

REVISED ON 7/02

BARS A TO BE EQUALLY SPACED. FOR NO. OF BARS SEE TABLE BELOW.

ELEV. PROP. OR EXISTING WALK, YARD, ETC.

ELEV. PROP. OR EXIST. SIDEWALK OR SHOULDER.

SECTION A-A

PLAN

ONE BAR B TO BE PLACED UNDER EACH STEP AND TWO UNDER LANDING AS SHOWN.

FROM PICTORIAL VIEW IT IS SEEN THAT:

$$V = \frac{V_1 W + 2V_2 (N-1) + V_3 (WN+1) + 2V_4}{27}$$

SUBSTITUTING VALUES OF ELEMENTARY VOLUMES:

$$V = \frac{0.917W + 1.146(N-1) + 0.726(WN+1) + 1.336}{27}$$

V - INDICATES TOTAL VOLUME OF STEPS IN CUBIC YARDS.
 V₁, V₂, V₃ & V₄ - INDICATE ELEMENTARY VOLUMES USED IN COMPUTING V.
 W - INDICATES CLEAR WIDTH OF STEPS, IN FEET, BETWEEN SIDEWALLS.
 N - INDICATES NUMBER OF STEPS IN INSTALLATION EXCLUSIVE OF LANDING.
 L1 - INDICATES LENGTH OF BARS A, IN INCHES. L1 = 13.038N + 8"
 L2 - INDICATES LENGTH OF BARS B, IN INCHES. L2 = 12W + 9"
 L3 - INDICATES LENGTH OF BARS C, IN INCHES. L3 = 13.038N + 18"

A LANDING IS TO BE PROVIDED WHERE 12 OR MORE STEPS ARE REQUIRED MINIMUM SIZE OF LANDING TO BE W + 1 FOOT X 4 FEET.

THIS ITEM MAY BE PRECAST OR CAST IN PLACE.
 CONCRETE TO BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST.
 FOR OTHER WIDTHS THE APPROXIMATE SPACING OF BARS A IN INCHES WILL BE EQUAL TO 80 ÷ N WITH A MINIMUM SPACING OF 6".
 REINFORCING BARS TO BE USED IN INSTALLATIONS OF 6 OR MORE STEPS.
 FOR TABULATION OF CONCRETE AND STEEL QUANTITIES SEE SHEET 2.

		NUMBER OF BARS A								
		N-1-5	N-6	N-7	N-8	N-9	N-10	N-11	N-12	N-13-25
NO STEEL	W = 3'	4	5	5	6	6	7	7	8	
	W = 4'	5	6	7	7	8	8	9	10	
	W = 5'	6	7	8	9	9	10	11	12	

HANDRAIL IS TO BE PROVIDED FOR STEPS HAVING FOUR OR MORE RISERS, AND WILL MEET THE FOLLOWING CONDITIONS:

- ON STEPS LESS THAN 44 INCHES WIDE HAVING BOTH SIDES ENCLOSED, AT LEAST ONE HANDRAIL, PREFERABLY ON THE RIGHT SIDE DESCENDING.
- ON STEPS LESS THAN 44 INCHES WIDE HAVING ONE SIDE OPEN, ONE HANDRAIL ON EACH SIDE.
- ON STEPS LESS THAN 44 INCHES WIDE HAVING BOTH SIDES OPEN, ONE HANDRAIL ON EACH SIDE.
- ON STEPS MORE THAN 44 INCHES WIDE BUT LESS THAN 88 INCHES WIDE, ONE HANDRAIL ON EACH SIDE.
- ON STEPS 88 OR MORE INCHES WIDE, ONE HANDRAIL ON EACH SIDE, AND ONE INTERMEDIATE HANDRAIL LOCATED APPROXIMATELY MIDWAY OF THE WIDTH.

SHEET 1 OF 2

SPECIFICATION REFERENCE	STANDARD CONCRETE STEPS FOR 1 1/2: 1 SLOPE
105 504	VIRGINIA DEPARTMENT OF TRANSPORTATION
	601.01

TABLE OF QUANTITIES

N	W = 3'		W = 4'		W = 5'		INCREMENTS *		N
	CONCRETE	REINF. STEEL	CONCRETE	REINF. STEEL	CONCRETE	REINF. STEEL	CONCRETE	REINF. STEEL	
	Cu. Yards	LBS.	Cu. Yards	LBS.	Cu. Yards	LBS.	Cu. Yards	LBS.	
1	0.259		0.320		0.381		0.061		1
2	0.382		0.470		0.558		0.088		2
3	0.505		0.620		0.734		0.115		3
4	0.628		0.770		0.911		0.142		4
5	0.751		0.920		1.088		0.168		5
6	0.874	50	1.070	60	1.265	70	0.195	10	6
7	0.998	62	1.220	74	1.442	85	0.222	12	7
8	1.121	70	1.370	89	1.619	102	0.249	13	8
9	1.244	84	1.520	99	1.796	120	0.276	14	9
10	1.367	93	1.670	116	1.973	132	0.303	16	10
11	1.490	110	1.820	127	2.150	149	0.330	17	11
12	1.613	119	1.970	146	2.326	174	0.357	19	12
13	1.736	137	2.120	167	2.503	197	0.384	30	13
14	1.859	147	2.270	179	2.680	211	0.410	32	14
15	1.983	157	2.420	191	2.857	225	0.437	34	15
16	2.106	167	2.570	203	3.034	239	0.464	36	16
17	2.229	177	2.720	215	3.211	253	0.491	38	17
18	2.352	186	2.870	227	3.388	267	0.518	40	18
19	2.476	196	3.020	239	3.565	281	0.545	43	19
20	2.598	206	3.170	251	3.742	295	0.572	45	20
21	2.721	216	3.320	262	3.918	309	0.599	47	21
22	2.844	225	3.470	274	4.095	323	0.626	49	22
23	2.967	235	3.620	286	4.272	337	0.652	51	23
24	3.091	245	3.770	298	4.449	351	0.679	53	24
25	3.214	255	3.920	310	4.626	365	0.706	55	25

* Increments to be added for each additional foot of width.

N - Indicates number of steps exclusive of landing.

W - Indicates width between sidewalls.

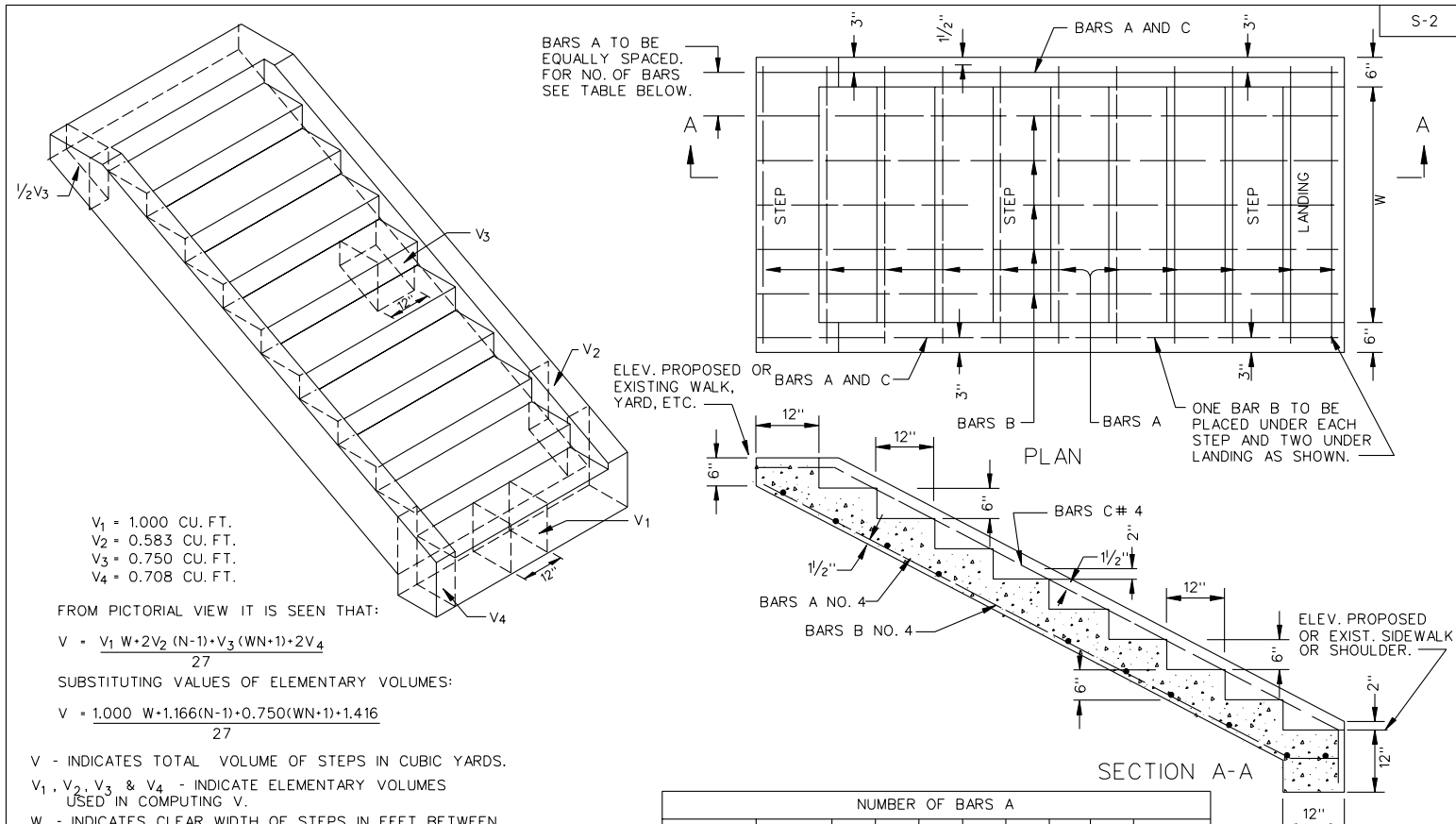
For detail drawings and dimensions of steps see sheet 1 of 2.

SHEET 2 OF 2

STANDARD CONCRETE STEPS FOR 1½: 1 SLOPE

SPECIFICATION
REFERENCE105
504

REVISED ON 7/02



V₁ = 1.000 CU. FT.
 V₂ = 0.583 CU. FT.
 V₃ = 0.750 CU. FT.
 V₄ = 0.708 CU. FT.

FROM PICTORIAL VIEW IT IS SEEN THAT:

$$V = \frac{V_1 W + 2V_2 (N-1) + V_3 (WN+1) + 2V_4}{27}$$

SUBSTITUTING VALUES OF ELEMENTARY VOLUMES:

$$V = \frac{1.000 W + 1.166(N-1) + 0.750(WN+1) + 1.416}{27}$$

- V - INDICATES TOTAL VOLUME OF STEPS IN CUBIC YARDS.
- V₁, V₂, V₃ & V₄ - INDICATE ELEMENTARY VOLUMES USED IN COMPUTING V.
- W - INDICATES CLEAR WIDTH OF STEPS, IN FEET, BETWEEN SIDEWALLS.
- N - INDICATES NUMBER OF STEPS IN INSTALLATION EXCLUSIVE OF LANDING.
- L1 - INDICATES LENGTH OF BARS A, IN INCHES. L1 = 13.416 N + 8"
- L2 - INDICATES LENGTH OF BARS B, IN INCHES. L2 = 12W + 9"
- L3 - INDICATES LENGTH OF BARS C, IN INCHES. L3 = 13.416 N + 18"

A LANDING IS TO BE PROVIDED WHERE 12 OR MORE STEPS ARE REQUIRED. MINIMUM SIZE OF LANDING TO BE W + 1 FOOT X 4 FEET.

THIS ITEM MAY BE PRECAST OR CAST IN PLACE. CONCRETE TO BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST. FOR OTHER WIDTHS THE APPROXIMATE SPACING OF BARS A IN INCHES WILL BE EQUAL TO 80/N WITH A MINIMUM SPACING OF 6". REINFORCING BARS TO BE USED IN INSTALLATIONS OF 6 OR MORE STEPS. FOR TABULATION OF CONCRETE AND STEEL QUANTITIES SEE SHEET 2.

		NUMBER OF BARS A								
		N+1-5	N+6	N+7	N+8	N+9	N+10	N+11	N+12	N+13-25
NO STEEL	W = 3'	4	5	5	6	6	7	7	8	
	W = 4'	5	6	7	7	8	8	9	10	
	W = 5'	6	7	8	9	9	10	11	12	

HANDRAIL IS TO BE PROVIDED FOR STEPS HAVING FOUR OR MORE RISERS, AND WILL MEET THE FOLLOWING CONDITIONS:

1. ON STEPS LESS THAN 44 INCHES WIDE HAVING BOTH SIDES ENCLOSED, AT LEAST ONE HANDRAIL, PREFERABLY ON THE RIGHT SIDE DESCENDING.
2. ON STEPS LESS THAN 44 INCHES WIDE HAVING ONE SIDE OPEN, ONE HANDRAIL ON EACH SIDE.
3. ON STEPS LESS THAN 44 INCHES WIDE HAVING BOTH SIDES OPEN, ONE HANDRAIL ON EACH SIDE.
4. ON STEPS MORE THAN 44 INCHES WIDE BUT LESS THAN 88 INCHES WIDE, ONE HANDRAIL ON EACH SIDE.
5. ON STEPS 88 OR MORE INCHES WIDE, ONE HANDRAIL ON EACH SIDE, AND ONE INTERMEDIATE HANDRAIL LOCATED APPROXIMATELY MIDWAY OF THE WIDTH.

SPECIFICATION REFERENCE
105 504

STANDARD CONCRETE STEPS FOR 2 : 1 SLOPE

VIRGINIA DEPARTMENT OF TRANSPORTATION

S-2

TABLE OF QUANTITIES

N	W = 3'		W = 4'		W = 5'		INCREMENTS *		N
	CONCRETE	REINF. STEEL	CONCRETE	REINF. STEEL	CONCRETE	REINF. STEEL	CONCRETE	REINF. STEEL	
	Cu. Yards	Lbs.	Cu. Yards	Lbs.	Cu. Yards	Lbs.	Cu. Yards	Lbs.	
1	0.275		0.340		0.405		0.065		1
2	0.401		0.494		0.587		0.093		2
3	0.528		0.648		0.768		0.120		3
4	0.654		0.802		0.950		0.148		4
5	0.781		0.957		1.133		0.176		5
6	0.907	51	1.111	61	1.315	71	0.204	10	6
7	1.034	63	1.265	75	1.496	87	0.231	12	7
8	1.160	71	1.419	91	1.678	104	0.259	13	8
9	1.287	86	1.574	101	1.861	122	0.287	15	9
10	1.413	94	1.728	118	2.043	134	0.315	16	10
11	1.540	112	1.883	129	2.226	155	0.343	17	11
12	1.666	121	2.036	149	2.406	177	0.370	19	12
13	1.793	140	2.191	171	2.589	201	0.398	30	13
14	1.919	150	2.345	183	2.771	215	0.426	32	14
15	2.046	160	2.500	195	2.954	229	0.454	35	15
16	2.172	170	2.653	207	3.134	244	0.481	37	16
17	2.299	180	2.808	219	3.317	258	0.509	39	17
18	2.425	190	2.962	231	3.499	272	0.537	41	18
19	2.552	200	3.117	243	3.682	287	0.565	43	19
20	2.678	210	3.271	256	3.864	301	0.593	45	20
21	2.805	220	3.425	268	4.045	315	0.620	48	21
22	2.931	230	3.579	280	4.227	330	0.648	50	22
23	3.058	240	3.734	292	4.410	344	0.676	52	23
24	3.184	250	3.888	304	4.592	358	0.704	54	24
25	3.311	260	4.042	316	4.773	372	0.731	56	25

* Increments to be added for each additional foot of width.

N - Indicates number of steps exclusive of landing.

W - Indicates width between sidewalls.

For detail drawings and dimensions of steps see sheet 1.

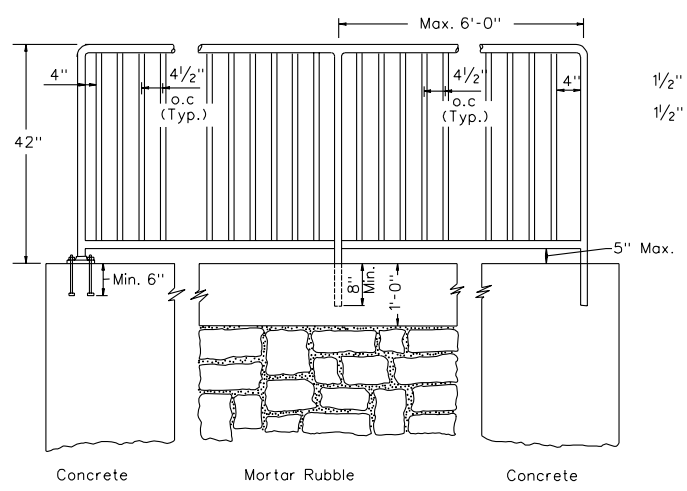
SHEET 2 OF 2

STANDARD CONCRETE STEPS FOR 2 : 1 SLOPE

VIRGINIA DEPARTMENT OF TRANSPORTATION

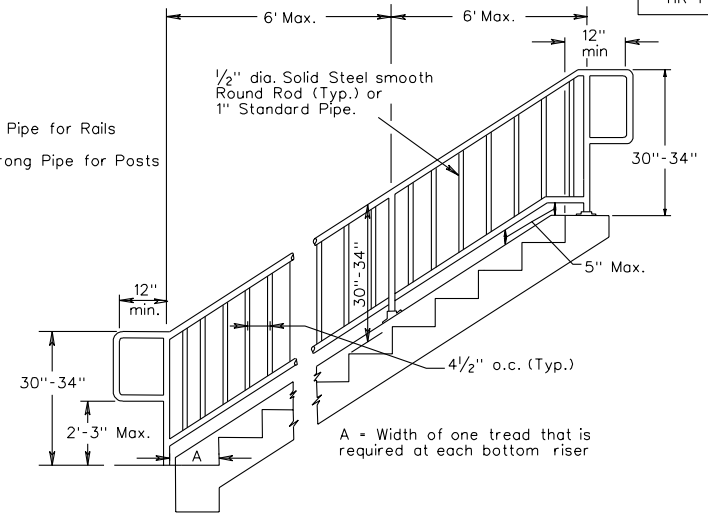
SPECIFICATION
REFERENCE

105
504

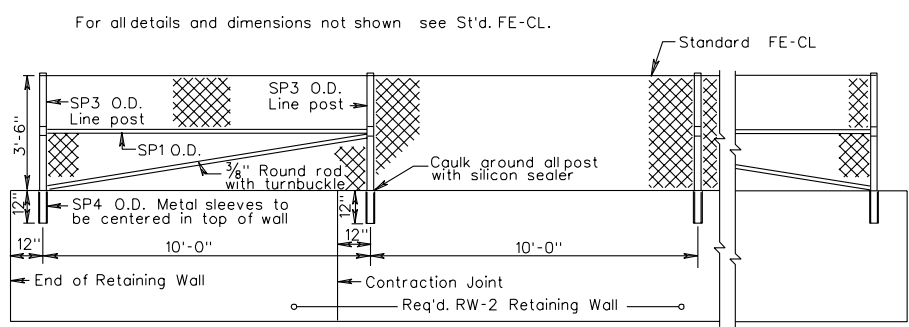
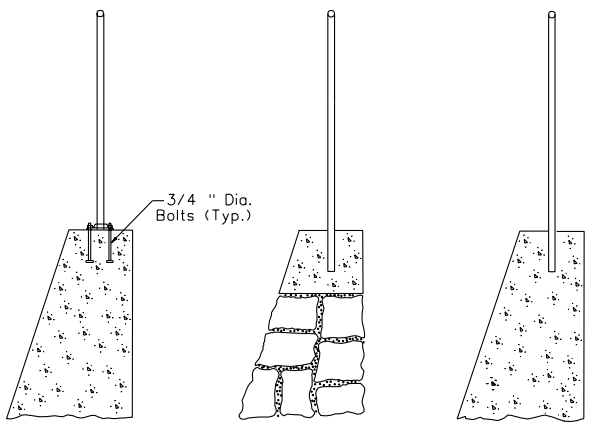


HANDRAIL (GUARD) INSTALLATION ON WALLS

1/2" O.D. Standard Pipe for Rails
 1/2" O.D. Extra Strong Pipe for Posts



HANDRAIL INSTALLATION



ALTERNATE INSTALLATION ON WALLS

Notes:
 This handrail is to be used only as a protection for pedestrians and should not be placed in any location where it might be subject to any vehicular impact. For vehicular protection standard guardrail should be used.

Handrail to be in accordance with the latest edition of the Virginia Uniform Statewide Building Code.

SPECIFICATION REFERENCE
505

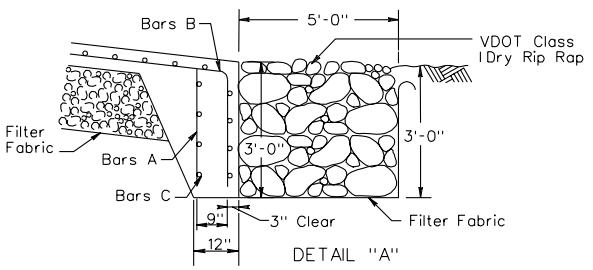
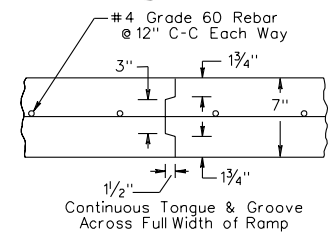
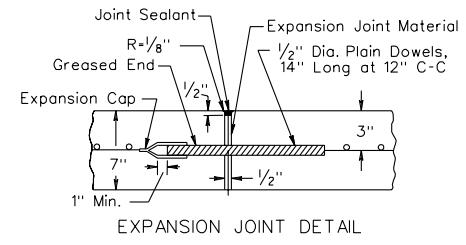
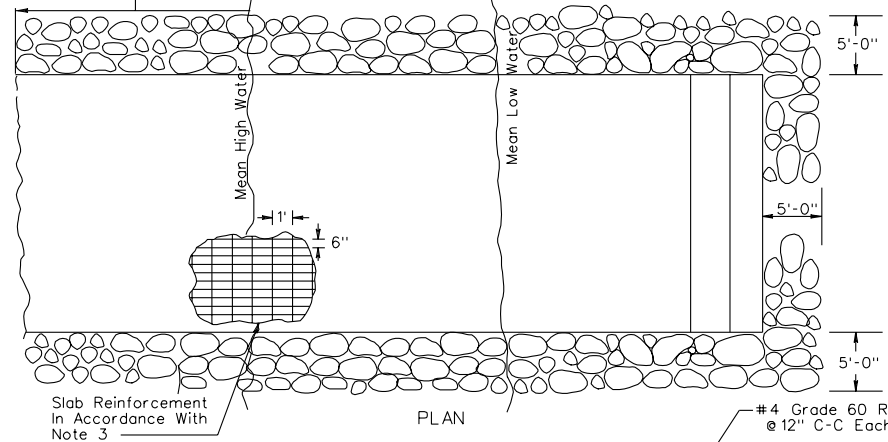
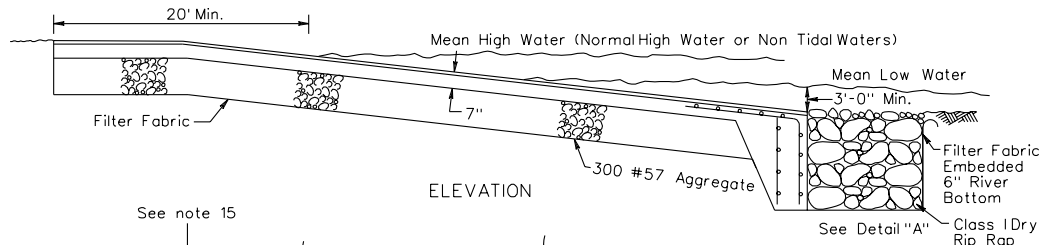
STANDARD HAND RAIL METHOD OF LOCATING AND ERECTING

VIRGINIA DEPARTMENT OF TRANSPORTATION

LR-1

NOTES:

1. The minimum slab width is to be 16'.
2. Slab details are to be in accordance with Standard Plan PR-2 except that expansion, contraction, and longitudinal joints may be eliminated unless required by the Engineer.
3. Steel fabric slab reinforcement shall consist of members rigidly attached at all joints or points of intersection and shall have an effective weight of not less than 61 Lbs./100 Sq.Ft. Longitudinal members shall be of No. 1 gage wire spaced at 6" o-c. Transverse members shall be of No. 4 gage wire spaced at 12" o-c. Alternate grade 60 No. 4 rebars 12" o-c eachway centered in slab.
4. Slab is to be constructed on either a straight grade or with vertical curves with a rate of change per foot of less than 2%.
5. The gradient of slab is to be 12-15%. Ramps constructed in salt water with the possibility of larger boats using the ramp should be designed using the lower end of this range.
6. All reinforcing steel members are to have a minimum of 3" concrete cover at edges of slab. Mesh reinforcement is to be placed 2" from top of slab.
7. Final finish of slab is to be obtained by the use of a steel rake (with tines bent away from the direction of pull) drawn transversely to axis of slab (parallel to water line).
8. Portions of slab which will ultimately be below water level are to be protected during pouring, finishing, and curing by the use of cofferdams, cribs, or other methods meeting the approval of the Engineer.
9. Class 1 Dry Rip Rap to be in accordance with Road and Bridge Specifications.
10. Suitable parking areas for vehicles and trailer are to be provided off of ramp.
11. Ramp should be angled downstream in river situations at the discretion of the Engineer.
12. On flowing river situations courtesy piers are not desirable, on all other situations a courtesy pier is desirable.
13. Launch ramps and parking areas should be free of overhead obstructions, especially electrical wires.
14. These facilities should be handicapped accessible to the top of boat ramp and courtesy pier if provided.
15. Where wave or tidal action occur, the Rip Rap length above mean high water shall be extended to dissipate water velocities.



SCHEDULE OF REINFORCING STEEL

BAR SIZE	NO.	LENGTH	SPACING C-C	
Bend to fit grade Bars "B" $\frac{1'-10''}{1'-10''}$				
A	# 4	* 2'-0"	1'-0"	Straight
B	# 4	* 4'-6"	1'-0"	Bent
C	# 4	8	* * 9" and as shown	Straight

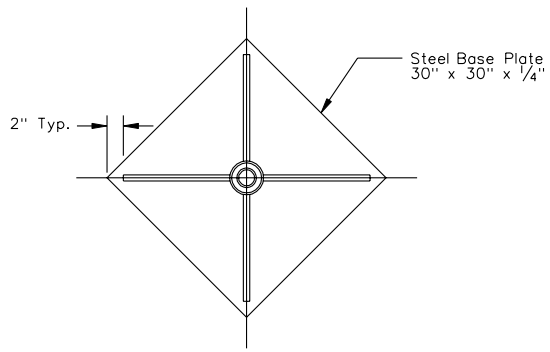
* No. of bars equals slab width in Feet.
* * Slab width minus 6"

MINIMUM DESIGN FOR SMALL BOAT LAUNCHING RAMPS AT PUBLIC LANDINGS

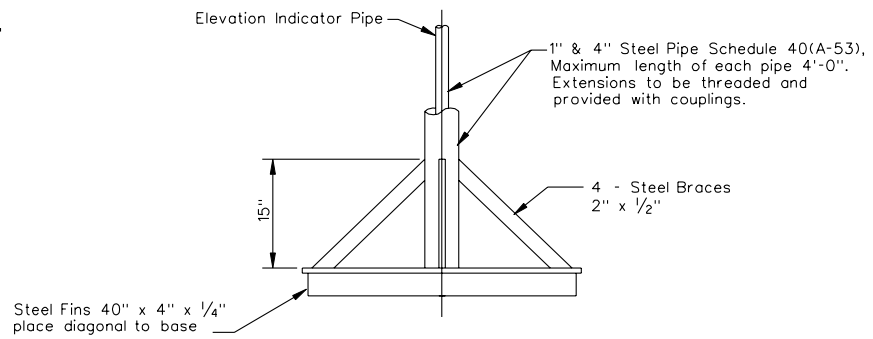
SPECIFICATION REFERENCE
316

601.06

VIRGINIA DEPARTMENT OF TRANSPORTATION



PLAN



ELEVATION

NOTE:
Settlement plates are to be placed as shown on plans
or as directed by the Engineer.

All connections between base plate, pipes, fins and
braces are to be fully welded.

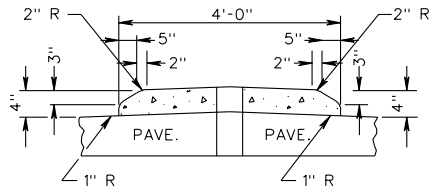
SPECIFICATION REFERENCE
303.10

SETTLEMENT PLATE

VIRGINIA DEPARTMENT OF TRANSPORTATION

SI-1

NOTE:
 C_L OF ISLAND IS TO BE PERPENDICULAR TO C_L
 OF MAJOR ROUTE REGARDLESS OF THE ANGLE
 OF INTERSECTION.

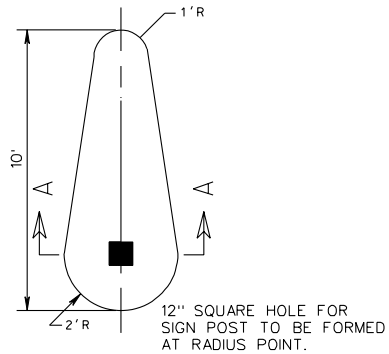


SECTION A-A

BASIS OF PAYMENT - EACH

0.5 CU. YDS CONCRETE TO BE CLASS A3 IF CAST IN
 PLACE, 4000 PSI IF PRECAST.

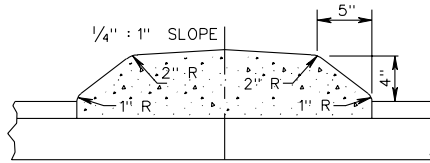
NOTE:
 SIZE OF ISLAND IS TO BE GOVERNED BY OFFSETS
 FROM PAVEMENT EDGES & C_L AS SHOWN ON PLANS.



WHEN SIGN ISLAND IS INSTALLED OVER EXISTING
 PAVEMENT A HOLE FOR SIGN POST IS TO BE EXTENDED
 TO THE SUBBASE.

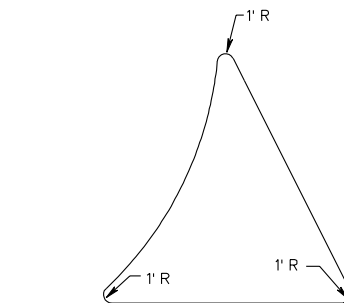
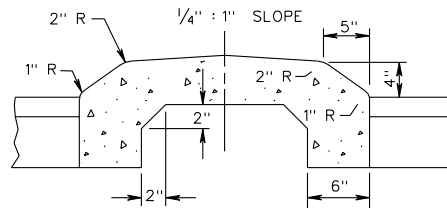
DETAIL OF STANDARD SIGN ISLAND

SI-2



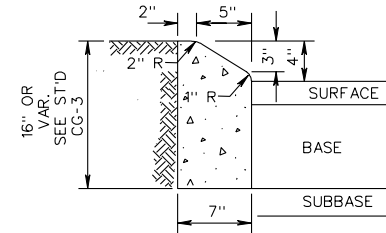
BASIS OF PAYMENT - SQUARE YARDS COMPLETE IN
 PLACE EXCLUSIVE OF POST AND SIGNS

NOTE:
 SIZE OF ISLAND IS TO BE GOVERNED BY OFFSETS
 FROM PAVEMENT EDGES & C_L AS SHOWN ON PLANS.



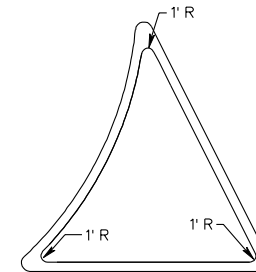
DESIGN OF STANDARD SIGN ISLAND

SI-3



NOTE:

SIZE OF ISLAND IS TO BE GOVERNED BY OFFSETS
 FROM PAVEMENT EDGES & C_L AS SHOWN ON PLANS.



DETAIL OF DIRECTIONAL ISLAND CURB

SPECIFICATION
 REFERENCE

105
 502

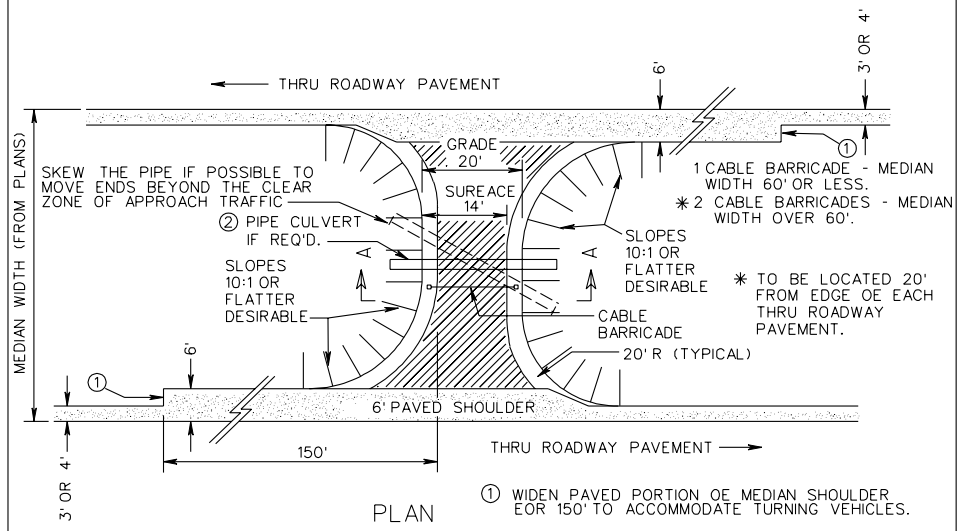
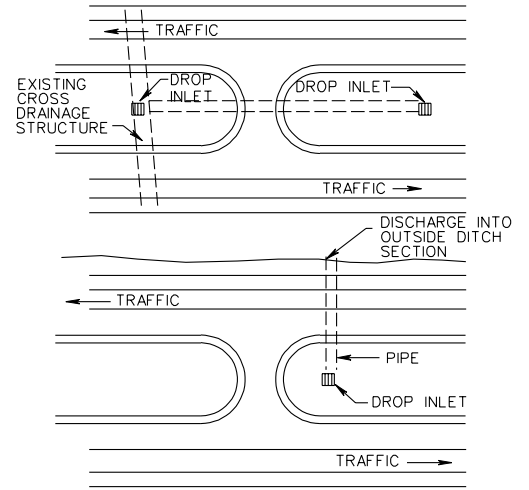
STANDARD PLAN FOR SIGN ISLANDS

VIRGINIA DEPARTMENT OF TRANSPORTATION

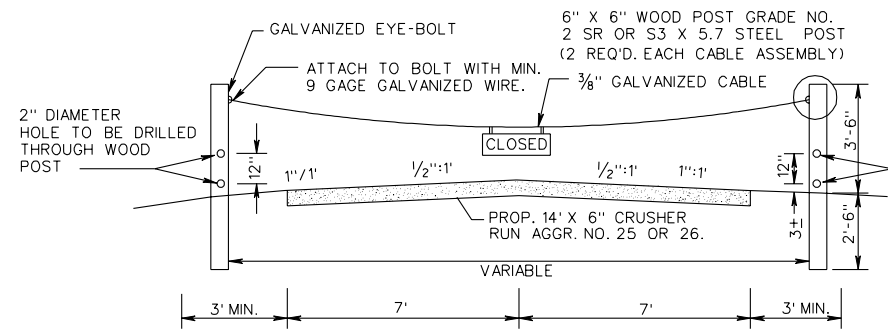
602.01

EXAMPLES OF ALTERNATE MEDIAN DRAINAGE

THESE ALTERNATIVES COULD BE CONSIDERED IN LIEU OF A PIPE UNDERNEATH THE MEDIAN CROSSOVER.

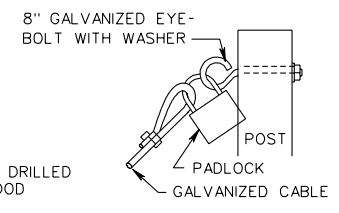


- ① WIDEN PAVED PORTION OF MEDIAN SHOULDER FOR 150' TO ACCOMMODATE TURNING VEHICLES.
- ② END TREATMENT AS REQUIRED TO MEET PROPOSED SLOPE.



SECTION A-A

WOOD POSTS TO BE SALT TREATED OR PRIMED AND PAINTED DARK GREEN.

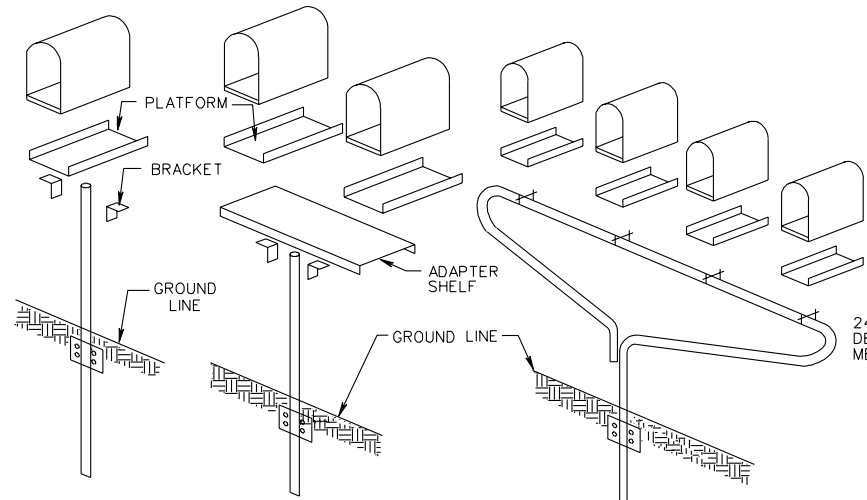


PADLOCK TO BE FURNISHED AND INSTALLED BY STATE FORCES UNLESS OTHERWISE SPECIFIED, CONTRACTOR TO TEMPORARILY ATTACH CABLE TO EYE-BOLT WITH MINIMUM 9 GAUGE GALVANIZED WIRE.

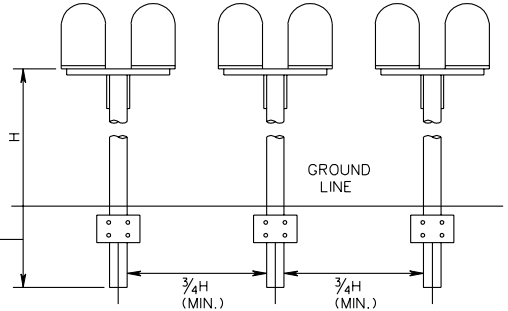
** SIGN
 MATERIAL: 0.080" ALUMINUM ALLOY 6061 - T6
 SIZE : 24" X 9"
 COLOR COMBINATION : C-1
 BORDER WIDTH : 1/2"
 MARGIN WIDTH : 1/2"
 CORNER RADII : 1/2"
 LETTER TYPE : L-1 OR L-2
 LETTER HEIGHT AND SERIES : 4" - D
 *** IN ACCORDANCE WITH V.D.O.T. "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS".
 ** MESSAGE, BOTH SIDES IF ONE CABLE BARRICADE IS USED.
 ** MESSAGE, ONE SIDE IF TWO CABLE BARRICADES ARE USED.

SPECIFICATION REFERENCE
505

STANDARD MAINTENANCE CROSSOVER
 FOR USE ON FREEWAYS
 VIRGINIA DEPARTMENT OF TRANSPORTATION



SINGLE DOUBLE MULTIPLE (MAX. 4 BOXES)



GROUPED

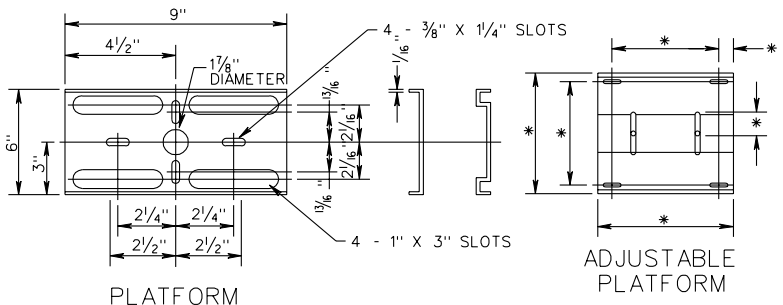
NOTES:
MAILBOXES SHALL BE OF LIGHT SHEET METAL OR PLASTIC CONSTRUCTION CONFORMING TO THE REQUIREMENTS OF THE U.S. POSTAL SERVICE.

MAILBOX SUPPORTS SHALL NOT BE SET IN CONCRETE UNLESS THE SUPPORT DESIGN HAS BEEN SHOWN TO BE SAFE BY CRASH TESTS WHEN SO INSTALLED.

POSTS MAY BE 4" X 4" OR 4 1/2" DIAMETER WOOD POST, 2" DIAMETER STANDARD STRENGTH STEEL PIPE, OR OTHER STEEL OR ALUMINUM POST SHAPES OF EQUAL STRENGTHS.

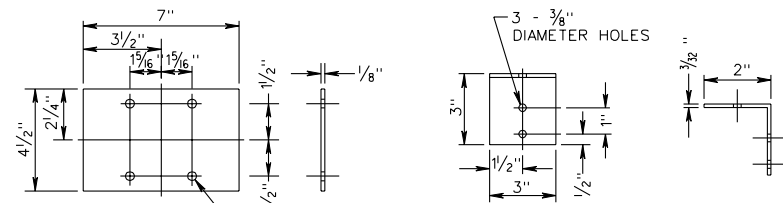
THE POST-TO-BOX ATTACHMENT DETAILS SHOULD BE OF SUFFICIENT STRENGTH TO PREVENT THE BOX FROM SEPARATING FROM THE POST TOP IF THE INSTALLATION IS STRUCK BY A VEHICLE. HARDWARE SHOWN IS SUGGESTED ONLY, ALL GUIDELINES AS REQUIRED BY THE U.S. POSTAL SERVICE MUST BE FOLLOWED.

* DIMENSIONS VARY ACCORDING TO THE SIZE OF THE MAIL BOX.



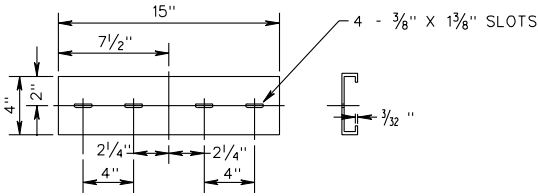
PLATFORM

ADJUSTABLE PLATFORM



ANTI-TWIST PLATE

BRACKET

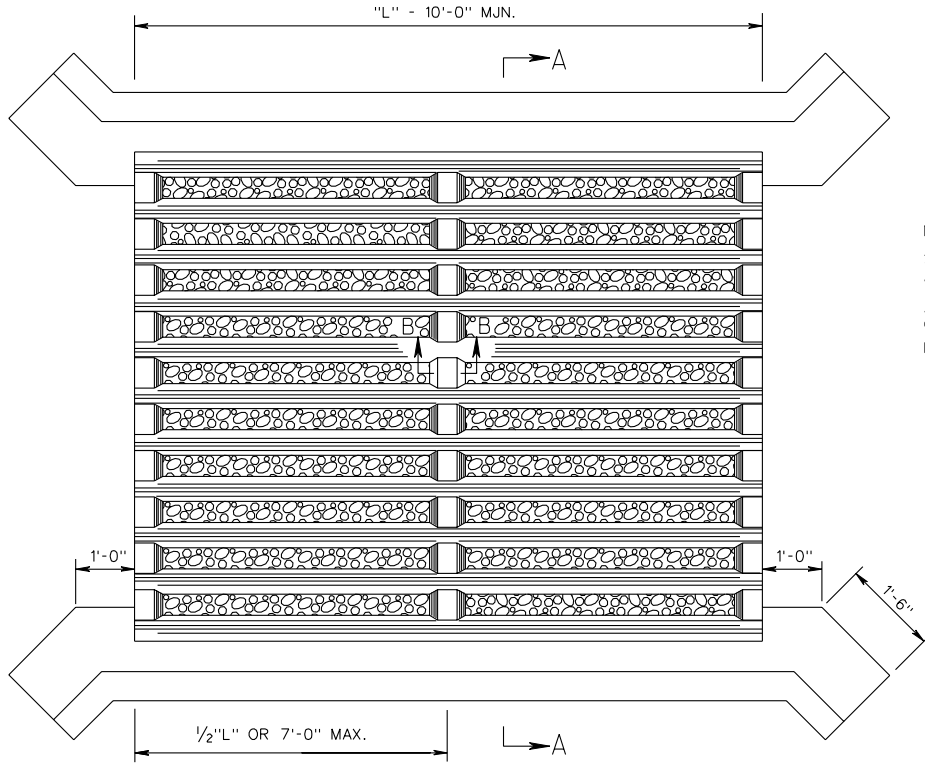


ADAPTER SHELF

SPECIFICATION REFERENCE	
NONE	

STANDARD MAILBOX

VIRGINIA DEPARTMENT OF TRANSPORTATION

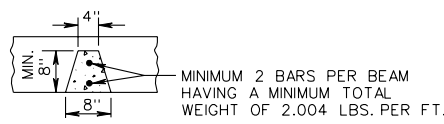


NOTES:
 ANY MANUFACTURERS FABRICATION MEETING OR EXCEEDING THE MINIMUM DESIGN REQUIREMENTS DETAILED HEREON WILL BE ACCEPTABLE.
 ALL CONCRETE IN PRECAST MEMBERS TO BE 4000 PSI
 CONCRETE IN FOOTING TO BE CLASS C1 OR CLASS A3.
 LENGTH TO BE AS SHOWN ON PLANS.

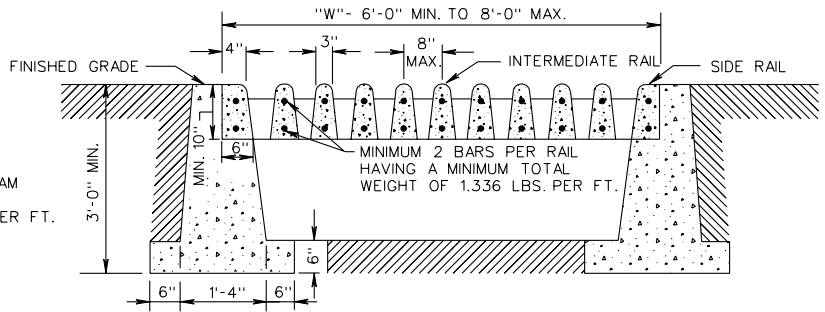
MINIMUM SECTIONAL AREA OF MEMBERS

- INTERMEDIATE RAIL — 28 SQ. IN.
- SIDE RAIL — 50 SQ. IN.
- BEAM — 48 SQ. IN.

PLAN VJEW



SECTION B-B
TYPICAL BEAM SECTION



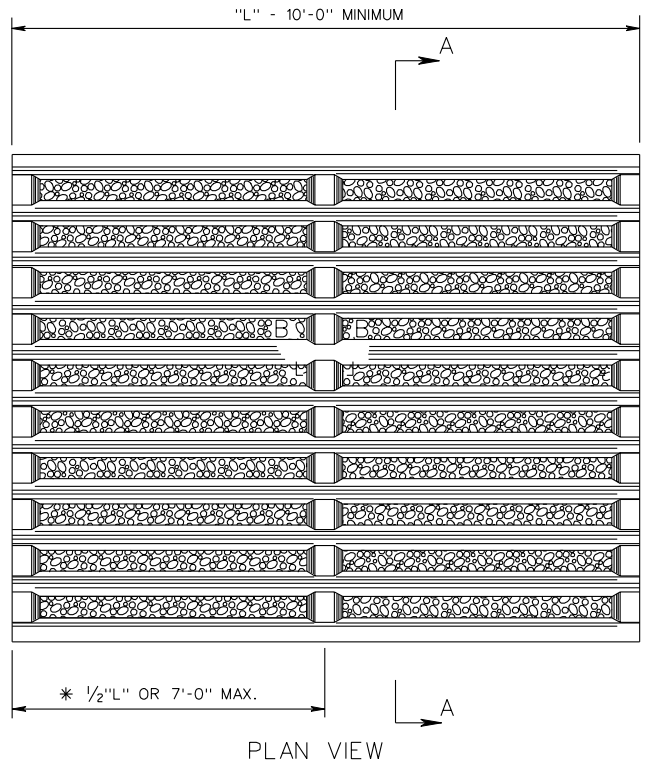
SECTION A-A

SPECIFICATION REFERENCE
302

PRECAST CONCRETE CATTLE GUARD

VIRGINIA DEPARTMENT OF TRANSPORTATION

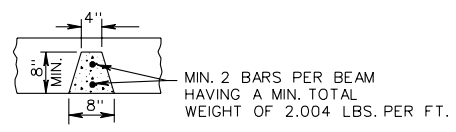
G-3A



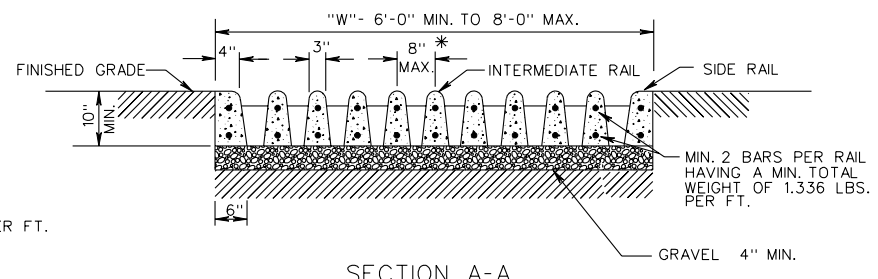
NOTES:
 ANY MANUFACTURERS FABRICATION MEETING OR EXCEEDING THE MINIMUM DESIGN REQUIREMENTS DETAILED HEREON WILL BE ACCEPTABLE.
 ALL CONCRETE IN PRECAST MEMBERS TO BE 4000 PSI.
 LENGTH TO BE AS SHOWN ON PLANS.
 * A RAIL SPACING OF 9 1/2" WOULD BE ALLOWED PROVIDED THE SPACE OF BEAMS DOES NOT EXCEED 3'.

MINIMUM SECTIONAL AREA OF MEMBERS

- INTERMEDIATE RAIL - 28 SQ. IN.
- SIDE RAIL - 50 SQ. IN.
- BEAM - 48 SQ. IN.



SECTION B-B
 TYPICAL BEAM SECTION



SECTION A-A

PRECAST CONCRETE CATTLE GUARD

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

302

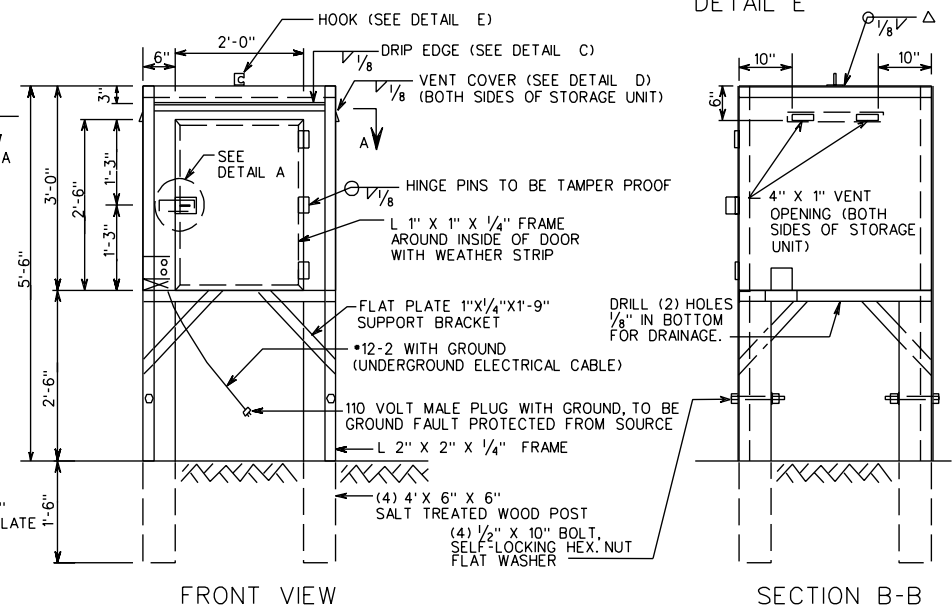
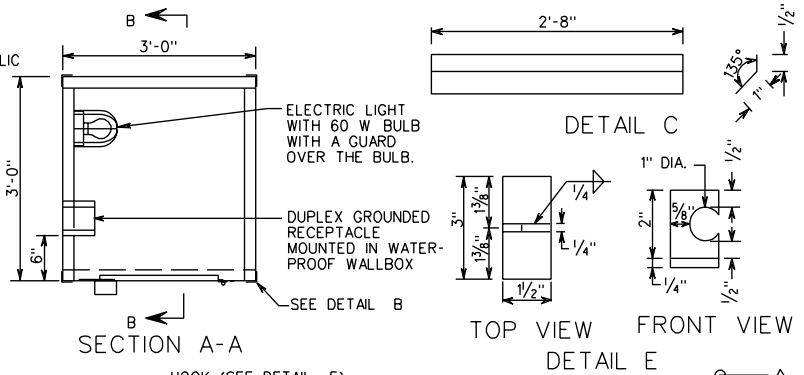
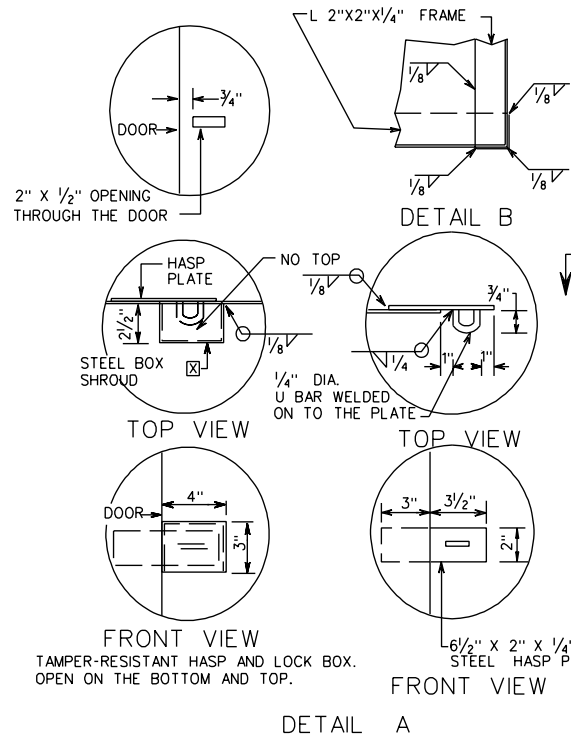
604.02

NOTES:

NO SEPARATE PAYMENT WILL BE MADE FOR FURNISHING, INSTALLING AND PROVIDING MAINTENANCE OF THE STORAGE FACILITY FOR NUCLEAR GAUGE AND THE PRICE THEREOF SHALL BE INCLUDED IN THE PRICE BID FOR FIELD OFFICE (TYPE) SPECIFIED, IN ACCORDANCE WITH SECTION 514 OF THE CURRENT ROAD AND BRIDGE SPECIFICATIONS. BOX TO BE CONSTRUCTED OF A-36 SHEET STEEL 1/8" MIN. THICKNESS. WHEN WELDING TO FRAME USE 1/8" FILLET WELDS. ALL FRAME WORK IS TO BE A-36 STEEL ANGLE L 2" X 2" X 1/4". ALL FRAME WELDS ARE TO BE 1/4" FILLET OR BUTT WELDED ACCORDINGLY. METAL SCREEN SHALL HAVE A MAXIMUM OF 50 SQUARES PER INCH TO A MINIMUM OF 25 SQUARES PER INCH AND BE SPOT WELDED TO INSIDE OF THE BOX OVER VENT OPENINGS. VENT OPENINGS SHALL BE PARTIALLY COVERED EXTERNALLY BY METAL VENT COVERS.

STORAGE AREA FOR RADIOACTIVE SOURCE IS TO BE PAINTED ON FLOOR TO SHOW THAT A MINIMUM 12" SPACE IS TO BE MAINTAINED FROM THE GAUGE TO THE EXPOSED WALL. CONTRASTING PAINT IS REQUIRED TO DEPICT STORAGE AREA.

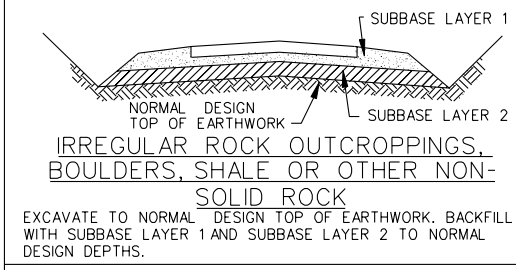
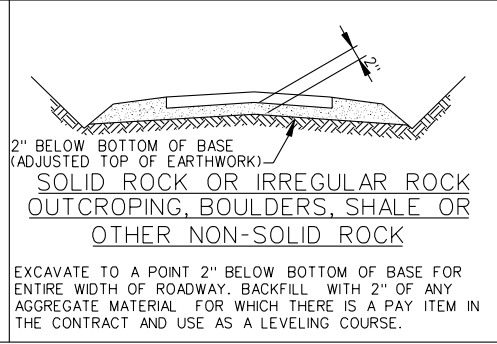
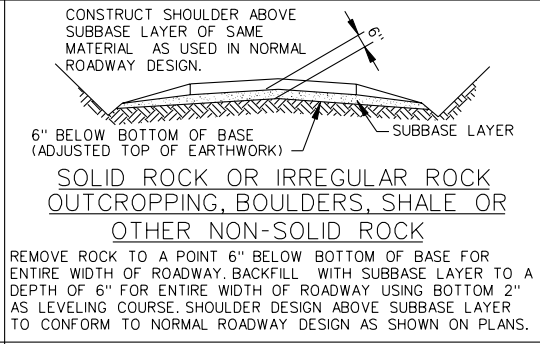
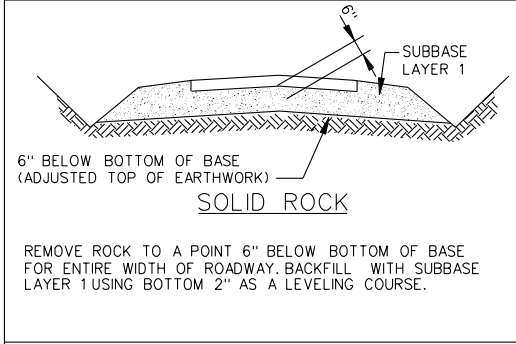
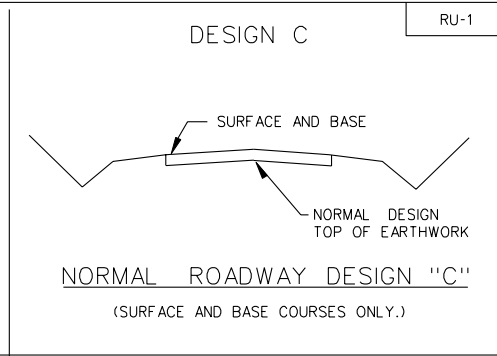
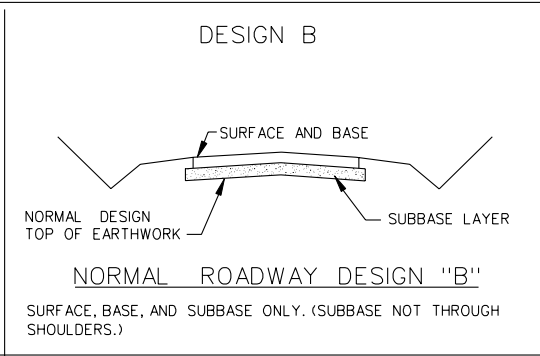
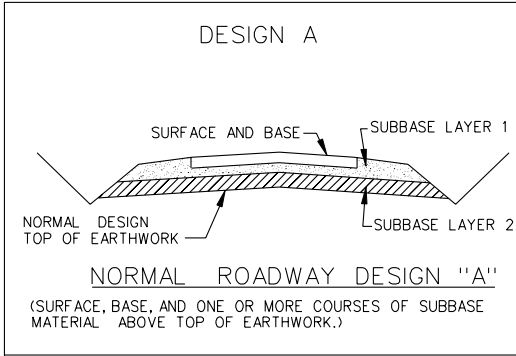
- △ THE HOOK SHALL BE WELDED TO THE CENTER OF THE TOP. STORAGE UNIT SHALL BE PAINTED INTERNALLY AND EXTERNALLY WITH A ONE COAT ACRYLIC DIRECT TO METAL (DTM) COATING, WITH A THICKNESS OF 4-6 MILS (WET MIL THICKNESS). COLOR SHALL BE EQUAL TO FEDERAL STANDARD COLOR NO. 595-17886 (WHITE).
- ☒ USE OF A CYLINDRICAL DESIGN IS AN ALLOWABLE OPTION FOR THE STEEL BOX SHROUD. THE DESIGN IS TO BE 4" ID. AND MOUNTED AT A 45° ANGLE OVER THE HASP OPENING IN THE DOOR.
- OPTIONAL SHROUD DESIGN IS TO BE SUBMITTED FOR THE ENGINEERS REVIEW AND APPROVAL.



SPECIFICATION REFERENCE

STORAGE FACILITY FOR NUCLEAR GAUGE

VIRGINIA DEPARTMENT OF TRANSPORTATION



NOTES:
APPLICABLE METHOD AS SHOWN HEREON IS TO BE USED AT SUCH LOCATIONS AS DESIGNATED BY THE ENGINEER.

ROCK CUT SECTIONS

IN DESIGN "A", IF CEMENT OR LIME SUBGRADE STABILIZATION IS INCLUDED IN THE NORMAL ROADWAY DESIGN, IT SHOULD BE ELIMINATED WHEN SOLID ROCK IS ENCOUNTERED. WHERE IRREGULAR ROCK OUTCROPPINGS, BOULDERS, SHALE OR OTHER NON-SOLID ROCK IS ENCOUNTERED, SUBSTITUTE AGGREGATE BASE OR SUBBASE MATERIAL FOR THE SUBGRADE STABILIZATION ON AN INCH FOR INCH BASIS USING BOTTOM 2" AS A LEVELING COURSE.

IN DESIGN "B", IF CEMENT OR LIME SUBGRADE STABILIZATION IS INCLUDED IN THE NORMAL ROADWAY DESIGN, IT SHOULD BE ELIMINATED WHEN SOLID ROCK, IRREGULAR OUTCROPPINGS, BOULDERS, SHALE OR OTHER NON-SOLID ROCK IS ENCOUNTERED. SUBSTITUTE AGGREGATE BASE OR SUBBASE MATERIAL FOR THE STABILIZATION ON AN INCH FOR INCH BASIS, USING BOTTOM 2" AS A LEVELING COURSE.

IN DESIGN "C", IF CEMENT OR LIME SUBGRADE STABILIZATION IS INCLUDED IN THE NORMAL ROADWAY DESIGN, ELIMINATED WHEN SOLID ROCK, IRREGULAR ROCK OUTCROPPINGS, BOULDERS, SHALE OR OTHER NON-SOLID ROCK IS ENCOUNTERED, SUBSTITUTE AGGREGATE BASE OR SUBBASE MATERIAL FOR THE STABILIZATION ON AN INCH FOR INCH BASIS USING BOTTOM 2" AS A LEVELING COURSE.

IN DESIGN "A", IF CEMENT STABILIZATION OF AGGREGATE BASE OR SUBBASE MATERIAL IS INCLUDED AS AN INTEGRAL PART OF THE PAVEMENT STRUCTURE ABOVE SUBGRADE ELEVATION ELIMINATE THE CEMENT WHEN SOLID ROCK IS ENCOUNTERED.

IN DESIGN "B", IF CEMENT STABILIZATION OF AGGREGATE BASE OR SUBBASE MATERIAL IS INCLUDED AS AN INTEGRAL PART OF THE PAVEMENT STRUCTURE ABOVE SUBGRADE ELEVATION, ELIMINATE THE CEMENT WHEN SOLID ROCK OR IRREGULAR ROCK OUTCROPPINGS, BOULDERS, SHALE OR OTHER NON-SOLID ROCK IS ENCOUNTERED.

ROCK FILL SECTIONS

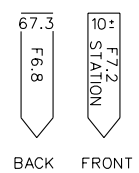
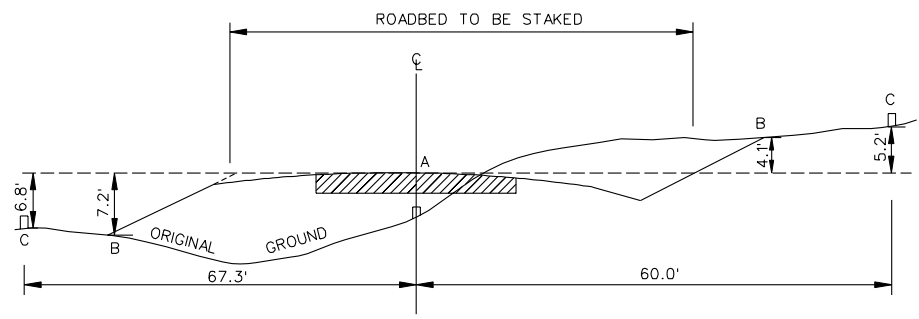
WHEN A FILL SECTION IS BUILT USING GOOD QUALITY STONE AT SUBGRADE ELEVATION AND 2' OR MORE BELOW SUBGRADE ELEVATION, FILL SECTIONS SHALL BE HANDLED IN THE SAME MANNER AS ROCK CUT-SECTIONS. GOOD QUALITY ROCK IN FILL SECTIONS SHOULD BE CONSIDERED THE SAME AS SOLID ROCK IN CUT SECTIONS SHOWN IN DESIGN "A". ALL OTHER ROCK FILL SUBGRADE CONDITIONS SHALL BE HANDLED ACCORDING TO DESIGN A, B OR C AS SHOWN.

SPECIFICATION REFERENCE
303

STANDARD METHODS OF UNDERCUTTING ROCK

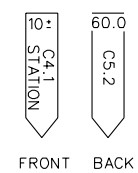
VIRGINIA DEPARTMENT OF TRANSPORTATION

SLOPE STAKES ON TANGENTS

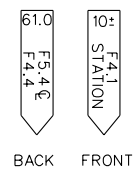
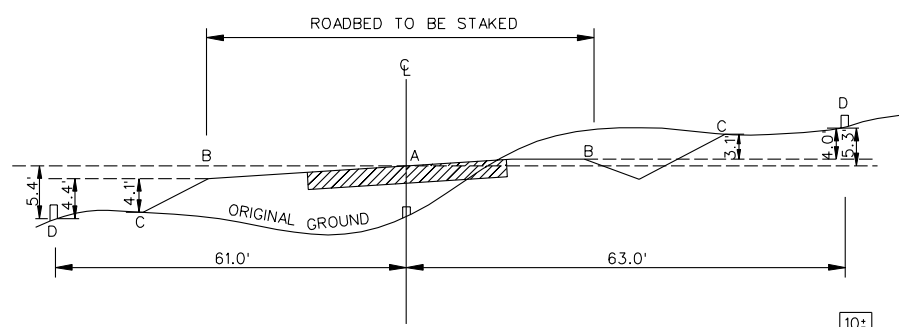


THE FRONT OF THE STAKE SHALL INDICATE THE CUT OR FILL TO THE SLOPE INTERSECTION (VERTICAL DISTANCE A TO B), THE OFFSET DISTANCE (B TO C), AND THE STATION.

THE BACK OF THE STAKE SHALL INDICATE THE CUT OR FILL AT THE POINT WHERE THE STAKE IS SET (VERTICAL DISTANCE A TO C), AND THE DISTANCE TO THE CENTERLINE (A TO C).

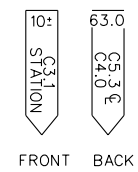


SLOPE STAKES ON CURVES



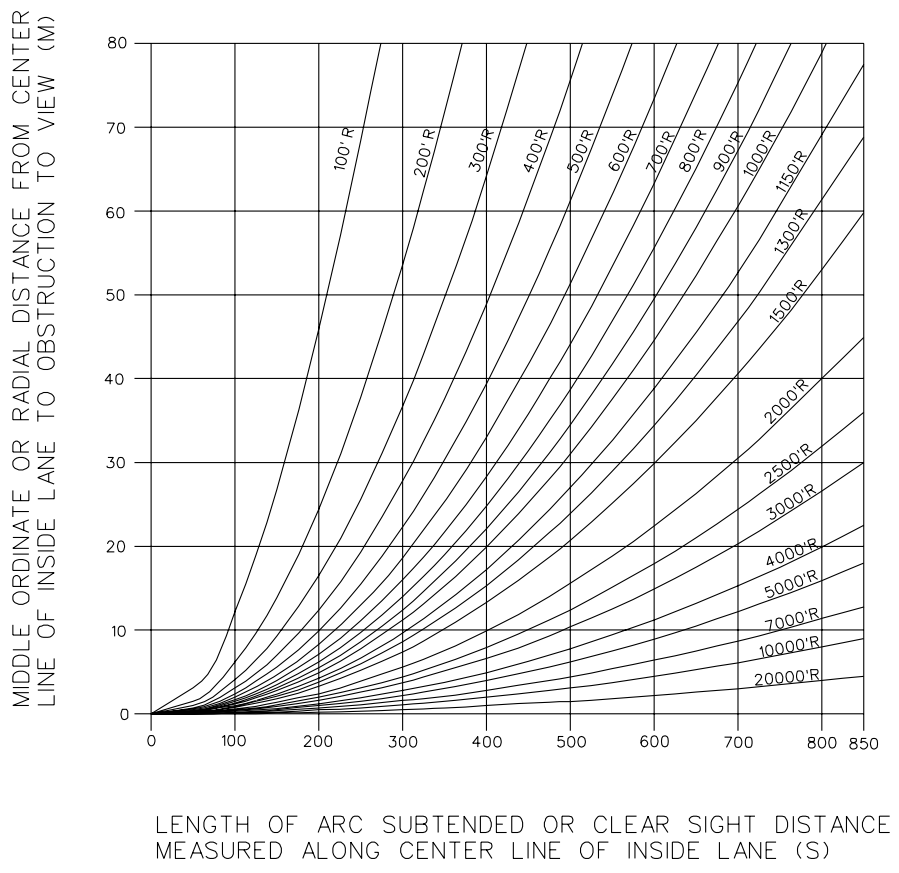
THE FRONT OF THE STAKE SHALL INDICATE THE CUT OR FILL TO THE SLOPE INTERSECTION INCLUDING SUPERELEVATION (VERTICAL DISTANCE B TO C), THE OFFSET DISTANCE (C TO D), AND THE STATION.

THE BACK OF THE STAKE SHALL INDICATE THE CUT OR FILL TO CENTERLINE AT THE POINT WHERE THE STAKE IS SET (VERTICAL DISTANCE A TO D), THE CUT OR FILL WHERE THE STAKE IS SET, INCLUDING SUPERELEVATION (VERTICAL DISTANCE B TO D), AND THE DISTANCE TO CENTERLINE (A TO D).

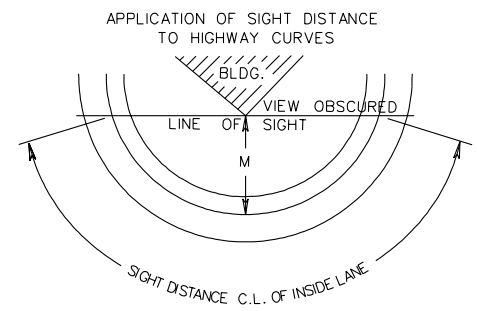


SPECIFICATION REFERENCE
105

STANDARD METHOD OF SETTING AND MARKING SLOPE STAKES



• 0.5 FEET STOPPING
 4.25 FEET PASSING
 LINE OF SIGHT AT MID POINT TO BE 2.0' ABOVE EDGE OF PAVEMENT FOR STOPPING SIGHT DISTANCE, AND 4.0' FOR PASSING SIGHT DISTANCE.



SIGHT DISTANCES ON HORIZONTAL CURVES
 HEIGHT OF EYE 3.5 FT.; HEIGHT OF OBJECT 0.5 AND 4.25 FT.

A = Algebraic Difference of Grades in Percent	When S > L: $S = \frac{664.575}{A} + \frac{L}{2}$																				When S < L: $S = 36.458 \sqrt{\frac{L}{A}}$																				SD-2	
	S = Sight Distance in Feet																				Sheet 2 of 2		A = Algebraic Difference of Grades in Percent																			
	L = Length of Vertical Curve in Feet																																									
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000																						
2.0	835	855	874	893	911	930	947	965	982	998	1015	1031	1047	1063	1078	1094	1109	1124	1138	1153	2.0																					
2.5	747	765	782	799	815	831	847	863	878	893	908	922	937	951	965	978	992	1005	1018	1031	2.5																					
3.0	682	698	714	729	744	759	773	788	802	815	829	842	855	868	881	893	905	918	930	941	3.0																					
3.5	631	646	661	675	689	703	716	729	742	755	767	780	792	803	815	827	838	849	861	872	3.5																					
4.0	591	605	618	631	644	657	670	682	694	706	718	729	740	752	763	773	784	795	805	815	4.0																					
4.5	557	570	583	595	608	620	631	643	654	666	677	687	698	709	719	729	739	749	759	769	4.5																					
5.0	528	541	553	565	576	588	599	610	621	631	642	652	662	672	682	692	701	711	720	729	5.0																					
5.5	504	516	527	539	550	561	571	582	592	602	612	622	631	641	650	660	669	678	686	695	5.5																					
6.0	482	494	505	516	526	537	547	557	567	576	586	595	605	614	623	631	640	649	657	666	6.0																					
6.5	463	474	485	495	506	516	525	535	545	554	563	572	581	590	598	607	615	623	631	640	6.5																					
7.0	447	457	467	477	487	497	506	516	525	534	543	551	560	568	576	585	593	601	609	616	7.0																					
7.5	431	442	451	461	471	480	489	498	507	516	524	533	541	549	557	565	573	580	588	595	7.5																					
8.0	418	428	437	447	456	465	474	482	491	499	507	516	524	531	539	547	554	562	569	576	8.0																					
8.5	405	415	424	433	442	451	459	468	476	484	492	500	508	516	523	531	538	545	552	559	8.5																					
9.0	394	403	412	421	430	438	447	455	463	471	478	486	494	501	508	516	523	530	537	543	9.0																					
9.5	383	392	401	410	418	426	435	443	450	458	466	473	480	488	495	502	509	516	522	529	9.5																					
10.0	374	382	391	399	408	416	424	431	439	447	454	461	468	475	482	489	496	503	509	516	10.0																					
10.5	365	373	382	390	398	406	413	421	428	436	443	450	457	464	471	477	484	490	497	503	10.5																					
11.0	356	365	373	381	389	396	404	411	419	426	433	440	447	453	460	466	473	479	485	492	11.0																					
11.5	348	357	365	372	380	388	395	402	409	416	423	430	437	443	450	456	462	469	475	481	11.5																					
12.0	341	349	357	365	372	379	387	394	401	408	414	421	428	434	440	447	453	459	465	471	12.0																					
12.5	334	342	350	357	365	372	379	386	393	399	406	412	419	425	431	437	444	449	455	461	12.5																					
13.0	328	335	343	350	358	365	372	378	385	392	398	404	411	417	423	429	435	441	447	452	13.0																					
13.5	322	329	336	344	351	358	365	371	378	384	391	397	403	409	415	421	427	433	438	444	13.5																					
14.0	316	323	330	338	344	351	358	365	371	377	384	390	396	402	408	413	419	425	430	436	14.0																					
14.5	310	318	325	332	339	345	352	358	365	371	377	383	389	395	401	406	412	417	423	428	14.5																					
15.0	305	312	319	326	333	339	346	352	358	365	371	377	382	388	394	399	405	410	416	421	15.0																					
16.0	295	302	309	316	322	329	335	341	347	353	359	365	370	376	381	387	392	397	402	408	16.0																					
17.0	287	293	300	306	313	319	325	331	337	342	348	354	359	365	370	375	380	385	390	395	17.0																					
18.0	278	285	291	298	304	310	316	322	327	333	338	344	349	354	359	365	370	375	379	384	18.0																					
19.0	271	277	284	290	296	302	307	313	318	324	329	335	340	345	350	355	360	365	369	374	19.0																					
20.0	264	270	276	282	288	294	300	305	310	316	321	326	331	336	341	346	351	355	360	365	20.0																					

SIGHT DISTANCE ON VERTICAL CURVES

HEIGHT OF EYE = 3.5 FEET HEIGHT OF OBJECT = 0.5 FEET

VIRGINIA DEPARTMENT OF TRANSPORTATION

608.03

SD-3		When S>L: $S = \frac{1546.362}{A} + \frac{L}{2}$																			When S<L: $S = 55.612 \sqrt{\frac{L}{A}}$										S = Sight Distance in Feet		Sheet 1 of 2		A = Algebraic Difference of Grades in Percent
A = Algebraic Difference of Grades in Percent		L = Length of Vertical Curve in Feet																																	
		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000														
2.0	798	823	848	873	898	923	948	973	998	1023	1048	1073	1098	1123	1148	1173	1198	1223	1248	1273	2.0														
2.5	644	669	694	719	744	769	794	819	844	869	894	919	944	969	994	1019	1044	1069	1094	1119	2.5														
3.0	540	565	590	615	640	665	690	715	740	765	790	815	840	865	890	915	940	965	990	1015	3.0														
3.5	467	492	517	542	567	592	617	642	667	692	717	742	767	792	817	842	867	892	916	940	3.5														
4.0	412	437	462	487	512	537	562	587	612	637	662	687	712	737	762	786	811	834	857	879	4.0														
4.5	369	394	419	444	469	494	519	544	569	594	619	644	669	694	718	741	764	786	808	829	4.5														
5.0	334	359	384	409	434	459	484	509	534	559	584	609	634	658	681	703	725	746	767	786	5.0														
5.5	306	331	356	381	406	431	456	481	506	531	556	581	605	627	649	671	691	711	731	750	5.5														
6.0	283	308	333	358	383	408	433	458	483	508	532	556	579	601	622	642	662	681	700	718	6.0														
6.5	263	288	313	338	363	388	413	438	463	488	512	534	556	577	597	617	636	654	672	690	6.5														
7.0	246	271	296	321	346	371	396	421	446	470	493	515	536	556	576	595	613	631	648	665	7.0														
7.5	231	256	281	306	331	356	381	406	431	454	476	497	518	537	556	574	592	609	626	642	7.5														
8.0	218	243	268	293	318	343	368	393	417	440	461	482	501	520	538	556	573	590	606	622	8.0														
8.5	207	232	257	282	307	332	357	381	405	427	447	467	486	505	522	540	556	572	588	603	8.5														
9.0	197	222	247	272	297	322	347	371	393	415	435	454	473	490	508	524	540	556	571	586	9.0														
9.5	188	213	238	263	288	313	338	361	383	403	423	442	460	477	494	510	526	541	556	571	9.5														
10.0	180	205	230	255	280	305	329	352	373	393	412	431	448	465	482	497	513	528	542	556	10.0														
10.5	172	197	222	247	272	297	321	343	364	384	402	420	438	454	470	485	500	515	529	543	10.5														
11.0	166	191	216	241	266	290	314	335	356	375	393	411	427	444	459	474	489	503	517	530	11.0														
11.5	159	184	209	234	259	284	307	328	348	367	385	402	418	434	449	464	478	492	505	519	11.5														
12.0	154	179	204	229	254	278	300	321	341	359	376	393	409	425	440	454	468	482	495	508	12.0														
12.5	149	174	199	224	249	272	294	315	334	352	369	385	401	416	431	445	459	472	485	497	12.5														
13.0	144	169	194	219	244	267	289	308	327	345	362	378	393	408	422	436	450	463	475	488	13.0														
13.5	140	165	190	215	239	262	283	303	321	338	355	371	386	400	415	428	441	454	467	479	13.5														
14.0	135	160	185	210	235	257	278	297	315	332	349	364	379	393	407	420	433	446	458	470	14.0														
14.5	132	157	182	207	231	253	273	292	310	327	343	358	372	386	400	413	426	438	450	462	14.5														
15.0	128	153	178	203	227	249	269	287	305	321	337	352	366	380	393	406	419	431	443	454	15.0														
16.0	122	147	172	197	220	241	260	278	295	311	326	341	354	368	381	393	405	417	429	440	16.0														
17.0	116	141	166	191	213	234	252	270	286	302	316	330	344	357	369	381	393	405	416	427	17.0														
18.0	111	136	161	185	207	227	245	262	278	293	307	321	334	347	359	371	382	393	404	415	18.0														
19.0	106	131	156	180	202	221	239	255	271	285	299	313	325	338	349	361	372	383	393	403	19.0														
20.0	102	127	152	176	197	215	233	249	264	278	292	305	317	329	341	352	363	373	383	393	20.0														

SIGHT DISTANCE ON VERTICAL CURVES

HEIGHT OF EYE = 3.5 FEET

HEIGHT OF OBJECT = 4.25 FEET

A = Algebraic Difference of Grades in Percent	When S > L: $S = -\frac{1546.362}{A} + \frac{L}{2}$																				When S < L: $S = 55.612 \sqrt{\frac{L}{A}}$																				SD-3 Algebraic Difference of Grades in Percent
	L = Length of Vertical Curve in Feet																				S = Sight Distance in Feet																				
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000																					
2.0	1298	1323	1348	1373	1398	1423	1448	1473	1498	1523	1548	1573	1597	1621	1645	1668	1691	1714	1736	1759	2.0																				
2.5	1144	1169	1194	1219	1244	1268	1292	1316	1339	1362	1385	1407	1429	1450	1471	1492	1513	1533	1553	1573	2.5																				
3.0	1040	1065	1089	1112	1135	1158	1180	1201	1223	1244	1264	1284	1304	1324	1343	1362	1381	1400	1418	1436	3.0																				
3.5	963	986	1008	1030	1051	1072	1092	1112	1132	1151	1170	1189	1207	1226	1244	1261	1279	1296	1313	1329	3.5																				
4.0	901	922	943	963	983	1003	1022	1040	1059	1077	1095	1112	1129	1146	1163	1180	1196	1212	1228	1244	4.0																				
4.5	849	869	889	908	927	945	963	981	998	1015	1032	1049	1065	1081	1097	1112	1128	1143	1158	1172	4.5																				
5.0	806	825	843	862	879	897	914	931	947	963	979	995	1010	1025	1040	1055	1070	1084	1098	1112	5.0																				
5.5	768	786	804	821	838	855	871	887	903	918	934	949	963	978	992	1006	1020	1034	1047	1060	5.5																				
6.0	736	753	770	786	803	819	834	849	865	879	894	908	922	936	950	963	977	990	1003	1015	6.0																				
6.5	707	723	740	756	771	786	801	816	831	845	859	873	886	899	912	925	938	951	963	975	6.5																				
7.0	681	697	713	728	743	758	772	786	800	814	828	841	854	867	879	892	904	916	928	940	7.0																				
7.5	658	673	689	703	718	732	746	760	773	786	799	812	825	837	849	862	873	885	897	908	7.5																				
8.0	637	652	667	681	695	709	722	736	749	761	774	786	799	811	823	834	846	857	868	879	8.0																				
8.5	618	633	647	661	674	688	701	714	726	739	751	763	775	786	798	809	820	831	842	853	8.5																				
9.0	601	615	629	642	655	668	681	694	706	718	730	741	753	764	775	786	797	808	819	829	9.0																				
9.5	585	598	612	625	638	651	663	675	687	699	710	722	733	744	755	765	776	786	797	807	9.5																				
10.0	570	583	596	609	622	634	646	658	670	681	692	703	714	725	736	746	756	767	777	786	10.0																				
10.5	556	569	582	595	607	619	631	642	654	665	676	686	697	708	718	728	738	748	758	768	10.5																				
11.0	543	556	569	581	593	605	616	627	638	649	660	671	681	691	701	711	721	731	740	750	11.0																				
11.5	531	544	556	568	580	591	603	614	624	635	646	656	666	676	686	696	705	715	724	733	11.5																				
12.0	520	532	544	556	568	579	590	601	611	622	632	642	652	662	672	681	691	700	709	718	12.0																				
12.5	510	522	533	545	556	567	578	589	599	609	619	629	639	649	658	667	677	686	695	703	12.5																				
13.0	500	512	523	534	545	556	567	577	587	597	607	617	627	636	645	654	663	672	681	690	13.0																				
13.5	490	502	513	524	535	546	556	566	576	586	596	605	615	624	633	642	651	660	668	677	13.5																				
14.0	482	493	504	515	525	536	546	556	566	576	585	595	604	613	622	631	639	648	656	665	14.0																				
14.5	473	484	495	506	516	527	537	546	556	566	575	584	593	602	611	620	628	637	645	653	14.5																				
15.0	465	476	487	497	508	518	528	537	547	556	565	574	583	592	601	609	618	626	634	642	15.0																				
16.0	451	461	471	482	492	501	511	520	529	538	547	556	565	573	582	590	598	606	614	622	16.0																				
17.0	437	447	457	467	477	486	496	505	514	522	531	540	548	556	564	572	580	588	596	603	17.0																				
18.0	425	435	445	454	463	473	482	490	499	508	516	524	532	540	548	556	564	571	579	586	18.0																				
19.0	413	423	433	442	451	460	469	477	486	494	502	510	518	526	534	541	549	556	563	571	19.0																				
20.0	403	412	422	431	440	448	457	465	474	482	490	497	505	513	520	528	535	542	549	556	20.0																				

SIGHT DISTANCE ON VERTICAL CURVES

HEIGHT OF EYE = 3.5 FEET

HEIGHT OF OBJECT = 4.25 FEET