Flowchart Development, and Exercise

Review the description of our overall project, look at the flowchart below, think about the needed analysis, and turn in the following:

1) A detailed flowchart for the "Maximum Canopy Interception" sub-workflow, as described in the instructions below, and
2) Two maps, one that shows the maximum canopy interception (CInt, below), and second map that shows the calculated rainfall at surface (RAS) for the entire study area, using the campus-wide data provided, clipped to the project work area. Include the usual map elements, e.g., legend, title, scale, north arrow.

Flowchart
Below is an example flowchart representing a workflow for our analysis. It is abridged, in that not all the steps are shown, and is one approach. There are others that might make more sense to you, so please feel free to modify this, or to use a different workflow.

Example Flowchart: Vector layers are green ovals, raster layers are red, boxes are spatial operations, input data have thicker borders.

Data layers are depicted as ovals, operations as rectangles. Raster data are shaded red, vector data shaded green. Input data are shown with a thicker borders, approximately the data you've developed in the first part of class. It depicts many intermediate layers, and the final layers. Some of these intermediate layers are temporary, and would be discarded at the end of the analysis, but some might be important enough to save into the final geodatabase.

The (incomplete) example flowchart is intended to help you think through the processing for your project. Note that some steps are omitted and if you follow this general logic you will need additional steps, e.g., the identify and recode steps are explicitly identified as omitted, and there will be sub-steps not shown, e.g., renumbering, selections, or column assignments.

We have not developed nor discussed the rainfall data layer. Here this is a raster layer encompassing your study area, with an attribute that is the amount of rainfall for one of your storm events. In following this approach, you would need to create this layer, perhaps most easily by first copying the study area boundary layer, assigning a rainfall value to a column, and then converting the polygon to a raster. These steps are not shown, and don't need to be in your flowchart, as you can simply identify them as starting data. Also note that for your complete analysis you'll have two rainfall layers, one each for the 2.5 and 5 cm storms. You'll eventually have to execute your flowchart and full workflows for each rainfall level, substituting an appropriate rainfall layer into each analysis. You only need to do sub-workflow for the 2.5cm rainfall amount for this assignment.

Remember to convert the rainfall data to appropriate metric units, in our case meters, because you'll be reporting your output in cubic meters of water per grate, and all calculations are simpler if you keep your cell size at one square meter and depths in meters during all calculations.

The flowchart was built under the assumption the buildings, soils, and canopy extent data are vector polygons layers, and the target grates/outlet layer is a vector point layer. For your base case or "as is" analysis, this grates layer is the pourpoint layer that contains the outlets to your two campus watersheds. We assume all surface area in the upstream watersheds drains to these grates, either directly, or through entering another grate which is connected via pipes to this grate.

This flowchart assumes you will eventually convert from vector data to raster data, before the combination steps shown in the right-most processing stream. The vector to raster conversions are not explicitly shown to save space, it simply would be another operation (vector to raster) and layer (e.g., raster Canopy interception) in the processing flow.

Note you don't have to base your semester-long analysis on this flowchart. You could conduct more of the analysis in vector, not convert the absorption layer to raster, convert the watersheds to vectors, and do a series of unions/recodes and then aggregations through a dissolve or summation within watershed polygons. Or, you could convert the input data to rasters earlier, and conduct more of the analysis in raster.

In this assignment, you need to create a detailed flowchart for only the calculation of your maximum canopy interception/net rainfall workflow. These approximate steps are shown enclosed in the dotted line bubble near the top-right of the flowchart graphic, labeled "Maximum Canopy….." You may start with the flowchart provided, but you have to provide more detail for your detailed flowchart, showing each/every ArcGIS processing tool you will use, and the parameters. Use drawio or a similar flowcharting tool to depict this flowchart.

Note that you will have to verify the flowchart works by actually performing the analysis in ArcGIS Pro with some test data. Use the Project Study Area Base data as your starting point. These data are described in a separate document, but are basically similar to the data you've developed and cover our entire project area. You will have to do a bit of pre-processing, e.g., clipping and minor table modifications.

Your flowchart must identify the specific ArcGIS Pro tools you will be using by name, e.g., recode/assign in a recode operation should explicitly show the recode table. Basically, you must specify key attributes by name if they are calculated using a tool, i.e., the primary input and outputs of the calculation, such that a person could exactly re-create your analysis.

You must identify the data name or tool in each square/oval, and the type of data (raster, vector point, vector line, or vector polygon) next to each square. You can shorten these to R, VPt, VL, and VPo if you wish, or color code them with a key.

You may use any graphics software you wish, but you must somehow embed the image in a pdf document. MSWord, LibreOffice, Mac Pages, and most other word processing softwares allow you to export pdfs, so simply embedding the graphic with your text and exporting should work.

You may also create a Model Builder model for this sub-workflow, and take a screen grab of the model as your flowchart. Next week's assignment includes converting this workflow into a Model Builder model.

Turn in the flow chart to Canvas, and the two maps, one of canopy interception, and another of the net rainfall, as described at the start of this document.