

**Standard Method of Test for
Random Method of Sampling Asphalt Mixtures
SCDOT Designation: SC-T-101 (06/21)**

1. Scope

- 1.1** This test method outlines the procedure for randomly sampling asphalt mixtures at the contractor's production plants and on the roadway. A table of random numbers is used to determine the sampling tonnage at the plant as well as the location for in-place density on the roadway. This method may be used in any situation requiring random selection procedures for sampling other highway construction materials.

2. Reference Documents

- 2.1 Plant - Form 400.03, and Form 400.05
2.2 Roadway - Form 400.11, and Form 400.12
2.3 SCDOT Website – Random Tonnage Generator

3. Definition

- 3.1 None

4. Significance and Use

- 4.1 The purpose of this procedure is to obtain random asphalt samples that are representative of the asphalt mixtures being produced. This procedure is used in determining sample tonnages and sample locations that are necessary for obtaining random samples used for acceptance of asphalt mixtures according to SCDOT specifications. Random core and gauge locations should be marked by the SCDOT once paving has been completed for each subplot in order for testing to occur along with paving operations. Inspectors should not wait until the end of the day or night to obtain the entire LOT's gauge readings or cut roadway core samples used for mixture acceptance.

5. Apparatus

- 5.1 None

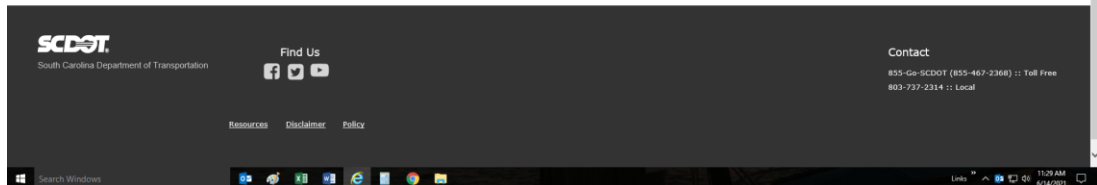
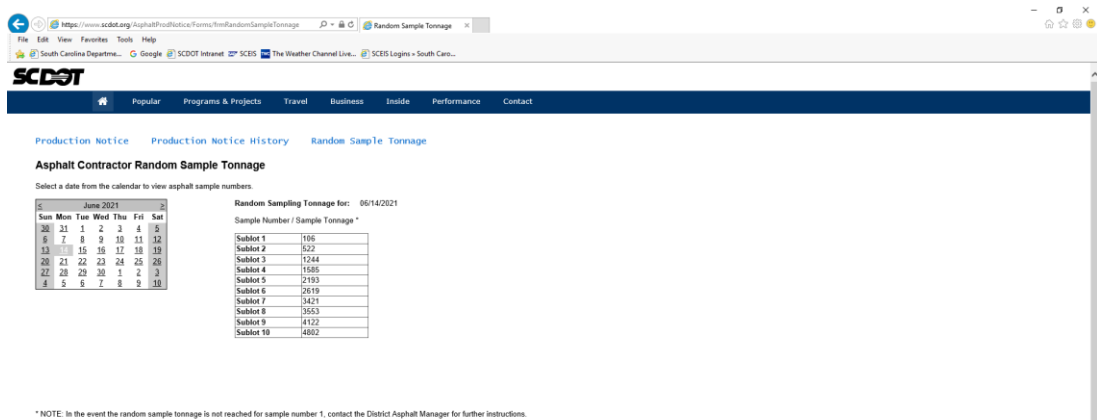
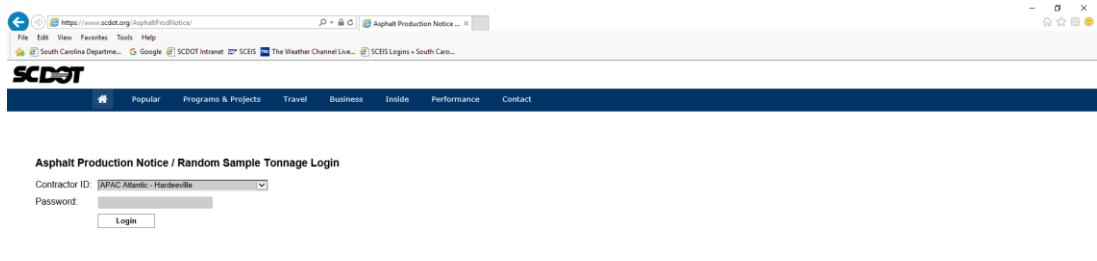
6. Test Specimen

- 6.1 None

7. Procedure

- 7.1. Determine sampling tonnages:
7.1.1. Sampling frequency: Samples of the material being produced at the plant are to be obtained from each subplot (usually 500 tons) during a normal day's production.

7.1.2. Prior to loading the asphalt mixture, select the random number from the SCDOT website: www.scdot.org, select the Business link, then select the Materials & Research link, and finally select the Random Sample Application link under the Asphalt Contractor Random Sample Tonnage heading. A shortcut link is listed here that may assist: <http://www.scdot.org/sct101samplegen/> corresponding to the calendar day of the month which your daily production begins. Additional login information can be acquired from the Asphalt Materials Engineer selkinghcb@scdot.org. Prior to getting the random tonnage table, several inputs must be entered to capture information about the day's or night's production for SCDOT work. Ensure that the information is accurate and up to date and make changes if necessary if the plant breaks down, there's cancelation of scheduled work due to weather, etc.



- 7.1.3 Take each subplot sample from the truck that contains the total tonnage of asphalt mixture from the beginning of the lot or day's production that corresponds to the tonnage selected for sampling.
- 7.1.4 If a representative of either the Office of Materials and Research or the District Asphalt Manager (DAM), or one of their representatives, is present within 30 minutes of obtaining a subplot sample or within 200 tons prior to the next subplot sample, they may instruct the contractor's technician to disregard the calculated tonnage and obtain the subplot sample while they are present. When this occurs, add a note to the comment section of the plant report for future reference. In the event that the random tonnage for the first sample will not be reached for a LOT, contact the DAM or a DAM representative to determine the random sample tonnage.
- 7.1.5 *In the event that the SCDOT website is down*, contact the DAM or DAM representative to notify them that the web system is down. Then compute the random tonnage for the day using the random number from Table 1 (first column) in this procedure that corresponds with the calendar day you begin production to determine the random sample tonnage.

Example: (Today March 23) – Go to Table 1 in this procedure and look for set 23

| 23 (first column) | (multiply random number x 500) + beginning of each subplot (500, 1000, 1500, 2000, 2500, etc.) | Sample Tonnage |
|----------------------|--|----------------|
| 0.278 | 0.278 x 500 | 139 |
| 0.503 | 0.503 x 500 + 500 | 752 |
| 0.102 | 0.102 x 500 + 1000 | 1051 |
| 0.818 | 0.818 x 500 + 1500 | 1909 |

- 7.1.6 *In the event the random tonnage value for the first sample is higher than your expected tonnage for that day's production.*

Login to the SCDOT website and select your random tonnage for that day.

<http://www.scdot.org/sct101samplegen/>

Example: The production schedule shows only 200 tons of Surface Type B today. The random sample tonnage is 351 tons on the website for today's date.

(You still need to obtain a sample in order to get a LPF)

Compute the random number... $351 / 500 = 0.702$

Use 0.702 times (X) your estimated tons for the day (200) = 140 tons

- 7.2. Sampling from a truck bed:
 - 7.2.1. Obtain a sample from the contractor provided sample stand at the asphalt plant.
- 7.3. Random roadway sampling of compacted asphalt mixtures:

- 7.3.1. Determine the subplot size for core locations depending on what type of asphalt mixture is being placed. Note the beginning station number for the day's run.
- 7.3.2. Select the set of random numbers from Table 1, "Random Number Table," that is determined by a random mean (for example, place tabs of paper with numbers 1 – 50 in a container, and randomly pick a tab and use that number as your number set). The first column of the table is to be used to determine the longitudinal distance from each beginning subplot station number (the use of random number generators such as calculators are prohibited).
- 7.3.3. Use the second column of random numbers in the same set to determine the transverse distance from the right edge of the roadway to the sample location.
- 7.3.4. For the first sample, multiply the first random number of the first column by the number of feet in the subplot (usually 1500 ft.). Add this value to the beginning station number of that subplot. This will give the station number of the sample location. To determine the transverse distance from the right edge of the roadway to the sample location, multiply the width of the lane available (available = width of lane - 2 ft.) by the random number from the second set and add one foot.
- 7.3.5. Use the same set of random numbers to continue this procedure for each sample location.
- 7.3.6. In the event that there are more than 10 random samples needed, start back at the first number (1) for location 11, 2 or 12, etc.

Example:

Given:

Day's Run - 4000 ft – Projected Ending Station #: 40+00

Average Roadway Width - 12 feet

Type mix - Surface Type B (1500 foot sublots)

Data set: 15

Starting Station # 0+00

- 7.3.7. Select from the first column of random numbers from the random number table:

| 15 | |
|-------|-------|
| 0.479 | 0.647 |
| 0.802 | 0.500 |
| 0.506 | 0.692 |
| 0.094 | 0.868 |
| 0.282 | 0.719 |
| 0.108 | 0.947 |
| 0.878 | 0.921 |
| 0.908 | 0.203 |
| 0.516 | 0.293 |
| 0.965 | 0.648 |

7.3.8. Use the first number in the first column of random numbers and calculate the longitudinal distance to the first sample in subplot number 1.

$$(1500 \text{ ft. subsection}) (.479) = 719 \text{ ft.}$$

Add this value to the beginning station number of the subsection to get the station number of the sample in subplot number 1.

$$\text{STA } 0+00 + 719 \text{ ft.} = \text{STA } 7+19$$

7.3.9. Use the first number in the second column of random numbers, and calculate the transverse distance from the right edge to the sample location.

$$(.647) (10 \text{ ft.}) + 1 \text{ ft.} = 7.5 \text{ ft. from right edge.}$$

Therefore, the first sample location is at STA 7+19 and is located 7.5 ft. from the right edge.

7.3.10. Repeat this for each subplot.

| SUBLOT | RAND. NOS. | FEET TO SAMPLE | SAMPLE LOCATION |
|--------|----------------|---|---|
| 1 | 0.479 0.647 | (.479)(1500ft.) = 719 ft. (.647)(10ft.) + 1 = 7.5 ft. | STA 0 + 00 + 719 = STA 7+19 7.5 ft. From right edge |
| 2 | 0.802 0.500 | (.802)(1500ft.) = 1203 ft. (.500)(10ft.) + 1 = 6.0 ft. | STA 15+00 + 1203 = STA 27+03 6.0 ft. From right edge |
| 3 | 0.506 0.692 | (.506)(1500ft.) = 759 ft. (.692)(10ft.) + 1 = 7.9 ft. | STA 30+00 + 759 + = STA 37+59* 7.9 ft. From right edge |

* STA 37+59 is within the ending STA # (40+00), therefore core three is taken from roadway.

8. Calculations

8.1 Calculations for this test are listed in the procedure section.

9. Report

9.1 Record sampling tonnages for asphalt plant tests on Form 400.03, and report on Form 400.05. Roadway gauge shots and cores are recorded and reported on Form 400.11 or 400.12. Include the random number selected for cores and gauge shot locations on the Form 400.11 or 400.12 for the LOT.

Table 1 – Random Number

| 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.117 | 0.573 | 0.391 | 0.198 | 0.764 | 0.821 | 0.414 | 0.377 | 0.710 | 0.177 | 0.086 | 0.461 | 0.748 | 0.352 | 0.966 | 0.344 | 0.750 | 0.304 | 0.689 | 0.951 |
| 0.724 | 0.362 | 0.105 | 0.349 | 0.943 | 0.283 | 0.653 | 0.880 | 0.910 | 0.615 | 0.344 | 0.519 | 0.807 | 0.014 | 0.595 | 0.380 | 0.188 | 0.118 | 0.371 | 0.262 |
| 0.013 | 0.511 | 0.440 | 0.710 | 0.252 | 0.136 | 0.515 | 0.928 | 0.955 | 0.350 | 0.776 | 0.836 | 0.752 | 0.859 | 0.114 | 0.649 | 0.948 | 0.035 | 0.906 | 0.305 |
| 0.717 | 0.376 | 0.066 | 0.252 | 0.389 | 0.363 | 0.368 | 0.090 | 0.113 | 0.152 | 0.816 | 0.968 | 0.600 | 0.247 | 0.024 | 0.985 | 0.971 | 0.238 | 0.435 | 0.680 |
| 0.723 | 0.886 | 0.182 | 0.543 | 0.853 | 0.739 | 0.141 | 0.397 | 0.582 | 0.582 | 0.896 | 0.238 | 0.206 | 0.907 | 0.933 | 0.827 | 0.172 | 0.377 | 0.186 | 0.506 |
| 0.875 | 0.412 | 0.970 | 0.908 | 0.497 | 0.162 | 0.080 | 0.295 | 0.442 | 0.686 | 0.998 | 0.530 | 0.718 | 0.161 | 0.381 | 0.960 | 0.167 | 0.939 | 0.618 | 0.964 |
| 0.493 | 0.210 | 0.552 | 0.293 | 0.592 | 0.949 | 0.680 | 0.759 | 0.449 | 0.248 | 0.676 | 0.469 | 0.013 | 0.310 | 0.739 | 0.537 | 0.340 | 0.867 | 0.553 | 0.456 |
| 0.866 | 0.886 | 0.488 | 0.527 | 0.931 | 0.061 | 0.997 | 0.699 | 0.394 | 0.057 | 0.481 | 0.562 | 0.157 | 0.796 | 0.833 | 0.905 | 0.112 | 0.126 | 0.360 | 0.637 |
| 0.768 | 0.022 | 0.261 | 0.710 | 0.994 | 0.782 | 0.324 | 0.822 | 0.383 | 0.528 | 0.542 | 0.551 | 0.590 | 0.152 | 0.481 | 0.122 | 0.915 | 0.608 | 0.617 | 0.258 |
| 0.093 | 0.933 | 0.123 | 0.534 | 0.827 | 0.288 | 0.936 | 0.154 | 0.458 | 0.815 | 0.312 | 0.757 | 0.413 | 0.905 | 0.138 | 0.184 | 0.724 | 0.730 | 0.478 | 0.484 |

| 11 | | 12 | | 13 | | 14 | | 15 | | 16 | | 17 | | 18 | | 19 | | 20 | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.586 | 0.618 | 0.140 | 0.703 | 0.535 | 0.198 | 0.600 | 0.664 | 0.479 | 0.647 | 0.890 | 0.546 | 0.883 | 0.018 | 0.406 | 0.293 | 0.359 | 0.627 | 0.090 | 0.727 |
| 0.051 | 0.641 | 0.985 | 0.652 | 0.911 | 0.055 | 0.692 | 0.628 | 0.802 | 0.500 | 0.787 | 0.697 | 0.093 | 0.678 | 0.327 | 0.564 | 0.101 | 0.273 | 0.078 | 0.137 |
| 0.966 | 0.483 | 0.756 | 0.494 | 0.631 | 0.818 | 0.599 | 0.926 | 0.506 | 0.692 | 0.352 | 0.635 | 0.689 | 0.350 | 0.649 | 0.355 | 0.940 | 0.549 | 0.899 | 0.935 |
| 0.986 | 0.506 | 0.534 | 0.701 | 0.676 | 0.770 | 0.543 | 0.585 | 0.094 | 0.868 | 0.656 | 0.142 | 0.693 | 0.337 | 0.644 | 0.805 | 0.751 | 0.017 | 0.406 | 0.681 |
| 0.895 | 0.772 | 0.918 | 0.781 | 0.827 | 0.488 | 0.757 | 0.373 | 0.282 | 0.719 | 0.418 | 0.860 | 0.158 | 0.390 | 0.598 | 0.485 | 0.092 | 0.263 | 0.994 | 0.820 |
| 0.362 | 0.330 | 0.519 | 0.313 | 0.963 | 0.550 | 0.963 | 0.894 | 0.108 | 0.947 | 0.580 | 0.656 | 0.785 | 0.964 | 0.859 | 0.218 | 0.656 | 0.532 | 0.245 | 0.275 |
| 0.131 | 0.547 | 0.359 | 0.042 | 0.004 | 0.398 | 0.054 | 0.325 | 0.878 | 0.921 | 0.751 | 0.522 | 0.837 | 0.880 | 0.971 | 0.274 | 0.939 | 0.437 | 0.533 | 0.541 |
| 0.667 | 0.647 | 0.080 | 0.590 | 0.594 | 0.905 | 0.968 | 0.112 | 0.908 | 0.203 | 0.575 | 0.359 | 0.470 | 0.663 | 0.957 | 0.914 | 0.920 | 0.902 | 0.692 | 0.571 |
| 0.165 | 0.515 | 0.348 | 0.895 | 0.874 | 0.346 | 0.502 | 0.467 | 0.516 | 0.293 | 0.130 | 0.621 | 0.725 | 0.780 | 0.705 | 0.203 | 0.059 | 0.441 | 0.628 | 0.187 |
| 0.092 | 0.689 | 0.872 | 0.327 | 0.193 | 0.732 | 0.708 | 0.624 | 0.965 | 0.648 | 0.188 | 0.002 | 0.881 | 0.863 | 0.691 | 0.731 | 0.770 | 0.376 | 0.092 | 0.199 |

| 21 | | 22 | | 23 | | 24 | | 25 | | 26 | | 27 | | 28 | | 29 | | 30 | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.853 | 0.611 | 0.143 | 0.877 | 0.278 | 0.237 | 0.858 | 0.758 | 0.672 | 0.710 | 0.785 | 0.935 | 0.407 | 0.538 | 0.708 | 0.252 | 0.599 | 0.710 | 0.165 | 0.944 |
| 0.489 | 0.547 | 0.243 | 0.957 | 0.503 | 0.340 | 0.714 | 0.621 | 0.280 | 0.416 | 0.523 | 0.327 | 0.918 | 0.207 | 0.139 | 0.604 | 0.573 | 0.785 | 0.951 | 0.983 |
| 0.800 | 0.371 | 0.530 | 0.596 | 0.102 | 0.209 | 0.293 | 0.473 | 0.557 | 0.160 | 0.944 | 0.299 | 0.621 | 0.802 | 0.707 | 0.042 | 0.362 | 0.476 | 0.314 | 0.105 |
| 0.643 | 0.850 | 0.697 | 0.239 | 0.818 | 0.852 | 0.520 | 0.436 | 0.860 | 0.961 | 0.639 | 0.537 | 0.229 | 0.599 | 0.563 | 0.379 | 0.784 | 0.826 | 0.138 | 0.630 |
| 0.498 | 0.147 | 0.372 | 0.029 | 0.015 | 0.348 | 0.185 | 0.715 | 0.173 | 0.357 | 0.673 | 0.619 | 0.767 | 0.223 | 0.528 | 0.050 | 0.354 | 0.835 | 0.511 | 0.860 |
| 0.853 | 0.633 | 0.749 | 0.818 | 0.489 | 0.230 | 0.923 | 0.246 | 0.227 | 0.553 | 0.452 | 0.059 | 0.587 | 0.186 | 0.630 | 0.074 | 0.664 | 0.712 | 0.942 | 0.667 |
| 0.804 | 0.769 | 0.524 | 0.410 | 0.277 | 0.616 | 0.664 | 0.389 | 0.759 | 0.589 | 0.945 | 0.928 | 0.040 | 0.719 | 0.602 | 0.842 | 0.986 | 0.547 | 0.389 | 0.287 |
| 0.863 | 0.599 | 0.106 | 0.097 | 0.924 | 0.101 | 0.649 | 0.953 | 0.149 | 0.895 | 0.560 | 0.183 | 0.225 | 0.760 | 0.773 | 0.612 | 0.099 | 0.540 | 0.932 | 0.684 |
| 0.556 | 0.859 | 0.274 | 0.624 | 0.481 | 0.024 | 0.424 | 0.532 | 0.692 | 0.080 | 0.834 | 0.632 | 0.208 | 0.200 | 0.889 | 0.661 | 0.079 | 0.836 | 0.218 | 0.194 |
| 0.239 | 0.052 | 0.608 | 0.957 | 0.557 | 0.171 | 0.612 | 0.047 | 0.412 | 0.510 | 0.077 | 0.392 | 0.203 | 0.327 | 0.734 | 0.418 | 0.440 | 0.819 | 0.354 | 0.593 |

| 31 | | 32 | | 33 | | 34 | | 35 | | 36 | | 37 | | 38 | | 39 | | 40 | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.051 | 0.750 | 0.484 | 0.416 | 0.561 | 0.134 | 0.398 | 0.932 | 0.676 | 0.118 | 0.036 | 0.308 | 0.385 | 0.431 | 0.254 | 0.938 | 0.427 | 0.820 | 0.223 | 0.812 |
| 0.432 | 0.672 | 0.094 | 0.345 | 0.725 | 0.191 | 0.188 | 0.239 | 0.115 | 0.163 | 0.662 | 0.390 | 0.577 | 0.886 | 0.024 | 0.649 | 0.296 | 0.548 | 0.215 | 0.168 |
| 0.602 | 0.388 | 0.410 | 0.963 | 0.017 | 0.629 | 0.823 | 0.843 | 0.169 | 0.208 | 0.610 | 0.678 | 0.310 | 0.019 | 0.693 | 0.347 | 0.047 | 0.809 | 0.632 | 0.910 |
| 0.331 | 0.485 | 0.647 | 0.319 | 0.509 | 0.915 | 0.899 | 0.886 | 0.288 | 0.220 | 0.045 | 0.761 | 0.310 | 0.467 | 0.453 | 0.814 | 0.399 | 0.965 | 0.178 | 0.013 |
| 0.097 | 0.295 | 0.799 | 0.974 | 0.952 | 0.028 | 0.885 | 0.454 | 0.668 | 0.437 | 0.578 | 0.783 | 0.462 | 0.758 | 0.102 | 0.477 | 0.704 | 0.633 | 0.554 | 0.100 |
| 0.510 | 0.827 | 0.486 | 0.780 | 0.670 | 0.115 | 0.855 | 0.731 | 0.046 | 0.344 | 0.658 | 0.424 | 0.405 | 0.901 | 0.747 | 0.318 | 0.960 | 0.392 | 0.736 | 0.351 |
| 0.428 | 0.238 | 0.611 | 0.643 | 0.214 | 0.763 | 0.795 | 0.282 | 0.218 | 0.952 | 0.722 | 0.791 | 0.405 | 0.474 | 0.121 | 0.184 | 0.972 | 0.495 | 0.601 | 0.933 |
| 0.596 | 0.855 | 0.311 | 0.850 | 0.962 | 0.234 | 0.255 | 0.042 | 0.900 | 0.516 | 0.230 | 0.161 | 0.525 | 0.053 | 0.029 | 0.985 | 0.451 | 0.303 | 0.538 | 0.021 |
| 0.820 | 0.910 | 0.914 | 0.408 | 0.668 | 0.508 | 0.311 | 0.489 | 0.297 | 0.760 | 0.323 | 0.041 | 0.213 | 0.967 | 0.307 | 0.647 | 0.020 | 0.992 | 0.009 | 0.878 |
| 0.544 | 0.880 | 0.226 | 0.499 | 0.401 | 0.807 | 0.742 | 0.656 | 0.704 | 0.828 | 0.293 | 0.049 | 0.469 | 0.102 | 0.007 | 0.857 | 0.751 | 0.891 | 0.166 | 0.013 |

| 41 | | 42 | | 43 | | 44 | | 45 | | 46 | | 47 | | 48 | | 49 | | 50 | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.496 | 0.980 | 0.099 | 0.608 | 0.589 | 0.517 | 0.287 | 0.191 | 0.527 | 0.889 | 0.756 | 0.582 | 0.192 | 0.707 | 0.615 | 0.887 | 0.891 | 0.601 | 0.583 | 0.345 |
| 0.068 | 0.986 | 0.241 | 0.255 | 0.729 | 0.807 | 0.870 | 0.116 | 0.963 | 0.869 | 0.608 | 0.589 | 0.794 | 0.130 | 0.523 | 0.544 | 0.997 | 0.473 | 0.170 | 0.999 |
| 0.318 | 0.441 | 0.634 | 0.760 | 0.243 | 0.593 | 0.163 | 0.342 | 0.190 | 0.671 | 0.854 | 0.216 | 0.132 | 0.324 | 0.568 | 0.816 | 0.261 | 0.682 | 0.009 | 0.764 |
| 0.067 | 0.133 | 0.768 | 0.266 | 0.284 | 0.722 | 0.590 | 0.975 | 0.338 | 0.528 | 0.709 | 0.655 | 0.770 | 0.058 | 0.574 | 0.233 | 0.297 | 0.190 | 0.281 | 0.459 |
| 0.325 | 0.692 | 0.521 | 0.359 | 0.147 | 0.307 | 0.209 | 0.983 | 0.169 | 0.427 | 0.156 | 0.961 | 0.021 | 0.808 | 0.297 | 0.252 | 0.813 | 0.940 | 0.673 | 0.832 |
| 0.924 | 0.796 | 0.736 | 0.431 | 0.080 | 0.316 | 0.753 | 0.574 | 0.073 | 0.657 | 0.880 | 0.689 | 0.674 | 0.764 | 0.656 | 0.275 | 0.614 | 0.892 | 0.796 | 0.335 |
| 0.780 | 0.156 | 0.507 | 0.272 | 0.894 | 0.767 | 0.178 | 0.161 | 0.321 | 0.303 | 0.837 | 0.990 | 0.839 | 0.931 | 0.144 | 0.046 | 0.200 | 0.935 | 0.226 | 0.364 |
| 0.565 | 0.182 | 0.353 | 0.925 | 0.876 | 0.261 | 0.540 | 0.766 | 0.888 | 0.657 | 0.317 | 0.989 | 0.738 | 0.310 | 0.407 | 0.627 | 0.485 | 0.569 | 0.114 | 0.703 |
| 0.183 | 0.392 | 0.308 | 0.275 | 0.137 | 0.853 | 0.695 | 0.443 | 0.125 | 0.169 | 0.369 | 0.481 | 0.166 | 0.876 | 0.884 | 0.291 | 0.275 | 0.405 | 0.455 | 0.127 |
| 0.187 | 0.760 | 0.475 | 0.311 | 0.902 | 0.161 | 0.415 | 0.649 | 0.892 | 0.468 | 0.899 | 0.149 | 0.280 | 0.459 | 0.739 | 0.530 | 0.860 | 0.438 | 0.770 | 0.622 |
| 0.492 | 0.911 | 0.346 | 0.235 | 0.362 | 0.417 | 0.098 | 0.355 | 0.239 | 0.267 | 0.796 | 0.216 | 0.011 | 0.497 | 0.312 | 0.948 | 0.052 | 0.179 | 0.557 | 0.971 |