South Carolina
Department of Transportation

INSTRUCTIONAL BULLETIN NO. 2009-2

SUBJECT: Riprap for Pipe End Treatments
(Storm Drain Pipe from 12" diameter to 120" diameter)
EFFECTIVE DATE: September 2009 Letting
SUPERSEDES: Plan Preparation Guide Page 16-2
REFERENCES: SC-M-714 – Permanent Pipe Culverts
Special Provision – Smooth Wall Pipe
Special Provision – Pipe End Treatments
Standard Drawings 804-305-00, 804-310-00`

PAY ITEMS:

8041020	**Riprap (Class B)**	**Ton**
8041030	**Riprap (Class C)**	**Ton**
8048210	**Geotextile For Erosion Control Under Riprap (Class 2) Type _**	**SY**

In order to provide protection of pipe ends, include quantities of riprap and geotextile at all locations where pipe ends are exposed unless directed otherwise by the engineer.

Include these quantities in the plans for ALL exposed ends regardless of straight, beveled, or special end treatment used or pipe type.

The following table shows suggested minimum riprap quantities for pipe ends:

TABLE 804-305B

		2:1 SLOPE		3:1 SLOPE		4:1 SLOPE		6:1 SLOPE	
PIPE INSIDE DIAMETER [IN]	REQ'D RIPRAP CLASS	RIPRAP [TON]	GEOTEXTILE [SY]	RIPRAP [TON]	GEOTEXTILE [SY]	RIPRAP [TON]	GEOTEXTILE [SY]	RIPRAP [TON]	GEOTEXTILE [SY]
12	B	6	7	8	10	10	12	15	18
15	B	6	8	9	11	11	14	16	20
18	B	7	9	10	12	12	15	18	22
24	B	8	10	11	15	15	19	22	27
30	B	10	13	14	18	18	23	26	34
36	B	13	17	18	24	23	31	34	45
42	B	16	21	23	30	29	39	43	57
48	B	20	26	28	37	36	48	53	70
54	B	24	32	34	45	44	59	64	86
60	B	29	39	40	54	53	71	77	104
66	B	34	46	48	64	62	84	91	124
72	B	40	53	56	75	73	98	107	145
78	B	46	62	64	87	84	114	123	167
84	B	52	71	74	100	96	130	141	192
90	C	102	80	144	113	188	148	277	218
96	C	115	91	162	128	211	167	311	245
108	C	143	113	201	159	262	207	387	306
120	C	175	138	247	195	322	254	474	375

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This calculation assumes riprap extends 1' vertically above and below pipe. And extends 3' or one pipe diameter beyond the side of the pipe (whichever is larger). The placement thickness and riprap size is as indicated below (from SCDOT Standard Drawing 804-305-00). These riprap quantities, where provided as inclusion items, may be adjusted at the resident engineer's discretion unless noted otherwise in the plans. These quantities do not include riprap for ditch lining.

CHART 804-305A
RIPRAP PLACEMENT

MINIMUM CLASS	D50(FT)	MINIMUM THICKNESS (FT)	PIPE DIAMETER(IN)
B	0.75	1.50	UP TO 84"
C	1.30	2.60	LARGER THAN 84"

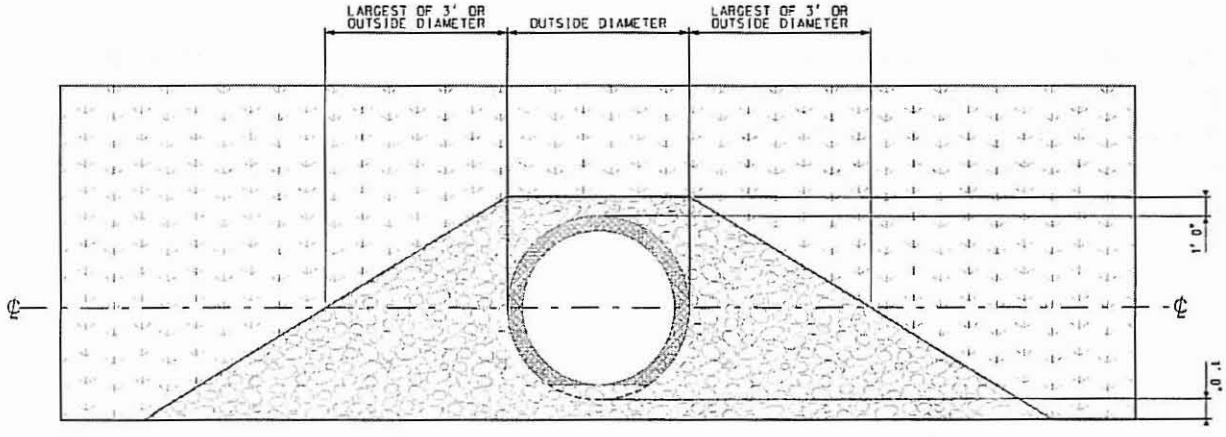

Figure 1: Pipe End Front Elevation

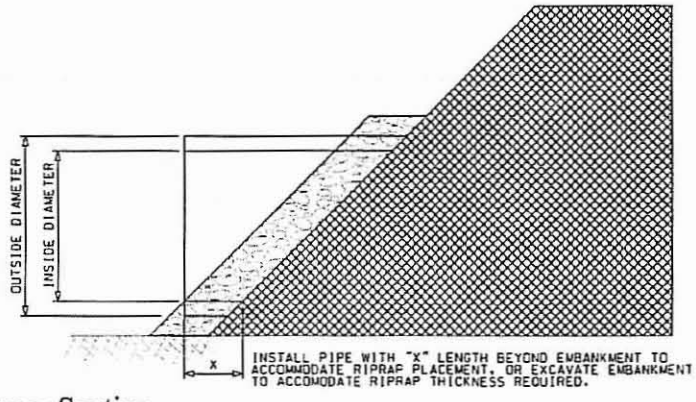

Figure 2: Pipe End Cross Section

Note: Install pipe with "X" length extending beyond embankment to accommodate riprap placement, or excavate embankment to accommodate riprap thickness required.

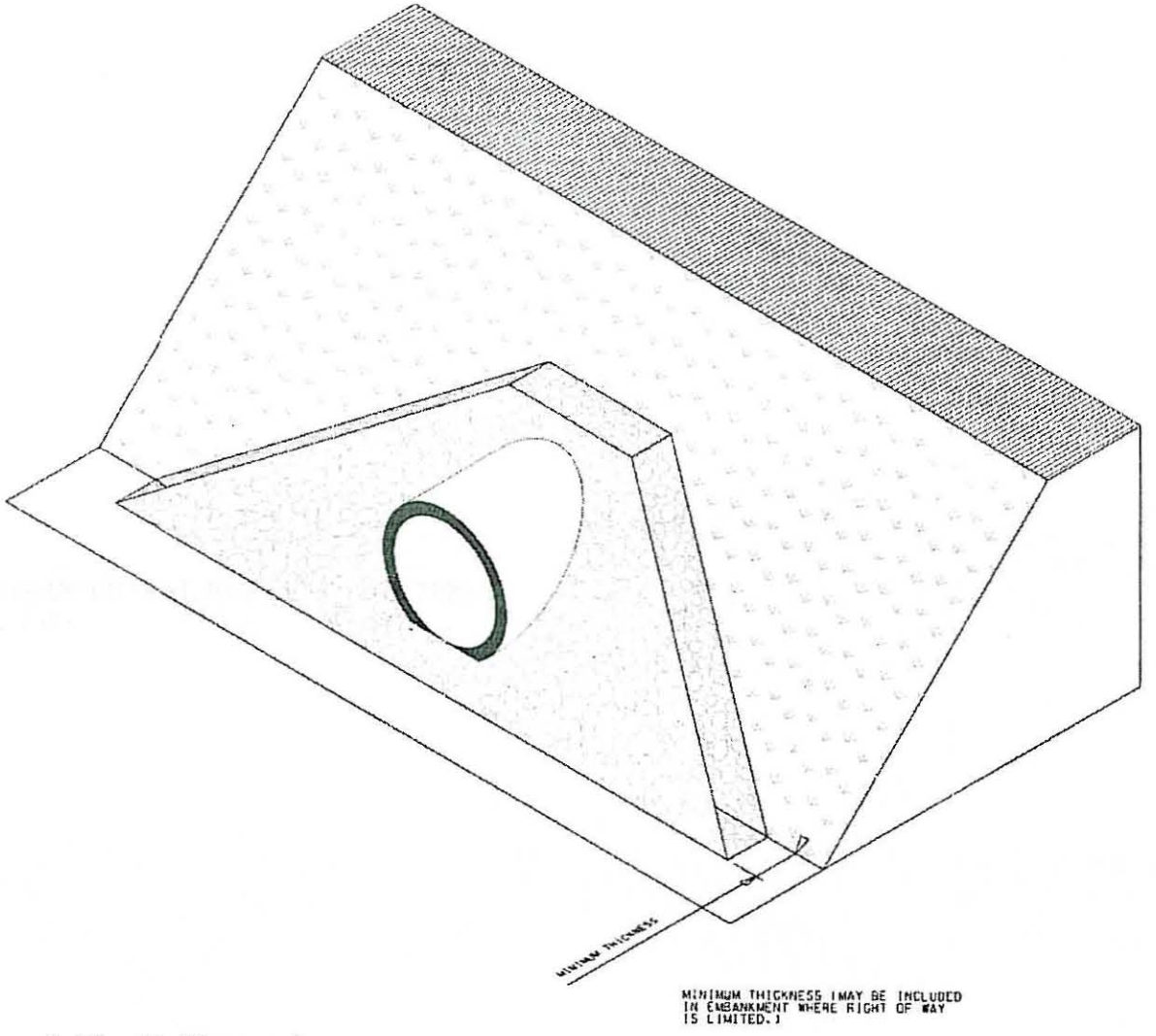

Figure 3: Pipe End Isometric

When ditch lining (804-310-00) is also required, provide the total quantity (value from table 804-305B plus quantity required to line ditch) and indicate on the plans as a minimum required quantity for each location. These quantities may only be increased by the resident engineer unless approved by the design engineer.

Approved: _____

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Preconstruction Support Engineer

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