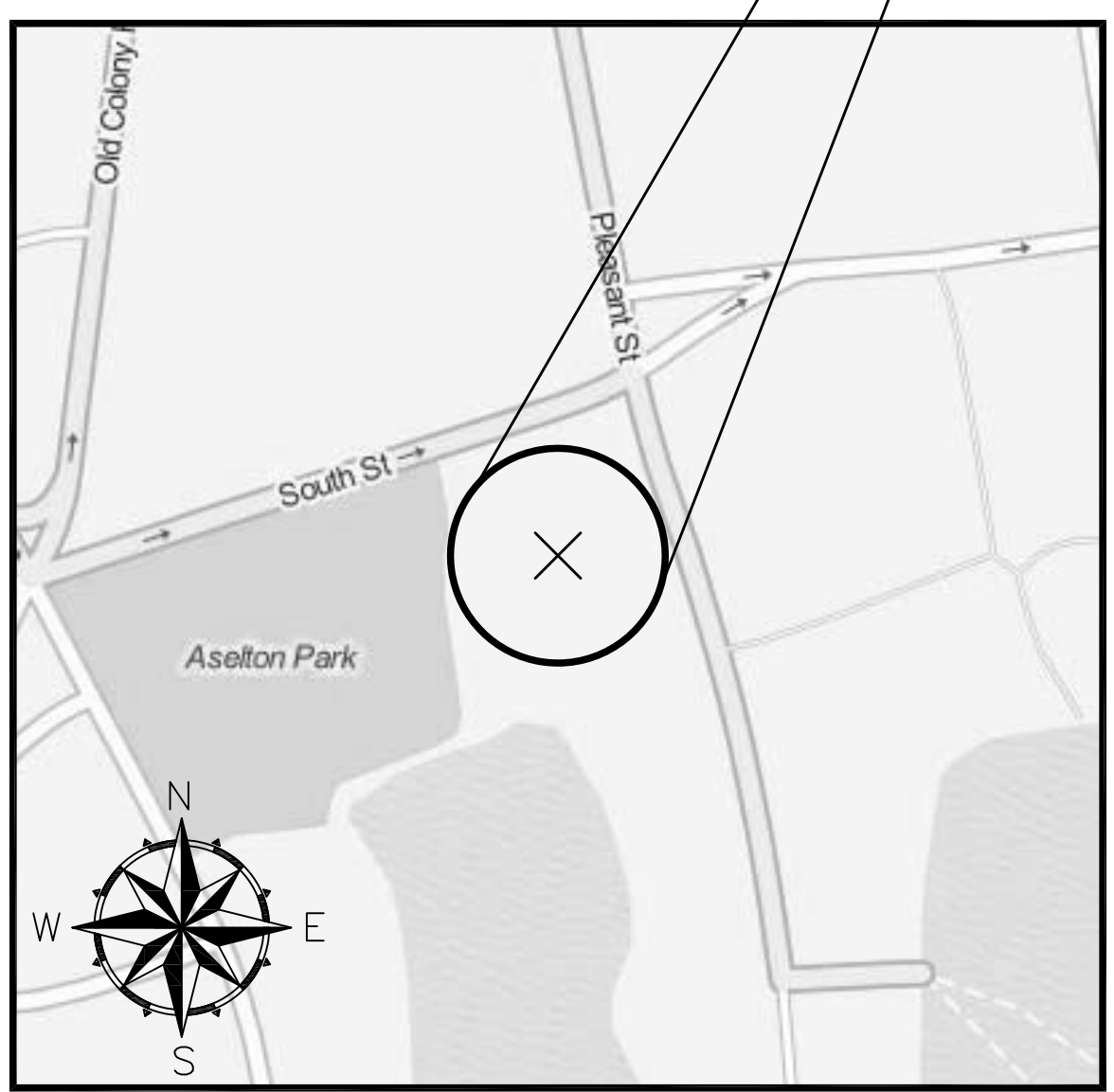
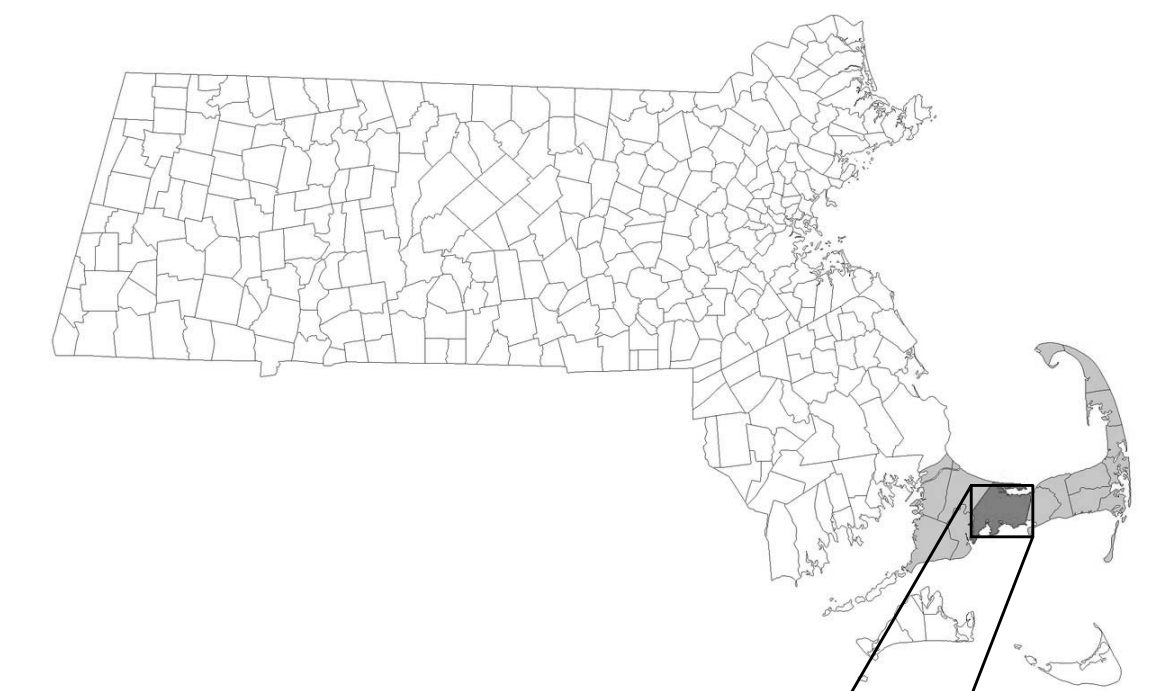


# EPA Green Infrastructure Stormwater BMP Retrofit for Two Cape Cod Municipalities A Demonstration and Outreach Project


BARNSTABLE, MA  
NOVEMBER 2015 - CONSTRUCTION AS-BUILTS

BARNSTABLE, MA  
Gateway Marina BMP - Gravel Bioretention  
Cell, South Street & Pleasant Street



BARNSTABLE PROJECT  
SCALE: 1" = 200'

<u>SHEET</u>	<u>TITLE</u>
C-1	EXISTING CONDITIONS
C-2	PROPOSED CONDITIONS
C-3	UTILITY PLAN
C-4	LANDSCAPING AND SURFACE TREATMENTS
C-5	DETAILS
C-6	DETAILS

 **EPA** United States Environmental  
Protection Agency, Region 1  
5 POST OFFICE SQUARE, SUITE 100  
BOSTON, MA 02109

 **WaterVision, LLC**  
481 GREAT ROAD, SUITE 3  
ACTON, MA 01720

 **COMPREHENSIVE  
ENVIRONMENTAL  
INCORPORATED**  
21 DEPOT STREET  
MERRIMACK, NH 03054



GATEWAY MARINA BMP, BARNSTABLE – EXISTING CONDITIONS

- 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.

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

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MERRIMACK, NH 03054

EPA Green Infrastructure Education and Outreach Project

GATEWAY MARINA BMP, GRAVEL BIORETENTION CELL

South Street and Pleasant Street, Barnstable MA

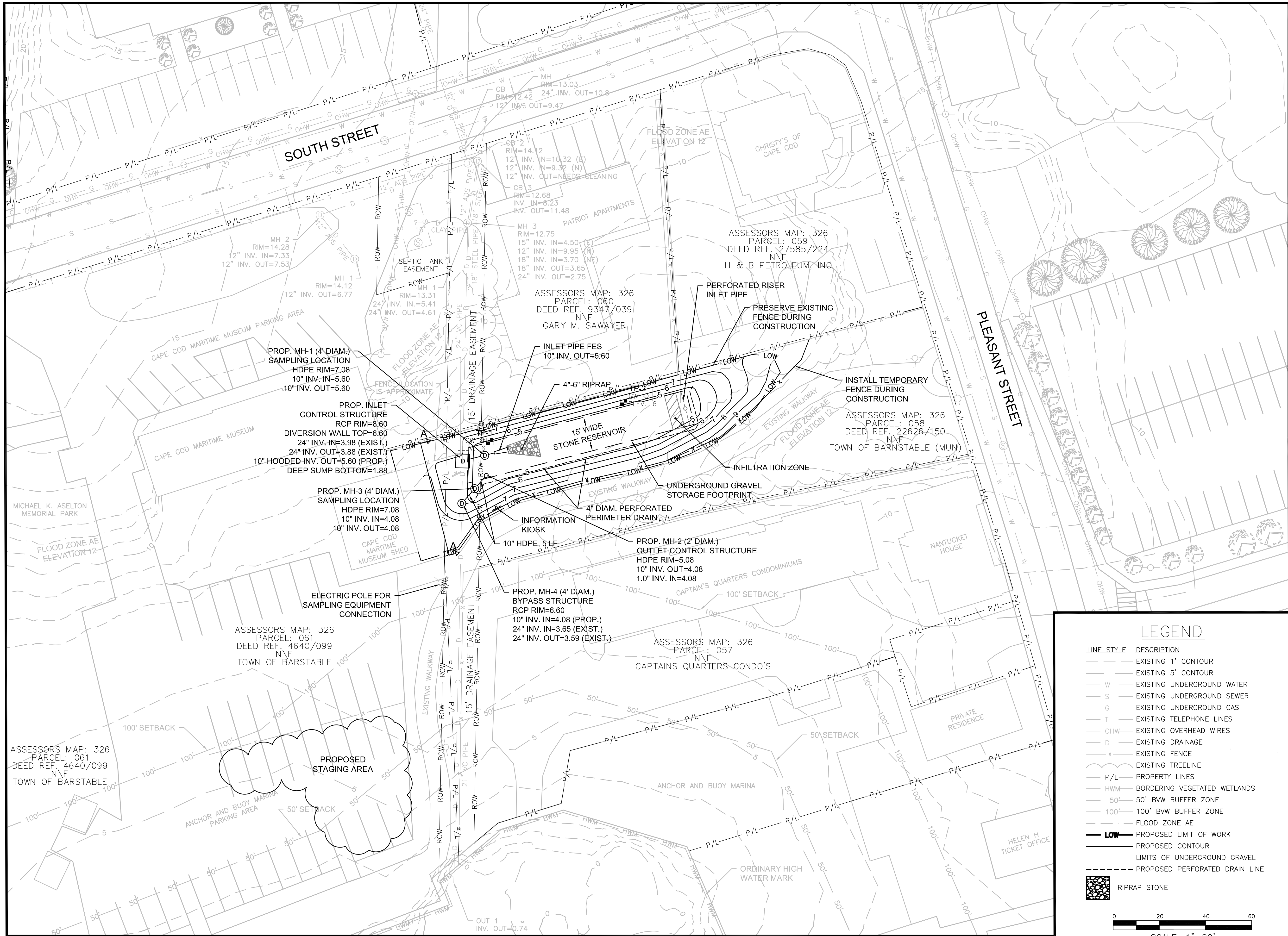
Project No.: 677-2 Date: NOVEMBER 2015 Drawn By: NC Checked By: ML Horizontal Datum: NAD88 Vertical Datum: NAVD88	Sheet  <b>C-1</b>
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**LEGEND**

LINE STYLE	DESCRIPTION
---	EXISTING 1' CONTOUR
---	EXISTING 5' CONTOUR
W	EXISTING UNDERGROUND WATER
S	EXISTING UNDERGROUND SEWER
G	EXISTING UNDERGROUND GAS
T	EXISTING TELEPHONE LINES
OHW	EXISTING OVERHEAD WIRES
D	EXISTING DRAINAGE
x	EXISTING FENCE
P/L	PROPERTY LINES
HWM	BORDERING VEGETATED WETLANDS
50'	50' BWV BUFFER ZONE
100'	100' BWV BUFFER ZONE
---	FLOOD ZONE AE

SCALE: 1"=20'





GATEWAY MARINA BMP, BARNSTABLE – PROPOSED CONDITIONS

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2	60% Design	02/15
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EPA Green Infrastructure  
Education and Outreach Project

GATEWAY MARINA BMP,  
GRAVEL BIORETENTION CELL

South Street and Pleasant  
Street, Barnstable MA

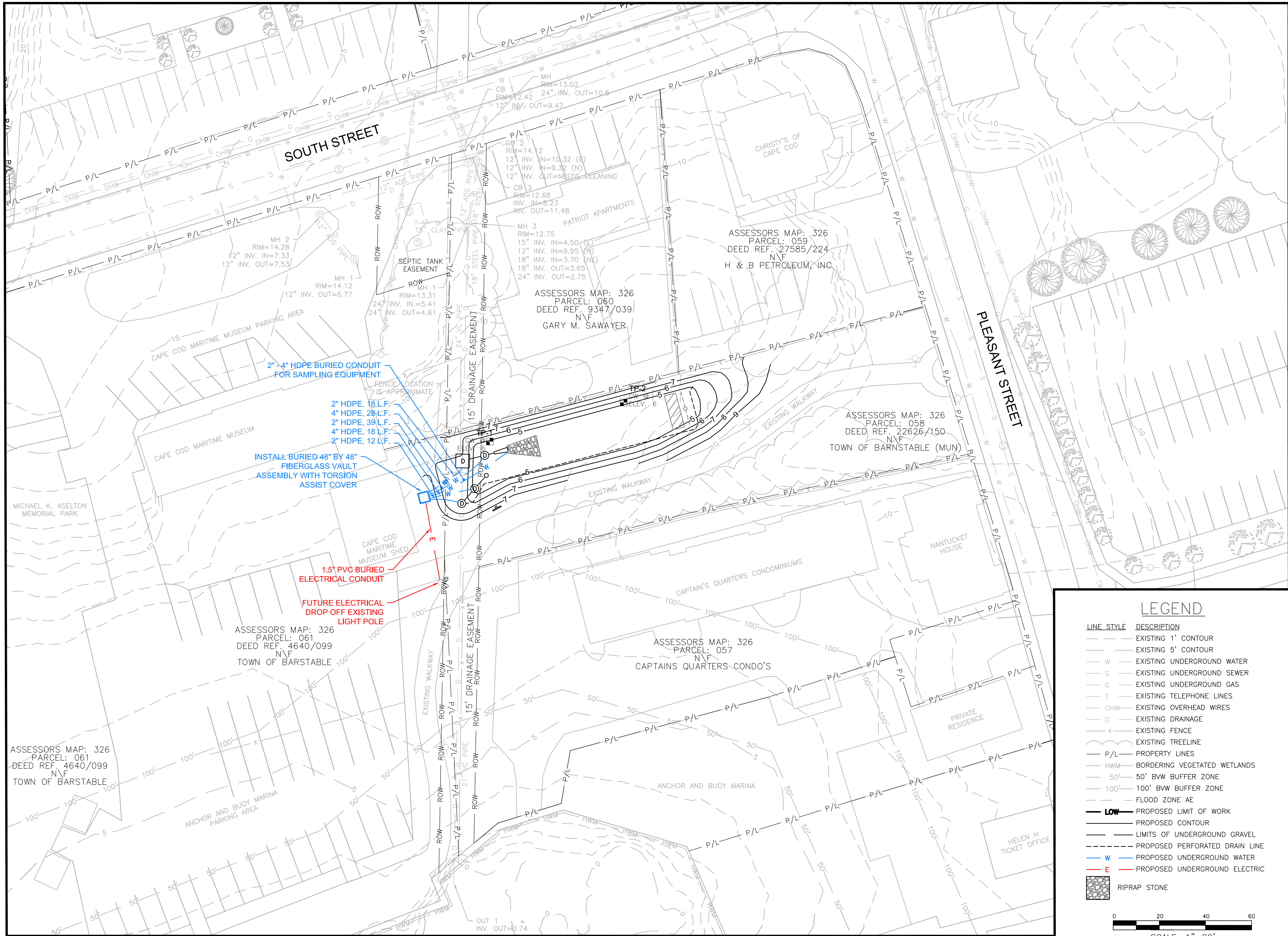
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LEGEND

LINE STYLE	DESCRIPTION
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---	EXISTING 5' CONTOUR
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S	EXISTING UNDERGROUND SEWER
G	EXISTING UNDERGROUND GAS
T	EXISTING TELEPHONE LINES
OHW	EXISTING OVERHEAD WIRES
D	EXISTING DRAINAGE
x	EXISTING FENCE
---	EXISTING TREELINE
P/L	PROPERTY LINES
HWM	BORDERING VEGETATED WETLANDS
50'	50' BWV BUFFER ZONE
100'	100' BWV BUFFER ZONE
---	FLOOD ZONE AE
---	PROPOSED LIMIT OF WORK
---	PROPOSED CONTOUR
---	LIMITS OF UNDERGROUND GRAVEL
---	PROPOSED PERFORATED DRAIN LINE
	RIPRAP STONE

SCALE: 1"=20'





GATEWAY MARINA BMP – UTILITY PLAN

- General Notes
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6	As-Builts	11/15
5	Utility Layout	09/15
4	100% Design for Const.	04/15
3	90% Design	03/15
2	60% Design	02/15
1	Conceptual	01/15
No.	Revision/Issue	Date

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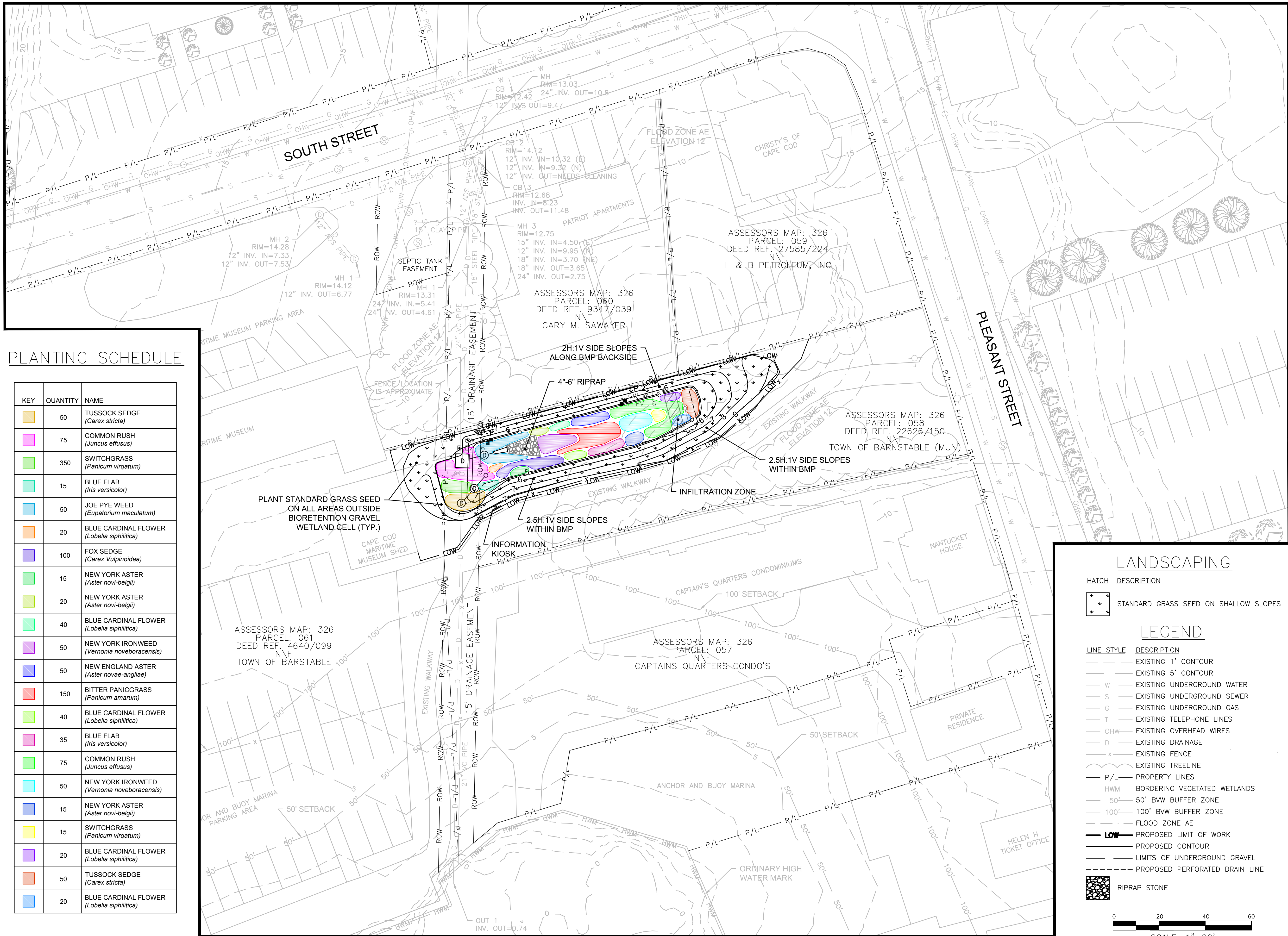
EPA Green Infrastructure  
Education and Outreach Project

GATEWAY MARINA BMP,  
GRAVEL BIORETENTION CELL

South Street and Pleasant  
Street, Barnstable MA

Project No.: 677-2	Sheet
Date: NOVEMBER 2015	
Drawn By: NC	C-3
Checked By: ML	
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Vertical Datum: NAVD88	





PLANTING SCHEDULE

KEY	QUANTITY	NAME
	50	TUSsock SEDGE (Carex stricta)
	75	COMMON RUSH (Juncus effusus)
	350	SWITCHGRASS (Panicum virgatum)
	15	BLUE FLAB (Iris versicolor)
	50	JOE PYE WEED (Eupatorium maculatum)
	20	BLUE CARDINAL FLOWER (Lobelia siphilitica)
	100	FOX SEDGE (Carex Vulpinoidea)
	15	NEW YORK ASTER (Aster novi-belgii)
	20	NEW YORK ASTER (Aster novi-belgii)
	40	BLUE CARDINAL FLOWER (Lobelia siphilitica)
	50	NEW YORK IRONWEED (Vernonia noveboracensis)
	50	NEW ENGLAND ASTER (Aster novae-angliae)
	150	BITTER PANICGRASS (Panicum amarum)
	40	BLUE CARDINAL FLOWER (Lobelia siphilitica)
	35	BLUE FLAB (Iris versicolor)
	75	COMMON RUSH (Juncus effusus)
	50	NEW YORK IRONWEED (Vernonia noveboracensis)
	15	NEW YORK ASTER (Aster novi-belgii)
	15	SWITCHGRASS (Panicum virgatum)
	20	BLUE CARDINAL FLOWER (Lobelia siphilitica)
	50	TUSsock SEDGE (Carex stricta)
	20	BLUE CARDINAL FLOWER (Lobelia siphilitica)

GATEWAY MARINA BMP, BARNSTABLE – LANDSCAPING AND SURFACE TREATMENTS

General Notes

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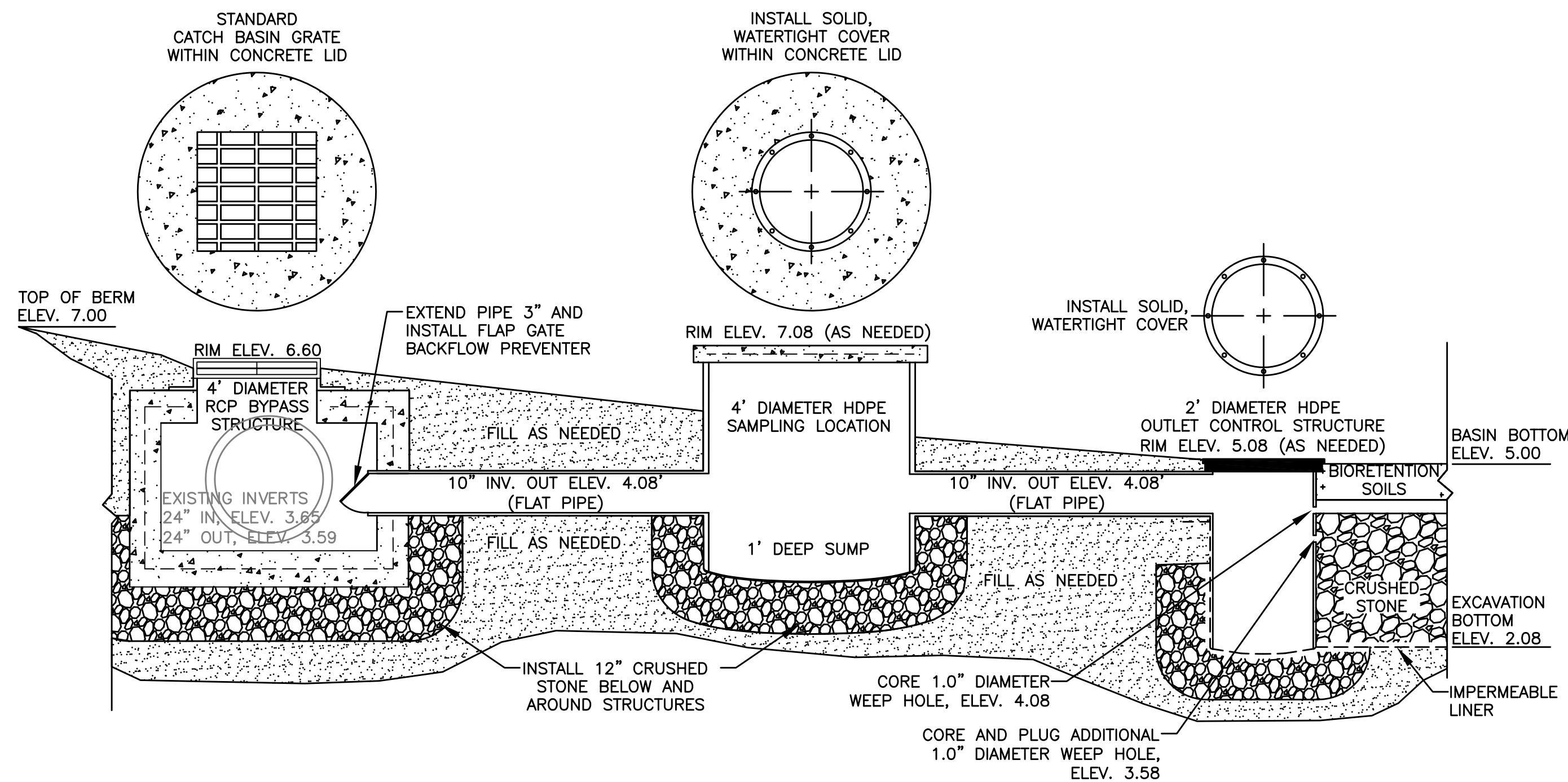
GATEWAY MARINA BMP,  
GRAVEL BIORETENTION CELL

South Street and Pleasant  
Street, Barnstable MA

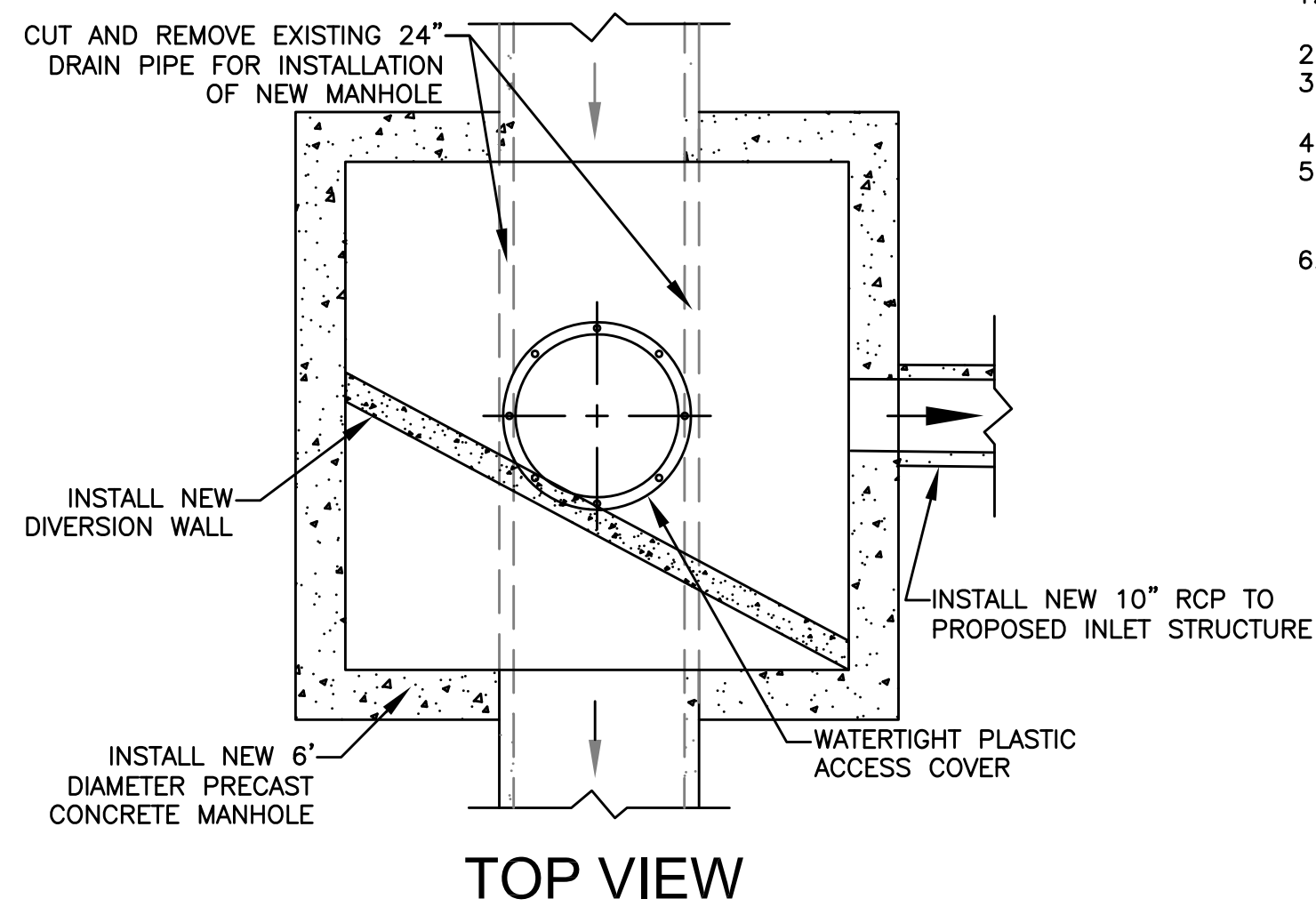
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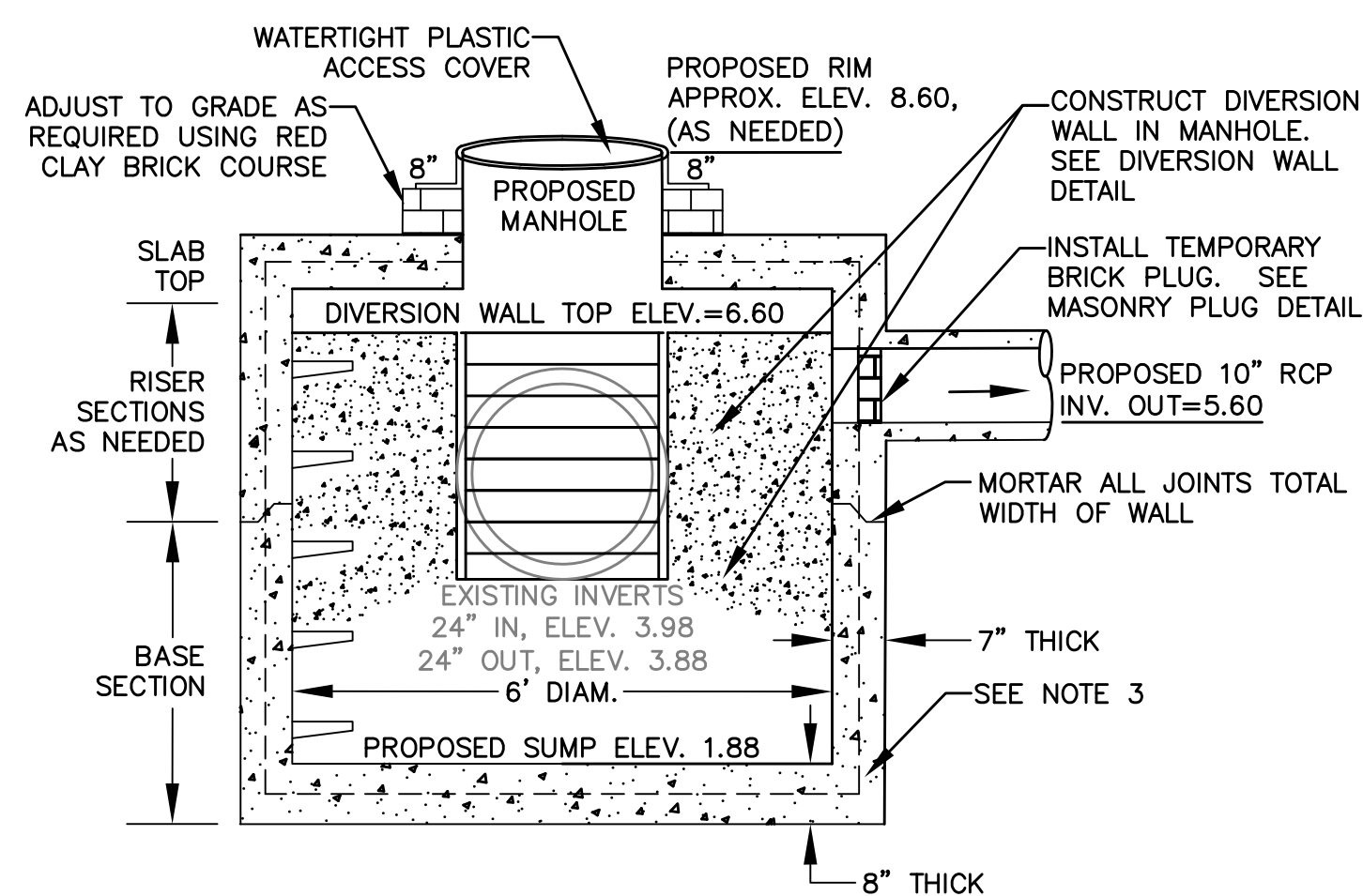




BMP OVERFLOW DETAILS



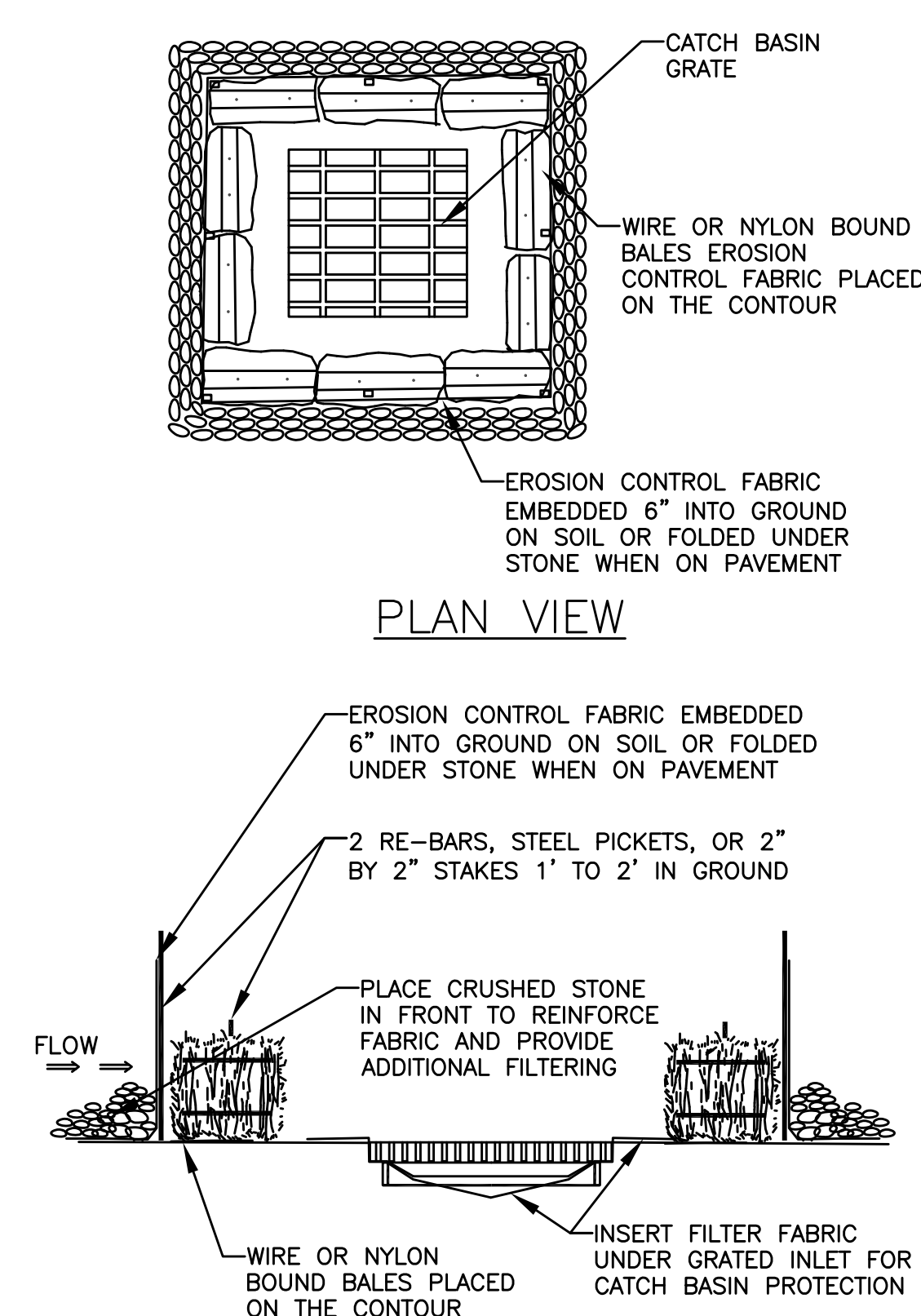
TOP VIEW



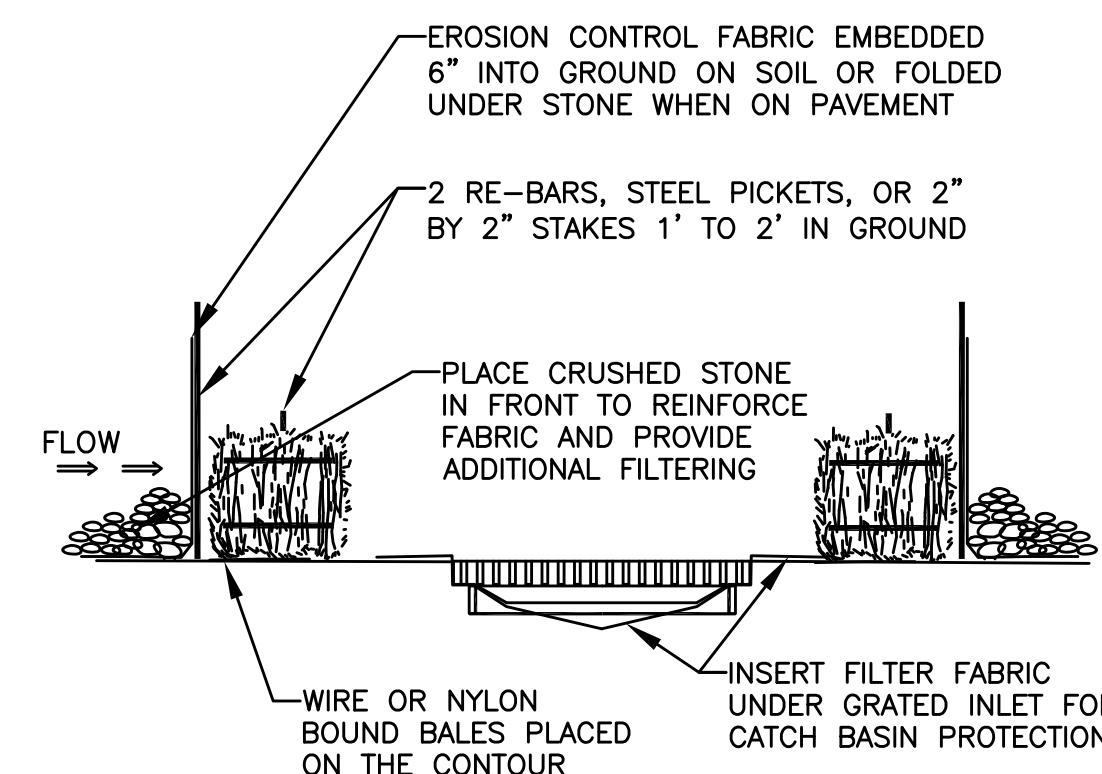
ELEVATION VIEW

RCP INLET CONTROL STRUCTURE

- NOTES
1. MANHOLE SHALL BE IN ACCORDANCE WITH SECTION 702 OF THE MA 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



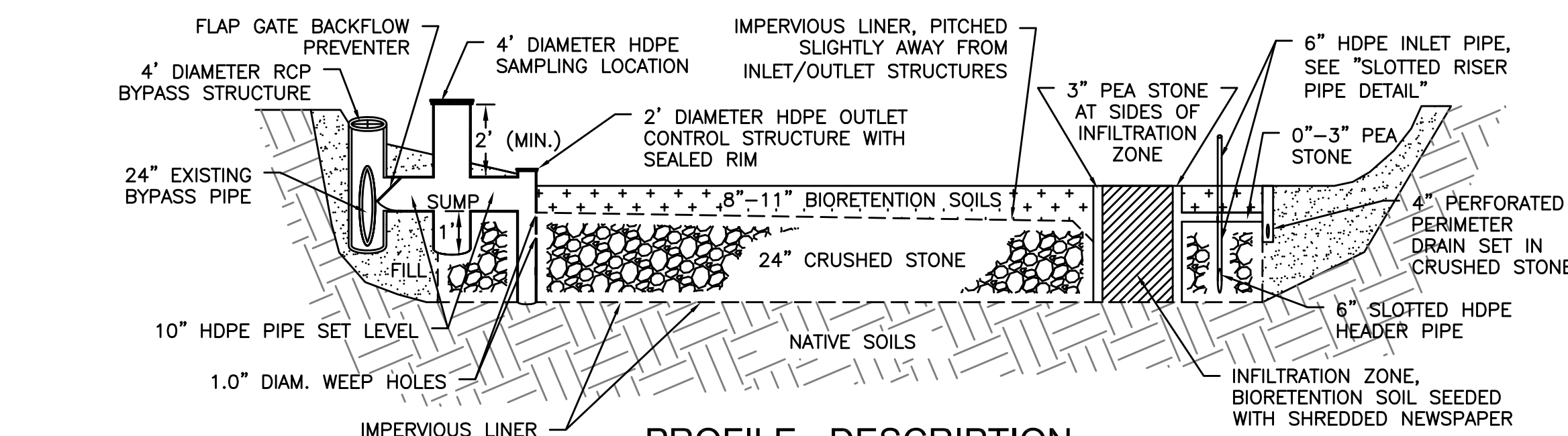
PLAN VIEW



PROFILE VIEW

- NOTES
1. SILT FENCE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 6"
  2. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED

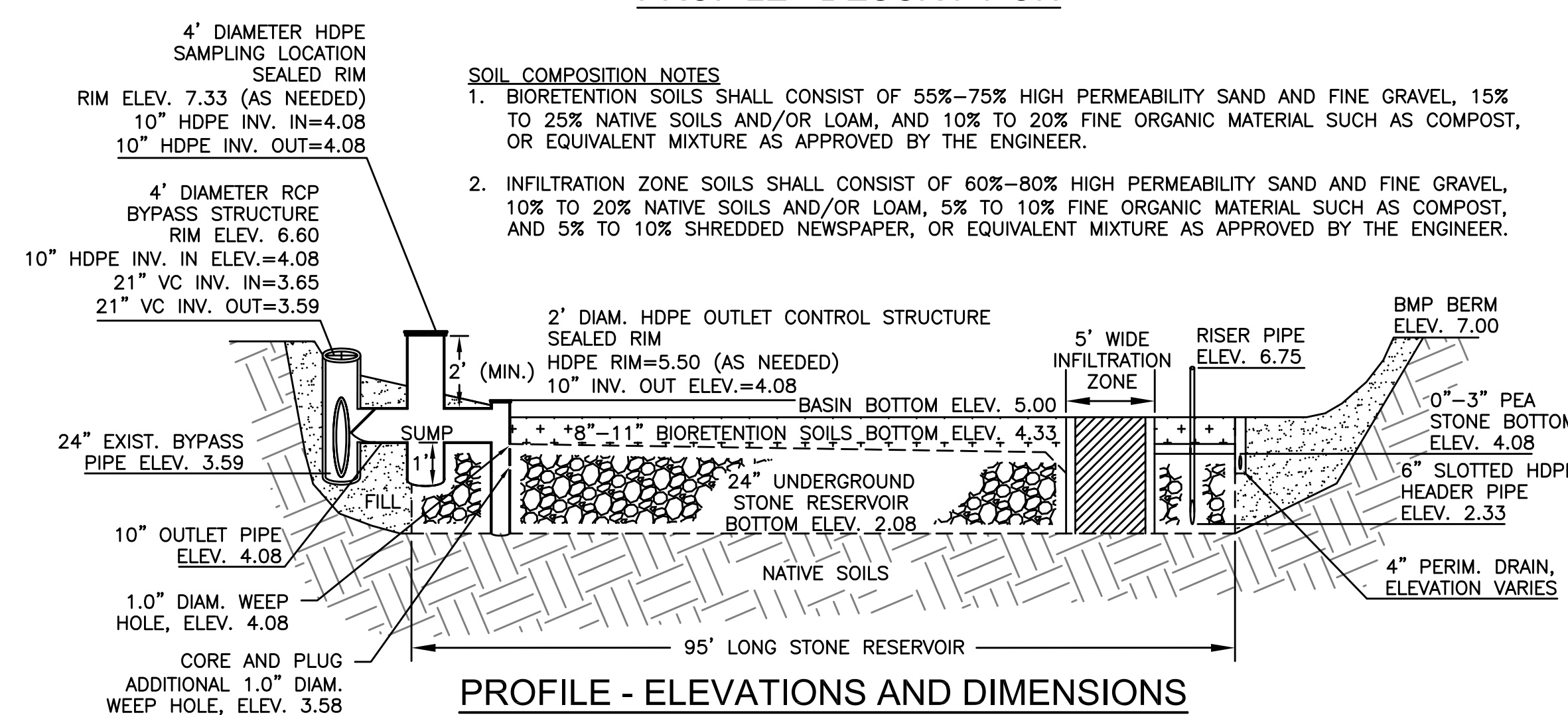
CATCH BASIN EROSION CONTROL



PROFILE - DESCRIPTION

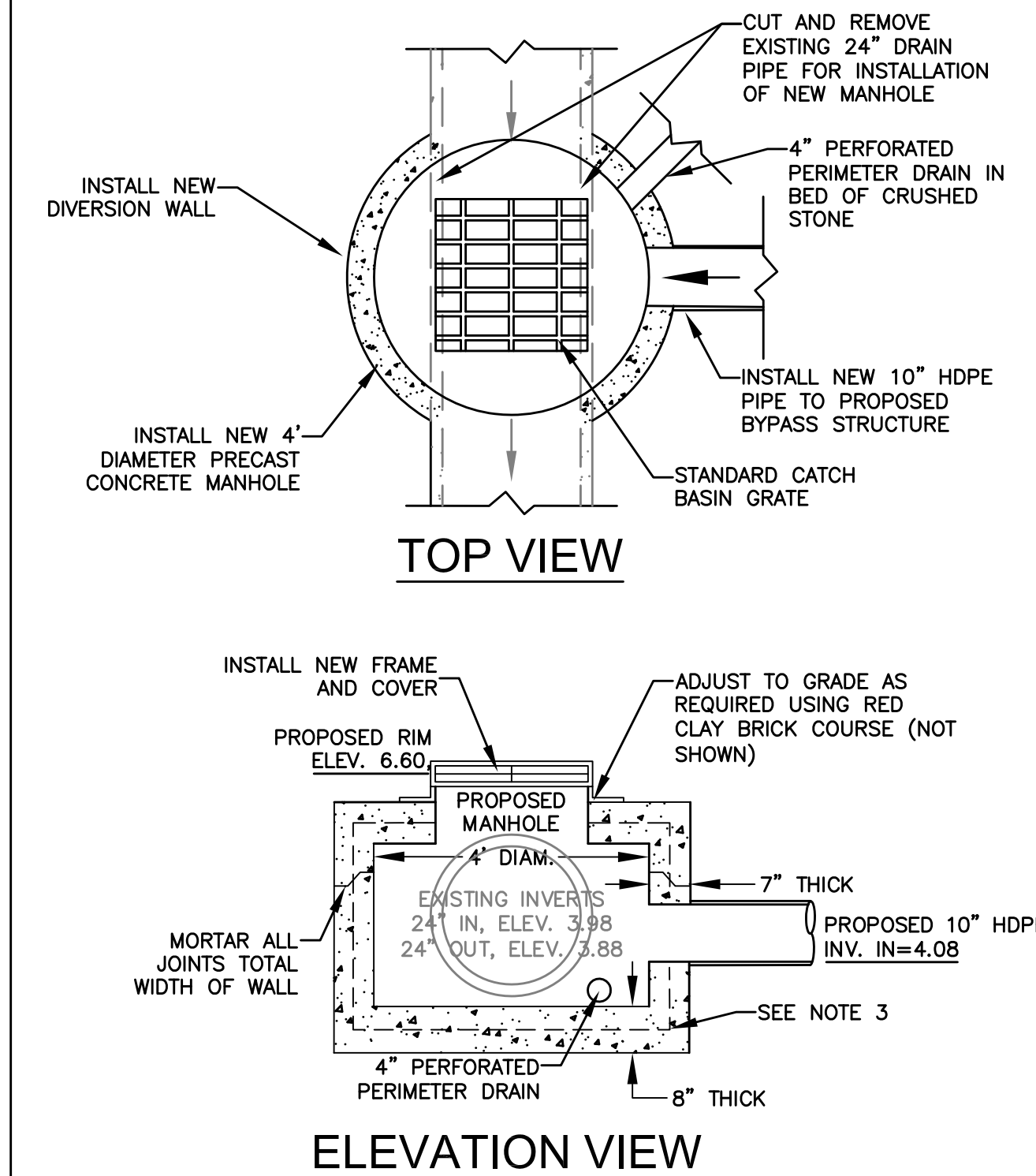
#### SOIL COMPOSITION NOTES

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.

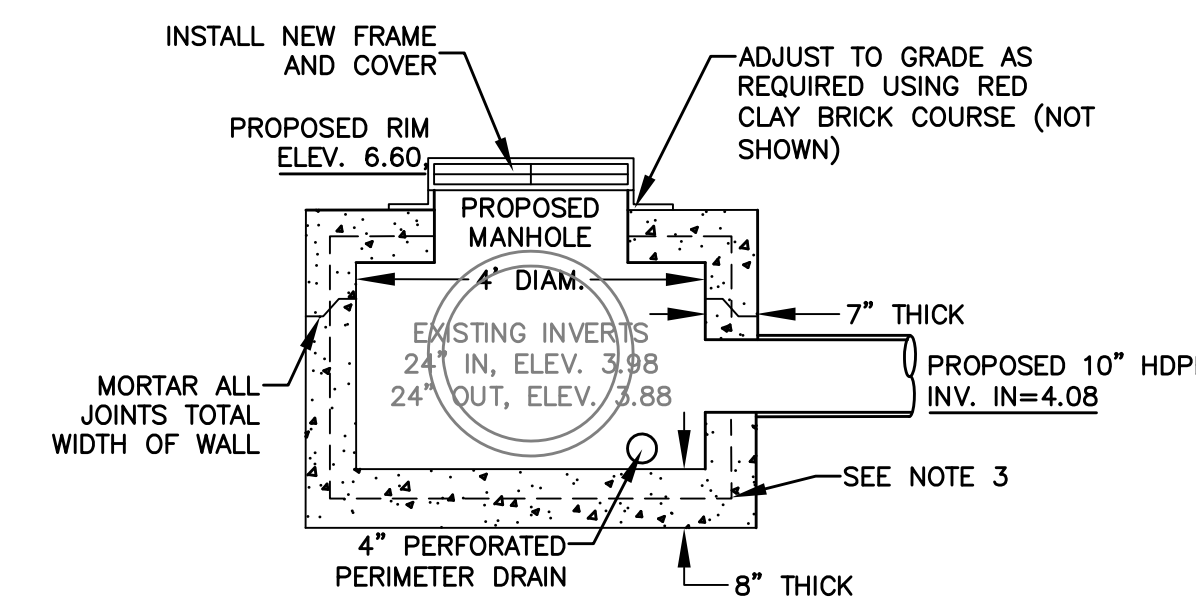


PROFILE - ELEVATIONS AND DIMENSIONS

STORMWATER BMP DETAILS

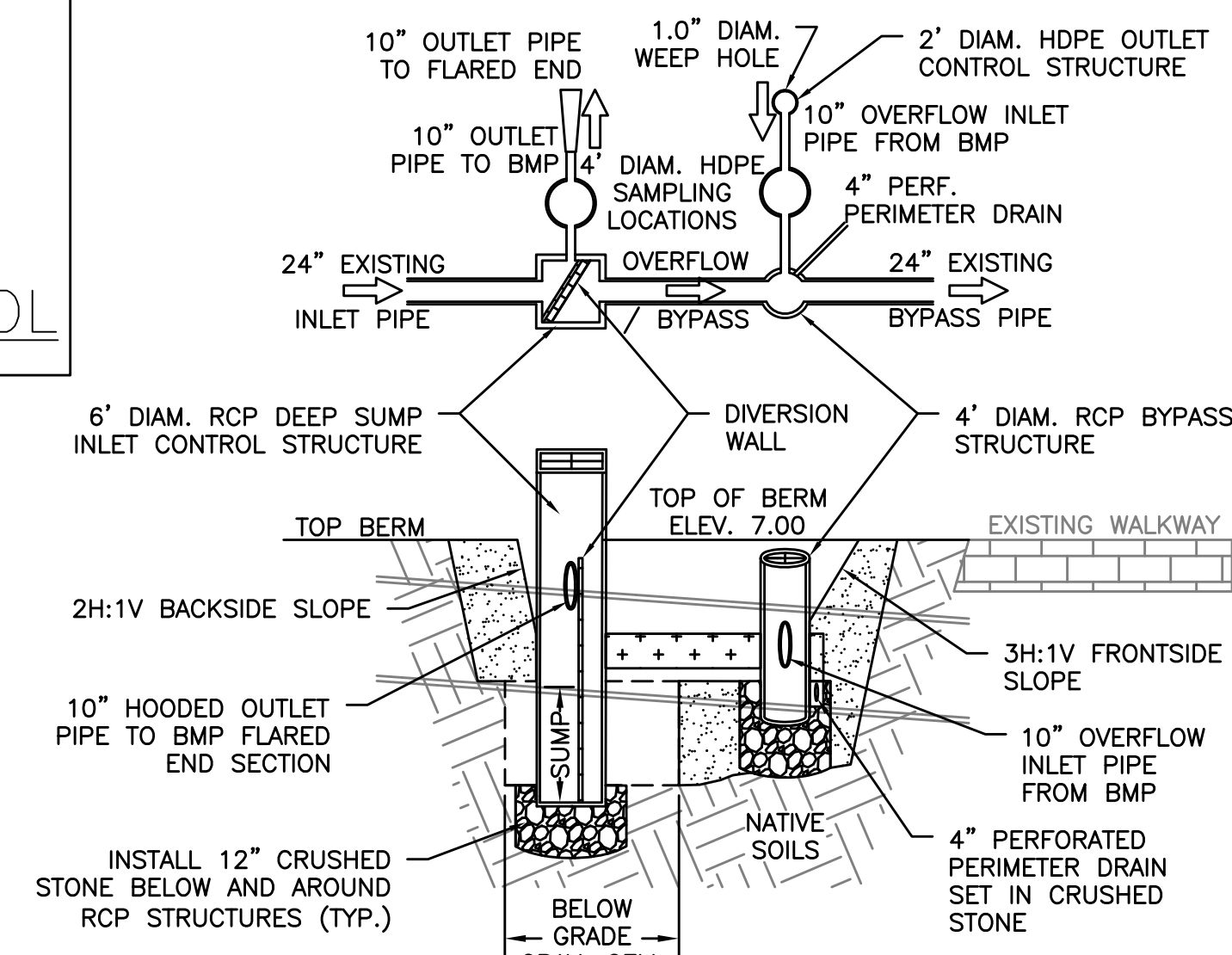


TOP VIEW

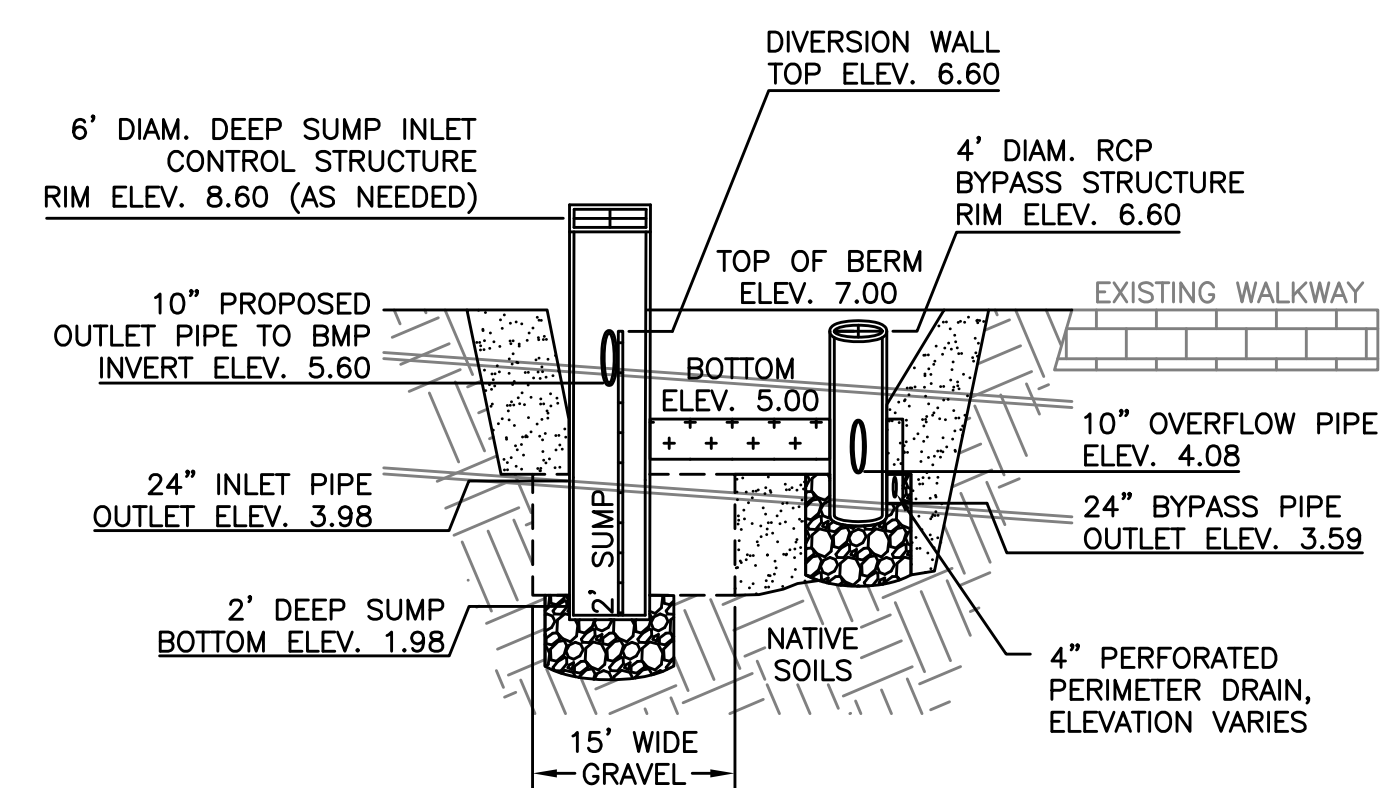


ELEVATION VIEW

RCP BYPASS STRUCTURE



CROSS-SECTION A-A - DESCRIPTION



CROSS-SECTION A-A - ELEVATIONS AND DIMENSIONS

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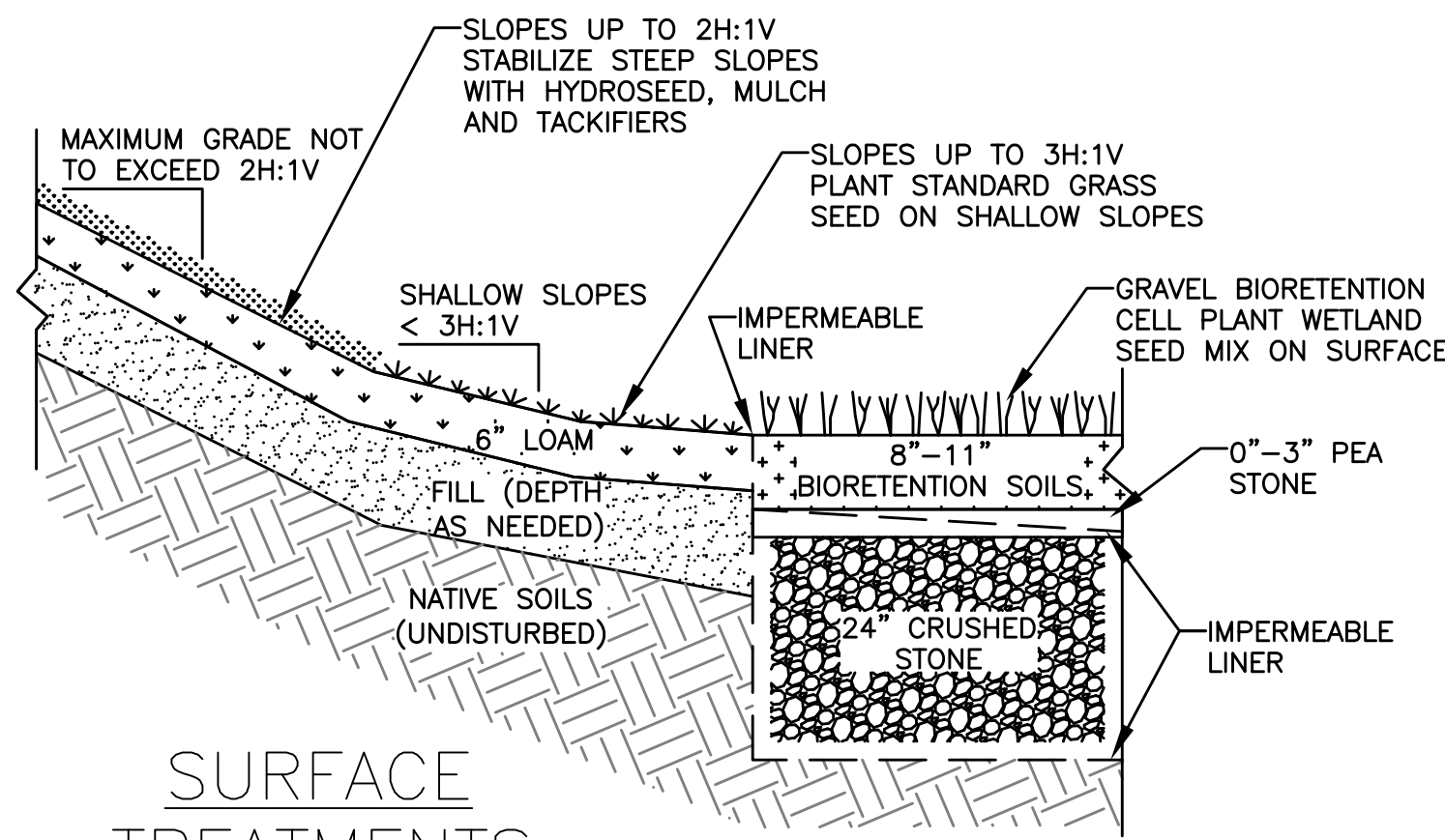
**GATEWAY MARINA BMP, GRAVEL BIORETENTION CELL**

South Street and Pleasant Street, Barnstable MA

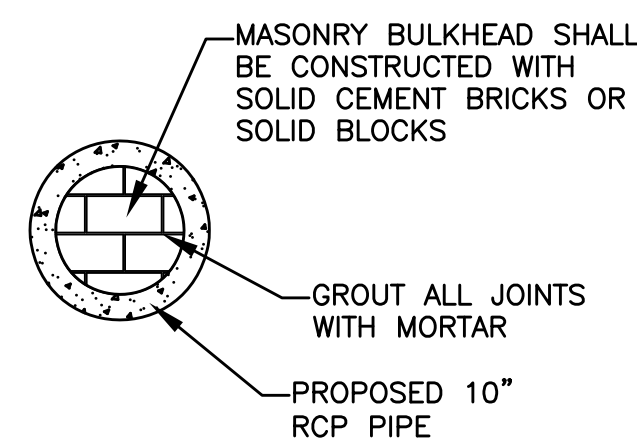
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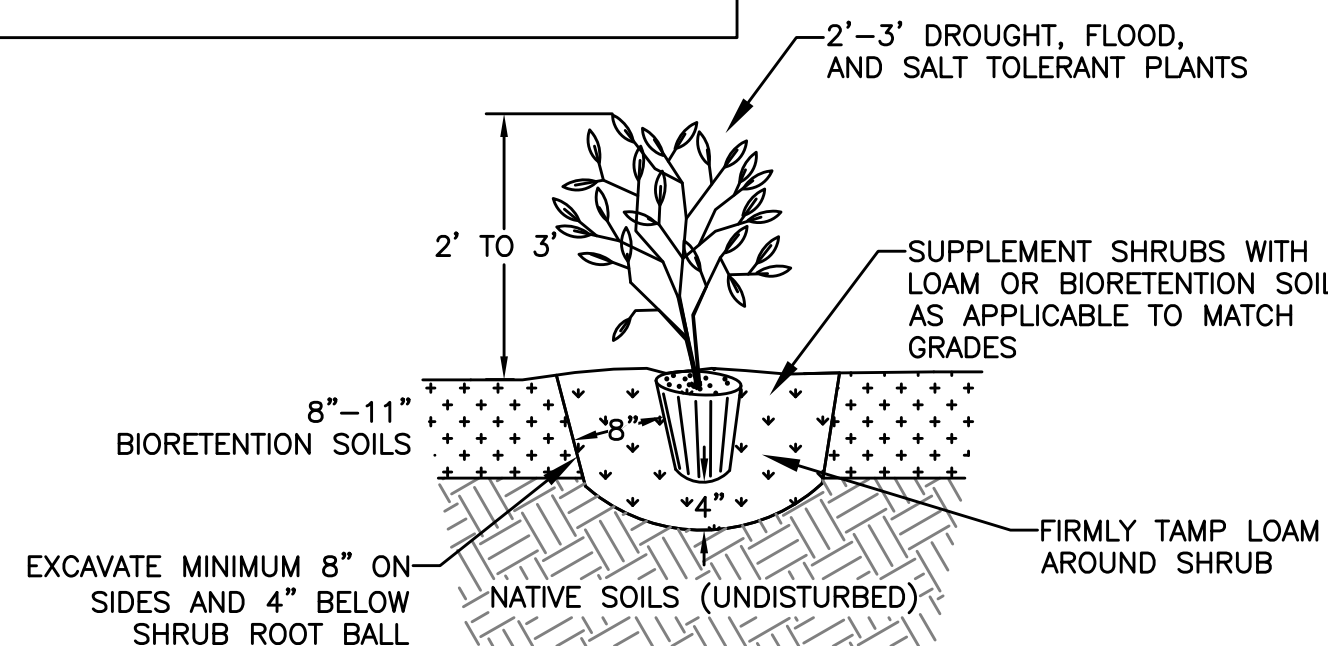




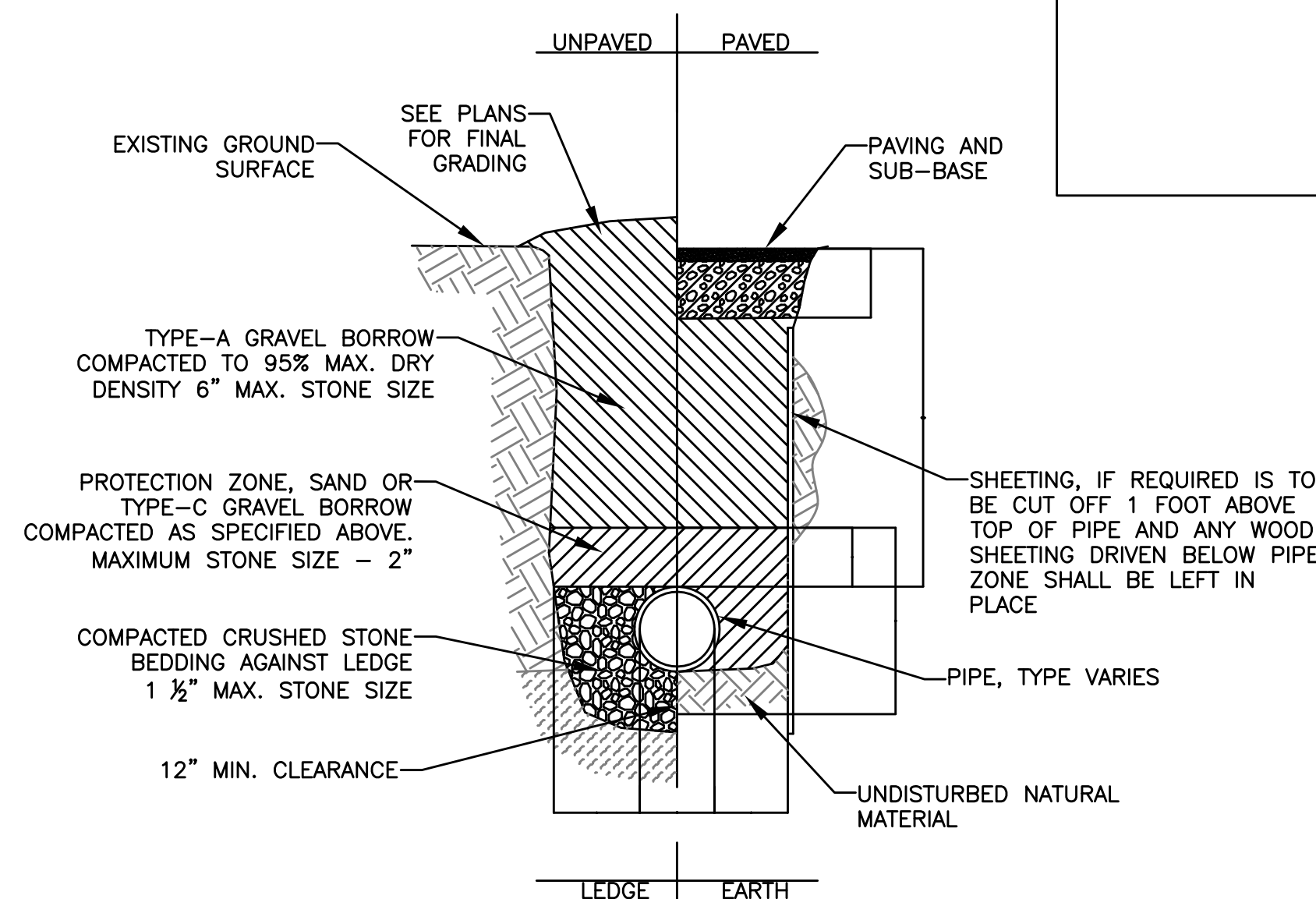
## SURFACE TREATMENTS



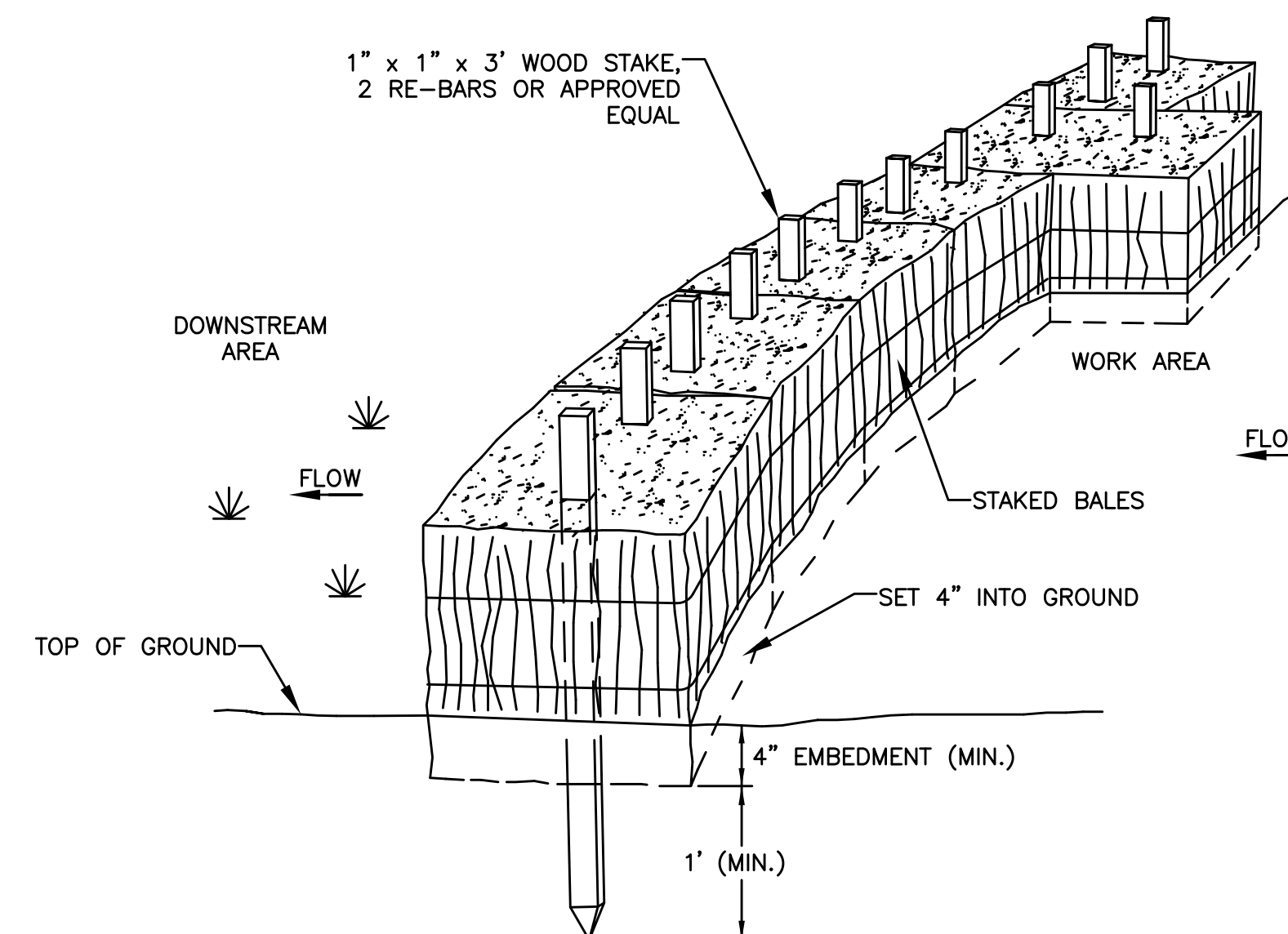
## TEMPORARY PLUG



## PLANTING DETAIL

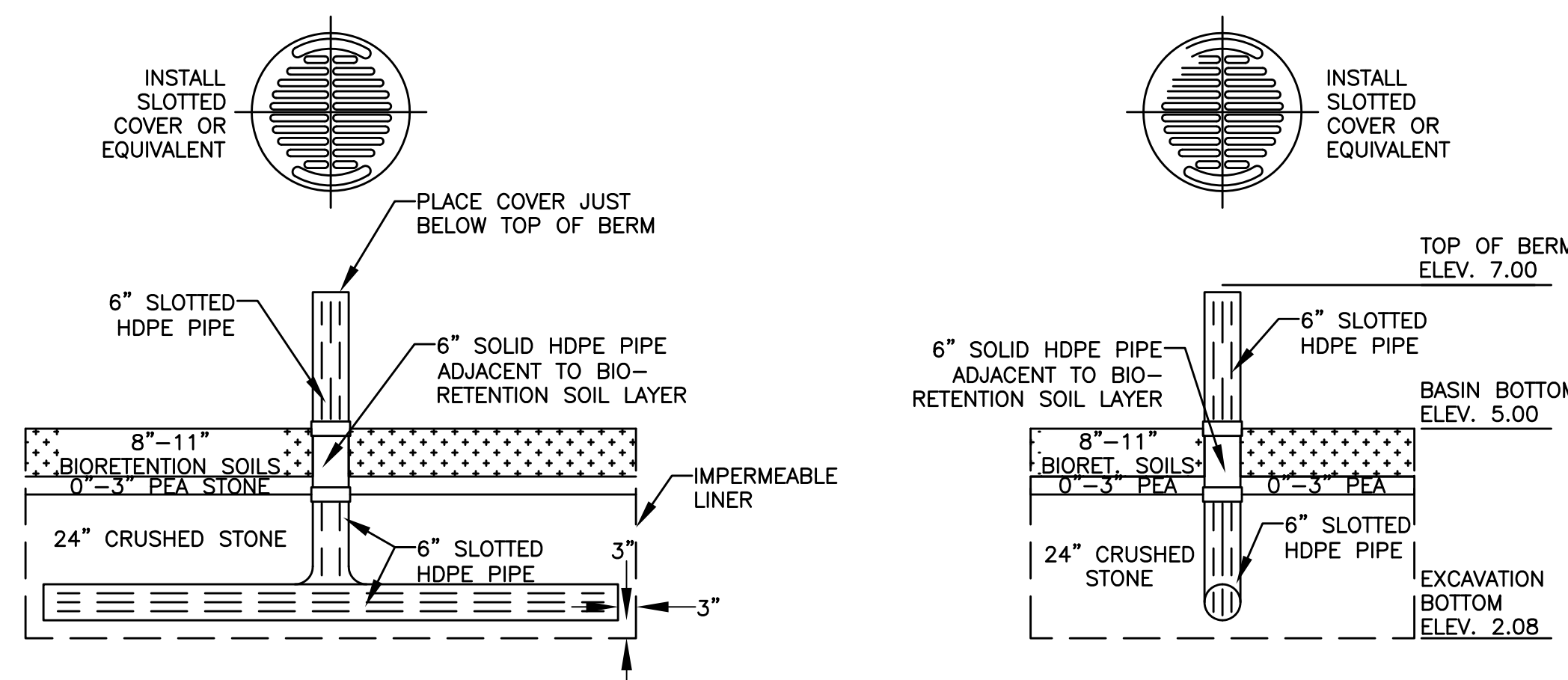


## PIPE TRENCHING DETAIL



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

## PERIMETER EROSION CONTROLS

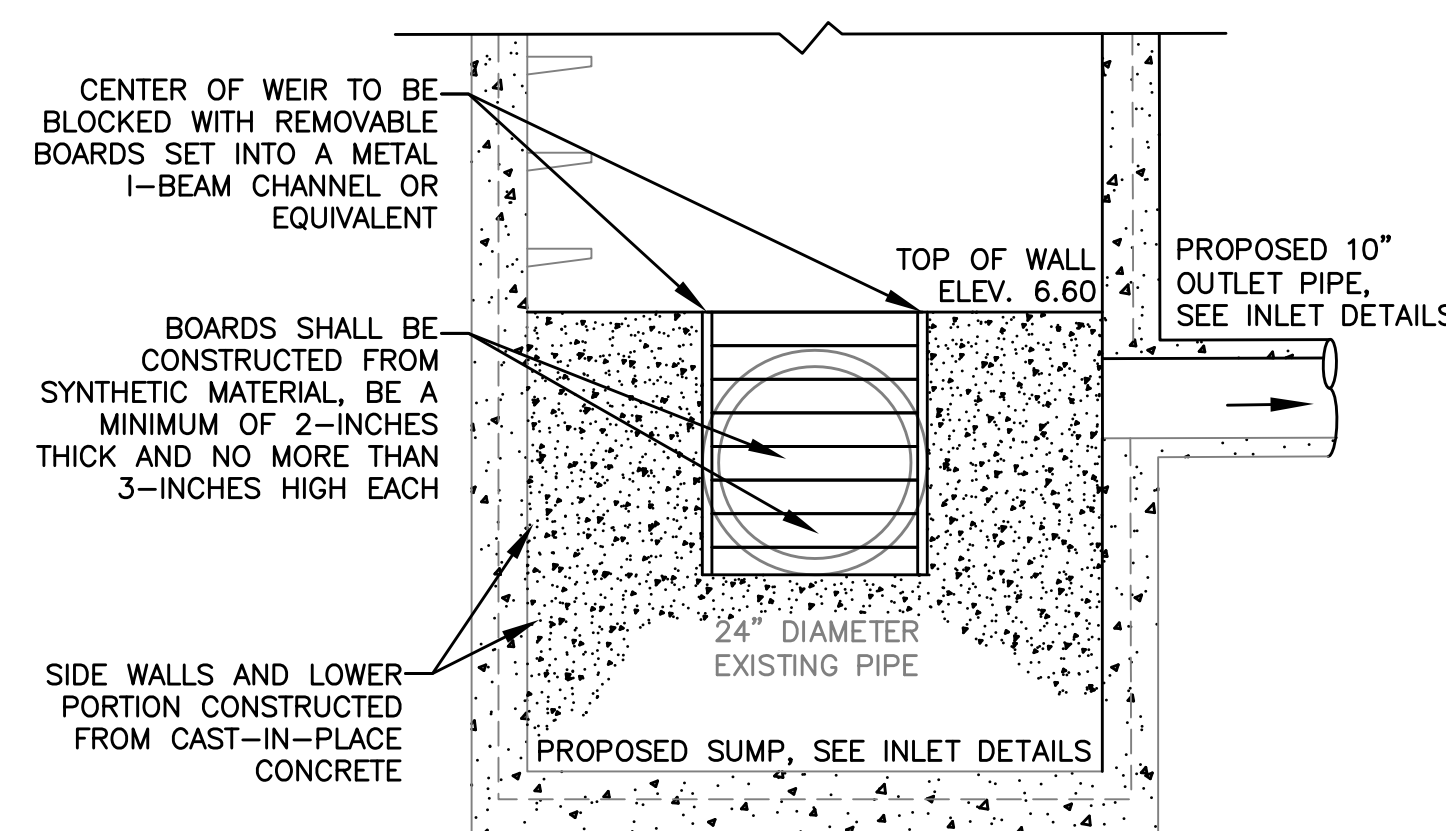


## CROSS-SECTION VIEW

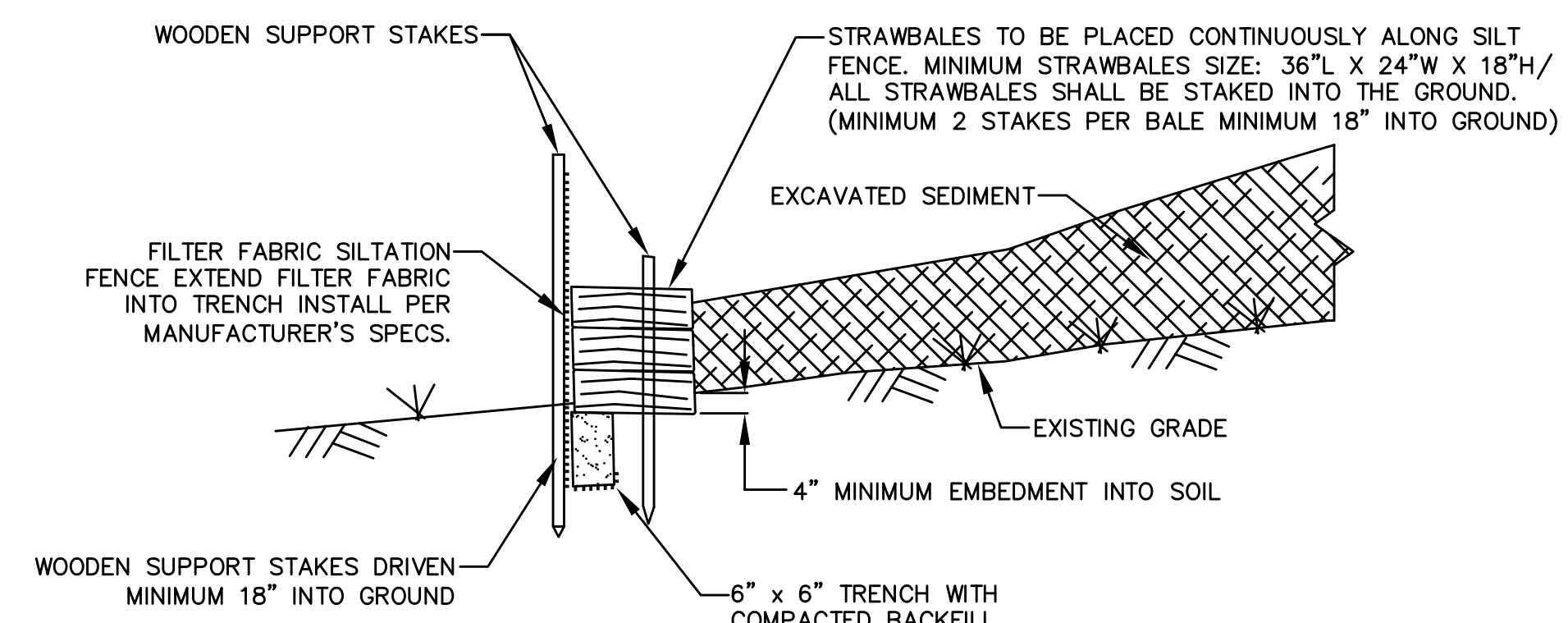
## ELEVATION VIEW

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

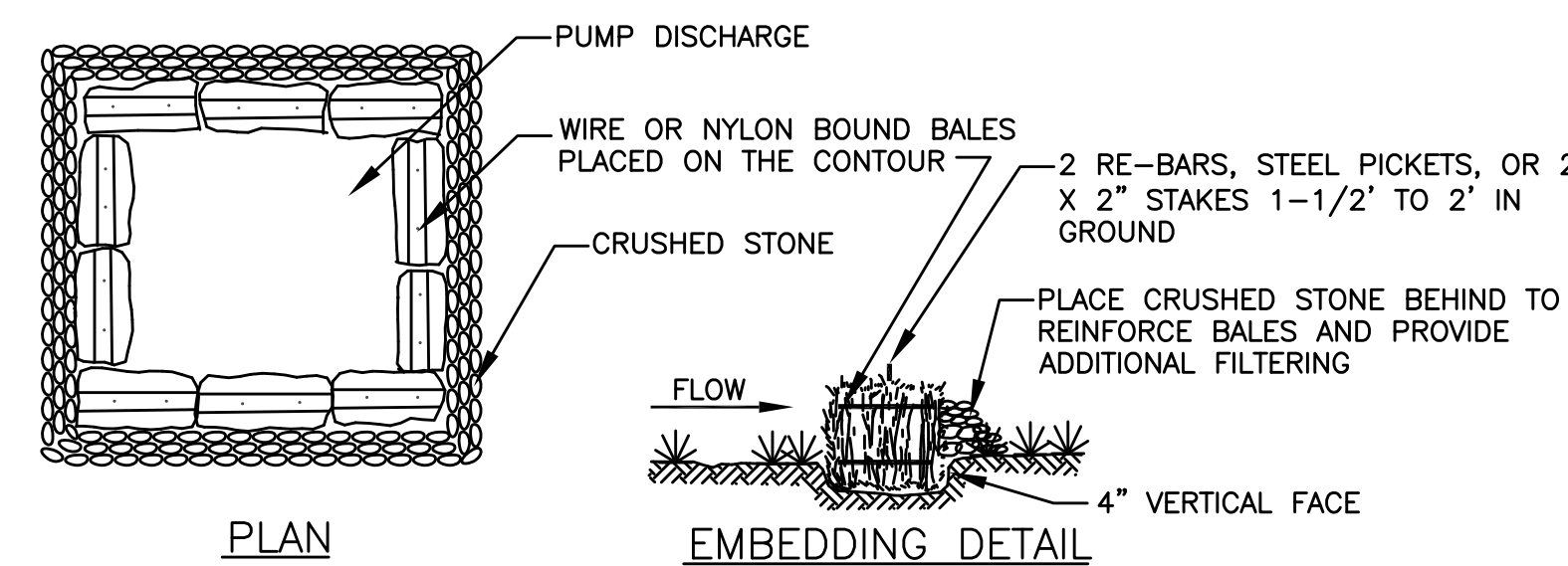
## SLOTTED RISER PIPE DETAIL



## DIVERSION WALL



## MATERIAL DE-WATERING AREA

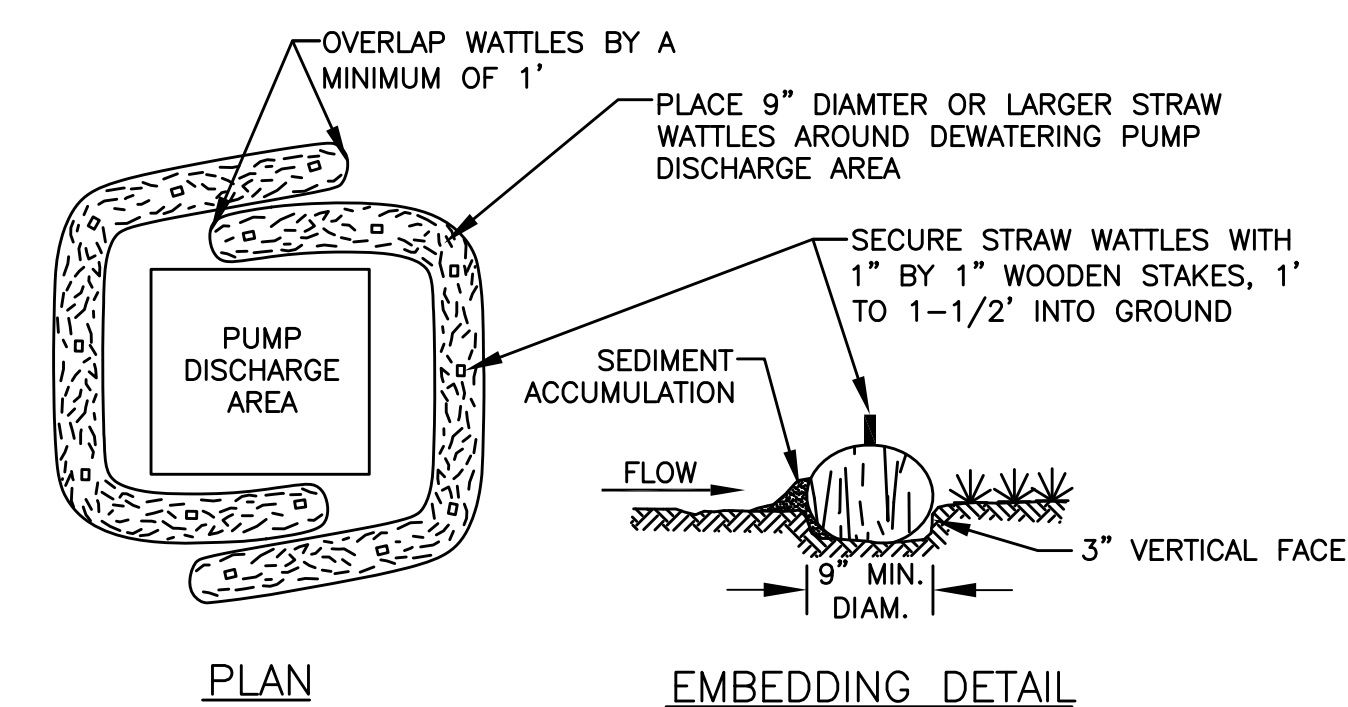


## PLAN

## EMBEDDING DETAIL

- STRAW BALE BARRIER CONSTRUCTION SPECIFICATIONS
1. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY BUTTED.
  2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4\".
  3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
  4. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.

## PUMPING DE-WATERING DISCHARGE AREA, HAY BALES



## PLAN

## EMBEDDING DETAIL

- STRAW WATTLE DEWATERING 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' ON-CENTER.
  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, STRAW WATTLES

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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.

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

**WaterVision, LLC**  
481 GREAT ROAD, SUITE 3  
ACTON, MA 01720

**COMPREHENSIVE ENVIRONMENTAL INCORPORATED**  
21 DEPOT STREET  
MERRIMACK, NH 03054

EPA Green Infrastructure  
Education and Outreach Project

GATEWAY MARINA BMP,  
GRAVEL BIORETENTION CELL

South Street and Pleasant  
Street, Barnstable MA

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

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