

USING RANDOM NUMBER TABLES
DOTD Designation: S 605-99

I. Definitions

- A. *Lot*: An isolated quantity of material from a single source. A measured amount of construction assumed to be produced by the same process. Examples of lots are: 1000 tons of asphaltic concrete, 1000 lin ft of base course, approximately 4000 yd² of P.C.C. pavement, an identifiable pour of structural concrete not exceeding 200 yd³.
- B. *Sublot*: A portion of a lot. Under some circumstances, a lot may be divided into sublots for sampling purposes. Examples of sublots are: one half of a lot of asphaltic concrete (approximately 500 tons) sampled for extraction testing, one quarter of a lot of asphaltic concrete (approximately 250 tons) sampled for Marshall properties, one fifth of a lot of asphaltic concrete paving sampled for pavement density.
- C. *Random*: Without aim or reason, depending entirely on chance alone.
- D. *Sample*: A small part of a lot or a sublot which represents the whole. A sample may be made up of one or more increments or test portions.
- E. *Random Number*: A number selected entirely by chance as from a table of random numbers (see Tables 1 through 5).

II. Method of Sampling

A. Procedures

When samples are to be obtained on the basis of time, quantity or location:

- 1. Select the unit of measure (tons, cubic yards, linear feet, time, etc.) that represents the lot or sublot.
- 2. Pick random numbers as needed from the Tables of Random Numbers, Tables 1 through 5.
- 3. Multiply the unit of measure selected in step 1 above by the selected random numbers.
- 4. The resulting values will represent the quantity, time or location to be sampled for each increment. Should the resulting value be outside the specified limits, this value shall be discarded and another number chosen.

B. Examples

1. Tonnage

The specifications for asphaltic concrete require four samples to be obtained per lot for Marshall properties testing.

- a. Divide the lot into four sublots of approximately equal size by tonnage (approximately 250 tons per sublot).
- b. Choose any number at random from Tables 1 - 5.
e.g. .667
- c. Multiply the random number selected by 250.
 $250 \times .667 = 166.75$
- d. The truckload in which ton number 167 occurs would then be sampled for Marshall properties for the first sublot.
- e. For subsequent sublots, repeat steps b and c, then add the ton number selected to the number of tons in the preceding sublot.

e.g. (1) Assume sublot 1 actually consists of 253 tons of asphaltic concrete.

(2) Assume that .022 is the random number selected for sublot 2.

(3) $250 \times .022 = 5.5$
 $253 + 5.5 = 258.5$

The truckload in which ton number 258 occurs would be sampled for Marshall properties for the second sublot.

2. Time

The specifications require that two samples (one per half day's operations) of asphaltic concrete friction course be obtained for extraction testing per lot.

- a. Assume the plant operates seven hours (4 hours the first half and 3 hours the second half).
- b. Pick any two numbers from Tables 1 - 5.
e.g. .541 and .201

- c. Multiply the first number picked by 4 ($.541 \times 4 = 2.16$) and the second number by 3 ($.201 \times 3 = .603$).
- d. If the plant started at 7:00 a.m., then the time to obtain the first sample would be calculated as follows:
 Multiply 2.16 (obtained in step c) by 60 minutes.
 $60 \times 2.16 = 129.8$ minutes
 Add 130 minutes to 7:00 a.m.
 The first sample would be obtained at 9:10 a.m.
- e. Assume the plant stops production from 11:00 a.m. - 1:30 p.m. The time for the second sample would be obtained in the same manner.
 Multiply .603 (from step c) by 60 minutes
 $60 \times .603 = 36.18$ min
 Add 36 minutes to 1:30 p.m.
 $1:30 + 36 = 2:06$ p.m.
3. *Exact Location Based on Transverse and Longitudinal Distance*
- a. Longitudinal Testing
 The specifications for asphaltic concrete require that the finished surface of the final wearing course be tested for conformance to surface finish tolerances at a randomly selected distance from the lane edge.
 (1) Pick a number from Tables 1 - 5.
 (2) Multiply the width of the lane by the random number selected.
 e.g. Lane Width = 12 ft
 Random Number = .343
 $12 \times .343 = 4.116$
 The lane would be tested for the entire length of the day's production at a point 4.1 ft from the lane edge.
- b. Core Locations
 The specifications for asphaltic concrete require that five samples be taken from each lot of material placed on a project for pavement density testing.
 (1) Divide the lot into five sublots of approximately equal length.
 (2) Select a number for each subplot from Tables 1 - 5.
 (3) Multiply the length of each subplot by the random number selected for that subplot, then add the product to the beginning station for the subplot to obtain the sampling location.
 e.g. (a) Assume the lot begins at station 1 + 54 and extends for 6840 linear feet.
 Each subplot would be 1368 linear feet.
 (b) Assume .418 is the random number selected.
 (c) $.418 \times 1368 = 571.824 = 572$ ft
 $(1 + 54) + 572 = 7 + 26$
 The sample for pavement density for the first subplot would be obtained at station 7 + 26.
 (d) Repeat for each subplot using the random numbers selected for that subplot.
- (4) To select the exact sample location transversely, apply the method in step 3.a. for each station location.

TABLE 1

.196	.430	.116	.770	.776	.669	.868	.665	.300	.989
.391	.400	.280	.238	.732	.794	.313	.256	.664	.016
.647	.457	.087	.836	.034	.678	.032	.423	.666	.556
.929	.878	.564	.998	.297	.447	.064	.311	.073	.771
.035	.070	.094	.050	.459	.135	.369	.321	.110	.803
.988	.209	.068	.656	.146	.346	.714	.909	.198	.707
.273	.882	.534	.541	.536	.863	.037	.822	.196	.088
.590	.974	.633	.483	.435	.481	.582	.967	.493	.951
.916	.783	.641	.022	.985	.495	.498	.068	.388	.838
.836	.419	.394	.772	.715	.673	.351	.759	.449	.291
.248	.530	.707	.439	.467	.472	.702	.675	.916	.275
.357	.556	.955	.094	.737	.788	.342	.703	.463	.248
.141	.410	.386	.343	.572	.342	.727	.318	.903	.562
.274	.670	.921	.535	.931	.077	.068	.244	.923	.374
.820	.429	.810	.749	.407	.974	.233	.821	.538	.536
.214	.793	.248	.241	.141	.268	.708	.002	.038	.443
.725	.400	.522	.348	.623	.481	.297	.165	.331	.020
.714	.027	.761	.411	.137	.632	.523	.762	.888	.697
.832	.466	.090	.395	.267	.306	.217	.001	.994	.767
.687	.148	.948	.636	.967	.024	.945	.143	.966	.886
.051	.763	.470	.158	.053	.439	.149	.830	.600	.551
.136	.546	.968	.240	.475	.483	.873	.818	.078	.269
.005	.220	.002	.069	.250	.519	.525	.091	.212	.296
.954	.695	.580	.990	.603	.955	.715	.417	.354	.807
.785	.547	.468	.981	.385	.037	.647	.324	.049	.666
.092	.844	.791	.435	.354	.561	.697	.314	.129	.516
.233	.206	.934	.836	.949	.846	.025	.410	.949	.199
.052	.470	.936	.345	.150	.510	.180	.613	.782	.001
.954	.976	.383	.192	.826	.624	.724	.606	.231	.693
.785	.104	.182	.583	.903	.784	.540	.251	.357	.692
.963	.579	.859	.053	.757	.840	.865	.944	.524	.766
.779	.151	.323	.691	.473	.333	.234	.065	.084	.366
.073	.294	.232	.748	.416	.328	.548	.777	.100	.332
.384	.309	.707	.736	.461	.258	.292	.152	.050	.825
.024	.533	.211	.555	.339	.817	.073	.215	.307	.102
.158	.261	.172	.190	.617	.898	.925	.283	.885	.098
.719	.819	.591	.224	.305	.194	.183	.999	.268	.238
.644	.108	.165	.016	.283	.229	.103	.168	.656	.834
.797	.924	.494	.432	.810	.543	.952	.865	.136	.081
.353	.538	.445	.672	.909	.849	.938	.608	.931	.851
.052	.329	.197	.082	.147	.667	.437	.354	.936	.527
.564	.380	.387	.774	.190	.939	.460	.647	.661	.210
.962	.121	.541	.108	.758	.986	.711	.102	.289	.165
.983	.269	.600	.201	.624	.385	.421	.350	.461	.126
.525	.350	.163	.969	.803	.114	.543	.578	.472	.747
.784	.830	.259	.236	.432	.064	.999	.144	.644	.377
.495	.241	.081	.535	.087	.041	.773	.079	.451	.886
.321	.075	.831	.252	.731	.618	.238	.418	.454	.268
.113	.363	.268	.799	.494	.534	.191	.059	.766	.110
.123	.210	.870	.241	.907	.889	.813	.130	.644	.614

TABLE 2

.940	.874	.324	.277	.598	.163	.646	.843	.414	.820
.741	.222	.885	.015	.257	.035	.017	.750	.489	.603
.628	.873	.951	.221	.223	.314	.728	.334	.392	.149
.117	.102	.805	.867	.177	.621	.065	.850	.739	.552
.179	.600	.604	.343	.258	.905	.572	.618	.498	.326
.660	.792	.950	.680	.467	.487	.099	.481	.370	.186
.542	.030	.455	.818	.598	.169	.614	.647	.874	.198
.309	.589	.317	.260	.476	.654	.463	.366	.947	.580
.691	.403	.869	.307	.943	.803	.268	.511	.124	.314
.083	.975	.358	.771	.081	.987	.871	.476	.147	.181
.277	.584	.853	.977	.294	.714	.730	.207	.746	.310
.130	.338	.540	.243	.477	.733	.474	.905	.310	.699
.802	.292	.985	.335	.244	.896	.432	.874	.114	.082
.108	.004	.903	.105	.574	.368	.538	.743	.086	.741
.541	.326	.266	.087	.244	.779	.305	.886	.617	.454
.603	.824	.373	.678	.459	.242	.173	.003	.707	.214
.497	.484	.920	.086	.766	.209	.592	.973	.029	.250
.786	.594	.164	.614	.390	.066	.830	.832	.255	.628
.666	.986	.998	.582	.812	.987	.095	.412	.901	.568
.440	.091	.073	.703	.764	.537	.985	.831	.657	.514
.414	.149	.495	.994	.149	.650	.952	.556	.704	.905
.945	.559	.496	.119	.703	.682	.669	.099	.744	.740
.416	.360	.641	.860	.908	.618	.806	.790	.114	.072
.502	.113	.417	.861	.247	.683	.554	.667	.775	.892
.413	.504	.906	.289	.409	.069	.950	.783	.281	.816
.258	.260	.715	.920	.726	.385	.907	.166	.988	.583
.061	.965	.883	.041	.214	.808	.689	.620	.897	.882
.608	.444	.744	.105	.011	.838	.364	.489	.180	.061
.809	.893	.104	.222	.805	.941	.926	.333	.670	.067
.195	.120	.467	.643	.131	.292	.210	.808	.775	.427
.493	.480	.236	.554	.217	.101	.911	.174	.294	.438
.063	.940	.159	.321	.474	.809	.981	.851	.296	.215
.609	.307	.118	.674	.404	.032	.967	.244	.107	.393
.923	.932	.782	.347	.712	.061	.394	.136	.257	.564
.779	.574	.313	.924	.855	.671	.581	.820	.227	.518
.381	.756	.116	.897	.958	.067	.476	.885	.706	.406
.396	.457	.913	.502	.926	.719	.119	.203	.193	.504
.840	.455	.993	.680	.676	.631	.691	.845	.385	.600
.474	.577	.576	.266	.247	.594	.140	.153	.692	.747
.433	.370	.289	.896	.764	.562	.623	.589	.088	.985
.642	.826	.185	.937	.131	.365	.788	.499	.870	.075
.668	.495	.323	.985	.867	.746	.263	.463	.553	.681
.724	.230	.215	.424	.925	.262	.784	.276	.183	.508
.210	.050	.130	.218	.124	.500	.152	.139	.595	.113
.953	.011	.066	.136	.010	.857	.550	.374	.358	.708
.497	.380	.104	.452	.340	.726	.752	.271	.366	.424
.582	.764	.975	.716	.502	.345	.871	.092	.267	.939
.895	.788	.682	.417	.739	.145	.303	.277	.110	.049
.154	.669	.481	.732	.468	.088	.734	.819	.588	.220
.121	.124	.512	.302	.608	.109	.214	.786	.492	.837

TABLE 3

.039	.461	.937	.894	.660	.653	.846	.232	.886	.161
.085	.554	.328	.780	.083	.860	.297	.762	.712	.853
.175	.701	.920	.215	.551	.281	.590	.936	.279	.909
.326	.861	.958	.831	.009	.936	.763	.779	.808	.514
.695	.777	.395	.905	.140	.619	.295	.616	.335	.780
.241	.591	.276	.494	.148	.672	.619	.100	.908	.754
.611	.231	.929	.773	.418	.382	.172	.943	.780	.267
.305	.704	.102	.202	.396	.309	.100	.829	.559	.485
.037	.599	.758	.717	.744	.166	.352	.374	.875	.823
.482	.379	.857	.619	.531	.433	.356	.972	.168	.311
.603	.653	.350	.949	.426	.297	.019	.316	.989	.231
.837	.402	.566	.442	.349	.374	.700	.736	.099	.065
.329	.405	.364	.232	.993	.600	.111	.586	.159	.253
.193	.845	.576	.606	.664	.646	.781	.559	.196	.413
.112	.747	.073	.408	.485	.929	.274	.476	.852	.149
.317	.260	.689	.339	.154	.355	.886	.596	.031	.121
.884	.382	.144	.504	.200	.977	.748	.413	.221	.508
.309	.744	.074	.828	.737	.533	.285	.405	.942	.380
.228	.893	.274	.748	.605	.128	.740	.617	.820	.268
.782	.993	.359	.386	.443	.486	.657	.014	.874	.220
.418	.547	.468	.326	.346	.300	.749	.345	.193	.549
.463	.049	.692	.460	.453	.521	.613	.855	.144	.951
.110	.294	.140	.792	.597	.277	.765	.513	.396	.544
.527	.337	.563	.315	.165	.676	.116	.893	.021	.161
.572	.898	.813	.585	.686	.376	.928	.866	.884	.584
.208	.156	.702	.326	.793	.220	.011	.267	.106	.391
.156	.924	.904	.614	.335	.665	.558	.641	.862	.704
.926	.297	.399	.115	.595	.067	.668	.515	.497	.037
.776	.019	.881	.080	.205	.409	.962	.257	.508	.616
.386	.486	.451	.545	.594	.059	.439	.680	.438	.693
.251	.889	.700	.021	.412	.312	.718	.957	.689	.403
.652	.629	.372	.295	.058	.119	.927	.340	.184	.622
.368	.625	.186	.509	.824	.005	.049	.701	.147	.997
.643	.692	.053	.162	.202	.759	.451	.332	.837	.567
.045	.624	.950	.946	.484	.558	.151	.782	.169	.361
.837	.873	.432	.145	.608	.983	.012	.349	.203	.126
.143	.345	.808	.279	.435	.318	.383	.761	.411	.480
.513	.246	.800	.074	.887	.736	.661	.431	.669	.678
.724	.008	.808	.002	.948	.900	.541	.436	.353	.131
.054	.306	.931	.464	.744	.561	.728	.834	.799	.416
.395	.484	.824	.593	.485	.247	.186	.674	.186	.241
.815	.711	.533	.273	.751	.724	.746	.707	.583	.997
.075	.120	.826	.820	.929	.141	.323	.763	.611	.940
.907	.235	.135	.200	.699	.742	.784	.501	.186	.872
.401	.193	.295	.627	.949	.598	.620	.787	.004	.997
.344	.157	.868	.087	.191	.023	.123	.783	.362	.691
.634	.363	.449	.822	.360	.867	.763	.605	.659	.488
.670	.070	.933	.547	.944	.284	.050	.807	.202	.060
.794	.146	.521	.286	.541	.243	.469	.482	.593	.938
.917	.552	.047	.031	.750	.029	.476	.382	.997	.478

TABLE 4

.100	.533	.765	.586	.346	.876	.809	.117	.392	.945
.375	.805	.648	.296	.248	.037	.206	.402	.008	.665
.084	.953	.196	.303	.232	.560	.159	.764	.350	.060
.990	.529	.093	.715	.383	.165	.886	.397	.044	.659
.128	.970	.801	.147	.640	.653	.989	.877	.121	.833
.660	.717	.340	.850	.366	.170	.658	.885	.119	.170
.310	.805	.455	.406	.353	.614	.867	.439	.234	.732
.852	.602	.020	.692	.686	.818	.730	.247	.186	.579
.635	.135	.053	.048	.905	.548	.284	.709	.834	.624
.737	.753	.035	.778	.358	.282	.609	.344	.352	.435
.985	.767	.149	.607	.221	.558	.609	.433	.505	.998
.118	.431	.398	.732	.507	.248	.294	.201	.527	.851
.834	.634	.062	.083	.137	.078	.184	.610	.687	.817
.886	.200	.865	.401	.367	.951	.903	.493	.296	.062
.995	.348	.875	.969	.918	.928	.937	.368	.234	.113
.654	.674	.174	.950	.580	.974	.730	.186	.402	.544
.801	.635	.117	.015	.453	.374	.211	.253	.143	.763
.743	.817	.774	.214	.432	.210	.455	.237	.962	.655
.699	.803	.662	.148	.369	.203	.766	.990	.944	.418
.098	.505	.142	.514	.464	.788	.962	.822	.543	.598
.914	.523	.684	.686	.461	.554	.947	.923	.370	.048
.803	.598	.269	.858	.702	.135	.531	.340	.420	.341
.441	.949	.851	.954	.329	.575	.576	.881	.222	.431
.125	.742	.111	.040	.128	.697	.966	.439	.287	.815
.636	.329	.165	.484	.402	.563	.436	.082	.072	.790
.611	.446	.264	.774	.519	.729	.653	.593	.425	.527
.154	.266	.952	.953	.593	.848	.823	.118	.332	.466
.945	.573	.678	.387	.546	.431	.911	.592	.929	.973
.424	.213	.973	.721	.168	.767	.030	.059	.257	.670
.235	.317	.732	.837	.689	.416	.262	.663	.055	.562
.044	.494	.752	.824	.458	.025	.619	.335	.653	.472
.005	.654	.640	.159	.961	.896	.546	.391	.232	.529
.359	.307	.268	.354	.333	.462	.779	.024	.901	.333
.598	.391	.454	.842	.836	.700	.130	.892	.785	.106
.460	.236	.013	.286	.772	.077	.939	.647	.706	.941
.321	.597	.873	.241	.055	.007	.867	.157	.853	.838
.692	.406	.201	.204	.159	.050	.187	.423	.971	.338
.195	.430	.017	.379	.404	.585	.666	.806	.849	.207
.451	.938	.194	.246	.436	.543	.590	.033	.208	.541
.948	.994	.361	.851	.348	.553	.015	.456	.050	.176
.980	.826	.452	.404	.449	.896	.390	.407	.354	.880
.331	.232	.419	.949	.894	.581	.886	.994	.375	.043
.809	.406	.963	.774	.201	.387	.250	.298	.946	.171
.797	.140	.719	.296	.698	.591	.748	.539	.003	.579
.186	.537	.981	.571	.310	.674	.054	.427	.779	.936
.740	.902	.775	.270	.977	.119	.525	.021	.808	.748
.541	.611	.809	.143	.053	.969	.561	.255	.360	.324
.116	.883	.520	.827	.593	.539	.099	.440	.884	.356
.483	.928	.312	.710	.022	.870	.323	.546	.150	.994
.690	.138	.876	.976	.355	.401	.105	.613	.018	.938

TABLE 5

.091	.097	.328	.527	.042	.304	.833	.374	.642	.044
.900	.497	.519	.654	.949	.997	.918	.150	.684	.659
.731	.207	.476	.269	.622	.464	.271	.018	.413	.760
.757	.490	.209	.749	.904	.272	.953	.871	.938	.178
.540	.056	.662	.003	.006	.398	.207	.295	.077	.813
.083	.910	.784	.785	.136	.873	.046	.563	.312	.420
.283	.264	.813	.591	.405	.893	.326	.475	.941	.840
.538	.233	.815	.628	.512	.290	.284	.795	.777	.791
.917	.741	.616	.269	.502	.212	.557	.514	.834	.055
.894	.694	.003	.391	.126	.646	.489	.306	.945	.408
.775	.820	.868	.901	.684	.774	.519	.980	.728	.507
.195	.174	.699	.288	.552	.773	.742	.251	.653	.415
.218	.313	.932	.757	.056	.156	.070	.046	.318	.452
.514	.499	.681	.621	.940	.345	.428	.191	.080	.449
.995	.331	.623	.170	.697	.830	.748	.142	.438	.834
.337	.007	.935	.869	.519	.721	.583	.822	.931	.972
.852	.893	.113	.270	.288	.137	.735	.400	.711	.643
.841	.640	.440	.166	.738	.091	.612	.561	.623	.423
.567	.234	.173	.131	.101	.622	.854	.560	.816	.880
.651	.806	.876	.261	.343	.861	.458	.069	.856	.277
.380	.176	.817	.711	.716	.937	.742	.049	.655	.698
.374	.397	.013	.586	.562	.086	.473	.605	.400	.438
.971	.348	.870	.417	.218	.250	.752	.047	.155	.578
.218	.134	.471	.072	.646	.902	.491	.441	.038	.552
.731	.742	.957	.035	.857	.296	.087	.156	.646	.202
.076	.929	.030	.072	.962	.156	.238	.538	.047	.994
.605	.441	.079	.814	.591	.695	.055	.139	.612	.455
.835	.655	.069	.983	.051	.719	.774	.783	.923	.498
.108	.746	.995	.507	.134	.319	.530	.839	.064	.362
.398	.952	.436	.147	.644	.814	.438	.351	.310	.167
.595	.478	.755	.800	.888	.486	.237	.156	.041	.408
.385	.341	.237	.763	.908	.022	.177	.207	.959	.953
.306	.668	.946	.127	.561	.091	.820	.400	.054	.200
.654	.659	.182	.437	.496	.041	.088	.676	.962	.836
.272	.264	.131	.294	.074	.606	.179	.911	.973	.358
.913	.991	.190	.210	.366	.728	.288	.793	.289	.252
.684	.688	.844	.622	.621	.408	.128	.590	.098	.146
.489	.877	.547	.591	.357	.754	.838	.692	.541	.160
.069	.197	.426	.601	.118	.528	.630	.901	.149	.344
.104	.019	.142	.712	.913	.821	.883	.851	.436	.883
.128	.343	.650	.184	.042	.392	.179	.077	.907	.769
.217	.976	.388	.961	.316	.096	.632	.023	.088	.449
.195	.515	.651	.659	.862	.258	.695	.798	.164	.529
.672	.670	.355	.563	.792	.686	.764	.222	.266	.802
.605	.377	.075	.992	.451	.529	.267	.637	.413	.344
.538	.377	.360	.850	.588	.859	.493	.331	.962	.642
.246	.736	.743	.342	.526	.123	.799	.601	.037	.873
.830	.451	.889	.815	.077	.973	.777	.585	.519	.867
.164	.334	.361	.073	.274	.851	.939	.552	.548	.759
.607	.157	.571	.762	.111	.458	.576	.979	.651	.860