

CNC Milling Instructional Contents:

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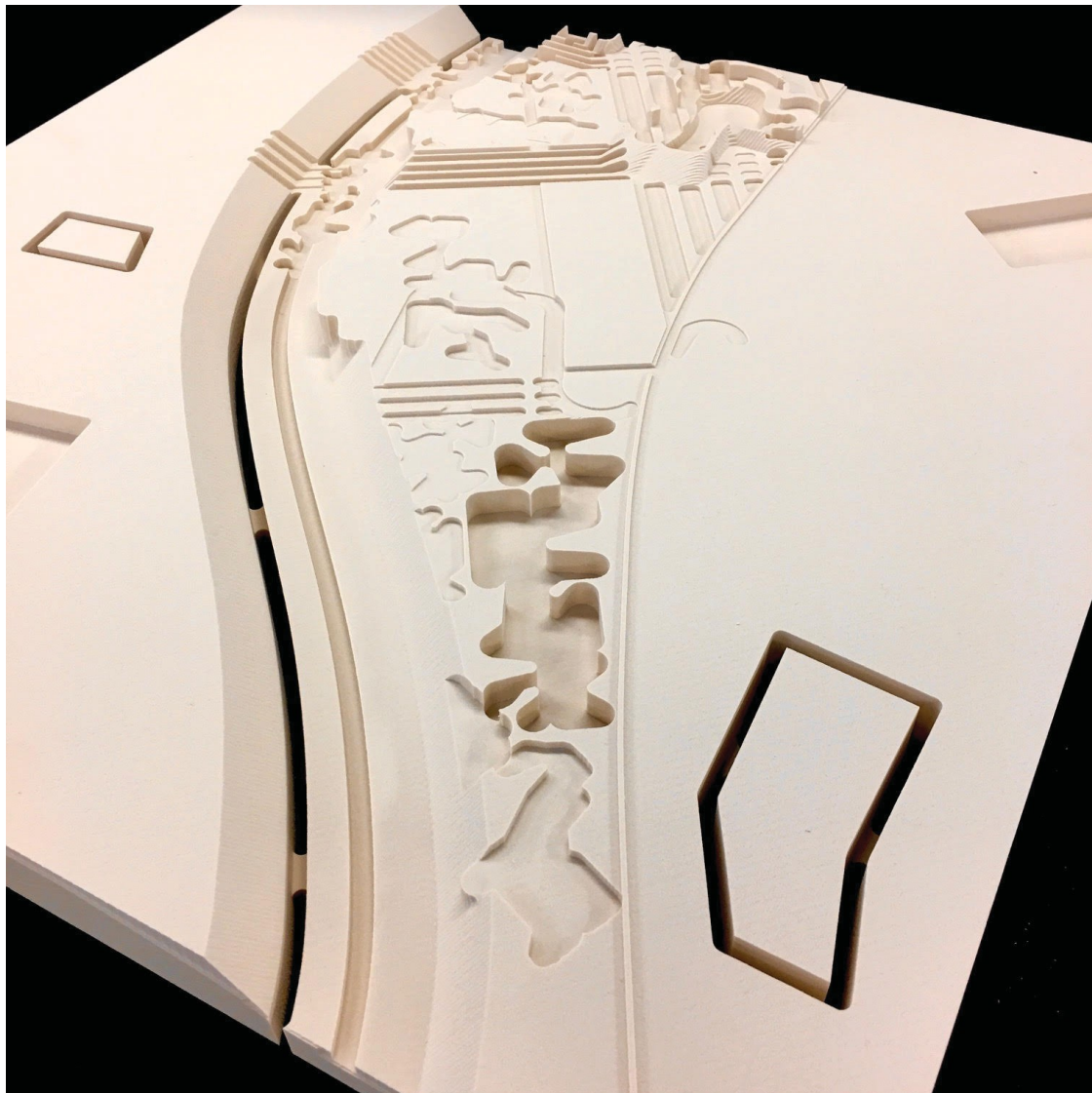
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Section 1:

Foam Milling- General File Setup:

-Place your design into the 'CNC Template' file found on either:

-Juno server: \\juno\Public\DigitalFabrication\CNC-Template-Tutorials)

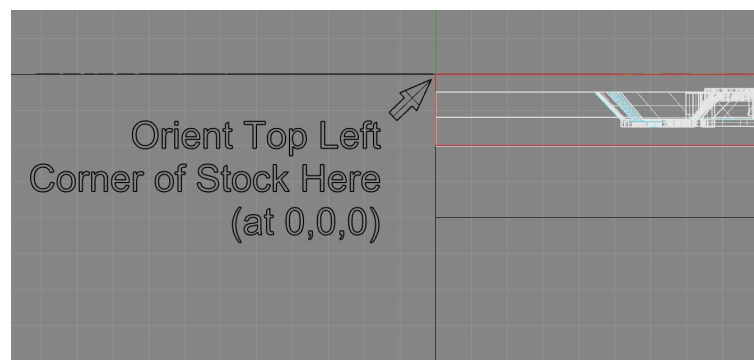
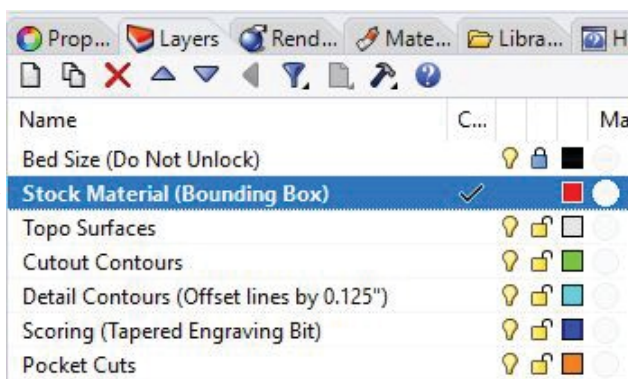
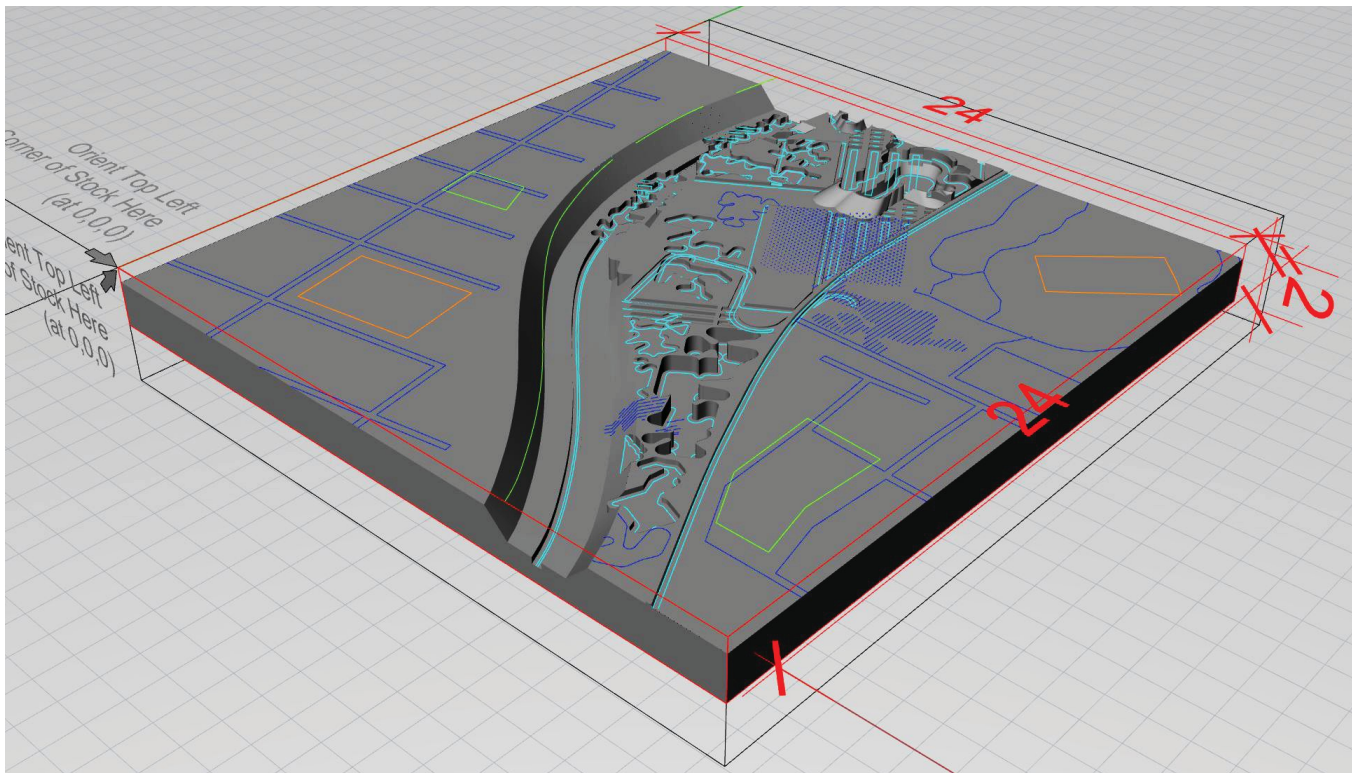
-UPenn Box fileshare folder: grp-sod-shop > CNC 3D File Submission > Templates
(<https://upenn.app.box.com/folder/122455942707>)

-The black bounding box on 'Bed Size' layer indicates the maximum millable area (24"x26.5"x4")
You may submit up to 2,500 cubic inches of foam material per submission. All files must be 64MB or less.

-Create a bounding box on the red 'Stock Material' layer that is the exact size of your actual stock material to be milled.

-Place your design within your stock material bounding box. Then place the model in the proper location by moving the top front left corner of the bounding box to the origin (0,0,0). Your geometry should then be below zero in the 'Z' axis (see pic below).

-There are five separate layers for different milling processes: 'Topo Surfaces', 'Cutout Contour', 'Detail Contours', 'Scoring' and 'Pocket Cuts'. Place your design elements in the appropriate layers.



Section 2:

Wood Milling - General File Setup:

-Place your design into the 'CNC Template' file found on either:

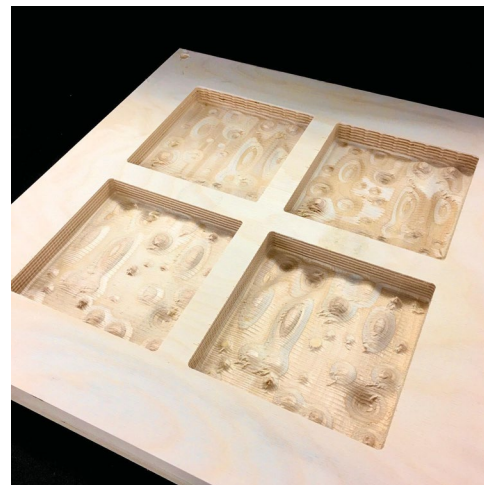
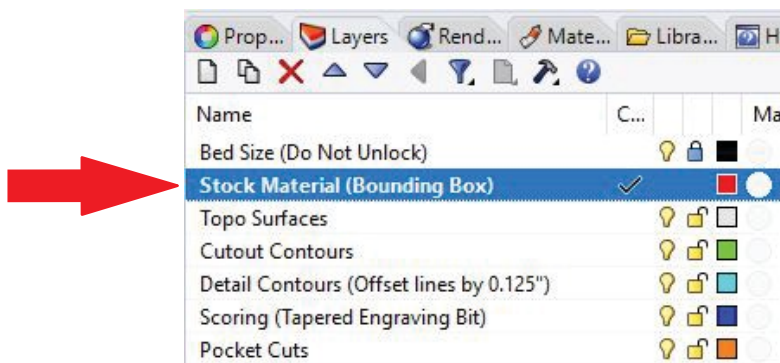
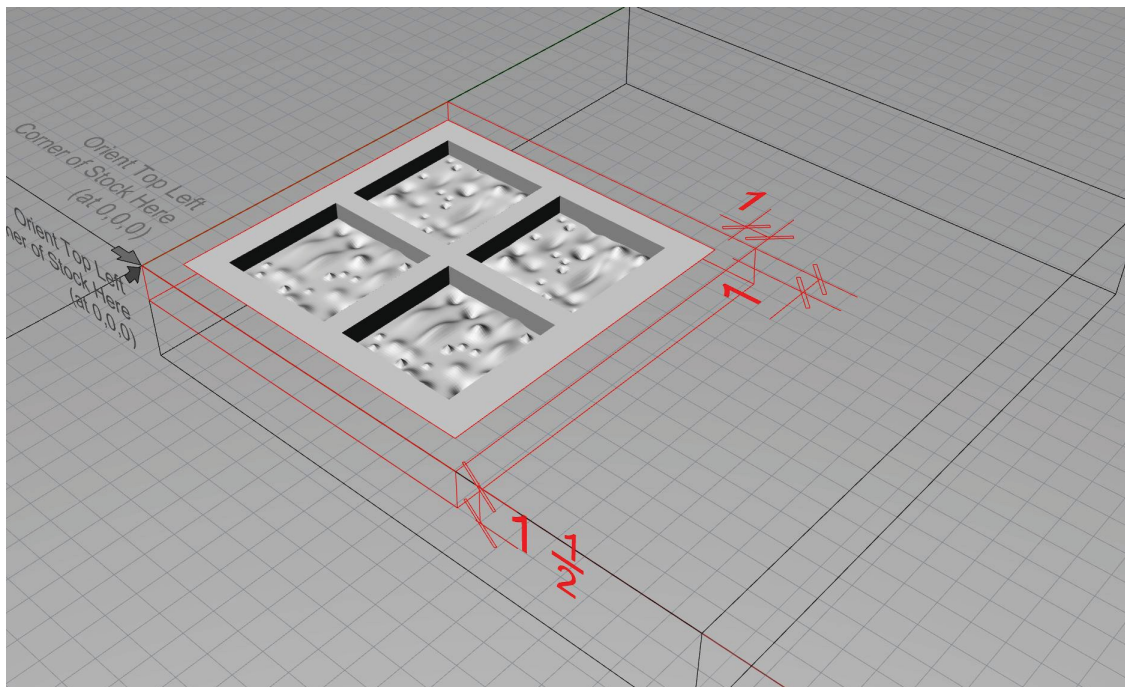
- Juno server: \\juno\Public\DigitalFabrication\CNC-Template-Tutorials)
- UPenn Box fileshare folder: grp-sod-shop > CNC 3D File Submission > Templates
(<https://upenn.app.box.com/folder/122455942707>)

-The black bounding box on 'Bed Size' layer indicates the maximum millable area (24"x26.5"x4")
You may submit up to 1,000 cubic inches of wood material per submission. All files must be 64MB or less.

-Files to be milled in wood *must* have an additional 1 inch wide blank border around the design so the technician may secure the material with wood screws.

-The deepest cut possible in wood is 1.5 inches, however your stock material may be up to 4 inches thick.

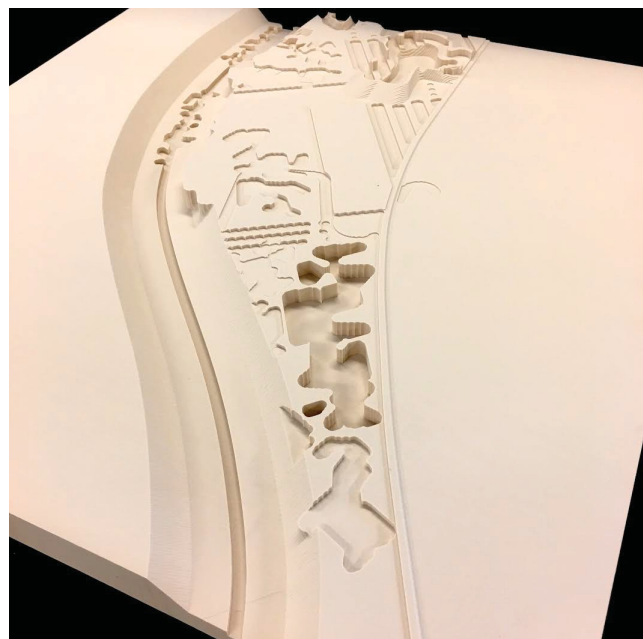
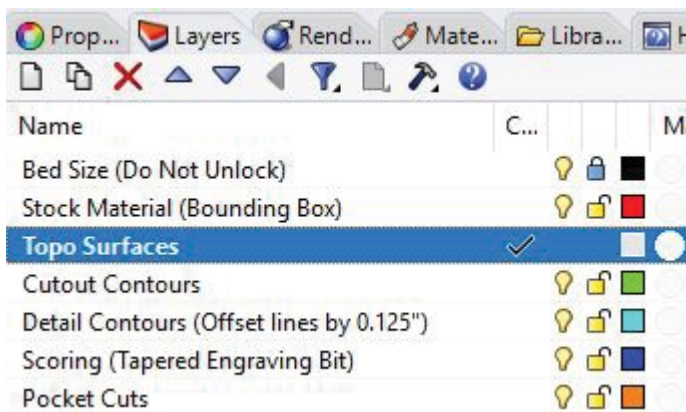
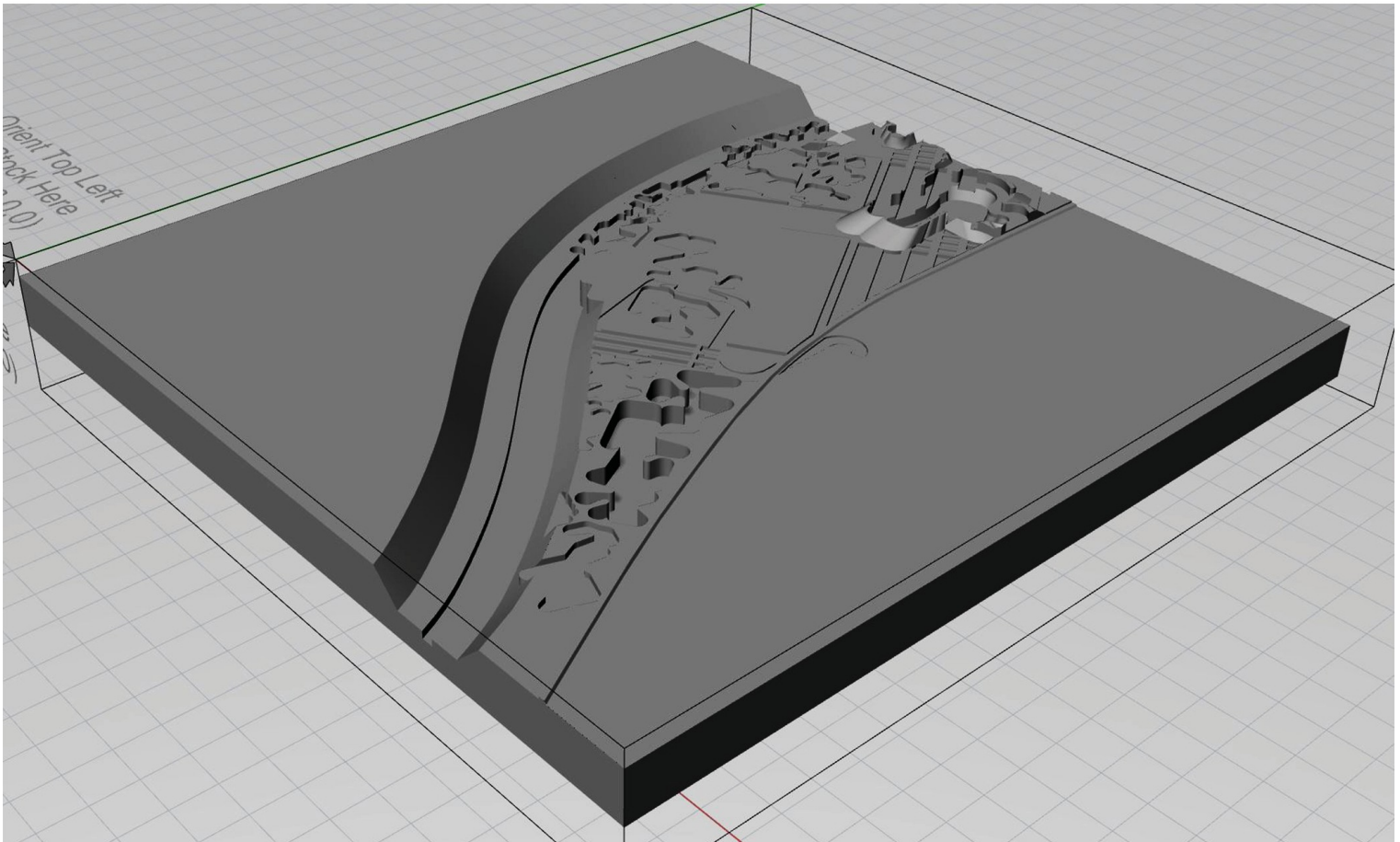
-There are five separate layers for different milling processes: 'Topo Surfaces', 'Cutout Contour', 'Detail Contours', 'Scoring' and 'Pocket Cuts'. Place your design elements in the appropriate layers.



Section 3:

Topo Surfaces Layer:

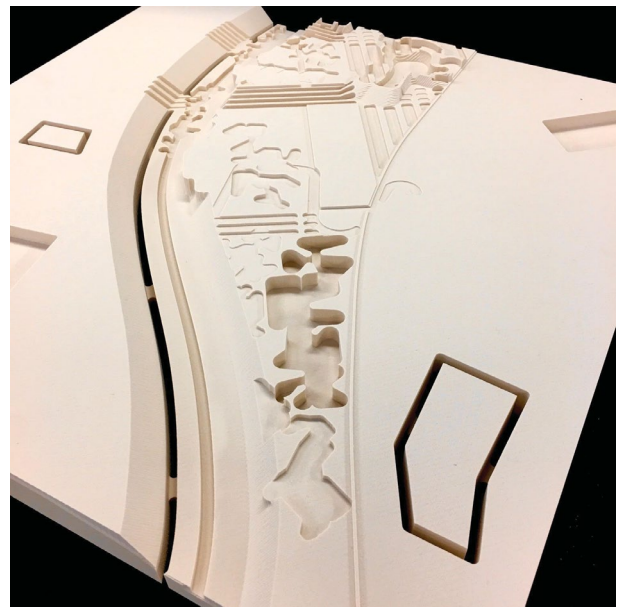
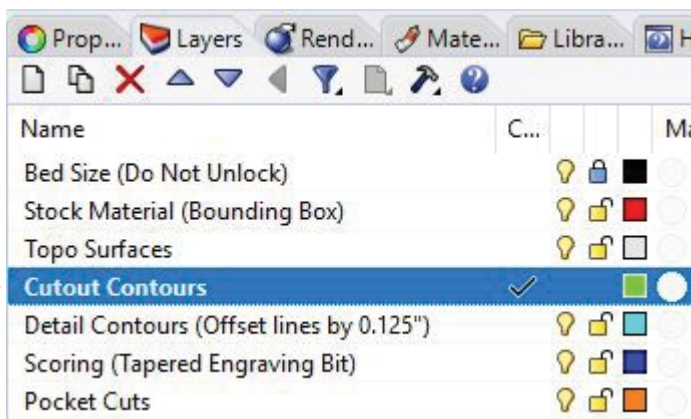
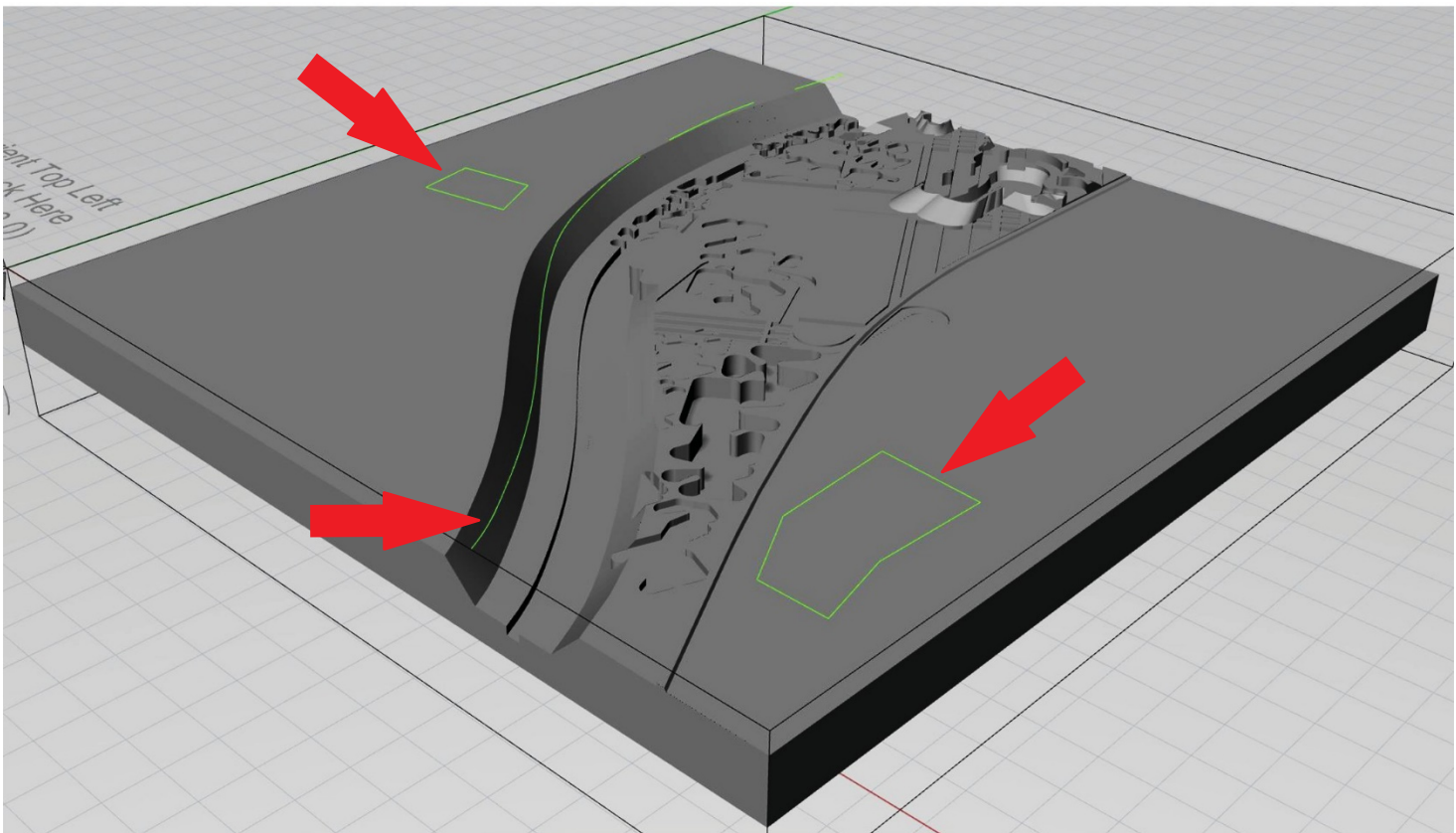
- All topographic NURBS and mesh surfaces are placed in the 'Topo Surfaces' layer.
- Your file size must be reduced to 64MB or less. Please delete all extraneous or unnecessary data from your file.
- Overly complex surface data containing excessive plane or point information will result in processing crashes. Please reduce and streamline this data.



Section 4:

Cutout Contours Layer:

- Polylines that represent cuts that go all the way through the bottom of the material are placed in the 'Cutout Contours' layer.
- Please place all cutout contour polylines at zero in the 'Z' axis for an accurate cut.
- All cutout contours will be programmed with tabs to keep pieces securely in place during milling. Tabs can be manually cut and sanded after milling is complete.
- Tab placement usually requires .75 inches between cutout contour polylines.



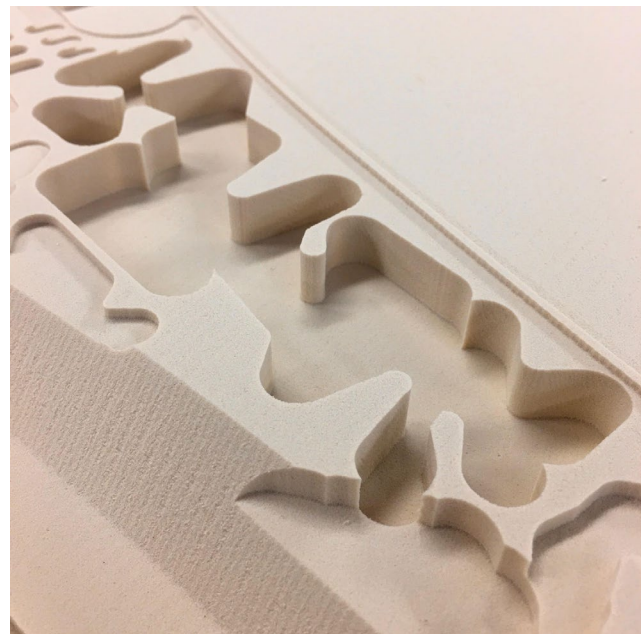
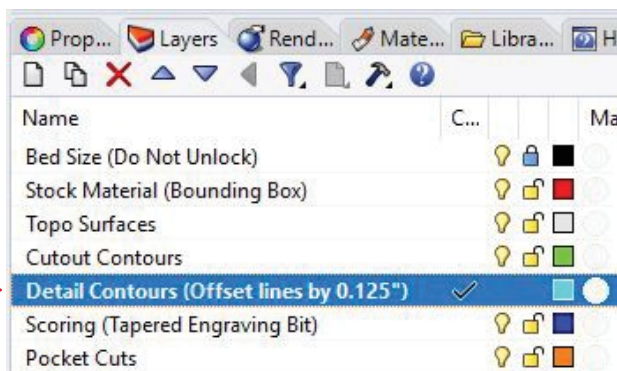
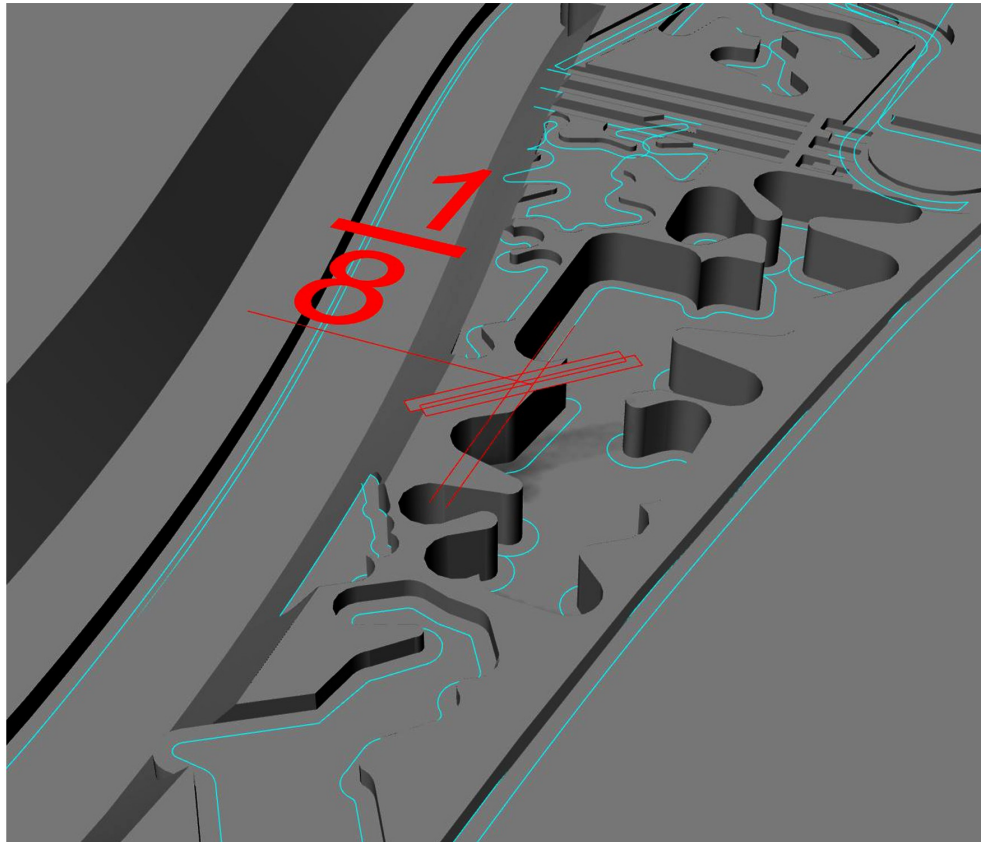
Section 5:

Detail Contours Layer:

-Polylines that define sharp edges or curves are placed in the 'Detail Contours' layer. This will result in a sharper edge or curve than would be possible with topo parallel pass milling.

-Please remember that the mill always cuts at a 90 degree angle, but of course can follow lines that move through three dimensional space.

-Please offset all lines exactly 0.125 inches from the original line location to where the center of the milling bit should travel {see pic below}.



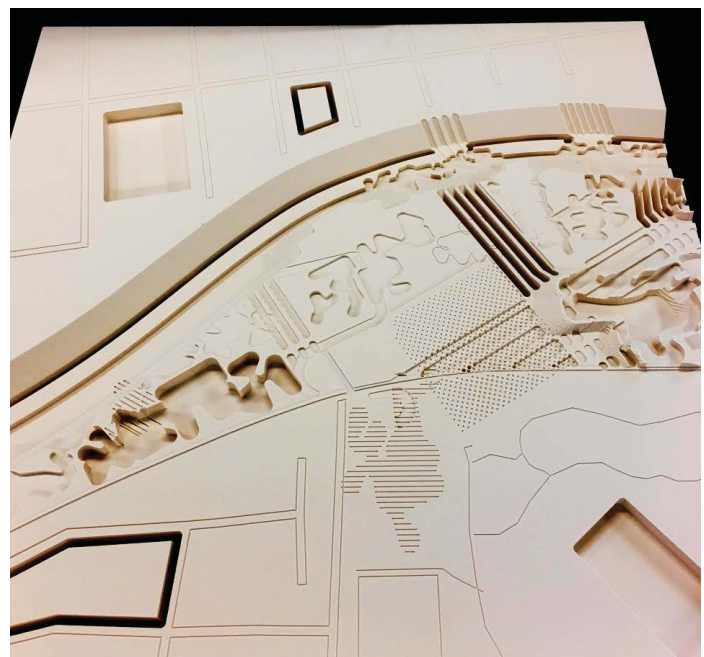
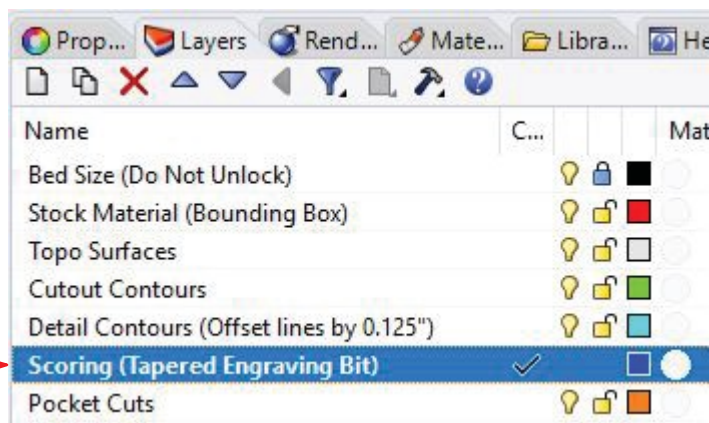
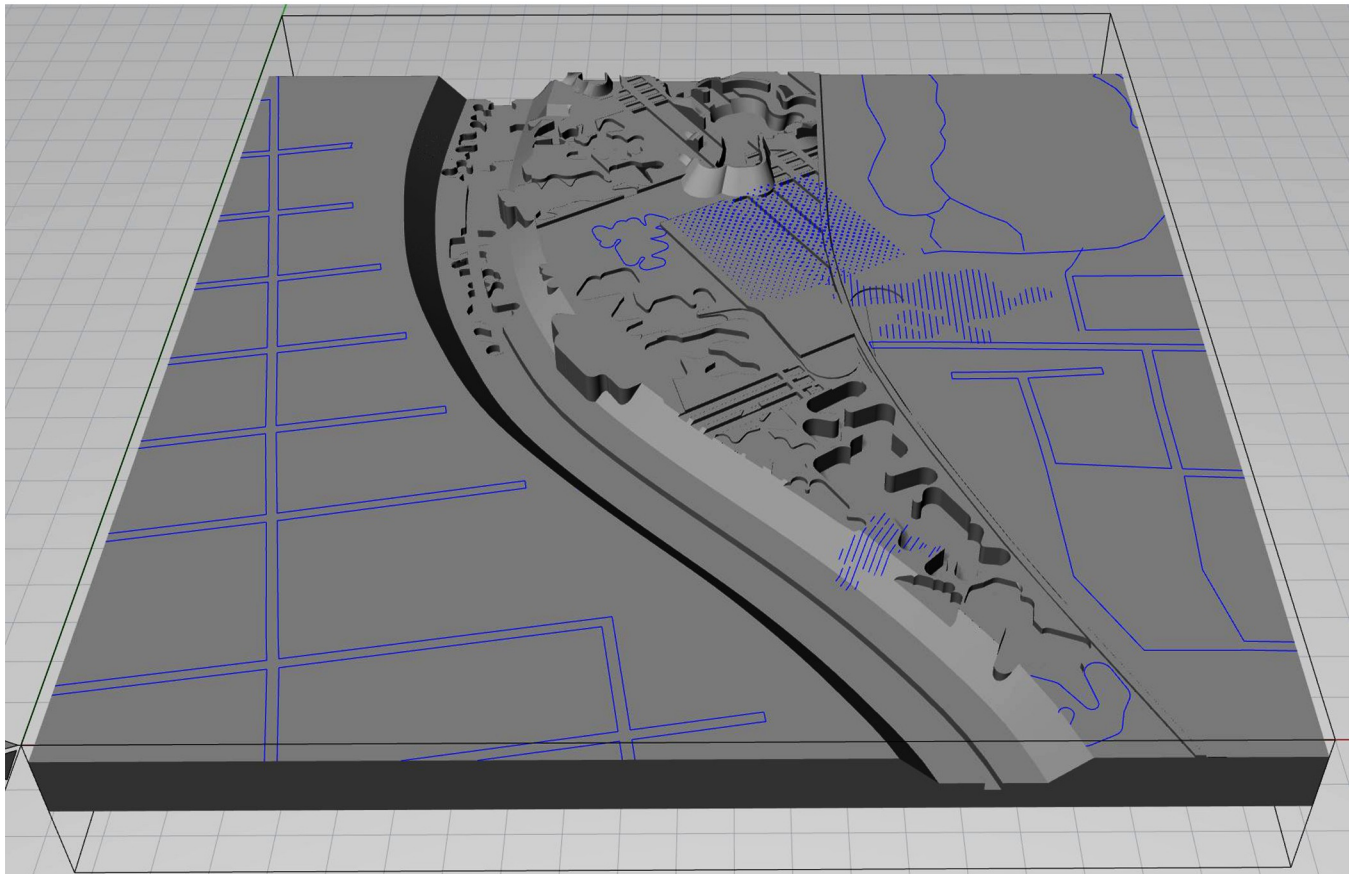
Section 6:

Scoring Layer:

-Polylines that represent light surface marks on stock material are placed on the 'Scoring' layer.

-Draw the polylines on the surface of your design, not at zero in the 'Z' axis. The lines should be at least 0.06 inches apart from each other to avoid overlapping.

-The scoring bits at the Fab Lab are for machinebale foam only. If you want to score wood, you must provide your own bit.



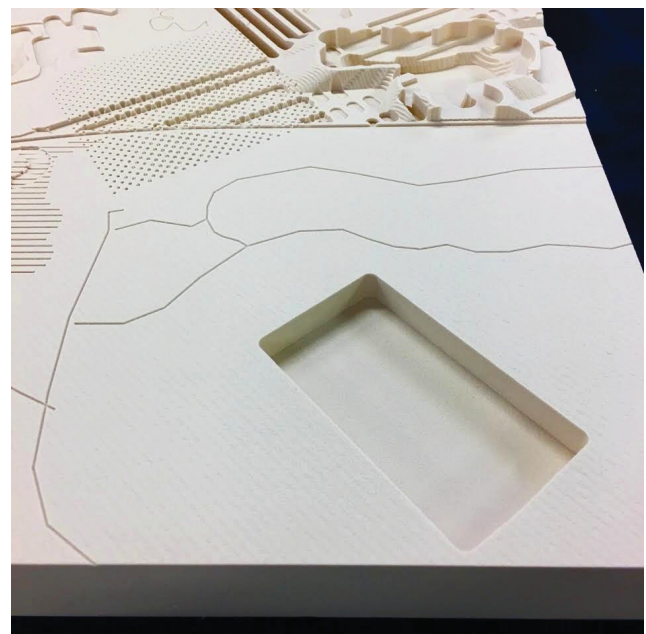
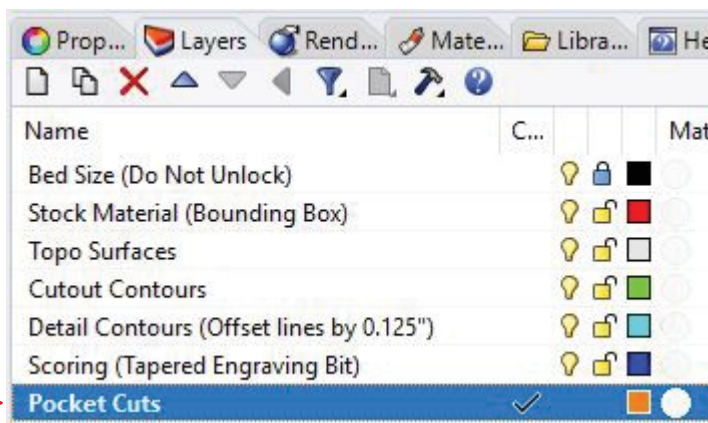
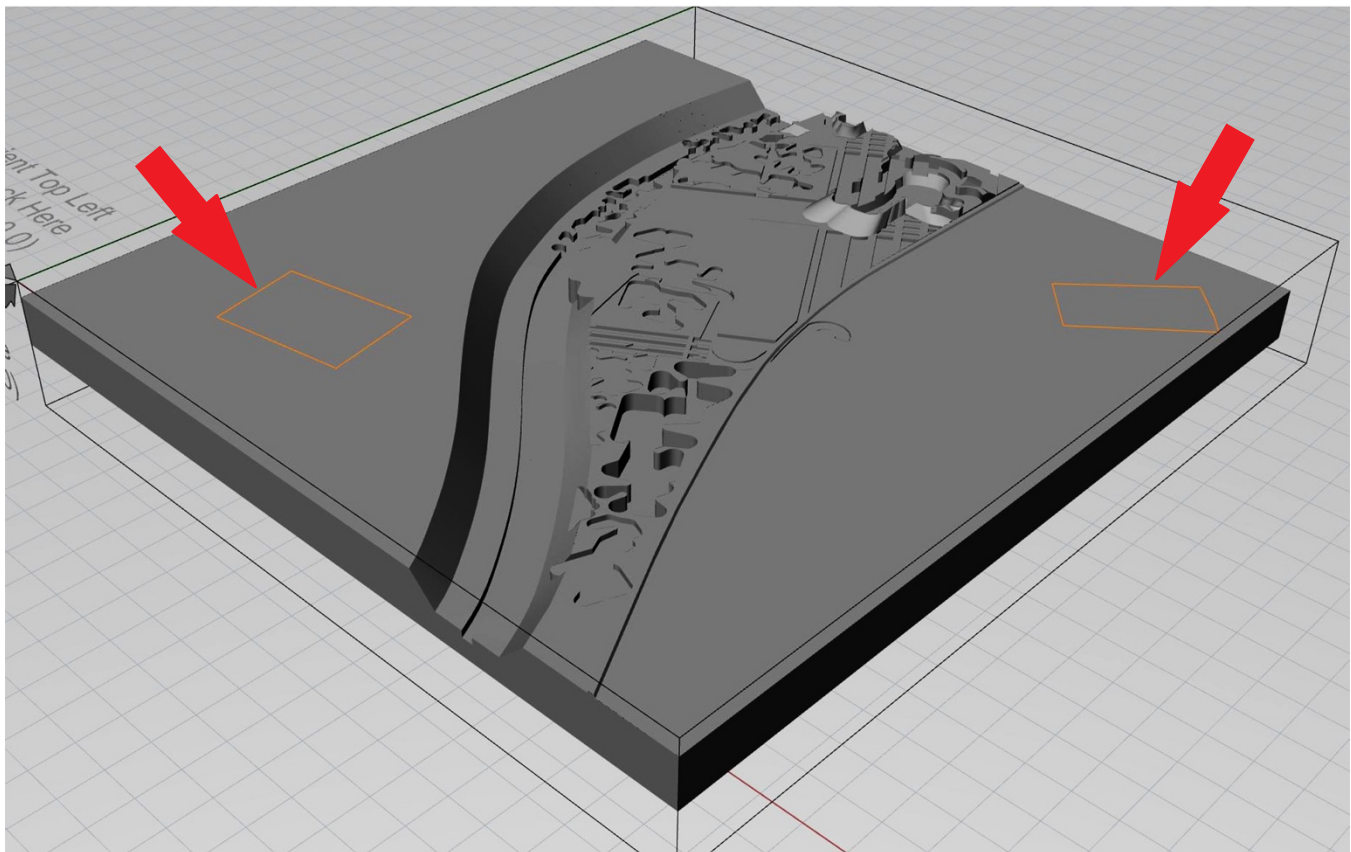
Section 7:

Pocket Cuts Layer:

-Pocket cut milling is an efficient way to remove material within a closed area to an exact depth.

-Pocket cuts will result in a sharper edge or curve than would be possible with top parallel pass milling.

-Specify the area by drawing a closed polyline on the surface of the model. Make sure you notify the lab technician of the depth of each pocket cut.



Section 8:

Two-Sided Milling:

-Two-sided milling can render complex standalone objects out of foam or wood by milling one side of the material, flipping it over and milling the other side.

-The object needs to 'float' in the middle of the stock material in your design.

-Two-sided milling objects must have a 1" border of stock material on all four sides.

-Please insert three dimensional block tabs between the object and the 1 inch border to secure the object.

-Make sure your defined stock bounding box (with 1 inch border) is the *exact* same size as your actual material. This will determine the accuracy of the alignment between the two sides.

