Bradford Perkins is the founder and senior partner of Perkins Eastman Architects, a large New York–based architecture, interior design, and planning firm that has won many design awards. He lectures regularly at architecture schools and other institutions and has published numerous articles on design and architecture management issues.

Bradford Perkins, FAIA, AICP

Design Phases 3.63

Building design is the keystone of architecture practice. Translating needs and aspirations, theories and technologies, and schedules and budgets into appropriate and exciting places and buildings requires great skill as well as attention to broader public concerns.

There are many ways of looking at the design process and the design practices in which architects engage. Design decision making can be seen as private and intuitive—for, in many respects it is—and yet many of the decisions designers make are broadly discussed and rationally analyzed. Design can be seen as complex and inaccessible, and yet it is taught to and practiced by thousands of capable architects—and hundreds of thousands more in a wide array of other disciplines. Design has moments of great inspiration and deep insight—but most of all it requires hours, months, and years of hard work.

Other practice topics in this series:
3.61 Facilities Planning and Programming
3.62 Site Analysis

Design is a continuous activity. It "begins" somewhere deep in the recesses of the project definition process; somewhere someone has an idea that ultimately takes form. Design never really ends; once opened for use, buildings are constantly modified and adapted—redesigned if you will.

3.61 Facilities Planning and Programming views this as a continuing and cyclical process—from project planning through development (design), implementation (construction), and management—and as an opportunity for architects to provide a client support circle of services. Page 603.

Most projects *do* have beginnings and ends. These points are defined by the contracts written to provide planning, design, construction, and facilities management services. Design, however, is the central issue at every step. The design process has been compared to a learning curve on which each step exposes the design team to new opportunities, new problems, and new knowledge about the situation at hand.

ARCHITECTURE IS THE ART OF INQUIRY.
Arthur Ericson

Design Influences

Every project situation is different. Each presents a different set of requirements and limitations. Each presents a unique set of cultural, environmental, technological, and aesthetic contexts to be considered. Each presents its own set of challenges and opportunities. Design brings to the surface the major considerations inherent in a situation. It is both a problem-seeking and a problem-solving process. While every project has a unique combination of design influences, some of the most important follow.

Program. All buildings have a series of aspirations, program requirements, and limitations to be met in design. The program may be short or long, general or specific, descriptive of needs or suggestive of solutions.

Community desires. A growing number of public agency approvals influence design. Many owners and their architects must adjust their 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.

3.71 Community Planning and Environmental Controls, page 653, and **3.72 Building Codes and Regulations,** page 663, expand on these requirements.

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 force in design that regulates every aspect of design and construction.

3.62 Site Analysis offers details. Page 617.

Site and climate. The site is, of course, a major influence. Physical characteristics (such as size, configuration, topography, and geotechnical issues), climate (wind, solar orientation, temperatures, humidity, and precipitation), environmental factors (views, existing vegetation, drainage), access, adjacent land uses, and many other site factors are considered in the final design.

Building context and existing fabric. One site feature that has been a major influence on many buildings is the surrounding environment. Not only does this have obvious effects on building configuration but it also can influence materials, fenestration, color, and detailing of the final building design. Of even more importance are any existing structures that may be incorporated in the building design. A growing percentage of building design problems call for working within the constraints of an existing structure.

Building technology. Building configuration, materials, and systems are rarely arbitrarily chosen 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 or a research facility. Similarly, horizontal divisions are often set to achieve maximum efficiency of layout; thus, office fenestration may be based on one module and housing on another module. In still other cases, these dimensions may be dictated largely by mechanical systems or even by the knowledge and preferences of the local construction industry.

Sustainable Design introduces this essential contemporary design issue. Page 651

Sustainability. In its broadest scope, sustainability refers to the ability of a society, ecosystem, or any such ongoing system to continue functioning into the indefinite future, without being forced into decline through exhaustion or overloading of the key resources on which that system depends. For architecture, this means design that delivers buildings and communities with lower environmental impacts while enhancing health, productivity, community, and quality of life.

3.73 Construction Cost Management takes up the issue of budgeting and cost management in design. Page 681.

Cost. Since most projects have limited budgets, cost considerations significantly influence almost all issues from building size and configuration to material selection and detailing. Cost is rarely a simple phenomenon. Budgets may be fixed by the amount of financing available, or they may be flexible and come into focus in the design process. Often a construction budget emerges from an analysis involving the owner and the entire project team. Some owners are willing to increase initial budgets to achieve overall life cycle cost savings, but in most cases there is a limit to the funds available for construction. Once defined, this limit has a major influence on subsequent design decisions.

Schedule. Because there are so many outside influences on design, it is common for the architect to make design decisions out of sequence or in such compressed time frames that some alternatives cannot be explored. For example, an alternative requiring a time-consuming zoning variance may be discarded in favor of one th keep the project on schedule. In another project, it may be necessary to commit to a final site plan early in the process—before the building "footprint" drawn the site plan is fully designed.

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 the building. Others look to their architect to help them define the project objectives, as well as to design a building that meets these goals. In both cases, the effectiveness of the marriage between client and architect is a major factor in making design decisions throughout the project.

Design Process

Almost every project has a unique set of factors that combine to make each problem different. For their part, individual architects approach design in different ways and with different values and attitudes. While design has a certain linear quality (it involves analysis, synthesis, and evaluation), it is widely acknowledged to have nonlinear qualities as well. The latter are sometimes described as "flashes of insight" and "creative leaps."

In his analyses of influential designers, Jim Franklin concludes that they see design as CONSEQUENTIAL, rather than SEQUENTIAL. New issues arise from decisions just made.

Increasingly we recognize that the design process works with information and ideas *simultaneously* at *many levels.* Thus the architect can be thinking about the overall geometry of the building, the ways in which a wheelchair-bound person might experience the spaces in the building, and the materials of which the building will be constructed all at the same time.

At the same time, we view designing as *reciprocal action and reflection.* Architects process requirements, issues, and variables and produce tentative design proposals. Examination and criticism of these proposals lead to new proposals. Each proposal reveals more about the problem and suggests an appropriate solution.

Analysis. However nonlinear it may be, design involves analysis. An initial step is to identify, analyze, confirm, and organize the factors that will influence the development of a design concept. Architects typically take the available data from the economic feasibility, programming, and site analysis steps and organize them into a form that allows the information to be used in building design. The data may be provided by the owner or developed by the architect in the course of providing predesign or site analysis services. The analyses—often pursued in parallel with one another—are described in the paragraphs that follow.

ON THE VALUE OF "PREDESIGN"

The AIA has engaged in an ongoing series of roundtables, workshops, and interviews involving principals of influential design firms and several large, full-service firms. The goal: to learn how these firms acquire, organize, and carry out their projects.

One message came through loud and clear: Extend "predesign" as long as possible. These firms operate on the following principles whenever they can:

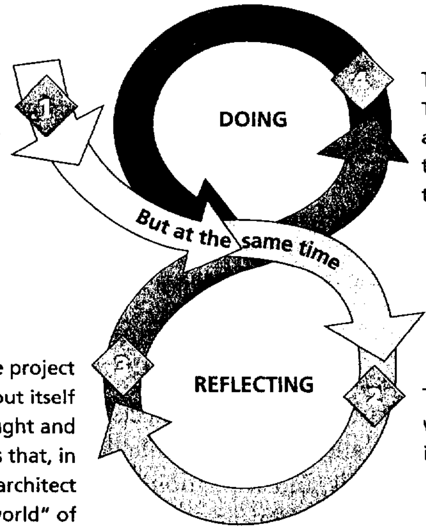
- Invent ways on each project to force yourself not to dive into design immediately. Find ways of getting the client involved in (and paying for) this "discovery phase."
- Identify and achieve consensus on the five or six *real* issues the project brings you to solve.
- Challenge the design team to find as many ways as it can to translate constraints into three-dimensional potential forms *without* actually designing the building.
- Look for ways—writing, diagrams, mass models, etc.—for describing both the minimum requirements and your highest aspirations for the project. Ask: How will you know later that you succeeded?
- Describe—again without designing the building—the strongest, best formal concepts to be explored in the design. *What concepts will be strong enough to withstand all the trade-offs that are part of every project?*
- Involve the client. This is the time for the two of you together not only to confirm the program and budget, but also to reconfigure the project and your mutual expectations. The client's buy-in to the concept and those five or six key issues is essential before you begin to design on the basis of them.

The resulting design concept is the key. It becomes the agreed-upon basis for keeping the project design focused as it evolves. It is a defense against those "hot ideas" that you, your staff, consultants, and even the client will come up with midway through the project. It is the set of design values against which the final design will be judged.

JAMES R. FRANKLIN, FAIA

James R. Franklin, *Current Practices in Small Firm Management* (AIA, 1990)

In his books, *The Reflective Practitioner* and *The Design Studio*, Donald Schön describes the process of designing as "reflection-in-action," a double-loop system such as the one drawn.



In a series of AIA roundtables with architects in influential design firms, one message came through loud and clear: Get involved in design at the predesign phase and extend this "discovery" phase until the key design issues emerge, the architect and client both accept them, and the base for a strong design concept is laid.

3.52 Project Operations presents additional findings on how architects design—and manage design in their offices. Page 559.

Program analysis. Many architects translate the words and numbers in the program statement into graphic terms, developing charts, bubble diagrams, and sketches of design concepts. Most architects stress the need to be actively involved in the program as a critical starting point for design. Even when the owner has prepared a program, it is useful to spend time confirming the program and converting it into understandable and usable design information.

Site analysis. Important site data are typically organized into a graphic record of the relevant physical, cultural, and regulatory factors. When organized in a common scale and format, these data often begin to point the way to design solutions. Ideas also present themselves in time spent walking the site, understanding both it and the surrounding community.

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 load requirements, exiting 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 well.

Documentation of existing conditions. Since many building design problems must work with or include existing structures in the 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.

Scheduling. The project schedule is a project management tool, but, at times, it can also become an important factor in design. Such major scheduling issues as project phasing, the time it takes to seek variances, and the sequencing of design decisions to accommodate fast-track construction can all influence the beginning of a design concept.

Cost. It is important to analyze the project budget to understand its implications for the building design. Virtually all project budgets are limited. The architect must make careful use of funds, directing them to those decisions that appear to be most important to the success of the design solution. An experienced analysis of the budget can usually identify the size of this discretionary portion as well as establish clear guidelines for the basic system selections to take place during the design.

Construction industry practice. Concurrent with schedule and cost analysis, most architects consider the aspects of local construction industry practice relevant to the design assignment. This can range from availability of materials and labor to commonly used materials, systems, and detailing.

THE BEST THINGS HAPPEN WHEN YOU HAVE TO DEAL WITH REALITY.

Robert Venturi

Design precedents. In many firms, an important aspect of the initial analysis is the critical assessment of relevant precedents from projects facing similar or related program, site, context, cost, or other design issues. It is common for architects to familiarize themselves with the design of buildings that deal with similar issues to stimulate solutions for their own design problems.

Synthesis. Building design begins with the architect's analysis, understanding, and response to the base data collected and analyzed. The combination of all this into a unified solution is the synthesis that is the core of concept design. The quotations included in "Architects on Designing" (page 636) are intended to provide some insight, from different perspectives, to the synthesis process.

Underlying these multiple perspectives are some common themes. Most architects start with an analysis of the base data and then work through sketches, talking, and thinking—reciprocal action and reflection—until they reach the level of understanding necessary to form a concept. While the particular design stimuli, organizing principles, areas of emphasis, and aesthetic vocabularies may be unique to a particular architect or firm, and while firms may synthesize these in different ways, there are some common tasks in design. These, broadly, are discussed below:

Establishing design goals. The client and design team have goals, expressed formally or informally, for the project. These goals create functional and aesthetic guidelines for judging design decisions, and the project objectives help establish priorities when trade-offs must be accommodated in the design solution. Compromises between budget and quality, appearance and energy efficiency, and hundreds of other decisions have to be made within the context of an understanding of project goals and priorities.

ARCHITECTS ON DESIGNING

For the eleventh edition of *The Architect's Handbook of Professional Practice,* I interviewed a number of architects whose firms had won the Architectural Firm Award from The American Institute of Architects. This award can be made annually to a firm "in which the continuing collaboration among individuals of the firm has been the principal force in consistently producing distinguished architecture for a period of at least ten (now twenty-five) years." I asked these distinguished architects to describe how they design and to comment on design issues of consequence in their practices. The result represents a collage of how contemporary architects approach design, the architect's core activity.

Building design begins with the architect's analysis, understanding, and response to the base of data, intentions, and impressions collected in the process of discovering what there is to know about the project. The combination of all this into a unified solution is the synthesis that is the core of concept design, but architecture firms approach this synthesis in different ways.

Lewis Davis of Davis, Brody and Associates believes it is very hard to define all the influences on the design process: "Very few architects—no matter how consistent their work—can trace all influences. Some are external: technology, available materials, code, etc. Some are internal: the architect's own education and experience or the building just seen in Europe."

Hugh Stubbins, founder of the firm that bears his name, says the design process "can be summarized in four words: ingenuity, hard work, and talent." As he describes it, he turns over the data in his mind—literally "turning the problem upside down"—until the concept forms itself.

Some firms—including Venturi Scott-Brown and Associates; Holabird and Root; CRS Architects; Hardy Holzman Pfeiffer Associates—follow approaches that generate and test several alternatives. Hugh Hardy notes that "often one proposes extremes or opposite possibilities to test an idea and elicit a response." Many assert the need for a strong idea at the outset. "The strongest ideas are often the ones developed early," according to Lewis Davis. Paul Brochas of Mitchell/Giurgola believes "if a basic conceptual premise is not established early, subsequent elaboration may result in amorphous design."

All have their own way of working in this critical phase. In the case of Kallman McKinnell and Wood, "It begins with Kallman and McKinnell sitting alone in the private studio they share upstairs from the rest of the office. They talk and sketch together, sometimes drawing on the same sheet and sometimes unable to remember later which seminal sketch was whose. At some point fairly early in the process, Henry Wood gets involved, advising on design primarily from the point of view of construction.... Only when the design has been fully conceptualized does it move out of Kallman and McKinnell's private studio into the larger office to begin the usual process of testing and development through models, measured drawings, and consultations with the owner and others."

Roy Solfisburg of Holabird and Root describes the way he and one of his design partners, Gerald Horn, work: "A project will come in to one of us.... We will develop at small scale—maybe on an 11 x 17 sheet—all-inclusive concepts in plan, section, and elevation. I will develop four to seven; Jerry will do two or three. This is done alone. We will bring these to a team of architects in the office—not just design architects, but also production architects and others. We will go over all of the schemes, discuss which ones are good and why, which are bad and why, and which parts from one would be better to put into another."

There are many possible starting points for synthesis. Robert Geddes of Geddes Brecher Qualls Cunningham explains the genesis of some of their concepts by stating, "Building design must understand the need for private space and spaces for small group and communal use. If architecture is separated from human social experience, it loses its values, it loses its ability to speak, and it loses its sources of imagination." For Sert, Jackson and Associates, "The starting point in architecture is urban design. The firm's work... retains roots in the age-old patterns of building that gave the villages and cities of Josep Luis Sert's native Spain their sense of liveliness and community." Romaldo Giurgola echoes the sentiment: "A building should respond both to the order of the city and the order of the land." Hardy Holzman Pfeiffer Associates uses history as a special stimulus; in the words of Norman Pfeiffer, "We started practicing at a time when it was still the profession's intent to tear everything down. We countered with a strong shared interest in the past. We used history as something to relate to, to contrast with, hoping to bring old and new together into a new kind of statement."

There is usually some logic to the process that produces 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." Joseph Esherick of Esherick, Homsey, Dodge and Davis describes their process: "Asking questions, in fact, is the approach to design." Esherick often carried out this notion by conducting meetings with clients over blank pieces of paper. As they talked, at times casually, about why the client wanted to build in the first place and what the point of the building would be, Esherick would sketch, revealing the form and character the project might take based on the client's impressions. Sooner or later these sketches would reach a critical mass. "The ideas pile up," Esherick likes to explain, "and the form emerges."

But there is more than logic at work. In their work and in their writings, nearly all of the AIA Firm Award winners have commented on the importance of the nonrational, the indescribable, the poetic in the creation of a successful building design. At key points, judgment, taste, intuition, and creative talent take over.

BRADFORD PERKINS, FAIA, AICP

Evolving a design concept. With the design goals in hand, the architect develops a design concept—or perhaps several. This may be a plan concept, the selection of a geometric form, a decision to mass the building vertically or horizontally, or the use of an organizing element (such as a central mall for the interior spaces). The concept might be based on a particular image or a historic precedent. It may employ a "design vocabulary" of formal and aesthetic ideas that will govern the development of the design. Whatever the underlying principles, it is common for architects to develop several representations and variations to help them understand and articulate the evolving design concepts.

Evaluating concept alternatives. Working with these possibilities and variations, most architects have developed a process for narrowing them down to a set of workable concepts. In some cases, the selection of alternatives is based on a point-by-point evaluation of the concept against the original project objectives. In other cases, it is an intuitive judgment based on experience. In most instances, it is a combination of both.

Beyond the first conceptual steps, the process becomes more complex. In all but the smallest and simplest projects, the steps that follow the concept involve a team of people. As the design team is expanded, most firms begin to involve the engineers, specialist consultants, and cost consultants necessary to help test and develop the selected concepts; they agree that early participation leads to a more efficient and coordinated design effort. For example, engineers not only guide the selection of many of the building systems employed but also define the size, area requirements, and preferred location of these systems. In more complex design problems, engineers often help analyze the feasibility, relative cost, and other critical factors of major design options.

Contractual Framework

Design is undertaken within a contractual framework that

- Outlines design tasks and requirements
- Identifies specific responsibilities for design, including those of the architect, of the owner, and possibly of third parties
- Establishes a schedule, including starting and completion dates
- Often defines design phases with interim milestone dates and owner approvals to proceed

This contractual framework is established in the agreement between owner and architect. Design activities may be described in detail or, in the case of small or limited scope projects, in a few sentences. AIA Document B141, the most commonly used form of owner-architect agreement, establishes five project phases:

- Schematic design
- Design development
- Construction documents
- Bidding or negotiation
- Construction contract administration

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AIA Document B141 assumes that a clear definition of the client's program exists; either the owner brings the program to the start of design or the architect provides the service as part of professional services. It also assumes that the process can move ahead in a linear fashion through a series of phases—each of which results in a more complete definition of the design—until the project is sufficiently detailed to go into documentation for bidding (or negotiation) and construction.

3.5 Project Management focuses on four interrelated design management activities: managing teams, operations, controls, and disputes. Page 545.

Reality isn't 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. Fast-tracking—breaking design into "packages" and awarding some before others are completed—further complicates matters. Design moves forward, but rarely in the clear linear fashion implied by the contractual phases.

Nonetheless, a contractual framework is important. It does impose an order on the process. When there are phases, the architect brings the design to an interim level of development, the owner reviews and approves it, and the project moves forward based on mutual understanding.

Schematic Design

AIA Document B141 identifies the first phase of services as schematic design. While different projects, clients, and design teams have slightly different definitions of the completion of this phase, certain objectives and products are commonly agreed-upon.

Schematic design establishes the general scope, conceptual design, and scale and relationships among the components of the project. The primary objective is to arrive at a clearly defined, feasible concept and to present it in a form that achieves client understanding and acceptance. The secondary objectives are to clarify the project program, explore the most promising alternative design solutions, and provide a reasonable basis for analyzing the cost of the project.

However the design process is defined, there are inevitably handoffs. Tom Kvan of The Coxe Group suggests this approach to defining the requirements at the end of a design phase: Make a list of deliverables. Now assume that you have just inherited the project from another firm that has suddenly gone out of business. What do you really need to know in order to move forward?

Typical documentation at the end of this phase can include

- A site plan
- Plans for each level
- All elevations
- Key sections
- An outline specification
- A statistical summary of the design area and other characteristics in comparison to the program
- A preliminary construction cost estimate
- Other illustrative materials—renderings, models, computer simulations, or additional drawings—needed to present the concept adequately

Drawings. These are typically presented at the smallest scale that can clearly illustrate the concept, perhaps 1/16" = 1'-0" (1:200 in SI units) for larger buildings and 1/8" = 1'-0" (1:100) or 1/4" = 1'-0" (1:50) for smaller buildings and interiors.

ocument B163 ard Form of Agree- etween Owner and ect for Designated ces (1993 edition)	**AIA Document B141** Standard Form of Agreement Between Owner and Architect (1987 edition)	**AIA Document B151** Abbreviated Form of Agreement Between Owner and Architect for Construction Projects of Limited Scope (1987 edition)	**AIA Document B155** Standard Form of Agreement Between Owner and Architect for a Small Project (1993 edition)
2.3 **iptions of** **gnated Services**	Article 2 **Scope of Architect's Basic Services**	Article 2 **Scope of Architect's Basic Services**	Article 1 **Architect's Responsibilities**
t Administration and gement Services Project Administration Disciplines Coordination/ Document Checking Agency Consulting/ Review/Approval Owner-supplied Data Coordination Schedule Development/ Monitoring Preliminary Estimate of the Cost of the Work Presentation Services			
hematic Design Phase .23 Architectural Design/Documentation* .24 Structural Design/Documentation .25 Mechanical Design/Documentation .26 Electrical Design/Documentation .27 Civil Design/Documentation .28 Landscape Design/Documentation .29 Interior Design/Documentation .30 Special Design/Documentation .31 Materials Research/Specifications ** Each service is further developed. Architectural Design/ Documentation, during the Schematic Design Phase, consists of responding to program requirements and preparing:* *.01 Review of owner's program and budget* *.02 Conceptual site and building plans* *.03 Preliminary sections and elevations* *.04 Preliminary selection of building systems and materials* *.05 Development of approximate dimensions, areas and volumes* *.06 Perspective sketch(es)* *.07 Study model(s)*	***Schematic Design Phase*** 2.2.1 The Architect shall review the program furnished by the Owner to ascertain the requirements of the Project and shall arrive at a mutual understanding of such requirements with the Owner. 2.2.2 The Architect shall prepare a preliminary evaluation of the Owner's program, schedule, and construction budget requirements, each in terms of the other. 2.2.3 The Architect shall review with the Owner alternative approaches to design and construction of the Project. 2.2.4 Based on the mutually agreed-upon program, schedule and construction budget requirements, the Architect shall prepare, for approval by the Owner, Schematic Design Documents consisting of drawings and other documents illustrating the scale and relationship of Project components. 2.2.5 The Architect shall submit to the Owner a preliminary estimate of Construction Cost based on current area, volume, or other unit costs.	***Design Phase*** 2.2.1 The Architect shall review with the Owner alternative approaches to design and construction of the Project. 2.2.2 Based on the mutually agreed-upon program, schedule and construction budget requirements, the Architect shall prepare, for approval of the Owner, Design Documents consisting of drawings and other documents appropriate for the Project, and shall submit to the Owner a preliminary estimate of Construction Cost.	1.1 During the Design Phase, the Architect will perform the following tasks: .1 Describe the project requirements for the Owner's approval. .2 Prepare a design solution based on the approved project requirements. .3 Upon the Owner's approval of the design solution, prepare Construction Documents indicating requirements for construction of the Project. .4 Help the Owner file documents required for the approval of governmental authorities. .5 Help the owner obtain proposals and award contracts for construction.

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AIA Document B163 *(continued)*	AIA Document B141 *(continued)*	AIA Document B151 *(continued)*	AIA Document B155 *(continued)*
Design Development Phase Services Includes Design Services .23 through .31 (same as Schematic Design Phase) .23 Architectural Design/ Documentation, during the Design Development Phase, consists of continued development and expansion of architectural Schematic Design Documents to establish the final scope, relationships, forms, size and appearance of the project through: .01 Plans, sections and elevations .02 Typical construction details .03 Three-dimensional sketches .04 Study model(s) .05 Final materials selection .06 Equipment layouts	***Design Development Phase*** 2.3.1 Based on the approved Schematic Design Documents and any adjustments authorized by the Owner in the program, schedule or construction budget, the Architect shall prepare, for approval by the Owner, Design Development Documents consisting of drawings and other documents to fix and describe the size and character of the Project as to architectural, structural, mechanical and electrical systems, materials, and such other elements as may be appropriate. 2.3.2 The Architect shall advise the Owner of any adjustments to the preliminary estimate of Construction Cost.		
Contract Documents Phase Services Includes Design Services .23 through .31 (same as Schematic Design Phase) .23 Architectural Design/ Documentation, during the Contract Documents Phase, consists of preparation of drawings based on approved Design Development Documents setting forth in detail the architectural construction requirements for the project.	***Construction Documents Phase*** 2.4.1 Based on the approved Design Development Documents and any further adjustments in the scope or quality of the Project or in the construction budget authorized by the Owner, the Architect shall prepare, for approval by the Owner, Construction Documents consisting of Drawings and Specifications setting forth in detail the requirements of the Project. .2.4.2 The Architect shall assist the Owner in the preparation of the necessary bidding information, bidding forms, the Conditions of the Contract, and the form of Agreement between the Owner and Contractor. 2.4.3 The Architect shall advise the Owner of any adjustments to previous preliminary estimates of Construction Cost indicated by changes in requirements or general market conditions. 2.4.4 The Architect shall assist the Owner in connecting with the Owner's responsibility for filing documents required for the approval of governmental authorities having jurisdiction over the Project.	***Construction Documents Phase*** 2.31 Based on the approved Design Documents, the Architect shall prepare, for approval by the Owner, Construction Documents consisting of Drawings and Specifications, setting forth in detail the requirements for the construction of the Project and shall advise the Owner of any adjustments to previous preliminary estimates of Construction Cost. 2.3.2 The Architect shall assist the Owner in connection with the Owner's responsibility for filing documents required for the approval of governmental authorities having jurisdiction over the Project. 2.3.3 Unless provided in Article 12, the Architect, following the Owner's approval of the Construction Documents and of the latest preliminary estimate of Construction Cost, shall assist the Owner in obtaining bids or negotiated proposals and assist in awarding and preparing contracts for construction.	

DESIGN DECISIONS

David Haviland, Hon. AIA, adapted from *Life Cycle Cost Analysis 2: Using It in Practice* (AIA, 1978)

sign is a continuous process, often broken into phases to gain commitment to more general decisions before they are developed detail. Here is one view of the level of decision making for each of a building's functional subsystems as the project moves rough design.

Predesign	*Early schematics*	*Later schematics or early design development*	*Design development or early construction documents*
General			
Project objectives Project scope Program codes and regulations Project budget Project schedule Delivery approach	Program interpretation Basic design concepts Siting Building massing Blocking and stacking Access and circulation Design vocabulary Style issues and constraints Sustainability	Design concept elaboration Schematic floor plan Schematic sections	Floor plans Sections Typical details
Site			
Site selection Site development criteria Requirements for access, circulation, parking, utilities, landscaping, lighting	Siting concepts Site forms and massing Access and circulation Views to/from buildings Concepts for grading, planting, paving, etc. Acoustics and other site issues	Design concept elaboration Initial site plan Schematic grading, planting, paving plans	Site plan Planting plan Typical site sections Typical site details Outline specifications
Foundation and Substructure			
Performance requirements for foundations, excavations, etc.	Subsurface conditions and requirements Impacts of program, energy on under-ground building Exploration of special problems	Schematic basement plan Refinement of special foundation requirements Selection of foundation system	Foundation plan Basement floor plan Sizing of key foundation elements Outline specifications
Superstructure			
Performance requirements for floor, roof, stair, other structural elements	Relation of structure to spatial organization, elevations, etc. Selection of use modules Basic structural module Initial system selection	Structural system selection Outline framing plan Sizes of key elements	Floor framing plans Roof framing plan Sizing of elements Important details Outline specifications
Exterior closure			
Restrictions on exterior design materials, etc. Performance requirements for walls, doors, windows, etc.	Approach to elevations, fenestration Views to/from building Initial envelope elements sizing and selection	Design concept elaboration Selection of wall systems, materials Schematic elevations fenestration	Elevations Key exterior details Outline specifications

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Predesign	*Early schematics*	*Later schematics or early design development*	*Design development or early construction documents*
Roofing			
Performance requirements for roofing elements	Roof type and pitch Initial system selection	Selection of roof system, materials	Outline specification
Interior construction			
Performance requirements for partitions, finishes, specialties Flexibility requirements	Approach to partitioning built-in furnishings Interior design vocabulary Layout of key spaces	Room designs Layout of key areas Selection of partition systems, finishes Important fixtures or theme elements	Input to plans and elevations Key interior elevations Initial finish schedules Outline specifications
Vertical circulation and conveying systems			
Performance requirements for conveying systems	Basic organization and circulation scheme Need for and types of vertical circulation Need for special conveying systems	Input to plans, sections and elevations Sizing of exits, other circulation areas Basic elevator and escalator concepts Other conveying systems concepts	Input to floor plans, framing plans, sections, elevations Outline specifications
Mechanical systems			
Performance requirements for plumbing, HVAC, fire protection Need for special mechanical systems	Impact of mechanical concepts on building planning Initial systems selection Initial distribution ideas Space allocation for mechanical areas	Mechanical systems selection Refinement of service, distribution concepts Input to plans, sections, and elevations	Detailed systems selection Initial system drawings and key details Distribution and riser diagrams Input to floor plans, framing plans, sections, elevations Outline specifications Initial equipment list
Electrical and lighting systems			
Performance requirements for lighting systems Performance requirements for electrical systems Need for special systems	Approaches to natural, artificial lighting Lighting quality and character Impact of site, design on electrical systems Space allocation for electrical systems	Window, skylight and glazing design Selection of lighting, electrical systems Service, power, and distribution concepts Input to plans, sections, and elevations	Detailed systems selection Distribution diagrams Key room lighting layouts, ceiling plans Input to plans, sections, and elevations Outline specifications
Equipment			
Delineation of equipment needs and performance	Impact of key equipment items on siting and design	Impact of key items on room design, framing plans, etc.	Input to plans, sections, and elevations Outline specifications Initial equipment list

Outline specifications. This is a general description of the work that indicates the major systems and materials choices for the project and provides the information necessary to communicate the appearance and function of the building.

Preliminary estimate of construction cost. The schematic design estimate usually includes a preliminary area analysis and a preliminary construction cost estimate. The level of detail is necessarily limited; the estimate may be broken down by major trades or systems (for example, foundations, structure, exterior closure, interior partitions and finishes, plumbing, mechanical, electrical, site work, and equipment). This may also include a preliminary analysis of the owner's budget, with recommendations for changes based on site, marketplace, or other unusual conditions encountered in schematic design. It is common for preliminary cost estimates made at this stage to include contingencies for further design development, market contingencies, and changes during construction.

AIA Document B141 (1987 edition) calls for a preliminary estimate of construction cost "based on current area, volume or other unit costs."

Other services. As part of schematic design, the architect may agree to provide life cycle cost analyses, energy studies, tenant-related design studies, other economic studies, special renderings, models, brochures, or promotional materials for the owner. These are included as "additional services" (in the AIA B141 form of owner-architect agreement), or they may be chosen from the list of possible designated services (in the B163 form of owner-architect agreement).

Approvals. The final step in schematic design (and, for that matter, each design phase) is to obtain formal client approval—in writing if at all possible. If approval is given verbally, it is a good idea to send the client a letter confirming the architect's understanding of the approval. (You may ask the client to initial the letter and return a copy.) The importance of this step cannot be emphasized enough. The schematic design presentation has to be clear enough to gain both the understanding and the approval of the client.

Design Development

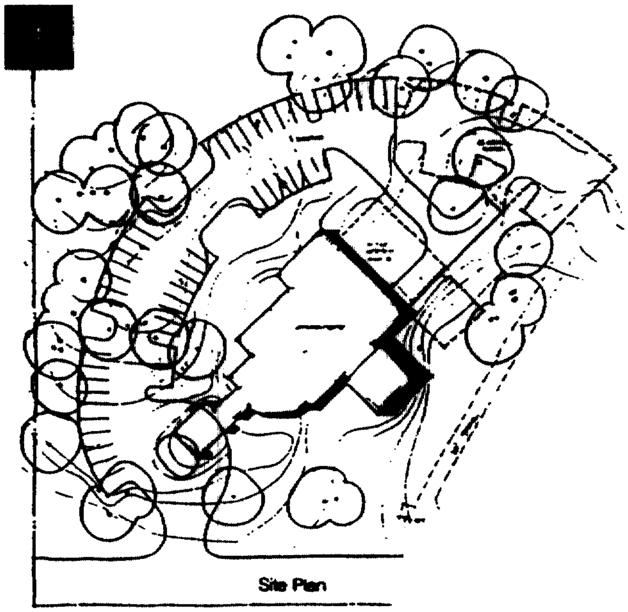
Design development is the period in which the design itself achieves the refinement and coordination necessary for a really polished work of architecture. The decisions made in schematic design are worked out at a scale that minimizes the possibility of major modifications during the construction contract documents phase. Working drawings and specifications are complex and intricately interrelated; changes in those documents are costly and more likely to lead to coordination problems during construction. Thus, the primary purpose of design development is to further define and describe all important aspects of the project so that what remains is the formal documentation step of construction contract documents.

During design development, the design team works out a clear, coordinated description of all aspects of the design. This typically includes fully developed floor plans, sections, exterior elevations, and, for particular areas or aspects of the building, interior elevations, reflected ceiling plans, wall sections, and key details. Often these become the basis for the construction documents to follow. The basic

James H. Boniface, AIA, The Freeman-White Architects
Reprinted from *The IDP* (January 1990)

Schematic design usually results in a site plan, floor plans, elevations, and a perspective.

1



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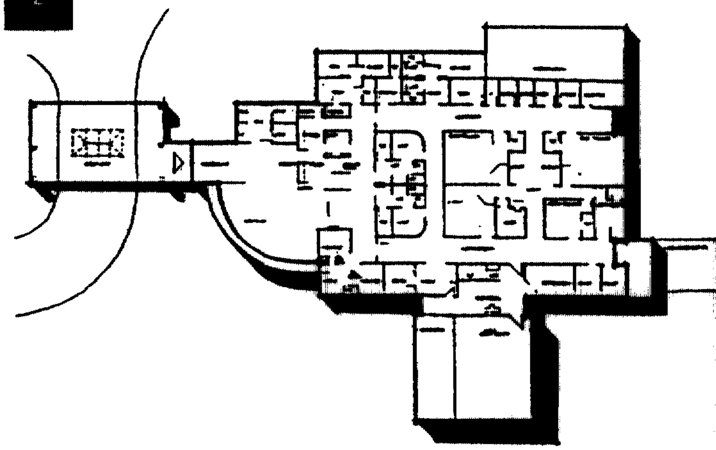

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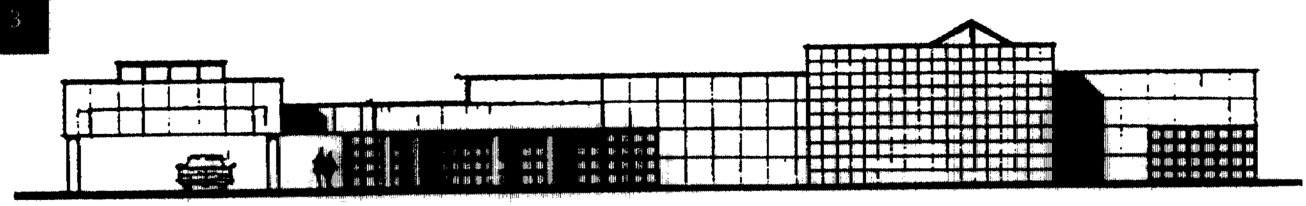
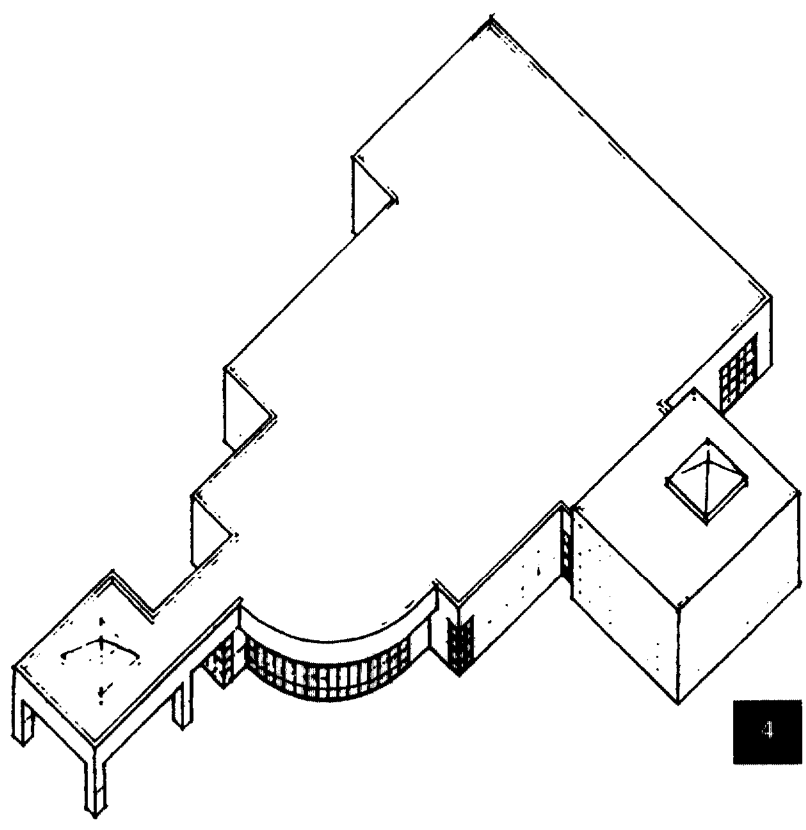




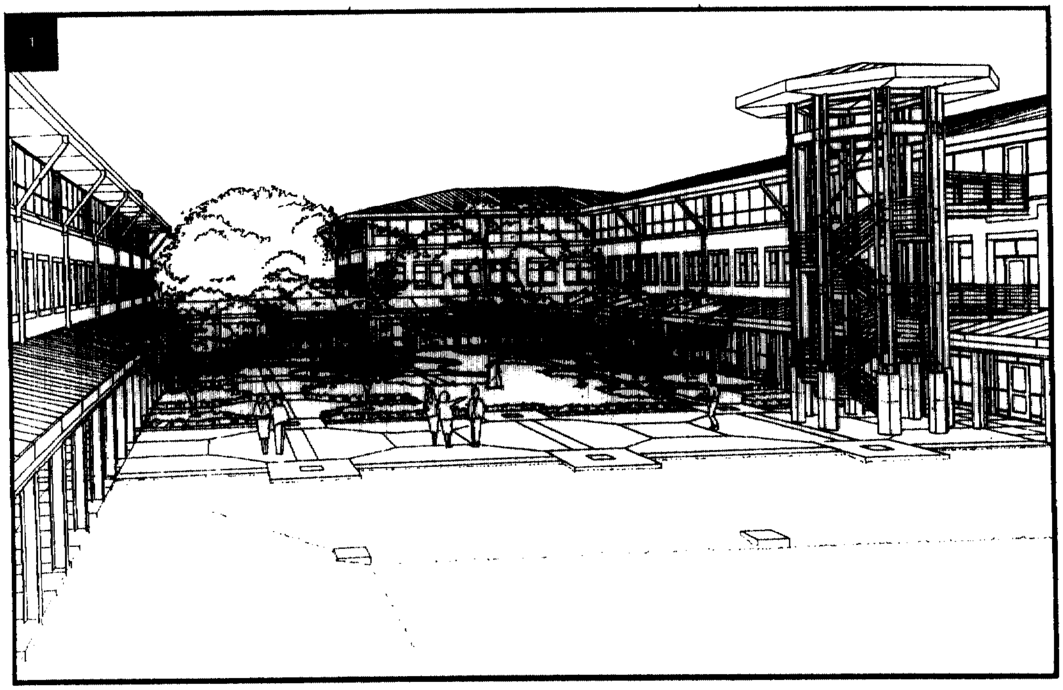
4

H. Dean Rowe, Rowe Holmes Hammer Russell Architects

Reprinted from *The IDP* (October 1990)

The 141 design development drawings for a $25.5 million regional service center were done at 24" x 36" size and reduced to 11" x 17" for presentation. Plans, elevations, sections, and perspectives were produced on the computer; the detailed wall sections were drawn by hand. A perspective and wall section are shown.

1



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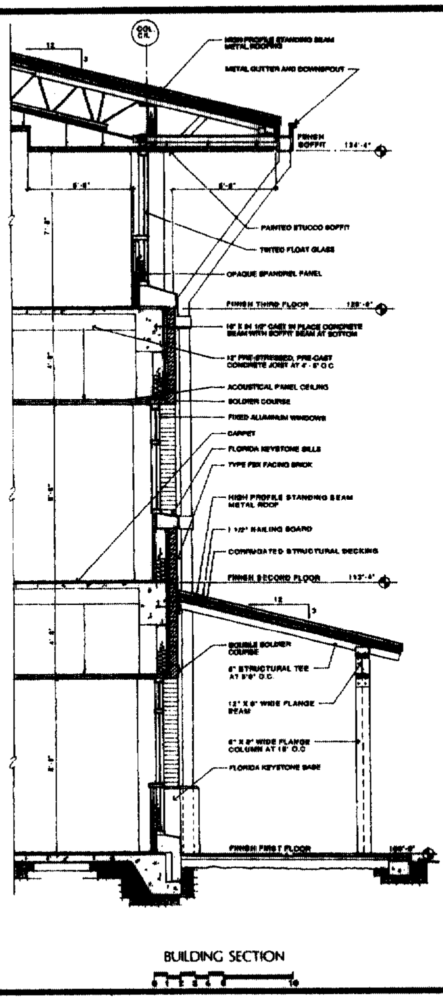

BUILDING SECTION

Gruzen Samton Steinglass Architects, Planners, New York, New York

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Many firms have checklists to help bring projects to an appropriate level of development at the end of the design development phase. Here is one firm's list.

ARCHITECTURAL DESIGN DEVELOPMENT SET

Title Sheet

Per office standard

Site, Survey, Landscaping Plans

See site consultant requirements.

Floor Plans

This consists of general (template) plans, overall coordinating plans, and plan enlargements for important and special areas.

1. *Template Plans*

   Data required:

   a. Building perimeter (footprint) and exterior wall type, thickness and composition fixed
   b. Structural grid or system fixed (with "hard" column sizes)
   c. Major mechanical/electrical systems determined and their requirements reflected and indicated on plans
   d. Indicate building core—elevators, stairs, etc.
   e. All internal partitions of appropriate thickness indicated
   f. Door swings indicated

   Reproduce floor plan templates. Make transparencies or CAD layers for further design development work (with originals placed aside) and distribute transparencies or layers to consultants for their use as background drawings.

   Plan information:

   a. Adequate internal and external dimensions for "hard fix"
   b. Floor, slab, and level elevations
   c. Typical door types
   d. Typical partition types
   e. Building core element—well worked out with dimensions
      - Stairs
      - Elevators
      - Major shafts
   f. Built-in furniture items—indication only and keyed to design requirements
      - Reception desk
      - Counters
      - Cabinets
      - Work tops
      - Beds and bunks
      - Lockers
      - Special furniture and equipment (early clarification of what is "NIC" and "by owner")
   g. Electrical receptacle and switch locations

2. *Coordinating Floor Plans*

If necessary. Small scale (e.g., 1/16" or 1:200). Scale down and reproduce the template plans with indication of exterior overall building dimensions, breaks, tie in, etc. As an additional use, this plan can be considered a large key plan, valuable to identify, cross reference, and key in information pertinent to the entire set.

3. *Detail Plans*

Larger scale (e.g., 1/4" or 1:100). Key areas, lobby, entries, public plaza, major corridors, special spaces, etc.

Required: All surfaces (floor, wall, and ceiling treatments), furniture indication, and layout.

Elevations

Drawn at the same scales as construction documents.

1. *General Elevations*

   Data required:

   a. Total full-height facades including roof structures
   b. All fenestration fixed and related to interior walls and internal slab heights
   c. Overall vertical building and floor heights indicated and related to established building datum
   d. Indicate column centers
   e. Indicate cross-reference points with sections
   f. Indicate setbacks, building profiles, expansion joints, etc.
   g. Indicate treatment of visible mechanical equipment (as worked out with consultants)
   h. Systems impact (precast concrete, stone, panel systems, metal/glass curtain wall, etc.) properly selected by adequate technical investigation

2. *Detail Elevations*

Key elevations that indicate unique or theme elements, as required to augment the normal building elevations:

   a. Building entries
   b. Public spaces
   c. Typical bay
   d. Canopy recesses
   e. Indicate: fenestration pattern, venting arrangements, divisions
   f. Metal and panel work—divisions and profile indication
   g. Exterior treatments
   h. Masonry details—coursings, special patterns, etc.
   i. Exterior louver placements
   j. Abutting topography and grade relationship

Sections

Objective: to achieve the "look" of the overall building solution. Technique: limit details, avoid repetition, show major different conditions only.

1. *Overall Sections*

   Overall building longitudinal and transverse "building explanation" type (at 1/16" or 1/8", 1:200 or 1:100, scale).

Supplementary Sections

Larger scale (e.g., 1/4" or 1:50) vertical and plan sections design profiled for the building "work out" purposes.

Detail Wall Sections

Largest scale (e.g., 3/4" or 1:20). Dominant full-height sections conveying basic building configuration to indicate

a. Foundation and perimeter treatment
b. Typical wall construction
c. Backup structure, abutting floor system
d. Window location and insulation methods
e. Flashing, masonry coursings
f. Mechanical penetrations impact (furrings, etc.)
g. Parapet design

Usually one full (no cut) section. Additional detail sections should be minimally detailed; provide an adequate number to provide a comprehensive building perimeter profile. All sections keyed to building elevations.

Details

Large scale (1 1/2" and 3", or 1:10 and 1:5) as required. Indicate key conditions. Technique: nonrepetitive prefinal design developed, encompassing good technical practice.

a. Window types: divisions, pattern, mullion profiles, vent detail, glazing type, jamb/head, plan section
b. Hollow metal (typical only; keyed to plans and schedules)
c. Frame types (typical only; for compatibility and profile)
d. Stair types—egress, public, exterior (including railing design)
e. Metal and glass walls, borrowed lights, etc.; for division, profile, and glazing
f. Nontypical design-related heavy-gauge metal work requiring special fabrication, joining, fastening to other building elements
g. Interior partition types (typical only; keyed to plans and schedules)
h. Built-in furniture items, reception desks, work tops, counters, cabinet types, display cases, recesses, wardrobes, millwork, etc.

Interior Elevations

Typical and special spaces, interfaced with and cross-referenced to floor and reflected ceiling plans. Indicate

a. Suspended ceiling lines reflecting structural and mechanical conditions above
b. Breaks
c. Level changes
d. Finish floor elevations
e. Pertinent vertical dimensions
f. Interior wall treatments, materials

These should be of prefinal quality adequate to convey design intent.

Reflected Ceiling Plans

Typical and special spaces. Integrated plans reflecting structural, mechanical, and electrical impacts. Plans to indicate:

a. Lighting layouts
b. Soffits, coves, furrings
c. Skylight locations
d. Ceiling materials
e. Acoustic treatments
f. Relationship with partitions
g. Interface with window details
h. Perimeter conditions—details, notches
i. Heating and ventilating register, diffuser locations
j. Sprinklers
k. Access panels
l. Exposed structure

Schedules

Schedules to be nonrepetitive and comprehensive, with specific keying to floor plans and elevations.

a. Prefinal interior finishes
b. Frame and door
c. Preliminary hardware
d. Window and glazing

Specifications

Comprehensive, abbreviated methods, materials, and systems descriptions in tune with the drawings. Use CSI format with applicable section numbers. Include all consultant portions as well as those special and supplementary conditions specific to the project.

Preliminary Estimate of Construction Cost

Adjustment of the preliminary estimate of construction cost prepared at the end of schematic design.

STRUCTURAL DESIGN DEVELOPMENT SET

1. *Floor plans at the same scale as the architectural drawings*
2. *Typical floor framing plans, including*
   a. Sizing of beam drops
   b. Slab openings
   c. Thicknesses
   d. Depressions
3. *Framing indication and governing sizing at*
   a. Roof structures
   b. Penthouse
   c. Bulkheads
   d. Other
4. *Nontypical framing scheme where required:*
   a. Lobby
   b. Floors at grade
   c. Other

➤

5. *All column points established*
6. *Final column schedule*
7. *Preliminary details and sections to adequately indicate structural system*
8. *Preliminary details of major unique conditions that affect scheme (as determined by the architect)*
9. *Details indicating accommodation with mechanical/electrical at areas of major interface*
10. *Design development specifications*
11. *Any necessary recommended adjustments to the preliminary estimate of construction cost*

MECHANICAL/ELECTRICAL DESIGN DEVELOPMENT SET

1. *Typical floor plans. Systems representation in diagrammatic (nondetailed) style, major items of equipment indicated, their space requirements and interface requirements with other systems. Indicate*
   a. Major shafts (sizes)
   b. Chases
   c. Mechanical rooms and electric closets
   d. Convector/fan coil locations, etc.
2. *Required penetrations:*
   a. Wall
   b. Slab
   c. Beam
3. *Terminal plans (lobby, cellar, roof) with items of heavy equipment shown in diagrammatic style, with their space requirements indicated:*
   a. Boiler/heater spaces (include clear height requirements)
   b. Transformer vaults (approval obtained from local utility company)
   c. Switchgear, emergency generator, water storage tanks, fire pumps, etc.
   d. Roof cooling towers, major air conditioning and air handling equipment, packaged units, etc.
4. *Locations of major roof air-handling equipment: cooling towers, exhaust fans, etc.*
5. Site utilities layouts
6. *Preliminary details of major and unique conditions that affect scheme (as determined by the architect)*
7. *Data to be developed in conjunction and in coordination with the project team:*
   a. Integrated diagrammatic lighting plans indicating all overhead mechanical and electrical equipment for typical floor and special spaces
   b. Preliminary electric fixture type schedule and cuts
   c. Cuts and explanatory information for interior visual items such as:
      - Louvers
      - Registers
      - Heating/cooling units
      - Cabinets
   d. Exterior louver requirements and proposed locations
8. *Design development specifications*
9. *Any necessary adjustments to the preliminary estimate of construction cost*

SITE DESIGN DEVELOPMENT SET

1. *Building location plan—building tied down dimensionally with pertinent adjacencies, street lines and grades, property lines, required setbacks, easements, rights of way, manholes, sewers, hydrants, light standards, etc., interfaced with survey*
2. *Main entry level datum elevation with key exterior grades at building perimeter*
3. *Site development grading and landscaping plans*
4. *Overall preliminary site grading and defined design of external elements, properly coordinated and interfaced with mechanical/electrical for utility entry points*
5. *Indicate areaways, vaults, access to subgrade spaces*
6. *Preliminary site and exterior building lighting scheme with identification of fixture types*
7. *Parking area defined with preliminary plotting*
8. *Indication of path, stairs, ramps, beams, terraces, etc.*
9. *Plant materials (indication and preliminary schedule)*
10. *Design development details:*
    a. Railings
    b. Stairs
    c. Ramps
    d. Paving types and patterns
    e. Kiosks
    f. Benches
    g. Light standards
    h. Others
11. *Design development specifications*
12. *Any necessary adjustments to the preliminary estimate of construction cost*

OTHER CONSULTANTS' DESIGN DEVELOPMENT SETS

1. Kitchen
2. *Elevator*
3. *Laundry*
4. *Refuse*
5. *Security*
6. *Other*

Include all preliminary information that allows proper interfaces with major design disciplines.

mechanical, electrical, plumbing, and fire protection systems are accurately defined if not fully drawn. No major issues that could cause significant restudy during the construction contract documents phase should be left unresolved.

The deliverables of the design development phase are similar to those of schematic design: drawings and specifications that fix and describe the size and character of the project, as well as any recommended adjustments to the preliminary estimate of construction cost. The design development phase usually ends with formal presentation to, and approval by, the owner.

Design development may be a substantial undertaking, or it may be a much briefer transition from schematic design to construction documents. Some owners require extensive schematic design services, with much of the project "developed" by the time this phase ends. For some straightforward or repetitive projects, the schematic design may be sufficiently clear for both owner and architect to proceed directly to construction documents with confidence. In these instances, design development may be brief (or in the most extreme cases, nonexistent).

Many firms use in-house checklists to help define the level of decision and documentation at the end of the various design phases. One such checklist is shown here.

In some project delivery approaches, the owner may wish to secure construction cost commitments before the design is fully developed—thus reducing or even eliminating the design development phase. This reduces one uncertainty but introduces another, for there is likely to be debate about what was included, and not included, in the cost estimate made on the basis of preliminary, partial, or "scope" documents.

3.22 Delivery Options examines the pros and cons of early construction contract awards based on partially developed documents. Page 389.

Design during the Implementation Phases

While most design issues should be resolved by the end of design development, some will continue to be refined, resolved, or modified during the construction documents, bidding and negotiation, and construction contract administration phases of the project.

SOMETHING IN THE DETAILS WILL REFINE AND REFRESH THE SOLUTION.

Charles Gwathmey

During the construction documents phase, additional design issues emerge as the design team works out the final material and system selections, details, and dimensions. For example,

- The final detailing and specification of an exterior wall, including the selection of specific products and manufacturers, inevitably leads to modification of the dimensions, color, transparency, and other aspects of the wall.
- The detailing and specification of interior partitions, openings, and finishes involves a large number of minute design decisions from the location of joints to the selection of the final materials or acceptable alternates.

3.8 Design Documentation, page 703, addresses the construction documents phase and **3.9 Construction-related Services,** page 743, addresses bidding/negotiation and construction contract administration.

Once a contractor or construction manager is selected, the need to make design decisions continues. The bidding and negotiation process inevitably leads to proposed substitutions or modifications in details to achieve cost savings or to simplify the construction process. Usually some of these are accepted and must be successfully integrated with the remainder of the design.

This is a planned process—not the result of errors and omissions in earlier stages—and is carefully delineated in the general conditions of the construction agreement.

Design continues even through the construction phase. The construction contract documents require interpretation and elaboration. Field conditions and other

problems may force design changes. Confronted with the reality of the project, the owner may request changes—reinforcing the elemental idea that design "never really stops" but continues through construction and everyday use of buildings and facilities.

FOR MORE INFORMATION

There are, of course, many books, periodicals, conference proceedings, slide and video collections, and other resources on the general subject of design, designers, and design theory, history, and criticism. The AIA Press publishes design books, with a special emphasis on influential designers (for example, its recent books on Hugh Newell Jacobsen; Moore, Ruble & Yudell; Centerbrook; Fay Jones; Gunnar Birkerts; Arquitectonica; and Graham Gund Architects). The Press also publishes practice management books and monographs, many of which are cited in the individual practice topics in this handbook.

Ellen Shoshkes, in *The Design Process: Case Studies in Project Development* (Whitney Library of Design, 1989), follows nine well-known projects through the design process, offering many examples of sketches, analyses, and development and presentation drawings done at various stages of the design process.

One of the goals of the AIA is to promote design and environmental quality as well as public awareness of architecture and architectural services. One way to do this is through design awards programs such as the Honor Awards for Architecture, Interiors, and Urban Design; the Thomas Jefferson Awards for Public Architecture; Institute Honors; and Honorary Membership. State and local AIA components also organize design awards programs. Call (202) 626-7300 for information.

At the more detailed level, the *Architectural Graphic Standards* family of publications (see **3.81 Construction Documents,** page 703) provides design guidance and technical and drawing standards. The Time-Saver Standards reference volumes also include a great deal of design information that might be scattered through many sources in a typical design library. These reference books include John Hancock Callender, *Time-Saver Standards for Architectural Design Data* (McGraw-Hill, 6th ed., 1982); Joseph DeChiara and John Hancock Callender, *Time-Saver Standards for Building Types* (McGraw-Hill, 3rd ed., 1991); Joseph DeChiara, Julius Panero, and Martin Zelnick, *Time-Saver Standards for Interior Design and Space Planning* (McGraw-Hill, 1991); and Charles E. Broudy and Vilma Barr, *Time-Saver Details for Retail Planning and Design* (McGraw-Hill, 1994).

The design process goes beyond solving problems and meeting project deadlines. Donald Schön's theory of how professional knowledge is developed through reciprocal action and reflection during design, what he calls "reflection-in-action," is described in *The Reflective Practitioner* (Basic Books, 1983) and *The Design Studio* (RIBA, London, 1985). Other texts, such as Peter G. Rowe's *Design Thinking* (MIT Press, 1987), look at the design process from a number of different theoretical positions.

AIA Center for the Environment

In its broadest scope, sustainability refers to the ability of a society, ecosystem, or other ongoing system to continue functioning into the indefinite future, without being forced into decline through exhaustion or overloading of the key resources on which that system depends.

Architects can play a major role in the creation of a sustainable society. Environmental deterioration results from a lack of relevant information, and poor design is responsible for many of our environmental problems. To minimize future degradation, and to restore already degraded environments, architects are challenged to lead the way into the newly emerging and rapidly flourishing field of environmentally conscious architecture and sustainable development.

The AIA/UIA Declaration of Interdependence for a Sustainable Future, signed at the 1993 World Congress of Architects, was a clarion call to architects around the world to

- Place environmental and social responsibility at the core of their practices and professional responsibilities
- Develop and continually improve practices, procedures, products, curriculums, services, and standards that will enable the implementation of sustainable design
- Educate fellow professionals, the building industry, clients, students, and the public about the critical importance and substantial opportunities of sustainable design
- Establish policies, regulations, and practices in government and business to ensure that sustainable design becomes normal practice
- Bring all existing and future elements of the built environment—and their design, production, use, and eventual reuse—up to sustainable design standards

As major facilitators of the design process, architects have a unique opportunity to shape the built environment. The buildings and communities they design can help heal the landscape and directly influence morale, productivity, and comfort in the places people work, shop, play, and live.

The AIA takes the position that it is imperative to begin the process of sustainable redevelopment of the built environment as rapidly as possible. We need to pioneer new, sustainable building types and town plans, transforming our cultural core.

Where might such a transformation lead us? While there is much yet to be discovered about the character of truly sustainable architecture, it is likely that these characteristics will be part of such an approach:

- All material processes will be cyclical by design. Rather than waste and pollution, outputs from one system will serve as welcome inputs to another.
- The basic energy used by society will be renewable. Carbon-based fossil fuels will become the least desirable form of energy.
- Long-lasting, quality products will allow people to spend less time producing and consuming material goods and more time learning, providing services, and relating to each other and to the natural world.

Such a society would handle its built environment by

- Designing buildings so they are minimal consumers, and may even be generators, of energy and other resources
- Using building materials that have a benign impact on the environment throughout their life cycle—in their acquisition, manufacture, placement, use, recycling, and eventual disposal
- Constructing buildings with internal environments—air quality, lighting, spatial design, aesthetics—that are health-giving and inspiring
- Arranging buildings so they foster community, and so that most people, most of the time, can have high-quality lives—including work, residence, commerce, and community—within walking or cycling distance
- Developing urban areas and regions so they have natural environments—whether as parks, greenbelts, or country-side—within walking distance of every residence
- Developing the infrastructure of public transit, roads, bike paths, utilities, and communications so that community at the human scale is enhanced, variety is readily accessible, and the automobile is optional for most people, most of the time

As the end of the twentieth century approaches, the architecture profession and its allies are synchronizing efforts to confront the challenge of increasing environmental concerns and threats to the quality of life. Superior design and technology are critical agents in successfully translating the requirements of a viable global ecosystem into built environments that not only sustain but also substantially advance our cultural and economic well-being. Sustainable design and technology offer opportunities to make buildings more enjoyable, productive, and intelligent and to restore degraded environments. The full ripple effects of applying sustainable design and advanced technologies in buildings remains unidentified, but the center has been defined: It is good design.

Strategies for sustainable design, and for renovating, retrofitting, and recycling our built environment, are rapidly evolving. The AIA's *Environmental Resource Guide,* updated and delivered on a quarterly basis, offers materials analysis, case studies, and selected reports detailing this fast-moving front. Call (800) 365-ARCH to order this guide.

THE AIA and the building industry have charged the AIA Center for the Environment with maintaining an essential level of involvement in environmental and energy-related areas.