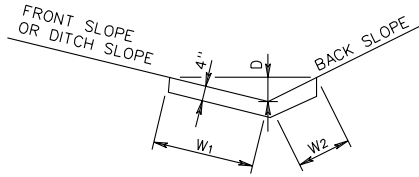


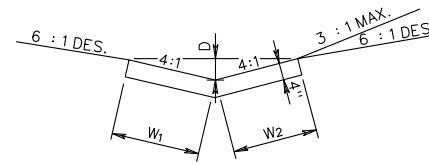
OUTSIDE ROAD DITCHES

MEDIAN DITCH



TYPE	D	FRONT SLOPE	BACK SLOPE	W1	W2	K	SQ. YDS. SURFACE AREA/LIN. FT.
A1	6"	6:1	4:1	3'-0"	2'-1"	48	0.565
A1	8"	6:1	4:1	4'-1"	2'-9"	104	.0759
A2	6"	6:1	3:1	3'-0"	1'-7"	42	0.509
A2	8"	6:1	3:1	4'-1"	2'-1"	92	0.685
A3	6"	6:1	2:1	3'-0"	1'-2"	38	0.463
A3	8"	6:1	2:1	4'-1"	1'-6"	82	0.620
B1	6"	4:1	4:1	2'-1"	2'-1"	38	0.463
B1	8"	4:1	4:1	2'-9"	2'-9"	82	0.611
B2	8"	4:1	3:1	2'-9"	2'-1"	72	0.537
B2	10"	4:1	3:1	3'-5"	2'-8"	130	0.676
B3	8"	4:1	2:1	2'-9"	1'-6"	60	0.472
B3	10"	4:1	2:1	3'-5"	1'-10"	111	0.583
B4	8"	4:1	1 1/2:1	2'-9"	1'-2"	55	0.435
B4	10"	4:1	1 1/2:1	3'-5"	1'-6"	101	0.546
C1	8"	3:1	2:1	2'-1"	1'-6"	50	0.398
C1	10"	3:1	2:1	2'-8"	1'-10"	92	0.500
C2	10"	3:1	1 1/2:1	2'-8"	1'-6"	80	0.463
C3	10"	3:1	1:1	2'-8"	1'-2"	70	0.426

TYPE D

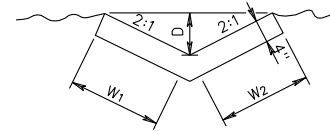


K - 82

D - DEPTH	W <sub>1</sub>	W <sub>2</sub>	SQ. YDS. SURFACE AREA PER LIN. FT
8"	2'-9"	2'-9"	0.611

DITCH AT TOE OF FILL OR TOP OF CUT

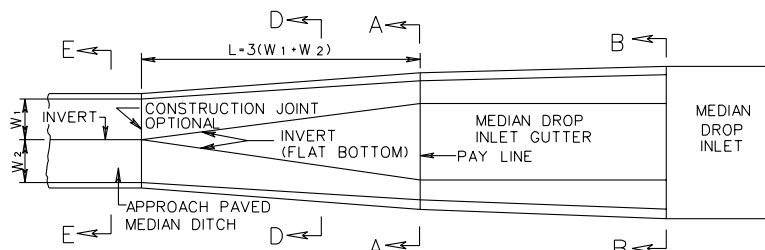
TYPE E



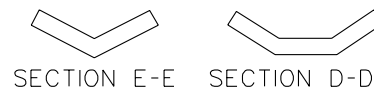
K - 115

12"	2'-3"	2'-3"	0.500
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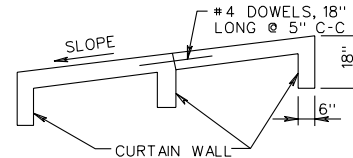
PLAN FOR TRANSITION OF PAVED MEDIAN DITCH TO MEDIAN DROP INLET GUTTER



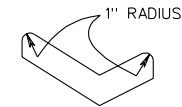
NOTES:  
 FOR SECTION A-A AND B-B SEE STANDARDS DI-7, 7A AND 7B.  
 TRADITIONAL PORTION OF PAVED DITCH TO BE PAID FOR AT THE SAME PRICE BID PER SQ. YARD FOR APPROACH PAVED MEDIAN DITCH.  
 STANDARD PG-2A DITCHES TO BE CLASS A3 CONCRETE.



CURTAIN WALL TO BE LOCATED AT BEGINNING AN END OF ALL CHANNELS AND ON THE LOWER END OF EACH EXPANSION JOINT.



ALTERNATE METHOD OF FORMING DITCHES



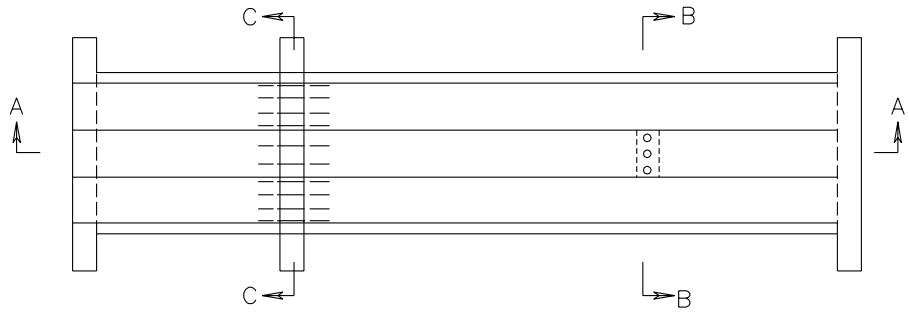
NOTE:  
 ALL DITCHES MAY BE CONSTRUCTED WITH VERTICAL SIDES AT THE OPTION OF THE CONTRACTOR.

SPECIFICATION REFERENCE

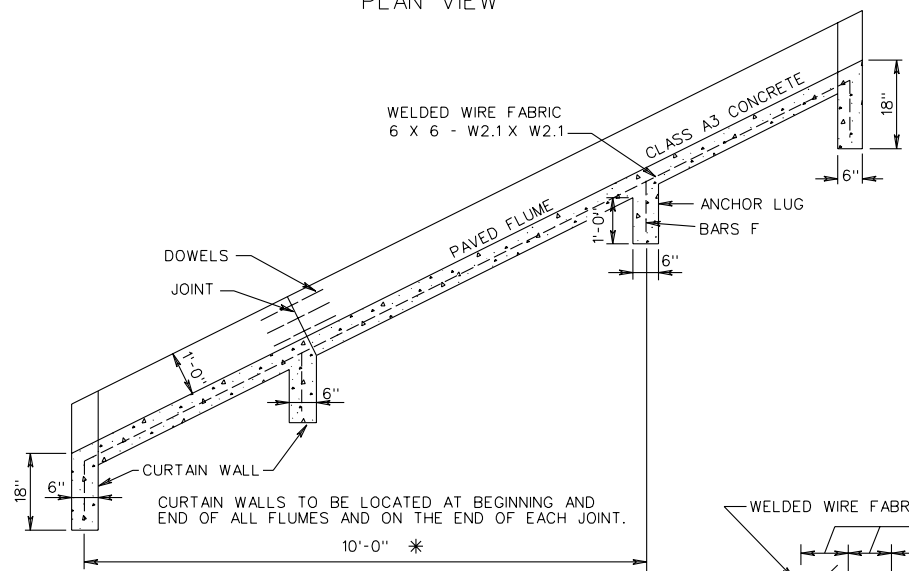
502

STANDARD PAVED DITCHES

VIRGINIA DEPARTMENT OF TRANSPORTATION

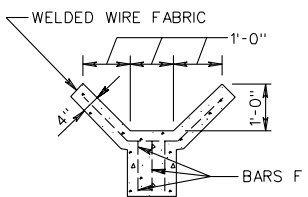


PLAN VIEW

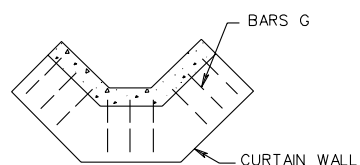


SECTION A-A

\*10'-0" C-C MAXIMUM TYPICAL SPACING BETWEEN ANCHOR LUGS. ANCHOR LUG IS TO BE A MAXIMUM OF 2' FROM END OF CHANNEL.



SECTION B-B



SECTION C-C

MARK	NO.	LENGTH		SIZE	SPACING C-C	SHAPE
		2:1	1/2:1			
F	3	1'-2"	1'-2"	4	4"	STRAIGHT
G	9	1'-5"	1'-5"	4	6"	STRAIGHT
DOWELS	10	1'-6"	1'-6"	4	5"	STRAIGHT

NO. SHOWN ARE FOR ONE ANCHOR LUG, CURTAIN WALL AND JOINT.

		CLASS A3 CONCRETE	REINFORCING STEEL
		CU. YDS.	LBS.
ANCHOR LUG	2:1	0.0208	2.34
	1/2:1	0.0216	2.34
CURTAIN WALL	2:1	0.099	8.51
	1/2:1	0.100	8.51
JOINT	2:1	—	10.02
	1/2:1	—	10.02

0.425 SQUARE YARDS SURFACE AREA PER LINEAR FOOT OF FLUME.

NOTE:  
DOWELS TO BE LOCATED AT ALL REQUIRED JOINTS.  
K VALUE - 128

FOR DETAILS OF PIPE SPILLOUTS FOR 12"-24" CULVERTS, SEE STANDARD DRAWINGS PS-2 AND PS-3.

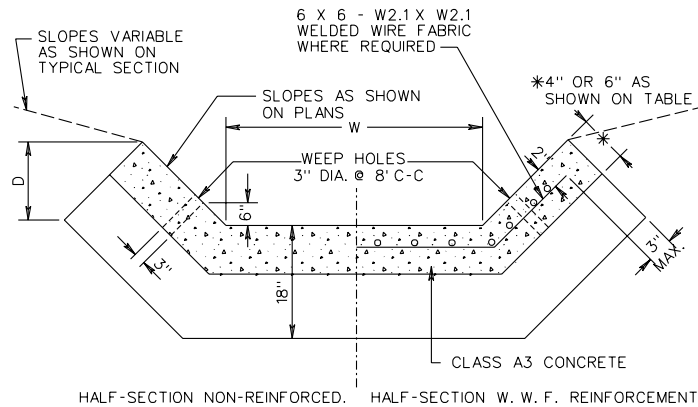
## STANDARD PAVED FLUME FOR 12" - 24" PIPE CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

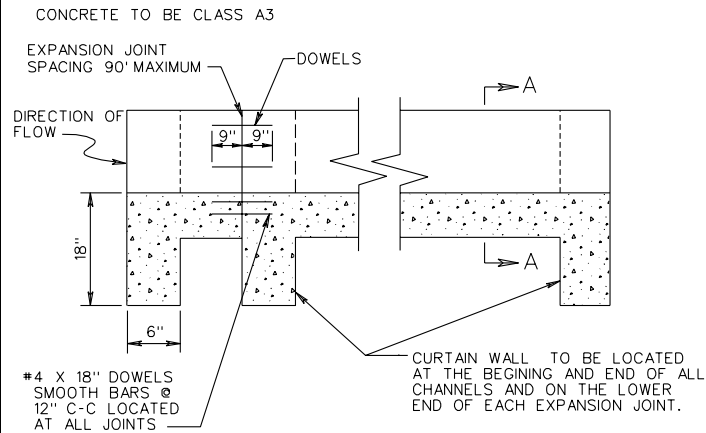
SPECIFICATION REFERENCE

502

 INDICATES CHANNEL WHERE WIRE MESH REINFORCEMENT IS NOT REQUIRED.



SECTION A-A



ELEVATION

SQUARE YARDS PER LIN. FT. OF PAVED CHANNEL

CONC. THICK-NESS	D	W									
		1'	2'	3'	4'	5'	6'	7'	8'	9'	10'
1:1 SIDE SLOPES											
4"	1'	0.425	0.536	0.648	0.759	0.870	0.981	1.092	1.203	1.314	1.425
	2'	0.740	0.851	0.962	1.073	1.184	1.295	1.406	1.517	1.629	1.740
	3'	1.054	1.165	1.276	1.387	1.498	1.609	1.721	1.832	1.943	2.054
	4'	1.368	1.479	1.590	1.702	1.813	1.924	2.035	2.146	2.257	2.368
6"	5'	1.682	1.794	1.905	2.016	2.127	2.238	2.349	2.460	2.571	2.682
	6'	1.997	2.108	2.219	2.330	2.441	2.552	2.663	2.774	2.886	2.997
	7'	2.311	2.422	2.533	2.644	2.755	2.866	2.977	3.089	3.200	3.311
	8'	2.625	2.736	2.848	2.959	3.070	3.181	3.292	3.403	3.514	3.625
	9'	2.940	3.051	3.162	3.273	3.384	3.495	3.606	3.717	3.828	3.939
	10'	3.254	3.365	3.476	3.587	3.698	3.809	3.920	4.032	4.143	4.254
1.5:1 SIDE SLOPES											
4"	1'	0.512	0.623	0.734	0.845	0.956	1.067	1.178	1.290	1.401	1.512
	2'	0.912	1.023	1.135	1.246	1.357	1.468	1.579	1.690	1.801	1.912
	3'	1.313	1.424	1.535	1.646	1.757	1.869	1.980	2.091	2.202	2.313
	4'	1.714	1.825	1.936	2.047	2.158	2.269	2.380	2.491	2.602	2.714
6"	5'	2.114	2.225	2.336	2.448	2.559	2.670	2.781	2.892	3.003	3.114
	6'	2.515	2.626	2.737	2.848	2.959	3.070	3.181	3.293	3.404	3.515
	7'	2.915	3.027	3.138	3.249	3.360	3.471	3.582	3.693	3.804	3.915
	8'	3.316	3.427	3.538	3.649	3.760	3.872	3.983	4.094	4.205	4.316
	9'	3.717	3.828	3.939	4.050	4.161	4.272	4.383	4.494	4.606	4.717
	10'	4.117	4.228	4.340	4.451	4.562	4.673	4.784	4.895	5.006	5.117
2:1 SIDE SLOPES											
4"	1'	0.608	0.719	0.830	0.941	1.052	1.164	1.275	1.386	1.497	1.608
	2'	1.105	1.216	1.327	1.438	1.549	1.660	1.772	1.883	1.994	2.105
	3'	1.602	1.713	1.824	1.935	2.046	2.157	2.268	2.380	2.491	2.602
	4'	2.099	2.210	2.321	2.432	2.543	2.654	2.765	2.876	2.988	3.099
6"	5'	2.596	2.707	2.818	2.929	3.040	3.151	3.262	3.373	3.485	3.596
	6'	3.093	3.204	3.315	3.426	3.537	3.648	3.759	3.870	3.981	4.093
	7'	3.589	3.701	3.812	3.923	4.034	4.145	4.256	4.367	4.478	4.589
	8'	4.086	4.197	4.309	4.420	4.531	4.642	4.753	4.864	4.975	5.086
	9'	4.583	4.694	4.805	4.917	5.028	5.139	5.250	5.361	5.472	5.583
	10'	5.080	5.191	5.302	5.413	5.525	5.636	5.747	5.858	5.969	6.080

NOTES:  
 DEPTH (D) AND WIDTH (W) TO BE AS SHOWN ON PLANS.  
 WEEP HOLES ARE TO BE PROVIDED ON ALL CHANNELS WHERE W IS EQUAL TO OR GREATER THAN 4' AND D IS EQUAL TO OR GREATER THAN 2'.  
 WEEP HOLE WITH 12" X 12" PLASTIC HARDWARE CLOTH, 1/4" MESH OR GALVANIZED STEEL WIRE DIAMETER 0.03 INCH, NUMBER 4 MESH, HARDWARE CLOTH ANCHORED FIRMLY TO THE BOTTOM OF THE CHANNEL.

SPECIFICATION REFERENCE

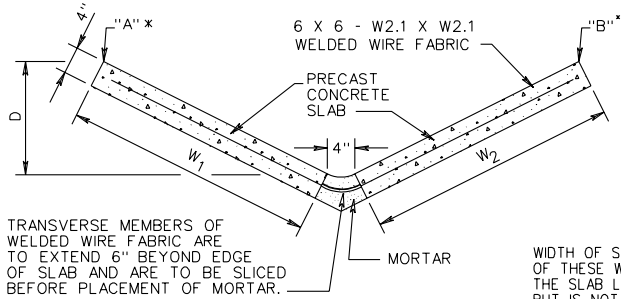
502

STANDARD PAVED DITCHES

VIRGINIA DEPARTMENT OF TRANSPORTATION

PG-6A, 6B

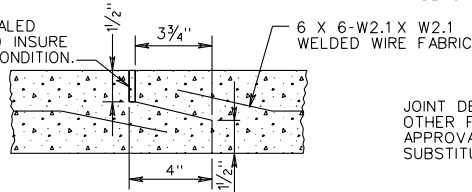
\* POINT B TO BE AT LEAST AS HIGH OR HIGHER THAN POINT A. WHEN LOCATED IN ROADSIDE DITCH POINT A TO BE LOCATED ON SHOULDER SIDE.



TRANSVERSE MEMBERS OF WELDED WIRE FABRIC ARE TO EXTEND 6" BEYOND EDGE OF SLAB AND ARE TO BE SLICED BEFORE PLACEMENT OF MORTAR.

WIDTH OF SLABS (W) IS TO BE 2'-0" OR 3'-0". ANY COMBINATION OF THESE WIDTHS MAY BE USED DEPENDING ON REQUIREMENTS. THE SLAB LENGTH IS TO BE AT THE OPTION OF THE FABRICATOR BUT IS NOT TO EXCEED LIMITS THAT WOULD FACILITATE EASY HANDLING.

JOINT TO BE SEALED WITH MORTAR TO INSURE A WATERTIGHT CONDITION.



JOINT DETAIL SHOWN IS SUGGESTED ONLY. OTHER FABRICATOR'S DESIGN MEETING THE APPROVAL OF THE ENGINEER MAY BE SUBSTITUTED.

PRECAST CONCRETE VEE DITCH

W1	W2	D	K
3'-0"	2'-0"	10"	112
3'-0"	2'-0"	12"	145
3'-0"	3'-0"	10"	137
3'-0"	3'-0"	12"	181
2'-0"	2'-0"	10"	87
2'-0"	2'-0"	12"	111
3'-0"	2'-0"	8"	80
3'-0"	3'-0"	8"	96
2'-0"	2'-0"	8"	64

CONCRETE VEE DITCH

ALL CONCRETE TO BE 4000 PSI. LIFTING DEVICES OF THE FABRICATOR'S DESIGN ARE TO BE FURNISHED WHEN REQUIRED.

BASIS OF PAYMENT TO BE SQUARE YARDS OF SURFACE MEASURE WHICH IS TO INCLUDE FURNISHING AND PLACING CONCRETE SLABS AND MORTARING JOINTS.

PIPE DRAIN DITCH LINER

PIPE SECTIONS MAY BE USED IN ROADSIDE DITCHES, MEDIAN DITCHES, SLOPE DRAINS, AND FLUMES WITH THE EXCEPTION OF 1/2 ROUND SECTIONS WHICH ARE RESTRICTED TO SLOPE DRAINS AND FLUMES ONLY.

WHEN PIPE DRAIN DITCH LINER IS SUBSTITUTED FOR STANDARD PG-2A OR 4 SPECIFIED ON THE PLANS, THE CONTRACTOR MUST SELECT A "K" VALUE SHOWN HEREON THAT IS EQUAL TO OR GREATER THAN THE "K" VALUE FOR THE TYPE AT STANDARD PAVED DITCH SHOWN BELOW.

"K" IS THE CONVEYANCE FACTOR AS CALCULATED BY THE MANNING'S FORMULA FOR FLOW IN OPEN CHANNELS.

PIPE DRAIN DITCH LINERS ARE TO BE CONSTRUCTED FROM SECTIONS OF CONCRETE PIPE OR REGULAR REINFORCED CONCRETE PIPE, BITUMINIZED FIBER PIPE, CORRUGATED ALUMINUM PIPE, OR CORRUGATED STEEL PIPE. NON-REINFORCED SECTIONS MAY BE USED FOR CONCRETE PIPE SIZES 24" OR LESS.

JOINTS TO BE OF STANDARD MANUFACTURER'S DESIGN FOR REGULAR CONCRETE PIPE AND MAY BE LAPPED, BUTTED WITH A COLLAR, OR BELL AND SPIGOT FOR BITUMINIZED FIBER PIPE. JOINTS FOR CORRUGATED METAL PIPE MAY BE BOLTED OR RIVETED. ALL JOINTS TO BE SEALED TO INSURE A WATER TIGHT BOND.

BITUMINIZED FIBER AND CORRUGATED METAL PIPE TO BE ANCHORED WITH 1" x 4" x 30" PRESSURE PRESERVATIVE TREATED STAKES PLACED AT ALL JOINTS WITH INTERMEDIATE SPACING NOT TO EXCEED 10 FEET. #4 X 30" HOOKED DEFORMED BARS MAY BE SUBSTITUTED IF APPROVED BY THE ENGINEER.

CONCRETE AND CORRUGATED METAL PIPE SECTIONS ARE TO BE AS SPECIFIED IN STANDARD PC-1 AND SPECIFICATIONS FOR MINIMUM HEIGHT OF FILL. BITUMINIZED FIBER PIPE SHALL CONFORM TO SECTION 240 OF THE SPECIFICATIONS, AND IS LIMITED TO SIZES 24" OR LESS.

INLET END OF PIPE DRAIN DITCH LINER INSTALLATION IS TO BE PROTECTED WITH ASPHALT OR CONCRETE TREATMENT AS DIRECTED BY THE ENGINEER TO PREVENT UNDERCUTTING.

COST OF PROTECTION TO BE INCLUDED IN PRICE BID FOR LINEAR FEET OF PIPE DRAIN DITCH LINER.

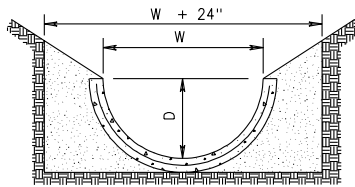
AT THE OPTION OF THE FABRICATOR, CONCRETE PIPE MAY BE GROOVED FOR SPLITTING.

LIFTING DEVICES OF FABRICATOR'S DESIGN ARE TO BE FURNISHED WHEN REQUIRED.

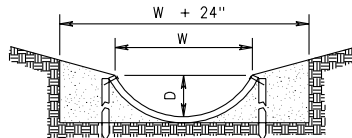
PIPE SECTIONS ARE TO BE AS SPECIFIED IN PIPE STANDARD PC-1 FOR MINIMUM HEIGHT OF FILL.

PG-6B

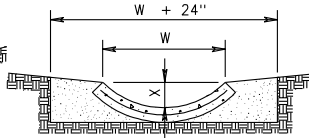
TRENCH IS TO BE EXCAVATED, PIPE SECTIONS PLACED, AND TRENCH REFILLED. THE MATERIAL PLACED AROUND THE PIPE IS TO BE FREE OF ROCK AND IS TO BE FIRMLY TAMPED.



1/2 ROUND SECTION FOR USE ON SLOPES AND FOR FLUMES ONLY.



1/3 ROUND SECTION



1/4 ROUND SECTION

PIPE SIZE	D	W	K SMOOTH	K C.M.
12"	6"	1'-0"	15	10
15"	7 1/2"	1'-3"	28	17
18"	9"	1'-6"	46	28
21"	10 1/2"	1'-9"	69	43

PIPE SIZE	D	W	K SMOOTH	K C.M.
24"	6"	1'-8 1/8"	27	17
30"	7 1/2"	2'-2"	49	31
36"	9"	2'-7 3/8"	79	49
42"	10 1/2"	3'-3 3/8"	118	74
48"	1'-0"	3'-5 3/8"	173	108
54"	1'-1 1/2"	3'-10 3/4"	234	146
60"	1'-3"	4'-3 1/8"	309	193

PIPE SIZE	D	W	K SMOOTH	K C.M.
54"	7 1/8"	3'-2 1/4"	83	52
60"	8 3/4"	3'-6 1/2"	109	68
66"	9 5/8"	3'-10 3/4"	142	88
72"	10 1/2"	4'-3"	179	112
78"	11 3/8"	4'-7 1/4"	235	147
84"	1'-0 1/4"	4'-11 1/2"	269	168
90"	1'-1 1/8"	5'-5 3/4"	325	203

PIPE DRAIN DITCH LINER

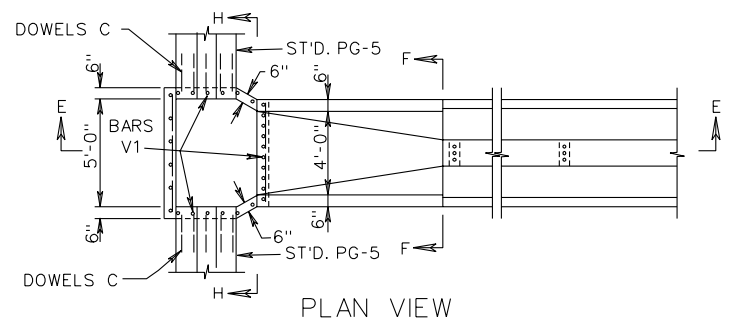
STANDARD PRECAST PAVED DITCHES DITCHES (CONCRETE, CORRUGATED METAL & BITUMINOUS FIBER PIPES)

SPECIFICATION REFERENCE

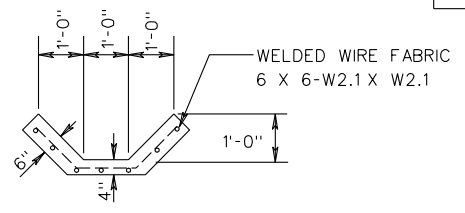
232  
502

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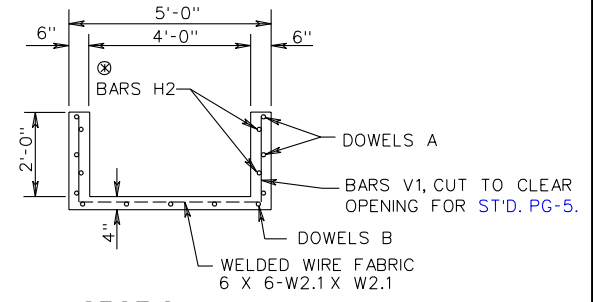
VIRGINIA DEPARTMENT OF TRANSPORTATION



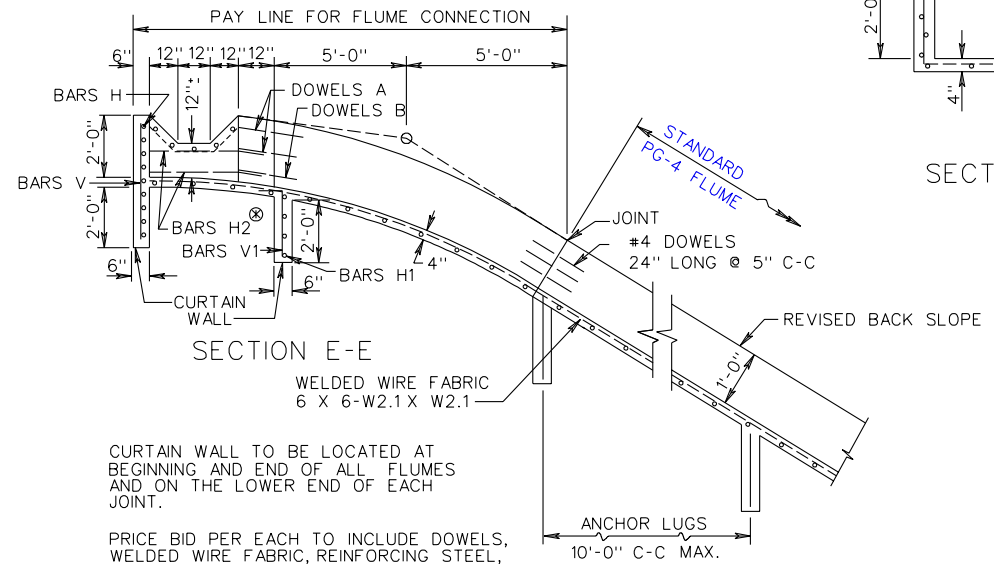
PLAN VIEW



SECTION F-F



SECTION H-H



SECTION E-E

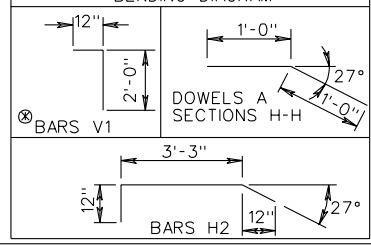
CURTAIN WALL TO BE LOCATED AT BEGINNING AND END OF ALL FLUMES AND ON THE LOWER END OF EACH JOINT.

PRICE BID PER EACH TO INCLUDE DOWELS, WELDED WIRE FABRIC, REINFORCING STEEL, ANCHOR LUGS AND CURTAIN WALL, AND CLASS A-3 CONC.

⊗ FIELD CUT BARS V1 & BARS H2 TO CLEAR OPENING FOR ST'D. PG-5.

APPROXIMATE QUANTITIES	
REINFORCING STEEL 139.3 LBS.	CLASS A3 CONC. 1.7 CU. YDS.

REINFORCING STEEL SCHEDULE				
MARK	SIZE	NO.	SPACING	LENGTH
H	#3	9	6"	5'-8"
H1	#3	4	6"	4'-8"
H2	#3	6	6"	5'-3"
V	#4	6	12"	4'-0"
V1	#4	24	6"	3'-0"
DOWELS A	#4	12	10"	2'-0"
DOWELS B	#4	6	10"	2'-0"
DOWELS C	#4	10	10"	1'-0"
W.W.F.		8GA		83 S.F.



SPECIFICATION REFERENCE
502

# DITCH FLUME CONNECTOR

VIRGINIA DEPARTMENT OF TRANSPORTATION