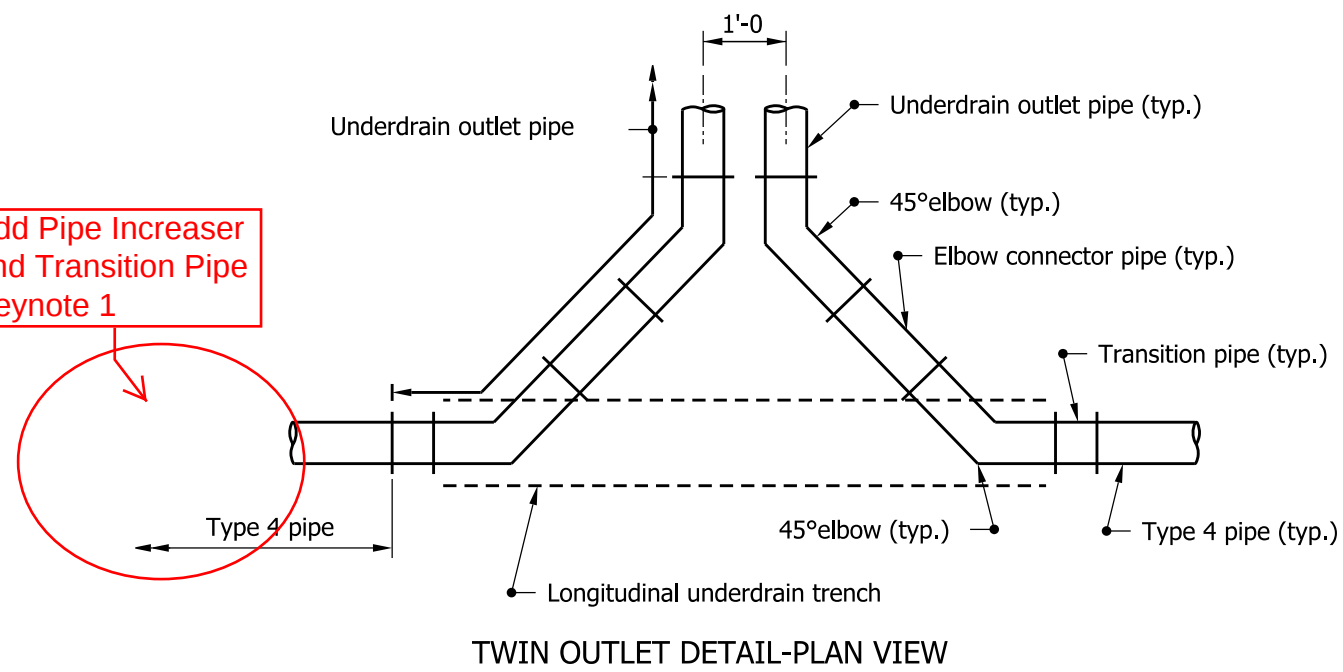


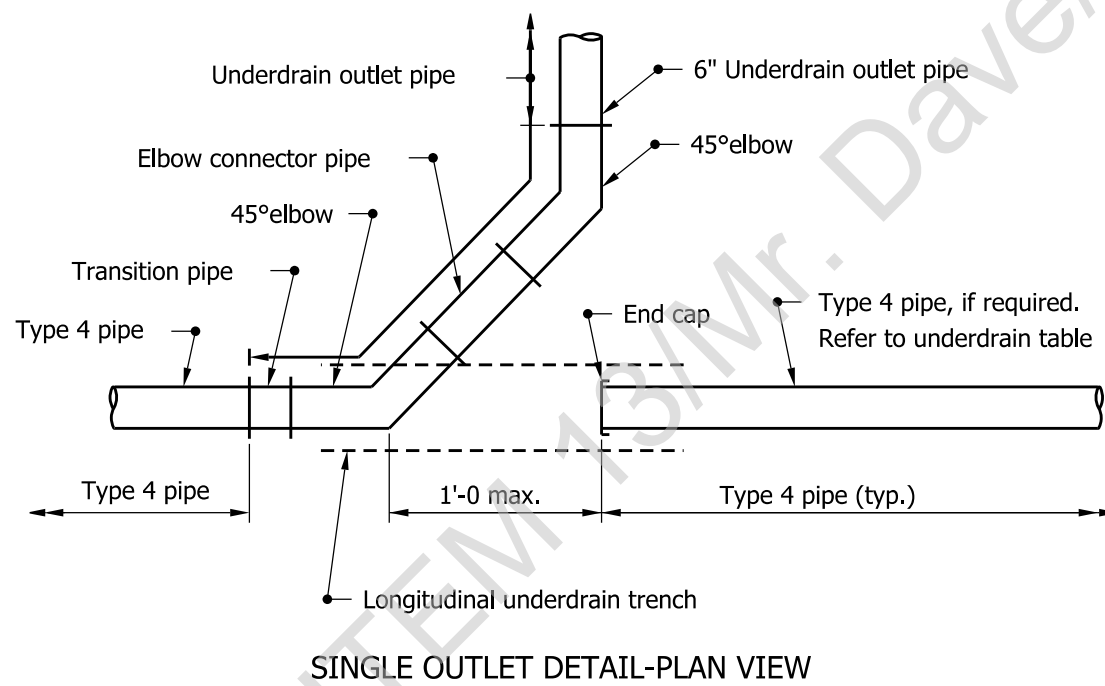
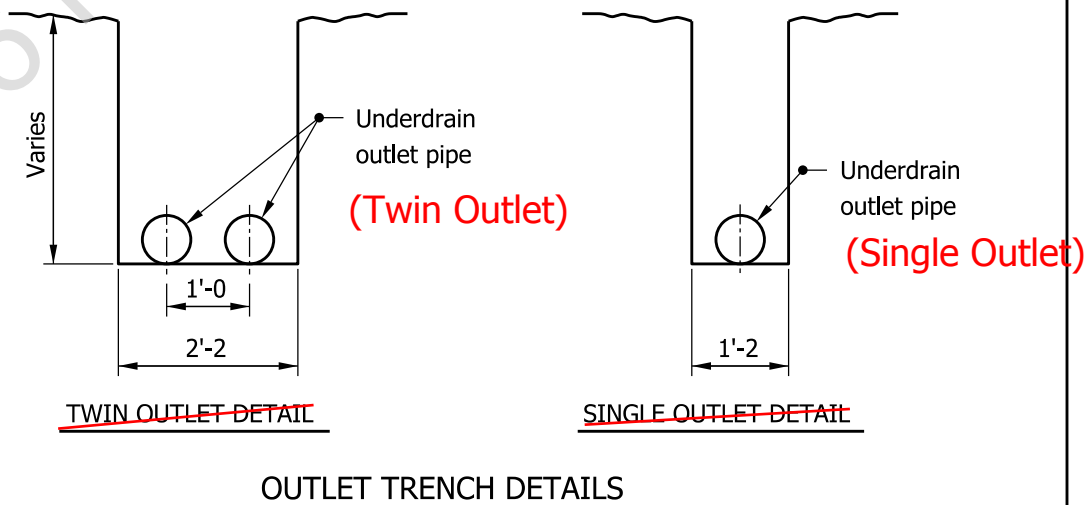
Add Pipe Increaser
and Transition Pipe
Keynote 1



NOTE:

1. See Standard Drawing E 718-UNDR-07 for General Notes.

1 If the underdrain pipe and the outlet pipe are of different sizes an increaser of the same material as the outlet pipe shall be installed 2 ft from the transition pipe and the 45° elbow.

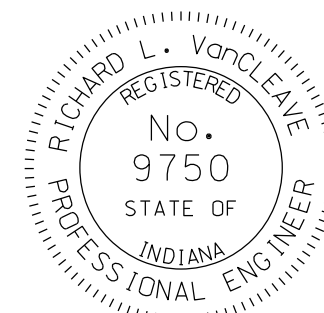


INDIANA DEPARTMENT OF TRANSPORTATION

UNDERDRAIN DETAILS

SEPTEMBER 2009

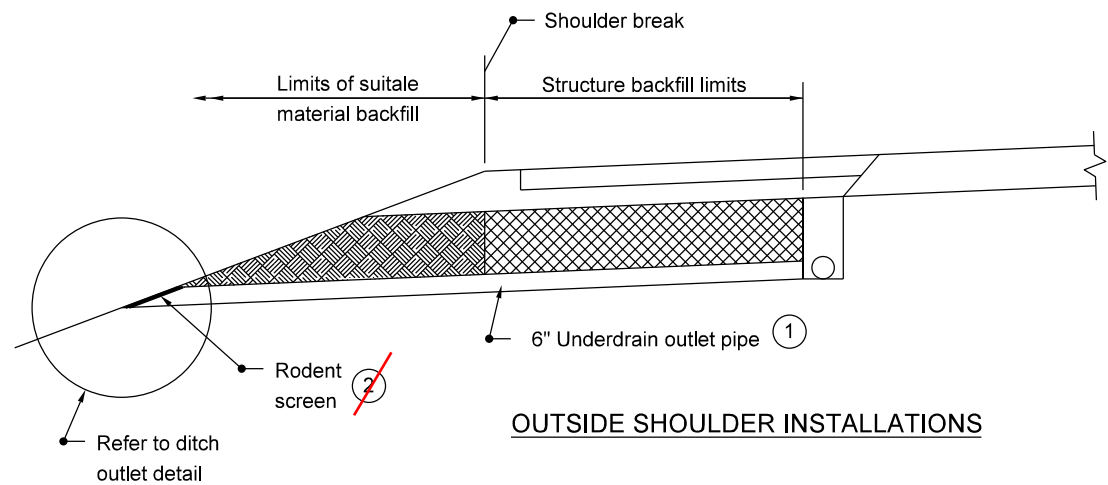
STANDARD DRAWING NO. E 718-UNDR-01⁰²



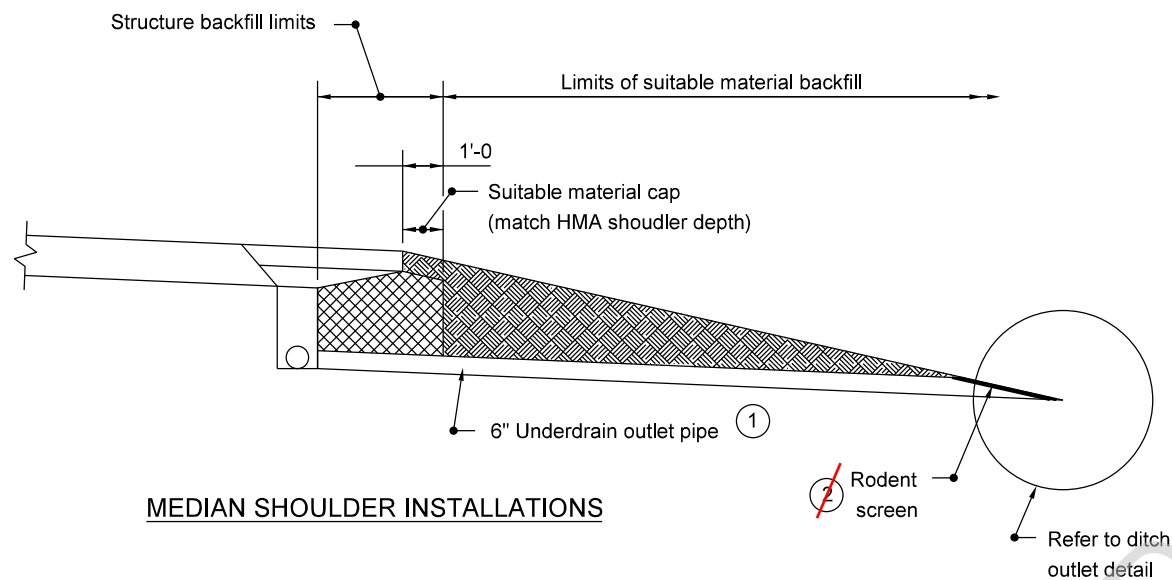
/s/ Richard L. VanCleave 09/01/09
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/01/09
CHIEF HIGHWAY ENGINEER DATE

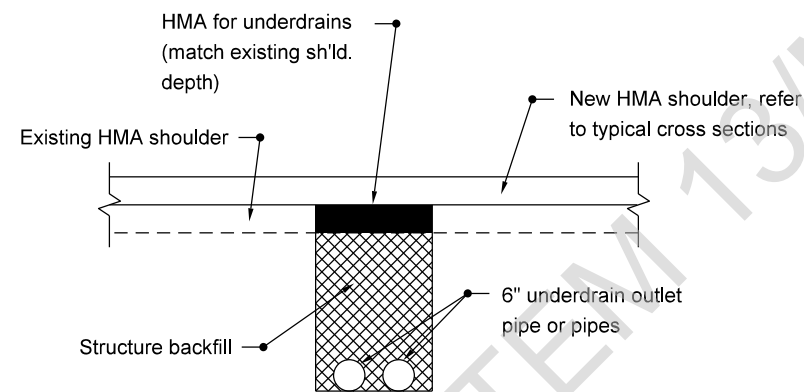
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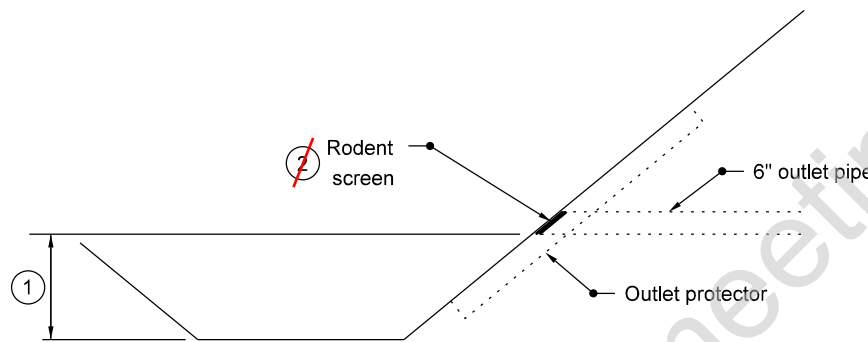
OUTSIDE SHOULDER INSTALLATIONS



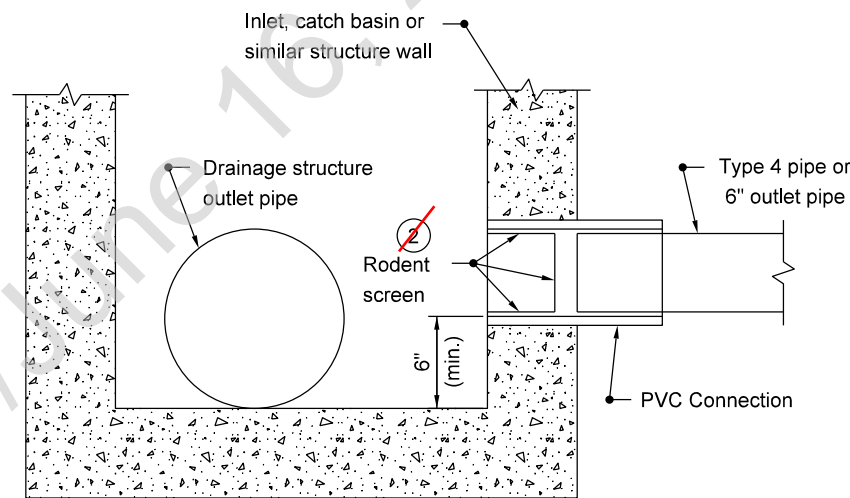
MEDIAN SHOULDER INSTALLATIONS



RETROFIT UNDERDRAIN OUTLET DETAIL (UNDER PAVED SHOULDER)



DITCH OUTLET DETAIL



DRAINAGE STRUCTURE OUTLET DETAIL

NOTE:

1. See Standard Drawing E 718-UNDR-07 for General Notes.

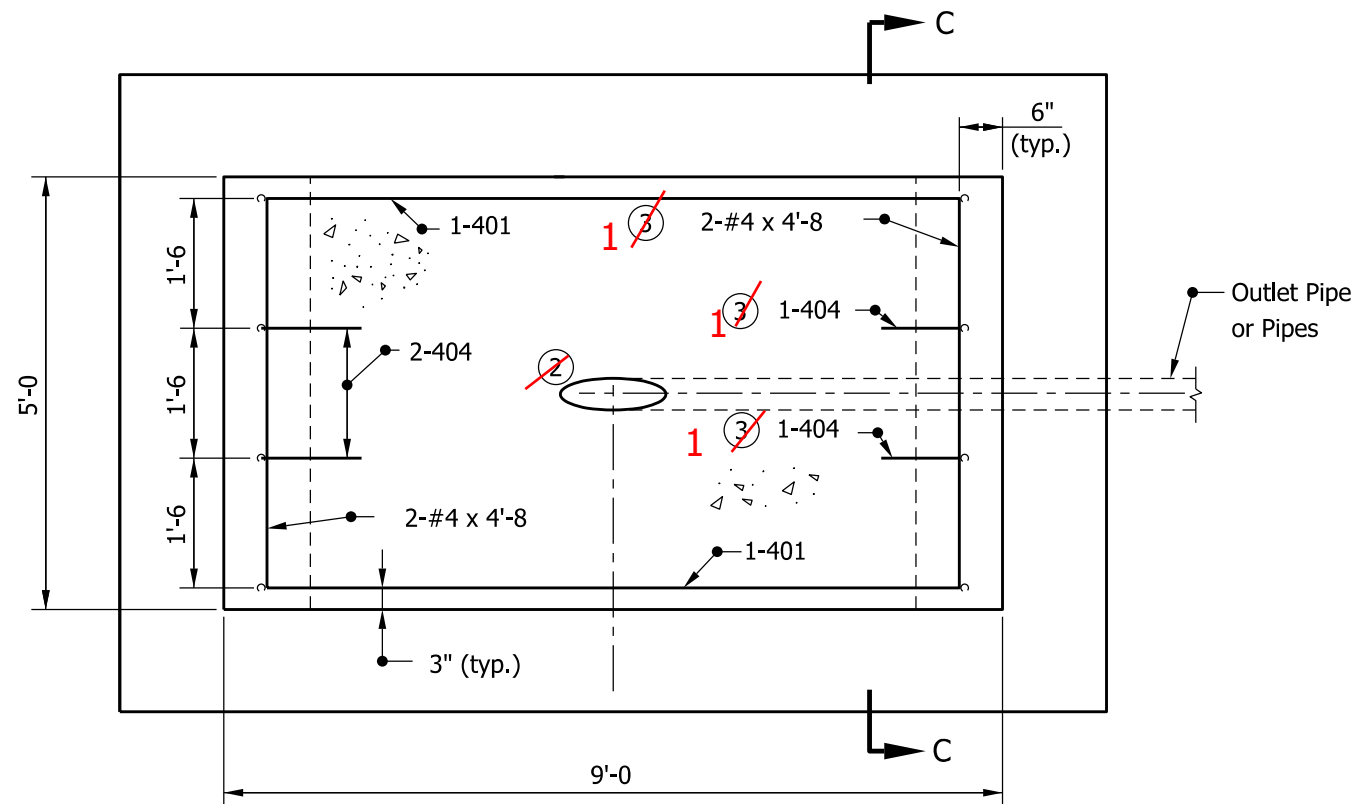
1 If underdrain outlet-pipe elevations are not shown on Underdrain Table, the minimum outlet-pipe slope shall be 0.3%. The minimum freeboard between the outlet-pipe outfall and the ditch line shall be 1'-0" for median ditches and 2'-0" for side ditches.

INDIANA DEPARTMENT OF TRANSPORTATION	
UNDERDRAIN DETAILS	
SEPTEMBER 2009	
STANDARD DRAWING NO. E 718-UNDR-02 ⁰³	
	/s/ Richard L. VanCleave09/01/09 DESIGN STANDARDS ENGINEERDATE /s/ Mark A. Miller09/01/09 CHIEF HIGHWAY ENGINEERDATE
DESIGN STANDARDS ENGINEER	

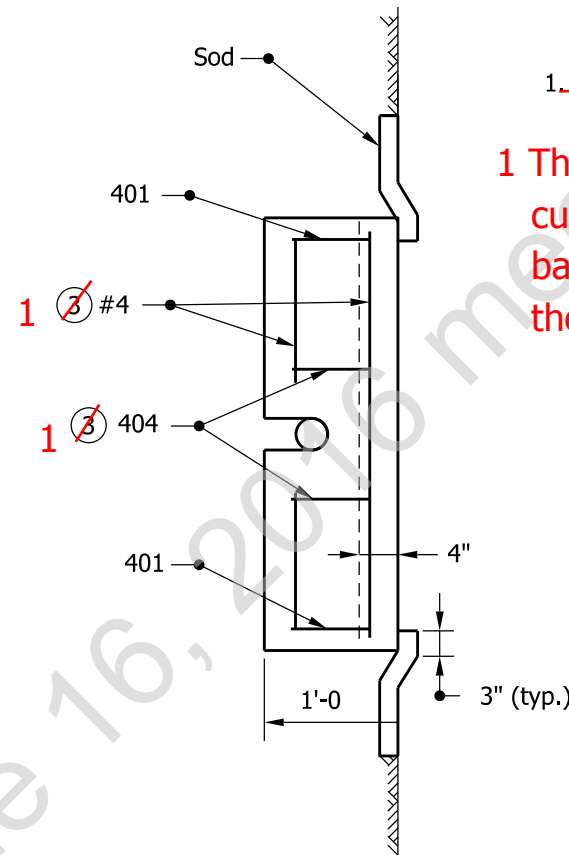
NOTE:

1. See Standard Drawing E 718-UNDR-07 for General Notes.

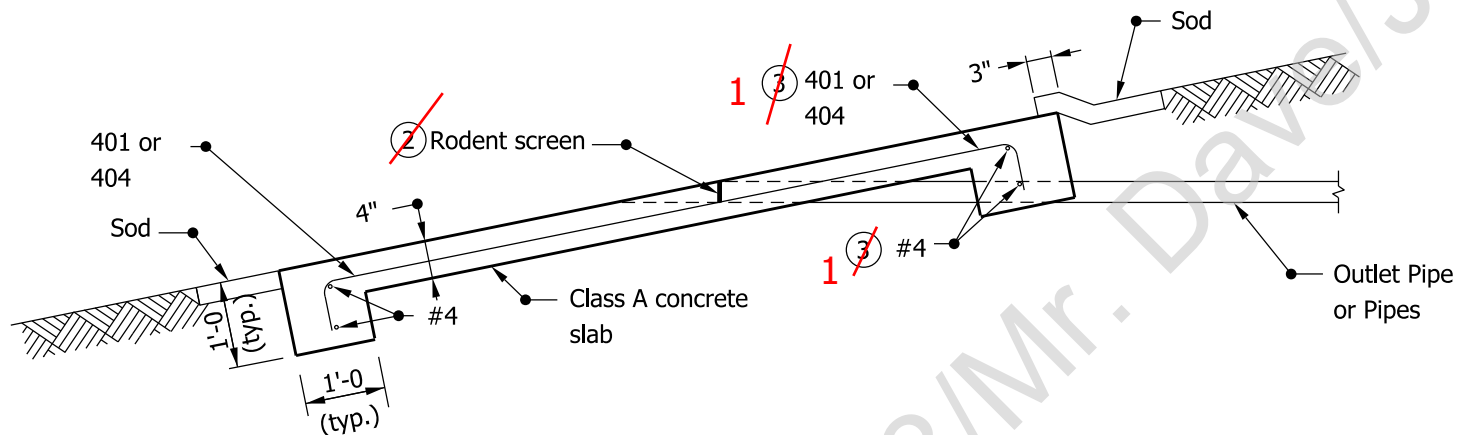
1 The #4 transverse bars in the upslope lug may be field cut to accommodate the outlet pipe or pipes. The 404 bars in the upslope lug may be moved to accommodate the outlet pipes.



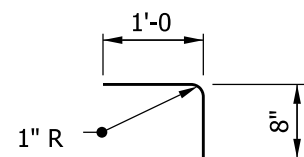
PLAN VIEW



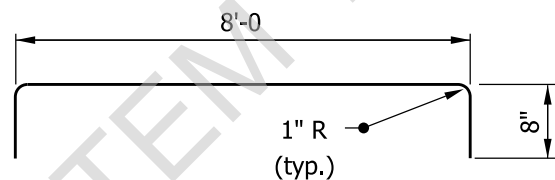
SECTION C-C



TYPICAL SECTION



404 x 1'-8



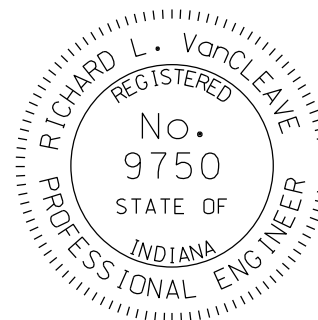
401 x 9'-4

INDIANA DEPARTMENT OF TRANSPORTATION

OUTLET PROTECTOR, TYPE 1

SEPTEMBER 2009

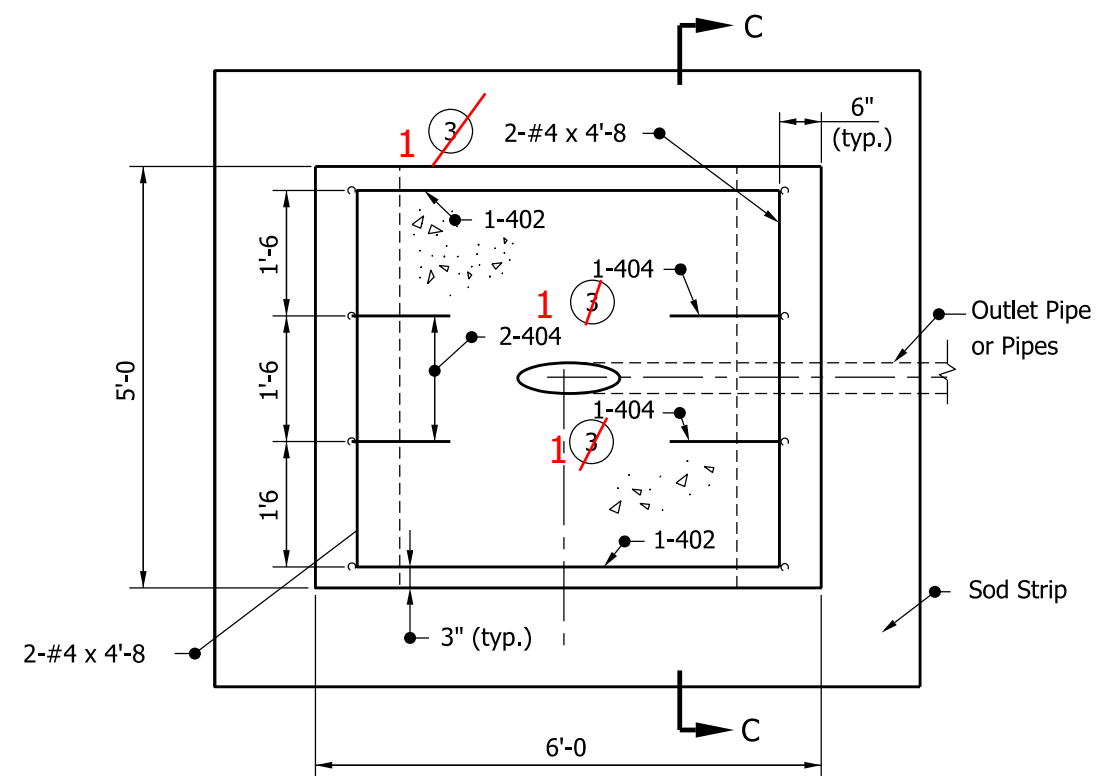
STANDARD DRAWING NO. E 718-UNDR-03



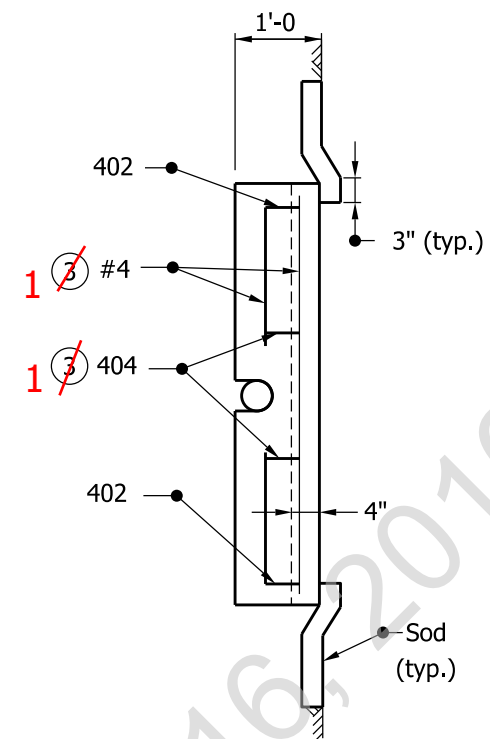
DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/01/09
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/01/09
CHIEF HIGHWAY ENGINEER DATE



PLAN VIEW

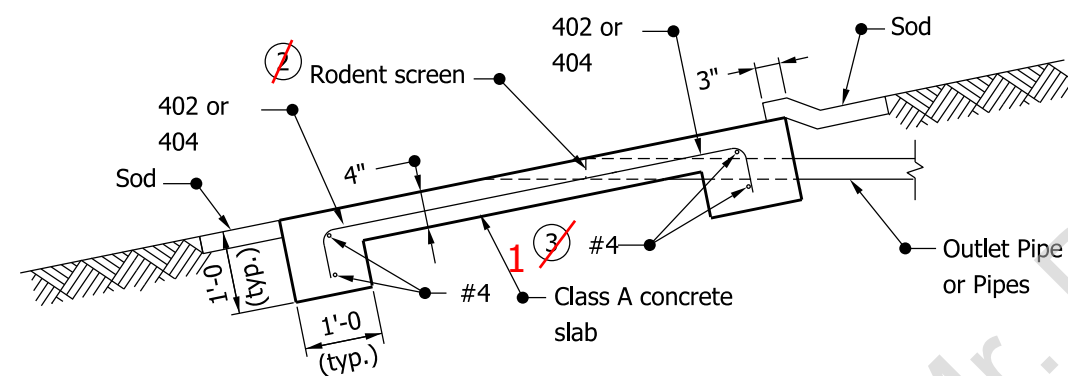


SECTION C-C

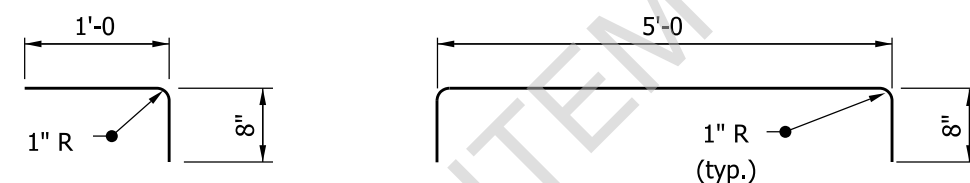
NOTE:

~~1. See Standard Drawing E 718-UNDR 07 for General Notes.~~

1 The #4 transverse bars in the upslope lug may be field cut to accommodate the outlet pipe or pipes. The 404 bars in the upslope lug may be moved to accommodate the outlet pipes.



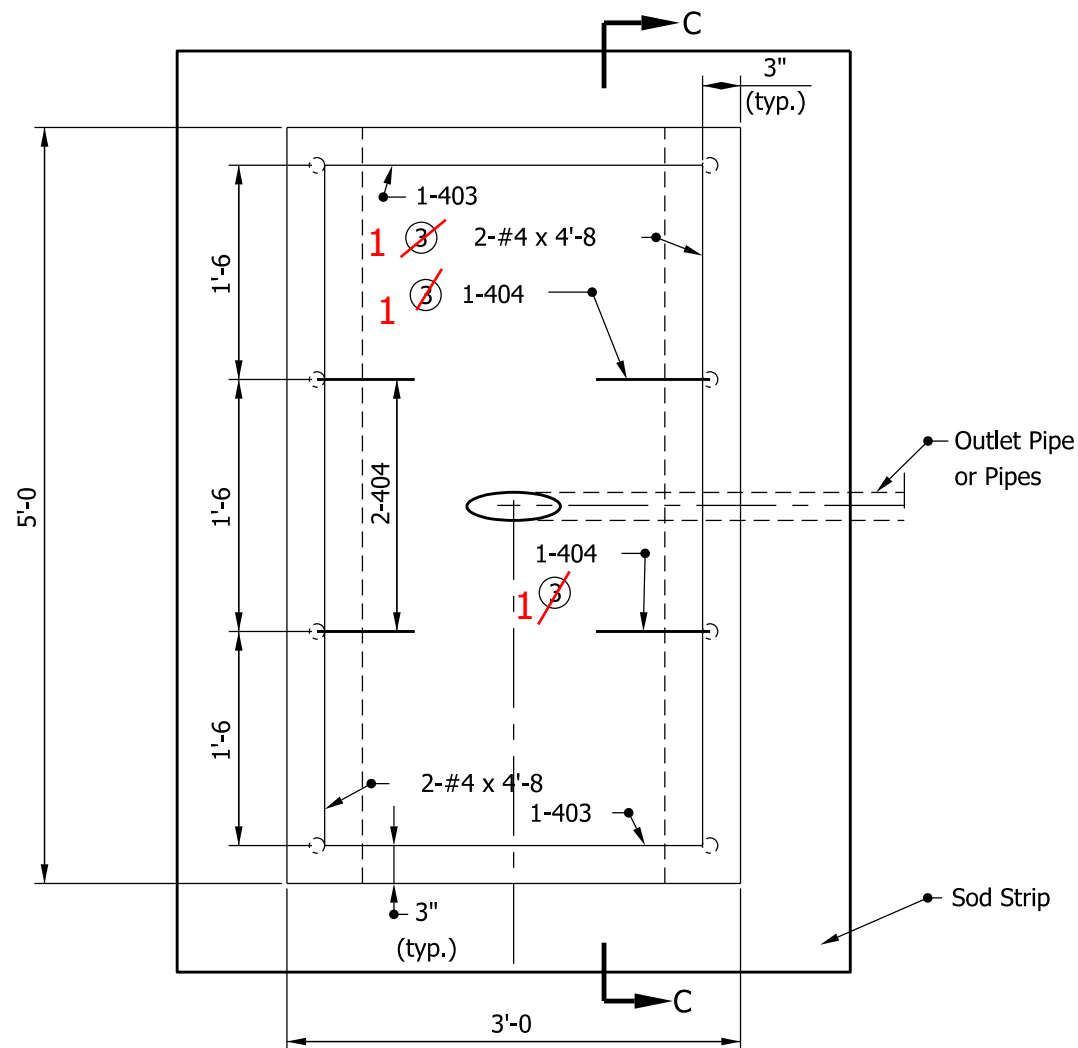
TYPICAL SECTION



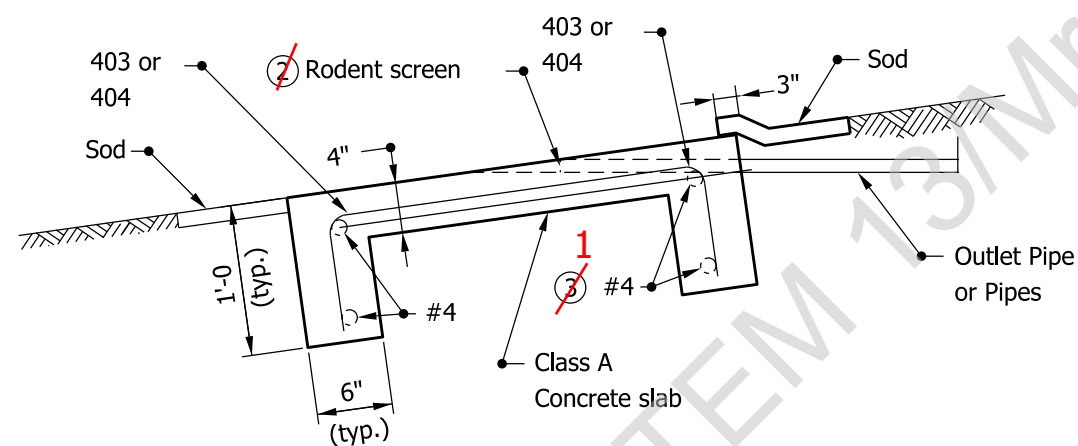
404 x 1'-8

402 x 6'-4

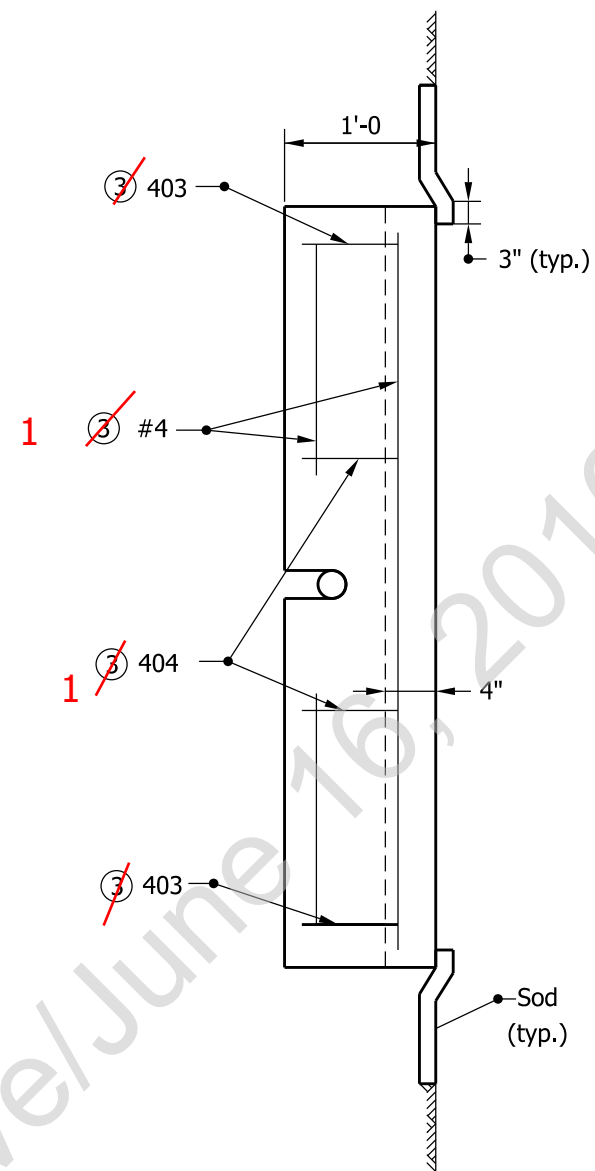
INDIANA DEPARTMENT OF TRANSPORTATION									
OUTLET PROTECTOR, TYPE 2									
SEPTEMBER 2009									
STANDARD DRAWING NO. E 718-UNDR-04 ⁰⁵									
	<table> <tr> <td><u>/s/ Richard L. VanCleave</u></td> <td><u>09/01/09</u></td> </tr> <tr> <td>DESIGN STANDARDS ENGINEER</td> <td>DATE</td> </tr> <tr> <td> <u>/s/ Mark A. Miller</u></td> <td> <u>09/01/09</u></td> </tr> <tr> <td>CHIEF HIGHWAY ENGINEER</td> <td>DATE</td> </tr> </table>	<u>/s/ Richard L. VanCleave</u>	<u>09/01/09</u>	DESIGN STANDARDS ENGINEER	DATE	 <u>/s/ Mark A. Miller</u>	 <u>09/01/09</u>	CHIEF HIGHWAY ENGINEER	DATE
<u>/s/ Richard L. VanCleave</u>	<u>09/01/09</u>								
DESIGN STANDARDS ENGINEER	DATE								
 <u>/s/ Mark A. Miller</u>	 <u>09/01/09</u>								
CHIEF HIGHWAY ENGINEER	DATE								
DESIGN STANDARDS ENGINEER									



PLAN VIEW



TYPICAL SECTION

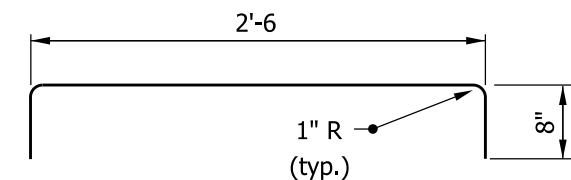


SECTION C-C

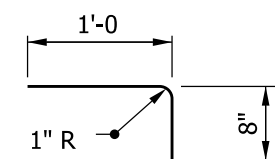
NOTE:

1. See Standard Drawing E 718-UNDR-07 for General Notes.

1 The #4 transverse bars in the upslope lug may be field cut to accommodate the outlet pipe or pipes. The 404 bars in the upslope lug may be moved to accommodate the outlet pipes.



403 x 3'-10



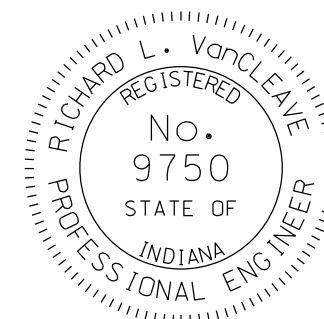
404 x 1'-8

INDIANA DEPARTMENT OF TRANSPORTATION

OUTLET PROTECTOR, TYPE 3

SEPTEMBER 2009

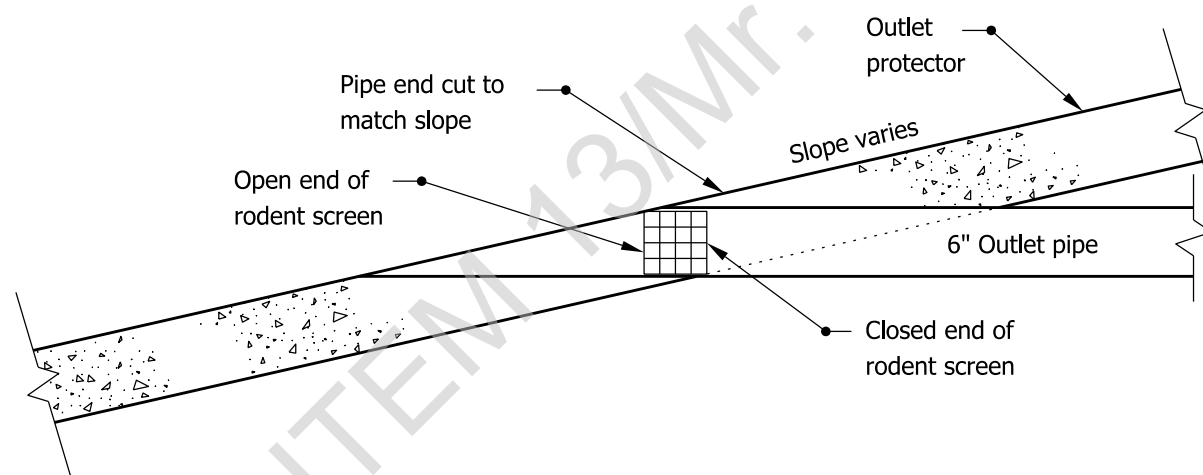
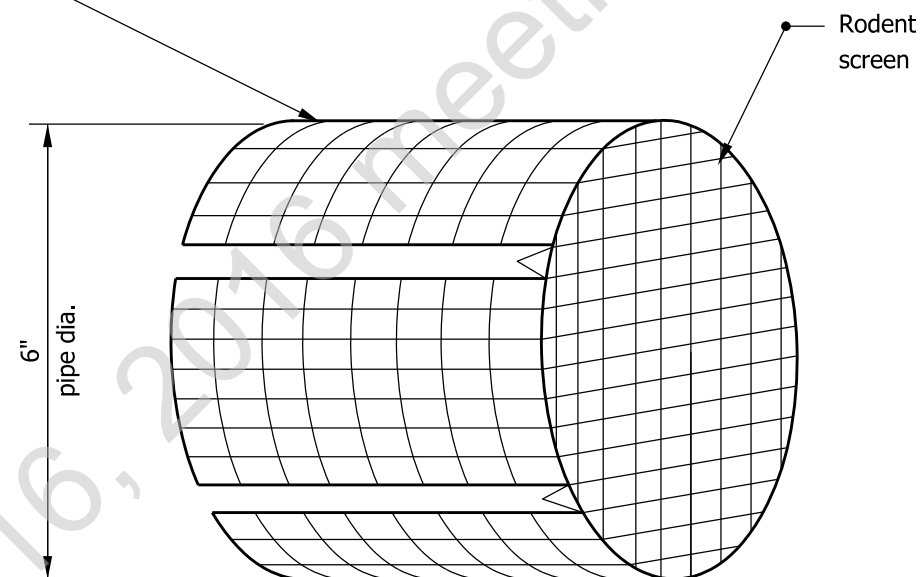
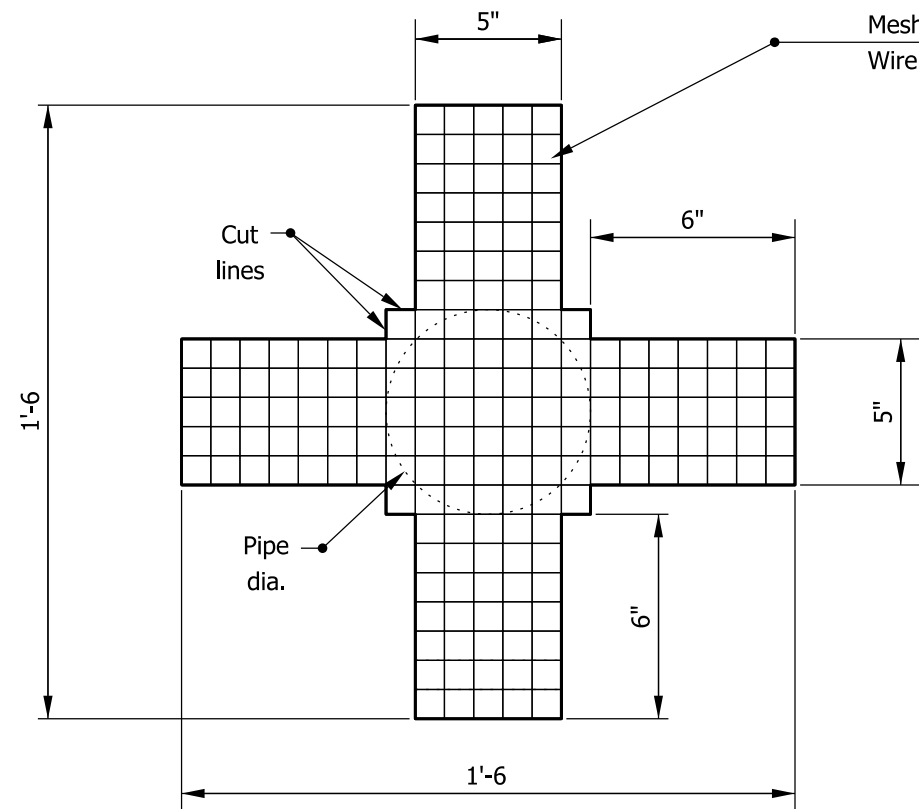
STANDARD DRAWING NO. E 718-UNDR-05



DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/01/09
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/01/09
CHIEF HIGHWAY ENGINEER DATE

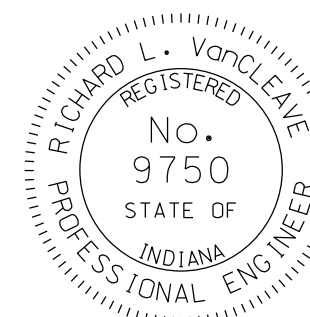


INDIANA DEPARTMENT OF TRANSPORTATION

OUTLET PROTECTOR RODENT SCREEN

SEPTEMBER 2009

STANDARD DRAWING NO. E 718-UNDR-06



DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/01/09
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/01/09
CHIEF HIGHWAY ENGINEER DATE

Index Added

GENERAL NOTES

- 1

If underdrain outlet-pipe elevations are not shown on Underdrain Table, the minimum outlet-pipe slope shall be 0.3%. The minimum freeboard between the outlet-pipe outfall and the ditch line shall be 1'-0 for median ditches and 2'-0 for side ditches.
- 2

~~See Standard Drawing E 718-UNDR-06 for rodent screen details.~~
- 3

The #4 transverse bars in the upslope lug may be field cut to accomodate the outlet pipe or pipes. The 404 bars in the upslope lug may be moved to accomodate the outlet pipe or pipes.

Moved to
appropriate
drawings

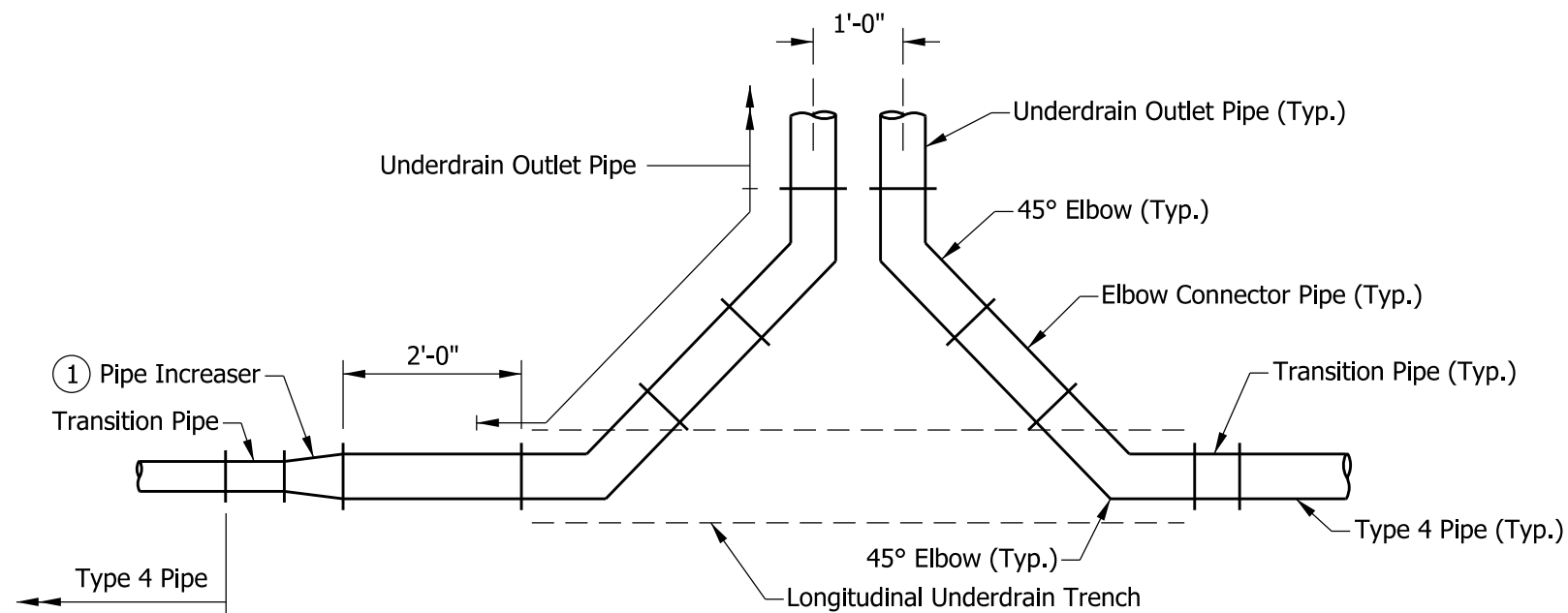
APPROXIMATE OUTLET PROTECTOR QUANTITIES			
TYPE	CONCRETE, CLASS A (cys)	REINFORCING BARS (lb)	SODDING (sys)
1	0.8	29	4.9
2	0.6	25	4.0
3	0.3	22	3.2

INDIANA DEPARTMENT OF TRANSPORTATION	
UNDERDRAIN NOTES	
SEPTEMBER 2009	
STANDARD DRAWING NO. E 718-UNDR-07 ⁰¹	
 REGISTERED No. 9750 STATE OF INDIANA PROFESSIONAL ENGINEER RICHARD L. VANCLEAVE DESIGN STANDARDS ENGINEER /s/ Richard L. VanCleave DESIGN STANDARDS ENGINEER 09/01/09 DATE /s/ Mark A. Miller CHIEF HIGHWAY ENGINEER 09/01/09 DATE	

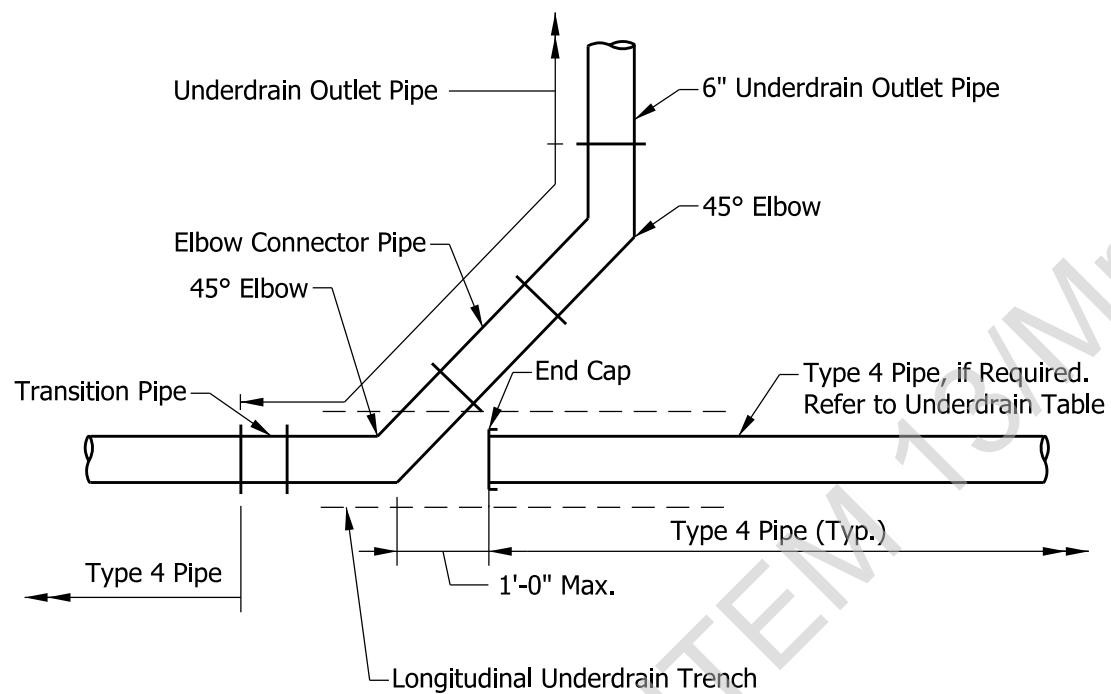
INDEX	
SHEET NO.	SUBJECT
1	Underdrain Drawing Index and General Notes
2	Underdrain Details
3	Underdrain Details
4	Outlet Protector, Type 1
5	Outlet Protector, Type 2
6	Outlet Protector, Type 3
7	Outlet Protector Rodent Screen

APPROXIMATE OUTLET PROTECTOR QUANTITIES			
TYPE	CONCRETE, CLASS A (cys)	REINFORCING BARS (lb)	SODDING (sys)
1	0.8	29	4.9
2	0.6	25	4.0
3	0.3	22	3.2

INDIANA DEPARTMENT OF TRANSPORTATION	
UNDERDRAIN DRAWING INDEX AND GENERAL NOTES SEPTEMBER 2017	
STANDARD DRAWING NO. E 718-UNDR-01	
	DESIGN STANDARDS ENGINEER DATE
	CHIEF ENGINEER DATE



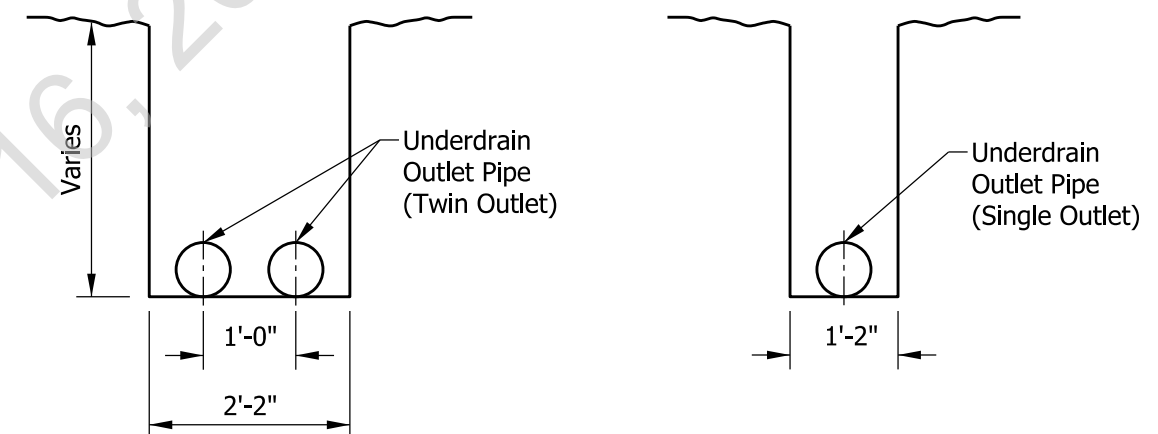
TWIN OUTLET DETAIL-PLAN VIEW



SINGLE OUTLET DETAIL-PLAN VIEW

NOTE:

- ① If the underdrain pipe and the outlet pipe are of different sizes an increaser of the same material as the outlet pipe shall be installed 2 ft from the transition pipe and the 45° elbow.



OUTLET TRENCH DETAILS

INDIANA DEPARTMENT OF TRANSPORTATION

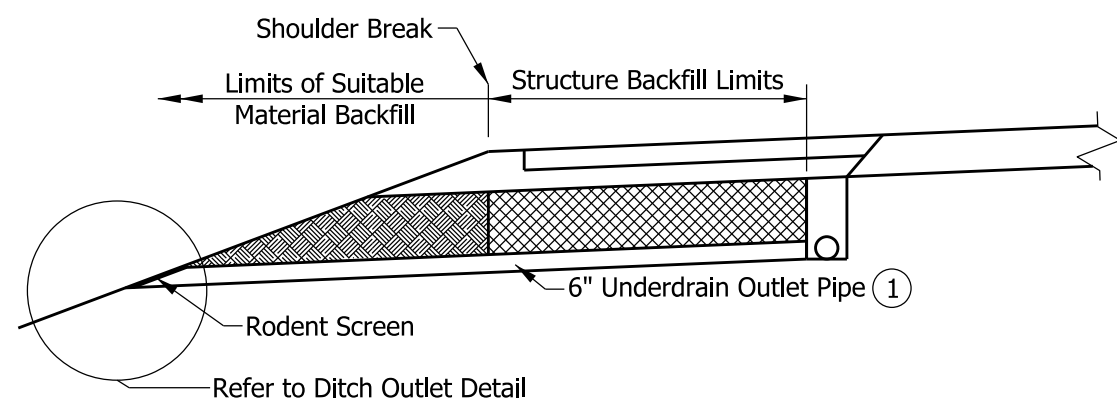
UNDERDRAIN DETAILS

SEPTEMBER 2017

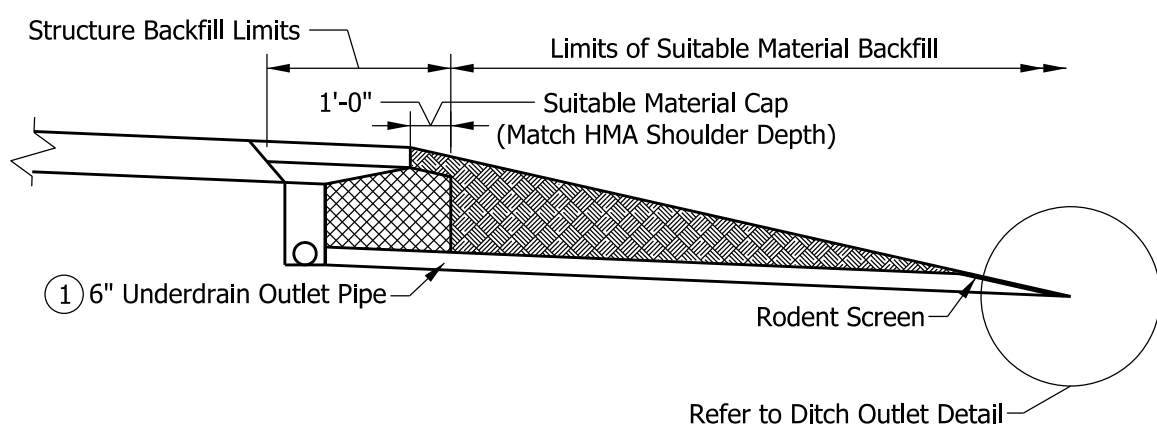
STANDARD DRAWING NO. E 718-UNDR-02

DESIGN STANDARDS ENGINEER DATE

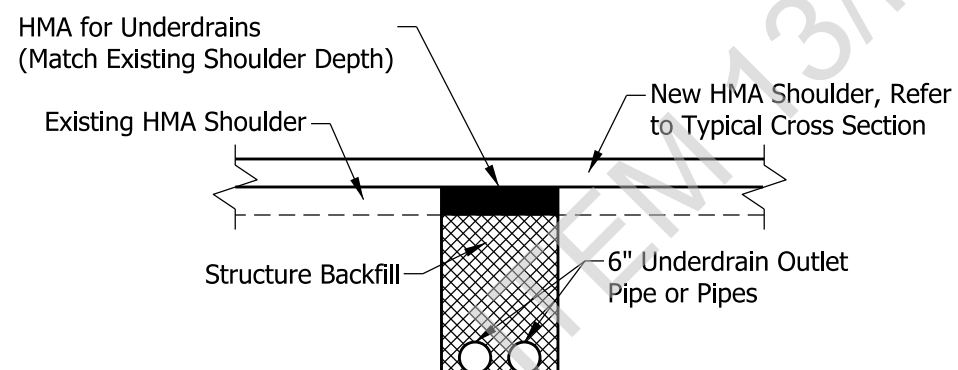
CHIEF ENGINEER DATE



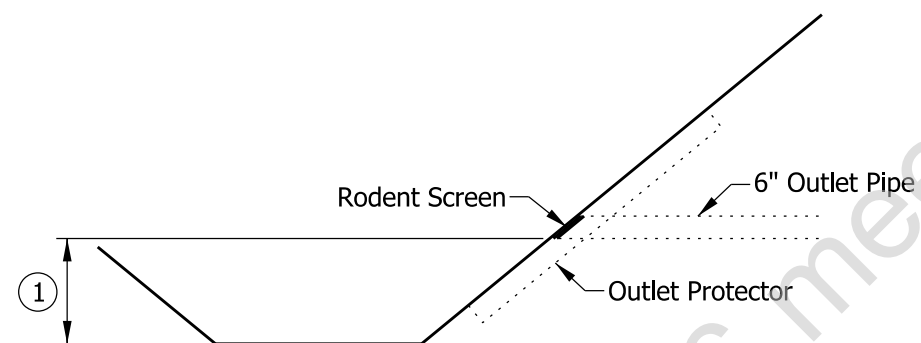
OUTSIDE SHOULDER INSTALLATIONS



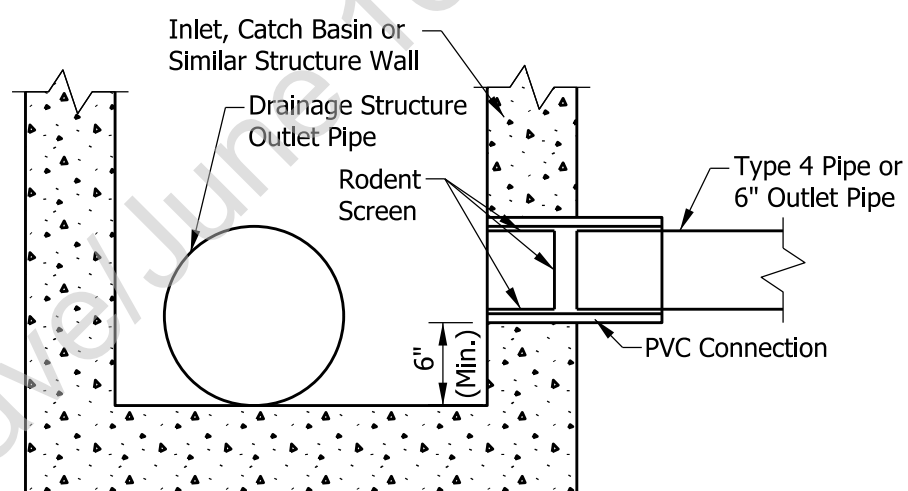
MEDIAN SHOULDER INSTALLATIONS



RETROFIT UNDERDRAIN OUTLET DETAIL (UNDER PAVED SHOULDER)



DITCH OUTLET DETAIL



DRAINAGE STRUCTURE OUTLET DETAIL

NOTE:

- ① If underdrain outlet-pipe elevations are not shown on Underdrain Table, the minimum outlet-pipe slope shall be 0.3%. The minimum freeboard between the outlet-pipe outfall and the ditch line shall be 1'-0" for median ditches and 2'-0" for side ditches.

INDIANA DEPARTMENT OF TRANSPORTATION

UNDERDRAIN DETAILS

SEPTEMBER 2017

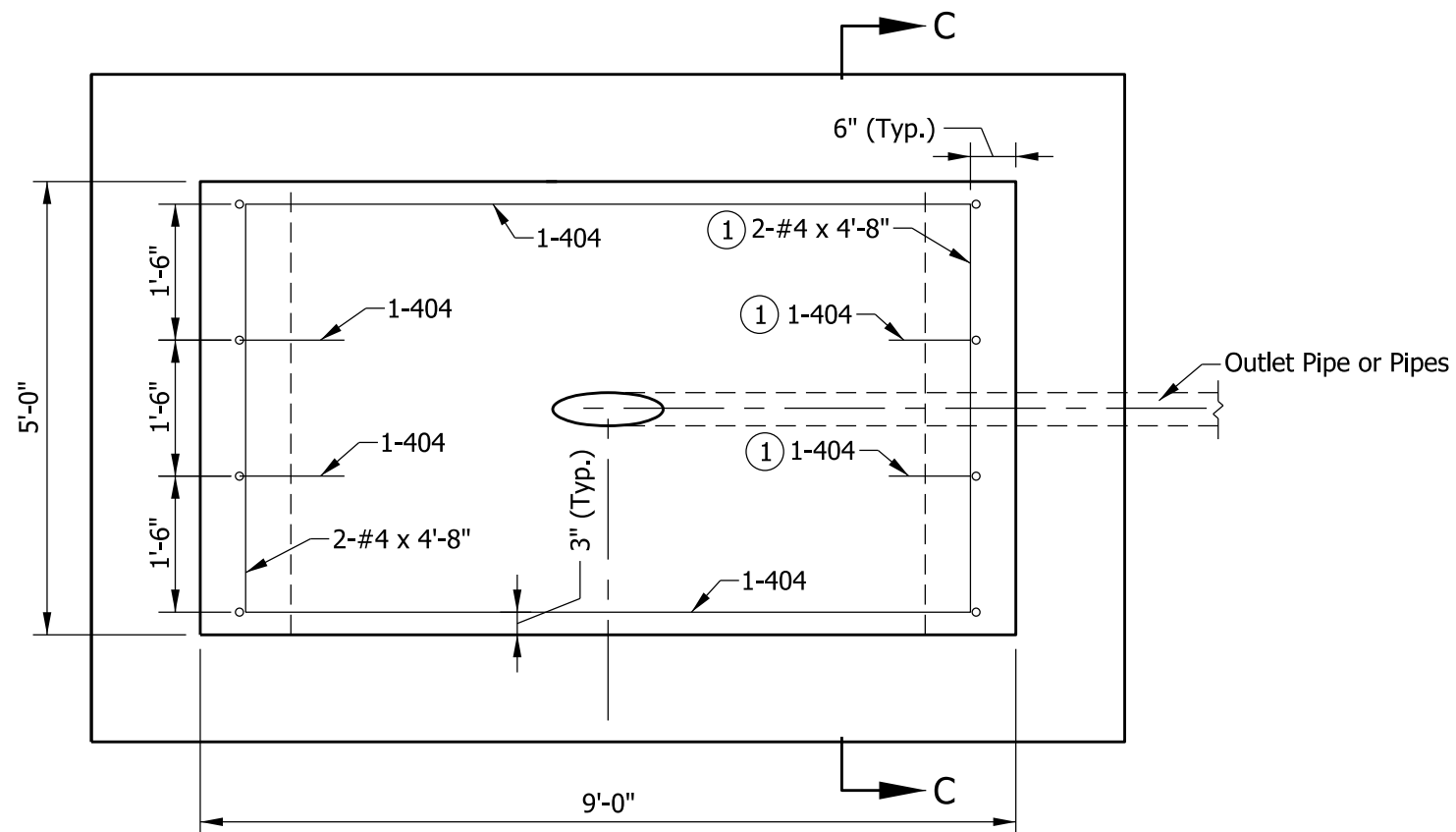
STANDARD DRAWING NO. E 718-UNDR-03

DESIGN STANDARDS ENGINEER

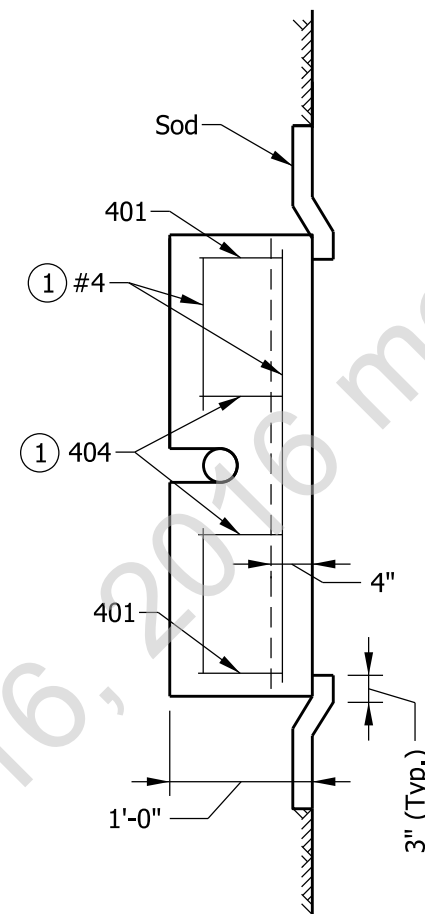
DATE

CHIEF ENGINEER

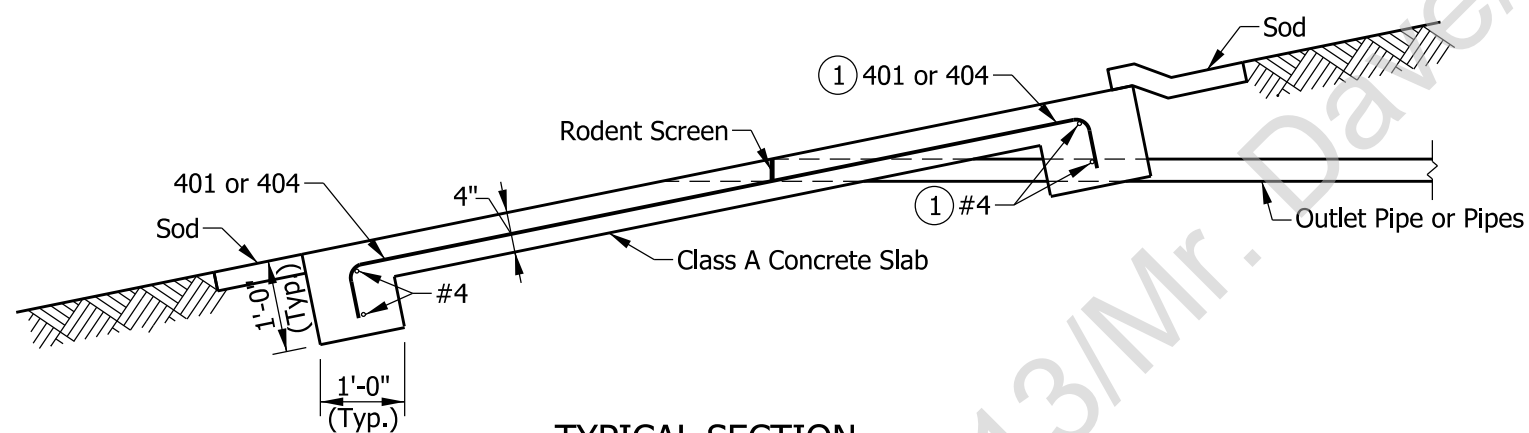
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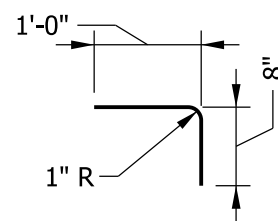
PLAN VIEW



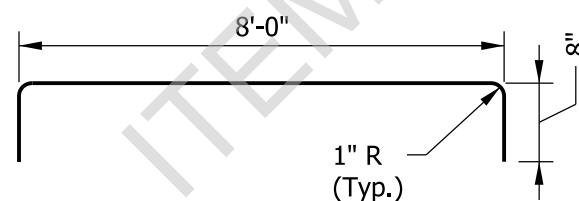
SECTION C-C



TYPICAL SECTION



404 X 1'-8"



402 X 6'-4"

NOTE:

- The #4 transverse bars in the upslope lug may be field cut to accommodate the outlet pipe or pipes. The 404 bars in the upslope lug may be moved to accommodate the outlet pipe or pipes.

INDIANA DEPARTMENT OF TRANSPORTATION

OUTLET PROTECTOR, TYPE 1

SEPTEMBER 2017

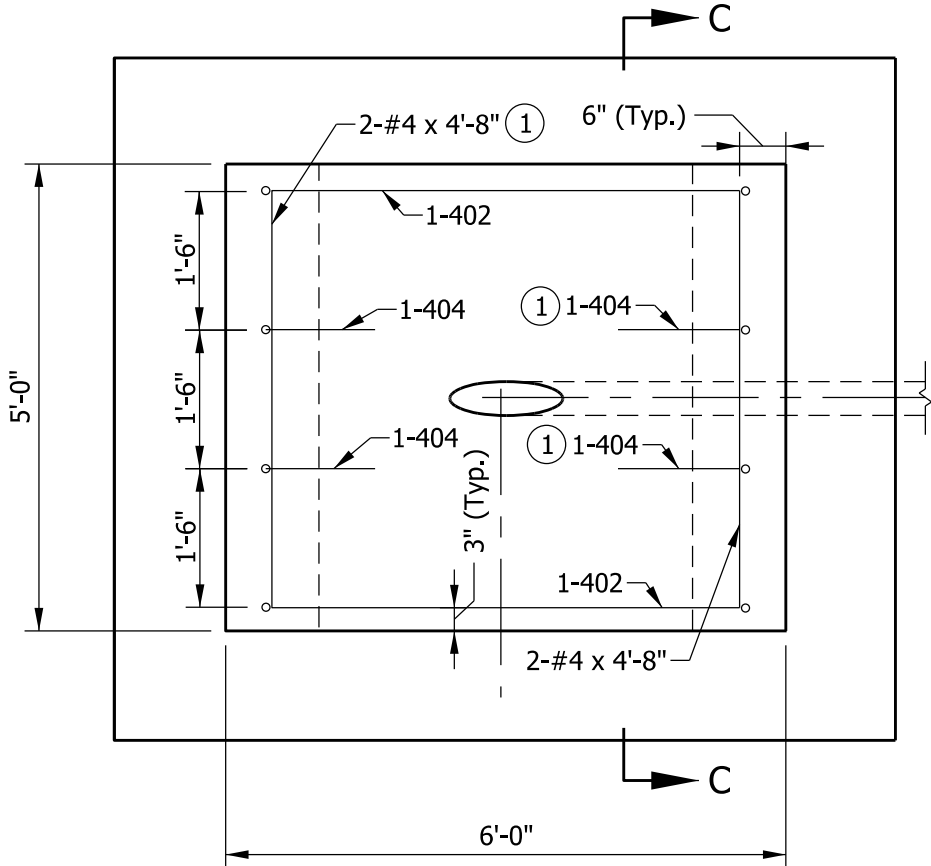
STANDARD DRAWING NO. E 718-UNDR-04

DESIGN STANDARDS ENGINEER DATE

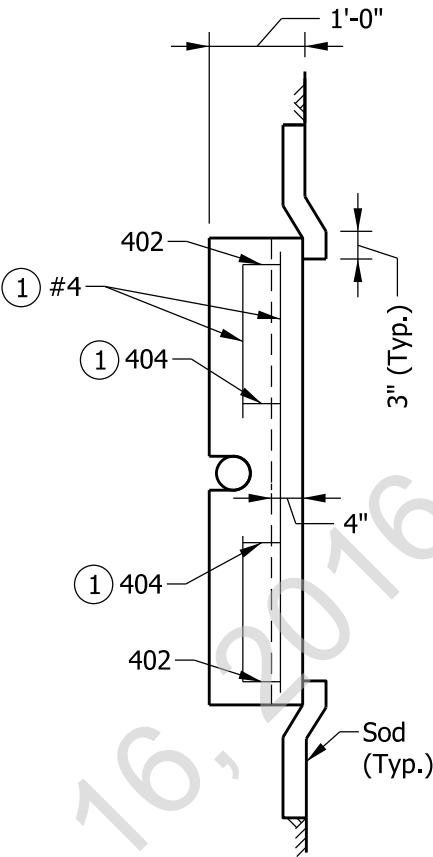
CHIEF ENGINEER DATE

NOTE:

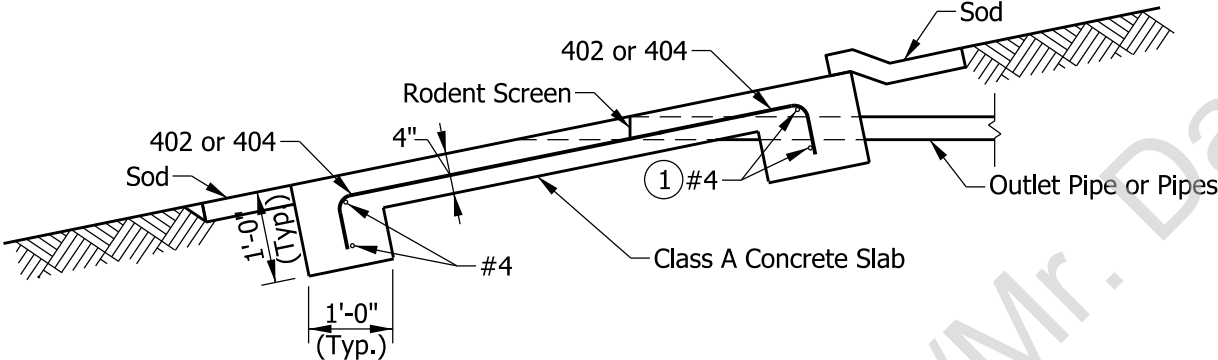
① The #4 transverse bars in the upslope lug may be field cut to accommodate the outlet pipe or pipes. The 404 bars in the upslope lug may be moved to accommodate the outlet pipe or pipes.



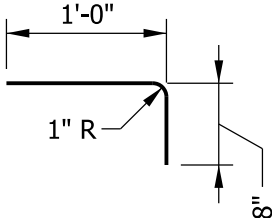
PLAN VIEW



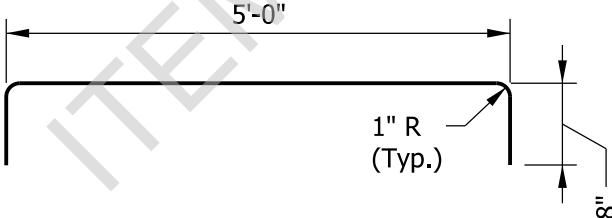
SECTION C-C



TYPICAL SECTION



404 X 1'-8"



402 X 6'-4"

INDIANA DEPARTMENT OF TRANSPORTATION

OUTLET PROTECTOR, TYPE 2

SEPTEMBER 2017

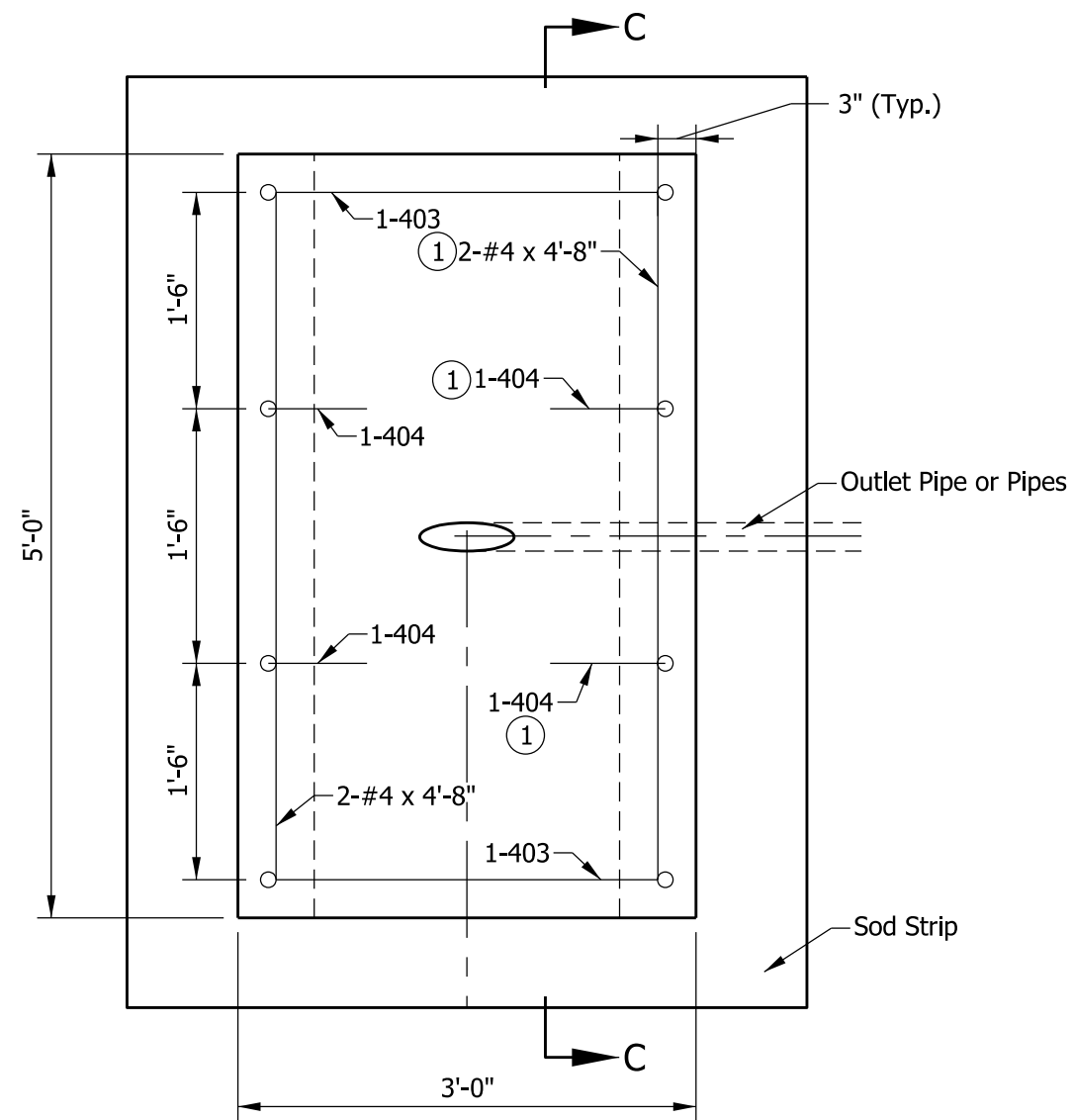
STANDARD DRAWING NO. E 718-UNDER-05

DESIGN STANDARDS ENGINEER

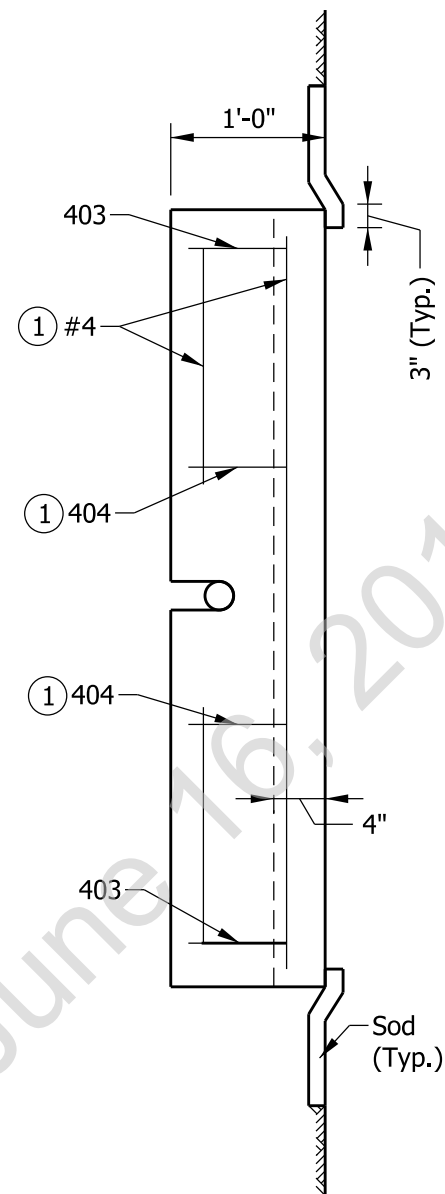
DATE

CHIEF ENGINEER

DATE



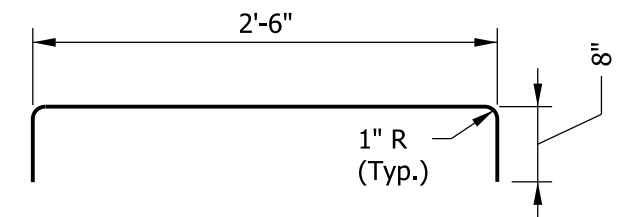
PLAN VIEW



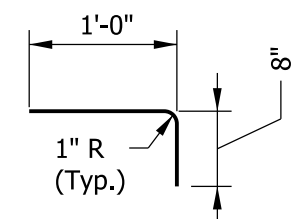
SECTION C-C

NOTE:

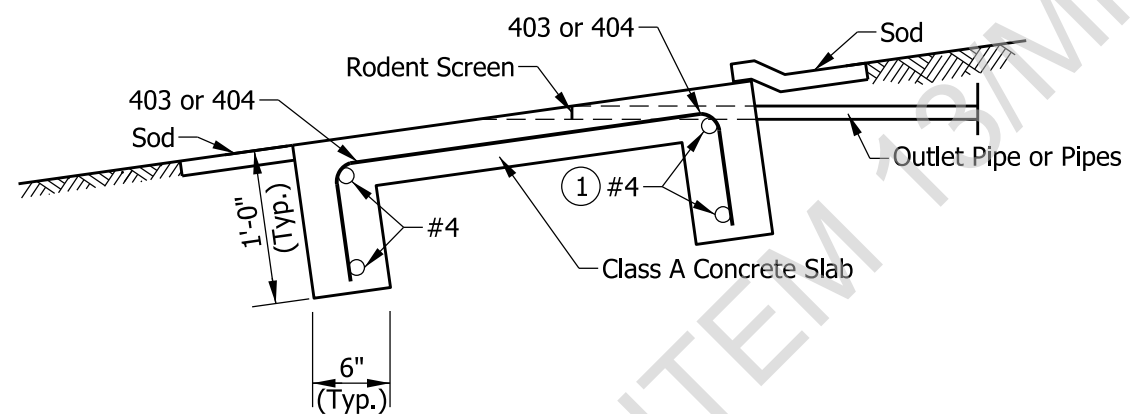
- ① The #4 transverse bars in the upslope lug may be field cut to accommodate the outlet pipe or pipes. The 404 bars in the upslope lug may be moved to accommodate the outlet pipe or pipes.



403 x 3'-10"



404 x 1'-8"



TYPICAL SECTION

INDIANA DEPARTMENT OF TRANSPORTATION

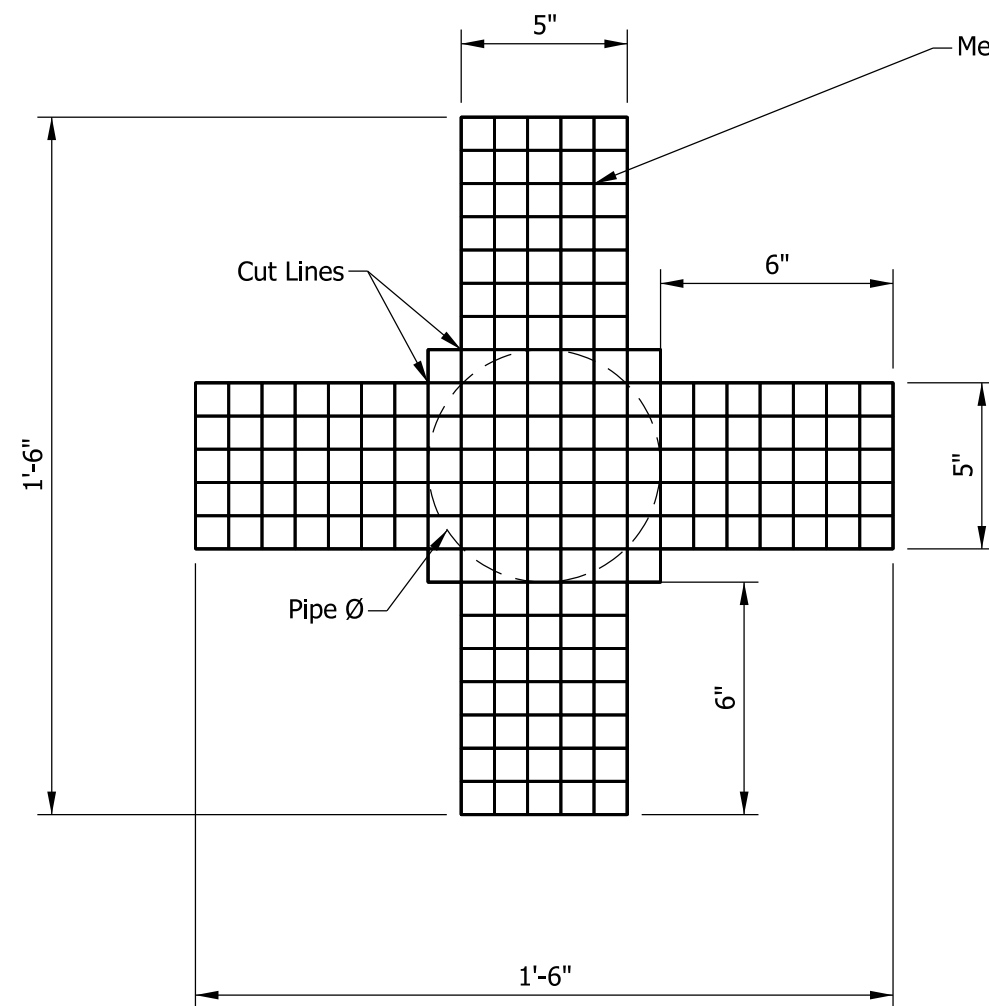
OUTLET PROTECTOR, TYPE 3

SEPTEMBER 2017

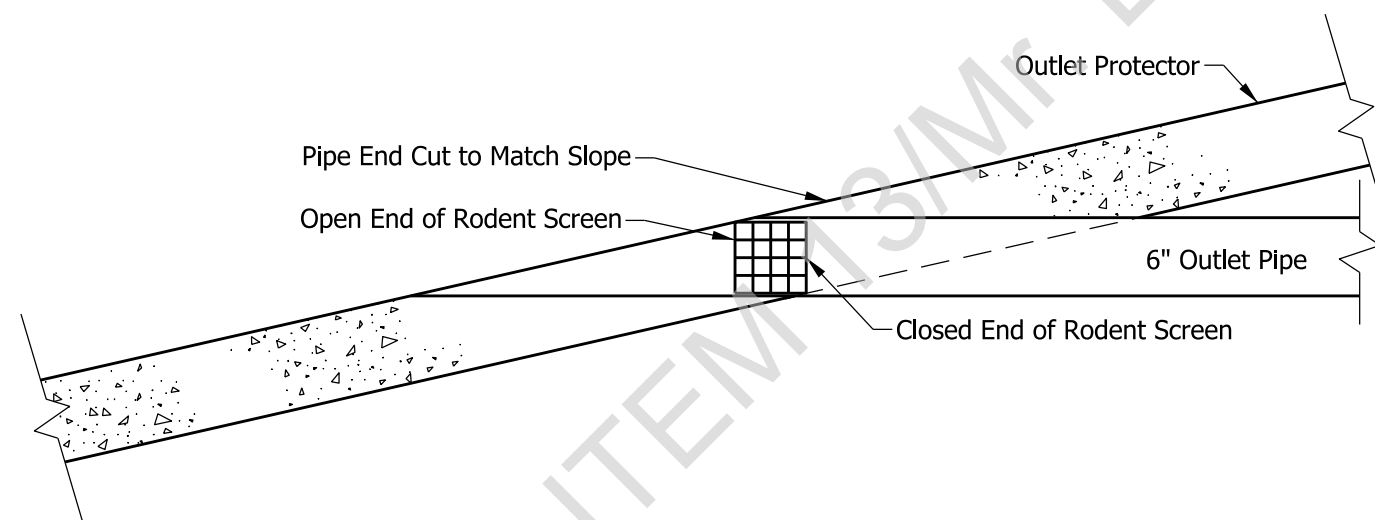
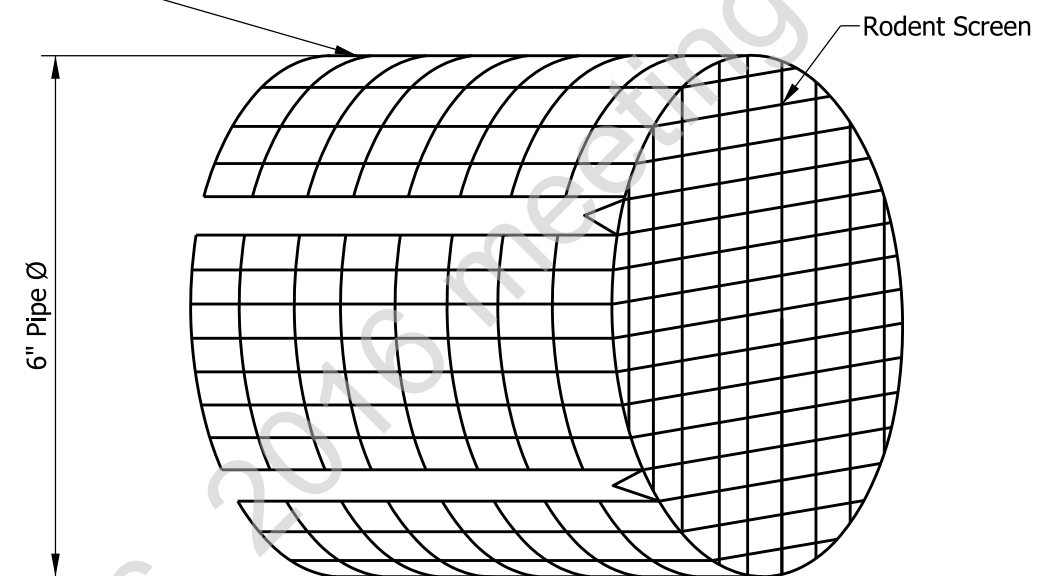
STANDARD DRAWING NO. E 718-UNDR-06

DESIGN STANDARDS ENGINEER DATE

CHIEF ENGINEER DATE



Mesh Size = 3 Openings per 1"
Wire $\varnothing$ = 0.072"



INDIANA DEPARTMENT OF TRANSPORTATION	
OUTLET PROTECTOR RODENT SCREEN	
SEPTEMBER 2017	
STANDARD DRAWING NO. E 718-UNDR-07	
	DESIGN STANDARDS ENGINEER _____ DATE _____
	CHIEF ENGINEER _____ DATE _____