2A Schematic Design

Schematic Design

Introduction

By completing the activities in this chapter, you will gain an understanding of the activities involved in schematic design. The following information is taken from the NCARB IDP Guidelines:

Schematic Design
Minimum Schematic Design Experience: 320 Hours
Definition: Involves the development of graphic and written conceptual design solutions for owner/client's approval.

2A

Tasks
At the completion of your internship, you should be able to:

- Develop design concepts, including site design
- Prepare schematic design documents
- Apply sustainable design principles
- Apply historic preservation principles
- Prepare presentation materials (e.g., models, renderings, drawings)
- Develop project phasing plans

Knowledge Of/Skill In

- 3-D modeling
- Adaptive reuse of buildings and/or materials
- Alternative energy systems and technologies
- Architectural history and theory
- Basic engineering principles
- Building design
- Building Information Modeling (BIM) technology
- Building systems and their integration
- Computer Aided Design and Drafting (CADD)
- Conflict resolution
- Construction sequencing
- Creativity and vision
- Critical thinking (e.g., analysis, synthesis, and evaluation of information)
- Design impact on human behavior
- Design principles
- Designing and delivering presentations
- Freehand drawing and design sketching
- Graphic communication
- Implications of design decisions (e.g., cost, engineering, schedule)
- Interpersonal skills (e.g., listening, diplomacy, responsiveness)
- Life safety
- Manual drafting
- Natural and electric lighting (e.g., daylight, solar control, energy consumption)
- Oral and written communications
- Problem solving
- Site design
- Space planning

resources

Download the current Intern Development Program (IDP) guidelines at www.ncarb.org/Experience-Through-Internships.aspx.

The American Institute of Architects. Demkin, Joseph A., ed. *The Architect's Handbook of Professional Practice.* 14th ed. Hoboken: John Wiley & Sons, 2008.

- Chapter 12.2 - Design Phases

The American Institute of Architects. Demkin, Joseph A., ed. *The Architect's Handbook of Professional Practice.* 13th ed. New York: John Wiley & Sons, 2001.

The American Institute of Architects, *The Architecture Student's Handbook of Professional Practice.* 14th ed. Hoboken: John Wiley & Sons, 2009.

- Chapter 7.3 - Design Phases

Knowledge Of/Skill In *Continued*

- Spatial visualization and modeling
- Sustainable design
- Team building, leadership, participation
- Universal design (environments usable by everyone regardless of limitations)
- Vertical circulation

notes

Take brief notes while reading the narrative and list key resources you used to complete the activities. Note discussion outcomes from meetings with your supervisor, mentor, or consultants. When finalizing the activity documentation (PDF), include your notes and the Emerging Professional's Companion *activity description.*

Narrative

Schematic design is the first of the five increments of basic architectural services defined in most AIA standard forms of agreement between owner and architect. During schematic design (SD), the architect typically works with the client and other project team members to explore alternative concepts for addressing the client's needs. A preferred design direction is selected for further exploration from these alternatives, and schematic design typically ends with a presentation of the proposed design including plans of each floor level, major elevations, outline specifications, a budget estimate, and other information needed to clearly describe how the design meets the client's project program and goals. The language used to define this increment in the standard AIA contract form is quoted in the accompanying sidebar.

Most of the examples of this process provided in this chapter have been drawn from interviews with the design principals of firms that won the AIA's Architecture Firm Award. This award is given annually to firms in which "the continuing collaboration among individuals has been the principal force in consistently producing distinguished architecture for a period of at least 10 years."

Major Variables Affecting Design

The first step in schematic design is usually identification of major issues that must be addressed—at least at a conceptual level. Although every project is unique, the following factors generally are the basis for most project designs:

Program
The program sets out the core of the design problem—the project objectives and the spaces and functional requirements to be accommodated. Most programs are unique to a project and client and, therefore, call for unique solutions.

Codes and Regulations
Regulatory constraints on design have increased steadily. Beginning with simple safety requirements and minimal land use and light-and-air zoning, building codes and regulations have grown into a major determinant in design.

In addition to formal code requirements, a growing number of public agency approvals influence design in a more subjective, less structured way. Many owners and their architects must adjust designs to satisfy community groups, neighbors, and public officials. These design adjustments are often ad hoc efforts to meet objections or to gain support rather than direct responses to codified requirements.

Site
The building site, of course, has a major influence on building design. Physical characteristics (such as size, configuration, topography, and geotechnical

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See Chapter 1A - Programming for more information on programming.

See Chapter 2D - Codes and Regulations for more information on building codes.

See Chapter 1B - Site and Building Analysis for more information on site analysis.

See Chapter 2C - Construction Cost for more information on building cost analysis.

issues), existing structures, environmental factors (views, existing vegetation, climate, solar orientation, drainage), access, adjacent land uses, and many other site factors become considerations in the final design.

One site consideration that often has a significant effect on building design is the surrounding environment. Not only does the community context have obvious effects on building configuration, it also frequently influences the scale, detailing, color, and texture of the final design. A more direct influence on building design are existing structures to be incorporated into the project. A growing percentage of building design problems calls for working within the constraints of an existing structure.

AIA Contract Document, Description of Schematic Design

AIA B101™, Standard Form of Agreement Between Owner and Architect, describes schematic design as follows:

> *§3.2.1 The Architect shall review the program and other information furnished by the Owner, and shall review laws, codes, and regulations applicable to the Architect's services.*
>
> *§3.2.2 The Architect shall prepare a preliminary evaluation of the Owner's program, schedule, budget for the Cost of the Work, Project site, and the proposed procurement or delivery method and other Initial Information, each in terms of the other, to ascertain the requirements of the Project. The Architect shall notify the Owner of (1) any inconsistencies discovered in the information, and (2) other information or consulting services that may be reasonably needed for the Project.*
>
> *§3.2.3 The Architect shall present its preliminary evaluation to the Owner and shall discuss with the Owner alternative approaches to design and construction of the Project, including the feasibility of incorporating environmentally responsible design approaches. The Architect shall reach an understanding with the Owner regarding the requirements of the Project.*
>
> *§3.2.4 Based on the Project's requirements agreed upon with the Owner, the Architect shall prepare and present for the Owner's approval a preliminary design illustrating the scale and relationship of the Project components.*
>
> *§3.2.5 Based on the Owner's approval of the preliminary design, the Architect shall prepare Schematic Design Documents for the Owner's approval. The Schematic Design Documents shall consist of drawings and other documents including a site plan, if appropriate, and preliminary building plans, sections and elevations'; and may include some combination of study models, perspective sketches, or digital modeling. Preliminary selections of major building systems and construction materials shall be noted on the drawings or described in writing.*

Building Technology

Building proportions, as well as choice of materials and systems, are rarely determined arbitrarily and are only partially based on aesthetic criteria. For example, the floor-to-floor height required to accommodate structural, mechanical, lighting, and ceiling systems in a cost-effective manner varies significantly from an apartment house to an office building to a research facility. Similarly, horizontal modules are often set to achieve maximum layout efficiency; thus, the exterior fenestration of an office building may be based on the module of a typical office width, while the fenestration of a hotel is based on the module of a typical guest room. In other cases, the dimensions may be dictated largely by mechanical systems, the technical criteria of the exterior materials, or the knowledge and preferences of the local construction industry.

notes

Cost
The owner's budget is often the most-discussed influence on building design. Since projects generally have limited budgets, cost considerations regulate almost all decisions, from building size and configuration to material selection and detailing.

Sustainability
In Chapter 1B - Site and Building Analysis, the study of the site and climate presented the design team with multiple opportunities for the incorporation of energy efficient building principles into the project. At the schematic design phase, the team must begin to formulate which of these principles should be developed to meet the goals of the owner. A protocol such as LEED requires certain energy strategies be initiated at this Phase in order to receive LEED Credits.

Ethics
What conflicts has the design created with the neighbors? With the community? Who bears the responsibility for researching valid design alternatives? These questions and other issues can potentially become significant ethical dilemmas for consideration by the architect and design team as the schematic design for the project is being developed.

Other Team Members
The design of few projects—and virtually none of any size and complexity—are carried out by a single individual. Many projects require a team of architects supported by as many as a dozen specialized consultants. Each of these team members will have some input on the final design.

The Client
A central ingredient in most successful design projects is a good client. Some clients have a clear idea of program, budget, and other project objectives, including the final appearance of a building. Others look to their architect to help them define the project objectives, as well as to design a building that meets their goals. In both cases, the effectiveness of the marriage between client and architect affects key design decisions made throughout the project. Eero Saarinen expressed the central importance of good architect-client relations in this suggestion: "Let's see if we can make this guy into a great client."

The above list of factors that affect the design process is far from complete. Almost every project has a unique set of factors that distinguish it.

Primary Steps In Schematic Design

Despite the range of design opportunities and constraints that architects face, the schematic design process used by most architects includes the following activities in one form or another:

1. **Analysis**
   Typically results in a definition of the design problem.
2. **Synthesis**
   Analysis is translated into a project concept.

resources

As you research and look for more information on topics presented in the *Emerging Professional's Companion*, remember that a quick internet search of keywords can be incredibly useful to completing your Activities.

3. **Refinement**
   The concept is worked into a design solution.
4. **Documentation**
   The design solution is graphically depicted.

Step 1: Analysis
Design begins with analysis. The key objective of this initial step is to identify, analyze, confirm, and organize the factors that will influence the development of a design concept. Architects typically take the data gathered and developed during the economic feasibility, programming, and site analysis stages of a project and organize them for use in building design. These data may be provided by the owner or they may be developed by the architect in the course of providing pre-design or site analysis services.

Each architect has his or her own approach to analysis. Some of the more common ones are described here:

Program analysis. Many architects translate the words and numbers in a program statement into graphic terms, developing charts, bubble diagrams, sketches of design concepts, and even three dimensional models. These become design tools.

Virtually all experienced architects stress the need to take time to familiarize yourself with the project program before design work begins. Most architects would prefer to be actively involved in programming, which they believe is a critical starting point for design. However, even when the owner has prepared a program before the architect is brought into the project, the architect needs to take time to review and understand the program and to undertake the series of tasks used to convert the program into understandable and usable design information.

For example, Charles Gwathmey and Robert Siegel of Gwathmey-Siegel & Associates usually work with a senior staff member to reach a full understanding of the program and other issues particular to a project. They diagram (to scale) all the program areas, noting adjacencies, mass, and other characteristics. Next, they overlay this drawing on the site plan to get a sense of the scale and size needed to accommodate the building as well as an understanding of its parts.

Site analysis. Important site data are typically diagrammed, organized, and drawn on one or more copies of the site survey. Some firms may build a site model as well. These efforts yield a common record of the physical, cultural, and regulatory factors discussed in Chapter 1B - Site and Building Analysis. When organized in a common scale and format, these data often begin to point the way to a design solution. No matter how well the data are documented, however, the architect needs to spend time walking the site. As Roy Solfisburg of Holabird and Root puts it, an important part of the process involves time for “tramping and photographing the site and surrounding community.”

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The site is almost always a major influence on building design. Romaldo Giurgola's statement that "a building should respond both to the order of the city and the order of the land" illustrates the importance of the site. His view is echoed by nearly all experienced architects.

Since many building design projects must work with or include existing structures in the final solution, it is essential to establish clear, accurate documentation of existing conditions, either by converting existing drawings into base sheets for use in design or by creating new measured base drawings. In addition to providing basic dimensional data for design, this step typically identifies existing physical and code problems.

Zoning and code analysis. Concurrent with the site analysis, many firms convert zoning and other code issues into graphic form. In the case of complex urban zoning codes, this may include graphic representations of the zoning envelope—the height, bulk, setbacks, and other limits imposed by the code.

When combined with parking and loading requirements, egress considerations, building area and height limitations, and other code requirements, this analysis can help the architect begin to shape the program into a building mass that fits the site. In many cities, zoning and other code constraints are a major architectural influence. Where land costs are high, the owner typically wants to fill the maximum allowable envelope. As Edward Larrabee Barnes noted, however, the architect is a professional: "There are times where maximum exploitation is not the right course, and the architect must argue for a smaller building."

Budget analysis. The project budget should be analyzed to determine its implications for building design. Virtually all project budgets are limited. The architect must make careful use of funds, applying more funds to those elements of the building that appear most important to the success of the design solution. This attention to cost may appear limiting, but in commenting on cost and other constraints Robert Venturi has observed, "The best things happen [in the genesis of a design] when you have to deal with reality."

The portion of a budget that is discretionary can usually be determined by an experienced analysis of the budget. Analysis of the budget can also establish clear guidelines for basic system selection during design.

Consideration of local construction industry practices. Concurrent with an analysis of the budget, most architects consider the aspects of local construction industry practice relevant to the design assignment. This can range from what materials and systems are commonly available to specific detailing frequently used in the area. Local choices are typically the most cost-effective for that region, and in many cases reflect climatic, code, and other local or regional considerations.

Scheduling considerations. The project schedule is more than a project management tool. At times, it can also be an important factor in

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Kliment, Stephen, ed. *Building Type Basics* series by John Wiley & Sons, 2001 and later.

design. Major scheduling issues such as phasing, the time it takes to seek variances, and the sequencing of design decisions to accommodate fast-track delivery can all influence initial consideration of a design concept.

Identification of architectural precedents. In many firms, an important aspect of the analyses carried out at the beginning of schematic design is the study of relevant projects that faced similar or related project issues (e.g., program, site, context, cost, etc.). Architects often familiarize themselves with the design of such buildings to stimulate solutions for their own design problems. These analyses can also help a client visualize some design ideas, as long as the owner is reassured the evolving design will not be just a copy of the precedent.

Step 2: Synthesis

The architect's combination of analysis and understanding and response of the data collected above is the next step in schematic design. The combination of all this into a unified solution is the synthesis that is the core of concept design. There are many different approaches to this critical step. Lewis Davis of Davis Brody Bond believes it is very hard to define all the influences that lead to a design: "Very few architects—no matter how consistent their work—can trace all influences. Some are external, such as technology, available materials, code, etc. Some are internal, such as the architect's own education and experience or the building just seen in Europe."

Some firms—including Venturi, Scott Brown and Associates; Holabird & Root; CRS; and Hardy Holzman Pfeiffer—follow approaches that generate and test several alternatives at once. Hugh Hardy notes that "often one proposes extremes or opposite possibilities to test an idea and elicit a response. Many assert the need for an early idea." "The strongest ideas are often the ones developed early," according to Lewis Davis.

There is usually some logic to the process that produces the initial sketches. Edward Larrabee Barnes cites the evolutionary development of design concepts, "There should be no clash of gears between the analysis phase and design." But there is more than logic at work. In their work and in their writings, nearly all the AIA Firm Award winners have commented on the importance of the non-rational, non-describable, and poetic in the creation of a successful building design. At key points, judgment, taste, intuition, and creative talent take over.

The particular design stimuli, organizing principles, areas of emphasis, and aesthetic vocabulary vary according to the architect or firm, and the way in which architects synthesize these vary as well. Underlying this diversity in the way architects approach schematic design, though, are some common tasks. Most firms begin with analysis of the base data and then work through sketches, talking and thinking until they reach the level of understanding necessary to form a concept.

Establishing design goals. The client and design team have goals, expressed formally or informally, for the project. Beyond the first conceptual steps involved in schematic design, the process becomes more complex. In all but the smallest and simplest projects, subsequent steps involve teamwork.

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While it is true that most significant works of architecture are developed under the guidance of a single strong design leader, most projects have at least 10 team members involved in decision making (architects, engineers, interior designers, consultants, construction managers, public agencies, and, of course, clients). Thus, design excellence results in part from the effective management of a complex team, all of whose members contribute to the quality of the final result. (Learn more in Chapter 3D - General Project Management.) It is important to recognize and deal effectively with the many participants who play a role in building design. Walter Gropius, a founder of the Architect's Collaborative, described the significance of a coordinated team effort this way:

"The essence . . . [is] . . . to emphasize individual freedom of initiative instead of authoritative direction by a boss. Synchronizing all individual efforts by a continuous give and take of its members, a team can raise its integrated work to a higher potential than the sum of the work of just as many individuals."

As important as teamwork and leadership from the architect are, the client is an essential part of the design effort. As Charles Gwathmey puts it, "If you include the client in an understanding of the problem and how you are responding to it, it makes the solution understandable instead of a mysterious aesthetic proposition. Issues of taste go away." During the schematic design phase, the architect and the client usually meet regularly to evaluate the project concept and discuss design ideas.

Design Teamwork. Aesthetic guidelines for judging design decisions, and project objectives help establish priorities when tradeoffs must be made in the design solution. Compromises between budget and quality, appearance and energy efficiency, and sustainable design goals and budget limitations, and hundreds of other decisions have to be made within the context of an understanding of project goals and priorities. As Paul Kennon of CRS asserts, "It is important to have all of the cards on the table and all of the issues identified."

Developing a parti. Since a design problem can usually be solved in several ways, another initial concept step is establishing a basic organization, or parti, for the project. This may be a plan concept, selection of a geometric form, a decision to mass the building vertically or horizontally, or use of an organizing element such as a central mall for the interior spaces. In thinking about this idea, you may want to note this observation of Edward Larrabee Barnes: "It is not just a case of form following function. Sometimes function follows form. The interaction is important."

In some cases, a basic design concept may stem from a particular image or one of the partis commonly used in earlier periods of architecture. Whatever the underlying principle, it is common for architects to develop several partis prior to the testing and evaluation steps that lead to a final concept.

resources

Miller, Sam F. Design Process: *A Primer for Architectural and Interior Design.* John Wiley & Sons, 1995.

Selecting a design vocabulary. Complementing, or even integral to the development of, a parti is the articulation of a design vocabulary. Architects work from a set of formal or aesthetic ideas that govern how they synthesize their initial ideas into a complete building design concept. While few firms claim a specific unchanging vocabulary, architects are, in Lewis Davis's words, "like painters . . . . We have a palette of design elements that we are comfortable with, know how to use, and have found can produce the best result."

This does not necessarily imply consistency. Paul Kennon noted that "some architects develop a vocabulary and refine it on each project. Others approach each project as a unique problem. They evolve a vocabulary that may be cruder but which grows from the problem itself."

Creating and evaluating alternatives. Clients and design teams may have slightly different definitions of what is accomplished in schematic design, and their definitions may vary from project to project. However, certain objectives and products are commonly agreed upon. The primary objective of schematic design is to arrive at a clearly defined, feasible concept and to present it in a form that the client can understand and accept. Secondary objectives are to clarify the project program, explore the most promising alternative design solutions, and provide a reliable basis for analyzing project cost.

Step 3: Refinement
Often the architect continues to explore two or more alternatives until a consensus is reached with the client about the preferred design direction. Once this has been set, the design team refines plans, sections, and elevations to work out the major functional and aesthetic features of the proposed design.

Step 4: Documentation
Communicating design ideas and decisions usually involves a variety of media. Most well-known architects make extensive use of models, but they also use other common study and presentation techniques. All stress the need to spend focused time sketching and testing potential ideas to be included in the recommended design. As Steven Izenour of the former firm Venturi, Rauch, and Scott Brown put it, "No matter how good an architect is, it takes a lot of time." Typical documentation at the end of schematic design can include:

- A site plan created during programming or by the architect as a discrete service before schematic design begins
- An updated written and graphic building program
- Plans for each level
- Elevations
- Two or more sections
- Outline specifications
- A statistical summary of the areas included in the plans as well as a summary of other key characteristics in relation to the program
- A preliminary construction cost estimate
- Other illustrative materials—renderings, models, or drawings—needed to adequately present the concept

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Drawings are typically presented at the smallest scale that can clearly illustrate the concept (perhaps 1/16" = 1'0" for larger buildings and 1/4" = 1'0" for smaller buildings and interiors). Outline specifications give a general description of the work, indicating the major systems and material choices for the project but usually providing little detailed product description. As part of the schematic design work, the architect may agree to provide energy studies, tenant-related design studies, life-cycle costs, or value analysis; special renderings; models; brochures; or promotional materials for the owner. It is also common for the architect to help the client complete initial land use and code reviews before the design proceeds to the next phase. Some of these reviews call for services beyond the architect's basic services. Many of these are included as "additional services" in AIA Document B101™, Standard Form of Agreement Between Owner and Architect.

Final Approvals

The final step in schematic design is to obtain formal client approval. The importance of this step cannot be overemphasized. The schematic design presentation has to be clear enough to gain both the understanding and the approval of the client. Once this has been obtained, most architects recommend that each item in the presentation be signed and dated by the client before design development services begin. While the successful completion of this project increment typically sets the direction for design development, it is only the first step in the design process. The AIA's standard description of the five increments in basic services implies that the process begins with a clear definition of the client's program. It also implies that the process can progress in a linear fashion through a series of steps, each of which results in a more complete definition of design, until a project is sufficiently detailed to go into documentation for bidding (or negotiation) and construction.

The reality is not so orderly. Evolving program requirements, budget realities, increased knowledge of site considerations (such as subsoil problems), public agency reviews, and many other factors make it necessary to go back and modify previous steps. Design moves forward, but rarely in the linear fashion implied by the standard two-phase description of design—schematic design and design development. Moreover, design rarely ends with completion of design development. Most architects agree that design choices occur in every step of the process of planning, designing, and constructing a building.

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resources

Fawcett, A. Peter. *Architecture: Design Notebook.* Oxford: Architectural, 2003.

notes

Take brief notes while reading the narrative and list key resources you used to complete the activities. Note discussion outcomes from meetings with your supervisor, mentor, or consultants. When finalizing the activity documentation (PDF), include your notes and the Emerging Professional's Companion *activity description.*

Creating an Alternative System of Proportions

Supplemental Experience for eight (8) Core IDP Hours

In consultation with your supervisor or mentor, choose a completed project to analyze. This activity requires you to study the composition and proportioning of exterior building elevations elements. Some materials are a part of the building's "skin" and provide shelter from the weather. Other materials are purely decorative and provide either visual or representational relief or pattern from the body of the building.

Suggested order of elements to study:

1. Focus on the use of materials and consider the relationship of that material with the exterior grade, various finish floor levels, the corner of the building, the centerline of the building, etc.
2. Study the transition of one material to the next. Why does it occur at that location in the facade?
3. Consider the reason for these materials to be used together in the composition. What factors—such as cost, manufacturers' recommended or available sizes, codes, and aesthetics—led to the final composition of the elevations?
4. Now look at the form of the building. Is the building symmetrical? Is it organized in the classical manner of base-shaft-cap or is there some other organizing parti? What influences created the overall form? What is the "style" or history of the building (if applicable)?
5. Next look at how changes in the vertical plane are used to create shade and shadow. How is the elevation oriented to the sun and what are the reasons why the Architect oriented the building on the site?

Activity - Core

Using the final schematic design phase elevations, record in sketch form the factors that influenced the following design elements:

- Major exterior materials and their location
- Record the major exterior element proportions
- Measure window and door dimensions and placement in the elevations
- Record the masonry unit or other exterior cladding material sizes. Is it a jumbo size?
- Record any pattern used in the exterior materials

After analyzing the exterior elements, devise an alternative system of proportions for the front facade and one side. Explain in 400 to 500 words, the issues the alternative system would raise (e.g., cost, code, material availability, and so on). Write 100 to 200 words about what inspired the new solution.

Why do you consider your design to be an improvement over the original design? What changes would you make to the original material selections? How does this change the style of the original design? Does your design cost more or less to construct than the original design? How about availability of materials you have chosen? Would this design require the structure of the building to be altered? Is there an existing building or architect that provided the inspiration for your design?

Share your work with your IDP supervisor or mentor and make suggested changes. Document the final version as a PDF.

Creating an Alternative Floor Plan

Supplemental Experience for eight (8) Core IDP Hours

Every floor plan is driven by the requirements of the building program, number of total occupants, the type of occupancy, intended use of a space or spaces, code requirements including circulation and exiting, and the creative nature of architectural design. Other considerations are structure, mechanical systems, furniture size and placement, and cost. All of these demands must be organized into a floor plan that is efficient, meets code, and satisfies the aesthetics of the design problem.

Activity - Core

In sketch form, analyze the schematic floor plans of the project you selected for the Activity *Creating an Alternative System of Proportions* OR select a different project to be studied. Respond to the following:

- Note the major design ideas incorporated in the plans.
- Make a list of the major project objectives and program goals.
- Determine how well the plans meet these goals.
- Calculate the occupant load of your floor plan.
- Speak to the original project architect or designer if possible about the program and design generators that were incorporated into the floor plan.
- Calculate the percentage of circulation space required compared to the overall gross square footage of your floor plan.
- Calculate the percentage of your floor area dedicated to the mechanical and electrical rooms. Consider the reason for their location.

If a single story building: How many exits are there and what is their relative location to the front entry and each other? How many spaces or rooms must a visitor travel through to arrive at the main space or room from the front entrance? Is this a single or mixed use building?

If a multi-story building: How many sets of stairs and their location relative to each other? Where is the elevator(s) located? Where are windows located? What are the fire safety features of the floor plan?

Also in sketch form, develop an alternative floor plan that fulfills the same goals. Evaluate the alternative against the same list of project objectives and program goals by considering the following:

- Did your alternate floor plan use more, less, or the same floor area as the original design?
- If less, what areas or functions were you able to make more efficient?
- If more, what issues required you to use more space?
- How does your plan improve the original design?

Share your work with your IDP supervisor or mentor and make suggested changes. Document the final version as a PDF.

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A Design with a Potential Problem

Supplemental Experience for eight (8) Elective IDP Hours

In this scenario, you are working on the design of a new elementary school in upstate New York. Due to a tight budget, the client has directed that the exterior envelope be kept very simple. You use this directive to propose a very modern building with simple but attractive detailing. Two essential elements of the design are a flat roof (low slope roof) and skylights over the main entries and in several other spaces.

In the meeting where you present the first schematic concepts, a school board member asks, "Don't flat roofs and skylights leak?" You answer, "If it's properly detailed, installed, and maintained, a flat roof—even one with skylights—should perform as well as any other roof."

After the meeting, one of the older members of the design team says to you, "No one will remember the 'if properly detailed, installed, and maintained' caveat. Flat roofs and skylights tend to leak more often than roofs with positive drainage and few penetrations. When a leak starts, it's often very difficult to determine who's at fault."

You find this comment sobering. Except for this one question, the school board's response to the design was positive. Should you change the design because something that should be avoidable might happen?

Consider the following questions: Are there materials in a standard skylight assembly that should be avoided in cold climates? Are there special features available to enhance the performance of the skylight? Does the type of flat roof membrane system affect the design and performance of the skylight with regards to expansion and contraction? Are there special flashings available for this situation? What type of alternate roof system will you consider? Is there a cost impact to the budget using this roof system?

Activity - Elective

Consult your supervisor, mentor or other experienced architects on their experience low-slope roofs and skylights. Record lessons learned in sketch format.

Review manufacturers' literature and conduct an internet search for information on leaking related to low-slope roofs and skylights.

Based on your research, write a response to the school board member's question. If you determine the proposed design solution is the correct approach for the project, prepare appropriate sketches and citations of articles to illustrate your conclusions and to demonstrate how the potential for leaks can be minimized. If you determine the proposed design may be too risky (be sure to include consideration of the local climate), prepare sketches of an alternate roof plan that will provide benefits similar to that of the original design.

Share your work with your IDP supervisor or mentor and make suggested changes. Document the final version as a PDF.

“Self-Sufficient” vs. Green Architecture

Supplemental Experience for eight (8) Elective IDP Hours

In this scenario, your client is a well-known and committed advocate for green design in the San Francisco Bay Area and an owner of a solar hot water and photovoltaic panel manufacturing company. Your firm is known for being able to design “state of the art,” self-sustaining houses that do not require power from the utility grid.

This client has invited you to design a house that will be 100% self-sufficient with regards to electrical power and hot water needs. The client is expecting you to showcase his panels by providing all or part of the energy needs in the design using the panels. He does realize that providing all of the energy using only these roof panels may be a very difficult goal to obtain and is willing to consider other forms of alternative energy generation technology to power the house as long as the outside power grid is not required.

Early calculations of the required power and hot water requirements for the project leads you to the idea that your design can rely solely on a mix of photovoltaic and solar panels that are to be roof mounted. The panels will have a low profile that will be integrated into the design and oriented to maximize the generation of power and hot water for the house.

The site has a moderate slope down of 6 to 8 percent from the north to the south. The prevailing wind is from the northwest.

You begin the design and while on-site checking some field conditions you notice that the entire west and southern property lines are covered with 8 to 10 foot high redwood trees. Within 10 years these trees will grow to a height of 25 to 30 feet and in the afternoon will shade most of the roof you had planned for the house. These trees will continue to grow and live well beyond the life of any house you plan.

Do you carry out the design knowing this? Do you cut down the trees knowing that they provide cooling in summer, absorb carbon dioxide, and are a habitat for wildlife? Or does the fact that the panels will provide a greater reduction of the carbon dioxide emissions govern? Are there other technologies available to help power the house? Is it possible to mitigate the potential impact the trees have on the house? How do you balance the self-sufficient requirements of the program with other issues of sustainability?

Activity - Elective

Write a letter to the client describing the reasons for your course of action using one of the following options:

- OPTION 1: You decide to proceed with the original design relying on the photovoltaic and hot water panels, as designed. At the end of 10 year growth period for the trees, determine what options you have to maintain the client’s requirement of a “self-sufficient” house.
- OPTION 2: You decide you cannot cut any of the trees but will rethink the basis of the design and plan for future tree growth now. Determine what options are available to you to meet the client’s original program.

Share your work with your IDP supervisor or mentor and make suggested changes. Document the final version as a PDF.

Reflections

Supplemental Experience for eight (8) Elective IDP Hours

In this scenario, you are working with one of the largest financial institutions in the country on a high rise building that will be the flagship for their banking operations on the West Coast. The site is located on a busy corner with heavy vehicle and pedestrian traffic in the financial area of downtown Los Angeles. Most of the neighbors are well known banks and other corporations and all have adopted the stylized architecture of southern California using reflective glass curtain wall that begins at ground level and is extruded vertically.

Your client has made it clear that the architecture of this building will also use this reflective glass curtain wall feature to create “the look” and blend in with the surrounding buildings.

You proceed with the design and as you study the site conditions and design of the building, you begin to understand that during certain times in the morning and afternoon, the reflective glass from the surrounding buildings create a bright crossfire of reflected sunlight at the intersection in front of the building. Your building design is only going to contribute to the problem and perhaps create a blinding and potentially dangerous condition for drivers and pedestrians in the area. You express these concerns to your client but they are indifferent to the problems you present and state “It’s public property anyway, and not our problem” and want you to continue with the development of the design, as is.

What are the options to using glass curtain wall? What is the potential liability if you proceed with the reflective glass? Is there a way to continue to use the reflective glass in the design without contributing to the reflected sunlight problem? How do change the attitude of your client?

Activity - Elective

Please reference the following source:

- Professional Liability and other insurance information from The AIA Trust, www.theaiatrust.org

Contact the insurance agent who provides professional liability coverage for your firm or if unavailable, work with someone knowledgeable about professional liability coverage. Discuss the potential claims from motorists or pedestrians who could be injured using the walks and streets in front of the building site. Record these answers.

Draw the building profile and show the geometry of the solar angles at summer and winter solstice for the latitude at Los Angeles. Show how you would redesign the exterior skin of the building at the first 5 stories to reduce the reflected sunlight onto the adjacent sidewalk and street intersection in front of the building.

Consider and record alternate optional design features, geometries or materials that could be used to filter, block or change the reflected sunlight of the building curtain wall to the surrounding area.

Share your work with your IDP supervisor or mentor and make suggested changes. Document the final version as a PDF.

Sustainable Design

Supplemental Experience for eight (8) Elective IDP Hours

In this scenario, one of your firm's clients is interested in developing a LEED-certified project, incorporating sustainable design concepts. While the client discusses the matter with some degree of certainty, client representatives indicate they do not really know what is involved in the LEED certification process, nor are they sure exactly how sustainable design will affect the design, construction, or cost of their project. The client asks your firm to develop a checklist of what will be entailed if they decide to proceed with development of a "green" building.

Activity - Elective

Please reference the following sources:
- *The Architect's Handbook of Professional Practice,* 14th ed. Chapters 12.7 and 12.8
- *Green Building Costs and Financial Benefits,* Gregory H. Kats. (PDF)

Research what sustainability or building green means to an architect's design process and prepare a summary report assessing what is involved in achieving LEED certification and how design and construction may be affected. Develop the checklist that has been requested by the client.

Start your study by downloading and assembling reference materials from the following resources or from links suggested by them:
- AIA Committee on the Environment: www.aia.org/cote
- U.S. Green Building Council: www.usgbc.org/LEED

In preparing your report, follow these steps:
- Develop an understanding of the basic philosophy of sustainable design, and summarize in the report.
- Research and note the different levels of LEED certification (Certified, Silver, Gold, and Platinum). Review the LEED project checklist available from the USGBC web site to put this information in perspective.
- Review each major area of sustainability espoused by the U.S. Green Building Council (e.g., site, water efficiency, materials and resources, etc.). In your report, cite examples of how these categories might influence an architect's building design.

Your report should address the following questions:
- Why is sustainable design important in today's society?
- How will the design of the building be affected by the level of certification the client chooses to pursue?
- Impact on construction of the building.
- Impact on the cost of the building.
- Address the cost/benefit equation related to sustainability or LEED certification.

Share your work with your IDP supervisor or mentor and make suggested changes. Document the final version as a PDF.

Evaluation of Context and Precedent

Supplemental Experience for eight (8) Elective IDP Hours

Use the same project you selected for the Activity *Creating an Alternative System of Proportions* OR choose a different project that is local to research the activities listed below.

Some projects are highly dependent on the surrounding community to help create a design vocabulary or palette from which the architect can use to create a design. Other architects may study this data and choose to reject the vocabulary and create a building that is developed on an entirely different set of values.

This activity is designed to study the site area and record the type of design vocabulary you find in the community and relate those values back to the building.

Activity - Elective

Study the site and prepare a photo essay that illustrates the features of the project site, the immediate area, and the community that have influenced the final design of the selected building.

Mount your photos on a board or develop a digital board presentation. Write a project report of 600 to 800 words that addresses what these issues are and why you think the architect was influenced by them. Select a minimum of the 3 most important influences. (Note: You may include more than 3 issues, if you deem it important to your thesis.)

If your building was influenced by the style of a historic or non-local prominent building, add this building to your photo essay and record your reasons for linking the building to your project.

Consider the following:

- Local structures used for comparable or related purposes.
- Materials commonly used in the area.
- Elements of the immediate area that could be incorporated or reflected in the final design, such as important site features (e.g., topography, views, adjacent structures, points of access, mature vegetation, etc.)

What is the height and density found on the site and in the surrounding area? Style of architecture? What is the average age of the buildings found here? What impact does the required property setbacks have on the building's function or form? Does the project "fit in" with the surrounding community or does the building stand in contrast? What problem was the architect trying to solve?

Share your work with your IDP supervisor or mentor and make suggested changes. Document the final version as a PDF.

2A

notes

Take brief notes while reading the narrative and list key resources you used to complete the activities. Note discussion outcomes from meetings with your supervisor, mentor, or consultants. When finalizing the activity documentation (PDF), include your notes and the Emerging Professional's Companion *activity description.*

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