

# Sectional Practices: Between Archeology and Generation

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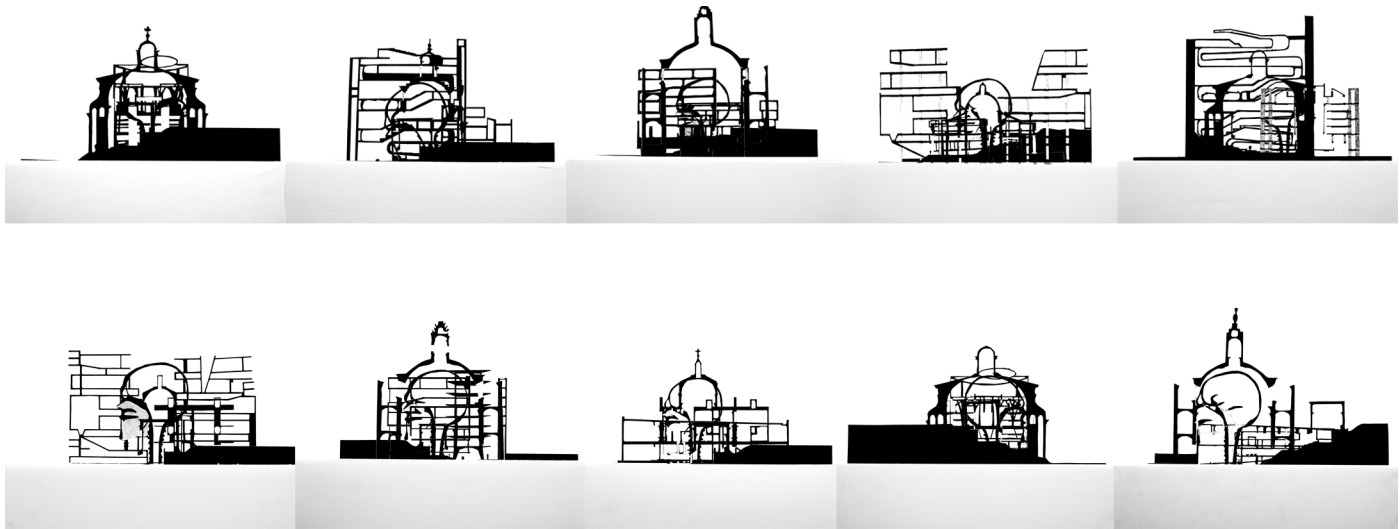


Figure 1: Two-dimensional superimposition machines

**How do the history and archeology of the section drawing become a generative tool for speculation? The studio work presented in this paper posits two-dimensional and three-dimensional methods for working within the limits of section in order to leave information behind.**

## INTRODUCTION

All architectural drawings leave gaps in information. Most complete drawing sets typically consist of plans, sections, elevations, and details. Each of these sets leaves the impression that a combination of drawing types is comprehensive, that more information is better, but gaps always exist. The introduction of digital modeling and fabrication tools furthers this comprehensive notion as plans and sections are easily cut from a constructed digital model and are extruded into space via laser cutters and CNC Routers. In this way, the historic section drawings that have served as precedents within the architectural discipline are placed into a remote category as digital tools make proximate novel forms that are easily cut with a section tool. When fabrication and assemblies are introduced in construction, however, material methods and tolerances always cause a separation in information. These gaps in information and history may serve as opportunities for speculation and exploration.

How can the remoteness of the historic section be made proximate as it is used to generate sectional practices in today's architectural pedagogy? The studio work presented in this paper stems from the exploration of the historic section cut as an archeological and generative tool for leaving information behind.

## ARCHEOLOGY OF SECTION

Throughout architectural history, the changing role of the section cut reveals sectional practices that have affected the way form and space are made. A section is "a representational technique as well as a series of architectural practices pertaining to the vertical organization of buildings and related architectural and urbanistic conditions".<sup>1</sup> As a result of the methods employed, these drawings have largely shaped historical and contemporary types of formal and spatial volumes. However, the section cut did not originally emerge as an architectural tool until the Renaissance era in the fifteenth century. In "The Ten Books on Architecture" Vitruvius states that an architectural arrangement's forms of expression are, "the ground plan (orthographia), elevation (ichnographia), and perspective (scaenographia)".<sup>2</sup> Respectively, each of these drawing types reveal the program of a building, the façade or main face of the building, as well as the experience of the building. The section cut and therefore the vertical organization of a building is not mentioned as one

of the original drawing types. In fact, sectional drawings did not even emerge through the architectural discipline. Instead, they emerged as an archeological act in describing anatomy and architectural ruins. The description of the human body as well as the practice of recording surviving monuments in decay gave birth to the section as a conscious projection of architectural intentionality. The section cut was therefore originally used to reveal what otherwise might be hidden in order to create a relationship between the interior and exterior.

During the fifteenth-century Renaissance era, a renewed interest in documenting the sectional ruins of classical antiquity intersected with section as speculation. Renaissance architects looked to the Pantheon as a primary focus of study. Initially, the section perspective was implemented in order to imply an understanding of space conceived volumetrically. This can be seen in early Renaissance drawings of the Pantheon in which dimensional accuracy was sacrificed for the illusion of a scene. While these drawings visualized a relationship between the building's contained form and the space, the architecture resided within an optical phenomenon. What later emerged during the Renaissance, was something more proximate to the section cut as we understand it in contemporary practice. The combination of an orthographic projection with the section cut allowed one to attribute geometric and dimensional accuracy to a drawing. Once this attribution was made, the section was standardized and turned into a professional drawing. Sectional practices emerged from this archeological analysis as an architectural tool.

During the eighteenth-century Enlightenment era, the proliferation of section in architecture increased as interior volumes were drawn in relation to the exterior context of the site. Further into the nineteenth-century Modernist era, the emphasis on section was stressed as sectional drawings demonstrated the interdependency of formal and structural systems. Today, sectional practices are largely influenced by the role of digital tools. As a result, the implementation of section has remained polarized as efficiencies have pushed toward volumetric repetition and the methods for drawing sections have been made easy by cutting a plane through a digital model rather than constructing the cut. In the studio, these chronological approaches to sectional practices are considered archeological acts in generating new sections through prescribed drawing, image-making, and modeling methods.

### GENERATION OF SECTION

It is the compromised nature of sectional practices in contemporary architecture that drives questions and work in the pedagogical framework of the studio within the curriculum of the Department of Architecture (DoArch) at South Dakota State University. How can section be used as a generative tool for constructing space? Students within two sectional practice studios at the professional and pre-professional levels addressed this question through a prescribed methodology. The first rule: **ONLY SECTION DRAWINGS ARE ALLOWED.** No plans, elevations, and other drawing types were permitted. As students explored how remote, constructed, historic

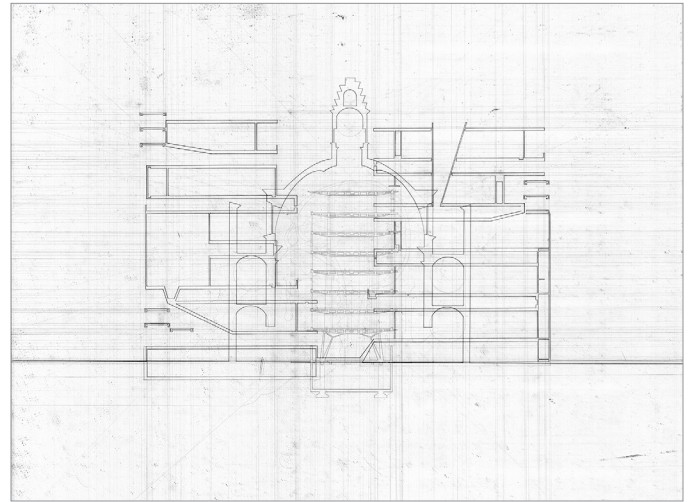


Figure 2: Five historic sections drawn on vellum and layered together.

section drawings provided an archeological and generative tool for leaving information behind, they also questioned the architectural implications of working through the limits of section.

Analysis of the selected historic section drawings led to a second rule: **SECTIONS MUST BE DRAWN, PHOTOGRAPHED, AND MODELED THE SAME.** Each student was assigned five section drawings from the Renaissance, Enlightenment, Modernist, and Contemporary eras of architectural history as well as a Non-Building section. Each section was hand drawn using the exact same line weights, line types, and graphic devices throughout (Figure 2). In this way, each section was detached from its historic time frame, which led to observable links among the sectional practices from each era. Instead of a linear progression in which the represented section drawing from one era built upon the methods of the previous era, the relationship among the section drawings worked like a network (Figure 3). Sections from the Contemporary era, for example, linked to those from the Enlightenment era in their representation of atmospheric conditions. A solid foundation for generating new sections formed through exact drawing methods as students moved beyond the chronological remoteness of the historic section in order to understand each in a more proximate contemporary context.

In generating new sections, student analysis of the historic section evolved through two-dimensional and three-dimensional superimposition methods. A "superimposition machine", a model in which historic section drawings were cut from black museum board, spaced within a foamcore box, and photographed, was built. The original sections were altered through an iterative process that implemented both digital and non-digital collage methods. In practice, digital methods are supported by the tools that drive their outcomes. The digital tools used here were comprised of both a digital camera and a laser cutter. In many ways, both tools have been criticized for their ease of use in quickly generating non-critical content. However, the efficiency and accuracy of these tools in making multiple images was necessary for making quick comparable iterations that could be collaged together. In his essay, "Everything

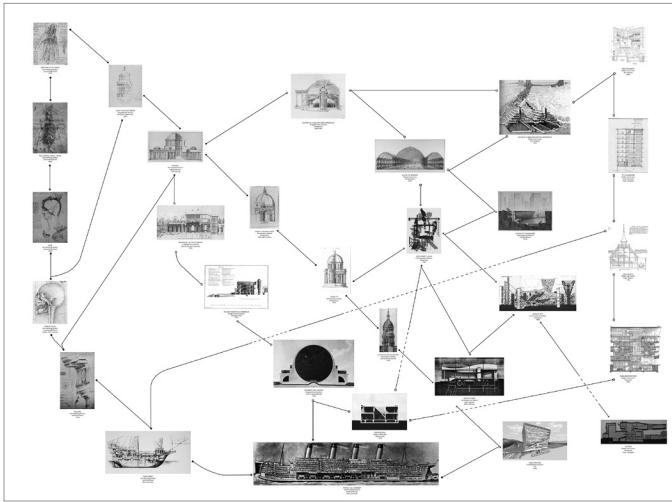


Figure 3: A network of historic section drawings.

is Already an Image”, John May describes three (3) categories of visual depiction that define contemporary architectural culture: drawings, photographs, and images. While a drawing consists of hand-mechanical gestures and a photograph always consists of a mechanical-chemical format, images are “thus the outputs of energetic processes defined by signalization, and these signals, in their accumulation, are what we mean when we say the word data”.<sup>3</sup> According to May’s definition, a “drawing” that is made in AutoCAD, Rhino, or other drafting software is truly an image, not a drawing. This was crucial to understanding the process within the studio as this technical definition described the construction of images instead of the prevailing language used to describe them. The physical manifestation of a section cut made on the laser cutter derived from the making of a digital image; the collection of these images was collapsed into a final image using a digital camera. What resulted were accidental, collaged images of superimposed sections that allowed for speculation.

Accidents and errors are not always welcome in architecture. As a form of speculation, though, accidents and errors form the foundation of potential generation so long as they are recognized. How can recognizable speculation be made evident to young architecture students? As the symmetrical domes of the Renaissance gave way to open Modernist volumes in the superimposition machines, students evaluated the resulting forms and spaces through types of symmetry, rhythm, repetition, datum lines, axes, and frames. Rules were written from a taxonomic breakdown of these basic design principles; with each iteration students were better equipped to recognize patterns among them. The establishment of rules as an archeological form of observed taxonomy transformed into the establishment of rules as rigid guides for generating new elements. The overlap of thicknesses between sections, for example, may have been recognized through an image and repeated along an axis in a following iteration or a large volume of space in one section may have framed the forms and spaces of another. If two thick elements overlapped,

it may have meant a planar wall or space between two columns formed the transition. It was this transition, the gap between each section, that offered an ambiguous reading among the sections as information was left behind.

Three-dimensional superimposition methods further pushed the speculative information gap through the introduction of a transverse section (Figure 4). If the two-dimensional image allowed recognizable relationships to be made by collapsing multiple sections together, the transverse section pulled the image apart by creating visible gaps. Students pulled the image apart to make a physical model for further analysis. The construction of the model from the initial two-dimensional image not only established physical limits, but digital limits as well. Digital modeling software like Rhino and Revit allow three-dimensional models to be constructed and sections to be cut from the model. Like the digital camera and the laser cutter, there is an ease of use in implementing the section tool. However, the tool depletes recognizable speculation as decisions are forced through the filled gaps of information in the model. For example, the previously discussed transition from a thick element in one section to another must be made clear in order to make the section cut. The transition HAS to be a planar wall or it HAS to be a space between two columns in order for the tool to work. The section becomes an afterthought of the model rather than a generator. Therefore, the construction of a digital model is less efficient than making the drawing or image of the section. While digital modeling software was implemented, its use was based in the making of drawn images of the extracted section cuts.

What are the architectural implications of working only through the limits of section? The challenge of eliminating plans and other drawing types in the architectural studio allowed for a focused historic precedent study. The limits enabled students to examine the remote historic section through contemporary sectional practices in order to recognize and speculate through accidental outcomes. Further, limits were set on the use of digital tools in order to implement the section as a constructed generator rather than an afterthought of the tool. Through these limits there was a freedom in deeply studying how section can be used as a tool for intersecting archaeological and generative practices. No drawing set is truly comprehensive. Ultimately, the exploration of remote, constructed, historic section drawings provided an archeological and generative tool for leaving information behind.

#### ENDNOTES

1. Paul Lewis, Marc Tsurumaki, and David J. Lewis, *Manual of Section* (New York: Princeton Architectural Press, 2016), 6.
2. Marcus Vitruvius. *The Ten Books on Architecture*, translated by Morris Hicky Morgan (New York: Dover Publications, 1914), 13.
3. John May, “Everything is Already an Image,” *Log*, no 40 (Spring/Summer 2017): 11-14.



Figure 4: Three-dimensional superimposition machines.