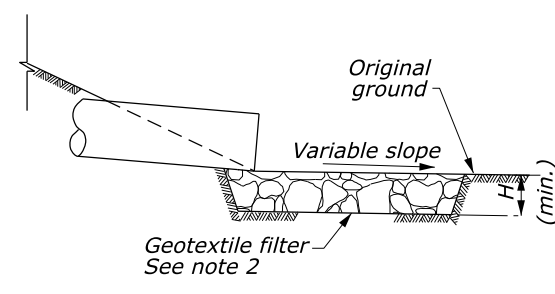
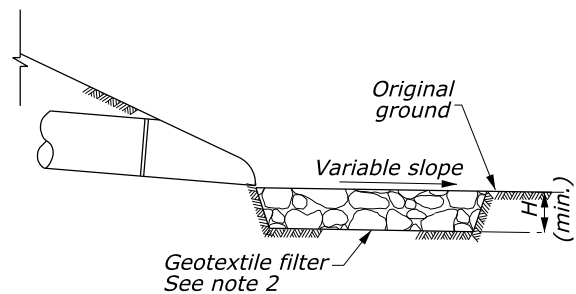
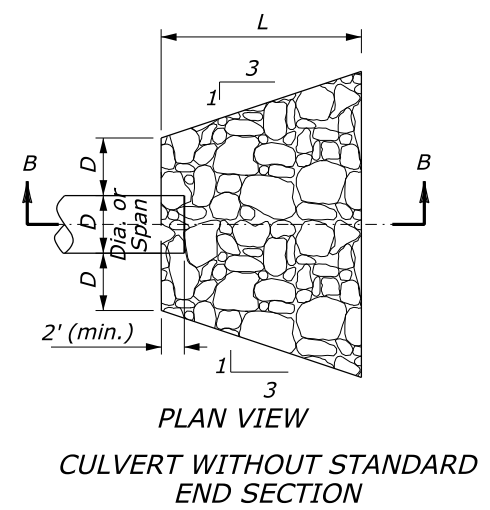
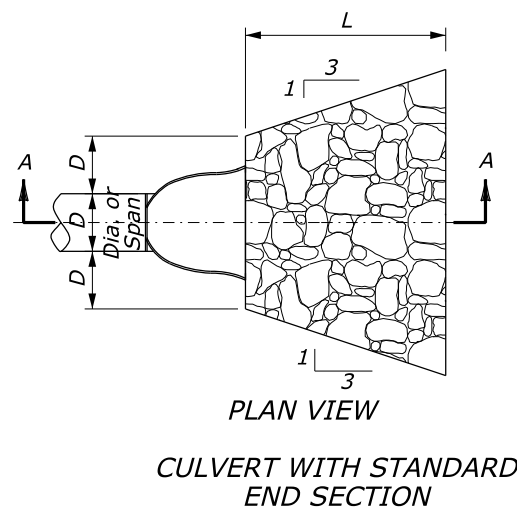


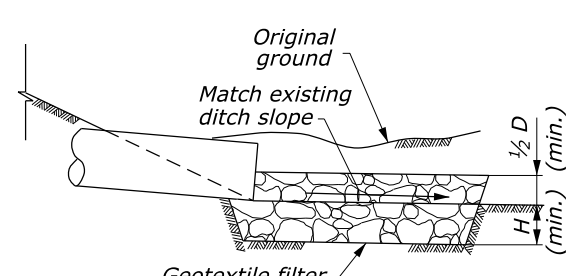
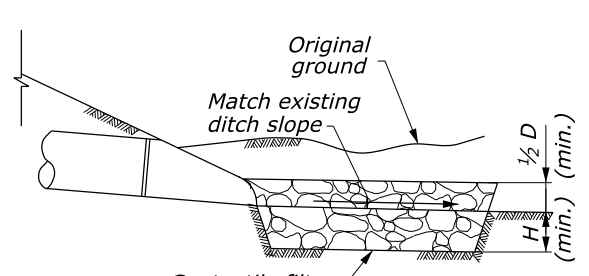
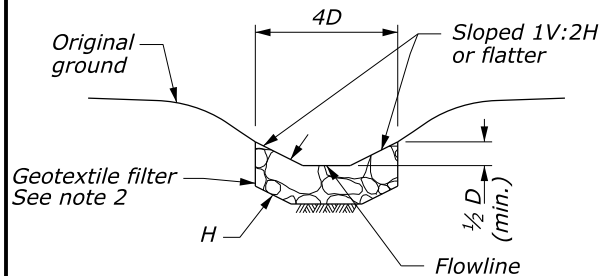
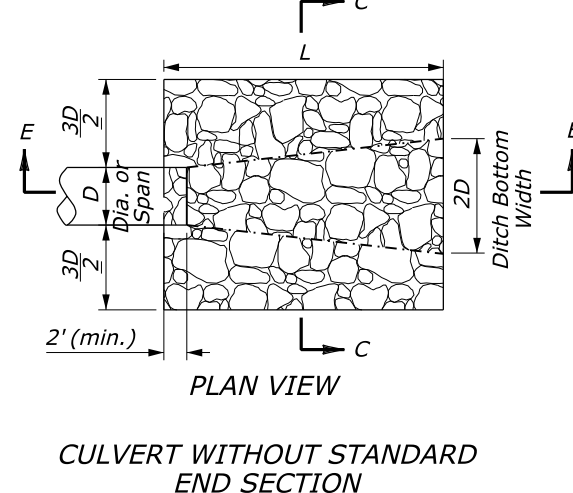
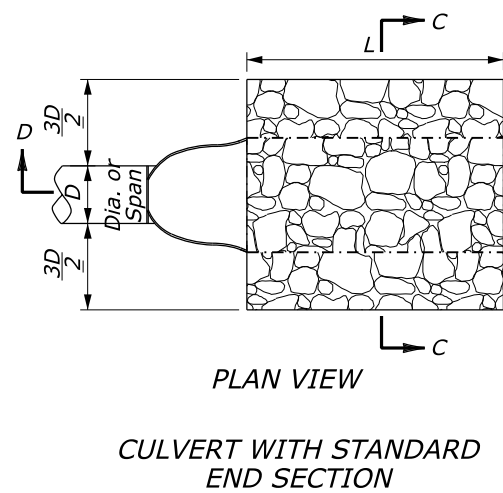
STATE	PROJECT	SHEET NUMBER



SECTION A-A

SECTION B-B

**PROTECTIVE APRON AT CULVERT OUTLET WITHOUT DITCH**



**PROTECTIVE APRON AT CULVERT OUTLET WITH DITCH**

**OUTLET WITHOUT DITCH PROTECTIVE APRON DIMENSIONS AND ESTIMATED QUANTITIES**

	CULVERT SIZE D (inches)	RIPRAP CLASS	LENGTH OF APRON L (feet)	DEPTH OF APRON H (feet)	ESTIMATED RIPRAP QUANTITY (CY)	ESTIMATED GEOTEXTILE QUANTITY (SY)
WITH END SECTION	12	2	4	1.5	1	5
	18	2	6	1.5	2.2	9
	24	2	8	1.5	3.9	14
	30	3	12.5	2	10.9	28
	36	3	16	2	15.6	37
	42	4	21	2.5	34.1	63
WITHOUT END SECTION	12	2	6	1.5	1.7	8
	18	2	8	1.5	3.2	12
	24	2	10	1.5	5.2	17
	30	3	14.5	2	13.3	33
	36	3	17	2	18.5	43
	42	4	23	2.5	38.7	70
48	4	26	2.5	49.8	87	

**OUTLET WITH DITCH PROTECTIVE APRON DIMENSIONS AND ESTIMATED QUANTITIES**

	CULVERT SIZE D (inches)	RIPRAP CLASS	LENGTH OF APRON L (feet)	DEPTH OF APRON H (feet)	ESTIMATED RIPRAP QUANTITY (CY)	ESTIMATED GEOTEXTILE QUANTITY (SY)
WITH END SECTION	12	2	4	1.5	0.9	5
	18	2	6	1.5	2	8
	24	2	8	1.5	3.6	13
	30	3	12.5	2	9.3	24
	36	3	15	2	13.4	32
	42	4	21	2.5	27.3	53
WITHOUT END SECTION	12	2	6	1.5	1.4	6
	18	2	8	1.5	2.7	10
	24	2	10	1.5	4.5	15
	30	3	14.5	2	10.8	27
	36	3	17	2	15.2	36
	42	4	23	2.5	29.9	57
48	4	26	2.5	38.6	70	

- NOTE:**
1. Use for aprons serving culverts with slopes of less than 10%.
  2. Furnish geotextile filter conforming to subsection 714.01(a). See summary tables for class and type.
  3. Excavation for placement of riprap will not be measured for payment.

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION  
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY DETAIL

**PLACED RIPRAP AT CULVERT OUTLETS**

DETAIL APPROVED FOR USE  
REVISOR: 08/2014 08/2020

DETAIL  
C251-50

## NOTES TO THE DESIGNER

Last Updated: August 2020

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### General Information

1. **Maximum slope.** Riprap aprons shown in this drawing can be used for culvert outlets with slopes up to 10%. For steeper applications, use alternate protective aprons, such as revet mattresses.

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### Applicable SCRs

1. None

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### Typical Pay Items Used

- 25101-2200 Placed riprap, method B, class 2 and/or
- 25101-2300 Placed riprap, method B, class 3 and/or
- 25101-2400 Placed riprap, method B, class 4
  
- 60201-0700 [12-inch to 48-inch] pipe culvert
- 60210-0700 End section for [12-inch to 48-inch] pipe culvert
  
- Geotextile quantity is shown for information only

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### Updates

October 16, 2000

- Updated border to FLH Standard

February 2, 2005

- Updated to MicroStation V8

March 2009

- Added drawings of aprons in ditches
- Added quantity tables
- Moved riprap rundown at culvert inlet to template drawing

November 2010

- Revised Section C-C and quantity table for outlet with ditch

April 2011

- Eliminated riprap apron under end section

August 2014

- Updated for FP-14
- Updated border

August 2020

- Update geotextile reference