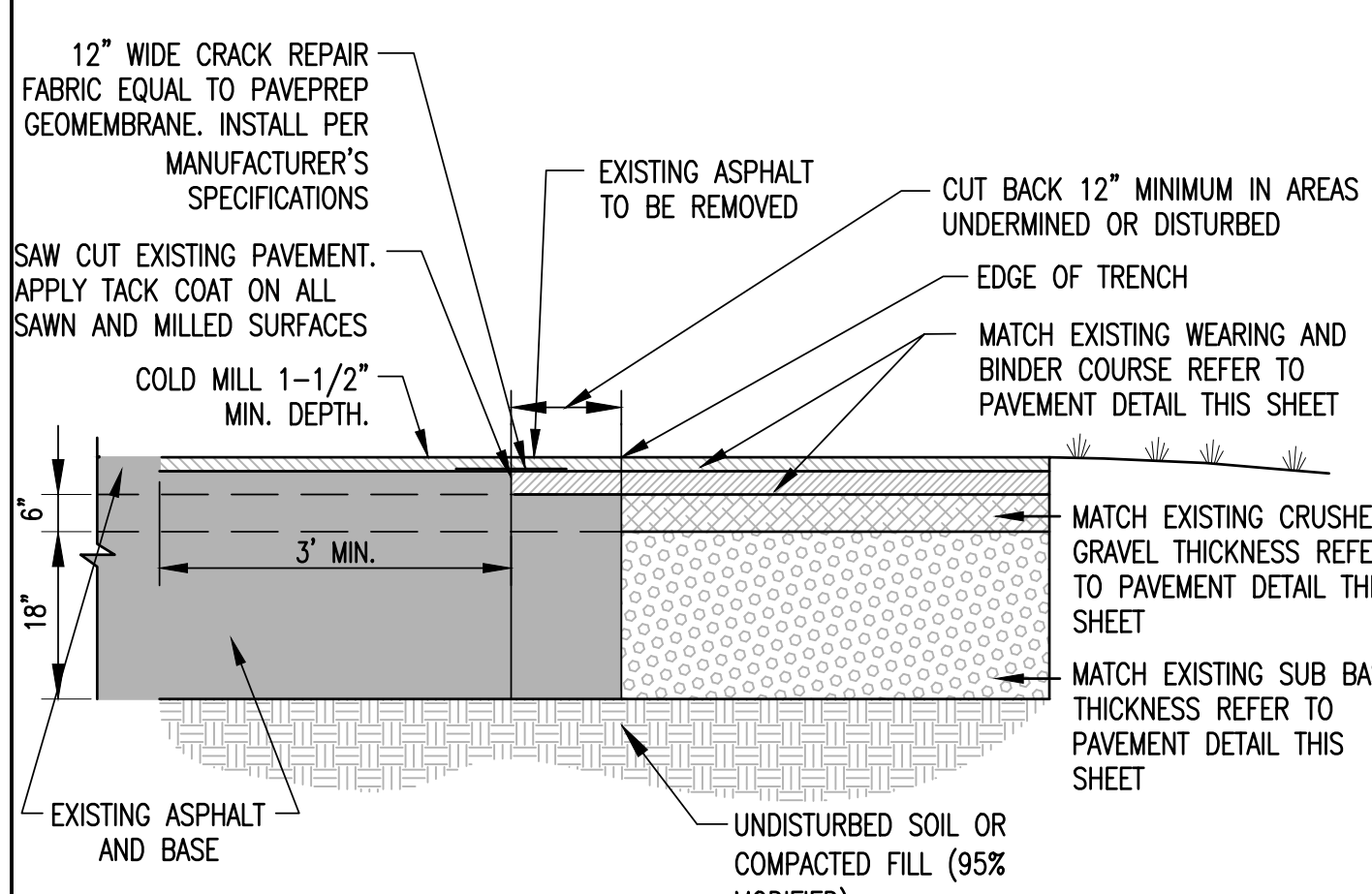


Stamp	
Date	
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Description	
Town of Bristol clo Valerie Caples, Town Administrator 1 South Street, PO Box 249 Bristol, Vermont, 05443 802-453-2410 ext. 1	
Proposed Site Plan School 001 Site Subsurface Infiltration Chamber Project Town of Bristol, Addison County, Vermont	
EV Project #	21230
Drawn By:	HKW
Checked By:	PB
Scale:	1" = 10'
Date:	02/10/2022
C2.0	



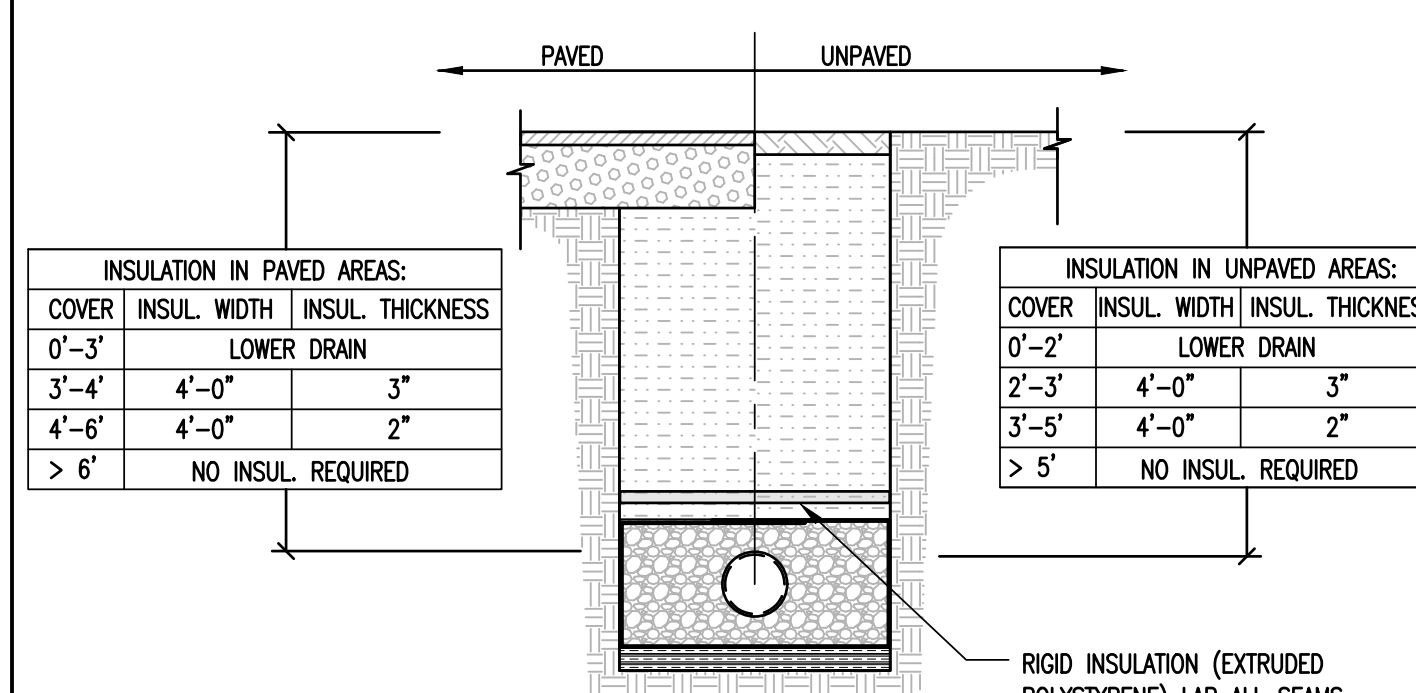
- NOTES:**
1. ALL SUBBASE MATERIALS SHALL BE PLACED IN 6" LIFTS AND COMPACTED TO 95% MAXIMUM DENSITY ACCORDING TO ASTM D-1557 (MODIFIED PROCTOR).
 2. PARKING LOT PAVEMENT CROSS SECTION BASED ON VTRANS STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

PAVEMENT DETAIL NOT TO SCALE 1



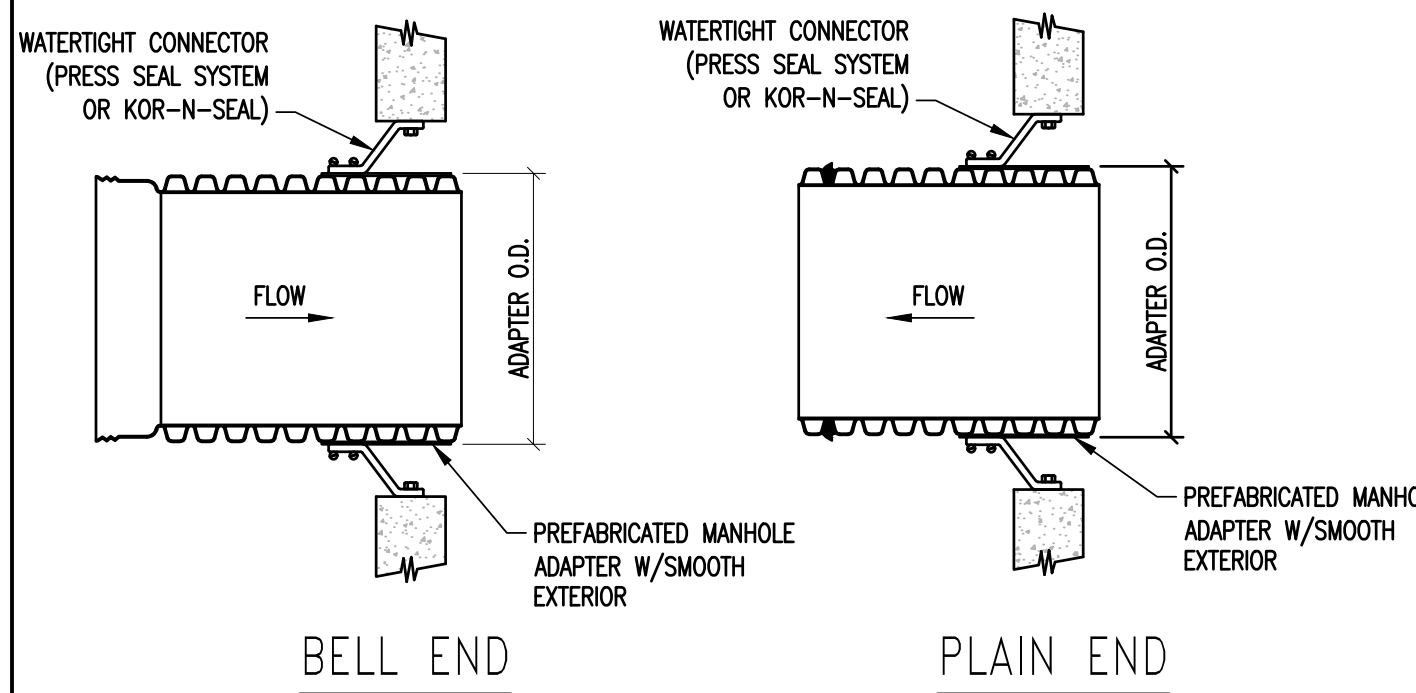
- NOTE:**
THIS METHOD OF PAVEMENT JOINT SHALL BE USED FOR ANY APPLICATION OR CONSTRUCTION WHERE PROPOSED PAVEMENT AND BASE WILL BE CONNECTED TO EXISTING PAVEMENT AND BASE.

ASPHALT PAVEMENT TRENCH PATCH DETAIL NOT TO SCALE 2



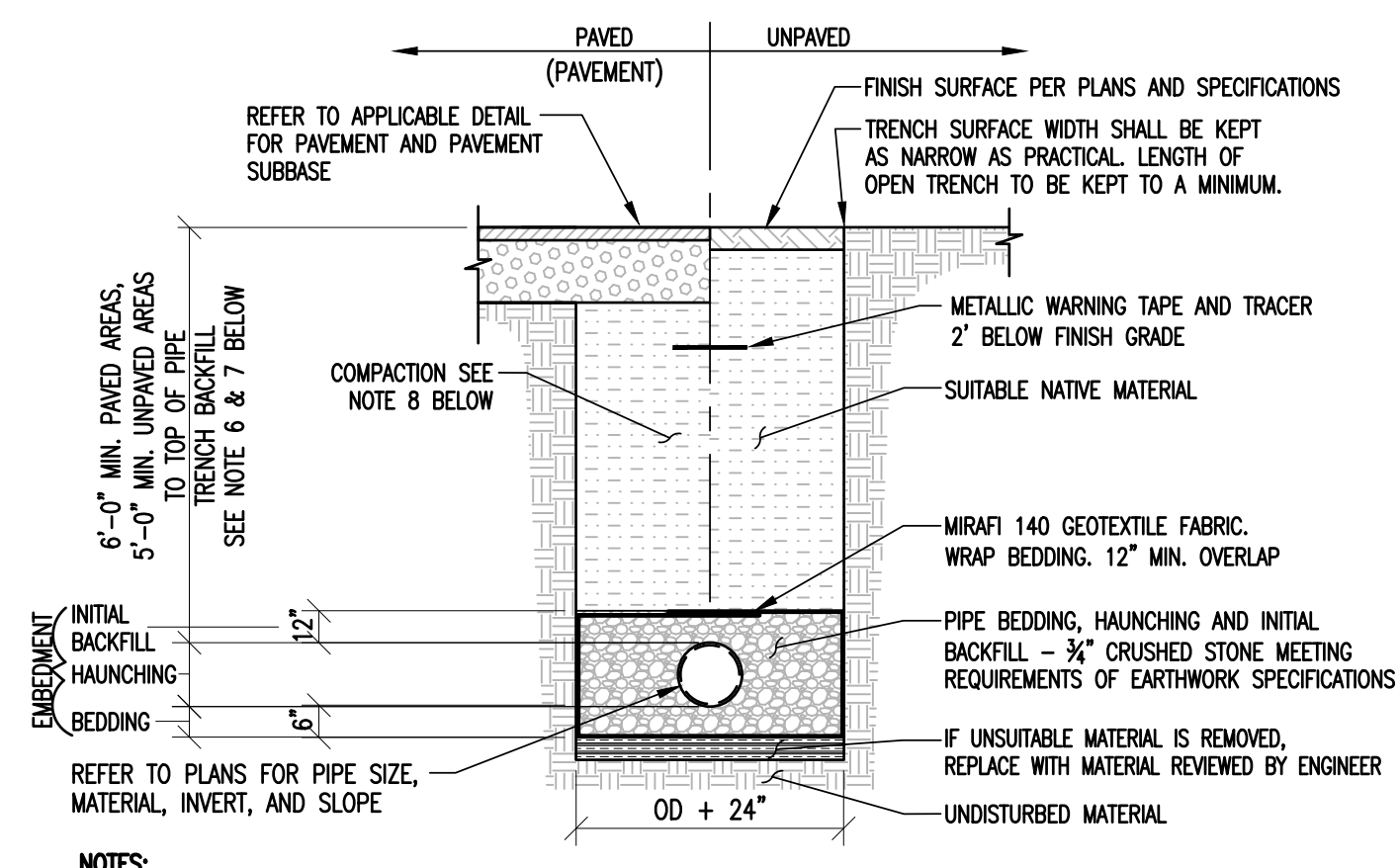
- TRENCH NOTES:**
1. REFER TO APPLICABLE TRENCH DETAIL FOR SPECIFIC BACKFILL INFORMATION. REFER TO APPLICABLE TABLE FOR WIDTH AND THICKNESS.

INSULATION OVER SHALLOW DRAIN DETAIL NOT TO SCALE 3



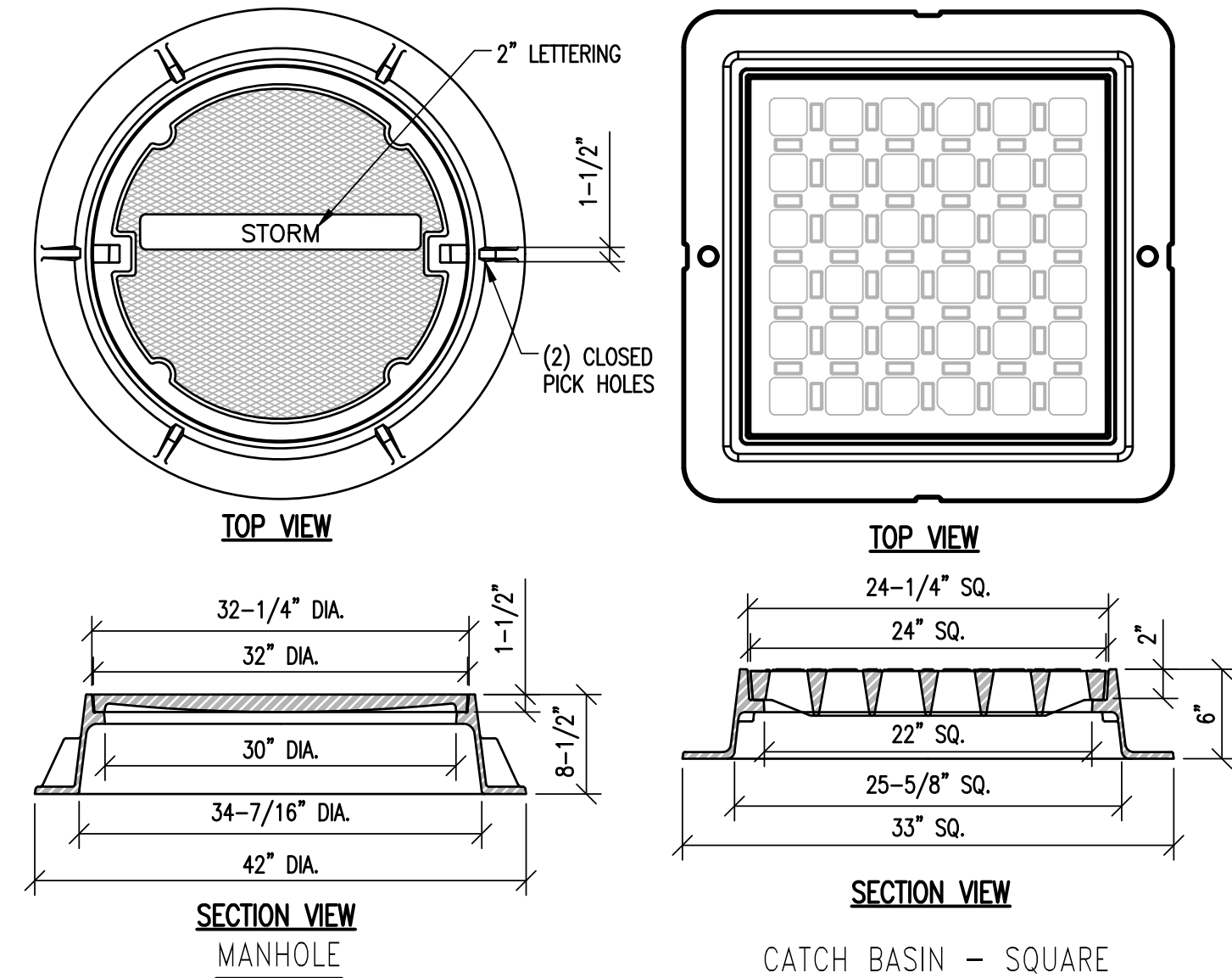
- GENERAL NOTES:**
1. PERFORMANCE HIGHLY DEPENDENT ON INSTALLATION. CONTRACTOR MUST ENSURE MANHOLE GASKET IS UNIFORMLY SEATED AROUND STRUCTURE ADAPTER. EXTRA PRECAUTIONS MUST BE TAKEN TO PREVENT DIFFERENTIAL SETTLEMENT BETWEEN THE PIPE AND MANHOLE.

STORM DRAIN MANHOLE/CATCHBASIN CONNECTION NOT TO SCALE 4



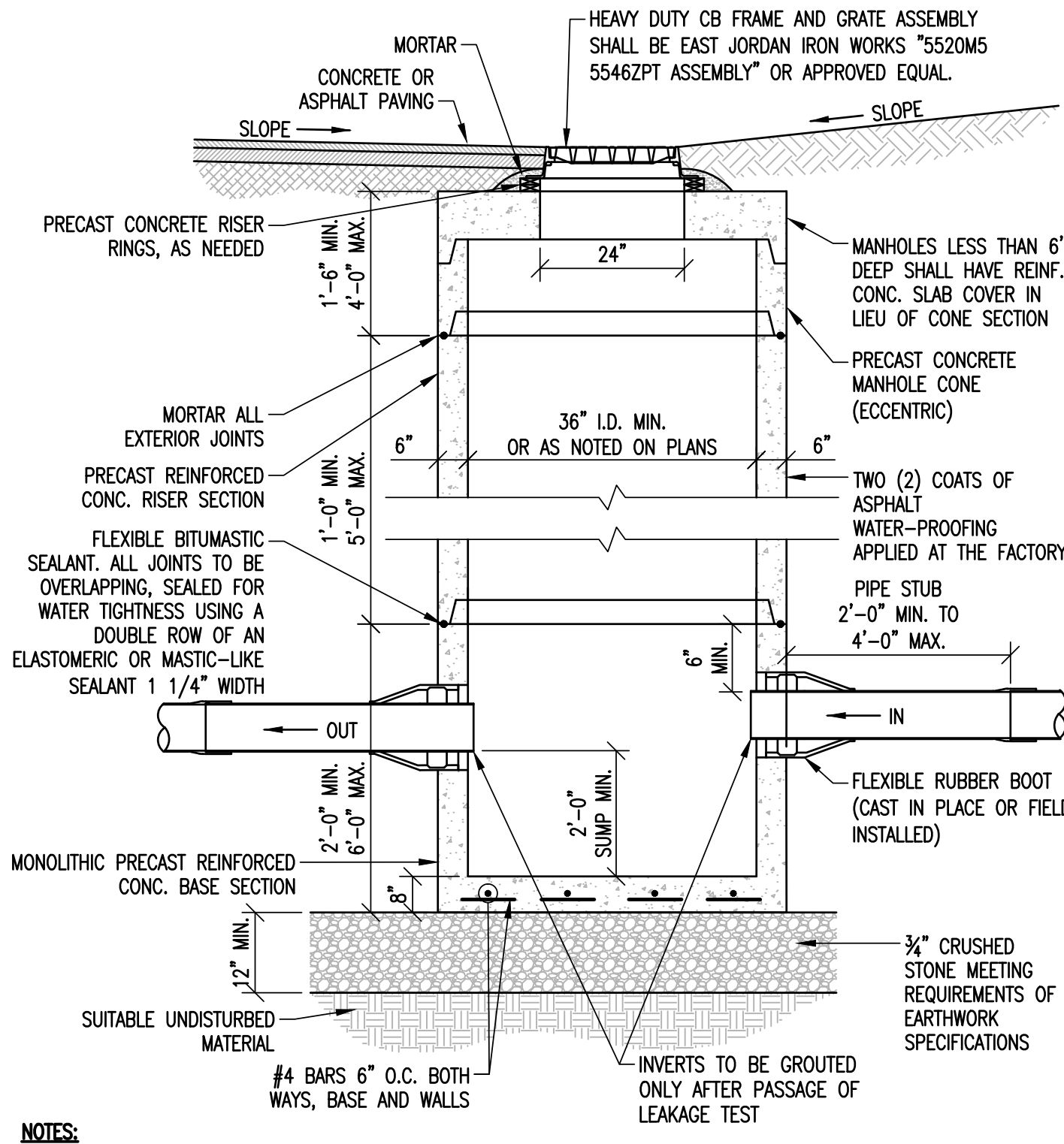
- NOTES:**
1. UNLESS OTHERWISE NOTED, ASSUME CLASS "C" SOILS. PERFORM ALL EXCAVATIONS TO OSHA REQUIREMENTS.
 2. BEDDING TO PROVIDE A FIRM, STABLE, CONTINUOUS AND UNIFORM SUPPORT FOR THE FULL LENGTH OF PIPE.
 3. PROVIDE 6" OF COVER OVER DRAIN PIPE IN PAVED AREAS AND 5" OF COVER OVER PIPE IN UNPAVED AREAS. OTHERWISE, REFER TO INSULATION OVER SHALLOW DRAIN LINE DETAIL.
 4. WHEN APPLICABLE INSTALL PIPE WITH BELL ENDS DOWN SLOPE. PREVENT SEDIMENT FROM ENTERING NEW STORM DRAIN SYSTEM DURING CONSTRUCTION.
 5. NO MECHANICAL TAMPERS SHALL BE USED DIRECTLY OVER PIPE TO INSURE PIPE IS NOT DAMAGED.
 6. TRENCH BACKFILL MATERIAL, INCLUDING ROADWAY LOCATIONS, SHALL BE NATURAL MATERIALS EXCAVATED FROM THE TRENCH DURING CONSTRUCTION. DEBRIS, FROZEN MATERIAL, LARGE CLODS OR STONE, ORGANIC MATTER OR OTHER UNSTABLE MATERIAL SHALL NOT BE USED FOR BACKFILL.
 7. LEDGE, ROCK, BOULDERS AND LARGE STONES SHALL BE REMOVED TO PROVIDE A MINIMUM CLEARANCE OF SIX INCHES BELOW AND ON EACH SIDE OF ALL PIPES.
 8. BACKFILL MATERIALS SHALL BE COMPACTED, IN 12" LAYERS, TO 92% OF MODIFIED PROCTOR (ASTM 1557) TO WITHIN 3 FEET OF FINISHED GRADE. IN AREAS UNDER ROADWAYS, DRIVES, AND PARKING THE UPPER 3 FEET SHALL BE COMPACTED, IN 6" LAYERS, TO 95% MODIFIED PROCTOR (ASTM 1557) AND IN LAWN OR OTHER UNDEVELOPED SPACE THE UPPER 3 FEET SHALL BE COMPACTED TO 92% MODIFIED PROCTOR.

TYPICAL STORM DRAIN TRENCH DETAIL NOT TO SCALE 5



- NOTES:**
1. ALL DIMENSIONS SHOWN HERE ARE NOMINAL.
 2. COVER SHALL BE HEAVY DUTY (H-20) LOAD RATED.
 3. CATCH BASIN (SQUARE) FRAME AND GRATE ASSEMBLY SHALL BE EAST JORDAN IRON WORKS FRAME 5546Z (PRODUCT NUMBER 00554611 (4 FLANGE) OR APPROVED EQUAL.
 4. CATCH BASIN (ROUND) FRAME AND GRATE ASSEMBLY SHALL BE EAST JORDAN IRON WORKS "2266Z 1040M3 SET" (PRODUCT NUMBER 00211033205) OR APPROVED EQUAL.
 5. MANHOLE (MH) FRAME AND COVER ASSEMBLY SHALL BE EAST JORDAN IRON WORKS "1480A V1419 ASSEMBLY" OR APPROVED EQUAL.

STORMWATER MH COVERS AND CB GRATES NOT TO SCALE 9



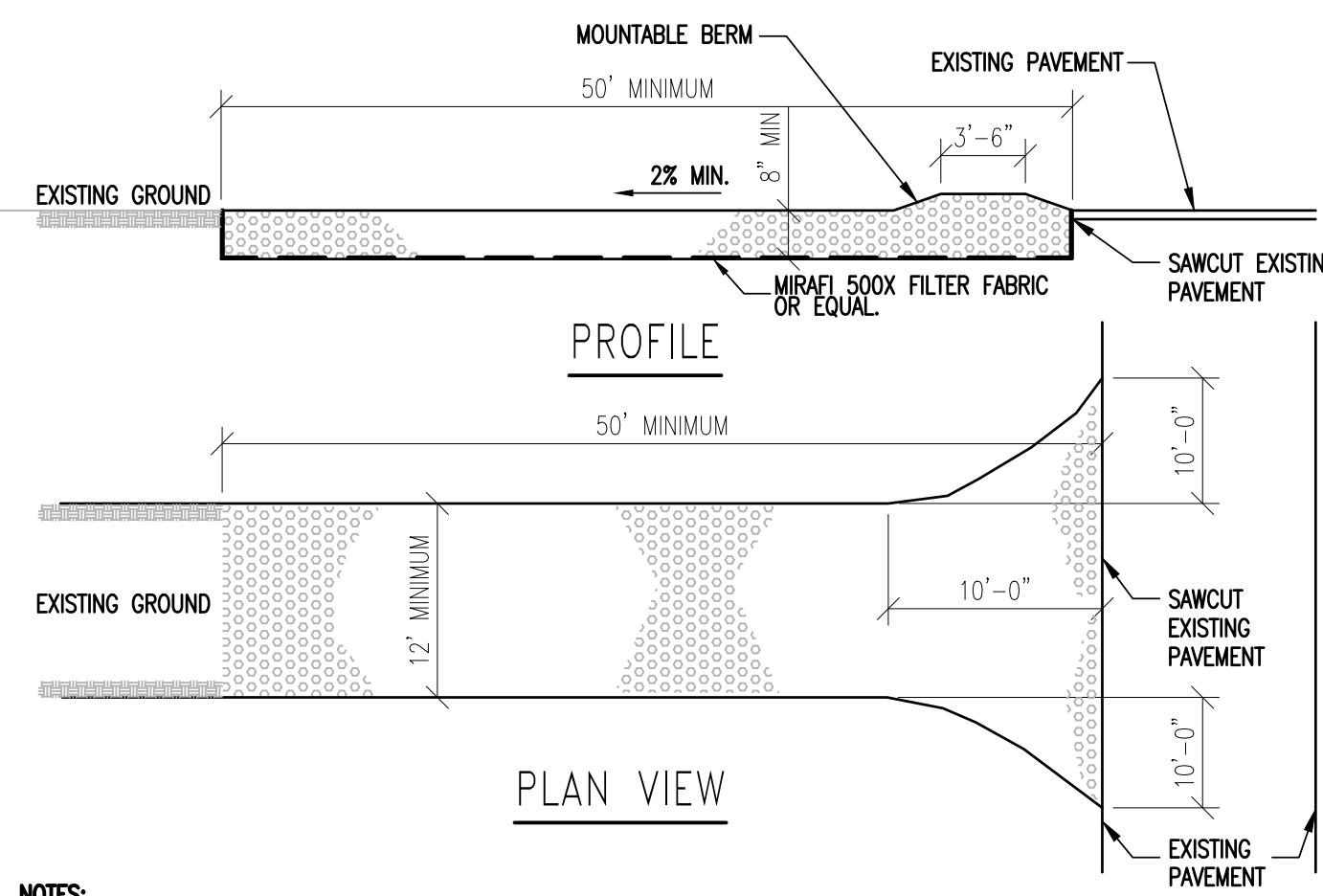
- NOTES:**
1. IF DEPTH OF MANHOLE IS 6 FT. OR LESS FROM RIM TO CENTERLINE INVERT, THEN A FLAT TOP WILL BE INSTALLED. IF DEPTH OF MANHOLE FROM RIM TO CENTERLINE INVERT IS MORE THAN 6 FT., THEN AN ECCENTRIC CONICAL TOP WILL BE INSTALLED.
 2. CATCH BASIN AND GRATE SHALL BE DESIGNED FOR H2O LOADING.

CATCH BASIN DETAIL NOT TO SCALE 6

EARTHWORK SPECIFICATIONS

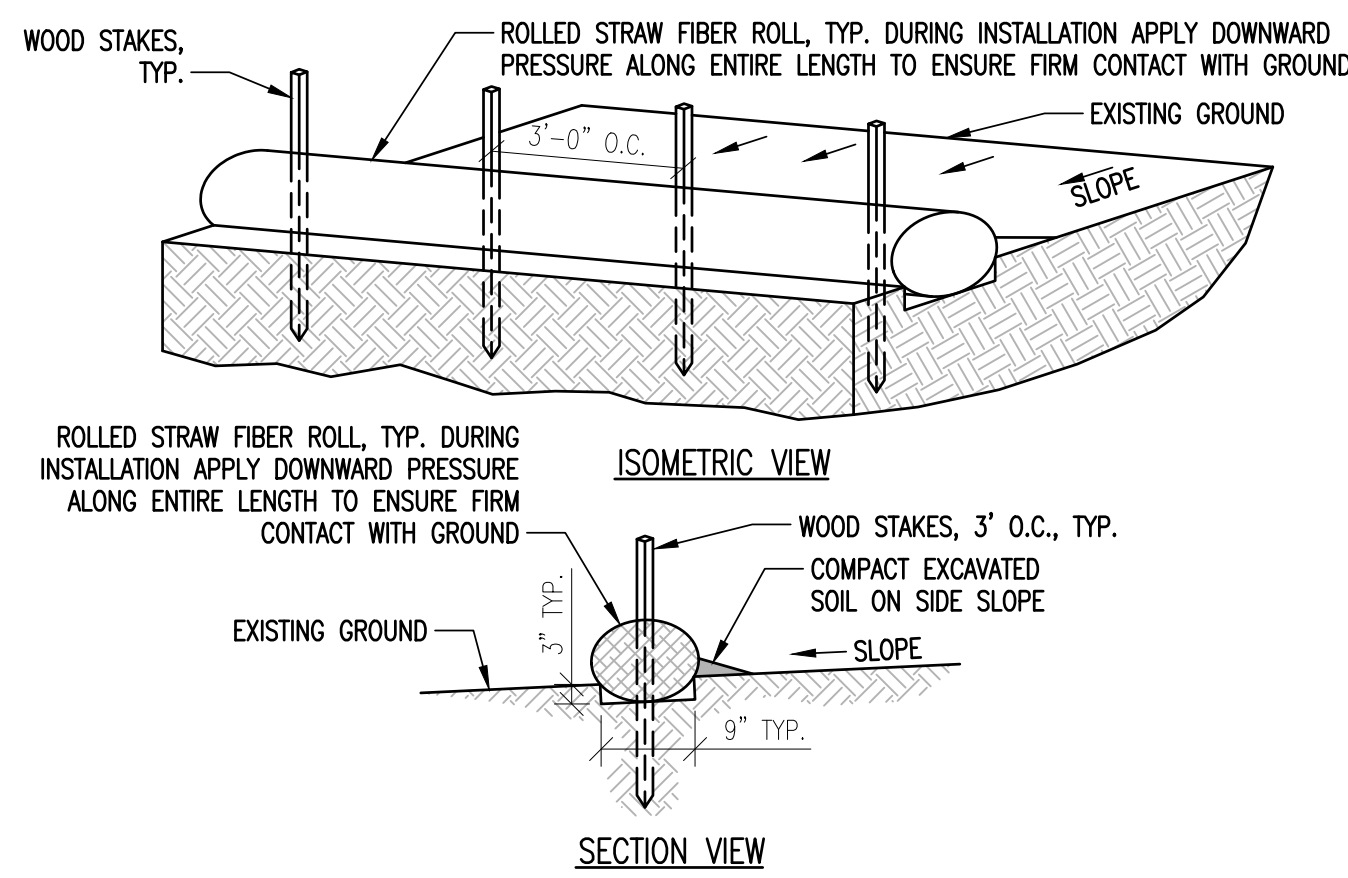
1. PRIOR TO THE START OF THE WORK, A PRE-CONSTRUCTION MEETING WILL BE HELD WITH THE TOWN DPW CONSTRUCTION ADMINISTRATOR, CONTRACTOR, OWNER & PROJECT ENGINEERS TO REVIEW PROCEDURES, IDENTIFY RESPONSIBILITIES. UNLESS STATED OTHERWISE, ALL MATERIALS AND METHODS SHALL BE IN ACCORDANCE WITH THE MOST RECENT VERSION OF THE APPLICABLE STATE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
2. CLEARING AND GRUBBING- ALL TOPSOIL AND UNSUITABLE MATERIALS SHALL BE REMOVED FROM THE DRIVEWAY, PARKING LOT, AND SIDEWALK LIMITS. THE DRIVEWAY AND PARKING LOT BASE MATERIAL SHALL EXTEND ONE FOOT BEYOND THE EDGE OF PAVING.
3. BASE COURSE- THE BASE COURSE SHALL CONSIST OF TWELVE INCHES OF DENSE GRADED GRAVEL AND SIX INCHES OF FINE CRUSHED GRAVEL. GRADATION CURVES COMPLYING WITH THE EARTHWORK SPECIFICATIONS SHALL BE PROVIDED FOR THE ENGINEERS REVIEW PRIOR TO CONSTRUCTION.
4. COMPACTION SHALL BE PERFORMED USING VIBRATORY ROLLERS AND WATER IN LIFTS OF NO GREATER THAN TWELVE INCHES. COMPACTION SHALL BE PERFORMED UNTIL THE REQUIRED DENSITY IS ACHIEVED. DENSITY SHALL BE DETERMINED BY AASHTO T238 METHOD AND SHALL NOT BE LESS THAN 95 PERCENT OF THE MAXIMUM DENSITY DETERMINED IN ACCORDANCE WITH AASHTO T99.
5. COMPACTION TESTING SHALL BE PERFORMED FOR EVERY LAYER OF MATERIAL PLACED AND FOR EVERY 1000 SQUARE FEET OF AREA.
6. PAVEMENT SHALL MEET APPLICABLE STATE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION REQUIREMENTS, IN ADDITION TO APPLICABLE TOWN ROAD STANDARDS.
7. PAVEMENT SHALL NOT BE INSTALLED WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT, NOR WHEN THE ROAD BASE TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT. PAVEMENT SHALL NOT FALL BELOW 185 DEGREES FAHRENHEIT PRIOR TO THE COMPLETION OF ROLLING. PAVEMENT SHALL NOT BE INSTALLED WHEN THE SUBGRADE IS FROZEN OR THE GRAPES ARE INCORRECT.
8. ALL REMAINING DISTURBED AREAS WITHIN THE RIGHT OF WAY SHALL BE FERTILIZED AND SEEDING IN ACCORDANCE WITH APPLICABLE STATE SPECIFICATIONS.
9. THE SEEDING OF SLOPES AND DITCHES SHALL REQUIRE THE USE OF EROSION CONTROL MATTING.
10. COST OF INITIAL INSPECTION AND TESTING SHALL BE PAID BY THE OWNER. SUBSEQUENT TESTING DUE TO FAILURE SHALL BE PAID BY THE CONTRACTOR.
11. ALL EARTHWORK MATERIALS SHALL BE OBTAINED FROM APPROVED SOURCES. THEY SHALL CONSIST OF SATISFACTORILY GRADED, FREE DRAINING MATERIAL, REASONABLY FREE FROM LOAM, SILT, CLAY AND ORGANIC MATERIAL. EARTHWORK MATERIALS SHALL MEET THE REQUIREMENTS OF THE PROJECT SPECIFICATIONS.

Stamp	
Date	
Description	
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Town of Bristol c/o Valerie Caples, Town Administrator 1 South Street, PO Box 249 Bristol, Vermont, 05443 802-453-2410 ext. 1	
Site & Stormwater Details School 001 Site Subsurface Infiltration Chamber Project Town of Bristol, Addison County, Vermont	
Sheet Title	
Project Title	
EV Project #	21230
Drawn By:	HKW
Checked By:	PB
Scale:	not to scale
Date:	02/10/2022
C3.0	



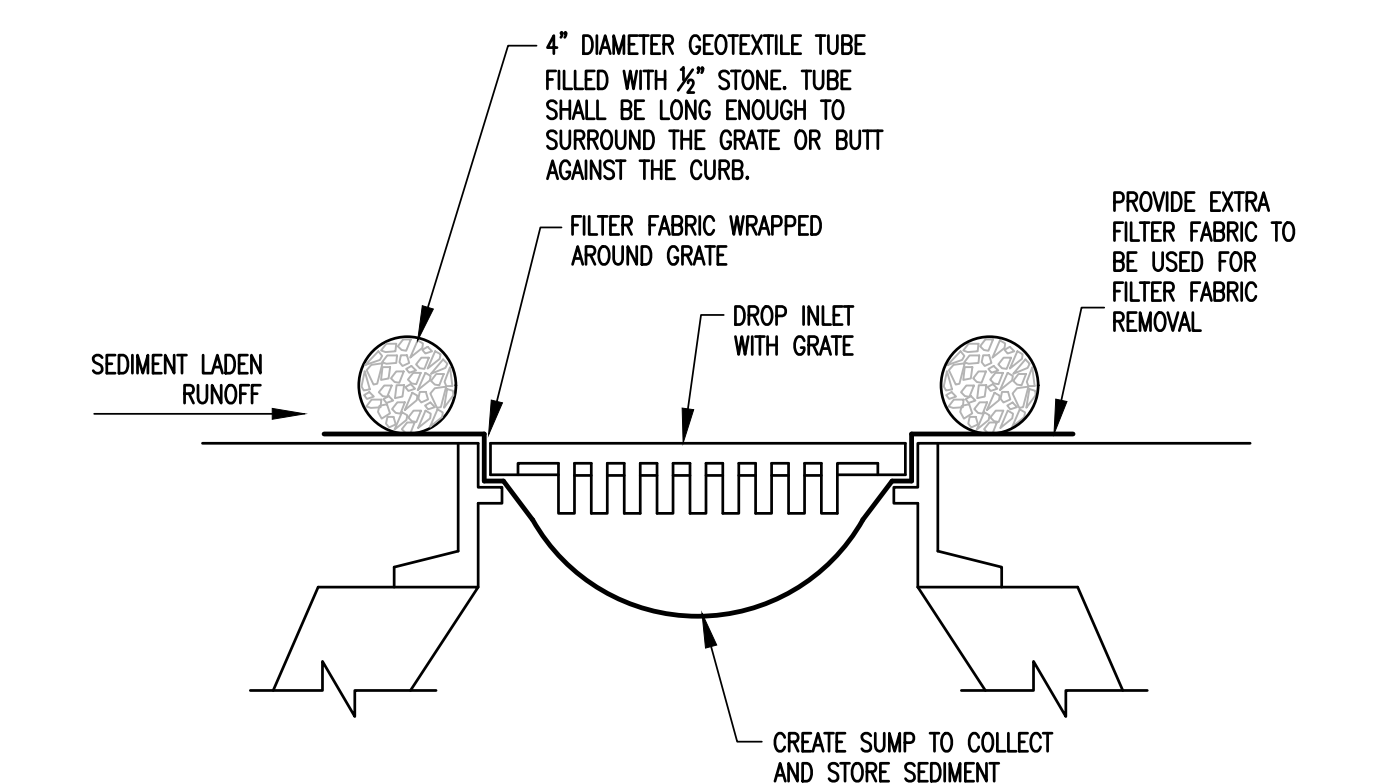
- NOTES:**
1. STONE SIZE: USE TYPE I STONE MEETING REQUIREMENTS OF THE EARTHWORK SPECIFICATIONS
 2. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCE SHALL BE PIPED ACROSS THE ENTRANCE.
 3. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND. REPAIR AND/OR CLEANOUT ANY MEASURES USED TO TRAP SEDIMENT, TRACKING ONTO PUBLIC RIGHT-OF-WAYS SHALL NOT BE ALLOWED. ALL SEDIMENT SPILLED, DROPPED, OR WASHED ONTO PUBLIC RIGHT-OF-WAYS MUST BE REMOVED IMMEDIATELY AND ANY WASH WATER MUST BE CONTAINED AND PROPERLY DISPOSED OF.
 4. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.
 5. WHEELS SHALL BE CLEANED TO REMOVE MUD PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.

STABILIZED CONSTRUCTION ENTRANCE DETAIL 1
NOT TO SCALE



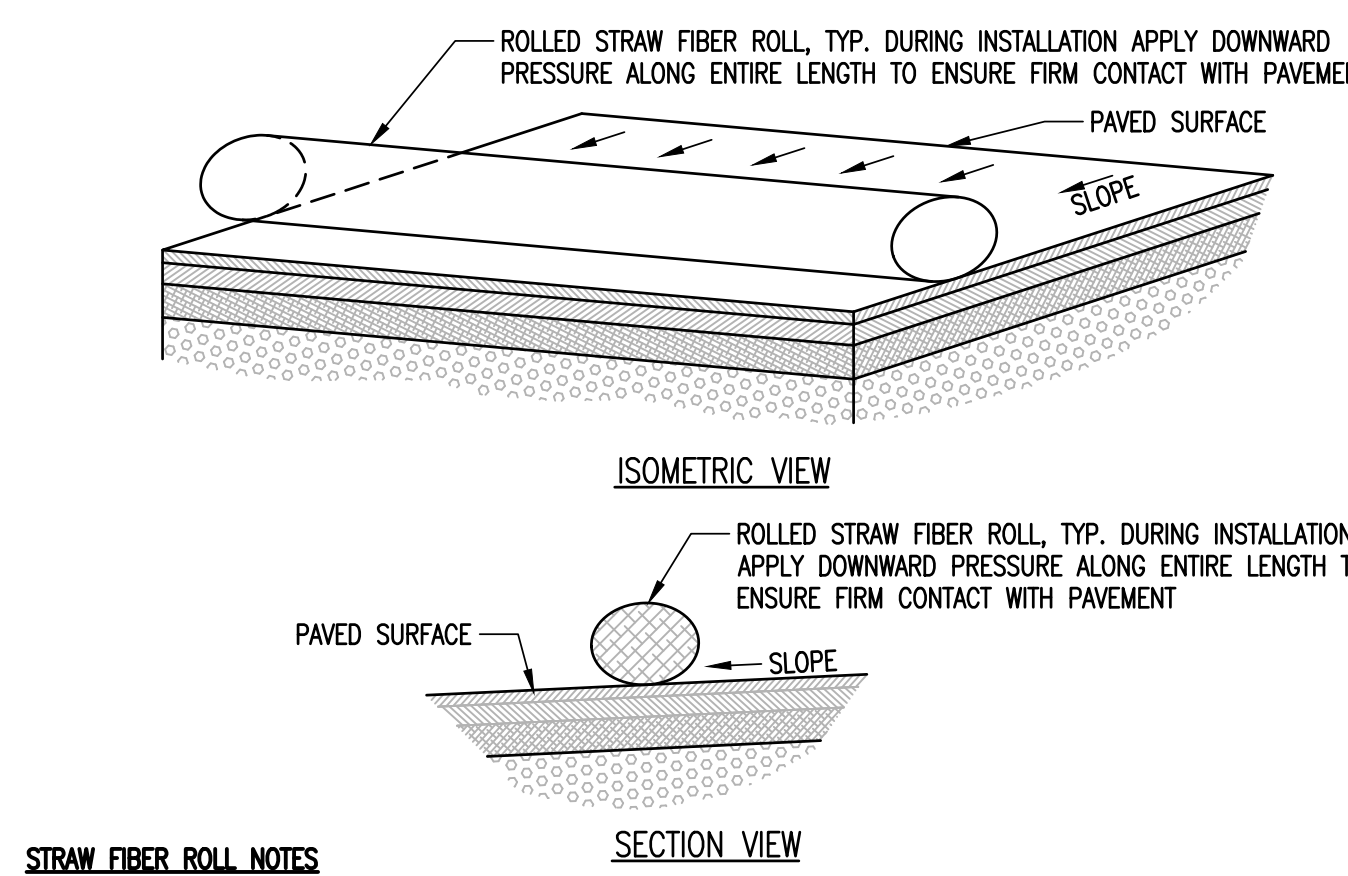
- STRAW FIBER ROLL NOTES**
1. INSTALL ROLLED STRAW FIBER ROLL PARALLEL ALONG THE CONTOUR OF THE SLOPE.
 2. TO MAXIMIZE SEDIMENT CONTAINMENT WITH THE STRAW FIBER ROLL, PLACE THE INITIAL STRUCTURE AT THE TOP/CREST OF THE SLOPE IF SIGNIFICANT RUNOFF IS EXPECTED FROM ABOVE. IF NO RUNOFF FROM ABOVE IS EXPECTED, THE INITIAL STRAW WATTLE CAN BE INSTALLED AT THE APPROPRIATE DISTANCE DOWNHILL FROM THE TOP/CREST OF THE SLOPE. THE FINAL STRUCTURE SHOULD BE INSTALLED AT OR JUST BEYOND THE BOTTOM/TOE OF THE SLOPE. WATTLES SHOULD BE INSTALLED PERPENDICULAR TO THE PRIMARY DIRECTION OF OVERLAND FLOW

STRAW FIBER ROLL - SOIL 4
NOT TO SCALE



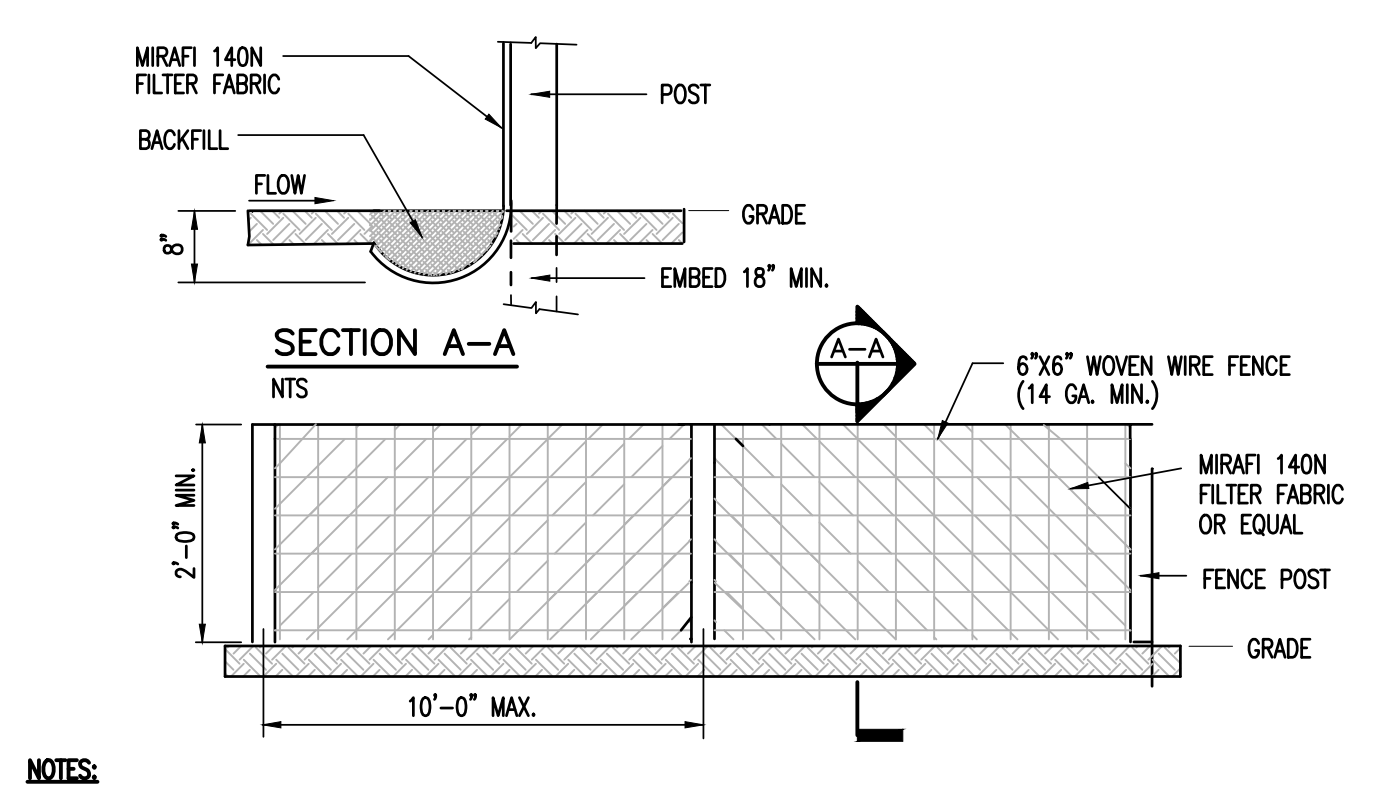
- MAINTENANCE:**
1. CONTRACTOR TO CLEAN AFTER EVERY STORM. IF THE BARRIER BECOMES CLOGGED WITH SEDIMENT SO THAT IT NO LONGER ADEQUATELY PASSES FILTERED WATER, THE SEDIMENT SHALL BE REMOVED AND THE BARRIER SHALL BE REPLACED. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
 2. THE FABRIC SHALL BE REMOVED WHEN THE DRAINAGE AREA HAS BEEN ADEQUATELY STABILIZED.

INLET PROTECTION DETAIL 2
NOT TO SCALE



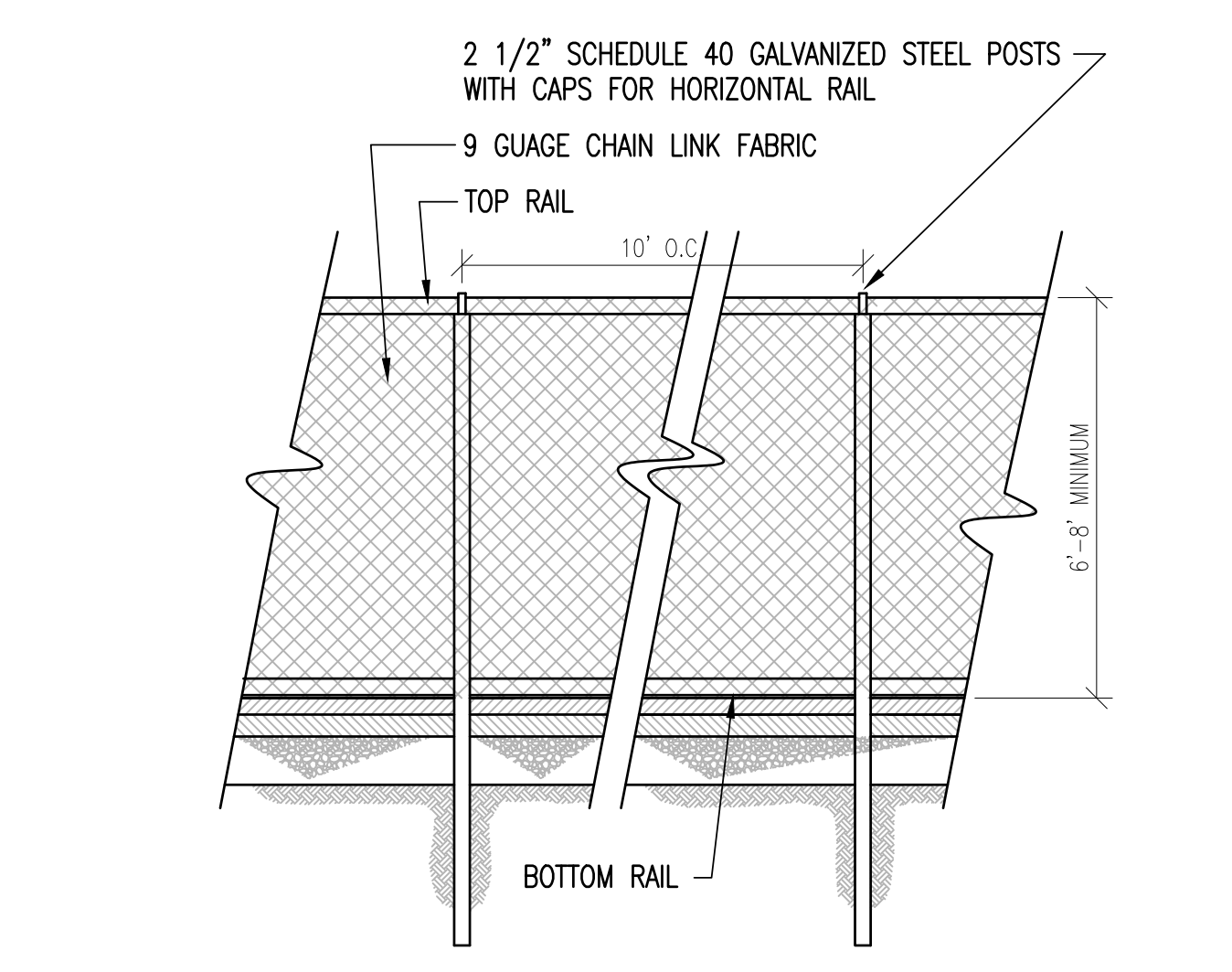
- STRAW FIBER ROLL NOTES**
1. INSTALL ROLLED STRAW FIBER ROLL PARALLEL ALONG THE CONTOUR OF THE SLOPE.
 2. TO MAXIMIZE SEDIMENT CONTAINMENT WITH THE STRAW FIBER ROLL, PLACE THE INITIAL STRUCTURE AT THE TOP/CREST OF THE SLOPE IF SIGNIFICANT RUNOFF IS EXPECTED FROM ABOVE. IF NO RUNOFF FROM ABOVE IS EXPECTED, THE INITIAL STRAW WATTLE CAN BE INSTALLED AT THE APPROPRIATE DISTANCE DOWNHILL FROM THE TOP/CREST OF THE SLOPE. THE FINAL STRUCTURE SHOULD BE INSTALLED AT OR JUST BEYOND THE BOTTOM/TOE OF THE SLOPE. WATTLES SHOULD BE INSTALLED PERPENDICULAR TO THE PRIMARY DIRECTION OF OVERLAND FLOW

STRAW FIBER ROLL - PAVEMENT 5
NOT TO SCALE

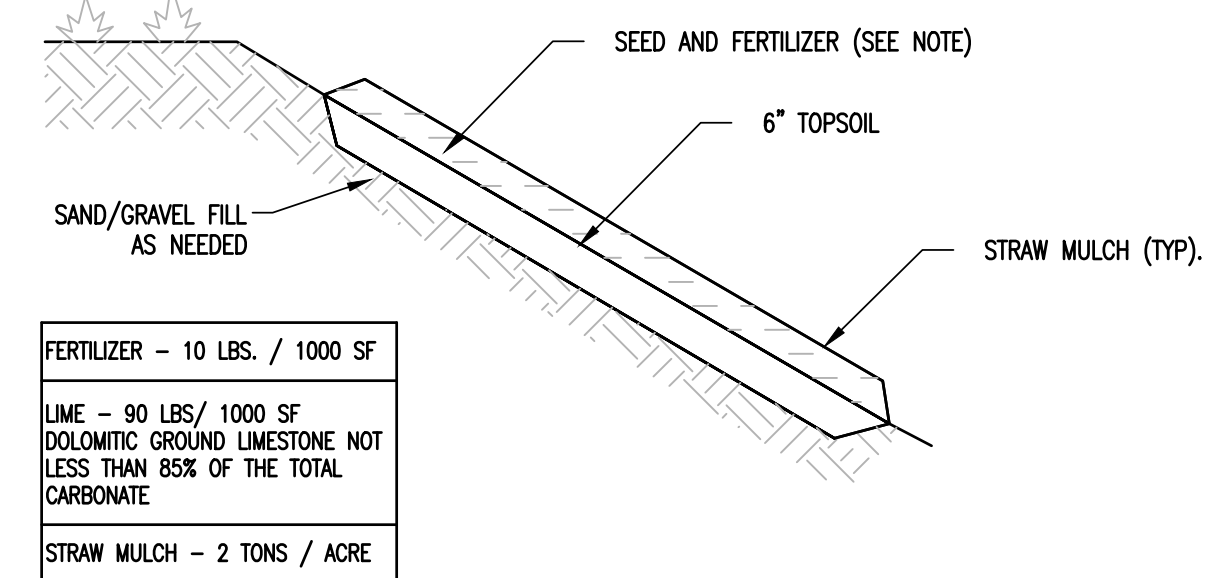


- NOTES:**
1. SILT FENCE SHALL BE PRE-FABRICATED EROSION CONTROL FENCE BY MIRAFI OR EQUAL, OR CONSTRUCTED IN PLACE AS SPECIFIED HEREIN.
 2. CONSTRUCTION IN PLACE SILT FENCE:
 - A. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
 - B. FILTER FABRIC TO BE FASTENED SECURELY TO WOVEN WIRE FENCE TIES SPACED EVERY 24" AT TOP OF MID SECTION.
 - C. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6", FOLDED AND STAPLED.
 3. INSPECTION SHALL BE FREQUENT (MINIMUM ONCE A WEEK AND AFTER EVERY RAINFALL). MAINTENANCE SHALL BE PERFORMED AS NEEDED, AND SEDIMENT REMOVED WHEN "BULGES" DEVELOP IN SILT FENCE.

SILT FENCE DETAIL 3
NOT TO SCALE



CONSTRUCTION FENCE DETAIL 6
NOT TO SCALE



FERTILIZER - 10 LBS. / 1000 SF

LIME - 80 LBS / 1000 SF
DOLOMITIC GROUND LIMESTONE NOT LESS THAN 85% OF THE TOTAL CARBONATE

STRAW MULCH - 2 TONS / ACRE

URBAN MIX GRASS SEED (FOR USE IN GRASSED LAWN AREAS AROUND BUILDINGS AND PARKING)		
% BY WEIGHT	LBS. LIVE SEED BY ACRE	TYPE OF SEED
37.5	45	CREeping RED FESCUE
31.3	37.5	KENTUCKY BLUEGRASS
31.3	37.5	WINTER HARDY, PERENNIAL RYE
100	120 LBS. LIVE SEED / ACRE	

- NOTES:**
1. SEEDING AND MULCHING OF DISTURBED AREAS SHALL TAKE PLACE WITHIN 48 HOURS OF FINAL GRADING.
 2. MULCH: HAY SHALL NOT BE USED. STRAW MULCH SHALL BE UTILIZED AND SHALL BE APPLIED AT A RATE OF 90-1,000 LBS/1,000 SF. MULCH SHALL NOT BE PLACED ON SLOPES OF GREATER THAN 3:1. SEED IMPREGNATED EROSION CONTROL NETTING SHALL BE USED IN ITS PLACE.
 3. SEED: SEEDING SHALL OCCUR AFTER APRIL 15 AND PRIOR TO SEPTEMBER 15TH IN ORDER TO ESTABLISH A STAND OF GRASS PRIOR TO GROUND FREEZING. SEED SHALL BE IN ACCORDANCE WITH SEED SPECIFICATION ON THIS SHEET.
 4. COVER SEED WITH 1/4 INCH SOIL UNLESS A HYDROSEEDER IS USED.
 5. MULCH ANCHORING: SHALL BE ACCOMPLISHED BY DEGRADABLE MULCH NETTING. USE WHEN SLOPES ARE GREATER THAN 10%.
 6. TOPSOIL AND MULCHING NOT TO BE APPLIED IN AREAS OF TRAVEL WAYS.

SEEDING AND MULCHED AREAS DETAIL 7
NOT TO SCALE

GENERAL EROSION CONTROL NOTES

1. THE CONTRACTOR SHALL DESIGNATE AN "ON-SITE EROSION CONTROL PLAN COORDINATOR" WHO WILL BE PRESENT ON-SITE FROM DAY-TO-DAY, AND SHALL BE RESPONSIBLE FOR ENSURING THAT THE EROSION CONTROL MEASURES REQUIRED BY THE EROSION CONTROL PLAN, DETAILS AND NOTES, ARE PROPERLY INSTALLED AND MAINTAINED. THE ON-SITE EROSION CONTROL PLAN COORDINATOR SHALL KEEP A WRITTEN RECORD OF INSPECTIONS AND MAINTENANCE OF EROSION CONTROL FEATURES. A COPY OF THESE PLANS AND INSPECTION/MAINTENANCE RECORDS SHALL BE KEPT ON-SITE AT ALL TIMES.
2. THE CONTRACTOR SHALL NOTIFY THE TOWN OF BRISTOL DEPARTMENT OF PUBLIC WORKS DIVISION AT LEAST 24-HOURS PRIOR TO ANY EARTH DISTURBING ACTIVITIES AND SUBMIT THE NAME AND CONTACT INFORMATION (CELL PHONE AND EMAIL) OF THE ON-SITE EROSION CONTROL COORDINATOR FOR THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR POSTING THE EROSION PREVENTION AND SEDIMENT CONTROL PLAN NOTICE IN A VISIBLE LOCATION AT ALL TIMES DURING EARTH DISTURBANCE.
3. DISTURBANCE LIMITS ARE TO BE MARKED, AND THE FOLLOWING MANAGEMENT PRACTICES INSTALLED, PRIOR TO BEGINNING EARTHWORK IN ANY GIVEN AREA: SILT FENCE, CONSTRUCTION ENTRANCE, INLET PROTECTION & TREE PROTECTION FENCING.
4. COMPLY WITH VERMONT STATE GENERAL CONSTRUCTION PERMIT CONDITIONS. ALL EROSION CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE VERMONT DEC "THE VERMONT STANDARDS AND SPECIFICATIONS FOR EROSION PREVENTION & SEDIMENT CONTROL", DATED 2019.
5. DURING THE NON-WINTER CONSTRUCTION SEASON, ALL DISTURBED AREAS ARE TO BE STABILIZED (TEMPORARY OR FINAL) WITHIN 14-DAYS OF INITIAL DISTURBANCE. AFTER THIS TIME, ANY DISTURBANCE WITHIN THIS WORK AREA MUST BE STABILIZED AT THE END OF EACH WORK DAY, WITH THE FOLLOWING EXCEPTIONS:
 - A. STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN 24 HOURS AND NO PRECIPITATION IS FORECAST DURING THAT PERIOD
 - B. WORK IS OCCURRING WITHIN A SELF-CONTAINED EXCAVATION, 2-FEET OR MORE IN DEPTH.
6. THE PERIOD BETWEEN NOVEMBER 1ST AND APRIL 15TH IS CONSIDERED THE "WINTER CONSTRUCTION PERIOD". IF SOILS WILL BE EXPOSED AFTER NOVEMBER 1ST, A PLAN FOR WINTER CONSTRUCTION MUST BE DEVELOPED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER ON OR BEFORE OCTOBER 1ST. THE CONTRACTOR SHALL ENSURE SEDIMENT CONTROL IS INSTALLED PRIOR TO THE SOIL FREEZING. AN INSPECTION WILL BE REQUIRED IF THE PROJECT IS COMPLETED DURING THE WINTER MONTHS TO ENSURE THE SITE IS SECURED FOR THE REMAINDER OF THE SEASON.
7. DURING THE WINTER CONSTRUCTION SEASON, ANY NEW DISTURBANCE MUST BE STABILIZED (TEMPORARY OR FINAL) AT THE END OF EACH WORK DAY WITH THE FOLLOWING EXCEPTIONS:
 - A. STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN 24 HOURS AND NO PRECIPITATION IS FORECAST DURING THAT PERIOD
 - B. WORK IS OCCURRING WITHIN A SELF-CONTAINED EXCAVATION, 2-FEET OR MORE IN DEPTH.
7. IN NO CASE SHALL SOIL BE EXPOSED FOR MORE THAN 14 DAY WITHOUT BEING STABILIZED.
8. ALL DISTURBED AREAS ARE TO BE PERMANENTLY STABILIZED WITHIN 48 HOURS OF FINAL GRADING.
9. THE PERIMETER OF THE SITE AND ALL BMP'S SHALL BE INSPECTED AT THE END OF EACH WORK DAY TO ENSURE SEDIMENT DOES NOT LEAVE THE SITE. IF SEDIMENT HAS TRAVELED BEYOND THE PROJECT LIMITS, IT SHALL BE RELOCATED IN AN UPGRADEMENT AREA ON SITE AT THE END OF EACH WORK DAY.
10. ALL STABILIZATION INVOLVING SEEDING IS TO BE COMPLETED BY SEPTEMBER 15TH.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAILY INSPECTION OF THE ADJACENT ROADWAYS FOR OFF-SITE TRACKING OF SOIL MATERIALS. SOIL, STONE, AND DEBRIS FOUND LEAVING THE SITE ARE TO BE REMOVED (WHEN FOUND) BY SWEEPING AT THE END OF EACH CONSTRUCTION DAY, OR MORE FREQUENTLY WHEN NEEDED TO PREVENT IMPACTS TO ADJACENT ROADS AND SIDEWALKS.
12. IF DEWATERING IS REQUIRED FOR CONSTRUCTION, THE CONTRACTOR MUST UTILIZE SEDIMENT FILTER BAGS (OR ALTERNATE APPROVED BY THE ENGINEER) TO PREVENT DISCHARGE OF SEDIMENT-LADEN WATER OFF SITE.
13. EXCAVATED MATERIAL FROM EARTH EXCAVATION AND DITCH DIGGING SHALL BE PLACED ON-SITE IN A LOCATION TO BE APPROVED OF BY THE OWNER AND/OR THE ENGINEER OR USED FOR PROJECT FILL MATERIAL IF DETERMINED SUITABLE BY THE OWNER'S REPRESENTATIVE.
14. STOCKPILED MATERIAL (TOPSOIL, BORROW, ETC.) SHALL HAVE SILT FENCE CONSTRUCTED AROUND THE PERIMETER. THE STOCKPILED MATERIAL SHALL BE SEEDING AND MULCHED AS SOON AS POSSIBLE TO PREVENT SOIL EROSION AND SEDIMENTATION OFF SITE. LOCATE STOCKPILES ON THE UPHILL SIDE OF DISTURBED AREAS, IF POSSIBLE. DURING WINDY CONDITIONS, STOCKPILED MATERIAL SHALL BE COVERED OR WATERED APPROPRIATELY TO PREVENT WIND EROSION.
15. SLOPES GREATER THAN 3:1 SHALL HAVE EROSION CONTROL MATTING INSTALLED TO STABILIZE THE SLOPE AND REDUCE THE EROSION POTENTIAL. MATTING SHALL BE BIODEGRADABLE WITH A 12 MONTH LONGEVITY, 15000 AS MANUFACTURED OR APPROVED EQUIVALENT. INSTALL MATTING OVER MULCHED SLOPES SO THAT MATTING IS IN CONTACT WITH THE SOIL AND MULCH. PIN MATTING WITH WIRE STAPLES 3 FEET O.C. TO ENSURE FULL BONDING WITH SOIL SURFACE. THE SLOPE SURFACES SHOULD BE LEFT SLIGHTLY ROUGHENED AND NOT SMOOTH. IF LARGE AMOUNTS OF OFFSITE WATER WILL DRAIN OVER THESE SLOPES, TEMPORARY DIVERSION SWALES SHALL BE INSTALLED UP SLOPE UNTIL THE SLOPE VEGETATION STABILIZES.
16. THE OWNER SHALL BE NOTIFIED WHEN SITE WORK IS COMPLETED AND THE SITE IS STABILIZED.

WINTER EROSION CONTROL NOTES

- WINTER CONSTRUCTION PROCEDURES**
1. DURING WINTER CONSTRUCTION, INSPECTIONS BY THE ON-SITE PLAN COORDINATOR SHALL OCCUR FOR ANY AREAS NOT FULLY STABILIZED, AND WEEKLY FOR THE ENTIRE SITE PRIOR TO ANY FORECASTED RAIN, THAW OR SPRING MELT WHEN TEMPORARY STABILIZATION IS IN PLACE.
 2. IN AREAS TO BE STABILIZED BY VEGETATION, ALL SEEDING MUST BE COMPLETED BY SEPTEMBER 15 TO ALLOW GROWTH TO OCCUR PRIOR TO THE GROUND FREEZING. STABILIZATION OF ALL OTHER DISTURBED AREAS SHALL BE COMPLETED BY OCTOBER 15.
 3. ENLARGED ACCESS POINTS, STABILIZED TO PROVIDE FOR SNOW STOCKPILING SHALL BE INSTALLED.
 4. LIMITS OF DISTURBANCE SHALL BE MOVED OR REPLACED TO REFLECT BOUNDARY OF WINTER WORK.
 5. SNOW WILL NOT BE PILED WITHIN 25 FEET OF PERIMETER CONTROLS (SUCH AS SILT FENCE) TO ALLOW FOR CLEARING AND MAINTENANCE. SNOW IS TO BE REMOVED FROM ALL STRUCTURAL EROSION PREVENTION AND SEDIMENTATION CONTROL MEASURES FOLLOWING EACH SIGNIFICANT SNOWFALL. NO SNOW STORAGE UP-GRADEMENT OF DISTURBANCE. NO SNOW DISPOSAL IN SEDIMENT PONDS/BASINS. IF NECESSARY, SNOW/ICE MUST BE REMOVED PRIOR TO STABILIZATION OF DISTURBED AREAS. ACCESS POINTS SHALL BE ENLARGED AND STABILIZED TO ALLOW FOR SNOW STOCKPILING.
 6. IN AREAS OF DISTURBANCE WITHIN 100 FT OF A RECEIVING WATER, SILT FENCE SHALL BE REINFORCED OR ELSE REPLACED WITH PERIMETER DIKES, SWALES OR OTHER PRACTICES RESISTANT TO THE FORCES OF SNOW LOADS.
 7. DRAINAGE STRUCTURES SHALL BE KEPT OPEN AND FREE OF SNOW AND ICE DAMS.
 8. ALL EROSION PREVENTION AND SEDIMENT CONTROL MEASURES ARE TO BE IN PLACE BY OCTOBER 15, OR IF NOT POSSIBLE, THEN PRIOR TO GROUND FREEZE.
 9. MULCH IS TO BE APPLIED AT THE END OF EACH WORKDAY TO ALL EXPOSED AREAS THAT HAVE NOT YET REACHED FINAL GRADE AT TWICE THE RATE INDICATED IN THE SEEDING AND MULCHING DETAIL FOR THE REGULAR CONSTRUCTION SEASON. MULCH SHALL BE TRACKED IN OR STABILIZED WITH NETTING.
 10. TO ENSURE COVER OF DISTURBED SOIL IN ADVANCE OF A MELT EVENT, AREAS OF DISTURBED SOIL MUST BE STABILIZED AT THE END OF EACH WORK DAY, WITH THE FOLLOWING EXCEPTIONS:
 - A. IF NO PRECIPITATION WITHIN 24 HOURS IS FORECAST AND WORK WILL RESUME IN THE SAME DISTURBED AREA WITHIN 24 HOURS, DAILY STABILIZATION IS NOT NECESSARY.
 - B. DISTURBED AREAS THAT COLLECT AND RETAIN RUNOFF, SUCH AS HOUSE FOUNDATIONS OR OPEN UTILITY TRENCHES.
 11. SNOW AND ICE SHALL BE REMOVED TO LESS THAN 1" THICKNESS PRIOR TO STABILIZATION.
 12. STONE STABILIZATION, 10 TO 20 FT WIDE IN AREAS SUCH AS THE PERIMETER OF BUILDINGS UNDER CONSTRUCTION WHERE CONSTRUCTION VEHICLE TRAFFIC IS ANTICIPATED SHALL BE INSTALLED.

Stamp	
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Erosion Prevention & Sediment Control Details
School 001 Site
Subsurface Infiltration Chamber Project
Town of Bristol, Addison County, Vermont

Sheet Title: EV Project # 21230
Drawn By: HKW
Checked By: PB
Scale: not to scale
Date: 02/10/2022

SECTION 31 0000
EARTHWORK

Part 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal of topsoil and subsoil.
- B. Cutting, grading, filling, rough contouring, and compacting the site for site structures, roadways, parking lots, walks and equipment pads.
- C. Building perimeter and site structure backfilling to subgrade elevations.
- D. Excavating for building foundations, site structures, slabs-on-grade, paving, landscaping, and utilities.
- E. Site filling and backfilling.
- F. Fill under slabs-on-grade.
- G. Fill under paving.
- H. Fill for over-excavation.
- I. Consolidation and compaction as scheduled.

1.02 RELATED SECTIONS

- A. Section 31 05 16 Aggregates for Earthwork.
- B. Section 31 0516 Erosion and Sedimentation Control
- C. Section 32 1216 Asphalt Paving
- D. Section 32 1313 Concrete Paving
- E. For additional earthwork requirements near:
 - 1. Storm lines see 33 4000 Storm Drainage Utilities

1.03 REFERENCES

- A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10 lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- B. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- C. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18-inch (457 mm) Drop.
- D. ASTM D2487 - Classification of Soils for Engineering Purposes.
- E. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- F. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with State of Vermont, Agency of Transportation "Standard Specifications for Construction", dated 2018 (designated VAOT), and the latest revision of the Agency of Transportation "General Special Provisions".
- B. Testing and analysis of soil material in accordance with testing schedule at the end of this specification section.
- C. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D1557/ AASHTO T180 and ASTM D2922.
- D. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D2487.
- E. If tests indicate materials do not meet specified requirements, change material and retest.
- F. Provide materials of each type from same source throughout the Work.

2.02 ACCESSORIES

A. Geotextile Fabric:

1. Woven fabric for stability: Mirafi 500X or equivalent, as approved by Engineer.
2. Non-Woven filter fabric for soil separation: Mirafi 140N or equivalent, as approved by Engineer.

B. Buried Warning Identification Tape

1. All on-site existing and proposed subsurface utility piping and conduits shall be provided with metallic identification tape and ball markers.
2. Provide metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Manufacture tape with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection. Provide tape on rolls, 6 inches minimum width, 0.004 inches minimum thickness, 1500 pounds per square inch lengthwise and 1250 pounds per square inch crosswise color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Provide permanent color and printing, unaffected by moisture or soil.
3. Warning Tape Color Codes
 - a. Red: Electric
 - b. Yellow: Gas
 - c. Orange: Telephone and Other Communications
 - d. Blue: Water Systems
 - e. Green: Sewer Systems

Part 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.02 STOCKPILING

- A. Stockpile materials offsite, unless otherwise agreed with Owner.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Prevent intermixing of soil types or contamination.
- E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.03 PREPARATION

- A. Identify required lines, levels, contours, and datum/benchmark locations.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect utilities that remain from damage.
- D. Notify utility company and contracting officer prior to removing or relocating utilities.
- E. Protect above and below grade utilities that remain.
- F. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- G. Protect bench marks, existing structures, signs, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

- H. Excavate topsoil from areas with proposed utility work, excavation, or proposed improvements. Stockpile in a segregated location.
- I. Remove deleterious material from site.

3.04 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas with proposed utility work, excavation, re-landscaped, or re-graded, or other proposed improvements, without mixing with foreign materials.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site to depth not exceeding 12 feet and protect from erosion. Segregate topsoil from other soil, aggregates, materials, and debris.
- D. Remove deleterious material from site.
- E. Remove excess topsoil not intended for reuse, from site.
- F. Strip and stockpile organic topsoil material. Strip to a depth to remove all significant organic topsoil which shall be no less than 6 inches but not more than 12 inches.

3.05 SUBSOIL EXCAVATION

- A. Underpin adjacent structures which may be damaged by excavating work. Do not interfere with 45 degree bearing splay of foundations.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.
- D. Excavate subsoil to accommodate building foundations, slabs-on-grade, paving and site structures, and construction operations.
- E. Control groundwater flowing toward or into excavations to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Do not permit French drains, sumps, ditches or trenches within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. While the excavation is open, maintain the water level continuously, at least 1 foot below the working level.
- F. Do not excavate wet subsoil. Grade top perimeter of excavating to prevent surface water from draining into excavation.
- G. When excavating through roots, perform work by hand and prune roots with appropriate sharp tools.
- H. Hand trim excavation. Remove loose matter.
- I. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard measured by volume.
- J. Notify Engineer and Project Manager of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- K. Stockpile in area designated on site to depth not exceeding 12 feet and protect from erosion. Remove subsoil from site not being reused.
- L. Stability: Replace damaged or displaced or over excavated subsoil to same requirements as specified for fill.
- M. Remove excess material not being used from site.

3.06 FILLING

- A. Install Work in accordance with State of Vermont, Agency of Transportation "Standard Specifications for Construction", dated 2018 (designated VAOT), and the latest revision of the Agency of Transportation "General Special Provisions".
- B. Compact native subgrade to density requirements for subsequent backfill materials.
- C. Scarify and proof roll subgrade surface to a depth of 4 inches to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

- D. Notify the Engineer prior to placing first lift of backfill in an area. Engineer may observe subgrade and request that the contractor proof-roll the excavation prior to allowing contractor to place fill.
- E. Cut out soft areas of native subgrade not capable of compaction in place. Backfill with granular backfill and compact to density equal to or greater than requirements for subsequent fill material.
- F. Verify sub-drainage, damp-proofing, or waterproofing installation has been inspected.
- G. Place geotextile fabric over subbase prior to placing next lift of fill in parking lots and paved areas. Where backfill is a granular, well draining material, adjacent to a material with fines (more than 6% passing the #200 sieve) the two materials shall be separated by geotextile.
- H. Backfill against supported foundation, do not backfill against unsupported foundation unless directed by structural engineer. Verify structural ability of unsupported walls to support imposed loads by the fill. If allowed, backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- I. Employ a placement method that does not disturb or damage other work.
- J. Fill areas to proposed contours and elevations with unfrozen materials.
- K. Place fill material in continuous layers and compact in accordance with schedule at the end of this section. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- L. Maintain optimum moisture content of fill materials to attain required compaction density.
- M. Slope grade away from building minimum three percent for the first 10 feet, unless otherwise indicated on grading plans.
- N. Make grade changes gradual. Blend slope into level areas with minimum 10-foot transition, unless otherwise indicated on grading plans.
- O. Remove surplus fill materials from site.

3.07 UTILITY MARKERS AND BURIED WARNING AND IDENTIFICATION TAPE

- A. Provide and install metallic identification tape and/or tracer wire for all new utility lines or existing line where the contractor has disturbed the existing warning or metallic identification tape. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.08 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.
- B. Top Surface of Backfilling under Paved Areas: Plus or minus 1/10 foot from required elevations.
- C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.09 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.
- B. If a borrow area is indicated, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

3.10 FIELD QUALITY CONTROL

- A. Contractor shall coordinate testing schedule with Owner and Engineer prior to beginning earthwork.
- B. Proof roll compacted fill surfaces under slabs-on-grade, paving, sidewalks, concrete pads.
- C. Testing: In accordance with ASTM D2922, ASTM D3017 and at the direction of the Owner.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

E. Frequency of Tests: See Schedule at end of section.

3.11 SCHEDULES

A. General Fill

1. Compact to 95% maximum density, modified proctor in the upper 3 feet.
2. Compact to 92% maximum density, modified proctor up to 3 feet below finished grade.
3. Maximum lifts of 12 inches loose measure before compaction.

END OF SECTION 31 0000 - EARTHWORK

SECTION 31 0516
AGGREGATES FOR EARTHWORK

Part 1 GENERAL

1.01 SECTION INCLUDES

- A. Aggregate materials.

1.02 RELATED SECTIONS

- A. Section 31 0000 Earthwork
- B. Section 31 2500 Erosion and Sedimentation Control
- C. Section 32 1216 Asphalt Paving
- D. Section 32 1313 Concrete Paving
- E. Section 33 4000 Storm Drainage Utilities
- F. Section 33 4923 Storm Chamber System

1.03 REFERENCES

- A. AASHTO - M147 - Materials for Aggregate and Soil-Aggregate.
- B. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-pound (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- C. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- D. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 pound (4.54 Kg) Rammer and 18-inch (457 mm) Drop.
- E. ASTM D2487 - Classification of Soils for Engineering Purposes.
- F. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- G. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- H. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.04 SUBMITTALS FOR REVIEW

- A. Samples: Submit, in air-tight containers, 10 pound samples of each type of fill to testing laboratory.
- B. Sieve analysis for material and proposed use.

1.05 SUBMITTALS FOR INFORMATION

- A. Materials Source: Submit name of imported materials suppliers.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with State of Vermont, Agency of Transportation "Standard Specifications for Construction", dated 2018 (designated VAOT), and the latest revision of the Agency of Transportation "General Special Provisions".

Part 2 PRODUCTS

2.01 AGGREGATE MATERIALS

A. Sand Borrow and Cushion (VTRANS 703.03A)

Sieve Designation	Percent by Weight Passing Sieve
2 inch	100
1-1/2 inch	90-100
1/2 inch	70-100
No. 4	60-100
No. 100	0-20
No. 200	0-8

B. Granular Borrow (VTRANS 703.04A)

Sieve Designation	Percent by Weight Passing Sieve
No. 4	20-100
No. 200	0-12

C. 3/8 Inch Stone (VTRANS 704.02A)

Sieve Designation	Percent by Weight Passing Sieve
1/2 inch	100
3/8 inch	85-100
No. 4	10 – 30
No. 8	0 - 10
No. 16	0 - 5

D. 3/4 Inch Stone (VTRANS 704.02B)

Sieve Designation	Percent by Weight Passing Sieve
1 inch	100
3/4 inch	90-100
3/8 inch	20 – 55
No. 4	0-10
No. 8	0-5

E. 1-1/2 Inch Stone (VTRANS 704.02C)

Sieve Designation	Percent by Weight Passing Sieve
2 inch	100
1-1/2 inch	95-100
3/4 inch	35-70
3/8 inch	10-30
No. 4	0-5

F. Gravel for Subbase (VTRANS 704.04A)

Sieve Designation	Percent by Weight Passing Sieve
No. 4	20-60
No. 100	0-12
No.200	0-6

G. Crushed Gravel, Coarse Graded (VTRANS 704.05A)

Sieve Designation	Percent by Weight Passing Sieve
4 inch	95-100
No. 4	25-50
No. 100	0-12
No. 200	0-6

H. Crushed Gravel, Fine Graded (VTRANS 704.05B)

Sieve Designation	Percent by Weight Passing Sieve
2 inch	100
1-1/2 inch	90-100
No. 4	30-60
No. 100	0-12
No. 200	0-6

I. Dense Graded Crushed Stone for Subbase (VTRANS 704.06A)

Sieve Designation	Percent by Weight Passing Sieve
3-1/2 inch	100
3 inch	90-100
2 inch	75-100
1 inch	50-80
1/2 inch	30-60
No. 4	15-40
No. 200	0-6

J. 1-1/2 inch Washed Crushed Stone (AASHTO M43 #4)

Sieve Designation	Percent by Weight Passing Sieve
2 inch	100
1-1/2 inch	90-100
1 inch	20-55
1/2 inch	0-15
3/8 inch	0-5

K. Granular Backfill for Structures (VTRANS 704.08A)

Sieve Designation	Percent by Weight Passing Sieve
3 inch	100
No. 4	45/75
No. 100	0-12
No. 200	0-6

L. Drainage Aggregate (VTRANS 704.16A)

Sieve Designation	Percent by Weight Passing Sieve
1 inch	100
3/4 inch	90-100
3/8 inch	20-55
No. 4	0-10
No. 8	0-5

M. Aggregate for EPSC (VTRANS 704.17A)

Sieve Designation	Percent by Weight Passing Sieve
6 inch	100
4 inch	80-100
3 inch	40-60
2 inch	0-20

N. Type I stone for stone fill (VTRANS 706.04, Type I)

The longest dimension of the stone shall vary from 1 inch to 12 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of four inches.

2.02 SOURCE QUALITY CONTROL

- A. Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557.
- B. If tests indicate materials do not meet specified requirements, change material or material source and retest.
- C. Provide materials of each type from same source throughout the Work.

Part 3 EXECUTION

3.01 STOCKPILING

- A. Stockpile materials on site at locations designated by Owner.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Direct surface water away from stockpile site so as to prevent erosion or deterioration of materials.

3.02 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.
- B. If a borrow area is indicated, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 2500
EROSION AND SEDIMENT CONTROL

Part 1 GENERAL

1.01 SECTION INCLUDES

- A. Stabilization Practices.
- B. Structural Erosion and Sediment Practices.

1.02 RELATED SECTIONS

- A. Section 31 0000 Earthwork.
- B. Section 31 0516 Aggregates for Earthwork.
- C. Section 32 1216 Asphalt Paving.
- D. Section 33 4000 Storm Drainage Utilities.
- E. Section 33 4923 Storm Chamber System.

1.03 REFERENCES

- A. ASTM D2487 - Classification of Soils for Engineering Purposes.
- B. Vermont Construction General Permit 3-9020 (latest version).
- C. Vermont Standards and Specifications for Erosion Prevention and Sediment Control (VSS).

1.04 SUBMITTALS FOR REVIEW

- A. Samples: Submit sieve analyses and proctors for each type of fill. Soil testing to be provided by testing laboratory accepted by engineer.
- B. Product Data: Submit data on materials to be used.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
- D. Notification of On Site Plan Coordinator (OSPC)
- E. Storm Water Inspection Reports for General Permit Erosion and Sediment Controls

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with State of Vermont, Agency of Transportation "Standard Specifications for Construction", dated 2018 (designated VAOT), and the latest revision of the Agency of Transportation "General Special Provisions".
- B. Perform Work in accordance with the requirements of Vermont Construction General Permit 3-9020 (latest version), Vermont Standards for Erosion Prevention and Sediment Control, and the construction plans.
- C. Provide products and perform work in accordance with "The Vermont Standards & Specifications for Erosion Prevention & Sediment Control" published by The Vermont Department of Environmental Conservation, latest revision.

Part 2 PRODUCTS

2.01 MATERIALS

- A. Non-woven Filter Fabric: Mirafi 140N or equivalent.
- B. Woven Filter Fabric: Mirafi 500X or equivalent
- C. Erosion Control Matting: North American Green S75BN
- D. Mulch: Hay or straw which is air-dried and free of undesirable seeds and coarse materials shall be utilized.

- E. Woven wire fabric (14 gauge minimum) 6 inch x 6 inch
- F. Solid Oak Posts 2 inch x 2 inch x 30 inch Long

2.02 ACCESSORIES

- A. Materials shall be in accordance with State of Vermont, Agency of Transportation "Standard Specifications for Construction", dated 2018 (designated VAOT)

Part 3 EXECUTION

3.01 Perform Work in accordance with all applicable permits and all contract documents.

3.02 The Contractor shall function as the Principal Operator and employ and designate a person to serve as the On-Site Plan Coordinator as defined by the Construction General Permit. This person shall, as required by the permit:

- A. Meet all qualifications established for an On-Site Plan Coordinator.
- B. Perform all of the duties and record-keeping requirements as specified for the On-Site Plan Coordinator or "Permittee".
- C. Maintain all records required by the On-Site Plan Coordinator
- D. Make document immediately ready for inspection by the Owner and Engineer

3.03 Limits of disturbance (LODs) should be the first construction item implemented on a construction site. All disturbance areas bordering areas of existing vegetation should be demarcated with a barrier appropriate to the location.

- A. Chain-link Fence: used to prevent public access to active work areas.
- B. Construction Fence: for use where the proposed disturbance is limited in both scale and duration. Examples include areas where only sidewalk construction is planned.

3.04 MULCHING

- A. All disturbed surfaces shall be temporarily or permanently seeded and mulched within 7 days of disturbance.
- B. Seeding and mulching of disturbed areas shall take place within 48 hours of final grading.
- C. Mulch: Hay or straw which is Air-dried and free of undesirable seeds and coarse materials shall be utilized. Apply mulch at a rate of 90-100 pounds /1,000 square feet. Mulch shall cover more than 90% of the surface.
- D. Mulch shall not be placed on slopes of greater than 3:1. Seed impregnated erosion control netting shall be used in its place.
- E. Seed: seeding shall occur after May 15 and prior to September 15th in order to establish a stand of grass prior to ground freezing. Seed shall be in accordance with seed specification on the design drawings.
- F. Cover seed with 1/4-inch soil unless hydroseed is used.
- G. Mulch anchoring: Use a mulch anchoring tool (blunt, straight discs) which shall be pulled over the mulch. Use degradable mulch netting when slopes are greater than 10%. Install in accordance with Rolled Erosion Control product.
- H. Topsoil and mulching not to be applied in areas of travel ways.

3.05 EROSION CONTROL MATTING

- A. Install erosion control matting shall be installed in:
 - 1. All locations where it is indicated on the plans.
 - 2. In all locations where the proposed slope is greater than 10%.
 - 3. In all locations that require temporary stabilization where the slope is greater than 10%.
- B. Mats or blankets shall be installed vertically downslope.

- C. Mats or blankets shall be overlapped a minimum of 4 inches. The uphill blanket shall overlap the downhill blanket.
- D. Matting and blankets shall be anchored in accordance with the manufacturer's recommendations, with a minimum staple size and spacing as shown on the drawings.
- E. Slope surface shall be free of rocks, clods, sticks and grass. mats/ blankets shall have good soil contact in all areas.
- F. Apply permanent seeding before placing blankets.
- G. Apply matting and/blanket materials and staple to maintain direct contact with the soil. do not stretch.

3.06 SILT FENCE

- A. Construct silt fence in locations as shown on plans.
- B. Construct to the maximum extent possible parallel to the existing grade.
- C. Silt fence shall be pre-fabricated erosion control fence by Mirafi or equal, or constructed in place.
- D. Woven wire fence to be fastened securely to fence posts with wire ties or staples.
- E. Filter fabric to be fastened securely to woven wire fence ties spaced every 24 inches at top of mid section.
- F. When two sections of filter cloth adjoin each other, they shall be overlapped by 6 inches, wrapped together around a stake and stapled.
- G. Inspection shall be frequent (minimum once a week and after every rainfall). Maintenance shall be performed as needed, and sediment removed when "bulges" develop in silt fence
- H. The bottom 18 inches of fabric shall be buried a depth of 8 inches with backfill soil placed on top of the fabric.
- I. Posts shall be embedded a minimum of 18 inches.

3.07 CATCH BASIN INLET PROTECTION DEVICE

- A. Clear the area of all debris that will hinder excavation.
- B. Grade approach to the inlet uniformly around the basin.
- C. Weep holes shall be protected by gravel.
- D. Upon stabilization of contributing drainage area, seal weep holes, fill basin with stable soil to final grade, compact it properly and stabilize with permanent seeding.
- E. Gravel bags, grate guards, Filtrex or Sediguard inlet protection devices may be used. Submit product information to engineer for review prior to use. Install products in accordance with the manufacturer's instructions and the latest edition of the VT EPSC Standards and Specifications.

3.08 CONSTRUCTION ENTRANCE

- A. Install where located on plans and in all locations where vehicles leave the site.
- B. Install in accordance with the dimensions shown on the construction plans.
- C. Stone size: use type 1 stone-site/earthwork specifications. Place stone over Mirafi 500X Filter Fabric.
- D. Surface water: all surface water flowing or diverted toward construction entrance shall be piped across the entrance.
- E. Maintenance: the entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public right-of-ways. this may require periodic top dressing with additional stone as conditions demand. repair and/or cleanout any measures used to trap sediment. all sediment spilled, dropped, washed, or tracked onto public right-of-ways must be removed immediately.
- F. Wheels shall be cleaned to remove mud prior to entrance onto public right-of-way. when washing is required, it shall be done on an area stabilized with stone which drains into an approved sediment trapping device.

3.09 DUST CONTROL

- A. Control dust for the duration of construction by the following methods, as necessary and if requested by the Town or Engineer:
1. Application of water
 2. Wet sweeping of surfaces, including adjacent road surfaces.
 3. Covering material stockpiles
 4. Ensuring that stone materials imported are clean, with little fine content.
 5. Stabilizing (temporary or permanent) disturbed areas when not under active construction.

END OF SECTION

SECTION 32 1216

ASPHALT PAVING

Part 1 GENERAL

1.01 SECTION INCLUDES

- A. Cutting and removal of all existing pavement as specified on the Design Drawings.
- B. Asphaltic concrete paving, wearing binder or base course. Surface sealer.
- C. Aggregate base course.
- D. Painting as required.

1.02 REFERENCES

- A. The State of Vermont, Agency of Transportation "Standard Specifications for Construction", dated 2018 (designated VAOT), and the latest revision of the Agency of Transportation "General Special Provisions."

1.03 QUALITY ASSURANCE

- A. All pavement work will be subject to quality control testing as specified by the VAOT.
- B. Obtain materials from same source throughout.

1.04 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with the State of Vermont, Agency of Transportation "Standard Specifications for Construction", dated 2018 (designated VAOT), and the latest revision of the Agency of Transportation "General Special Provisions."

Part 2 PRODUCTS

2.01 MATERIALS

- A. Bituminous materials (including crack filler) shall comply with the Agency of Transportation "Standard Specification for Construction", dated 2018 (designated VAOT). The bituminous wearing course shall be Type III. The bituminous base course shall be Type II.
- B. Pavement markings shall be made from a normal type retro-reflectorized paint in standard colors (yellow or white) and per 646.06 VAOT. All colors are to be approved by the Owner.
- C. Signage, unless otherwise indicated, shall be in accordance with Section 675 VAOT.

Part 3 EXECUTION

3.01 COORDINATION OF WORK

- A. The Contractor shall coordinate all work to minimize impact on traffic and other work under this contract.

3.02 REMOVAL

- A. All pavement is to be saw-cut at all limits of removal, and recycled.

3.03 EXAMINATION

- A. Verify base conditions.
- B. Verify that existing subgrade is dry.
- C. Verify gradients and elevations of base are correct.

3.04 WEATHER LIMITATIONS

- A. Bituminous material shall be applied only when the ambient temperature is greater than 45 degrees Fahrenheit and the road surface and aggregate is dry.
- B. Bituminous material shall not be placed between November 30th and May 1st unless directed to do so by the Owner and Engineer.

3.05 PLACEMENT OF MATERIALS

- A. Install sub-base as shown on Construction Drawings, or to match existing adjacent sub-base.
- B. Coat existing saw-cut edge of pavement with emulsion. Apply in accordance with manufacturer's instructions.
- C. Placement of bituminous material shall be completed in accordance with the State of Vermont, Agency of Transportation "Standard Specifications for Construction", dated 2018 (designated VAOT).
- D. Placement of bituminous crack filler shall comply with Section 417 VAOT. Apply in accordance with manufacturer's instructions.
- E. The type and thickness of pavement shall be as shown on the Construction Drawings.
- F. Pavement markings shall be applied according to Section 646 VAOT. Pavement markings shall be configured as designated on the Design Drawings. A 4 inch wide white line shall be used for all pavement markings if not otherwise specified on the design drawings. Apply all marking in accordance with the manufacturer's instructions. Details not shown on the Plans shall be in conformance with the current edition of the MUTCD.
- G. Rolling of pavement courses shall be done with a 10-ton smooth wheeled roller. Where a roller will not fit, use a hand operated vibratory compactor.
- H. Signage, shall be installed in the location as indicated on the Pavement Marking and Signage plan in the Design Drawings. Install in accordance with Section 675 VAOT. Install signs perpendicular to the primary direction of vehicular travel unless indicated on the plans otherwise. Where the design plans show a sign co-located with a pipe bollard, the sign post shall be cast in concrete inside the pipe bollard.

3.06 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch.
- C. Variation from True Elevation: Within 1/2 inch.

3.07 FIELD QUALITY CONTROL

- A. Provide field inspection and testing per Owners direction.
- B. The Engineer will verify the acceptability of the pavement and markings in appearance and compliance with the requirements of the specification. Restored pavement that does not meet the specifications shall be corrected at no expense to the Owner.

END OF SECTION

SECTION 33 4000
STORM DRAINAGE UTILITIES

Part 1 GENERAL

1.01 SECTION INCLUDES

- A. Site storm sewerage drainage piping, fittings and accessories, manholes, catch basins, covers, and bedding.
- B. Trenching and backfill.

1.02 RELATED SECTIONS

- A. Section 31 0000 Earthwork.
- B. Section 31 0516 Aggregates for Earthwork.
- C. Section 33 4923 Storm Chamber System.

1.03 REFERENCES

- A. Refer to all current and relative ASTM sections.

1.04 SUBMITTALS FOR REVIEW

- A. Submit complete copies of all samples and shop drawings to the Owner and Engineer in pdf format for approval. All related items shall be submitted at the same time.
- B. Product Data: Provide data on pipe materials, pipe fittings, and accessories, manholes, covers, clean-outs and fittings.
- C. On all manufacturers' product cut sheets, specific items submitted for review shall be clearly indicated.
- D. Approval for shop drawings and samples must be received prior to purchasing equipment and products, and prior to starting work.
- E. In-place soil compaction tests and necessary supporting lab work.
- F. Gradation tests for bedding materials and subsurface materials.
- G. Concrete tests including compression tests, on-site slump, temperature, and air entrainment

1.05 SUBMITTALS FOR INFORMATION

- A. Manufacturer's Instructions: Indicate special procedures required to install Products specified.
- B. Certificates: Certify that products meet or exceed specified requirements.

1.06 SUBMITTALS AT PROJECT CLOSEOUT

- A. Record actual locations of pipes, connections, and invert elevations on record drawings.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with appropriate utility company, municipality and state codes.
- B. Protect all products and materials, before, during, and after installation.
- C. Where applicable, follow the manufacturer's recommended procedures for unloading, storage and installation of all products and materials.

1.08 EXISTING UTILITIES

- A. Location of utility installations and underground structures are shown as approximate on contract documents.

- B. Prior to submitting a proposal, the contractor shall fully review all drawings related to the existing site conditions, and shall become fully familiar with the nature and extent of the work to be done, and the materials required to complete the work.
- C. All utilities shall be located by the contractor prior to beginning construction. Report all discrepancies between that shown on the drawings and that found in the field to the engineer.
- D. Existing utilities shall be protected and supported during construction.
- E. All water, gas, cable, telephone, electric, sewer and other utilities found to interfere with the proposed construction shall be relocated in a manner acceptable to the engineer.

Part 2 PRODUCTS

2.01 STORM SEWER PIPE MATERIALS

- A. Plastic Pipe: ASTM D3034, SDR 35, Poly Vinyl Chloride (PVC) material; bell and spigot style rubber ring sealed gasket joint, ASTM F-758.
- B. Ductile Iron Pipe: Meeting AWWA/ANSI C150/A21.50-91
- C. High Density Polyethylene Pipe: AASHTO M 294, AASHTO M 252

2.02 ACCESSORIES

- A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, clean-outs, reducers, traps and other configurations required.
- B. Flared-End-Sections shall be a precast reinforced concrete pipe flared-end-section meeting ASTM C76 with a transition to PVC pipe as shown on the drawings.
- C. Transition Couplings: as needed for connection to roof drain outlets.

2.03 CATCH BASINS, MANHOLES AND COVERS

- A. Manhole and Catch Basin sections: Reinforced precast 4000 psi concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C923.
- B. Lid and frame: ASTM A48, Class 30B, 24 inch opening, cast iron construction, machined flat bearing surface, removable lid with H20 rating. Lid and frame shall be placed off-center over manhole steps. Catch basin lids to be grated.
- C. Manhole steps: Polyethylene (PE) coated ½ inch diameter steel rungs. Steps shall be installed at 12 inches on center.
- D. All pipe penetrations shall be pre-cast or cleanly cored, and shall be clear of all joints by a minimum of 6 inches of full wall thickness.
- E. Riser sections shall be precast concrete unless otherwise approved by the Engineer.

2.04 CLEAN-OUTS

- A. Pipe and Cover: Vertical pipe shall be PVC SDR 35. Clean-out frame and cover shall be Lebaron No. LA0910 or approved equal, and labeled "CLEANOUT".

2.05 BEDDING AND COVER MATERIALS

- A. Bedding: Fill Type meeting the requirements of Sand Blanket, Sand Fill, or Sand Borrow.
- B. Cover: Fill Type meeting the requirements of Sand Blanket, Sand Fill, or Sand Borrow or Common Fill as required by the drawings at various depths of cover.

Part 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions.
- B. Verify that building connections and municipal utility storm sewer size, location, and invert are as indicated.

- C. Notify local municipalities 48 hours prior to commencing any storm sewer work. Specify which services are likely to be interrupted and the estimated schedule of work.

3.02 TRENCHING AND BEDDING

A. Preparation

1. Identify required lines, levels, contours, and datum locations.
2. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
3. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
4. Maintain and protect above and below grade utilities which are to remain.
5. Cut out soft areas of subgrade not capable of compaction in place. Backfill with appropriate Fill Type meeting the requirements of the Earthwork Section 310000 and compact to density equal to or greater than requirements for subsequent backfill material.

B. Excavating

1. Excavate subsoil required for utilities to municipal utilities.
2. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.
3. Do not interfere with 45 degree bearing splay of foundations.
4. Excavation shall be 6 inches below pipe inverts to accommodate the bedding material. Correct areas over Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
5. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

- C. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 8 inches compacted depth; compact to 95 percent of standard optimum density.

- D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact to 95 percent of modified optimum density.

- E. Maintain optimum moisture content of bedding material to attain required compaction density.

3.03 INSTALLATION – PIPE

- A. During loading, transportation and unloading, take care to prevent damage to pipes and fittings. Examine all pipes and fittings before laying, no damaged piece shall be installed. Take care to keep inside of pipe clean.

- B. Coordinate the Work with termination of foundation and roof drain connections outside building, connection to municipal storm sewer utility service, and trenching.

- C. Maintain separation from other piping in accordance with VT DEC requirements.

- D. Install pipe, fittings, and accessories in accordance with manufacturer's instructions.

- E. Lay pipe straight and to slope gradients noted on drawings; with maximum variation from true slope of 1:1000.

- F. Pipe shall be laid with bell ends facing upslope.

- G. Where pipe is laid on a slope of 5 percent or more, the laying shall start at the low end and proceed uphill, with the bell ends upgrade.

- H. A watertight plug shall be placed in the open ends of installed pipe when pipe laying is not in progress.

- I. If any defective piping or fitting is discovered after it has been laid, it shall be removed and replaced at the contractor's expense.

3.04 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen fill materials.

- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

- C. Refer to applicable details for backfill material type and compaction requirements.

- D. Maintain optimum moisture content of fill materials to attain required compaction density.

- E. Remove surplus fill materials from site.
- F. Leave fill material stockpile areas completely free of excess fill materials.

3.05 INSTALLATION - MANHOLES, CATCH BASINS AND CLEAN-OUTS

- A. Form bottom of excavation clean and smooth to correct elevation. Provide 12-inch crushed stone base.
- B. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe end sections.
- C. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.
- D. Establish elevations and pipe inverts for inlets and outlets as indicated.
- E. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.06 RESTORATION OF THE SURROUNDING SITE

- A. At the completion of storm sewer line installation, the surrounding site shall be restored according to drawings (if shown), otherwise to a condition equal to that existing before the beginning of the work.

END OF SECTION

SECTION 33 4923
SPECIAL PROVISION STORM CHAMBER SYSTEM

Part 1 GENERAL

1.01 SECTION INCLUDES

- A. Corrugated polyethylene infiltration chambers, end caps, pipe connections, drainage aggregate, geotextile, inspection ports and related items as depicted on project plans.

1.02 RELATED SECTIONS

- A. Section 31 0000 Earthwork.
- B. Section 31 0516 Aggregates for Earthwork.
- C. Section 33 4000 Storm Drainage Utilities.

1.03 REFERENCES

- A. Refer to all current and relative ASTM sections.

1.04 SUBMITTALS FOR REVIEW

- A. Prior to commencement of work, the Contractor shall submit shop drawings to the Engineer showing relevant layout and construction details, along with volume estimates.

1.05 SUBMITTALS FOR INFORMATION

- A. Manufacturer's Instructions: Indicate special procedures required to install Products specified.
- B. Certificates: Certify that products meet or exceed specified requirements.

1.06 SUBMITTALS AT PROJECT CLOSEOUT

- A. Record actual locations of system, and invert elevations on record drawings.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with appropriate utility company, municipality and state codes.
- B. Protect all products and materials, before, during, and after installation.
- C. Follow the manufacturer's recommended procedures for unloading, storage and installation of all products and materials.

Part 2 PRODUCTS

2.01 POLYETHYLENE CHAMBERS

- A. Chambers to be constructed of virgin polyethylene and rated to support HS-20 loading when properly installed. Each chamber section is to measure 43.8" long, 100" wide, 60" high, and provide a minimum installed storage of 166.3 cubic feet.

2.02 GEOTEXTILE FABRIC

- A. Non Woven: Geotex 601T, Mirafi 180N or approved equal.
- B. Woven: Geotex 315WT, Mirafi 600X or approved equal.

Part 3 EXECUTION

3.01 INSTALLATION

- A. Excavate bed and prepare subgrade per engineer's plans and manufacturer's requirements.
- B. Place non-woven geotextile over prepared soils and up excavation walls.
- C. Place clean, crushed, angular stone foundation 12" (300 mm) min. Compact to achieve a flat surface.
- D. Install manifolds and lay out woven scour geo textile at inlet rows [min. 10.3 ft (3.2 m)] at each inlet end cap. Place a continuous piece (no seams, double layer) along entire length of Isolator® Row.
- E. Install chambers by overlapping end corrugations. Maintain a minimum of 9" spacing between rows. Install end caps at both ends of each row. Neatly cut end caps to closely fit pipe connections.
- F. Evenly backfill to avoid displacement and/or unequal support of chambers. Fully extend stone backfill horizontally to edges of excavation. Continue stone backfill and compaction as indicated in the contract documents.

END OF SECTION