

TABLE OF QUANTITIES

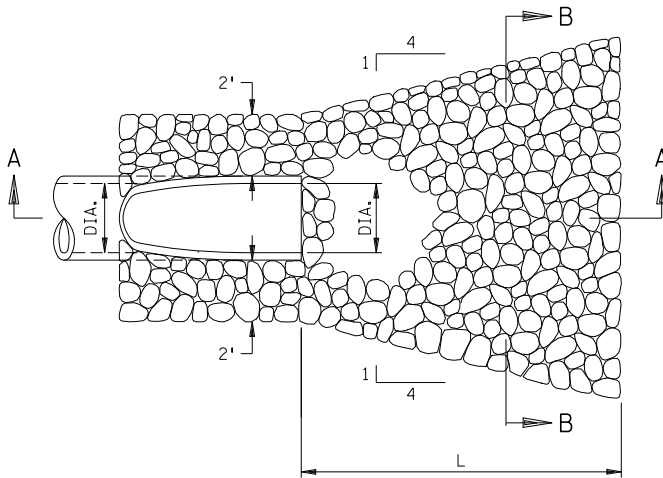
1:4 SLOPE

DIA. OF ROUND PIPE (IN.)	L (FT.)	CLASS II $d_{50} = 6"$			CLASS III $d_{50} = 9"$			CLASS IV $d_{50} = 12"$		
		GEO-TEXTILE FILTER (SQ. YD.)	GRANUL FILTER UNDER APRON (CU. YD.)	12" DEPTH RIPRAP (CU. YD.)	GEO-TEXTILE FILTER (SQ. YD.)	GRANUL FILTER UNDER APRON (CU. YD.)	18" DEPTH RIPRAP (CU. YD.)	GEO-TEXTILE FILTER (SQ. YD.)	GRANUL FILTER UNDER APRON (CU. YD.)	24" DEPTH RIPRAP (CU. YD.)
18	10	39.4	0.3	3.7	43.4	0.5	5.5	47.8	0.6	7.4
24	12	46.6	0.6	5.1	51.3	0.9	7.7	56.2	1.2	10.2
30	14	44.1	0.7	6.4	49.1	1.1	9.6	54.4	1.4	12.8
36	16	62.4	1.0	8.0	67.9	1.5	12.0	73.8	2.0	16.0
42	18	64.5	1.5	9.9	70.6	2.2	14.8	77.1	2.9	19.7
48	20	92.8	2.1	11.9	99.5	3.1	17.9	106.6	4.1	23.8

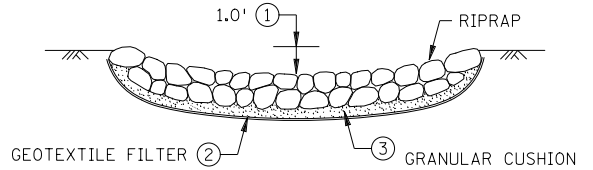
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1:6 SLOPE

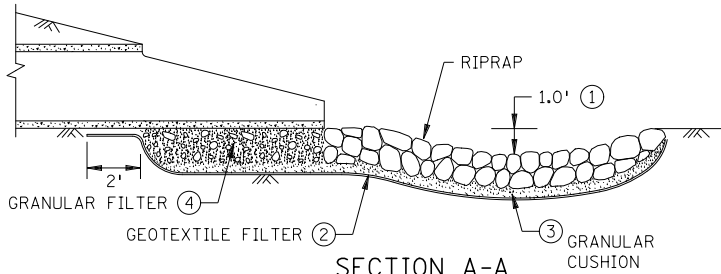
DIA. OF ROUND PIPE (IN.)	L (FT.)	CLASS II $d_{50} = 6"$			CLASS III $d_{50} = 9"$			CLASS IV $d_{50} = 12"$		
		GEO-TEXTILE FILTER (SQ. YD.)	GRANUL FILTER UNDER APRON (CU. YD.)	12" DEPTH RIPRAP (CU. YD.)	GEO-TEXTILE FILTER (SQ. YD.)	GRANUL FILTER UNDER APRON (CU. YD.)	18" DEPTH RIPRAP (CU. YD.)	GEO-TEXTILE FILTER (SQ. YD.)	GRANUL FILTER UNDER APRON (CU. YD.)	24" DEPTH RIPRAP (CU. YD.)
12	8	15.9	0.2	2.7	18.4	0.3	4.1	21.1	0.4	5.4
15	8	26.7	0.5	5.4	29.6	0.7	8.0	32.8	0.9	10.7
18	10	32.3	0.6	6.7	35.5	0.9	10.1	38.9	1.2	13.4
24	12	40.4	1.0	8.7	44.0	1.5	13.0	47.8	2.0	17.3



PLAN



SECTION B-B



SECTION A-A

NOTES:

- REQUIREMENTS FOR GEOTEXTILE TYPE, RIPRAP SIZE AND THICKNESS WILL BE DESIGNATED IN THE PLANS.
- PIPE SIZES LARGER THAN THOSE SHOWN REQUIRE A SPECIAL DESIGN.
- ① FOR PIPES GREATER THAN OR EQUAL TO 30", USE 1.5'.
- ② GEOTEXTILE FILTER, SPEC. 3733, SHALL COVER THE BOTTOM AND SIDES OF THE AREA EXCAVATED FOR THE RIPRAP, GRANULAR FILTER MATERIALS.
- ③ GRANULAR FILTER, SPEC. 3601, MAY BE USED AS A CUSHION LAYER. PLACE FILTER PER SPEC. 2511. THE CUSHION LAYER IS INCIDENTAL.
- ④ GRANULAR FILTER OR RIPRAP, SPEC. 3601, TO EXTEND UNDER ENTIRE OPEN PORTION OF PIPE APRON. DEPTH OF MATERIAL UNDER APRON SHALL MATCH RIPRAP DEPTH. WHEN USING RIPRAP INCREASE RIPRAP QUANTITY ACCORDINGLY AND PLACE A 3" LAYER OF 1.5" CRUSHED ROCK UNDER THE APRON TO AID IN GRADING FOR APRON PLACEMENT. CRUSHED ROCK IS INCIDENTAL.

APPROVED DECEMBER 9, 2013

*Christopher Ry*  
STATE DESIGN ENGINEER

STATE OF MINNESOTA  
DEPARTMENT OF TRANSPORTATION

RIPRAP AT  
PRECAST CONCRETE END SECTIONS  
(1:4 AND 1:6 SLOPES)

SPECIFICATION  
REFERENCE  
2511  
3601  
3733

STANDARD  
PLATE  
NO.

3139B