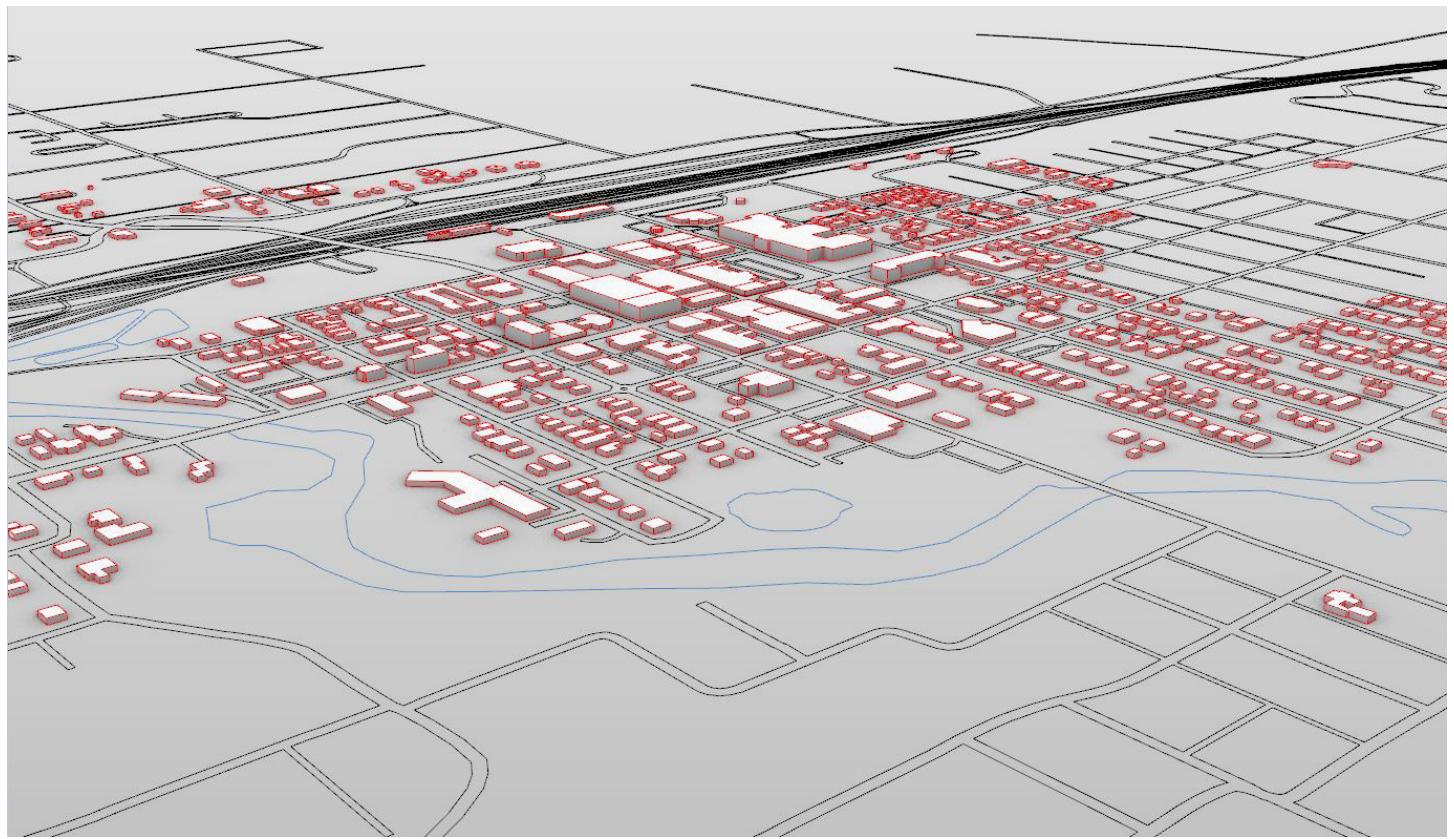


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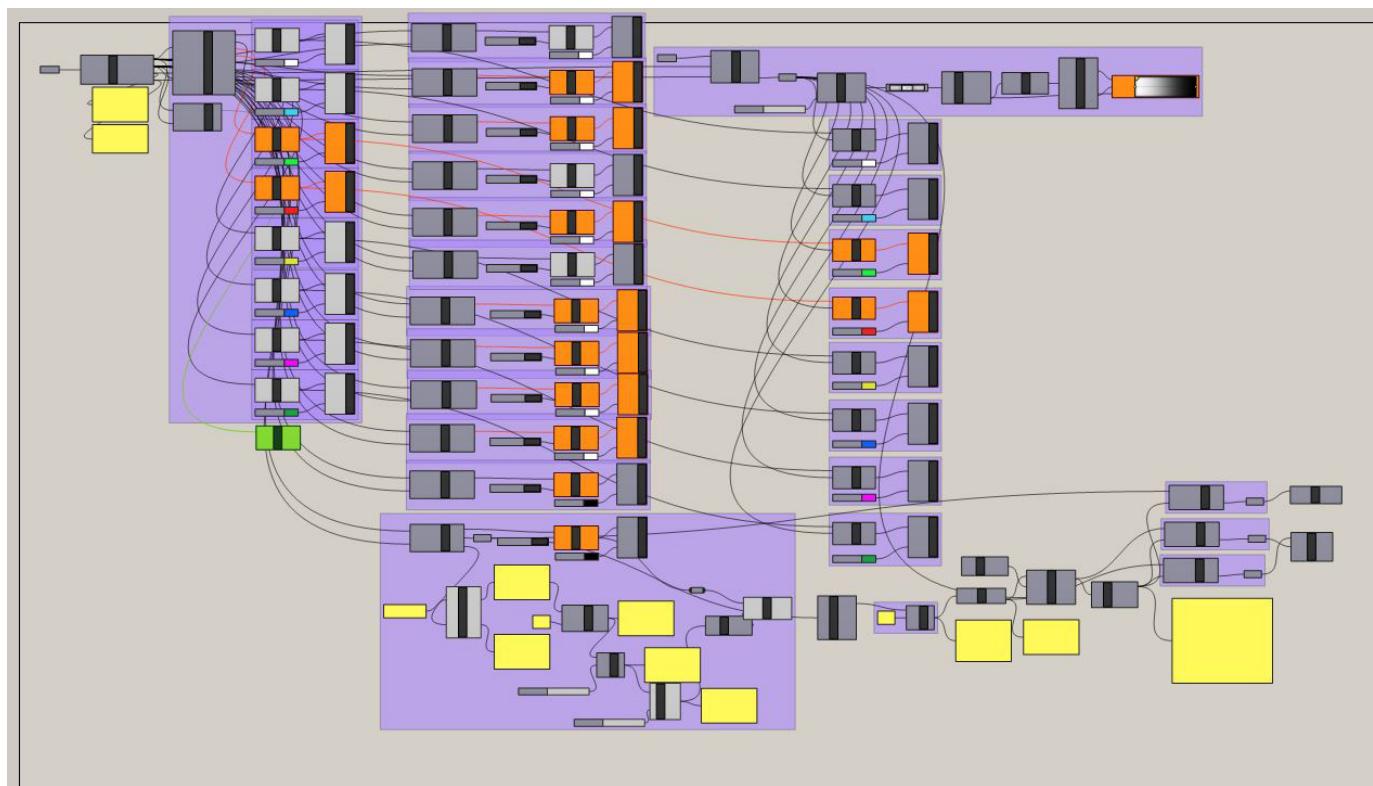
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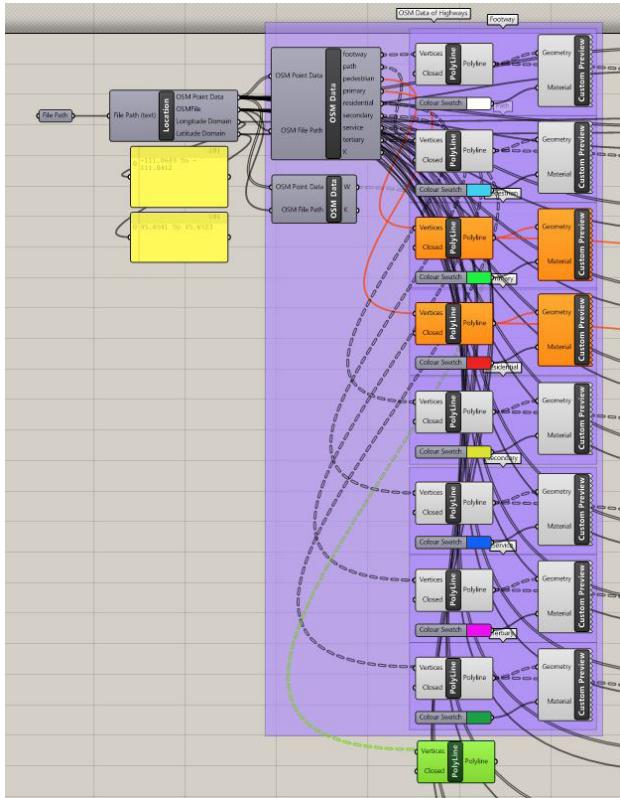
Site Plan from Grasshopper Script



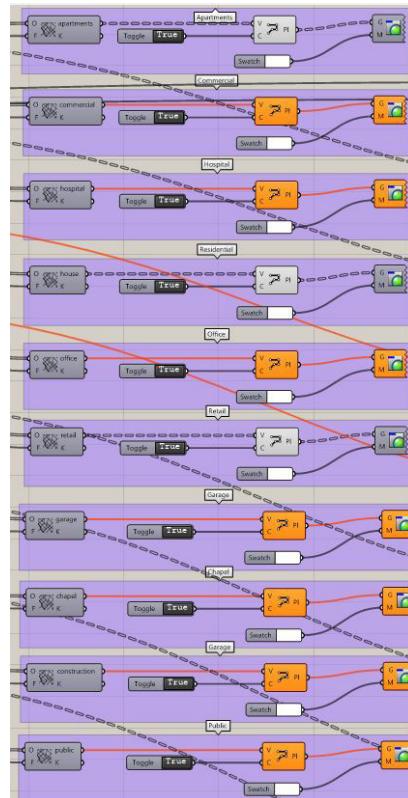
Grasshopper Script: Elk Site Plan



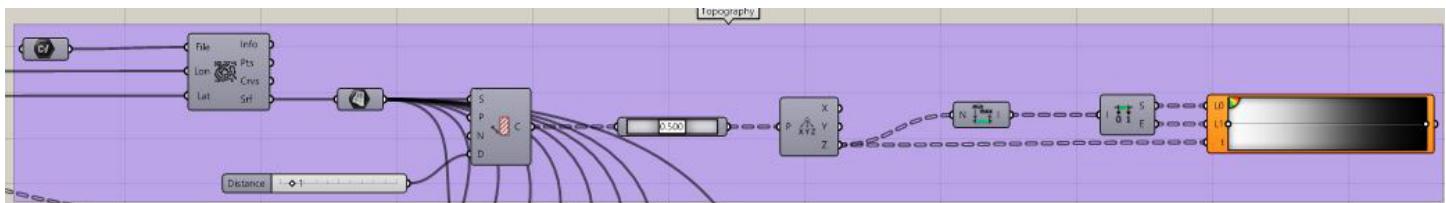
Grasshopper Script: Elk (Roads and Pathways)



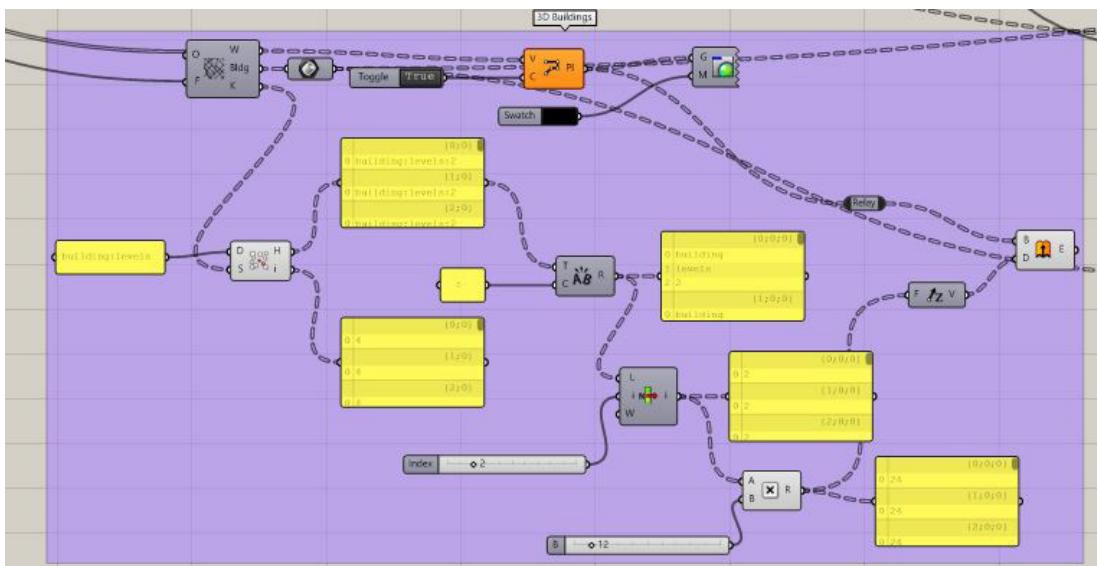
Grasshopper Script: Elk (Building Footprints)



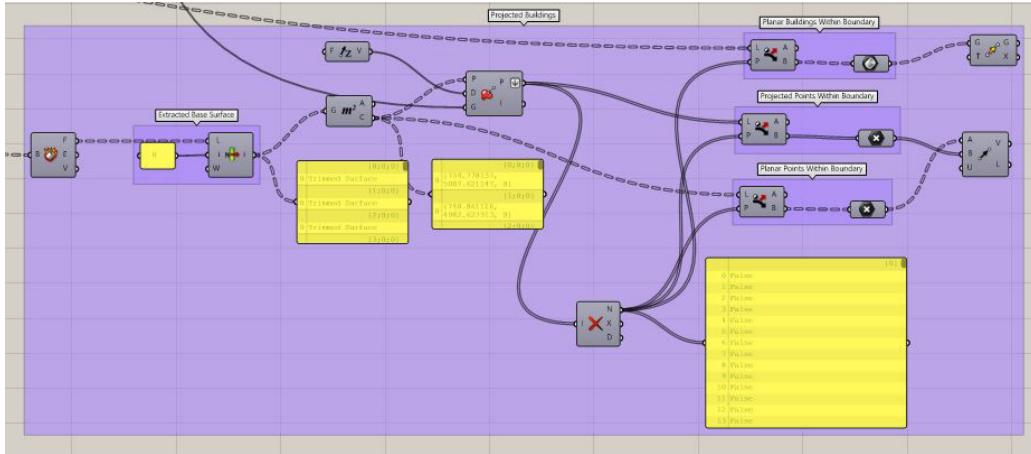
Grasshopper Script: Elk (Topography)



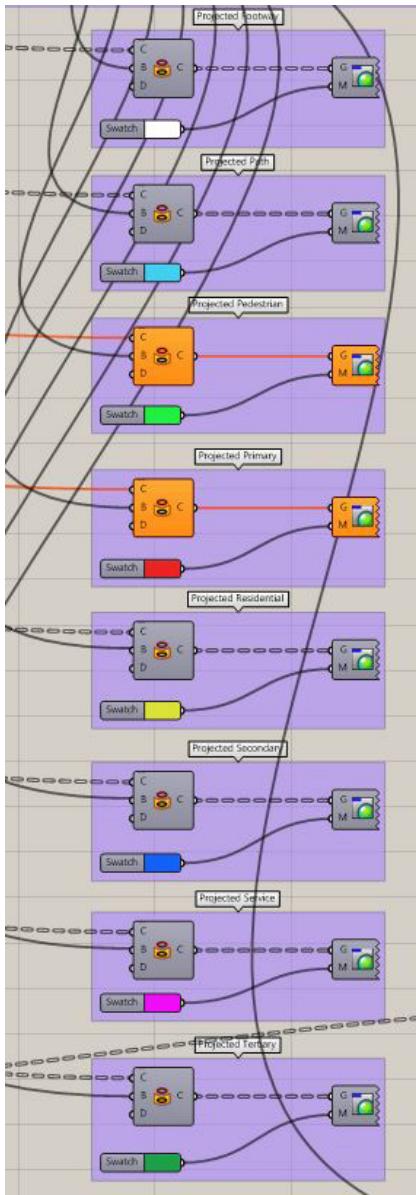
Grasshopper Script: Elk (3D Building Extrusion)



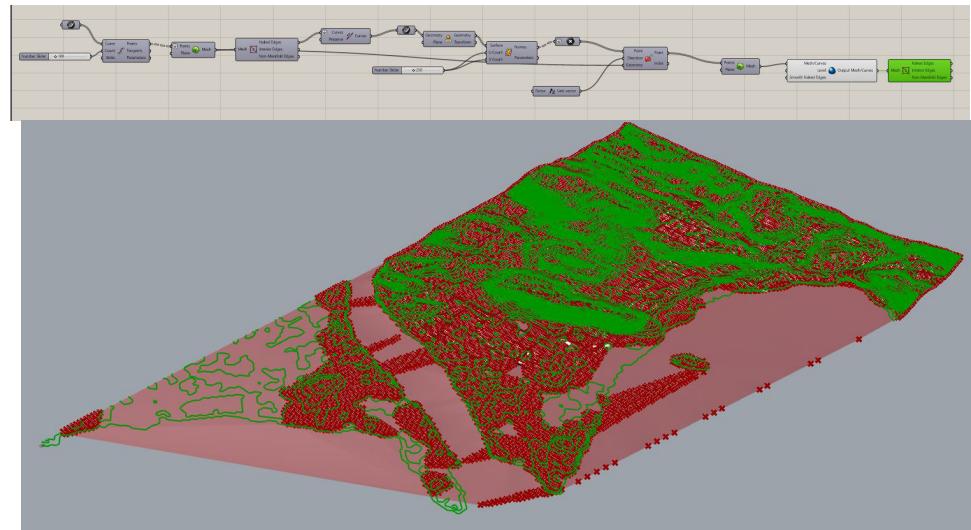
Grasshopper Script: Elk (Projected Buildings to Toposurface)



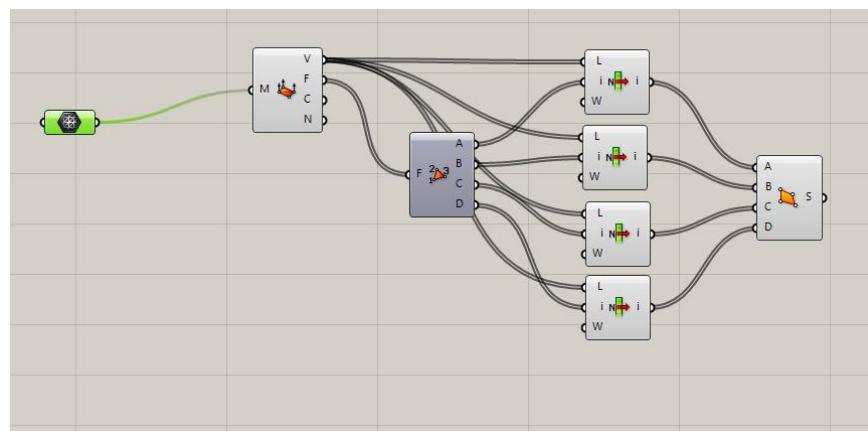
Grasshopper Script: Elk (Projected Roads to Toposurface)



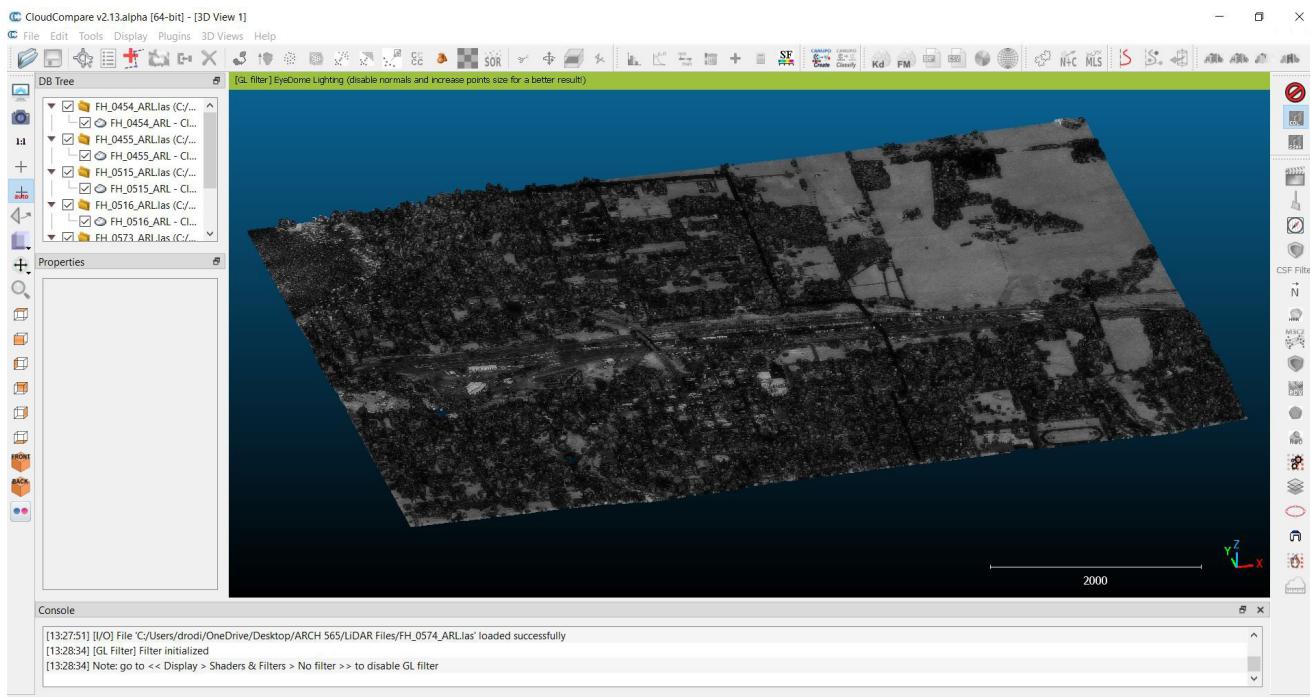
Grasshopper Script: Contours to Site Mesh



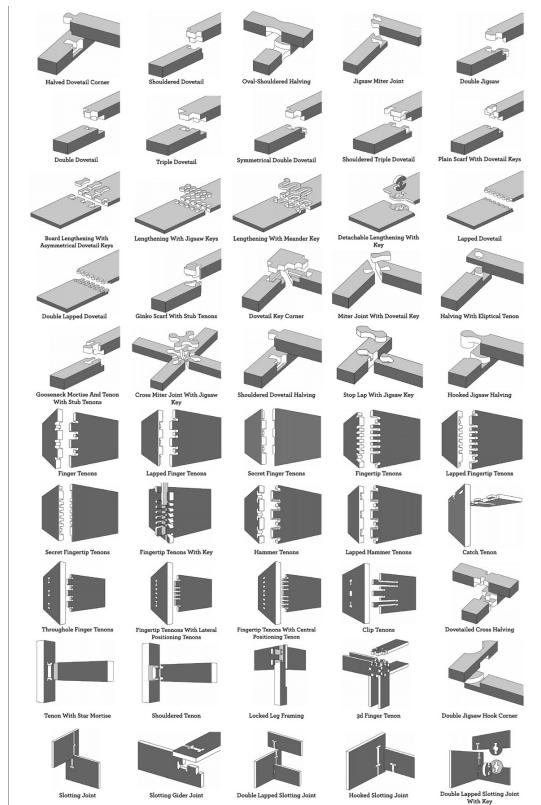
Grasshopper Script: Mesh to Surface



CloudCompare: Whitefish Site for Thesis



Examples of Different Joints for Thesis Project

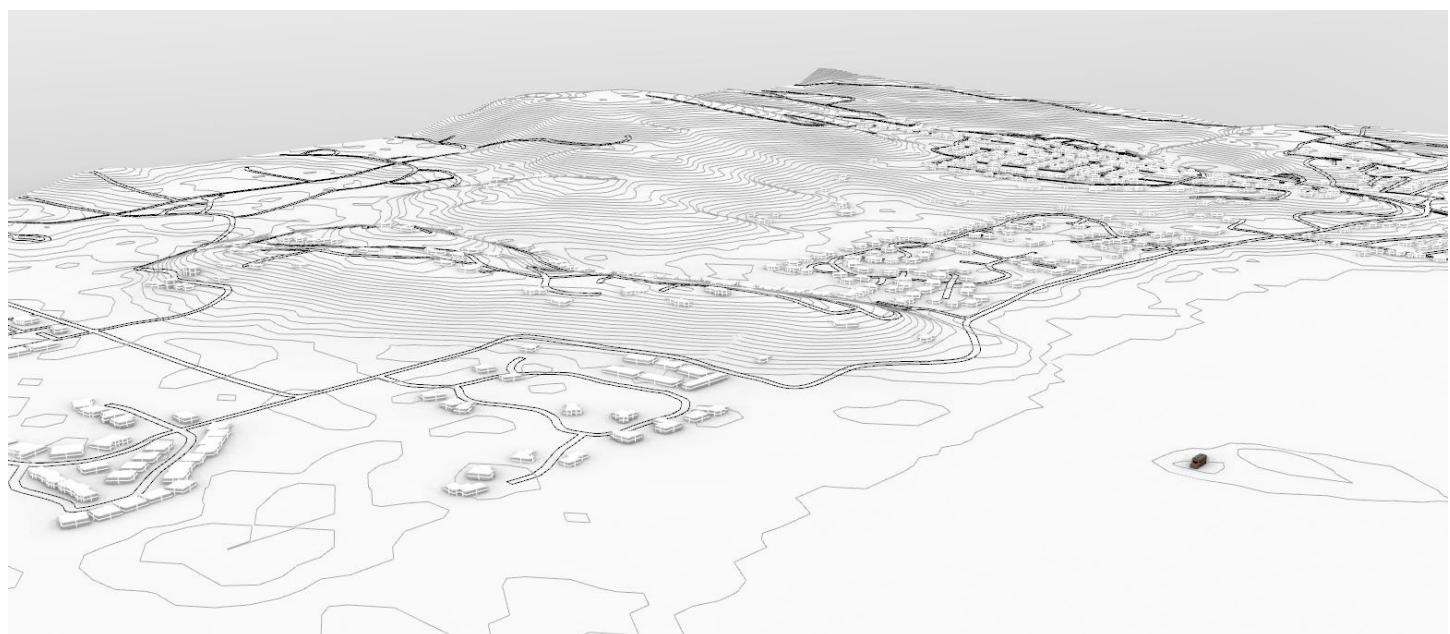
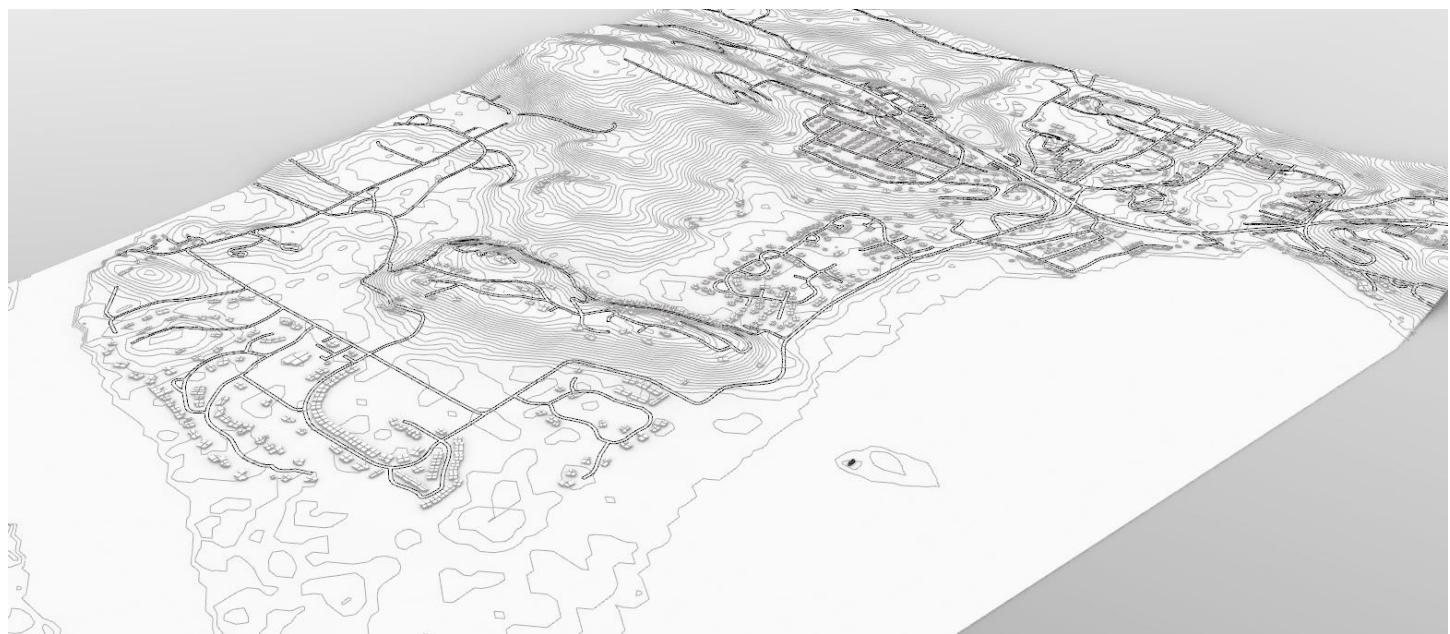


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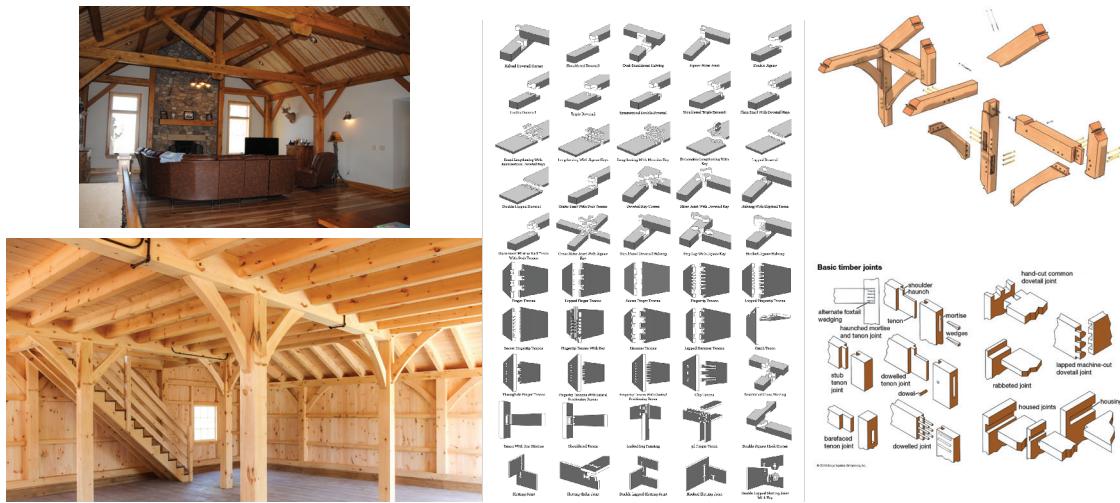
Site Model for ARCH 528 Project: (Contours to Surface Scripts and Elk Script)



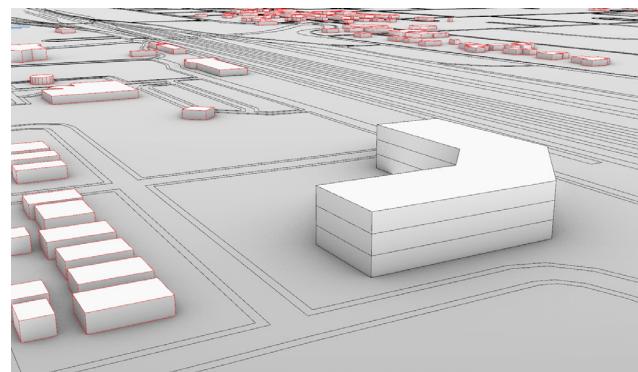
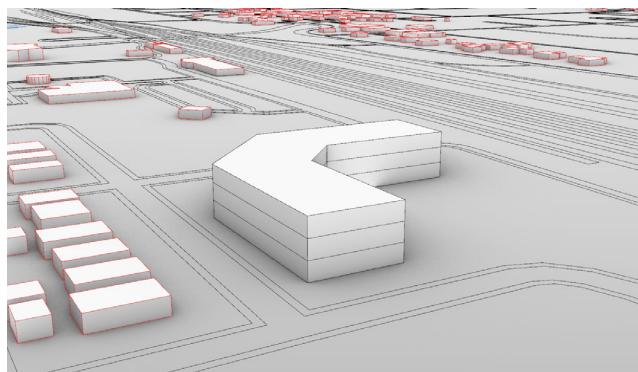
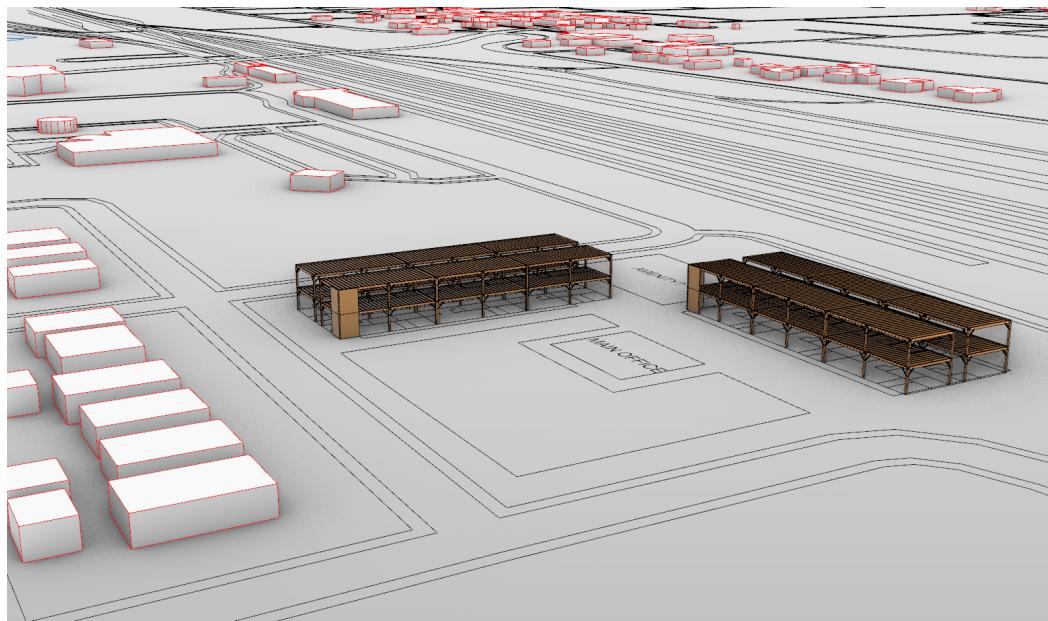
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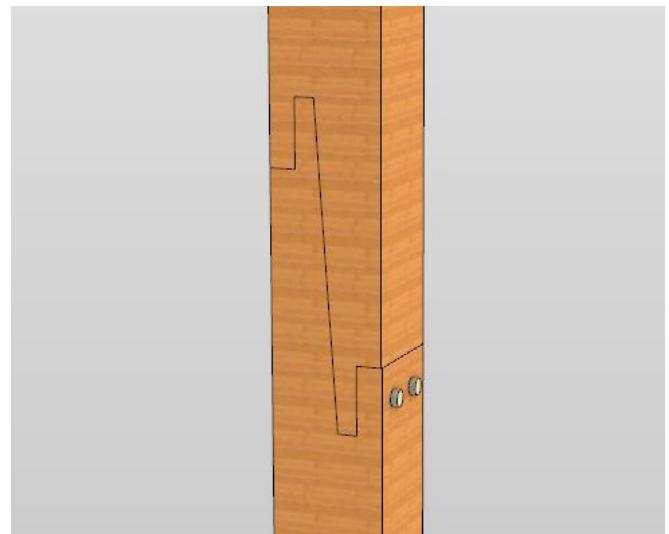
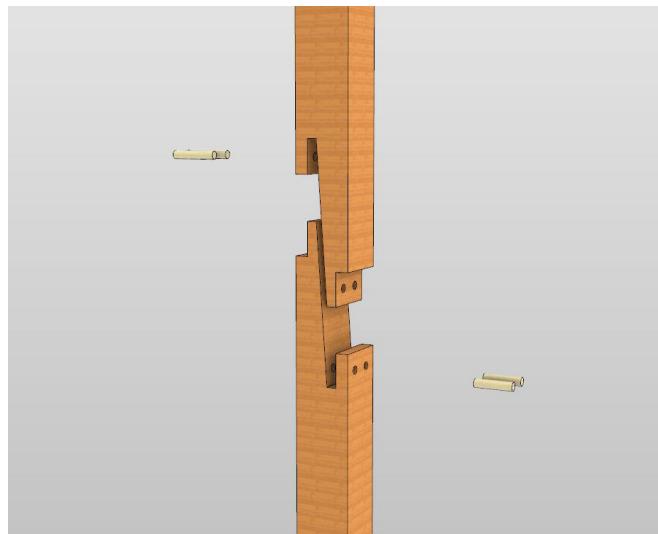
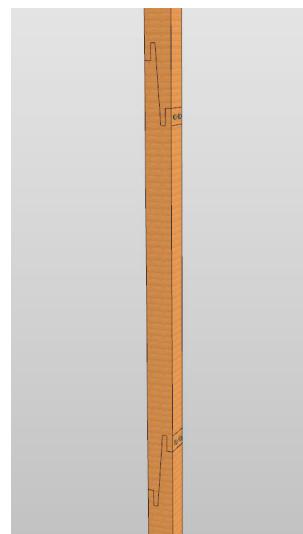
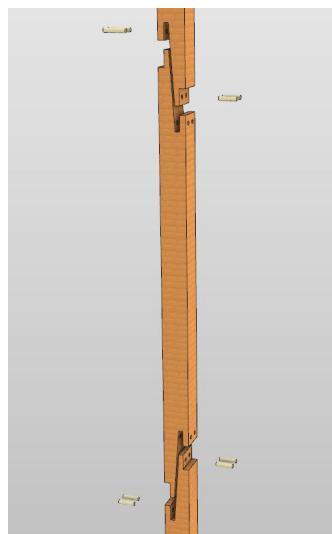
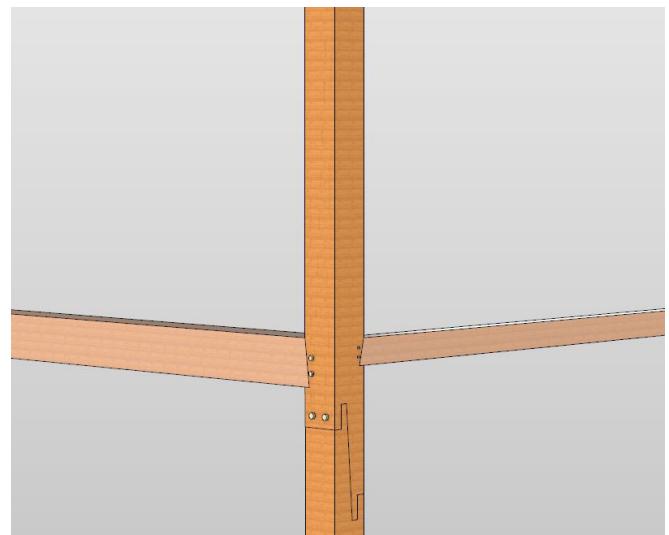
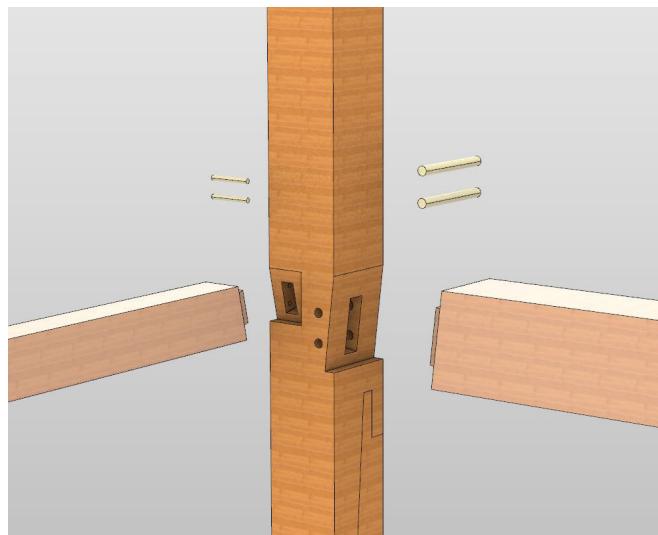
Sample Joint Research and Studies

Precedent Analysis

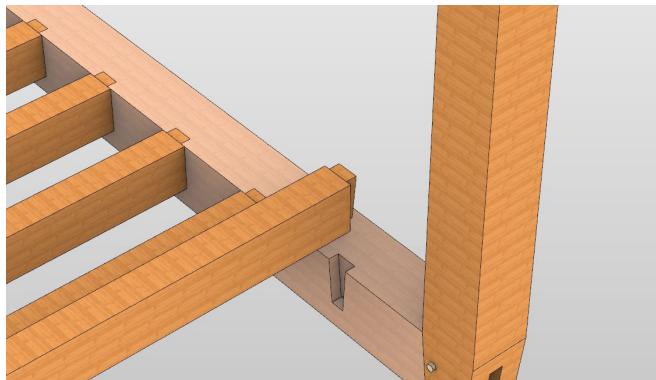
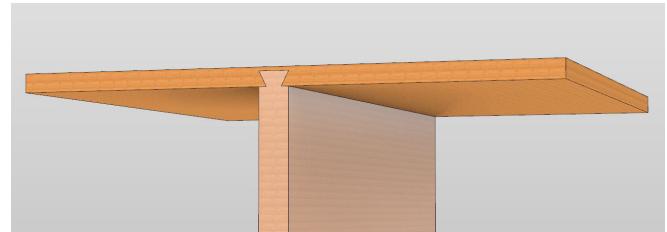
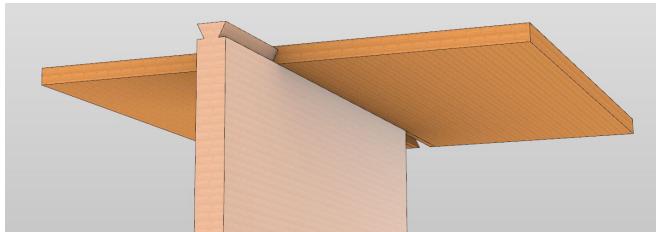
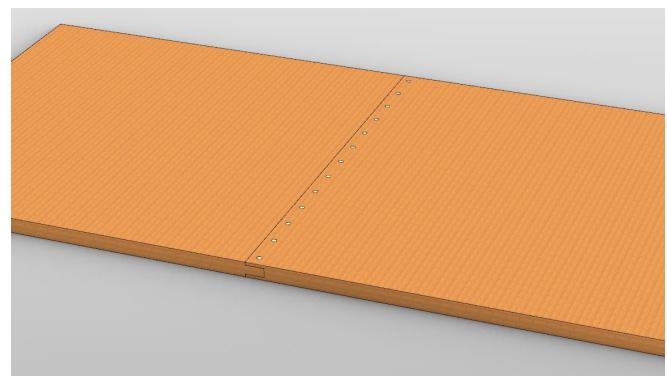
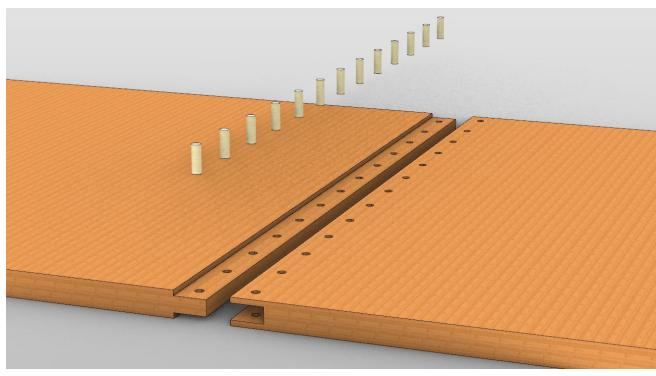
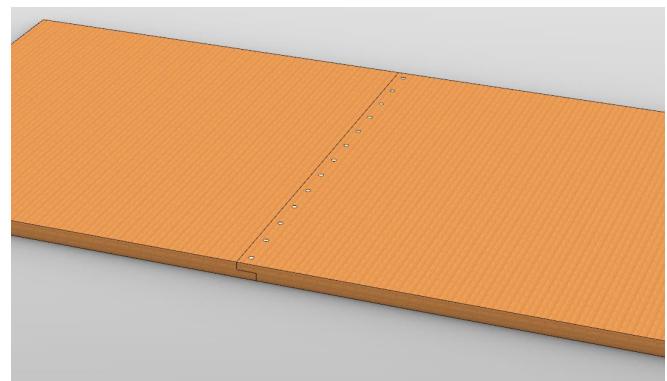
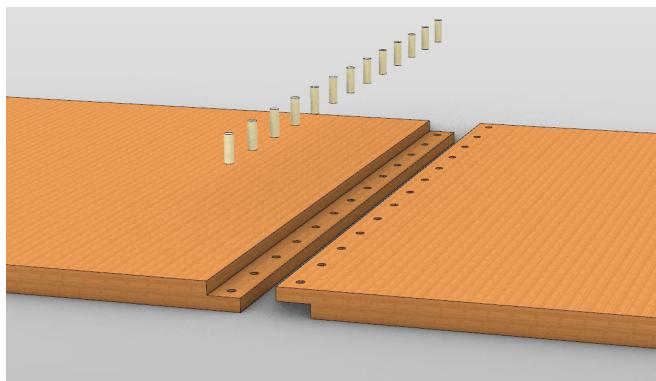


Preliminary Structural Analysis/Massing Models





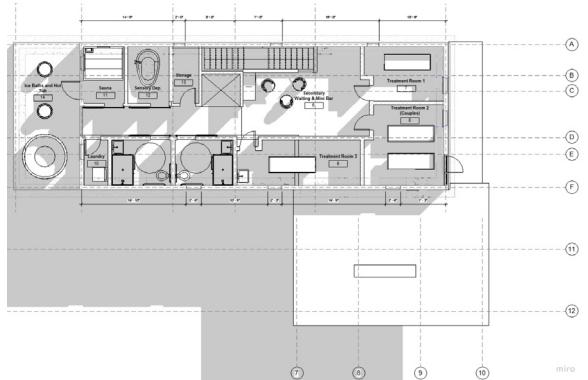
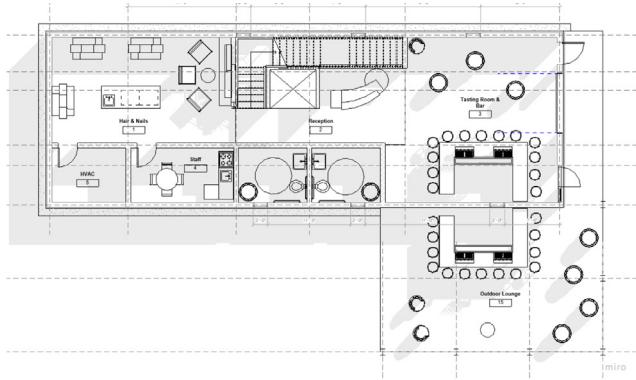
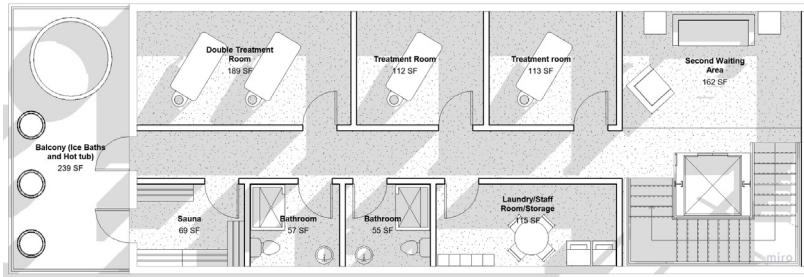
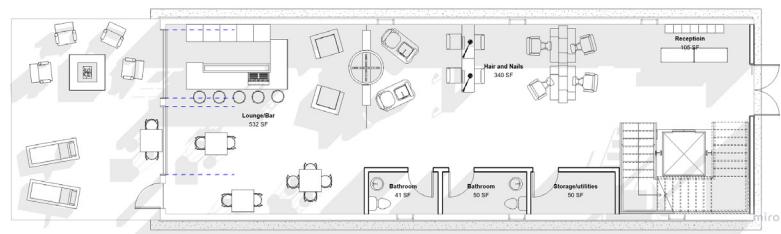
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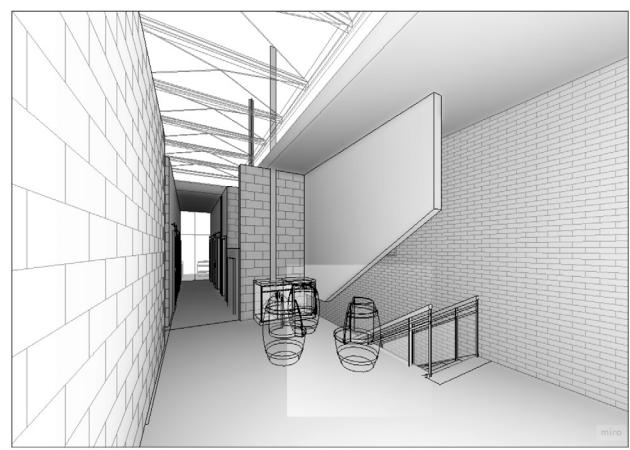
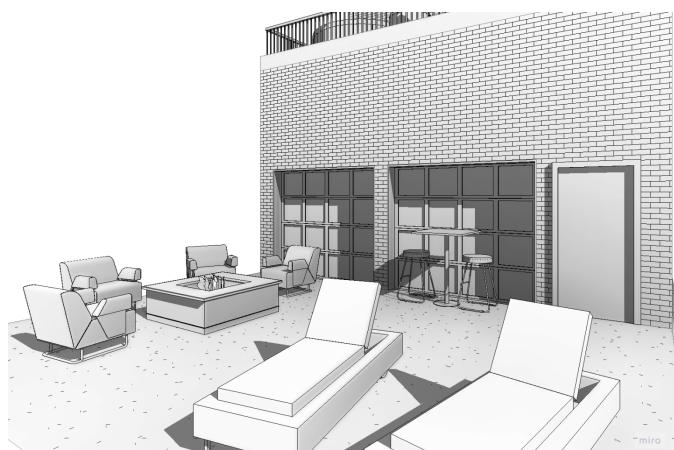
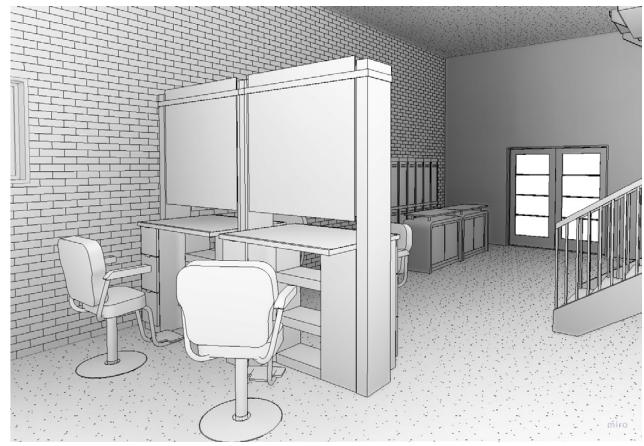
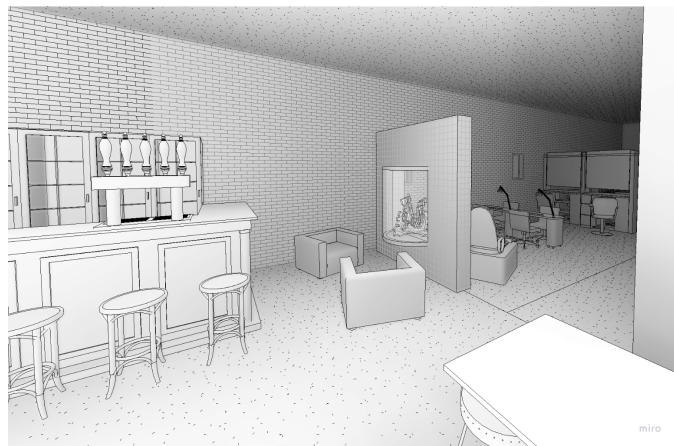
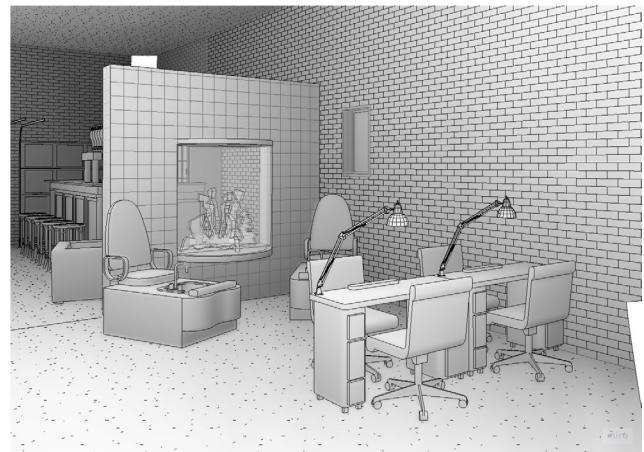
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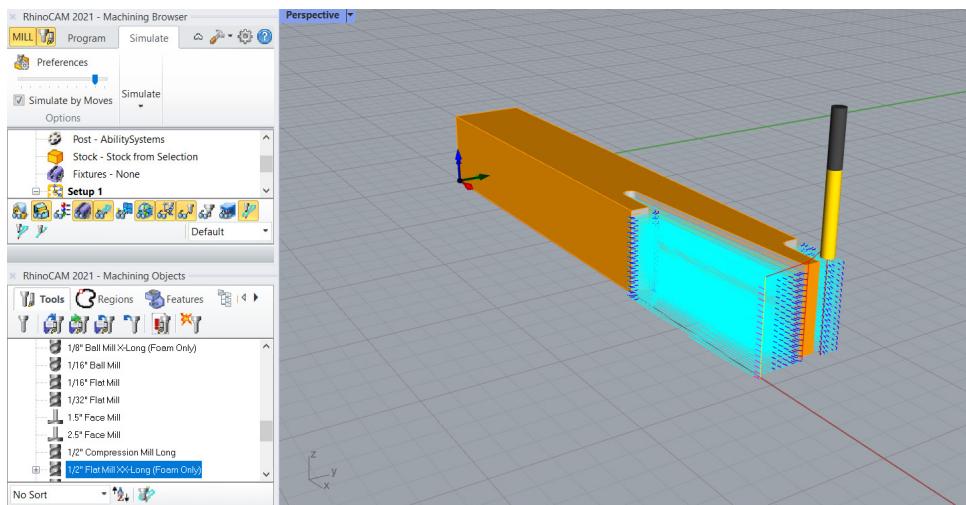
PHASE 2: SCHEMATIC DESIGN
DAVIDSON | RODICH | DALVIT



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Scarf Joint Horizontal Roughing Tool Path

CNC Mill Work

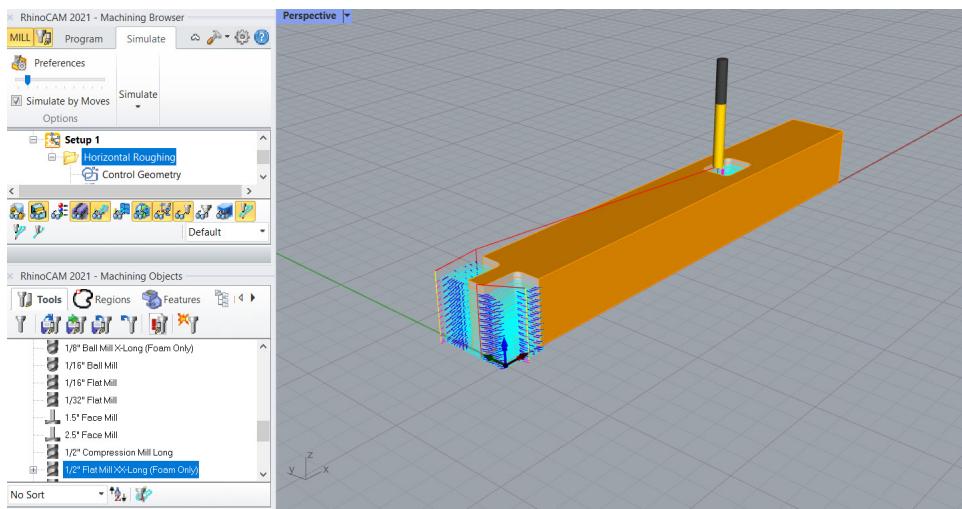


Final Product

Connection Detail showing Joint and Dowel Connection



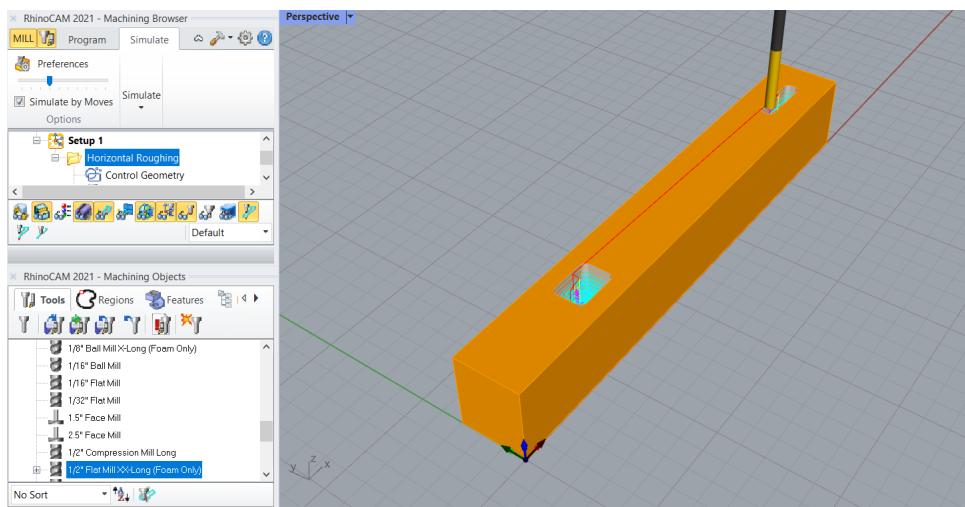
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Mortise and Tenon Elbow
Joint Column Tool Path

Will have images of Final Product once cut

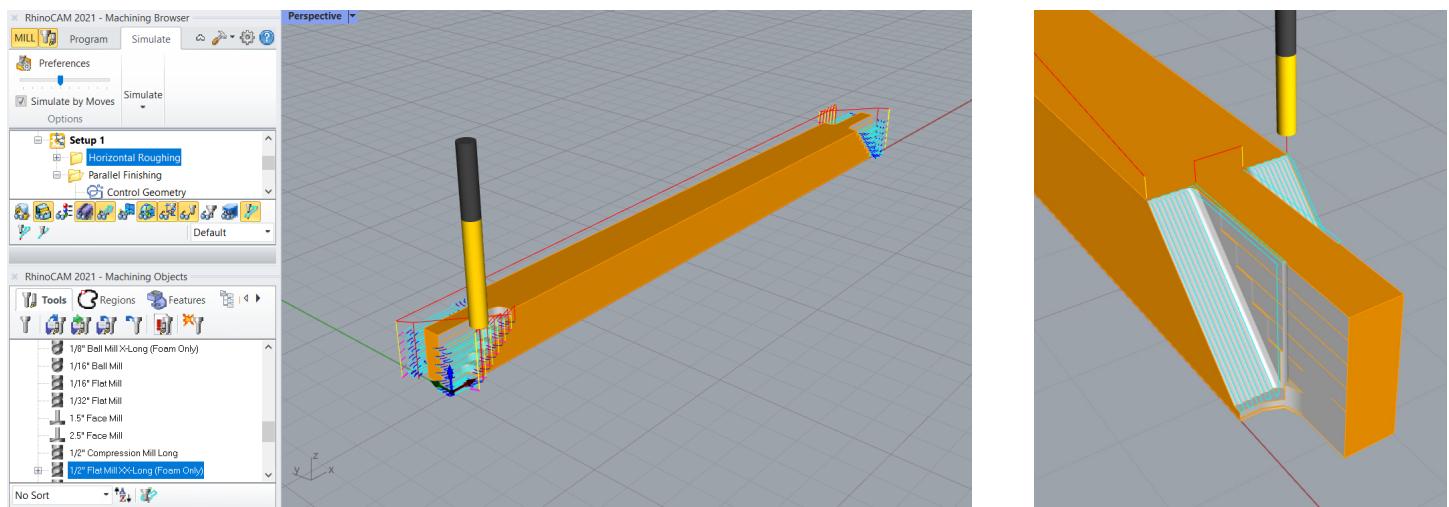
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Mortise and Tenon Elbow Joint Beam Tool Path

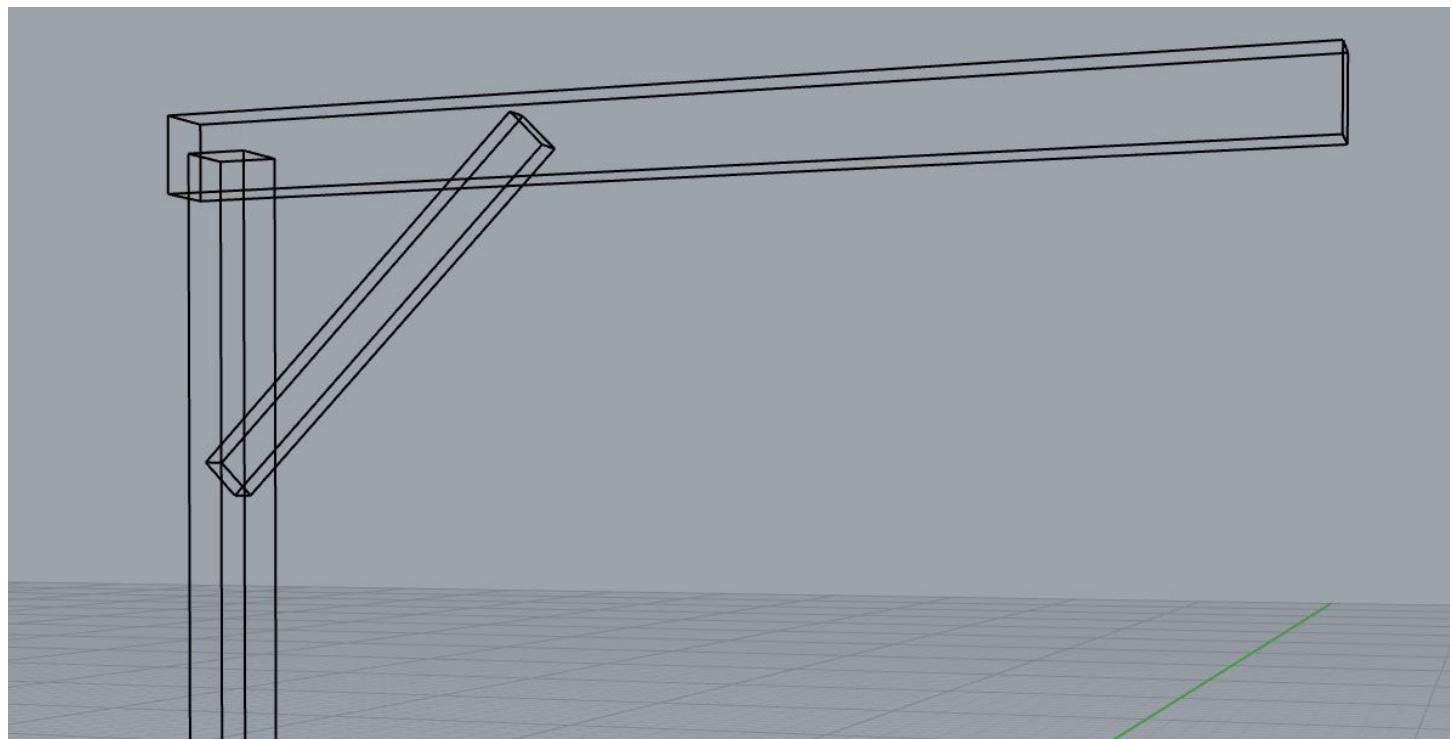
Will have images of Final Product once cut

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Mortise and Tenon Elbow Joint 45 Degree Bracket Tool Path

Will have images of Final Product once cut

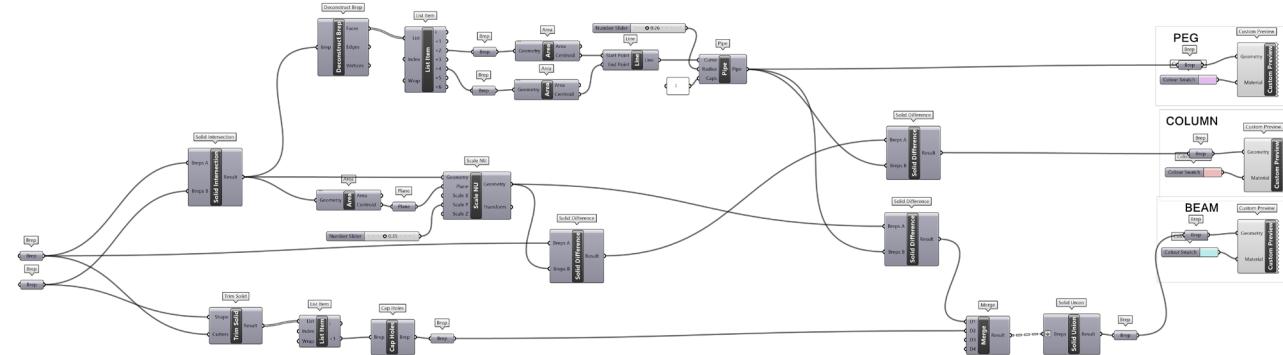


The problem I started with was how to create an elbow joint using wood dowel connections. This is the starting form I was going off of which informed the rest of the design.

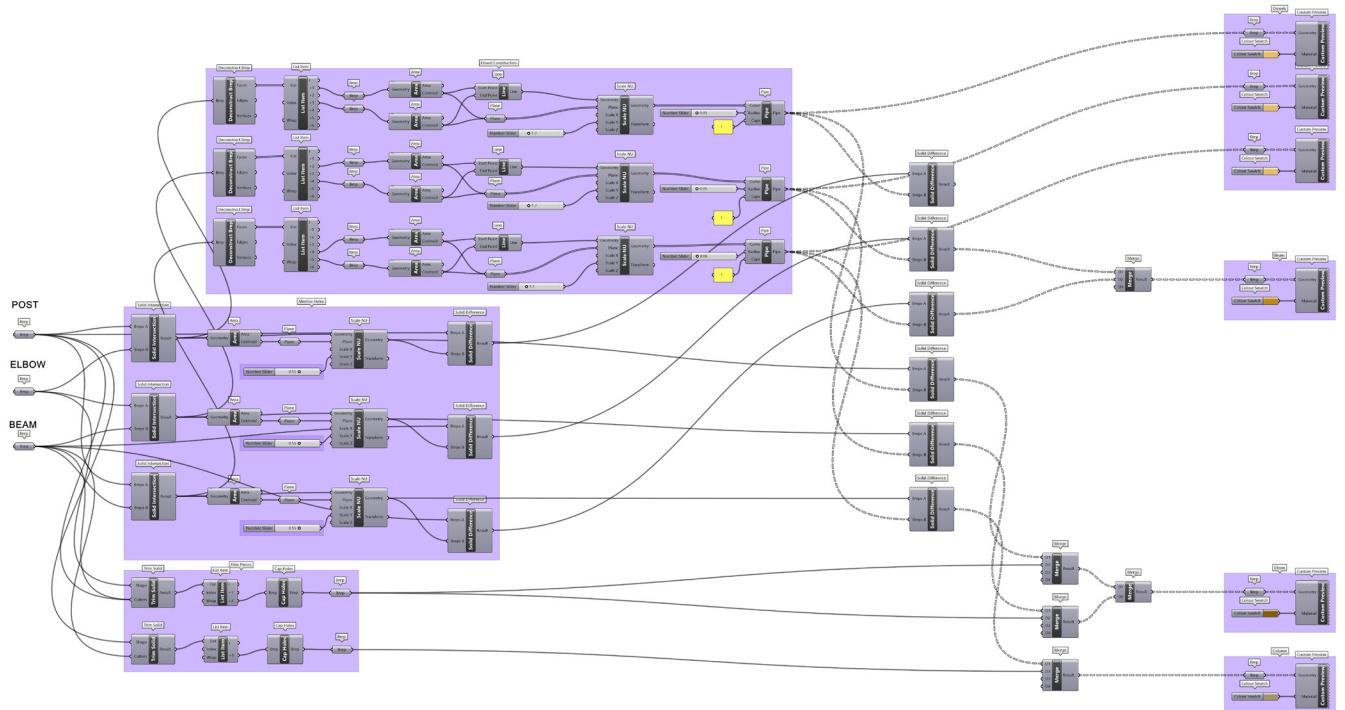


This was the final solution created by the grasshopper script to the right.

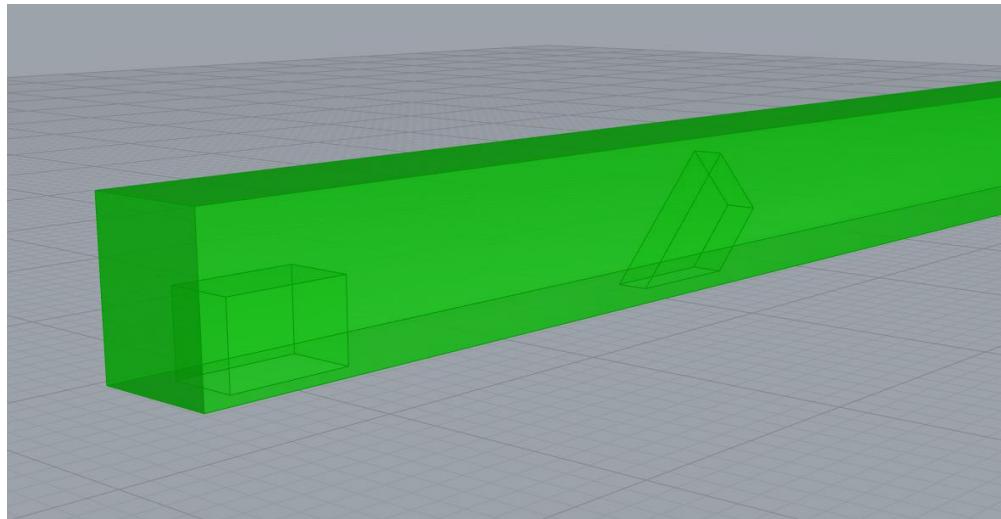
Tennor And Mortice



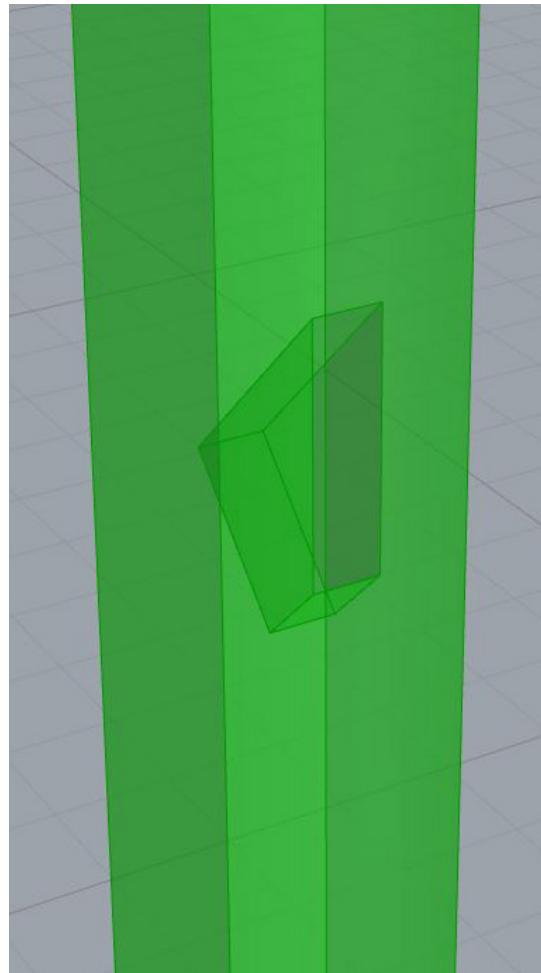
This was the starting grasshopper script from which I created my own out of. This script was more basic than what I needed and only created a mortise and tenon joint for one connection.



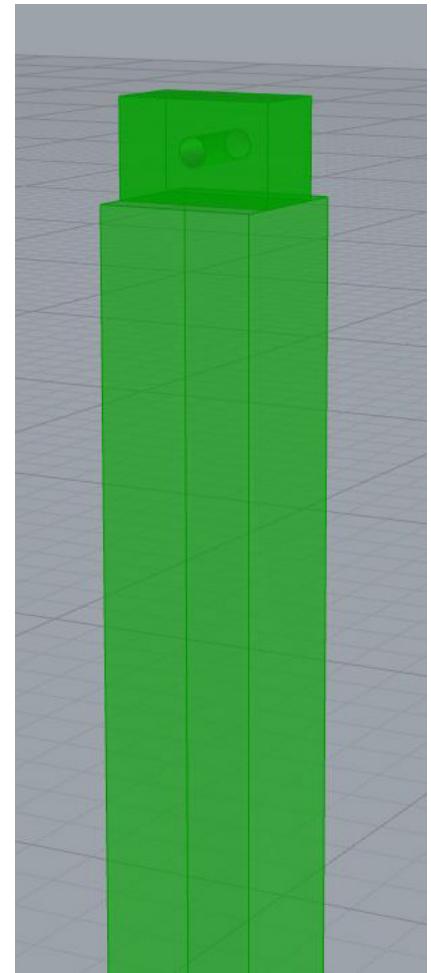
This was the final script I created from the original above. Rather than only using one connection, three connections are made while also extruding the dowels out from the edge conditions and incorporating the elbow joint to the beam.



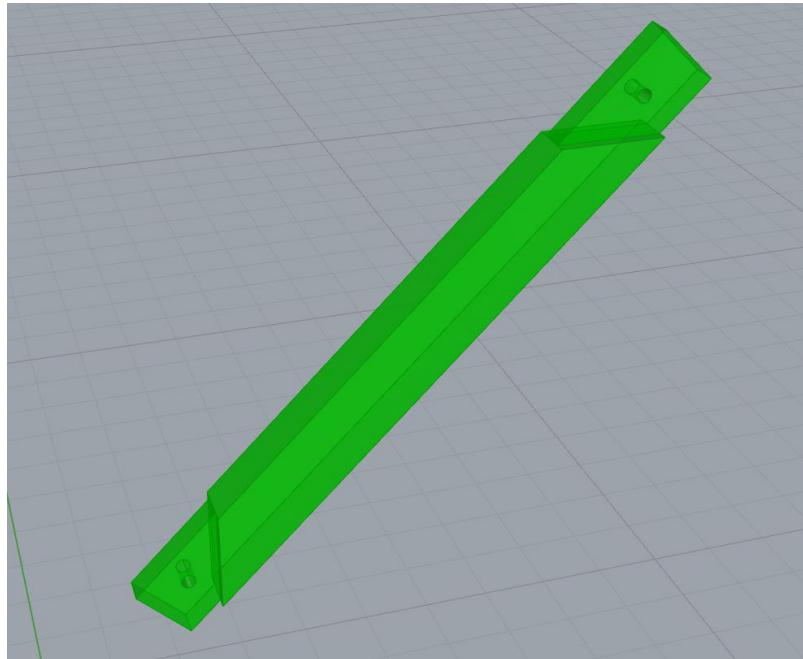
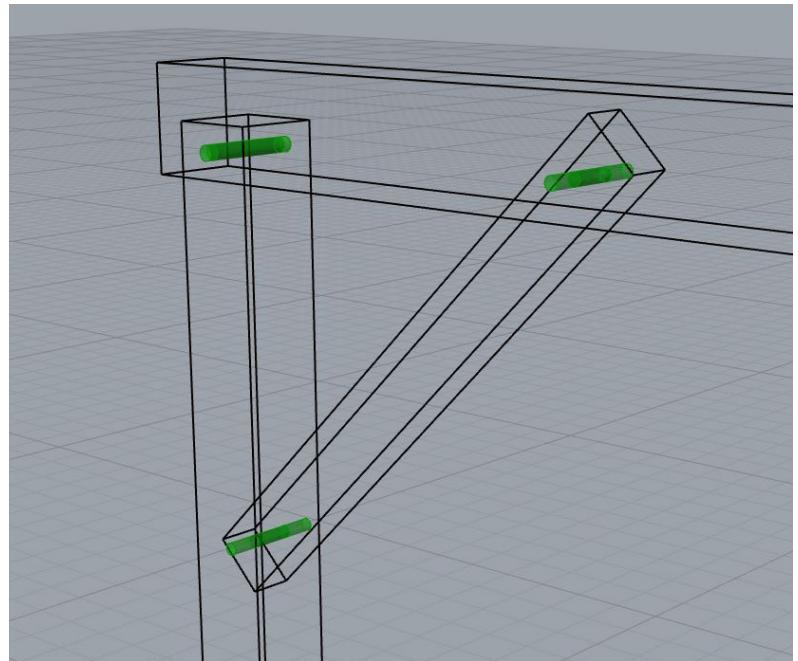
Detail image of beam with both mortise joints from post and elbow



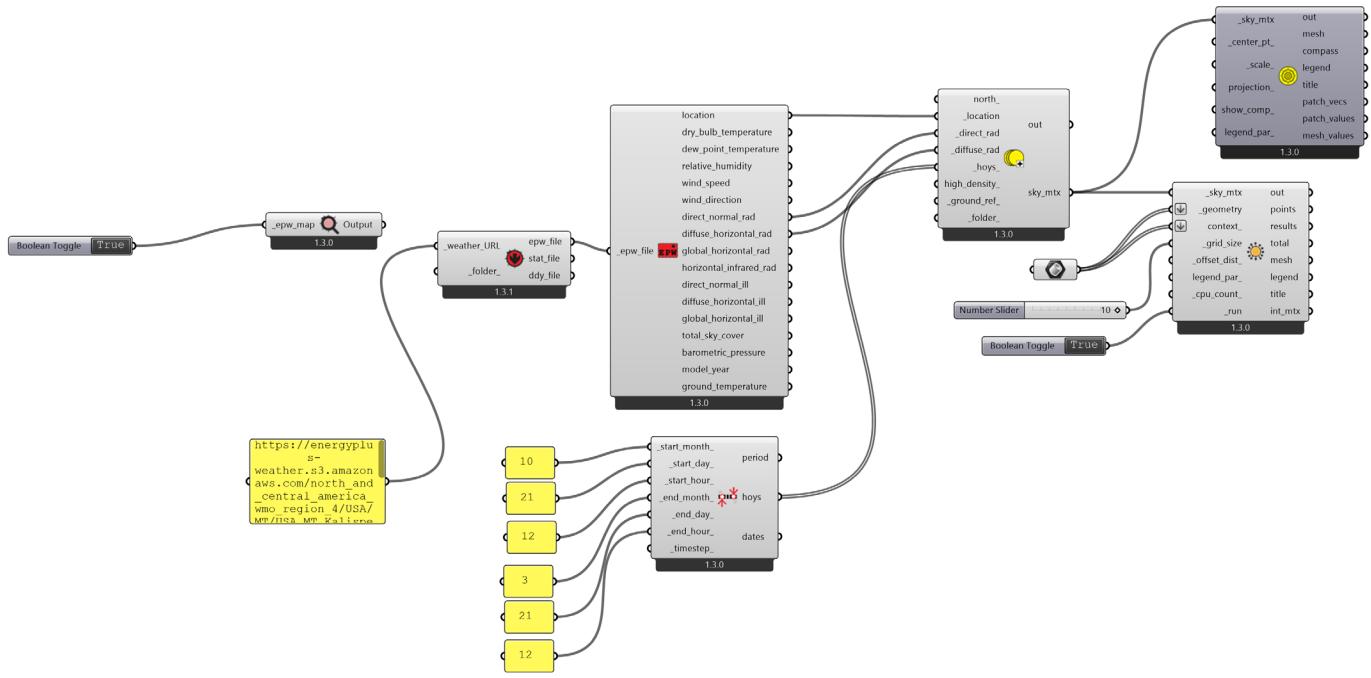
Detail image of post with mortise from elbow and tenon for beam



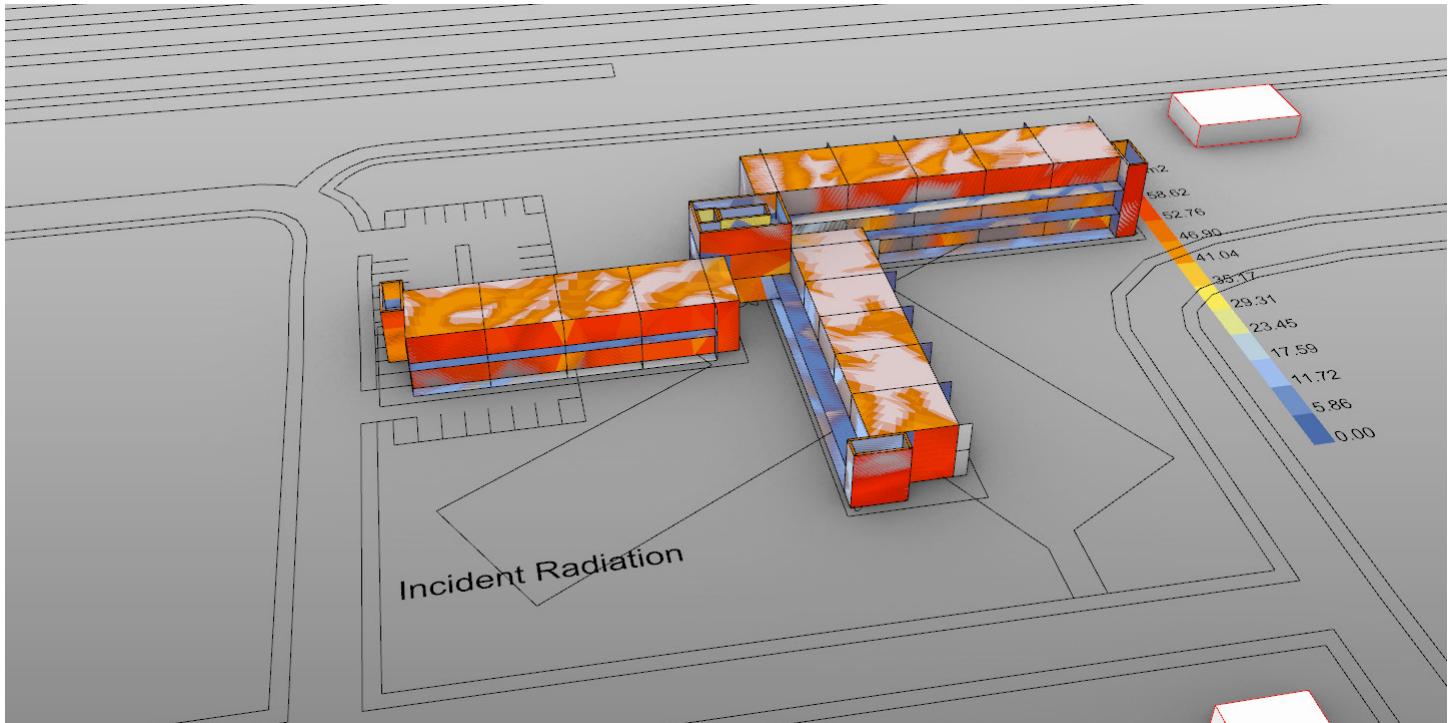
Detail image of dowel connections for beam, post, and elbow. (showing extrusion out from edge of beam and post)



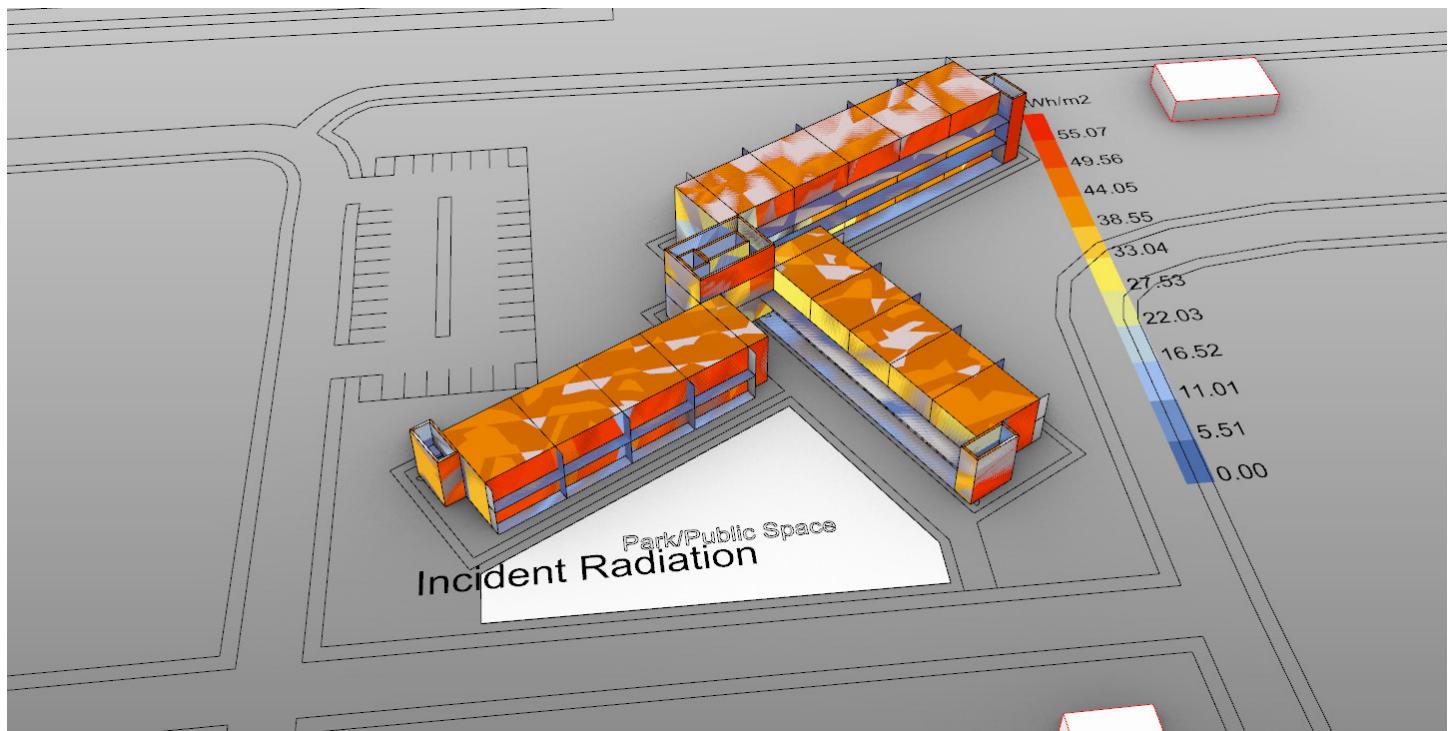
Detail image of elbow joint with both tenons for beam and post



Ladybug Incident Radiation Analysis Script



Building Oriented Vertically North to South



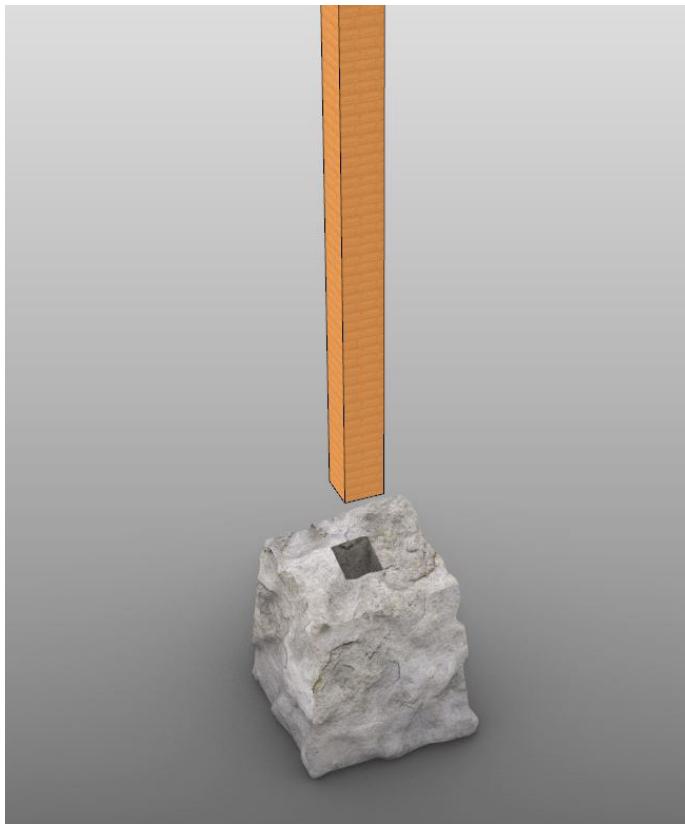
Building Oriented at a 35 Degree Angle Southeast



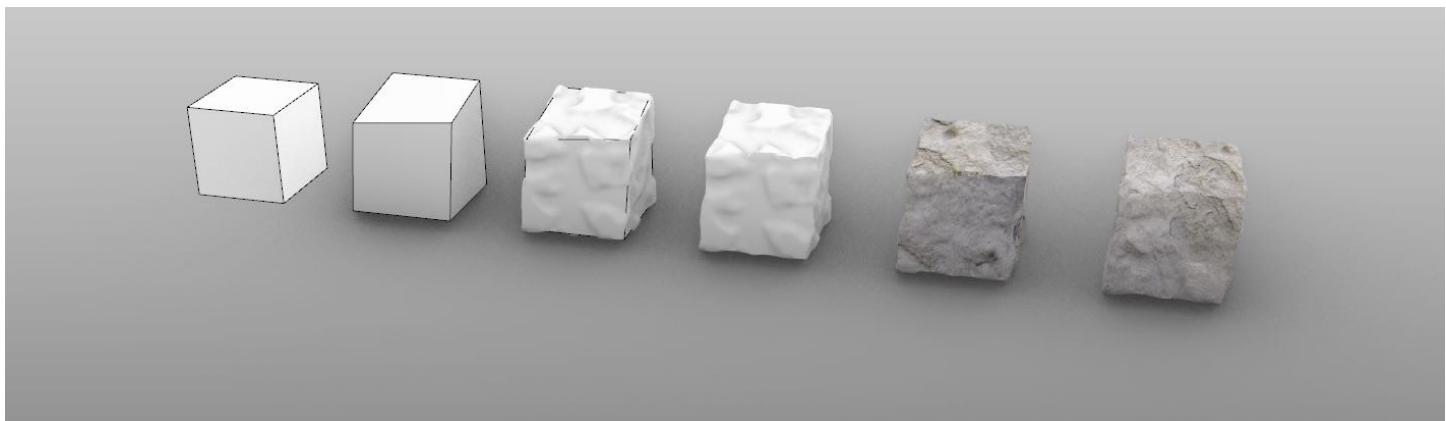
Building Oriented at a 35 Degree Angle Southwest



The problem I started with was how to create natural stone foundations in Rhino. This is the technique I am using for foundation work on my studio project because it ties back into traditional foundation work used in Japan and China, a major part of my thesis proposal.

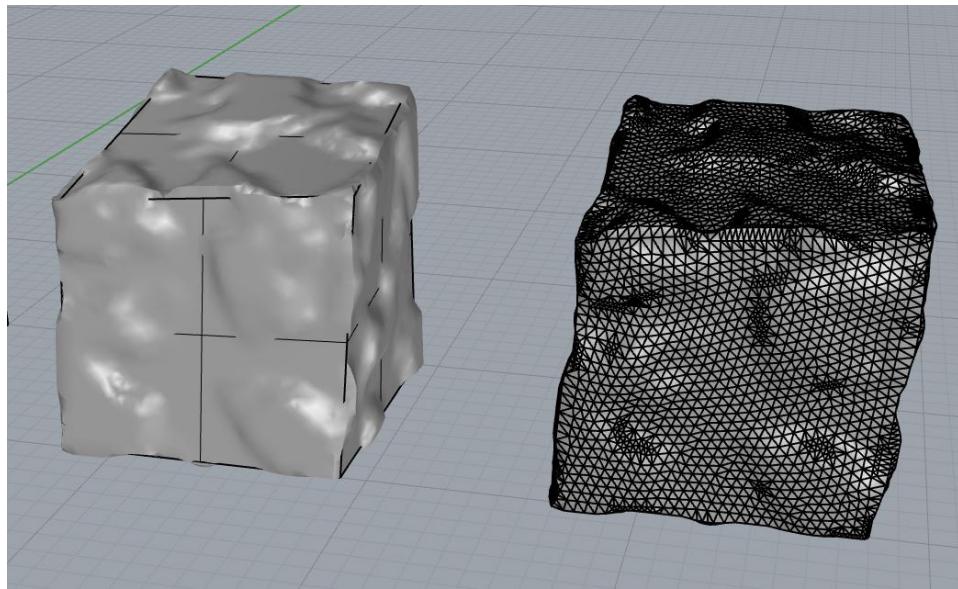


This is the final solution I was able to come up with. The stone would be carved out by a trained stone scribe, the way it has traditionally been done in the past. Another solution I came up with would be to design concrete framework that I would be able to CNC so the product would be faster to manufacture



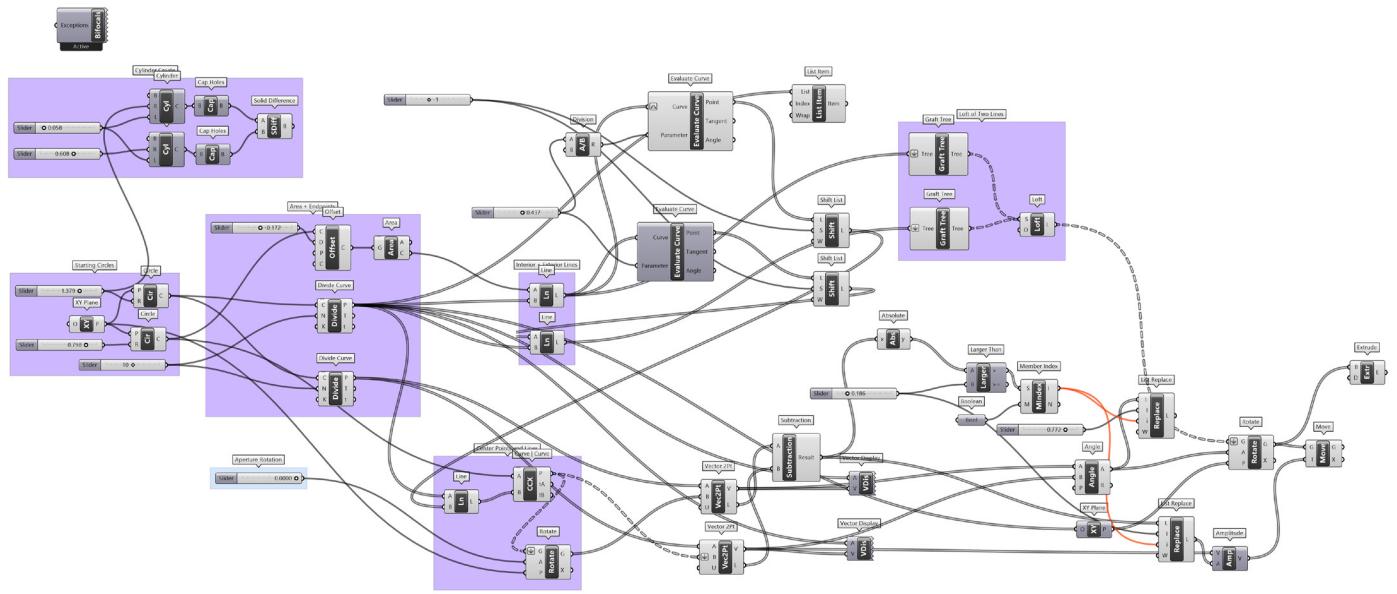
Here is the step by step process I took to create the stone framework:

1. Start with Box in Rhino.
2. Move points to create an more organic shape of a stone.
3. Use Displacement tool to apply a Granite Texture.
4. Use ExtractRenderMesh Tool to create a usable Mesh in Rhino.
5. Apply Stone Texture to the Mesh.
6. Apply Box Mapping onto the Mesh to create more realistic look.
7. Use tool MeshBooleanDifference to create hole for the column to go into

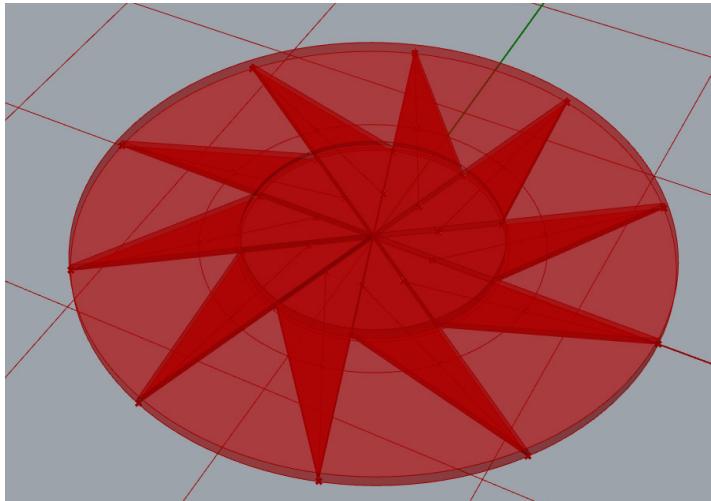


When working on creating this in Rhino, these were the two steps I had trouble with since I did not know these commands yet. Through research, however, I was able to figure out how to use Displacement Mappings and the ExtractRenderMesh tools.

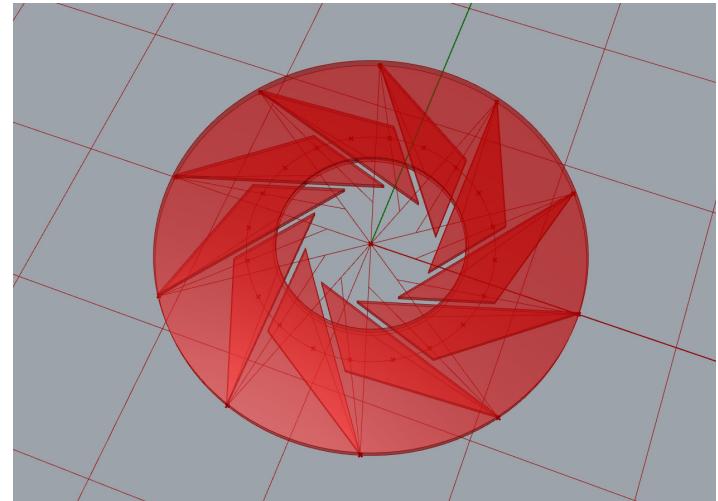
Camera Aperture/Shutter Simulation Grasshopper Script



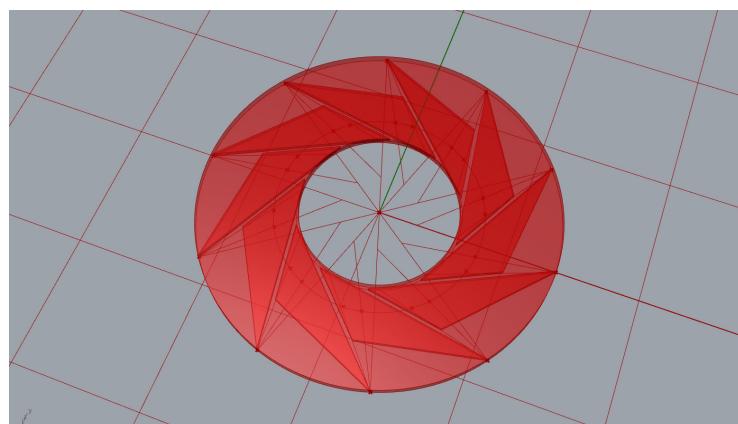
Camera Aperture/Shutter Simulation



Camera Aperture/Shutter Simulation Closed

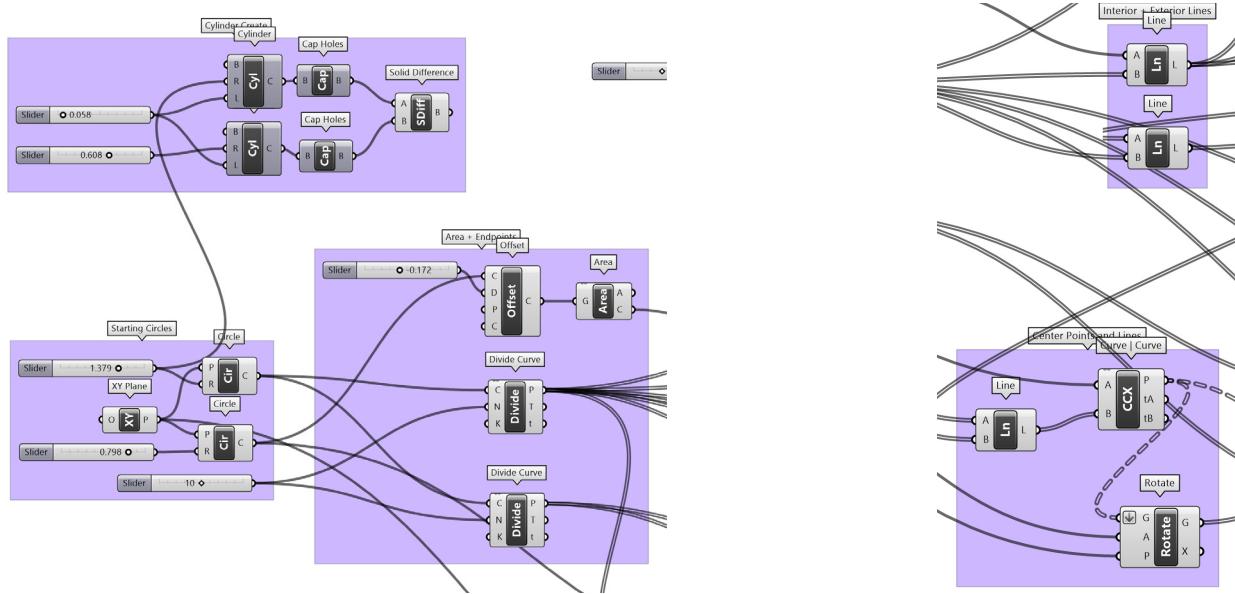


Camera Aperture/Shutter Simulation Semi-Open

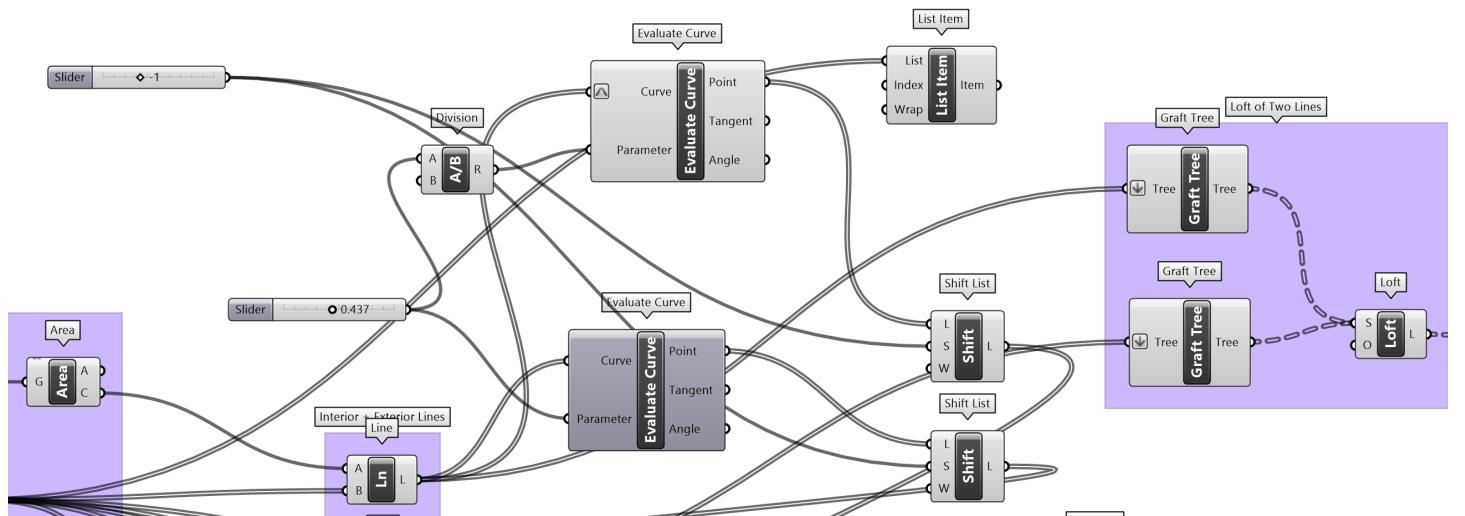


Camera Aperture/Shutter Simulation Open

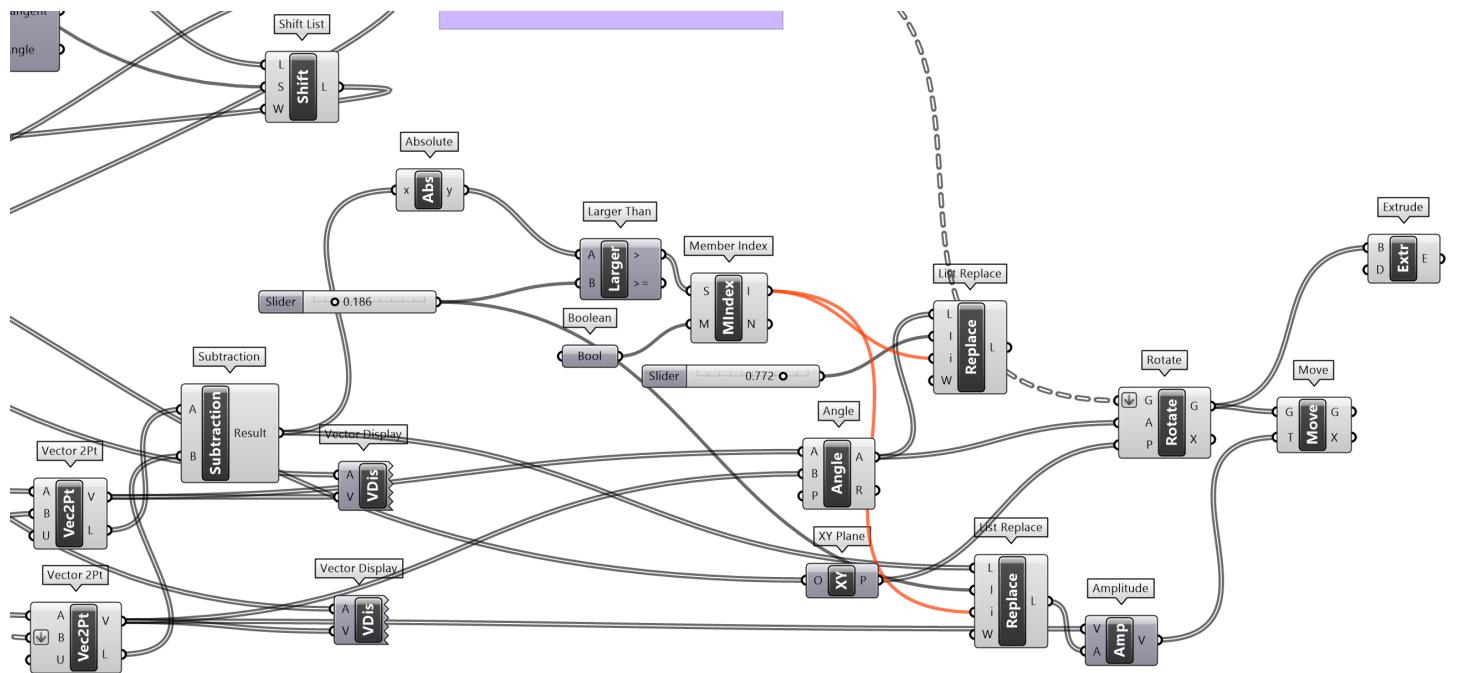
The problem I started with was how to create a simulation of a camera aperture in Grasshopper. The first part of the problem was to create the geometry I would be working with. This included two cylinders and finding the endpoints of each triangle in the shutter of the camera. The next step was to create the lines that would shape the triangles that would be used for the lens.



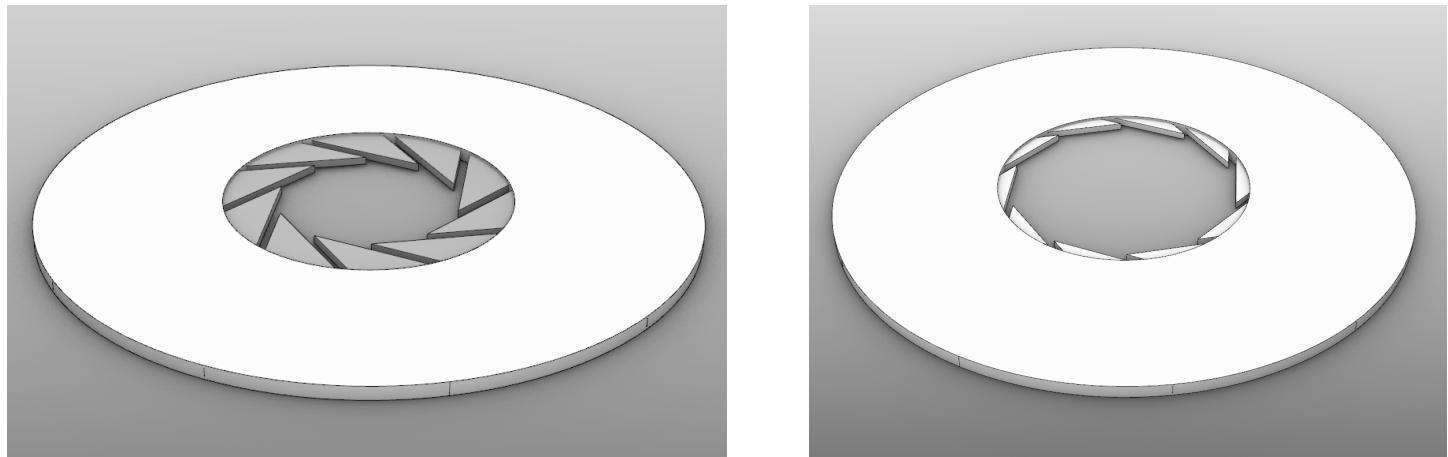
By creating an offset circle on the interior of the cylinder, I was able to control the centerpoint of each triangle to follow the path of the circle making it so each triangle opens the same distance.



Evaluating both curves that go to the center and the edge of the inner cylinder, I was able to locate where each triangle would be when fully open and halfway open. From this, I could graft both lines and loft them together to get the shape of each of the triangles forming the aperture of the camera lens.



From this point, I needed to do some research and get help on how the triangles moved around the cylinders in a mathematical sense. The rest of the script shows the math behind the rotation of the triangles using the circles and grid lines for guides. From this, the last step was to extrude the triangles to make them match the height of the cylinders.



Finished Product