



DETERMINATION OF BITUMINOUS DISTRIBUTOR TRUCK TRANSVERSE SPREAD RATE

(A Modification of California Test 339)

1. SCOPE

- 1.1 This procedure describes the method for determining the transverse spread rate, in gallons per square yard, of bituminous distributor trucks. **This procedure is applicable for all bituminous materials other than asphalt-rubber and cutback asphalts.**

Note: Three Alternate Sampling Procedures are outlined in this test method.

- 1.2 This test method involves hazardous material, operations, and equipment. This test method does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.
- 1.3 See Appendix A1 of the Materials Testing Manual for information regarding the procedure to be used for rounding numbers to the required degree of accuracy.

2. APPARATUS

- 2.1 Requirements for the frequency of equipment calibration and verification are found in Appendix A3 of the Materials Testing Manual. Apparatus for this test procedure shall consist of the following:
- 2.1.1 Balance - A balance capable of measuring the maximum weight to be determined and conforming to the requirements of AASHTO M 231, except the readability and sensitivity of any balance utilized shall be at least 0.1 gram.
- 2.1.2 Oven - An oven capable of maintaining a temperature of 140 ± 5 °F.
- 2.1.3 Metal Sheets (20 gauge galvanized) - 7-7/8 inches in width and with a length to accommodate a sixteen foot spray bar. Any combination of lengths of metal plates may be used. (For example, three plates each 68

inches long; or two plates each 84 inches long and one plate 36 inches long.)

- 2.1.4 Testing Machine (when Alternate Sampling Procedure #1 is used.) - A device with a sliding platform which holds the test plates as they are moved under and through the bituminous material while it is being sprayed. See Figure 4 for an illustration of a typical "sliding platform" device.
- 2.1.5 When Alternate Sampling Procedures #2 or #3 are used, a provision to raise the plates and pads off the surface must be provided. (For example, 2" x 4" or 1" x 6" boards in any combination of lengths for a total length of 17 feet.)
- 2.1.6 Stapler - For fastening cotton pads to paper strips.

3. MATERIALS

- 3.1 100% cotton gauze pads - 4" x 8", 12 ply.
- 3.2 5" x 12" strips cut from heavy wrapping paper.
- 3.3 Masking tape, minimum 1" width.
- 3.4 Scotch tape, 3/4" width

4. PREPARATION OF TEST PADS AND TEST PLATES

- 4.1 Prepare each test pad by attaching two cotton pads (laid on top of each other) to each paper strip with a staple at each corner of the cotton pads. The cotton pads are attached to the paper strips as shown in Figure 1.
- 4.2 Place a strip of scotch tape along each end of the paper strip as shown in Figure 1. This will allow the masking tape to be easily removed from the paper strip during the removal of the test pad from the test plate.
- 4.3 Place an identification number on the paper back of each test pad. To facilitate the assembly of the test plates at the test site, it is helpful to also place the identification number in the middle of either end on the front of each test pad. (Fifty-one consecutively numbered test pads are required to fabricate the three test plates for each test.)

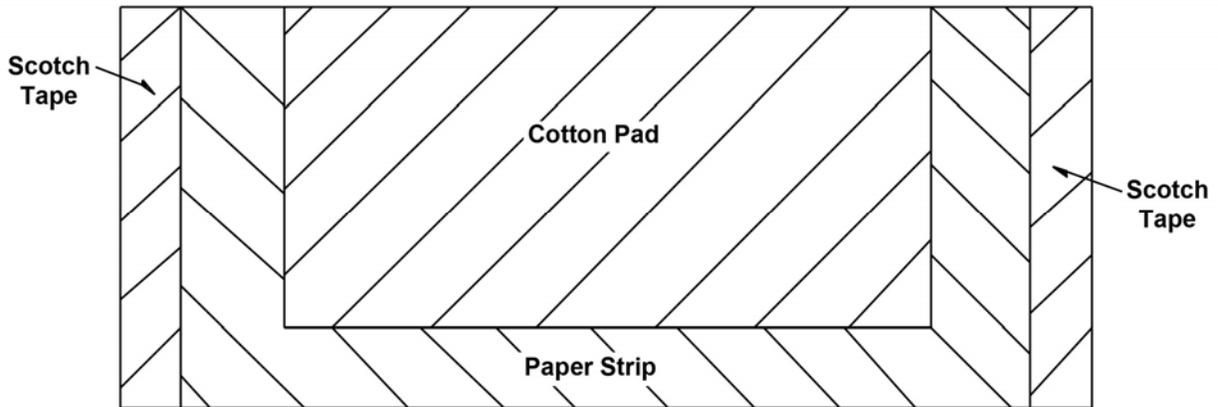
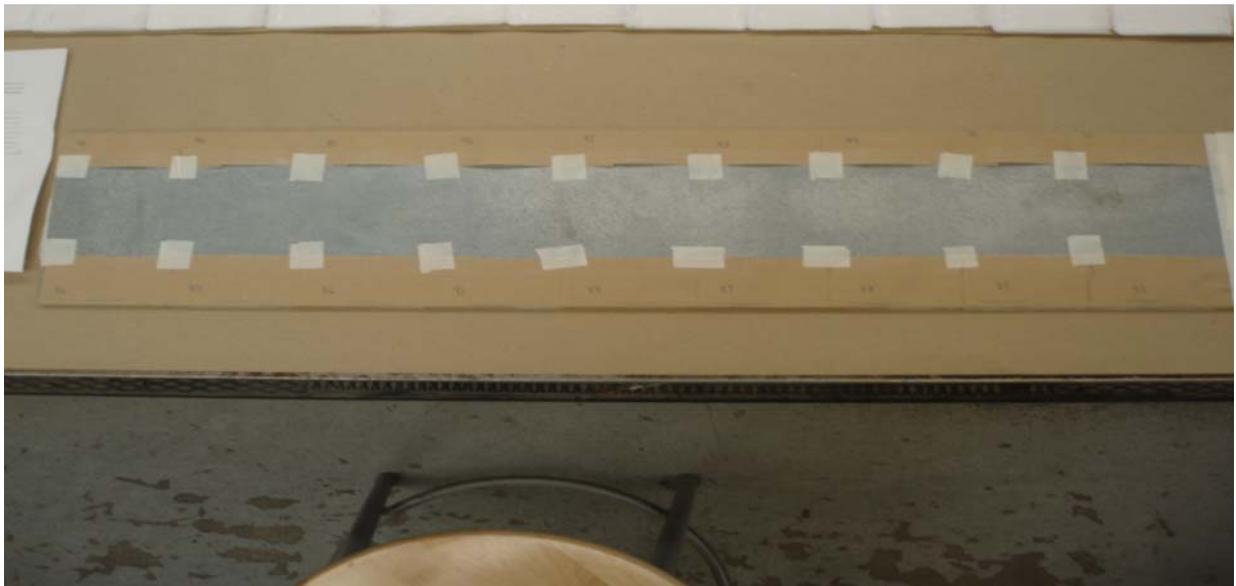


Figure 1 – Test Pad

- 4.4 Weigh each test pad and record its tare weight to the nearest 0.1 gram on the test record shown in Figure 7.
- 4.5 The test pads are attached to the metal sheet in numerical order so that the cotton pads are snug against each other by overlapping the adjacent strips 1 inch. Figure 2 provides an illustration of test pads attached to the test plate. Twenty-one test pads are required to fabricate an 84-inch test plate. Nine test pads are required to fabricate a 36-inch test plate. Each end of the test pad is folded over to the backside of the test plate and secured with masking tape.



Front of Test Plate



Back of Test Plate

Figure 2 – Test Pads Attached To Test Plate

- 4.6 Stack the assembled test plates on one another, with the corresponding test record containing the test pad tare weights. Wrap the bundle in heavy wrapping paper, as shown in Figure 3, for protection and to keep them clean while being stored or transported to the test site.

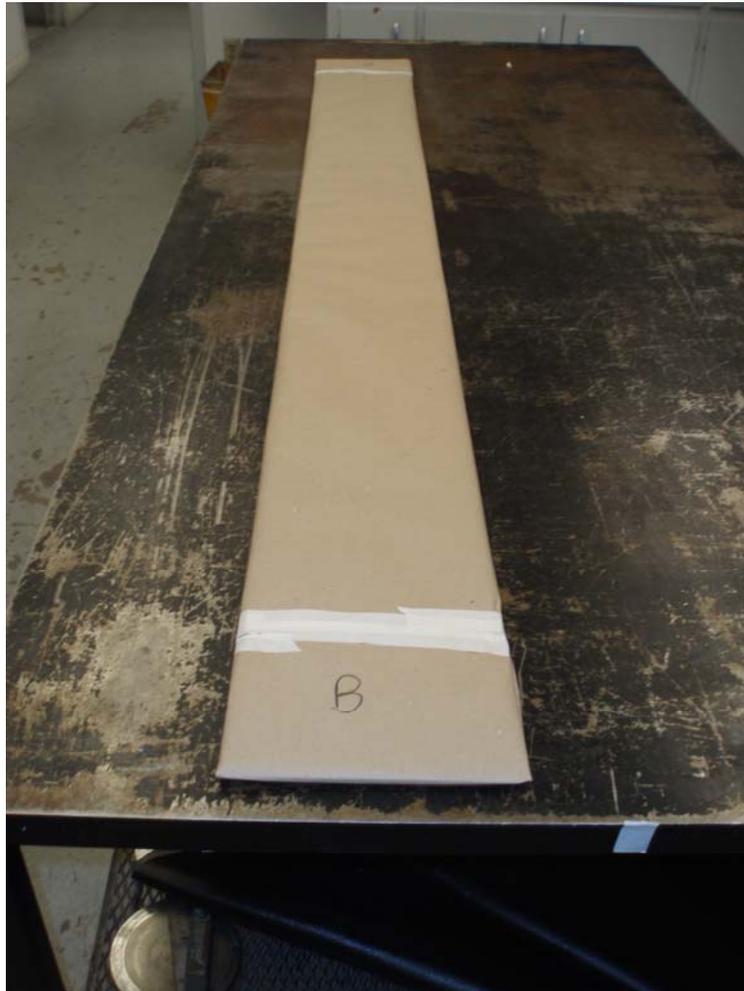


Figure 3 – Wrapped Test Plates

- 5. ALTERNATE SAMPLING PROCEDURE #1**
- 5.1 Alternate Sampling Procedure #1 utilizes the sliding platform testing machine described in Subsection 2.1.4. In this procedure, the distributor truck remains stationary while the test is being performed. Side shields shall not be used when testing is performed under this procedure.

- 5.1.1 Securely attach the test plates to the testing machine platform by wire tying. The test plates are placed end-to-end so that the test pads are in numerical order with test pad No. 1 being on the driver's side of the truck.
- 5.1.2 Position the distributor truck so that its spray bar is over the testing machine, but far enough away from the test plates to prevent any bituminous material being sprayed on the test pads. Initiate the spraying. When the spray is judged to be normal, energize the platform so that it moves under and through the spray, as illustrated in Figure 4. Terminate the spray and pull the distributor truck away from the testing machine.
- 5.1.3 Proceed to Section 8.



**Typical "Sliding Platform" Testing Machine
With Bituminous Material Being Sprayed**

Figure 4

6. ALTERNATE SAMPLING PROCEDURE #2

6.1 If desired, Alternate Sampling Procedure #2 may be used instead of Alternate Sampling Procedure #1 described in Section 5 or Alternate Sampling Procedure #3 described in Section 7. Side shields shall not be used when testing is performed under this procedure.

6.1.1 Place the boards used to raise the plates off the surface in a suitable location.

Note: The boards should be protected from the bituminous material by wrapping them in heavy paper.

6.1.2 Place the test plates end-to-end on top of the boards so that the test pads are in numerical order with test pad No. 1 being on the driver's side of the truck.

6.1.3 Back the distributor truck up to test plates so that the back wheels of the truck are a few inches from the test plates.

6.1.4 Drive the distributor truck forward at a constant speed and spray bituminous material across the test plates.

6.1.5 Proceed to Section 8.

7. ALTERNATE SAMPLING PROCEDURE #3

7.1 If desired, Alternate Sampling Procedure #3 may be used instead of Alternate Sampling Procedure #1 described in Section 5 or Alternate Sampling Procedure #2 described in Section 6. Side shields shall not be used when testing is performed under this procedure.

7.1.1 Place the boards used to raise the plates off the surface in a suitable location, which will facilitate the distributor truck backing up at a constant speed with the ability to stop prior to its wheels hitting the test plates.

Note: The boards should be protected from the bituminous material by wrapping them in heavy paper.

- 7.1.2 Place the test plates end-to-end on top of the boards so that the test pads are in numerical order with test pad No. 1 being on the driver's side of the truck.
- 7.1.3 With the distributor truck starting at an adequate distance in front of the test plates, it is backed up at a constant speed so that the bituminous material is sprayed across the test plates. The distributor truck must be stopped prior to its wheels hitting the test plates.
- 7.1.4 Proceed to Section 8.

8. REMOVAL OF TEST PADS FROM THE TEST PLATES

- 8.1 After the spraying operation is complete, leave the test plates in place a short time to allow the bituminous material to set up enough to prevent running.
- 8.2 Remove the test plates and transport them to the laboratory.
- 8.3 Place each test plate in turn on an adequate size work area. Starting with the highest number test pad and proceeding to the lowest number, remove each test pad taking care to not remove any of the paper when removing the masking tape. Fold each test pad, and stack them in a drying pan as shown in Figure 5.
- 8.4 Dry the test pads to constant weight at $140 \pm 5^{\circ}\text{F}$. Allow them to cool to room temperature prior to weighing.

Note: If PG asphalt binder is used, drying of the test pads at 140°F is not required.
- 8.5 Weigh each test pad and record its weight to the nearest 0.1 gram on the test record shown in Figure 8.

9. CALCULATIONS

- 9.1 Omit end test pads that are outside the spray bar width.
- 9.2 Determine the weight of bituminous material on each of the remaining test pads, by subtracting the corresponding test pad tare weight, and record the weight to the nearest 0.1 gram on the test record shown in Figure 7.



Folded and Stacked Test Pads

Figure 5

- 9.3 Multiply the weight of bituminous material on each test pad by 0.0107, or use the table found in Figure 6, to determine the spread rate to the nearest 0.001 gal./sq. yd. for each test pad.
- 9.4 Determine the average spread rate to the nearest 0.001 gal./sq. yd.
- 9.5 Determine the acceptable range as shown below:
 - 9.5.1 $\text{Acceptable Range} = \text{Average spread rate} \pm 10\%$, or
 $\pm 0.020 \text{ gal./sq. yd.}$, whichever is less.
- 9.6 Determine the number of test pads that are outside the acceptable range. More than three pads outside the acceptable range constitutes a failing test. Three or fewer test pads outside the acceptable range constitutes a passing test.

10. REPORT AND EXAMPLE

10.1 Report the following:

10.1.1 The spread rate, to the nearest 0.001 gal./sq. yd., for each test pad used in the spread rate calculations.

10.1.2 The average spread rate, to the nearest 0.001 gal./sq. yd.

10.1.3 Any test pads outside the acceptable range.

10.1.4 The person performing the test, the test date, the contractor's name, and identifying information on the truck tested (the license plate number and the truck number).

10.1.5 The Alternate Sampling Procedure used.

10.1.6 Whether the test result indicates a passing result or a failing result.

10.2 A blank test report form is shown in Figure 7. An example of a completed test report is given in Figure 8.

CONVERSION TABLE

(Weight of bituminous material on a 4" by 8" cotton pad to gals./sq. yd.)

grams	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
8	0.086	0.087	0.088	0.089	0.090	0.091	0.092	0.093	0.094	0.095
9	0.096	0.097	0.098	0.099	0.100	0.102	0.103	0.104	0.105	0.106
10	0.107	0.108	0.109	0.110	0.111	0.112	0.113	0.114	0.116	0.117
11	0.118	0.119	0.120	0.121	0.122	0.123	0.124	0.125	0.126	0.127
12	0.128	0.129	0.131	0.132	0.133	0.134	0.135	0.136	0.137	0.138
13	0.139	0.140	0.141	0.142	0.143	0.144	0.146	0.147	0.148	0.149
14	0.150	0.151	0.152	0.153	0.154	0.155	0.156	0.157	0.158	0.159
15	0.160	0.162	0.163	0.164	0.165	0.166	0.167	0.168	0.169	0.170
16	0.171	0.172	0.173	0.174	0.175	0.177	0.178	0.179	0.180	0.181
17	0.182	0.183	0.184	0.185	0.186	0.187	0.188	0.189	0.190	0.192
18	0.193	0.194	0.195	0.196	0.197	0.198	0.199	0.200	0.201	0.202
19	0.203	0.204	0.205	0.206	0.208	0.209	0.210	0.211	0.212	0.213
20	0.214	0.215	0.216	0.217	0.218	0.219	0.220	0.221	0.223	0.224
21	0.225	0.226	0.227	0.228	0.229	0.230	0.231	0.232	0.233	0.234
22	0.235	0.236	0.237	0.239	0.240	0.241	0.242	0.243	0.244	0.245
23	0.246	0.247	0.248	0.249	0.250	0.251	0.252	0.254	0.255	0.256
24	0.257	0.258	0.259	0.260	0.261	0.262	0.263	0.264	0.265	0.266
25	0.267	0.269	0.270	0.271	0.272	0.273	0.274	0.275	0.276	0.277
26	0.278	0.279	0.280	0.281	0.282	0.284	0.285	0.286	0.287	0.288
27	0.289	0.290	0.291	0.292	0.293	0.294	0.295	0.296	0.297	0.298
28	0.300	0.301	0.302	0.303	0.304	0.305	0.306	0.307	0.308	0.309
29	0.310	0.311	0.312	0.313	0.315	0.316	0.317	0.318	0.319	0.320
30	0.321	0.322	0.323	0.324	0.325	0.326	0.327	0.328	0.330	0.331
31	0.332	0.333	0.334	0.335	0.336	0.337	0.338	0.339	0.340	0.341
32	0.342	0.343	0.344	0.346	0.347	0.348	0.349	0.350	0.351	0.352
33	0.353	0.354	0.355	0.356	0.357	0.358	0.359	0.361	0.362	0.363
34	0.364	0.365	0.366	0.367	0.368	0.369	0.370	0.371	0.372	0.373
35	0.374	0.376	0.377	0.378	0.379	0.380	0.381	0.382	0.383	0.384

Figure 6

ARIZONA DEPARTMENT OF TRANSPORTATION
BITUMINOUS DISTRIBUTOR TRUCK TRANSVERSE SPREAD RATE
 (Arizona Test Method 411)

OWNER/CONTRACTOR: _____ TESTED BY: _____ DATE: _____

TRUCK #: _____ TRUCK LICENSE PLATE #: _____ SPRAY WIDTH _____ FT.

AVERAGE SPREAD RATE: _____ GALS./SQ. YD. ACCEPTABLE RANGE: UPPER _____ LOWER: _____

TYPE OF BITUMINOUS MATERIAL USED IN TEST: _____ TEST RESULT: PASS _____ FAIL _____

PAD #	WT. PAD + BIT. MAT'L.	PAD TARE	WT. BIT. MAT'L.	* SPREAD RATE	PAD OUT	REMARKS	PAD #	WT. PAD + BIT. MAT'L.	PAD TARE	WT. BIT. MAT'L.	* SPREAD RATE	PAD OUT	REMARKS
1							27						
2							28						
3							29						
4							30						
5							31						
6							32						
7							33						
8							34						
9							35						
10							36						
11							37						
12							38						
13							39						
14							40						
15							41						
16							42						
17							43						
18							44						
19							45						
20							46						
21							47						
22							48						
23							49						
24							50						
25							51						
26													

* SPREAD RATE = GALS./SQ.YD.

REMARKS: _____

Figure 7

ARIZONA DEPARTMENT OF TRANSPORTATION
BITUMINOUS DISTRIBUTOR TRUCK TRANSVERSE SPREAD RATE
 (Arizona Test Method 411)

OWNER/CONTRACTOR: ACME ASPHALT TRANSPORT **TESTED BY:** JOHN DOE **DATE:** 09/28/12

TRUCK #: 960 **TRUCK LICENSE PLATE #:** C 4568 A2 **SPRAY WIDTH** 16 FT.

AVERAGE SPREAD RATE: 0.139 GALS/SQ. YD. **ACCEPTABLE RANGE:** **UPPER** 0.153 **LOWER:** 0.125

TYPE OF BITUMINOUS MATERIAL USED IN TEST: SS-1 **TEST RESULT:** **PASS** **FAIL**

PAD #	WT. PAD + BIT. MAT'L.	PAD TARE	WT. BIT. MAT'L.	* SPREAD RATE	PAD OUT	REMARKS	PAD #	WT. PAD + BIT. MAT'L.	PAD TARE	WT. BIT. MAT'L.	* SPREAD RATE	PAD OUT	REMARKS
1		12.3					27	23.2	12.0	11.2	0.120	X	
2		12.3					28	25.9	12.3	13.6	0.146		
3	25.4	11.9	13.5	0.144			29	25.6	12.5	13.1	0.140		
4	26.0	12.0	14.0	0.150			30	25.0	12.0	13.0	0.139		
5	25.0	12.3	12.7	0.136			31	24.8	12.2	12.6	0.135		
6	25.1	12.0	13.1	0.140			32	24.7	11.9	12.8	0.137		
7	25.0	11.7	13.3	0.142			33	24.6	11.8	12.8	0.137		
8	24.8	11.7	13.1	0.140			34	24.3	11.8	12.5	0.134		
9	24.5	11.6	12.9	0.138			35	24.8	11.8	13.0	0.139		
10	23.6	11.6	12.0	0.128			36	24.2	11.8	12.4	0.133		
11	25.0	11.9	13.1	0.140			37		11.6	13.4	0.143		
12	23.9	11.6	12.3	0.132			38	5.1	11.7	13.4	0.143		
13	25.9	11.7	14.2	0.152			39	4.8	11.9	12.9	0.138		
14	25.2	12.8	12.4	0.133			40	5.2	11.0	14.2	0.152		
15	23.9	11.5	12.4	0.133			41	25.2	11.7	13.5	0.144		
16	24.6	11.6	13.0	0.139			42	25.2	11.7	13.5	0.144		
17	24.5	11.7	12.8	0.137			43	24.7	12.0	12.7	0.136		
18	24.3	11.8	12.5	0.134			44	25.0	11.6	13.4	0.143		
19	25.8	13.0	12.8	0.137			45	25.0	11.5	13.5	0.144		
20	23.6	11.5	12.1	0.129			46	23.2	11.4	11.8	0.126		
21	24.3	11.4	12.9	0.138			47	23.7	11.3	12.4	0.133		
22	26.6	11.9	14.7	0.157	X		48	23.1	11.6	11.5	0.123	X	
23	25.5	11.8	13.7	0.147			49	26.1	12.0	14.1	0.151		
24	25.3	11.9	13.4	0.143			50		11.8				
25	23.9	11.8	12.1	0.129			51		11.6				
26	24.4	11.7	12.7	0.136									

* SPREAD RATE = GALS/SQ.YD.

REMARKS: _____

Figure 8