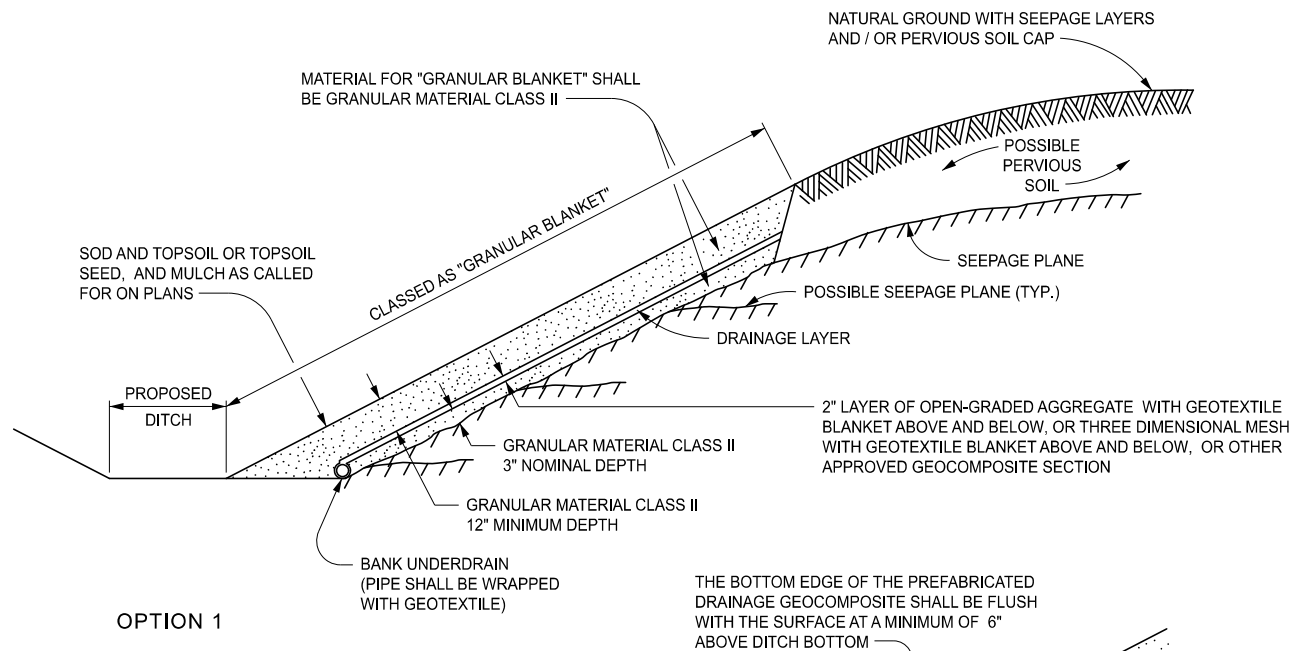
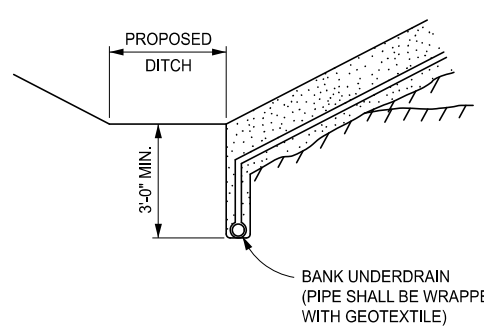


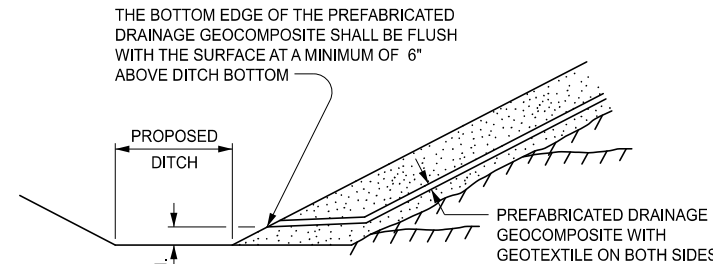
GRANULAR BLANKET TYPE 1



OPTION 1



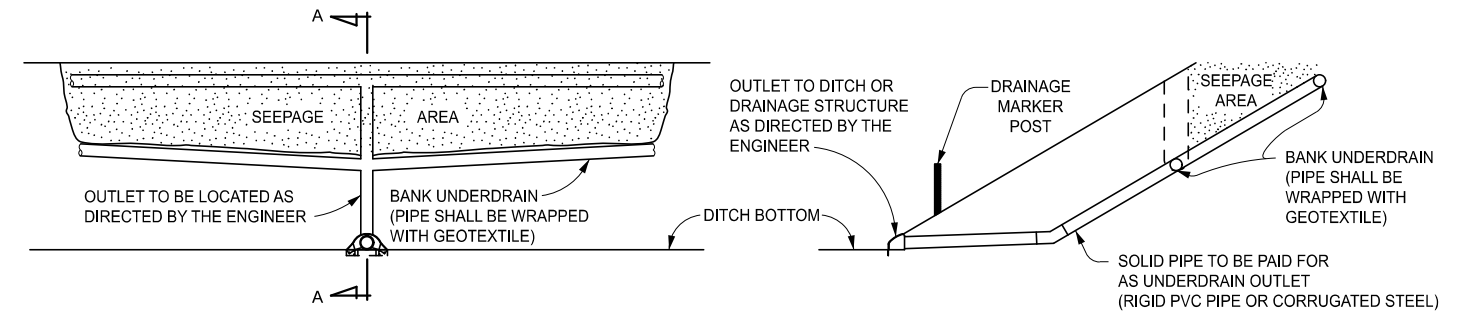
OPTION 2



OPTION 3

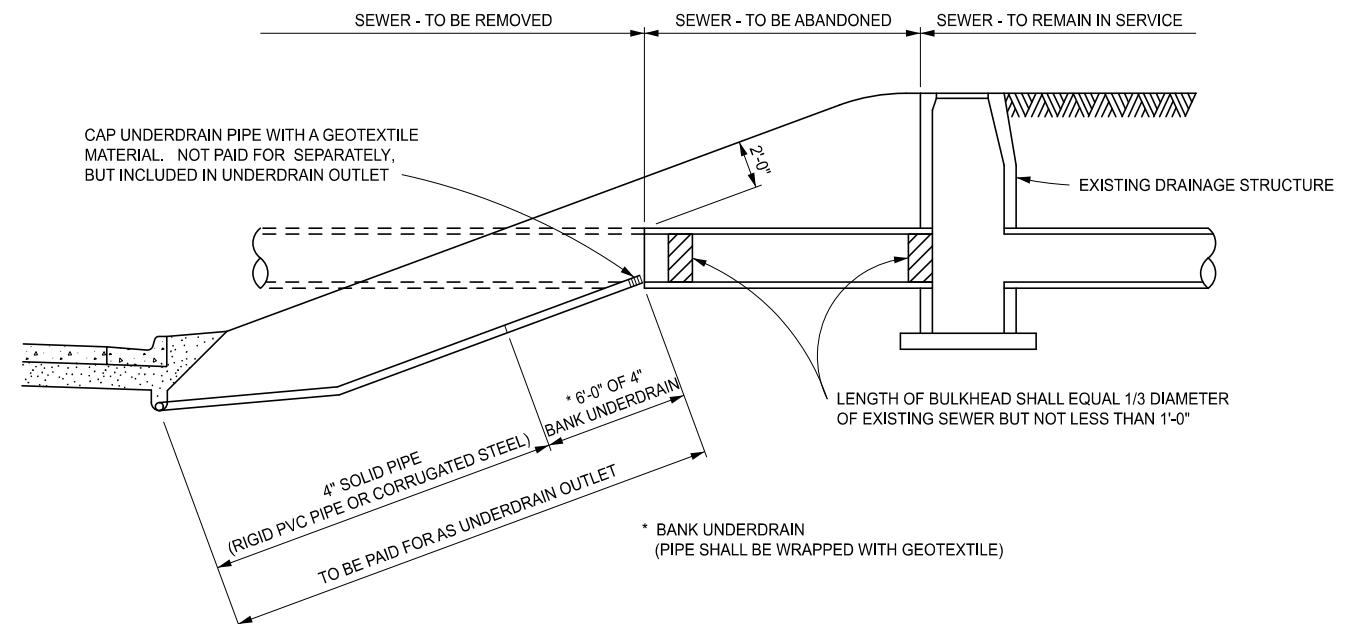
NOTE: OPTION 1, 2, OR 3 WILL BE DETERMINED BY THE ENGINEER BASED ON THE PROJECT CONDITIONS.

GRANULAR BLANKET TYPE 2



SECTION A - A

BANK UNDERDRAIN OUTLET



WEEPER UNDERDRAIN AND BULKHEADING SEVERED SEWER

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS
FOR UNDERDRAINS, AND SEWER BULKHEADS

(SPECIAL DETAIL)
FHWA APPROVAL

06/28/2021
PLAN DATE

R-80-F

SHEET
1 OF 8



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS
FOR UNDERDRAINS, AND SEWER BULKHEADS

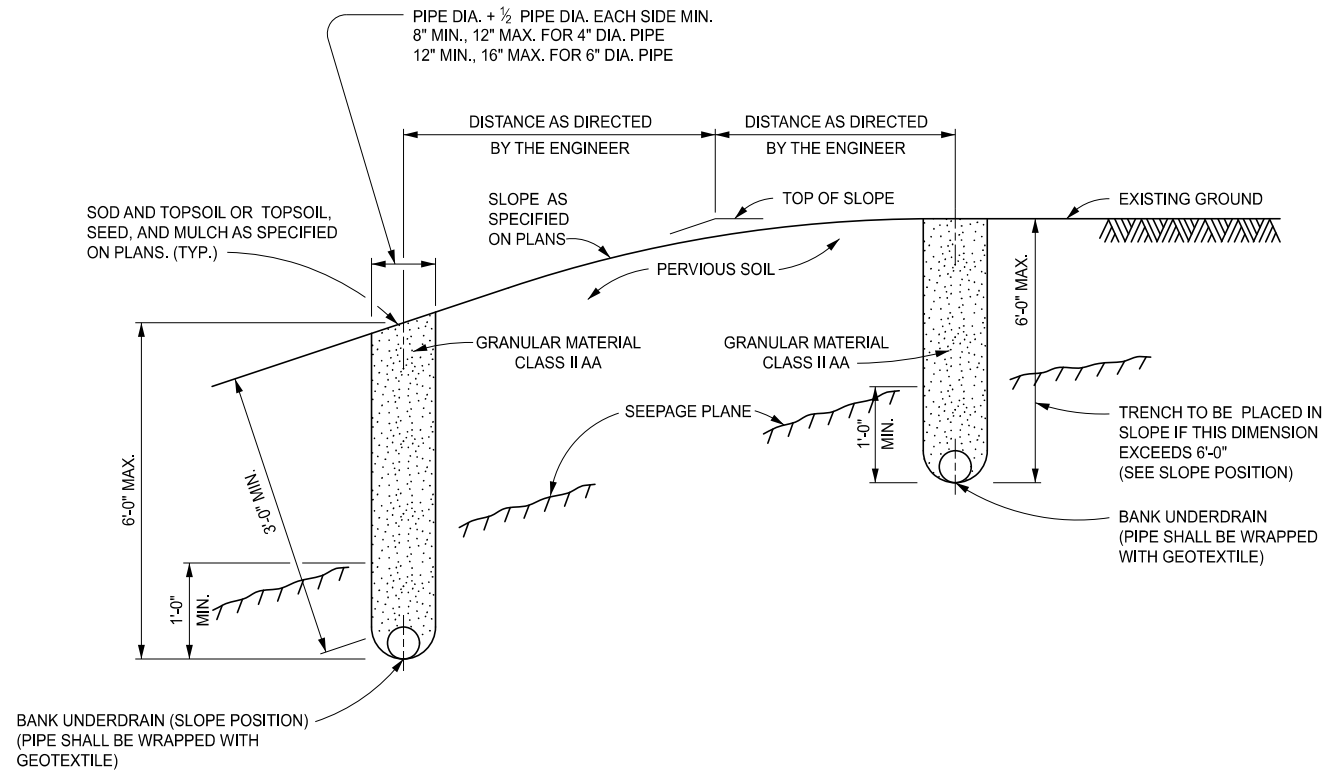
(SPECIAL DETAIL)
FHWA APPROVAL

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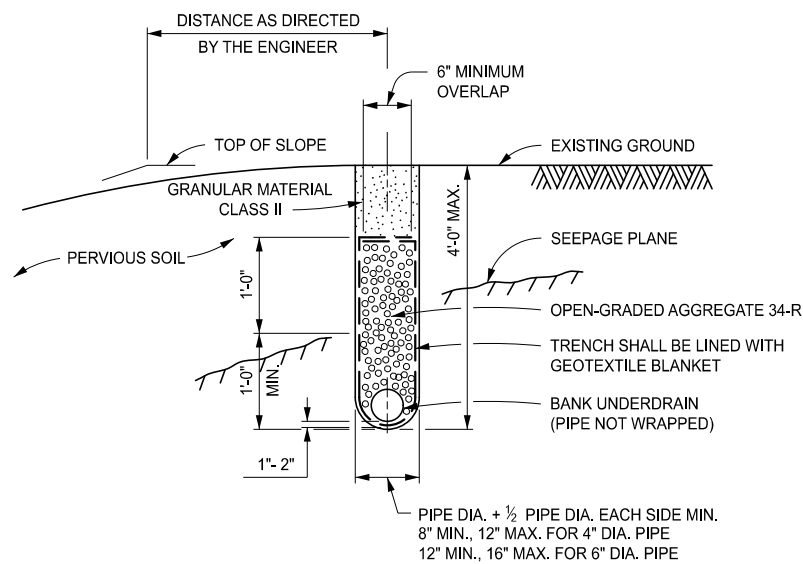
R-80-F

SHEET
2 OF 8

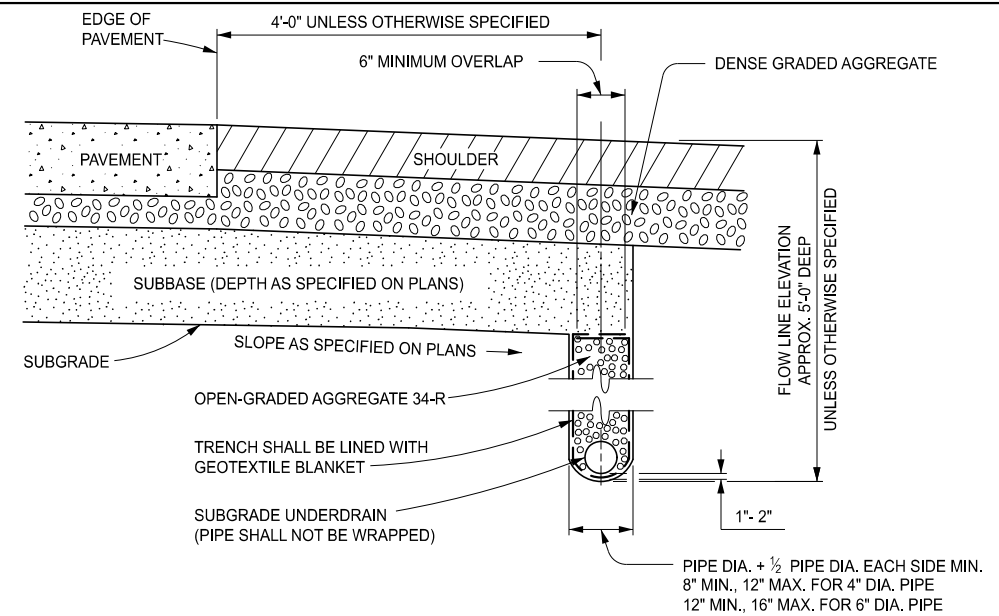
SECT



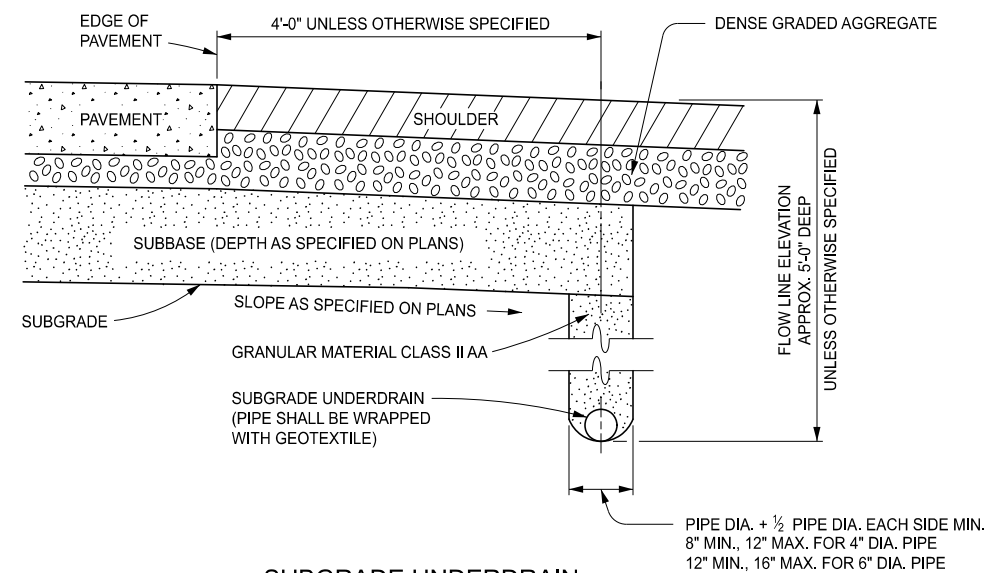
BANK UNDERDRAINS



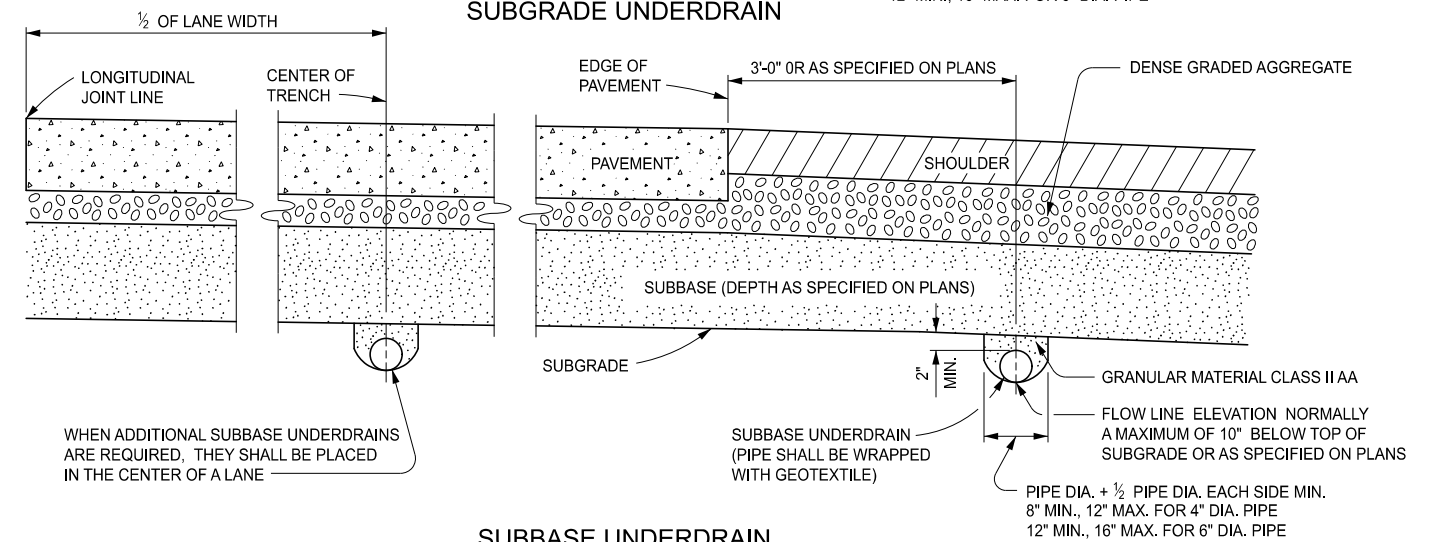
BANK UNDERDRAIN, OPEN-GRADED



SUBGRADE UNDERDRAIN - OPEN-GRADED



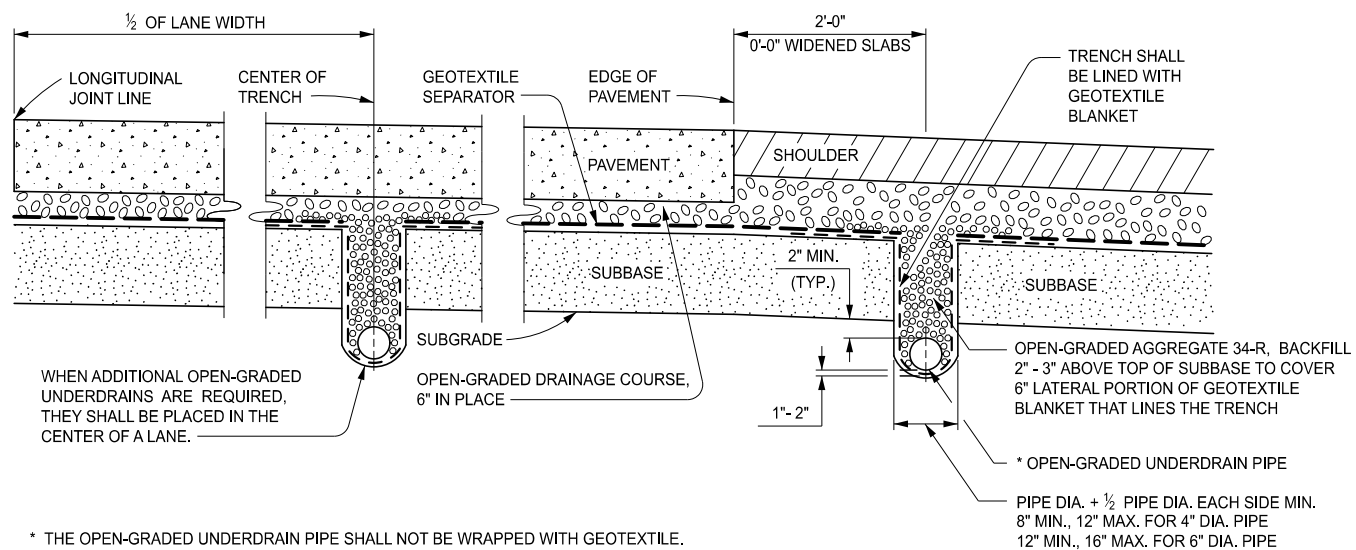
SUBGRADE UNDERDRAIN



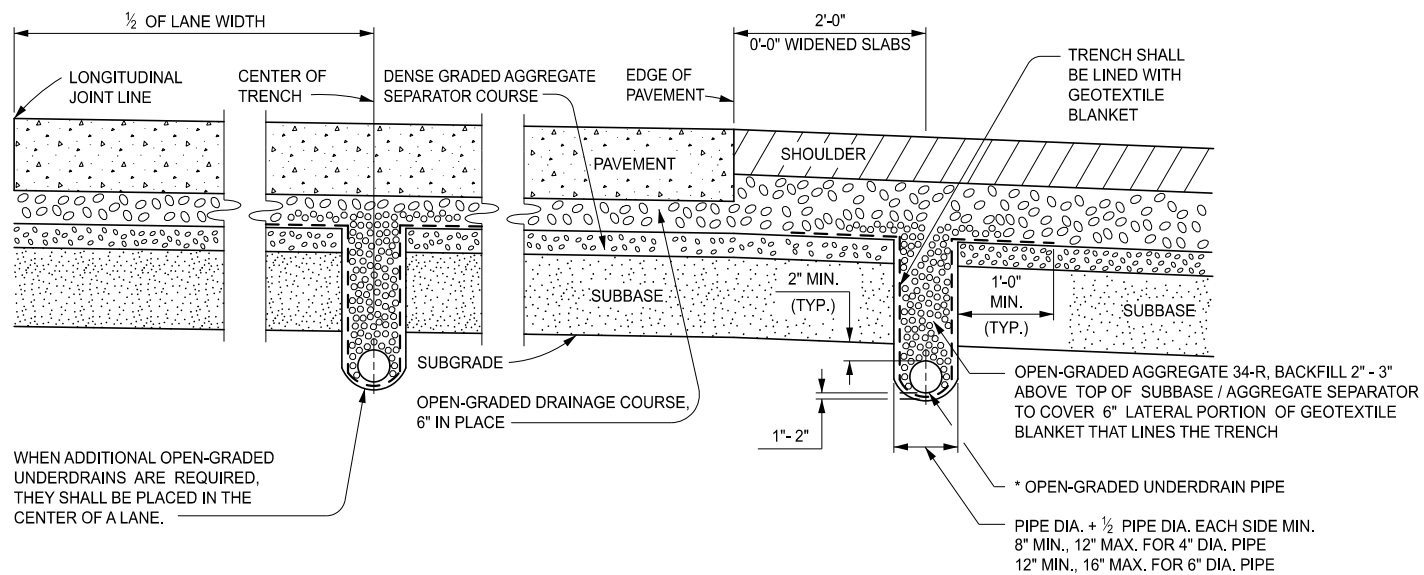
SUBBASE UNDERDRAIN

 Michigan Department of Transportation	STANDARD PLAN FOR			SHEET
	GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS FOR UNDERDRAINS, AND SEWER BULKHEADS			
DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	(SPECIAL DETAIL) FHWA APPROVAL	06/28/2021 PLAN DATE	R-80-F	

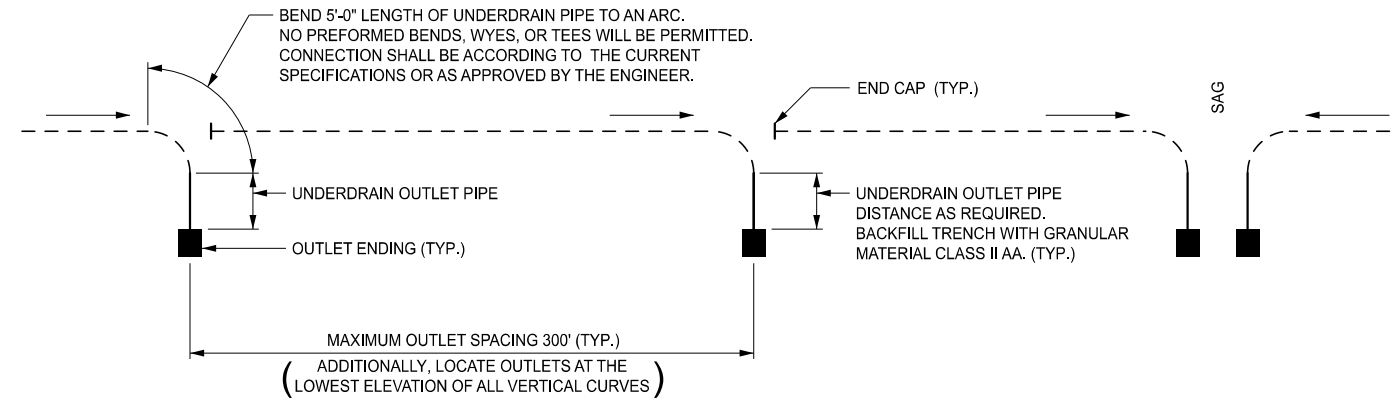
 Michigan Department of Transportation	STANDARD PLAN FOR			SHEET
	GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS FOR UNDERDRAINS, AND SEWER BULKHEADS			
DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	(SPECIAL DETAIL) FHWA APPROVAL	06/28/2021 PLAN DATE	R-80-F	



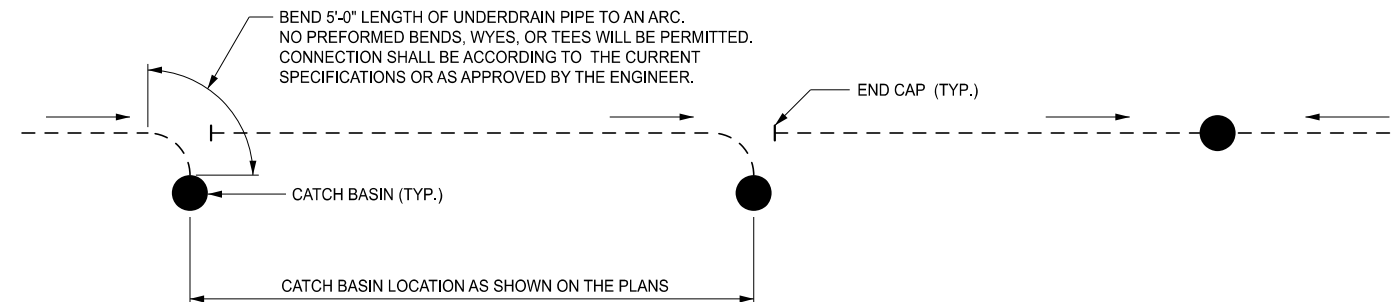
OPEN-GRADED UNDERDRAIN PIPE WITH GEOTEXTILE SEPARATOR



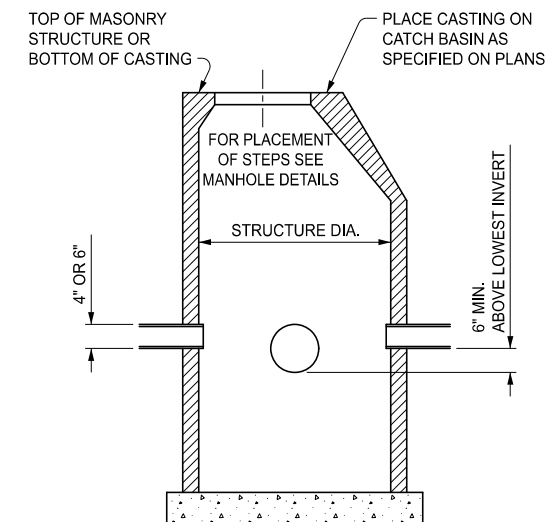
OPEN-GRADED UNDERDRAIN PIPE WITH DENSE GRADED AGGREGATE SEPARATOR COURSE



PLAN SHOWING OUTLETS FOR UNDERDRAINS



PLAN SHOWING UNDERDRAINS TAPPED INTO CATCH BASINS

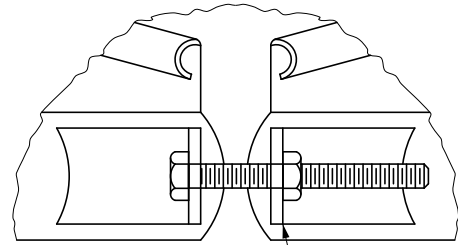


PROFILE VIEW

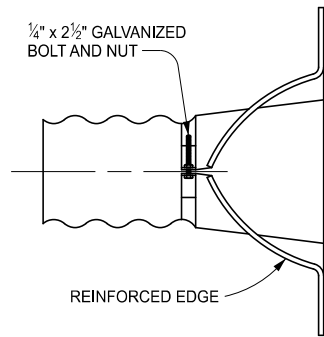
 Michigan Department of Transportation	STANDARD PLAN FOR			R-80-F	SHEET
	GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS FOR UNDERDRAINS, AND SEWER BULKHEADS				
DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	(SPECIAL DETAIL) FHWA APPROVAL	06/28/2021 PLAN DATE			5 OF 8

 Michigan Department of Transportation	STANDARD PLAN FOR			R-80-F	SHEET
	GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS FOR UNDERDRAINS, AND SEWER BULKHEADS				
DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	(SPECIAL DETAIL) FHWA APPROVAL	06/28/2021 PLAN DATE			6 OF 8

SECT

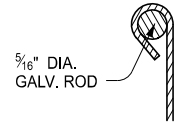


1/8" x 1" x 2 1/2"
STEEL FOR CONNECTOR
BRACKET (TYP.)



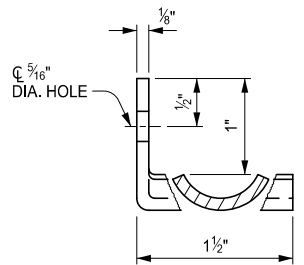
1/4" x 2 1/2" GALVANIZED
BOLT AND NUT

REINFORCED EDGE



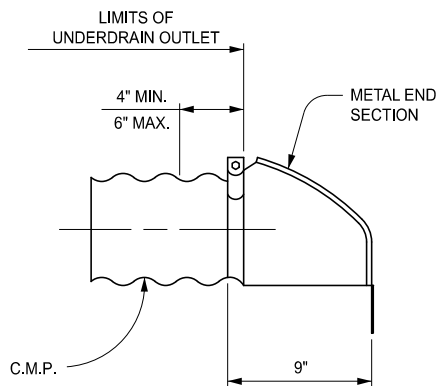
5/16" DIA.
GALV. ROD

REINFORCED EDGE
DETAIL



5/16" DIA. HOLE

CONNECTOR BRACKET
DETAIL



LIMITS OF
UNDERDRAIN OUTLET

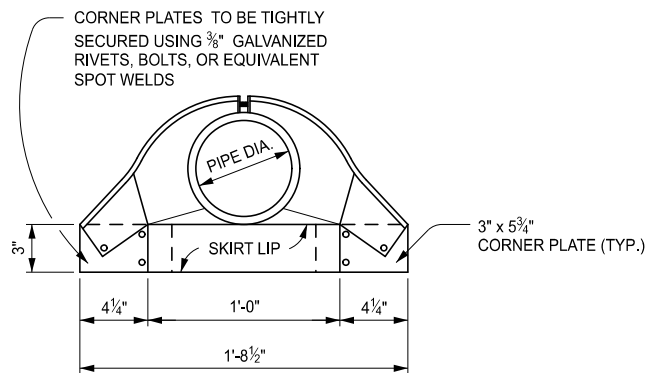
4" MIN.
6" MAX.

METAL END
SECTION

C.M.P.

9"

STEEL END SECTION FOR 4" OR 6" PIPE



CORNER PLATES TO BE TIGHTLY
SECURED USING 3/8" GALVANIZED
RIVETS, BOLTS, OR EQUIVALENT
SPOT WELDS

PIPE DIA.

3" x 5 3/4"
CORNER PLATE (TYP.)

3"

4 1/4" 1'-0" 4 1/4"

1'-8 1/2"

SKIRT LIP



DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

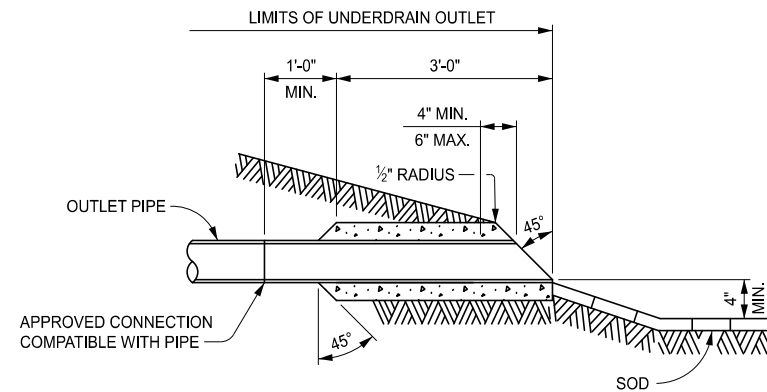
STANDARD PLAN FOR
GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS
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FHWA APPROVAL

06/28/2021
PLAN DATE

R-80-F

SHEET
7 OF 8



LIMITS OF UNDERDRAIN OUTLET

1'-0" MIN. 3'-0"

4" MIN. 6" MAX.

1/2" RADIUS

45°

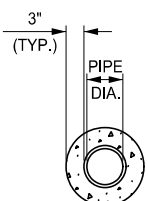
OUTLET PIPE

APPROVED CONNECTION
COMPATIBLE WITH PIPE

45°

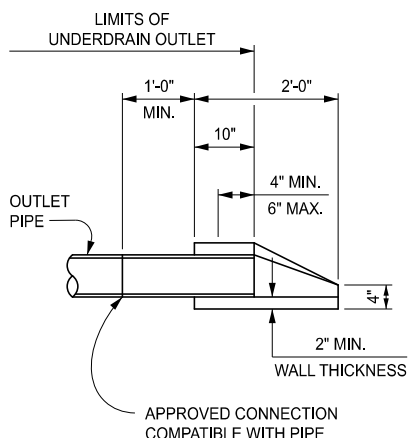
SOD

CONCRETE RING FOR 4" OR 6" PIPE



3"
(TYP.)

PIPE
DIA.



LIMITS OF
UNDERDRAIN OUTLET

1'-0" MIN. 2'-0"

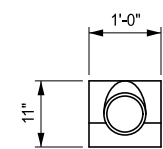
10"

4" MIN. 6" MAX.

OUTLET PIPE

APPROVED CONNECTION
COMPATIBLE WITH PIPE

2" MIN.
WALL THICKNESS



1'-0"

CONCRETE END SECTION
FOR 4" OR 6" PIPE

NOTES:

POSITIVE DRAINAGE SHALL BE PROVIDED FOR UNDERDRAINS AND UNDERDRAIN OUTLETS.

UNDERDRAIN PIPE SIZES SHALL BE AS SPECIFIED ON THE PLANS.

CONNECTIONS BETWEEN UNDERDRAIN PIPE AND UNDERDRAIN OUTLET PIPE SHALL BE CONSTRUCTED ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION AND AS APPROVED BY THE ENGINEER.

CONNECTIONS, IF REQUIRED WITHIN THE OUTLET PIPE, SHALL BE ACCORDING TO APPLICABLE ASTM SPECIFICATIONS REFERENCED IN THE STANDARD SPECIFICATIONS FOR CONSTRUCTION. THEY SHALL BE WATER TIGHT, AND OF THE SAME MATERIAL AS THE OUTLET PIPE.

OUTLET CONNECTIONS TO DRAINAGE STRUCTURES SHALL BE ACCORDING TO STANDARD SPECIFICATIONS FOR CONSTRUCTION FOR DRAINAGE STRUCTURES.

UNDERDRAIN OUTLET PIPE SHALL BE RIGID PVC OR CORRUGATED METAL ONLY.

THE CONCRETE RING OR CONCRETE END SECTION SHALL BE CAST AROUND THE SAME TYPE OF PIPE AS THAT USED FOR UNDERDRAIN OUTLET PIPE.

STEEL END SECTIONS SHALL BE ATTACHED TO THE ENDS OF CORRUGATED METAL PIPE AS SPECIFIED ON THIS STANDARD PLAN, BY STANDARD METAL BANDS, OR BY OTHER CONNECTING DEVICES AS APPROVED BY THE ENGINEER.

STEEL END SECTIONS ARE NOT ALLOWED ON PVC OUTLET PIPE. CONCRETE END SECTIONS ARE REQUIRED.

HELICALLY CORRUGATED PIPE (EXCEPT PERFORATED PIPE) SHALL HAVE THE ENDS OF THE PIPE REROLLED TO FORM ANNULAR CORRUGATIONS FOR CONNECTING THE END SECTION.

GRANULAR MATERIAL PRODUCED FROM CRUSHED PORTLAND CEMENT CONCRETE IS NOT PERMITTED FOR ANY BACKFILL MATERIAL.



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PLAN DATE

R-80-F

SHEET
8 OF 8

SECT