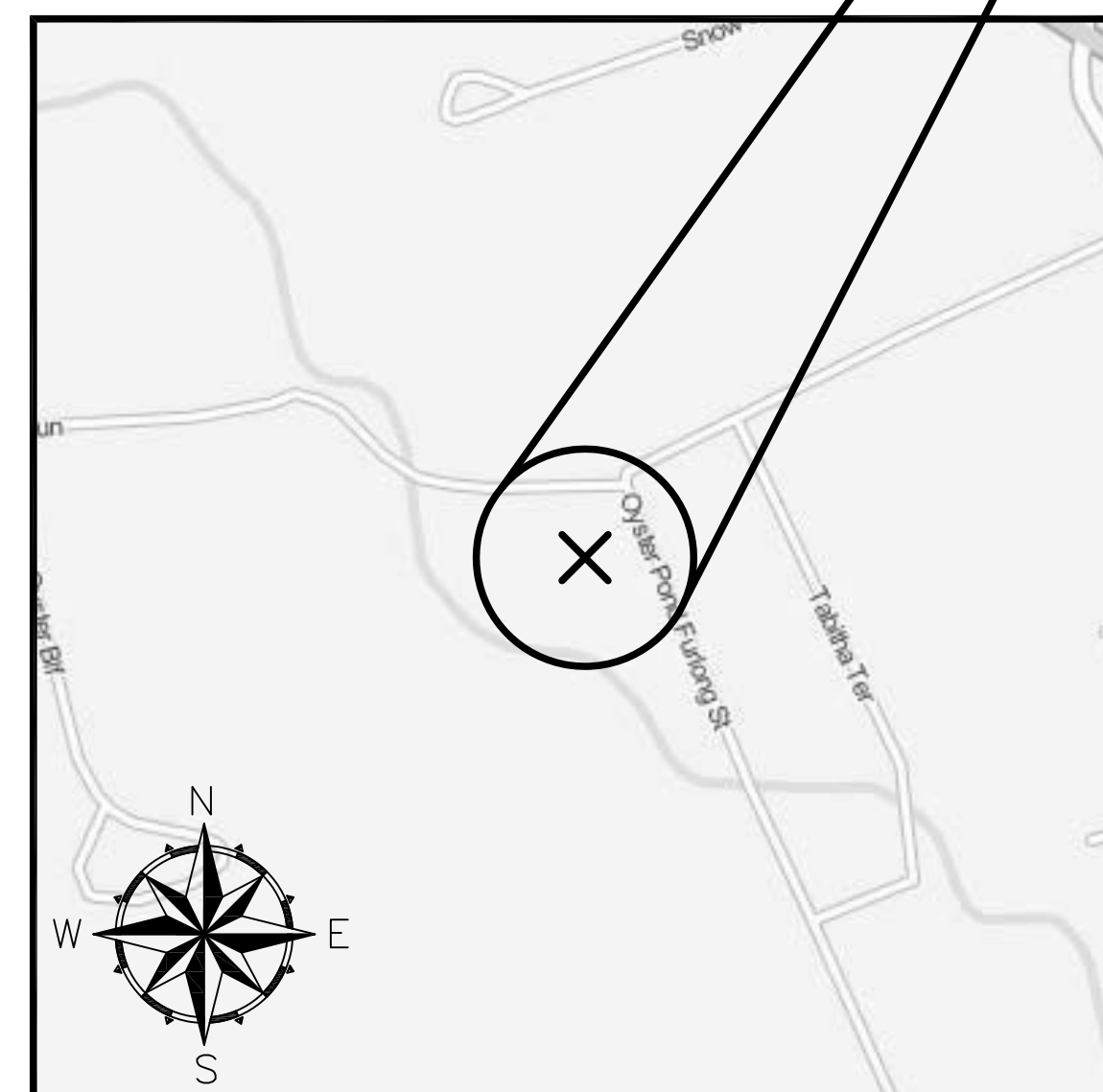
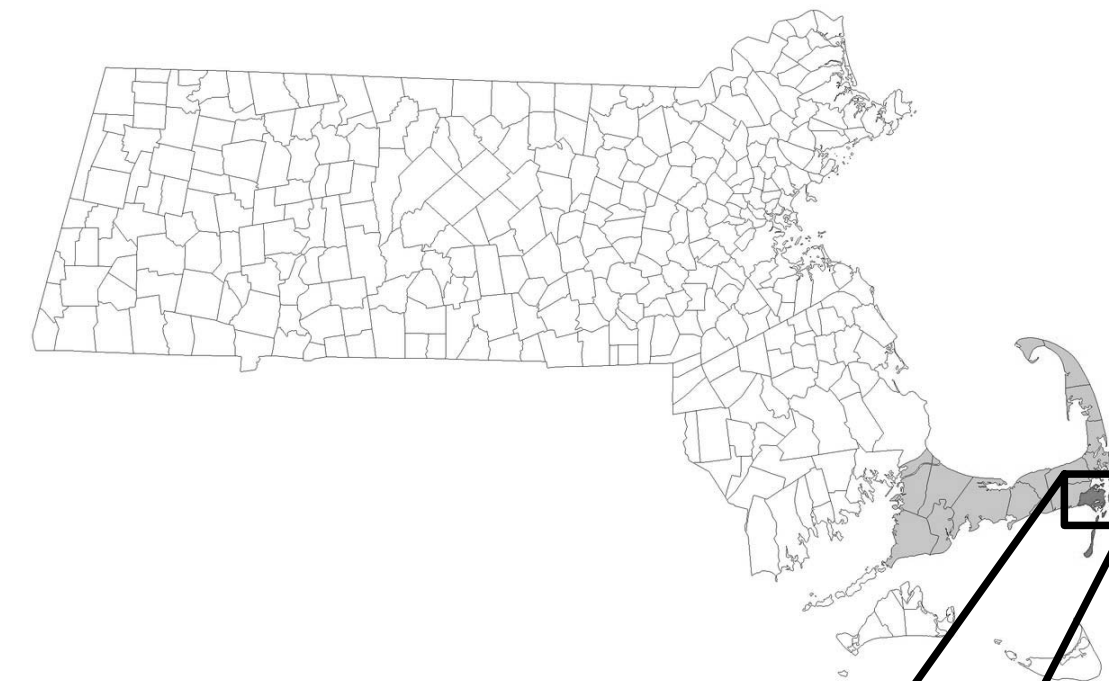


EPA Green Infrastructure Stormwater BMP Retrofit for Two Cape Cod Municipalities A Demonstration and Outreach Project

CHATHAM, MA
NOVEMBER 2015 - CONSTRUCTION AS-BUILTS

CHATHAM, MA
Oyster Pond BMP - Gravel Bioretention Cell,
Oyster Pond Furlong & Absegami Run



CHATHAM PROJECT

SCALE: 1" = 200'

<u>SHEET</u>	<u>TITLE</u>
C-1	EXISTING CONDITIONS AND WETLAND BUFFERS
C-2	GRADING PLAN
C-3	DRAINAGE LAYOUT
C-4	UTILITY LAYOUT
C-5	LANDSCAPING AND SURFACE TREATMENTS
C-6	DETAILS
C-7	DETAILS



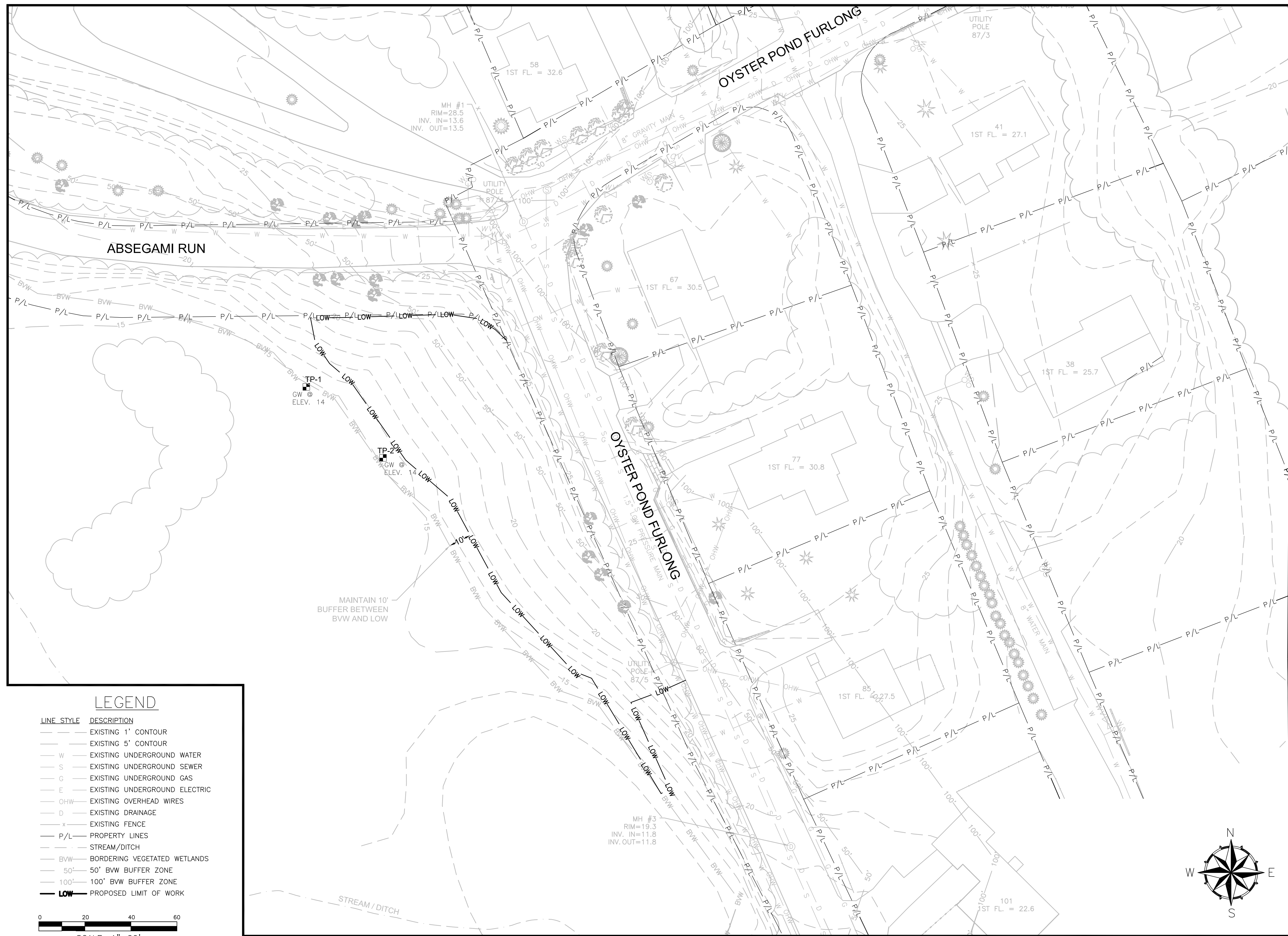
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109



481 GREAT ROAD, SUITE 3
ACTON, MA 01720



21 DEPOT STREET
MERRIMACK, NH 03054



LEGEND

LINE STYLE	DESCRIPTION
--- (dashed)	EXISTING 1' CONTOUR
--- (dashed)	EXISTING 5' CONTOUR
W	EXISTING UNDERGROUND WATER
S	EXISTING UNDERGROUND SEWER
G	EXISTING UNDERGROUND GAS
E	EXISTING UNDERGROUND ELECTRIC
OHW	EXISTING OVERHEAD WIRES
D	EXISTING DRAINAGE
X	EXISTING FENCE
P/L	PROPERTY LINES
---	STREAM/DITCH
BVW	BORDERING VEGETATED WETLANDS
50'	50' BVW BUFFER ZONE
100'	100' BVW BUFFER ZONE
LOW	PROPOSED LIMIT OF WORK

General Notes

1. THE LOCATION OF UNDERGROUND UTILITIES HAVE NOT BEEN VERIFIED OR INSPECTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT "DIG-SAFE" AT 1-888-344-7233.
2. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION TO PREVENT ANY DAMAGE TO ADJACENT PROPERTIES. ALL AREAS WHICH ARE AFFECTED BY THE CONTRACTOR'S OPERATIONS SHALL BE RETURNED TO THEIR ORIGINAL CONDITION OR BETTER, AT NO ADDITIONAL COST TO THE OWNER.
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4. CONTRACTOR SHALL IMMEDIATELY REPAIR OR FILL ANY POTHoles THAT OCCUR DUE TO CONSTRUCTION.
5. CONTRACTOR SHALL LINE LIMIT OF WORK (LOW) WITH STRAW BALES STAKED WITH A MINIMUM OF TWO (2) STAKES PER BALE A MINIMUM OF ONE (1) FOOT DEEP INTO THE GROUND.
6. REMOVE ALL TEMPORARY EROSION CONTROLS FROM THE SITE AT THE CONCLUSION OF CONSTRUCTION ACTIVITIES.
7. CONTRACTOR SHALL REPAIR ALL PAVING ON SITE DAMAGED OR REMOVED DURING CONSTRUCTION.
8. STORMWATER SHALL NOT BE DIRECTED INTO THE BASIN UNTIL ALL PLANTINGS ARE SUITABLY ESTABLISHED. CONTRACTOR SHALL EITHER TIE INTO THE EXISTING CATCH BASIN LAST OR INSTALL A REMOVAL PLUG.

No.	Revision/Issue	Date
6	As-Builts	11/15
5	Revised Design for Const.	06/15
4	100% Design for Const.	04/15
3	90% Design	03/15
2	60% Design	02/15
1	Conceptual	01/15

WaterVision, LLC
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 21 DEPOT STREET
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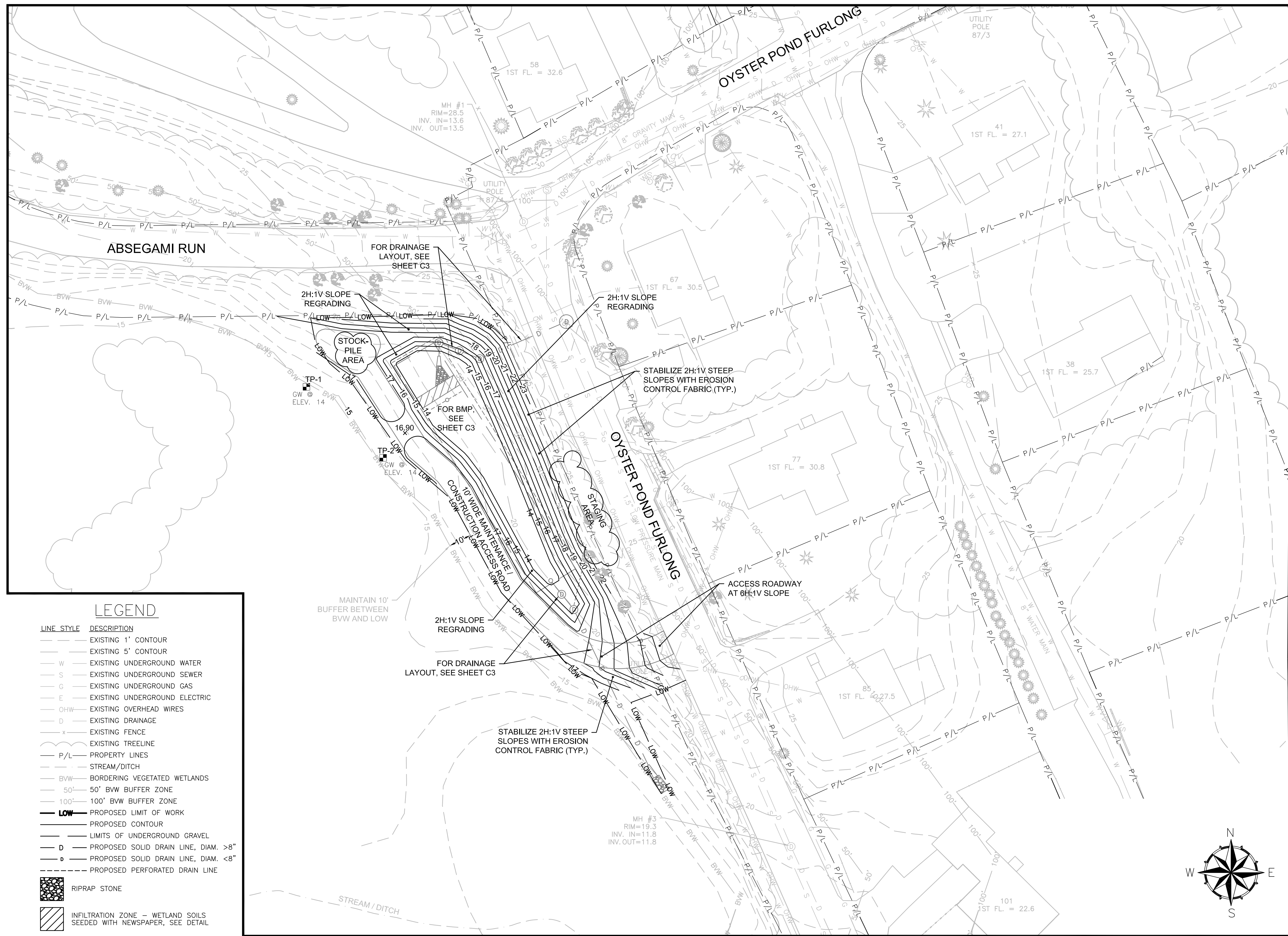
EPA Green Infrastructure Education and Outreach Project

OYSTER POND BMP, GRAVEL BIORETENTION CELL

Oyster Pond Furlong and Absegami Run, Chatham, MA

Project No.: 677-2	Sheet
Date: NOVEMBER 2015	C-1
Drawn By: NC	
Checked By: ML	
Horizontal Datum: NAD88	
Vertical Datum: NAVD88	

OYSTER POND BMP – EXISTING CONDITIONS AND WETLAND BUFFERS



LEGEND

- | LINE STYLE | DESCRIPTION |
|------------|---|
| --- | EXISTING 1' CONTOUR |
| --- | EXISTING 5' CONTOUR |
| W | EXISTING UNDERGROUND WATER |
| S | EXISTING UNDERGROUND SEWER |
| G | EXISTING UNDERGROUND GAS |
| E | EXISTING UNDERGROUND ELECTRIC |
| OHW | EXISTING OVERHEAD WIRES |
| D | EXISTING DRAINAGE |
| x | EXISTING FENCE |
| --- | EXISTING TREELINE |
| P/L | PROPERTY LINES |
| --- | STREAM/DITCH |
| BVW | BORDERING VEGETATED WETLANDS |
| 50' | 50' BVW BUFFER ZONE |
| 100' | 100' BVW BUFFER ZONE |
| LOW | PROPOSED LIMIT OF WORK |
| --- | PROPOSED CONTOUR |
| --- | LIMITS OF UNDERGROUND GRAVEL |
| D | PROPOSED SOLID DRAIN LINE, DIAM. >8" |
| d | PROPOSED SOLID DRAIN LINE, DIAM. <8" |
| --- | PROPOSED PERFORATED DRAIN LINE |
| ▒ | RIPRAP STONE |
| ▨ | INFILTRATION ZONE - WETLAND SOILS SEEDED WITH NEWSPAPER, SEE DETAIL |

General Notes

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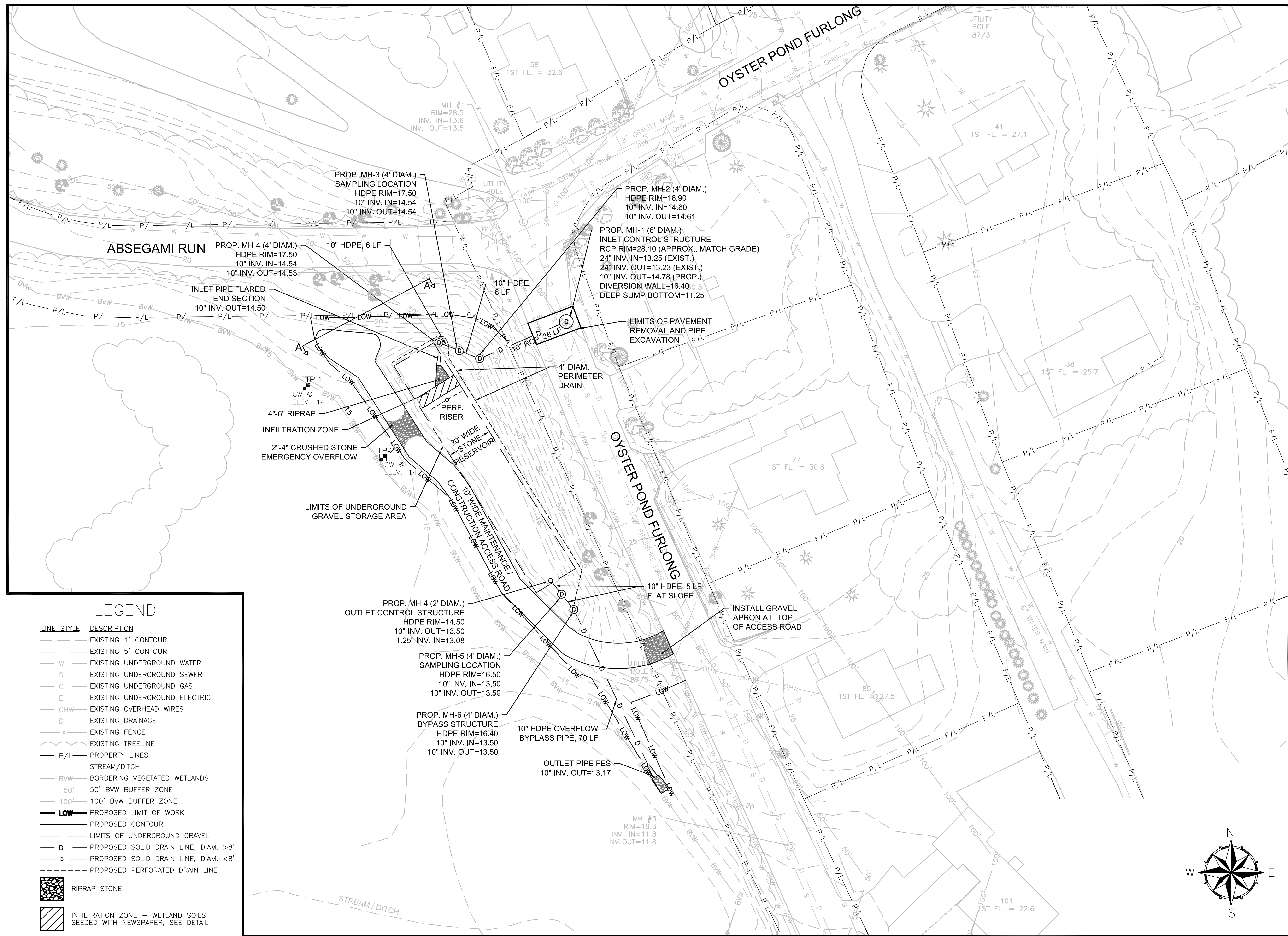
EPA Green Infrastructure Education and Outreach Project

OYSTER POND BMP, GRAVEL BIORETENTION CELL

Oyster Pond Furlong and Absegami Run, Chatham, MA

Project No.: 677-2	Sheet
Date: NOVEMBER 2015	C-2
Drawn By: NC	
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Horizontal Datum: NAD88	
Vertical Datum: NAVD88	

OYSTER POND BMP - GRADING PLAN



- General Notes**
1. THE LOCATION OF UNDERGROUND UTILITIES HAVE NOT BEEN VERIFIED OR INSPECTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT "DIG-SAFE" AT 1-888-344-7233.
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EPA Green Infrastructure Education and Outreach Project

OYSTER POND BMP, GRAVEL BIORETENTION CELL

Oyster Pond Furlong and Absegami Run, Chatham, MA

Project No.: 677-2	Sheet
Date: NOVEMBER 2015	C-3
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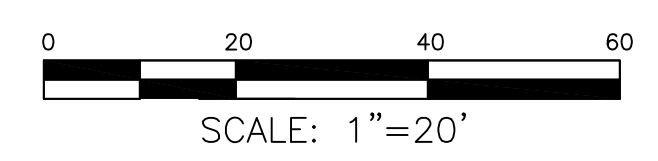
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LINE STYLE DESCRIPTION

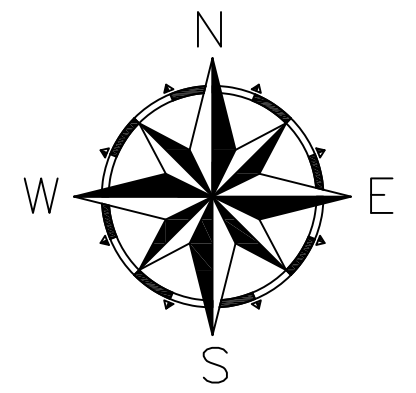
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- W --- EXISTING UNDERGROUND WATER
- S --- EXISTING UNDERGROUND SEWER
- G --- EXISTING UNDERGROUND GAS
- E --- EXISTING UNDERGROUND ELECTRIC
- OHW --- EXISTING OVERHEAD WIRES
- D --- EXISTING DRAINAGE
- x --- EXISTING FENCE
- EXISTING TREELINE
- P/L --- PROPERTY LINES
- STREAM/DITCH
- BVW --- BORDERING VEGETATED WETLANDS
- 50' --- 50' BVW BUFFER ZONE
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- LOW --- PROPOSED LIMIT OF WORK
- PROPOSED CONTOUR
- LIMITS OF UNDERGROUND GRAVEL
- D --- PROPOSED SOLID DRAIN LINE, DIAM. >8"
- d --- PROPOSED SOLID DRAIN LINE, DIAM. <8"
- o --- PROPOSED PERFORATED DRAIN LINE

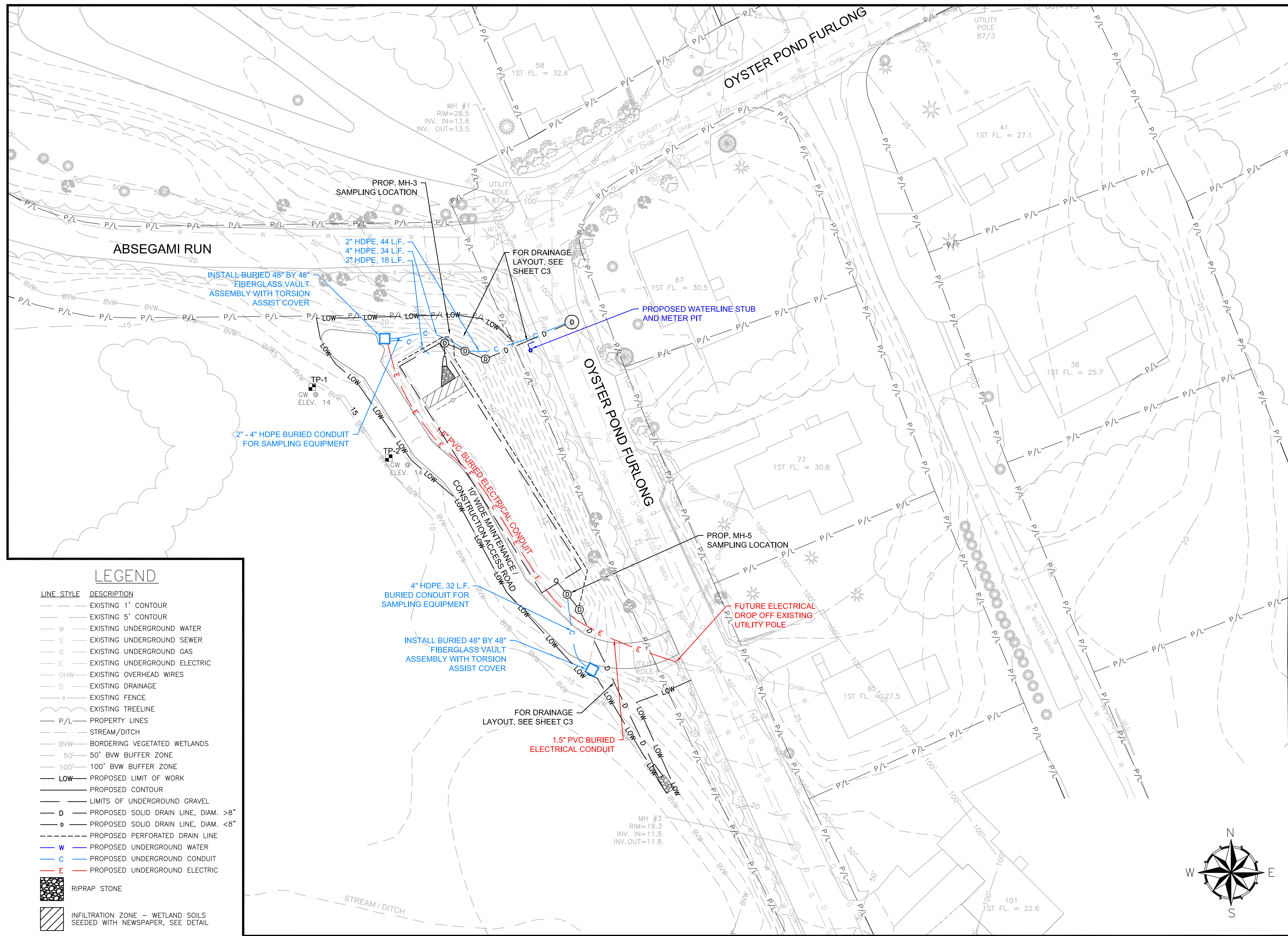
SYMBOLS

- [Stippled Area] RIPRAP STONE
- [Hatched Area] INFILTRATION ZONE - WETLAND SOILS SEEDED WITH NEWSPAPER, SEE DETAIL



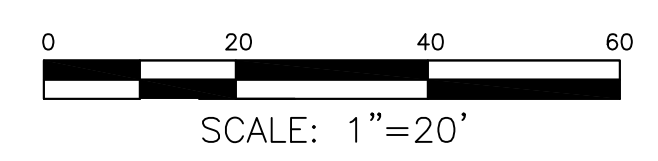
OYSTER POND BMP - DRAINAGE LAYOUT





LEGEND

LINE STYLE	DESCRIPTION
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---	EXISTING 5' CONTOUR
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S	EXISTING UNDERGROUND SEWER
G	EXISTING UNDERGROUND GAS
E	EXISTING UNDERGROUND ELECTRIC
OHW	EXISTING OVERHEAD WIRES
D	EXISTING DRAINAGE
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---	PROPOSED PERFORATED DRAIN LINE
W	PROPOSED UNDERGROUND WATER
C	PROPOSED UNDERGROUND CONDUIT
E	PROPOSED UNDERGROUND ELECTRIC
█	RIPRAP STONE
█	INFILTRATION ZONE - WETLAND SOILS SEEDED WITH NEWSPAPER, SEE DETAIL



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No.	Revision/Issue	Date
7	Utility Layout As-Built	11/15
6	Utility Layout	10/15
5	Revised Design for Const.	06/15
4	100% Design for Const.	04/15
3	90% Design	03/15
2	60% Design	02/15
1	Conceptual	01/15

WaterVision, LLC
 481 GREAT ROAD, SUITE 3
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COMPREHENSIVE ENVIRONMENTAL INCORPORATED
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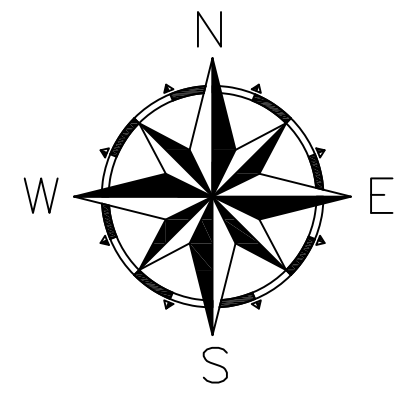
EPA Green Infrastructure Education and Outreach Project

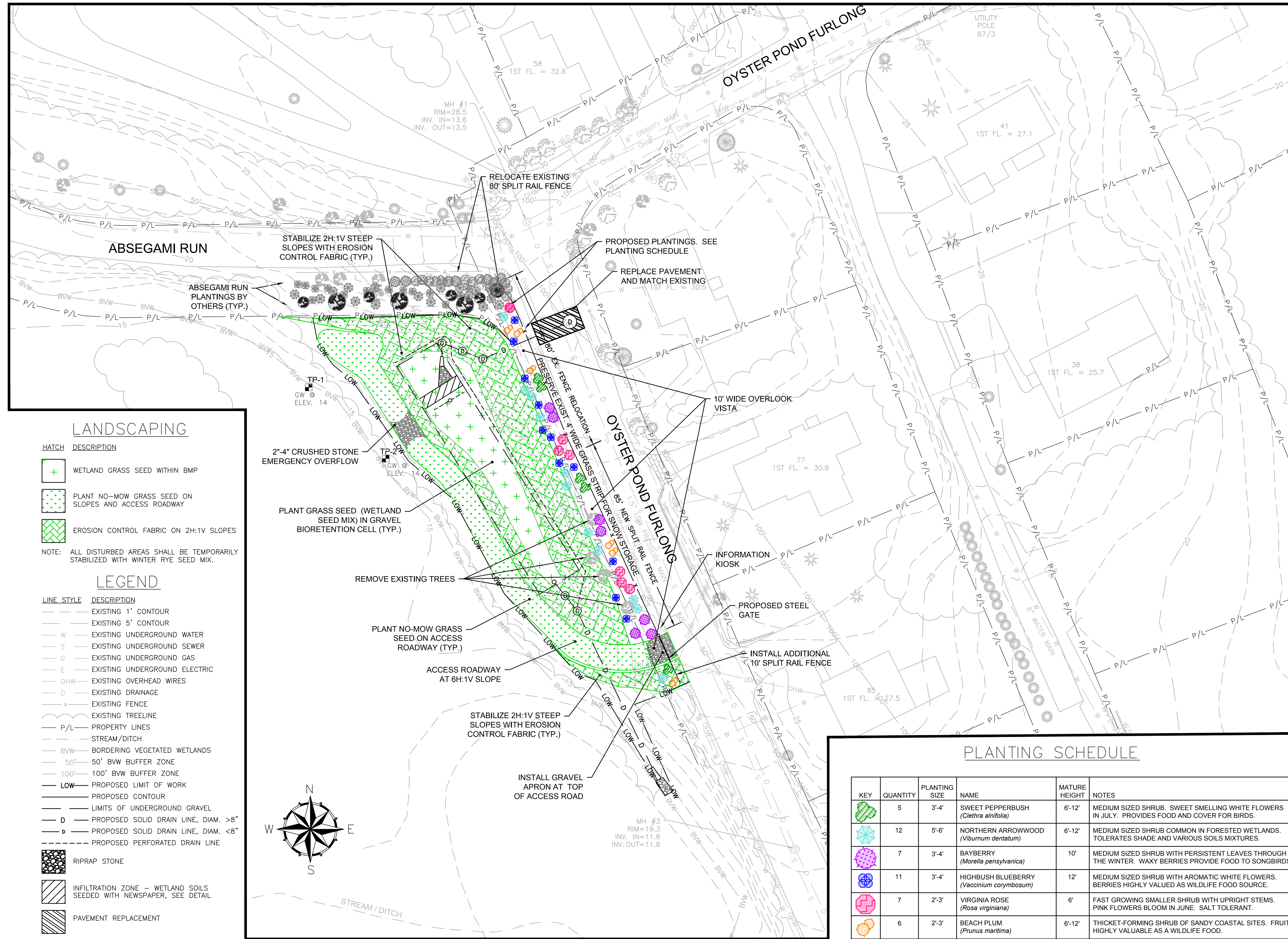
OYSTER POND BMP, GRAVEL BIORETENTION CELL

Oyster Pond Furlong and Absegami Run, Chatham, MA

Project No.: 677-2	Sheet
Date: NOVEMBER 2015	C-4
Drawn By: NC	
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Horizontal Datum: NAD88	
Vertical Datum: NAVD88	

OYSTER POND BMP - UTILITY PLAN





LANDSCAPING

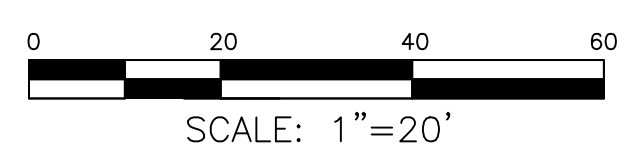
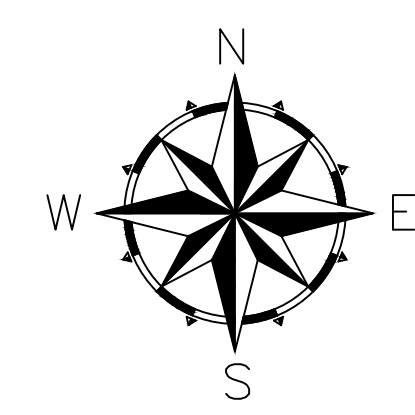
HATCH	DESCRIPTION
	WETLAND GRASS SEED WITHIN BMP
	PLANT NO-MOW GRASS SEED ON SLOPES AND ACCESS ROADWAY
	EROSION CONTROL FABRIC ON 2H:1V SLOPES

NOTE: ALL DISTURBED AREAS SHALL BE TEMPORARILY STABILIZED WITH WINTER RYE SEED MIX.

LEGEND

LINE STYLE	DESCRIPTION
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---	EXISTING 5' CONTOUR
W	EXISTING UNDERGROUND WATER
S	EXISTING UNDERGROUND SEWER
G	EXISTING UNDERGROUND GAS
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LOW	PROPOSED LIMIT OF WORK
---	PROPOSED CONTOUR
---	LIMITS OF UNDERGROUND GRAVEL
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d	PROPOSED SOLID DRAIN LINE, DIAM. <8"
---	PROPOSED PERFORATED DRAIN LINE

	RIPRAP STONE
	INFILTRATION ZONE - WETLAND SOILS SEEDED WITH NEWSPAPER, SEE DETAIL
	PAVEMENT REPLACEMENT



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7	Landscaping Design As-Built	11/15
6	Landscaping Design	08/15
5	Revised Design for Const.	06/15
4	100% Design for Const.	04/15
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WV WaterVision, LLC
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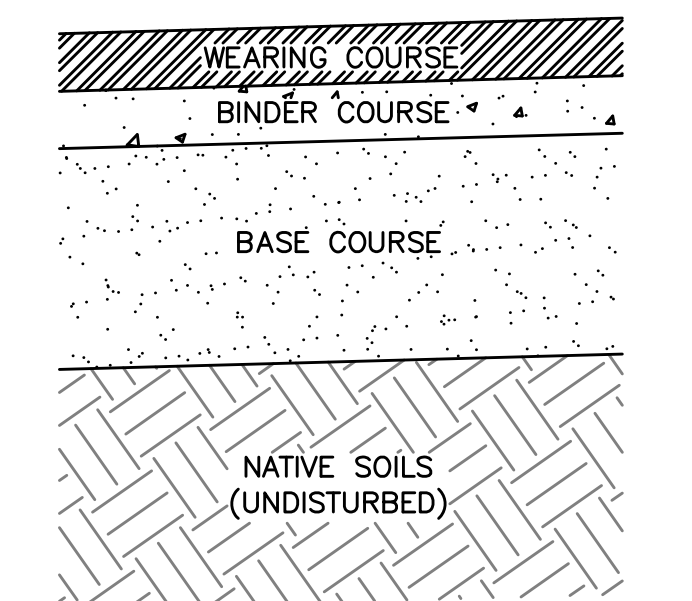
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Project No.: 677-2	Sheet
Date: NOVEMBER 2015	C-5
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PLANTING SCHEDULE

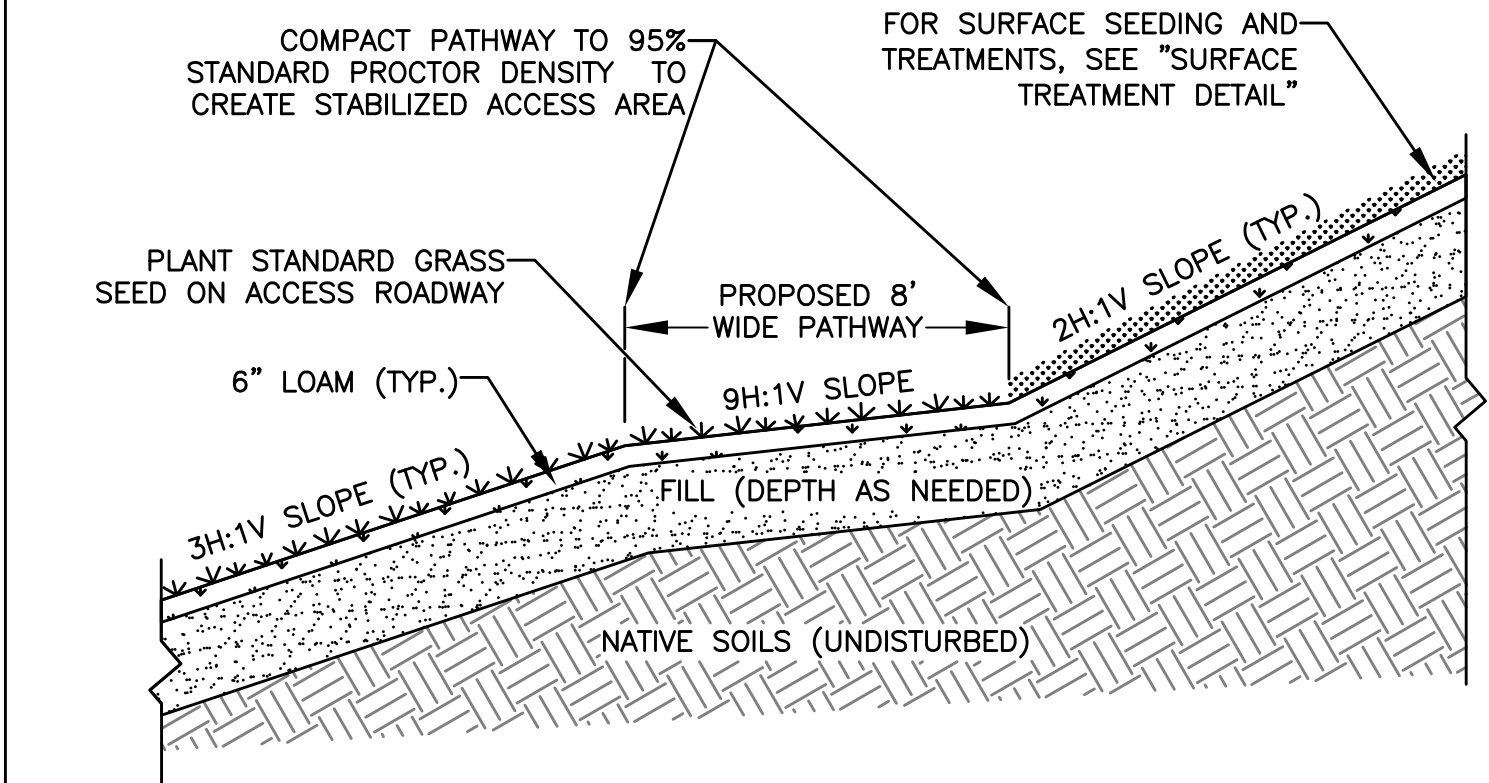
KEY	QUANTITY	PLANTING SIZE	NAME	MATURE HEIGHT	NOTES
	5	3'-4'	SWEET PEPPERBUSH (<i>Clethra alnifolia</i>)	6'-12'	MEDIUM SIZED SHRUB. SWEET SMELLING WHITE FLOWERS IN JULY. PROVIDES FOOD AND COVER FOR BIRDS.
	12	5'-6'	NORTHERN ARROWWOOD (<i>Viburnum dentatum</i>)	6'-12'	MEDIUM SIZED SHRUB COMMON IN FORESTED WETLANDS. TOLERATES SHADE AND VARIOUS SOILS MIXTURES.
	7	3'-4'	BAYBERRY (<i>Morella pensylvanica</i>)	10'	MEDIUM SIZED SHRUB WITH PERSISTENT LEAVES THROUGH THE WINTER. WAXY BERRIES PROVIDE FOOD TO SONGBIRDS.
	11	3'-4'	HIGHBUSH BLUEBERRY (<i>Vaccinium corymbosum</i>)	12'	MEDIUM SIZED SHRUB WITH AROMATIC WHITE FLOWERS. BERRIES HIGHLY VALUED AS WILDLIFE FOOD SOURCE.
	7	2'-3'	VIRGINIA ROSE (<i>Rosa virginiana</i>)	6'	FAST GROWING SMALLER SHRUB WITH UPRIGHT STEMS. PINK FLOWERS BLOOM IN JUNE. SALT TOLERANT.
	6	2'-3'	BEACH PLUM (<i>Prunus maritima</i>)	6'-12'	THICKET-FORMING SHRUB OF SANDY COASTAL SITES. FRUIT HIGHLY VALUABLE AS A WILDLIFE FOOD.

OYSTER POND FURLONG - LANDSCAPING AND SURFACE TREATMENTS

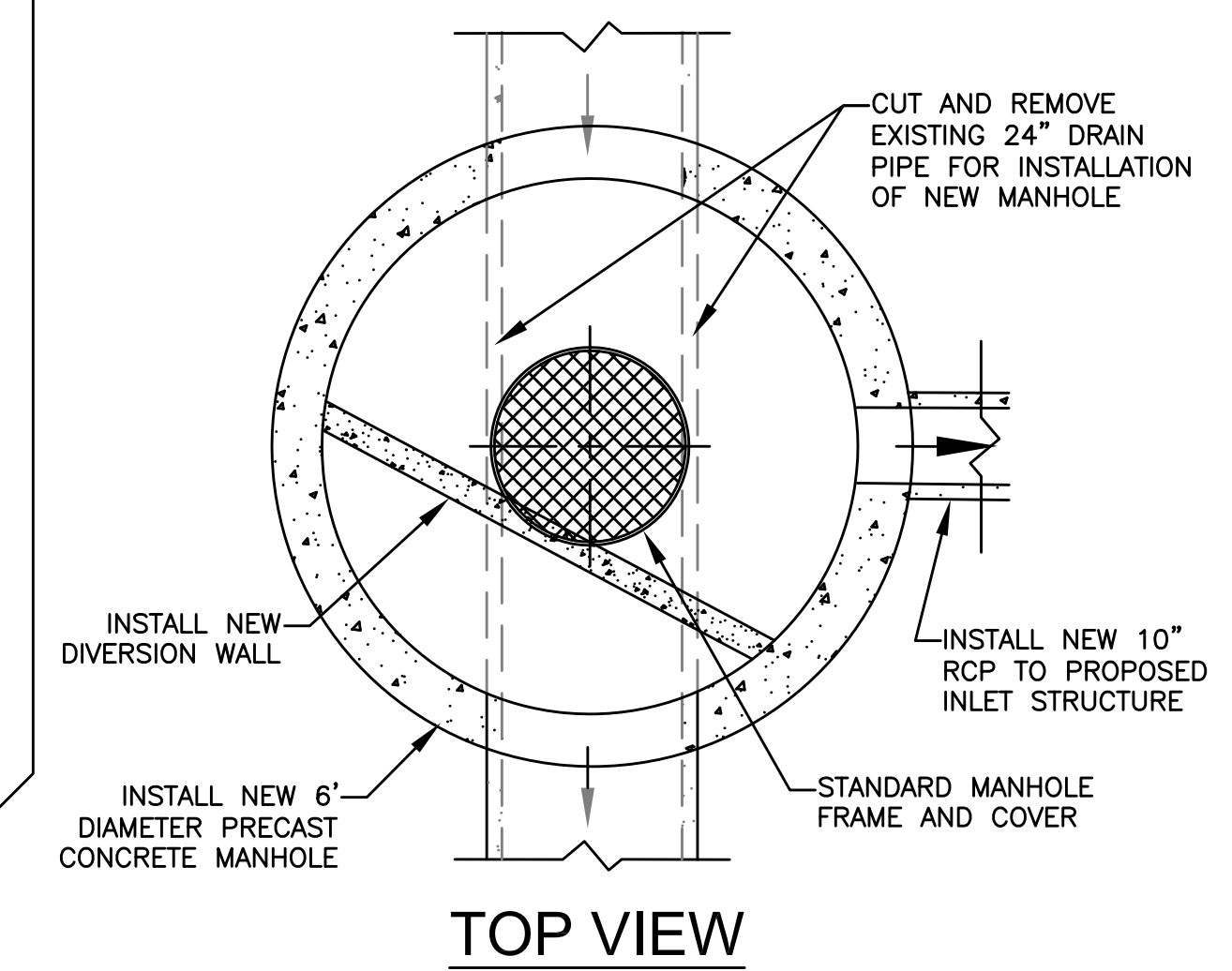


NOTES
1. PAVEMENT CROSS SECTION IS TYPICAL. CONTRACTOR TO MATCH EXISTING CONDITIONS.

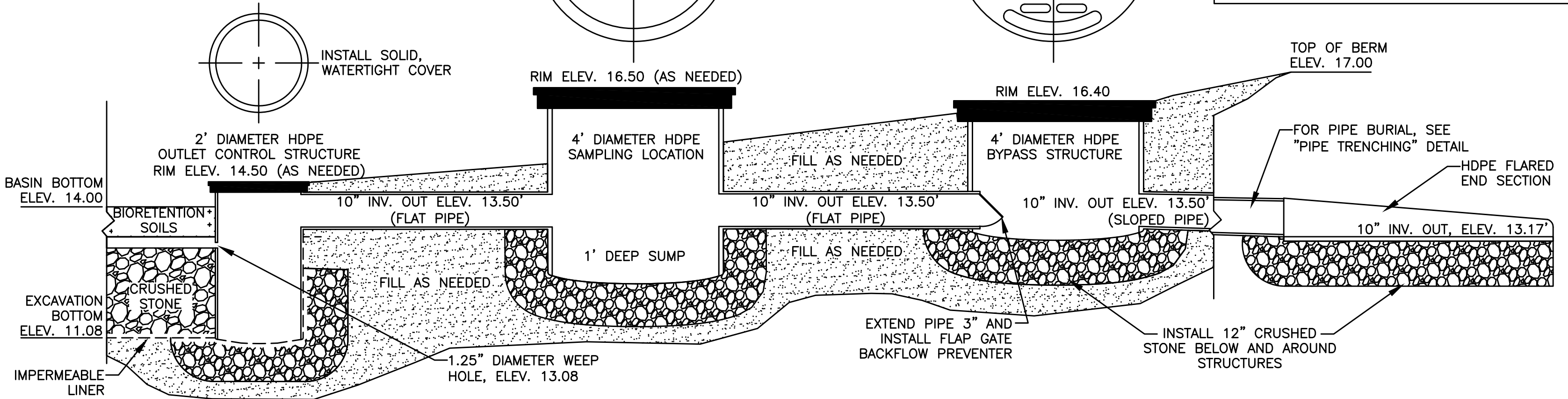
TYPICAL PAVEMENT



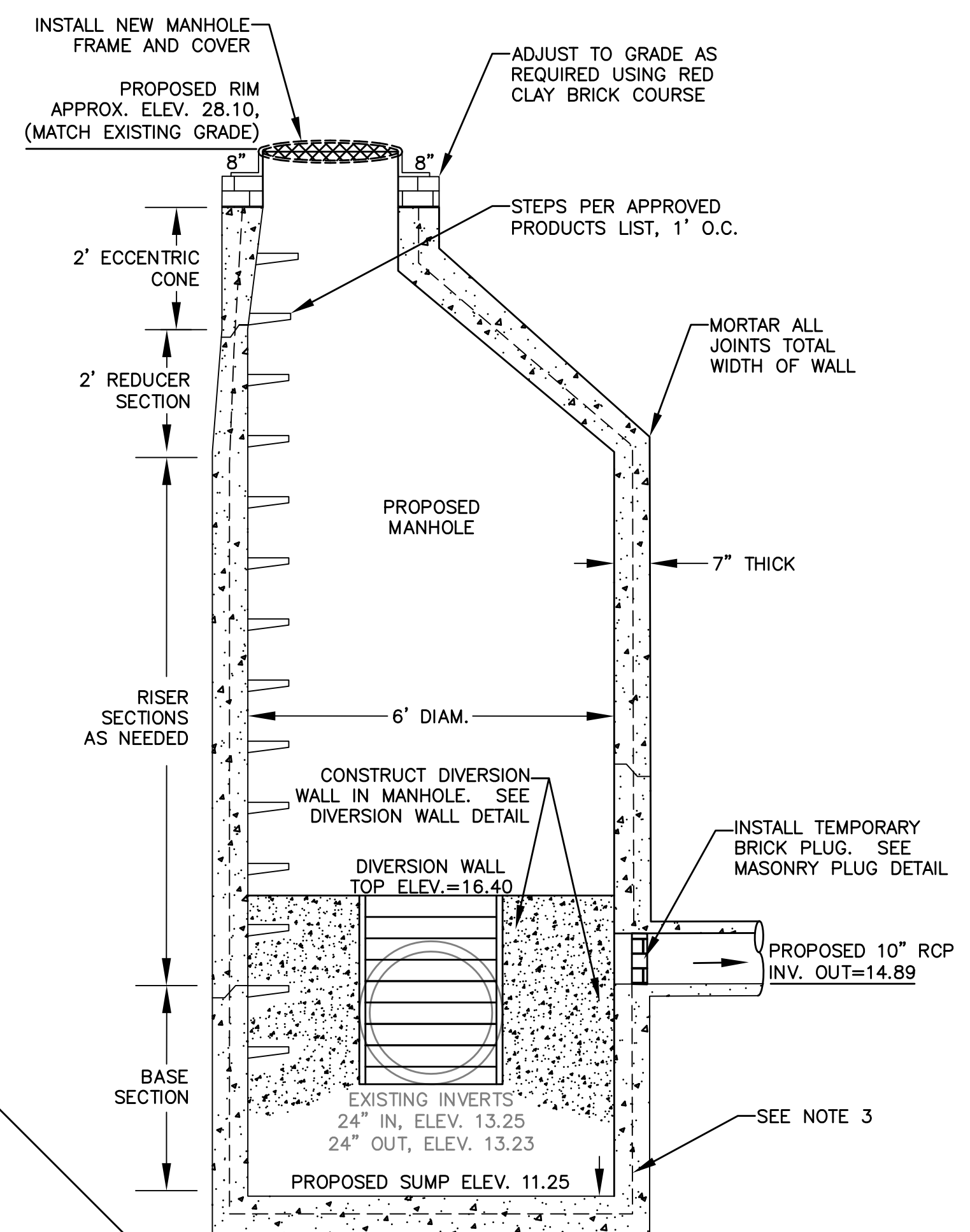
ACCESS ROADWAY



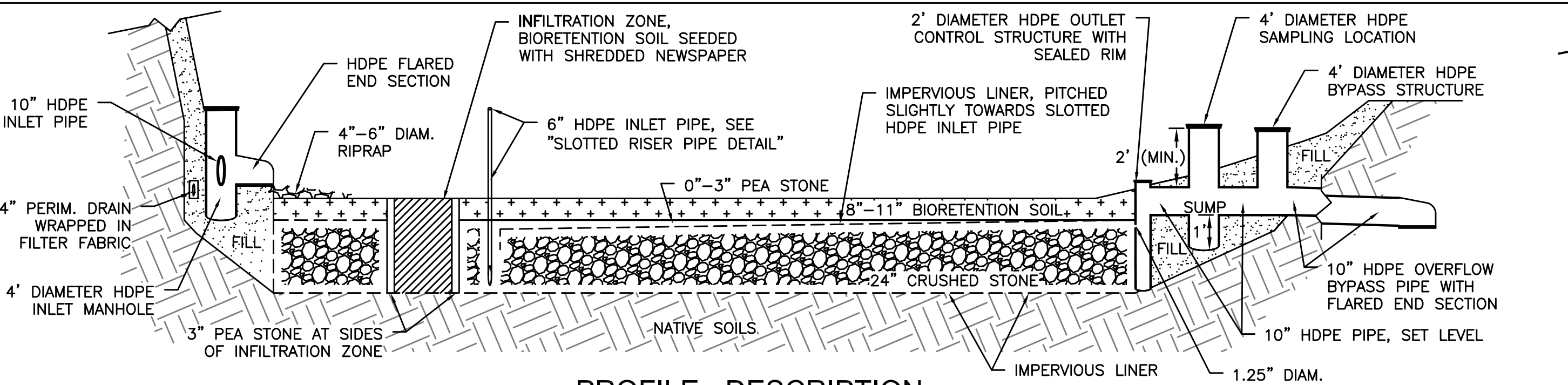
TOP VIEW



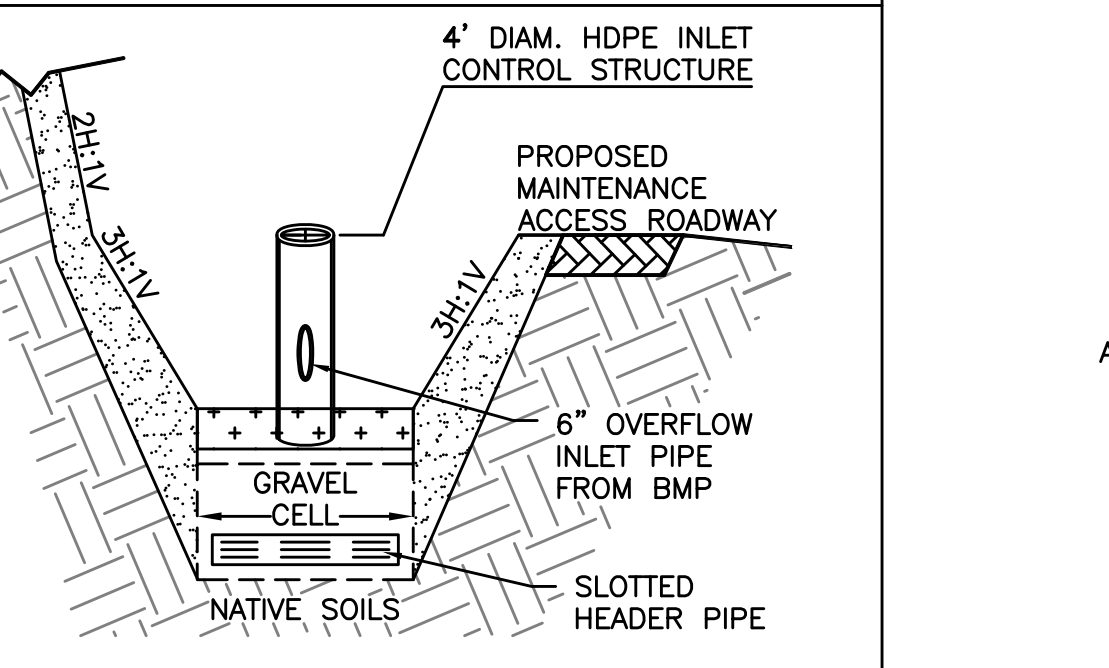
BMP OVERFLOW DETAILS



ELEVATION VIEW

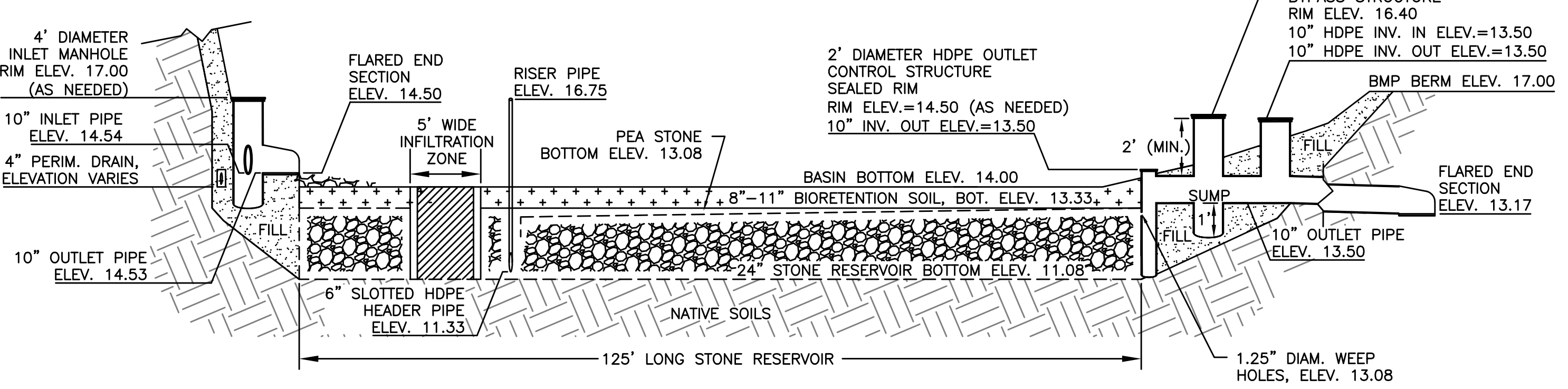


PROFILE - DESCRIPTION

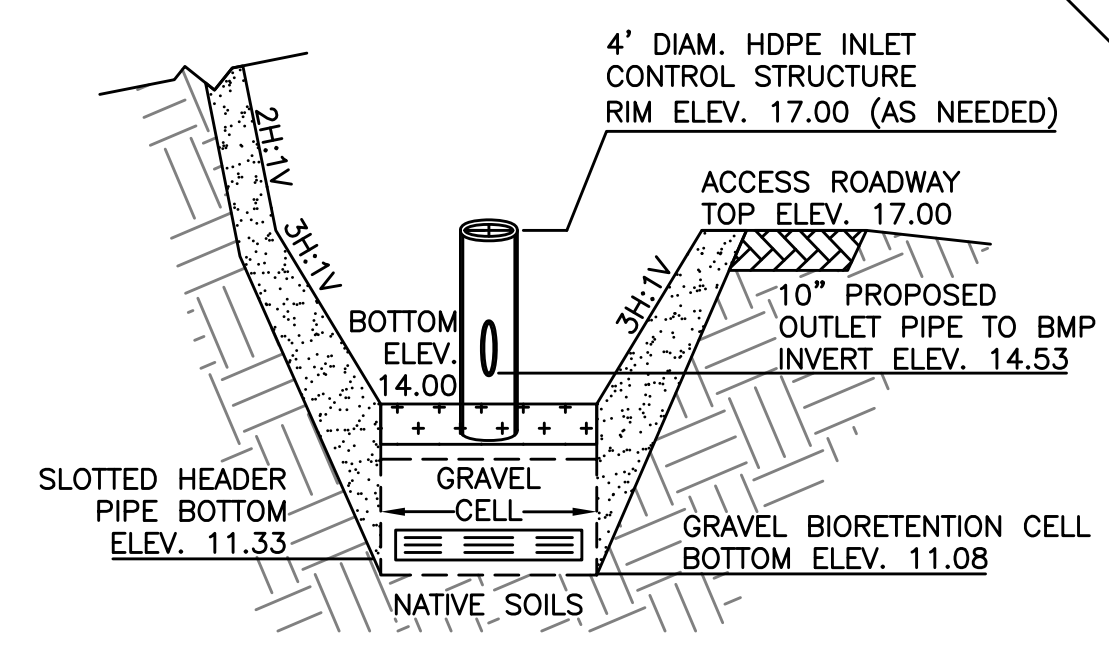


CROSS-SECTION A-A - DESCRIPTION

SOIL COMPOSITION NOTES
1. BIORETENTION SOILS SHALL CONSIST OF 55%-75% HIGH PERMEABILITY SAND AND FINE GRAVEL, 15% TO 25% NATIVE SOILS AND/OR LOAM, AND 10% TO 20% FINE ORGANIC MATERIAL SUCH AS COMPOST, OR EQUIVALENT MIXTURE AS APPROVED BY THE ENGINEER.
2. INFILTRATION ZONE SOILS SHALL CONSIST OF 60%-80% HIGH PERMEABILITY SAND AND FINE GRAVEL, 10% TO 20% NATIVE SOILS AND/OR LOAM, 5% TO 10% FINE ORGANIC MATERIAL SUCH AS COMPOST, AND 5% TO 10% SHREDDED NEWSPAPER, OR EQUIVALENT MIXTURE AS APPROVED BY THE ENGINEER.



PROFILE - ELEVATIONS AND DIMENSIONS



CROSS-SECTION A-A - ELEVATIONS AND DIMENSIONS

NOTES
1. MANHOLE SHALL BE IN ACCORDANCE WITH SECTION 702 OF THE RI STANDARD SPECIFICATIONS
2. CIRCUMFERENTIAL STEEL REINFORCEMENT REQUIRED = 0.15 SQ. IN./LF. MINIMUM
3. STEEL REINFORCEMENT FOR BASE SECTION BOTTOM SHALL BE A MINIMUM OF 0.12 SQ. IN./LF. (BOTH WAYS)
4. ONE POUR MONOLITHIC BASE SECTION.
5. ANY NECESSARY ADJUSTMENTS DURING CONSTRUCTION WILL BE DONE BY SAW-CUTTING AND/OR CORING ONLY. NO JACKHAMMERS, HAMMERS AND CHISELS OR PNEUMATIC TOOLS WILL BE ALLOWED
6. STEPS SHALL CONFORM TO STD. 5.3.0 AND SHALL BE INSTALLED AT THE CASTING PLANT

RCP INLET CONTROL STRUCTURE

General Notes
1. THE LOCATION OF UNDERGROUND UTILITIES HAVE NOT BEEN VERIFIED OR INSPECTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT "DIG-SAFE" AT 1-888-344-7233.
2. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION TO PREVENT ANY DAMAGE TO ADJACENT PROPERTIES. ALL AREAS WHICH ARE AFFECTED BY THE CONTRACTOR'S OPERATIONS SHALL BE RETURNED TO THEIR ORIGINAL CONDITION OR BETTER, AT NO ADDITIONAL COST TO THE OWNER.
3. ANY CHANGE IN FIELD CONDITIONS SHALL BE REPORTED TO THE ENGINEER TO INSURE THAT ANY MODIFICATIONS TO THE ORIGINAL DESIGN ARE PROPER AND ADEQUATE TO SERVE THE PROJECT'S NEEDS AND COMPLY WITH THE APPLICABLE STANDARDS AND REGULATIONS.
4. CONTRACTOR SHALL IMMEDIATELY REPAIR OR FILL ANY POTHoles THAT OCCUR DUE TO CONSTRUCTION.
5. CONTRACTOR SHALL REPAIR ALL PAVING OR BRICKWORK ON SITE DAMAGED OR REMOVED DURING CONSTRUCTION.
6. REMOVE ALL TEMPORARY EROSION CONTROLS FROM THE SITE AT THE CONCLUSION OF CONSTRUCTION ACTIVITIES.
7. STORMWATER SHALL NOT BE DIRECTED INTO THE BASIN UNTIL ALL PLANTINGS ARE SUITABLY ESTABLISHED. CONTRACTOR SHALL EITHER TIE INTO THE EXISTING CATCH BASIN LAST OR INSTALL A REMOVAL PLUG.

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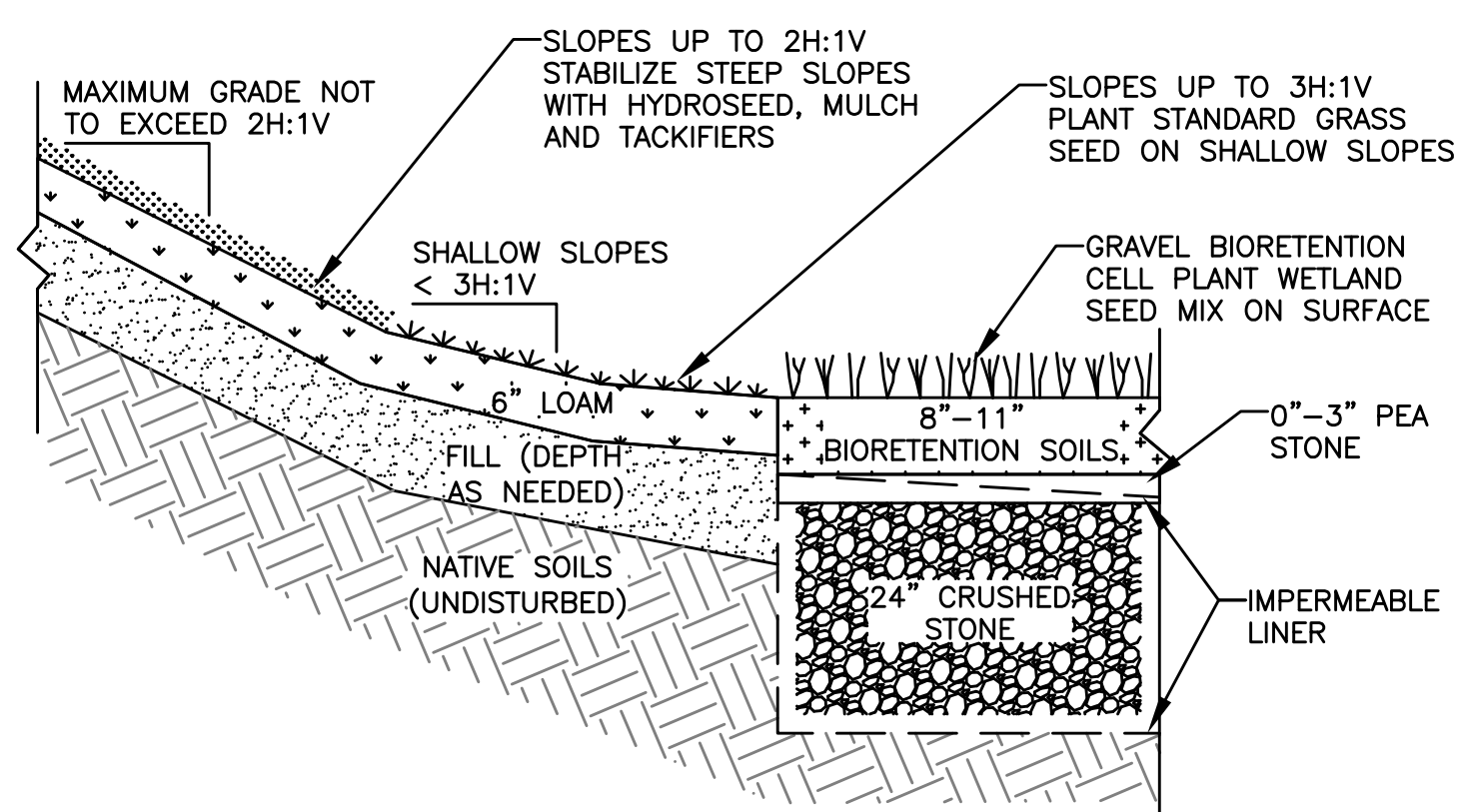
EPA Green Infrastructure Education and Outreach Project
OYSTER POND BMP, GRAVEL BIORETENTION CELL
Oyster Pond Furlong and Absegami Run, Chatham MA

Project No.: 677-2
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Vertical Datum: NAVD88

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STORMWATER BMP DETAILS

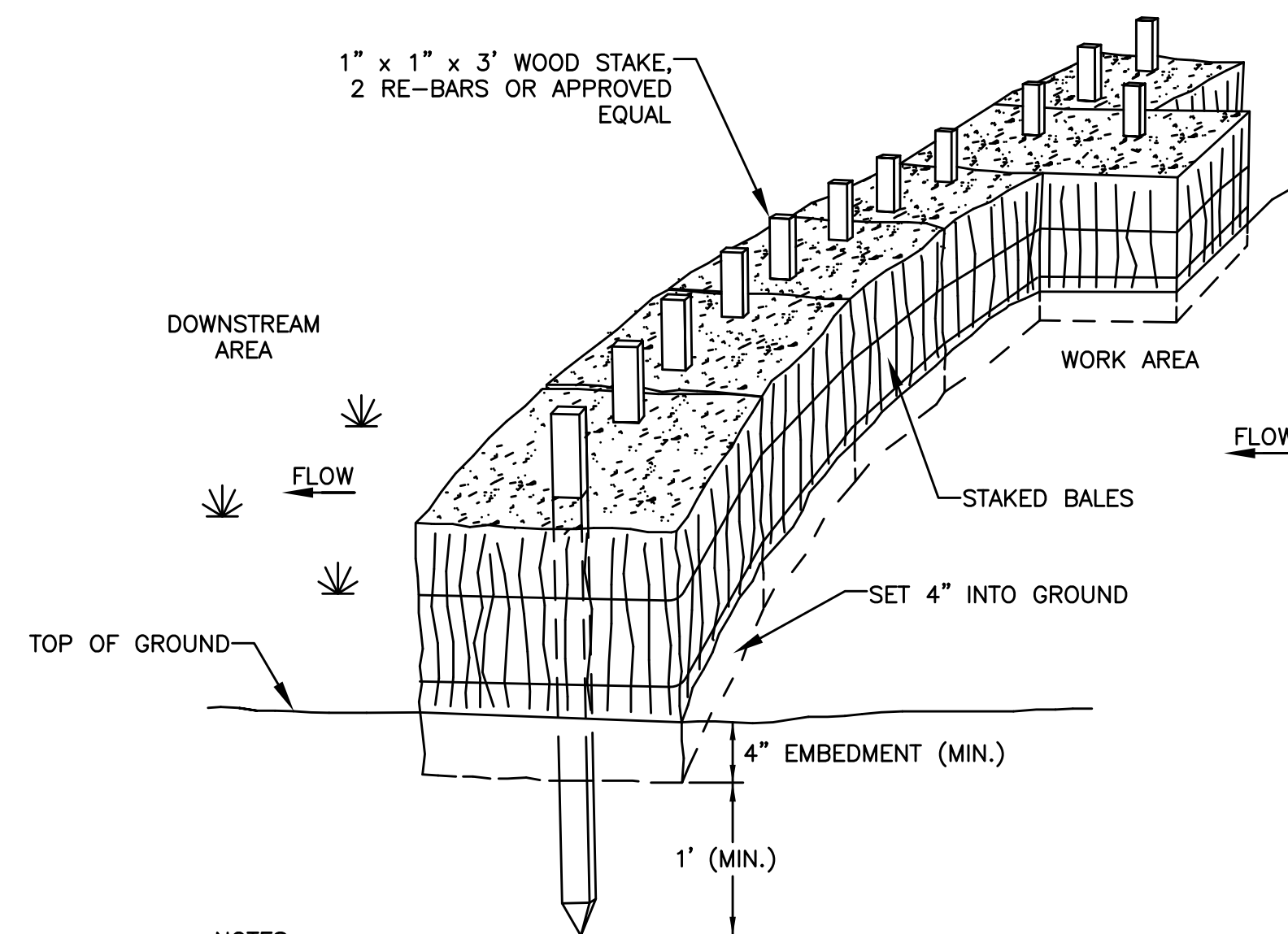
OYSTER POND BMP - DETAILS



SOIL COMPOSITION NOTES

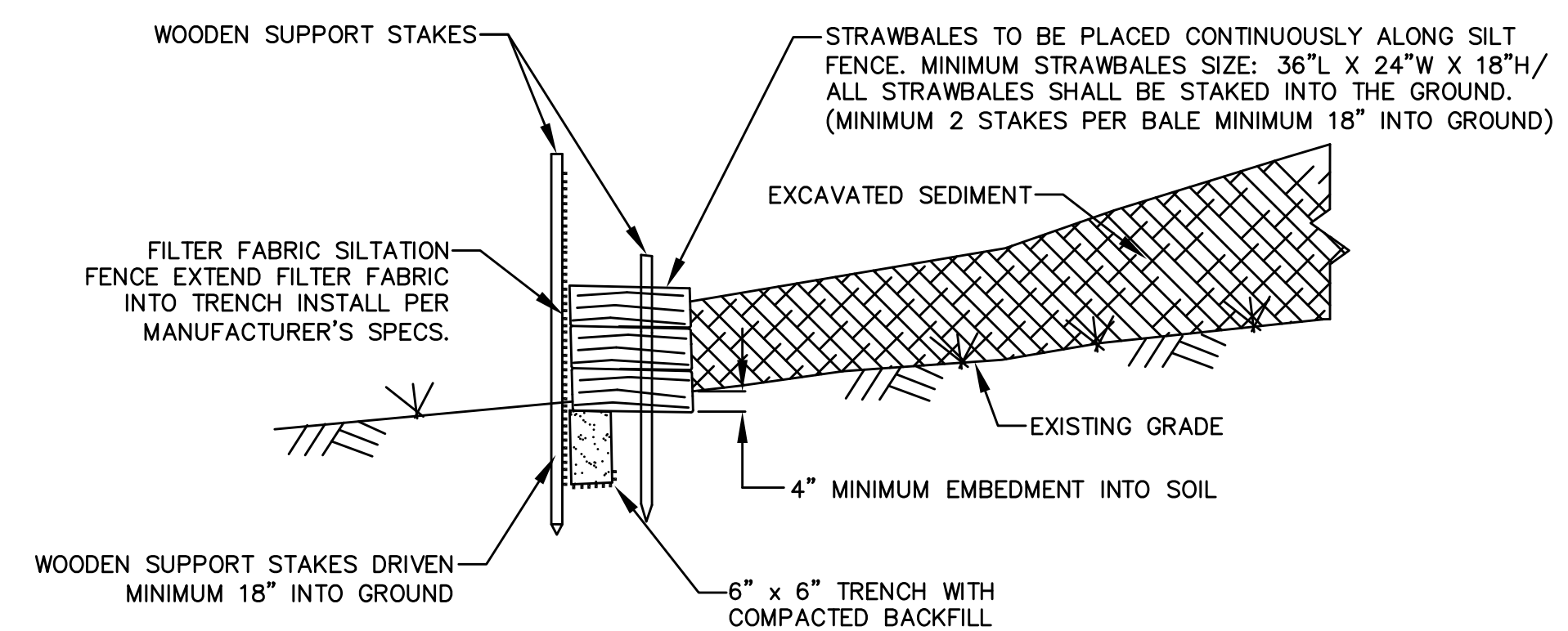
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2. INFILTRATION ZONE SOILS (NOT SHOWN) SHALL CONSIST OF 60%-80% HIGH PERMEABILITY SAND AND FINE GRAVEL, 10% TO 20% NATIVE SOILS AND/OR LOAM, 5% TO 10% FINE ORGANIC MATERIAL SUCH AS COMPOST, AND 5% TO 10% SHREDDED NEWSPAPER, OR EQUIVALENT MIXTURE AS APPROVED BY THE ENGINEER.

SURFACE TREATMENTS

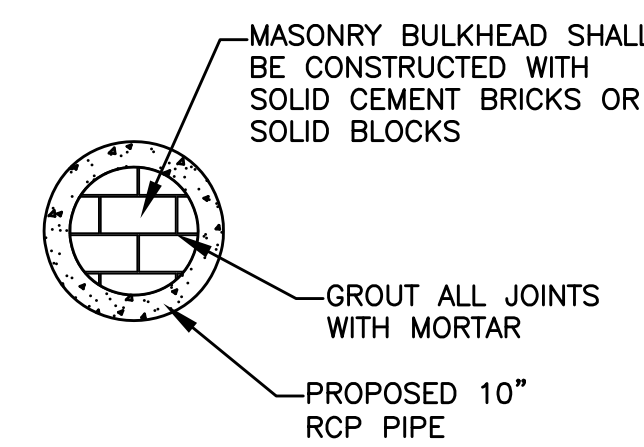


- NOTES**
1. PUT ONE HAYBALE PERPENDICULAR ALONG HAYBALE BARRIER (100' O.C.)

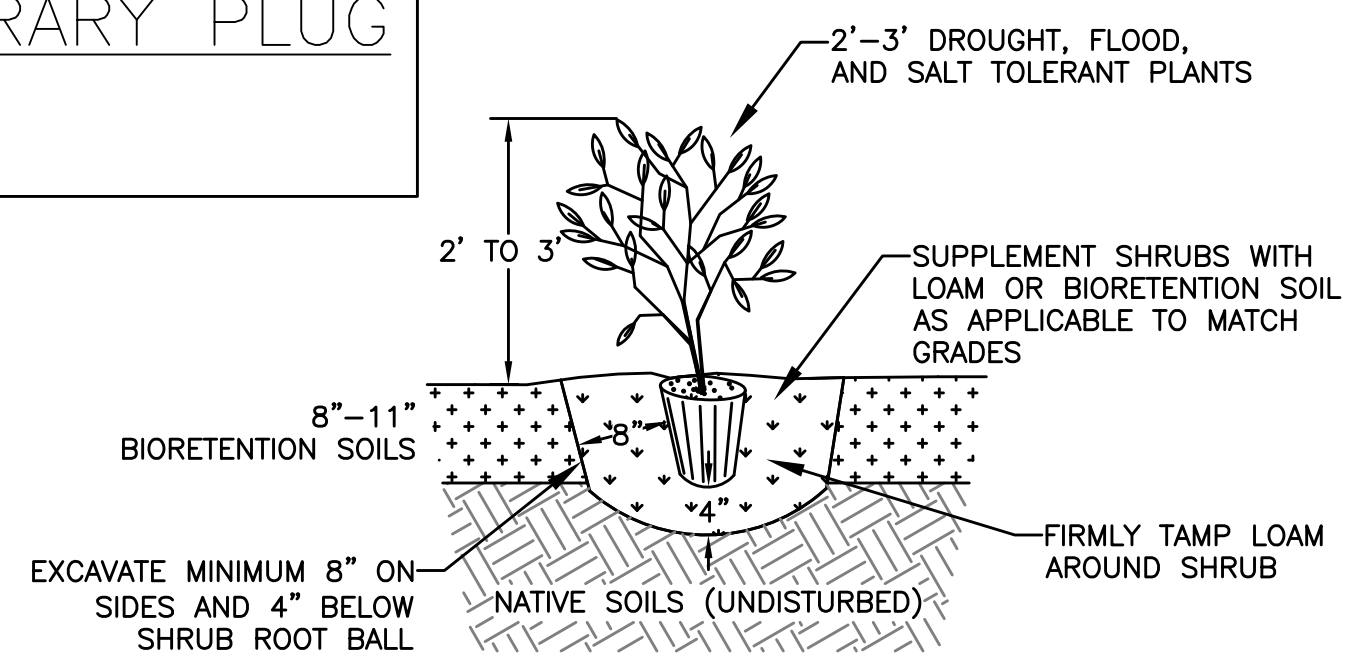
PERIMETER EROSION CONTROLS



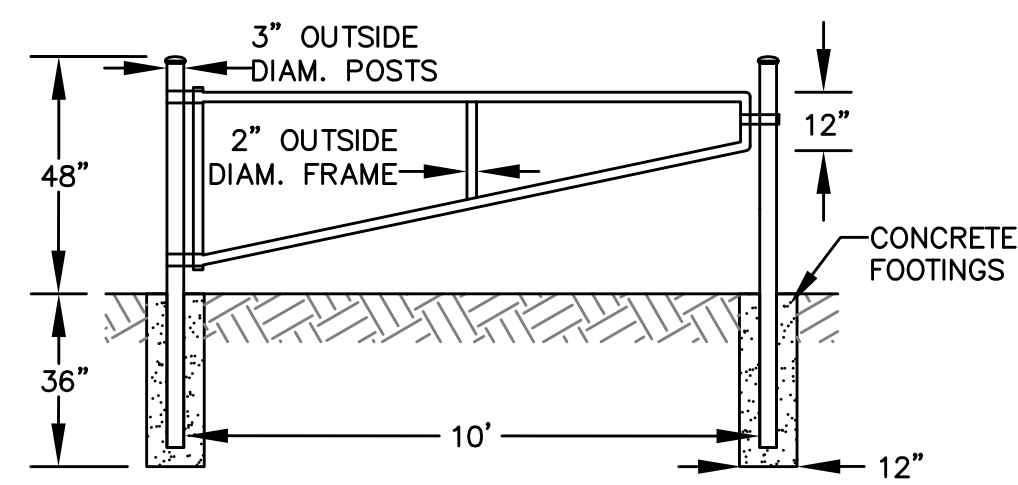
MATERIAL DE-WATERING AREA



TEMPORARY PLUG

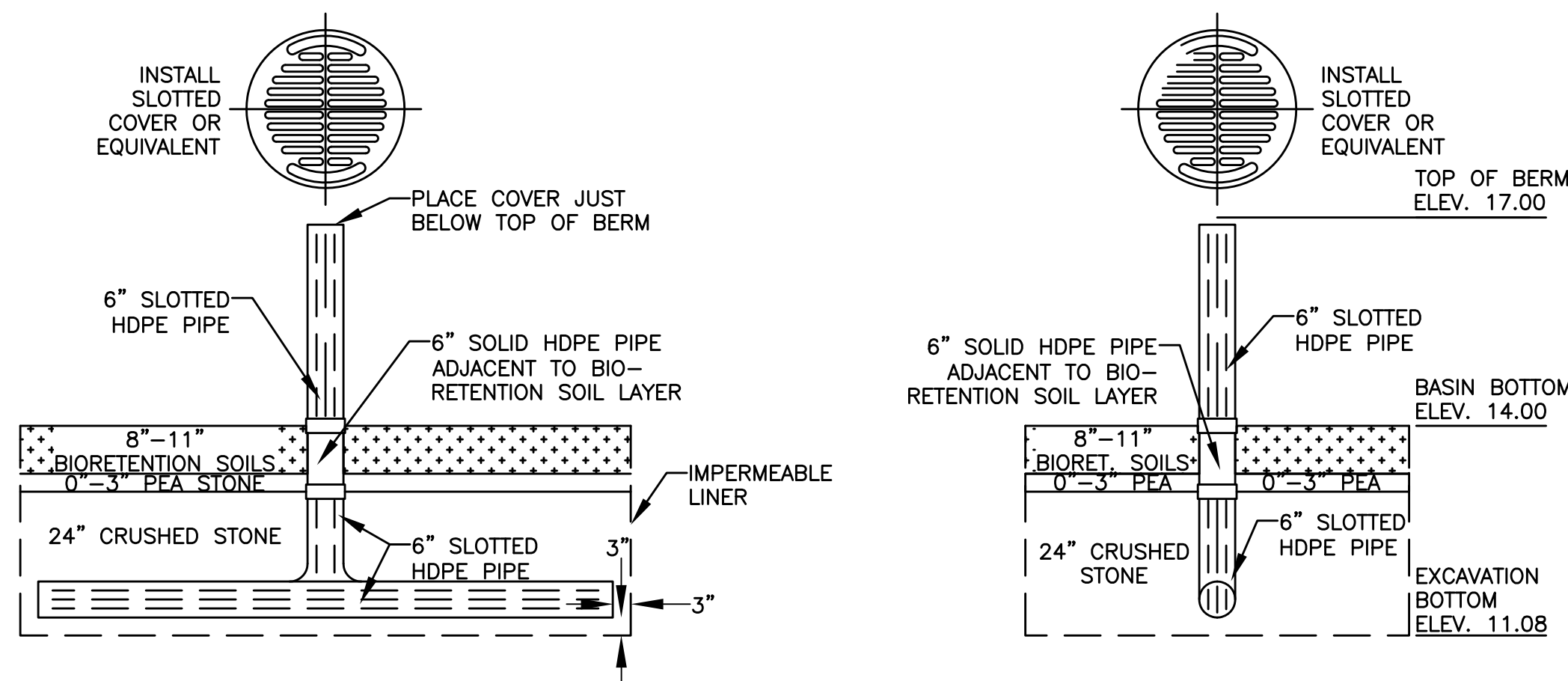


PLANTING DETAIL



- GATE SPECIFICATIONS**
1. GATE SHALL EITHER BE COATED IN GREEN VINYL OR FIELD PAINTED DARK GREEN.

GATE DETAIL

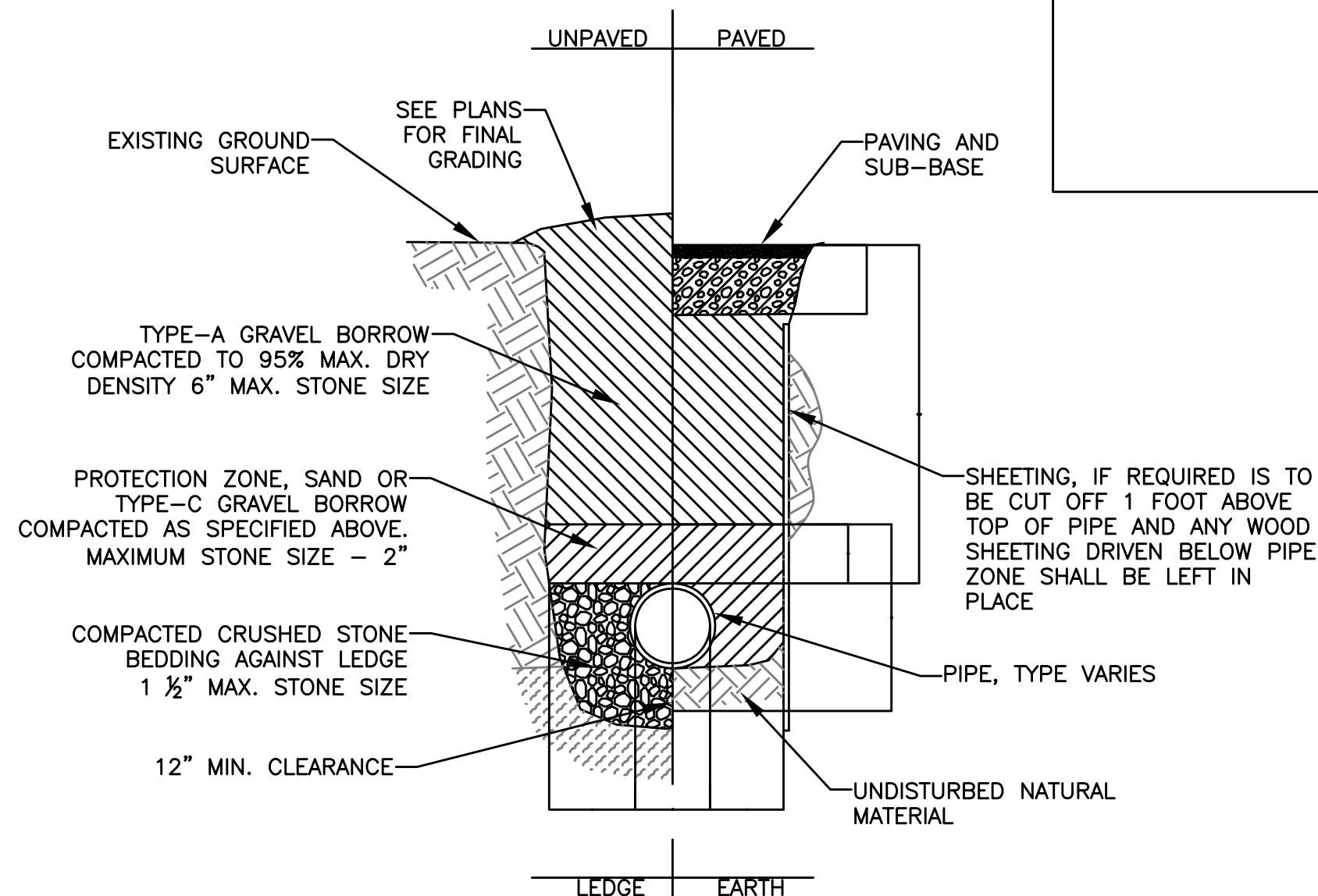


CROSS-SECTION VIEW

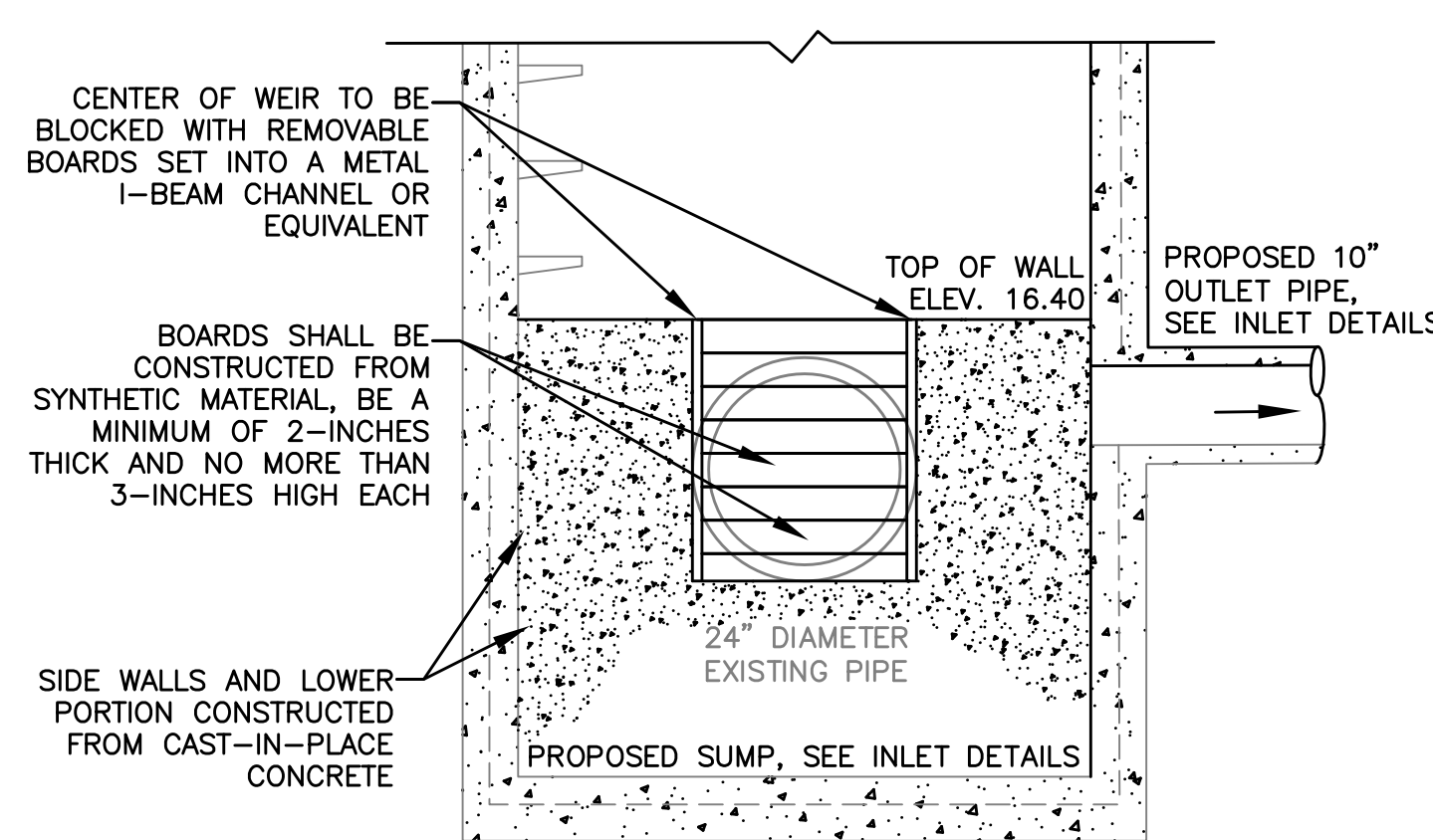
ELEVATION VIEW

- SLOTTED PIPE SPECIFICATIONS**
1. SLOTS SHALL BE A MINIMUM OF 0.040 INCHES WIDE SPACED EVERY 0.25\"/>

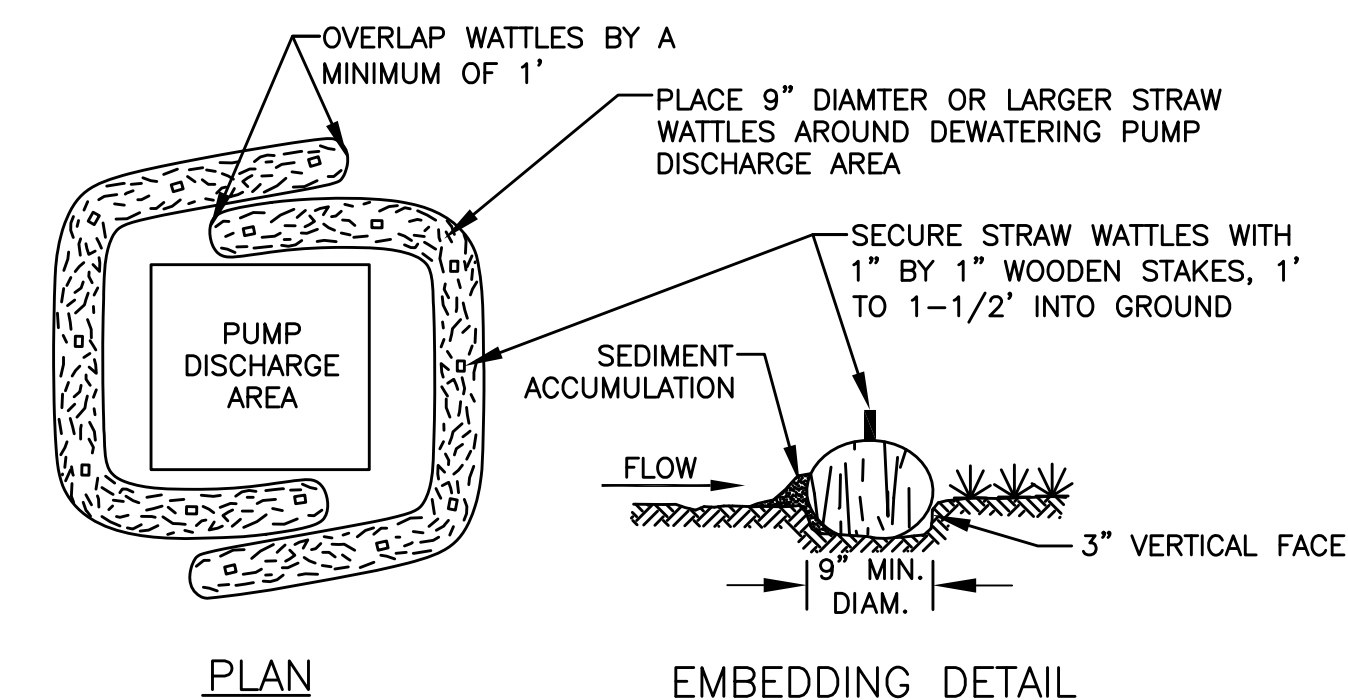
SLOTTED RISER PIPE DETAIL



PIPE TRENCHING DETAIL



DIVERSION WALL



PLAN

EMBEDDING DETAIL

STRAW WATTLE DE-WATERING AREA CONSTRUCTION SPECIFICATIONS

1. WATTLES SHALL BE PLACED IN A ROW WITH ENDS OVERLAPPING A MINIMUM OF 1'.
2. EACH WATTLE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 3\"/>
3. WATTLES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS INSTALLED AT A MINIMUM EVERY 3\"/>
4. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. SEDIMENT SHALL BE REMOVED WHEN THE HEIGHT REACHES THE HALFWAY POINT ON THE STRAW WATTLE.

PUMPING DE-WATERING DISCHARGE AREA

General Notes

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OYSTER POND BMP - DETAILS