CONSTRUCTION SPECIFICATIONS FOR BIORETENTION SYSTEMS

1. MATERIAL SPECIFICATIONS
THE ALLOWABLE MATERIALS TO BE USED IN BIORETENTION AREA ARE DETAILED IN TABLE 1.

Parameter	Specification	Size	Notes
Planting Soil Filter Media	Sand 85-88% Silt 8-12% Clay < 2% Organic Matter 5-5%	N/A	USDA soil types loamy sand or sandy loam. The organic matter shall be well aged (6-12 months), well aerated, leaf compost or approved equivalent. See notes below.
Mulch	shredded hardwood	N/A	Aged 6 months, minimum. Finely shredded softwood will be considered by Engineer. See notes below.
Pea Gravel Layer	2 to 4 inch layer of washed stone	3/8 inch	For use between the filter media and the underdrain gravel.
Filter Fabric	Mirafi 140N, Geotex 351 or approved equivalent.	N/A	Non-woven geotextile fabric w/ flow rate of > 110 gallons/minutes/square
Erosion Control Blanket	Bionet S150BN or approved	N/A	Short term biodegradable erosion
Gravel Layer (underdrain)	AASHTO M-43	0.375" to 0.75"	None
Underdrain Piping	ASTM D 1785 or AASHTO M-278	4 inch perforated schedule 40 PVC	3/8" perf. @ 6" on center, 4 holes per row. T's and Y's as needed depending on underdrain
Underdrain Cleanout	Non-perforated PVC pipe, PVC elbow, cap, and all associated fittings	4 inch	None

2. PLANTING SOIL
THE SOIL SHOULD BE A UNIFORM MIX, FREE OF STONES, STUMPS, ROOTS OR OTHER SIMILAR OBJECTS LARGER THAN TWO INCHES. NO OTHER MATERIALS OR SUBSTANCES SHOULD BE MIXED OR DUMPED WITHIN THE BIORETENTION AREA THAT MAY BE HARMFUL TO PLANT GROWTH, OR PROVE A HINDRANCE TO THE PLANTING OR MAINTENANCE OPERATIONS. THE PLANTING SOIL SHOULD BE FREE OF NOXIOUS WEEDS.

THE PLANTING SOIL SHALL BE TESTED AND MEET THE FOLLOWING CRITERIA:

PH RANGE:	5.2 – 7.0
MAGNESIUM:	35 LB/ACRE
PHOSPHOROUS:	75 LB/ACRE
POTASSIUM:	85 LB/ACRE
SOLUBLE SALTS:	NOT TO EXCEED 500 PPM

ALL BIORETENTION AREAS SHOULD HAVE A MINIMUM OF ONE TEST. EACH TEST SHOULD CONSIST OF BOTH THE STANDARD SOIL TEST FOR PH, PHOSPHORUS, AND POTASSIUM AND ADDITIONAL TESTS OF ORGANIC MATTER, AND SOLUBLE SALTS. A TEXTURAL ANALYSIS IS REQUIRED FROM THE SITE'S STOCKPILED TOPSOIL. IF TOPSOIL IS IMPORTED, THEN A TEXTURE ANALYSIS SHOULD BE PERFORMED FOR EACH LOCATION WHERE THE TOP SOIL WAS EXCAVATED.

SINCE DIFFERENT LABS CALIBRATE THEIR TESTING EQUIPMENT DIFFERENTLY, ALL TEST RESULTS SHOULD COME FROM THE SAME TESTING FACILITY. THE TESTING RESULTS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.

SHOULD THE PH FALL OUT OF THE ACCEPTABLE RANGE, IT MAY BE MODIFIED (HIGHER) WITH LIME OR (LOWER) WITH IRON SULFATE PLUS SULFUR.

3. MULCH LAYER SPECIFICATIONS
SHREDDED, AGED, HARDWOOD MULCH IS THE PREFERRED ACCEPTED MULCH TO PREVENT FLOATING DURING STORM EVENTS. PINE MULCH AND WOOD CHIPS WILL FLOAT AND MOVE TO THE PERIMETER OF THE BIORETENTION AREA DURING A STORM EVENT AND ARE TYPICALLY NOT ACCEPTABLE. A FINELY SHREDDED, WELL AGED, ORGANIC DARK PINE MULCH MAY BE ACCEPTABLE ON A CASE BY CASE BASIS. THE CONTRACTOR MUST SUBMIT TO THE ENGINEER A SAMPLE OF MULCH (1–GALLON MIN.) FOR INSPECTION PRIOR TO MULCH DELIVERY TO THE SITE.

MIX APPROXIMATELY HALF OF THE SPECIFIED MULCH LAYER INTO THE PLANTING SOIL TO A DEPTH OF APPROXIMATELY 2 INCHES TO HELP FOSTER A HIGHLY ORGANIC SURFACE LAYER.

4. COMPACTION
IT IS VERY IMPORTANT TO MINIMIZE COMPACTION OF BOTH THE BASE OF THE BIORETENTION AREA AND THE REQUIRED BACKFILL. WHEN POSSIBLE, USE EXCAVATION HOES TO REMOVE ORIGINAL SOIL. IF BIORETENTION AREA IS EXCAVATED USING A LOADER, THE CONTRACTOR SHOULD USE WIDE TRACK OR MARSH TRACK EQUIPMENT, OR LIGHT EQUIPMENT WITH TURF TYPE TIRES. USE OF EQUIPMENT WITH NARROW TRACKS OR NARROW TIRES, RUBBER TIRES WITH LARGE LUGS, OR HIGH PRESSURE TIRES WILL CAUSE EXCESSIVE COMPACTION RESULTING IN REDUCED INFILTRATION RATES AND STORAGE VOLUMES AND IS NOT ACCEPTABLE. COMPACTION WILL SIGNIFICANTLY CONTRIBUTE TO DESIGN FAILURE.

COMPACTION CAN BE ALLEVIATED AT THE BASE OF THE BIORETENTION FACILITY BY USING A PRIMARY TILLING OPERATION SUCH AS A CHISEL PLOW, RIPPER, OR SUBSOILER. THESE TILLING OPERATIONS ARE TO REFRACTURE THE SOIL PROFILE THROUGH THE 12–INCH COMPACTION ZONE. SUBSTITUTE METHODS MUST BE APPROVED BY THE ENGINEER. ROTOTILLERS TYPICALLY DO NOT TILL DEEP ENOUGH TO REDUCE THE EFFECTS OF COMPACTION FROM HEAVY EQUIPMENT.

WHEN BACKFILLING THE BIORETENTION FACILITY, PLACE SOIL IN LIFTS 12" OR GREATER. DO NOT USE HEAVY EQUIPMENT WITHIN THE BIORETENTION BASIN. HEAVY EQUIPMENT CAN BE USED AROUND THE PERIMETER OF THE BASIN TO SUPPLY SOILS AND SAND. GRADE BIORETENTION MATERIALS WITH LIGHT EQUIPMENT SUCH AS A COMPACT LOADER OR A DOZER/LOADER WITH MARSH TRACKS.

5. PLANT INSTALLATION
ROOT STOCK OF THE PLANT MATERIAL SHOULD BE KEPT MOIST DURING TRANSPORT AND ON–SITE STORAGE. THE DIAMETER OF THE PLANTING PIT SHOULD BE AT LEAST SIX INCHES LARGER THAN THE DIAMETER OF THE PLANTING BALL. SET AND MAINTAIN THE PLANT STRAIGHT DURING THE ENTIRE PLANTING PROCESS. THOROUGHLY WATER GROUND BED COVER AFTER INSTALLATION.

TREES SHOULD BE BRACED USING 2" X 2" STAKES ONLY AS NECESSARY AND FOR THE FIRST GROWING SEASON ONLY. STAKES ARE TO BE EQUALLY SPACED ON THE OUTSIDE OF THE TREE BALL.

GRASSES AND LEGUME SEED SHOULD BE TILLED INTO THE SOIL TO A DEPTH OF AT LEAST ONE INCH. GRASS AND LEGUME PLUGS SHOULD BE PLANTED FOLLOWING THE NON–GRASS GROUND COVER PLANTING SPECIFICATIONS.

THE PLANTING SOIL SPECIFICATIONS PROVIDE ENOUGH ORGANIC MATERIAL TO ADEQUATELY SUPPLY NUTRIENTS FROM NATURAL CYCLING. THE PRIMARY FUNCTION OF THE BIORETENTION STRUCTURE IS TO IMPROVE WATER QUALITY. ADDING FERTILIZERS DEFEATS, OR AT A MINIMUM, IMPEDES THIS GOAL. ONLY ADD FERTILIZER IF COMPOST OR MULCH IS USED TO AMEND THE SOIL. ROTOTILL UREA FERTILIZER AT A RATE OF 2 POUNDS PER 1,000 SQUARE FEET.

THE BIORETENTION SIDE SLOPES SHALL BE STABILZED PER THE DETAILS AND SEEDED WITH NEW ENGLAND EROSION CONTROL/RESTORATION MIX FROM NEW ENGLAND WETLAND PLANTS, INC. (www.newp.com or 413–548–8000) OR APPROVED EQUIVALENT.

6. UNDERDRAINS
GRAVEL SHALL BE PLACED AROUND THE UNDERDRAIN PIPE AS SHOWN IN THE DETAILS. OBSERVATION WELLS AND/OR CLEAN–OUT PIPES MUST BE PROVIDED (SEE PLANS FOR LOCATION).

THE MAIN COLLECTOR PIPE FOR UNDERDRAIN SYSTEMS SHOULD BE CONSTRUCTED AT A MINIMUM SLOPE OF 0.4%. OBSERVATION WELLS AND/OR CLEAN–OUT PIPES MUST BE PROVIDED (SEE PLANS FOR LOCATION).

7. MISCELLANEOUS
THE BIORETENTION FACILITY MAY NOT BE CONSTRUCTED UNTIL ALL CONTRIBUTING DRAINAGE AREAS HAVE BEEN STABILIZED, AND SHALL REMAIN OFFLINE AND INOPERATIONAL UNTIL ALL VEGETATION IS STABILIZED.

BIORETENTION CONSTRUCTION SEQUENCE AND REQUIRED INSPECTIONS

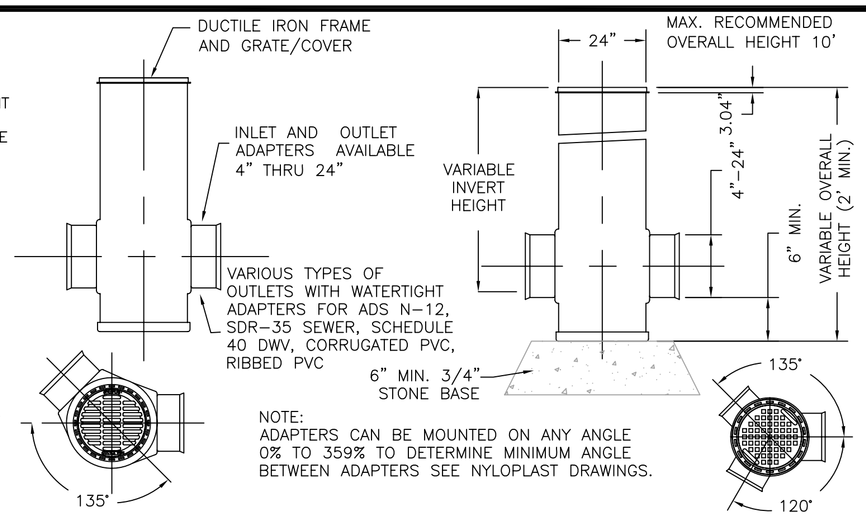
1. PRECONSTRUCTION MEETING.
2. INSTALLATION OF EROSION AND SEDIMENT CONTROL PRACTICES.
3. PRIOR TO CONSTRUCTION THE INFILTRATION BASIN AREA SHOULD BE ROPED OR FENCED OFF TO PREVENT CONSTRUCTION ACTIVITIES OR VEHICULAR TRAFFIC FROM OCCURRING IN THE AREA. CONSTRUCTION EQUIPMENT SHALL NOT BE ALLOWED TO DRIVE ACROSS OR BE STORED IN THE AREA INTENDED TO SERVE AS THE INFILTRATION BASIN (1).
4. CLEAR/GRUB PROPOSED DISTURBED AREA.
5. ROUGH GRADE BIORETENTION AREA DURING GENERAL SITE GRADING.
4. INSTALL INFLOW DRAINAGE SYSTEM AS SHOWN IN DETAILS (PIPE, CHANNEL, ETC).
5. EXCAVATE BIORETENTION FACILITY(IES) TO WITHIN 1 FOOT OF UNDERDRAIN BOTTOM.
6. CREATE TEMPORARY SEDIMENT FOREBAY AT BIORETENTION INFLOW (OPTIONAL).
4. GRADE AND STABILIZE ALL CONTRIBUTORY DRAINAGE AREAS TO BIORETENTION FACILTY(IES).
5. EXCAVATE BIORETENTION FACILITY(IES) TO INVERT OF UNDERDRAIN SYSTEM AND INSTALL FILTER FABRIC ALONG EXCAVATION SIDE WALLS ONLY. MANDATORY INSPECTION REQUIRED SEE NOTE (3) BELOW.
6. INSTALL OVERFLOW OUTLET STRUCTURE PER DETAILS.
7. INSTALL UNDERDRAIN, UNDERDRAIN STONE, PERFORATED PIPE, AND FILTER FABRIC ON TOP OF UNDERDRAIN STONE ONLY. MANDATORY INSPECTION REQUIRED PRIOR TO COVERING THE UNDERDRAIN, SEE NOTE (3) BELOW.
8. INSTALL PEA GRAVEL LAYER AS SHOWN IN DETAILS.
9. BACKFILL WITH BIORETENTION PLANTING SOIL TO DESIGN GRADE (UN–COMPACTED) – SEE PLANTING SOIL SPECIFICATIONS. THE CONTRACTOR MUST SUBMIT A SOIL SAMPLE (1 GALLON) TO THE ENGINEER PRIOR TO SOIL DELIVERY TO THE SITE.
10. INSTALL MULCH LAYER AS SHOWN IN DETAILS AND MIX WITH PLANTING SOIL. THE CONTRACTOR MUST SUBMIT A MULCH SAMPLE (1 GALLON) TO THE ENGINEER PRIOR TO DELIVERY TO THE SITE.
11. INSTALL SILT FENCE ALONG THE BIORETENTION PERIMETER TO PREVENT SEDIMENT FROM WASHING INTO THE NEWLY PLANTED AREAS FROM DISTURBED AREAS AROUND THE FACILITY(IES).
12. STABILIZE ALL REMAINING DISTURBED AREAS AROUND FACILITY(IES) BY SEEDING, HYDROSEEDING AND/OR OTHER EROSION CONTROL METHODS AS OUTLINED IN THE EROSION AND SEDIMENT CONTROL PLANS AND DETAILS. MANDATORY INSPECTION REQUIRED SEE NOTE (3) BELOW.
13. INSTALL BIORETENTION PLANTS AS SHOWN IN PLANTING PLANS AND DETAILS. NO PLANTING SHOULD OCCUR BEFORE REMAINING DISTURBED AREAS AROUND THE FACILITY(IES) ARE STABILIZED. THE CONTRACTOR WILL BE REQUIRED TO REMOVE ANY SEDIMENT WHICH WASHES INTO THE BIORETENTION AREA DURING THE CONSTRUCTION AND PLANTING PHASES. IF SUITABLE VEGETATIVE COVER HAS NOT BEEN ESTABLISHED ALONG THE BIORETENTION SLOPES PRIOR TO PLANTING, A SILT FENCE PERIMETER SHALL BE INSTALLED AT THE TOE OF THE BIORETENTION SLOPES AND REMAIN IN PLACE UNTIL VEGETATIVE COVER IS ESTABLISHED.
14. INSTALL REMAINING MULCH AROUND PLANTS AS SHOWN IN DETAILS.
15. REMOVE REMAINING EROSION AND SEDIMENT CONTROLS ONLY AFTER SURROUNDING EXPOSED SOIL ARES HAVE BEEN PROPERLY STABILIZED.

NOTES:
(1.) SEE GENERAL CONSTRUCTION NOTES FOR OVERALL CONSTRUCTION SEQUENCE.
(2.) SEE GENERAL NOTES/SPECIFICATIONS/CONSTRUCTION DETAILS FOR DETAILED CONSTRUCTION REQUIREMENTS.
(3.) MANDATORY NOTIFICATION/APPROVAL OF THE PROJECT ENGINEER IS REQUIRED PRIOR TO PROCEEDING WITH NEXT STAGE. CALL THE ENGINEER (HORSLEY WITTEN GROUP, INC.) AT 508–833–6600 PRIOR TO 12:00 NOON THE PROCEEDING DAY TO ARRANGE FOR INSPECTION.

BIORETENTION SCHEDULE:

No.	Bottom Surface Area (sf)	Bottom Elev. (ft)	Top Berm Elev. (ft)	Rim Elev. (ft)
A3-A	1,650	556.00	557.25	556.75
A3-B	1,475	562.00	563.25	562.75
A4	500	539.00	539.75	539.50
A8-A	200	529.00	630.25	629.75
A8-Bwe	120	620.00	621.25	N/A
A8-Bea	110	620.00	621.25	N/A
A8-C	400	611.00	612.50	611.75
A11-A	520	575.00	576.25	575.75
A11-B	975	575.00	576.25	575.75
B5A	1,800	699.00	700.75	699.75
B5B	1,500	699.75	701.50	700.50

No.	Bottom Surface Area (sf)	Bottom Elev. (ft)	Top Berm Elev. (ft)	Rim Elev. (ft)
B11A	1,125	695.25	697.00	696.00
B11B	1,350	Varies	Varies	697.25
B11C	1,400	692.25	693.50	N/A
B11D	2,200	689.25	691.00	690.50
C4-D	500	617	618.00	617.50
C4-E	1,215	614.25	615.25	614.75
C5-D	500	615	616.00	615.50
C16	125	595.5	597.00	596.00
C17-A	395	595.75	597.25	596.50
C17-B	750	593.25	594.75	594.00
C18	2,000	Varies	Varies	600.00

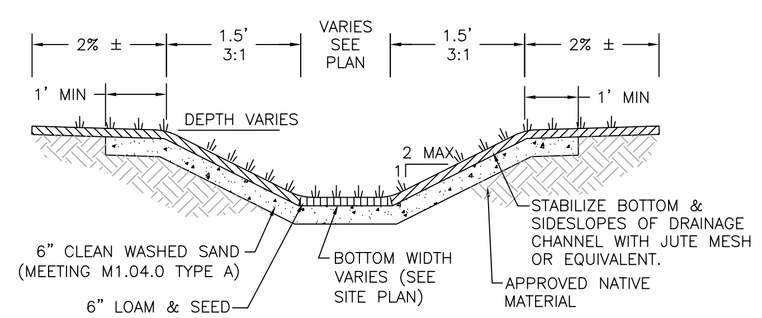


NOTE:
ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0% TO 359% TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE NYLOPLAST DRAWINGS.

OVERFLOW INLET DETAIL
NOT TO SCALE

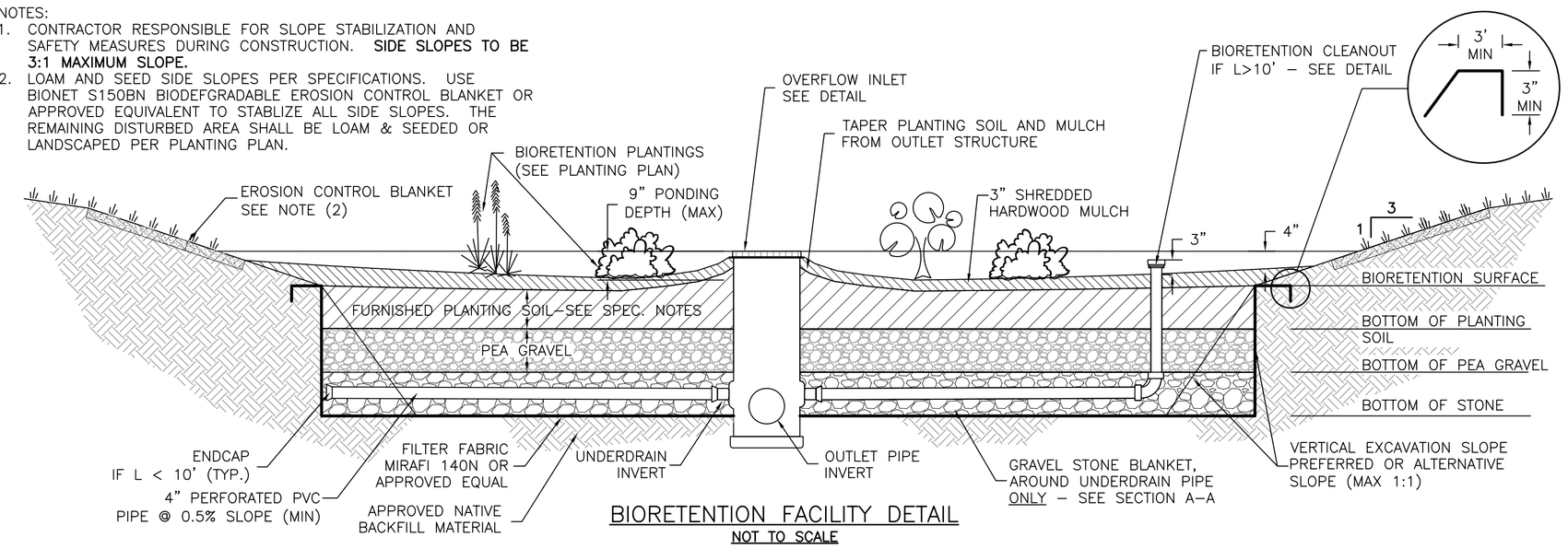
BY "NYLOPLAST" OR APPROVED EQUIVALENT

NOTE:
CONTRACTOR SHALL SHAPE CHANNEL IN A PARABOLIC MANNER.

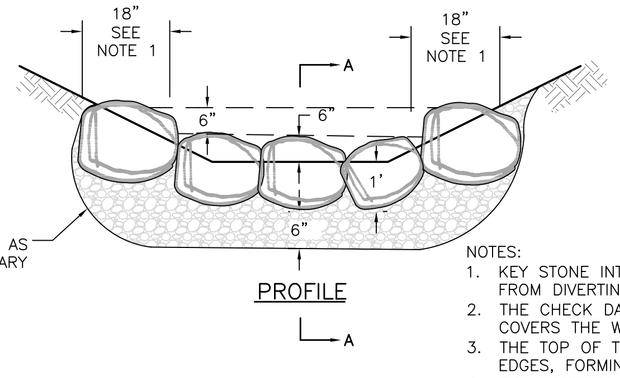


TYPICAL GRASS CHANNEL DETAIL
NOT TO SCALE

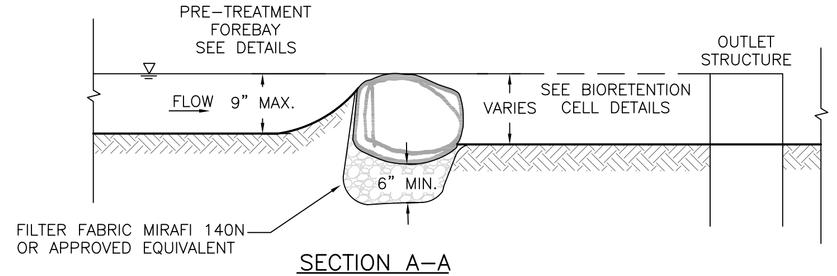
NOTES:
1. CONTRACTOR RESPONSIBLE FOR SLOPE STABILIZATION AND SAFETY MEASURES DURING CONSTRUCTION. SIDE SLOPES TO BE 3:1 MAXIMUM SLOPE.
2. LOAM AND SEED SIDE SLOPES PER SPECIFICATIONS. USE BIONET S150BN BIODEFGRADABLE EROSION CONTROL BLANKET OR APPROVED EQUIVALENT TO STABLIZE ALL SIDE SLOPES. THE REMAINING DISTURBED AREA SHALL BE LOAM & SEEDED OR LANDSCAPED PER PLANTING PLAN.



BIORETENTION FACILITY DETAIL
NOT TO SCALE



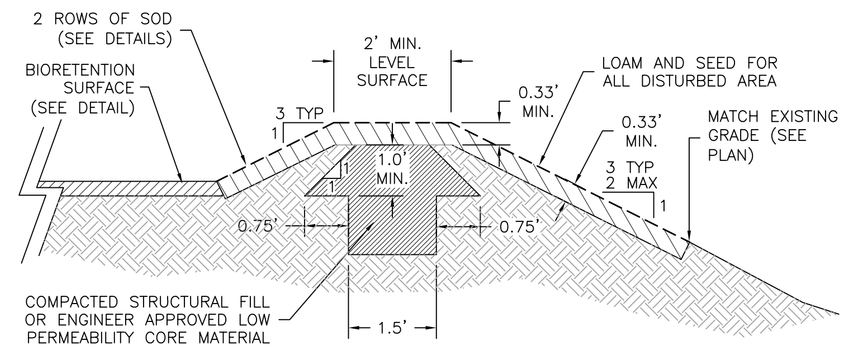
PROFILE



SECTION A–A

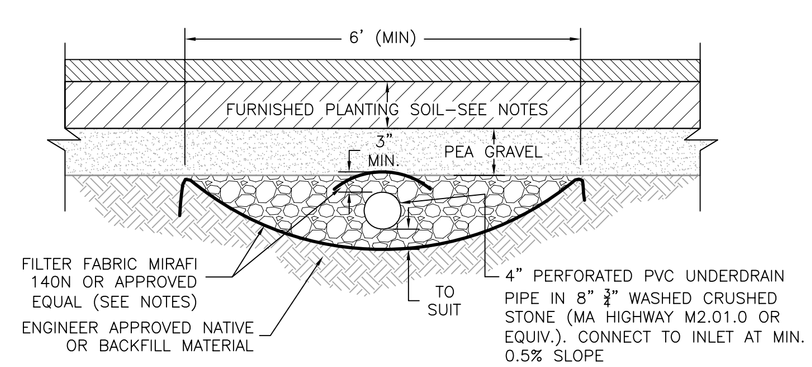
NOTES:
1. KEY STONE INTO THE BIORETENTION BANKS AND EXTEND INTO THE ABUTMENTS A MINIMUM OF 18" TO PREVENT FLOW FROM DIVERTING THE CHECK DAM.
2. THE CHECK DAM SHALL BE CONSTRUCTED OF 18"–24" STONE. THE STONE SHALL BE PLACED SO THAT IT COMPLETELY COVERS THE WIDTH OF THE BIORETENTION AND KEYED IN THE BIORETENTION BANKS.
3. THE TOP OF THE CHECK DAM SHALL BE CONSTRUCTED SO THE CENTER IS APPROXIMATELY 6" LOWER THAN THE OUTER EDGES, FORMING A WEIR THAT WATER CAN FLOW ACROSS.
4. THE MAXIMUM HEIGHT OF THE CHECK DAM AT THE CENTER SHALL NOT EXCEED 6".
5. THE UPSTREAM SIDE OF THE DAM SHALL BE LINED WITH APPROXIMATELY 1" OF 3/4" TO 11/2" CRUSHED AGGREGATE.

STONE CHECK FOR BIORETENTION TYPICAL DETAIL
NOT TO SCALE

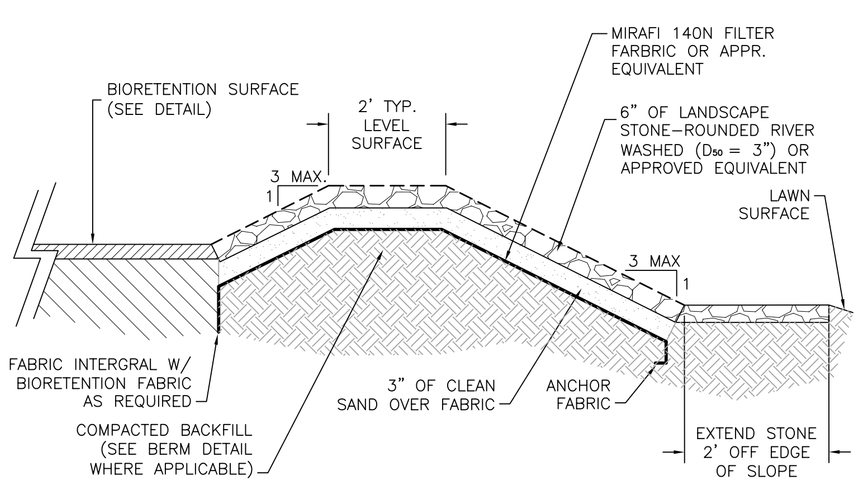


BIORETENTION BERM DETAIL
NOT TO SCALE

NOTES:
1. FILTER FABRIC ABOVE UNDERDRAIN SHALL EXTEND VERTICALLY 1–INCH± INTO THE SAND LAYER & HORIZONTALLY 1–FOOT OFF THE CENTER OF THE UNDERDRAIN PIPE.



BIORETENTION FACILITY SECTION A–A
NOT TO SCALE



BIORETENTION EMERGENCY OVERFLOW DETAIL
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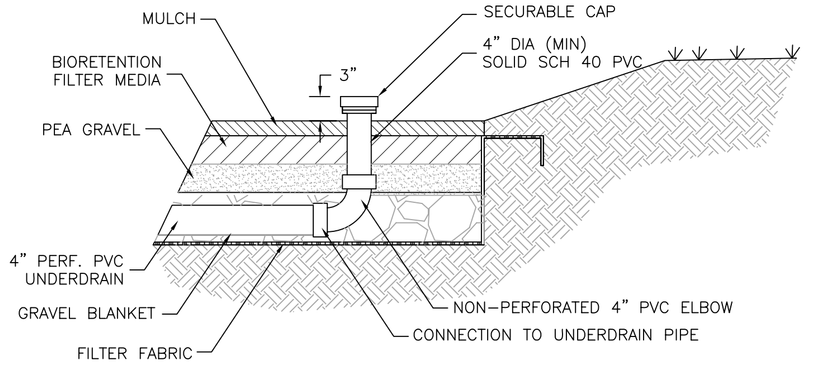

TYPICAL BIORETENTION CLEANOUT DETAIL
NOT TO SCALE

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
www.horsleywitten.com
90 Route 6A Sandwich, MA 02563
508-833-6600 voice 508-833-3150 fax

Center for Watershed Protection
8390 Main, Street 2nd Floor
Ellicott City, MD 21043
410-461-8323 voice 410-461-8324 fax

Revisions

Rev.	Date	By	Appr.	Description
1				
2				
3				
4				
5				
6				
7				

Date: 01/20/2010 | Designed By: RAC | Drawn By: ERK | Checked By: RAC

Plan Set: EAGLEVILLE BROOK IMPERVIOUS COVER TMDL RETROFIT PROJECT UNIVERSITY OF CONNECTICUT

Plan Title: DETAILS (1)

Prepared For:
Center for Land Use Education and Research
University of Connecticut
Chester Arnold
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Hallam, CT 06439
Phone: (860) 345-5320
Fax: ----

Existing Conditions Provided By:
University of Connecticut Facilities

Phone: ----
Fax: ----
Dated: November 2009

Registration:
DRAFT NOT FOR CONSTRUCTION

Project Number: 9037

Sheet Number: 11 of 13

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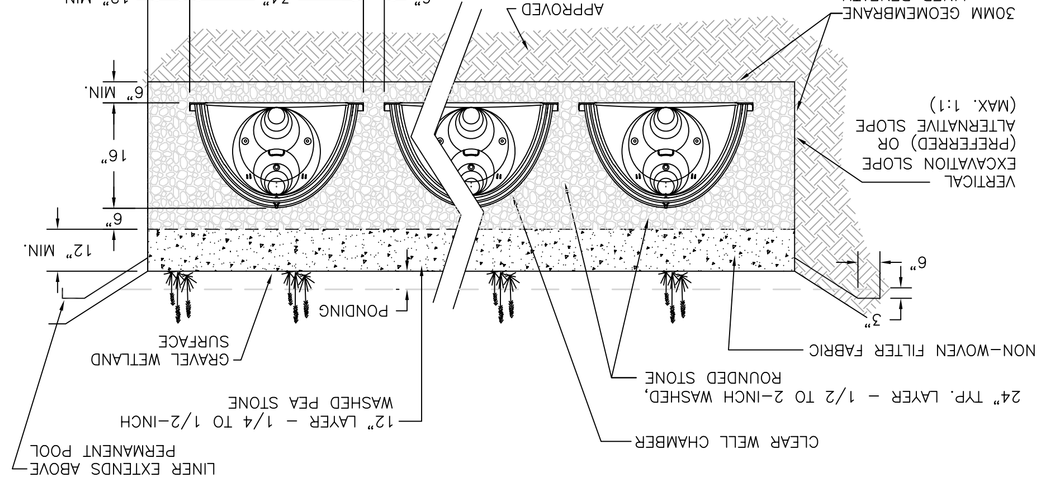
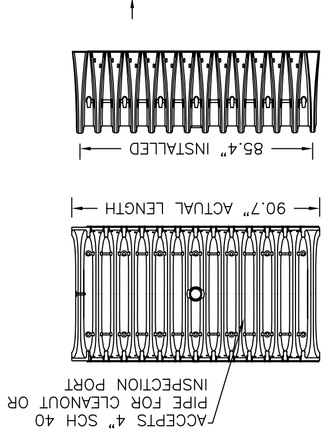
last modified: 01/18/10 printed: 01/20/10 by bk H:\Projects\2009\9037 CWP-Eagleville Brook\Drawings\9037-DE.dwg

TYPICAL CLEAR WELL CHAMBER CROSS SECTION DETAIL

NOT TO SCALE

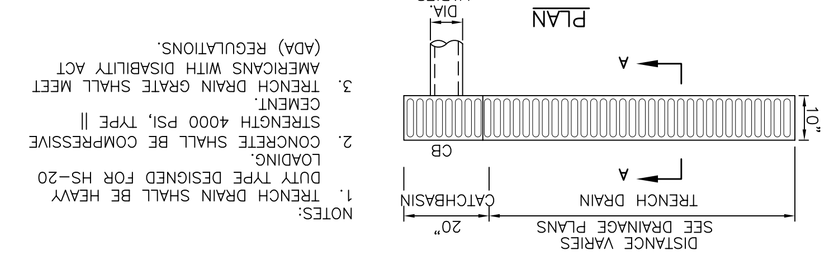


CHAMBER DETAILS



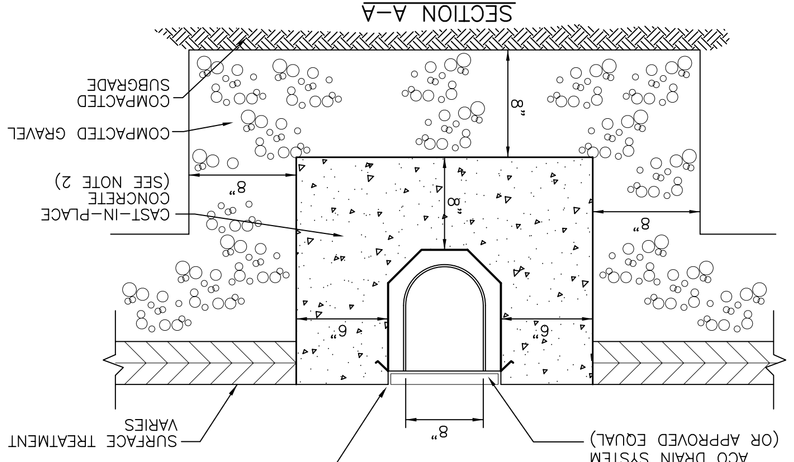
TRENCH DRAIN (TYPE A)

NOT TO SCALE

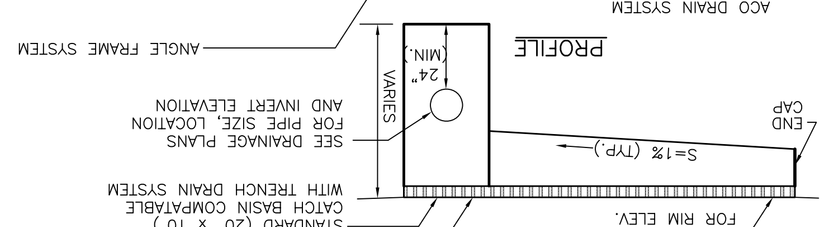


NOTES:
1. TRENCH DRAIN SHALL BE HEAVY DUTY TYPE DESIGNED FOR HS-20 LOADING.
2. CONCRETE SHALL BE COMPRESSIVE STRENGTH 4000 PSI, TYPE II CEMENT.
3. TRENCH DRAIN GRATE SHALL MEET AMERICANS WITH DISABILITY ACT (ADA) REGULATIONS.

SECTION A-A

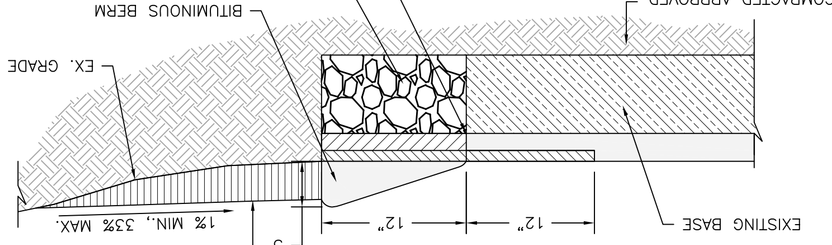


PROFILE



PAVED DRAINAGE FLUME

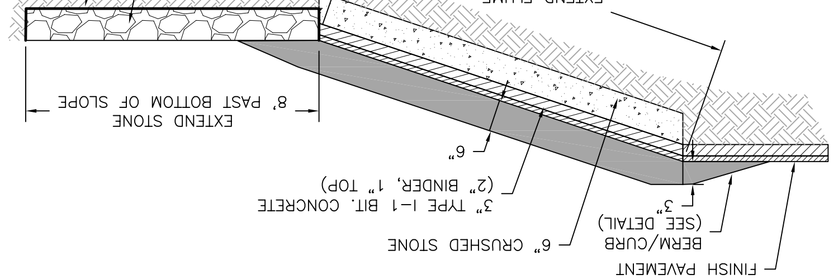
NOT TO SCALE



NOTES:
1. THE PAVED FLUME SHOULD EXTEND DOWN TO THE TOE OF THE SLOPE.
2. THERE SHALL BE NO OVERFLOW FROM THE END OF THE APRON TO THE SURFACE OF THE RECEIVING CHANNEL. THE SUBGRADE OF THE RIP RAP SHALL BE GRADED SO THAT RIP RAP AT THE END OF THE APRON SHALL BE AT THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE INVERT OF THE APRON SHALL BE AT THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE RIP RAP RECEIVING CHANNEL.
3. THE WIDTH OF THE END OF THE FLUME SHALL BE EQUAL TO THE BOTTOM WIDTH OF THE RIP RAP RECEIVING CHANNEL. MAXIMUM TAPER TO RECEIVING CHANNEL 5:1.
4. ALL SUBGRADE FOR STRUCTURE TO BE COMPACTED TO 95% OR GREATER.
5. THE PLACING OF FILL, EITHER LOOSE OR COMPACTED IN THE RECEIVING CHANNEL SHALL NOT BE ALLOWED.
6. THE GEOTEXTILE FILTER FABRIC SHALL BE MIRAFI 140N OR EQUIVALENT

BITUMINOUS BERM (EXISTING PAVEMENT)

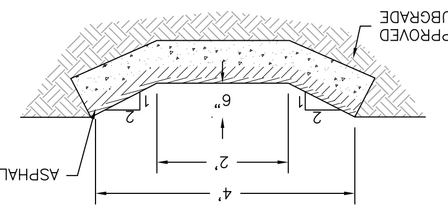
NOT TO SCALE



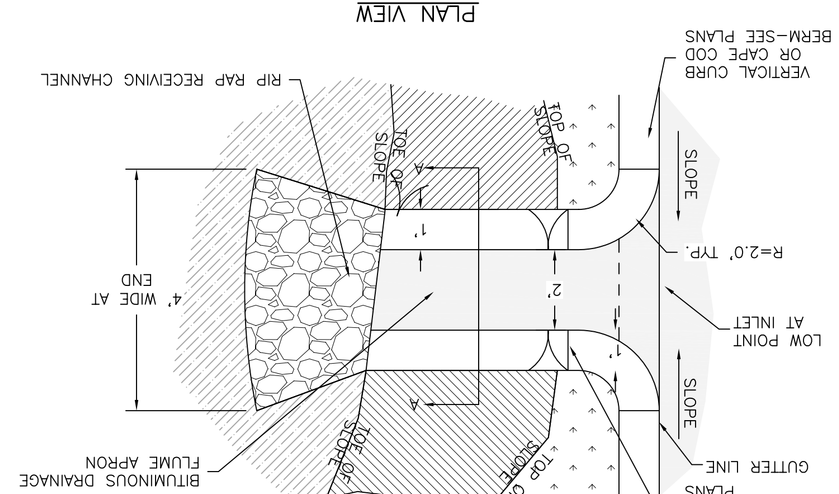
NOTE:
1. PAVEMENT PATCH TO BE 3" TYPE I-1 BITUMINOUS CONCRETE (2" BINDER, 1" TOP). PRIOR TO INSTALLATION OF THE BITUMINOUS TOP COAT, SAWCUT AND MILL 1" INTO THE EXISTING PAVEMENT, AT A DISTANCE OF 1' FROM THE PAVEMENT EDGE. INSTALL TOP COAT OVER THE BINDER COARSE AND 1" MILLED SECTION.
2. BERM CONSTRUCTED OF BIT. CONC. WEARING SURFACE COURSE AS SHOWN
3. PROVIDE 1" CHAMFER OF EDGE ALONG BERM FACE
4. BERM TO BE CONSTRUCTED INTEGRAL WITH TOP PAVEMENT COURSE.
5. ADJUST BACKFILL GRADE (MAX. 2:1 SLOPE) TO MEET EXISTING GRADE.

SECTION VIEW

SECTION A-A

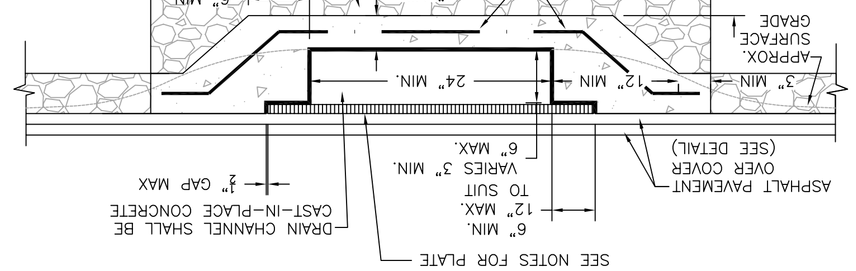


PLAN VIEW



TYPICAL SIDEWALK CROSS DRAIN DETAIL

NOT TO SCALE



NOTES:
1. FLATE SHALL BE INSTALLED SO THE TOP EDGE IS FLUSH WITH THE ADJOINING CONCRETE CHANNEL EDGE. PLATE SHALL BE MADE OF STEEL OR CAST IRON AND SUITABLE FOR H-20 LOADING AS APPROVED BY THE ENGINEER. CEMENT CONCRETE SHALL BE READY MIX CLASS A AGGREGATE, 4000 PSI TYPE II CONCRETE.
2. TOP OF PLATE AND CONCRETE SHALL BE INSTALLED FLUSH WITH BOTTOM OF BINDER. PAVEMENT SHALL BE INSTALLED OVER PLATE AS SHOWN IN DETAIL.
3. ALL COMPONENTS SHALL BE CONSTRUCTED TO H20 LOADING STANDARDS.

PLAN

TYPICAL HDPE DRAIN PIPE TRENCH DETAIL

NOT TO SCALE

NOTES:
1. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH A FOUNDATION OF CLASS I OR II MATERIAL AS DEFINED IN ASTM D2321, "STANDARD PRACTICE FOR INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS." LATEST EDITION, AS AN ALTERNATIVE AND AT THE DISCRETION OF THE ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A WOVEN GEOTEXTILE FABRIC.
2. BEDDING, HAUNCHING AND INITIAL BACKFILL: SUITABLE MATERIAL SHALL CONSIST OF CLEAN, HARD, PARTICLES OF GRAVEL MEETING THE FOLLOWING:

SIEVE SIZE	PERCENT PASSING
3/8"	85-95
NO. 4	5-15
NO. 8	0-2

UNLESS OTHERWISE APPROVED BY ENGINEER.
MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.
UNLESS OTHERWISE SPECIFIED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" PIPE (100-600mm).

NOMINAL Ø IN (mm)	MIN. RECOMMENDED TRENCH WIDTH, in (mm)
8 (200)	25 (630)
10 (250)	28 (710)
12 (300)	31 (790)
15 (375)	34 (860)
18 (450)	39 (990)

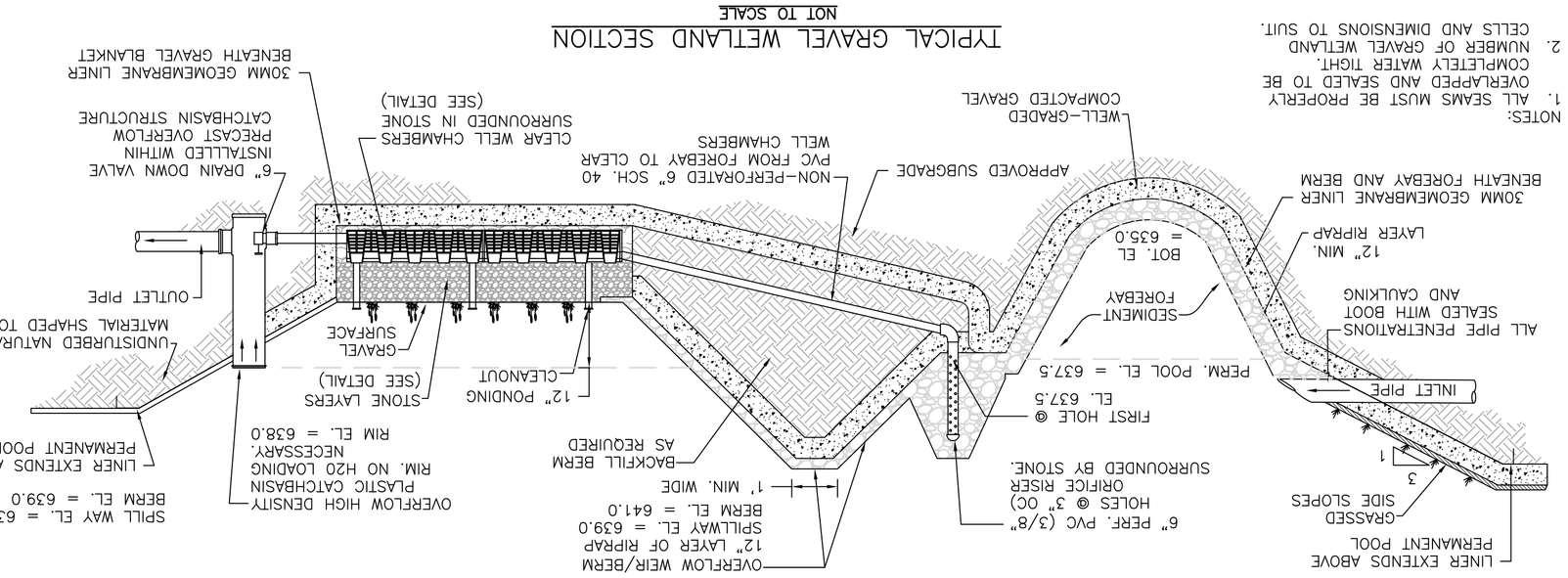
3. UNLESS OTHERWISE SPECIFIED BY THE ENGINEER, MINIMUM TRENCH WIDTHS SHALL BE AS FOLLOWS:
4. MINIMUM COVER: MINIMUM RECOMMENDED DEPTHS OF COVER FOR VARIOUS LIVE LOADING CONDITIONS ARE SUMMARIZED IN THE FOLLOWING TABLE. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE TAKEN FROM THE TOP OF PIPE TO THE GROUND SURFACE.

SURFACE LIVE LOADING CONDITION	MINIMUM RECOMMENDED COVER, in (mm)
H25 (FLEXIBLE PAVEMENT)	12 (300)
H25 (RIGID PAVEMENT)	12 (300)
E80 RAILWAY HEAVY CONSTRUCTION	24 (610) 48 (1220)

*TOP OF PIPE TO BOTTOM OF BITUMINOUS PAVEMENT

TYPICAL GRAVEL WETLAND SECTION

NOT TO SCALE

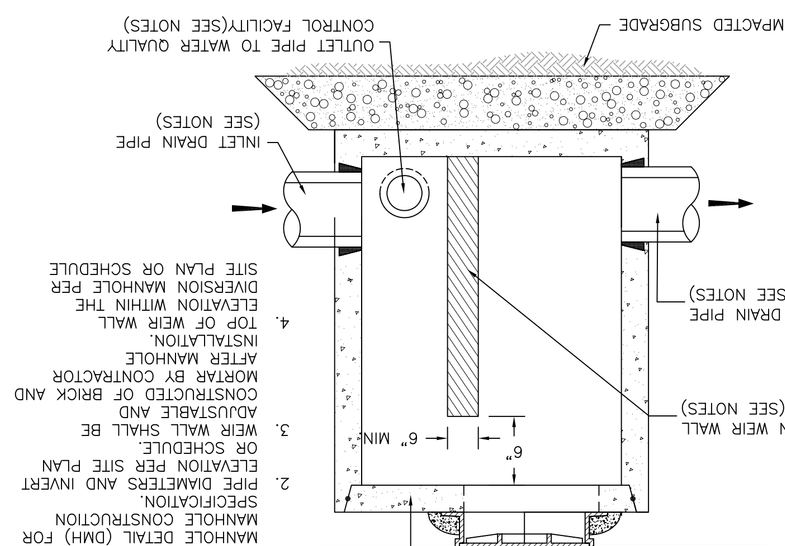


NOTES:
1. ALL SEAMS MUST BE PROPERLY OVERLAPPED AND SEALED TO BE COMPLETELY WATER TIGHT.
2. NUMBER OF GRAVEL WETLAND CELLS AND DIMENSIONS TO SUIT.

DIVERSION DRAIN MANHOLE

NOT TO SCALE

SECTION A-A



NOTES:
1. SEE PRECAST DRAIN MANHOLE DETAIL (DMH) FOR MANHOLE CONSTRUCTION SPECIFICATION, SCHEDULE.
2. PIPE DIAMETERS AND INVERT ELEVATION PER SITE PLAN
3. WEIR WALL SHALL BE ADJUSTABLE AND CONSTRUCTED OF BRICK AND MORTAR BY CONTRACTOR AFTER MANHOLE INSTALLATION.
4. TOP OF WEIR WALL ELEVATION WITHIN THE DIVERSION MANHOLE PER SITE PLAN OR SCHEDULE

PLAN

Existing Conditions Provided By:
University of Connecticut Facilities
....
Phone: ....
Fax: ....
Dated: November 2009

Prepared For:
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University of Connecticut
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Date: 01/20/2010
Designed By: RAC
Drawn By: ERK
Checked By: RAC

Revisions

Rev.	Date	By	Appr.	Description
1				
2				
3				
4				
5				
6				

Plan Set:

EAGLEVILLE BROOK IMPERVIOUS COVER TMDL RETROFIT PROJECT UNIVERSITY OF CONNECTICUT

DETAILS (2)

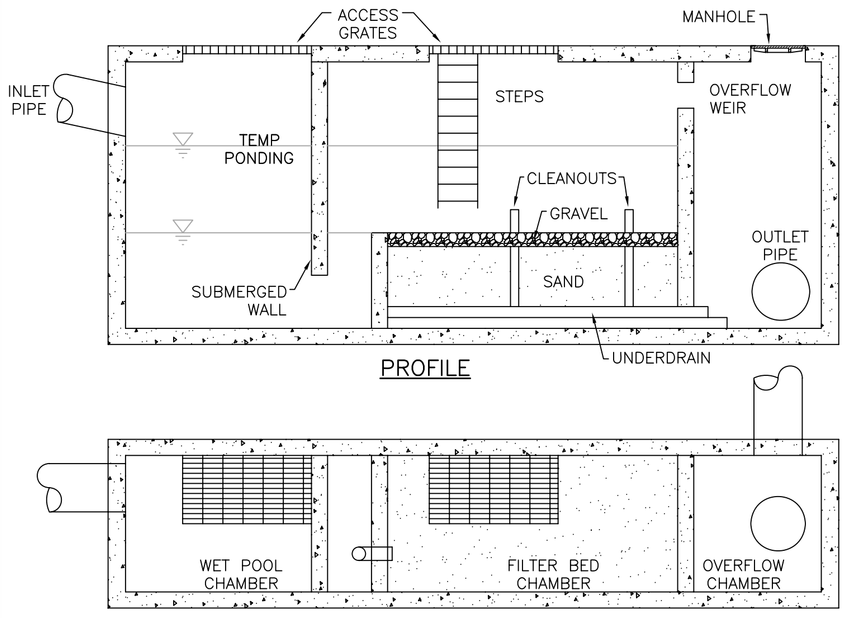
Plan Title:

Registration:

DRAFT NOT FOR CONSTRUCTION

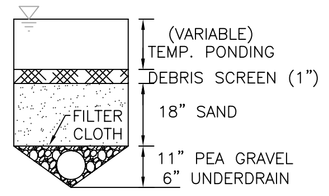
Project Number: 9037

Sheet Number: 12 of 13



PROFILE

PLAN VIEW

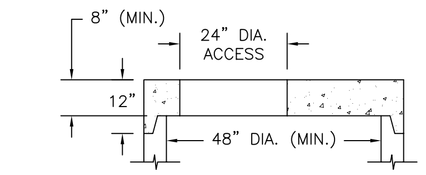


NOTES:
FRAME AND COVER TO CONFORM TO MASSACHUSETTS STANDARDS, (LEBARON FOUNDRY MODEL LK 110A, OR APPR. EQUIV.)

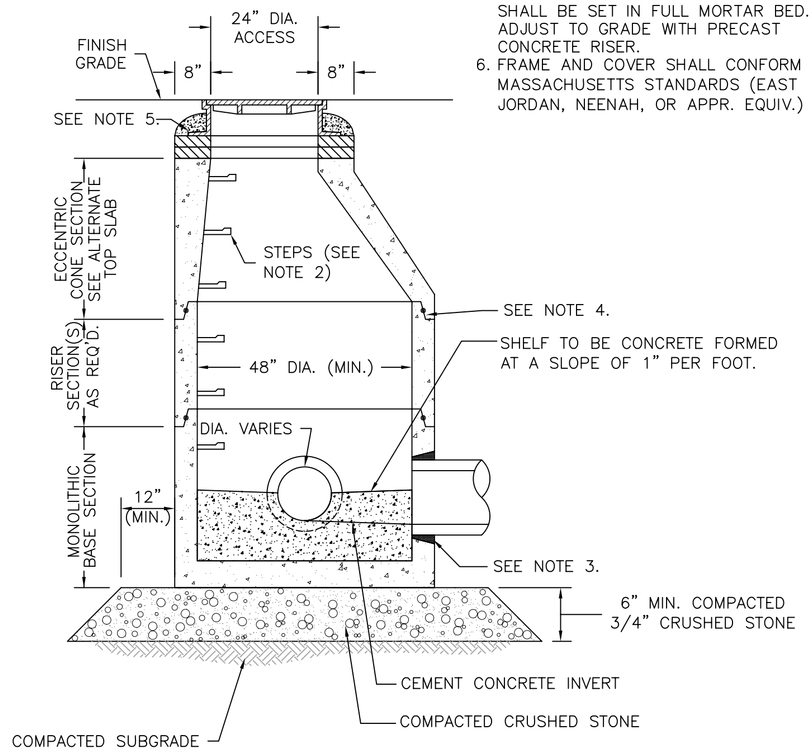
TYPICAL SECTION

MATERIALS:
1. SAND – CONCRETE SAND (M1.01.0 TYPE A, AASHTO M6 OR EQUIV.)
2. STONE – 1/2 – 3/4" WASHED (M2.01.0 OR EQUIV.)
3. GEOTEXTILE – WOVEN DRAINAGE FABRIC (AMOCO 1198, MIRAFI–700XG OR EQUIV.)
4. PIPING – PVC (MIN. SDR 40)
5. GASKETS – COMPATIBLE W/ PVC SCHEDULE (A–LOK, STAR SEAL OR EQUIV.)
6. GRATES – CAST IRON STORM DRAIN (EAST JORDAN 6957 TYPE "M–2" OR EQUIV.)
7. SOLID COVERS – CAST IRON STORM DRAIN (EAST JORDAN 6957 TYPE "A" OR EQUIV.)
8. FRAMES – 1/4" STEEL ANGLE
9. CONCRETE – 4500 PSI AT 28 DAYS
10. MIN. REINFORCING – 2 MATS OF 6" x 6" W4/W4 WIRE MESH

UNDERGROUND SAND FILTER
NOT TO SCALE



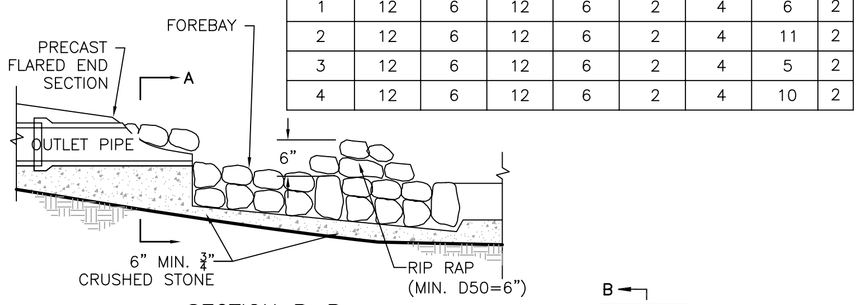
ALTERNATE TOP SLAB



NOTES:
1. ALL SECTIONS SHALL BE DESIGNED FOR H–20 LOADING.
2. COPOLYMER MANHOLE STEPS SHALL BE INSTALLED AT 12" O.C. FOR THE FULL DEPTH OF THE STRUCTURE.
3. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
4. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
5. DRAIN MANHOLE FRAME AND COVER SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH PRECAST CONCRETE RISER.
6. FRAME AND COVER SHALL CONFORM TO MASSACHUSETTS STANDARDS (EAST JORDAN, NEENAH, OR APPR. EQUIV.)

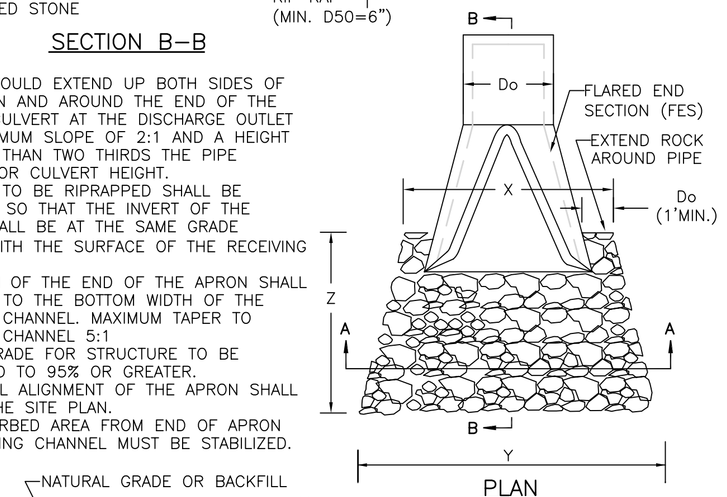
PRECAST DRAIN MANHOLE (DMH)
NOT TO SCALE

OUTLET	Do (IN)	d50	D (IN)	H (IN)	X (FT)	Y (FT)	Z (FT)	M
1	12	6	12	6	2	4	6	2
2	12	6	12	6	2	4	11	2
3	12	6	12	6	2	4	5	2
4	12	6	12	6	2	4	10	2

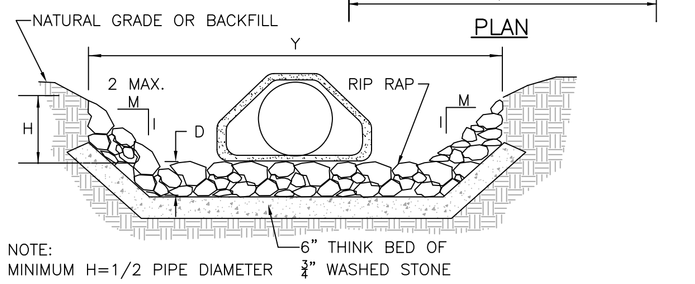


SECTION B–B

NOTES:
1. RIPRAP SHOULD EXTEND UP BOTH SIDES OF THE APRON AND AROUND THE END OF THE PIPE OR CULVERT AT THE DISCHARGE OUTLET AT A MAXIMUM SLOPE OF 2:1 AND A HEIGHT NOT LESS THAN TWO THIRDS THE PIPE DIAMETER OR CULVERT HEIGHT.
2. THE AREA TO BE RIPRAPPED SHALL BE UNDERCUT SO THAT THE INVERT OF THE APRON SHALL BE AT THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE RECEIVING CHANNEL.
3. THE WIDTH OF THE END OF THE APRON SHALL BE EQUAL TO THE BOTTOM WIDTH OF THE RECEIVING CHANNEL. MAXIMUM TAPER TO RECEIVING CHANNEL 5:1
4. ALL SUBGRADE FOR STRUCTURE TO BE COMPACTED TO 95% OR GREATER.
5. HORIZONTAL ALIGNMENT OF THE APRON SHALL BE PER THE SITE PLAN.
6. ANY DISTURBED AREA FROM END OF APRON TO RECIEVING CHANNEL MUST BE STABILIZED.



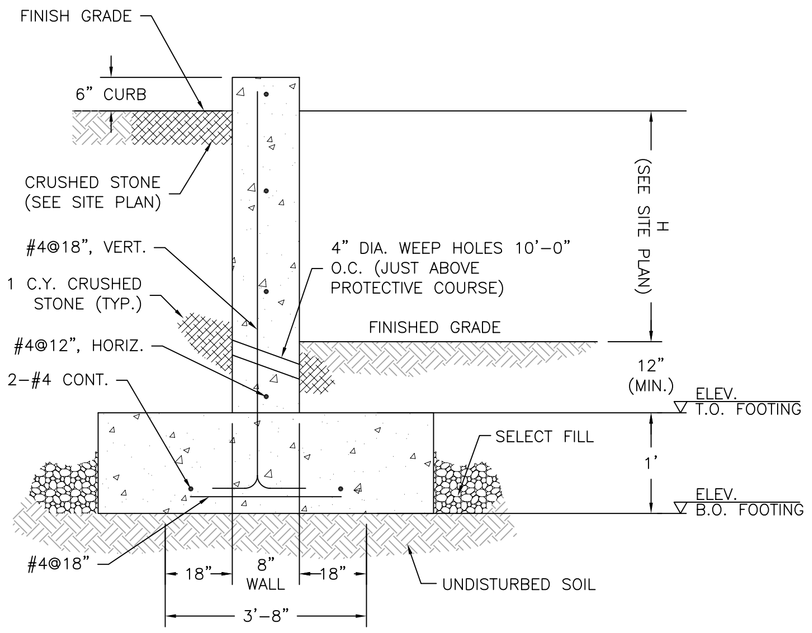
PLAN



NOTE:
MINIMUM H=1/2 PIPE DIAMETER

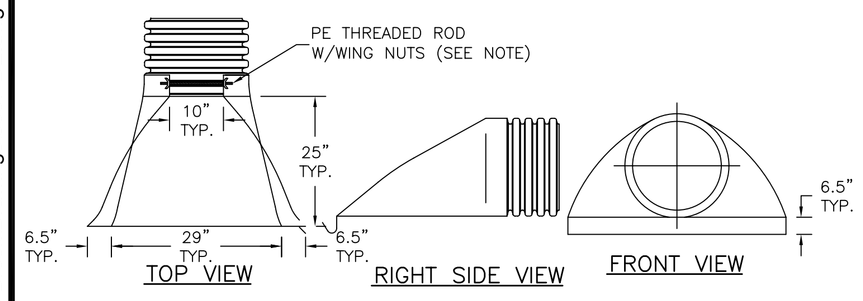
SECTION A–A

TYPICAL RIP RAP OUTFALL DETAIL
NOT TO SCALE



NOTE:
SEE MASS HIGHWAY CONSTRUCTION STANDARDS, DRAWING NUMBER 305.1.0 FOR COMPLETE CANTILEVEER RETAINING WALL SECTION.

CANTILEVER RETAINING WALL SECTION
NOT TO SCALE

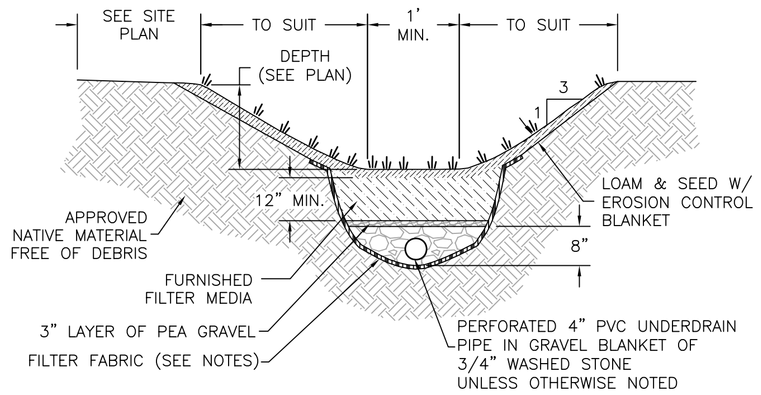


TOP VIEW RIGHT SIDE VIEW FRONT VIEW

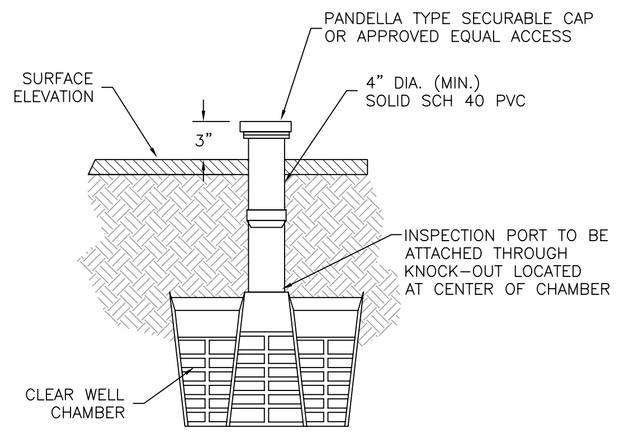
NOTES:
1. PE THREADED ROD W/WING NUTS PROVIDED FOR END SECTIONS 12"–24". 30" & 36" END SECTIONS TO BE WELDED TO PIPE PER MANUFACTURER'S RECOMMENDATIONS.
2. ALL DIMENSIONS ARE NOMINAL
3. DRAIN PIPES LESS THAN 12" IN DIAMETER SHALL BE SAWCUT TO MATCH SLOPE.
4. DETAIL PROVIDED BY ADVANCED DRAINAGE SYSTEMS, INC.

TYPICAL FLARED END SECTION
NOT TO SCALE

NOTE:
1. FILTER FABRIC SHALL BE MIRAFI 140N OR EQUAL.
2. EROSION CONTROL BLANKET SHALL BE JUTE MESH OR APPROVED EQUIVALENT.
3. SEE DRY SWALE SPECS FOR FILTER MEDIA.

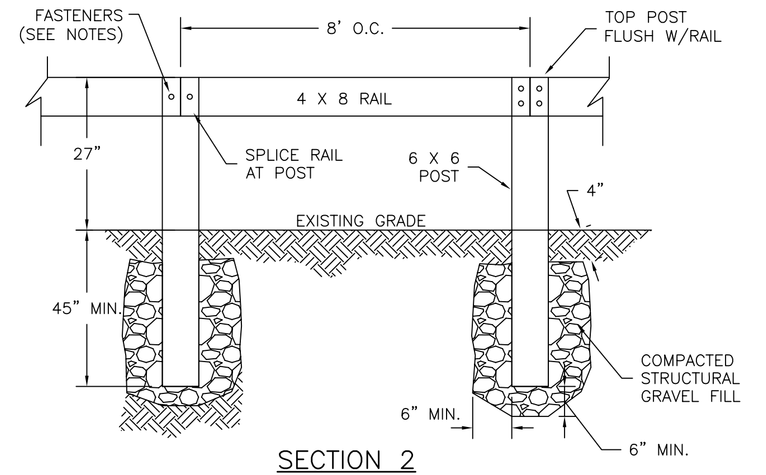


DRY SWALE WITH UNDERDRAIN (SECTION)
NOT TO SCALE

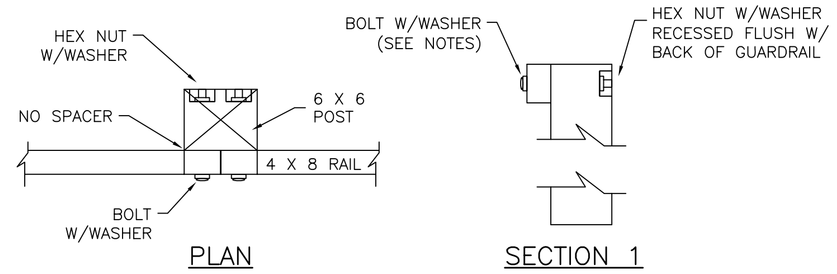


NOTES:
CLEANOUTS SHALL BE INSTALLED AT THE BEGINNING AND END OF EACH CHAMBER SERIES WITH A MINIMUM OF EVERY OTHER CHAMBER (1 EVERY 2 CHAMBERS IN SERIES).

TYPICAL CLEANOUT DETAIL
NOT TO SCALE



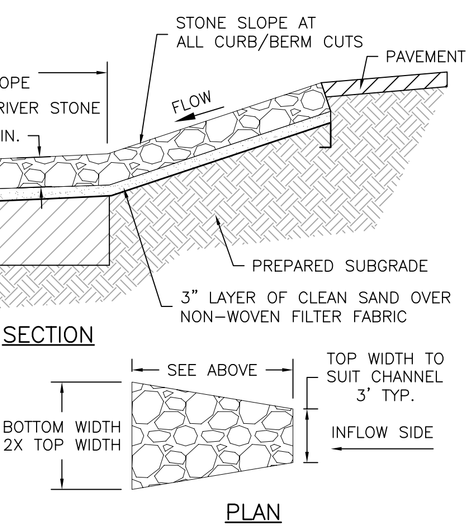
SECTION 2



PLAN SECTION 1

NOTES:
1. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. POST AND RAILS TO BE PRESSURE TREATED LUMBER.
3. ALL SPLICES ARE TO BE MADE AT POSTS.
4. BUMPER ANCHORS SHALL BE RAIL BOLTS WITH NUTS AND WASHER CONNECTION. FASTENERS SHALL BE HOT DIPPED GALVANIZED OR STAINLESS STEEL MATCHING ASTM A153 AND ASTM A653.
5. THE CONTRACTOR SHALL INSTALL EITHER TWO ¾"Ø BOLTS OR ONE 2"Ø BOLT AT EACH RAIL TO POST CONNECTION.
6. COMPACTED GRAVEL FOOTING SHALL EXTEND AROUND THE ENTIRE POST.
7. WOOD POSTS SHALL BE NOTCHED AS NECESSARY TO FACILITATE CURVES AND CHANGES IN DIRECTION. RAIL SHALL BE CUT TO CREATE A RAIL TO RAIL FLUSH FACE JOINT AS NECESSARY.
8. BEGINNING & END SECTIONS SHALL BE ANCHORED INTO THE GROUND A MINIMUM 1–FOOT BELOW FINISH GRADE.

TIMBER GUARD RAIL
NOT TO SCALE

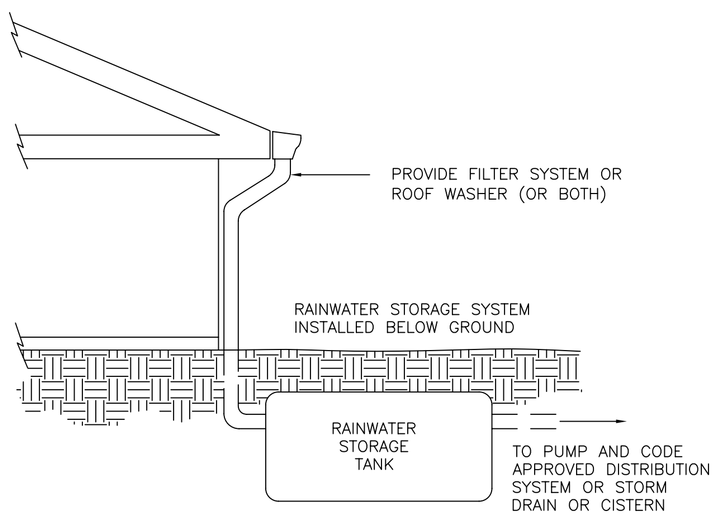


SECTION

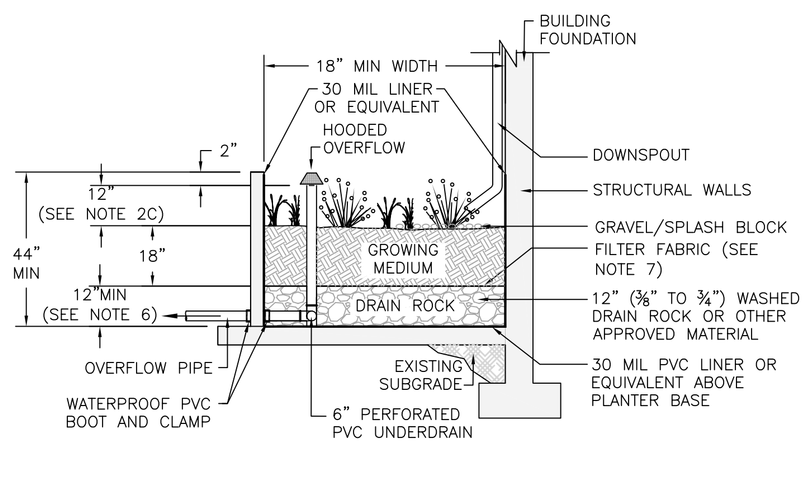
NOTES:
1. A INFLOW SHALL BE CONSTRUCTED AT THE END OF ALL CURB OR BERM CUTS THAT DISCHARGE INTO A BIORETENTION AREA.
2. BACKFILL SHALL COMPLETELY COVER FILTER FABRIC.
3. FILTER FABRIC SHALL BE TOE–ED INTO THE BIORETENTION MATERIAL & UPPER SLOPE (3" MIN.).
4. SHAPE CHANNEL AS REQUIRED WITH MIN. 6" SIDESLOPE DEPTH.

PLAN

BIORETENTION INFLOW DETAIL
NOT TO SCALE



RAIN WATER HARVESTING SYSTEM DETAIL
NOT TO SCALE



DOWNSPOUT PLANTER BOX
NOT TO SCALE

Revisions

Rev.	Date	By	Appr.	Description
1				
2				
3				
4				
5				
6				
7				

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Drawn By: ERK
Designed By: RAC
Checked By: RAC
Date: 01/20/2010

Plan Set: EAGLEVILLE BROOK IMPERVIOUS COVER TMDL RETROFIT PROJECT UNIVERSITY OF CONNECTICUT

Plan Title: DETAILS (3)

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Existing Conditions Provided By:
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Fax: ----
Dated: November 2009

Registration:
DRAFT NOT FOR CONSTRUCTION

Project Number: 9037

Sheet Number: 13 of 13

last modified: 01/18/10 printed: 01/20/10 by bk H:\Projects\2009\9037 CWP-Eagleville Brook\Drawings\9037-DE.dwg