

BDF



South Carolina
Department of Transportation

DM0299

FEBRUARY 19, 1999

MEMORANDUM TO GROUP LEADERS & CONSULTANTS

SUBJECT: Bridge End Drainage Details

This memorandum replaces the previous Design Memorandums DM0488 and DM0189 dated October 17, 1988 and February 22, 1989 respectively.

Bridge Design has received reports of erosion problems at bridge ends and ends of approach slabs on bridges without deck drains. The field engineers have requested that the concrete curb and gutter with flume be detailed, in the bridge plans, for these projects. The concrete curb and gutter with flume should be detailed on bridges that have no bridge deck drains regardless of the slope coming off the bridge.

Bridges with bridge deck drains and a slope coming off the bridge less than 1% can continue to use the road department's standard concrete curb and gutter. Bridges with bridge deck drains and a slope coming off the bridge more than 1%, should be detailed in the bridge plans, with the concrete curb and gutter with flume.

The attached drawings "BCGFLUME" and "BCGFLUMEA" detailing the concrete curb and gutter at the end of approach slab, with or without asphalt approaches, should be revised as necessary to fit each project.

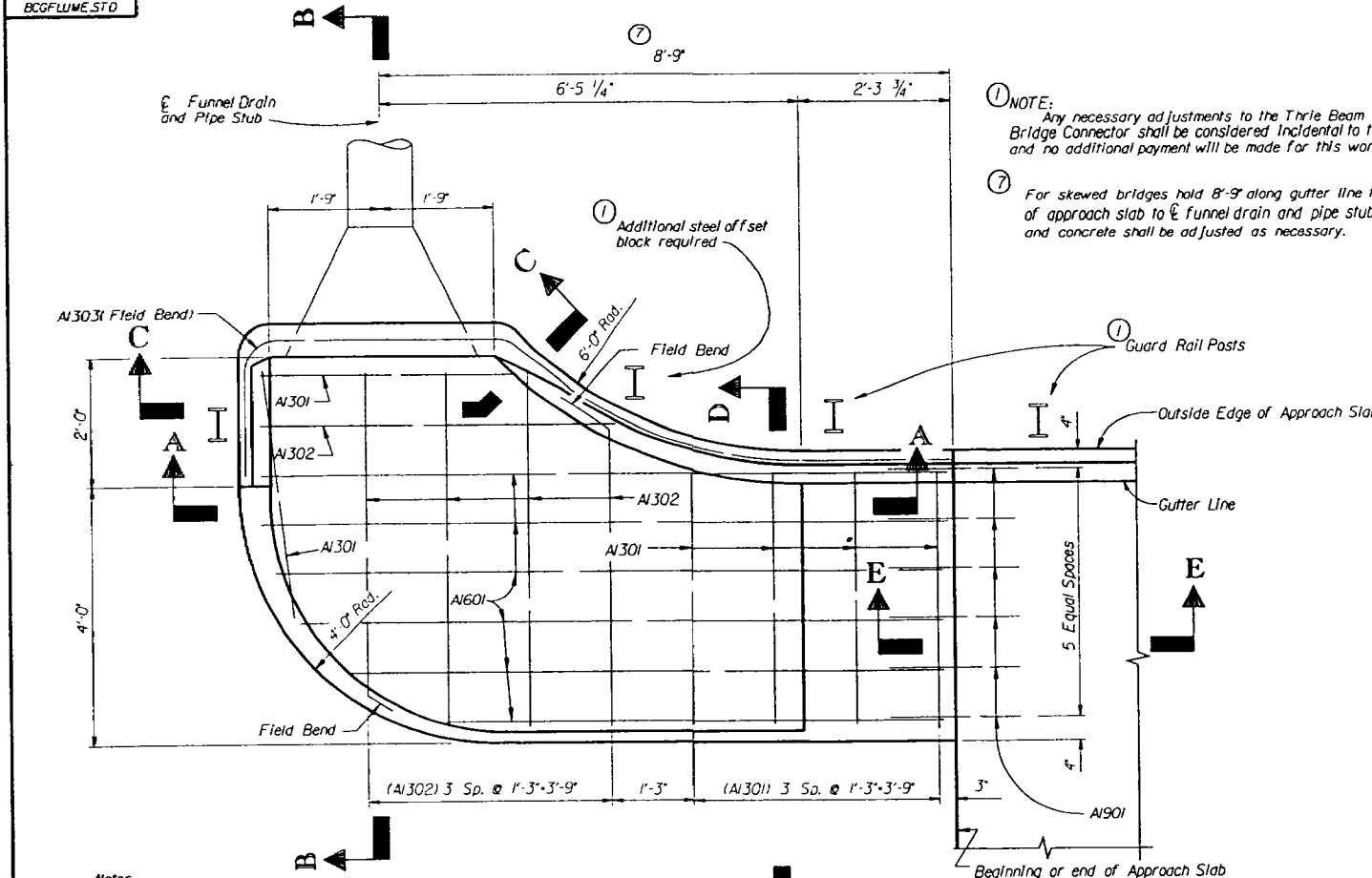
The attached drawing "BCGFLUME1" detailing the concrete curb and gutter at the end of bridge, with or without asphalt approaches, should be revised as necessary to fit each project.

All of the above drawings can be found in the Bridge Standards File under the file name BCGFLUME.STD.

Randy R. Cannon, P.E.
Bridge Design Engineer

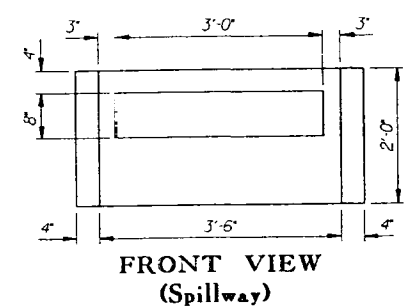
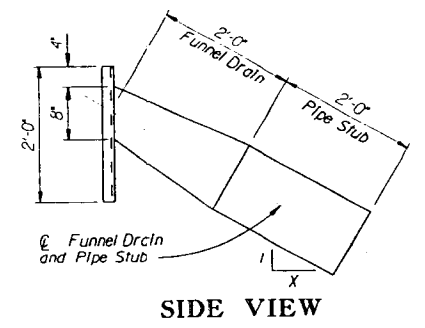
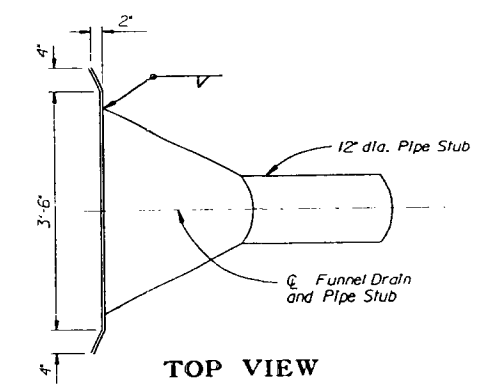
Attachments:
cc: Assistant Bridge Design Engineers
File: PC/REL





NOTE:
 1 Any necessary adjustments to the Thrle Beam Guard Rail Bridge Connector shall be considered incidental to the Contract and no additional payment will be made for this work.
 7 For skewed bridges hold 8'-9" along gutter line from end of approach slab to center of funnel drain and pipe stub. Reinforcing steel and concrete shall be adjusted as necessary.

METAL FUNNEL DETAILS



Metal Funnel Drain shall include the spillway, funnel drain and pipe stub. Spillway and funnel drain shall be fabricated from flat smooth metal sheets. Metal for the spillway, funnel drain and pipe stub may be 0.064" (min.) thick steel (See note 6) or 0.075" (min.) thick aluminum (See note 3).
 All costs for materials, equipment and labor necessary to fabricate and install the metal funnel, including the pipe stub, shall be included in the unit price bid for Curb and Gutter with Flume.

REINF. STEEL SCHEDULE
(ONE CURB & GUTTER)

MARK	NO.	DIMENSION			LENGTH
	REQ'D	"-"	"-"	"-"	
A1301	6	4'-0"			4'-0"
A1302	5	5'-6"			5'-6"
A1303	1	13'-2"			13'-2"
A1304	9	0'-10"			0'-10"
A1601	6	10'-8"			10'-8"
A1901	6	2'-0"			2'-0"

QUANTITIES
(ONE CURB & GUTTER)

Class "D" Concrete	2.2 C.Y.
Reinforcing Steel (4)	133 Lbs.

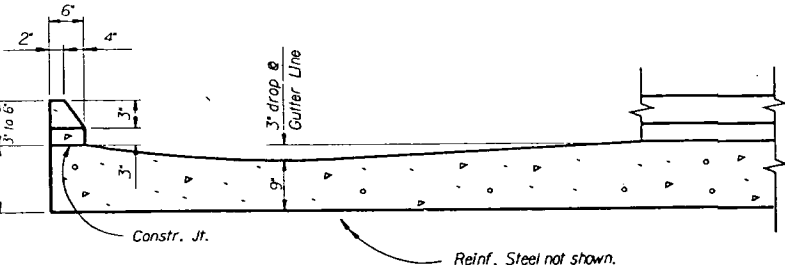
QUANTITIES
PIPE SLOPE DRAIN

12" Dia. Pipe Slope Drain	XX L.F.
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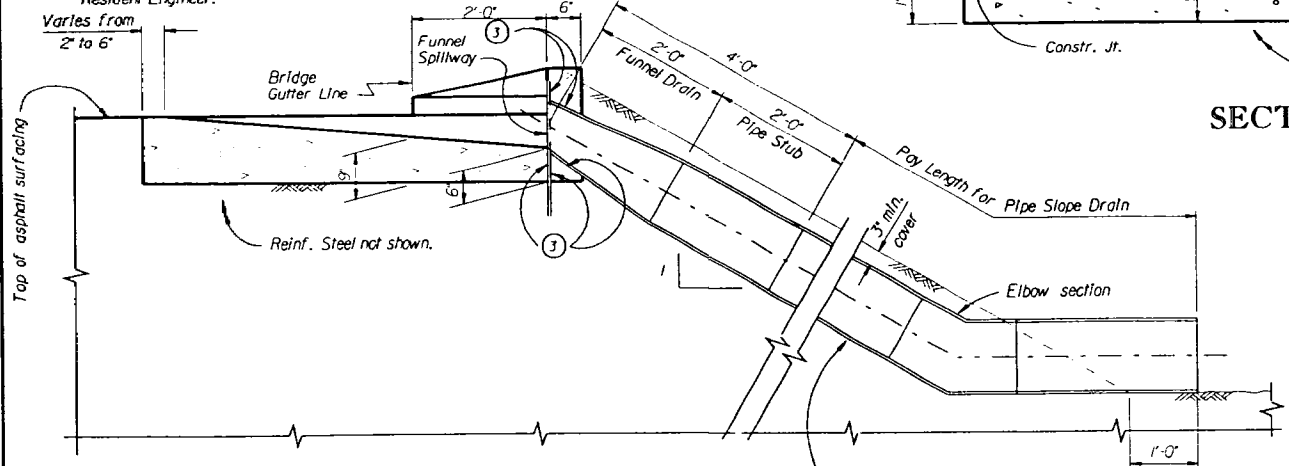
4 Includes 5 Lbs. for A1304 and 18 lbs. for A1901. At no additional expense to the Department, Resin Anchors may be substituted for A1304 or A1901.
 5 For one bridge end drainage.

Notes:
 The grade and alignment of the curb and gutter shall parallel the grade and alignment of the approach roadway. Roadway section from end of flume to approach slab (when specified) shall be built to the same crown as the bridge roadway.
 6 Steel shall be galvanized after fabrication in accordance with ASTM A-123. If the galvanizing for the funnel drain or pipe stub is damaged before final acceptance, the area affected shall be field galvanized in accordance with ASTM A-780. Application, including cleaning shall be in accordance with manufacturer's instructions.
 3 If the Contractor elects to use the aluminum Funnel Drain then one coat of asphaltic paint shall be applied to area of Funnel Drain and Spillway in contact with concrete. An alternate method of preventing contact may be used if desired by the Contractor. Asphaltic paint or alternate method shall be approved by the Resident Engineer.

P L A N

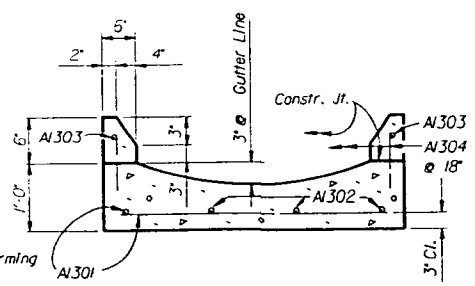


SECTION A-A

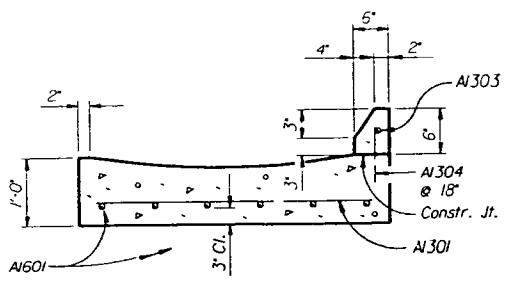


SECTION B-B

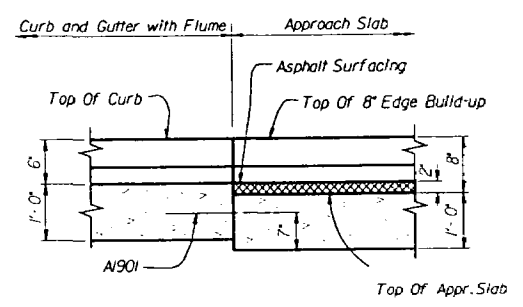
12" dia. 16 Gauge Galv. C. M. Pipe or
 12" dia. Corrugated Polyethylene (PE) Drainage Tubing conforming to the current AASHTO Spec. M-294 (Type C) as applicable or
 12" dia. Corrugated Aluminum Alloy Culvert, Type I (0.075" Min.) conforming to the current AASHTO Spec. M-196.
 2 Pipe or Tubing shall not be perforated.



SECTION C-C



SECTION D-D



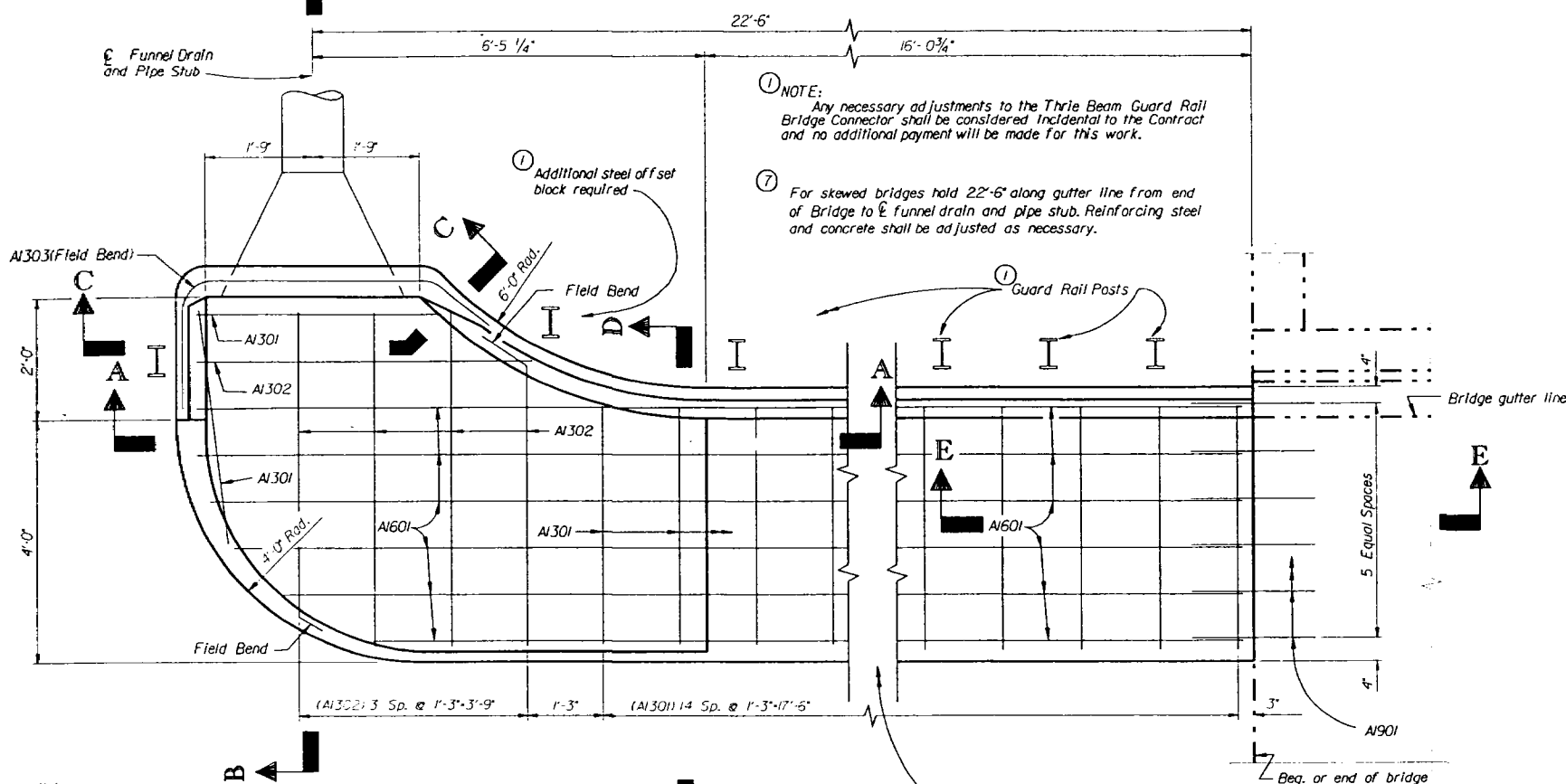
SECTION E-E

Notes:
 For location of bridge end drainage see Bridge Plan and Profile.
 All costs of materials, equipment, and labor necessary to construct the required number of curbs and gutters with flumes, including excavation and backfilling for such, shall be included in the unit price bid for Curb and Gutter with Flume.
 All costs for materials, equipment and labor necessary to construct the pipe slope drains, including excavation and backfilling for such, shall be included in the unit price bid for 12" Pipe Slope Drains. Elbow sections shall be considered as part of the pipe slope drains and no additional payment will be made for these items.

REV.	REJ	JAR	2-99
UPDATE			
REV.	REJ	HEB	10-91
APPR. SLAB ATT.			
REV.	KMG	MCM	9-91
NOTE 7			
REVIEWED			
QUAN.	DR.	MSA	RRC
DES.	BY	CHL	DATE

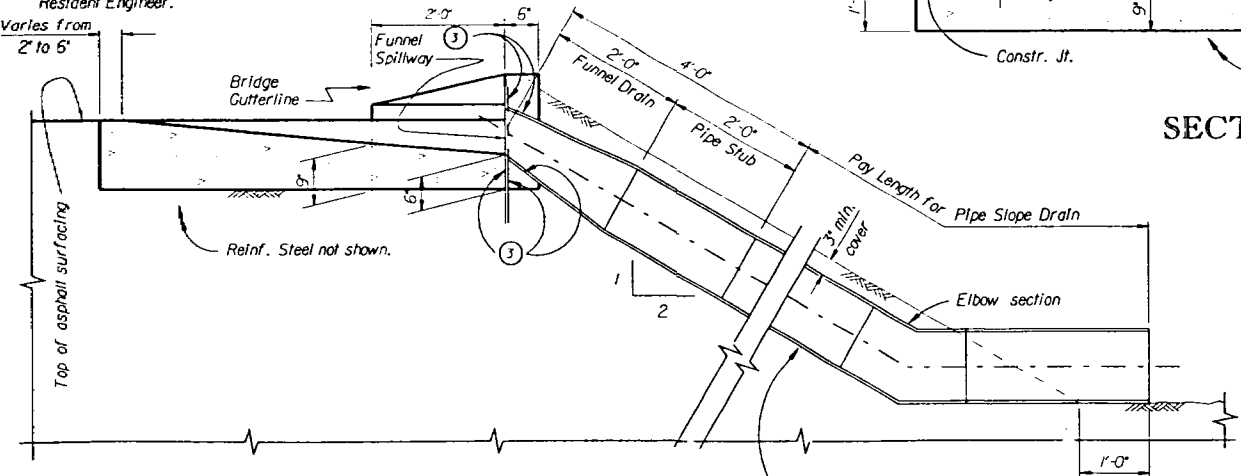
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION BRIDGE DESIGN COLUMBIA, S.C.			
CURB AND GUTTER WITH FLUME (ASPHALT APPROACHES)			
FILE NO.	ROUTE	COUNTY	DRAWING NO.
XXXX	X-XX	XXXXXX	BCGFLUME-2

As of 2/18/99 REG



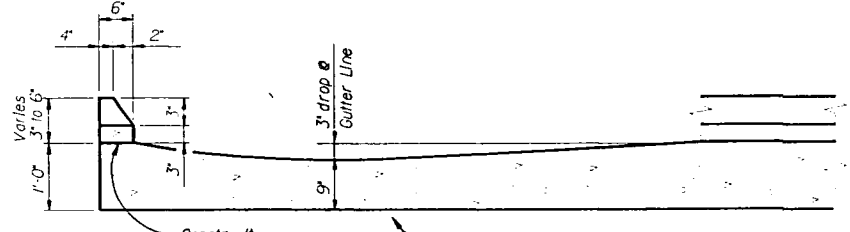
P L A N

Notes:
 The grade and alignment of the curb and gutter shall parallel the grade and alignment of the approach roadway. Roadway section from end of flume to end of bridge (when specified) shall be built to the same crown as the bridge roadway.
 ⑤ Steel shall be galvanized after fabrication in accordance with ASTM A-123. If the galvanizing for the funnel drain or pipe stub is damaged before final acceptance, the area affected shall be field galvanized in accordance with ASTM A-780. Application, including cleaning shall be in accordance with manufacturer's instructions.
 ③ If the Contractor elects to use the aluminum Funnel Drain then one coat of asphaltic paint shall be applied to area of Funnel Drain and Spillway in contact with concrete. An alternate method of preventing contact may be used if desired by the Contractor. Asphaltic paint or alternate method shall be approved by the Resident Engineer.

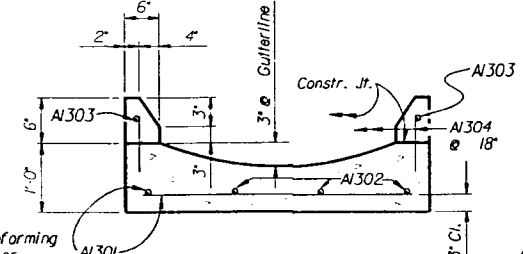


SECTION B-B

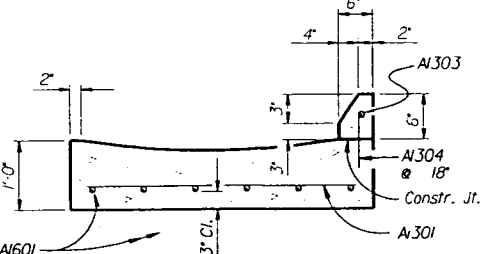
12" dia. 16 Gauge Galv. C. M. Pipe or 12" dia. Corrugated Polyethylene (PE) Drainage Tubing conforming to the current AASHTO Spec. M-294 (Type C) as applicable or 12" dia. Corrugated Aluminum Alloy Culvert, Type I (0.075" Min.) conforming to the current AASHTO Spec. M-196.
 ② Pipe or Tubing shall not be perforated.



SECTION A-A

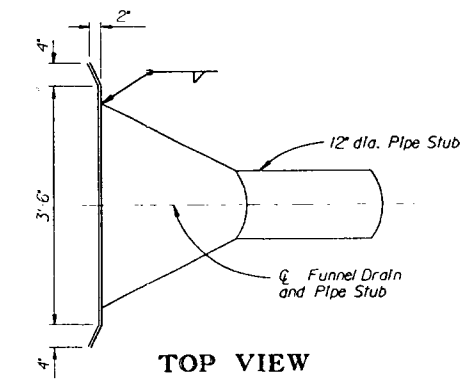


SECTION C-C

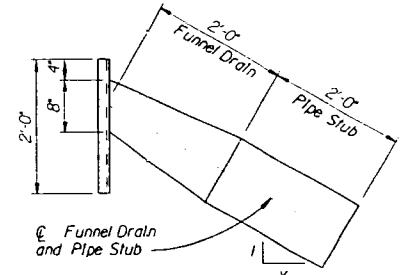


SECTION D-D

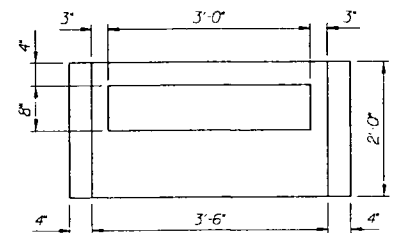
METAL FUNNEL DETAILS



TOP VIEW



SIDE VIEW



FRONT VIEW (Spillway)

Metal Funnel Drain shall include the spillway, funnel drain and pipe stub. Spillway and funnel drain shall be fabricated from flat smooth metal sheets. Metal for the spillway, funnel drain and pipe stub may be 0.064" (min.) thick steel (See note ⑥) or 0.075" (min.) thick aluminum (See note ③).
 All costs for materials, equipment and labor necessary to fabricate and install the metal funnel, including the pipe stub, shall be included in the unit price bid for Curb and Gutter with Flume.

REINF. STEEL SCHED. (ONE CURB & GUTTER)

MARK	NO.	REQ'D	DIMENSION	LENGTH
A1301	17	4'-0"		4'-0"
A1302	5	5'-6"		5'-6"
A1303	1	13'-2"		13'-2"
A1304	18	0'-10"		0'-10"
A1601	12	13'-0"		13'-0"
A1901	6	2'-0"		2'-0"

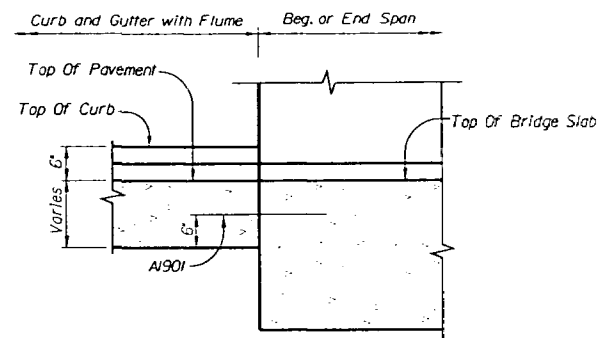
QUANTITIES (ONE CURB & GUTTER)

Class "D" Concrete	45 C.Y.
Reinforcing Steel ④	260 Lbs.

QUANTITIES PIPE SLOPE DRAIN

12" Dia. Pipe Slope Drain	XX L.F.
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- ④ Includes 10 Lbs. for A1304 and 18 lbs. for A1901. At no additional expense to the Department, Resin Anchors may be substituted for A1304 or A1901.
- ⑤ For one bridge end drainage.



SECTION E-E (Drawn For Flat Slab Only)

Notes:
 For location of bridge end drainage see Bridge Plan and Profile.
 All costs of materials, equipment, and labor necessary to construct the required number of curbs and gutters with flumes, including excavation and backfilling for such, shall be included in the unit price bid for Curb and Gutter with Flume.
 All costs for materials, equipment and labor necessary to construct the pipe slope drains, including excavation and backfilling for such, shall be included in the unit price bid for 12" Pipe Slope Drains. Elbow sections shall be considered as part of the pipe slope drains and no additional payment will be made for these items.

REV.			
REV.			
REV.	REJ	JAR	2-99
		UPDATE	
REVIEWED			
QUAN.	Y/A	JAR	8-94
DR.	MSA	RRC	10-88
DES.			
BY	CHK	DATE	

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION BRIDGE DESIGN COLUMBIA, S.C.

CURB AND GUTTER WITH FLUME

FILE NO.	ROUTE	COUNTY	DRAWING NO.
XX-XXX	X-XXX	XXXXXX	BCGF LUME1

As of 2/18/99 R.E.G.