

# Hybrid Analytical Representation

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*The diagram serves the design process through its inherent adaptability as a mode of representation. It is called upon at each phase of a design's evolution to serve the process in a wide range of capacities, both internal and external. As an operation, diagramming is a method capable of sustaining - or even bolstering- both non-linear inquiry as well as external explication. It can serve the individual as a tool of meditative exploration; it can function as the bridge, offering a translation of complex ideas by relying on a notational language that supersedes discipline-specific conventions or vocabulary.*

*At its best, the diagram is a generative orchestration of measured, edited data that moves beyond the pictorial. Moving both out and in simultaneously, the diagram holds the potential to be the common ground, the meeting place between designer and client, designer and consultant, designer and designer.*

*But recognizing the potency of a diagram is not enough. Is it possible to develop a method of diagramming that moves beyond the confines of whatever the current technological trappings might be? That is, instead, beholden to a notational language, one that comfortably moves across media? This paper explores the pedagogic potential of hybridization to define a liminal region where operative and scripted diagramming methods congeal in a single design process.*

## 1 INTRODUCTION

The described pedagogy underpins a series of design diagrams that shift between precision and looseness, quickly moving beyond the image of the landscape in favor of immersion in its phenomenological experience. Students develop the work through a process of transforming and compiling diagrams. The students are asked to

build these pieces prioritizing a consistent notational language that will, at times, favor digital media while analog at other times. Rather than focusing solely on product, students are asked to respond to the evolutions incurred by each transformation.

## 2 PEDAGOGY

### 2.1 Notation . Language



Figure 1 . Black City, Julie Mehretu

“...to give these sounds to people in a form that has constant availability and yet is not a past event but something which is continuing.” Max Neuhaus

Site documentation. This is such a typical beginning to a design studio project that the process has become largely homogenous and uninformative. Students wander through landscapes taking endless unfocused photomontages that are (maybe)

assembled back in studio and left mostly uncultivated. The gathering of data from the site is, in theory, the beginning of the design process and should aim to actively balance interpretation with democratic collection.

This project, explored within the context of a two-week wintersession course at the LSU Robert Reich School of Landscape Architecture, works with the potential of notational language to drive site documentation towards an active agency that generates speculation, analysis, and interpretation simultaneously, thus initiating (rather than delaying) the design process. Students are asked to read the site by simultaneously defining and annotating over time and across space. This approach results in a feedback loop of diagramming and notation centered around moments of dynamic release and static constraint. The result becomes a didactic matrix of iterative diagramming that can be used to critically examine switches, breaks and evolution on site.

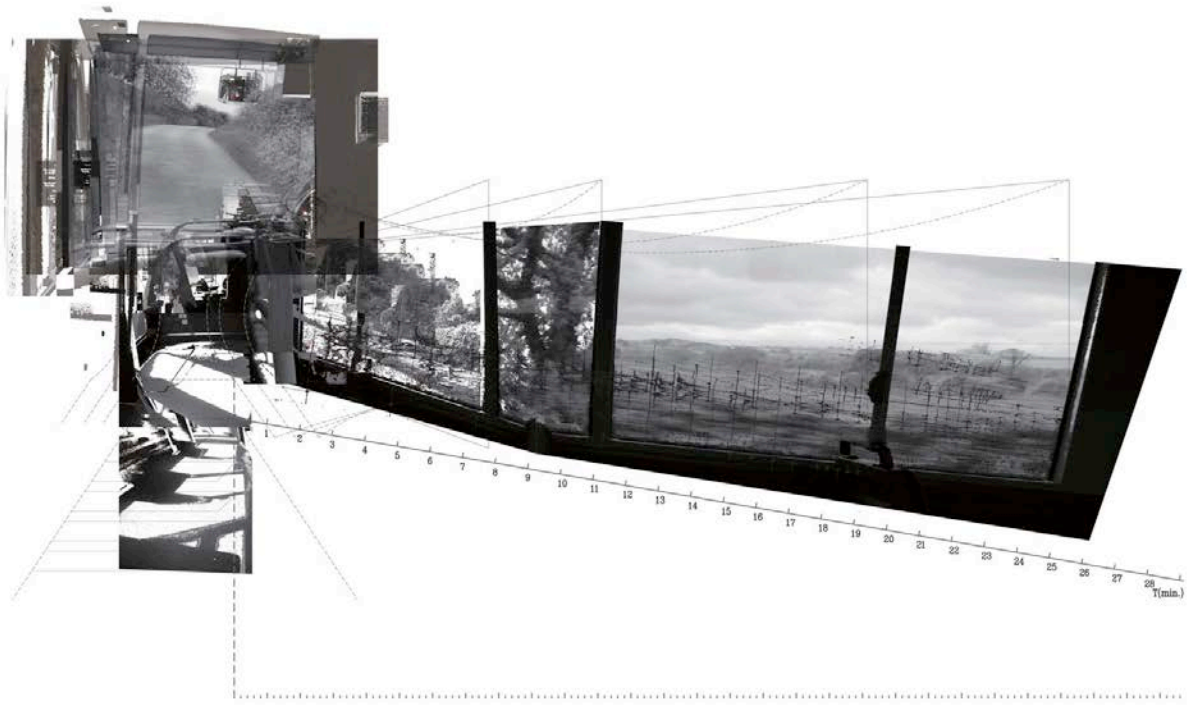


Figure 2 . Mei Fang Liao; Bus Transect



Figure 3 . Site aerial with transect overlay

The selected site, the intersection of the Mississippi River Bridge and downtown Baton Rouge, provides a rich palette of phenomena and temporal ecological disturbance. Students engage the site through a series of recordings that analyze the impact of the phenomena on the condition of the site. Using assigned transects, students track the interferences that create deflections, deviations, or deformations in the volume and/or surface of the site. Students are introduced to a notational language of mark-making to describe the force and trace of the interferences. Each student produced an initial analog map based on the following process:

1. Each student is assigned a transect in either the north/south or east/west direction. The transect becomes the focus for each student's recordings and observations.
2. Students choose a single phenomena such as light, use patterns, hydrology, weather, sound, and geomorphology.
3. [CONSTRAINT] Each transect is measured and documented through photography. At least one set of photos must be taken at each grid intersection.
4. [RELEASE] Over a 2-4 period, the phenomenological interferences are documented. This is notated in plan and section, measuring as precisely as possible to determine the location(s) and trace of each interference.
5. Using mylar as the middle ground, a layered mapping of the transect is built using photos from each grid intersection (individual shots or assemblages), timeline demarcating duration of site observations, and notations describing the space and force of phenomenological interference. All of the marks are limited to point, lines, and planes (which can be further differentiated by size, shape and opacity).

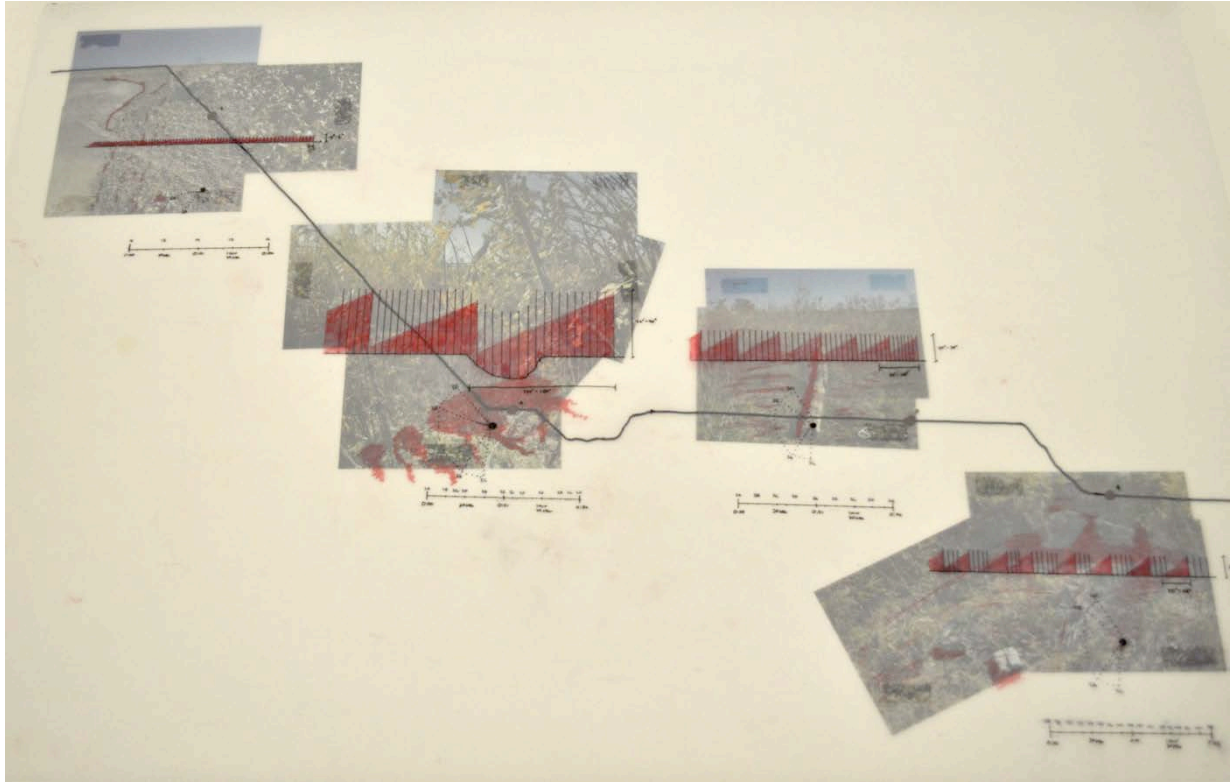


Figure 4 . Charlie Pruitt Notational Site Diagram

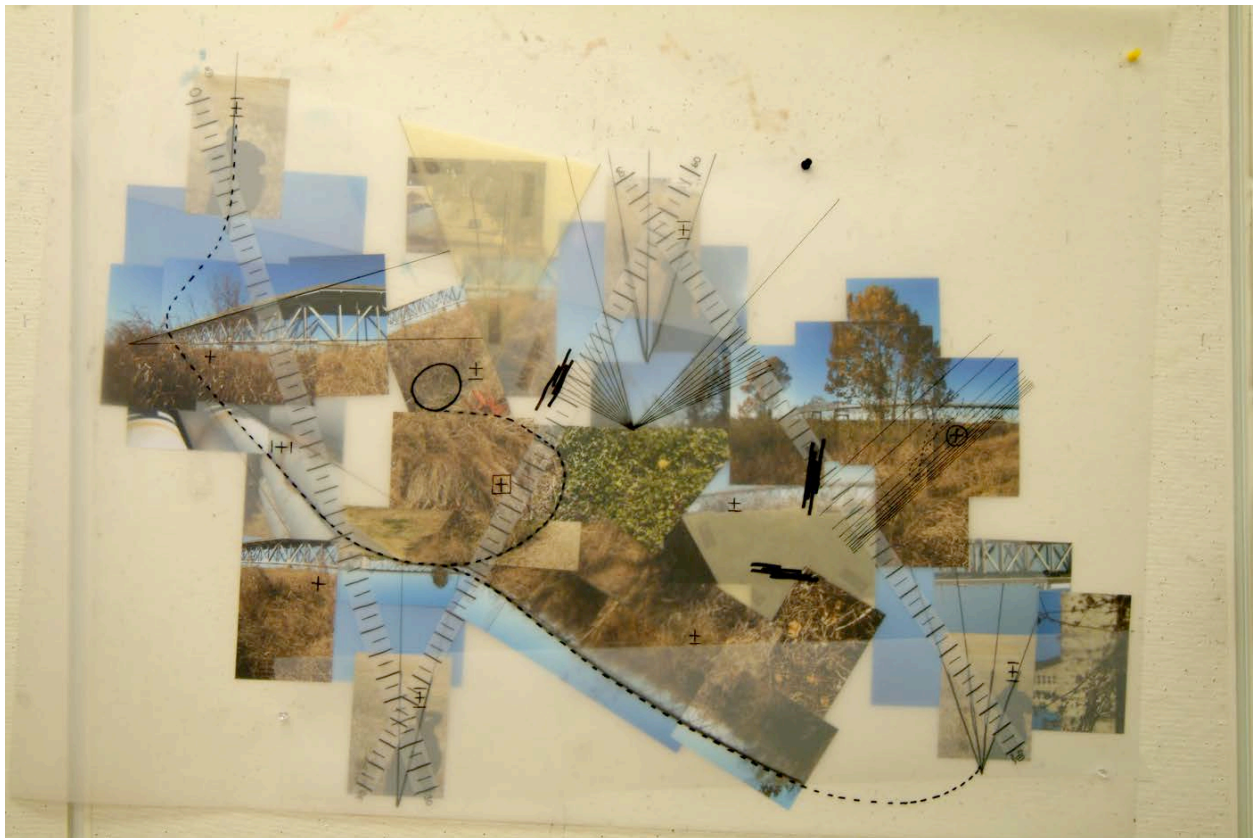


Figure 5 . Will Tietje Notational Site Diagram

## 2.2 Digital Model . Quantify

“Notations always describe a work that is yet to be realized. Even if already performed, the work it describes is open to interpretation and change in the course of future performance.” Stan Allen, *Mapping the Unmappable*

The notational mappings, the first extraction from the site, provide the necessary base data for the next iterations. These marks are tied to the site but, more importantly, lack a formal determinism that would lock them into a particular reality. The notations document observations and establish a set of ordered relationships or networks onto which new speculations can be projected.

In the next iteration, students are asked to quantify the relative notational marks (site data) for use in the construction of a series of data-driven models. The models act as sites in and of themselves, with immaterial topographies that describe relationships, continuities, and boundaries according to their initial recorded phenomena.

Using the analog site mapping, students reinterpret the virtual grid of site transects. The grid is transformed based on values attached to the initial site recordings; all transformations are tied to the grid points, polys(cells), and edges. To build the digital model, students were required to quantify and interpolate the information represented in the site mapping, attributing values to the recorded data using the following value ranges: binary (off/on), value (amplitude), vector (movement, change). In addition to their own mapping, students were also asked to compile the values assessed by their colleagues. This requires the interpretation of the entire class' work in order to develop a data set based on each point of the grid. The data set is created with a defined range of values that may be applied to a variety of transformations.

Using a provided site model each point is given a value that defines the point's Z-elevation to create a site topography that expresses the recorded site phenomena. This topography is an abstraction of the recorded phenomena as it relates to the datum (0 or ground elevation) and may be in either the positive or negative vertical direction. Depending on how the data is interpreted it is possible to tessellate the grid points in order to further refine the topography and to maintain data fidelity. The topography created is a new site representation that relates each data point by the resulting connections between the edges and polygons. This topography represents a single phenomena across a continuous topology.

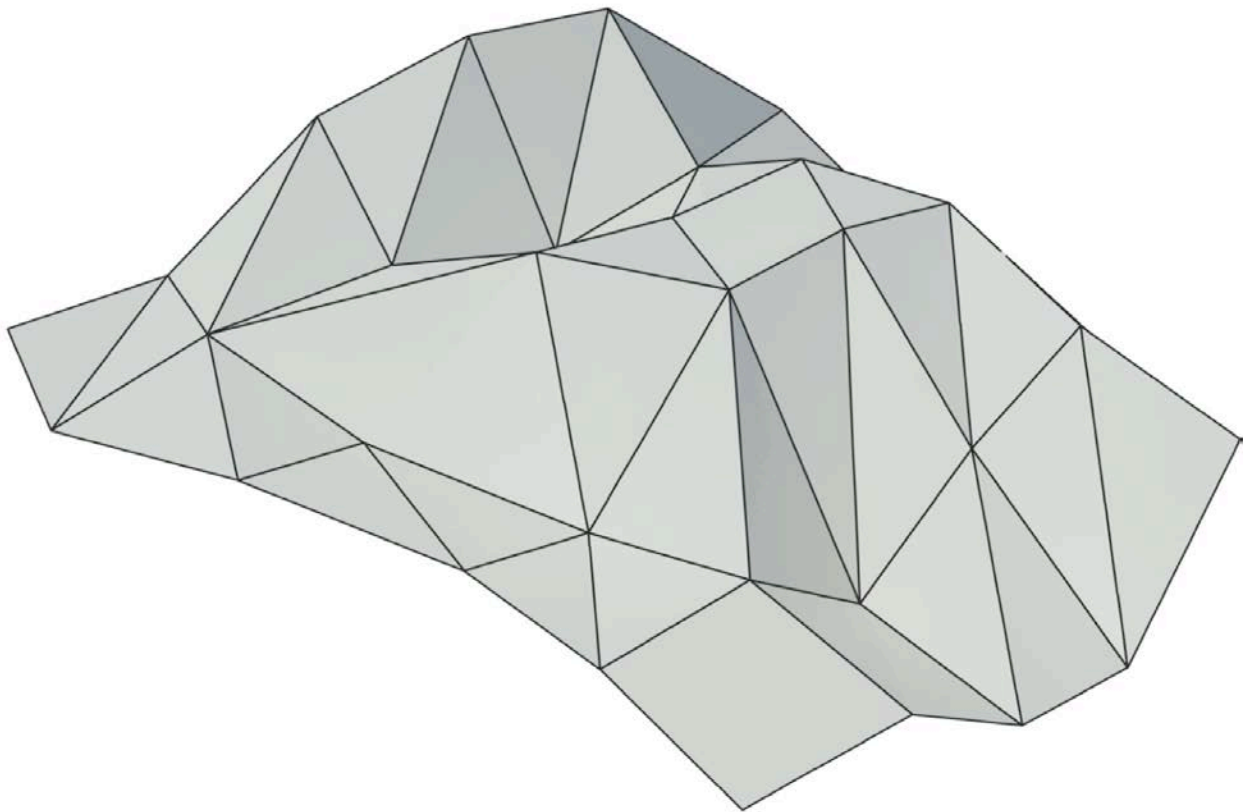


Figure 6 . Emily Bullock Topography 01

At this point students create a copy of the topography, allowing for a second iteration to be created that will explore the relationship between the original phenomena

and a second phenomena. Using their colleague's data, students model a secondary relationship using an extrusion and beveling. This gives up to three transformations to map data to, the vertical height of the extrusion, the beveling of the resulting column, and the xy transformation of the upper horizontal plane, parallel to the lower/upper topography. This procedure does not refine the topography but attempts to map with the aforementioned transformations.

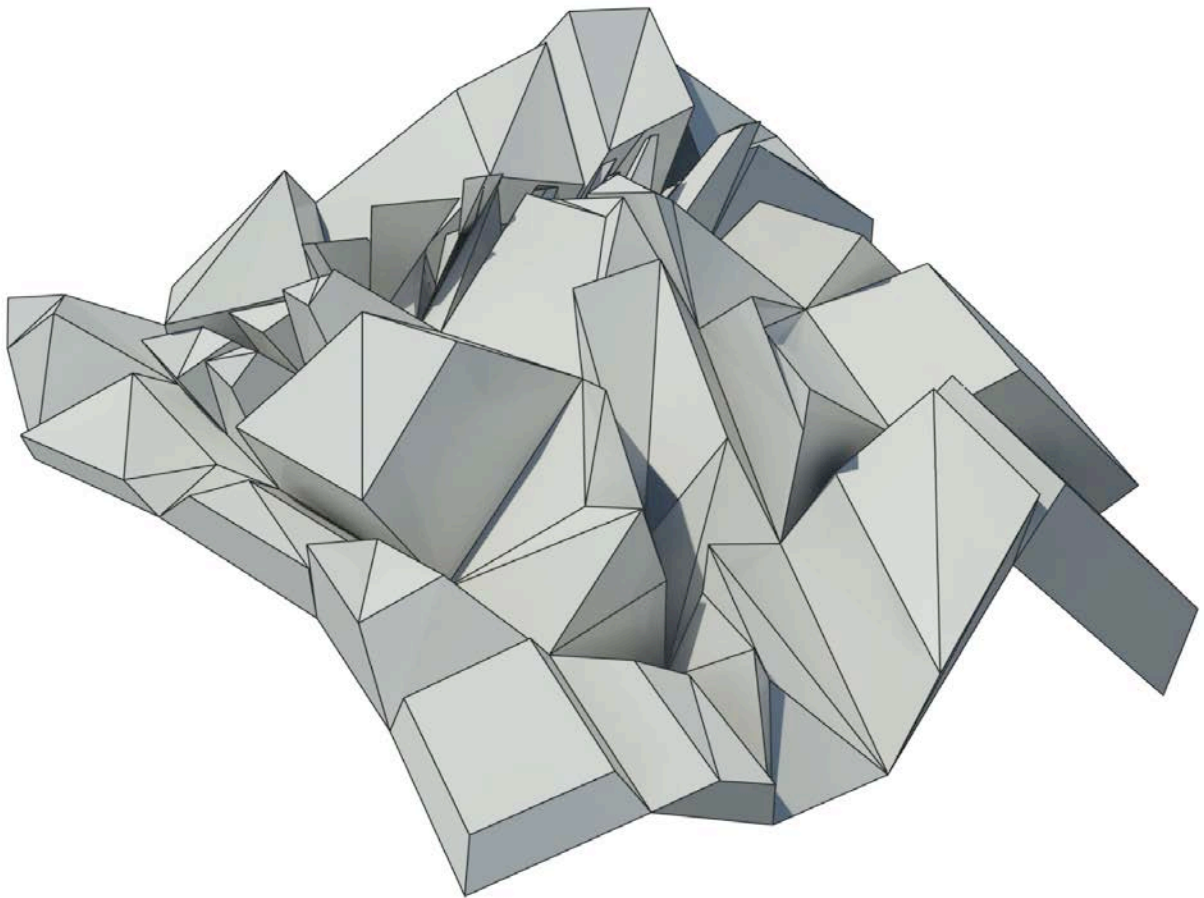


Figure 7 . Emily Bullock Topography 02

A copy of the second topography is created to begin a new iteration that will explore relationships between the mapped phenomena across the site and/or time. This relationship is explored through modeled horizontal connections between the vertical

columns. This begins with tessellations on the sides of the vertical columns, the number of tessellations and the connections speak to the lateral connections and/or time.



Figure 8 . Emily Bullock Topography 03

### **2.3 Illustration . Clarity**

“The pieces are diagrams of an 'adaptable framing device' with which to decode current and developing urban conditions.” Petra Kempf

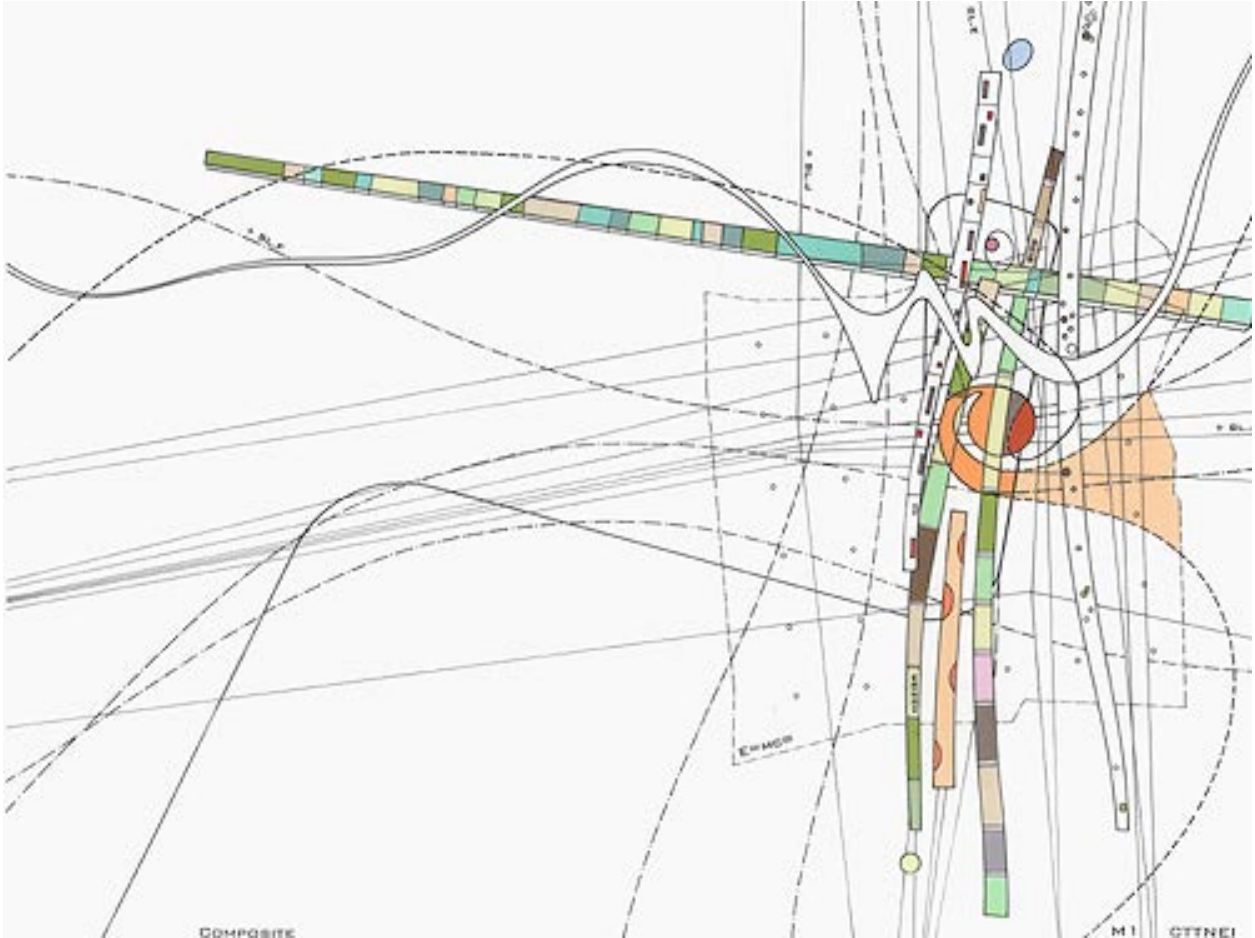


Figure 9 . Petra Kempf, You are the City

The quantification process explored in the digital modeling produces an abstraction, further removing the creator from the physical site. But, this process also simultaneously heightens the relationship between the intertwined phenomena. Complex new readings of place, systems, and time can now emerge, unencumbered by the unavoidable didacticism of the physical site.

At this stage the representation must be dissected, examined and re-presented in order to explicate the quantification. The renderings of the generated topography from the previous exercise are used as the basis for a technical illustration, annotating and highlighting the phenomena represented in the model. The model is dissected using

slices and section cuts in 3d modeling software and then illustrated and annotated in vector editing software. The rendered views slip back hierarchically and the section cuts become a new network into which seasonal change is projected; thus, students must identify and quantify states that exist between the points, polys, and edges. The introduction of seasonal change provides a datum that requires students to make speculations about how the phenomena they observed in relative moments in the first site visit can be used as an analytical reference for speculation about the entire year.

A similar language of points, lines, and planes, differentiated by size, shape and opacity, are used to create the technical illustration. This is an annotated illustration, different from the original drawing which attempted to record, narrate and express phenomena. The illustration elucidates the viewer as to how the interference created by the phenomena changes throughout the seasons. While some technical illustrations may be used to convey information to laypersons, the audience for this illustration is the student's colleagues; therefore the content is specific to design professionals.

Spring

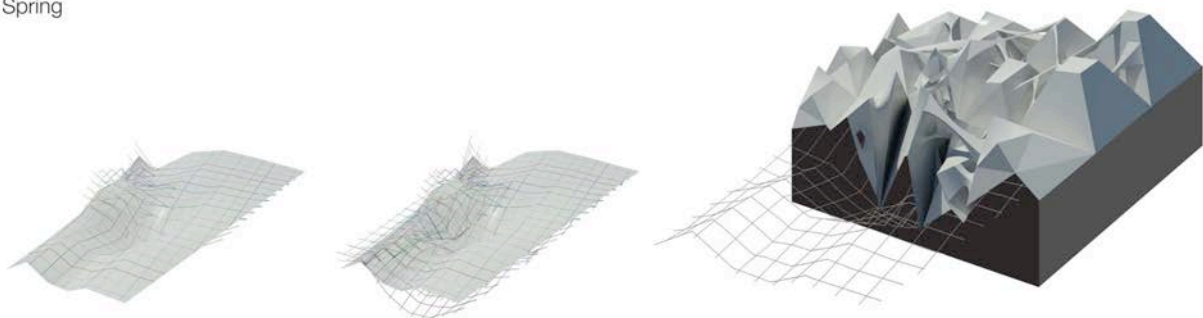


Figure 10 . Will Tietje Technical Illustration

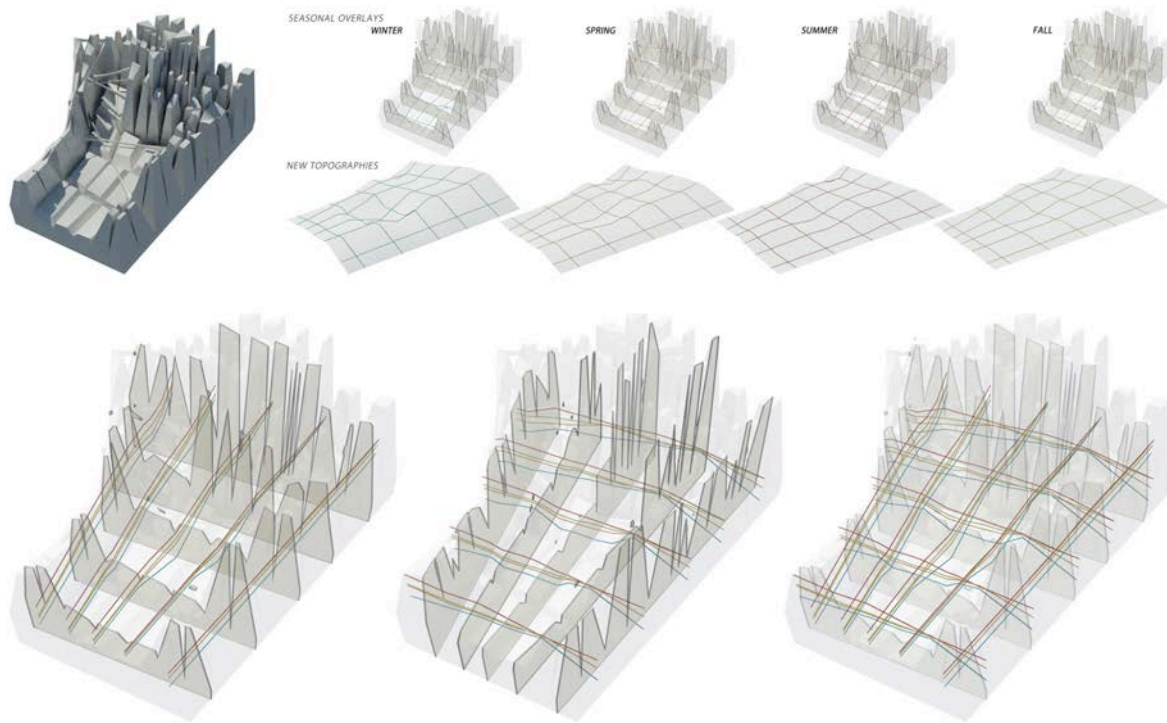


Figure 11 . Alex Ramirez Technical Illustration

## 2.4 Model . Compile

“We must constantly ask ourselves what the use of a particular material could mean in a specific architectural context. Good answers to these questions can throw new light onto both the way in which the material is generally used and its own inherent sensuous qualities.” Peter Zumthor, in *Thinking Architecture*

The notational language used thus far has been critical to the identification of new interpretations of place. The separation from form allowed by the limited marking palette focused the thinking on phenomenological relationships and the explicative nature of the technical illustrations required a certain level of control over one’s speculations. In the next iteration, physical materials are introduced. The

unavoidable presence of gravity and structural integrity introduce a material accountability to the design thinking.

Working in two groups and with the technical illustrations as a guide, the site is then expressed as a composite physical site model, using each of the transects as an armature for the expression of the phenomena. The groups are divided based on the site transects with north-south transects in one group and east-west transects in a second group. The physical model is constructed using seven materials: one material describes the site transects and the remaining six materials express the interactions of each phenomena throughout the site.

The transects are constructed from chipboard, cardboard, basswood, or wire. Each group comes to an agreement on how the transects will be represented and constructed. While each transect will likely assume its own form, the material and representation strategy is similar across the model. After the transects are complete, each group member weaves their phenomena into the site using a new material (i.e. 6 new materials (one per phenomena) are woven into the transects). The weaving process creates a three-dimensional, physical transformation of the notational information contained in the previous assignments. Each group is required to negotiate and agree on how the materials will be used to represent each phenomena in order to create a legible and meaningful strategy for connections, overlaps, adjacencies, and boundaries.

The analog model inherently slows down the making process, introducing increased time within which the students can more fully engage with the fundamental value of their transformations. This method requires real-time, verbal negotiations

between students and creates an analog parametric model that is shaped through composite interactions.



Figure 12 . East West Physical Model

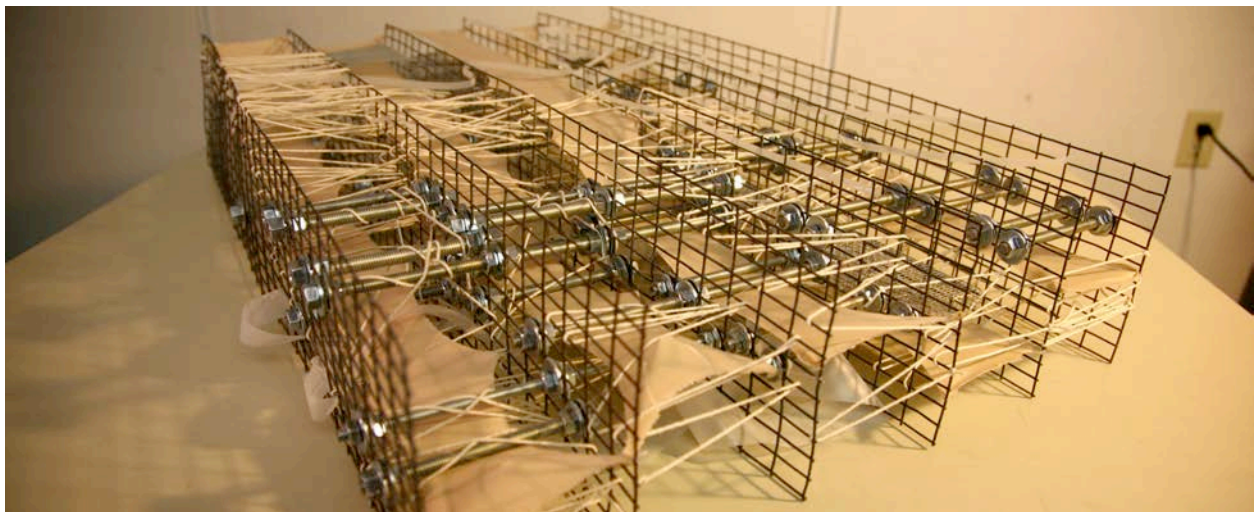


Figure 13 . North South Physical Model

## **2.5 Animation . Disassemble**

We cannot conceive time as a mere physical dimension; we can only grasp time through its actualizations: the traces, places, and events of temporal occurrence.”

Juhanni Palasmaa

Returning to the initial pedagogic idea that analytical pieces made in the early phases of the design process can immediately present and enable design interpretation, this step looks at the model as a three-dimensional notation, an active ground in and of itself. This transformation asks the students to disrupt their understanding of the model as a finished piece and to disassemble the model through a recorded performance. Each group identifies key moments expressed in the site model and disassembles the model in order to express the connections between the static and dynamic site components. The dis-assembly highlights the dynamic qualities of the site, focusing on connections that are represented by a third material introduced through the course of the animation. This dis-assembly is documented as a stop motion animation. Students introduce materials (wire, dowels, etc) to highlight the apparent connections revealed during the course of the stop motion animation.

Each group creates a script of moves, a recorded strategy to disassemble the model. The script identifies key moments that will be followed in order to create the animation. The script is written notes and key diagrams, similar to an instruction manual that could be given to an individual to recreate the deconstruction process.

The disassembly process breaks down change into a digestible five images per second making each move extremely deliberate. As each component is choreographed

a further understanding of the model's construction is implicit and illustrated through the recording of each frame.



Figure 14 . Filmstrip of North South Physical Model Animation

## 2.6 Storyboard . Analysis

Grounds operate with great nuance. They resist hierarchy. There are no axes, centers, or other obviously explicit means of providing orientation. Single, uncomplicated meanings are rare. Instead there are open networks, partial fields, radical repetition, and suggestive fragments that overlap, weave together, and constantly transform.”

Robin Dripps, from “Groundwork,” in Site Matters

The deconstruction process occurring in the stop motion animation requires reflection and interpretation in order to move beyond a representational exercise. Using frames from the stop motion animation students create an annotated storyboard diagramming the key moments within the animation and the transitional stitches that hold the animation together. This “reverse storyboard” acts as a series of time-based diagrams tied to key frames in the animation sequence within which the seemingly chaotic movement can be digested and articulated as a series of dependent and quantifiable relationships. The term “reverse” is used to describe the new position the storyboard is given within the larger process; rather than functioning as a planning tool it becomes an analytical tool. The storyboard is not just reflective but also comprehensive in its analysis, thus creating a composite of the full animation. Change is analyzed based on comparisons between frames and against the larger set of imagery. Students

interpret the group animations as a system, attempting to elucidate the process of change. Each group exchanges animations and scripts in order to create the reverse storyboard.

The animation and script are examined in order to determine the focus of the storyboard and reference points. Each student develops a strategy to layout key moments in the animation, a process which involves extracting approximately 1/10th of the current animation (approximately 30 frames). Using the now-familiar notational language of points, lines and planes, the frames (in-betweens) are analyzed and diagrammed to illustrate the process of change with a notational scoring. The final product is a series of 20-30 diagrams and/or a single running diagram that accompanies the frames from the animation.



Figure 15 . Will Tietje Reverse Storyboard

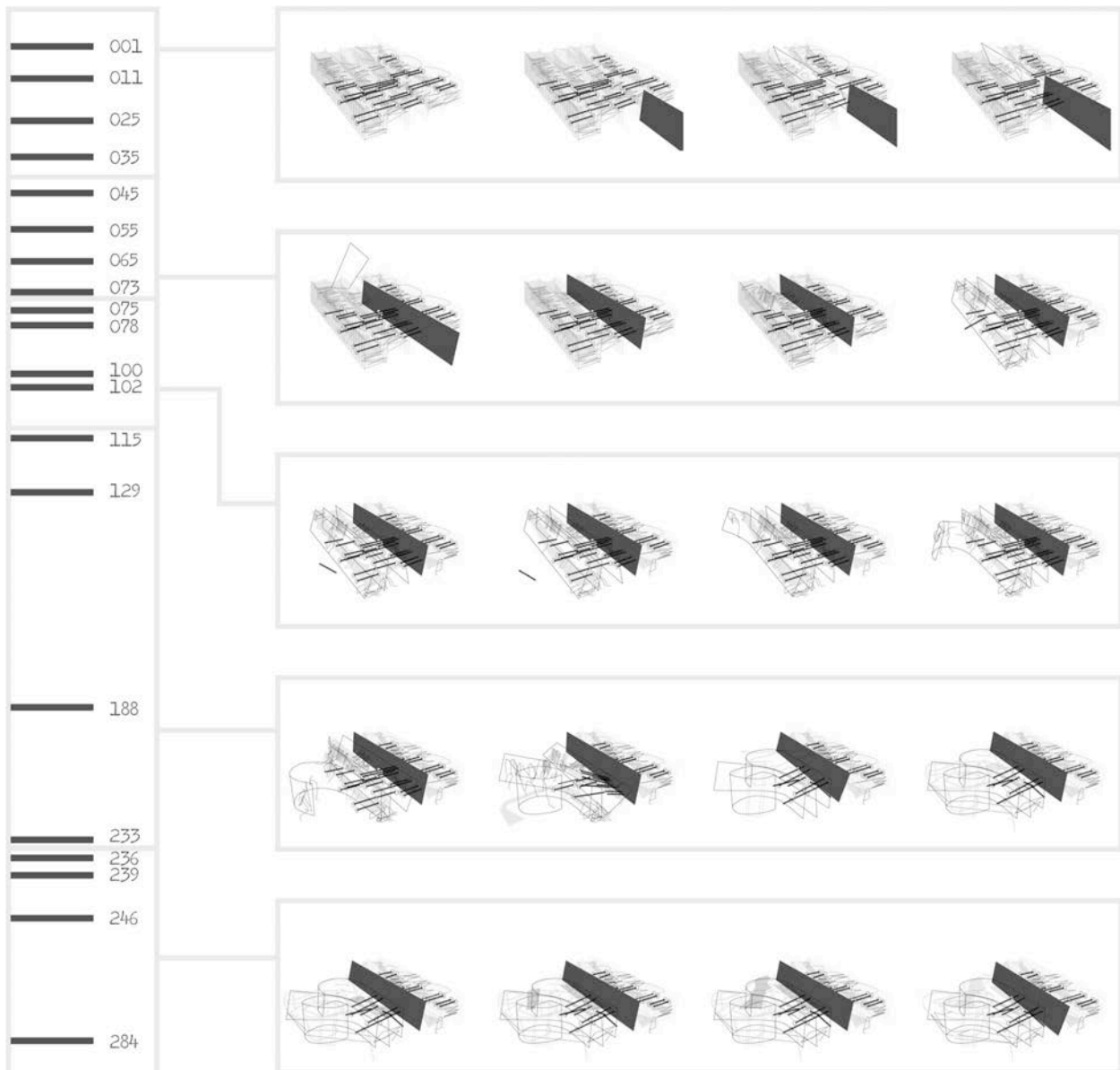


Figure 16 . Jessica Carvajal Reverse Storyboard

## 2.7 Sculpted Motion

Animating a subject is a process that illustrates dynamic processes and requires dissection and transformation to clarify it as an analytical piece. Like many forms of representation, animation exists through of its subject but upon creation becomes a subject itself. The previous (reverse storyboard) analysis of the animation yielded a series of diagrams that develop a relationship between the dynamic transitions within

the animation. This creates a method to interpret the information and further illustrates hierarchies between chaotic elements. The product of that analysis then becomes a new entity taking on a physical form. The students are asked to design an object that represents the motion analyzed within the previous animation and reverse storyboard. The final object becomes a static representation of a period of time, essentially a sculpture of motion.

Through a series of sketches the students derived the form from the annotated storyboard, identifying key profiles within the storyboard diagrams. This process began as a series of sketches and/or composites looking at the relationship between the diagrams. The profiles pay close attention to the transitional stitches, translating these moments into an interconnected form. The sketch profiles are translated into technical drawings to prepare objects for manufacturing.

The groups created CAD drawings and/or models that were used to create laser cut plexi, wire and/or chipboard models. The technical drawings are a translation of the sketching/compositing process. The model captured the motion created and analyzed in the animation, using the processes of cutting and etching in the laser cutter to form the profiles and embed data.

The pedagogical impetus for “sculpted motion” comes from the earlier work of Urs Hirschberg at TU Graz and Allen Sayegh at the Harvard Graduate School of Design. In a workshop at TU Graz, led by Hirschberg and Sayegh, students attached motion capture points to key portions of dynamic movements. This could have been a person dancing or a pendulum swinging and then used the resultant captures to develop formal compositions. In a similar manner students tracked specific phenomena

across frames within their animations and used the result to create sculptural compositions. The sculptures not only represented the information at specific moments in time but also the interrelationships between components.

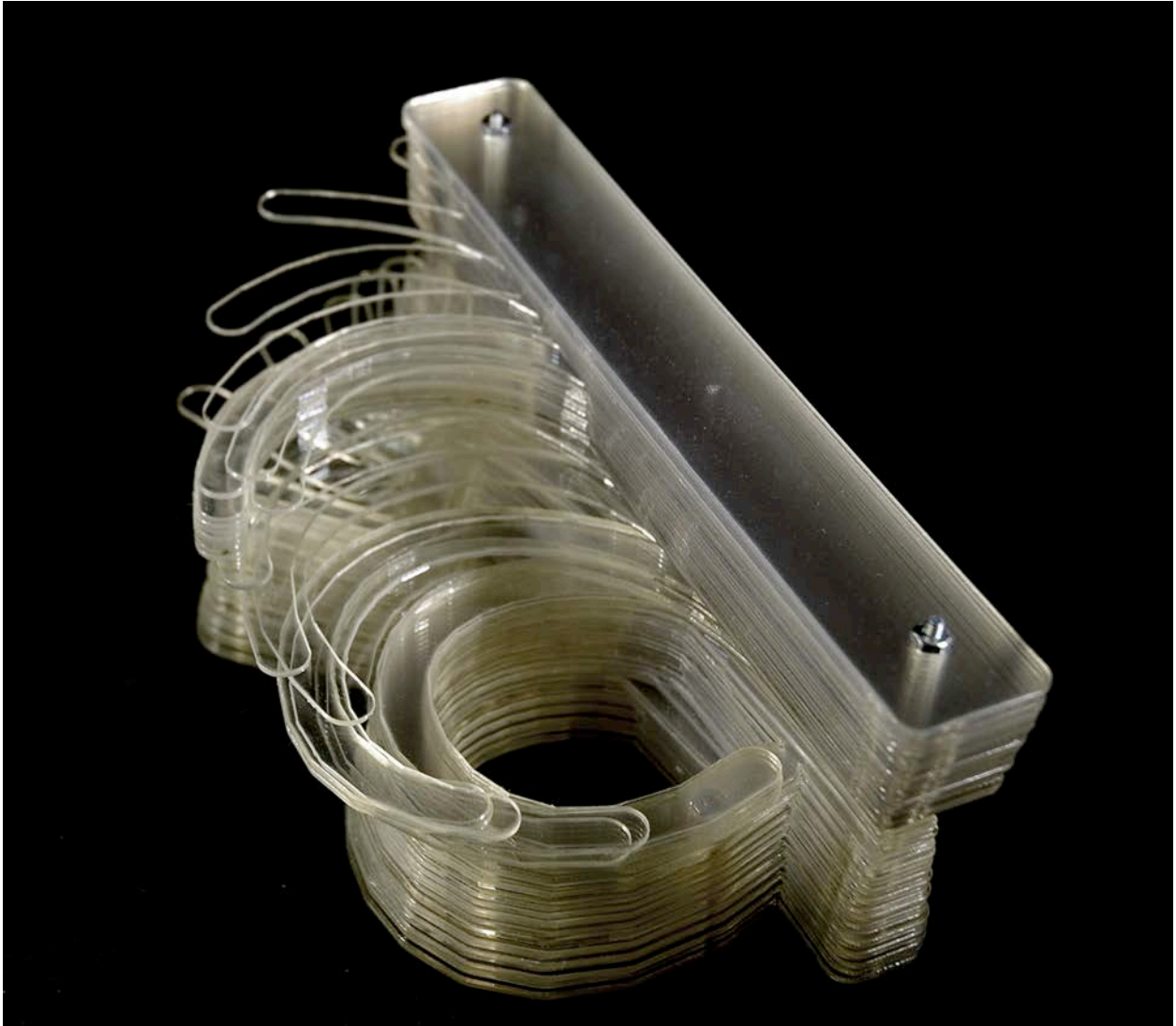


Figure 17 . Jessica Carvajal and Emily Bullock Sculpted Motion



Figure 17 . Alex Ramirez and Will Tietje Sculpted Motion

### **3 CONCLUSION**

The typical process of site inventory and subsequent analysis can so easily be superficial and lacking in self-criticism. This is particularly true when sites no longer follow typical roles that “McHargian” mappings have helped to understand in the past. Emergent technologies present a tremendous variety of operations and outputs, but do not bear the responsibility of pedagogic integration. The process of judiciously adapting and hybridizing technologies, views, datasets, and site systems must fall, appropriately, to the educators. We must instruct not solely on the acquisition of skills but on the transformation of site data between anecdotal and quantifiable systems, on the dissection of composite analytical processes, and on the value system that governs the

selection of the appropriate media to explore design questions. These processes build a body of work that can be used to tease out the intricacies of the representations used to describe the ephemeral or unknown. This culminates in a re-visioning of the site diagram.

Designers cannot merely recognize that diagrams are important but instead must confront the methods and procedures involved in their assembly. The ability to move between loose and tight media is necessary to create a fluid working process that resists the gestural and embraces the quantifiable. To engage change, time, and phenomena as site-shaping forces, designers must foreground these two dialectical modes of representation. The possibility to “feel” a site while also obtaining data that can be inserted into an analytical design process is necessary to understand site specificity. The aforementioned pedagogy has approached this through notation, quantification, simulation, dissection and hybridization.

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