Chad’s Notes About the main contouring script

CN = is generic shorthand for County Name

CH = Clearinghouse

GDB = File Geodatabase

FC = Feature Class

FD = Feature Dataset – a special folder found inside of a GDB that restricts the coordinate system of all FCs contained within it.

STEPS

1. Check to see if a Shapefiles folder exists in the state/county folder, if it does not exist, create it.
2. Check to see if a DWG folder exists in the state/county folder, if it does not exist, create it.
3. If a Contours\_Line\_SP FC exists in the correct place, which is in Contours\_Step2.gdb/Contours\_SP, delete it.
4. If a Contours\_Line\_SP FC exists in the wrong place, which is the root of Contours\_Step2.gdb, without being inside the Contours\_SP FD, delete it, because two FCs with the same name, cannot exists inside the same GDB, regardless of where in the GDB they are.
5. If a Contours\_Line\_SP FC exists in the correct place, which is in Contours\_Step2.gdb/Contours\_SP, delete it.
6. If a FC named Mosaic\_Boundary\_UTM exists in the root of CN\_County\_Contours.gdb, delete it.
7. Calculate the statistics for the FC named Mosaic\_Dataset\_UTM, that already exists and is located in the Contours\_Step1.gdb. This could possibly make the contours tool run faster.
8. Run the contours tool which uses the Mosaic\_Dataset\_UTM as input to create the first version of the contour lines. The output will be UTM\_Contours\_Elev\_Ft and will be located in the root of Contours\_Step1.gdb and will be in same coordinate system as the input Mosaic\_Dataset\_UTM, which should be one of the UTM zones. During this process, the elevation values for the contour line is converted from meters to Ft using a multiplication factor of 3.280839895. Lengths of lines are still in units of meters.
9. From the UTM\_Contours\_Elev\_Ft FC, select and delete any lines that are less than 5 meters long. In my mind, this is deleting “noise” from the data.
10. Use the Project tool to change the projection of the UTM\_Contours\_Elev\_Ft FC to the state plane coordinate system assigned to the current county being worked on. The output is named Contour\_Lines\_SP and should be located in Contours2.gdb/Contours\_SP FD. Since the Contours\_SP FD has already been created with the correct state plane coordinate system for that county, it should not be necessary to declare an output coordinate system in the project tool, itself. When using the GUI to run the project tool, the Output\_Coordinate\_System parameter is automatically filled in when the output location for the projected FC is specified. I don’t know if it works the same way with the Python script, but I have not seen any problems with the output coordinate system, even though I think a South Carolina coordinate system is hardcoded into the python script. I think the coordinate system of the output FD is overriding the coordinate system specified in the python script.
11. Use the Smooth tool, to smooth the contour lines. The input is Contours2.gdb/Contours\_SP Contour\_Lines\_SP, and the output is Contours3.gdb/Smoothed\_Contours/Smoothed\_Contour\_Lines and should be in the correct state plane coordinate system because the Smoothed\_Contours FD should already be in the correct state plane coordinate system.
12. When the Index\_5000\_Ft FC was created (prerequisite), it was generated with a little bit of a buffer, so it may contain square polygons for areas that we do not have contour lines for. The purpose of this step, is to delete all the polygons in the Index\_5000\_Ft FC that do not overlap with the Smoothed\_Contour\_Lines FC, because in a following step, the Index\_5000\_Ft FC will be used to split the Smoothed\_Contour\_Lines FC into smaller pieces. This step is a select by location tool to find the polygons that do overlap with the contour lines, invert the selection, and then delete those unnecessary polygons.
13. When the contours tools runs (Step 8), it creates a column in the attribute table named Contour and that column contains the elevation value for the contour lines. Since that column name is not self-explanatory and will not easily convert into a column recognized in the DWG format, we need to add a column name that is self-explanatory and can be easily converted to DWG format. Therefore we add a column named Elevation and calculate it to the value found in the Contour column.
14. We add another column named Line\_Type and we calculate it to one of three different values. If the Elevation value is divisible by 10, with no remainder, Line\_Type is calculated to “Index-10”. If the Elevation value is divisible by 2, with no remainder it, Line\_Type is calculated to “Index-2”, assuming it has not already been calculated to ‘Index-10”, everything else (odd elevation numbers) are calculated to “Intermediate-1”.
15. Since several data columns found in the Smoothed\_Contour\_Lines FC attribute table are not necessary, they are deleted. The deleted columns include “Id”, “Contour”, and “InLine\_FID”.
16. Use the Split tool to cut the Smoothed\_Contour\_Lines FC into smaller subsets, for selling on the CH. The split tool takes two inputs and they are Smoothed\_Contour\_Lines and Index\_5000Ft. You must also declare a “split field” which is a column found in the Index\_5000Ft FC that will be used to name all of the many FCs that will be output. The field used to name the output FCs is the field named TILE\_NUM, found in the Index\_5000Ft FC. The Target Workspace is also a required parameter of this tool. The output location/workspace is always the CN\_County\_Contours\CN\_County\_Contours.gdb\Smoothed\_PAEK\_10FT FD. Since this FD has already been created with the correct state plane coordinate system and all the inputs should also already be in the correct state plane coordinate system, it should ensure the output FCs are also in the correct state plane coordinate system, and they should all have a unique name.
17. Use the compact geodatabase tool to compact the CN\_County\_Contours\CN\_County\_Contours.gdb geodatabase. I normally I don’t compact GDBs unless I’ve deleted a bunch of FCs from it. However, maybe compacting it after such a large operation as the split tool gives some advantage that I am not aware of. I should look at how much time is spent on this step and if it seems like a lot of time, maybe we should consider deleting this step.
18. Use the Multipart to Singlepart tool to iterate through all the FCs in the CN\_County\_Contours\CN\_County\_Contours.gdb\Smoothed\_PAEK\_10FT FD and accomplish two things. The first thing that it accomplishes is to convert the multipart features found in the individual FCs within the Smoothed\_PAEK\_10FT FD to singlepart features, while at the same time exporting the FCs from the Smoothed\_PAEK\_10FT FD to a shapefile format. We discovered this was a necessary step because DWG files do not support multipart features. This process results in many shapefiles being created with the following naming convention "{Name}\_1Ft.shp"
19. When the shapefile is created it contains a new unnecessary column, named “ORIG\_FID”, so it is deleted.
20. When multipart features are converted to singlepart features, the Shape\_Leng field in the attribute table is not automatically updated, so it is necessary to use the calculate geometry tool to update the Shape\_Leng field using the units of US Feet.
21. Export each of the "{Name}\_1Ft.shp" shapefiles to a dwg format, keeping the root name of the file the same.
22. Use the export tool with an included filter to create a 2Ft interval shapefile from the 1Ft interval shapefile. Lines (features) meeting the criteria of where\_"Line\_Type = 'Index-10' Or Line\_Type = 'Intermediate-2'"), are exported to a shapefile named "{Name}\_2Ft.shp"
23. Export each of the "{Name}\_2Ft.shp" shapefiles to a dwg format, keeping the root name of the file the same.
24. Delete unnecessary files that are associated with shapefiles. Files with extensions of [".shp.xml", ".sbx", ".sbn", ".cpg"], can be deleted.
25. Delete unnecessary files that are associated with DWG files, such as .dwg.xml files.
26. Use Define Mosaic Dataset NoData to classify nodata values with zero. I honestly don’t know exactly what this does, or how to verify that it works, but in order to “shrink” down the actual data boundary of useful DEM data, this is the first step in doing so. I need to learn more about what’s going on here because we’ve had problems with this step, or the next step, or both.
27. Use Build Footprints tool on the Mosaic\_Dataset\_UTM which is located in the Contours\_Step1.gdb. This tool, when used after the NoData tool, should shrink the vector boundary and footprints within the Mosaic\_Dataset\_UTM, to match the extent of actual useful DEM data, instead of the theoretical 10km x 10km squares.
28. Use the Export Mosaic Dataset Geometry tool, to export the new boundary of the Mosaic\_Dataset\_UTM to a useful vector FC that can be used in other processes. The name of the output FC is Mosaic\_Boundary\_UTM and it is located in the root of the GDB CN\_County\_Contours\CN\_County\_Contours.gdb. The coordinates of the FC should be the UTM zone assigned to that county and should happen automatically because that’s the coordinate system of the Mosaic\_Dataset\_UTM.
29. Use the project tool to create a copy of the Mosaic\_Boundary\_UTM FC into the correct state plane coordinate system. The input is Mosaic\_Boundary\_UTM and the output is named Mosaic\_Boundary\_SP and it is located in CN\_County\_Contours\CN\_County\_Contours.gdb\Smoothed\_PAEK\_10FT FD. The coordinate system of that FD should be the correct state plane coordinate system for that county. IF A COORDINATE SYSTEM IS SPECIFICALLY LISTED IN THE PYTHON SCRIPT, I DON’T KNOW WHAT HAPPENS, BECAUSE THE COORDINATE SYSTEM OF THE OUTPUT FD SHOULD DICTATE THE OUTPUT COORDINATE SYSTEM. I think this step is working ok, even if the specified output coordinate system is wrong.
30. Use the Intersect tool to create a trimmed down index FC. The intersect tool will overlay the Mosaic\_Boudary\_SP FC and the Index\_5000Ft FC to only keep the areas where they overlap each other. The output FC is named Data\_Limits\_Step1 and should be in state plane coordinates because both inputs are also in state plane coordinates.
31. Use the dissolve tool on the Data\_Limits\_Step1 FC, so that all polygons are merged into a single polygon. The output FC name is Data\_Limits\_SP and is in a state plane coordinate system, because all the inputs are in that same coordinate system.
32. Use the clip tool to cut down the size of the Index\_5000Ft FC to only cover the extent of the Data\_Limits\_SP FC. The output FC is named Index\_5000Ft\_w\_Limits and is located in the root folder of CN\_County\_Contours\CN\_County\_Contours.gdb
33. Use the project tool to create a new FC named Index\_5000Ft\_WGS. The input is the Index\_5000Ft\_w\_Limits FC.
34. Use the Features to JSON tool to create a json file named CN\_County\_Contours\_Index.geojson, using Index\_5000Ft\_WGS as the input.