Drawing: The Language of Architectural Design

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## Introduction

If we define a process of making the built environment (i.e., architecture) as having at least two distinct and sometimes overlapping phases, then many would agree there is a design and a construction phase. We can map our journey from design to construction and use a common language for this process.

<Insert Figure 1.0.1\_makingTheBuiltEnvironment>

Figure 1.0.1: Making the Built Environment

Ask anyone what an architect does, and the most obvious answer would be, “an architect draws.” A common historical framework of makers follows the arc of the great built works from master stone masons scribing on the floor who then became known as master builders working on parchment. Later schools of architecture like the Ecole de Beaux Arts and after that The Bauhaus were established and formally codified systems of study based almost entirely on developing specialized drawing and representation skills. Today a professional’s predominant activity in an office revolves around mark making, on a board or in the computer, as a means of bridging the ideas in the architect’s head and the constructor’s tools.

The sketch that follows was made from a Neo-Classical statue of the famous creator of the Dome over the Florence Cathedral, Filippo Brunelleschi. The irony of this depiction of Brunelleschi making a drawing on what appears to be a paper-like material is a fantasy worthy of our consideration. Sculptor Pampaloni was no doubt influenced by the teachings of this time from the Ecole des Beaux Arts. In the sculptor’s hands the language of architecture is literally chiseled in stone. It is the act of drawing. Never mind that Brunelleschi’s design communication approach to his carpenters and masons centered on the creation of a scaled down wooden model of the Dome!

<Insert Figure 1.0.2\_filippoBrunelleschi>

Figure 1.0.2: After Statue of Filippo Brunelleschi by Pampaloni (1838)

Since the English word for language is derived from the Latin word for tongue, it is tempting to imagine the taste of architecture. Developing further this idea of sensing our way to meaning, we could imagine the sound of a tongue speaking architecture. In a very real way, we know that we can touch and see and even smell architectural construction. The word language has multiple meanings that enrich our understanding, and for our purpose of learning this process of making architecture we shall refine our definition as something that expresses a thought and communicates meaning in a specific way.

While architecture is far more complex than simply sketching preliminary designs, illustrating images for the client and drafting documents for construction, drawing has been and continues to be our predominant mode for communicating architectural meaning. Unless Artificial Intelligence (AI) is taught the complex profession of architecture and engineering, and as long as our predominate mode of communication remains in the real rather than the virtual world or holographic simulation, then drawing will continue to be the language of architecture.

In the sections that follow we will begin our first design project. Discovering an appreciation for the scope of the work is the primary consideration in any project. From there you will be introduced to some history and theory, so as to ground your design work. Along this path you will learn the art of storytelling and test the role of simulation. Projects in this chapter include developing skills in watercolor, precedent analysis, physical modeling, electronic modeling, site analysis and flyover animation of your project. This phase of our process is commonly known as “Pre-Design” in the profession. The work in Chapter Nine continues with the “Design Development” phase.

## Our First Design Project. A Sense of Place Making

Architects often think in terms of “A Sense of Place.” Instead of relying on a dictionary definition of place, let’s start with a question. What distinguishes a place from a space? For instance, how is your favorite location to be alone and think different than a hotel room? Does your place have special meaning to you, and do you have a unique claim to it in some way? Your place is specific, while there are a multitude of generic hotel room spaces.

Charles Moore (1925-93,) an important 20th c. architect from the United States, wrote in “Toward Making Places” (Moore, Lyndon, and Ryn 1962, 31)

The architect’s task is more than the manipulation of materials and the molding of space; it is the definition and possession of place. . .. A building is in a specific place to which it must specifically respond. Generalized forms must grow out of a thorough understanding of the particular place, activities, techniques of building and systems of service. We must start not with the geometry but with the user.

Because architecture is more than making beautiful sculptural forms and more than providing an ample amount of space and even more than the sum of its parts, then the designer could envision “sense of place” as an organic system.

[Vitruvius] identified three elements: firmitas, utilitas, and venustas. Firmness or physical strength secured the building’s structural integrity. Utility provided an efficient arrangement of spaces and mechanical systems to meet the functional needs of its occupants. And venustas, the aesthetic quality associated with the goddess Venus, imparted style, proportion, and visual beauty. (Chicago Library 2011)

It is evident when we look at museums and sports stadia and airports that sculptural formalism influences architects; and, it is equally apparent that spatial concerns drive a sometimes-utilitarian character to our schools and offices and multi-family housing.

If we integrate these ideas, then can we propose that good architecture has the Vitruvian attributes of strength, utility and beauty (i.e., delight,) and it is centered on the experience of the users. Architectural design is the activity and system by which we make good and meaningful places. This system makes meaning through a sense of place. Design activity is an organic system and thus has input and output flows, component modules, synthesis and emergence, and it can be mapped as a web of interconnected modules. This complexity gives design a richness.

How do we begin to design? The question looms so large as to cause intense panic or paralysis in most new architecture students. Many think of design as a problem solving exercise. Koberg and Bagnall (Koberg and Bagnall (1981), 121) developed a basic model of creative problem solving adapted here as:

* analysis: how to take it apart?
* concept: what does it mean?
* synthesis: how to put it all together?

As useful as this three-part abstraction seems at first, it can be challenging to morph these processes into a design, because each question has a complexity well beyond the beginning design student. In most projects the number of unknowns far exceeds our comfort level and obscures our path. You will learn about design tools to help you move forward. Have you heard of “bubble diagrams” or “precedent analysis”? These are topics we will cover in time.

Instead of getting lost in the weeds with esoteric processes, we’ll proceed with considering what we do know. Search your memory for your favorite places. Uncover the special and unique qualities and experiences you’ve had in a place. It could be in nature, a library, a place of worship or historical site. How did that place make you feel? What are the several things that make it meaningful. Write down a list of words using your senses as much as you can. Here’s one I can remember:

<Insert Table 1.1\_senseDescription>

| **sense** | **description** |
| --- | --- |
| sight | A late afternoon sun casts long shadows over a large square bounded at one end by a multi-domed basilica remaining in golden hour light. There is a breathtakingly large campanile tower and opening to the water just out of sight. Arcades flank three sides of the square, full of color and movement. |
| hearing | People talking and laughing, birds flutter and call out. There are sounds of boats, plates being delivered and music and laughter. |
| smell | So many different scents: food from all over the world, coffee, petrol fumes, cigarette smoke and perfumes and body odor. |
| taste | The espresso tastes rich on the tongue after the delicious pasta and cream sauce. The early evening air tastes of a hint of rain, or is that the dankness of the canals? |
| touch | Feet pad over the rough pavers of differing textures, and hands brush the stone columns. Bodies jostle for position and my trusty camera and sketchbook bounce against my side in a day bag that feels heavy after all the sight- seeing. |

Table 1.1: Sense: Description Exercise

Shall we suspend for a moment the presumption of design leading straight as an arrow to the problem solution? Experience has shown that, unlike your calculus homework, a correct design solution may be an elusive target. Alternately, let’s think of successful design as exhibiting an optimal balance and fit of embodied sensate intention and begin by asking ourselves how we define a sense of place. Can you relate to the above descriptions in your imagination? Even if you have never been to the Piazza San Marco in Venice, you can draw on your senses and memories and recreate the sense of this place. What is interesting about this exercise is that it does not imply specific forms, styles, materials or spatial allocations.

<Insert Figure 1.1.0\_veniceWedding>

Figure 1.1.0: Historical Venetian Wedding Celebration in the Piazza San Marco

## An Overview of Three Overlapping Architectural Design Theories: Defining Good Questions

The observational method we explored in the above Sense Table Exercise situates our inquiry within empiricism. We used our senses to describe observable facts. Not all architectural theory is grounded in observable phenomena. For an alternative context, we could identify theoretical arguments that rely on logical frameworks and sometimes unobservable phenomena and thus situated within an epistemology of rationalism.

…to come to the same assessment of a hypothesis, each must interpret the observed phenomena in the same way. Differences of interpretation will become evident in the way these details are described with precision. Moreover, the precise way these details are described depends on the entire theory within which the hypothesis is set. A **theory** is a systematically integrated set of general principles, methods of investigation, and concepts whose function is to explain a wide array of phenomena. Theories generate hypotheses about specific phenomena, but, significantly, they also provide the filter or lenses through which we interpret the observations that test hypotheses. (Hughes and Lavery 2004, 244)

It was tempting for theorists to talk about Modernism of the 20th century in rationalist terms. Popular phrases arising from this tendency included, “Form Ever Follows Function” from US architect Louis Sullivan (1856-1924), “Less is more” from German architect Ludwig Mies van der Rohe (1886–1969) and “The house is a machine for living in” from French architect Le Corbusier (1887-1965.) Each of these ideas reflected a reductivism and theory of architecture that proved compelling to many architects, and yet could sometimes be too elusive, abstract and esoteric to appreciate by those who lived in the architecture. Rather than debate this interesting approach, shall we instead adopt a more skeptical stance and seek theoretical frameworks that we can use to contextualize our own design thinking?

In promoting Space and Articulation over symbolism and ornament, [Modern architects] distorted the whole building into a duck. (Venturi, Brown, and Izenour 1988, 163)

Let us too dispel a stylistic approach and yield that taxonomy to the architectural historians. How does it help the designer to think about styles like Modernism, Postmodernism or Deconstructionism? We are engaged in using our imagination and experience to make places that enhance the experiences and imagination of people. For that it seems most useful to adopt empirical and sensate processes. You may be familiar with the phrase “reverse engineering.” This concept implies sense making through intuition and inference of observed connections that we disassemble. We learned above from Koberg and Bagnall (Koberg and Bagnall (1981), 121) a three-step process: analysis, conception and synthesis that allows us to reverse engineer what we sense is good architecture and construct a simplified and useful theory framework for design. You may note the three illustrations below that reflect variously an idea about Formalism, Contextualism or Abstractionism are not strictly speaking architecture. This is a deliberate choice. We want to remain clear-eyed within our dialectic, so as not to conflate architectural style with substantive theory.

Spatial forms in architecture are neither Euclidean nor Einsteinian. In architecture spatial form means place, path and domain, that is, the concrete structure of man’s environment. (Norberg-Schulz 1983, 5)

Finally, it is a frequent critique of a dialectical approach to say, “That is a distinction without a difference.” The three theories presented below are limited by this critique, because it is possible to identify overlapping theories evident in architecture. If we take a pragmatic approach, then it is useful for our design thinking to qualify these ideas with a preamble, such as “The **predominant** idea that comes to the fore is…” Formalism, or Contextualism, or Abstractionism. As a designer, you are wise to focus your efforts on one theory or line of inquiry.

“When everyone’s super, no one will be.” Syndrome (Bird 2004)

### Formalism: What is a Rational Object that Creates Our Sense of Place?

The title of this section uses the word rational. We should not confuse this with rationalism discussed earlier that was characterized by deduction, because we proceed with an empirical and phenomena of sense approach. The word rational is derived from the Latin ratio which was related to reasoning and calculation, and ratio for us today means the proportion or relationship (measure?) between two or more things. It is this latter idea that is architecturally suggestive.

In space one dimension implies a line, two dimensions a plane and three dimensions a volume. The most fundamental way to describe a sense of place is to identify the where (x,y,z or GPS coordinates) and the what, and the “what” of a place uses attributes like size, shape and form. We may say that Formalism has a potential sense of place because of the built environment object itself. The predominance of this view of architecture is so ubiquitous that we could stop here without learning much. For most people, of course, architecture is an object. What distinguishes a formalistic approach to architecture implies deliberate consideration for, and focus on, elements of size and shape, proportion and balance, solid and void, etc. In other words, the designer’s intent is to foreground the ideas about the relationships between objects.

<Insert Figure 1.2.1\_grainElevator>

Figure 1.2.1: Additive Transforms Over Time in New Palestine, IN Grain Elevator

These relationships are often a resultant of several transformations available to a designer over a period of time. Imagine starting with a proxy habitable object such as a three-meter cube volume. Transforms a designer may apply include adding more forms, subtraction, stretching, skewing, decimating, translating, juxtaposition, etc. The question for you as the designer: How can I best communicate through drawing or modeling those concepts of form by foregrounding the focused choices I made and by diminishing any confounding noise and/or by moving the less significant attributes to the background? What kinds of drawings best illustrate my concepts? As you will see, sometimes a minimalist line drawing without tone value, local color or rendering of light best illuminates the design concepts.

### Contextualism: What Places Sustain Us Socially and Psychologically?

Phenomena of the social (focused on the group) and psychological environments (inwardly focused on the individual) may be contrasted with the natural environment. The social environment is bounded by the group’s institutional and cultural artifacts and is measured in relationship to the individual and to the natural environment. The psychological environment is the individual measured in relationship to self. The natural environment is relatively unbounded.

It was already suggested that there is some overlap between the three theories. Formalism described above focuses on size, shape and form and foregrounds the transformations a designer makes. Contextualism may appear to use Formalism transformations as well, in order to foreground social and psychological ideas. It is important to remember that we are asking the question why? in our inquiry about competing theories of architectural design. What is the designer’s intent?

This implies that the meaning of any phenomenon is the context in which it appears, and that any man is the interrelationships or meanings which are accessible to him. The faculty of abstraction and generalization, or induction, is therefore the basic distinction of man, and the experience of meaning his basic need. To grow up signifies to become aware of meanings. (Norberg-Schulz 1983, 221)

Why and how do we seek communion with each other? The symbolism of places of worship are rich with examples of Contextualism. How do we gather together and trade provisions? The promenade of market day is a triumph of the social construct and leaving behind our hunter-gatherer days in exchange for and with the collective. Where do we share knowledge and stories and cultural objects? Schools and playhouses and museums weave the longevity of our shared tapestry of experiences and archive them for future generations. It is natural then to look to these environmental typologies for exemplars of Contextualism.

<Insert Figure 1.2.2\_ponteVecchio>

Figure 1.2.2: Market Promenade of Ponte Vecchio in Florence, Italy

How do we as designers use the “interrelationships or meanings” available to us? If we foreground context over the formal and abstract methods, then we intend to connect people to places and to each other. This is not just in a metaphorical sense. It is in a very real, physical and objective way.

We see, in summary, that every pattern we define must be formulated in the form of a rule which establishes a relationship between a context, system of forces which arises in that context, and a configuration which allows these forces to resolve themselves in that context. (Alexander 1979, 253)

Let’s illustrate this method with a thought experiment: you and two colleagues in our studio are working together on a competition design project. Your team needs to make a shared workspace within an enormous warehouse with high ceilings and large glass windows to the north and south. You are given some movable privacy partitions, large work surfaces, chairs, etc. It is understood there are other teams competing against your team on the same floor. You arrange your setting to allow for a private workspace so that you can focus, while having a view to your team members. You shield views into your space for privacy without blocking the natural light available from the windows. In your mind’s eye, do you see how setting a story and context allows your creative design impulses to envision a resolution of forces? Do you understand how this differs from foregrounding formal ideas?

### Abstractionism: What are Embedded Ideas that Transcend Our Place?

When discussing above a phenomenological and sensate idea of the word rational within Formalism, it was a challenge not to conflate that with a theory known as Rationalism. We face a similar dilemma with the word abstract, because it too can be understood in the epistemological view that knowledge is reasoned logically from intellectual deduction. It may be helpful to draw the distinction between a priori and a posteriori knowledge. Does our knowledge proceed independently from experience, or is it arrived at through experience? We are interested here in making immediate and useful theory based in the sensate world.

…[A]rchitecture is engaged with fundamental existential questions. All experience implies the acts of recollecting, remembering and comparing. An embodied memory has an essential role as the basis of remembering a space or a place. . .. Architecture is the art of reconciliation between ourselves and the world, and this mediation takes place through the senses. (Pallasmaa 2005, 72)

The architect who enquires about abstract ideas in making places is at once predictive of our transcendent responses to architecture and tolerant and inviting of our unexpected feelings about the environment. We may think of this as evocative and symbolic architecture. Again, we face the critique of distinction without a difference between Abstractionism and Contextualism, because sociological and psychological context is often a tool of abstract reference. Our measure as before will be the question, what was the idea that the designer intended to bring to the fore?

In Rothko’s paintings the color relationships, as they interact within the rectangle and within the space, set up a gentle rhythmic pulsation. The painting becomes both a focus for the spectator’s meditations and a screen before a mystery. (Lucie-Smith 1984, 42)

<Insert Figure 1.2.3\_vietnamWarMem>

Figure 1.2.3: The Power of Names. Vietnam Veterans Memorial Washington, DC

Between the two poles of zeitgeist (Rationalism) and genius loci (Empiricism), the architectural designer navigates toward meaning. This work consults the genius of place and is adapted to the specific interrelationships as we saw with Contextualism.

Consult the Genius of the Place in all;  
That tells the Waters or to rise, or fall, (Pope 2020, 81)

A procession through a church nave simulates a journey. A dramatic swooping roof of an airport terminal sends the imagination to flight. A science institute commemorating Einstein is a lighthouse. Abstractionism in architecture foregrounds the similarities of our experiences from a set of contexts. We learned from Koberg and Bagnall about a process involving taking an idea apart, asking what it means in its essence, and then reimagining that idea for the new context. Another word for this is abstraction, and the method is called analogical reasoning.

Whenever we encounter something we do not understand, it is a natural reaction to try to understand it by reference to something that is familiar to us…the reasoning presupposes an analogy between two things (objects, classes of objects, situations, relationships), one of which is familiar and one unfamiliar. (Hughes and Lavery 2004, 206–7)

What makes this type of architecture challenging is the reliance on interpretation for the conceptual abstractions. Are the observations about the familiar relatable and transmutable to the unfamiliar? The risk for the designer is that the vision is too personal or esoteric, and it does not translate. Sometimes the results are sublime and sometimes merely interesting… or, banal! When our ideas reach out only to the few, then we may fairly be called elitist. When our ideas pursue only a personal vision, then we are self-absorbed. The successful architect finds that transcendent ideas resonate and activate the social and psychological sensate impulses of the many.

Abstractionism encompasses the metaphoric and transcendent architecture grounded in, informed by, and abstracted from a specific context.

## Storytelling and Simulation for Pre-Design

Architecture is commonly understood to comprise art and science and technology in varying degrees. Architects and engineering professionals come to embody these ideals in temperament and personality. We have a need to be well educated in the arts, and in storytelling and having visioning aptitudes. Equally, we are steeped in knowledge of Newtonian physics, material sciences and measurement through simulation and calculation. If society tends to dichotomize the arts and the sciences, on the other hand, we must be polymaths, of extraordinarily broad and comprehensive knowledge. We are not always specialists, yet we have specialized knowledge of technological tools and the technology of building.

Before we get started you may be interested in why these exercises were chosen. As mentioned before, as professionals we should endeavor to be skeptical about how we spend our most valuable resource, our time and attention. It may sound irreverent, yet wouldn’t you like to ask your professor, “Why should I care?” In each of the exercises and sketches, there is a section that addresses this rhetorical question called Learning. Read this brief explanation first of Learning Objectives and compare the ideas with the Learning section in each exercise and sketch.

### Learning and Accreditation

Architecture (NAAB) and architectural engineering (ABET) programs are accredited in the United States. Accredited programs must demonstrate that students attain several program and learning outcomes. The course of study in Contemporary Practices in Architectural Drawing and Illustration contributes to two of the learning outcomes. The National Architectural Accrediting Board (NAAB) evaluates architecture programs in the United States. Of the six student learning objectives and outcomes, “SC.5 Design Synthesis” addresses:

How the program ensures that students develop the ability to make design decisions within architectural projects while demonstrating synthesis of user requirements, regulatory requirements, site conditions, and accessible design, and consideration of the measurable environmental impacts of their design decisions. (NAAB 2020, 4)

The Accreditation Board for Engineering and Technology (ABET) evaluates engineering programs in the US. “Criterion 3 Student Outcomes” describes seven outcomes, and “Outcome 3” addresses:

an ability to communicate effectively with a range of audiences (ABET 2020)

Let us also consider learning outcomes at a more granular level. For this we will use an analogue of a programming paradigm called object-oriented programming. An object is an instance of a class and can contain data fields thought of as attributes and functions also known as methods. In addition, these programs allow for inheritance of other objects that bring along corresponding attributes and methods. For instance, using a popular language like JavaScript here is a simple program.

<Insert Text Box Here: monospace font as code>

1 function SomeObject(key, key1) {

2 this.key = key;

3 this.key1 = key1;

4 }

5

6 let Thing = new SomeObject("value", 2020);

7 let myThing = new SomeObject("Eric", 1988);

8

9 console.log(Thing);

10 console.log(myThing.key, myThing.key1);

Evaluating this program results in the console printing two lines:

<Insert Text Box Here: monospace font as code>

> Object { key: "value", key1: 2020 }

> Eric 1988

At first glance this is a lot of programming effort to assign some values. If you use your imagination, however it should be evident how powerful this idea of inheritance can be for modular program design. It can also be a powerful idea in the architectural studio, where the design learning outcomes inherit the properties of the student learning outcomes and program outcomes. Since design learning outcomes (DLO) “inherit” attributes and methods of the program and learning outcomes, A DLO can be considered a kind of teaching hypothesis. We should seek the kinds of meaningful outcome objectives that could be “tested” or measured. See the Criteria section in each exercise and sketch problem for a rubric used to assess and measure success for each module.

Now that we are equipped with a basic toolbox of design ideas let’s get to work building some projects. In the exercises and sketch problems that follow we will work with watercolors, digital painting, observational drawing, paper models and electronic models. Each project you do reflects a contemporary and real-world illustration that you can expect do in a professional setting. The projects share a common section outline:

* Introduction
* Learning
* Scenario
* Materials
* Steps
* Tips
* Criteria
* Related Assignments

## Sketch J. Watercolor Storyboard of Twelve Site Context Vignettes

### Introduction

<Insert Figure 1.3.1\_shakerStoryboard>

Figure 1.3.1: Sketch J. Watercolor Storyboard Example from Shaker Village, KY

How does an architect start the design process? Most architects would agree that until we visit a site, a project has not yet begun. The site visit has a powerful impact on all decisions. Let’s compare the architect’s first site visit with making a movie. Film directors make storyboards. These visual sketches of the script document a plan for shooting a scene. They provide guidelines and cues for simulating ahead of time how to construct complex lighting, sound, movements, etc. Storyboards bridge the medium of a text script with an acted story. Since a film director and an architect creatively simulate scenes, then architects may benefit from creative tools used in movie making.

Drawing is simulation. If you are a director, then storyboards simulate filming actors in dialogue before the time when the director yells, “Action!”. For a painter:

“[T]he drawing is almost like a rehearsal of what’s going to happen.” (Santos 2020, Timestamp 3:11)

For an architect drawing simulates habitation of the built environment ahead of construction. Matthew Brehm made the case for sketching the environment when he described in detail the role of the Grand Tour in the development of 17th to 19th century architectural education.

“Sketching developed further as a form of study during the time of the Grand Tour…recording through sketching and measured drawings was a significant component of the tour.” (Brehm 2012, 6)

We can imagine how the sketchbooks became for those architects a simulation for the later architectural designs they would make, and a personal encyclopedia of exemplary forms and details. How then shall we simulate and record our first impressions of an architectural site we visit? Unless you are working without a specific site, or perhaps on a prototype design that must fit many sites, then the experiences you feel when visiting a location are unique and can inspire your architectural design. Storyboarding a site visit embeds and communicates an experience.

### Learning

This assignment module contributes to the following design learning outcomes, which finish the sentence “As a successful student in this course, I am now able…”

* … to conceptualize my design decisions within a context of the site conditions including orientation, topography, built environment placement, regulatory requirements, accessibility, environmental impacts, approach sequence, vegetation, view sheds, etc.
* … to visualize a sequence of observed site conditions, translate observations to envisioned experiences and communicate ideas both to others and to myself, as I design the narrative of user interactions necessary for creating a “sense of place.”

### Scenario

Since we discussed Contextualism as a theory above, let’s put those ideas to work. With your critical eye search the site for social and psychological ideas that you observe. It is hard to think this way at first. Once you sensitize your vision to this filtered approach, you’ll learn all kinds of things. Let’s analyze the example provided for you.

The series of images comes from a day spent at Shaker Village of Pleasant Hill Kentucky on Veteran’s Day 2009. The image is presented in the middle of the process. The first three images are rendered in watercolor over the fountain pen and blue-black permanent ink. The remaining nine images show the line rendered stage. Instead of describing the history of the Shaker community, let’s focus on the thumbnail sketches. It is late autumn and a sugar maple by the lake blazes red leaves. The next two scenes establish the importance of the rural fencing types, wood post and rail and stacked stone. Simple gable roofs cap the cubic vernacular forms with punched openings. Materials are wood and stone. Scenes are cropped to show overall formal arrangements and also closer texture and details. The scenes all point to the important values of the now gone Utopian community: simplicity, craftsmanship, serenity and humility. If you see even more things not here described, then the storyboards are working!

This assignment is based on readings from Drawing Shortcuts by Jim Leggitt. (Leggitt 2010, 12–47) The finished image shall be 12" x 9" (i.e. 864px and 648px.) The image shall be composed of 12 “thumbnail” storyboard vignettes drawn from direct observation. Each thumbnail shall be 2.25" square (i.e. 413px.)

The sequence of images shall be arranged in storytelling order (e.g., chronological, thematic, etc.) The matrix shall be in landscape format with three rows of four squares and separated by 0.5" (i.e. 36px.) Line work including tone and value shall be felt-tip marker. Color shall be illustrator’s choice (e.g. wet or dry media.)

### Materials

* Sketchbook
* Pen
* Wet or dry color media

### Steps

1. Prepare a blank piece of sturdy watercolor paper for your field trip. Draft the thumbnail matrix as described in pencil. A professional matrix layout is consistently spaced and precisely delineated. For your convenience, a vector drawing (i.e., svg file) has been included in the “Tips” section that you can trace.
2. While on site block in the thumbnail scene that you have framed, and do not forget to take a photograph of the same scene for later reference. Proceed in your site visit in chronological order. Balance your selected views to tell a comprehensive story of the entire site and limited to 12 squares. Using your blocked-in thumbnail pencil sketches and photographic references prepare your drawing in the studio for line rendering in felt tip pen (i.e., 1.0 mm or less nib size.)
3. Thinking ahead to your color rendering material of choice (e.g., water or solvent based,) select a felt tip marker of the opposite choice to your color render material. For example, if you do not want your permanent ink felt tip pen to run, then watercolor is a better choice. The reverse is true if using a water based felt tip pen…use a solvent based marker.
4. Using we media such as watercolor or chisel point marker, render color. You may also render using a digital program.
5. Photograph your final image under outside lighting conditions. In order to reduce glare, then find a spot in shade where no obscuring shadows fall on your image.
6. In a raster editing program such as GIMP, open your photograph as a layer. Correct for color aberrations using the “pick gray scale for all channels” method in the Levels tool. Make other adjustments (e.g., Exposure, Sharpening with High Pass Filter, and Saturation, etc.). Save your working file.
7. Make a copy and flatten the images. Scale image to meet the above specification. Export file as portable network graphics (i.e., png) file.

### Tips

* My personal preference for color markers is the solvent-based brand called Chartpak AD. There are several comparable manufacturers (e.g. Prismacolor, Faber Castell, etc.) Some are water-based, and some are solvent-based. The markers I use are the Chartpak Ad Marker Sets - Architectural, Set of 25
* Watercolors may be used for this assignment. Color and felt-tip line work can often be incompatible together, and the way I remember compatibility is to select opposites for the best results (e.g. solvent-based felt-tip line work + water-based color marker, or water-based felt-tip line work + solvent-based color marker.

<Insert Figure 0131matrixResource.svg>

Figure 1.3.1: Resource Guide for Tracing Storyboard Matrix

### Criteria

| **DLO** | **Advanced (4 pts)** | **Proficient (3 pts)** | **Developing (2 pts)** | **Beginner (1 pt)** |
| --- | --- | --- | --- | --- |
| Site conditions | Designer demonstrates comprehensive understanding of the site conditions that impact design decisions | Designer demonstrates some competency in identifying the site conditions that impact design decisions | Designer identifies only a few of the site conditions that impact design decisions | Designer does not demonstrate understanding of the site conditions that impact design decisions |
| User requirements | Designer demonstrates comprehensive understanding of the user requirements that impact design decisions | Designer demonstrates some competency in identifying the user requirements that impact design decisions | Designer identifies only a few of the user requirements that impact design decisions | Designer does not demonstrate understanding of the user requirements that impact design decisions |
| Communication | Student demonstrates a professional communication aptitude | Student demonstrates a competent level of communication skills | Student demonstrates a limited competency in communicating ideas | Student does not demonstrate competency in communicating ideas |
| Craft | Illustrator demonstrates exemplary attention to work product and excellence. | Illustrator demonstrates good attention and care towards work product. | Illustrator completes work, but the product seems rushed to completion. | Illustrator demonstrates attention towards work product, but work quality is inconsistent. |
| Line | Illustrator uses line to hold the viewer's attention. Lines are controlled and evoke both power and subtlety. Line is descriptive and/or symbolic and supports compositional goals. | Illustrator's line work demonstrates several professional attributes. Linework does not distract the viewer and generally supports compositional objectives. | Illustrator's use of line is somewhat effective. Lines are consistent and well-crafted. Linework has some non-contributing attributes. | Illustrator attempts to use line descriptively. Lines are inconsistent and lack attention to craft. |
| Professionalism | Illustrator completes the work on time. Work demonstrates exemplary attention to learning objectives. | Illustrator completes the work on time and demonstrates a good work ethic. | Illustrator generally completes the work at a minimum level of expectation. | Illustrator is missing parts of the work and makes a plan for completion of the remaining assignment. |

### Related Assignments

* Sketch K. Formal Precedent Study. Thumbnail Sketch to Contour Drawing
* Exercise Fifteen. Electronic Site Contour Model and Three Proposed Places

## Sketch K. Formal Precedent Study. Thumbnail Sketch to Contour Drawing.

<Insert Figure 1.3.2\_sketchK>

Figure 1.3.2: Sketch K. Formal Precedent Study. Thumbnail Sketch to Contour Drawing

### Introduction

Less content is often more informative and useful than the most comprehensive data. As an example, an abstract drawing may offer more knowledge than the most descriptive photograph of a building. One purpose of drawing is not only to record the observed subject but also to analyze and clarify what is most important. This analysis proceeds by reduction through multiple drawing layers and iterations, which can be considered a fundamental process of creative architectural design. The innovations and technologies that affect how we practice our profession have changed significantly, which has led many to question the usefulness of drawing (esp., by hand.) Experience suggests that reliance on electronic technologies underestimates the creative role of "redrawing." This sometimes leads to a "kit-of-parts" approach, which can be a derivative and biased design viewpoint. For a student, there is an urgent need to practice skills that promote abstract thinking. Benefits of deliberate sketching and iterative redrawing include greater understanding of the design problem constraints and opportunities, improved communication, efficient management of multiple design variables, and, well, better design thinking! This exercise will demonstrate a deliberate and iterative approach that results in a refined contour drawing and analysis of the formal attributes of observed architecture.

### Scenario

How do you analyze the most essential formal attributes of architecture? This question is important, because understanding architecture in generalizable and abstract terms allows us to focus on design principles (e.g., form, organization, content, composition, etc.) Abstraction helps to diminish the "noise" that distracts us when working on difficult architectural problems. What is a reliable tool for abstracting formal meaning from the architecture we observe? The process of sketching and iterative redrawing offers the most purposeful and efficient method, which is consistent with the needs of design. Drawing initial thumbnail sketches "in the field" or as quick visioning vignettes is a great skill to develop. Confidence in sketching encourages us to work quickly from idea to idea in an iterative approach. The sketches can also leverage our communication skills and help clients understand the designed-environment experience.

As you begin this exercise select an oblique external view of a building, so that you can sketch a quick thumbnail drawing of the scene in two-point perspective (i.e., step one.) The downloadable three-step template described in the "Steps" section below provides a deliberate and reliable tool for drawing a perspective of the selected building. The tool focuses your efforts on calibrating observational skills using analytic perspective methods. One of the most difficult and important drawing skills to learn is how to analyze an oblique perspective of architecture from direct observation, separating the essential attributes from the background "noise." Your focus should be to describe the patterns made from the primary forms (e.g., surfaces, walls and roofs) and openings (i.e., fenestration.) The process of abstraction involves drawing and re-drawing incrementally larger views of reduced detail with each iteration. The resulting abstract composition is a minimalist contour drawing. The goal of this exercise is to draw an abstract contour diagram of an oblique external view of a building in perspective, so that the figure-ground drawing in 01.2\_ModelSystems reveals the essential formal architectural attributes.

### Learning

This assignment module contributes to the following design learning outcomes, which finish the sentence “As a successful student in this course, I am now able…”

* ...to draw effective representations of designs using professional architectural practices and know which techniques are most appropriate for a given drawing.

### Materials

* Sketchbook
* "Three x 3" template page
* Pen

### Steps

1. Working quickly as a sketch, use the smallest square in the template (i.e., thumbnail) and draw only the major horizontal and vertical lines.1
2. Add the smaller shapes and tones for apertures and shadows. Complete the thumbnail with suggestions of materials, tonal "color" and detail.
3. Draw a "rule-of-thirds" grid over the thumbnail sketch to define a desired composition. Transfer that grid of nine rectangles to the medium square.
4. In the medium square redraw, as contours only, the primary forms using the transfer grid as a guide. Make "corrections" to the perspective.
5. Scale the drawing up to the large-square size (i.e., 150%.) Center this under large square and trace the contour drawing and new frame.

### Tips

1. If you don't have easy access to a photocopier or scanner as implied in step 5, then you could repeat the transfer grid process to enlarge the image for the final drawing. This may be a preferred method anyway because it gives you extra redrawing practice.
2. This method of building sketches is comprehensively described, first on pages 24-5 and again on pages 34-7 (i.e., grid) in, Laseau, P. 2004. Freehand sketching, an introduction. WW Norton and Co. NY.
3. There is no real "rule" of composition, and this idea may be thought of as more of a guideline. It is a very familiar concept in photography and is a setting on most phone cameras.

### Criteria

| **DLO** | **Advanced (4 pts)** | **Proficient (3 pts)** | **Developing (2 pts)** | **Beginner (1 pt)** |
| --- | --- | --- | --- | --- |
| Communication | Student demonstrates a professional communication aptitude | Student demonstrates a competent level of communication skills | Student demonstrates a limited competency in communicating ideas | Student does not demonstrate competency in communicating ideas |
| Craft | Illustrator demonstrates exemplary attention to work product and excellence. | Illustrator demonstrates good attention and care towards work product. | Illustrator completes work, but the product seems rushed to completion. | Illustrator demonstrates attention towards work product, but work quality is inconsistent. |
| Line | Illustrator uses line to hold the viewer's attention. Lines are controlled and evoke both power and subtlety. Line is descriptive and/or symbolic and supports compositional goals. | Illustrator's line work demonstrates several professional attributes. Linework does not distract the viewer and generally supports compositional objectives. | Illustrator's use of line is somewhat effective. Lines are consistent and well-crafted. Linework has some non-contributing attributes. | Illustrator attempts to use line descriptively. Lines are inconsistent and lack attention to craft. |
| Professionalism | Illustrator completes the work on time. Work demonstrates exemplary attention to learning objectives. | Illustrator completes the work on time and demonstrates a good work ethic. | Illustrator generally completes the work at a minimum level of expectation. | Illustrator is missing parts of the work and makes a plan for completion of the remaining assignment. |

### Related Assignments

* Sketch J. Watercolor Storyboard of Twelve Site Context Vignettes
* Exercise Fourteen. Physical Paper Model of Formal Precedent

## Exercise Fourteen. Physical Paper Model of Formal Precedent

<Insert Figure 1.3.3\_exerciseFourteen>

Figure 1.3.3: Exercise Fourteen. Physical Paper Model of Formal Precedent

### Introduction

Innovations in building information modeling and three-dimensional visualization programs have not killed off the hand-crafted paper model. The utility of a physical sketch model and the availability of inexpensive materials makes physical model building a must-have skill for students. Exercise Fourteen excerpts from an essential workflow of the designer:

* Interpret a spatial environment as an abstract drawing
* Design an intervention
* Test the design in a simulation model
* Repeat as needed.

In this module, you will draw a pattern on paper and make cuts and folds, so that the model "pops up" and makes form and space. The module has been adapted from an exercise called *Origamic Architecture, Visualization, and 3-D Modeling in Real Space* in the 3rd edition of Rendow Yee’s Architectural Drawing (Yee 2007, 652). Some practice examples can be downloaded from the web site listed in the Tips section (Baud & Bui 2010). The content for your work shall be developed from a drawing of a significant urban building you made in *Sketch K. Formal Precedent Study. Thumbnail Sketch to Contour Drawing*. It is important to learn efficient physical modeling skills. It is useful that you can quickly interpret and translate abstract ideas back and forth between two-dimensional representations and three-dimensional formal studies. Benefits of updating your skills and design approach include heightened awareness of essential design attributes, greater ability to abstract your design ideas, improved communication, and yes, better architecture.

### Scenario

As a student you want to learn the techniques of our profession. Over the next several years you will develop proficiency in solving problems in the built environment. Architecture and engineering have a wide array of useful tools and skills, which leverage your creativity and focused concentration on difficult design challenges. You will find that a quick three-dimensional (3d) model made from your drawings will help you simulate and communicate an experiential appreciation of the built environment.

A good designer has a proficiency in translating a project vision between two-dimensional (2d) representations and 3d objects. The back-and-forth-visioning processes are proven efficient, clear, reliable, and outcome-oriented. That is not to say the process is quick or easy to learn. A professional develops abstractions to complex problems of form, often by drawing patterns on paper (e.g., sketches, technical drawings, etc.) This process can reveal the essence of important ideas, which may be concealed by too much background "noise." When a professional makes an abstract 3d model in a simulated spatial environment, it is often with the purpose of testing if the constructed environment reliably reflects the essence of the design ideas.

### Learning

This assignment module contributes to the following design learning outcomes, which finish the sentence “As a successful student in this course, I am now able…”

* ...to interpret two-dimensional representations of designs into three-dimensional simulations using conventional paper-modeling techniques.

### Materials

* Cork-backed straight edge
* Craft knife (i.e., X-acto)
* Bristol board, 9"x12"

### Steps

1. Using the drawing created in *Sketch K. Formal Precedent Study. Thumbnail Sketch to Contour Drawing*, draft by hand a technical, figure-ground drawing of a significant urban building.
2. Fold and cut the piece of paper and create a prototype model of a simple stair-stepping practice pattern.
3. Integrate the craft-knowledge gained in the previous steps and make sketches and several folded studies of the technical drawing.
4. Map the technical drawing onto the designed bas relief pattern.
5. Cut and fold the two-dimensional technical drawing, to create a three-dimensional "origami architecture." (Yee 2007)

### Tips

1. The sharper the blade the safer it is to use. Sounds like a paradox, however you do not want a dull blade to slip uncontrolled across the board and coming to rest on your finger!
2. While a challenge to find, you may get inspiration from a video entitled, *Between the Folds* (PBS 2011).
3. Really analyze your object in terms of *figure-ground* binary relationships. The more that you filter the three-dimensional object to the most basic formal principles, the easier the modeling task.

### Criteria

| **DLO** | **Advanced (4 pts)** | **Proficient (3 pts)** | **Developing (2 pts)** | **Beginner (1 pt)** |
| --- | --- | --- | --- | --- |
| Craft | Illustrator demonstrates exemplary attention to work product and excellence. | Illustrator demonstrates good attention and care towards work product. | Illustrator completes work, but the product seems rushed to completion. | Illustrator demonstrates attention towards work product, but work quality is inconsistent. |
| Professionalism | Illustrator completes the work on time. Work demonstrates exemplary attention to learning objectives. | Illustrator completes the work on time and demonstrates a good work ethic. | Illustrator generally completes the work at a minimum level of expectation. | Illustrator is missing parts of the work and plans for completion of the remaining assignment. |

### Related Assignments

* Sketch K. Formal Precedent Study. Thumbnail Sketch to Contour Drawing.
* Exercise Twenty-one. Sectional “Anatomy” of a Design Project

## Exercise Fifteen. Electronic Site Contour Model and Three Proposed Places

<Insert Figure 1.3.4\_exerciseFifteen>

Figure 1.3.4: Exercise Fifteen. Electronic Site Contour Model and Three Proposed Places

### Introduction

This is the first of several component parts in the design and representation of a workspace in a wooded setting. Below you can find a "Program Brief." The exercise begins with you drawing an electronic model of the site plan at the right. Once this site has been modeled, print a view as evidence of your learning and as a medium to sketch your site location ideas. Import several trees, and other entourage. You will find it useful to also model a 10 ft. cube (3m) as a proxy object on the site situated where you believe a good location for the workspace should be.

Experiment with at least three locations. Please refrain from modeling your project. Rather, sketch a perspective view of a proposed workspace located on the site by using the tracing method that we explored in volume one (i.e., Exercise Ten. Contour Line Drawing of Eye-level Perspective.) Only represent a form with a shed roof and refrain from drawing windows, door openings, materials, or any other detail. Repeat this step two more times. In all, you should propose three separate formal ideas. Select one form from the three ideas and develop it into a rendered design drawing. Provide a color study like the example above in Figure 1.3.4: Exercise Fifteen. Electronic Site Contour Model and Three Proposed Places.

### Scenario

Our project has a program description. You can modify some of the specifics based on themes you would like to explore:

#### Program brief statement: My Drafting Room: A Workshop for Drawing

*Since the three friends "moonlight" as illustrators and model builders, then a studio where they can meet clients, pinup work for internal review and maintain a connection to the natural environment may provide an ideal outlet to exercise creativity in a rejuvenating setting.*

*While the lakeside site is a challenging, wooded and steeply sloping grade, the moderate climate displays a full spectrum of seasonal changes. The rationally cubic and vernacular form of the building sets an appropriate feel to the rustic setting.*

*Since the entrepreneurs have secured startup funding that includes their vision of a workshop in the woods, then the architectural budget shall be closely managed in order that initial, operating and life cycle costs are carefully controlled for sustainability of the enterprise.*

*Because the undisturbed site was selected for its experiential beauty, a minimal access drive and a mechanical package concrete pad exist; therefore, the formal studio envisions a one-time "construction-disturbance" period. The interior may be adapted in the future to accommodate changing workflow, and the professional staff shall remain few.*

<Insert Figure 1.3.5\_sitePlanSketch>

Figure 1.3.5: Site Plan Sketch

In *Exercise Fourteen. Physical Paper Model of Formal Precedent* you studied three-dimensional representation using a physical material, paper. In this assignment you will build an electronic model. You will continue to build more and more detail into this model through the rest of the semester. The model will serve as a framework and scaffolding for your design work. One caveat we should consider about electronic models is that each revision can take a considerable amount of time to make. If we construct our models from the very beginning with several best practice ideas in mind, then it is beneficial to our working efficiency. An electronic model can be both a great leveraging tool (i.e., reward) for your productivity and an enormous time sink (i.e., risk) that takes valuable resources away from your prime directive, to design a spatial intervention that "improves" the existing condition for the various "clients" you serve (e.g., owner, user, visitor, nature, society, etc.) One hedge against this kind of risk to your productivity and flow of design ideas is the use of a hybrid digital-analog process.

### Learning

This assignment module contributes to the following design learning outcomes, which finish the sentence “As a successful student in this course, I am now able…”

* “… make a complex electronic model of an architectural system, apply materials, textures, and lighting sources, and output a photorealistic rendering of the scene.”

### Materials

* Electronic Modeling Program (e.g., SketchUp and Blender)
* Site Plan Sketch
* Tracing paper
* Colored pencils and felt-tip markers

### Steps

1. Download the provided sketch of the site plan.
2. In SketchUp or Blender, import the file of type "jpeg." Move the jpeg to a layer of its own (i.e., image.) Blender does not use the layer concept. It is useful to use *Collection* in the same way to organize your file.
3. Size the image using the graphic scale, as demonstrated in studio.
4. Using the Freehand command in SketchUp (Grease Pencil in Blender,) build up a "layer cake" of topographic lines, placing each on its own layer (e.g., 00, 02, 04, ..., 36.)
5. "Push-pull" the "topos" to the correct height. Choosing three different locations on the site, place one 10' cube, move it around to the three locations and save each view.
6. Print each of the three views for your use in the next step.
7. Using a tracing paper overlay method, sketch each perspective view.

### Tips

1. The exercise is designed to focus decision making. Several simplifications have been described (e.g., proxy cube, three locations, etc.) These moves can be more complex and involve several more iterations in a professional office. That may be a good choice for you to repeat several iterations.
2. In Exercise Sixteen you are provided with a design for the mechanical package concrete pad that has been standardized to a given geometry. This may not conform to your design. As you develop more electronic modeling skills, you are easily able to modify the pad so that it logically supports your design.

### Criteria

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DLO | Advanced (4 pts) | Proficient (3 pts) | Developing (2 pts) | Beginner (1 pt) |  |
| Craft | Illustrator demonstrates exemplary attention to work product and excellence. | Illustrator demonstrates good attention and care towards work product. | Illustrator completes work, but the product seems rushed to completion. | Illustrator demonstrates attention towards work product, but work quality is |  |
| Rendering | Illustrator uses line to hold the viewer's attention. Image is controlled and evokes both power and subtlety. Image is descriptive and/or symbolic and supports compositional goals. | Illustrator's line work demonstrates several professional attributes. Rendering style does not distract the viewer and generally supports compositional objectives. | Illustrator's use of line is somewhat effective. Rendering style is consistent and competent. There are some non-contributing attributes. | Illustrator attempts to use line descriptively. Rendering is inconsistent and lacks attention to craft. |  |
| Technical | Illustrator observes and analyzes object data and translates it to a meaningful graphic representation. Professional conventions are followed, inclusive of line weight, orthographic and dimensional information. | Illustrator observes and analyzes object data and translates it to a meaningful graphic representation. Most professional conventions are followed, and some information is missing. | Illustrator is challenged to observe and analyze object data correctly. Few professional conventions are followed, and some information is missing. | Illustrator attempts to observe and analyze object data and representation is inconsistent. Professional drawing conventions are not followed. |  |
| Professionalism | Student completes the work on time. Work demonstrates exemplary attention to learning objectives. | Student completes the work on time and demonstrates a good work ethic. | Student generally completes the work at a minimum level of expectation. | Student is missing parts of the work and makes a plan for completion of the remaining assignment. |  |

### Related Assignments

* Sketch J. Watercolor Storyboard of Twelve Site Context Vignettes
* Exercise Fourteen. Physical Paper Model of Formal Precedent
* Exercise Sixteen. An Aerial Flyover Animation of Your Selected Place

## Exercise Sixteen. An Aerial Flyover Animation of Your Selected Place

<Insert Figure 1.3.6\_exerciseSixteen>

Figure 1.3.6: Exercise Sixteen. An Aerial Flyover Animation of Your Selected Place

### Introduction

You have modeled the site contours in an electronic modeling software and have proposed at least three possible locations on the site for your design of "workshop for drawing" in *Exercise Fifteen. Electronic Site Contour Model and Three Proposed Places*. Using your preferred location, model first a concrete retaining wall and a concrete pad from the provided design in *Figure 1.3.7 Mechanical Pad Design*. We will cover the design and sizing parameters during lecture (see also below in the Steps section.) Place a deck of wood framed design directly over the concrete mechanical pad. The decking will form the floor of your workshop. Model in SketchUp or Blender your design to a 100 level of detail (LOD.) The deliverable for this exercise is an animated GIF. Refer to the Steps section for setup and export options.

<Insert Figure 1.3.7\_mechanicalPad>

Figure 1.3.7: Mechanical Pad Design

### Scenario

A common tool for understanding modeling requirements comes from architectural engineering and construction (AEC) industry organizations, particularly the American Institute of Architects (AIA). There are five different levels of development (LOD) when modeling: 100, 200, 300, 400, and 500. The simple way to understand this is to ask how much detail is necessary at a given stage of design. Imagine you are presenting your work to a client. It is the first meeting. What are the main questions: Where is the project located on the site? What is the orientation? How are you capitalizing on the views? Prevailing winds? Solar gain? Your electronic model should show the primary geometric form of the proposal. This may include the primary shape of the roof design. It may or may not include fenestration (e.g., windows and door openings.) Material details are rarely relevant at this first meeting! No details are relevant. A 100-level of development is used during the pre-design phase of a project and may be described as a conceptual model that shows height, area, volume, orientation, and location. We may think of this as a proxy design…a point of beginning.

### Learning

This assignment module contributes to the following design learning outcomes, which finish the sentence “As a successful student in this course, I am now able…”

* “… make an animation from a complex electronic model of an architectural system, apply materials, textures, and lighting sources, and output a photorealistic rendering of the scene.”

### Materials

* Electronic Modeling Program (e.g., SketchUp and Blender)
* Mechanical Pad Design
* GIMP

### Steps

1. Using your design from Exercise Fifteen, identify the approximate project location in the SketchUp or Blender model. Determine 6"-thick concrete pad dimensions (i.e., make it the same footprint as your design.)
2. Position concrete pad under project as simplified footprint on site and design a 12" wide retaining wall holding back the upward sloping soil, to depress pad so that it "daylights" about six inches above the front of the building edge.
3. Create column supports and deck in coordination with structural retaining wall. Place wood deck construction so that the floor height is about the same as the top of the retaining wall.
4. Build 100-level (LOD) model on deck. Project shall be both economical in construction and fully accessible. This predicts a one-story-only design.
5. Using tools in SketchUp or Blender, create a five-scene fly-around animation and export at a rate of 5 fps several PNG files (i.e., 30-35 images.)
6. Open all files as layers in GIMP. Sort layers in correct order. Export as GIF animation.

### Tips

1. While SketchUp and Blender are not fully building information modeling (BIM) programs, you will benefit from simulating workflows used in BIM. Specifically, it is important to work in *Components* (SketchUp) and *Collections* (Blender.) The best way to envision this workflow is to think of nesting a drawing inside another drawing.
2. Building on the previous tip: the author enjoys a process of building a model of separate components. Close the model. Open another new model, perhaps called something like *assembly*, and importing the separate component models inside of the assembly model.
3. Suggested order of operations for your mechanical concrete pad could therefore be an assemblage of the following component models:

* Spread Footing
* Footing Wall
* Concrete Slab
* Concrete Retaining Wall
* Concrete Columns
* Double Wood Sill Plate
* Double Wood Beam (Girder)
* Wood Joists

### Criteria

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DLO | Advanced (4 pts) | Proficient (3 pts) | Developing (2 pts) | Beginner (1 pt) |  |
| Craft | Illustrator demonstrates exemplary attention to work product and excellence. | Illustrator demonstrates good attention and care towards work product. | Illustrator completes work, but the product seems rushed to completion. | Illustrator demonstrates attention towards work product, but work quality is |  |
| Rendering | Illustrator uses line to hold the viewer's attention. Image is controlled and evokes both power and subtlety. Image is descriptive and/or symbolic and supports compositional goals. | Illustrator's line work demonstrates several professional attributes. Rendering style does not distract the viewer and generally supports compositional objectives. | Illustrator's use of line is somewhat effective. Rendering style is consistent and competent. There are some non-contributing attributes. | Illustrator attempts to use line descriptively. Rendering is inconsistent and lacks attention to craft. |  |
| Technical | Illustrator observes and analyzes object data and translates it to a meaningful graphic representation. Professional conventions are followed, inclusive of line weight, orthographic and dimensional information. | Illustrator observes and analyzes object data and translates it to a meaningful graphic representation. Most professional conventions are followed, and some information is missing. | Illustrator is challenged to observe and analyze object data correctly. Few professional conventions are followed, and some information is missing. | Illustrator attempts to observe and analyze object data and representation is inconsistent. Professional drawing conventions are not followed. |  |
| Professionalism | Student completes the work on time. Work demonstrates exemplary attention to learning objectives. | Student completes the work on time and demonstrates a good work ethic. | Student generally completes the work at a minimum level of expectation. | Student is missing parts of the work and makes a plan for completion of the remaining assignment. |  |

### Related Assignments

* Sketch J. Watercolor Storyboard of Twelve Site Context Vignettes
* Exercise Fourteen. Physical Paper Model of Formal Precedent
* Exercise Fifteen. Electronic Site Contour Model and Three Proposed Places
* Exercise Seventeen. Multi-view Construction Drawing

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