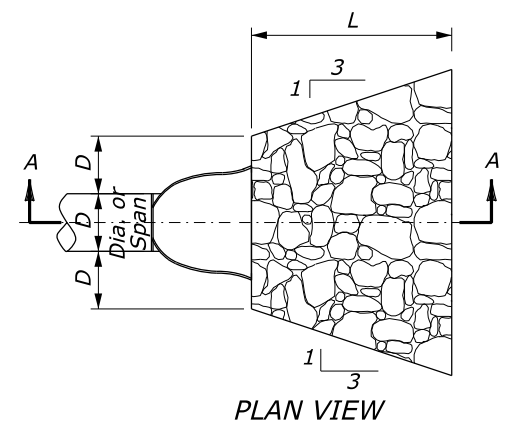
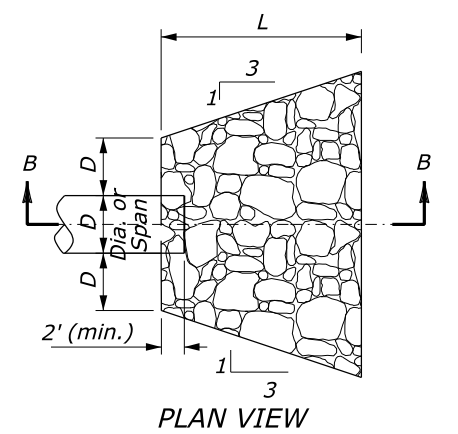


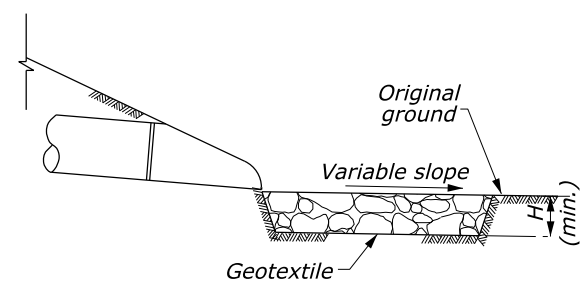
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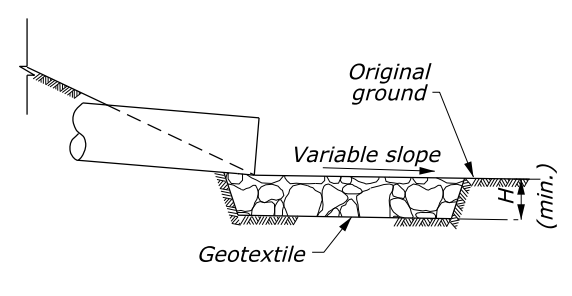
PLAN VIEW
CULVERT WITH STANDARD END SECTION



PLAN VIEW
CULVERT WITHOUT STANDARD END SECTION

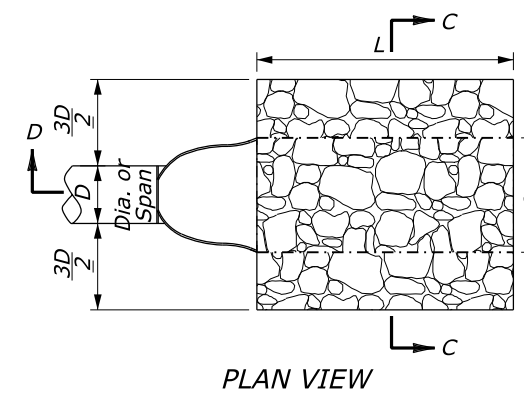


SECTION A-A

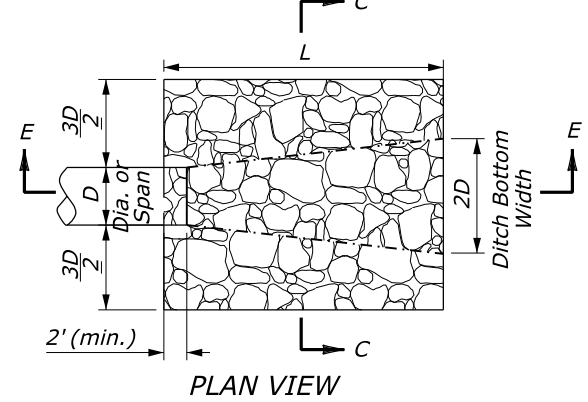


SECTION B-B

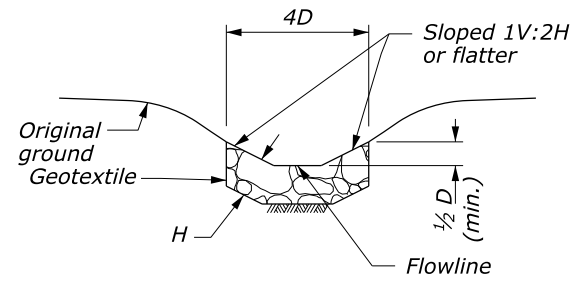
PROTECTIVE APRON AT CULVERT OUTLET WITHOUT DITCH



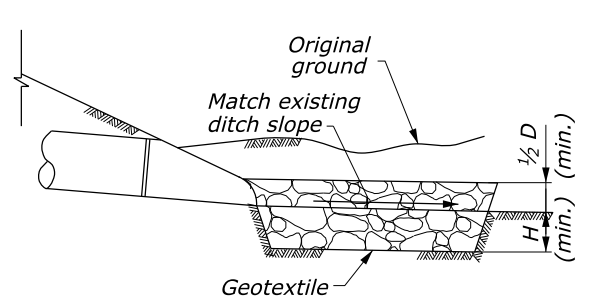
PLAN VIEW
CULVERT WITH STANDARD END SECTION



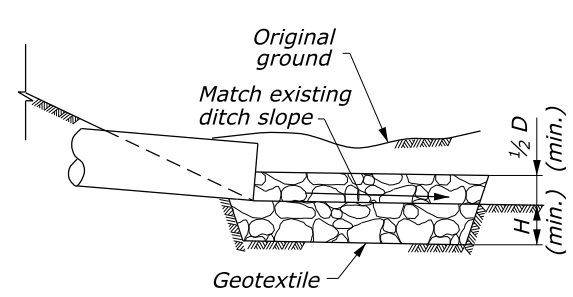
PLAN VIEW
CULVERT WITHOUT STANDARD END SECTION



SECTION C-C



SECTION D-D



SECTION E-E

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 conforming to Subsection 714.01(a).
3. Excavation for placement of riprap will not be measured for payment.

9:48:31 AM N:\CFL-DPT\Drawings\FP-14\FP14_Details\C251-50.dgn

9/22/2014

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	DETAIL
REVISED: 08/2014	C251-50

NOTES TO THE DESIGNER

Last Updated: August 2014

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.

Applicable SCRs

1. Section 251:
<http://www.cflhd.gov/resources/design/constructspecs/scr/fp14/documents/S251-14.docx>

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

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