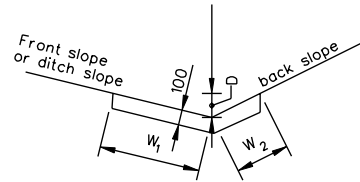


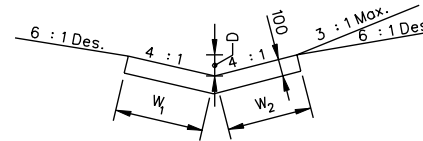
OUTSIDE ROAD DITCHES



TYPE	D	FRONT SLOPE	BACK SLOPE	W1	W2	K	SQ. METERS SURFACE AREA/METER
	mm						
A1	150	6:1	4:1	910	620	48	1.53
A1	200	6:1	4:1	1215	825	104	2.04
A2	150	6:1	3:1	910	475	42	1.39
A2	200	6:1	3:1	1215	630	92	1.85
A3	150	6:1	2:1	910	335	38	1.25
A3	200	6:1	2:1	1215	445	82	1.66
B1	150	4:1	4:1	620	620	38	1.24
B1	200	4:1	4:1	825	825	82	1.65
B2	200	4:1	3:1	825	630	72	1.46
B2	250	4:1	3:1	1030	790	130	1.82
B3	200	4:1	2:1	825	445	60	1.27
B3	250	4:1	2:1	1030	560	111	1.59
B4	200	4:1	1 1/2:1	825	360	55	1.19
B4	250	4:1	1 1/2:1	1030	450	101	1.48
C1	200	3:1	2:1	630	445	50	1.08
C1	250	3:1	2:1	790	560	92	1.35
C2	250	3:1	1 1/2:1	790	450	80	1.24
C3	250	3:1	1:1	790	355	70	1.15

MEDIAN DITCH

TYPE D

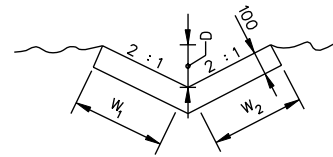


K = 82

D - Depth	W <sub>1</sub>	W <sub>2</sub>	Sq. m surface area per m
200	825	825	1.65

DITCH AT TOE OF FILL OR TOP OF CUT

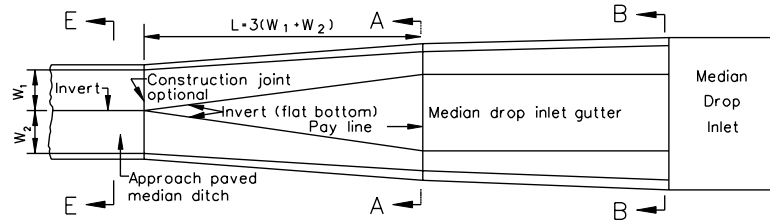
TYPE E



K = 115

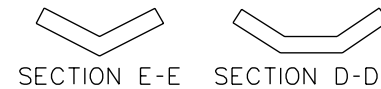
300	670	670	1.34
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PLAN FOR TRANSITION OF PAVED MEDIAN DITCH TO MEDIAN DROP INLET GUTTER

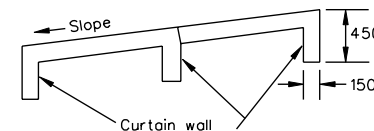


Notes:

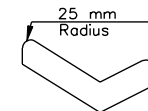
For Section A-A see Standards DI-7, 7A and 7B.  
 Traditional portion of paved ditch to be paid for at the same price bid per sq. meter for approach paved median ditch.  
 Standard PG-2A ditches to be Class 20 Concrete.



Curtain wall to be located at beginning 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

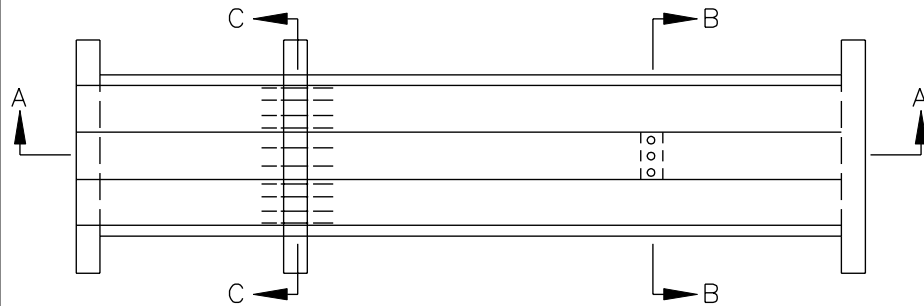
502

STANDARD PAVED DITCHES

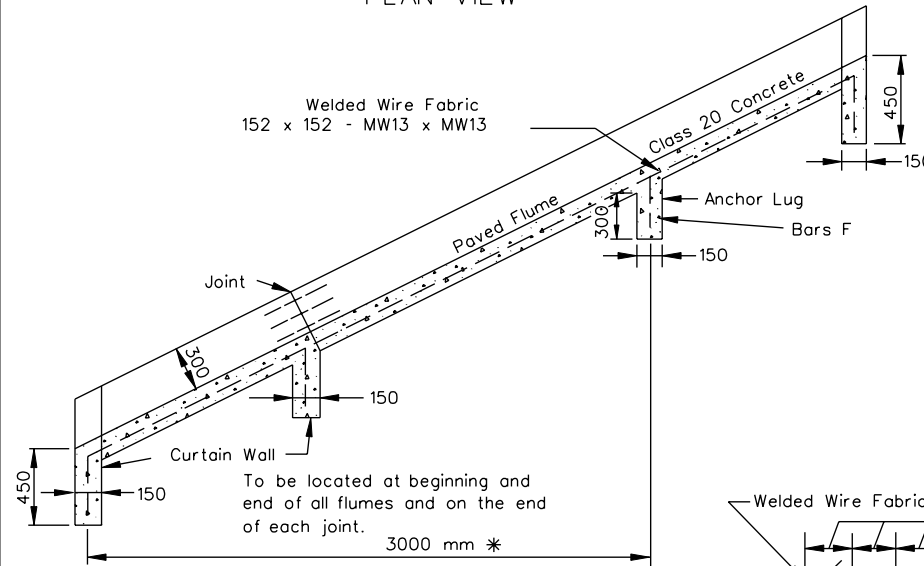
VIRGINIA DEPARTMENT OF TRANSPORTATION

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

109.01

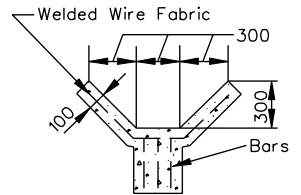


PLAN VIEW

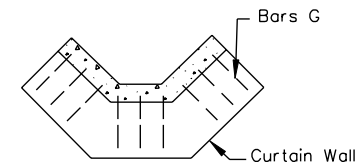


SECTION A-A

\*3000 mm c-c maximum typical spacing between Anchor Lugs. Anchor Lug is to be a maximum of 600 mm from end of channel.



SECTION B-B



SECTION C-C

SCHEDULE OF REINFORCING STEEL

Mark	No.	Length		Size	Spacing c-c	Shape
		2:1	1½:1			
F	3	350	350	# 13	100 mm	Straight
G	9	430	430	# 13	150 mm	Straight
Dowels	10	450	450	# 13	125 mm	Straight

No. shown are for one anchor lug, curtain wall and joint.

APPROXIMATE QUANTITIES			
		Class 20 Concrete	Reinforcing Steel
		M <sup>3</sup>	Kg
Anchor Lug	2:1	0.016	1.06
	1½:1	0.017	1.06
Curtain Wall	2:1	0.076	3.80
	1½:1	0.077	3.80
Joint	2:1	—	4.50
	1½:1	—	4.50

1.166 Square meters surface area per linear meter of flume.


Note:

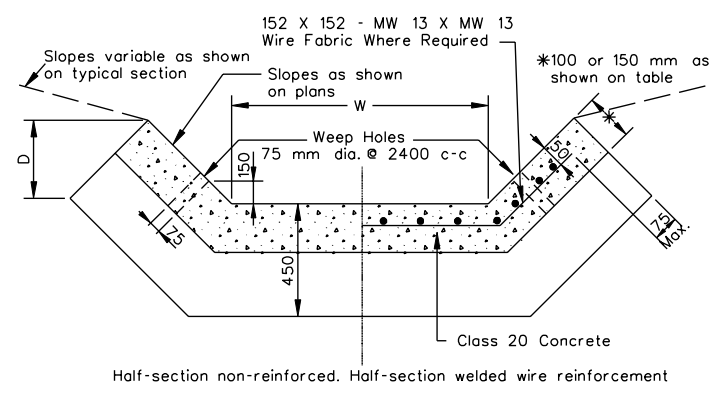
Dowels to be located at all required joints.  
K value = 128

STANDARD PAVED FLUME  
FOR 300 mm - 600 mm PIPE CULVERTS

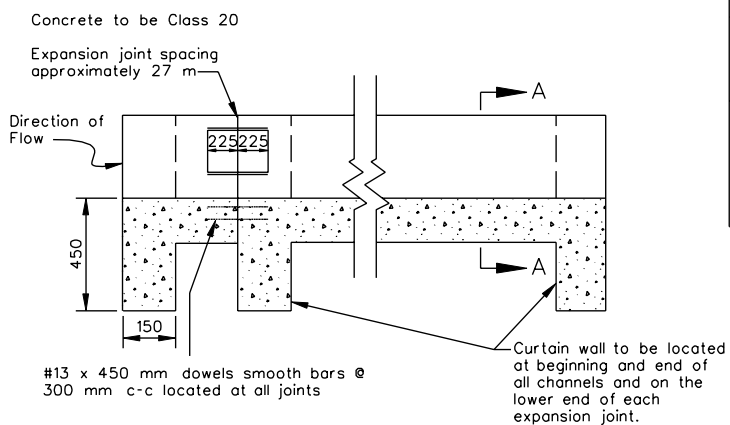
SPECIFICATION REFERENCE

502

 Indicates channel where wire mesh reinforcement is not required.



SECTION A-A



ELEVATION

SQUARE METERS PER METER OF PAVED CHANNEL											
CONC. THICKNESS	D Meters	W (Meters)									
		0.30	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00
1:1 SIDE SLOPES											
100 mm	0.30	<del>1.149</del>	1.449	1.749	2.049	2.349	2.649	2.949	3.249	3.549	3.849
	0.60	<del>1.997</del>	2.297	2.597	2.897	3.197	3.497	3.797	4.097	4.397	4.697
	0.90	<del>2.846</del>	3.146	3.446	3.746	4.046	4.346	4.646	4.946	5.246	5.546
	1.20	3.694	3.994	4.294	4.594	4.894	5.194	5.494	5.794	6.094	6.394
150 mm	1.50	4.543	4.843	5.143	5.443	5.743	6.043	6.343	6.643	6.943	7.243
	1.80	5.391	5.691	5.991	6.291	6.591	6.891	7.191	7.491	7.791	8.091
	2.10	6.240	6.540	6.840	7.140	7.440	7.740	8.040	8.340	8.640	8.940
	2.40	7.088	7.388	7.688	7.988	8.288	8.588	8.888	9.188	9.488	9.788
150 mm	2.70	7.937	8.237	8.537	8.837	9.137	9.437	9.737	10.037	10.337	10.637
	3.00	8.785	9.085	9.385	9.685	9.985	10.285	10.585	10.885	11.185	11.485
	1.5:1 SIDE SLOPES										
	100 mm	0.30	<del>1.382</del>	1.682	1.982	2.282	2.582	2.882	3.182	3.482	3.782
0.60		<del>2.463</del>	2.763	3.063	3.363	3.663	3.963	4.263	4.563	4.863	5.163
0.90		<del>3.545</del>	3.845	4.145	4.445	4.745	5.045	5.345	5.645	5.945	6.245
1.20		4.627	4.927	5.227	5.527	5.827	6.127	6.427	6.727	7.027	7.327
150 mm	1.50	5.708	6.008	6.308	6.608	6.908	7.208	7.508	7.808	8.108	8.408
	1.80	6.790	7.090	7.390	7.690	7.990	8.290	8.590	8.890	9.190	9.490
	2.10	7.872	8.172	8.472	8.772	9.072	9.372	9.672	9.972	10.272	10.572
	2.40	8.953	9.253	9.553	9.853	10.153	10.453	10.753	11.053	11.353	11.653
150 mm	2.70	10.035	10.335	10.635	10.935	11.235	11.535	11.835	12.135	12.435	12.735
	3.00	11.117	11.417	11.717	12.017	12.317	12.617	12.917	13.217	13.517	13.817
	2:1 SIDE SLOPES										
	100 mm	0.30	<del>1.642</del>	1.942	2.242	2.542	2.842	3.142	3.442	3.742	4.042
0.60		<del>2.983</del>	3.283	3.583	3.883	4.183	4.483	4.783	5.083	5.383	5.683
0.90		<del>4.325</del>	4.625	4.925	5.225	5.525	5.825	6.125	6.425	6.725	7.025
1.20		5.667	5.967	6.267	6.567	6.867	7.167	7.467	7.767	8.067	8.367
150 mm	1.50	7.008	7.308	7.608	7.908	8.208	8.508	8.808	9.108	9.408	9.708
	1.80	8.350	8.650	8.950	9.250	9.550	9.850	10.150	10.450	10.750	11.050
	2.10	9.691	9.991	10.291	10.591	10.891	11.191	11.491	11.791	12.091	12.391
	2.40	11.033	11.333	11.633	11.933	12.233	12.533	12.833	13.133	13.433	13.733
150 mm	2.70	12.375	12.675	12.975	13.275	13.575	13.875	14.175	14.475	14.775	15.075
	3.00	13.716	14.016	14.316	14.616	14.916	15.216	15.516	15.816	16.116	16.416

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 1200 mm and D is equal to or greater than 600 mm.
- Weep hole with 300 x 300 mm plastic hardware cloth, 6 mm mesh or galvanized steel wire diameter 0.76 mm, number 4 mesh, hardware cloth anchored firmly to the bottom of the channel.

SPECIFICATION REFERENCE
502

STANDARD PAVED DITCHES

VIRGINIA DEPARTMENT OF TRANSPORTATION

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS 109.03

PG-6A

Width of slabs (W) is to be 600 mm or 900 mm. 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.

Transverse members of welded wire fabric are to extend 150 mm beyond edge of slab and are to be spliced before placement of mortar.

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.

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.

For  $W_1 = 900, W_2 = 600, D = 250, K = 112.$   
 For  $W_1 = 900, W_2 = 600, D = 300, K = 145.$   
 For  $W_1 = 900, W_2 = 900, D = 250, K = 137.$   
 For  $W_1 = 900, W_2 = 900, D = 300, K = 181.$   
 For  $W_1 = 600, W_2 = 600, D = 250, K = 87.$   
 For  $W_1 = 600, W_2 = 600, D = 300, K = 111.$   
 For  $W_1 = 900, W_2 = 600, D = 200, K = 80.$   
 For  $W_1 = 900, W_2 = 900, D = 200, K = 96.$   
 For  $W_1 = 600, W_2 = 600, D = 200, K = 64.$

PG-6A, 6B

### CONCRETE VEE DITCH

All concrete to be 30 MPa.

Lifting devices of the fabricator's design are to be furnished when required.

Basis of payment to be square meters of surface measure which is to include furnishing and placing concrete slabs and mortaring joints.

### PIPE DRAIN DITCH LINER

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 600 mm or less.

Joints to be of standard manufacturer's design for regular concrete pipe and may not 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 watertight bond.

Bituminized fiber and corrugated metal pipe to be anchored with 25 x 100 x 750 mm creosoted stakes placed at all joints with intermediate spacing not to exceed 3000 mm. #13 x 750 mm hooked deformed bars may be substituted if approved by the Engineer.

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 of standard paved ditch shown below.

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 standard PC-1 for minimum height of fill.

Concrete and corrugated metal pipe sections are to be as specified in Standard PC-1 and Specifications for minimum height of fill. Bituminous fiber pipe shall conform to section 240 of the Specifications, and is limited to sizes 600 mm or less.

"K" is the conveyance factor as calculated by the Manning's formula for flow in open channels.

### PRECAST CONCRETE VEE DITCH

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      1/3 ROUND SECTION      1/4 ROUND SECTION

PIPE SIZE	D	W	K SMOOTH	K C.M.
300	152	304	15	10
375	190	381	28	17
450	229	458	46	28
525	267	533	69	43

PIPE SIZE	D	W	K SMOOTH	K C.M.
600	152	529	27	17
750	190	660	49	31
900	229	791	79	49
1050	267	924	118	74
1200	305	1056	173	108
1350	340	1187	234	146
1500	380	1319	309	193

PIPE SIZE	D	W	K SMOOTH	K C.M.
1350	200	972	83	52
1500	222	1080	109	68
1650	244	1187	142	88
1800	267	1295	179	112
1950	289	1403	235	147
2100	311	1511	269	168
2250	333	1619	325	203

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 pipe drain ditch liner.

### PIPE DRAIN DITCH LINER

109.04      UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

VIRGINIA DEPARTMENT OF TRANSPORTATION

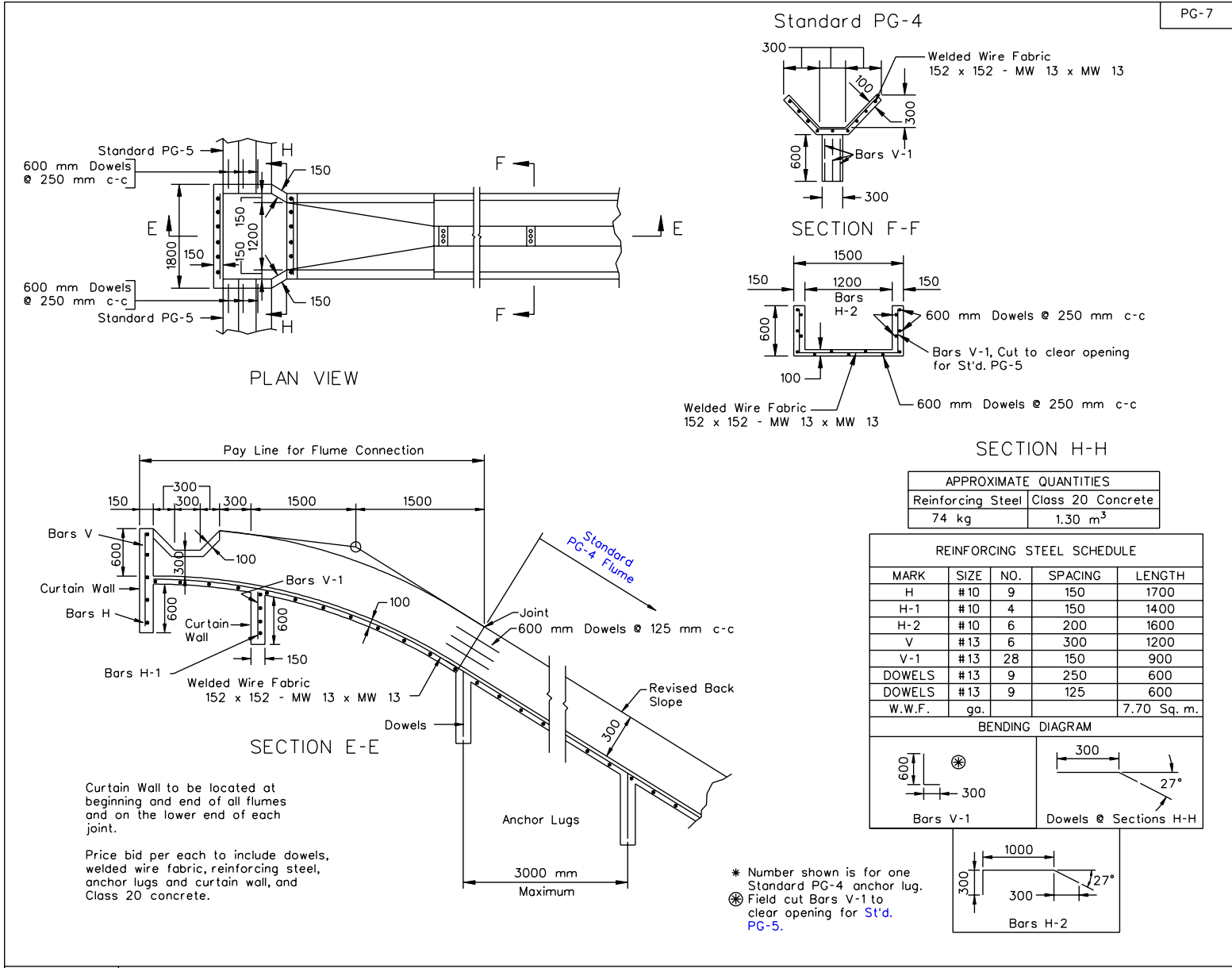
## STANDARD PRECAST PAVED DITCHES

SPECIFICATION REFERENCE

232  
502

REVISED ON 7/02

PG-7



SPECIFICATION REFERENCE
502

# DITCH FLUME CONNECTOR

VIRGINIA DEPARTMENT OF TRANSPORTATION

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109.05