Architectural Signs

Translating the Linework of Architecture

Architects draw lines. They draw lines on paper and on the computer screen. They start drawing lines at the first project meeting and stop only when the project is completed. Each line drawn is a sign; it is a representation of tangible reality that has yet to be built. Embedded within these lines is the information needed to construct architectural works. It is essential that architecture students are educated not just to create lines, but to understand and interpret the information they embody. These lessons promote critical thinking and are essential in expanding the consciousness of future architects.

In The Thinking Hand, Juhani Pallasmaa posits that because architects, along with most designers, rarely fabricate their own design work, "they need to understand the possibilities and limits of the materials and crafts, and communicate their ideas and intentions to the specialist craftsman, whose hands become the designer's surrogate hands in the execution of the work."[1] Laced within this commentary is the idea that proper communication of architectural value stems from knowledge of the materials and crafts that compose the built environment.

The question posed here, however, is not how architects achieve this communication, but how they learn to do so. As architecture students progress through their education, how do they come to understand the meaning embedded in the lines they draw and, in turn, how do they learn to use that knowledge to become more conscious of the architecture they design? This process requires the use of translation. In Translations from Drawing to Building, Robin Evans states: "To translate is to convey. It is to move something without altering it."[2] "Architecture has…been thought of as an attempt at maximum preservation in which both meaning and likeness are transported from idea through drawing to building with minimum loss."[3] But, delivering near lossless translation requires a great deal of knowledge – for both the scribe and the translator – about architecture and its representational mediums.

Almost everything an architect generates is a representation, a signifier of information. The burgeoning knowledge base of the novice student must include lessons in creating and interpreting these signs. Each line contains myriad information; some traits are spatial: length, scale, position in space. These qualities tend to be readily digestible to most students of architecture. There are other characteristics embedded in lines, however, that are substantially more difficult for students to grasp. As such, emphasis must be placed in the academic environment on integrating these traits – materiality, cost, means of assembly, and sequence of inclusion – into the developing consciousness of future generations of architects.

MATERIALITY

Lines have no mass. Every object created, however, is subject to the limits of and opportunities provided through its material composition. Color, lineweight, linetype, and hatching are frequently employed in both hand drawing and computer aided design [CAD] programs to demonstrate meaning. These techniques, however, can easily skew a drawing to present a material response that would be impossible to achieve in reality. Hand drawing has the potential to convey more material character through the integration of different mediums, but suffers from the same lack of embedded material knowledge.

Three-dimensional modeling programs have similar translation issues. These programs often integrate materiality through the application of mapped imagery. Although aesthetically powerful, this technique can create a multitude of issues for students. In most situations, any material can be mapped onto any surface; a component shaped like a steel beam, for instance, can be mapped with an image of a brick wall creating a complete disconnect between materiality and construction. Students must be taught to avoid these traps and to study the relationship between the intended materiality of a line and the potential that the material quality will emerge from it.

ASSEMBLY|FABRICATION

Lines miraculously stick together. The lines students draw in their studio work or in their technical assignments are not welded or mortared. They require no assembly, no joinery, no adhesives or nails. Only in limited situations, unfortunately, do architectural drawings created in the academic environment examine the actual assembly or fabrication of space.

This lack of understanding or consideration for the assembly or joining of parts leads students to often develop fantastic design ideas that have no ability to be achieved in reality. As lines are put to paper or modeled in the computer, students have to be taught to think through how the disparate elements of their designs would be fastened together in an actual construction. The introduction of this level of consideration early in their education has the potential to not only help the future work of these individuals (both in the classroom and in the office) be more thoughtfully designed, but also to mitigate unnecessary complications in the assembly of future built work.

SEQUENCE

Lines occur in a vacuum; they are not subject to the external forces of the world. As such, lines can be drawn in any order on a sheet of paper. This disconnect is equally apparent in the world of building information modeling [BIM]. In this realm, a wall is put up, complete with interior and exterior finishes, then a window with a full trim package is inserted into a hole spontaneously cut into the wall. Although a great deal of information is contained within the components of a BIM model, notions of sequence of installation are not amongst them.

As such, students need to study the ideal order of the assembly of parts present in almost all construction practices. This order is dependent on many factors: physical necessity, material lead times, and subcontractor scheduling being amongst the most common. Understanding the realities of lines means understanding the order in which they need to arrive when translated into building materials; how are they stacked, placed, and assembled? Students must reflect on how considering sequence when drawing lines can have a positive influence on the process of constructing a building.

COST

Lines are free. Each line drawn – or each component modeled – carries equal value to the one drawn next to it. That certainty is juxtaposed with the vast range of costs that the represented elements carry. It is not just material value that is important though. The placement of lines also involves implied value. If a line is placed three inches from another, would the assembly cost three times as much as it would if the two lines were only placed an inch apart? If a line is drawn vertically instead of horizontally on the face of a building, how much does it increase the labor costs for installation of the cladding?

Frequently, cost is a non-issue in the academic environment in most curriculums and it is unrealistic to expect that to change in most situations. Students, however, must be taught to resist blindly adding lines to the page and instead respect the value inherent within them. Each line can add or subtract value; each can save money for the owner or push a project over budget.

ADAPTATION TO COURSEWORK

In 2012, a large group of second year architecture and interior design students in an introductory technology course focused on wood construction was given the opportunity to start to understand drawn lines. In small groups, they were given a drawing of a wall section of a single-story residence (Figure 1) and asked to build a 4'-0" wide mock-up of the assembly. This particular drawing was used for a number of reasons. First, most of the students participating in this course had never built anything prior to this exercise and had a equally limited design palate. Asking this group of fledgling students to create a unique design with more authorship was certainly considered, but ultimately deemed non-essential to this particular learning experience focused on translation and not creative design. Second, the time that would have been required to include a design phase in this project was not possible within the course's existing construct.[4] Third, the prototypical wall section utilized was directly connected to the lessons taught throughout the semester in the lectures regarding wood light frame construction. And finally, although the students certainly were able to draw this wall section for themselves at the end of the semester with differing levels of quality and precision, at the beginning of the semester when the design/build problem was introduced it was far more effective to start them all at the same point than to have

varying levels of accuracy from which to start their exploration.

The working process of the project emphasized translation through a series of linked exercises. Each group: 1) finished the design of the wall, 2) created a parts list from their design, 3) created a cost estimate from the parts list, and 4) created a storyboard detailing the construction sequencing and scheduling (Figure 2). After all submittals were approved by the faculty, the groups built their wall sections at full scale in the school's outdoor build yard (Figures 3 and 4).[5] The project concluded with a final submission – a summary and reflection document – that included a photo narrative of the build process and a set of as-built markups of the storyboard and other submittals indicating where learned reality differed from initial assumptions.

CONCLUDING THOUGHTS

"Drawing in architecture is not done after nature, but prior to construction; it is not so much produced by reflection on the reality outside the drawing, as productive of a reality that will end up outside the drawing."[6] As lines occur prior to construction, they have the potential to significantly impact the efficiency and effectiveness of the construction of the building and the resulting product. As a result, when creating representations the "mature designer and architect is not focused on the lines of the drawing, as he is envisioning the object itself, and in his mind holding the object in his hand or occupying the space being designed. During the design process, the architect occupies the very structure that the lines of the drawing represent."[7] It is our responsibility to train our novice students to become the mature architects Pallasmaa refers to.

Although ultimately very successful,[8] this project was certainly not without its struggles. First, the costs for the project materials were placed on the students as no outside funding was available except for a discount provided by a local lumber retailer. Although not exorbitant, this was certainly a burden on (and source of concern for) the students as the semester progressed. Second, the wall sections were temporary constructions, built in a day and removed a week after construction. As such, despite salvaging the wood for reuse, a considerable amount of material went into the dumpster. This process also failed to generate a lasting physical impact as would hopefully be the case with a community based design/build project; after the projects were taken down, the only remaining impact was locked within the minds of the students. And third, the project, as mentioned previously, was not a creative endeavor;

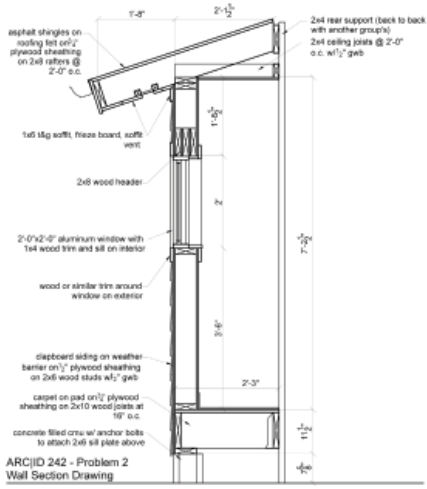

Figure 1: Building Technology I - Proposed Wall Section Drawing
Source: Drawing by Author

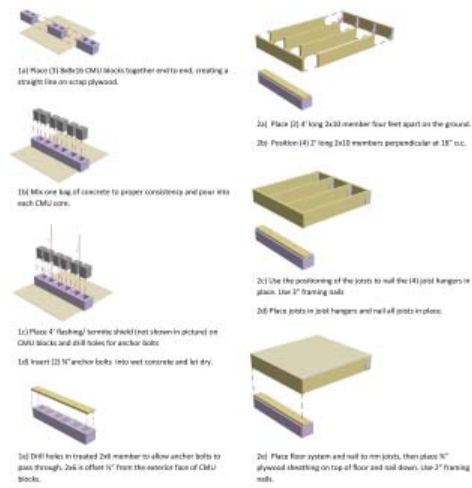

Figure 2: Building Technology I - Storyboard Samples
Source: Drawings by S12 ARC242 Group 4

it was an exercise in translation. Future iterations of the project undertaken since this instance have attempted to bridge the structure of the learning experience in this original version with a community-based design endeavor. Although the product has become far more meaningful in these versions of the project, the purity of the process and the original learning objectives as well as the clarity of the project goals have certainly been compromised from the original.

Through this process, the students were introduced to the reality of the lines used to create the initial drawing. Slowly they pulled apart the section and investigated its embedded qualities. It is this intimacy with lines that students of architecture must embrace. To know the lines drawn is to understand their qualities and the impact those qualities can have on the practice of architecture. Drawing is not just a means of recording, but a discussion, a dialogue, a conversation between architect and architecture. Drawing must be an engaged process; when drawing a line the mind must not be centered on points A and B, but on the material presence created when connection, the options for fastening it to the adjacent line, how craftsmen will hoist it into place, and how it sustainably fits within the larger budget of the project. Lines are not passive; they are, instead, the active impressions of the mind's work.

ENDNOTES

[1] Juhani Pallasmaa, The Thinking Hand: Existential and Embodied Wisdom in Architecture (West Sussex, UK: John Wiley & Sons, 2009), 63.

[2] Robin Evans, Translations from Drawing to Building and Other Essays (Cambridge, Massachusetts: The MIT Press, 1997), 154.

[3] ibid., 181.

[4] This project was undertaken for the first time in the faculty's first semester teaching this particular building technology course. As such, projects were necessarily adapted to an existing construct and set of learning objectives.

[5] This paragraph was adapted from (withheld for anonymity)

[6] Evans, Translations from Drawing to Building, 165.

[7] Pallasmaa, The Thinking Hand, 59.

[8] The 59 students who participated in the course evaluations at the end of the semester rated the learning experience of the entire course at a 4.85 out of 5.0, or a 97%. More recently, several graduates of the program who participated in the project and are now working in the architecture and construction fields have stated that this project was one of the best learning experiences they had in the program due to the lessons learned that are expressed in this paper.

Figure 3: Building Technology I - Build Day
Source: Photos by R. Swenson

Figure 4: Building Technology I - Students Building on Site
Source: Photos by R. Swenson