

NATIVE GRASSES AND WILD FLOWERS
(SEE DESIGN MANUAL SECTION 13 FOR
PLANTING SPECIFICATIONS)

PONDING DEPTH
MIN 4" / MAX 12"

2"-3" HARDWOOD
MULCH

MIN 10' FROM
STRUCTURAL
FOUNDATIONS

3H:1V MAX
SIDE SLOPES

DOUBLE WASHED
#8 STONE

NON-WOVEN
FILTER FABRIC
(IF REQUIRED)

VARIES

DOUBLE WASHED
#57 STONE

4" MIN PERFORATED
UNDERDRAIN PIPE,
CLEANOUT AND GEOTEXTILE
FABRIC SOCK AS REQUIRED
0.5% MIN SLOPE

MIN 3' - MAX 6'
ENGINEERED MIX
OF PERMEABLE SOIL

IN SITU SOIL

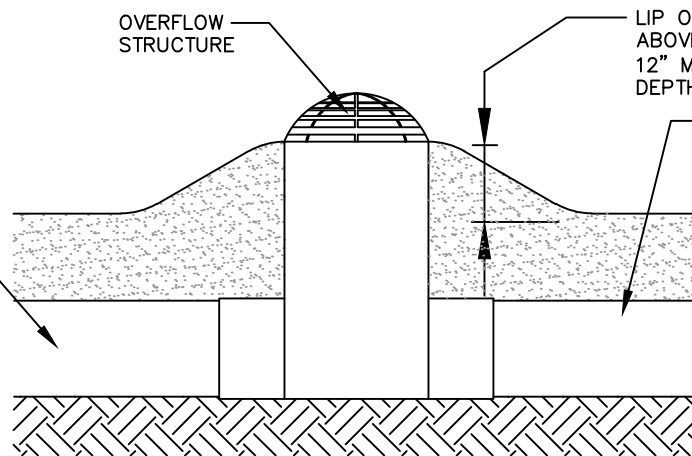
RAIN GARDEN TYPICAL SECTION

OVERFLOW
STRUCTURE

LIP OF BASIN MIN 6"
ABOVE ENGINEERED MIX
12" MAX PONDING WATER
DEPTH

UNDERDRAIN
(IF REQUIRED)

OUTLET PIPE TO
STORM SEWER
OR RECEIVING
WATER



OVERFLOW STRUCTURE TYPICAL SECTION

NOT TO SCALE



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EXHIBIT 18-1
RAIN GARDEN & OVERFLOW STRUCTURE
REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA
EFFECTIVE DATE: JUNE 30, 2021



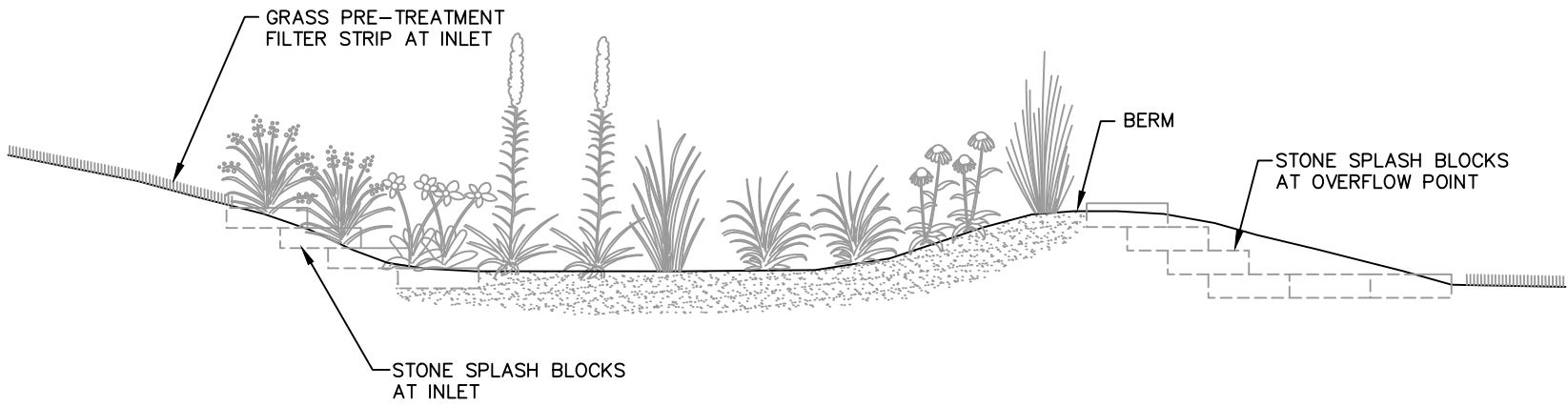
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EXHIBIT 18-2

RAIN GARDEN INLET & OUTLET SPLASH BLOCKS

REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA

EFFECTIVE DATE: JUNE 30, 2021



NOT TO SCALE

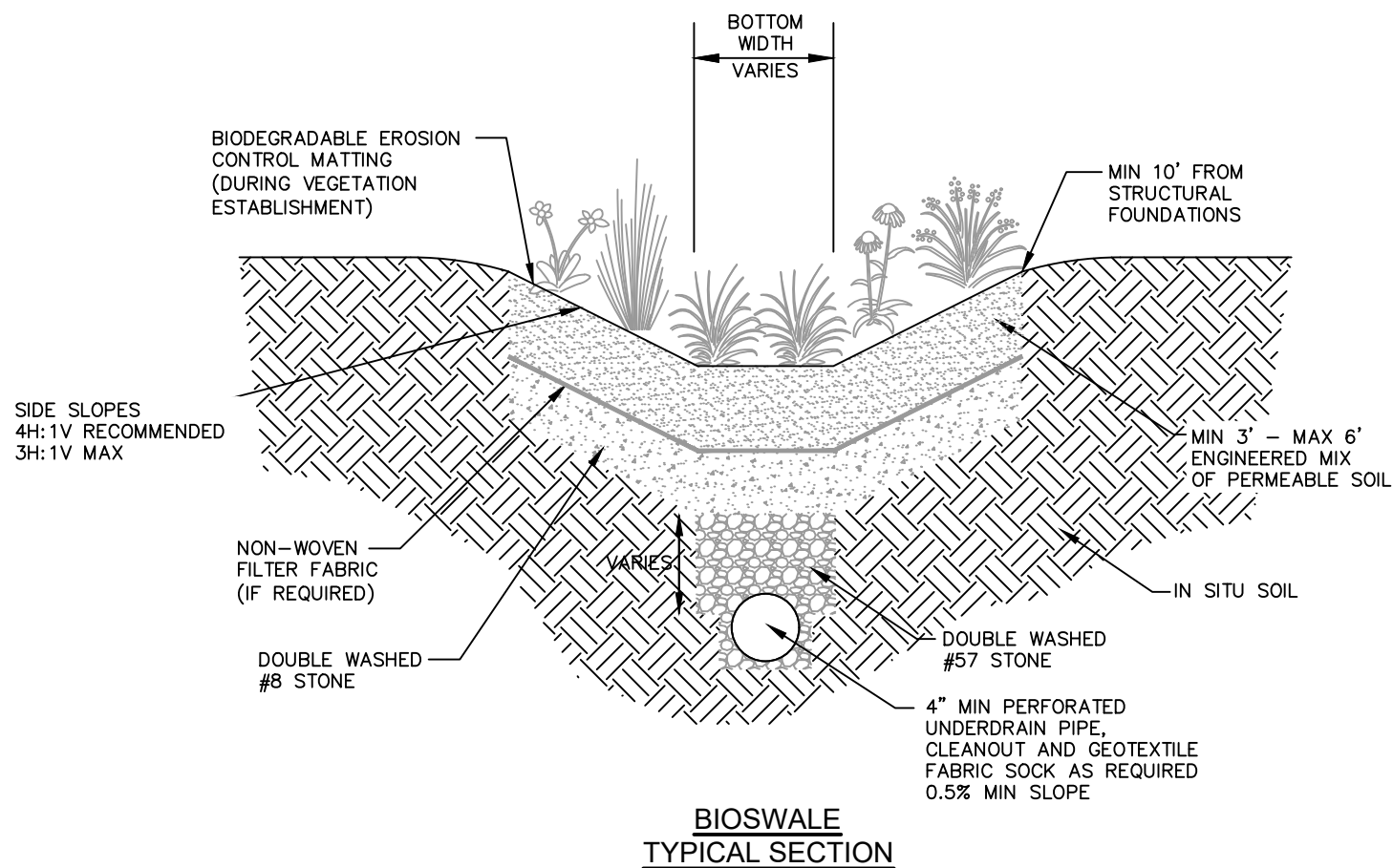


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EXHIBIT 18-3 BIOSWALE

REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA

EFFECTIVE DATE: JUNE 30, 2021



NOTES:

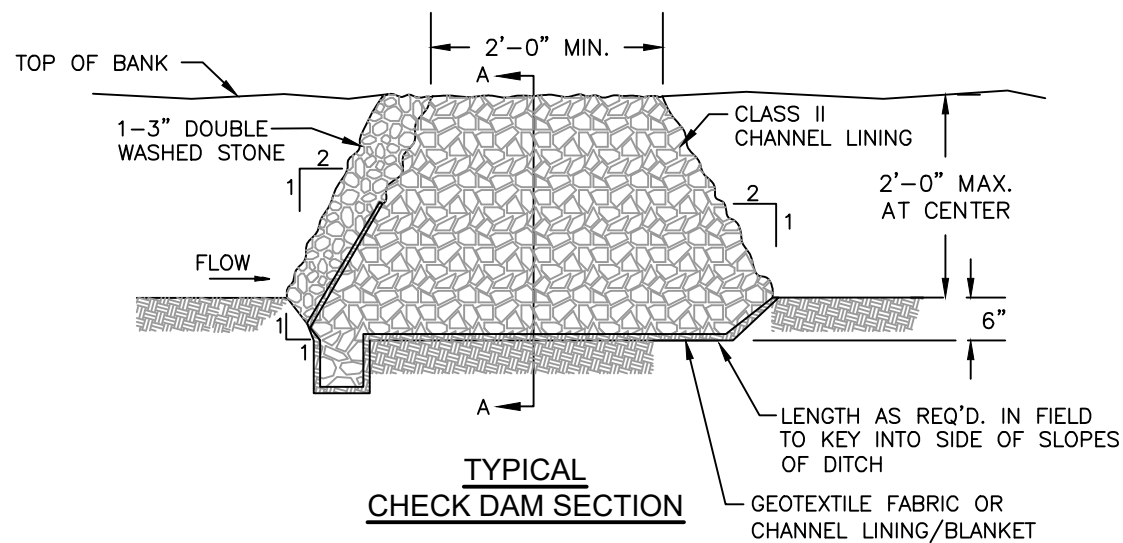
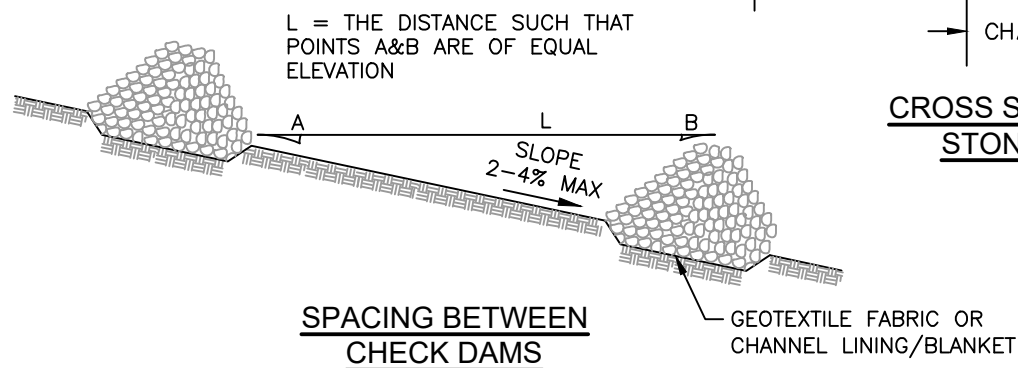
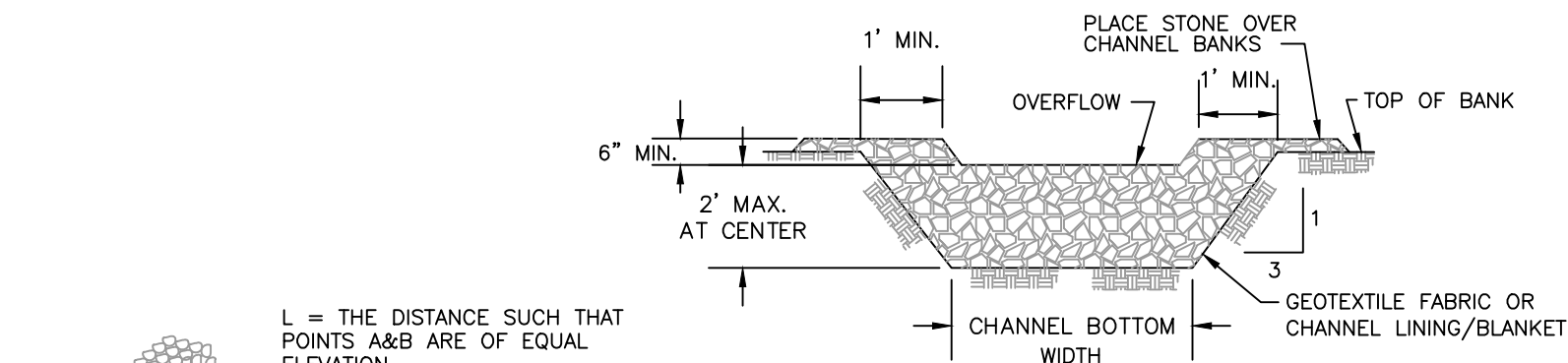
1. LONGITUDINAL CHANNEL SLOPE 1% - 4%
2. CHECK DAMS OR WEIRS REQUIRED FOR SLOPES 2% - 4%

NOT TO SCALE



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EXHIBIT 18-4
CHECK DAM WITHIN BIOSWALE
REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA
EFFECTIVE DATE: JUNE 30, 2021



NOT TO SCALE

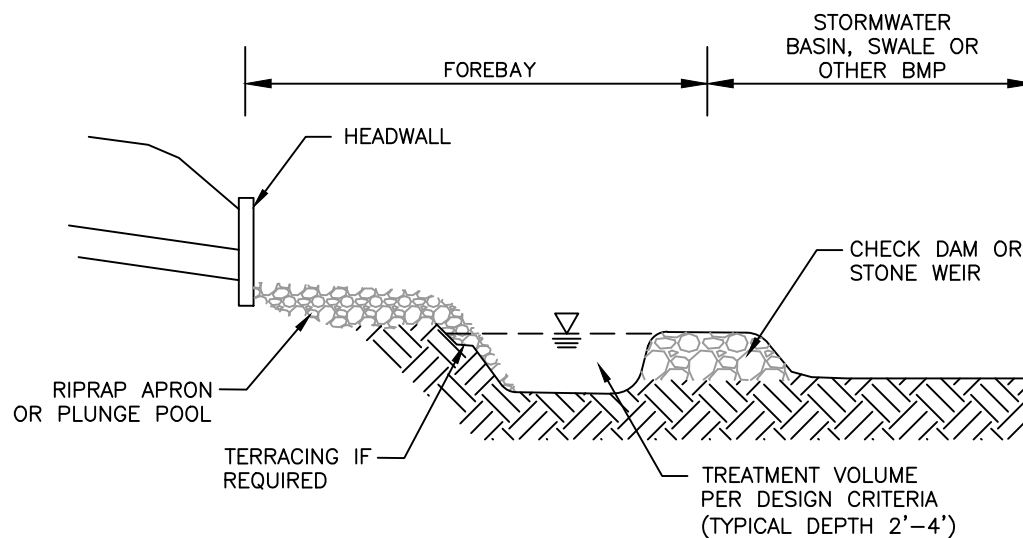
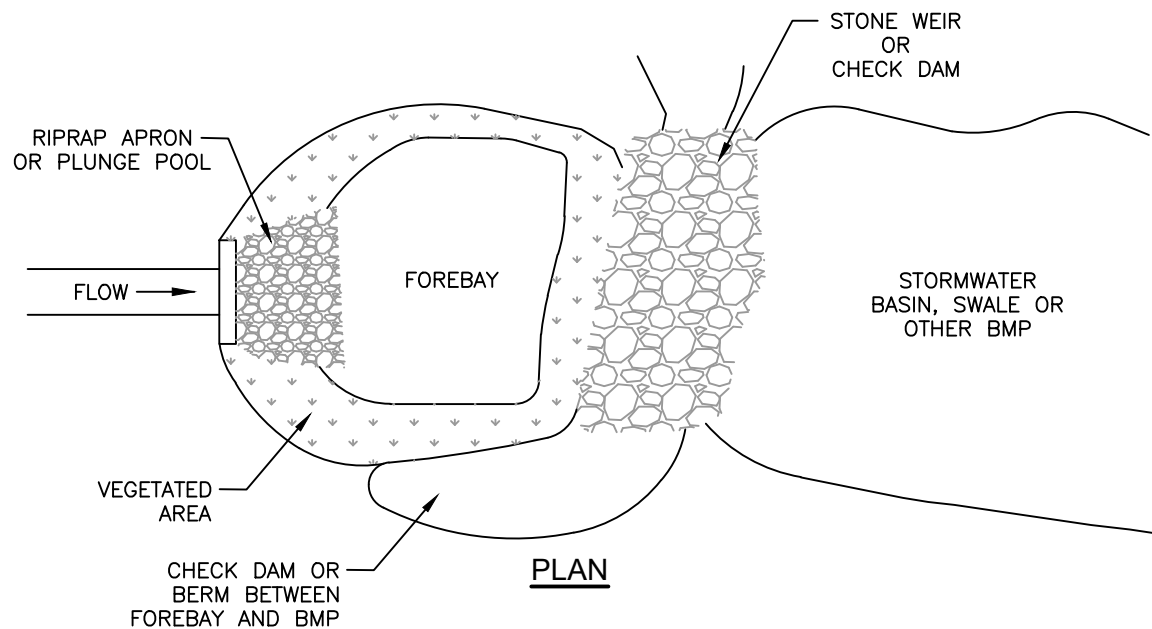


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EXHIBIT 18-5 FOREBAY

REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA

EFFECTIVE DATE: JUNE 30, 2021



NOTE:
FOREBAYS ARE RECOMMENDED FOR
RAIN GARDENS AND ARE REQUIRED
FOR CONSTRUCTED WETLANDS, AND
WET AND DRY BASINS

NOT TO SCALE



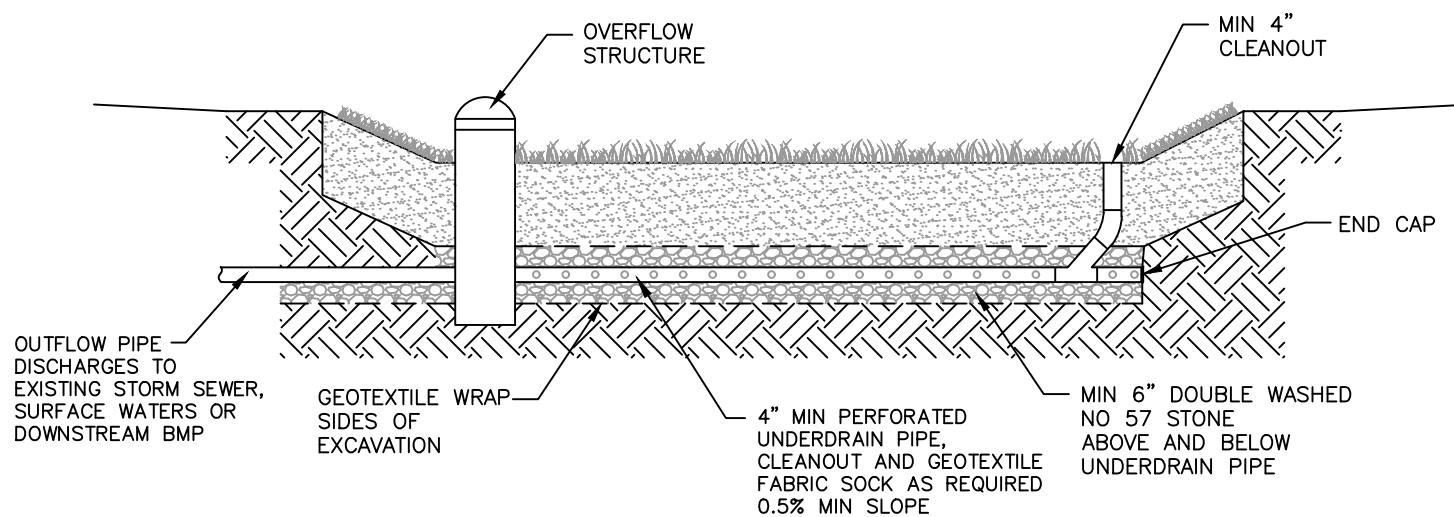
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EXHIBIT 18-6

UNDERDRAIN WITH CLEANOUT

REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA

EFFECTIVE DATE: JUNE 30, 2021

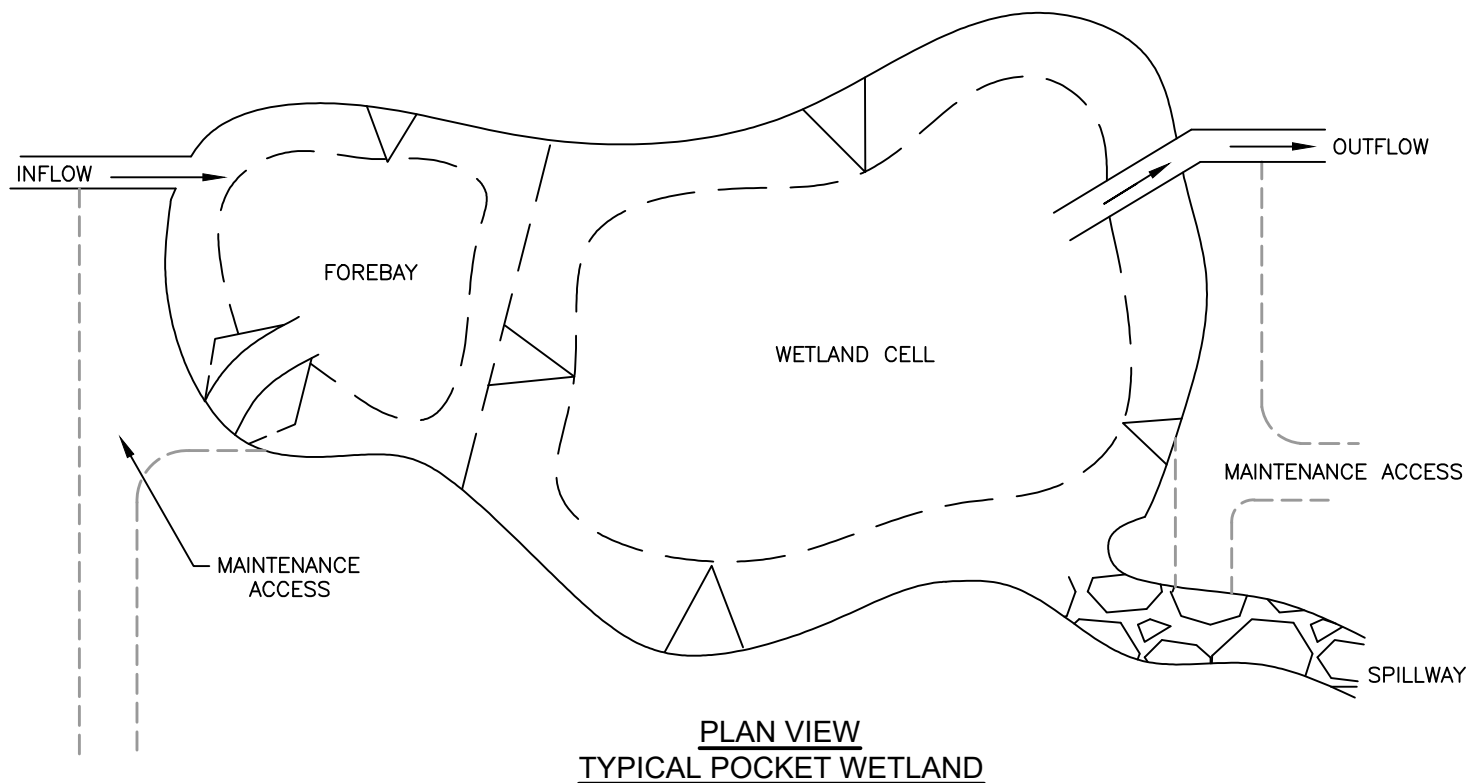


NOT TO SCALE

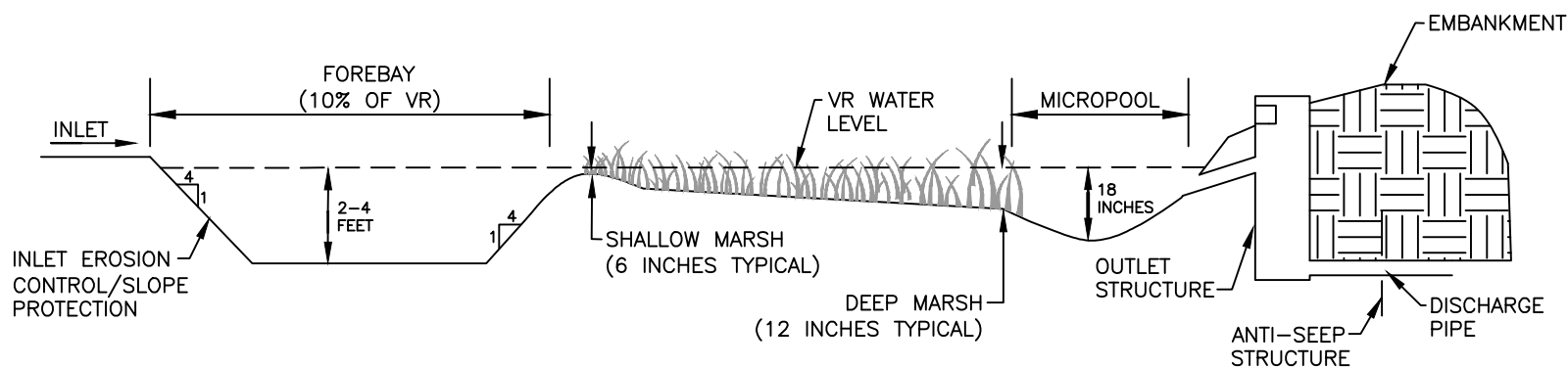


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EXHIBIT 18-7
CONSTRUCTED POCKET WETLAND
TYPICAL PLAN VIEW AND PROFILE
EFFECTIVE DATE: JUNE 30, 2021



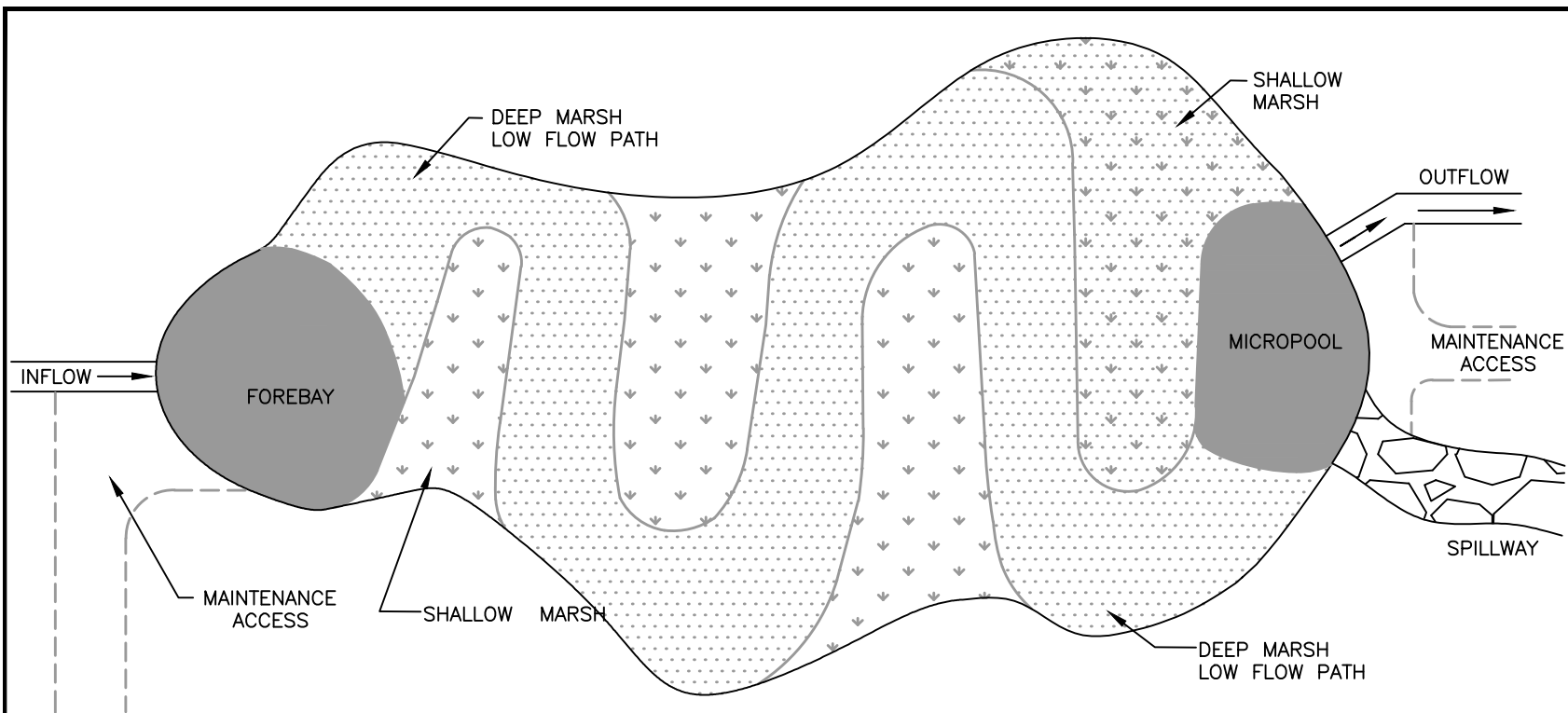
PLAN VIEW
TYPICAL POCKET WETLAND



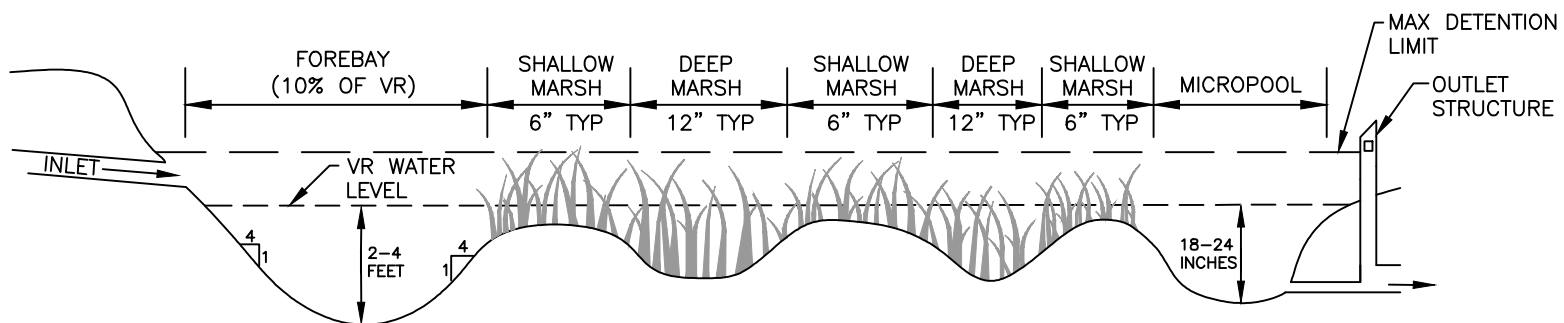
PROFILE
TYPICAL POCKET WETLAND

- NOTES:
1. MUST BE MODIFIED PER SITE SPECIFIC DESIGN.
 2. SEE MSD GREEN INFRASTRUCTURE DESIGN MANUAL CHAPTER 18.4.2 FOR MORE INFORMATION ON CONSTRUCTED WETLAND DESIGN.

NOT TO SCALE



PLAN VIEW OF A
TYPICAL SHALLOW WETLAND



PROFILE OF A
TYPICAL SHALLOW WETLAND

NOTES:
1. MUST BE MODIFIED PER SITE SPECIFIC DESIGN.
2. SEE MSD GREEN INFRASTRUCTURE DESIGN MANUAL
CHAPTER 18.4.2 FOR MORE INFORMATION ON
CONSTRUCTED WETLAND DESIGN.

NOT TO SCALE



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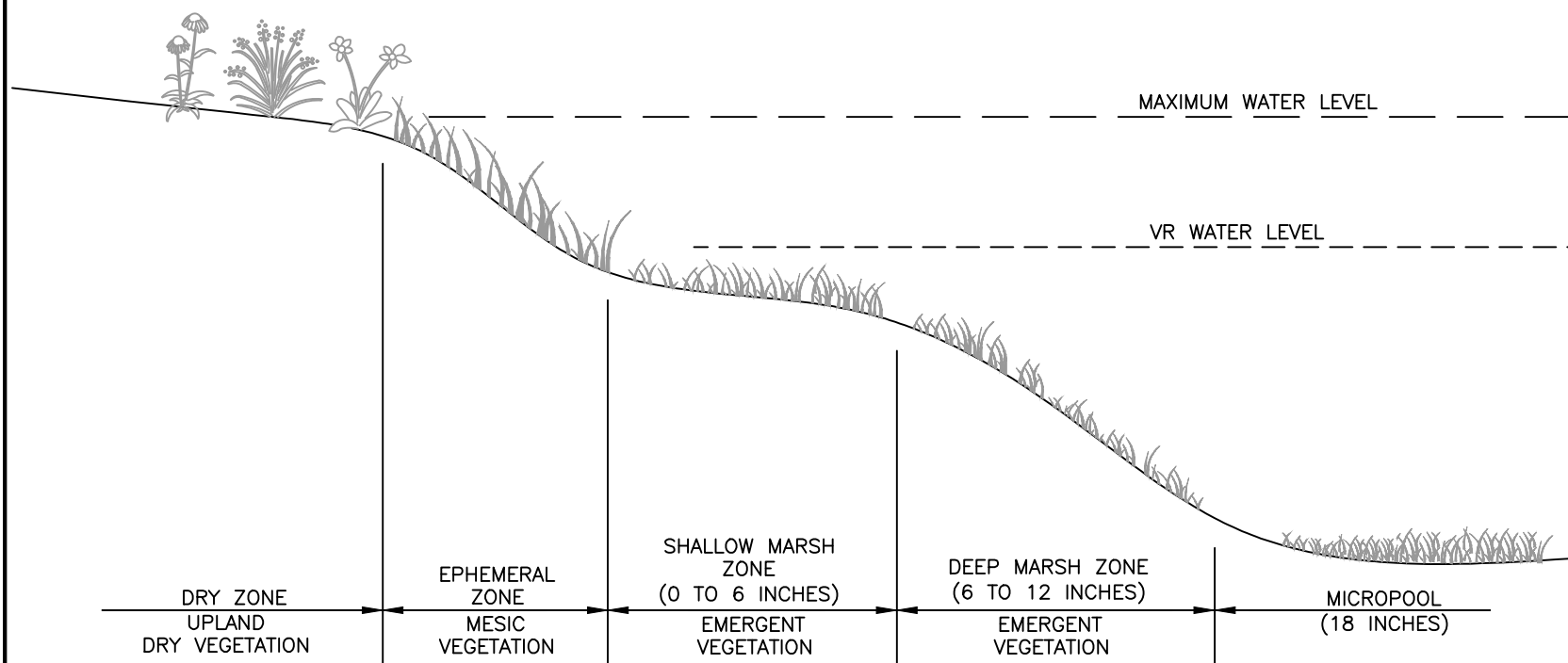
EXHIBIT 18-8
CONSTRUCTED SHALLOW WETLAND
TYPICAL PLAN VIEW AND PROFILE
EFFECTIVE DATE: JUNE 30, 2021



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EXHIBIT 18-9 CONSTRUCTED WETLAND PLANT SELECTION ZONES

EFFECTIVE DATE: JUNE 30, 2021



NOTES:

1. MUST BE MODIFIED PER SITE SPECIFIC DESIGN.
2. SEE MSD GREEN INFRASTRUCTURE DESIGN MANUAL CHAPTER 18.4.2 FOR MORE INFORMATION ON CONSTRUCTED WETLAND DESIGN.
3. MICRO (DEEP) POOLS, DEEP AND SHALLOW MARSH (WATER) ZONES, EPHEMERAL ZONES AND DRY ZONES SHOULD BE IDENTIFIED WITH APPROPRIATE VEGETATION TYPES FOR CONSTRUCTED WETLANDS.

NOT TO SCALE

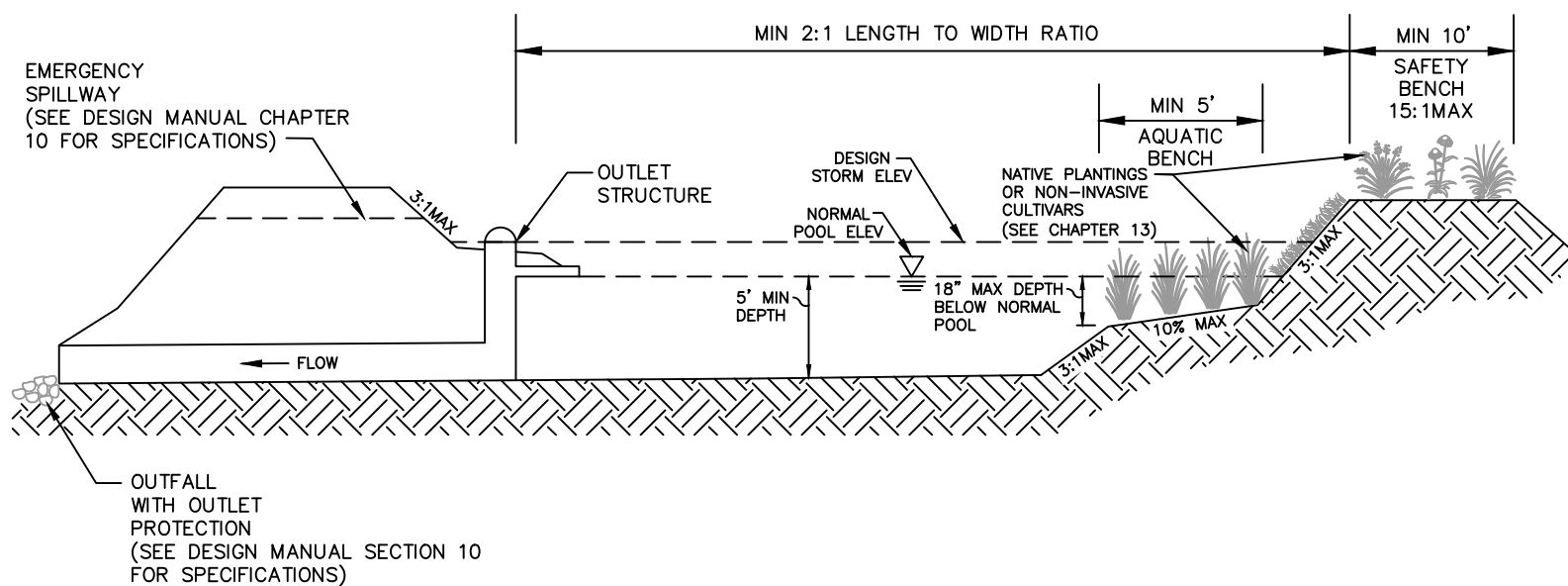


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EXHIBIT 18-10 GREEN WET BASIN TYPICAL PROFILE

REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA

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NOTE:
FOREBAY REQUIRED AT BASIN INLET.
REFER TO EXHIBIT 18-5 FOR TYPICAL
FOREBAY PLAN AND PROFILE.

NOT TO SCALE

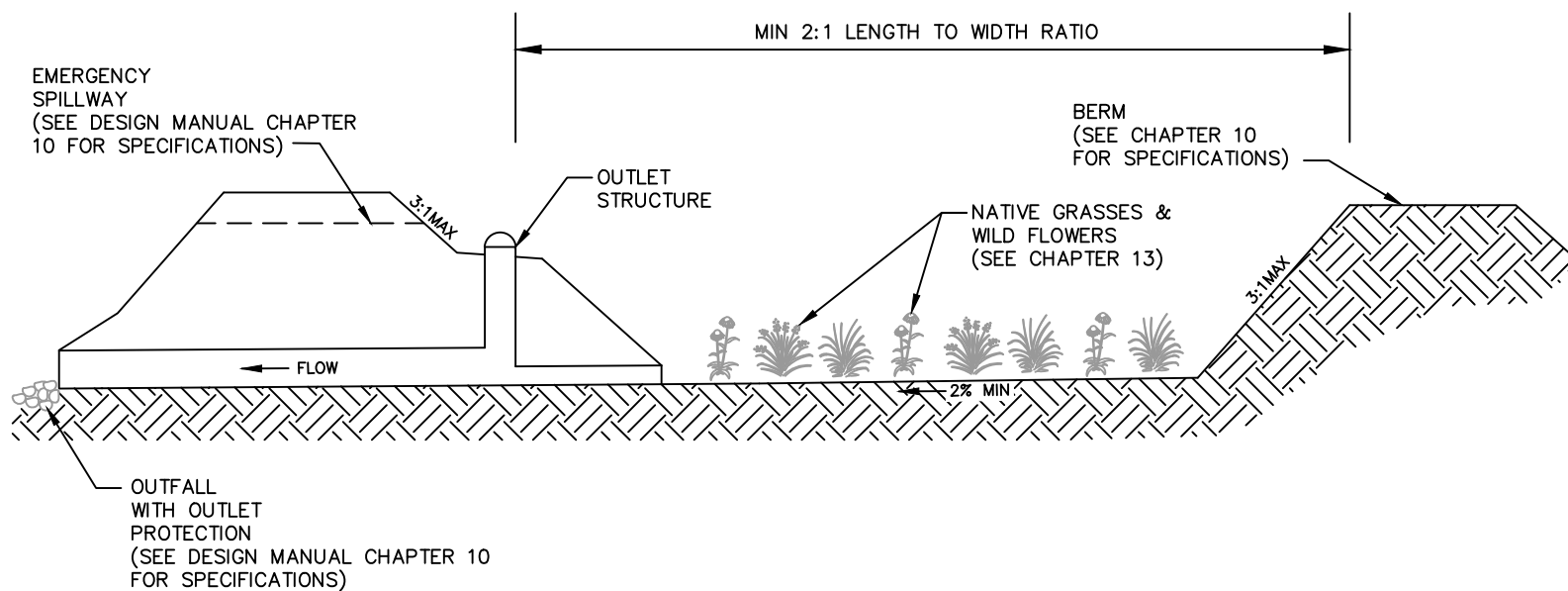


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EXHIBIT 18-11 GREEN DRY BASIN TYPICAL PROFILE

REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA

EFFECTIVE DATE: JUNE 30, 2021



NOTE:
FOREBAY REQUIRED AT BASIN INLET.
REFER TO EXHIBIT 18-5 FOR TYPICAL
FOREBAY PLAN AND PROFILE.

NOT TO SCALE



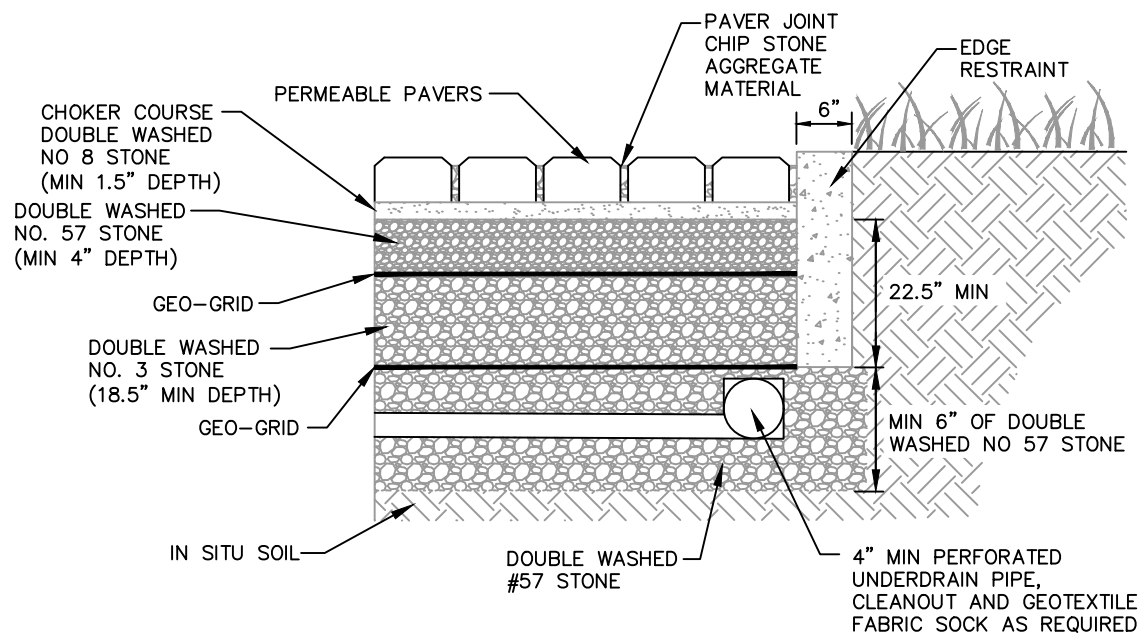
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EXHIBIT 18-12

PERMEABLE PAVER TYPICAL SECTION

REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA

EFFECTIVE DATE: JUNE 30, 2021



NOTE:
MINIMUM SEPARATION OF 10 FEET
FROM BUILDING FOUNDATIONS

NOT TO SCALE



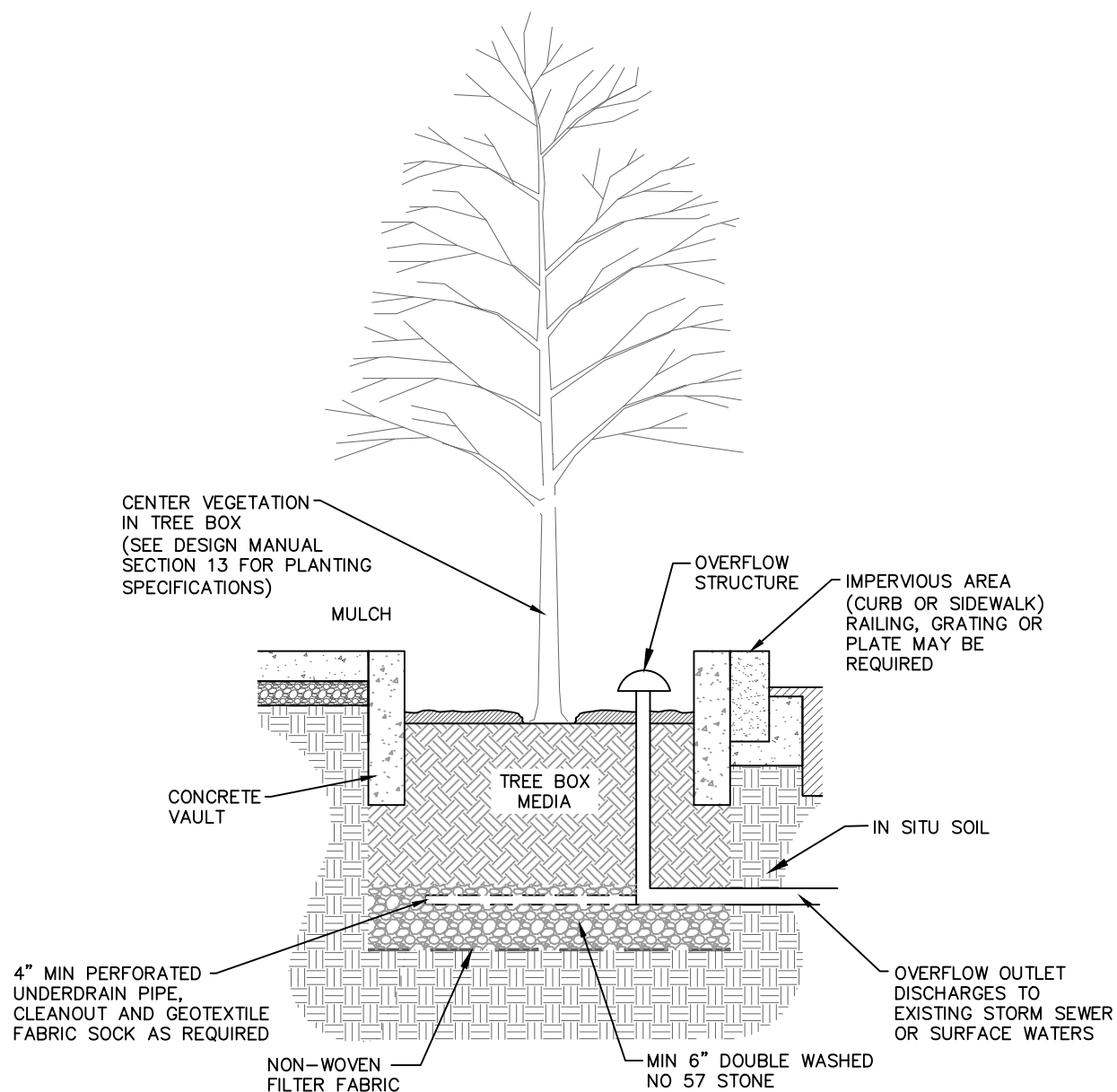
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EXHIBIT 18-13

TREE BOX TYPICAL SECTION

REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA

EFFECTIVE DATE: JUNE 30, 2021



TREE BOX
TYPICAL SECTION

NOTE:
MINIMUM SEPARATION OF 10 FEET
FROM BUILDING FOUNDATIONS

NOT TO SCALE



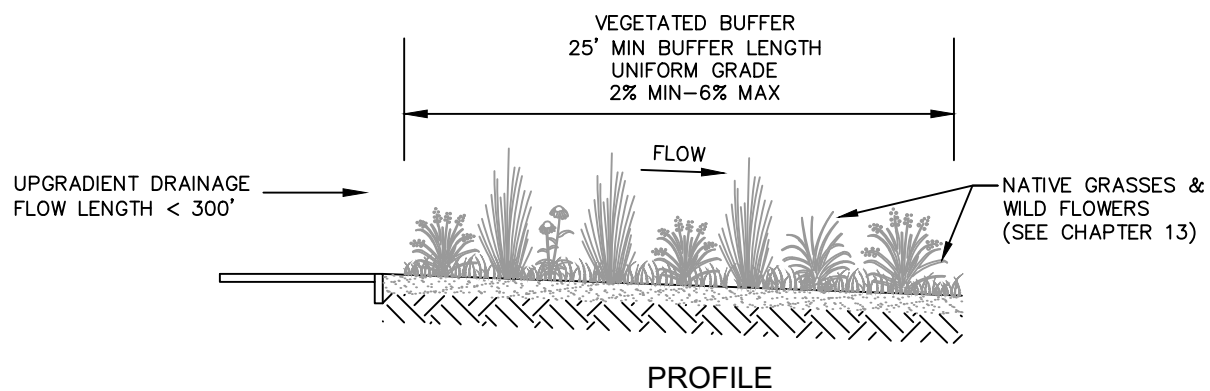
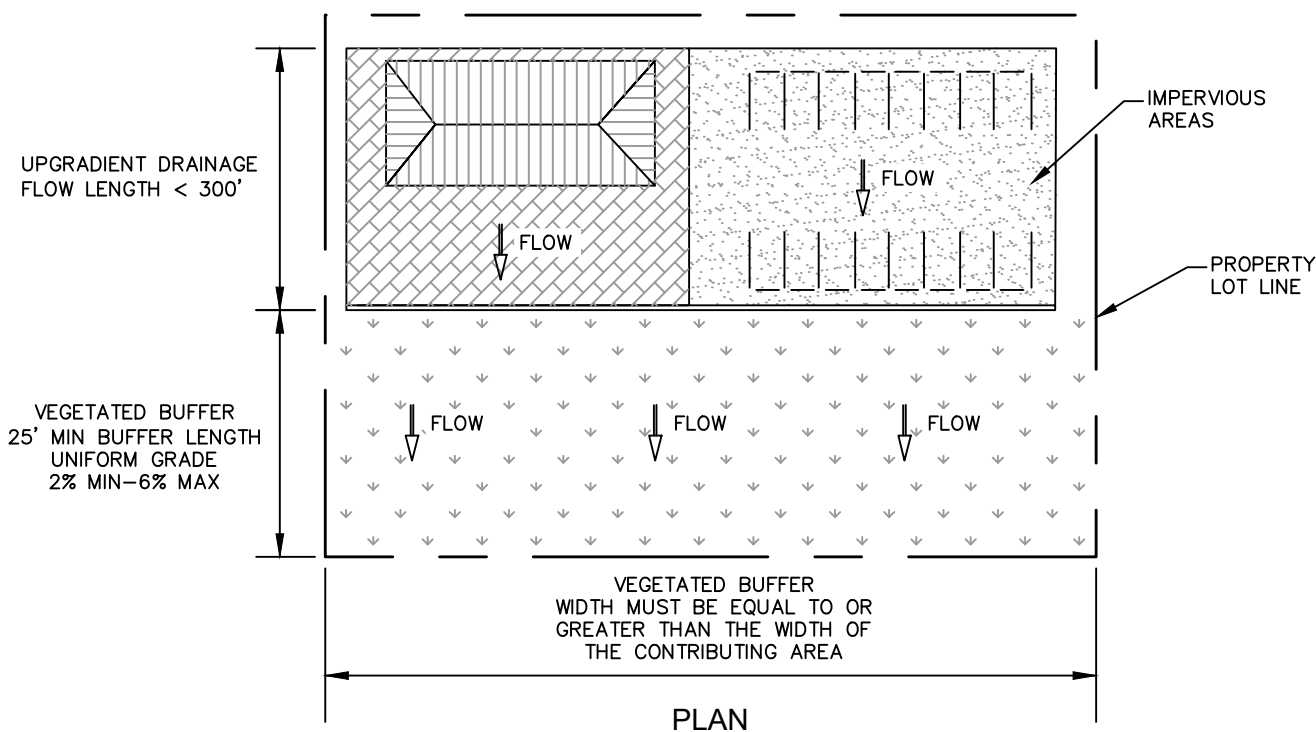
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EXHIBIT 18-14

VEGETATED BUFFER PLAN & PROFILE

REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA

EFFECTIVE DATE: JUNE 30, 2021

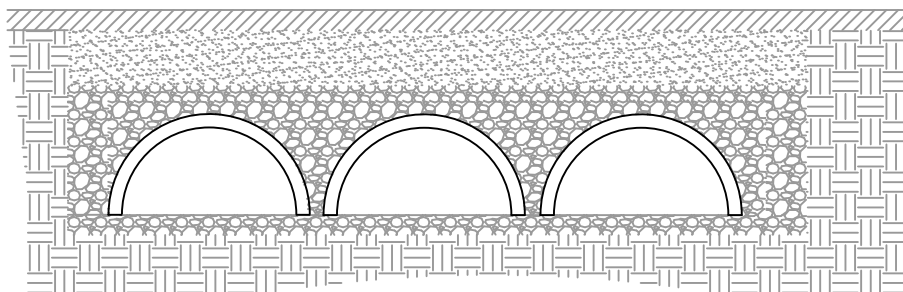
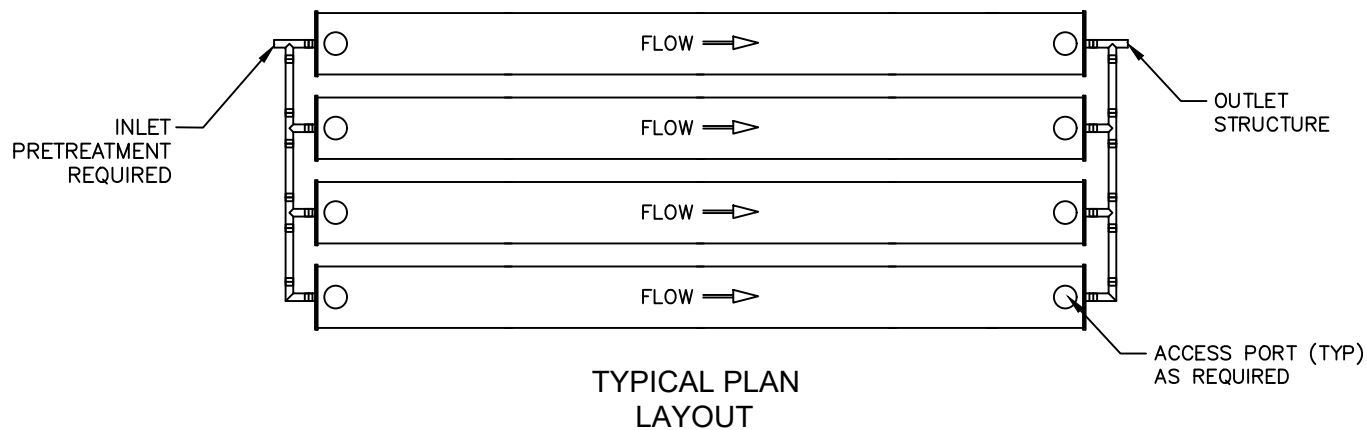


NOT TO SCALE

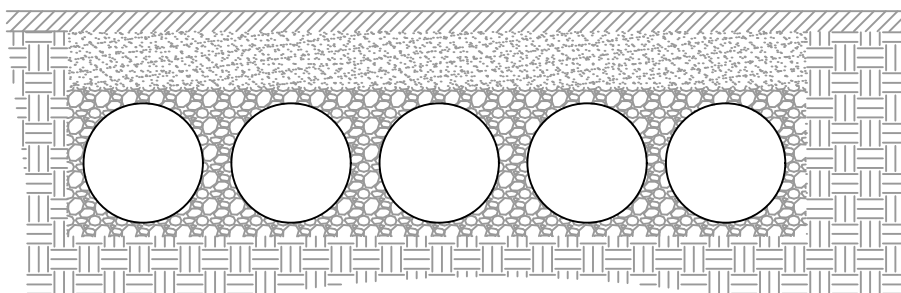


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EXHIBIT 18-15
UNDERGROUND INFILTRATION BASIN
REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA
EFFECTIVE DATE: JUNE 30, 2021



PROFILE
ARCHED PIPE WITH OPEN BOTTOM



PROFILE
CLOSED PERFORATED PIPE

NOTE:

1. PRETREATMENT REQUIRED FOR SYSTEM.
2. STONE AND FILTER FABRIC PER DESIGN REQUIREMENTS.
3. STONE TO BE DOUBLE WASHED.
4. ACCESS PORTS AND EMERGENCY OVERFLOW REQUIRED.
5. PIPE SLOPE BETWEEN 0.5% - 4%
6. CONTRACTOR TO MINIMIZE COMPACTION AND THE USE OF HEAVY MACHINERY IN THE BASIN AREA.
7. MULTIPLE, APPROPRIATELY SPACED MANHOLES/ACCESS PORTS TO BE PROVIDED TO ALLOW FOR MAINTENANCE AND INSPECTION OF THE SYSTEM.



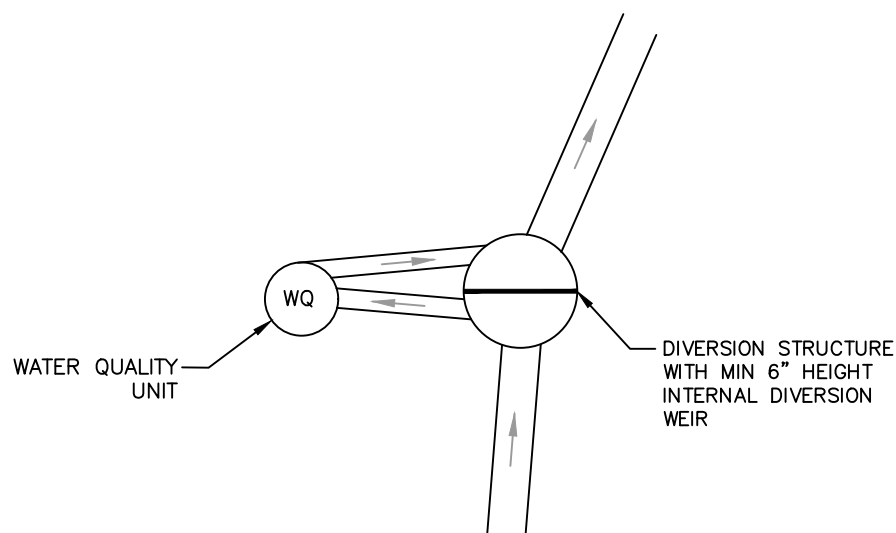
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EXHIBIT 18-16

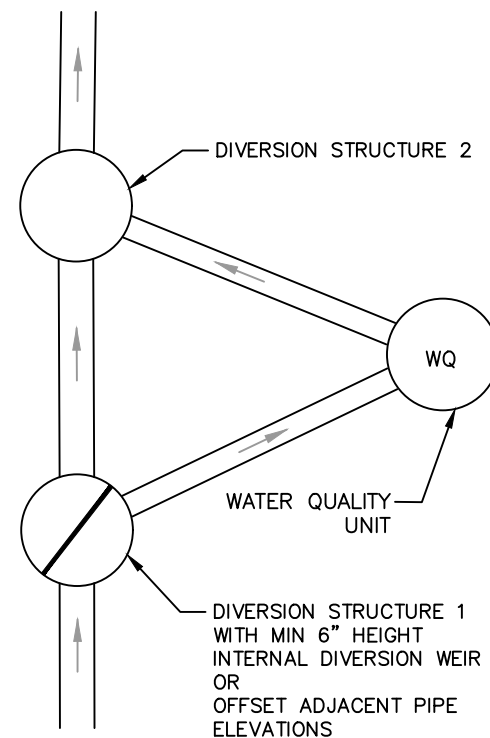
WATER QUALITY UNIT GENERAL ARRANGEMENT

REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA

EFFECTIVE DATE: JUNE 30, 2021



SINGLE DIVERSION STRUCTURE
OFF-LINE WATER QUALITY UNIT



DOUBLE DIVERSION STRUCTURE
OFF-LINE WATER QUALITY UNIT

← FLOW DIRECTION

NOT TO SCALE

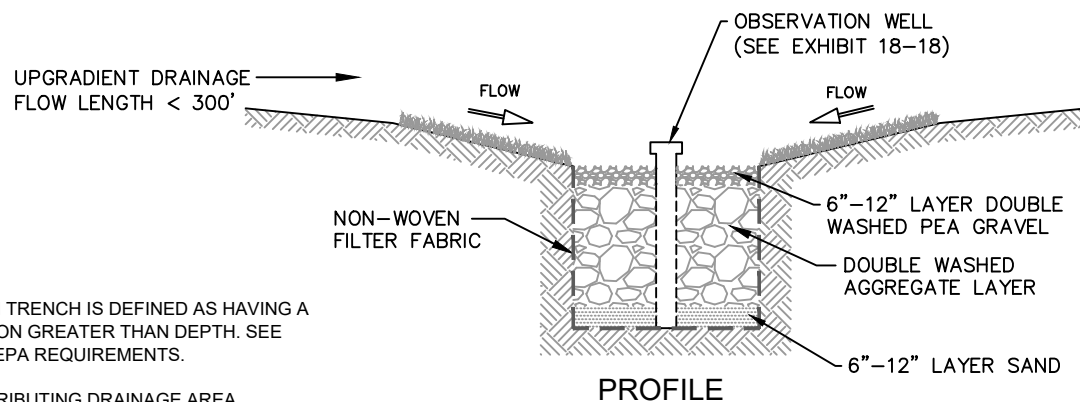
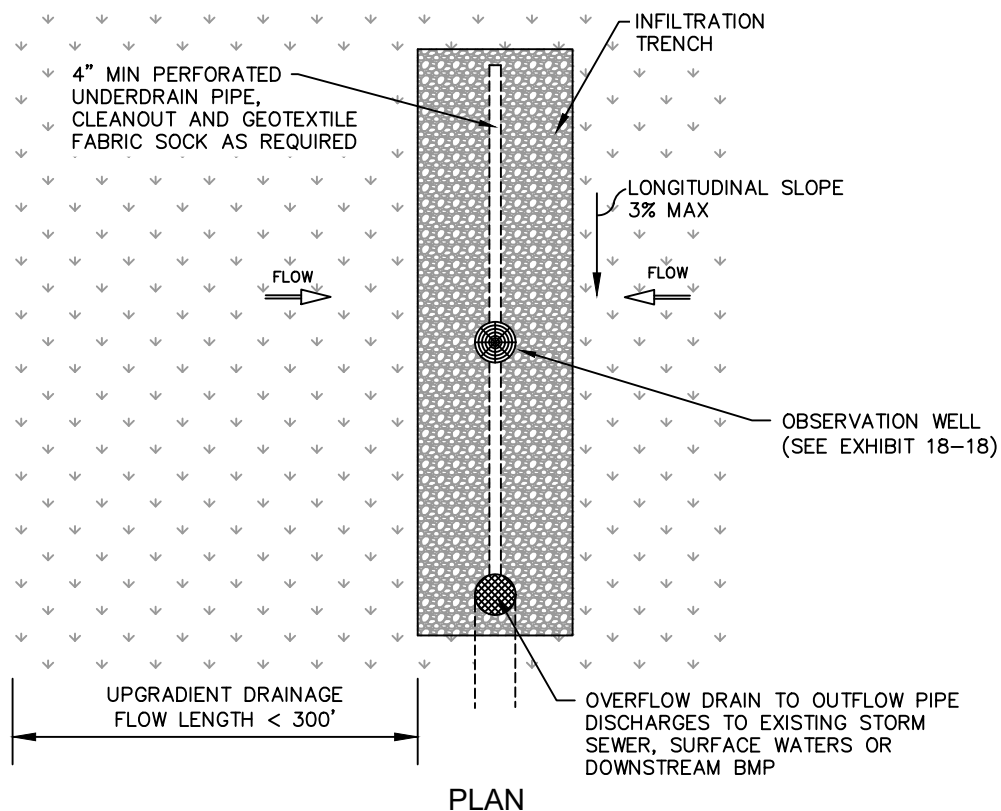


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EXHIBIT 18-17 INFILTRATION TRENCH PLAN & PROFILE

REFER TO MSD DESIGN MANUAL CHAPTER 18 FOR DESIGN CRITERIA

EFFECTIVE DATE: JUNE 30, 2021



NOTE:
1. AN INFILTRATION TRENCH IS DEFINED AS HAVING A SURFACE DIMENSION GREATER THAN DEPTH. SEE CHAPTER 18 FOR EPA REQUIREMENTS.

2. SLOPE OF CONTRIBUTING DRAINAGE AREA SHOULD BE LESS THAN 10%.

NOT TO SCALE

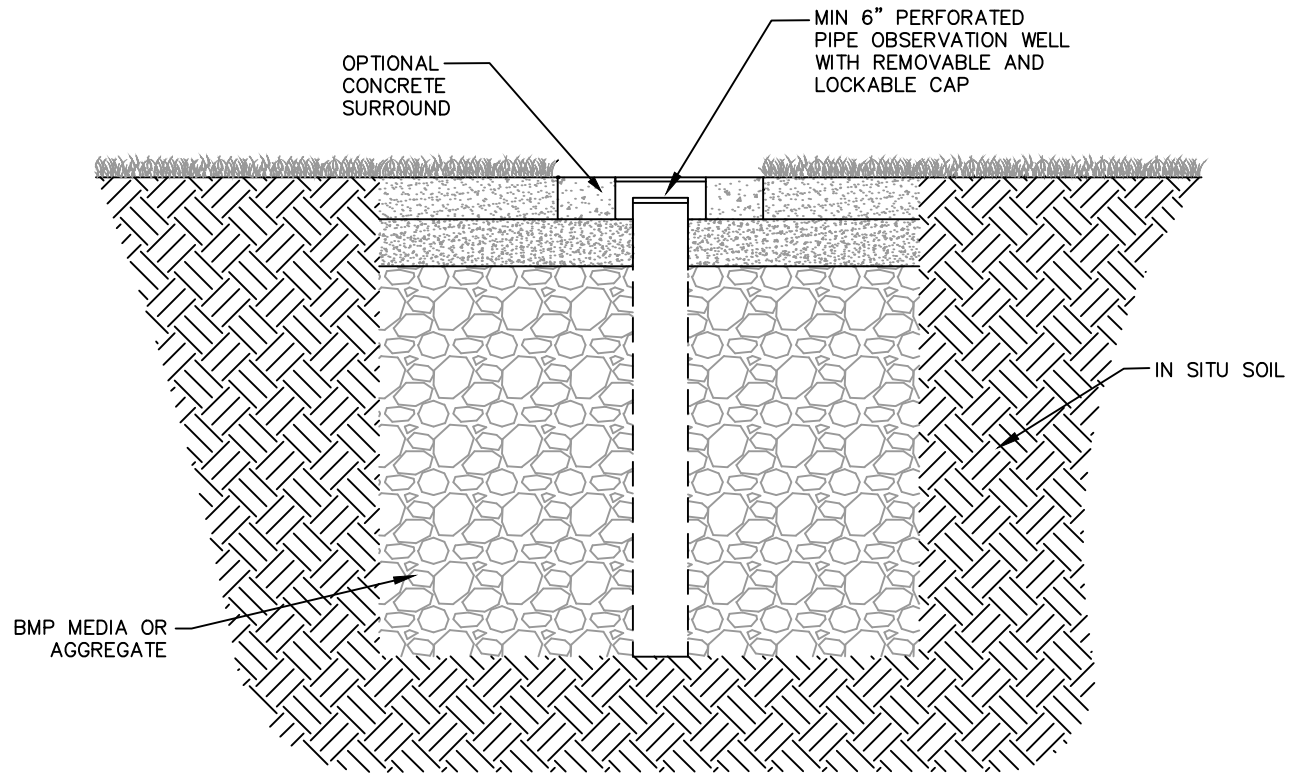


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EXHIBIT 18-18 OBSERVATION WELL

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NOT TO SCALE