Systematic Random Sampling Workbook

This DEP spreadsheet was based on a triangular systematic random sampling approach. The basic principles of the spreadsheet are as follows:

> First, the spreadsheet will randomly generate a starting point, which can be anywhere within the rectangular area defined by Xmin, Xmax, Ymin and Ymax.
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> Based the starting point, the spreadsheet generates a triangular grid pattern. The starting point is located at the 0-th row. Above the 0-th row are 1st row, 2nd row, 3rd row, etc. Below the 0-th row are -1st row, -2nd row, -3rd row, etc. This triangular grid pattern is then used to define diamond-shaped cells. Each diamond-shaped cell (such as Cell A as illustrated in the example plot of the DataInput worksheet) is defined by four grid points of the triangular grid. Don't confuse this diamond-shaped cell of the systematic random sampling with the cell of a spreadsheet.
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> Finally, the spreadsheet randomly generates one and only one sampling point in each diamond-shaped cell.
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> A diamond-shaped cell located at border of the rectangle as defined by Xmin, Xmax, Ymin and Ymax would have part of the cell within the rectangle and part outside the rectangle. The spreadsheet would randomly generate a sampling point for each of such cells as well. If the sampling point is within the rectangle, it will show up in the SamplingPoints worksheet. Otherwise, it will be hidden from viewing.

The dimensions of the diamond-shaped cell, i.e., the cell spacing value (L) in DataInput!B15 and the height (0.866L) in DataInput!B16 are determined by the "area of contamination" (DataInput!B3) and the number of samples (DataInput!B12). Note that the area of each diamond-shaped cell is equal to 0.866*L^2. The area of each diamond-shaped cell (0.866*L^2) times the number of samples (DataInput!B12) is equal to the "area of contamination" (DataInput!B3). Also note that the spreadsheet randomly generates one and only one sampling point in each diamond-shaped cell. Because the randomly generated triangular grid pattern may not match with the 2D layout of the sampling area exactly, the diamond-shaped cells at the 2D-layout boundary would have part within the sampling area and part outside the sampling area. As a result, the generated sampling points for these diamond-shaped cells may not sit within the 2D layout of the sampling area. For this reason, a click on the button of "Click Here to Generate a New Triangular Grid" may not generate the exact number of sampling points that you want within the sampling area.

This spreadsheet was design for 3D sampling. For example, if you were doing in-situ bioremediation of contaminated soil, you would need to take samples from the contaminated soil "volume", a 3D feature. In order to use this spreadsheet to determine confirmation-sampling points on the sidewalls and bottom of the excavation pit, which is essentially a 2D sampling, some adjustments on the input are required. (You are not taking samples from excavated soil volume for attainment demonstration. Instead, you are taking samples from sidewalls and pit bottom for attainment demonstration. Pit

bottom and sidewalls are 2D features.) First, the input value for the "area of contamination" (DataInput!B3) in an excavation case is the total area of your sidewalls and pit bottom. You need to draw your excavation side walls and pit bottom in 2D. Overlay the x-axis and y-axis on this 2D layout. Xmin in DataInput!B18, Xmax in DataInput!B19, Ymin in DataInput!B20 and Ymax in DataInput!B21 then should be determined based on this 2D layout.

Cells DataInput!B4 and DataInput!D4 are for 3D sampling only. These are used to define the sampling depth range. For example, if you are taking samples from 2' to 15' in 3D sampling, you would enter 2 into DataInput!B4 and enter 15 into DataInput!D4. For 2D sampling in excavation cases, just enter zeros into DataInput!B4 and DataInput!D4. Ignore all z-coordinate output values on SamplingPoints worksheet. (All z-coordinate output values on SamplingPoints worksheet should be equal to zero if you enter zeros into DataInput!B4 and DataInput!D4.)

Enter volume of contaminated soil into DataInput!B5. (Please note that the unit of DataInput!B5 is cubic yard, not cubic foot.) This value should be determined based on site characterization data. (You should not assume that it is equal to DataInput!B3*DataInput!B4.)

For 3D sampling, DataInput!B12 is for the number of samples you plan to take within the contaminated soil volume. For 2D sampling, such as for attainment demonstration in excavation cases, enter the number of samples you plan to take on the side walls and pit bottom into cell DataInput!B12. As mentioned above, a click on the push button of "Click Here to Generate a New Triangular Grid" may not generate the exact number of sampling points that you want within the sampling area. To get away from this, you need to repeat clicking this button until a new set has the exact number of sampling points within the sampling area. Do not try to discard any sampling point within the sampling area manually. This would violate the purpose of systematic random sampling.

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