

FIELD SAMPLING AND TESTING MANUAL
RANDOM SAMPLING AND TESTING PROCEDURES

RANDOM SAMPLING AND TESTING

A random sample is a sample taken by the use of a sampling plan in which each unit of a lot has an equal chance of being chosen. Random sampling is based on the use of a random number table to select items such as test sites, test samples, and times for selection of samples. The random number table provides the mean by which an item can be selected using the product of the random number and the dimension of the applicable item. The use of a calculator to generate random numbers is acceptable, but in the following examples the random number table will be used.

Example No. 1

Assume one day's production is a lot. The contractor begins work at 7:00 A.M. and works a 12-hour day. The sampling frequency is four samples selected at random times during the day.

Divide the 12-hour day into four equal sublots of three hours each. The following times result:

7:00 A.M.	-	10:00 A.M.
10:00 A.M.	-	1:00 P.M.
1:00 P.M.	-	4:00 P.M.
4:00 P.M.	-	7:00 P.M.

To determine the sampling times, arbitrarily select a group of digits on the random numbers table (located at the back of this appendix) by placing the point of a pencil on the page with eyes closed. In addition to the number under the pencil point, select three more numbers by going up or down, left or right, or diagonally. The pencil point landed on 0.18 in this example. Prior to the selection of the number it had been decided to go down the column. The three additional numbers are 0.90, 0.93, and 0.73 (Block "A"). Multiply each number by three hours (convert to 180 minutes) and add the result to the beginning time of each subplot to determine the sample times.

0.18×180 minutes	=	32 minutes
0.90×180 minutes	=	162 minutes
0.93×180 minutes	=	167 minutes
0.73×180 minutes	=	131 minutes

Samples should be obtained at the following times:

32 minutes after 7:00 A.M.	or	7:32 A.M.
162 minutes after 10:00 A.M.	or	12:42 P.M.
167 minutes after 1:00 P.M.	or	3:47 P.M.
131 minutes after 4:00 P.M.	or	6:11 P.M.

Example No. 2

Under Section 408 of the Standard Specifications, the Contractor is to take two cores in each subplot for determining density. The cores are to be taken adjacent to each other and at a random location. A subplot is defined as one paver-width wide (excluding the shoulders), 2,000 ft long, and of the depth specified for the pavement course.

Sample numbers and subplot numbers are established for the full day's production. On [SFN 10071](#), "[Compaction Control](#)," record the sample number and the beginning station of the lot. The beginning station of each subplot is 2,000 ft greater than the previous one. Compute the locations to be cored using random numbers to determine the station and offset from the edge of the pavement. Adjust core locations falling within one foot of the pavement edge or select a new random location within the test area.

Use the same procedure as in Example No. 1 to arbitrarily select the digits from the random number table. In this example only three numbers will be chosen ([Block "B"](#)). Assume the beginning station of the lot to be 105+00.

<u>Sample No.</u>	<u>Station</u>
1	$0.13 \times 2000 = 260$ ft Sta. 105+00 + 260 = Sta. 107+60
2	$0.94 \times 2000 = 1880$ ft Sta. 125+00 + 1880 = Sta. 143+80
3	$0.14 \times 2000 = 280$ ft Sta. 145+00 + 280 = Sta. 147+80

To select the transverse distance from the right edge of the roadway, three additional consecutive numbers are chosen following the procedure in Example No. 1. Each of the digits in [Block "C"](#) is multiplied by the lane width (12 ft).

<u>Sample No.</u>	<u>Transverse Distance from Right Edge</u>
1	$0.68 \times 12 = 8.2$ ft
2	$0.26 \times 12 = 3.1$ ft
3	$0.85 \times 12 = 10.2$ ft

The calculations above result in the following sampling schedule for each subplot:

<u>Sample No.</u>	<u>Sample Location</u>
1	Sta. 107+60 - 8.2 ft from right edge of roadway
2	Sta. 143+80 - 3.1 ft from right edge of roadway
3	Sta. 147+80 - 10.2 ft from right edge of roadway

TABLE OF RANDOM NUMBERS WITH EXAMPLES

0.10	0.09	0.73	0.25	0.33	0.76	0.52	0.01	0.35	0.86	0.34	0.67	0.35	0.48	0.76	0.80	0.95	0.90	0.91	0.17
0.37	0.54	0.20	0.48	0.05	0.64	0.89	0.47	0.42	0.96	0.24	0.80	0.52	0.40	0.37	0.20	0.63	0.61	0.04	0.02
0.08	0.42	0.26	0.89	0.53	0.19	0.64	0.50	0.93	0.03	0.23	0.20	0.90	0.25	0.60	0.15	0.95	0.33	0.47	0.64
0.99	0.01	0.90	0.25	0.29	0.09	0.37	0.67	0.07	0.15	0.38	0.31	0.13	0.11	0.65	0.88	0.67	0.67	0.43	0.97
0.12	0.80	0.79	0.99	0.70	0.80	0.15	0.73	0.61	0.47	0.64	0.03	0.23	0.66	0.53	0.98	0.95	0.11	0.68	0.77
0.66	0.06	0.57	0.47	0.17	0.34	0.07	0.27	0.68	0.50	0.36	0.69	0.73	0.61	0.70	0.65	0.81	0.33	0.98	0.85
0.31	0.06	0.01	0.08	0.05	0.45	0.57	0.18	0.24	0.06	0.35	0.30	0.34	0.26	0.14	0.86	0.79	0.90	0.74	0.39
0.85	0.26	0.97	0.76	0.02	0.02	0.05	0.16	0.56	0.92	0.68	0.66	0.57	0.48	0.18	0.73	0.05	0.38	0.52	0.47
0.63	0.57	0.33	0.21	0.35	0.05	0.32	0.54	0.70	0.48	0.90	0.55	0.35	0.75	0.48	0.28	0.46	0.82	0.87	0.09
0.73	0.79	0.64	0.57	0.53	0.03	0.52	0.96	0.47	0.78	0.35	0.80	0.83	0.42	0.82	0.60	0.93	0.52	0.03	0.44
															A				
0.98	0.52	0.01	0.77	0.67	0.14	0.90	0.56	0.86	0.07	0.22	0.10	0.94	0.05	0.58	0.60	0.97	0.09	0.34	0.33
0.11	0.80	0.50	0.54	0.31	0.39	0.80	0.82	0.77	0.32	0.50	0.72	0.56	0.82	0.48	0.29	0.40	0.52	0.42	0.01
0.83	0.45	0.29	0.96	0.34	0.06	0.28	0.89	0.80	0.83	0.13	0.74	0.67	0.00	0.78	0.18	0.47	0.54	0.06	0.10
0.88	0.68	0.54	0.02	0.00	0.86	0.50	0.75	0.84	0.01	0.36	0.76	0.66	0.79	0.51	0.90	0.36	0.47	0.64	0.93
0.99	0.59	0.46	0.73	0.48	0.87	0.51	0.76	0.49	0.69	0.91	0.82	0.60	0.89	0.28	0.93	0.78	0.56	0.13	0.68
0.65	0.48	0.11	0.76	0.74	0.17	0.46	0.85	0.09	0.50	0.58	0.04	0.77	0.69	0.74	0.73	0.03	0.95	0.71	0.86
0.80	0.12	0.43	0.56	0.35	0.17	0.72	0.70	0.80	0.15	0.45	0.31	0.82	0.23	0.74	0.21	0.11	0.57	0.82	0.53
0.74	0.35	0.09	0.98	0.17	0.77	0.40	0.27	0.72	0.14	0.43	0.23	0.60	0.02	0.10	0.45	0.52	0.16	0.42	0.37
0.69	0.91	0.62	0.68	0.03	0.66	0.25	0.22	0.91	0.48	0.36	0.93	0.68	0.72	0.03	0.76	0.62	0.11	0.39	0.90
0.09	0.89	0.32	0.05	0.05	0.14	0.22	0.56	0.85	0.14	0.46	0.42	0.75	0.67	0.88	0.96	0.29	0.77	0.88	0.22
					C														
0.91	0.49	0.91	0.45	0.23	0.68	0.47	0.92	0.76	0.86	0.46	0.16	0.28	0.35	0.54	0.94	0.75	0.08	0.99	0.23
0.80	0.33	0.69	0.45	0.98	0.26	0.94	0.03	0.68	0.58	0.70	0.29	0.73	0.41	0.35	0.53	0.14	0.03	0.33	0.40
0.44	0.10	0.48	0.19	0.49	0.85	0.15	0.74	0.79	0.54	0.32	0.97	0.92	0.65	0.75	0.57	0.60	0.04	0.08	0.81
0.12	0.55	0.07	0.37	0.42	0.11	0.10	0.00	0.20	0.40	0.12	0.86	0.07	0.46	0.97	0.96	0.64	0.48	0.94	0.39
0.63	0.60	0.64	0.93	0.29	0.16	0.50	0.53	0.44	0.84	0.40	0.21	0.95	0.25	0.63	0.43	0.65	0.17	0.70	0.82
0.61	0.19	0.69	0.04	0.46	0.26	0.45	0.74	0.77	0.74	0.51	0.92	0.43	0.37	0.29	0.65	0.39	0.45	0.95	0.93
0.15	0.47	0.44	0.52	0.66	0.95	0.27	0.07	0.99	0.53	0.59	0.36	0.78	0.38	0.48	0.82	0.39	0.61	0.01	0.18
0.94	0.55	0.72	0.85	0.73	0.67	0.89	0.75	0.43	0.87	0.54	0.62	0.24	0.44	0.31	0.91	0.19	0.04	0.25	0.92
0.42	0.48	0.11	0.62	0.13	0.97	0.34	0.40	0.87	0.21	0.16	0.86	0.84	0.87	0.67	0.03	0.07	0.11	0.20	0.59
0.23	0.52	0.37	0.83	0.17	0.73	0.20	0.88	0.98	0.37	0.68	0.93	0.59	0.14	0.16	0.26	0.25	0.22	0.96	0.63
0.04	0.49	0.35	0.24	0.94	0.75	0.24	0.63	0.38	0.24	0.45	0.86	0.25	0.10	0.25	0.61	0.96	0.27	0.93	0.35
0.00	0.54	0.99	0.76	0.54	0.64	0.05	0.18	0.81	0.59	0.96	0.11	0.96	0.38	0.96	0.54	0.69	0.28	0.23	0.91
0.35	0.96	0.31	0.53	0.07	0.26	0.89	0.80	0.93	0.54	0.33	0.35	0.13	0.54	0.62	0.77	0.97	0.45	0.00	0.24
0.59	0.80	0.80	0.83	0.91	0.45	0.42	0.72	0.68	0.42	0.83	0.60	0.94	0.97	0.00	0.13	0.02	0.12	0.48	0.92
0.46	0.05	0.88	0.52	0.36	0.01	0.39	0.00	0.22	0.86	0.77	0.28	0.14	0.40	0.77	0.93	0.91	0.08	0.36	0.47
0.32	0.17	0.90	0.05	0.97	0.87	0.37	0.92	0.52	0.41	0.05	0.56	0.70	0.70	0.07	0.86	0.74	0.31	0.71	0.57
0.69	0.23	0.46	0.14	0.06	0.20	0.11	0.74	0.52	0.04	0.15	0.95	0.66	0.00	0.00	0.18	0.74	0.39	0.24	0.23
0.19	0.56	0.54	0.14	0.30	0.01	0.75	0.87	0.53	0.79	0.40	0.41	0.92	0.15	0.85	0.66	0.67	0.43	0.68	0.06
0.45	0.15	0.51	0.49	0.38	0.19	0.47	0.60	0.72	0.46	0.43	0.66	0.79	0.45	0.43	0.59	0.04	0.79	0.00	0.33
0.94	0.86	0.43	0.19	0.94	0.36	0.16	0.81	0.08	0.51	0.34	0.88	0.88	0.15	0.53	0.01	0.54	0.03	0.54	0.56
0.98	0.08	0.62	0.48	0.26	0.45	0.24	0.02	0.84	0.04	0.44	0.99	0.90	0.88	0.96	0.39	0.09	0.47	0.34	0.07
0.33	0.18	0.51	0.62	0.32	0.41	0.94	0.15	0.09	0.49	0.89	0.43	0.54	0.85	0.81	0.88	0.69	0.54	0.19	0.94
0.80	0.95	0.10	0.04	0.06	0.96	0.38	0.27	0.07	0.74	0.20	0.15	0.12	0.33	0.87	0.45	0.01	0.62	0.52	0.98
0.79	0.75	0.24	0.91	0.40	0.71	0.96	0.12	0.82	0.96	0.69	0.86	0.10	0.25	0.91	0.74	0.85	0.22	0.05	0.39
0.18	0.63	0.33	0.25	0.37	0.98	0.14	0.50	0.65	0.71	0.31	0.01	0.02	0.46	0.74	0.05	0.45	0.56	0.14	0.27
0.74	0.02	0.94	0.39	0.02	0.77	0.55	0.73	0.22	0.70	0.97	0.79	0.01	0.71	0.19	0.52	0.52	0.75	0.80	0.21
0.54	0.17	0.84	0.56	0.11	0.80	0.99	0.33	0.71	0.43	0.05	0.33	0.51	0.29	0.69	0.56	0.12	0.71	0.92	0.55
0.11	0.66	0.44	0.98	0.83	0.52	0.07	0.98	0.48	0.27	0.59	0.38	0.17	0.15	0.39	0.09	0.97	0.33	0.34	0.40
0.48	0.32	0.47	0.79	0.28	0.31	0.24	0.96	0.47	0.10	0.02	0.29	0.53	0.68	0.70	0.32	0.30	0.75	0.75	0.46
0.69	0.07	0.49	0.41	0.38	0.87	0.63	0.79	0.19	0.76	0.35	0.58	0.40	0.44	0.01	0.10	0.51	0.82	0.16	0.15

TABLE OF RANDOM NUMBERS

0.10	0.09	0.73	0.25	0.33	0.76	0.52	0.01	0.35	0.86	0.34	0.67	0.35	0.48	0.76	0.80	0.95	0.90	0.91	0.17
0.37	0.54	0.20	0.48	0.05	0.64	0.89	0.47	0.42	0.96	0.24	0.80	0.52	0.40	0.37	0.20	0.63	0.61	0.04	0.02
0.08	0.42	0.26	0.89	0.53	0.19	0.64	0.50	0.93	0.03	0.23	0.20	0.90	0.25	0.60	0.15	0.95	0.33	0.47	0.64
0.99	0.01	0.90	0.25	0.29	0.09	0.37	0.67	0.07	0.15	0.38	0.31	0.13	0.11	0.65	0.88	0.67	0.67	0.43	0.97
0.12	0.80	0.79	0.99	0.70	0.80	0.15	0.73	0.61	0.47	0.64	0.03	0.23	0.66	0.53	0.98	0.95	0.11	0.68	0.77
0.66	0.06	0.57	0.47	0.17	0.34	0.07	0.27	0.68	0.50	0.36	0.69	0.73	0.61	0.70	0.65	0.81	0.33	0.98	0.85
0.31	0.06	0.01	0.08	0.05	0.45	0.57	0.18	0.24	0.06	0.35	0.30	0.34	0.26	0.14	0.86	0.79	0.90	0.74	0.39
0.85	0.26	0.97	0.76	0.02	0.02	0.05	0.16	0.56	0.92	0.68	0.66	0.57	0.48	0.18	0.73	0.05	0.38	0.52	0.47
0.63	0.57	0.33	0.21	0.35	0.05	0.32	0.54	0.70	0.48	0.90	0.55	0.35	0.75	0.48	0.28	0.46	0.82	0.87	0.09
0.73	0.79	0.64	0.57	0.53	0.03	0.52	0.96	0.47	0.78	0.35	0.80	0.83	0.42	0.82	0.60	0.93	0.52	0.03	0.44
0.98	0.52	0.01	0.77	0.67	0.14	0.90	0.56	0.86	0.07	0.22	0.10	0.94	0.05	0.58	0.60	0.97	0.09	0.34	0.33
0.11	0.80	0.50	0.54	0.31	0.39	0.80	0.82	0.77	0.32	0.50	0.72	0.56	0.82	0.48	0.29	0.40	0.52	0.42	0.01
0.83	0.45	0.29	0.96	0.34	0.06	0.28	0.89	0.80	0.83	0.13	0.74	0.67	0.00	0.78	0.18	0.47	0.54	0.06	0.10
0.88	0.68	0.54	0.02	0.00	0.86	0.50	0.75	0.84	0.01	0.36	0.76	0.66	0.79	0.51	0.90	0.36	0.47	0.64	0.93
0.99	0.59	0.46	0.73	0.48	0.87	0.51	0.76	0.49	0.69	0.91	0.82	0.60	0.89	0.28	0.93	0.78	0.56	0.13	0.68
0.65	0.48	0.11	0.76	0.74	0.17	0.46	0.85	0.09	0.50	0.58	0.04	0.77	0.69	0.74	0.73	0.03	0.95	0.71	0.86
0.80	0.12	0.43	0.56	0.35	0.17	0.72	0.70	0.80	0.15	0.45	0.31	0.82	0.23	0.74	0.21	0.11	0.57	0.82	0.53
0.74	0.35	0.09	0.98	0.17	0.77	0.40	0.27	0.72	0.14	0.43	0.23	0.60	0.02	0.10	0.45	0.52	0.16	0.42	0.37
0.69	0.91	0.62	0.68	0.03	0.66	0.25	0.22	0.91	0.48	0.36	0.93	0.68	0.72	0.03	0.76	0.62	0.11	0.39	0.90
0.09	0.89	0.32	0.05	0.05	0.14	0.22	0.56	0.85	0.14	0.46	0.42	0.75	0.67	0.88	0.96	0.29	0.77	0.88	0.22
0.91	0.49	0.91	0.45	0.23	0.68	0.47	0.92	0.76	0.86	0.46	0.16	0.28	0.35	0.54	0.94	0.75	0.08	0.99	0.23
0.80	0.33	0.69	0.45	0.98	0.26	0.94	0.03	0.68	0.58	0.70	0.29	0.73	0.41	0.35	0.53	0.14	0.03	0.33	0.40
0.44	0.10	0.48	0.19	0.49	0.85	0.15	0.74	0.79	0.54	0.32	0.97	0.92	0.65	0.75	0.57	0.60	0.04	0.08	0.81
0.12	0.55	0.07	0.37	0.42	0.11	0.10	0.00	0.20	0.40	0.12	0.86	0.07	0.46	0.97	0.96	0.64	0.48	0.94	0.39
0.63	0.60	0.64	0.93	0.29	0.16	0.50	0.53	0.44	0.84	0.40	0.21	0.95	0.25	0.63	0.43	0.65	0.17	0.70	0.82
0.61	0.19	0.69	0.04	0.46	0.26	0.45	0.74	0.77	0.74	0.51	0.92	0.43	0.37	0.29	0.65	0.39	0.45	0.95	0.93
0.15	0.47	0.44	0.52	0.66	0.95	0.27	0.07	0.99	0.53	0.59	0.36	0.78	0.38	0.48	0.82	0.39	0.61	0.01	0.18
0.94	0.55	0.72	0.85	0.73	0.67	0.89	0.75	0.43	0.87	0.54	0.62	0.24	0.44	0.31	0.91	0.19	0.04	0.25	0.92
0.42	0.48	0.11	0.62	0.13	0.97	0.34	0.40	0.87	0.21	0.16	0.86	0.84	0.87	0.67	0.03	0.07	0.11	0.20	0.59
0.23	0.52	0.37	0.83	0.17	0.73	0.20	0.88	0.98	0.37	0.68	0.93	0.59	0.14	0.16	0.26	0.25	0.22	0.96	0.63
0.04	0.49	0.35	0.24	0.94	0.75	0.24	0.63	0.38	0.24	0.45	0.86	0.25	0.10	0.25	0.61	0.96	0.27	0.93	0.35
0.00	0.54	0.99	0.76	0.54	0.64	0.05	0.18	0.81	0.59	0.96	0.11	0.96	0.38	0.96	0.54	0.69	0.28	0.23	0.91
0.35	0.96	0.31	0.53	0.07	0.26	0.89	0.80	0.93	0.54	0.33	0.35	0.13	0.54	0.62	0.77	0.97	0.45	0.00	0.24
0.59	0.80	0.80	0.83	0.91	0.45	0.42	0.72	0.68	0.42	0.83	0.60	0.94	0.97	0.00	0.13	0.02	0.12	0.48	0.92
0.46	0.05	0.88	0.52	0.36	0.01	0.39	0.00	0.22	0.86	0.77	0.28	0.14	0.40	0.77	0.93	0.91	0.08	0.36	0.47
0.32	0.17	0.90	0.05	0.97	0.87	0.37	0.92	0.52	0.41	0.05	0.56	0.70	0.70	0.07	0.86	0.74	0.31	0.71	0.57
0.69	0.23	0.46	0.14	0.06	0.20	0.11	0.74	0.52	0.04	0.15	0.95	0.66	0.00	0.00	0.18	0.74	0.39	0.24	0.23
0.19	0.56	0.54	0.14	0.30	0.01	0.75	0.87	0.53	0.79	0.40	0.41	0.92	0.15	0.85	0.66	0.67	0.43	0.68	0.06
0.45	0.15	0.51	0.49	0.38	0.19	0.47	0.60	0.72	0.46	0.43	0.66	0.79	0.45	0.43	0.59	0.04	0.79	0.00	0.33
0.94	0.86	0.43	0.19	0.94	0.36	0.16	0.81	0.08	0.51	0.34	0.88	0.88	0.15	0.53	0.01	0.54	0.03	0.54	0.56
0.98	0.08	0.62	0.48	0.26	0.45	0.24	0.02	0.84	0.04	0.44	0.99	0.90	0.88	0.96	0.39	0.09	0.47	0.34	0.07
0.33	0.18	0.51	0.62	0.32	0.41	0.94	0.15	0.09	0.49	0.89	0.43	0.54	0.85	0.81	0.88	0.69	0.54	0.19	0.94
0.80	0.95	0.10	0.04	0.06	0.96	0.38	0.27	0.07	0.74	0.20	0.15	0.12	0.33	0.87	0.45	0.01	0.62	0.52	0.98
0.79	0.75	0.24	0.91	0.40	0.71	0.96	0.12	0.82	0.96	0.69	0.86	0.10	0.25	0.91	0.74	0.85	0.22	0.05	0.39
0.18	0.63	0.33	0.25	0.37	0.98	0.14	0.50	0.65	0.71	0.31	0.01	0.02	0.46	0.74	0.05	0.45	0.56	0.14	0.27
0.74	0.02	0.94	0.39	0.02	0.77	0.55	0.73	0.22	0.70	0.97	0.79	0.01	0.71	0.19	0.52	0.52	0.75	0.80	0.21
0.54	0.17	0.84	0.56	0.11	0.80	0.99	0.33	0.71	0.43	0.05	0.33	0.51	0.29	0.69	0.56	0.12	0.71	0.92	0.55
0.11	0.66	0.44	0.98	0.83	0.52	0.07	0.98	0.48	0.27	0.59	0.38	0.17	0.15	0.39	0.09	0.97	0.33	0.34	0.40
0.48	0.32	0.47	0.79	0.28	0.31	0.24	0.96	0.47	0.10	0.02	0.29	0.53	0.68	0.70	0.32	0.30	0.75	0.75	0.46
0.69	0.07	0.49	0.41	0.38	0.87	0.63	0.79	0.19	0.76	0.35	0.58	0.40	0.44	0.01	0.10	0.51	0.82	0.16	0.15

