

**BIORETENTION - EROSION PREVENTION AND SEDIMENT CONTROL SEQUENCING**

- INSTALL SILT FENCE AND/OR OTHER APPROPRIATE TEMPORARY SEDIMENT AND EROSION CONTROL DEVICES TO PREVENT SEDIMENT FROM ENTERING THE BIORETENTION DURING CONSTRUCTION.
- RUNOFF SHALL NOT BE DIRECTED INTO THE BIORETENTION FACILITY UNTIL:
  - ALL UPGRADIENT CONTRIBUTING AREAS HAVE BEEN PERMANENTLY STABILIZED.
  - THE BIORETENTION FACILITY IS COMPLETE AND ALL AREAS SUBJECT TO RUNOFF HAVE BEEN PERMANENTLY STABILIZED.
- REMOVE TEMPORARY EROSION PREVENTION AND SEDIMENT CONTROL DEVICES AFTER THE BIORETENTION IS PLACED ONLINE AND IS RECEIVING RUNOFF.
- IN THE EVENT THAT SEDIMENT IS INTRODUCED INTO THE BIORETENTION, THE SEDIMENT AND ALL CONTAMINATED MATERIAL (SUCH AS MULCH OR SOIL MIX) SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR AT NO EXPENSE TO THE OWNER.

**BIORETENTION - GENERAL CONSTRUCTION SPECIFICATIONS**

- THE BIORETENTION SHALL BE EXCAVATED TO THE DIMENSIONS, SIDE SLOPES, AND ELEVATIONS SHOWN ON THE DRAWINGS. THE METHOD OF EXCAVATION SHALL MINIMIZE THE COMPACTION OF THE SUBGRADE SOIL WITHIN THE FOOTPRINT OF THE BIORETENTION AREA.
- THE BIORETENTION SOIL MIXTURE SHALL BE PLACED AND GRADED USING LOW GROUND CONTACT PRESSURE EQUIPMENT. TO THE EXTENT POSSIBLE, WORK SHALL BE PERFORMED BY EQUIPMENT OPERATING ON THE ADJACENT SLOPES.
- ALL WORK RELATED TO PLACEMENT OF MULCH AND PLANT INSTALLATION SHALL BE ACCOMPLISHED WITH METHODS AND EQUIPMENT THAT DO NOT RESULT IN FURTHER COMPACTION OF THE BIORETENTION SOIL MIX.

**BIORETENTION - MATERIAL SPECIFICATIONS:**

MULCH SHALL BE HARDWOOD CHIP MULCH IF PLUGS OR PLANTINGS ARE USED AND STRAW MULCH IF SEED MIX IS SPECIFIED.

**HARDWOOD CHIP MULCH**

IF HARDWOOD CHIP MULCH IS USED IT SHALL CONSIST OF RAW WOOD MATERIAL FROM ONLY HARDWOOD TIMBER AND SHALL BE A PRODUCT OF A MECHANICAL CHIPPER, HAMMERMILL, OR TUB GRINDER. MULCH CONSISTING OF SOFTWOOD TIMBER, MANUFACTURED BOARDS, AND/OR CHEMICALLY TREATED WOOD IS UNACCEPTABLE. THE MATERIAL SHALL BE UNIFORM IN COLOR AND SUBSTANTIALLY FREE OF MOLD, DIRT, SAND/ST, WEEDS, SEED AND FOREIGN MATERIAL. THE MATERIAL SHALL BE AGED A MINIMUM OF 12 MONTHS, BUT SHALL NOT BE IN AN ADVANCED STATE OF DECOMPOSITION.

THE MULCH MATERIAL, WHEN DRIED, SHALL ALL PASS A FOUR (4) INCH SCREEN AND NOT MORE THAN 20 PERCENT BY MASS SHALL PASS A ONE TENTH (0.1) INCH SCREEN. GRASS CLIPPINGS ARE UNSUITABLE FOR MULCH.

**STRAW MULCH**

IF STRAW MULCH IS USED IT SHALL CONSIST OF AIR-DRIED MATERIAL, FREE OF UNDESIRABLE SEEDS & COARSE MATERIALS. STRAW MULCH SHALL BE APPLIED DIRECTLY AFTER SEEDING AND SHALL BE PLACED AT AN APPLICATION RATE OF 90-100 LBS PER 1,000 SF OF SURFACE AREA (±2 TONS/ACRE). 90% OF THE SURFACE SHALL BE COVERED. WOOD FIBER MULCH (HYDROMULCH) MAY BE USED TO SECURE THE STRAW MULCH AND SHALL BE APPLIED WITH A HYDROSSIDER IMMEDIATELY AFTER MULCHING AT AN APPLICATION RATE OF 17 LBS PER 1,000 SF (±500 LBS/ACRE).

**BIORETENTION SOIL MIX**

THE BIORETENTION SOIL CONSISTS OF TWO LAYERS: THE UPPER MEDIA LAYER AND THE LOWER MEDIA LAYER. THE UPPER MEDIA LAYER SHALL EXTEND 12" BELOW THE MULCH LAYER AND SHALL CONSIST OF USDA SAND TO LOAMY SAND CLASSIFICATION, OR A WELL BLENDED, HOMOGENEOUS MIXTURE OF THE FOLLOWING COMPONENTS:

SAND	85-95% (NO MORE THAN 25% FINE OR VERY FINE SAND)
SILT & CLAY	0-15% (NO MORE THAN 25% CLAY CONTENT BY WEIGHT)
ORGANICS	0-3% (COMPOST) OR 3-7% (PEAT OR OTHER ORGANIC MATERIAL)

\*ORGANICS SHOULD CONSIST OF COMPOST THAT MEETS THE DEFINITION OF "COMPOST" IN THE AGENCY'S SOLID WASTE MANAGEMENT RULES OR THE CONTAINMENT STANDARDS IN THE VERMONT SOLID WASTE MANAGEMENT RULES §6-1104(g)(6-7), §6-1105(e)(8-9), AND §6-1106(e)(7-9).

THE BIORETENTION SOIL MIX SHALL BE FREE OF STONES, STUMPS, OR ROOTS LARGER THAN TWO (2) INCHES IN ANY DIMENSION. THE SOIL MIX SHALL BE FREE OF NOXIOUS WEEDS.

THE BIORETENTION SOIL SHALL BE TESTED FOR A PHOSPHORUS SATURATION RATIO (PSR) LESS THAN OR EQUAL TO 0.10. TESTING OF THE SOIL SHALL FOLLOW THE FOLLOWING PROCEDURE:

- SAMPLES ARE TO BE AIR DRIED AND SIEVED THROUGH 2 MM PRIOR TO TESTING.
- AIR-DRY, SIEVED SOIL SAMPLES ARE THEN TO BE EXTRACTED WITH THE MEHLICH-3 SOLUTION (0.2 M CH<sub>3</sub>COOH + 0.25 M NH<sub>4</sub>NO<sub>3</sub> + 0.015 M NH<sub>4</sub>F + 0.013 M HNO<sub>3</sub> + 0.001 M EDTA) BY SHAKING A SOIL-SOLUTION SUSPENSION FOR 5 MINUTES AT A 1:10 (SOIL MASS-SOLUTION) RATIO, FOLLOWED BY FILTERING TO REMOVE PARTICLES ABOVE 2 μm IN SIZE (0.45 μm PORE SIZE IS ALSO ACCEPTABLE).
- EXTRACTS FROM THE MEHLICH-3 PROCEDURE ARE TO BE ANALYZED FOR P, Fe, AND AI BY ICP-OES.
- THE PSR IS THEN CALCULATED AS FOLLOWS:

$$PSR = \frac{(P_{M3}/50) + (A_{M3}/27)}{(P_{M3}/50) + (A_{M3}/27)}$$

WHERE:  
 P<sub>M3</sub> = MEHLICH-3 P IN MG P PER KG DRY SOIL  
 Fe<sub>M3</sub> = MEHLICH-3 Fe IN MG Fe PER KG DRY SOIL  
 A<sub>M3</sub> = MEHLICH-3 AI IN MG AI PER KG DRY SOIL

MEHLICH-3 EXTRACTIONS MUST BE USED FOLLOWING THE ABOVE PROTOCOL. OTHER SOIL TEST EXTRACTIONS, INCLUDING MODIFIED MORGAN TESTS, OXALATE EXTRACTIONS, WATER EXTRACTIONS, OR EXTRACTIONS USED TO QUANTIFY TOTAL ELEMENTS, ARE NOT ACCEPTABLE.

THE LOWER MEDIA LAYER SHALL CONSIST OF USDA SAND TO LOAMY SAND AND GENERALLY MEET THE SAME GRADATION AS THE UPPER MEDIA LAYER. THE LOWER MEDIA LAYER SHALL NOT HAVE COMPOST OR OTHER ORGANIC MATERIAL UNLESS TO SUPPORT A TREE PLANTING. ORGANIC MATERIAL SHALL ONLY BE ACCEPTABLE IN THE LOCATION THAT THE TREE IS PLANTED.

**LOW PERMEABILITY SOIL**

THE SOIL SHALL CONSIST OF A MINIMUM OF 15% PASSING THE No. 200 SIEVE, PLACED AND COMPACTED TO PROVIDE A MAXIMUM PERMEABILITY RATE OF 1 X 10<sup>-5</sup> CM/SEC (0.025 FT/DAY).

**ALTERNATIVE LINERS:**

IN SUBSTITUTION OF LOW PERMEABILITY SOIL LINER THE FOLLOWING MAY BE USED:

- GEOMEMBRANE:**  
 30 MIL LINEAR, LOW DENSITY POLYETHYLENE GEOMEMBRANE
- OVER EXCAVATE THE BOTTOM OF THE BIORETENTION BASIN BY 4".
  - PLACE 4" OF SAND BARRIER (TRANS SPEC. 703.03).
  - PLACE POLYETHYLENE GEOMEMBRANE AND WELD FIELD SEAMS PER MANUFACTURER SPECIFICATIONS.

**BENTONITE:**

- OVER EXCAVATE THE BOTTOM OF THE BIORETENTION BASIN BY 6".
- APPLY BENTONITE AT A MINIMUM RATE OF 2 LBS/SF (MINIMUM OF THICKNESS OF 1/4"), RAKE AS NEEDED TO PROVIDE A CONSISTENT LAYER.
- REPLACE THE OVER EXCAVATED SOIL AND COMPACT.

**EARTH FILL FOR STORMWATER BASINS NOTES**

**MATERIAL**

THE FILL MATERIAL SHALL BE TAKEN FROM APPROVED BORROW AREAS ON OR OFF-SITE. IT MUST BE FREE OF ROOTS, STUMPS, WOOD, RUBBISH, STONES GREATER THAN 6". FROZEN OR OTHER OBJECTIONABLE MATERIALS. FILL MATERIAL FOR THE CENTER OF THE EMBANKMENT SHALL CONFORM TO UNIFIED SOIL CLASSIFICATION GC, SC, CH, OR CL AND SHALL HAVE AT LEAST 30% PASSING THE #200 SIEVE.

**PLACEMENT**

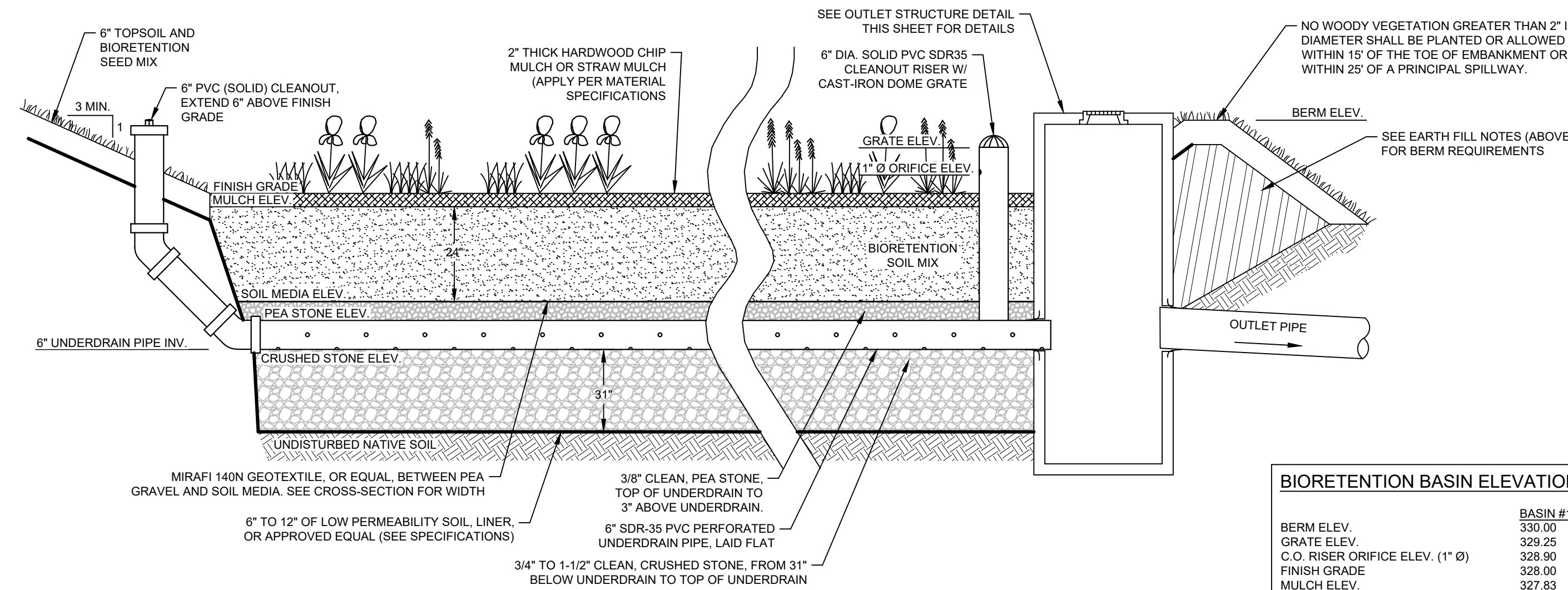
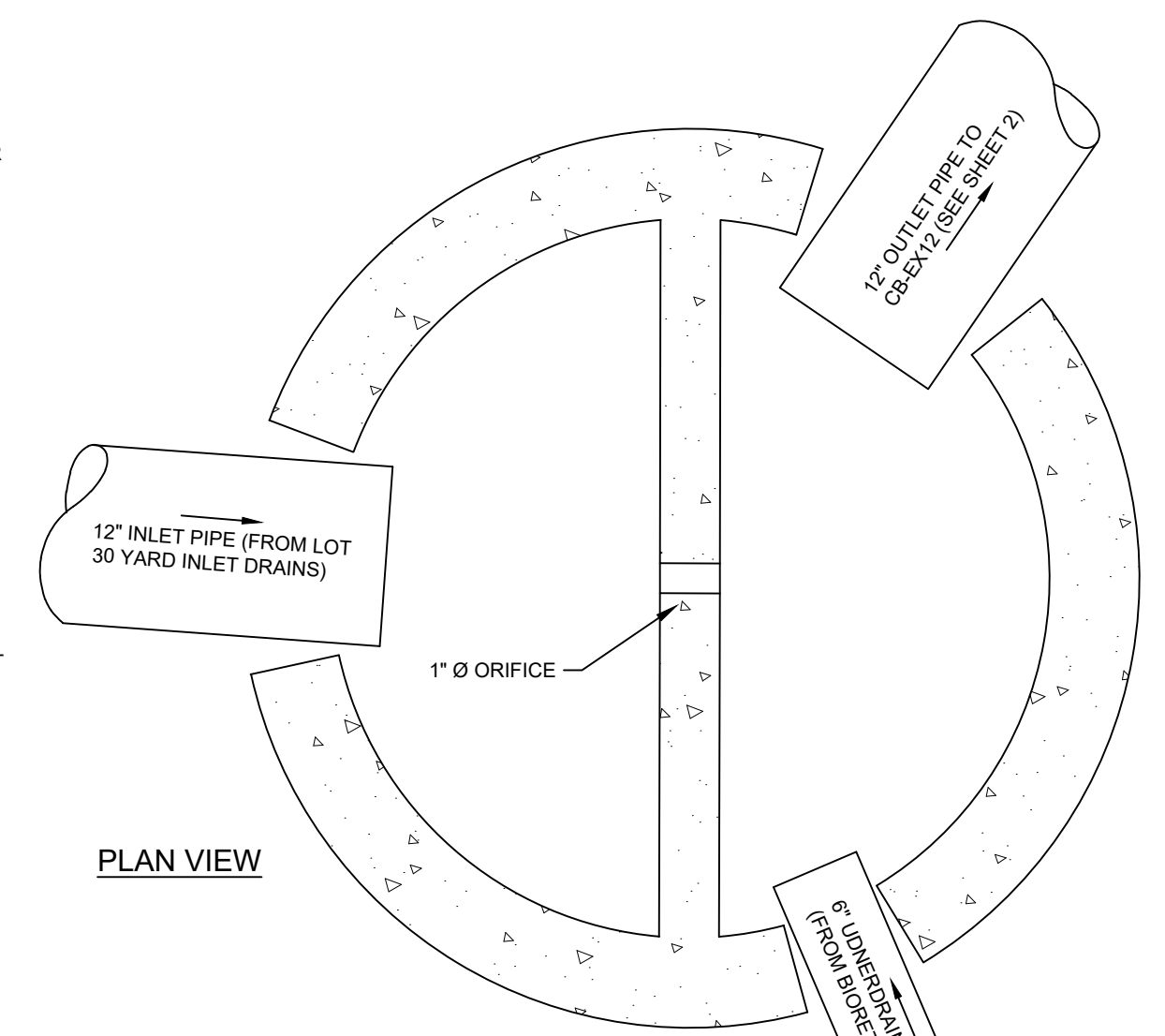
FILL MATERIALS SHALL BE PLACED IN MAXIMUM 8" THICK (BEFORE COMPACTION) LAYERS WHICH ARE TO BE CONTINUOUS OVER THE ENTIRE LENGTH OF THE FILL. THE MOST PERMEABLE BORROW MATERIAL MUST BE PLACED IN THE DOWNSTREAM PORTIONS OF THE EMBANKMENT. THE PRINCIPAL SPILLWAY MUST BE INSTALLED CONCURRENTLY WITH FILL PLACEMENT AND NOT EXCAVATED INTO THE EMBANKMENT.

**COMPACTION**

95% COMPACTION SHALL BE ACHIEVED BY AASHTO METHOD T-99 (STANDARD PROCTOR).

**PIPE COLLARS**

A MINIMUM OF TWO PIPE ANTI-SEEP COLLARS, CONSTRUCTED WITH CLAY OR FLOWABLE FILL, SHALL BE CONSTRUCTED ALONG THE LENGTH OF THE OUTLET PIPE. SEE DETAIL THIS SHEET.

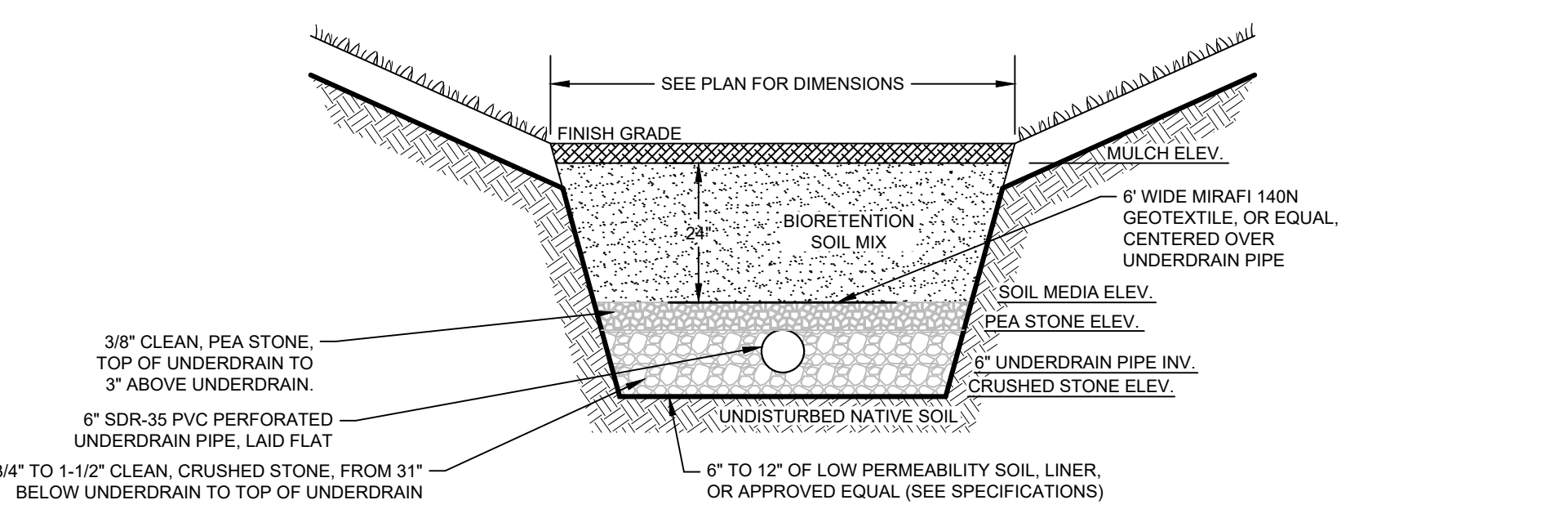


**BIORETENTION BASIN ELEVATION SCHEDULE**

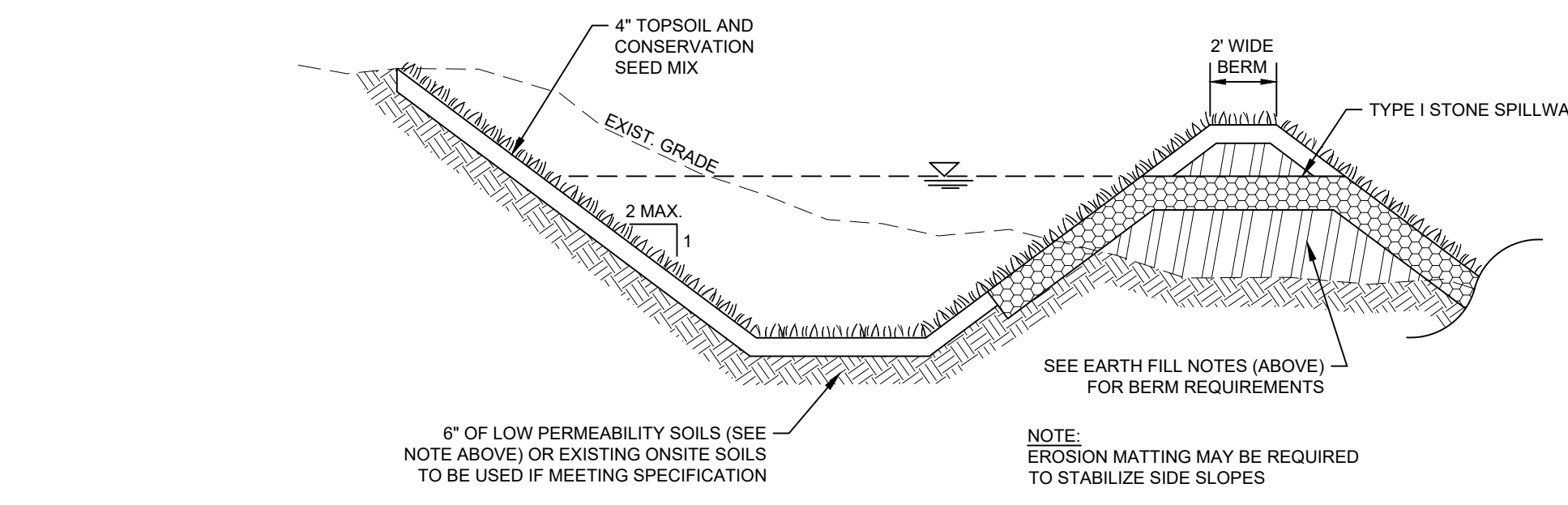
	BASIN #1
BERM ELEV.	330.00
GRATE ELEV.	329.25
C.O. RISER ORIFICE ELEV. (1" Ø)	328.90
FINISH GRADE	328.00
MULCH ELEV.	327.83
SOIL MEDIA ELEV.	325.63
PEA STONE ELEV.	325.58
6" UNDERDRAIN PIPE INV.	325.08
CRUSHED STONE ELEV.	324.83

\*SEE PLANS FOR OUTLET STRUCTURE SCHEDULE

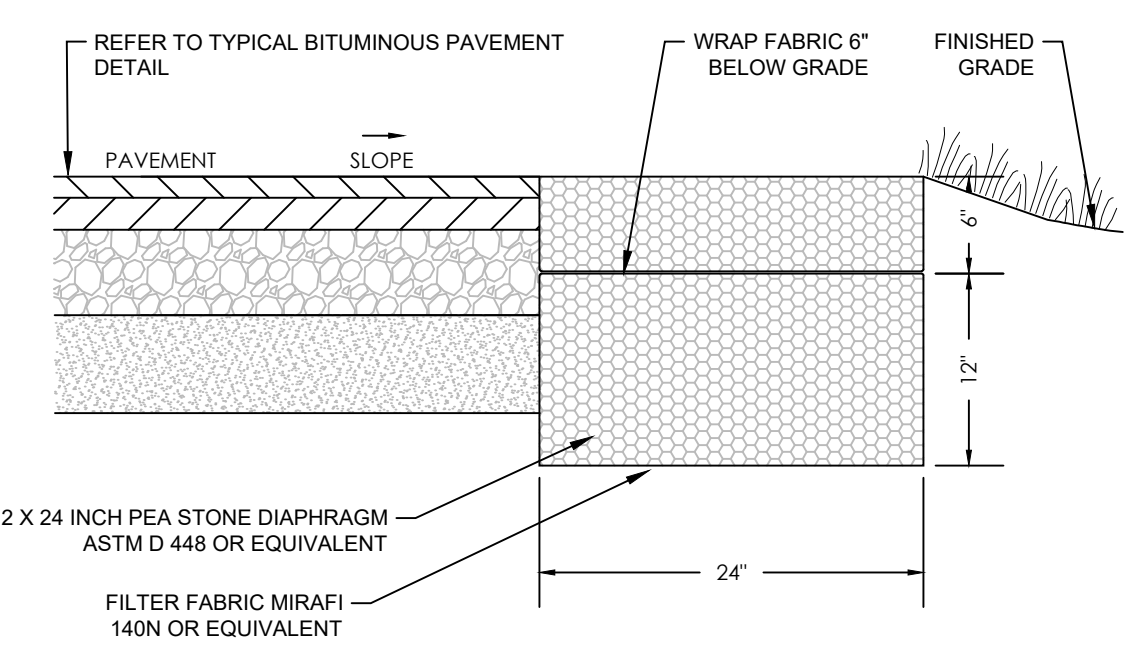
**LOT 30 BIORETENTION BASIN WITH UNDERDRAIN**  
 NTS  
 SIDE VIEW



**LOT 30 BIORETENTION BASIN WITH UNDERDRAIN**  
 NTS  
 CROSS-SECTION

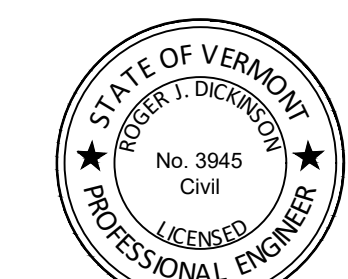


**LOT 30 FOREBAY SECTION**  
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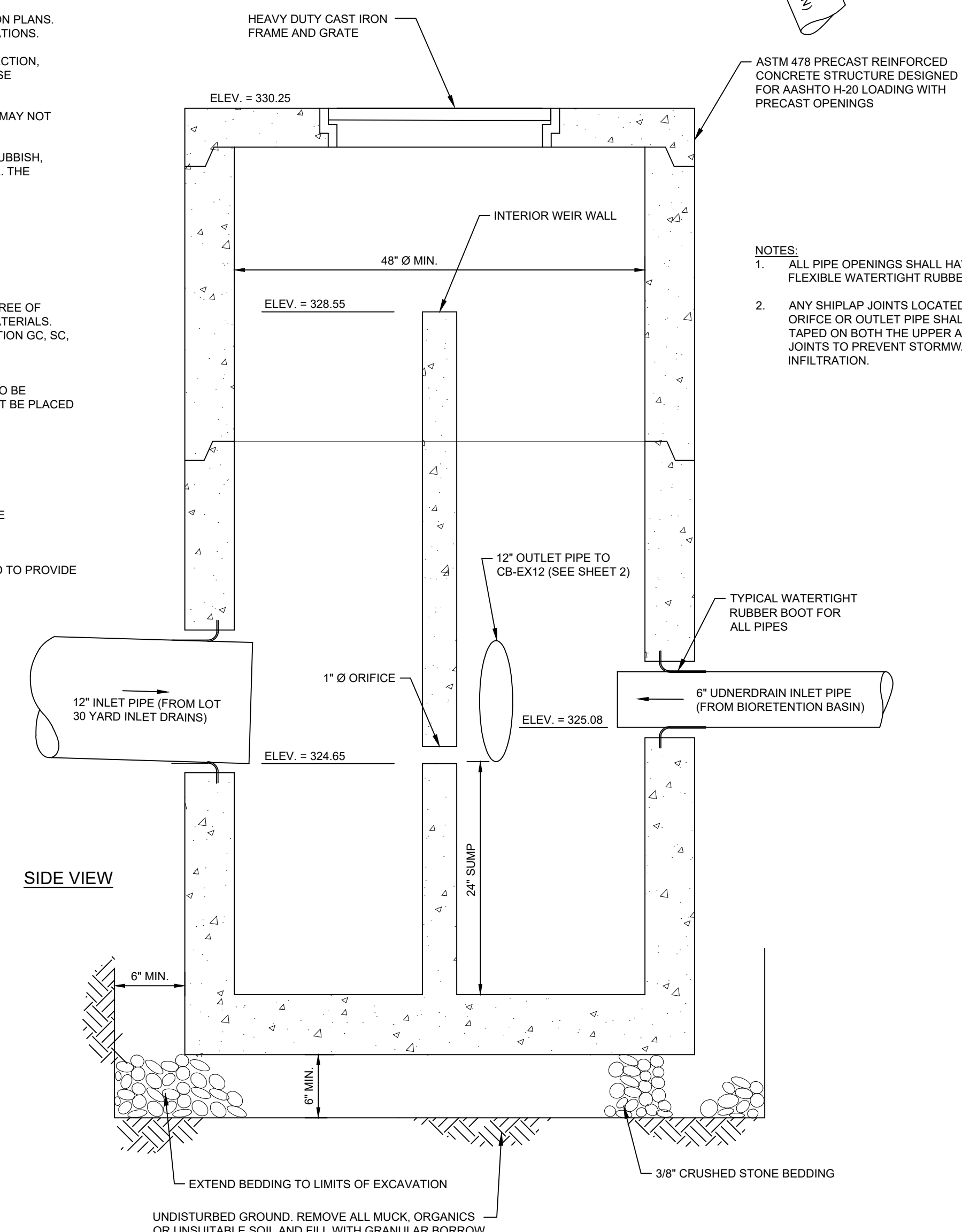


**STONE DIAPHRAGM DETAIL**  
 NTS

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01/11/23	MOVED KALEY'S WAY DETAILS TO SHEET 11A	RD
11/21/22	EDITS TO ADDRESS STATE SW COMMENTS	DJH
Date	Revision	By
These plans shall only be used for the purpose shown below:		
<input type="checkbox"/> Sketch/Concept	<input type="checkbox"/> Act 250 Review	
<input type="checkbox"/> Preliminary	<input type="checkbox"/> Construction	
<input checked="" type="checkbox"/> Final	<input type="checkbox"/> Record Drawing	



**OUTLET STRUCTURE #2 DETAIL**  
 NTS

Project No. 19054  
 Survey N/A  
 Design NDS/RD  
 Drawn DLH  
 Checked RJD  
 Date 5/11/22  
 Scale AS NOTED  
 Sheet number 11

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**STORMWATER DETAILS & SPECIFICATIONS**

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