Chapter Five: Construction Documentation

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## Field Sketches, Site Photography and the Project File

Field sketches are drawn to document the existing conditions of a building site. During the same site visit architecture and engineering professionals may take photographs. Along with the signed contract with the owner for professional services, these sketches and photographs often make up the beginning elements of the project file. Historically, the project file was often either a manilla folder with a two-hole punched metal clasp binder and/or a three-ring binder. In the professional office, this project file was usually maintained by the project architect, engineer or manager. If you were a professional working on the job, then you would walk to the manager’s desk with your own notepad and questions to consult the project file. The file very rarely was taken from the manager’s desk! With the development of the computer, the project file is more likely to be a directory folder in a shared network drive. The project architect still acts as the archivist.

Facts are important only if they are appropriate. Facts are used to describe the existing conditions of the site, including the physical, legal, climatic, and aesthetic aspects. These facts about the site should be documented graphically to be really effective. (Pena 2012, 50)

<Insert Figure 5.1.1>

Figure 5.1.1: Field Sketch of Shakertown Center Family Dwelling Cupola

Since the project file in whatever form is the most important living document, then we can infer that the contents of the file have legal consequence in the case of any disputes that may arise. Field sketches may look informal and sometimes messy, but you should not underestimate their importance.

Keep all important project records. Written documentation will serve as proof of your firm’s position in the event of any disputes. Written means printed, in the form of notes, letters, photographs, photocopies, faxes, printed e-mail, or printouts of computer files that are stamped with a date. (Moreno 2001, 389)

The field sketch serves several needs for the project, because the sketch documents the existing conditions, forms a basis for subsequent construction drawings, and is a record of the dimensional and geometric properties that disappear once the actual construction begins. The same can be said about the photographic record. Dimensioned and annotated drawings in combination with the photographs represent a far better record than faulty memories or mental images. When you are practicing your field sketches focus on both efficiency and making a comprehensive documentation of existing conditions. Your time will be limited on site by the economic constraints of the project budget, yet the value of your efforts will be equally appreciated back in the office. As you begin to translate your notes, sketches and photographs into working documents, each piece of observed data will allow you and your colleagues a sense of confidence in the complex decision you must make. Unless your field sketches are lost or are incomplete as a record, your understanding of the existing building and site conditions will follow from a strong foundation of professionalism. Architects, engineers, construction managers and the clients for whom these professions serve all depend on making quick sketches that include dimensions, annotations and accurate graphic relationships. These sketches are supported with a photographic record and sometimes also an audio recording or video made directly while on site capturing initial thoughts and impressions. In this way we can say that good architecture begins with empirical research that is catalogued and integrated into the development of the design. Each project is unique. Architecture reflects this deliberate focus on the site and built context as fundamental drivers of design ideas.

### Sketch C. Field Sketches of Floor Plans of Five Large Rooms

#### Introduction

<Insert Figure 5.1.2>

Figure 5.1.2: Field Sketches of Floor Plans of Five Large Rooms

Sketch the floor plan of five living spaces. Draw freehand but make sure the plan is proportionally correct. Include walls, openings, doors, windows, and furniture. Include notes about the space, materials, measurements, or other observations as you see fit. Use 1 page per drawing. Each drawing should be approximately 10 minutes.

The plan is a horizontal section and should be cut through the building at a height which goes through all wall openings, such as doors and windows. Show lines which occur above this section plane as dashed or dotted lines. (Kirby Lockard 1977, 18)

#### 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 analyze the built environment and apply measured drawing skills that include plans and elevations, illustrating line quality, drawing notation and dimensioning.

#### Scenario

Going out to the field and measuring existing conditions is one of the most common activities in a professional design office. The first step in most projects is to photograph, measure and make drawings with notes. These field notes are a valuable resource back in the office when we begin to make the technical drawings.

As a professional architect who teaches architecture and engineering students, I am often asked by people outside of the profession why we still learn drawing by hand. In an age of computer-aided drawing, why would a student want to know how to draw by hand when the computer is so excellent? There are so many answers to this question, and we’ll talk about one of them now. The field sketch of existing conditions is the most efficient, effective, and inexpensive method for verifying and beginning a construction project. These field sketches and early photographs are so important to the project, that they are kept in the official job file, not to be discarded. They are an important component of the construction documents and are legal instruments in practice. We should learn how to gather good documentation and make effective sketches.

#### Materials

* Phone camera or digital camera
* Pencil
* Tape measure
* Sketchbook
* 1:96 Grid Paper

#### Steps

1. Select a large complex room with doors and windows and furniture. A good source for your selection is a lecture hall, library reading room, high-rise lobby, etc. This offers the challenge of a mid-sized room that is not too large to be a burden and that is more of a challenge than a residence.
2. With a tape measure, identify the overall height, width, and openings with dimensions. Construct a floor plan freehand and pay particular attention to the overall proportions of the room (e.g., 1:1, 1:2, 1:4, 2:3, 3:4, etc.) Drawing this image freehand and with the grid promotes sketching precision without the need for drafting tools.
3. Photograph your room from various views. These images will be useful to you after you have returned to the studio and wish to add notes and an estimate of furniture locations, etc.
4. Taking our analysis from the general to the specific, use the tape measure and take important inner dimensions and note important relationships. Include dimensional information about the inner elements and details.
5. Select four more rooms of similar description. Repeat this process for a total of five floor plan field sketches.

#### Video

<Insert Figure 5.1.3\_fieldSketchFloorPlan>

Figure 5.1.3: Video Still. Field Sketch of a Floor Plan

#### Tips

* Taking a large clipboard to the field is useful in providing a mobile and hard surface to draw.
* Photograph everything about the room. You will be glad to have the information when back in the studio.

#### 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

* Exercise Four. Hand Drafting an Orthographic Multi-view Projection of Complex Chair
* Sketch D. Field Sketches of Two Exterior Elevations of Large Buildings
* Sketch E. Field Sketches of Two Interior Elevations of Large Rooms
* Sketch F. Field Sketches of Five Partial Interior Sections of Large Room
* Exercise Seven. Interior Construction Drawing. Floor Plan and Interior Elevations

### Sketch D. Field Sketches of Two Exterior Elevations of Large Buildings

#### Introduction

<Insert Figure 5.1.3>

Figure Sketch D. Field Sketches of Two Exterior Elevations of Large Buildings

Sketch two exterior building elevations of a medium to large building. Draw freehand, do not draft. Make sure the drawing is proportionally correct by comparing dimensions (height and width) but there’s no need to measure the space or building. Use your best judgment. Include details of openings, windows, and doors as appropriate to the scale of the drawing. Check with your textbook for elevation drawing conventions. Add notes and observations to each drawing. Use 1 page per drawing. Each drawing should be approximately 10 minutes.

A principal view of an object projected orthographically on a vertical picture plane…may be a front, side, or rear view…. In architectural graphics, we label elevation views in relation to the compass directions or to a specific feature of a site. (Ching 1998, 125)

#### 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 analyze the built environment and apply measured drawing skills that include plans and elevations, illustrating line quality, drawing notation and dimensioning.

#### Scenario

This assignment is a continuation Sketch C. Field Sketches of Floor Plans of Five Large Rooms. Please review the Scenario section for that assignment for more information.

#### Materials

* Phone camera or digital camera
* Pencil
* Tape measure
* Sketchbook
* 1:96 Grid Paper

#### Steps

1. Select two exterior elevations of a large and complex building. Again, a good source for your selection is a lecture hall, library reading room, high-rise lobby, etc. This offers the challenge of a mid-sized room that is not too large to be a burden and that is more of a challenge than a residence.
2. With a tape measure, identify the overall height, width and openings with dimensions. Construct exterior elevations freehand and pay particular attention to the overall proportions of the room (e.g., 1:1, 1:2, 1:4, 2:3, 3:4, etc.) Drawing this image freehand and with the grid promotes sketching precision without the need for drafting tools.
3. Photograph your room and building from various views. These images will be useful to you after you have returned to the studio and wish to add notes and an estimate of furniture locations, etc.
4. Taking our analysis from the general to the specific, use the tape measure and take important inner dimensions and note important relationships. Include dimensional information about the inner elements and details.

#### Video

<Insert Figure 5.1.4\_fieldSketchExtElevation>

Figure 5.1.4: Video Still. Field Sketch of Exterior Elevations

#### Tips

* Taking a large clipboard to the field is useful in providing a mobile and hard surface to draw.
* Photograph everything about the room and building. You will be glad to have the information when back in the studio.

#### 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. |  |
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#### Related Assignments

* Exercise Four. Hand Drafting an Orthographic Multi-view Projection of Complex Chair
* Sketch C. Field Sketches of Floor Plans of Five Large Rooms
* Sketch E. Field Sketches of Two Interior Elevations of Large Rooms
* Sketch F. Field Sketches of Five Partial Interior Sections of Large Room
* Exercise Seven. Interior Construction Drawing. Floor Plan and Interior Elevations

### Sketch E. Field Sketches of Two Interior Elevations of Large Rooms

#### Introduction

<Insert Figure 5.1.5>

Figure Sketch E. Field Sketches of Two Interior Elevations of Large Rooms

Sketch two interior room elevations of a medium to large building. Draw freehand, do not draft. Make sure the drawing is proportionally correct by comparing dimensions (height and width) but there’s no need to measure the space or building. Use your best judgment. Include details of openings, windows, and doors as appropriate to the scale of the drawing. Check with your textbook for elevation drawing conventions. Add notes and observations to each drawing. Use 1 page per drawing. Each drawing should be approximately 10 minutes.

#### 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 analyze the built environment and apply measured drawing skills that include plans and elevations, illustrating line quality, drawing notation and dimensioning.

#### Scenario

This assignment is a continuation Sketches C. Field Sketches of Floor Plans of Five Large Rooms and D. Field Sketches of Two Exterior Elevations of Large Buildings. Please review the Scenario section for that assignment for more information.

#### Materials

* Phone camera or digital camera
* Pencil
* Tape measure
* Sketchbook
* 1:96 Grid Paper

#### Steps

1. Select a two interior walls in a large and complex room with doors and windows and furniture. A good source for your selection is a lecture hall, library reading room, high-rise lobby, etc. This offers the challenge of a mid-sized room that is not too large to be a burden and that is more of a challenge than a residence.
2. With a tape measure, identify the overall height, width, and openings with dimensions. Construct an interior and exterior elevations freehand and pay particular attention to the overall proportions of the room (e.g., 1:1, 1:2, 1:4, 2:3, 3:4, etc.) Drawing this image freehand and with the grid promotes sketching precision without the need for drafting tools.
3. Photograph your room and building from various views. These images will be useful to you after you have returned to the studio and wish to add notes and an estimate of furniture locations, etc.
4. Taking our analysis from the general to the specific, use the tape measure and take important inner dimensions and note important relationships. Include dimensional information about the inner elements and details.

#### Video

<Insert Figure 5.1.6\_fieldSketchIntElev>

Figure 5.1.6: Video Still. Field Sketch of Two Interior Elevations of Large Rooms

#### Tips

* Taking a large clipboard to the field is useful in providing a mobile and hard surface to draw.
* Photograph everything about the room and building. You will be glad to have the information when back in the studio.

#### Criteria

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
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#### Related Assignments

* Exercise Four. Hand Drafting an Orthographic Multi-view Projection of Complex Chair
* Sketch C. Field Sketches of Floor Plans of Five Large Rooms
* Sketch D. Field Sketches of Two Exterior Elevations of Large Buildings
* Sketch F. Field Sketches of Five Partial Interior Sections of Large Room
* Exercise Seven. Interior Construction Drawing. Floor Plan and Interior Elevations

### Sketch F. Field Sketches of Five Partial Interior Sections of Large Rooms

#### Introduction

<Insert Figure 5.1.7>

Figure Sketch F. Field Sketches of Five Partial Interior Sections of Large Rooms

Sketch five sections of buildings and/or spaces of a large building. Sketch loosely using your choice of media. Focus on proportion and accuracy, using your best judgment to estimate size and scale of spaces. Include details of openings, windows, and doors as appropriate to the scale of the drawing. Check with your textbook for elevation drawing conventions. Add notes and observations to each drawing. In a future project, Exercise Eight. Rendered Section. Hybrid Drawing, we will develop one of these sections into a larger rendered sectional drawing. Use 1 page per drawing. Each drawing should be approximately 10 minutes.

#### 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 analyze the built environment and apply measured drawing skills that include plans and elevations, illustrating line quality, drawing notation and dimensioning.

#### Scenario

This assignment is a continuation Sketches C. Field Sketches of Floor Plans of Five Large Rooms and D. Field Sketches of Two Exterior Elevations of Large Buildings and E. Field Sketches of Two Interior Elevations of Large Rooms. Please review the Scenario section for that assignment for more information.

#### Materials

* Phone camera or digital camera
* Pencil
* Tape measure
* Sketchbook
* 1:96 Grid Paper

#### Steps

1. Select a five interior walls in a large and complex room with doors and windows and furniture. A good source for your selection is a lecture hall, library reading room, high-rise lobby, etc. This offers the challenge of a mid-sized room that is not too large to be a burden and that is more of a challenge than a residence.
2. With a tape measure, identify the overall height, width and openings with dimensions. Construct a interior sections freehand and pay particular attention to the overall proportions of the room (e.g., 1:1, 1:2, 1:4, 2:3, 3:4, etc.) Drawing this image freehand and with the grid promotes sketching precision without the need for drafting tools.
3. Photograph your room and building from various views. These images will be useful to you after you have returned to the studio and wish to add notes and an estimate of furniture locations, etc.
4. Taking our analysis from the general to the specific, use the tape measure and take important inner dimensions and note important relationships. Include dimensional information about the inner elements and details.

#### Video

<Insert Figure 5.1.8\_fieldSketchF\_IntSect>

Figure 5.1.8: Video Still. Field Sketches of Five Partial Interior Sections of Large Rooms

#### Tips

* Taking a large clipboard to the field is useful in providing a mobile and hard surface to draw.
* Photograph everything about the room and building. You will be glad to have the information when back in the studio.

#### Criteria

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
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| 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. |  |

## Construction Drawing Page Layout and Document Set Organization

### Architectural Drawing Conventions

What is a construction drawing? How does it differ from a sketch made by a craftsman in preparation for hand or machine work?

…the collection of final preconstruction drawings that represent the building as a whole. They are the pictorial record of the official design for the building, and generally include detailed depictions of every element of the finished building…drawings are produced by the design team, and go through several drafts during the design phase before the final draft becomes part of the contract, which is then sent out to be bid on by contractors. The winning contractor is bound by all of the contract documentation, including the construction drawings. (Higgins 2018)

Architectural drawing conventions are a mostly standardized set of graphic practices that describe complex technical design intentions for construction in place. While constructors are responsible for the means and methods of construction, these design intention documents often imply how materials are assembled and how each is secured in place. Engineers who subcontract to the architect and constructors who read these drawings share a language for interpretation. Here are some useful reference books along with place of publication that cover many of these conventions:

* Architectural Graphic Standards, New York
* Neufert Architects’ Data (Bauentwurfslehre,) Leipzig Germany
* The Architect’s Handbook of Professional Practice, New York
* Time Saver Standards, New York

Wherever architects are licensed around the world, we generally find that architectural drawing conventions are standardized. The first architectural academy was founded at the Ecole des Beaux Arts in Paris in the 19th century. Four primary models of education developed geographically from this initial academy: France, Britain, Germany, and the US. This period was also fraught with colonial expansion throughout the world, and cultural institutions were expanded along with political and military hegemony.

It was natural that the rise of colonial expansionism, the world wars that accompanied these ambitions, and the rebuilding efforts along with a globalization capital and trading model would all combine to create a set of shared architectural practices and protocols for designing and constructing environments and buildings throughout these empires, even long after Colonialism diminished in influence. The major exception to this remains the Imperial vs. SI units of measurement divide. Measurement as a principle is so fundamental to how architectural standards are constructed that it may seem incredible that other elements of education and practice bear so many similarities. Nonetheless, it would be trivial for a young intern architecture student from Middletown, USA to leave inches behind and work in millimeters in Melbourne, Australia.

Architects, engineers, and constructors share a common language of construction drawings, and the processes used to develop these drawings and the protocols evident in professional design firms are remarkably similar wherever work is being built. As we will see in subsequent chapters, the important advances made possible by computer-aided drawing, interdisciplinary design and shared building information modeling assets have only served to increase architectural standards.

### Exercise Seven. Interior Construction Drawing. Floor Plan and Interior Elevations

#### Introduction

Select one of the plans from your 5 sketchbook plans (i.e., Sketch C. Field Sketches of Floor Plans of Five Large Rooms) to develop into a drafted plan and four interior elevations. Arrange the drawings on the page in a clear order and at an appropriate scale for the space. Include furniture, openings, doors, windows, and other details. Focus on line weights, quality of lines, and composition to communicate the nature of the space.

Also include a plan diagram of the space that clearly shows the different zones of activity or information about the space that is not readily apparent in the drafted plan. A diagram is a graphic representation of information. Each line and symbol should convey information about the space, relationships, and its basic design. The final drawing will have one drafted plan four drafted interior elevations one plan diagram.

<Insert Figure 5.2.2\_exerciseSeven>

Figure 5.2.2: Exercise Seven. Interior Construction Drawing. Floor Plan and Interior Elevations

#### 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 analyze the built environment and apply measured drawing skills that include plans and elevations, illustrating line quality, drawing notation and dimensioning.

#### Scenario

The defining characteristic of any construction drawing is the organized presentation of orthographic multi-view drawings composed together in relationships of alignment, cross-referencing, economy of presentation and utmost precision. This requires a strong set of standards that you must learn to become a productive professional.

Construction drawings are the instruments of service for architects and engineers. These drawings are the primary means of communicating the design intention to the constructors. Drawing conventions are more standardized for construction drawings than other things we draw. There are courses, especially at technical schools, that are dedicated to reading construction drawings. There are generally accepted principles for the preparation and interpretation of construction drawings.

Since architects, engineers, fabricators and constructors interact on projects with each other, we can infer there are advantages to having a standardized set of procedures and conventions in the preparation of construction documents. There are very small deviations in some drawing conventions between disciplines (e.g., architectural vs. engineering and engineering vs. fabrication,) yet these differences are not material to accurate comprehension of any of these technical drawings.

Interdisciplinary teams form to make our complex buildings and structures. Teams are bound by contract law to protect all parties engaged in the very messy business of construction. While it is beyond the scope to discuss contracts here, an example is helpful to make the connection between rigorous drawing standards and minimizing litigation and disputes on the job. Traditionally there was a contract between the architect and the owner. Separately there was a contract between the constructor and the owner. We will skip talking about the subcontracts (e.g., architects and engineers, constructors and fabricators, etc.) Above the term instruments of service was used, and construction drawings are sometimes artfully called the contract documents. In fact, the contract between the architect and the owner usually specifies that the contract documents consist of the signed agreement, the construction drawings, and the material specifications. The predominant source of litigation or a breach of contract between the architect and the owner often points to errors and omissions in the material specifications (written) and the construction drawings (drawings and written information.)

Therefore, a strength of a good professional no doubt points to characteristics of detailed attention combined with careful processes to check for these errors and omissions. While the principles discussed in this assignment may seem very picky, pedantic, or peculiar, there is very good precedent for learning the precise art of making excellent construction drawings.

It may surprise you to learn that architectural drawing conventions are remarkably similar throughout the world. The author has taken care to include both imperial units (i.e., feet and inches) alongside SI units (i.e., metric), because you are likely to encounter both in your career. Yet, this may be the greatest distinction you may find. In other words, you could plop most architects and engineers down in a seat in a New York, Paris, Tokyo, Mumbai, Melbourne, Cairo or Buenos Aires design office and they could be productive in a very short time.

Subflooring or underlayment for resilient tile, terrazzo, other finish flooring, should be level to within 1/8" over a 10’ length. Concrete slab beneath wood finish floor should be level to 1/4" in 10’. (Unknown 1974, 27)

#### Materials

* Pencil
* Architect’s scale
* Grid paper and triangles
* Arch B, 12" x 18" (A3, 297mm x 420mm) sheet

#### Steps

1. Plan for a vellum drafting sheet size of Arch C which is 12“x18” (A3, 297mm x 420mm). The drawing scale is 1/8“=1’-0” or 1:96 (1:100 in SI units.)
2. Acquire a grid underlay guide of four cells per inch. Be aware that some engineering grids use five cells per inch, and this is less helpful. The Imperial system of measurement is based on multiples of 4, and the metric system (SI units) are based on multiples of 10. Therefore, if working in SI units find millimeter grid paper.
3. Draw a 0.9mm border line located one inch (25mm) from each edge. This yields a drawing area that is 10” x 16” (i.e., for A3 it is 247mm x 370mm) available for each of six images. Alignment of these images is important for an organized and professional composition. Observe that most rooms are wider in one direction than the other; and since there is a requirement for two floor plan type drawings the wider dimension most likely runs along the x-axis. Therefore, most compositions favor a three row and two column organization. Divide the available drawing area, such that each cell has a column width of 8” (185mm) and a row height of 3.33” (99mm.)
4. A good rule of thumb for many of the drawings that we do is to proceed from the general to the specific. The most general geometric description for our plans, elevations and sections is a bounding rectangle (i.e., what are the outer limits in terms of width and height of the object we are drawing.) Begin by locating each bounding box. Refer to Figure 5.2.2 for information about allowing room for dimensioning and titles.
5. As you add detail for each drawing think of this entire process in three steps or phases: first, mapping phase, layout sheet for all drawings and block in individual cell layouts; second, construction phase, build appropriate detail of each drawing; third, render phase, add linework for clarification as well as dimensions and notes and captions.

#### Video

<Insert Figure 5.2.3\_interiorConstDwg>

Figure 5.2.3: Video Still. Interior Construction Drawing

#### 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. |  |

#### Tips

1. Refer to Figure 5.2.2: Exercise Seven. Interior Construction Drawing. Floor Plan and Interior Elevations for a good example of how to organize and coordinate plans and interior elevations.
2. Laseau (Laseau (1989), 164-9) illustrates what he calls *ideagrams*.
3. Since this assignment is a “sketch” drawing instead of a “drafted” work, then you may benefit from using a tracing grid and guide. The scale of each cell grid at 1/8“=1’-0” would be 2 feet per cell. If using metric units, then you may use millimeter grid paper, and the 1:100 scale would be one meter per cell.
4. If using an alternate method of creating a template sheet in a vector drawing program like Inkscape, print the output from the vector program as a PDF. When using Acrobat Reader’s “poster” feature, it is critical that you print to a scale of 100% (i.e., NOT, “to fit.”)

#### Related Assignments

* Exercise Four. Hand Drafting an Orthographic Multi-view Projection of Complex Chair
* Sketch C. Field Sketches of Floor Plans of Five Large Rooms
* Sketch E. Field Sketches of Two Interior Elevations of Large Rooms

## Sections Represent the Complexities of Architecture

A rendered interior section shows several design elements in one image. The exterior construction is implied by the wall thickness. Several construction elements may be inferred due to the way things like soffits, door and window heads and heating, ventilation and air conditioning is accommodated and drawn. Materials, textures, and colors are rendered. This is a rich drawing.

…the term section typically describes a cut through the body of a building, perpendicular to the horizon line. A section drawing is one that shows a vertical cut transecting, typically along a primary axis, an object or building. The section reveals simultaneously its interior and exterior profiles, the interior space, and the material, membrane, or wall that separates interior from exterior, providing a view of the object that is not usually seen. (Lewis 2016, 6)

### Hybrid Drawings: On the Desk and Inside the Box

A hybrid is often thought of as an offspring of two parent elements. Just as you are a hybrid of your parents, it would not be correct to say that you express equal characteristics of mom and dad. You are more than the sum of your parts. We have done drawings by hand, *on the desk*. We have also begun using the computer to draw, *in the box*. There are tell-tale characteristics of each. Many have mistakenly considered this an either-or choice. In this course, we will think of this choice as *both-and*!

There are two characteristics explored in this section: efficiency and quality. It may be helpful to list some commonly held ideas.

* Drawing with a computer is efficient over the long term, especially for technical drawings, complex perspective scenes and color renderings.
* Drawing by hand is efficient for certain quick drawings like small sketches and diagrams.
* Computer drawings have qualities such as great precision and high resolution.
* Hand drawings have qualities such as friendliness, craftsmanship and emotional appeal.
* Both computer and hand drawings can be impressive to clients.

Whenever these dualities are expressed, there is a tendency to argue the merits of one over the other. If you are like the author, then you may say why must I choose between ice cream or apple pie? Let me have apple pie *à la Mode*!

Visualists have been trying to reproduce the characteristics of hand drawing with computers for many years…hybrid imaging produces a 100 percent computer-generated image that has an inviting quality and casual appearance. Hand drawing may play a minor role during initial visualization stages, but the computer is the primary image generator. [Leggitt 2010, 210]

Since the qualities that we discussed above are often a matter of personal preference, then we would sometimes choose to do a drawing by hand, and at other times to do a drawing totally in the computer. The point is that you as the illustrator should have choices that are a function of best fit for the project rather than a preference for using a particular tool. For instance, if your client specifies a computer rendering in your agreement for services, or a watercolor rendering by hand, then you would want to meet your client’s expectations. It can matter sometimes. If you have a choice, then there is much to gain from a hybrid approach.

Since new illustration techniques have developed with the introduction of the computer, it has been an exciting time to make architectural renderings. The relationship between traditional hand drawing techniques have also evolved in a way that synthesizes the two processes into a new hybrid practice for illustration. It is encouraging and empowering to experiment with evolving your drawing processes from the desk, to inside the box, and back and forth.

### Raster Graphics and Digital Painting. Introductory Techniques

In chapter two we discussed the differences between raster and vector graphics. Here we do a deeper dive into \*painting with pixels\*. There are some unique techniques involved with digital painting, however most of the techniques are an attempt to emulate analogue processes. As an example, a sophisticated watercolor technique involves the painting of glazes. A glaze of transparent color is placed on paper and allowed to dry. Successive transparent layers are added. Each time the previous color is allowed to dry before applying a new glaze. Contrast this to the idea of mixing colors wet-in-wet. One great advantage of digital painting is that this effect can be done without the need to wait for the paper to dry! Depending on what brush parameters and characteristics are chosen, one can paint both glazes and wet-in-wet technique simultaneously.

While one idea is to emulate analogue hand painting, there are many unique things about the digital experience. The two predominant advantages of digital painting are layer structure and advanced masking techniques. Other important tools that you will find in all digital painting programs include layer blend modes, filters, multi-view interfaces, opacity, and some vector line functionality. Check out the *Steps* section below in Exercise Eight for more detail about how to stack effects and leveraging layers and layer masks.

### Exercise Eight. Rendered Section. Hybrid Drawing

#### Introduction

Select one of the sections that you drew in Sketch F. Field Sketches of Five Partial Interior Sections of Large Rooms. The section must show an opening from interior space to exterior space (door, window, balcony, etc.) Manually draft the section on an Arch B, 12" x 18" (A3, 297mm x 420mm) sheet. Draft to an appropriate scale for your space. (i.e., An example room 18’ wide, or 6m, and 12’ high, or 4m, would fit well at 1/2“=1’-0” (1:20 SI units.)

Scan the drawn room section and bring it into a raster-image editor program. Render the section using the program to illustrate the space. Include both interior and exterior in the rendering and include scale figures. Do not worry about perspective, construction details, or details that do not add to the basic shape and/or character of the space. The section only needs to show the basic profile of the space or room. The intent is to use digital graphics combined with hand drafting to document the character of a space. The final composition can be assessed upon the quality of the drafted section and the ability to use a raster-image editing program to illustrate an architectural space. The final drawing should have:

* hand drafted section
* scanned and imported into Photoshop
* rendered interior
* rendered exterior
* 1 scale figure, minimum

<Insert Figure 5.3.1\_exerciseEight>

Figure 5.3.3: Exercise Eight. Rendered Section. Hybrid Drawing

#### 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 analyze the built environment and apply measured drawing skills that include plans and elevations, illustrating line quality, drawing notation and dimensioning.

#### Scenario

At the turn of the twenty-first century a gap widened between “high tech” younger designers and the hands-on “low tech” veteran designers. Designers positioned between the two groups were the first to take notice and began searching for ways to integrate…new methods that merge traditional drawing techniques with high-tech digital tools. (Leggitt 2010, 8)

Artists and illustrators can leverage the speed of direct-to-paper linework and combine it with the convenience of layering and the powerful editing tools and filters of digital painting programs. The hybrid nature of this drawing is two-fold: it is a construction drawing and an illustrative rendering; and it is made using digital and analogue drawing techniques. Whenever you can illustrate multiple design considerations within a single drawing, we may say that it is rich and dense with information. The drawing is suggestive of important interrelationships. The relationships between construction, user experience, utility and aesthetic are made evident in a rendered section drawing, because the viewer apprehends these concepts and design elements all at once. Therefore, when planning such a multi parameter exposition the designer makes certain implicit claims about important architectural juxtapositions that can be aided by such a collage approach. The digital collage of layers is very efficient and open to several iterations and overlays. Unless the choices of materials, colors and textures is deliberately and carefully considered, then the collage of design elements can seem arbitrary and unbalanced. On the other hand, as the designer gains more confidence in this technique the rendered interior section drawing can be one of the most influential and descriptive architectural illustrations.

#### Materials

* Pencil
* Architect’s scale
* Grid paper and triangles
* Arch B, 12" x 18" (A3, 297mm x 420mm) sheet
* Raster-image editor (e.g., GIMP, Photoshop, etc.)

#### Steps

1. Plan for a vellum drafting sheet size of Arch B which is 12“x18” (A3, 297mm x 420mm). The drawing scale is perhaps 1/2“=1’-0” or 1:24 (1:20 in SI units.) Draw a larger scaled interior section than in Sketch F. Focus on line weight differentiation, such that all construction elements that are sectioned (i.e., cut-through) are a thick line (0.7+mm) and elements that are visible in elevation are a thinner line (0.35mm.)
2. Place your drawing flat either on the ground, table or taped to the wall and illuminate with even and non-shadow producing light. Photograph with the camera on your phone using the largest physical lens and try to avoid using the pinch feature to zoom (i.e., digital zoom.)
3. Import into the digital painting program (i.e., GIMP.) The image is probably larger than you need. As an example, if the original crop of an iPhone 12 Pro Max would result in a photo with a resolution of 4032px x 3024px, and perhaps more than 8 Mb file, then it would be larger than we needed and unnecessarily burden the computer during our digital painting phase. A more useful maximum pixel dimension would be 2700 px and a corresponding file size of less than 4 Mb.
4. Using a layering system begin to paint the walls. A common strategy with painters is to build from the background toward the foreground elements. Add another layer to add the window elements. You may want to find a photograph of a window element in elevation to sample and manipulate like an Electronic Dance Music DJ samples drum break beats! Have fun and bring in furniture, plants, and other entourage elements to enliven your scene.
5. One requirement of this assignment is to show the outside environment through an opening in the wall. Use a layer mask to open a view to the layer below where the exterior scene you borrowed from a web image resource resides. Try to blur the outside layer below just a little and slightly desaturate the color intensity. This creates a perception of atmospheric perspective. Another layer should include at least one scale reference human silhouette that does not compete or dominate the architectural materials and finish. Adding significant blur (gaussian or motion blur) or making this silhouette completely gray in color can be effective.

#### Video

<Insert Figure 5.3.2\_renderSect>

Figure 5.3.2: Video Still. Rendered Section Drawing

#### Tips

1. Photographing artwork is a challenge. It is far easier to correct for scale and perspective for instance, than it is for uneven light. Seek a high contrast line, a white background, and dark and clear lines. Remember to place a scale reference to use when adjusting in the digital painting program.
2. The most useful skill to learn in digital painting is creating a mask. Imagine that you are viewing an interior wall. Draw a smaller rectangle on the wall. In your mind’s eye, take some imaginary scissors and cut out the rectangle, so that you can see to the outside. In principle this is a layer mask.
3. Layering is the predominant feature of digital painting. Again, it is useful to use an analogy to enable our understanding. Imagine that you draw a sketch of an existing exterior elevation on a piece of tracing paper. Tear off another sheet and tape directly over your sketch. On this top sheet draw a new porch design. Don’t like it? Instead of erasing the undesirable porch design, tear off another sheet of tracing paper and redraw an improved design over the top of the sheets below and repeat this process. In the digital world, each new layer is analogous to each sheet of tracing paper…only MUCH MORE powerful!
4. Many people love watercolor paintings. A big part of the watercolor aesthetic is the layering of transparent and fluid glazes that allow for a depth of color development over time. You can emulate this technique by reducing the opacity of the layers and experimenting with layer modes such as “multiply” and “overlay.” The main point of this exercise is to experiment!

#### 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 tone value to represent the interplay of light on volumetric forms. Image is controlled and evokes both power and subtlety. Image is descriptive and/or symbolic and supports compositional goals. | Illustrator's tone value work demonstrates several professional attributes. Rendering style does not distract the viewer and generally supports compositional objectives. | Illustrator's use of tone value is somewhat effective. Rendering style is consistent and competent. There are some non-contributing attributes. | Illustrator attempts to use tone value descriptively. Rendering is inconsistent and lacks attention to craft. |  |
| Technical | Modeler observes and analyzes object data and translates it to a meaningful electronic model representation. Professional conventions are followed, inclusive of view selection, accurate translation of field notes and light source selection | Modeler observes and analyzes object data and translates it to a meaningful electronic model. Most professional conventions are followed, and some information is missing. | Modeler is challenged to observe and analyze field sketch correctly in the electronic model. Few professional conventions are followed, and some information is missing. | Modeler attempts to observe and analyze field sketch 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 F. Field Sketches of Five Partial Interior Sections of Large Rooms
* Exercise Seven. Interior Construction Drawing. Floor Plan and Interior Elevations

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