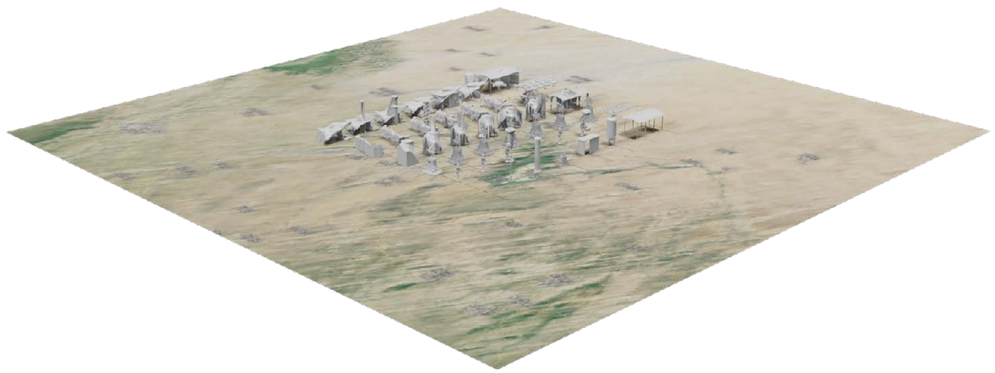
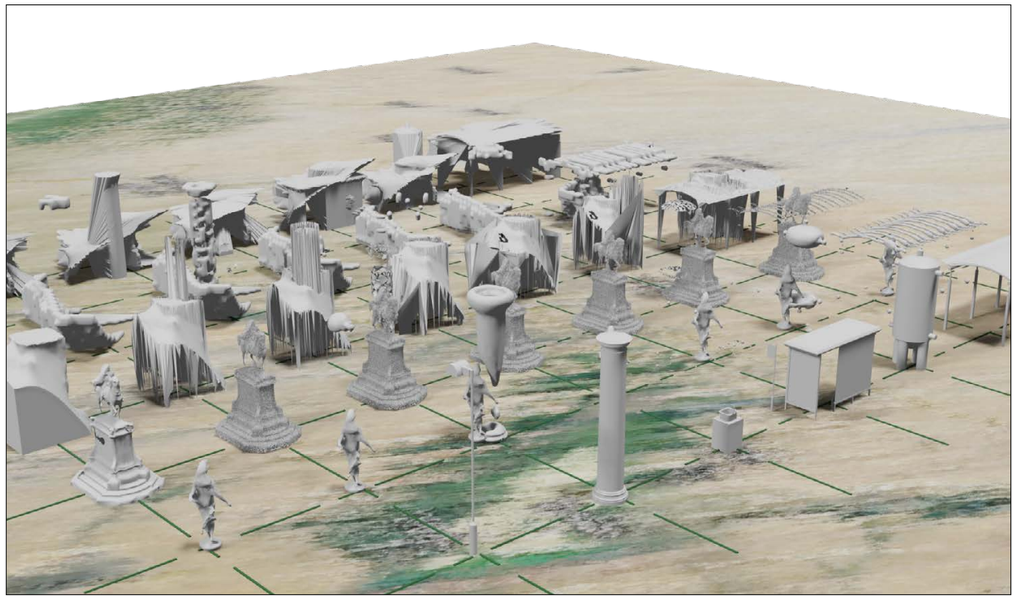
SCENE 1

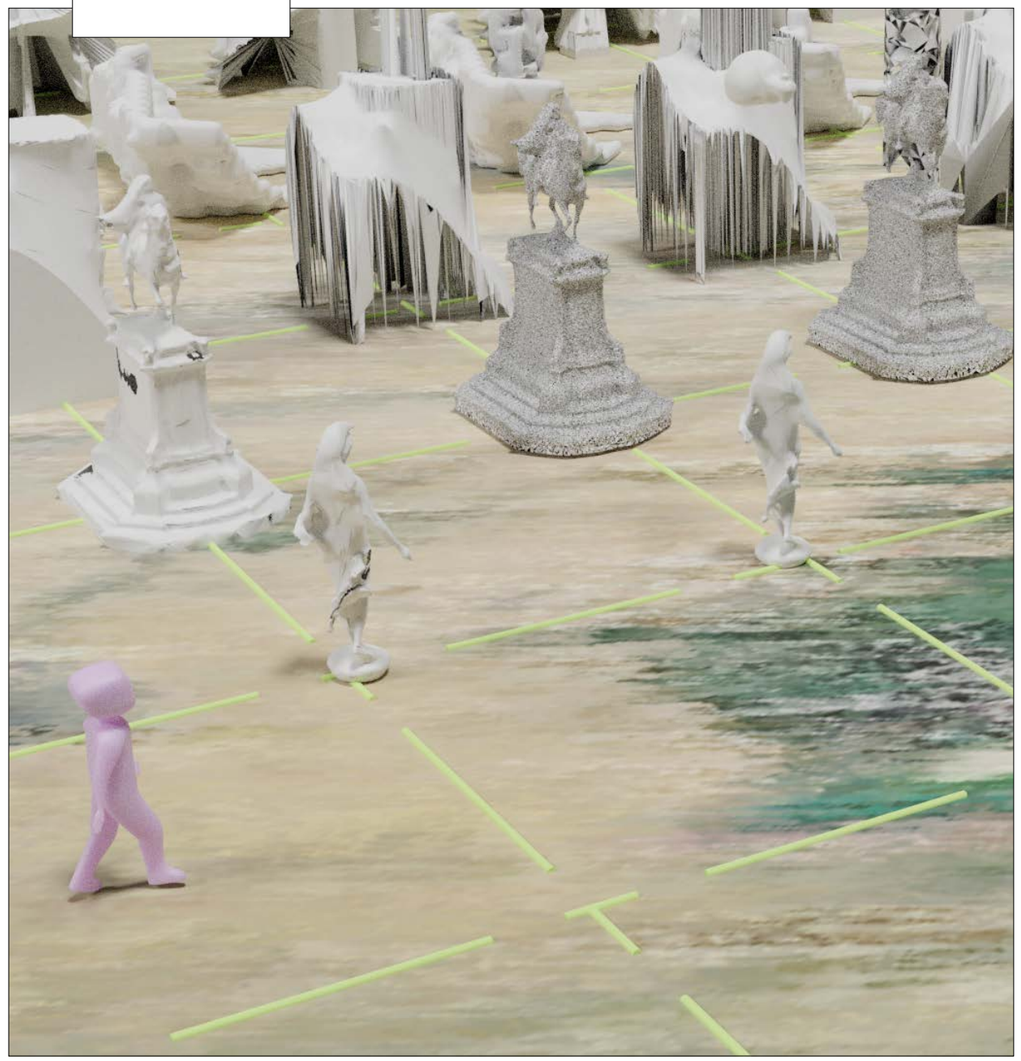
THE COURTYARD

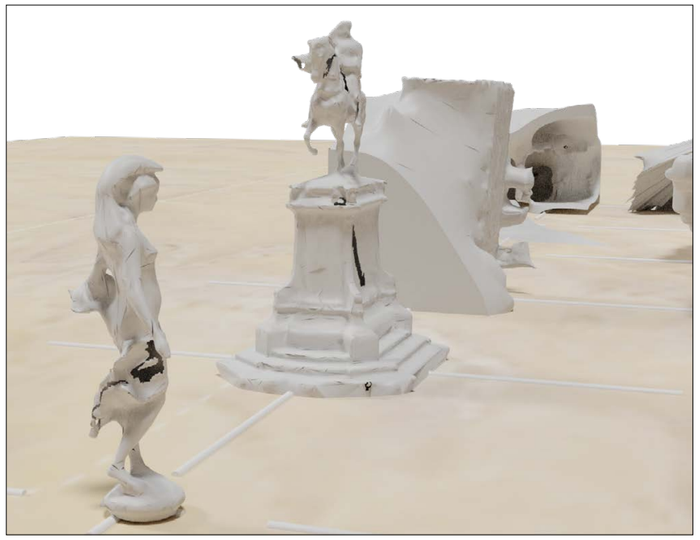
The recap surfaces in this scene are the *Bodies*, inspiring the overall theme of freestanding objects. Freestanding object has been interpreted as an architectural object that is more or less freestanding in its form even though it might be interconnected through other systems. The scene opens to a clearly defined set, a square of 100m x 100m. In the middle of this set, a grid can be distinguished. An object is placed in each of the intersections of the grid. In the courtyard the collection introduces us to the ways of the surface and mesh. A digital object is not a mass, it is made up of a number of points that connect lines and make up faces.



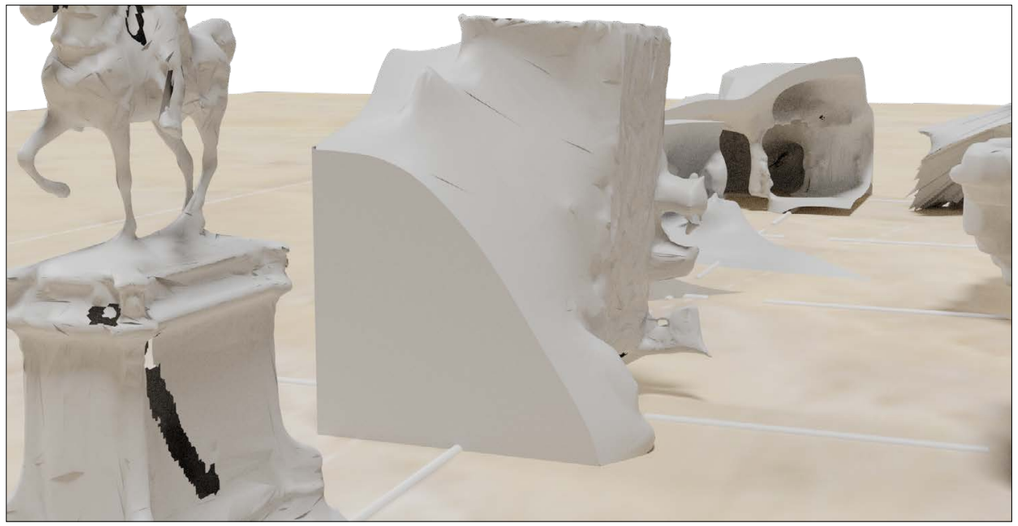


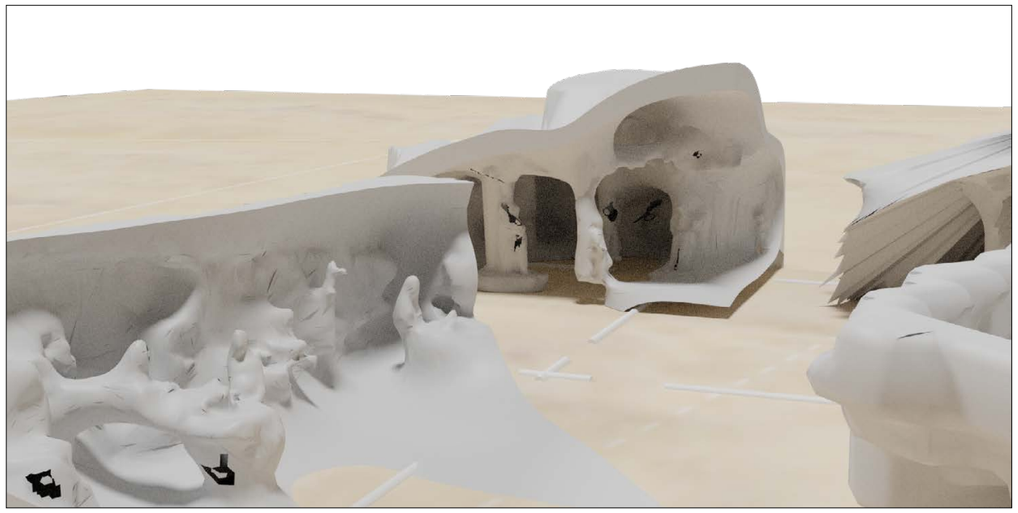
From the intersecting point without an object two axes stretches in each direction.



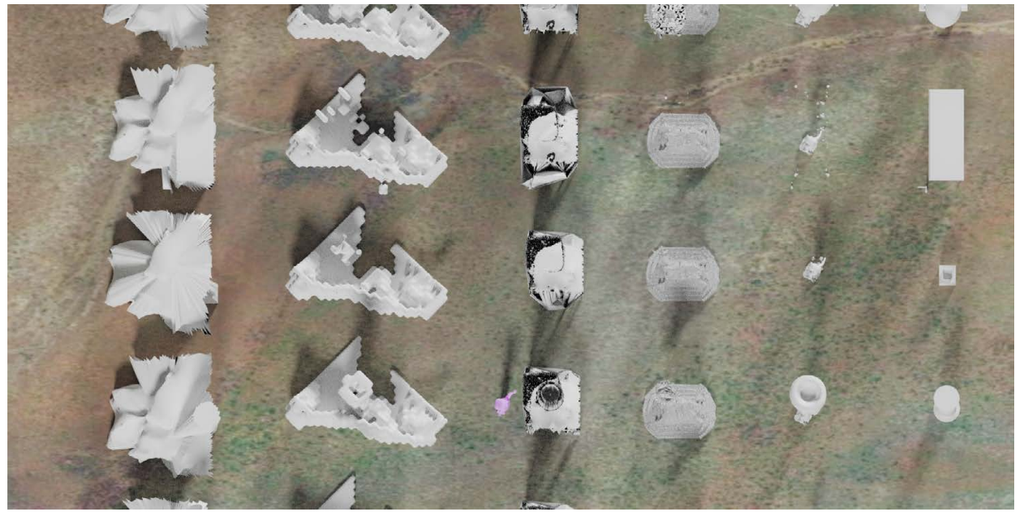


On the left side we can spot the ReCaps, aligned from the simplest form towards a more complex version.

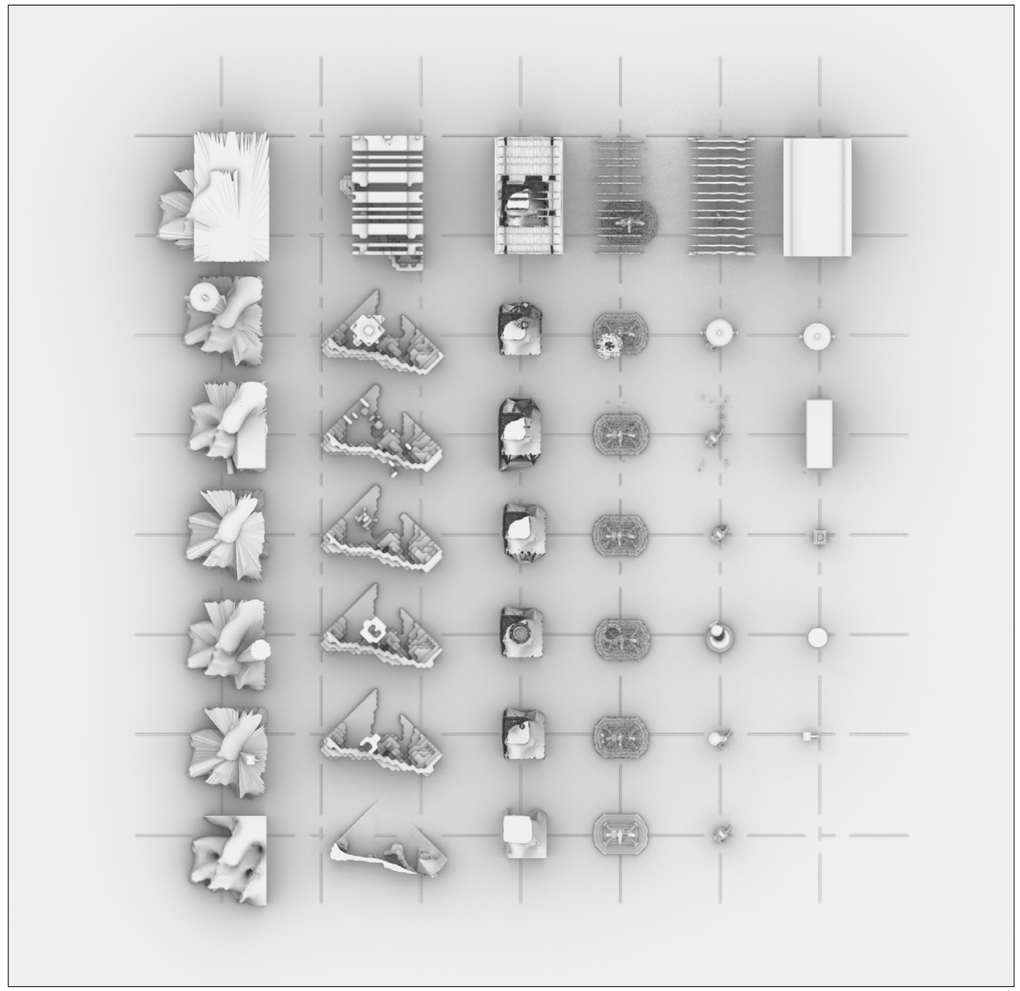


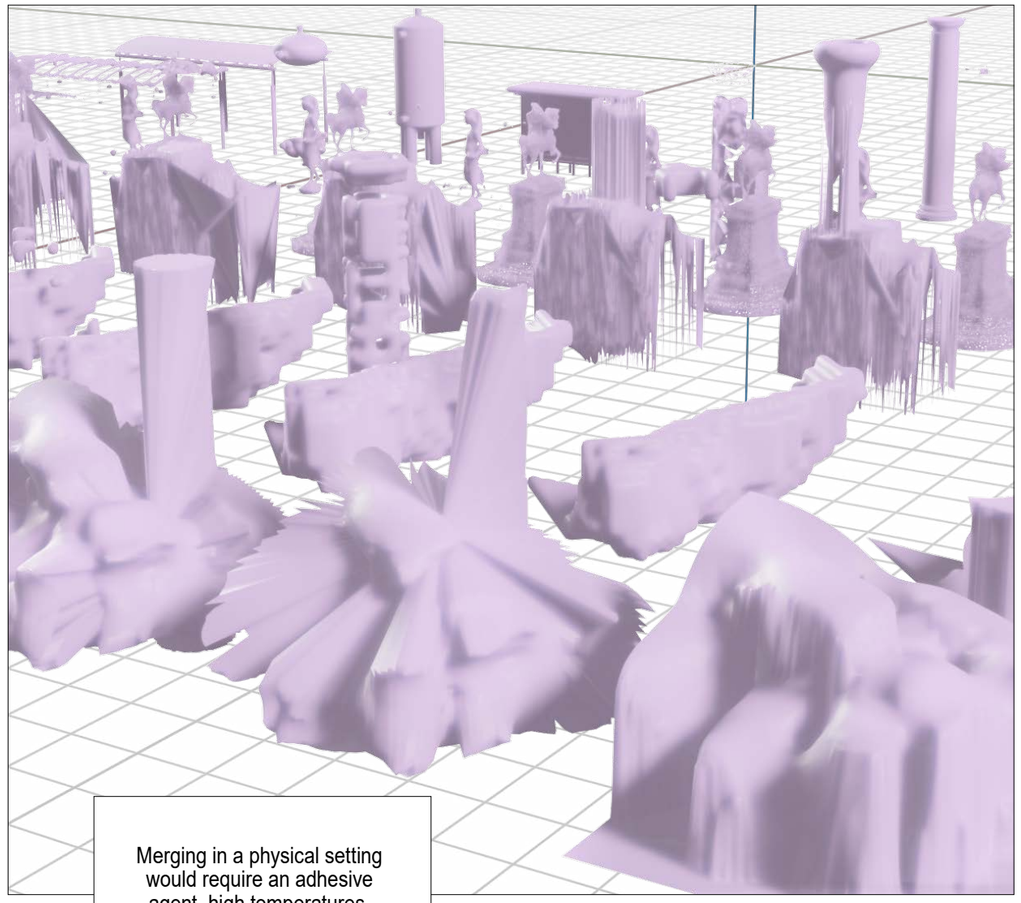


On the right in a similar order, simplicity towards complexity, stand familiar objects. A streetlight, a bus stop, and a pergola.

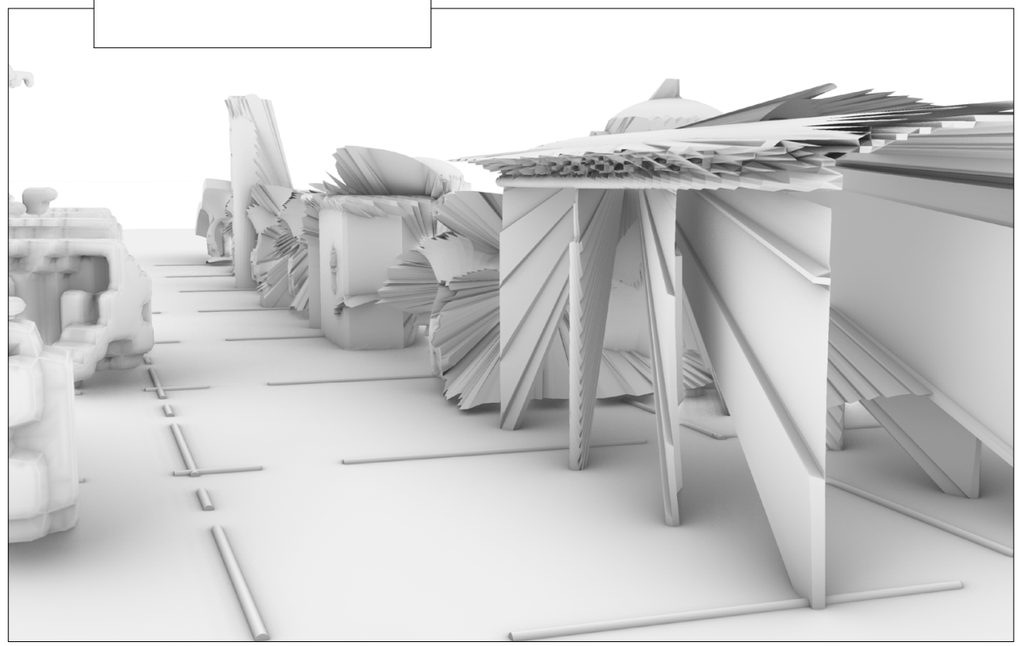


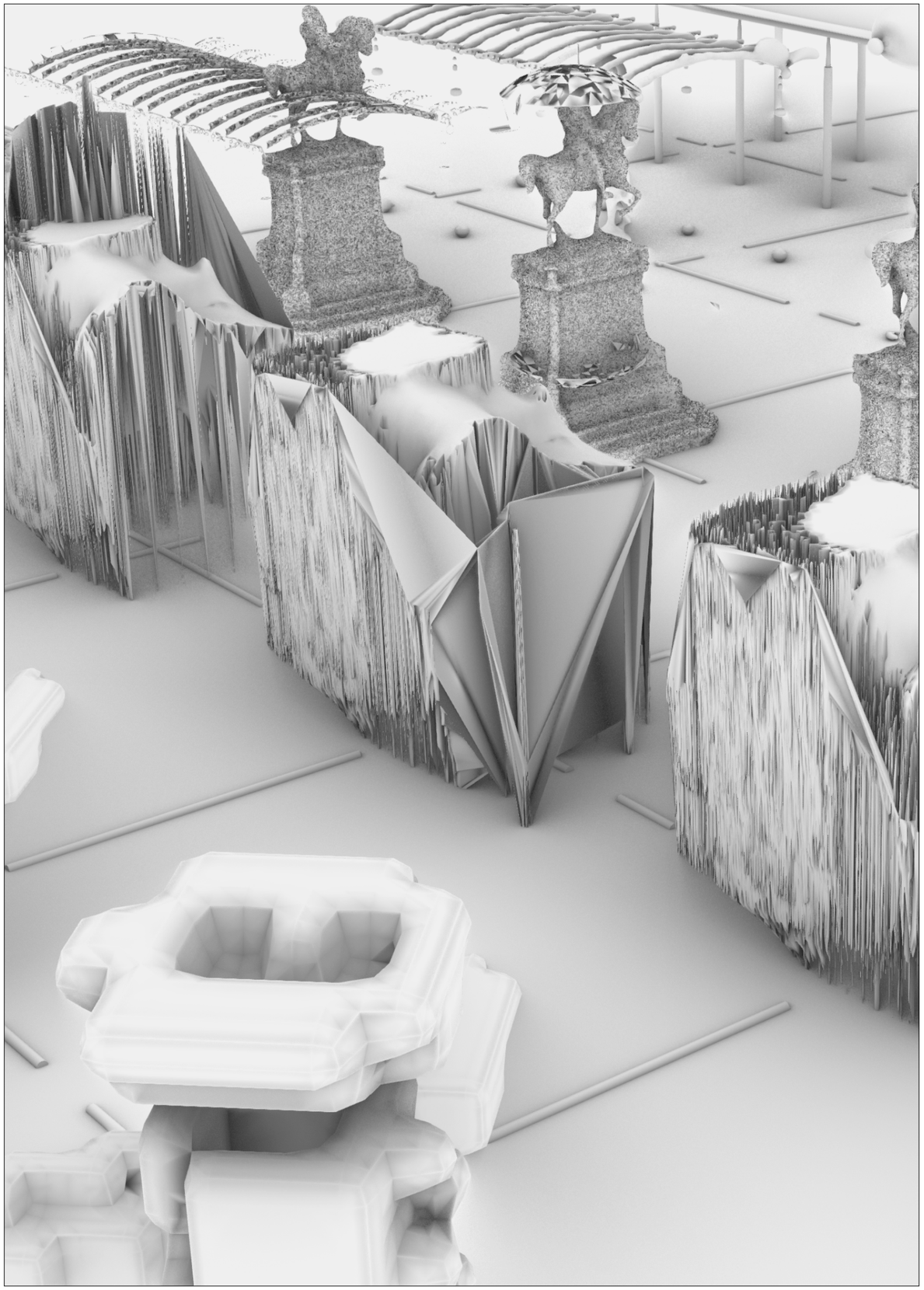
In each intersection of the grid, two objects from both sides meet and merge. One and one continues as one.



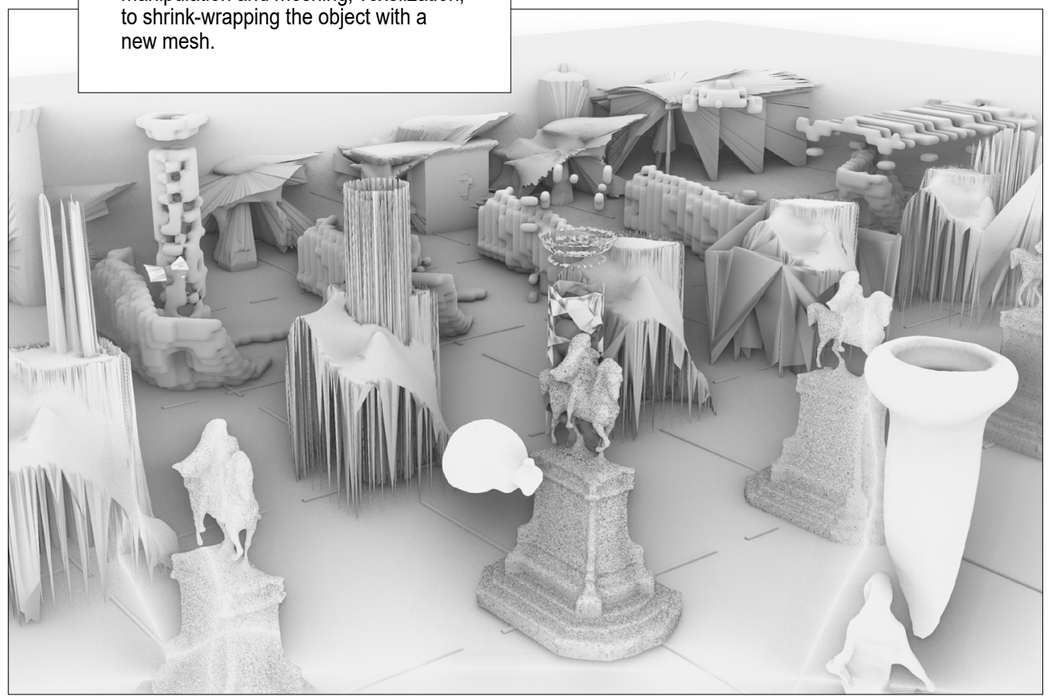


Merging in a physical setting would require an adhesive agent, high temperatures, maybe dangerous equipment and skilled craftmanship. It would be very laborious and require high motivation.





Here, on the other hand, a plethora of executable algorithms will help us. There are a few various approaches that can be considered when merging two objects other than manually merging them. These range from Boolean operations, point cloud manipulation and meshing, voxelization, to shrink-wrapping the object with a new mesh.



Voronoi Filtering

*Compute a **Voronoi filtering** (Amenta and Bern 1998) with Qhull library (http://www.qhull.org/).*

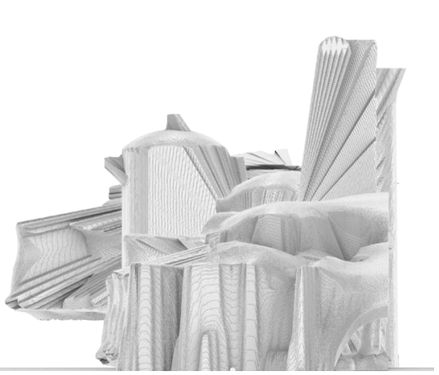
The algorithm calculates a triangulation of the input point cloud without requiring vertex normals.It uses a subset of the Voronoi vertices to remove triangles from the Delaunay triangulation.
After computing the Voronoi diagram, foreach sample point ses the two farthest opposite Voronoi vertices.Then tes a Delaunay triangulation of the sample points e selected Voronoi vertices, and keep only those es in witch all three vertices are sample points.

Surface Reconstruction: Screened Poisson

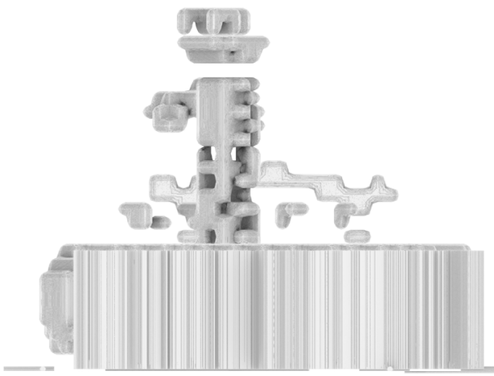
This surface reconstruction algorithm creates watertight surfaces from oriented point sets.
The filter uses the original code of Michael Kazhdan and Matthew Bolitho implementing the algorithm described in the following paper:
Michael Kazhdan, Hugues Hoppe,
"Screened Poisson surface reconstruction"
ACM Trans. Graphics, 32(3), 2013

***WARNING:** this filter saves intermediate cache files in the "working" folder (last folder used when loading/saving). Be sure you are not working in a READ-ONLY location.*

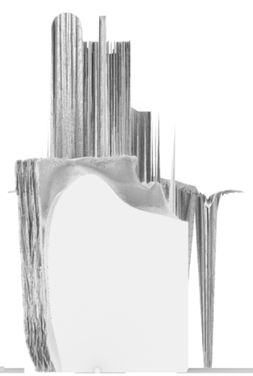
DESIGN OUTPUT



Using the mesh created when shrink-wrapping the two models using a deform algorithm in Autodesk Maya.



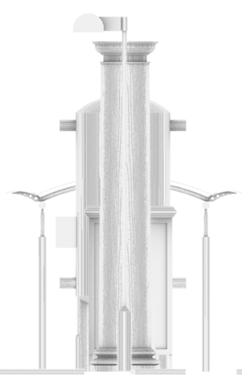
Meshing a voxel cloud in Grashopper using Volvox and Weaverbird.



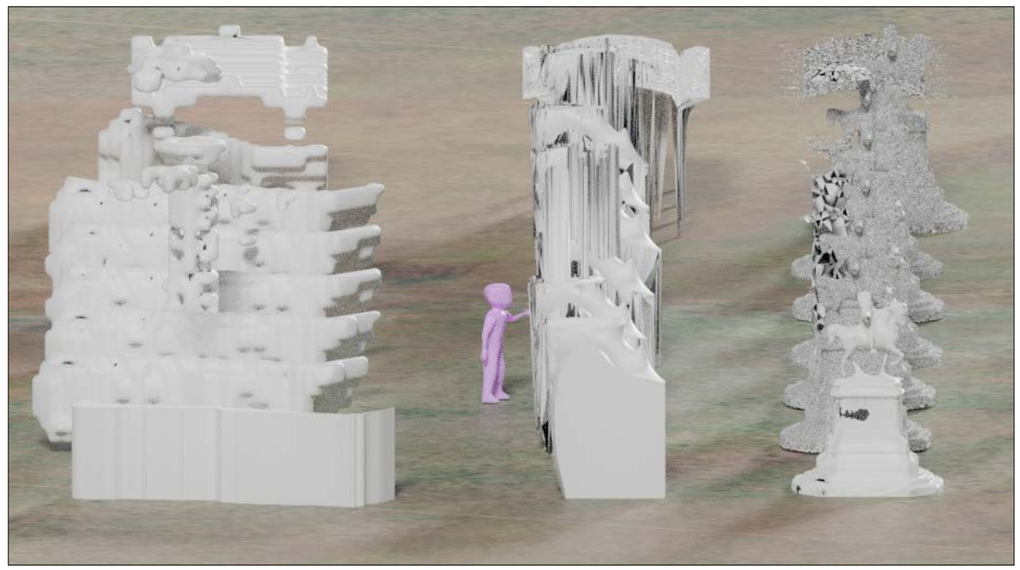
Creating a mesh with a Delanuay triangulation from a point cloud using Grasshopper.

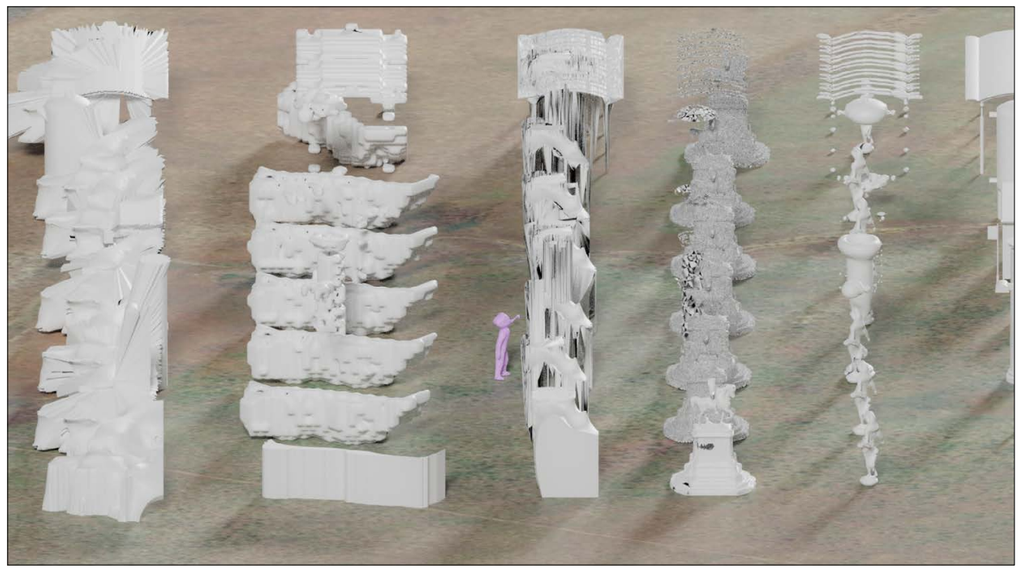
Voronoi filter to triangulate a mesh in Meshlab.

Surface reconstruction with a screened poisson algorithm in Meshlab.

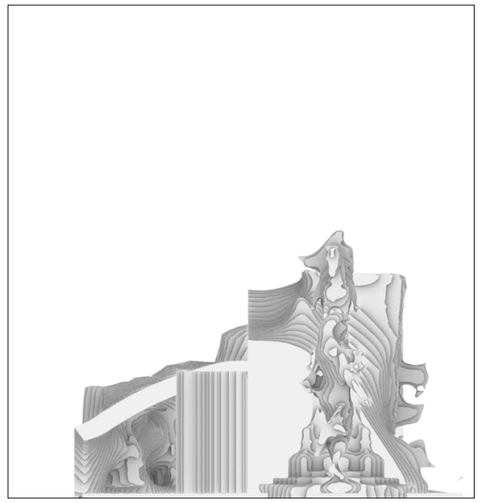


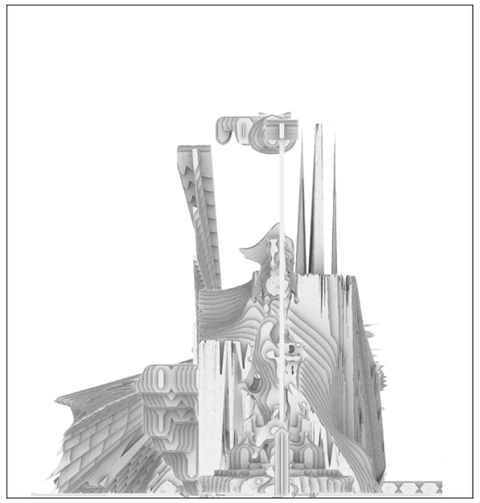
Axis of ReCaps.

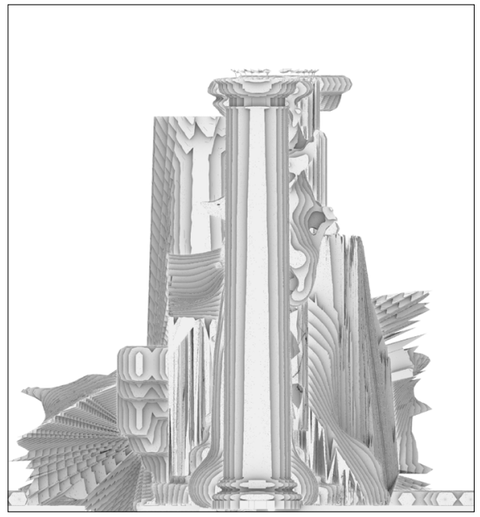


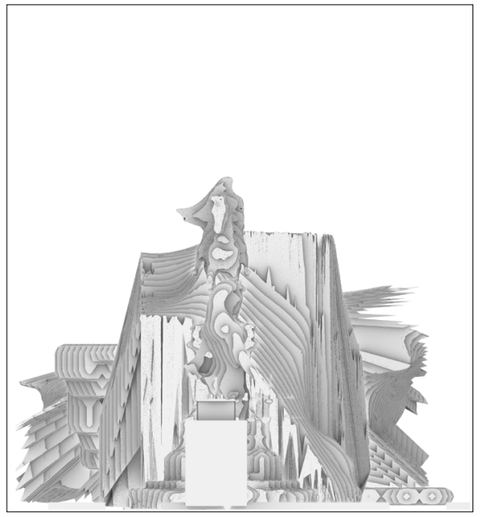


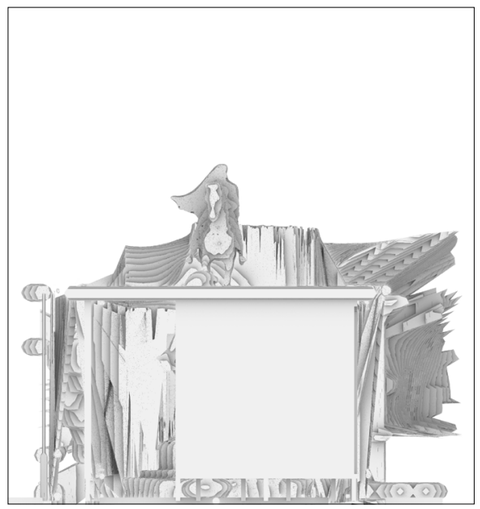
DESIGN OUTPUT

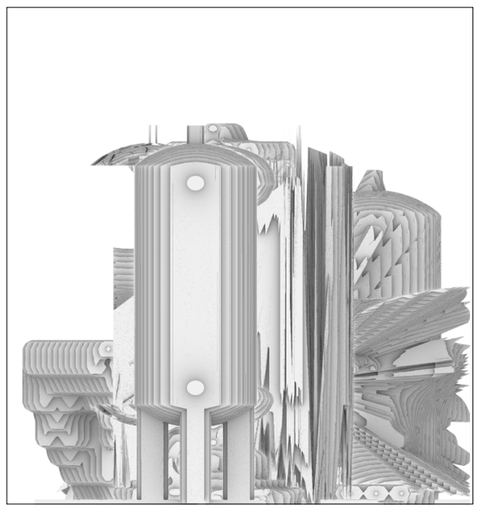




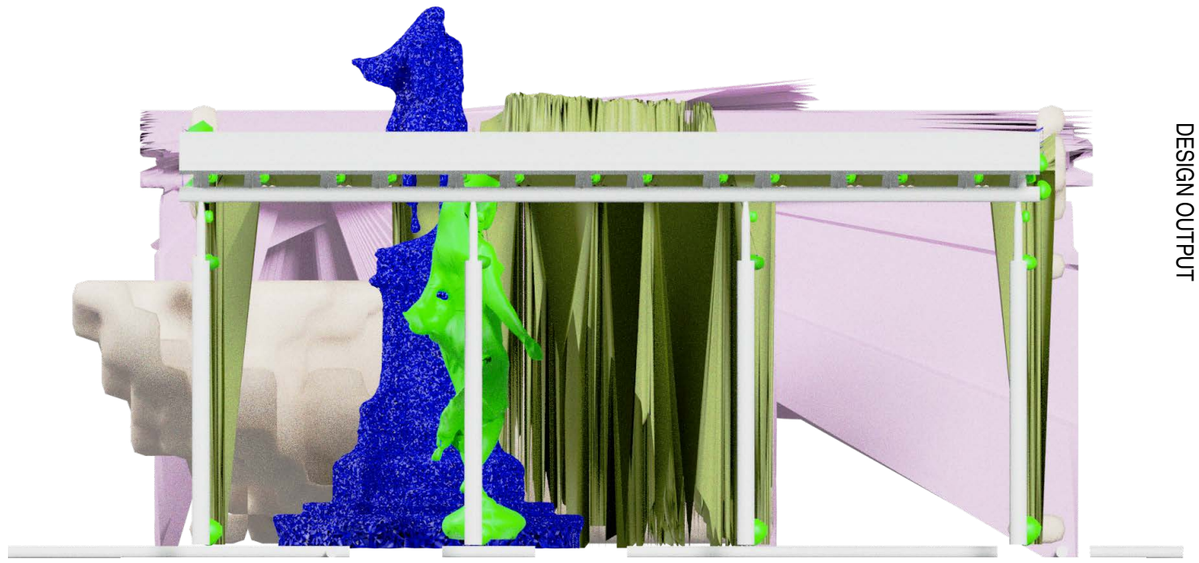








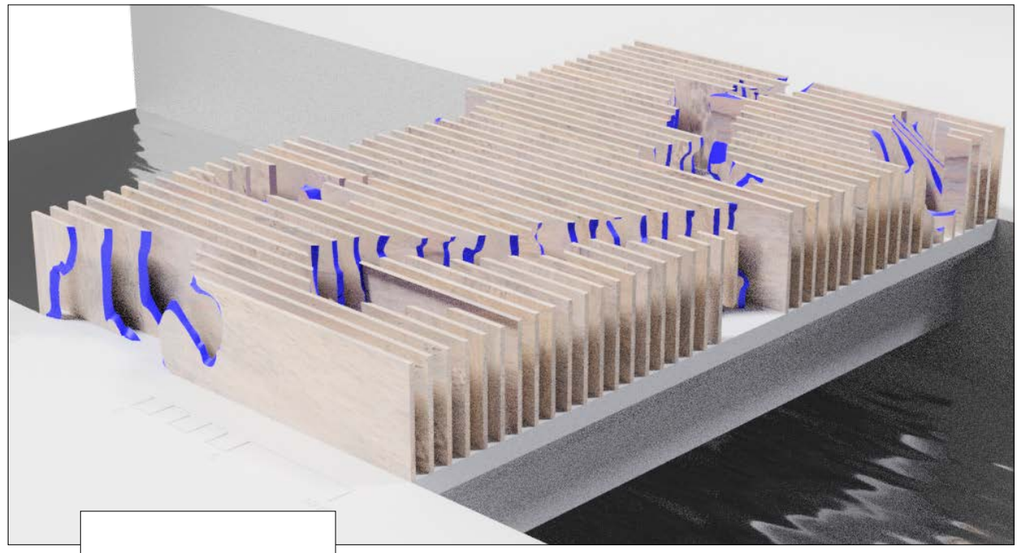
None of these solutions are polished or optimized, just pushed just past the limit of successful execution. By this act of transformation, the nature of the points as discrete objects rather than the larger assemblage into forms emerge. The points restructure and reimagine the objects. The expansive network takes precedence over the hierarchical relationship of shape and meaning.



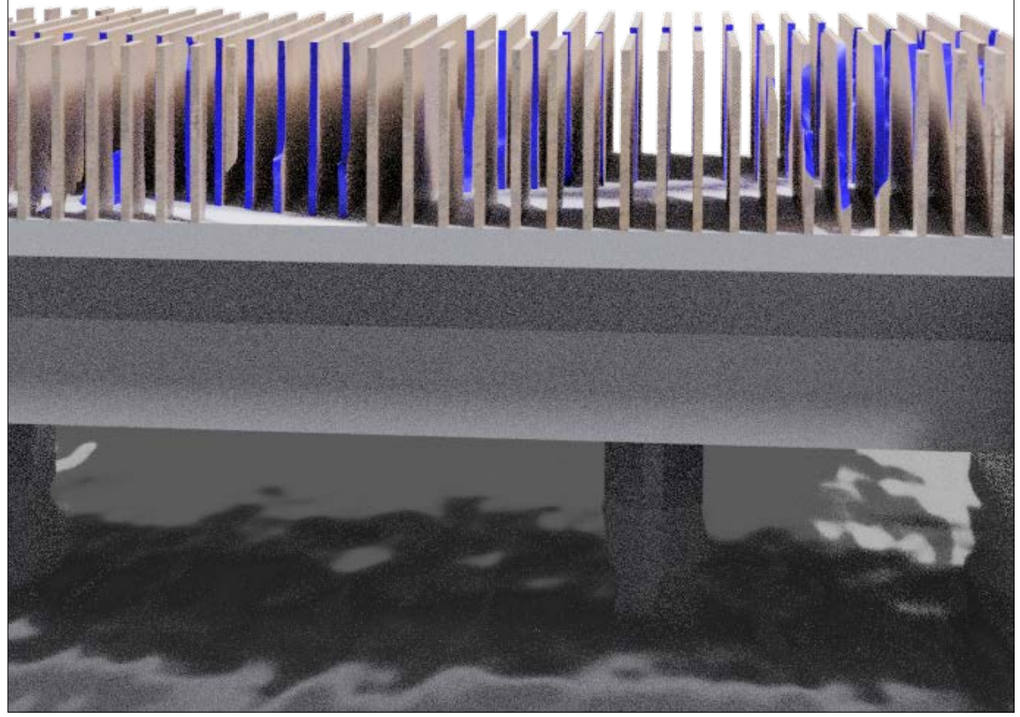
DESIGN OUTPUT

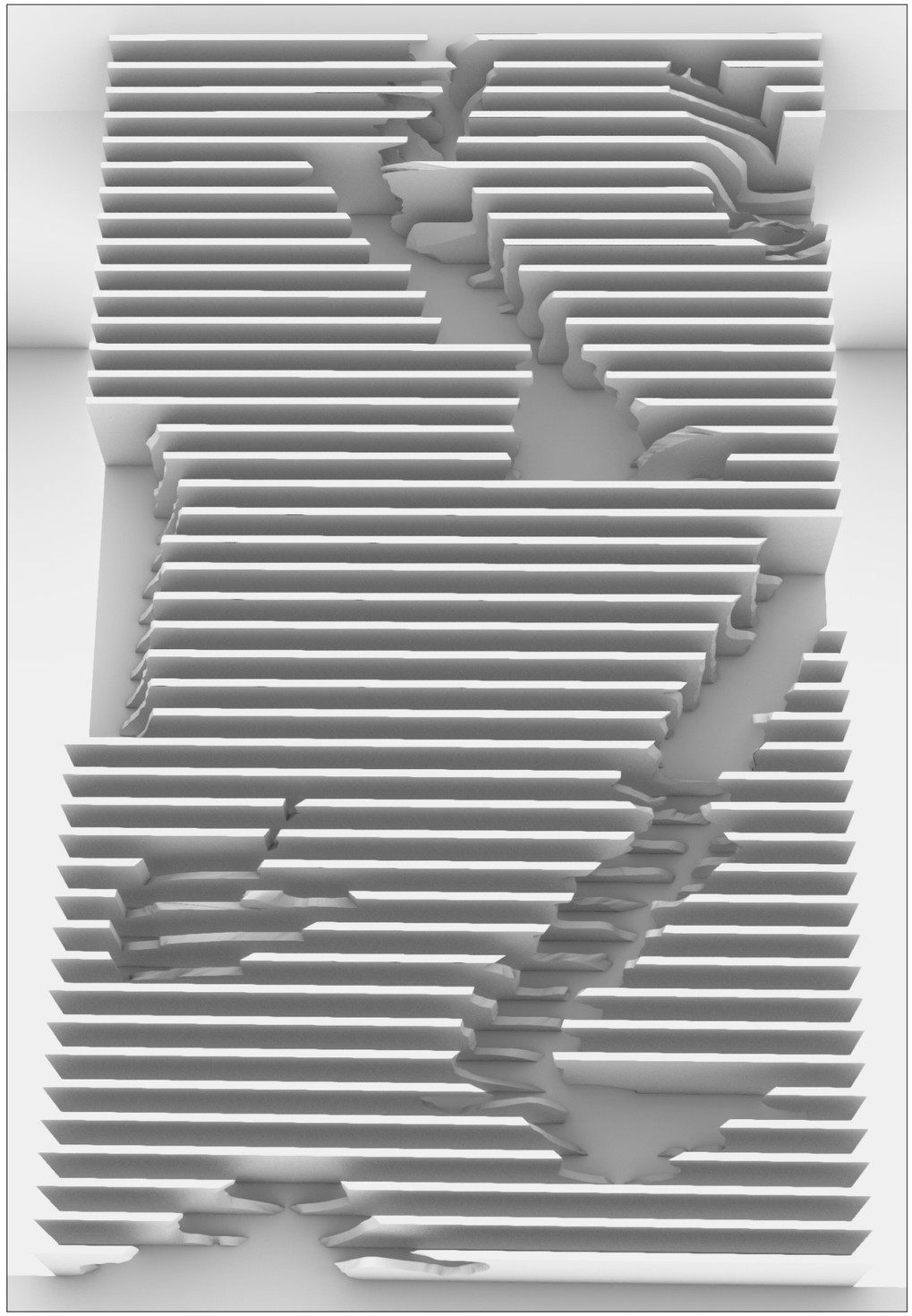
THE CROSSING

The theme of this scene is the partition. The partition shields and guides movement. The ReCap surfaces are the *Screens* and they find their counterpart in Revit as walls. The Crossing sets up a starting point on one side, leaving the bridge as the only means of crossing the gap to the other.

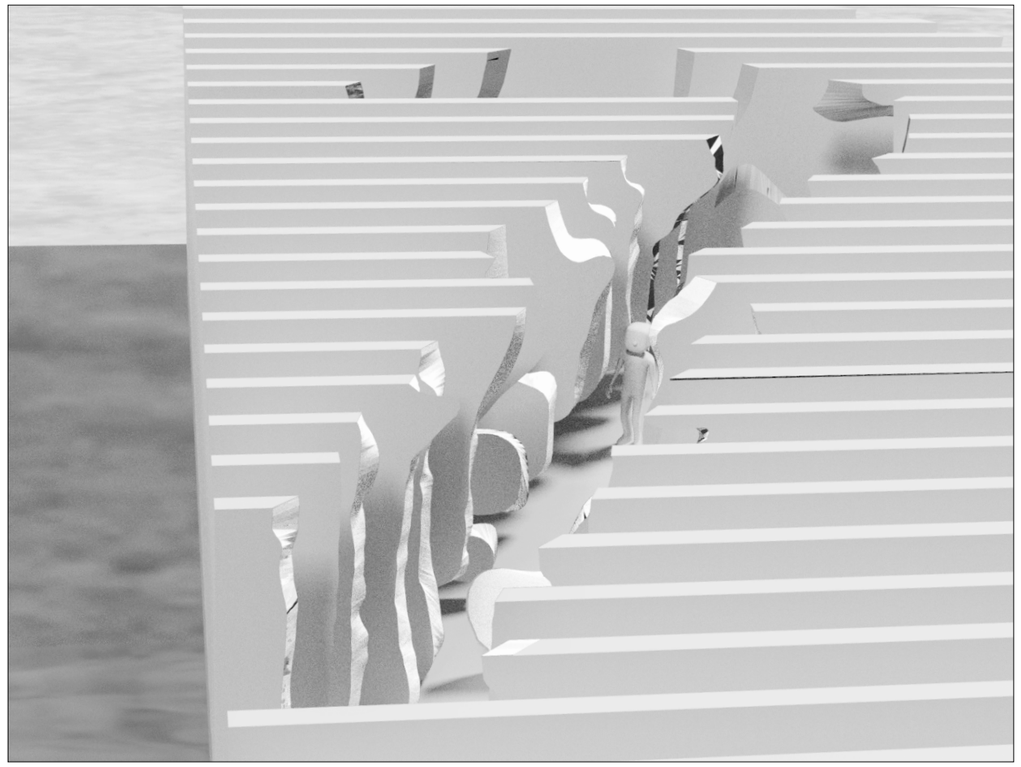


On this bridge, wall after wall form a barrier. Here the screens are used as cutting objects to enable movement across the divide. A passage through the otherwise impenetrable set of obstacles is created from the cuts.

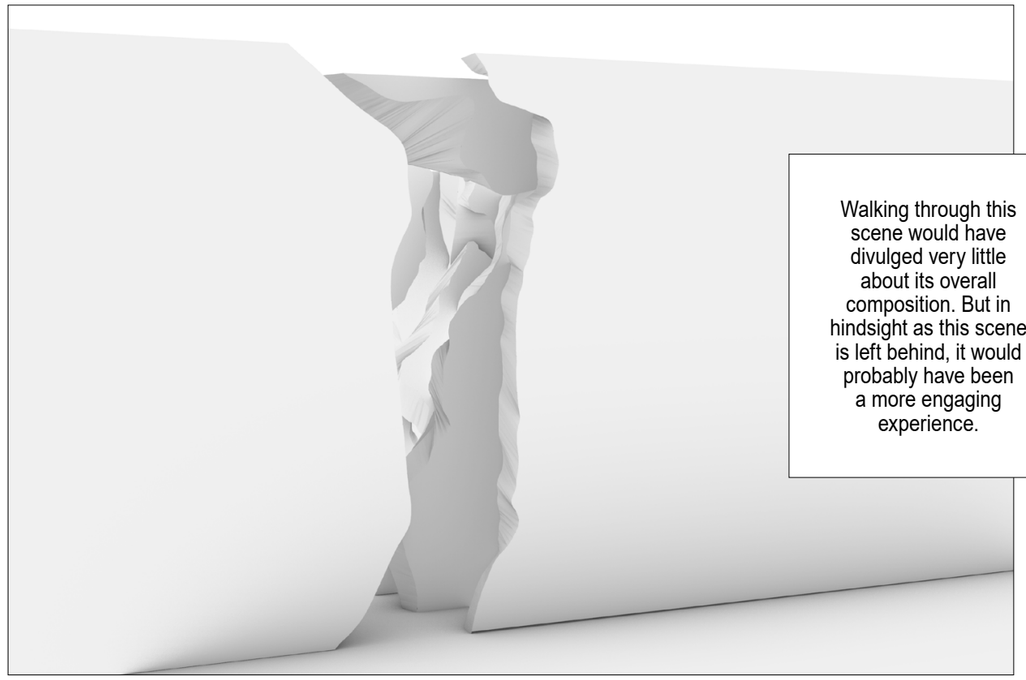




Digital surfaces have no correlation in a real-world setting. Surfaces exist as an attribute to a mass. There are no freestanding surfaces. With this treatment these two oppositions can meet.



In each scene the ReCaps are treated in a different way. The cuts on the walls leave imprints of the amorphous surfaces behind.

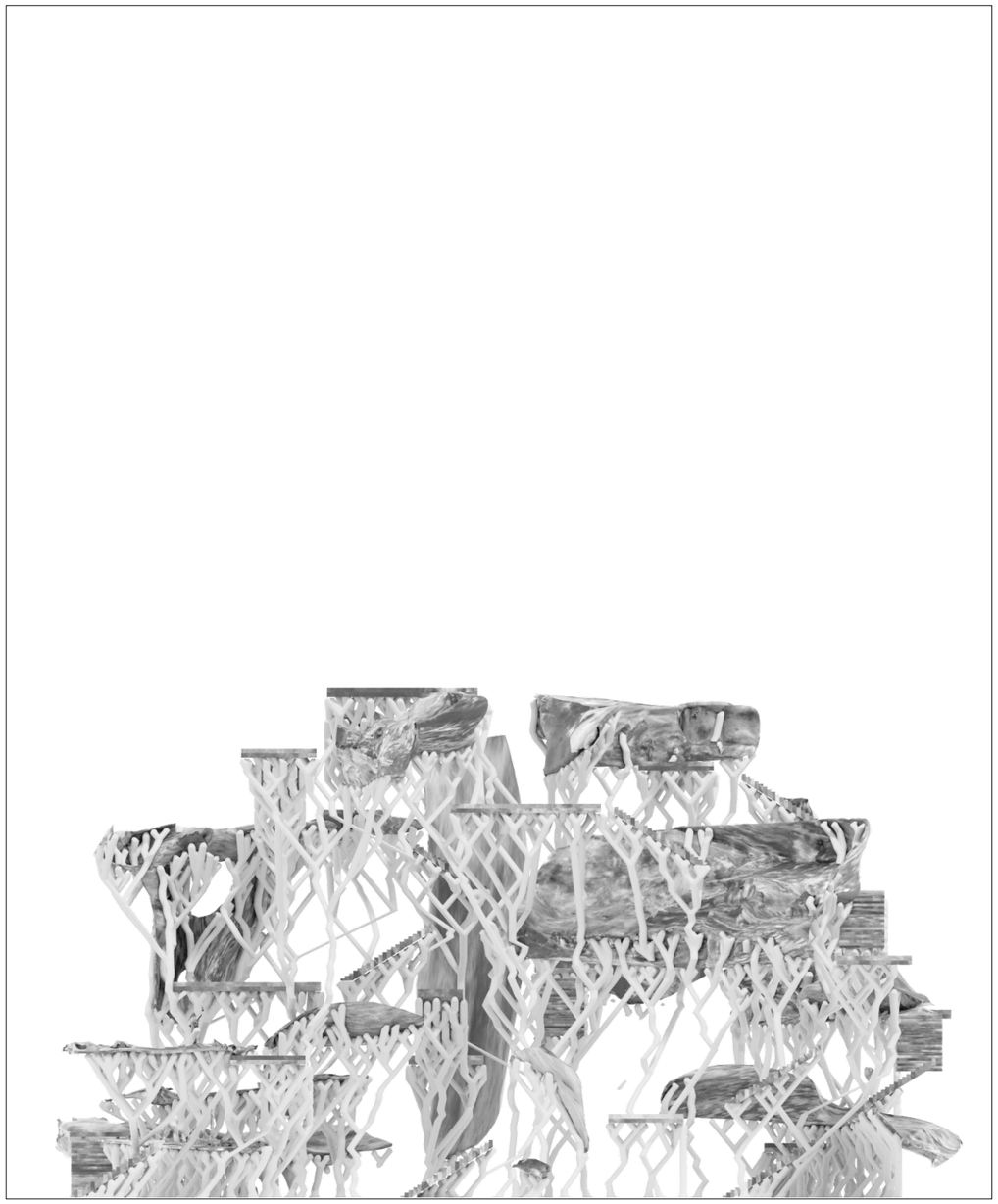


Walking through this scene would have divulged very little about its overall composition. But in hindsight as this scene is left behind, it would probably have been a more engaging experience.

SCENE 3

THE GARDEN

What is first perceived as a large forest-like cluster is upon closer inspection a collection of objects suspended by a multibranching structure.



DESIGN OUTPUT

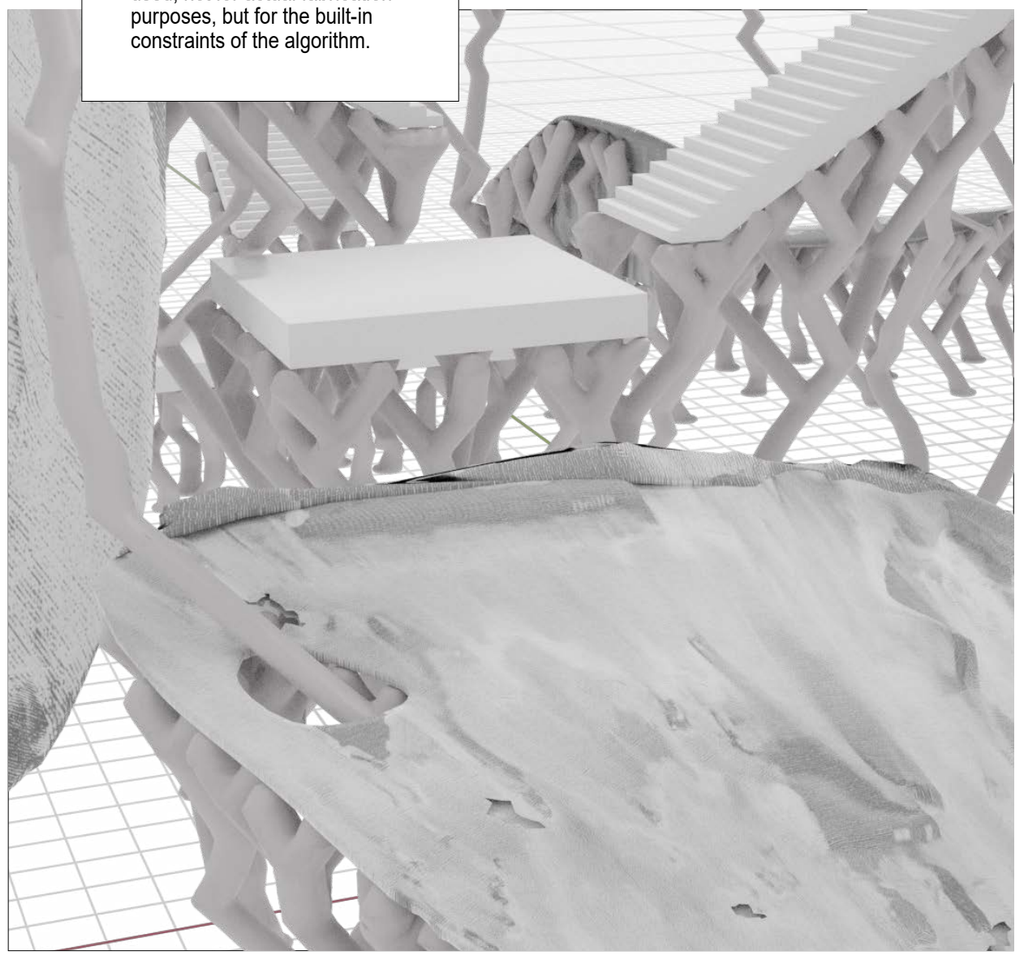
The ReCap objects here are the *Disjoints*, models that were split into several parts presenting the theme connections. The disjoints are not level as most of the other groups, creating a variation in height. Stairs and slabs are used as Revits to provide scale and orientation.

If the first scene relied heavily on continuous transformations of the same data, this scene, instead, have generated new form based off input data. The various objects are assembled, then imported into the Autodesk application Meshmixer.

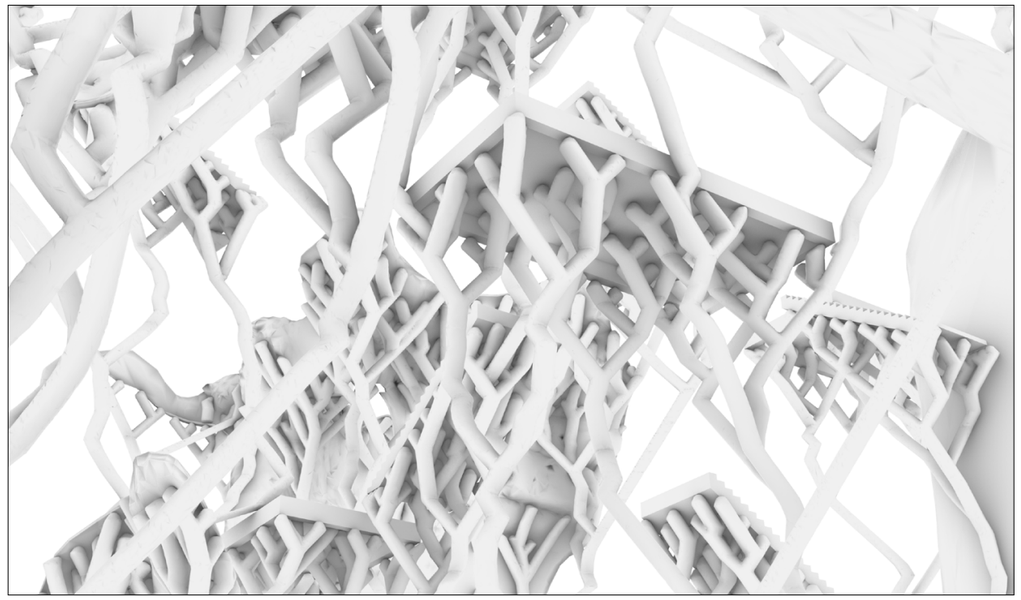
DESIGN OUTPUT

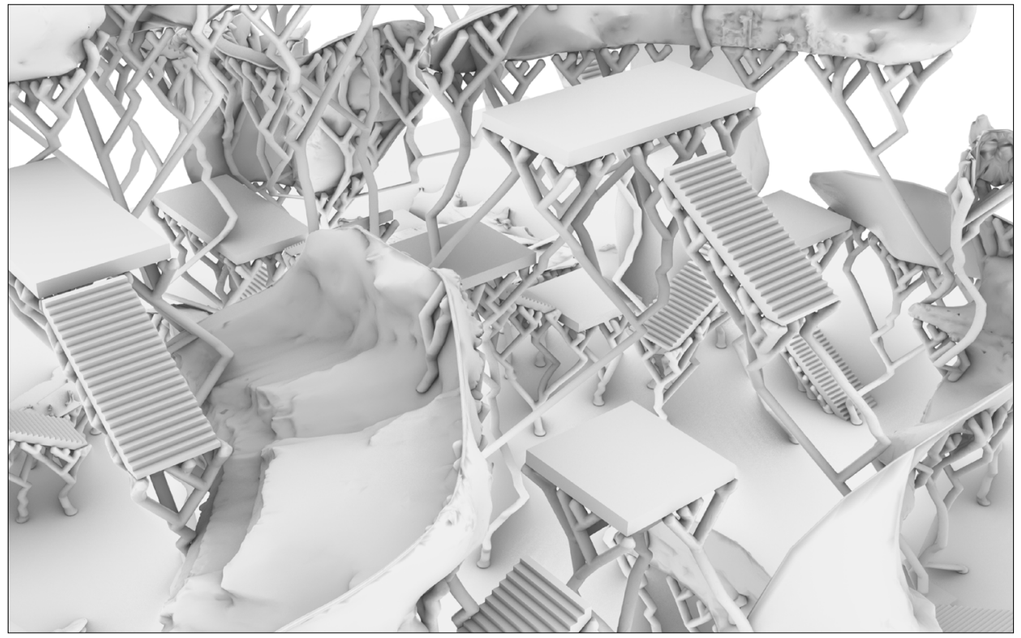
DESIGN OUTPUT

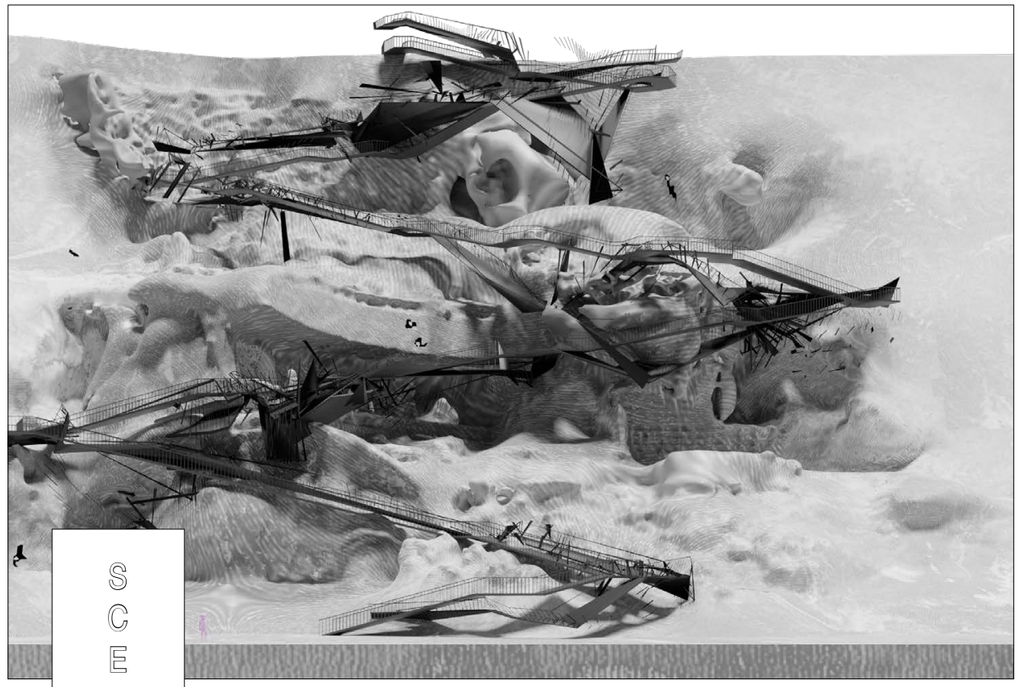
Meshmixer is a 3D modelling software specializing in mesh-modelling and preparation for 3D printing. It produces branch-like structures which function as supports for the model when it is 3D-printing. This function is used, not for actual fabrication purposes, but for the built-in constraints of the algorithm.



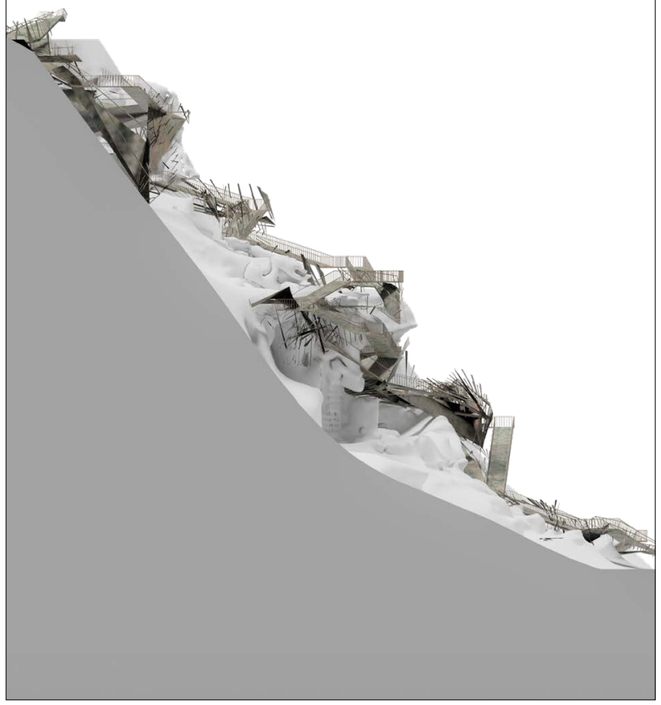
The ReCap meshes in this scene are made into solids. They still keep their most recognizable features but have an added thickness. Since the surface only has one side, that side is both the back and front side. The colour of the surface is thus displayed on both sides equally. When made into a solid, the models gain an inside and outside or back and front. This can be seen in the treatment of colour.







SCENE 4



THE WAY

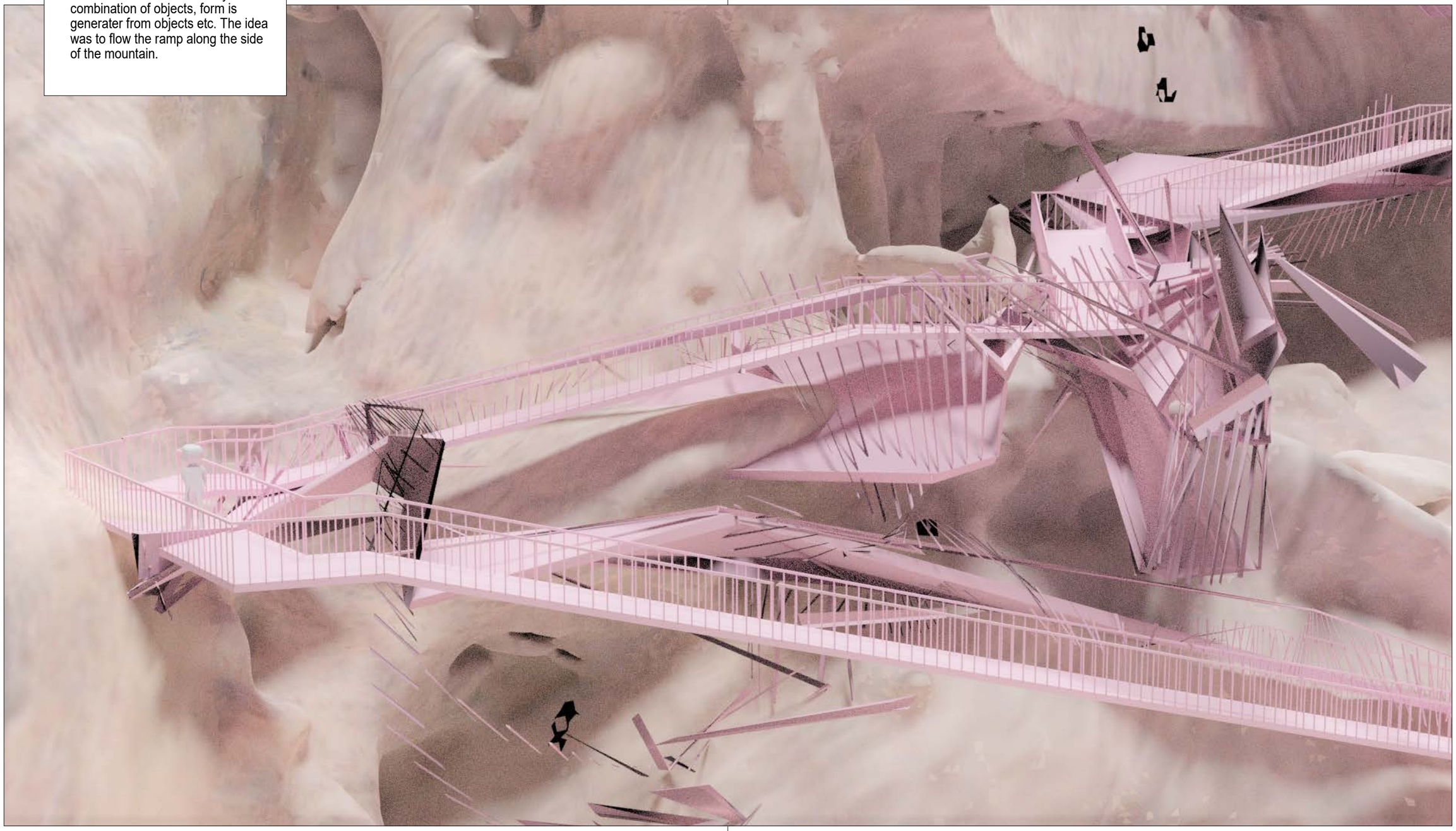
A steep wall is the first thing that meets the eye. A dangerous and maybe impossible climb lies ahead.

The category presented in this scene is the *Drapes*. The theme based off the forms are continuous surfaces. Most of them have a slight incline or stepped slope leading to the treatment of the ReCaps in this scene. The models were exported as point clouds and assembled edge to edge creating a large mass. The point clouds were then meshed to create a collective surface.

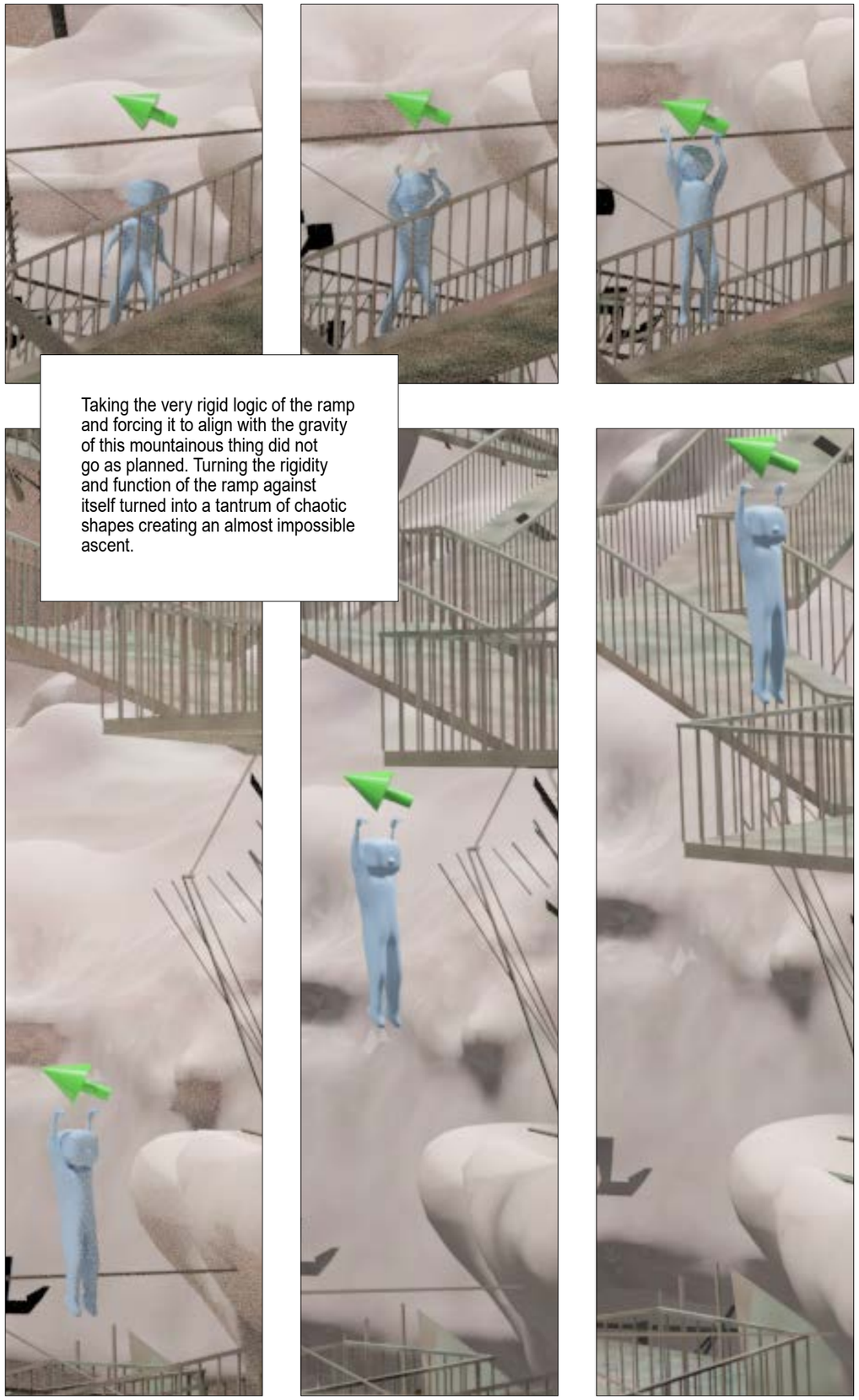
To provide a scale to this massing, and keeping with the theme, a continuous ramp was added.

With this addition, the contrasting attributes of the two model categories turned one into landscape and the other into a ridiculous detour.

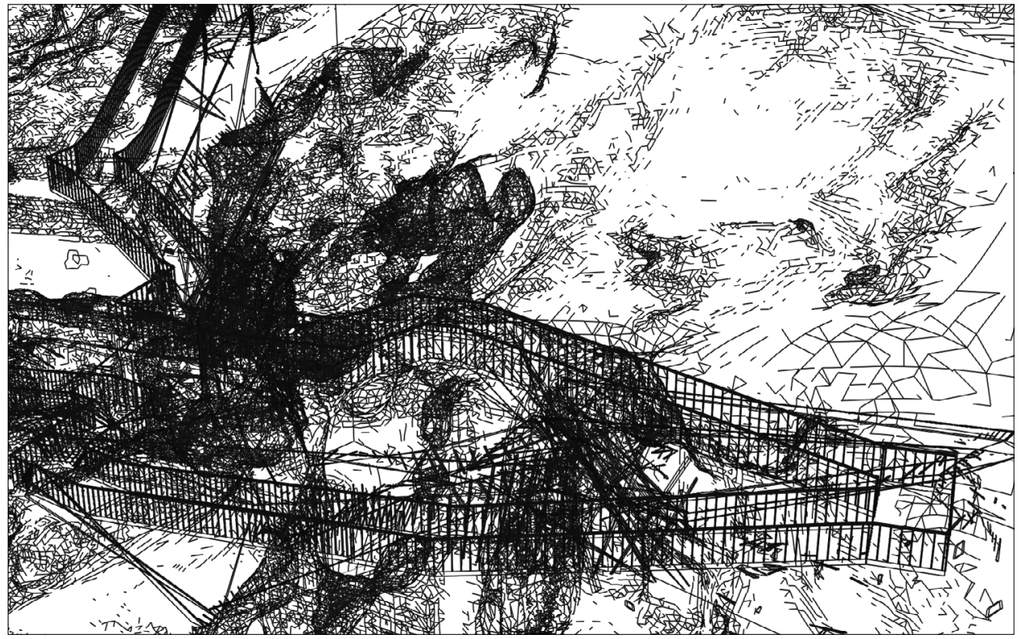
As a general approach to each scene, something has to *happen*. A transformation is incited by the combination of objects, form is generater from objects etc. The idea was to flow the ramp along the side of the mountain.

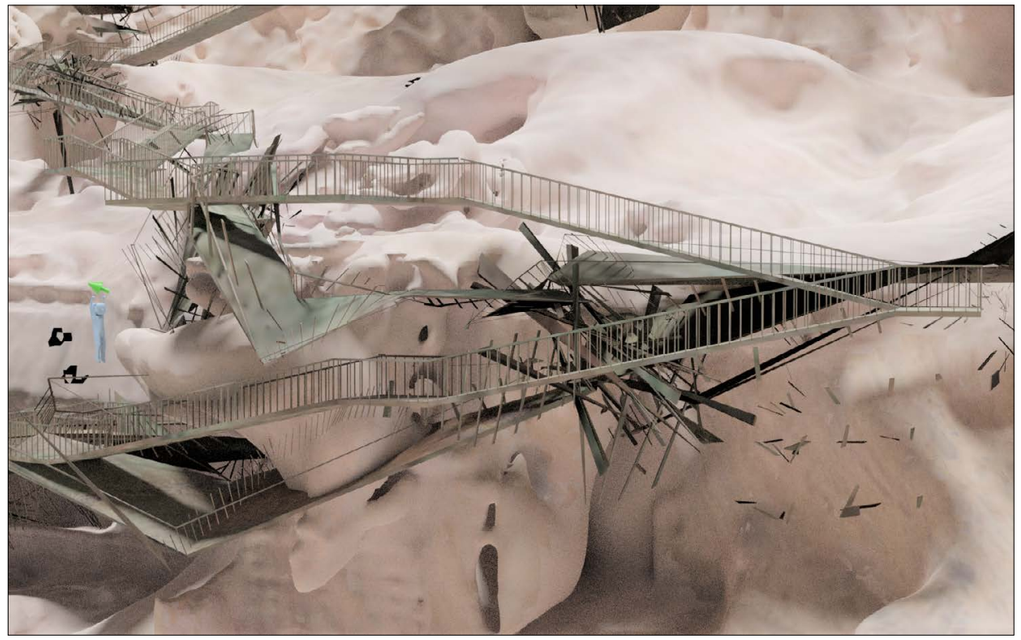


DESIGN OUTPUT

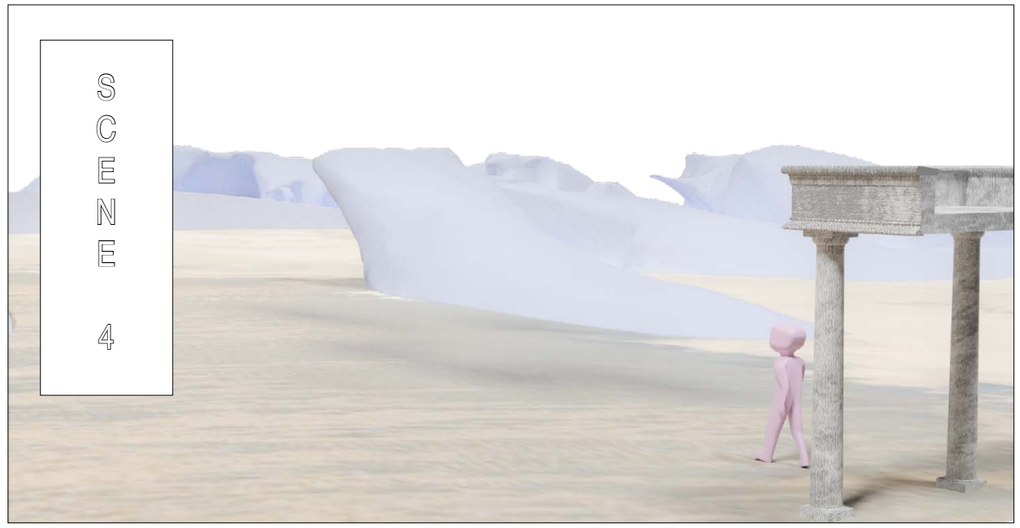


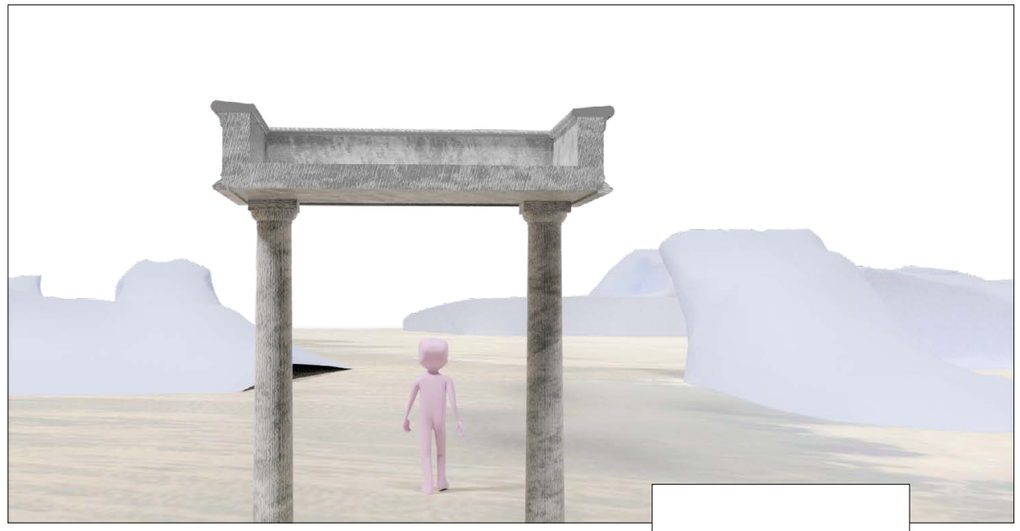
Taking the very rigid logic of the ramp and forcing it to align with the gravity of this mountainous thing did not go as planned. Turning the rigidity and function of the ramp against itself turned into a tantrum of chaotic shapes creating an almost impossible ascent.





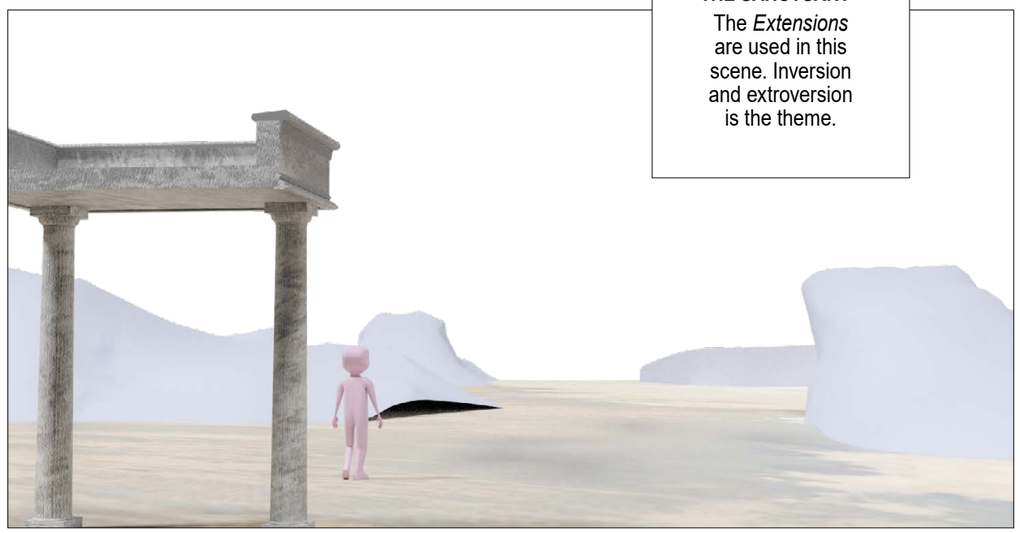
Instead the resulting effect provided even more heaviness to the landscape.

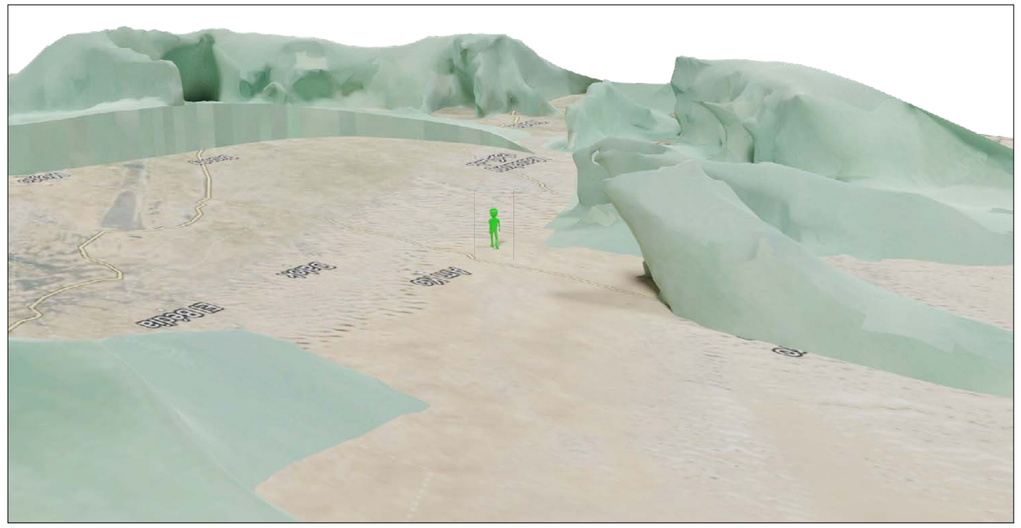


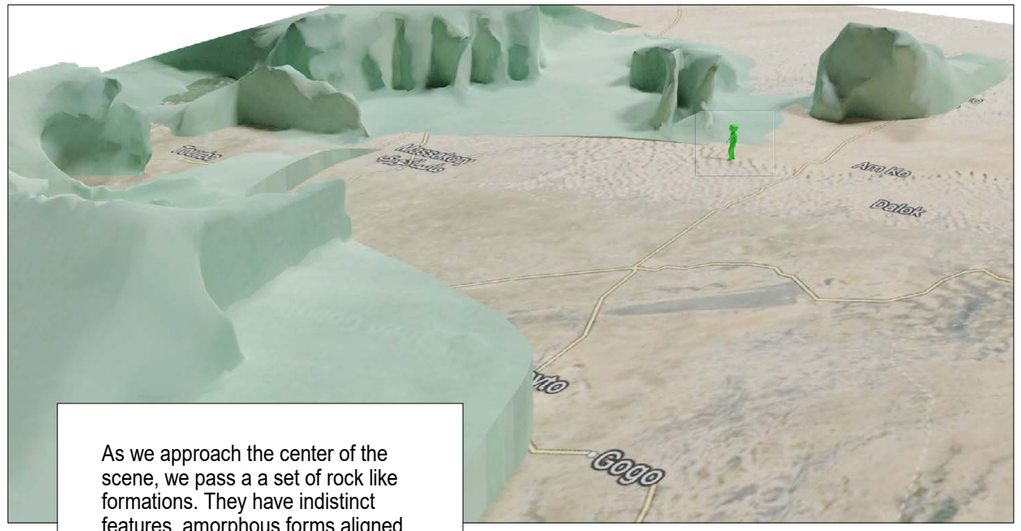


THE SANCTUARY

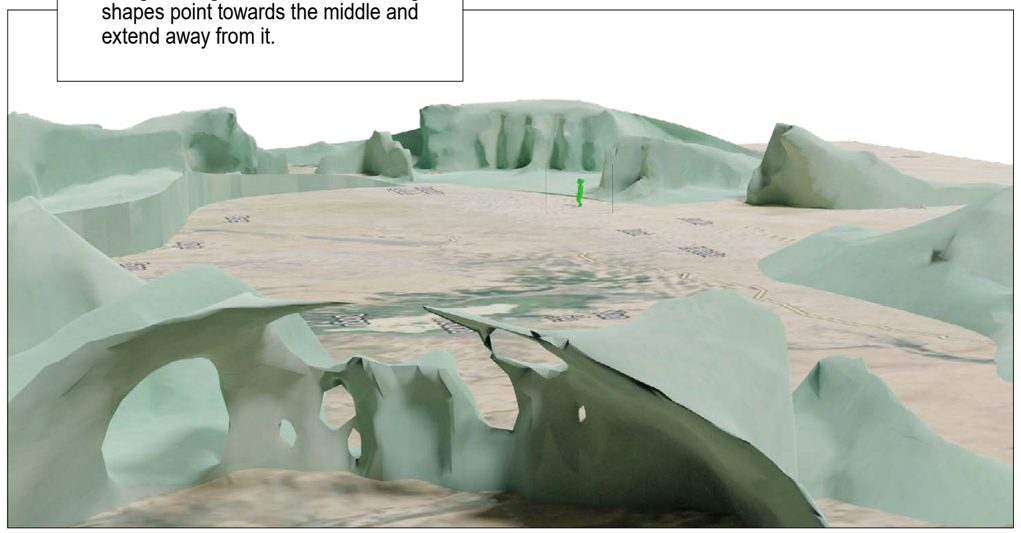
The *Extensions* are used in this scene. Inversion and extroversion is the theme.







As we approach the center of the scene, we pass a a set of rock like formations. They have indistinct features, amorphous forms aligned along the edge of a circle. Protruding shapes point towards the middle and extend away from it.



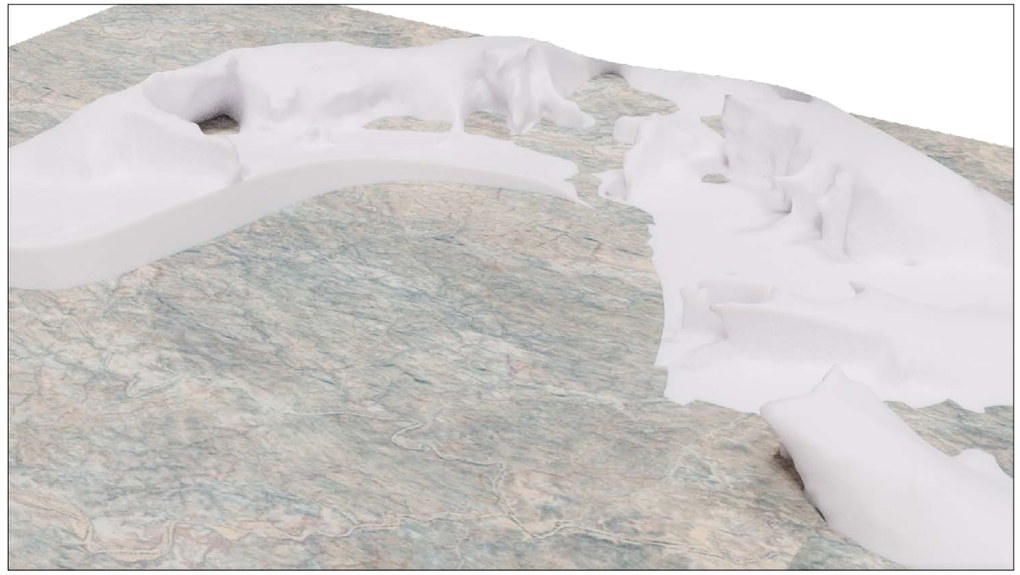
There appears to be two different half circles facing each other. There is no way to distinguish between the ReCaps and the Revits. In the final scene, they have yet again merged.

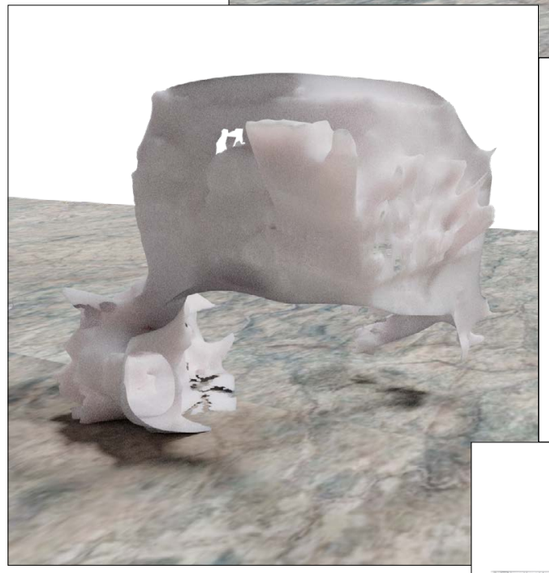
But this time, by a vastly different approach. The various components were arranged into an overall composition and then rendered as a sequence of images. These images were then imported into ReCap Photo and sent into the cloud to produce another photogrammetry model. This procedure was then repeated for several rounds until the original model was no longer legible. Digitizing already digital content.

The process of merging the various parts into one model is sidestepped, the algorithm will assume the proximity of components as a larger whole and output one object.

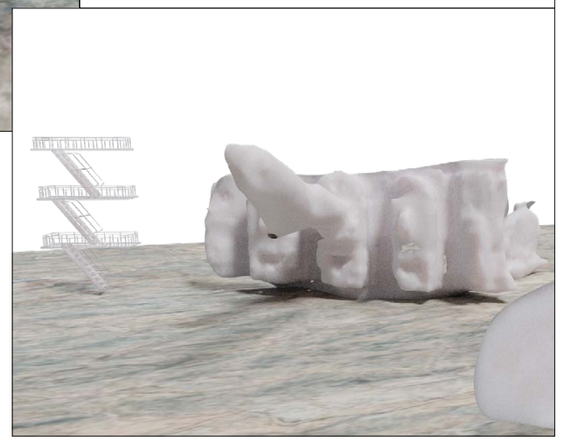
The theme also set up a very reflexive approach to the photogrammetry. The camera did not just revolve around the model, but tried to *recreate* the technique that created the category *Extensions* in the first place.

It is not an easy task to reverse engineer what was seen as an autonomous tendency. A process guided by feeling and trial and error to directly try and grasp the vague parameters of the algorithm. It is a complete reversal of the thesis' method. Everything from camera angles, panning, texture and lighting of models to how they are placed all affect the outcome. To then try to achieve a "A parallel panning shot capturing a cohesive front part with holes in it, such as a wall with open windows. The algorithm can not calculate the depth of such a cavity and thus stretches those parts away from the camera position" (p. 46) was not an easy task in a digital environment.

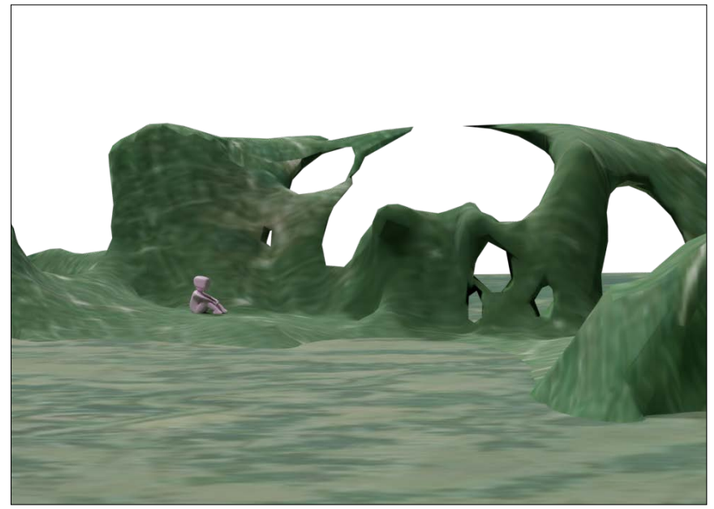


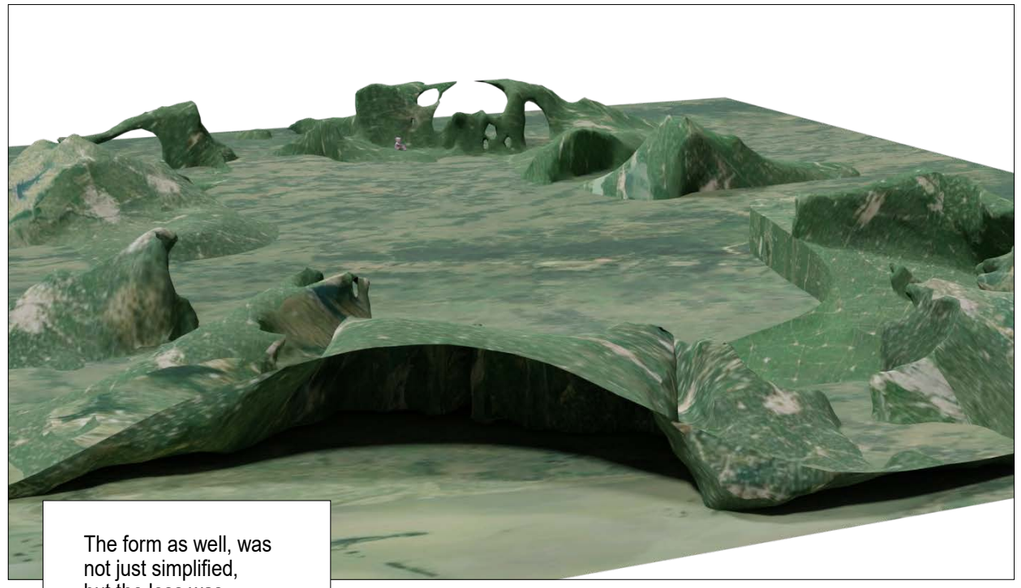


To work outside of precision, to not aim for a specific result and instead use whatever happens to be the output, is a preferable method that will not induce headaches. To turn this haphazard method and try to reach a predefined output by calibrating more or less unknown parameters cannot be recommended. But for the sake of testing the method and level of knowledge reached throughout the project of this particular algorithm, this meta approach was carried out and successful to an extent.



On the opposite side of the circle is a mirror model that have been through four iterations of photogrammetry, losing much of its original characteristics. The progressing (or detoriating) series of models have visual references to physical aging but here the thing being worn off is the complexity of the mesh.





The form as well, was not just simplified, but the loss was interpreted and patched by the algorithm to progressively change the shape of the object.

END

DESIGN OUTPUT