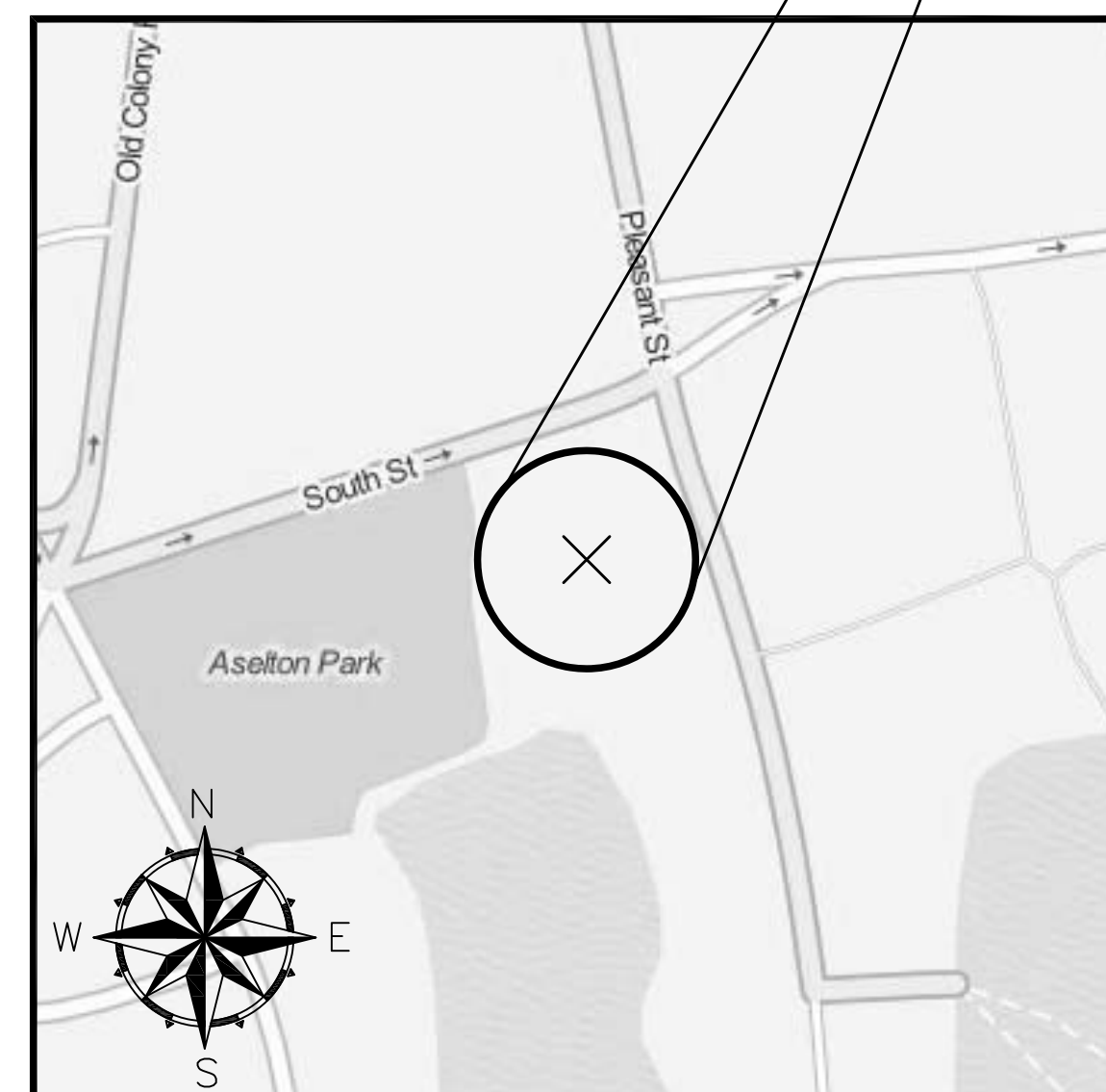
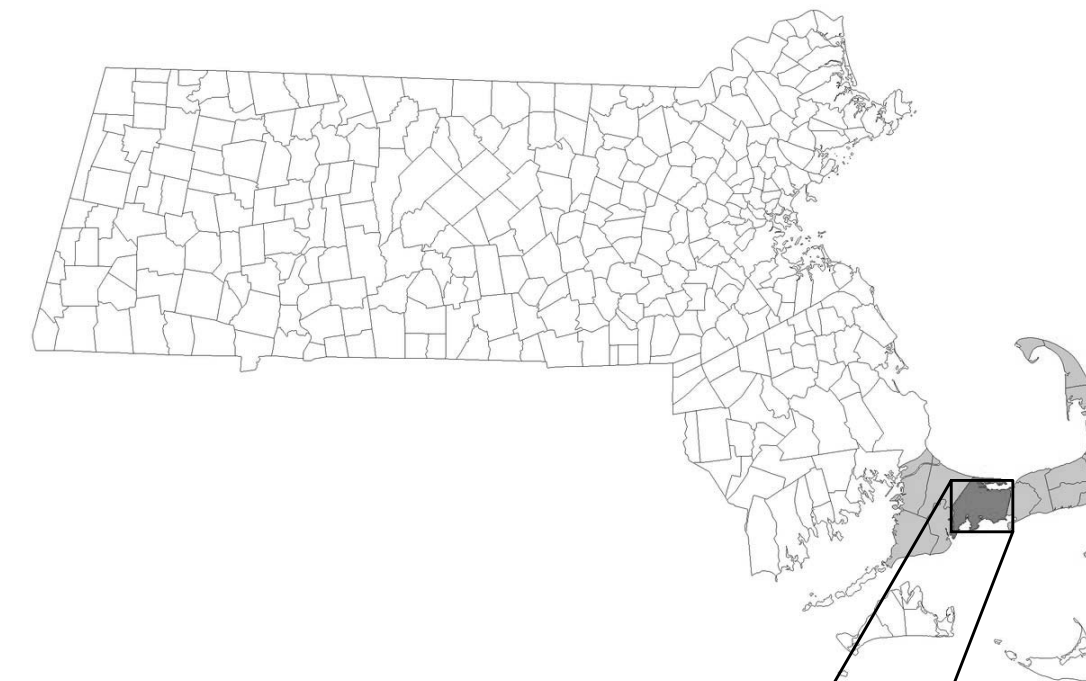


EPA Green Infrastructure Stormwater BMP Retrofit for Two Cape Cod Municipalities A Demonstration and Outreach Project

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



5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109



481 GREAT ROAD, SUITE 3
ACTON, MA 01720



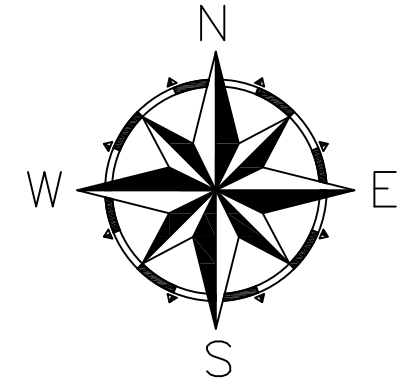
21 DEPOT STREET
MERRIMACK, NH 03054



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.



No.	Revision/Issue	Date
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

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EPA Green Infrastructure Education and Outreach Project

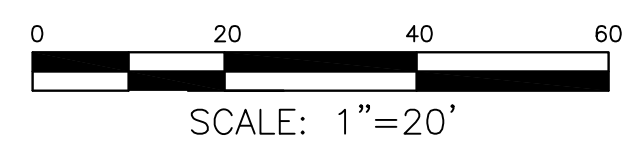
GATEWAY MARINA BMP, GRAVEL BIORETENTION CELL

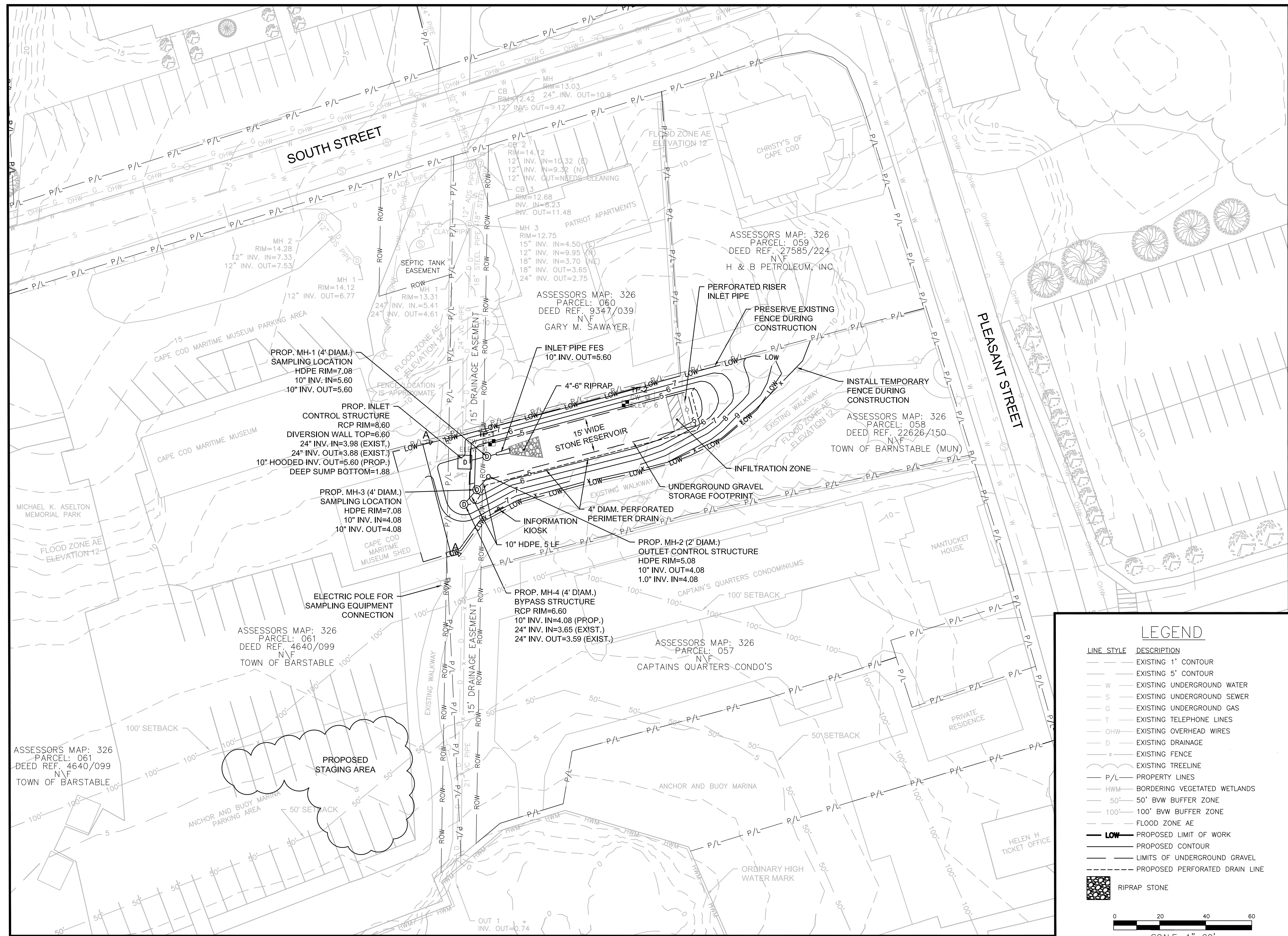
South Street and Pleasant Street, Barnstable MA

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

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 |

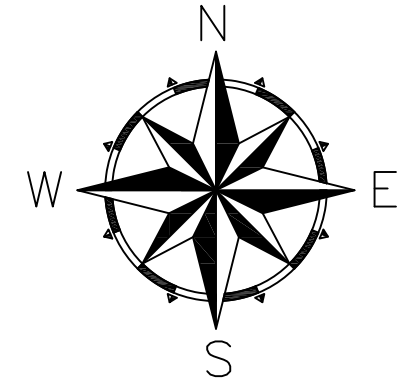




GATEWAY MARINA BMP, BARNSTABLE – PROPOSED CONDITIONS

General Notes

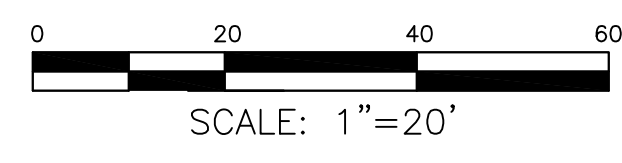
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4	100% Design for Const.	04/15
3	90% Design	03/15
2	60% Design	02/15
1	Conceptual	01/15

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
 - EXISTING TREELINE
 - P/L PROPERTY LINES
 - HWM BORDERING VEGETATED WETLANDS
 - 50' 50' BWV BUFFER ZONE
 - 100' 100' BWV BUFFER ZONE
 - FLOOD ZONE AE
 - LOW PROPOSED LIMIT OF WORK
 - PROPOSED CONTOUR
 - LIMITS OF UNDERGROUND GRAVEL
 - PROPOSED PERFORATED DRAIN LINE
 - [Pattern] RIPRAP STONE



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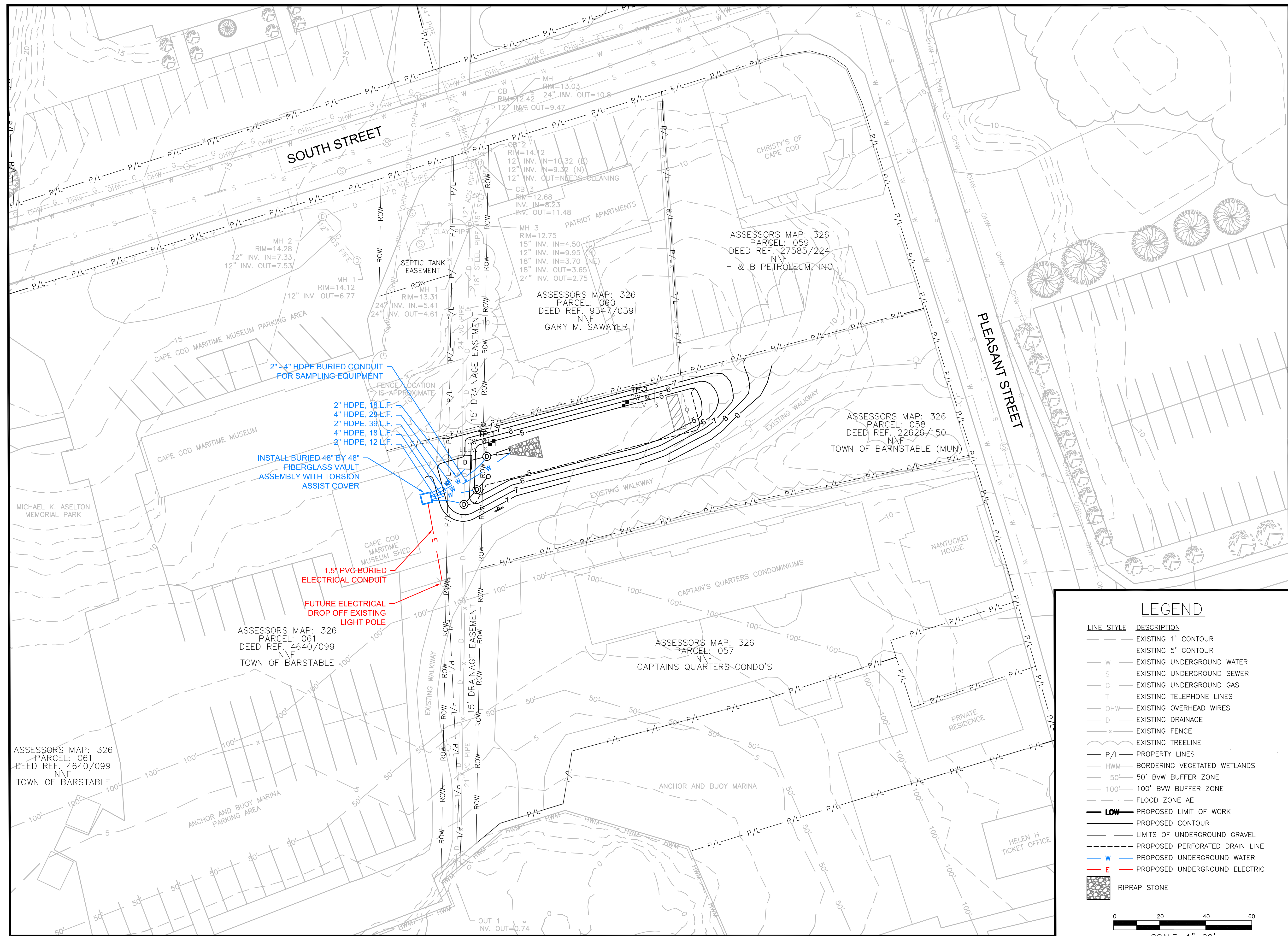
COMPREHENSIVE ENVIRONMENTAL INCORPORATED
 21 DEPOT STREET
 MERRIMACK, NH 03054

EPA Green Infrastructure Education and Outreach Project

GATEWAY MARINA BMP, GRAVEL BIORETENTION CELL

South Street and Pleasant Street, Barnstable MA

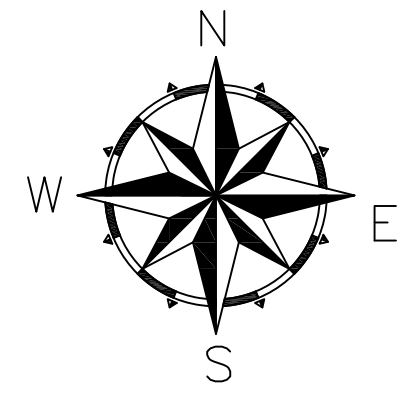
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Date: NOVEMBER 2015	C-2
Drawn By: NC	
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Horizontal Datum: NAD88	
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GATEWAY MARINA BMP – UTILITY PLAN

General Notes

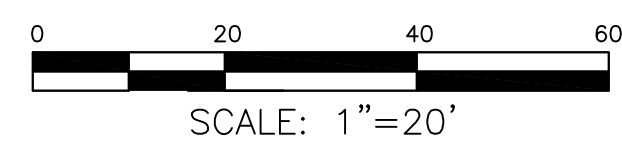
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No.	Revision/Issue	Date
6	As-Builts	11/15
5	Utility Layout	09/15
4	100% Design for Const.	04/15
3	90% Design	03/15
2	60% Design	02/15
1	Conceptual	01/15

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
 - --- EXISTING TREELINE
 - P/L --- PROPERTY LINES
 - HWM --- BORDERING VEGETATED WETLANDS
 - 50' --- 50' BWV BUFFER ZONE
 - 100' --- 100' BWV BUFFER ZONE
 - --- FLOOD ZONE AE
 - **LOW** --- PROPOSED LIMIT OF WORK
 - --- PROPOSED CONTOUR
 - --- LIMITS OF UNDERGROUND GRAVEL
 - --- PROPOSED PERFORATED DRAIN LINE
 - W --- PROPOSED UNDERGROUND WATER
 - E --- PROPOSED UNDERGROUND ELECTRIC
 - RIPRAP STONE



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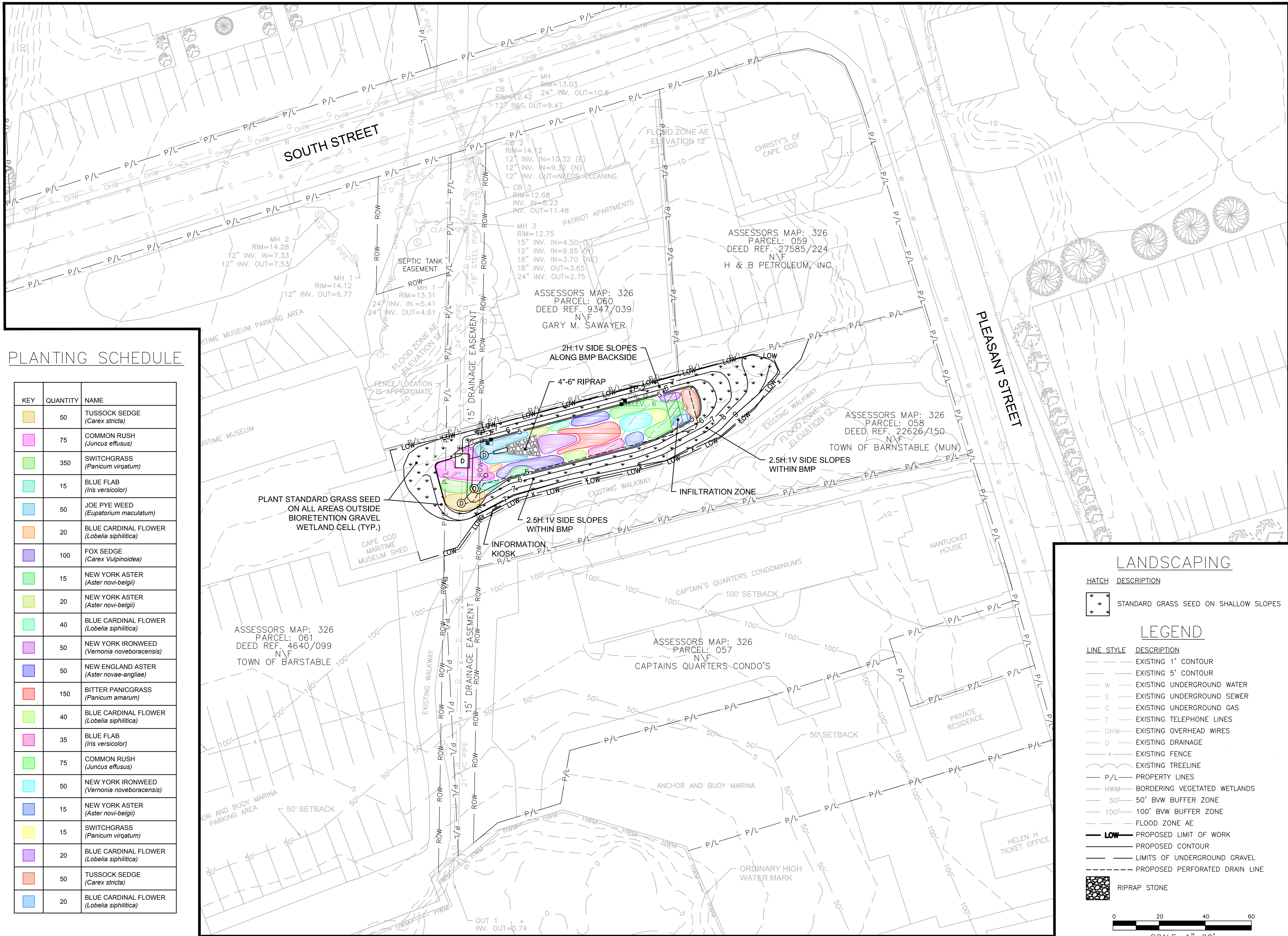
COMPREHENSIVE ENVIRONMENTAL INCORPORATED
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 MERRIMACK, NH 03054

EPA Green Infrastructure Education and Outreach Project

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South Street and Pleasant Street, Barnstable MA

Project No.: 677-2	Sheet
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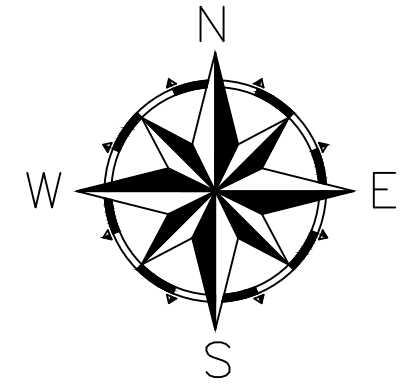


PLANTING SCHEDULE

KEY	QUANTITY	NAME
[Orange]	50	TUSSOCK SEDGE (<i>Carex stricta</i>)
[Pink]	75	COMMON RUSH (<i>Juncus effusus</i>)
[Green]	350	SWITCHGRASS (<i>Panicum virgatum</i>)
[Light Blue]	15	BLUE FLAB (<i>Iris versicolor</i>)
[Light Blue]	50	JOE PYE WEED (<i>Eupatorium maculatum</i>)
[Orange]	20	BLUE CARDINAL FLOWER (<i>Lobelia siphilitica</i>)
[Purple]	100	FOX SEDGE (<i>Carex vulpinoidea</i>)
[Green]	15	NEW YORK ASTER (<i>Aster novi-belgii</i>)
[Light Green]	20	NEW YORK ASTER (<i>Aster novi-belgii</i>)
[Light Green]	40	BLUE CARDINAL FLOWER (<i>Lobelia siphilitica</i>)
[Purple]	50	NEW YORK IRONWEED (<i>Vernonia noveboracensis</i>)
[Purple]	50	NEW ENGLAND ASTER (<i>Aster novae-angliae</i>)
[Red]	150	BITTER PANICGRASS (<i>Panicum amarum</i>)
[Light Green]	40	BLUE CARDINAL FLOWER (<i>Lobelia siphilitica</i>)
[Pink]	35	BLUE FLAB (<i>Iris versicolor</i>)
[Green]	75	COMMON RUSH (<i>Juncus effusus</i>)
[Light Blue]	50	NEW YORK IRONWEED (<i>Vernonia noveboracensis</i>)
[Light Blue]	15	NEW YORK ASTER (<i>Aster novi-belgii</i>)
[Yellow]	15	SWITCHGRASS (<i>Panicum virgatum</i>)
[Purple]	20	BLUE CARDINAL FLOWER (<i>Lobelia siphilitica</i>)
[Orange]	50	TUSSOCK SEDGE (<i>Carex stricta</i>)
[Light Blue]	20	BLUE CARDINAL FLOWER (<i>Lobelia siphilitica</i>)

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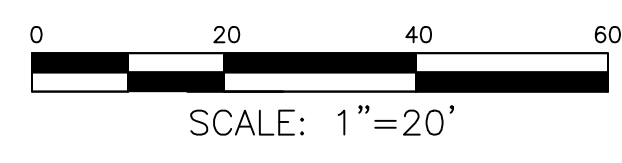
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1	Conceptual	01/15

LANDSCAPING

HATCH	DESCRIPTION
[Hatched pattern]	STANDARD GRASS SEED ON SHALLOW SLOPES

LEGEND

LINE STYLE	DESCRIPTION
[Dashed line]	EXISTING 1' CONTOUR
[Dashed line]	EXISTING 5' CONTOUR
[Wavy line]	EXISTING UNDERGROUND WATER
[Line with 'S']	EXISTING UNDERGROUND SEWER
[Line with 'G']	EXISTING UNDERGROUND GAS
[Line with 'T']	EXISTING TELEPHONE LINES
[Line with 'OHW']	EXISTING OVERHEAD WIRES
[Line with 'D']	EXISTING DRAINAGE
[Line with 'x']	EXISTING FENCE
[Line with 'x']	EXISTING TREELINE
[Solid line]	PROPERTY LINES
[Line with 'HWM']	BORDERING VEGETATED WETLANDS
[Line with '50']	50' BWV BUFFER ZONE
[Line with '100']	100' BWV BUFFER ZONE
[Line with 'FLOOD']	FLOOD ZONE AE
[Line with 'LOW']	PROPOSED LIMIT OF WORK
[Dashed line]	PROPOSED CONTOUR
[Line with 'LIMITS']	LIMITS OF UNDERGROUND GRAVEL
[Line with 'DRAIN']	PROPOSED PERFORATED DRAIN LINE
[Hatched pattern]	RIPRAP STONE



GATEWAY MARINA BMP, BARNSTABLE – LANDSCAPING AND SURFACE TREATMENTS

WaterVision, LLC
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EPA Green Infrastructure Education and Outreach Project

GATEWAY MARINA BMP, GRAVEL BIORETENTION CELL

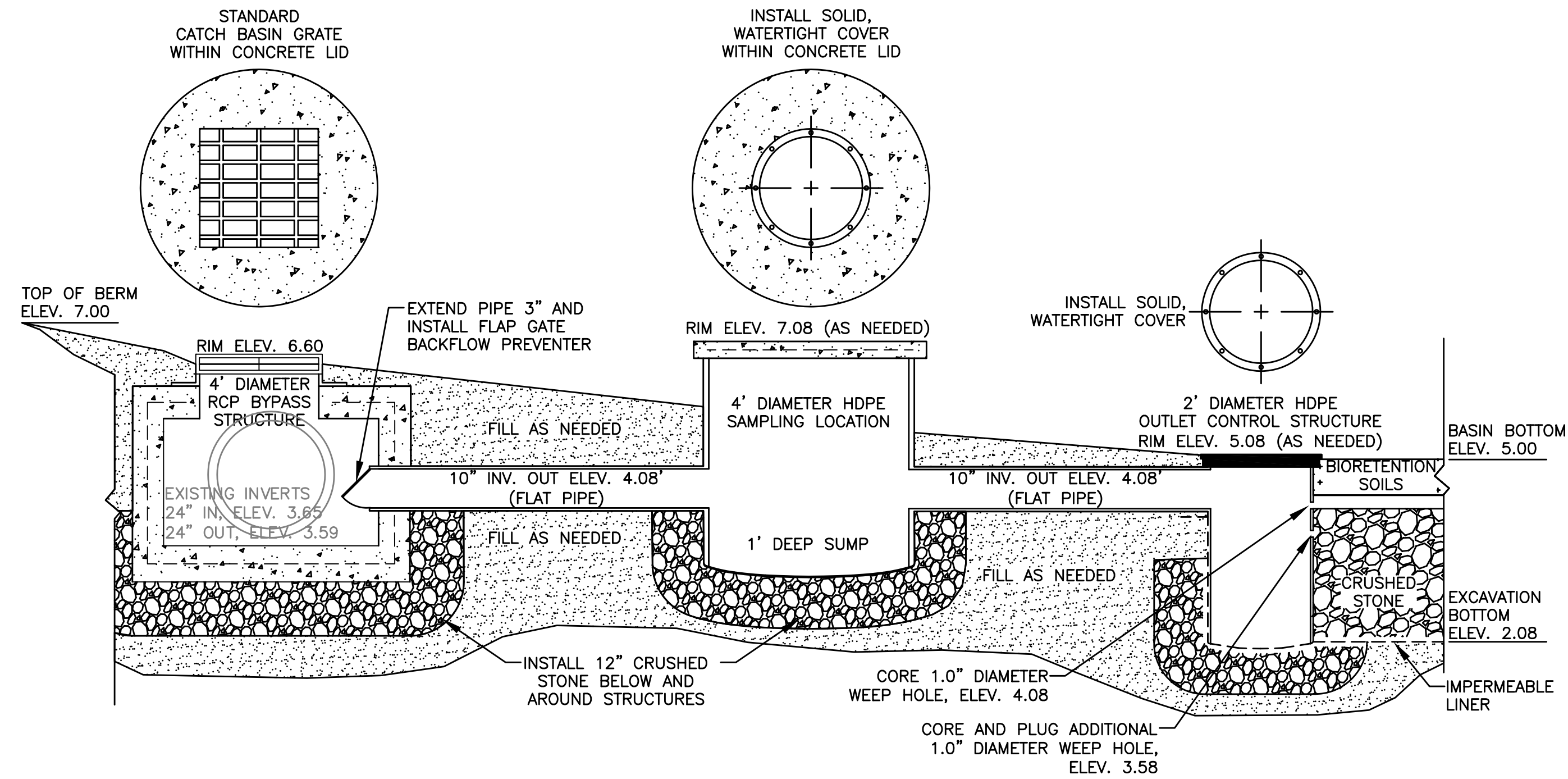
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Project No.: 677-2
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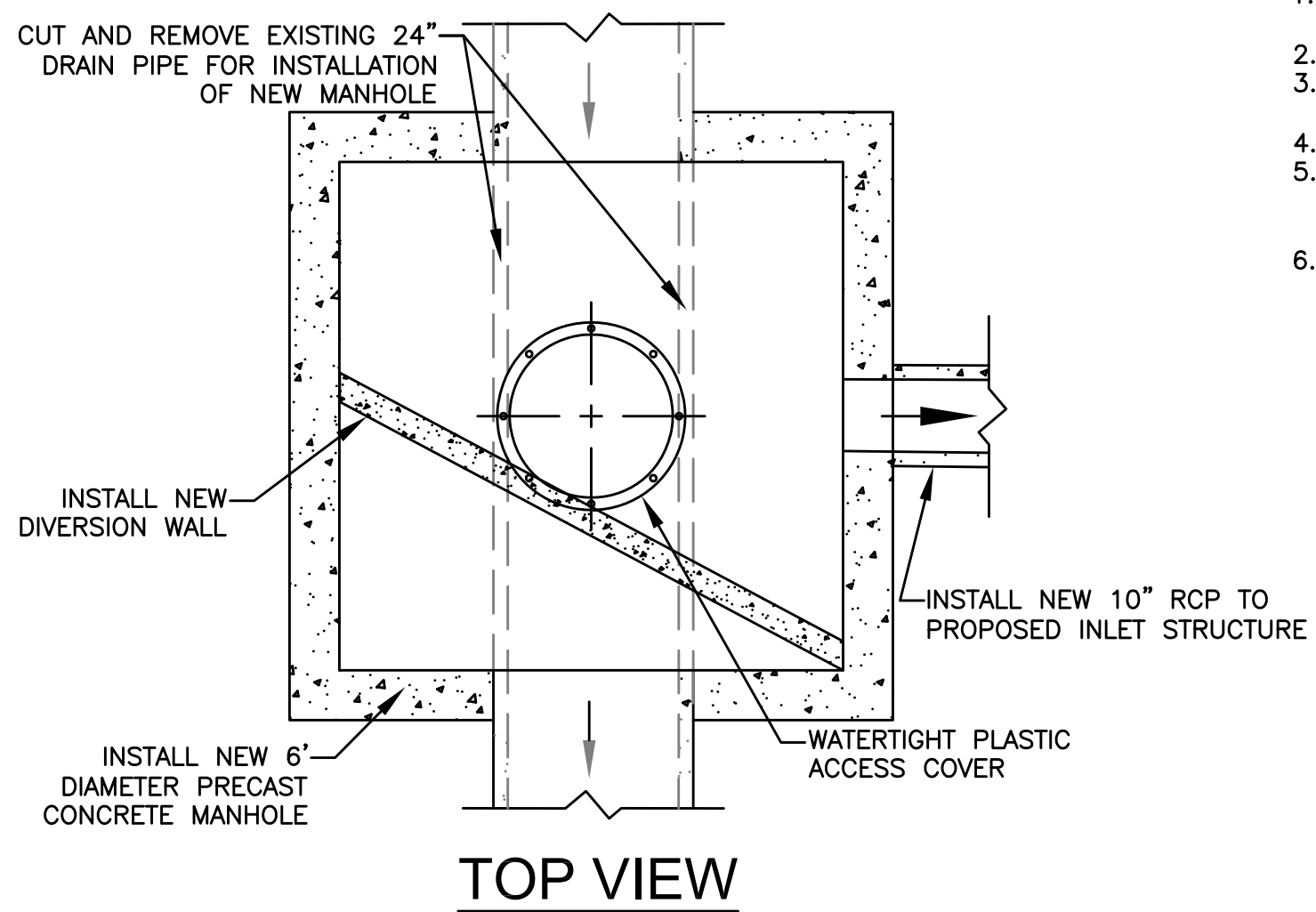
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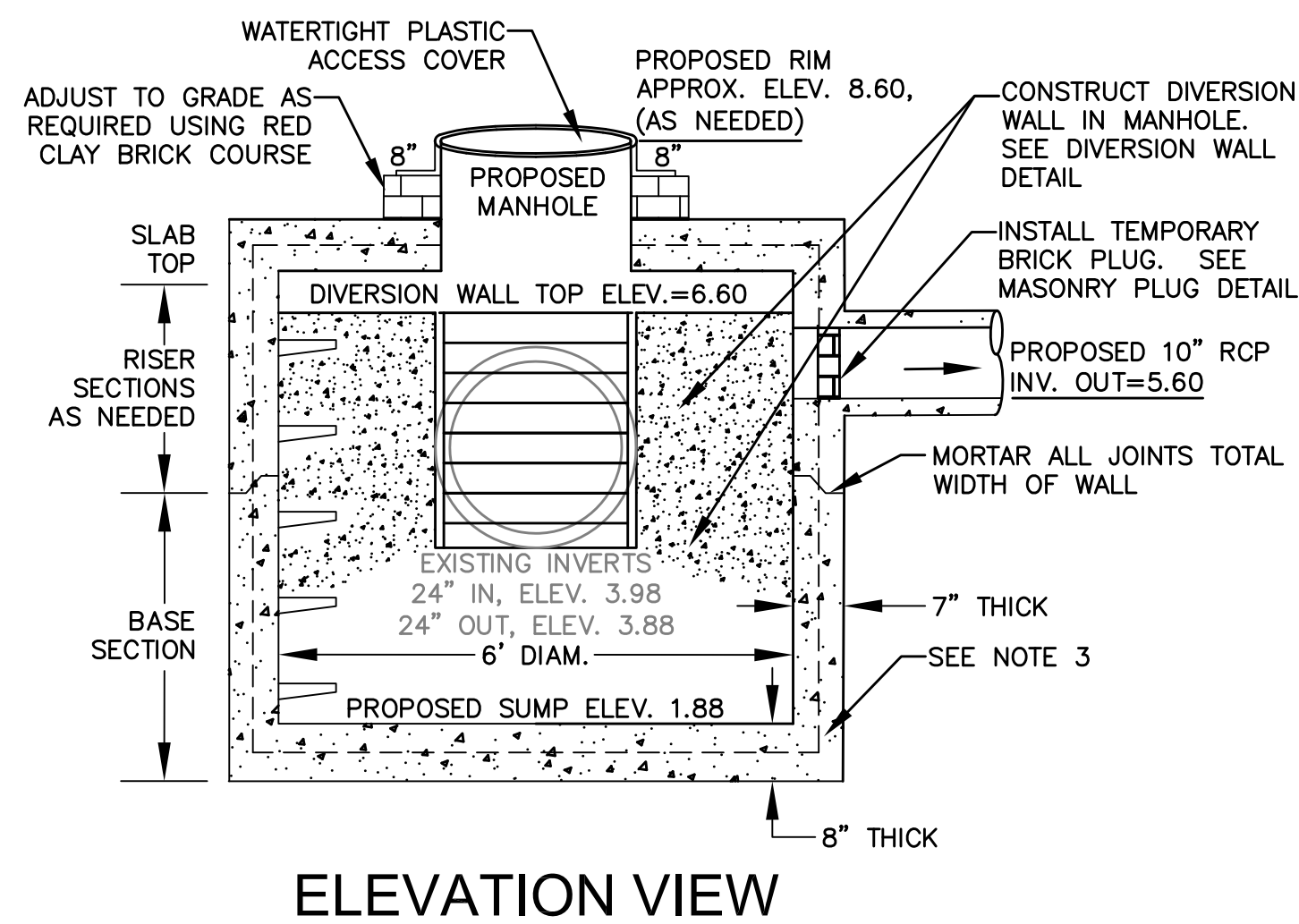
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C-4



BMP OVERFLOW DETAILS



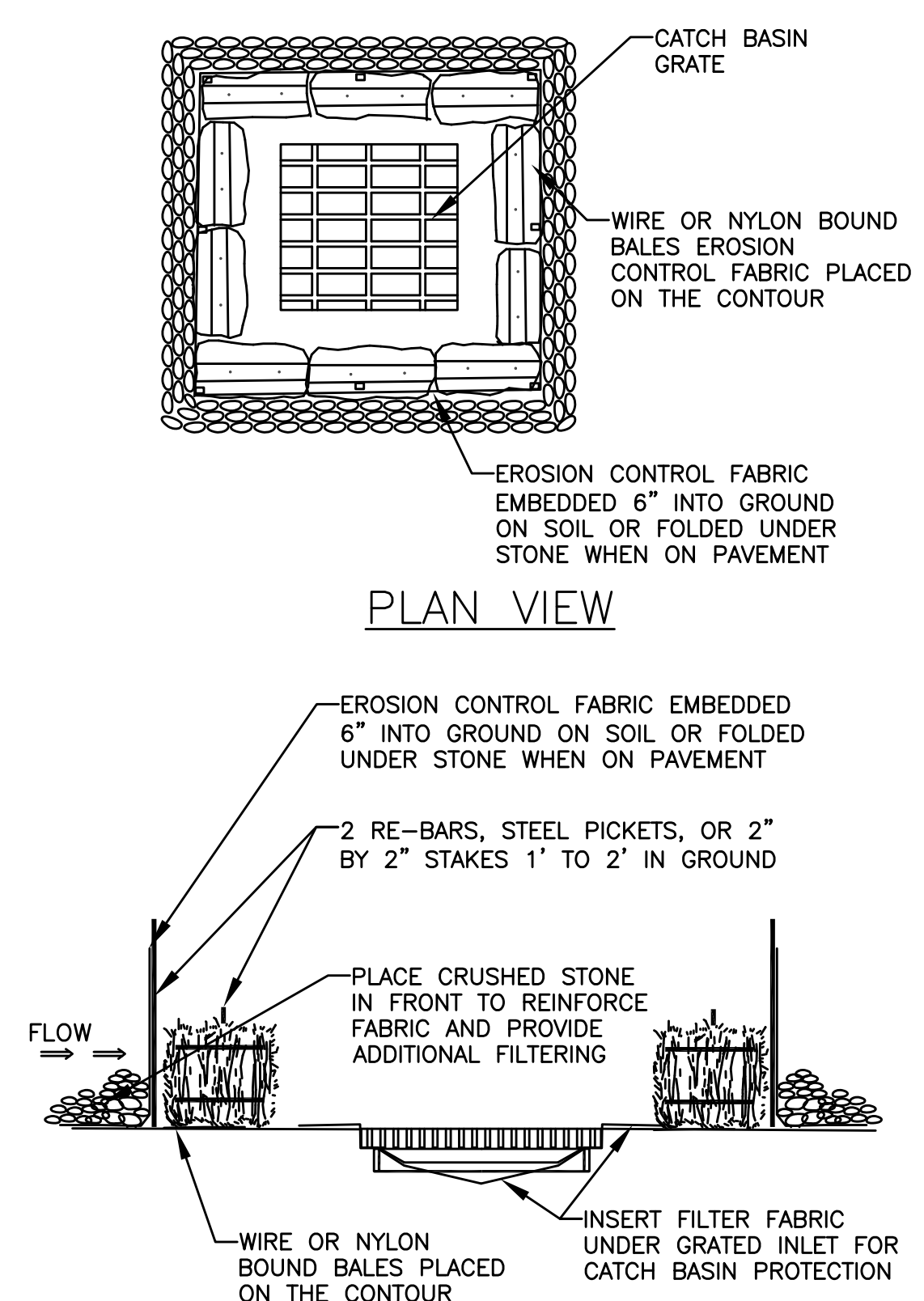
TOP VIEW



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

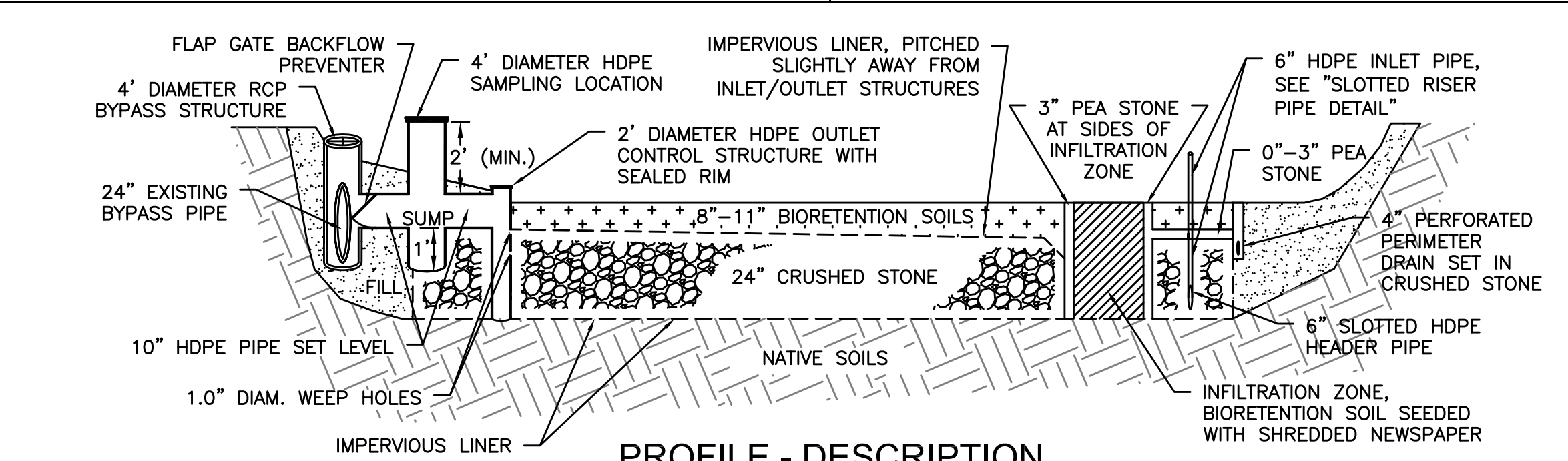


PLAN VIEW

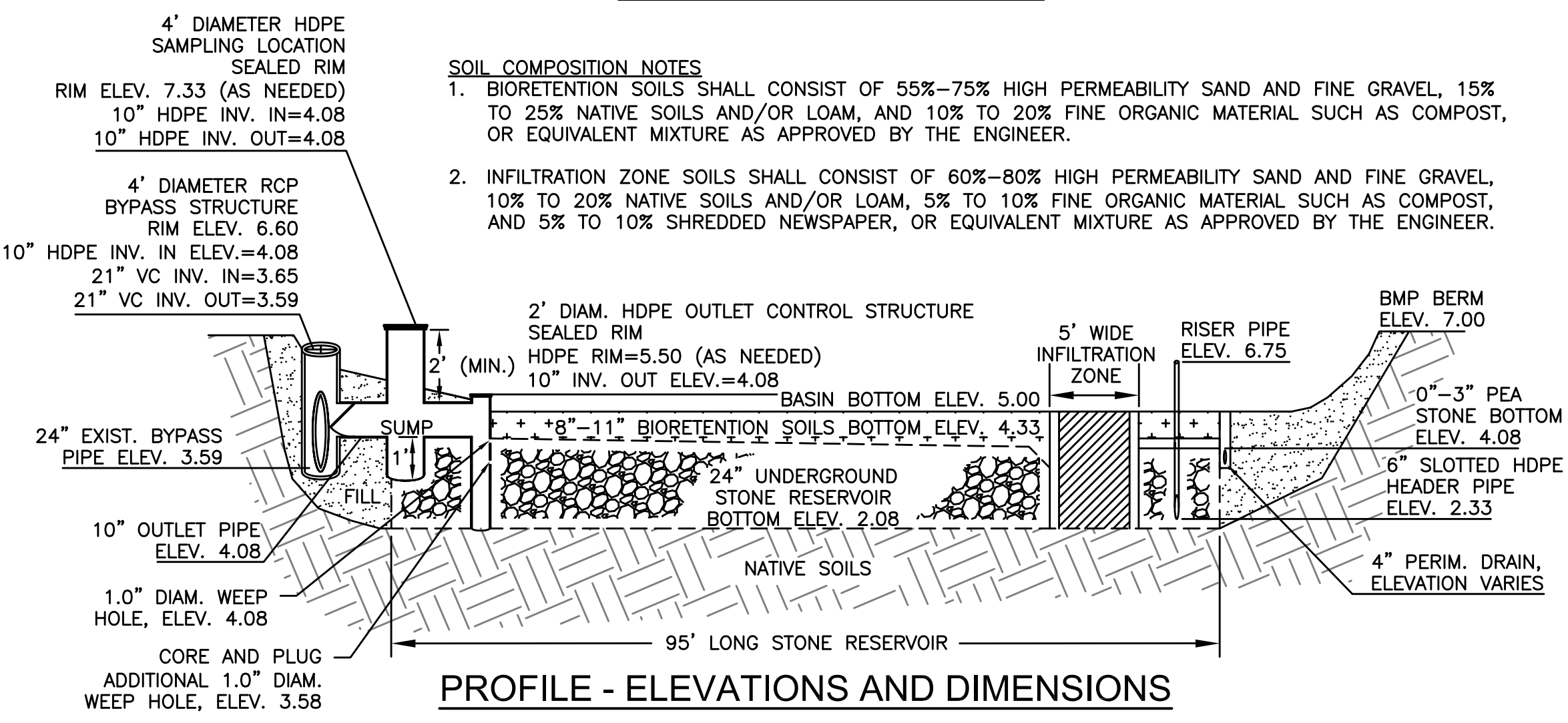
PROFILE VIEW

- 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

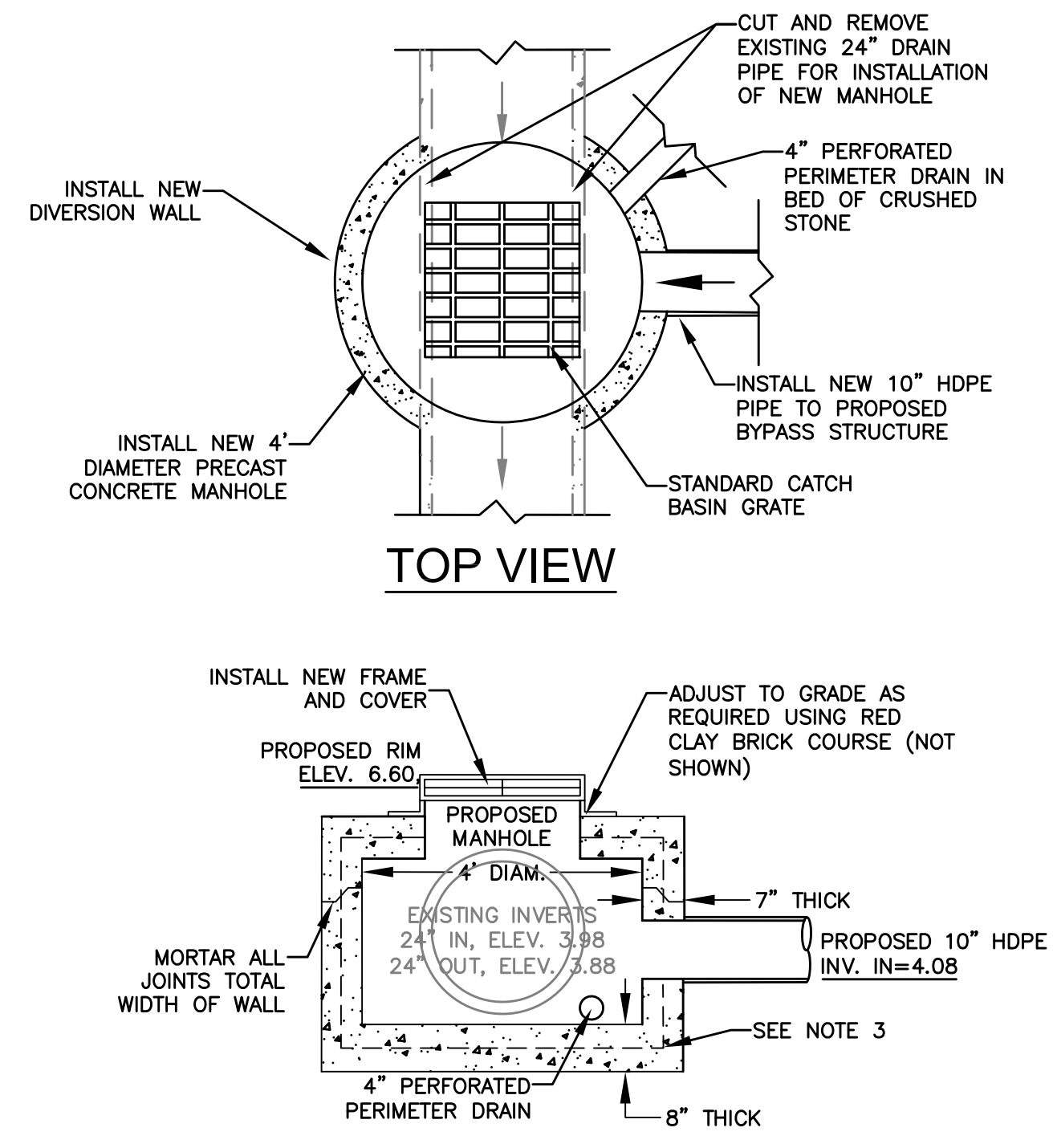


PROFILE - DESCRIPTION



PROFILE - ELEVATIONS AND DIMENSIONS

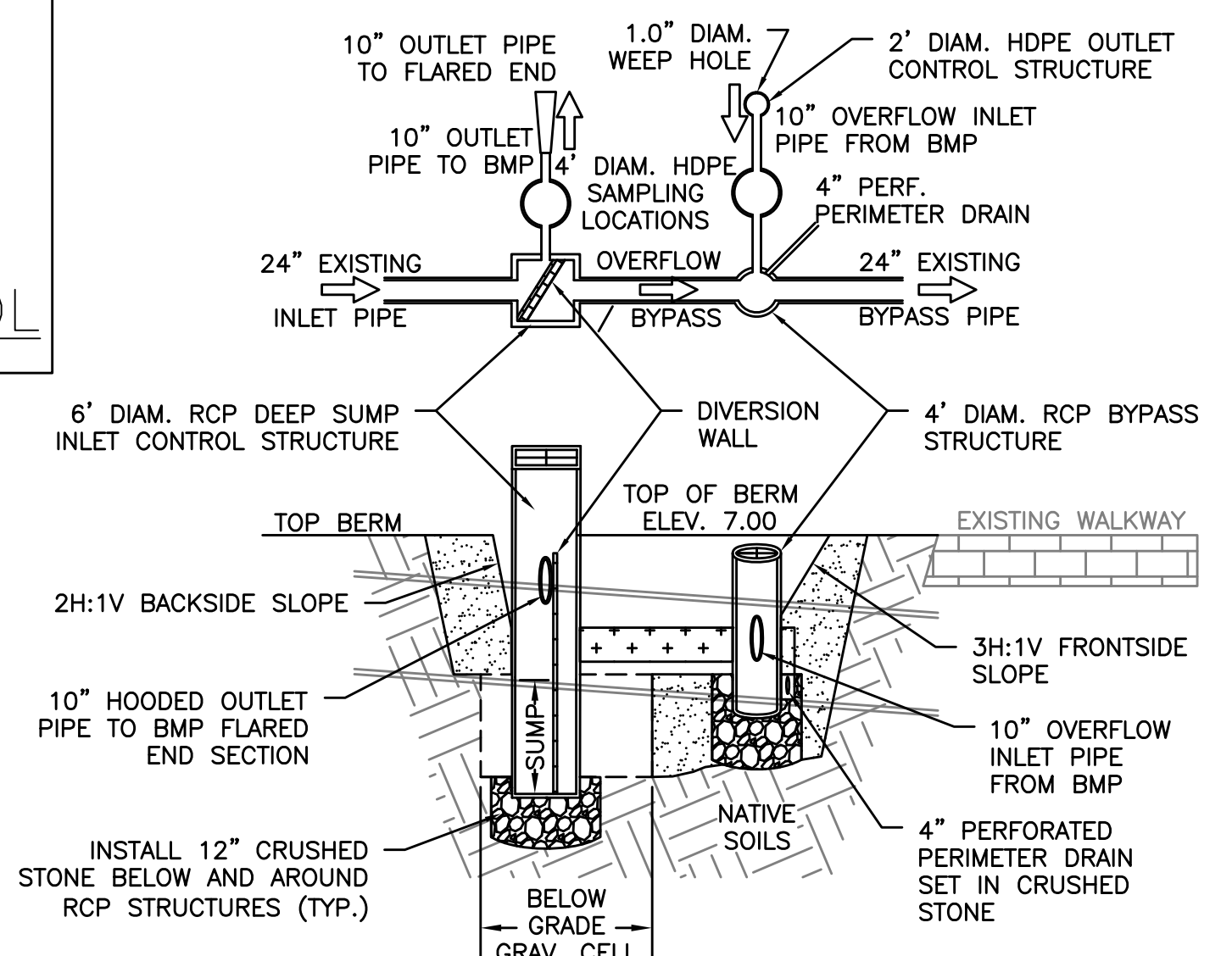
STORMWATER BMP DETAILS



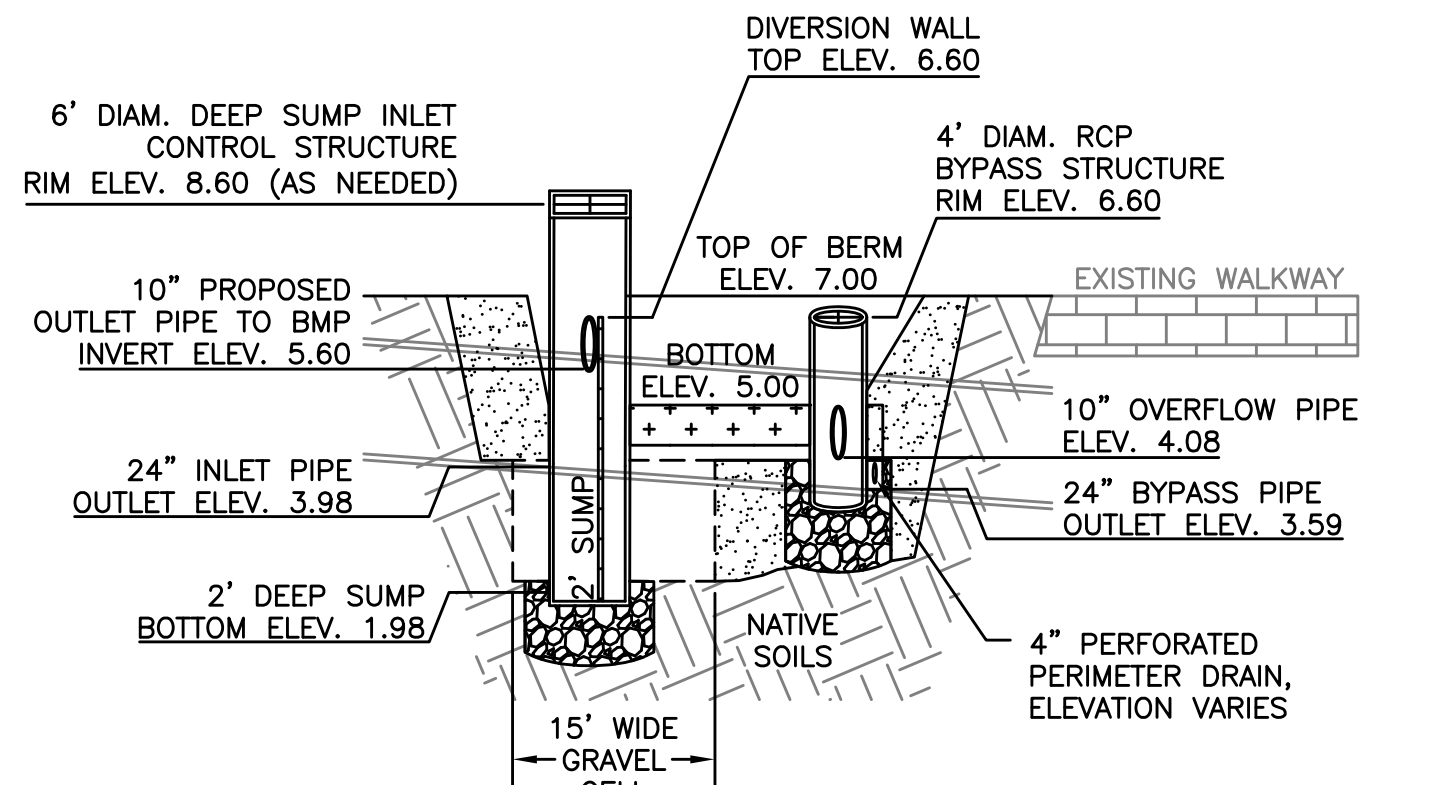
TOP VIEW

ELEVATION VIEW

RCP BYPASS STRUCTURE



CROSS-SECTION A-A - DESCRIPTION



CROSS-SECTION A-A - ELEVATIONS AND DIMENSIONS

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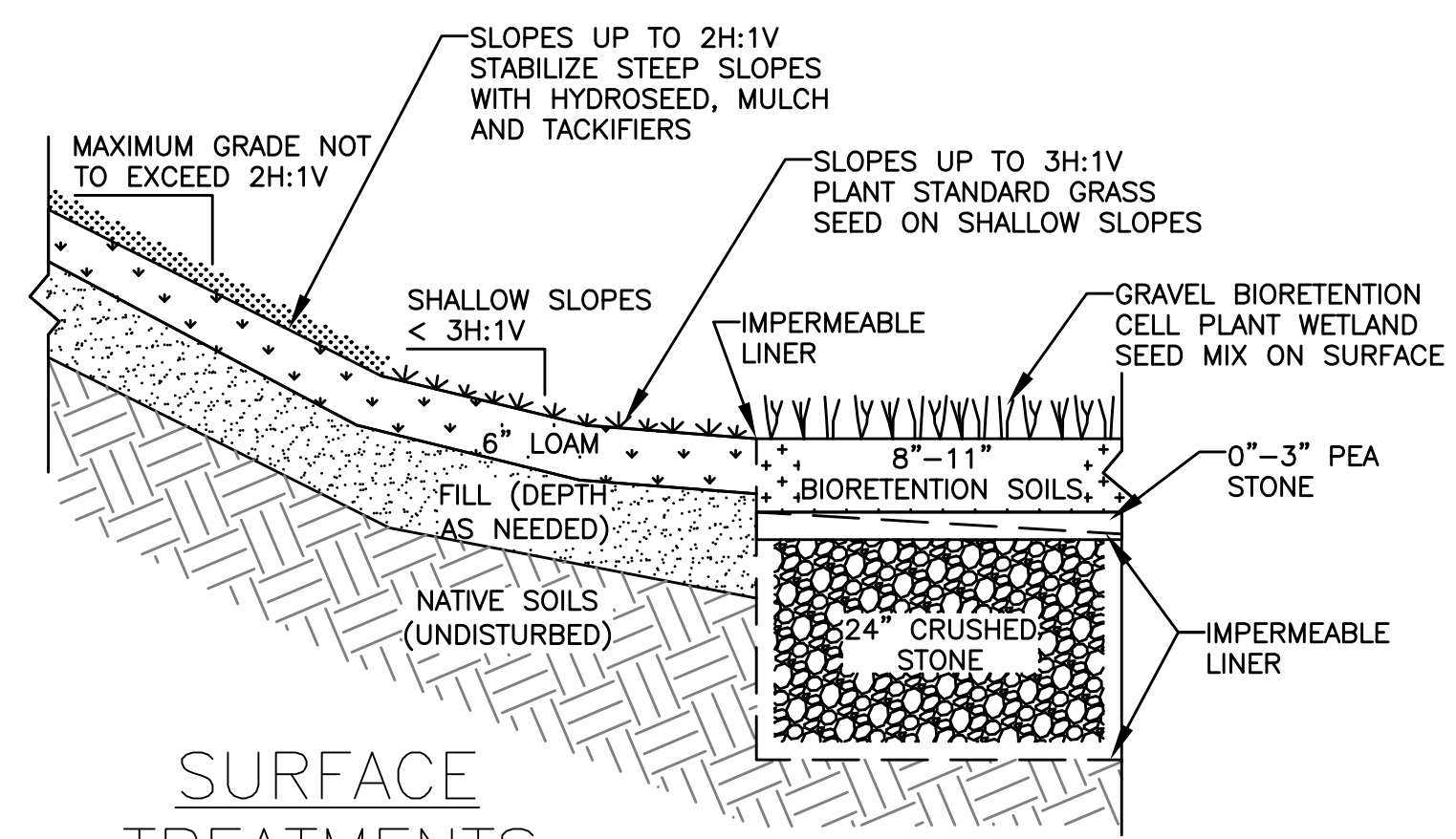
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South Street and Pleasant Street, Barnstable MA

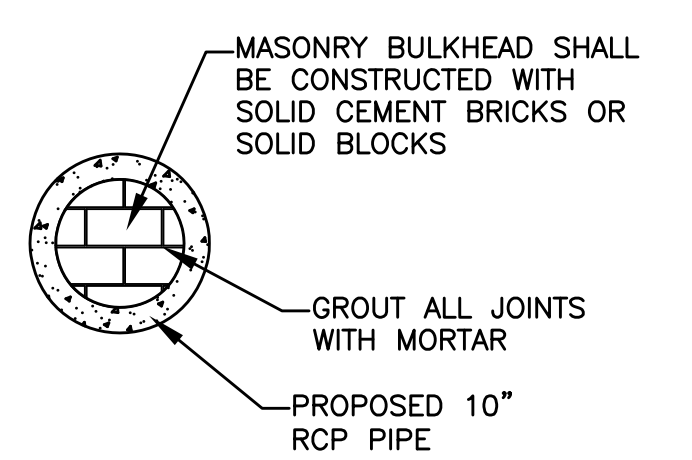
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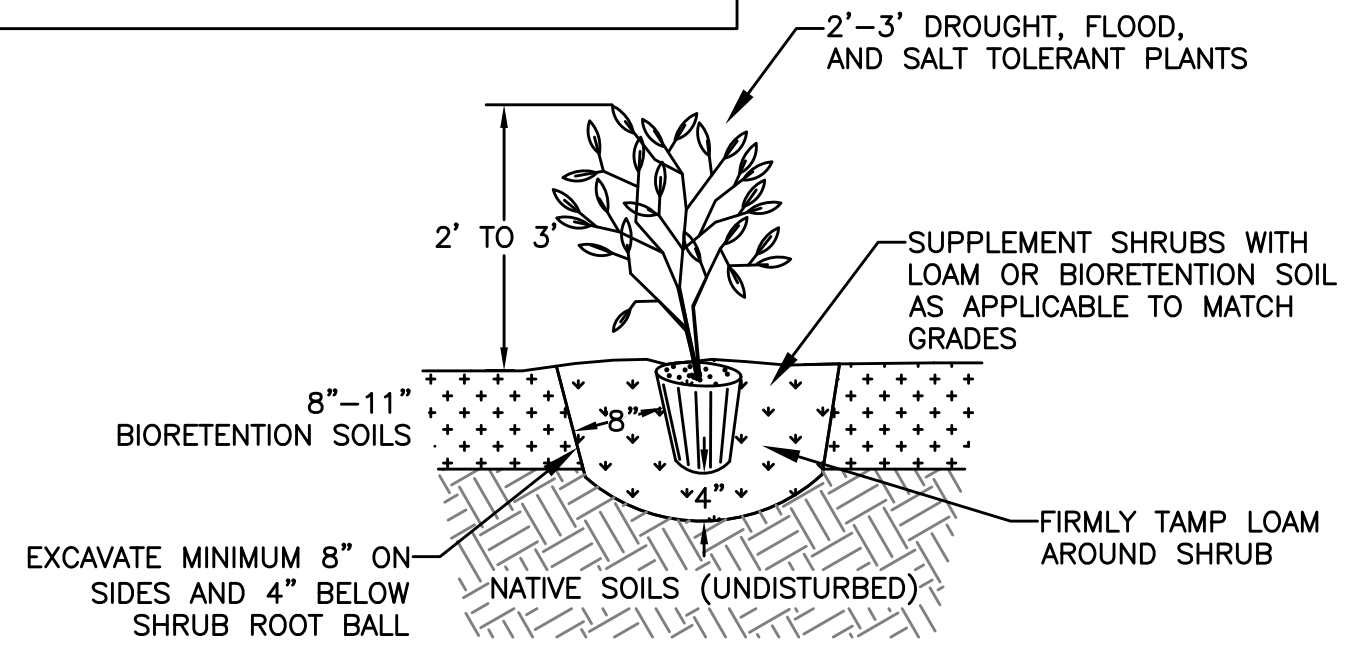
SURFACE TREATMENTS

SOIL COMPOSITION NOTES

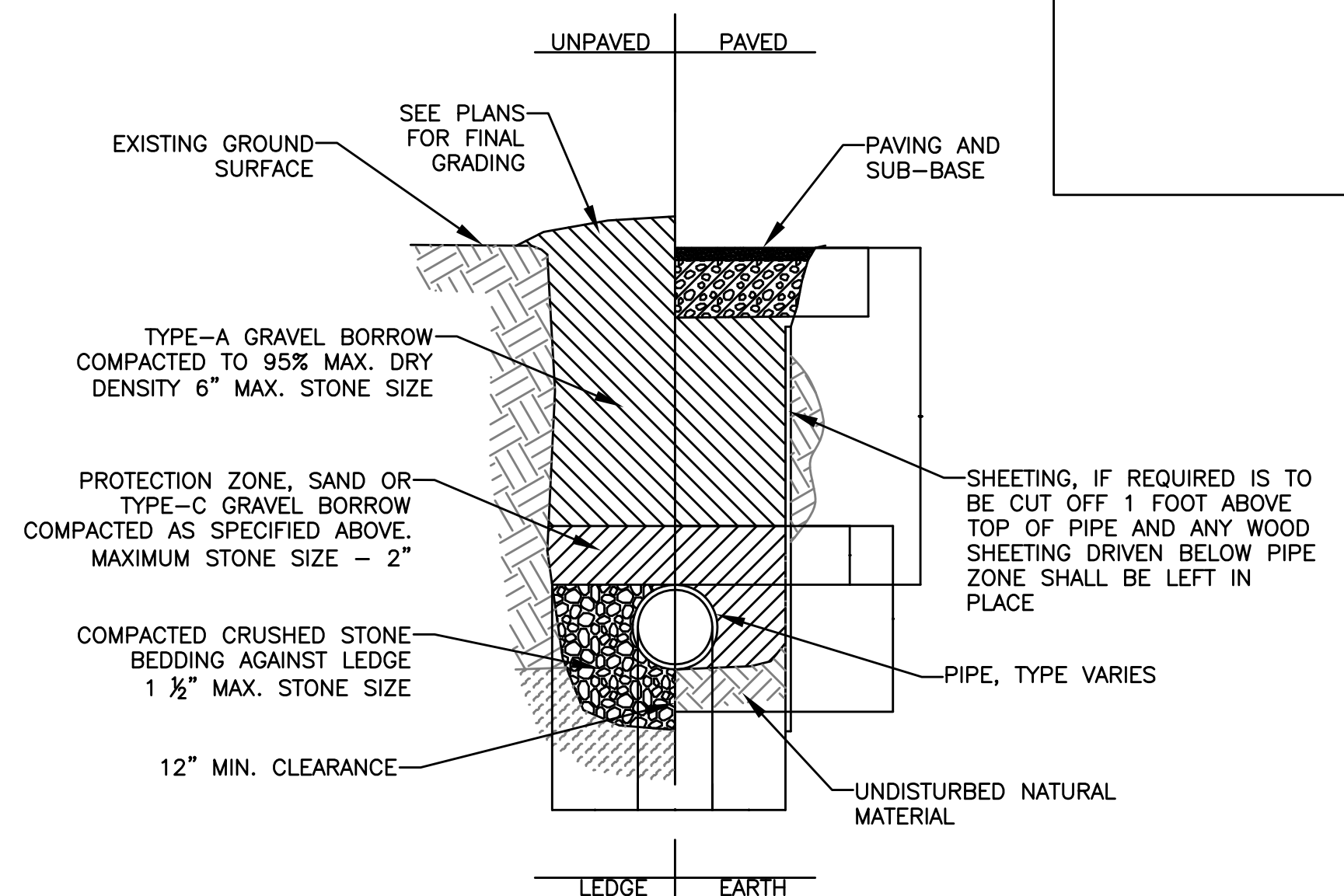
1. BIORETENTION SOILS SHALL CONSIST OF 55%-75% HIGH PERMEABILITY SAND AND FINE GRAVEL, 15% TO 25% NATIVE SOILS AND/OR LOAM, AND 10% TO 20% FINE ORGANIC MATERIAL SUCH AS COMPOST, OR EQUIVALENT MIXTURE AS APPROVED BY THE ENGINEER.
2. INFILTRATION ZONE SOILS (NOT SHOWN) SHALL CONSIST OF 60%-80% HIGH PERMEABILITY 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.



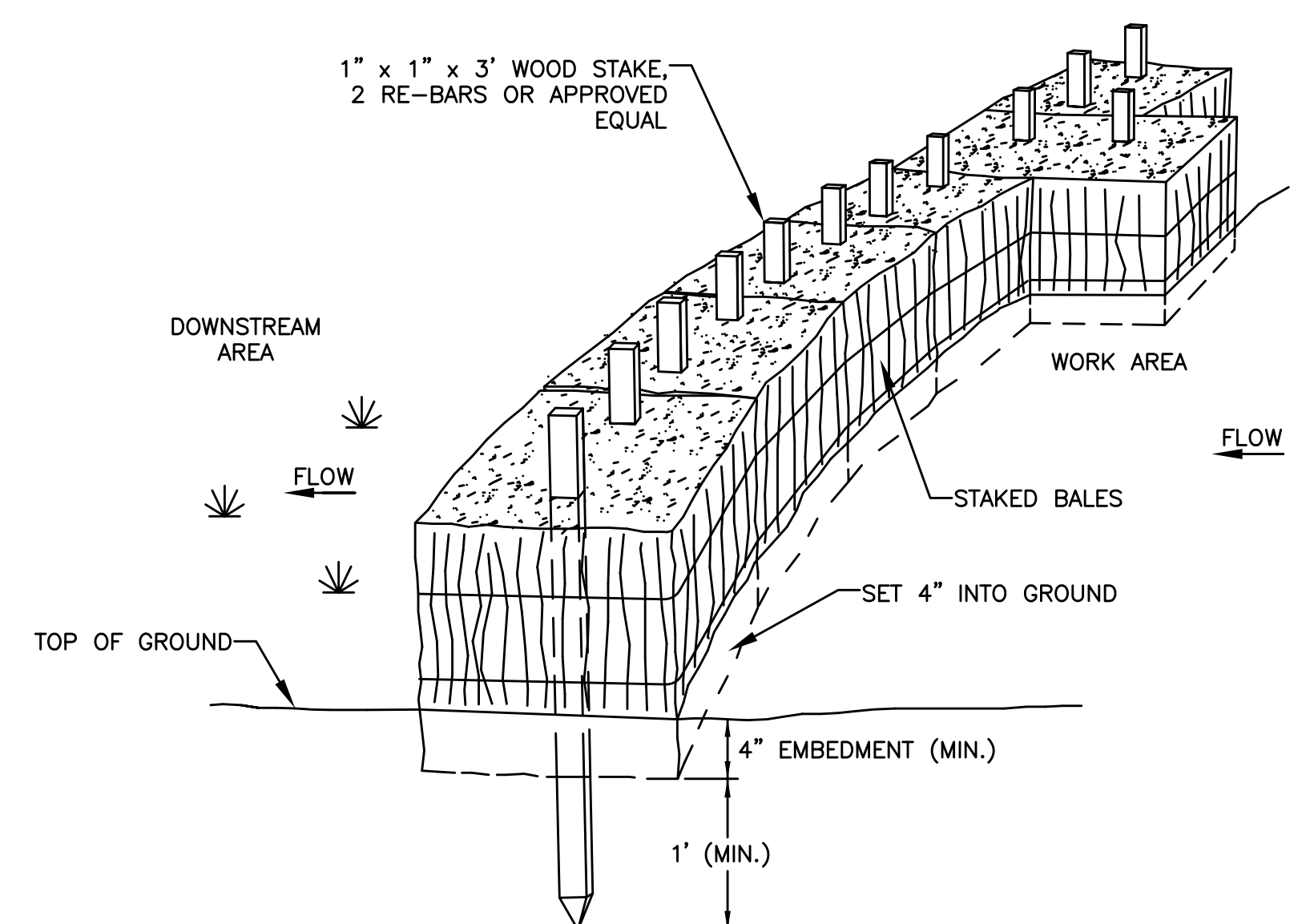
TEMPORARY PLUG



PLANTING DETAIL

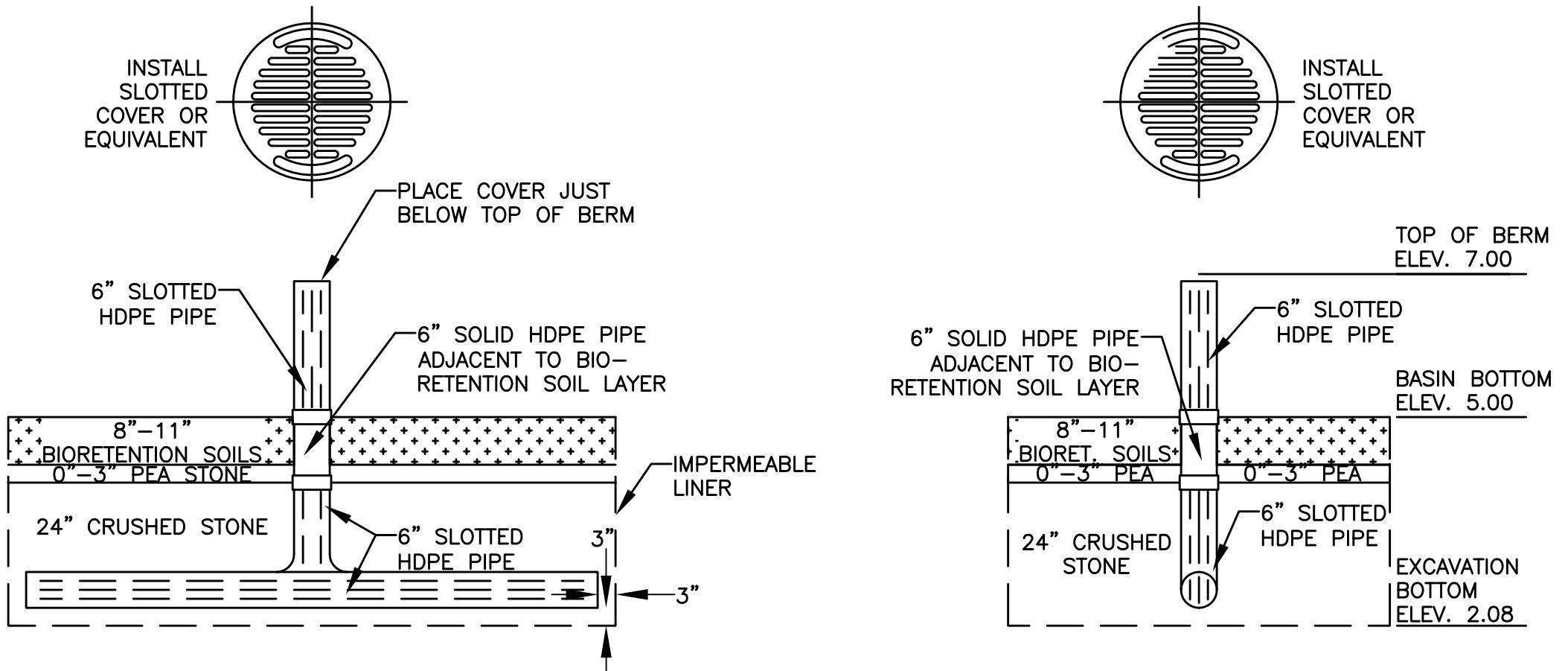


PIPE TRENCHING DETAIL



PERIMETER EROSION CONTROLS

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

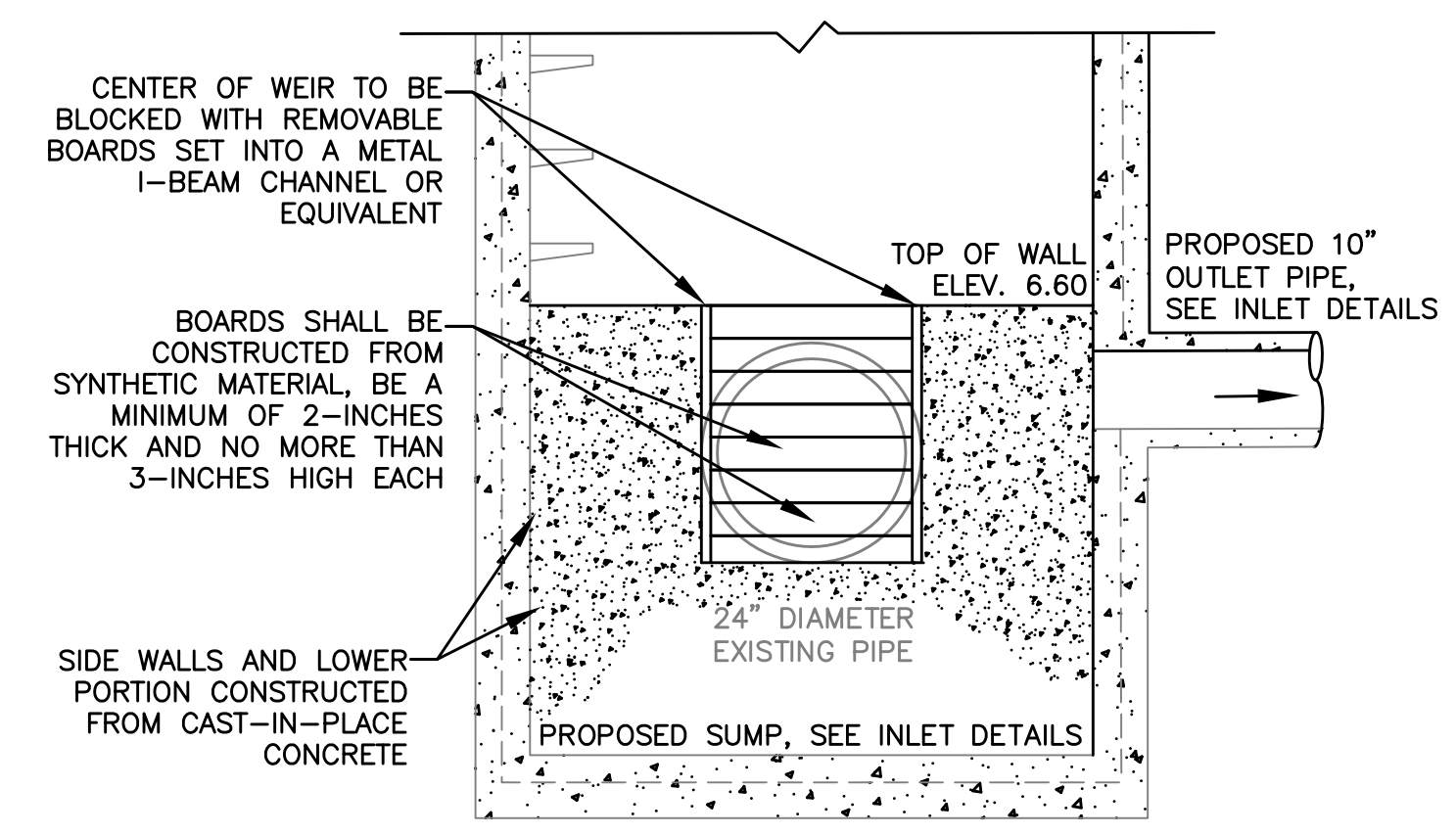


CROSS-SECTION VIEW

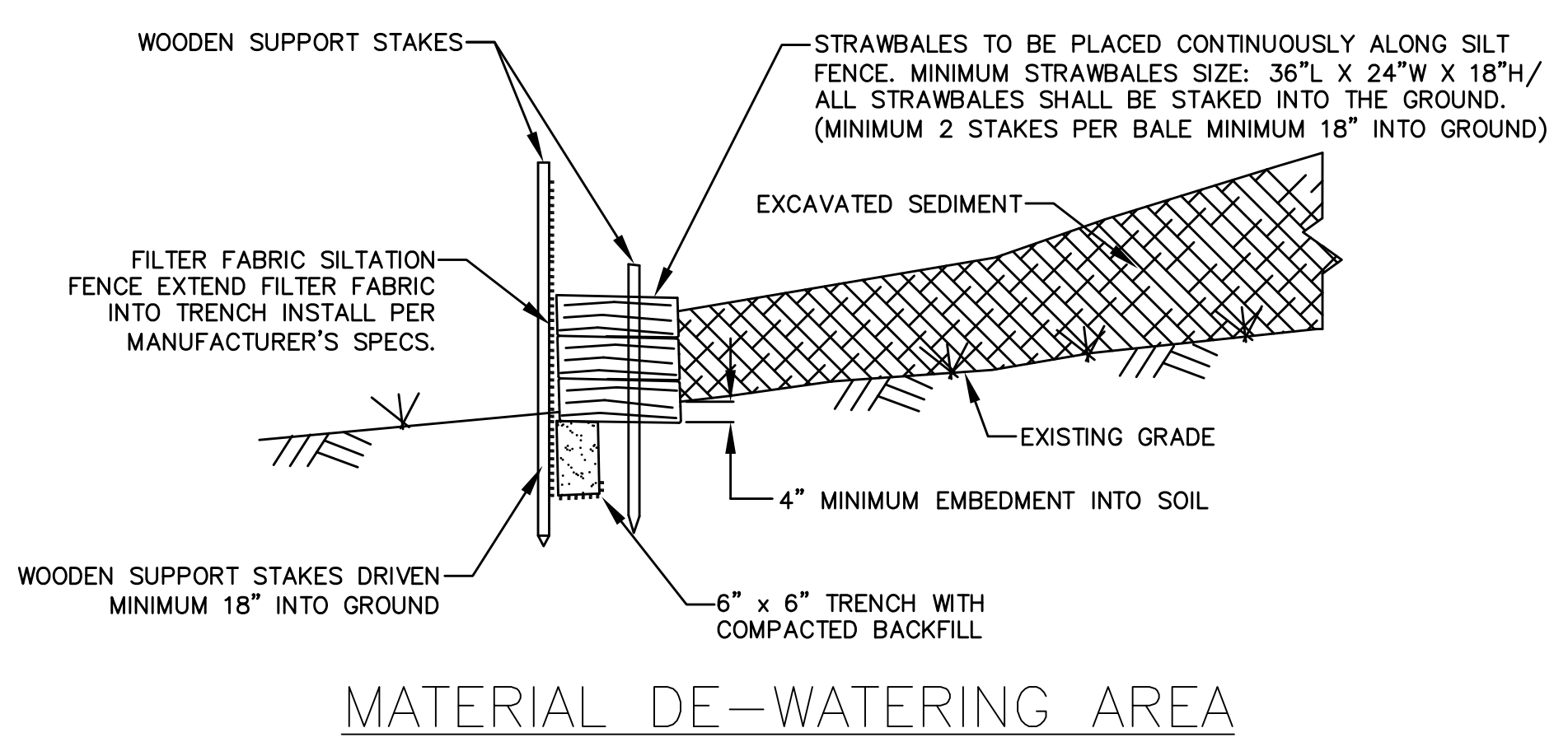
ELEVATION VIEW

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

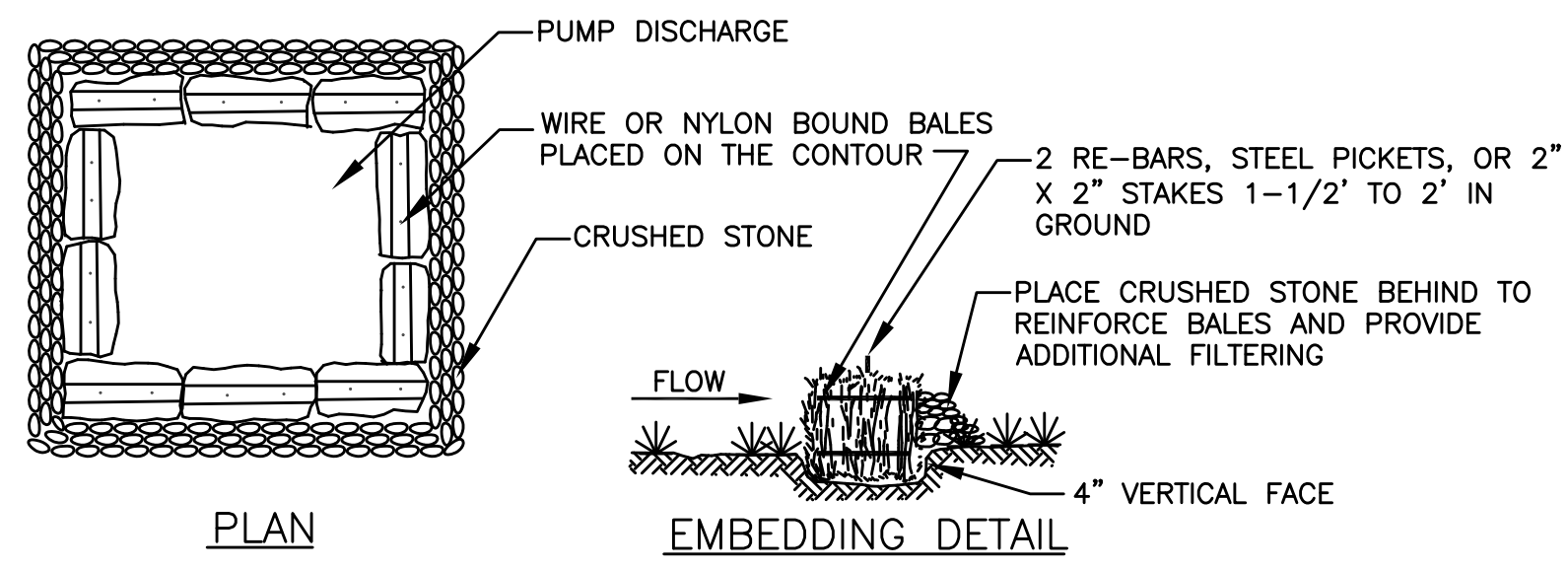
SLOTTED RISER PIPE DETAIL



DIVERSION WALL



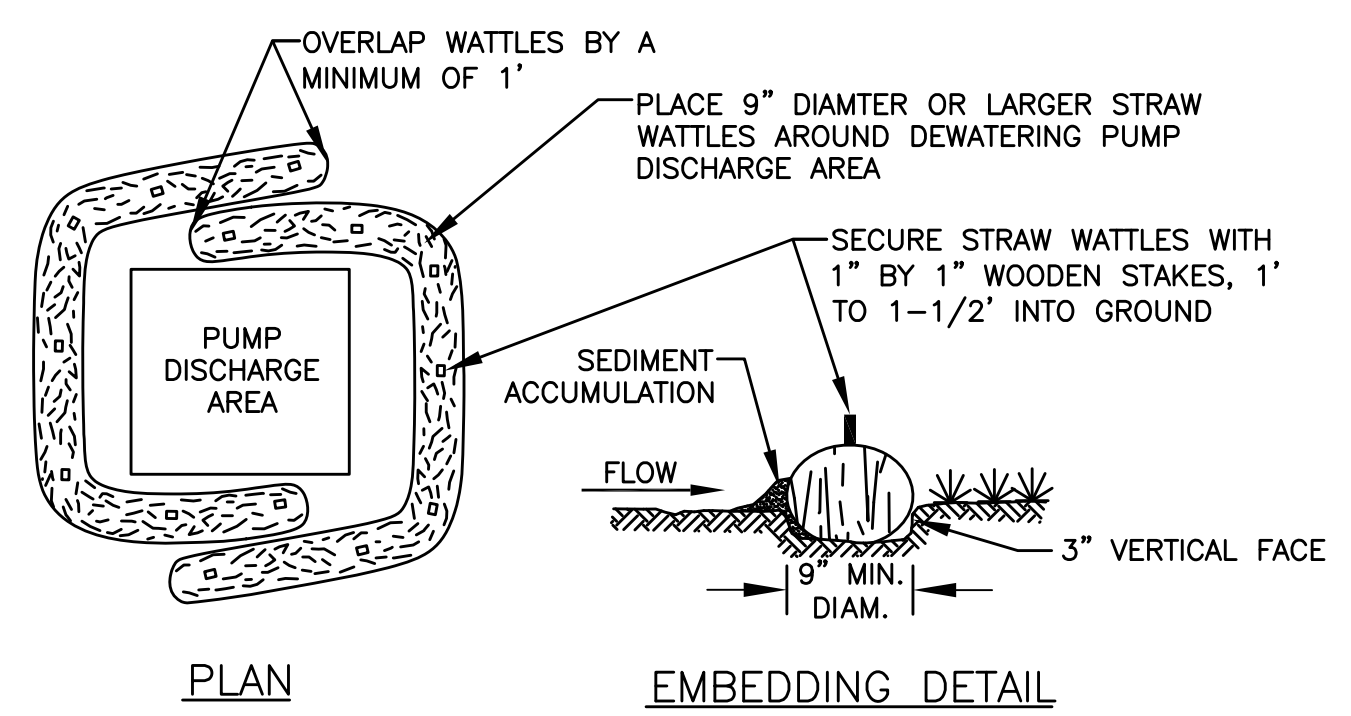
MATERIAL DE-WATERING AREA



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\"/>

PUMPING DE-WATERING DISCHARGE AREA, HAY BALES



STRAW WATTLE DE-WATERING AREA CONSTRUCTION SPECIFICATIONS

1. WATTLES SHALL BE PLACED IN A ROW WITH ENDS OVERLAPPING A MINIMUM OF 1\"/>

PUMPING DE-WATERING DISCHARGE AREA, STRAW WATTLES

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.

No.	Revision/Issue	Date
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

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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	C-6
Drawn By: NC	
Checked By: ML	
Horizontal Datum: NAD88	
Vertical Datum: NAVD88	