

**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.  
 V<sub>1</sub>, V<sub>2</sub>, V<sub>3</sub> & V<sub>4</sub> - 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.

**PLAN**

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

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

**SECTION A-A**

ELEV. PROP. OR EXIST. SIDEWALK OR SHOULDER.

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

SPECIFICATION REFERENCE

105  
504

# STANDARD CONCRETE STEPS FOR 1 1/2:1 SLOPE

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT

ROAD AND BRIDGE STANDARDS

REVISION DATE

SHEET 1 OF 2

601.01