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**REFERENCES**  
 NATIONAL DOCUMENTS  
 ASTM A706  
 SCDOT DOCUMENTS  
 SECTION 718/701 SCDOT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION QUALIFIED PRODUCT L15 T14

RELATED DRAWINGS & KEYWORDS

**PRECONSTRUCTION SUPPORT ENGINEER**



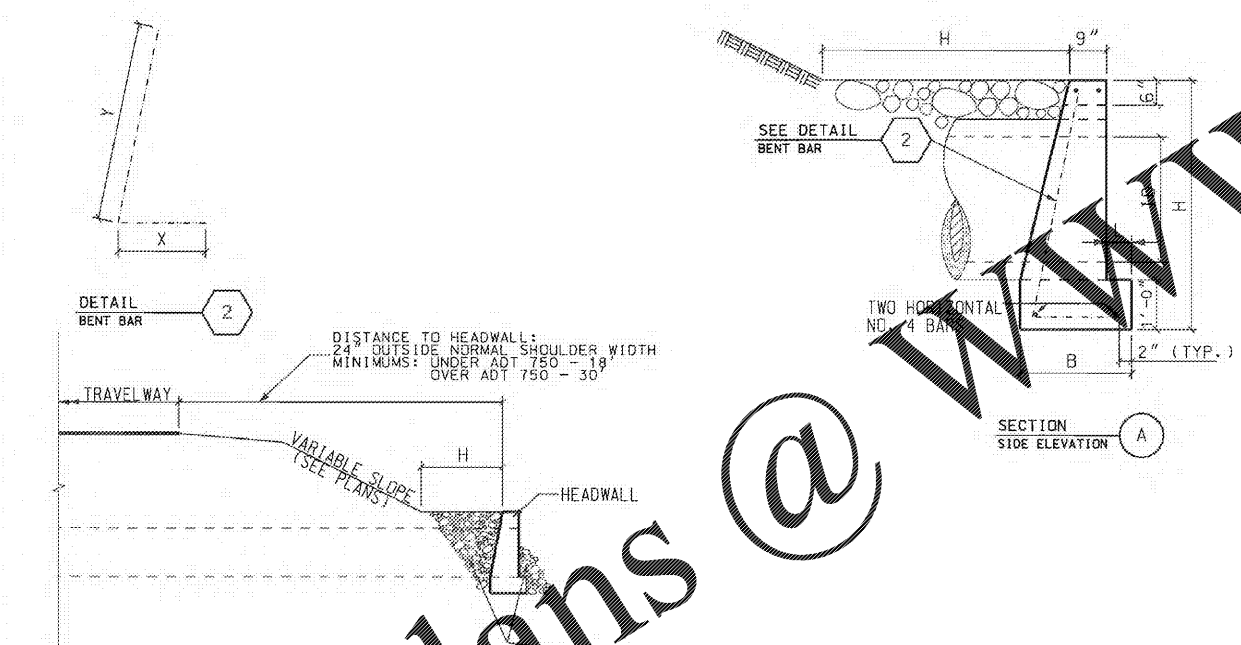
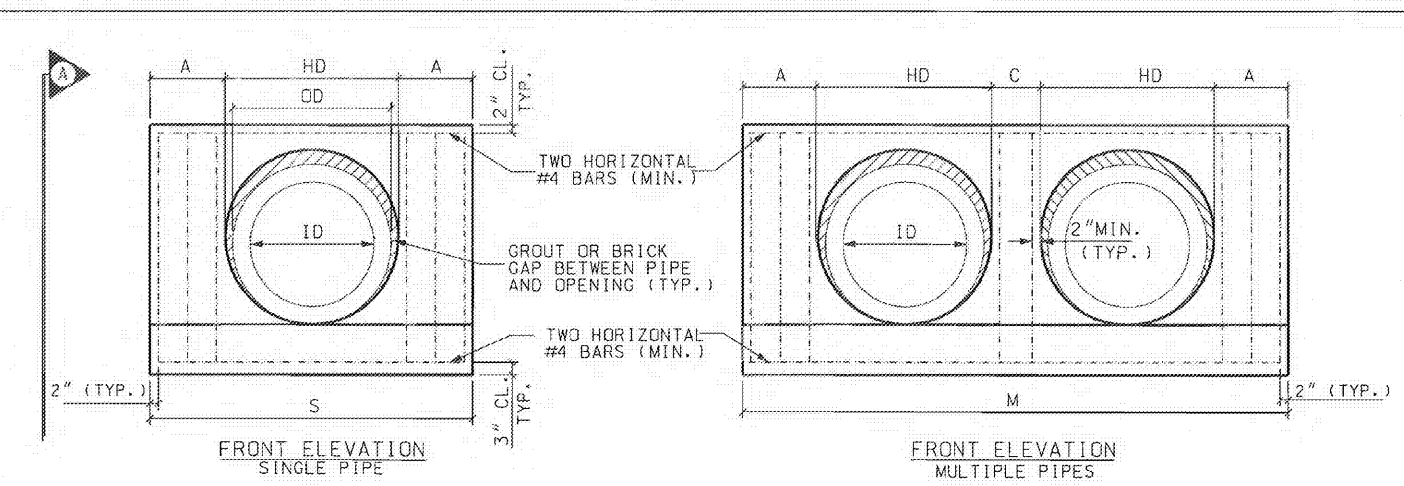
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**SCDOT**  
 SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 DESIGN STANDARDS OFFICE  
 955 PARK STREET  
 ROOM 405  
 COLUMBIA, SC 29201

**STANDARD DRAWING**  
 END TREATMENT (STRAIGHT HEADWALL FOR CIRCULAR PIPE)

719-605-00  
 EFFECTIVE LETTING DATE MAY 2008



USE CLASS B RIP-RAP IN ACCORDANCE WITH SCDOT STANDARD SPECIFICATION SECTION 804 FOR BOTH BACKFILL AND WRAP-AROUND (SEE CHART 701-605A)

**TABLE 719-605B STRAIGHT HEADWALL FOR CIRCULAR PIPE**

INSIDE DIA. (ID)	OUTSIDE DIA. (OD)	MINIMUM OPENING HD	SINGLE PIPE HEADWALL			MULTIPLE PIPE HEADWALL											
			MINIMUM HEADWALL HEIGHT (H)	MINIMUM FOOTING WIDTH (F)	MINIMUM TIE WIDTH (L)	(A)	WALL WIDTH (S)	(X)	(Y)	BENT BAR QTY.	REBAR SIZE	RIPRAP QTY. (TON)	WALL WIDTH (M)	PIPE SPACE (C)	ADDITIONAL REBAR PER PIPE	ADDITIONAL RIPRAP QTY. (TON/FT)	
15"	21"	21"	3'-6"	1'-10"	0'-6"	1'-7/2"	5'-3"	1'-6"	3'-0"	6	4	3	7'-9"	0'-6"	2	4	0.4
18"	24"	24"	3'-10"	1'-11"	0'-6"	1'-7"	5'-6"	1'-7"	3'-3"	6	4	3	8'-6"	0'-6"	2	4	0.5
24"	30"	30"	4'-4"	2'-0"	0'-6"	1'-7"	6'-0"	1'-8"	3'-9"	6	4	4	9'-6"	0'-8"	2	4	0.6
30"	36"	36"	5'-0"	2'-2"	0'-6"	1'-6"	6'-6"	1'-10"	4'-3"	6	4	6	11'-0"	1'-0"	2	4	0.8
36"	42"	42"	5'-7"	2'-3"	0'-6"	1'-5/2"	7'-0"	1'-11"	4'-9"	6	4	8	12'-0"	0'-11"	2	4	1.0
42"	48"	48"	6'-2"	2'-5"	0'-6"	1'-11"	8'-6"	2'-11"	5'-4"	6	4	12	14'-6"	1'-4"	3	4	1.2
48"	54"	54"	6'-10"	3'-0"	1'-0"	1'-10"	9'-0"	2'-8"	5'-10"	6	4	15	15'-6"	1'-2"	3	4	1.5
54"	60"	60"	7'-5"	3'-2"	1'-0"	2'-3/2"	10'-6"	2'-10"	6'-4"	8	4	20	18'-0"	1'-7"	3	4	1.7
60"	66"	66"	8'-0"	3'-3"	1'-0"	2'-3"	11'-0"	2'-11"	6'-10"	8	4	24	19'-0"	1'-6"	3	4	2.0

- ① (M) SHOWN IS FOR 2 PIPES OF THE SAME DIAMETER. ADJUST (M) AS REQUIRED FOR MULTIPLE PIPES OR PIPES OF VARIOUS DIAMETER.
- ② RIPRAP QUANTITY FOR MULTIPLE PIPE IS PER FOOT OF (M) DIMENSION
- ③ EACH HEADWALL REQUIRES TWO ADDITIONAL HORIZONTAL BARS IN FOOTING LENGTH (S-4") OR (M-4")
- ④ ADD BARS FOR EACH ADDITIONAL PIPE

**NOTES:**

- FOR BUILT IN PLACE CONSTRUCTION OF THE STRAIGHT CONCRETE HEADWALL CLASS 4000 CONCRETE SHALL BE USED. FOR PRECAST CONSTRUCTION, A MINIMUM OF CLASS 4000P CONCRETE MEETING THE REQUIREMENTS OF SECTION 701 OF THE SCDOT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (LATEST EDITION).
- REINFORCING STEEL SHALL BE ASTM A-706, LOW-ALLOY STEEL DEFORMED BARS FOR CONCRETE REINFORCEMENT, GRADE 60.
- GROUT SHALL BE TYPE M MORTAR MATERIAL IN ACCORDANCE WITH SECTION 718 OF THE SCDOT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (LATEST EDITION).
- IN THE EVENT THE HEADWALL IS SKEWED TO THE PIPE, THE POSITION OF PIPE THAT PROTRUDES BEYOND THE EXPOSED FACE OF THE HEADWALL SHALL BE CUT FLUSH AND GROUTED SMOOTH WITH THE EXPOSED FACE OF THE HEADWALL.
- FOR THREE OR MORE LINES OF PIPE THE WIDTH (M) SHALL BE INCREASED BY THE "HD" AND "C" DIMENSIONS AND THE REINFORCING STEEL SHALL INCREASE ACCORDINGLY.
- WHEN PIPES OF DIFFERENT DIAMETERS ARE USED, DESIGN SHOULD COMPLY WITH DESIGN OF LARGEST PIPE.
- PRECAST NOTES:  
 7. THE USE OF PRECAST ITEMS WILL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF OBTAINING SATISFACTORY INSTALLATIONS.  
 8. LIFT HOLES AND LIFT DEVICES MAY BE PLACED AS NECESSARY. ALL LIFT HOLES SHALL BE GROUTED AND CURED PRIOR TO COMPLETION OF THE INSTALLATION. ALL LIFTING METHODS MUST MEET OSHA REGULATIONS.  
 9. THE CONTRACTOR SHALL USE MANUFACTURERS LISTED ON QUALIFIED PRODUCT LIST 14.  
 10. PRECAST ITEMS MODIFIED FROM THIS STANDARD SHALL NOT BE LISTED ON QUALIFIED PRODUCT LIST 14, HOWEVER, CONTRACTOR SHALL SUBMIT DESIGN DRAWINGS AND CALCULATIONS TO THE ENGINEER OF RECORD FOR REVIEW.
- PRECAST INSTALLATION NOTES:  
 11. BED SHALL BE PREPARED AND COMPACTED FOR STRAIGHT CONCRETE HEADWALL AS REQUIRED BY SCDOT STANDARD SPECIFICATIONS FOR PRECAST ITEMS. ELEVATION OF BEDDING MATERIAL SHALL BE APPROPRIATE TO ACCOMMODATE ELEVATION OF PIPE.  
 12. PLACE AND LEVEL PRECAST HEADWALL.  
 13. PIPES SHALL BE BRICKED AND GROUTED IN PLACE.  
 14. PIPES AND HEADWALL SHALL BE BACKFILLED AND COMPACTED AS REQUIRED BY SCDOT STANDARD SPECIFICATIONS.  
 15. BRICK AND MORTAR SHALL BE USED TO ADJUST ELEVATIONS OF THROAT WALLS AS REQUIRED TO MEET ELEVATION AND CROSS SLOPES.  
 16. ANY LOCATION WHERE THE ABOVE REQUIREMENTS CANNOT BE MET SHALL BE COMPLETED USING CAST IN PLACE MATERIALS MEETING THE REQUIREMENTS OF THIS STANDARD DRAWING. ANY ADDITIONAL MATERIALS OR COSTS ASSOCIATED WITH THE USE OF PRECAST SHALL BE PAID FOR BY THE CONTRACTOR AND MAY NOT BE CHARGED TO SCDOT.  
 17. THE CONTRACT UNIT PRICE FOR STRAIGHT HEADWALL FOR CIRCULAR PIPE SHALL INCLUDE THE COST OF FURNISHING ALL MATERIALS (BUILT IN PLACE OR PRECAST) AND WORK INCIDENTAL TO THE CONSTRUCTION OF THE STRUCTURE COMPLETE IN PLACE AS SHOWN (INCLUDING CLASS B RIP-RAP) IN ACCORDANCE WITH THE SCDOT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (LATEST EDITION).  
 18. THE PAY ITEM SHALL BE:  
 STRAIGHT CONCRETE HEADWALL (\_\_\_\_) PIPE (\_\_\_\_) LINES-EACH  
 SIZE \_\_\_\_\_ NUMBER \_\_\_\_\_

**TABLE 719-605A RIPRAP**

CLASS	D <sub>50</sub> (FT)	MINIMUM THICKNESS (FT)
A	0.50	1.00
B	0.75	1.50
C	1.30	2.60
D	1.80	3.60
E	2.25	4.50
F	2.85	5.70

**TABLE 719-605C PRECAST ITEMS**

STRAIGHT HEADWALL SINGLE PIPE 15" DIA. MAX. (39"x20"x63")
STRAIGHT HEADWALL SINGLE PIPE 18" DIA. MAX. (42"x21"x66")
STRAIGHT HEADWALL SINGLE PIPE 24" DIA. MAX. (48"x24"x72")
STRAIGHT HEADWALL SINGLE PIPE 30" DIA. MAX. (54"x26"x78")
STRAIGHT HEADWALL SINGLE PIPE UP TO 36" DIA. MAX. (60"x27"x84")
STRAIGHT HEADWALL SINGLE PIPE 42" DIA. MAX. (66"x29"x102")
STRAIGHT HEADWALL SINGLE PIPE 48" DIA. MAX. (72"x36"x108")
STRAIGHT HEADWALL SINGLE PIPE 54" DIA. MAX. (78"x38"x126")
STRAIGHT HEADWALL SINGLE PIPE UP TO 60" DIA. MAX. (84"x39"x132")
STRAIGHT HEADWALL MULTIPLE PIPES 15" DIA. MAX. (39"x20"xM)
STRAIGHT HEADWALL MULTIPLE PIPES 18" DIA. MAX. (42"x21"xM)
STRAIGHT HEADWALL MULTIPLE PIPES 24" DIA. MAX. (48"x24"xM)
STRAIGHT HEADWALL MULTIPLE PIPES 30" DIA. MAX. (54"x26"xM)
STRAIGHT HEADWALL MULTIPLE PIPES UP TO 36" DIA. MAX. (60"x27"xM)
STRAIGHT HEADWALL MULTIPLE PIPES 42" DIA. MAX. (66"x29"xM)
STRAIGHT HEADWALL MULTIPLE PIPES 48" DIA. MAX. (72"x36"xM)
STRAIGHT HEADWALL MULTIPLE PIPES 54" DIA. MAX. (78"x38"xM)
STRAIGHT HEADWALL MULTIPLE PIPES UP TO 60" DIA. MAX. (84"x39"xM)

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