

**ATTACHMENT – G**  
**MATERIALS TESTING SPECIFICATION REFERENCE GUIDE**

**08-16-20**

## Arlington County, VA Materials Testing Specification Reference Guide (8/18/2016)

<b>MATERIAL AND TEST</b> (REF. - VDOT TEST METHODS MANUAL )	<b>VDOT ROAD AND BRIDGE SPECIFICATION</b> <b>2002 (Or Latest Version)</b>	<b>MINIMUM RATE OF SAMPLING</b> (REF. - VDOT MANUAL OF INSTRUCTIONS)	<b>LOCATION OF SAMPLING</b>	<b>REMARKS</b>
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<b>SOILS AND AGGREGATES</b>				
<b>1. Embankments</b>				
(a) Density, Any Method	303.04(h)	One (1) test per 2500 yd <sup>3</sup> or less plus: (a) for fills less than 500 ft. length one (1) test on every other 6-in. layer bottom to top of fill starting with the second lift; (b) for fills from 500-2000 ft. length, two (2) tests per 6-in. layer within top five (5) ft. of fill; (c) for fills greater than 2000 ft length, break into equal segments not to exceed 2000 ft. and use same frequency for each section as for fills 500 to 2000 ft. in length.	Roadway	When tests are not run due to gravel, muck, rock, etc. give station and depth on report in lieu of test, with reason. For nuclear test, use Direct Transmission Method, VTM-10. See Notes 1 and 2.
<b>2. Finished Sub-grade (Both Cut and Fill Sections)</b>				
(a) Density, Any Method	305.03	One (1) test per 2000 continuous linear ft. of roadway and one test minimum per intersection per construction location	Roadway (24 ft.)	For nuclear test, use Direct Transmission Method, VTM-10. See Notes 1 and 2.

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(b) Density, Any Method	305.03	One (1) test per continuous section/block/or intersection	Curb, Comb. Curb and Gutter	For nuclear test, use Direct Transmission Method, VTM-10. See Notes 1 and 2.
(c) Density, Any Method	305.03	One (1) test per continuous section/block/or intersection	Sidewalk	For nuclear test, use Direct Transmission Method, VTM-10. See Notes 1 and 2.
<b>3. Central Mix Aggregate (Treated or Untreated) Base, Subbase, and Select Material</b>				
(a) Density, Any Method	305.03, 308.03, & 309.05.	One (1) test per 1/2 mile or less per continuous lane application width per layer. If testing by nuclear method, each test shall consist of average of five (5) readings.	Roadway. Location of five (5) nuclear readings at randomly selected sites.	For nuclear tests, use Backscatter, Control Strip Method, VTM-10. With nuclear method, set up roller pattern and control strip for each layer or lift placed. See Notes 1 and 2.
(b) Density, Any Method	305.03, 308.03, & 309.05.	One (1) test per continuous section/block/or intersection	Curb, Comb. Curb and Gutter	For nuclear test, use Direct Transmission Method, VTM-10. See Notes 1 and 2.
(c) Density, Any Method	305.03, 308.03, & 309.05.	One (1) test per continuous section/block/or intersection	Sidewalk	For nuclear test, use Direct Transmission Method, VTM-10. See Notes 1 and 2.

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<b>4. Backfill for Pipes and Box Culverts</b>	302.03, 303.04(g), 401.03(i)	Minimum one test per lift on alternating sides of pipe for each 300 feet of pipe or portion thereof. Test pattern is to begin after first 4" compacted layer above the structures bedding and continue to 1' above top of pipe or box culvert structure. For rate of testing greater than 1' above top of pipe refer to contract documents and Rate of Sampling for embankments.	Alternating sides of structure	For nuclear test, use Direct Transmission Methods, VTM-10. See Notes 1 and 2.  Backfill lifts shall be compacted in horizontal layers not more than 6 inches in thickness, loose measurement. (Or as Specified by the Contract Documents)
<b>5. Backfill for Drop Inlets</b>	302.03, 303.04(g)	Minimum one test every other lift around the perimeter beginning after the first 4" compacted layer above the bedding and continue to top of the structure. Stagger tests to ensure consistent compaction effort has been achieved.	Perimeter of structure	To include drop inlets, junction boxes, etc. For nuclear test, use Direct Transmission Methods, VTM-10. See Notes 1 and 2.  Backfill lifts shall be compacted in horizontal layers not more than 6 inches in thickness, loose measurement. (Or as Specified by the Contract Documents)
<b>6. Backfill for Manholes</b>	302.03, 303.04(g)		Perimeter of structure	For nuclear test, use Direct Transmission Methods, VTM-10. See Notes 1 and 2.  Backfill lifts shall be compacted in horizontal layers not more than 6 inches in thickness, loose measurement. (Or as Specified by the Contract Documents)

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<b>HYDRAULIC CEMENT CONCRETE</b>				
<b>1. Sidewalk, Curb, Comb. Curb and Gutter</b>				
(a) Temperature Measurements	217	One test per batch (truck), and when making compressive specimens.	At job site, and prior to placing concrete in forms.	If test on any batch fails, recheck batch immediately before rejecting. Enter results of tests in project records.
(b) Air Content	217	One test per batch (truck), and when making compressive specimens	At job site, and prior to placing concrete in forms	Any of 3 approved methods may be used for this test. However, with any test method used, with readings indicating concrete to be outside of specification must be confirmed first with test by Pressure Method before rejection of concrete. Enter results in project records.
(c) Consistency (Slump Test)	217	One test per batch (truck), and when making compressive specimens.	At job site, and prior to placing concrete in forms.	If test on any batch fails, recheck batch immediately before rejecting. Enter results in project records.

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(d) Compressive Strength...	217	<p>For <u>miscellaneous concrete</u>, one set of 3 cylinders shall be made for each 250 cubic yards, with a minimum of one set of 3 per day. Any one set to be made from same batch.</p> <p>For <u>structural concrete</u>, one set of 3 cylinders shall be made for each 100 cubic yards of concrete placed, with a minimum of 2 sets of 3 cylinders each per structure per class of concrete. Any one set to be made from same batch.</p>	At job site.	<p><u>Molding and Curing</u> Molds shall be placed on a rigid horizontal surface free from vibration and other disturbances during the first 24 hours, all test specimens shall be stored under conditions that maintain the temperature immediately adjacent to the specimens in the range of 60°F to 80°F, and prevent loss of moisture.</p> <p><u>Testing</u> Except when high-early strength concrete is specified, compressive strength testing will be performed at 28 days.</p>

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<b>ASPHALT PAVEMENT</b>				
(a) In-Place Pavement Density by Nuclear Method  (Roller Pattern)/ (Control Strip)  (Asphalt Pavement)	Roads and Bridges Section 315.05  VTM-76  AASHTO T-166	Establish Roller pattern and Control Strip according to VTM-76. Ten (10) stratified random sample to establish target density. Verify minimum density achieved with cores per VTM-76.  <b>QC technician shall be certified and pass State proficiency</b>	Field	Contractor/Asphalt Producer shall provide Certified Asphalt Paving Technician for density testing
(b) In-place Pavement Density by Nuclear Method and/or VDOT cores Test Section)  (Asphalt Pavement)	Roads and Bridges Section 315.05  VTM-76  AASHTO T-166	Test Section-  Lot Size: 5000 ft. per Lane width.  Ten (10) stratified random samples per lot for nuclear gauge and/or five(5) stratified random plug/cores per lot  <b>QC technician shall be certified and pass State proficiency</b>	Field	Contractor/Asphalt Producer shall provide Certified Asphalt Paving Technician for density testing
(c) Temperature Measurements	Roads and Bridges  211.08	One temperature measurement initially on first and fifth loads, each type mix each production day, and thereafter minimum of one per hour of production time for each mix type, by Producer's Certified Asphalt	QC - Processing or mixing plant from back of truck  <b>QA – Field</b>	The Contractor should take and record temperature measurements of the asphalt concrete at the beginning of paving operations and thereafter at a rate of not less than one measurement every hour. The

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		Concrete Technician. If any test outside of tolerance, minimum of 3 additional tests made in different points of the load, and 4 tests averaged and average used as temperature of load or batch.		Project Officer may increase the frequency of temperature measurements at any time. The temperature should be checked using an appropriate heat-sensing device (i.e. probe thermometer, infrared thermometer, etc.).

Note 1. Density tests are reported on Forms TL-53, TL-54, TL-55, TL-124, TL-125 (Sand Cone Method), and TL-125A (One-Point Proctor Method).

Note 2. If there is a breakdown in the nuclear testing equipment, then density testing shall continue using other approved methods.