

Facility Planning Process
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TOPIC	PAGE
1.0 Introduction	1
Figure 1.0 Facility Design Directive	3
2.0 Developing a Facility Program	4
Figure 2.0 Basic Program Process	5
Figure 3.0 Peña Matrix	7
Figure 4.0 Programming Resource Information	9
Figure 5.0 Continuity of Process	10
2.1 Committee Leadership	11
2.2 Comprehensive Analysis	13
Figure 6.0 Translation to Design	14
Figure 7.0 Bubble Diagram (Strong Relationship – Secondary Relationship)	18
Figure 8.0 Adjacency Matrix (Essential-Desirable-Nonessential)	19
3.0 Selection of an Architectural Firm	20
3.1 Basic Architectural Services	22
3.2 What the Architect Will Expect	23
Figure 9.0 Working Partnership	24
3.3 What to Expect from the Architect	25
Figure 10.0 Elaboration and Reduction (Design Process)	27
3.4 Selection of the Architect	28
3.5 Qualifications Scientific Tangible Preparation	29
3.6 Contracting for Architectural Services	29
3.7 Conditions of the Contract	32
4.0 Delivery of the Project	32
4.1 Selection of the Building Design Committee	33
Figure 11.0 Project Support Structure	34
4.2 Communications Interfacing	35
4.3 Time Schedule for the Design Process	36
4.4 Project Feasibility and Reevaluation of Program	37
5.0 Working with the Architect	38
5.1 Collaborative Design Process	39
Figure 12.0 Order—Chaos—Order	40
Figure 13.0 Project Design Evolution	40
5.2 Elements for Achieving the Best Design Solution	41
5.3 Level of Client Involvement	41

6.0 Pre-design	42
6.1 Transitioning from Pre-design	42
7.0 Schematic (Preliminary) Design Phase	43
7.1 Evaluation and Review	45
7.2 Cost Estimates and Budget	46
7.3 Understanding Construction Documents	47
8.0 Design Development (Basic) Design Phase	47
8.1 Evaluation and Review	49
8.2 Cost Estimates and Budget	50
9.0 Construction Document (Final) Design Phase	50
9.1 Evaluation and Review	52
9.2 Final Cost Estimates	53
10.0 Bidding and Negotiating	54
10.1 Contract Documents	54
10.2 Bid Package	55
11.0 Project Administration	55
11.1 Preconstruction	56
11.2 Contract Analysis	57
11.3 Documentation	57
11.4 Schedules and Interpretation	58
11.5 Negotiation	59
11.6 Principles of Contract Interpretation	60
11.7 Claim Procedures and Presentation	61
11.8 Entitlement and Damages	61
11.9 Project Close-out	62
12.0 Post Construction	64
12.1 Process Evaluation and Records	64
12.2 Warranties	65
13.0 Conclusion	65
References	69

Facility Planning Process

1.0 Introduction

The process of planning a facility is an extensive undertaking involving many interrelated steps, see figure 1.0, Facility Design Directive. Each step of the facility planning process is important in giving rise to new questions, maintaining assessment of information, and determining the appropriate criteria that will guide decision making in the development of educational facilities. The facility planning process ideally is conducted as a systematic approach involving the collaborative efforts of various individuals. The conclusion of a facility planning process is a comprehensive plan, fulfilling the preestablished educational objectives. Without the proper team of individuals following a path of rational inquiry, decisions can be arbitrary or ambiguous. The facility planning process models the final facilities functional, operational, philosophic, environmental, and aesthetic expectations. This modeling process will work to assure that the project mission, characterized by the physical facility and the educational goals determined by the educational specification, are coupled in such a way that a unique set of opportunities arises. These opportunities are uncovered, investigated, and integrated or discarded in an effort to exceed the original vision of the final product. Kowalski (1989) indicates, "Systematic and integrated planning helps reduce errors". He suggests that because schools are complex structures where the potential for irreconcilable mistakes are likely, then patterning proven models and encouraging thorough and insightful investigation of past mistakes will best serve the collaborative process.

Donald MacKenzie (1989) states that there are four primary characteristics of the planning process:

1. Quality facility planning means a coordinated collaboration of responsible individuals.
2. Facility planning has at its core value the unique educational objectives defined in the educational specification.
3. Effective facility planning is an integrative process of ideas, investigation, and decision making.
4. Insightful facility planning recognizes that change is inevitable, and that facilities should be designed for future adaptation and modification.

The quest for quality outcomes in a project planning process is naturally the overall and the initial objective of the programming committee. Quality results from the synchronized effort to direct the chaotic flow of issues and ideas that develops as time passes in the planning process. With a systematic planning process the inevitable chaos can be managed, organized and directed toward order—an understandable culmination of analysis and synthesis. There should be and will be an overwhelming magnitude of information brought out by determined individuals seeking the best solutions. The best planning process will follow an orderly process of consideration as Donald MacKenzie indicates, but also the process must ignite the frenzy of information, ideas, and vision, in an effort to elaborate and then to reduce the magnitude of investigation and consideration to concise decisions. By way of this approach the concern for “What if?”, “What if we would have...?”, will not follow the finished product. The approach outlined is suited to the least resistance for reducing chaos and thus stagnating the “What if?”. The quality of outcomes (order) stem from the quality of input (chaos).

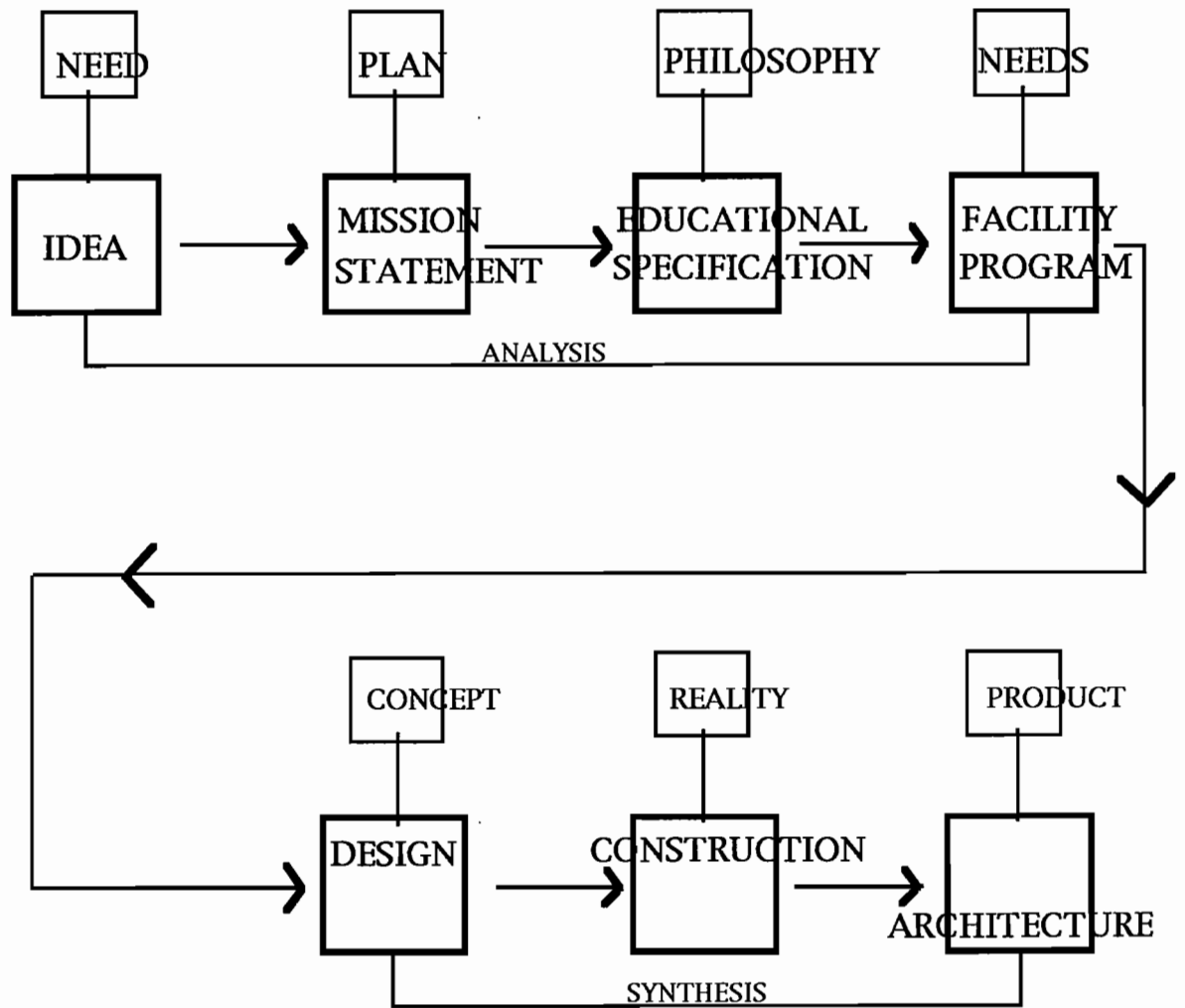


Figure 1.0 Facility Design Directive

2.0 Developing a Facility Program

The facility design program is a document that defines in specific detail and content the scope of work for the entire project. Programming is the process of identification and systematic organization of the functional, architectural, structural, mechanical, aesthetic, and budget criteria which guide decision making in the design of buildings. The American Institute of Architects defines programming as “the process of leading to a statement of an architectural problem and the requirements to be met in formulating a solution. Programming is a problem-seeking process and therefore seeks to identify the problem that the design process must solve” (The Architect's Handbook of Professional Practice, 1987). The entire programming process is commonly referred to in five basic procedures: establishing goals, collecting information, determining relationships and forming a clear problem statement. See figure 2.0, Basic Programming Process for general description of sequential steps in problem solving the program process.

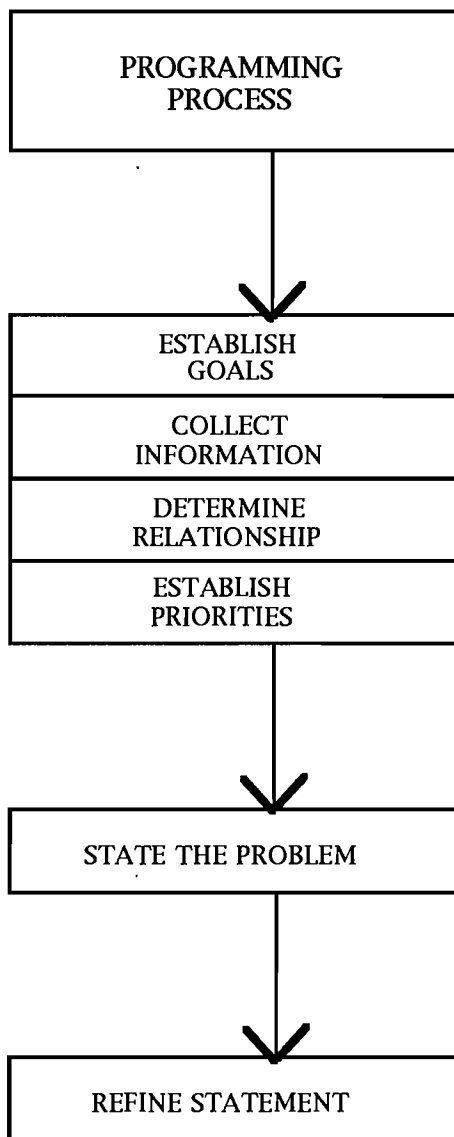


Figure 2.0 Basic Program Process

An effective format for organizing programmatic data is the division of information into four design considerations--function, form, economy, and time. These four divisions are represented by Peña (1987) as:

- Function--considers objectives, methods of achieving them, and human needs
- Form--considers the site, the character of the spatial aspects, and pertinent structural aspects
- Economy--considers the construction budget, as well as long term operating costs
- Time--considers the schedules for design, construction, and occupancy

In addition to the four design related program considerations, five associated process actions are chronologically organized upon a matrix for assessment of the four design considerations. Kumlin (1995) defines them as:

- Step 1 Establish goals
- Step 2 Collect, organize, and analyze facts
- Step 3 Uncover and test concepts
- Step 4 Determine needs
- Step 5 State the problem

figure 3.0 shows the Peña matrix. Appendix 'A' includes an expanded version of this matrix that provides typical responses between the process actions and design considerations.

	Function	Form	Economy	Time
Goals				
Facts				
Concepts				
Needs				
Problem				

Figure 3.0 Peña matrix

Prior to beginning the program development for the facility, all curriculum considerations, teaching and learning methodologies, and educational philosophy should be clear and concisely organized and articulated in an educational specification. A group process should precede the program development whereby the educational goals and the means for attainment of these goals are determined and transcribed to provide a conclusive, working educational philosophy. Castaldi (1987) promotes this idea stating that, "Considerable time should be spent by the faculty in developing the curriculum before an architect is asked to put a single line on paper."

Resource information is gathered or otherwise received from a variety of contributors to the process. The programmatic requirements for schools reflect the combined philosophies, creative ideas, and objective knowledge of individuals and resources. The programming resource diagram illustrated in figure 4.0 is the basis for final program data. Each information resource is filtered through a committee assessment process for consideration of applicability to the program objectives. Successful resource input will begin the formulation of a program data set to become output in the final building product.

Continuity of the planning process, shown in figure 5.0 is essential to the success and quality of the final product. Therefore, it is necessary to involve the key members of the curriculum design and educational specification development in the programming process. Oversight carry-over from one process to the other is effective in maintaining original objectives. One of the critical needs is to insure that an effective leader is designated to oversee the programming process. This leader must have strengths in group dynamics, be a strong administrator of the curriculum objectives and under best conditions, and should have previous experience in transforming educational philosophy into the practical requirements of building design and facility use.

Leaders for the programming process may be anyone having a suitable aptitude for control over process. However, it is common to see the school system superintendent or their assistants, school principles, or other selected designees having a broadened background and experience, expanded responsibility, authority, and ranking status to engender other department heads and staff to commit to the programming process. It is most important that the educational content of the project not be lost in the transformation to practical planning and budget scrutiny. It is of primary importance to the quality and success of the entire

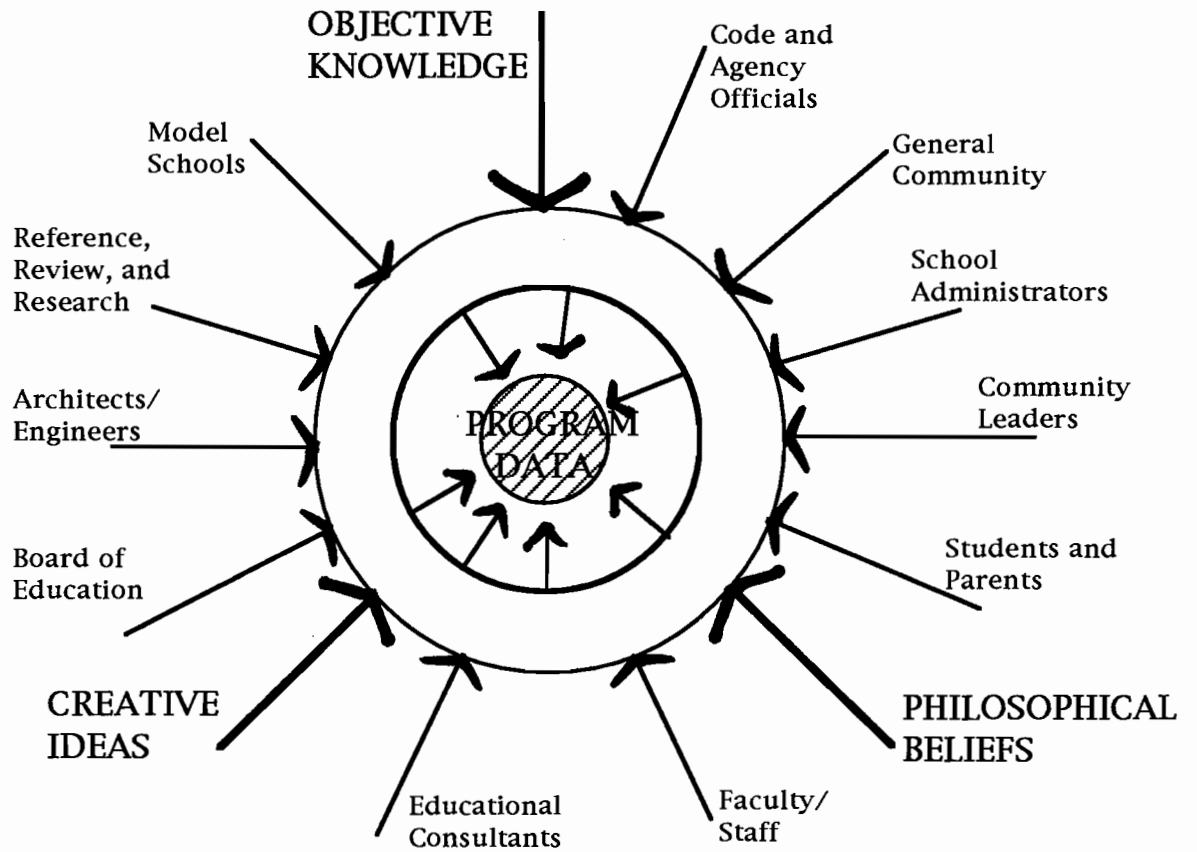


Figure 4.0 Programming Resource Information

planning process to have a qualified leader who will maintain process continuity. From the onset of educational driven directives through the actual facility

construction and henceforth to post occupancy, it is the purpose of a capable leader to perpetuate ideas, understanding, and project vision.

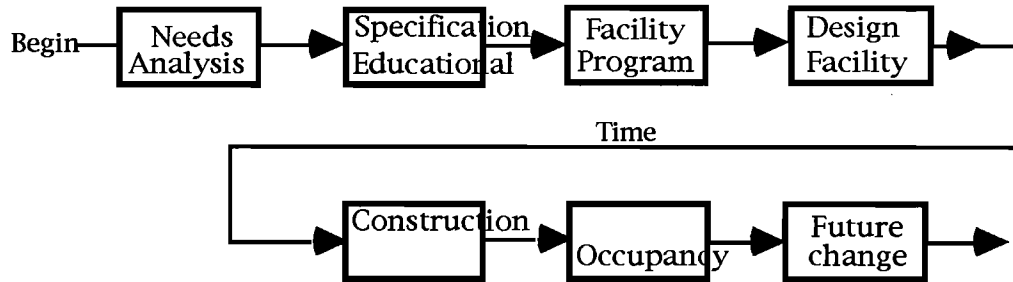


Figure 5.0 Continuity of Process

"All buildings have a series of program requirements and limitations to be met in design. The program may be presented in general terms (as a description of a problem facing the owner—for example, 'our classrooms are not adequately meeting the demands of our new curriculum'), or it may specify in detail an initial view of what it will take to solve the problem ('provide six new classrooms, each of 900 square feet, with these characteristics...')" (The Architect's Handbook of Professional Practice, 1987). The level in which program requirements are articulated may be very superficial or very detailed. They may be verbal

description, comparisons, model examples, graphic representations, or what ever method will clarify objectives and intentions.

According to Heimsath (1977), “there are four elements to be developed in the Programming Phase. These elements lead to a programming document, which in turn becomes the basis for schematic design concepts. The four elements are:

1. A clarification of goals for the project and the background of the organization and the participants.
2. A definition of the area requirement in terms of physical space, tools, participants, and activities, including anticipated flexibility.
3. Development of adjacency matrices [space relationships] based on the adjacency of social activities, environmental criteria, and service proximity.
4. Establishing alternatives in terms of activities, personnel, size of units, and relationship to the site and community.

2.1 Committee Leadership

The designated leader will head the programming committee. The committee leader will direct selection of additional members for the programming committee. The size of the group should be small enough to facilitate efficiency but large enough to provide an appropriate amount of experience and expertise. “The team [committee] should include about fifteen persons, a group that is large enough to stimulate the creative process but small enough to avoid awkwardness and loss of group cohesion and informality. In large institutions [or large size projects], subgroups may be organized so that everyone in the employ of the school

may make tangible contribution to the planning of the school plant" (Castaldi, 1987).

Experts devoted to the specialized curriculum objectives should be selected in addition to experts that can assert the necessary awareness and vision of the physical nature of the building.

The planning process is the opportunity to tap the creative potential of the faculty, professional persons, administrators, nonprofessional personnel, and students. This group of individuals does not constitute the primary planning committee but are the essential constituency and informational resource of the planning committee. These individual constituents can be surveyed or questioned to provide a broadened cross section of information and input to the planning process and the program document. The primary planning committee must have decision making authority. This authority serves process efficiency. It is this authority that aids the critique, assessment, rejection and acceptance process of input information, and advances the collection of relevant program data.

The planning committee is the root system of the facility project (Kowalski, 1989). The typical members of this committee for a new high school facility might consist of:

- Superintendent or Assistant Superintendent of Schools
- Principal(s)
- Community officials or community leaders
- Principal members of the faculty and staff
- Educational consultant, architect, or engineers
- Student and parent representatives

In cases where the building and site will be within a university setting, it is advisable to have personnel from the operations department, campus architects, deans, vice presidents, and other campus services as members of the programming committee. In situations where the leadership is inexperienced with details of the programming process, it is advisable to retain an educational consultant and a programming consultant to direct the planning process in conjunction with the committee leader.

Establishing a group of cooperative individuals with a diversity of interests and expertise appropriate to the specific objectives will strengthen the input information to be used to initiate the facility design. Communications that enhance the objectives and motivate participation, investigation, and creativity will produce the straightest path to establishing a precise, organized, and quality driven program.

2.2 Comprehensive Analysis

Educational philosophy and the needs to support this philosophy must be translated to the physical reality. The educational philosophy derived for implementation into comprehension of a new facility involves many intangible elements of investigation. For example, a space to be used for technical drawing and presentation should provoke a sense of being within a professional business environment. This may be a philosophical belief that is determined effective to the educational output of students and must become part of the programming analysis. At the same time the program analysis involves critical tangible elements that have significant impact in providing the reality to this educational philosophy. For example, the analysis might include particular furnishing, materials, equipment, or model examples to identify the intent.

Educational philosophy merges with the physical reality through the facility design process. The philosophy can be understated, unclear, or minimally promoted; or it can be salient and integrated successfully from programming to design. The keys to success remain with the quality of program development and with the committee's ability to translate philosophical ideas into tangible design goals that will represent the architectural reality, see figure 6.0.

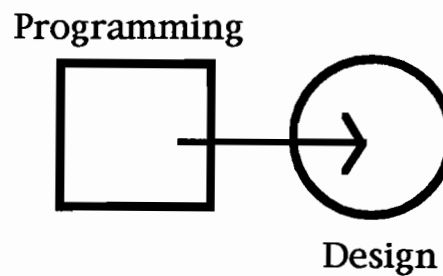


Figure 6.0 Translation to Design

A properly considered, planned, and designed facility will express the educational philosophy in terms of functional operation and environmental aesthetics. The quality of the final design and the built facility directly reflects the level of attention to detail and diligence to a comprehensive analysis that is conducted prior to selecting an architect, and then transitioning to the preliminary design phase. When design professionals are retained by contract and design discussions are initiated, the project schedule and legal contractual obligation of architects and owners make it an inappropriate time to develop program

requirements. Standard binding contracts provide language or otherwise identify time constraints for completion of the design phase to protect both the owner and the architect (see AIA Document, B141–Standard Form Of Agreement Between Owner And Architect). At the onset of preliminary design the pace of design production is expected to increase and be a steady progression. It would be back-tracking to preempt design processes for the development of programming, planning intent, or the fundamental details of that intent. The common expectation of design facilitators is that design will flow from the programmatic document whereby design articulation is maximized and decision making limited to refinement of the established goals.

2.3 Analysis Detail

Programming requires that spatial planning be determined. The determination of spatial requirements will be translated to architectural concepts during design. Spatial requirements can be conducted in differing ways, but each space that is required for a particular activity in the building must first be articulated in program language. Careful consideration of each space regarding the overall philosophy that surrounds the activity and physical function of that space must be addressed by the program document. There should be a continuous comparison of the part (individual space) to the building as a whole. The individual space to the composite plan for educational philosophy (educational specification). It is through these comparisons that the entirety of the architecture emerges.

The dialogue and response(s) from thought processes that articulate and identify space(s) will need to be continually documented throughout the course of program development. It is precisely this type of thought and dialogue that proves most important to the overall quality of the building's final design. All refined

perceptions, articulations, and other practical information will be communicated by way of written and graphic representations. These ideas are then consolidated in the final program document. If the perceptual as well as the practical information is not easily identifiable and retrievable, it will become necessary to repeat and even reestablish lines of reasoning to formulation of philosophical and functional ideas. More than likely, this need to reestablish basis will occur during critical design meetings with the architect. Therefore, managing the output of programmatic meetings is essential to the quality of the program document.

The detail of space requirements for the building must also be seriously considered and studied with particular care during the programmatic phase of facilities design. "Space standards are basic irreducible building blocks for most programs" (Kumlin, 1995). The amount of square and volumetric footage should be determined to a reasonable level of certainty. The perceptions regarding working space and the detail contents of that space are clear indicators of expectation useful to architects and designers. Space standards generally define accommodation of contents of the space--people, furniture, equipment (Kumlin, 1995). If this specific criteria can not be decided on or readily determined, then various options for that space should be described. Reaching limits of perception, understanding, and specific determinants of space is understandable and acceptable so long as these limitations are acknowledged in the program document. This declaration will enable the architect to understand dilemmas and seek particular means for solving each undetermined issue. Each facility space is to be analyzed regarding type of use, function, flexibility, and aesthetics, among other primary considerations, that will determine an adequate assessment of the spatial requirements. Janitorial space, additional storage, maintenance, equipment, mail rooms, telecommunications space, and the like are several examples of commonly

overlooked spatial needs. The programming document should include each type of space with the accompanying square and volumetric footage as is conceivable. This step is also very important to early projection of project cost. The committee and the architect will use the established square footage figures to qualify and quantify budget and preliminary construction costs.

It is ideal to express the hierarchy of relationship between spaces. The most useful way to communicate these relationships is through the use of schematic bubble diagrams. These diagrams are a comprehensive means for showing spatial affinities and grouping strategies in simple graphic representation. See figure 7.0 for an example of bubble diagramming. Additionally, space matrixes are used to chart the interrelationships among spaces in a more rigid application. See figure 8.0 for an example of space matrices. The usefulness of these diagram aids can not be overstated.

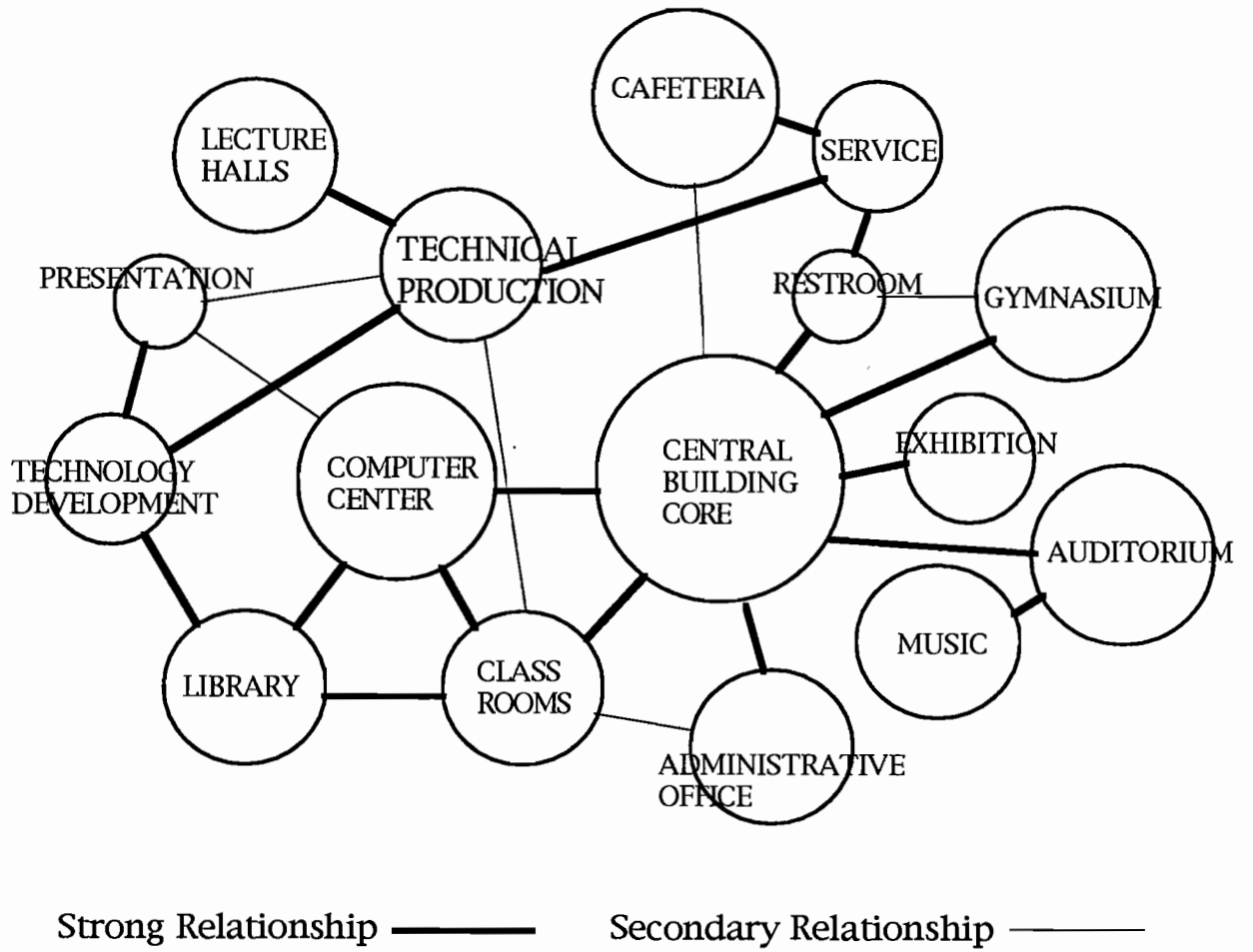


Figure 7.0 Bubble Diagram

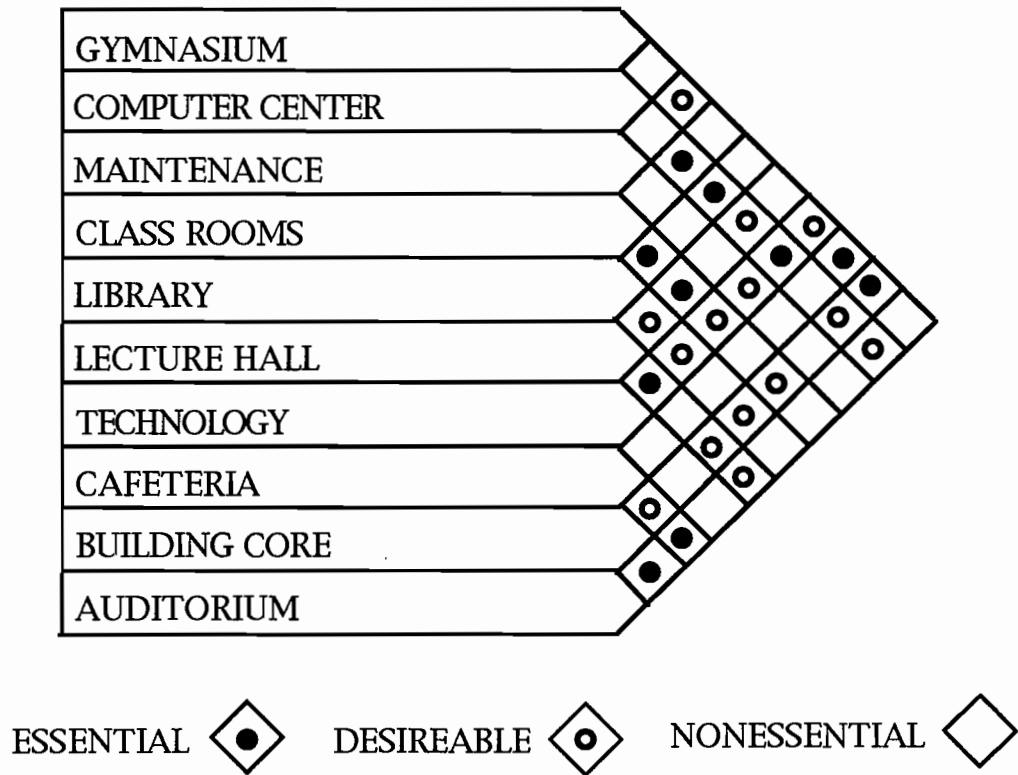


Figure 8.0 Adjacency Matrix

Time also plays a very important role in every project. A time table illustrating the progression of programming, design and construction are elements comprising the early facility schedule. The schedule is an important element of

the programming document. The schedule conveys the expectations for implementation and sets a realistic objective for meeting the eminent milestones of the project. It is normal that schedules are not stable and frequently change. An initial schedule should be continuously reassessed through the progression of program development and into design. The schedule will need continual monitoring and revision to keep it current. A schedule is very important to assuring that milestone dates are maintained, e.g., a high school building addition may require completion and occupancy on a specific date prior to the school year beginning. The schedule that is initiated by the programming committee is the beginning of what will become the bid documents construction schedule and will eventually be used by the contractor(s) to gauge their construction bids. A well executed schedule developed during the programming phase that defines the schedule for programming, design, and construction will aid in limiting cost increases by extending these processes far into the future. Extended design process time can increase project cost due to inflation, materials costs escalation, and contracting market fluctuations.

3.0 Selection of an Architectural Firm

When the educational specification and the project program are completed (in some situations the building program may be part of the architects extended services) and after the planning funds have been arranged and made available from the financier, an architectural firm can be selected. The architectural firm will conduct the facility design and can safely be retained for such service when the program and funds are readied. (Note: The architectural firm from here forward will be referred to as the architect for reasons of simplicity.) The architect that is chosen for completion of the design is critical because the architect strongly affects

both the function and the cost of a school building (Castaldi, 1982). The architect is the primary designer of the building and architect's design decisions are directly influenced by the educational specification and the building program. There is an essential need in design to have keen insight about the effective integration, operation and organization, or psychological as well as physiological building characteristics. Because good design requires these needs, architects "prelive" building design. Architects anticipate the consequences of design and thereby, provide meaning and a preconceived vision to the architecture.

Design is a process that varies by individual architect. The responsibility for transitioning to conceptual interpretation lies in the hands and mind of the architect. The quality of conceptual work is contingent upon the programming effort that precedes the architects initial involvement. Also, the personal ability of the architect to interpret building code and comprehend the specific program objectives is reflective of the architect's previous experience and knowledge related to educational facilities. In addition, the architect is caretaker of the available funds for the facility as the design develops. He or she must maintain creative control whereby the design that emerges is reflective of prudent design decisions balancing functional or utilitarian aspects with aesthetic perception and appeal. As elaboration on design ideas continues seeking new opportunity, so too is the process of reduction in design and rational decision-making a continuous process. The basic philosophy of the architect can greatly influence the design of a school building and, thus, will control the cost of the building as well as the resulting function and quality of the building (Castaldi, 1982). Selection of an architectural firm may be critical to assuring the expected project outcome.

"Owners [educational committee] will ask that architects design what is economically sound, socially useful, aesthetically pleasing or some combination

thereof. Regulatory agencies will control, through a series of prohibitions or incentives, the physical health and safety aspects of a building” (Heimsath, 1977). Moreover, it is the architect’s philosophical view, personal attitude toward the project, compatibility with the committee, know-how in dealing with similar projects, and proven record of follow through performance that are critical to choosing an appropriate architect and prospering a successful project.

3.1 Basic Architectural Services

The service of the architect can begin before the actual design is started (if retained to perform programming) and will continue until the facility is complete and accepted by the educational committee. What the architect's specific role and responsibility is depends on the services that are negotiated and agreed on between the owner and architect. There are six major phases or areas of service involved in the architectural planning process:

1. Pre-design planning (not part of standard agreements and requires supplemental or additional services)
2. Schematic design
3. Design development
4. Construction documents preparation
5. Bidding
6. Construction (CEFPI, 1976 & AIA Documents 1987)

Additionally, this sequential process can be described in a more general form as:

- Analysis, which typically results in a definition of the design problem (programming).

- Synthesis, where analysis is translated into a project concept (design).
- Refinement, where the concept is worked out into a detailed design solutions.
- Implementation, where the design solution is converted into documents for use during bidding and construction. (The Architect's Handbook of Professional Practice, 1987).

3.2 What the Architect Will Expect

The architect will require documentation that is generated by the program committee. It is expected that this information be reflective of thorough consideration and tenacious effort to identify every crucial aspect necessary to obtaining the appropriate operation of the educational objective. The educational specifications should clearly and specifically spell out the physical requirements for the project as an outgrowth of the educational program, according to the Maryland State Department Of Education (1994). AIA documents indicate that programming is the responsibility of the client, or owner, who must provide full information, including a complete program, regarding requirements for the project (Heimsath, 1977). Clearly, "every decision the client [committee] makes during programming simplifies the design problem" (Peña, 1987).

It is essential that the architect begin the design process with an organized committee ready and willing to expedite the many decisions that will be forthcoming during the design process. This committee like the programming committee must have the vested authority to make crucial and final decisions. The authorized representatives of the owner shall render decisions in a timely manner (AIA Document, B141). The architect will want to be assured of the

commitment and the quality of involvement by the committee members . The relationship that exists is graphically illustrated in figure 9.0.

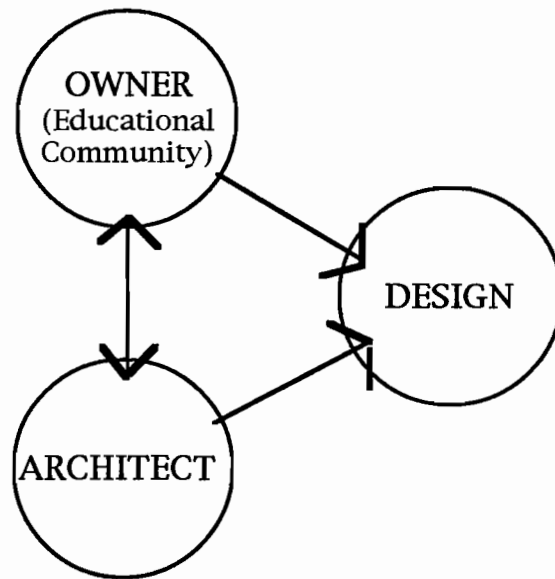


Figure 9.0 Working Partnership

The architect will want to review a time schedule defining implementation for the project development and the time frame for actual construction that is established by the committee. Also, the architect has the right to request that the owner (committee) provide evidence of financial arrangements and resources for fulfilling the obligations of the contract.

The architect will require, and the owner is responsible for providing, all pertinent information related to the legal description of the property, surveys, geotechnical studies, testing, site utility locations, and legal information identifying the characteristics of the building site. The owner is responsible for supplying, as it is necessary, all hazardous materials and environmental conditions inspection and testing reports.

3.3 What to Expect from the Architect

Architects as professionals are responsible for complying with the legal standards of professional conduct enforced by each state. Architects that are members of the American Institute of Architects (AIA) are additionally responsible for maintaining professional demeanor that complies with standards of ethical behavior. These obligations are in place to assure that the architectural profession maintains public respect, and that clientele will be assured that they are served by competent individuals acting in a professional manner.

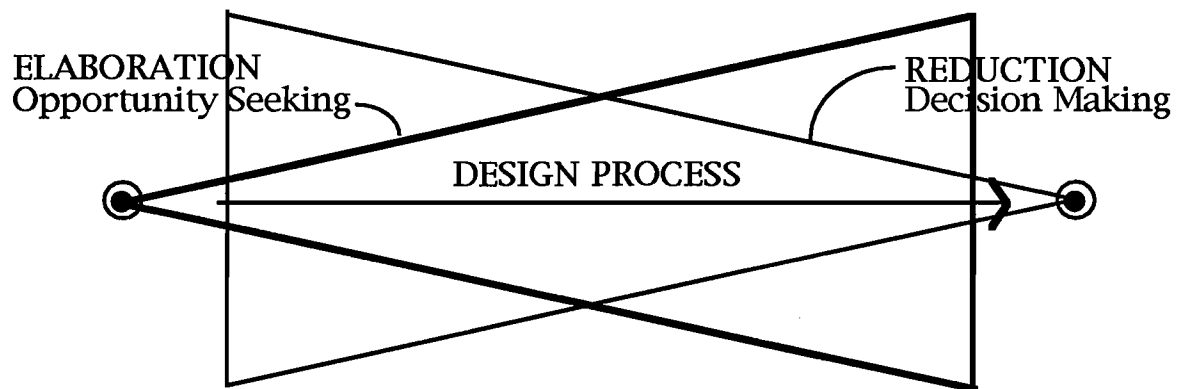
The architect will work within the accepted norms of the profession and the aspirations of the committee, regulatory agencies, and construction industry. The architect will work to support and reinforce the established programmatic criteria. "No building design can or should force the abandonment of a particular educational philosophy. Hopefully [it is expected that], the building design will facilitate any teaching/learning style used by any teacher-learner-facilitator

working in this facility" (MacKenzie, 1989). It will be the architect's mandate to assure this compliance.

The architect is only required to confirm that the client's program is appropriate for the purposes that the architect is hired to perform (AIA Document, B141). The architect is responsible for supplying a preliminary estimate of construction cost based on the limited initial information provided by the owner regarding program, schedule, and construction budget (AIA Document, B141).

The architect is required to perform services as expeditiously as is consistent with professional skill and care and the orderly progress of work (AIA Document, B141). The contract agreement is subject to time limitations, where both parties can be deemed responsible for delays in the execution of work and both are capable of breaking a contract for nonperformance of these responsibilities.

The architect will provide necessary research to produce a building design that is in compliance with the relevant codes having jurisdiction and is responsible for assuring that the building meets all life safety standards and legal requirements. The architect will want to engage in an exchange of ideas with the committee. These ideas are generated from prescribed documentation and by way of spontaneous input brought about by open dialogue sessions. These meetings in conjunction with the program document will initiate the formulation of a conceptual vision for the facility by the architect. The architect will then begin to produce schematic drawings and graphic representations to illustrate these concepts. The committee is expected to participate in reviewing concept drawings and is expected to provide feedback in the form of decisions that will progress the concept development. The synthesis of design is composed of elaborating on the possibilities for design and then to be reviewed and reduced through solidified decisions about design, as illustrated in figure 10.0, Elaboration and Reduction.



From: Graphic Thinking For Architects And Designers

Figure 10.0 Elaboration and Reduction

3.4 Selection of the Architect

Selection of an architect is one of the most important decisions a board of education must make in planning a school building (Castaldi, 1982). The architectural firm can be selected in various ways. Architectural firms vary in size and in the types of services that can be provided. The capability of the architect and the architect's commitment to realizing the objectives outlined by the committee are the primary ingredients for selection. To determine if the proper ingredients exist to assure a strong, reliable relationship, committees must interview various architects, listening to presentations and asking critical questions about their design philosophy, beliefs, and practices, as well as their project intentions and capability to meet the scheduling demands. This relationship will be the key link in meeting the committees final objectives. In addition to this, review of similar projects and review of the outcome data from past projects is paramount to finalizing the architect selection. The following are several primary areas for investigation of past projects:

- Ability to meet schedules and deadlines
- Initial projected construction cost versus final cost
- Building efficiency--net to gross S.F. ratio
- Change order costs as a percentage of the construction cost
- Quality of project administration, conflict resolution, and mediation ability
- Responsiveness and final relationship with the owner

These aspects in addition to quality review with previous clientele will provide a clearer understanding of the architect's working profile.

3.5 Qualifications

"The architect is a professional, who, in most cases, will have completed a minimum of eight years of study and in-training experience and will have passed comprehensive state examinations in which qualifications to practice architecture must be demonstrated. In addition, the architect may be a member of the American Institute of Architects (AIA), which requires compliance with a mandatory code of ethical professional practice" (CEFPI, 1976). The architect must be a registered licensed architect in the state that the project will be constructed.

3.6 Contracting for Architectural Services

Contracts allocate risk as well as responsibility. No architectural services should be initiated without a formal legal agreement between parties. History has shown that projects related to school design and construction are involved in a relatively large amount of litigation (Architect's Handbook of Professional Practice, 1987). The balancing of risk and responsibility with regard to compensation is the basis for effectively managing an agreement between the architect and the owner. The owner may also need to enter into other primary consulting contracts (separate from the architect contract) dependent on the situational aspects and particular project requirements. These contracts should be handled in a similar manner as the architectural agreement. For example, it is possible for the owner to have separate contracts with educational consultants, interior designers, and civil engineers, to name several possibilities.

The AIA Documents offer standard service agreements, designated service agreements, and specialized service agreements. These are ready to use documents that are available to define and execute a formal contractual arrangement. These documents are strong and clear statements of planned actions and designated responsibilities that have been forged in the industry and tested in

the courts (Architect's Handbook of Professional Practice, 1987). These documents can also be used as a composite check list of possible services that can be provided. It is advisable to have a lawyer knowledgeable in architectural and construction service contracts review the proposed agreement prior to finalizing the contract.

Because there are commonly misunderstandings about what the duties and responsibilities of the architect actually are, it is advised that prior to contracting with an architect that the committee familiarize themselves with AIA Document B141. Particular attention should be taken to understand what the architect is not responsible for as outlined below. The architect is not responsible for:

- Educational specifications
- Building programming
- Elaborate or extensive changes to program effecting original design intent
- Extensive drawing changes at the architect's expense after contract documents are approved
- Supervision during construction (only periodic observation)
- Means and methods for construction
- Assuring safety during construction
- Making final choices and decisions for the project
- Specialized interior design services
- Selection, purchase or installation of moveable equipment and furnishings
- Occupancy of the building
- Post-construction evaluation

Each type of contractual agreement will require determining the method of compensation. There are four primary methods of compensation for consultants as follows:

1. Stipulated sum
2. Stipulated sum as a percentage of construction cost
3. Cost-plus-fee
4. Unit-cost methods

These compensation methods can be further explored in the Architect's Handbook of Professional Practice.

The architect's compensation over the duration of a project is commonly broken down by the main divisions of the project. The following divisions and related percentages of the total fee paid illustrate the common compensation breakdown:

Architect's Fee Schedule

Completion of Schematic Design	15%
Completion of Design Development	35%
Completion of Construction Documents	75%
Bidding & Negotiation	80%
Construction Administration Project Finalization	100%

3.7 Conditions of the Contract

Conditions of the contract as stated above are either standard or basic services common to most projects or are specifically determined to fit the special conditions of the project. The architect will submit to the owner a proposal for the services that are necessary to the project or that are determined essential by the owner. Compensation to the architect is, therefore, based upon a series of assumptions: what the architect will or will not do; what the owner will or will not do; legal terms and conditions; and hundreds of other factors implicit and explicit (Architect's Handbook of Professional Practice, 1987). These conditions that establish the basis for the architect's fee must be clearly developed. They can either be defined in the program document and/or negotiated prior to requesting the architect's fee proposal for project services. The particular requirements of the architect's services must be established in writing in order to protect the interest of both parties. Using the AIA Documents B141, B161, or B162 or using the AIA Documents as a model set of contract requirements is in the best interest to the owner and the architect.

4.0 Delivery of the Project

Delivery of the project involves high quality pre-documentation and assessment, but there must be continuity in assuring that this information is processed into design. "A great deal of preliminary work must be completed before an architect can begin to design an educational facility" (Castaldi,1987). The committee must prepare to elaborate and bolster the programmatic documentation through organized meetings that will endeavor to build an enhanced vision of their preconceptions. This preliminary work provides the opportunity to reevaluate preconceived ideas at a continually higher level of assessment, where

this new assessment is augmented by the realization of actual design formulated by the architect. The architect, in conjunction with the committee, begins the initial formulation of a tangible practicality to the project.

4.1 Selection of the Building Design Committee

The building committee may or may not be different from the group assembled for program documentation. It is more than likely that several or many members of the programming committee will remain active in the building design process. It is feasible, however, that appropriate swapping of individuals may enhance the outcome of the design process. It is possible that individuals well versed in establishing program requirements may not be equally versed in translating that information into facility design. It is recommended that the committee leader remain active and that the leader reevaluate the makeup of the group and the dynamics of that group for efficiency of design processing. The development of a strong committee prepared for design evaluation and decision making is a key component in developing the project support structure, see figure 11.0.

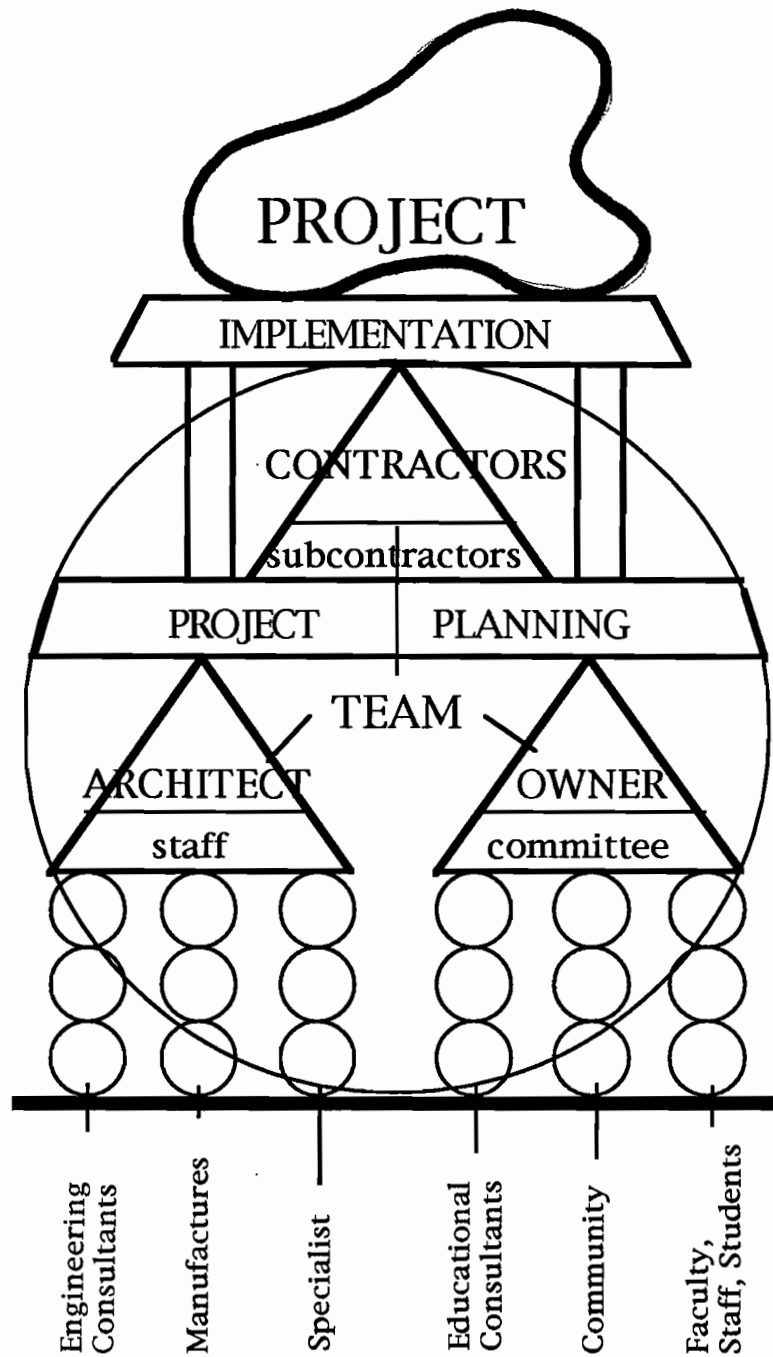


Figure 11.0 Project Support Structure

For building design, it is advisable to have committee members that can visualize or perceive the transformation of program requirements into two and three dimensional drawings, sketches, and graphic abstractions. The members must be capable of reading the progressive detail that design and document preparation builds. They must have the capability to sustain understanding through sequential progressions of the design. Members are best when they are meticulous and have an interest in reviewing and evaluating complex drawings and detail. Having the ability to maintain a high level of critical assessment and direct involvement with how details effect the facility as a finished product are admirable traits for building committee members.

4.2 Communications Interfacing

There must be group cohesiveness between the members of the committee and the architect to effectively produce the required design results. The intensity that occurs during meetings and the level of detail vital to decision making can be demanding and result in varying tensions between committee members and other constituents. School boards and the associated constituency is known for tendency toward intense scrutiny and lack of consensus on goals, schedules, and budgets (The Architect's Handbook Of Professional Practice, 1987). Therefore, the design committee should strive to alleviate these expected tendencies and move to reduce added tensions. The group must maintain focus and overcome the desire to interject emotionally driven input. There must be continual reinforcement to meet the project objectives by use of insightful analysis and calculated decision making relevant to the particular circumstances. The architect must convey goals obtained from the committee to his designers. Goals are more than a list of spaces. Designers require inspiration that is driven by the "what and why" of things that are generated from goals (Peña, 1987). For this reason, communication should

build a vision of goals that verbally illustrate how needs will be met when the building is occupied, what the committee wants to achieve, and why (Peña, 1987). Building the appropriate atmosphere conducive to bringing out this vision and open expression of thoughts is the key objective of communication interfacing.

4.3 Time Schedule for the Design Process

It is very important that the committee, in conjunction with the architect, establishes a schedule for processing the facility design. Though the program document will have a tentative schedule for the entire facility project, many times the original schedule will not be relevant due to unexpected delays and unforeseen changes. It is necessary to reconstruct a realistic schedule at the beginning of the building design phase. The project schedule seeks to fix the key milestones in the life of the project. The project scheduling includes some or all of the following elements:

- Funding availability for planning fees
- Initiation and completion of predesign
- Review/check
- Initiation and completion of schematic design phase
- Review/check
- Initiation and completion of design development
- Review/check
- Initiation and completion of construction documents
- Review/check
- Planning review for permits
- Advertizing for construction bids
- Prebid meeting with bidding contractors

- Bid due date and bid opening
- Negotiation and evaluation of bids
- Bid selection
- Funding availability for construction contracts, furnishings, and equipment
- Contractor contract execution
- Contractor notice to proceed
- Preconstruction meeting
- Construction commencement
- Construction/project administration
- Substantial project completion
- Construction ending
- Furnishings and equipment installation
- Occupancy
- Project finalization

Each of these schedule milestone have sub-elements that aid in further identifying secondary objectives and specific tasks necessary to directing a quality project. Review the proposed schedule with the architect to assure that proper time frames are allocated for each. The sub-elements of each milestone should be established and combined on the schedule. Providing a detailed schedule will establish a sound beginning to the design process and will initiate a road map through the process, assuring that everyone remains on course.

4.4 Project Feasibility and Reevaluation of Program

The AIA Document B141 form of agreement is commonly used to contract between the architect and the owner. It is not standard within this agreement for

the architect to be responsible for project programming. The architect will not perform this duty unless compensated for these additional services and the contract is so stipulated to reflect this addition. The architect will, however, initially and continually review the program produced by the programming committee or other consultant. The architect will determine that the state of the committee's program is feasible and remains viable throughout the design process. The program analysis process conducted by the architect is a beginning to the "checks and balances" process that is on going throughout design. The architect works to correct deficiencies to the established program and cross references the program to assure compliance.

5.0 Working with the Architect

Working well with the architect is, simply put, being a good client. It is necessary to understand the role of the committee and the role of the architect in the design process. At the beginning of the design process a good client will have a clear understanding of the program, budget, and other project objectives (The Architect's Handbook of Professional Practice, 1987). The committee will work to use the architect as a counselor for enhancing their preliminary ideas. The architect will analyze the committee's documented information and verbal input to define the project design problem. The architect will begin to synthesize whereby analysis is translated into project concepts. The refinement of concepts will then be worked out in detailed design solutions (The Architect's Handbook of Professional Practice, 1987). The committee can gear their commentary, communications, and questions with the architect to improve the analysis and synthesis process.

5.1 Collaborative Design Process

The building committee and the architect, along with consultants contracted by the architect or the building committee, engage in a collaborative design process as a team. This process forms a continuous feedback loop where goal oriented visions are verbalized by the team members during design process meetings. The facility development process progresses an initial idea, loose in its articulation toward continuously more refined and concrete understanding and realization. The process is synonymous with a system that moves from order (prior to initiation facility need) into chaos (analysis of the problem) and on toward order (synthesis of the problem) see figure 12.0 and figure 13.0. The architect endeavors to analyze and synthesis chaos and assimilate this abstract information into conceptual design. The architect works to achieve the essence of the design by articulating order and providing vision through conceptual understanding and two or three dimensional design representations. These schemes are then evaluated by the team for viability. "There is a need to amplify, to view the whole problem: but there is also need to abstract. You amplify and then narrow down; you seek the ramifications of the information gathered; then you turn around to determine the bare implications. It's a continual process" (Peña, 1987). This collaboration is the filtering process that brings order out of chaos (Peña, 1987). The collaborative design process is an elaboration on usable ideas and an exchange of differing possibilities to reach an ultimate consensus on goals.

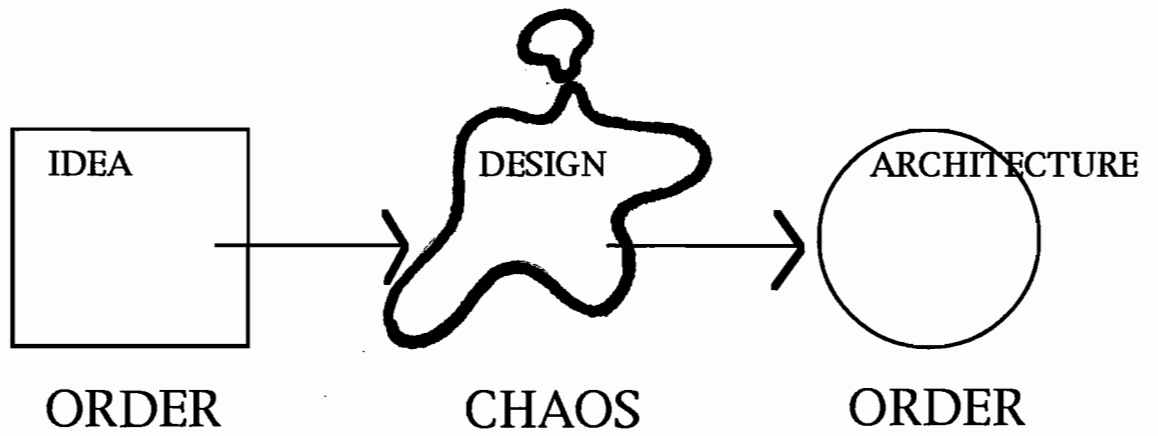


Figure 12.0 Order-Chaos-Order

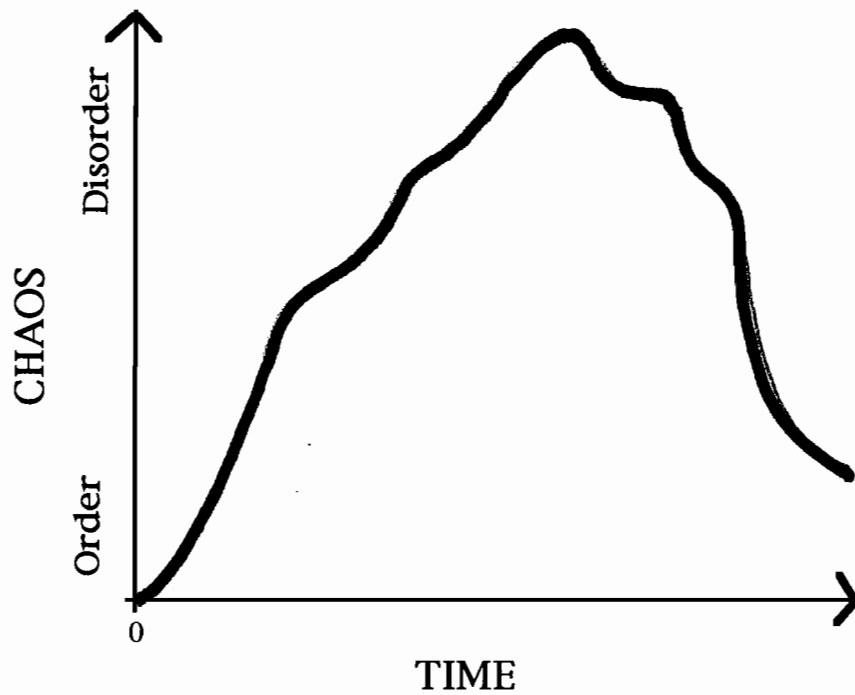


Figure 13.0 Project Design Evolution

5.2 Elements for Achieving the Best Design Solution

William Peña suggests the best design solutions are those that are generated by project teams lead by two responsible group leaders—one to represent the client [educational committee] and the other to represent the architect. They must work together toward a successful project. Each leader must be able to:

- Coordinate the individual efforts of his group members
- Make decisions or cause them to be made
- Establish and maintain communication within, and between, the two groups

The project team must have good management (Peña, 1987).

The generation of information, vision, and decision-making must be recorded. Minutes to every meeting must be issued for validity and verification. It is standard for the architect to perform this duty. However, meeting notes should be taken by all members of the committee or a single designee to the committee. "To achieve effective, clear communication among many people—professionals, clients, users—information collected must be carefully documented" (Peña, 1987).

5.3 Level of Client Involvement

The level of client involvement differs from group to group and project to project. There is no set rule for determining the proper level or quality of involvement with which the committee or individual committee members engage themselves in the design process. It is true, however, that a well organized committee, where individuals are assigned specific research and investigative duties, will be more responsive in decision making. Thorough understanding of particular circumstances are more conducive to the translation of visions and

make comprehension by the architect more efficient. Architects who can focus on formulation of concepts rather than the extraction of information excel the design solution process, and are better able present a greater variety of working concepts. Therefore, clients that can begin to define their own vision, think through actual needs, and research specific elements of the facility detail, aid in producing more refined and responsive solutions to design.

6.0 Predesign

The architect may or may not be hired for services related to predesign. If not contracted to provide the predesign or project programming, the architect may be contracted to strictly assist in providing architectural analysis. "The architect often participates in the development of educational specifications as an advisor on architectural possibilities and limitations" (CHEF, 1991). "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 available data from economic feasibility, programming, and site analysis steps and organize them into a form that allows their use in building design" (AIA Documents, 1987).

6.1 Transitioning from Predesign

The schematic stage following predesign can be characterized by abstraction. It is a process of problem description and identification. The architect will take the broad scope of information that is established by programming and work to simplify and breakdown the whole of the system into manageable parts. At the same time, the whole becomes more clearly defined. The process involves communication through abstract graphic representations that act to illustrate or symbolize objective, perception, meaning, or intent. It is a fundamental way of

rationalization, of bringing written or verbal information into a new light of comprehension. The abstractions presented by the architect are the primary source for decision making at the schematic design stage. Reducing problems or considerations to graphics and drawings allows for a more responsive envisioning of information to solve these problems.

7.0 Schematic (Preliminary) Design Phase

The schematic design phase is the initiation of translating programmatic goals into concepts that can be represented in sketch form to be studied by the project team. Schematic design is the initiation of the synthesis process. The graphic representations the architect provides begin to demonstrate the realism of the project and aid in establishing priorities, objectives, decisions, and tradeoffs. During the schematic design phase the architect initiates an extensive code search to determine the appropriate life safety design requirements or restrictions. From this point forward, the architect must assimilate code and make the building design responsive to specific requirements of that code.

Regular work sessions or meetings are conducted to unfold the program into visual analysis. This is the most formidable phase of conceptual generation of the facility. Many conceptual formulations may be studied for viability in meeting goal oriented objectives. "It is at this time that the educational committee can make the greatest impact on the function of the building. It is the time when teachers and school administrators can get positive responses to changes from the architect" (Castaldi, 1987). It is the opportune phase for creative investigation.

The architect will also initiate the formation of design theory and rationale that solidifies meaning in and of the architecture to be produced. The unification of all elements that emerge the design and move it toward becoming

“architecture” is known as *parti*. Parti is a term that architects use during schematic design to convey that they have evolved the necessary assimilation of diverse content information to a point where the essence of the architecture for the facility as a whole can be abstractly represented in a graphic conceptualization. This is a meaningful testing point for the architect as it means that the conceptual organization of the building has been realized. “The parti is seen as the dominant idea of a building which embodies the salient characteristics of that building. It encapsulates the essential minimum of the design, without which the scheme would not exist, but from which the architecture can be generated” (Clark & Pause, 1985). It is not enough to produce a building. The committee is urged and should set its objective toward seeking “architecture”, whereby creative and objective elements unify to form a basis for cohesive understanding. The difference between simply orchestrating the construction of a building and the production of meaningful architecture should be investigated by the committee.

Because the architect has not spent a large allotment of time at this phase and has only minor investments in engineering developments, the architect has latitude to allow extended assessment and change to the original planning during schematic design. The more concepts studied and assessed during schematic design the better the outcome of the entire building design. “It can be stated categorically that the amount of time spent by all concerned at this stage will be quite rewarding from the standpoint of significantly reduced costs and substantially increased educational function” (Castaldi, 1987). It is normal for the architect to develop several different concept solutions to a design problem. Between intuitive judgment based on experience and formal grading against the original project objectives, the architect can narrow alternatives to the most responsive solution (AIA Documents, 1987).

It is normal for schematic design to be studied not only in two-dimensional design such as drawings, sketches, and charts but also by way of scale study models. These models replicate the building's form and function in three dimensions. Typical documentation at the end of this phase can include:

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

The schematic phase shall be completed when documents are reviewed by the committee for compliance and are accepted and approved. Review with the architect should be stringent in order to assure that all committee members understand the documents and the architect's interpretation and intention. The design must be strictly reviewed against the original requirements of the program and with regard to the changes that occurred during the design process. It is common practice to have all documents of the schematic design signed and dated by project building committee members.

7.1 Evaluation and Review

As stated above, it is critical to carefully review the schematic documents presented by the architect. However, schematic documents are normally not very

detailed and may be limited in providing enough information for self-assurance by the committee members. This problem is common and illustrates why careful review of the schematic design documents is so critical. The architect should be called upon to answer and interpret the documents to the satisfaction of every committee member. The transition of program to drawings may be a giant leap for many members who have labored on the verbal interpretation of the facility requirements for such an extended time. It is normal that there may be anxiety or even frustration by some members in seeing their early labor reduced to mere lines on paper. However, it is just this simplicity coming forth from intense study, investigation, and communication that makes schematic design intriguing. A lack of clear understanding may arise from insufficiency to interpret drawing documentation. The project architect will be able to convey to the committee a verbal re-articulation of the design progression. This re-articulation will avert much of the member apprehension and provide a clearer understanding of the proposed solution to this point in the process of design.

7.2 Cost Estimates and Budget

It is very important to make sure that cost estimates, no matter how preliminary, are not overlooked or discredited as irrelevant. It is true, however, that cost estimates at this stage will not be very thorough or specifically detailed. Cost estimates that are produced for schematic design are normally produced using a method that generates the cost of construction based on square footage rather than material itemization. All consultants, structural, mechanical, electrical, civil, etc. should provide preliminary cost and schematic drawings. In addition, cost for interiors, equipment, specialty items, along with change order allowances and contingencies should be compiled to form the schematic design phase construction

cost. These costs should be evaluated against the original programming budget before proceeding to design development.

7.3 Understanding Construction Documents

Schematic design phase is the appropriate time for the architect to elaborate on what the final construction documents will comprise. Too often, the members of the committee are not familiar with the content of final working drawings and the level of detail that will make them suitable for accurate bidding and construction. It is important that this review enlighten the committee on how the documents will be set up and the particular level of specificity and detail that will be gradually generated. Document reviews will get progressively more complicated and preparing to comprehend and analyze these documents requires appropriate preparation and knowledge for accurate and systematic review. It will be up to the committee members or their designee to evaluate the forthcoming documents for conformity to programmatic requirements and with regard to subsequent changes.

8.0 Design Development (Basic) Design Phase

Design development processes the design to a higher level of articulation and detail. The architect broadens the development by integrating the differing engineering disciplines into the design. The abstractions that comprise parts are dissected and individually studied, designed, and integrated to the building whole. The coordination of required engineering consultants (as the case may be) is the responsibility of the architect. If the architectural firm does not provide in-house engineering, then it is normal for the architect to subcontract with the disciplines necessary to design civil, electrical, mechanical, and other specialty engineering as

the project demands. It is at this stage that the architect begins serious integration of the code requirements involving life safety issues.

Design development will bring the systems and the subsequent documents related to those systems into a symbiotic relationship with the architectural design. This should be the goal of the architect as the overseer and the objective of all other consultants for the project. When this phase of design is completed, the relationship between the varying disciplines should be unified and effectively organized to integrate with the architect's building philosophy or parti.

This stage is where information and goals are further refined to produce more effective spaces and use of the facility. The facility vision is formidable and articulation is enhanced. It is the opportunity for the planning committee to invest great thought to the specific and actual requirements of each space. The materials to be used, the equipment to be housed, the furnishings to be included, and the verification of the practical-functional use, as well as aesthetic values, are key elements that must be considered and determined.

Design and/or level of design are difficult to confirm. Design is a continual process that has no true beginning or end. The process of design is an interplay of give-and-take, modification, elimination, and reevaluation. It will not cease until the project is actually occupied, and even then new change will occur. Knowing this, and realizing that clear resolution of ideas early on reduces costs and provides for process efficiency without delays, suggests that the planning committee is well advised to commit vigorous effort to deepening their understanding about the building design. The committee should relentlessly seek to comprehend the nuances of the building and, in essence, "prelive" the functional and aesthetic effects that are to be generated. What the architect envisions may not necessarily

serve the precise operation, philosophy, or working practices that the planning committee expects. It is up to the committee to clarify understanding.

The design development document set will include an extensive number of drawings and details. The documents will include all floor plans, exterior elevations, sections, details, interior elevations, ceiling plans, and associated schedules along with specifications. These drawings will show a significant level of articulation and coordination between other drawings and drawing sections. Other sections of the document set will include mechanical, electrical, structural, site, and other specialty consultant documents such as, interiors, elevators, and fire protection, to name several. These drawings should involve the same level of articulation and coordination as the architectural drawings. It is the responsibility of the architect and consultants to coordinate between drawings and systems and maintain all subsequent revisions.

8.1 Evaluation and Review

The design development signifies the phase of refinement that allows for full exploration of the building design. It will be the last period of time in the design process where design options are easily explored. Options are more easily explored during this period because the architectural drawings are refined from schematic level, yet remain rough, without the level of articulation to be found in the construction document phase that will follow. For this reason, the evaluation and review should be conducted in a state of mind where design (functional and aesthetic) elements are the primary target of the committee's inquiry. The committee's review and evaluation process should assure coordination between broad concept and refined detail, as well as complementary specifications to the specific design. This systematic method is expected during this evaluation process. "No major issues that could cause significant restudy during the construction

contract documents phase should be left unresolved" (Architect's Handbook of Professional Practice, 1987).

All review and evaluation comments should be documented, and all notes and revisions identified on drawings should be issued to the architect for assessment, modification, or redesign. Sign-off on this phase of design should not occur until all issues are revised to the satisfaction of the committee. When the design development documents express the level of design intent and articulation representative of the committee and the architect collaboration, then and only then should the documents be signed, engaging the architect to proceed with development of construction documents.

8.2 Cost Estimates and Budget

Just as the design reflects the appropriate level of refinement, so to must the construction cost estimate issued by the architect. The design development cost estimate must show the cost breakdown of all primary trades for the project construction as well as all elements of construction that are part of the primary trades work. Therefore, each consultant (engineering, interiors, etc.) will have included their portion of the required cost for the total construction. The cost for each element should be described by cost associated with labor, materials, and equipment. Each trade should have clearly identified overhead, profit, and contingency. The cost estimate at this point must be conclusive and within the designated budget. The design development phase should not be approved by the committee if the costs for construction are over budget.

9.0 Construction Document (Final) Design Phase

By approving the design development documents, the committee grants the architect approval to move forward to the construction document phase of

design. This approval signifies a major transition in document production. It also suggests that the building design has been effectively completed. Although design will continue to be studied and minor change in design will still occur, the focus during this phase of production is in preparing all documents to a suitable level for use during construction. "Construction documents are all the written and graphic documents prepared or assembled by the architect/engineer for communicating the design and administering the project" (Architect's Handbook of Professional Practice, 1987).

Construction documents not only provide the owner with hard documentation of what the project will be, but also serve as the legal framework for parties to the construction project. The following elements of the contract documents represent that which legally binds all parties:

- Contract Forms
 - *Agreements
 - *Performance Bonds
 - *Payment Bond
 - *Certificates
- Contract Conditions
 - *General
 - *Supplementary
- Specifications
 - *Division 1 thru 16 (Masterformat)
- Drawings
 - *All drawings part of the set
- Addenda
 - *Changes occurring prior to bid due date
- Contract Change Directives
 - *Changes occurring during after bids are opened

Drawings are produced to a level of completeness that will allow for intelligible understanding by virtue of clear, accurate, and precise detail(s).

Drawings that are of lesser quality, that are vague and contain ambiguities, produce

higher contractor bids and result in more conflict, disputes, and claims during construction. This idea equally applies to the level of completeness with the project specifications. Plenty of time should be allowed for thorough completion of the construction documents. Qualities and relationships are best indicated on the drawings; quantities and standards of workmanship are best placed in the specifications. Drawings and specifications will be produced and organized by way of standardized methods and formats.

9.1 Evaluation and Review

Construction document phase is the culmination of the design processes. The construction documents are detailed and specific. The documents are a compilation of many revisions and changes that have taken place during the course of review and dialogue sessions. The design phase is reaching its total completion and, common to many project situations, is the critical concern for document completion by a specified period of time. Because of this time consideration, the documents are simultaneously pulled together by all supported members, varying individuals in the architect's office, engineering disciplines, specification writers, cost estimators, interior designers, landscape architects, and others in a hastened pace. Some of the checks and balances set forth at the beginning are now less adequate with time constraints being paramount. Therefore, review and evaluation of construction documents is extremely critical. The documents at this point require intense scrutiny not only against the original program document but with regard to all the subsequent exchanges of information during the entire design process. A thorough and systematic approach defining discrepancies, deviations, and ambiguities must occur.

9.2 Final Cost Estimates

Final cost estimates (evaluation) for construction of the project should be definitive. The total cost for construction will have become more accurate over the course of design. The architect's cost estimate at this point should be within ten percent of the mean value of all bid submittals. Where cost estimates for the predesign phase were presented loose for budgetary purpose,s the cost evaluation for schematic, design development, and construction documents show a progressive refinement. These costs are presented for the purpose of determining the actual construction costs of the project. Each contractor trade is to have an elaborate breakdown of the elements involved for construction and required equipment. The refinement of the drawing detail will be reflected in the accuracy of the associated costs. Architects often use the services of construction companys to conduct a detailed cost evaluation that can be used for the final cost estimate issued to the owner. This will assure that costs are current with market trends and the changing nuances of the construction industry.

To determine total project cost, it will be necessary to add many other costs to the construction cost to provide a full understanding of the financial obligation for the project. The following costs are commonly associated with new construction projects and represent the extent of total project costs:

- Total construction cost
- All consultant fees for the project
- Fees due to changes during construction
- Construction change order cost
- Land cost and site improvements
- Moveable equipment, specialty items, and furnishings

- Moving, relocation, and set-up cost
- Reproduction, bidding, and advertising costs
- Owner insurances
- Financing charges
- Miscellaneous
- Contingency

Each of these cost items require careful review and should be considered at the very early stages of the programming phase. By the time construction document phase is reached, these items and the associated issues concerning these items will need to be thoroughly understood and the final cost for each established.

10.0 Bidding and Negotiating

The period of time designated as bidding and negotiation is the transition period between document production and actual construction. During bidding, contractors are solicited to provide cost proposals for completion of the construction. When these bids are received and verified for conformance with the bid requirements, then a contractor(s) can be selected for construction of the project. Often, a period of negotiation will occur where the owner and contractor reach an agreement that will then be legally executed in the form of a contract.

10.1 Contract Documents

Contractors are provided with contract documents to bid the proposed work. It is these documents and these documents alone that each contractor must use to ascertain the cost to complete work. The construction documents encompass all quantities, qualities, and relationships of the work required for the project (The Architect's Handbook of Professional Practice, 1987).

10.2 Bid Package

The bid package, also known as the bidding requirements, contains specific information relevant to bidding. The bid package includes the invitation to bid (or advertisement), instruction to bidders regarding information in preparing bids, the actual bid form to present the bid, and the requirements for bid security (known as the bid bond). All contractors must follow the specific requirements that are designated in the bidding requirements or face forfeiture of their bid for non-compliance or non-responsiveness.

11.0 Project Administration

Because the owner, architect, and contractor each have defined responsibilities for the project, it is important that each maintain close attention to the activities that will occur during construction. In some cases, architects for the project are not retained or required to perform project administration. This is not advised, as the architect is the one party who has the most familiarity with the project and has a personal obligation for seeing the project completed. The role of the architect in construction administration should not be minimized. It should be known, however, that the architect, under the standard form of AIA agreements, is only responsible for observation during construction at intervals he deems appropriate or as requested by the owner or contractor. It is not the architect's responsibility to supervise. Observation means that the architect will assure compliance with the contract documents. The architect, along with observation duties, will make interpretations and decisions that are consistent with and reasonably inferable from the contract documents (AIA Document A201, 1987). The architect is not responsible for:

- Exhaustive or continuous or on-site inspections

- Construction means, methods, techniques, sequences, procedures, safety precautions, and programs
- The contractor's failure to carry out the work (AIA Document A201, 1987)

To obtain additional or broadened services of the architect for construction contract administration, AIA Document B162 can be used to assess the needed services and designate those services through written contract. Additional services are highly recommended.

11.1 Preconstruction

The preconstruction conference is key to the beginning a successful project. The conference is conducted by the architect and is held to clarify responsibilities and operating procedures. A complete coverage of all activities for construction is addressed with special emphasis on:

- Schedules and deadlines
- Future weekly and monthly meeting dates
- Restrictions, limitations and special conditions
- Eminent changes to the project
- Chain of communications
- Change order directive procedure
- Pay request procedure
- Other pertinent preconstruction issues

The preconstruction meeting is attended by all major players in the project. It is the opportunity to develop open dialogue between the constituents and address all issues that will help in assuring a clear understanding of the entire project. The architect will begin by reiterating the project objectives and, following a prescribed

agenda, will ultimately request that dialogue begin to clarify any unknowns. Minutes for meetings are taken and issued to the parties of the project. It is critical that the minutes are reviewed, edited for correction, and held for future record.

11.2 Contract Analysis

It is important to know the exact requirements of each contract for the project. Knowing the owner's responsibilities, responsibilities of each parties contractual agreement, and the mutual responsibilities will make the prosecution of construction and the remedying of difficulties much more likely. It is important for the building committee to understand what constitutes the architect's legal contract and the contractor's legal contract.

11.3 Documentation

Another essential element to project administration is documentation and record keeping. The complexity of circumstance and communications in a project's construction require that diligent documentation and notes authenticate the activities that transpire in a project. Architects vary in their ability and discretion in documenting the communications of a project. A designated person from the building committee should attend all meetings held between the architect and the contactors during construction. Mental recall will not result in achieving the accuracy and confirmation that becomes necessary when representing the specifics that have occurred over the course of a construction project. Even the smallest of seemingly insignificant matters can reassert itself and become a major complication. The building committee's designee has a need-to-know regarding circumstances that transpire during the course of construction related to changes, conflicts, and disputes. These matters normally require the approval of additional funds by the owner to reach a resolution. Having someone available at meetings enables a direct communication link to the rest of the

committee and, as the case may be, the community. Producing a document or note to refresh one's memory and provide assurance and authenticity to past circumstance can mean the difference between extensive argument or the immediate resolution of difficult matters.

Robert A. Rubin contends that, "If the first task, that of record keeping, is conscientiously conducted, many construction differences are likely never to reach the courtroom". He emphasizes, "Verbal agreements entered into in good faith are not recalled in detail. The stage will be set for a potential dispute or claim" (1992). Accurate and responsive notes will reduce conflict tensions.

11.4 Schedules and Interpretation

The job progress schedule is the most enduring document to the course of construction. The schedule, when formulated with thorough insight and monitored and updated continuously, will produce a replication of the expected events and will chart the unexpected events that occur during the entire course of construction. The accuracy of this schedule is only as good as the those who monitor, evaluate, and provide updates. The architect on the project must enforce the continued updating and reassessment of the job progress schedule.

Revisions to the AIA Document A201 require the lead contractor for the project to prepare and issue to the owner and architect a progress schedule. This progress schedule is important for showing the contractor's consideration of work events that will occur the course of the entire project. The project schedule, using the critical path method (CPM), is the forecaster of all interrelationships between prime contractor work and subcontractor work. The continuously monitored CPM schedule can be extremely important in substantiating contractor claims and also identifies where and if claims for delay have occurred.

“The courts now recognize this type of scheduling not only as a reliable method of determining who is responsible for job delays but also as a reliable method of determining the impact of each event which caused the delay. This in turn can be used to determine who caused what delay and how the damages for the delays can be apportioned” (Levy, 1987). The progress schedule enables the contractor to control, manage, and supervise the project performance. It is a reliable document for all parties to the project.

Wickwire states, “It is imperative that construction projects of the 1990s implement effective use of the project schedule. . .The importance of scheduling has increased for the following reasons: Economics, Scheduling efficiency, Technology availability, Legal application, and Claim preparation” (1990).

11.5 Negotiation

The skills of negotiation principles and techniques are pivotal to the success of project administrators and ultimately to the project outcome. The architect’s role in the administration of a project involves many multi-faceted responsibilities. Most of these responsibilities require dialogue and communication to accomplish project objectives. A major portion of an architect’s activity involves communication that enhances the interpersonal relationships of a project. Many issues must be settled during the course of construction. It is advisable to have an architect that is a strong negotiator as well as a committee designee that is responsible for overseeing the construction process.

Negotiation is the means by which conflict is settled. “Negotiation is the process of joint decision making. It is communication, direct or tacit, between individuals who are trying to forge an agreement for mutual benefit” (Young, 1991). Architects and owners must conduct continual assessment of the circumstance and operative variables to a particular situation and then, as Roger

Fisher and William Ury describes, reach the “Best Alternative To a Negotiated Agreement ” (1981). The architect is challenged with the responsibility for determining what will be accepted by the parties (contractor and owner) and then moves to present this idea in the negotiation forum. The owner and contractor will negotiate settlement of the issue. The ability of the owner’s representative as well as the architect to negotiate well will serve to balance the sharpened and sometimes aggressive skills of contractors.

11.6 Principles of Contract Interpretation

These are some of the primary rules of contract interpretation that have legally established precedence and can be used to guide legal contract documents and project administration. Having a working knowledge of the following contract law terminology will aid in negotiation and provides a foundation that assists in lessening mistakes that can lead to levels of resolution beyond party negotiations.

1. Mistake and Mutual Mistake-Misinterpretation by a single party or other parties
2. Quantum Meruit-Entitled value of recovery due to non performance of a party
3. Acquiescence-Silent acceptance
4. Express and Implied Contracts-Oral and written contracts or contracts by inference
5. Mutual Renunciation-Abrogation of contract by mutual consent
6. Accord and Satisfaction/Novation-Modification of a contract under new settlement terms
7. Anticipatory Repudiation-Refusal to render promised performance
8. Estoppel-No escape from liability if other party relied on statements, actions or inactions
9. Contract Breach-Contractual promise broken by a party

These legal terms are common to disputes, arbitration, and litigation. Having a general understanding of the legal intent of these terms can help avoid the various pitfalls common to the construction process. Understanding the potential for problems is beneficial to all parties of a construction project.

11.7 Claim Procedures and Presentation

Change is the only constant that can be assured in a construction project. Ultimately, project changes result in claims of various types. Claims are the most critical deterrent to a continuously progressive and smooth running construction project. Claims will escalate over time and need to be dealt with promptly and thoroughly. Claims that are not attended to in prompt fashion are more likely to result in disputes. Most claims are handled in the normal course of construction activities. When claims become more involved with dispute and disagreement, the architect should initiate a presentation meeting for that particular claim. These meetings allow the opportunity for parties (contractor, architect and owner) to address the issues in detail of each viewpoint. The main attempt is to establish the facts that can be agreed on and continue to move forward in a good faith effort toward resolution. Having a good working knowledge of claim procedure will enhance settlement outcome and may reduce unnecessary escalation of differences. The bottom line is, reduction of costly arbitration and litigation.

11.8 Entitlement and Damages

Entitlement is one aspect of the construction claim that identifies in detail the reasoning, cause, or theory that a claimant is entitled to additional compensation. Entitlement must be established based on the factual circumstance of action or inaction by particular parties (contractor, architect, and owner) and should be concluded based on the contractual obligations and contract law. Success in establishing entitlement is largely based on the records maintained, the level of

communication developed, and the intensity of investigation regarding a claim. The other equally important aspect to claim proceedings are establishing damages. Damage is the restitution to be recovered by owner or contractor (in some cases the architect) for suffered loss, detriment, or injury, whether to person, property, or rights, through the unlawful act or omission or negligence of another. A claimant normally expects to be compensated for their view of entitlement. Upon notice of a claim, the architect should react quickly to investigate, notify the owner, and simultaneously begin to develop the apparent damage assessment. Decisions of acceptance or rejection of a claim can not be made until both entitlement and damages are assessed with equal importance. The architect must not rely on other party's assessments. It is critical that the architect not only investigate the detail of entitlement but thoroughly develop an associated damage profile. A change order to the project can then be written and executed by the contractor, architect, and owner.

11.9 Project Close-out

The initiation of project close-out is when contractors are requested to complete punch-list items as deemed necessary by the architect, owner, and consultants. When all of these items are completed and the job site is cleaned from such repair and construction, the contractor will request a final inspection by the architect and consultants. The contractors are issued a certificate of final completion when all work is completed to the satisfaction of the architect, owner, and consultants. Contractors are also requested to complete the requirements specified for project close-out. These specific requirements will be required prior to issuing the final completion certificate. Some of the standard close-out items are:

- Final building inspection by building code officials

- Final building inspection and system testing by fire code officials
- Inspection sign-off and occupancy permits issued
- Equipment operations and maintenance training conducted by contractors for the owner's representatives
- Record drawings are submitted by all contractors
- Additional stock materials are handed over to the owner
- All maintenance manuals, material and equipment warranties, obligations, and operation documents are issued by contractors
- Contractors issue warranties and guarantees for workmanship
- Contractors issue lists of incomplete work, damages, and corrections required (contractor punch-list)
- Contractors request architect's final review
- Architect reviews and issues, as appropriate, the certificate of substantial completion
- Remaining work is completed by contractors and the site is thoroughly cleaned
- Architect issues final completion certificate
- Occupancy of the building is allowed

The contractors are then able to submit for final payment and release of retainage.

The contractors must issue the following documents before payment can be made:

- Affidavits must be issued certifying that all obligations by contractors to second and third parties for payroll, equipment, and materials have been satisfied
- Consent of surety must be issued by contractors
- Waiver of liens against the owner's property must be submitted
- Any other documents or obligatory data to satisfy the contract

At last, the final payment and retainage certificates are signed and released finalizing the contractors project requirements.

12.0 Post Construction

The transition from construction to occupancy requires a period of adjustment. It is normal for occupants to feel somewhat awkward and sensitive to their new surrounding's imperfections. It is a period of time that should not be overlooked. It is in this transition that personnel will learn and assimilate the functional objectives of the environment. To help with this stage, it is advised that a transition plan be implemented. In this plan, a system should be established for dealing with questions, concerns, and problems that arise from the staff's use of the facility. It is all too easy to dismiss these concerns and comments, but the reality is that much of the information collected post construction is a valuable asset for future planning and change to the educational facility. It is even a reality that changes have already occurred that will make the functional design intentions obsolete. Therefore, a post-occupancy evaluation is desirable.

The post-occupancy evaluation should occur over the next year while contractor workmanship warranties and equipment warranties are valid. Stringent evaluation should occur on a period basis over the year with regard to equipment, furnishings, and infrastructure (plumbing, mechanical, etc.) operation. When problems develop that are potentially the cause of faulty installation, means and methods of construction, or failure due to faulty instrumentation or equipment, the contracting agency should be notified immediately.

12.1 Process Evaluation and Records

A quality tracking system is essential for documenting the problems of the facility. Recording the dates of inspections, report of problems, calls to contracting

agencies for repair or replacement, and the actual date of site visits by the contracting agency is a critical log for future problems beyond the warranty periods.

The as-built documents (drawings, specifications, shop drawings, maintenance manuals, etc.) should be maintained for ease of reference. It is advised to request duplicate copies of these records during project close-out. The facility is a living system that requires personnel capable of understanding and tracking the operation of these systems. It is certain that adequate post evaluation processes can alleviate unnecessary out-of-pocket expenses at a later time.

It is recommended that a formal post-occupancy evaluation be conducted prior to the end of the first year. During this evaluation, appropriate personnel be called together to produce a critical and thorough document in the form of a checklist. A review team will then conduct the evaluation. This team can be comprised of members of the original building committee, facility planners, staff personnel, and the architect and consultants for the facility design. This evaluation is not only critical to determining the needed deficiencies of the facility that are under warranty but also becomes an invaluable tool for expanding the quality of future facility planning processes, programming, and design.

12.2 Warranties

Warranties that are issued during the project close-out will normally contain the date for which that particular warranty went into effect. If specific dates are not conclusive, the date for final completion of the project is usually the date that warranties begin.

13.0 Conclusion

The facility planning process flows from order, since when the idea or the need for a facility becomes evident there is no disorder. Disorder begins with the

initiation of idea(s) necessary to propagate project direction. As idea progresses toward more concrete realizations, there is necessity for abstraction to germinate and spurn a depth of idea. The byproduct will be disorder, and the facility planning process moves from order into a state of chaos. It is in this chaos that philosophy and concepts are born and new ideas and opportunities are revealed. In this chaos there is order, but it must be identified and structured into understanding if it is to enhance the outcome of planning and architecture. Through the throes of chaotic entanglement order emerges, materials are erected, buildings stand, occupants enter, the facility functions, and architecture speaks. It is the final outcome—the architecture—which represents the cyclic planning process from order to chaos and back to order.

The facility planning process, in all its varied steps toward envisioning and reasoning outcome, requires the commitment of individuals who can process information, assimilate the abstraction, and convene with concrete ideas and decisions that are clear and focused. Building the necessary dynamics, understanding the course of actions, and following a systematic approach will lessen the burden of reacting in retrospect and will ultimately produce a higher quality facility in the finished product.

The significance of a school facility is such that the environment of the architecture can play a significant role in stimulating student learning processes, and the environment will engage teachers and trainers with motivation to reach beyond standard practices. The new facility is a visual, physical, and functional environment that conveys the operational and perceptual qualities that people with ideas, objectives, and philosophies direct. School facilities continue to change to support the demands of new technology and the variations in teaching methods. To be certain that a new facility being built reflects the expectations of

the educational community, it is incumbent upon the practitioners of facility planning to systematically process order from chaos.

Appendix A

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