2.3 Management of the Project

2.3.5 Schematic Design

Schematic Design

Introduction

Schematic design is the phase of the project during which the client's requirements and desires assume architectural form. The term also represents the important conceptual stage where the architect can provide added value by using creativity and ability to synthesize various, and often competing, requirements. At this stage, the architect and the client agree on an architectural concept representing a synthesis of the following elements:

- the nature of the site;
- the space planning requirements described in the client's program;
- the self-image or philosophical objectives of the client;
- the design approach of the architect.

In schematic design, the architect and the client discuss and confirm the key issues of the project and agree on the architectural form to accommodate them. This form should be based on a design brief or functional program developed during pre-design (refer to Chapter 2.3.4, *Pre-design*). The benefits and value of preparing a well-thought-out program cannot be overstated.

Throughout the schematic design phase, the architect tests the client's program by studying various planning and massing relationships, always within the constraints of the project budget. Ideally, schematic design will conclude with a design which is the best possible synthesis of all the factors being considered.

Schematic designs may be developed using an Integrated Design Approach which involves a multi-disciplinary team of design professionals as well as the client as a core team member. Sometimes a facilitator is involved to assist the team in establishing sustainable goals and in considering the impacts of all design decisions on the life cycle of the building. Inevitably there will need to be trade-offs (such as incorporating high performance windows and thereby reducing the size and cost for mechanical equipment). The sustainable vision for the project should involve documentation of all design decisions. Integration at the schematic design stage of appropriate site development, building envelope characteristics, and mechanical and electrical systems optimizes the contribution of each design discipline.

Also new software developments allow architects to undertake preliminary modeling and develop rapid prototypes as well as document the building as a three-dimensional model using Building Information Modeling or BIM. These new techniques mean that the design work is more "front-end loaded" or more intensive during the schematic design and design development phases and therefore schedules, staff time and invoicing must be adjusted accordingly.

As the design character emerges, the need to change program details may become evident. The schematic design process provides a method for fine-tuning elements of the client's requirements and adjusting spatial relationships before beginning design development.

Schematic design is also the stage when the architect assembles the design team, including sub-consultants who:

- become familiar with the opportunities and challenges presented by the building site;
- investigate different types of construction materials, systems, and contractual methods;
- may obtain detailed site information, including all services such as water, sewer, gas;
- establish the project's technical principles;
- review their proposals with the architect and the client.

Refer also the Site Evaluation Checklist in Chapter 2.3.4, *Pre-design*.

Client-Architect Relationship

The most successful projects result when the client participates actively in the development of the design. Throughout schematic design, the architect-client dialogue continues, as proposals for specific responses to the project's requirements are put forward by the architect. It is important for the parties to remain in agreement over the fundamental issues outlined in the functional program. To facilitate effective client participation and to maintain the trust between the parties, the architect must encourage communication and ensure that all design issues and construction budgets are presented and open to discussion. Minutes of design meetings should be taken and circulated.

Timely client involvement will help resolve difficulties with program elements or highlight the need to modify the program. Budgets must be reviewed to ensure that the proposed solution meets all functional requirements; alternatively, the budget can be adjusted. With a speculative building project, or with alternative construction project delivery systems, the architect may not have access to a community of users. In this instance, the client is considered the user representative. The architect may request that the client formally confirm certain decisions with recognized user groups or associations.

To ensure that projects run smoothly and design time is optimized, the architect should insist that clients provide timely approvals and information on functional requirements.

Information Required at Schematic Design

The client is responsible for providing functional program addressing:

- functional requirements and spatial relationships;
- flexibility and provision for expansion;
- special equipment and systems;
- site requirements;
- construction budget;
- time frame or schedule.

In addition to the program, the client is responsible for providing full documentation of site conditions, including:

- legal and physical surveys;
- reports on sub-surface conditions, including the presence of hazardous materials or other pollutants;
- any other professional reports or opinions from specialist consultants that will have an impact on the work.

If the client does not have all this documentation, the architect may help procure it, acting as the client's agent. Alternatively, the architect may insist that the client retain specialists to provide the necessary information, partly because the architect's liability insurance will not cover certain sub-consultants.

If the architect and the client do not yet have a clearly defined understanding of project objectives, schematic design should be delayed until the appropriate information is available and intentions are understood. Assistance with programming and obtaining missing information are considered additional or optional services and, should be billed accordingly.

As the schematic design process continues, the architect applies technical and regulatory knowledge by:

- incorporating appropriate construction materials and methods;
- ensuring compliance with building codes;
- dealing with occupational health and safety codes;
- ensuring that local zoning and urban design requirements are met.

Before proceeding to design development, architects must fully investigate planning and technical requirements as well as regulations of Authorities Having Jurisdiction (such as environmental impact, site plan control, zoning, parking requirements, and limiting distances). A general overview, rather than a detailed analysis, of building code compliance is necessary at this stage.

Space, Circulation, and Massing Studies

As part of the preliminary analysis of a new commission, the architect will often prepare a series of space diagrams to identify the comparative size and relationships of the functional areas and spaces required. Proportions and volumes can be established and, with the data rationalized to this extent, the preliminary architectural planning and designing can be more realistically undertaken.

In addition, pedestrian and vehicular circulation diagrams — linking the relevant spaces and applicable site constraints — can be undertaken, usually concurrently. Consultant input, especially related to mechanical and electrical space requirements as well as vehicular traffic and vertical transportation systems, may be sought at this stage.

On large and complex projects, the architect should ask the client to approve such diagrams as they are developed.

Having undertaken and established some basic planning relationships in the form of these flow and space diagrams, the architect, with input from the design team, must then consider the overall form which the project could take.

Using sketches and block models, the architect investigates various forms and relative volumes for the building project. From such massing studies, the architect can:

- establish the sculptural quality of the building;
- visualize the space between buildings (proposed and existing);
- determine the effect of sun, shade, snow, rain, and wind on the project and its surrounding environment.

Engineering Services for Schematic Design – Integrated Design

The Integrated Design Process helps to ensure that all building systems and components, such as site design, structure, orientation, envelope, lighting and ventilation are viewed as interdependent. During the schematic design phase, the architect usually facilitates the design team, including structural, mechanical, and electrical engineers. Other specialist sub-consultants may be required, depending on site conditions and programmatic requirements. Engineering sub-consultants help prepare the construction budget submitted at the completion of the schematic design stage (refer to Chapter 2.3.3, *Cost Planning and Control*). The project will progress more smoothly if the consultants become familiar with the site and program requirements early on in the process.

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As the general form of the facility emerges from programmatic data, engineers from the various disciplines work with the architect to develop structural, mechanical and electrical, designs and building system concepts which are appropriate to the project goals. Early involvement by design engineers is a significant factor in obtaining the synthesis of building elements that can lead to reduced capital costs and improved building performance.

Design Alternatives: Evaluation and Selection

The project program may include more than one possible path to follow for planning or for developing architectural concepts. In these circumstances, the architect may prepare design alternatives for the client to consider.

At the schematic design stage, design alternatives should involve quick diagrammatic studies to address issues such as circulation, planning, and volumetric aspects of the project, without developing architectural detail. Some clients may want to review multiple options, thinking that this demonstrates a thoroughness of process. These options should be limited to simple planning diagrams. The number of options should be limited and based upon the fee proposal and the agreement with the client. One design alternative should then be selected and developed in more detail. The architect must strike a balance between providing an appropriate level of basic

services and undertaking extensive studies that should be identified (and billed) as optional or additional services.

Design alternatives should be evaluated and selected on the basis of:

- completeness of response to program elements;
- success in resolving functional relationships and adjacency requirements;
- compliance with previously established sustainable goals;
- the merits of alternative structural, mechanical, and electrical systems;
- comparisons of building efficiencies, including:
  - ratio of net to gross floor areas;
  - ratio between circulation and usable floor areas;
  - wall surface to floor area ratios;
  - capital, operating, and maintenance costs.

Building Cost Analysis

During schematic design, the architect prepares preliminary cost estimates, usually based on the area or volume of the proposed building, multiplied by the appropriate unit costs (refer to Chapter 2.3.3, *Cost Planning and Control*). Sometimes it becomes clear at the schematic design phase that the client's expectations cannot be met within the current budget. In this case, the architect needs to work with the client to adjust the scope of work or the quality, or alternatively, provide for an increase in the budget.

Documentation and Presentation

Schematic design documents illustrate the functional relationships of the project elements as well as the project's scale and character, based on the final version of the functional program, the schedule, and the construction budget. The design documents may include:

- a site plan;
- principal floor plans;
- vertical sections;
- building elevations;
- illustrative sketches or perspective renderings, computer-generated presentations;
- massing models.

In addition to design documents, it is often appropriate to prepare a report containing the following:

- design approach or philosophy;
- sustainable goals and environmental features;
- probable construction cost (with appropriate qualifications — refer to Chapter 2.3.3, *Cost Planning and Control*);
- summary of status of design with respect to applicable environmental, planning, and zoning regulations as well as building codes;
- preliminary schedule for design and construction start and completion and the form of construction procurement;
- description of structural, mechanical, and electrical systems;
- basic area calculations and analyses;
- site data;
- product and material description and sample of key construction materials or finishes.

The architect reviews the documents with the client and should obtain written approval before beginning design development.

Standard Contract Documents and Checklists

A list of the services to be provided in the schematic design phase is contained in Schedule A or Schedule B, Schedule of Architect's Services and Client Responsibilities, for use with the *Canadian Standard Forms of Contract Between Client and Architect: RAIC Document Six and in Schedule A -Schedule of Architect's Services and Client's Responsibilities of Canadian Standard Forms of Agreement Between Client and Architect — Abbreviated Version: RAIC Document Seven*.

A detailed "Checklist for the Management of the Architectural Project," including requirements during the schematic design phase, is available at the end of Chapter 2.3.1, *Management of the Project*.

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