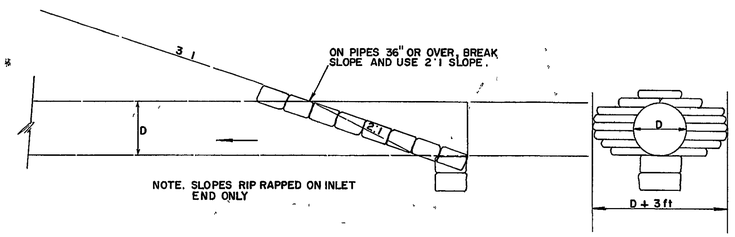
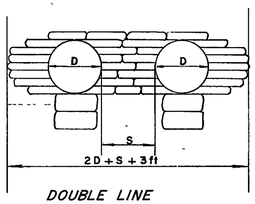
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	BRSTP-2938-00(004)	117	188

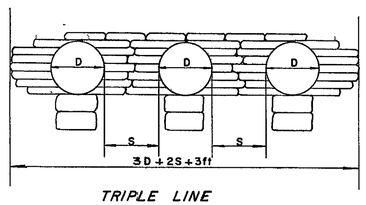
STRAIGHT END WALL TYPE 1



SINGLE LINE

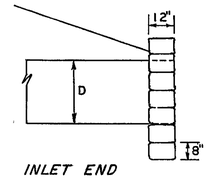


DOUBLE LINE

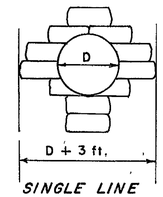


TRIPLE LINE

STRAIGHT END WALL TYPE 3



INLET END



SINGLE LINE

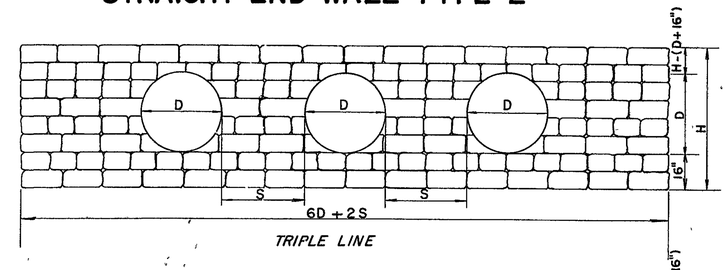
NOTE:
SINGLE LINE SHOWN ABOVE TYPE 3 STRAIGHT END WALL MAY UTILIZE MULTIPLE LINES WITH 2D + S + 3 ft = WIDTH FOR DOUBLE LINES AND 3D + 2S + 3 ft. = WIDTH FOR TRIPLE LINES.

TYPE 3 STRAIGHT END WALL QUANTITIES

DIAMETER OF PIPE	AREA OPENING	SAND CEMENT BAG RIP RAP	ADD'L RIP RAP FOR EACH ADDT'L PIPE
INCHES	SQ FT.	SQ YDS.	SQ. YDS.
18	1.767	1.5	1.0
24	3.142	1.8	1.7
30	4.909	2.2	2.5
36	7.069	2.5	3.5
42	9.621	2.8	4.2
48	12.566	3.2	4.9

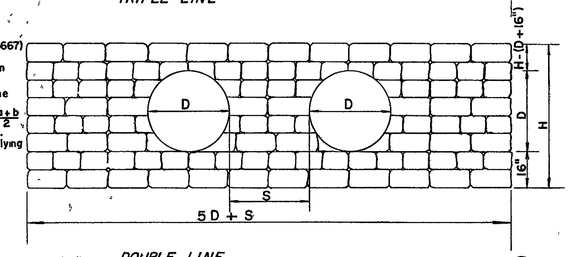
NOTE: FOR APRON QUANTITIES SEE CHART BELOW.

STRAIGHT END WALL TYPE 2

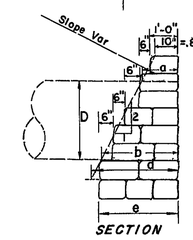


TRIPLE LINE

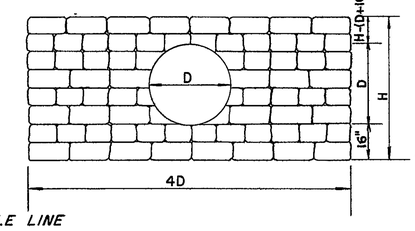
End Area = $\frac{.8333 + d}{2} \times (H - .6667) + e \times .667 =$
Total Volume = End Area in Sq. Ft x 4 D in Ft
Pay Volume = Total Volume − Volume of C D
Volume of C D = $\pi r^2 \times \frac{a+b}{2}$
Convert Cu. Ft. into Sq. Yds. of 8" bag courses by multiplying Cu Ft by $\frac{1.5}{9}$ = 0.1666



DOUBLE LINE

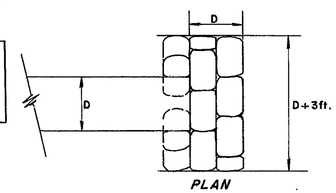


SECTION



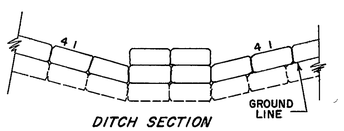
SINGLE LINE

D = INSIDE DIAMETER OF PIPE
S = ONE INSIDE DIAMETER OF PIPE OR 3 FT WHICHEVER IS SMALLER.

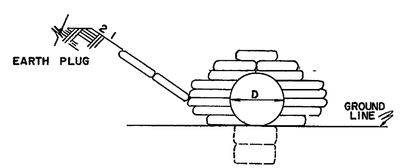


PLAN

"L" TYPE END WALL - TYPE 1

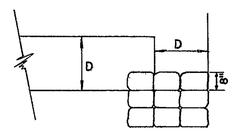


DITCH SECTION

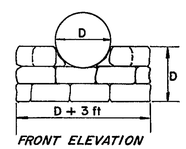


SINGLE LINE

APRON FOR OUTLET END



SIDE ELEVATION



FRONT ELEVATION

SPECIAL NOTE.

IN GENERAL, SAND CEMENT BAG RIPRAP ENDWALLS TYPE 1 ARE TO BE USED ONLY ON 18" AND 24" CROSS DRAIN PIPE. IN SPECIAL SITUATIONS, TYPE 2 ENDWALLS MAY BE USED ON 30" AND LARGER CROSS DRAIN PIPE IN LIEU OF THE DESIRED CLASS B CONCRETE HEADWALLS. NORMAL USAGE OF THIS STANDARD IS ON LOW TRAFFIC STATE AID AND F A S PROJECTS.

SAND CEMENT BAG RIPRAP TO BE IN ACCORDANCE WITH SECTION 603 OF THE STANDARD SPECIFICATIONS, EXCEPT THAT THE BAGS WILL BE 8" THICK NORMAL SIZE OF SAND CEMENT BAG TO BE APPROXIMATELY 18" x 12" x 8". EACH COURSE OF BAGS TO BE WETTED SUFFICIENTLY TO ALLOW THE PROPER CEMENT REACTION

METHOD OF MEASUREMENT: WHERE TYPE 1, 2 OR 3 SAND CEMENT BAG ENDWALLS ARE CONSTRUCTED ACCORDING TO DIMENSIONS AS SHOWN ON THE STANDARD, PAYMENT WILL BE MADE BASED ON THE NUMBER OF SQ. YDS. SHOWN ON THE STANDARD FOR THAT SIZE PIPE AND CONDITION. QUANTITIES SHOWN ARE BASED ON THE INSIDE DIAMETER OF PIPE. NO DEDUCTION SHALL BE MADE FOR SHELL THICKNESS OF PIPE IN COMPUTING PAY QUANTITIES.

WHERE DIMENSIONS VARY FROM THOSE SHOWN, PAY QUANTITIES WILL BE COMPUTED ACCORDING TO THE DETAIL AS SHOWN.

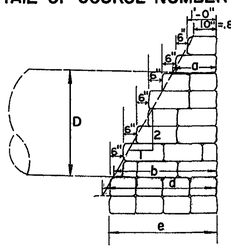
QUANTITIES SHOWN FOR APRON AT OUTLET AND "L" TYPE ENDWALLS ARE FOR ESTIMATING PURPOSES ONLY. PAYMENT FOR APRON AT OUTLET AND "L" TYPE ENDWALLS IS TO BE MADE ACCORDING TO QUANTITIES MEASURED AS ACTUALLY PLACED

IN GENERAL TYPE 3 ENDWALLS SHOULD BE USED ON 18", 24" OR 30" PIPES WHERE THE RESULTANT LENGTH OF THE CROSS DRAIN PIPE WILL BE LESS THAN IF TYPE 1 ENDWALLS WERE USED, HOWEVER IN SPECIAL SITUATIONS TYPE 3 ENDWALLS MAY BE USED ON PIPES UP TO 48" IN DIAMETER OR WHERE LONGER LENGTHS OF PIPE ARE REQUIRED.

	TYPE 1			
	STRAIGHT END WALL QUANTITIES-ONE WALL		"L" TYPE END WALL QUANTITIES-ONE WALL	
DIAMETER OF PIPE	AREA OPENING	SAND CEMENT BAG RIP RAP	ADDT'L RIP RAP FOR EACH ADDT'L PIPE	SAND CEMENT BAG RIP RAP	ADDT'L RIP RAP FOR EACH ADDT'L PIPE
INCHES	SQ FT	SQ YDS	SQ.YDS	SQ.YDS	SQ YDS
18	1.767	2.5	2.1	8.4	2.1
24	3.142	2.8	3.1	11.3	3.1
30	4.909	3.5	4.4	14.4	4.4
36	7.069	3.8	4.8	17.7	4.8
42	9.621	3.5	5.5	20.8	5.5
48	12.566	3.8	6.3	24.9	6.3
54	15.904	4.2	7.1	29.4	7.1
60	19.635	4.5	7.9	34.3	7.9
66	23.758	4.8	8.7		
72	28.274	5.2	9.6	(Based on	
78	33.183	5.8	10.0	4 1 Front	
84	38.485	6.2	11.3	Slopes and	
90	44.179	6.5	12.3	2 1 Plug	
96	50.266	6.8	13.2	Slope	
102	56.745	7.2	14.2		
108	63.617	7.5	15.2		

TYPE 2 STRAIGHT END WALL QUANTITIES-ONE WALL										APRON AT OUTLET	
4D LENGTH IN FEET	a ft	b ft	d ft	e ft	H HEIGHT IN FT & IN	H HEIGHT IN BAG COURSE NO	SAND CEMENT BAG RIP RAP SQ.YDS	ADDT'L RIP RAP FOR EACH ADDT'L PIPE SQ YDS.	NORMAL SAND CEMENT BAG RIP RAP SQ.YDS.	ADDT'L RIP RAP FOR EACH ADDT'L PIPE SQ.YDS.
									3.5	3.0
									4.5	3.0
10	1.58	2.83	3.17	3.0	5'-4"	8	17.1	7.6	6.0	4.0
12	1.33	2.83	3.17	3.0	5'-4"	8	20.2	8.9	6.0	5.3
14	1.42	3.17	3.50	3.5	6'-0"	9	29.8	11.8	9.2	5.0
16	1.50	3.50	3.83	4.0	6'-8"	10	41.9	15.4	9.2	6.6
18	1.58	3.83	4.17	4.0	7'-4"	11	50.8	17.0	11.0	10.0
20	1.33	3.83	4.17	4.0	7'-4"	11	56.0	17.3	13.0	10.0
22	1.42	4.16	4.50	4.5	8'-0"	12	73.9	21.8	15.2	14.0
24	1.50	4.50	4.83	5.0	8'-8"	13	95.2	26.9	15.2	14.0
26	1.58	4.83	5.17	5.0	9'-4"	14	109.3	28.7	20.0	16.0
28	1.33	4.83	5.17	5.0	9'-4"	14	117.1	29.1	20.0	18.7
30	1.42	5.17	5.50	5.5	10'-0"	15	145.8	35.3	22.5	24.0
32	1.50	5.50	5.83	6.0	10'-8"	16	178.7	42.2	25.5	24.0
34	1.58	5.83	6.17	6.0	11'-4"	17	199.1	44.1	28.3	30.0
36	1.33	5.83	6.17	6.0	11'-4"	17	210.0	44.7	28.3	30.0

DETAIL OF COURSE NUMBER & ARRANGEMENT



PIPE DIAMETER	COURSE NO
30"	8
36"	8
42"	9
48"	10
54"	11
60"	11
66"	12
72"	13
78"	14
84"	14
90"	15
96"	16
102"	17
108"	17

REVISIONS	BY	DATE
add Ty 3 Str End Wall	R.M.U	7-28-72
Spec. Note Rev	R.M.U.	5-25-76

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

STANDARD

SAND CEMENT BAG RIP RAP FOR END WALL & APRON

SCALE 3/8" = 1 Ft

MAY, 1968

DESIGNED R.B.S
DRAWN A.V.S
TRACED A.V.S
CHECKED R.B.S

SUBMITTED STATE BRIDGE DESIGN ENGINEER
APPROVED STATE HIGHWAY ENGINEER

NUMBER 1018 B

Dietzgen N O 135 "Imperial"