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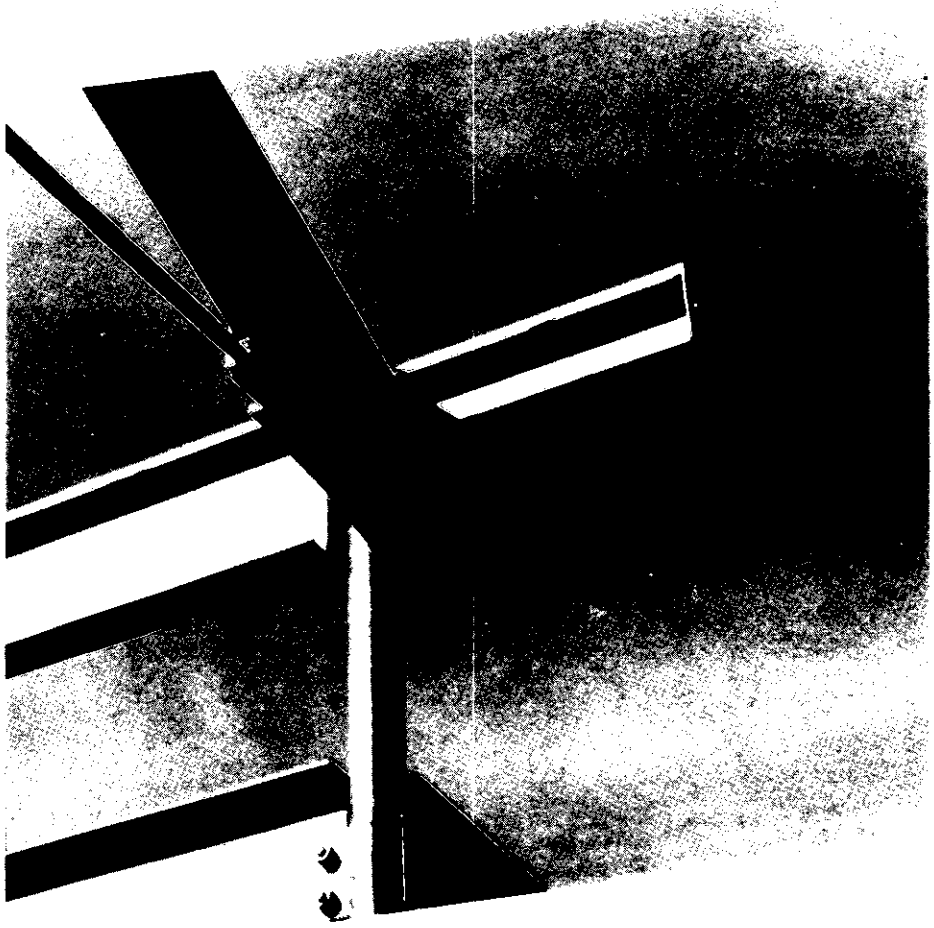
So You Need A New Building?

A Guide To Clients On Procurement Approaches



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1989

SO YOU NEED A NEW BUILDING?

A GUIDE TO CLIENTS ON PROCUREMENT APPROACHES

by

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EXECUTIVE SUMMARY

So You Need A New Building?
A Guide To Clients on Procurement Approaches

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For Whom this Guide is Intended. This guide to building procurement is directed at clients for future buildings. The potential clients for whom this guide has been written could be business persons or public officials who have to "buy" buildings for themselves or their organizations.

Objectives of this Building Procurement Guide. The first objective of this guide is to advise the potential client for a building about the phases of the overall design and construction procurement process and each of the major alternative approaches he may adopt for any building from those available in the industry.

The second objective is to equip a potential client with knowledge and information about procuring buildings so that he can better understand presentations made to him by those trying to sell particular procurement approaches to him. A knowledgeable potential client will be better able to ask relevant questions about a particular approach being presented to him and understand the ramifications of what is being proposed to him.

The result of the client reaching these objectives will be better matching of a client's needs with a procurement approach available in the construction marketplace.

What the Guide Provides. This guide firstly describes the constituent phases of the overall building procurement process, i.e., Building Needs Statement, Feasibility Study, Design Process, Construction Contracting, Construction Process, and Commissioning. Then, the guide presents each of the major procurement approaches with their features and some general guidance to the advantages and disadvantages of each approach. These approaches to procurement of buildings are Traditional, Design/Builder, Vendor/Provider, Construction Manager, and Project/Program Manager. The guide closes with a short section on some general success factors which should be considered in handling any of the alternative approaches to building procurement described in this guide. Also, the guide includes a brief description of the common formats of contracts for professional services and construction work.

From these descriptions the potential client can match his situation and a future building to a more wisely selected particular procurement approach which will be best suited to his needs.

The whole guide should be read and considered by the client prior to making his choice of a procurement process for a particular building, rather than considering only isolated parts of the guide.

Copies of the Report. Copies of the report can be obtained from the Executive Secretary of the Florida Building Construction Industry Advisory Committee, c/o School of Building Construction, University of Florida, Gainesville, Florida, 32611, which provided funding for this research project.

I ACKNOWLEDGEMENTS

Quite a number of people have contributed to this guide by their writings, by discussion with the author or by answering a questionnaire on the subject. However, some should be singled out for specific acknowledgement.

The work was funded by the Florida Building Construction Industry Advisory Committee (Mr. Bill Conway, Chairman) and its Mr. Paul Scheele must be thanked for his thoughtful advice and for being the project manager who kept nudging things along. Also, Paul, and Hoyt Lowder should be acknowledged for being so helpful in supporting it as a proposal and in its formative stages.

Helpful reviews of a draft were provided by Dean Anthony Catanese, Linda Waller and Don Taylor of the College of Architecture, University of Florida. Jane Edwards has to be thanked for her contribution on keeping the language as simple as possible, but correct, on a topic of this nature.

Special thanks must go to Bob Bridger (Executive Vice President of Koger Properties in Jacksonville) for his help in testing a questionnaire used as part of the research and more importantly for his penetrating comments on clarifying the presentation of the complexity of procurement of buildings. Thanks, Bob.

Again, many thanks go to Libby Lewitt who so ably transformed my rough drafts to text and changed those texts by adds, deducts, and changes in sequence to this final state, and for gearing up my spirits with her humor. Thanks, Libby.

II FOR WHOM THIS GUIDE IS INTENDED

This short guide is directed at advising clients for future buildings on the phases required in their procurement process and the various major procurement approaches available in the construction industry.

The potential clients for whom this guide has been written could be business persons or public officials who have to "buy" buildings for themselves or their organizations.

III OBJECTIVES OF THIS BUILDING PROCUREMENT GUIDE

The first objective of this guide is to advise the potential client for a building about the overall design and construction procurement process and each of the major alternative approaches he may adopt for any building. This guide can aide each client in making the best choice of a particular procurement approach to match the needs of each building.

The second objective is to equip a potential client with knowledge and information about procuring buildings so that he can better understand presentations made to him by those trying to sell particular procurement approaches to him. A knowledgeable potential client will be better able to ask relevant questions about a particular approach being presented to him and understand the ramifications of what is being proposed to him.

The result of the client reading these objectives will be better matching of a client's needs with one of the procurement approaches available in the construction marketplace. Satisfying these objectives will provide a basic increase in efficiency in the construction marketplace which benefits both the client and the capable designer and constructor.

IV WHAT THE GUIDE WILL PROVIDE

This guide to the various major approaches to procuring a building will, firstly, describe the constituent phases of the overall building procurement process. Then, the guide will present each of the major approaches with their features and some general guidance to the advantages and disadvantages of each approach. The guide closes with a short section on some factors which should be considered in handling any of the alternative approaches to building procurement described in this guide. Also, the guide includes a brief description of the common formats of contracts for professional services and construction work.

From these descriptions the potential client can evaluate his situation so that he can more wisely select a particular procurement approach which will be best suited to his needs. The whole guide should be read and considered by the client prior to making his choice of a procurement process for a particular building, rather than considering only isolated parts of the guide.

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VI PHASES OF THE BUILDING PROCUREMENT PROCESS

a) INTRODUCTION

In the context of time, the major phases of procuring a building are: (a) Building Needs Statement,

(b) Feasibility Study,

(c) Design Process,

(d) Construction Contracting,

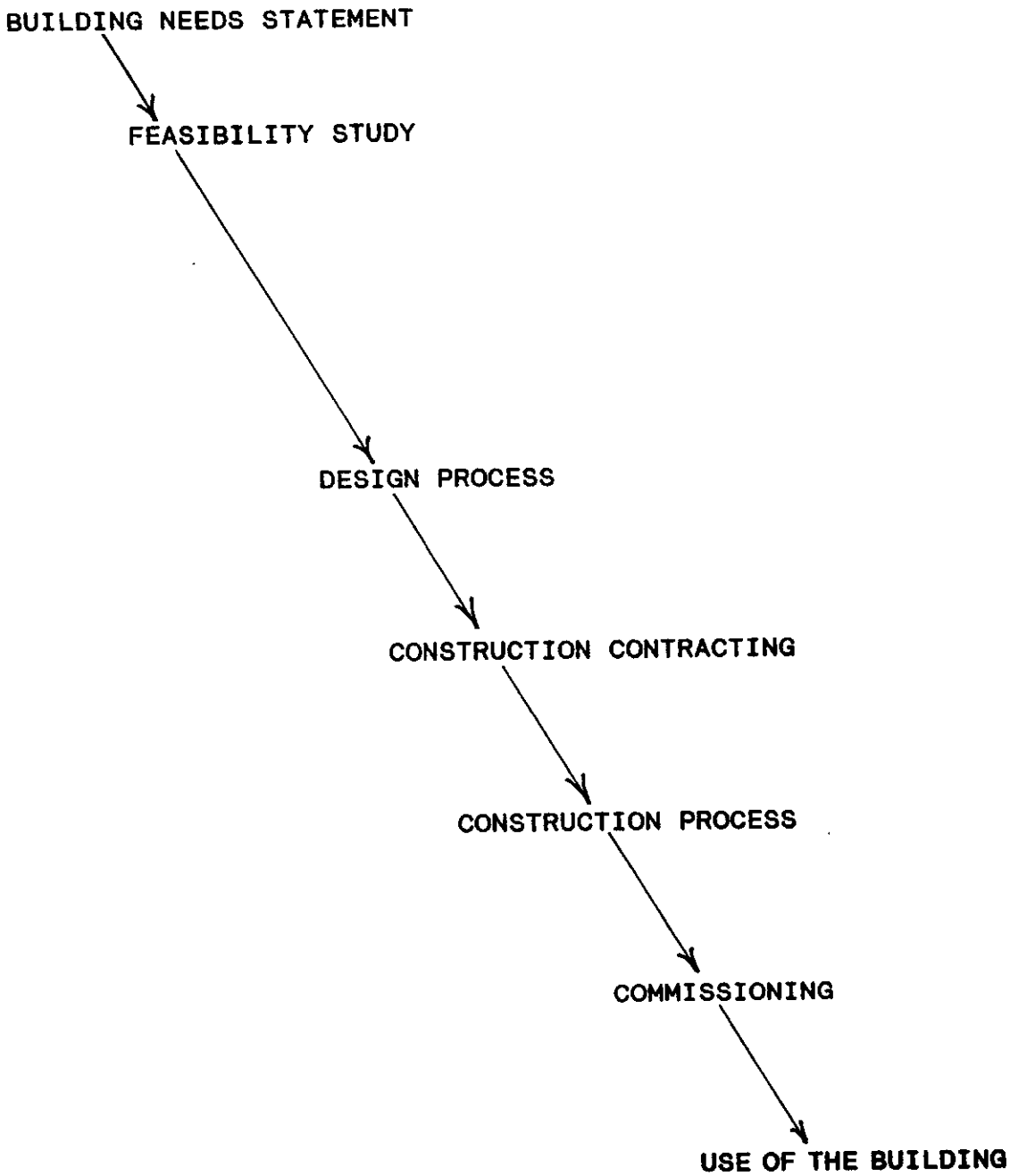
(e) Construction Process, and

(f) Commissioning.

Finally, the purpose of the whole effort, (g) Use of the Building, should never be forgotten.

The ultimate use of the building is the fundamental objective of the whole process, but its effectiveness and efficiency in the functional, economic, aesthetic, and real estate senses are dependent upon recognizing, considering and incorporating the appropriate constituents in the building during all the phases of procurement.

In a broad sense, both the Building Needs Statement and the Feasibility Study should be the responsibility of the client although he can benefit from using professional expertise in these processes from within and outside his own organization. The remaining phases should be carried out by one of the major approaches described later in this guide. However, first, a description of each required procurement phase is presented.


BUILDING NEEDS STATEMENT
FEASIBILITY STUDY
DESIGN PROCESS
CONSTRUCTION CONTRACTING
CONSTRUCTION PROCESS
COMMISSIONING
USE OF THE BUILDING

(b) BUILDING NEEDS STATEMENT

Any building can be seen as a combination of many facets to satisfy the needs of its owner and user, e.g. user functional spaces, geographic location, economic value, alternative future use, and aesthetic image. These may be combined in different permutations in different buildings on different locations.

Within the activities of a prospective client, the need for a new building can be from lack of existing space, inappropriate space, appropriate space in an inappropriate location, or some functional obsolescence which may inhibit future performance of the client's organization in their existing buildings. It may be that there is a new process that needs to be housed or an opportunity exists for future benefit to the client. However, most organizations tend to evolve from their past needs to their future needs for buildings.

These future needs of the client, who may be an individual or a public or private organization, should be clearly established in writing. These needs should include the quantified spaces and the required qualities of the various spaces and their locational interrelationships within the whole building along with a description of the most appropriate site location features for the building.

The purpose of this phase is to establish in writing, vaguely or exactly, the characteristics of the future building with its specific needs, positive and negative, and their priorities. This proposed building will have a life duration of many years and,

hence, its potential to satisfy users' needs over that future duration should be considered and incorporated into this statement of building needs. Also, the interaction between the future building and its immediate surroundings and neighborhood, now and in the future, should be considered.

The building needs statement will be the origin from which all of the subsequent phases will develop their content, activities, and boundary conditions prior to the final phase of use of the building.

From the above it can be seen that this needs statement should be valid, accurate and as complete as possible. Failure to state needs and objectives clearly will likely cause confusion and inaccuracy in each subsequent phase of the procurement process resulting in higher costs, poorer quality and greater time consumption in procurement for the client.

(c) FEASIBILITY STUDY

This phase of procurement of a potential building gathers together all the known desirable benefit features and cost features of the building needs and carefully arranges and evaluates them as a cost/benefit study.

All the functional, aesthetic, image, and economic benefits provided to the client organization by the building over each year of its economic lifespan should be established and valued as well as can be ascertained. Then these benefits can be modified for

their probabilities and discounted to present value by the marginal cost of money to the client.

Both the capital and annual maintenance and operating costs and risks related to the building over its economic lifespan should be established and evaluated. The capital costs should at least include land, design, and construction, financing, relocation into the new building, and disruption of existing operations, the procurement process itself, and the resolution of issues with all regulations of all government agencies for the location in which the building is proposed to be built including obtaining all permits. Also, the cost of arranging permanent financing for the completed building should be incorporated into the feasibility study. The annual maintenance and operating costs of the building, including salaries, wages, supplies, and power needed for each year of its economic life should be forecast and discounted to present value.

Each of (i) capital costs and (ii) one time benefits should be plotted for the time of their occurrence and calculated apart from (iii) flows of benefits and (iv) flows of costs which will occur each year over the lifetime of the use of the building.

The client should establish the future duration of desired economic use of the building. Also, the marginal cost rate of money to the client or his organization should be established for the time of the commitment to funding the new building. After establishing these figures, they should be used as major constituents in measuring the present value of both (i) capital and

annual costs, and (ii) the stream of benefits from the proposed building.

The sums of the array of benefits and the array of costs should be compared in order to establish the overall cost/benefit value ratio for the proposed building.

The functional feasibility of the proposed building and the appropriateness of all physical and economic characteristics of the proposed site and location of the building should be built into the feasibility study. The nature and probability of the market for the products and services provided by the building should be considered as input to the feasibility study.

In this context, selection of the location of the building and the price of land and its development costs along with future real estate values are four crucial variables which have considerable impact on both benefits and costs. Furthermore, the cost of financing the building is important and this usually varies by the source of financing and the timing of raising and paying for the financing. Site location and financing should either be fixed by now or considered as alternatives to be evaluated by cost/benefit analysis to establish which are the best choices for this building.

The choice of which procurement process alternative is the most appropriate may be considered as a variable constituent of the feasibility study or even be derived from the considerations covered in the building needs phase.

All of these constituents should be handled on an iterative, creative basis, not only to carry out the feasibility study, but

also to help define the parameters of the best building which is most suitable and beneficial to the client.

The objective of the feasibility study is to ascertain on paper, as well as can be, the streams of benefits and costs of the building derived from the need, the risks, and the surrounding economic and social climate over the duration of life of the investment. The feasibility study should compare the sum of the streams of (i) benefits and (ii) costs of the proposed building as a ratio. The benefits should exceed the costs if the building is to go ahead. If the client uses a capital investment cut off ratio to select which investments to fund, then that cut off ratio should be included in making the "go/no go" decision on the proposed building.

(d) DESIGN PROCESS

The output from the design process is the complete design of the physical building to be used by the client. The design process transforms the building needs statement (plus any refinements from the feasibility study) into a written and graphic expression of the proposed physical building to be built and used. This design should include consideration of the duration of economic life established in the feasibility study.

The design of the site around the building and consideration of all physical, economic and aesthetic interfaces between the surrounding urban environment and the building being designed is a major constituent of the design. This interface of the building to

its surroundings includes compliance with all federal, state, and local government regulations existing at the time.

Clearly, the building site should have been selected and bought or optioned by this time, and it is usually wise that all the arrangements have been completed for financing (a) the finished building, as well as (b) the construction process.

Under some of the major procurement processes described below, the whole design will not be complete until after the construction process has begun.

(i) Design Sub-Phases

Generally, the design process may encompass the sub-phases of (i) establishing users' needs, (ii) conceptual design, (iii) design development, (iv) construction drawings, and (v) the production of specifications of the building's components.

The design phase may or may not include (vi) the production of the set of contractual documents for the construction process which control the organizational format of the construction team of contractors, the conditions under which the construction work will take place, and the parameters by which the construction will be priced and contracted. (It is considered more appropriate to describe this construction contract sub-phase under the major phase of construction contracting in this guide).

Establishing (i) user needs is similar to the activities and contents of the building needs phase described above. This first sub-phase of the design process should carry the statement of

building needs to a more detailed level by establishing the required array of user spaces, their sizes and required juxtaposition, as well as refining or interpreting the building needs and objectives to a state from which conceptual design can be carried out. If a building needs statement does not exist prior to the inception of the design phase, then preparing such a statement will be the first sub-phase of the design process.

The (ii) conceptual design sub-phase primarily deals with establishing the general layout and external physical expression and the bulking of the building in relation to its surroundings so that its aesthetics and image are appropriate to the needs of the building. It will also have to be compatible to the building's internal functional and spatial aspects according to the statement of users' needs created at the beginning of the design phase and/or in the building needs statement.

The (iii) design development sub-phase comprises taking the conceptual design and reducing it to the specificity of drawings from which the construction drawings can be produced. Here, the scope of user's needs and the concept of the design should not be lost in the plethora of design and construction details considered, but each should complement the other. The greater the completeness, quality, and specificity of design development drawings, the greater the potential for risk minimization and accurate cost and duration estimates of the subsequent construction process which constitutes the major element of capital costs of the future building.

The (iv) production of construction drawings transforms the developed design to a level of detail that can be costed, priced, scheduled, and built by contractors. These construction drawings will be part of the package of construction contract documents.

The (v) writing of material specifications should present a clear statement of the quality of all materials required by the construction drawings with a clarity that can be costed out and contractually understood by participants in the contracting and construction process. Also, this document should be structured to match building trade work scopes normal in the location of the building as this document will be the part of the construction contractual package which controls the actual construction work.

Generally, a design process tends to flow from (a) user needs and spaces and their functional relationships to (b) their physical boundary conditions (walls, ceilings, floors) and contents (mechanical and electrical output systems) to (c) a blended summation of all such features to (d) a compatible totality of that blend with (e) the (already developed) design concept which matches the building to its environment and location.

(ii) Design Participants

It should be borne in mind that the whole design phase will most likely not be carried out by one person. For any building other than a very small one, there will be a large array of specialist designers, architects, engineers, and consultants involved in all sub-phases of the design process. Each of these

experts is a specialist who has to be briefed on building needs, and his input has to be gathered, considered, and coordinated to the design concept by the core design team. Then there is the process of carefully blending the necessary inputs and interactions from the wide array of specialist experts in the design so that the specifics in the variety of building sub systems evolves to a complete design of the whole building.

The process used to produce a design will be interactive and iterative among these experts because of the required complexity of coordinating the somewhat simultaneous interactions among the inputs of all these specialist consultants. Thus, design, while generally sequential in the above sub-phases, has extremely complex interactions among many specialist designers. These interactions also tend to be iterative and numerous since each specialist is subjected to "what ifs" from inputs of other specialist designers. Failure to tolerate the above interactive and iterative complexity will most likely allow ineffectiveness, inefficiency and obsolescence to be present in the design of the building which will be used for many years by the client and subsequent users and owners.

(e) CONSTRUCTION CONTRACTING

This phase comprises two sub-phases, (i) the writing of the construction contract package or packages, and (ii) the contracting process establishing what parties will carry out the whole or parts of the construction process. Fixing the price, or a mechanism to

establish the price, for the whole construction process or each part of it is also a major function of this second sub-phase.

(i) Contract Package

The package of construction contractual documents usually comprises the conditions of contract and other associated documents, such as specifications, design drawings, and bills of quantities if unit prices are to be sought. This package will become the contract between the client and the party or parties who will execute the construction process and it is usually put together by agents of the client.

It is this package of documents which comprises the data base upon which the price of the construction work will be established by whatever means has been defined by the client in these contract conditions. If there is to be competitive bidding for the position of carrying out the whole construction process or sub parts of it, or if such positions are to be selected by negotiation between the client and potential parties from the construction industry, then all of these activities will be based on the contents of this contractual package of conditions of contract, specifications, the set of design and/or construction drawings, and bills of quantities produced from the design.

This package of contract documents will also be the basis for all costing and pricing of work and bidding or negotiating by participating contractors. Also, it is the basis for handling of change orders and disputes between the parties involved in the con-

struction work, for defining the form of payments by the client to contractors during construction, how the construction work will be carried out, and all other required contractual aspects related to the construction process.

The most important document in this package is the general conditions of contract. This document states all conditions binding upon the client and the party or parties executing the construction work. It defines the duties and responsibilities of all roles on the client's side and the construction contractor's side of this primary contractual interface.

These general conditions of contract may be based on a generic set of clauses produced by a construction industry association, but with suitable modifications by the client's agents for the needs of each particular building. Alternatively, a client who has a large building program may have created his own set of general conditions of contract for his own needs. However, there are benefits for efficiency in procurement by having the conditions of the contract based on a generic set of construction contract clauses which are widely used and well known in the locality of the building.

If unit prices are to be sought from contractors then a carefully created bill of quantities will be produced from the design drawings by an agent of the client as a part of the contract package. Such unit prices for each piece of the building creates the optimum in risk sharing between the client and contractor in that disputes can be settled by the client paying for what he gets

at the contractually offered unit prices and the complement of the contractor being paid for what he has provided at these same unit prices.

For lump sum bidding or negotiating, the specifications are usually created by the design agent but if bills of quantities are to be used, there are advantages in having the specifications written by the agent who creates the bills of quantities.

(ii) Contracting Process

The second sub-phase of the construction contracting process begins after the creation of the contractual package by the client's agents. This comprises the distribution of the contractual package to all the potential construction contractors to be used as the data base for their costing and pricing and competitive bidding for their position on the construction team. Also, if this selection of construction team players is carried out by negotiation, then each potential participant will base his negotiations and prices upon this contractual package. In some situations it may be that a party desiring to do work for the client will provide their own conditions of contract as a constituent of such negotiations.

If this second sub-phase of contracting is by bidding by construction contractors, a subsequent part usually follows in which the client and his agents appraise the bids submitted and the capabilities of each bidder. These post bid appraisals may extend into post bid negotiations between the client and each

prospective contractor. Alternatively, the bidder capability appraisal may have taken place prior to bidding and only those contractors thought capable of performing the work would have been allowed to bid. Unfortunately for some government agencies, they are precluded from post-bid appraisals and can only appraise and qualify bidders prior to bidding which is followed by hiring the lowest bidder.

The client most fully serves himself by appraising each contractors capability with knowledge of his bid price and how much it differs from other bidders' capabilities and prices. Also, it is advantageous to the client that there be minimum duration between the time of (i) appraising a contractors capability and especially his current work load and (ii) the start of his construction work.

At the end of this whole phase, the client, usually on the advice of his agents, will choose the contractor party or parties to carry out all or parts of the construction process.

In some of the procurement approaches, this selection process occurs many times during the whole construction process because the client may choose a different contractor for each of the construction contract packages into which the whole construction process has been analyzed by his agents.

(f) CONSTRUCTION PROCESS

The construction process involves erecting the whole building in place, the handling of the flows of all resources, such as

materials, labor and equipment on-site and their delivery to the site of the building. It also includes handling all the information flows among all parties to the construction process.

While considering the following complicated but industrially efficient aspects of the construction process, the client should realize that the maximum rate of his capital expenditure will occur in this construction phase. Delays during or unnecessary extensions of the construction process mean that such capital expenditures have been made but are idle for such lost durations.

The construction process tends to be somewhat deterministic compared to the design process because what has to be built has been defined in the contractual package. The normal sequence of construction work for a building is foundations, then structural elements, then the building envelope, and then the mechanical and electrical work prior to the surface finishes. Site development work is usually being carried out before, during and after building construction as appropriate to the whole building. Within each trade there is usually a work sequence from rough work through intermediate work to finishes work. However, work types of all trades are usually interwoven to generally move the work of all trades through the rough to intermediate to finishes sequence in each location within the building.

In the construction process, there are needs for (i) management of the overall construction process and, separately, (ii) management of each specific, contracted trade package of work required in the building.

(i) Managing The Overall Construction Process

The objective of management of the overall construction process is (a) to coordinate and expedite the whole process and (b) to be a linkage between (i) all the participants in the construction process and (ii) the client and his agents. The flows of contractual and work data on quality, time, money, and directives to and monitoring of the construction process comprise a large volume of interactive information which must be handled expeditiously for successful construction. The scheduling of this rational but complex construction process is the datum to controlling the actual work of the specialist trades to a coordinated overall construction process. Managing and expediting the efforts of all the different participants is a very complicated management process dealing with people and machines and money. Also it includes handling, at contractually agreed times, the making of payments to contractors by the client for work completed. Should changes be made or required to the design or construction contract during construction, then the client and his agents will negotiate these changes with the parties involved in these changes through the manager of the overall construction process.

Usually the management of the whole construction process can be further complicated in that the party managing the overall construction process, and each party managing each specialist trades work are entrepreneurially separate entities. This separation exists for overall, efficient, economic industry response to the random and variable nature of the demands of

society for construction work, but is normal in the construction industry. This situation increases the need for more careful and high quality management if the client wishes an expeditious construction process and a resulting quality building.

(ii) Managing Each Trade Package

The objective of management of each contracted work package is directed at the specifics within each trade's work, e. g., mason, plumber, electrician, and the efficient use of its required resources of men, equipment and money to complete that work package in that building. These trade or work packages comprise the basic construction of the building regardless of how the overall management of construction is contracted to be carried out under each of the alternative procurement processes. However, in some circumstances,the whole construction process can be expedited by careful analysis of the building into these trade or work sub-contracts by whomever is managing the overall construction process.

Contracts for these work packages can be between (i) each trade contractor and the general contractor entrepreneurially responsible for the whole construction process or (ii) each trade contractor and the client with a client's agent managing the whole construction process or (iii) each trade contractor and the client who manages the whole construction process with his own staff. These contracts can be established by bidding or negotiating or both between these parties.

(g) COMMISSIONING

Subsequent to construction, the client achieves his overall objective of using the building in whatever way he wishes. However, as construction is ending and certainly before the building is used, the client should have all the parts of the building inspected to ensure they are working properly. This can be a straightforward check that all parts of the building are as contracted to be built, or it may require the evaluation of building performance over a period of months. This extended commissioning is more likely with building sub-systems which are dynamic, such as air conditioning or user communications, rather than static, such as walls and floors. At least all the building sub-systems should be commissioned for the client by the agent who inspected them during construction and can affirm that they are of a quality specified in the contract documents and that the whole building functions as designed.

Commissioning as a separate phase is usually more prevalent in industrial-use type buildings where the installation of major machines must be tested in place along with the whole building as a single harmonious functioning entity. Such commissioning of the building in place is also prevalent and usually required in buildings serving the public and where strict building systems performance is essential. Hospitals are an example of buildings of this type.

VII WHEN AND WHICH PROCUREMENT APPROACH TO CHOOSE

The strategic decision of which alternative procurement approach will be used for a building should be made immediately after the decision to proceed with designing and constructing the building. This important choice should be made prior to or with the selection of the prime designer agent by the client and the beginning of the design process under any of the following alternative major procurement approaches.

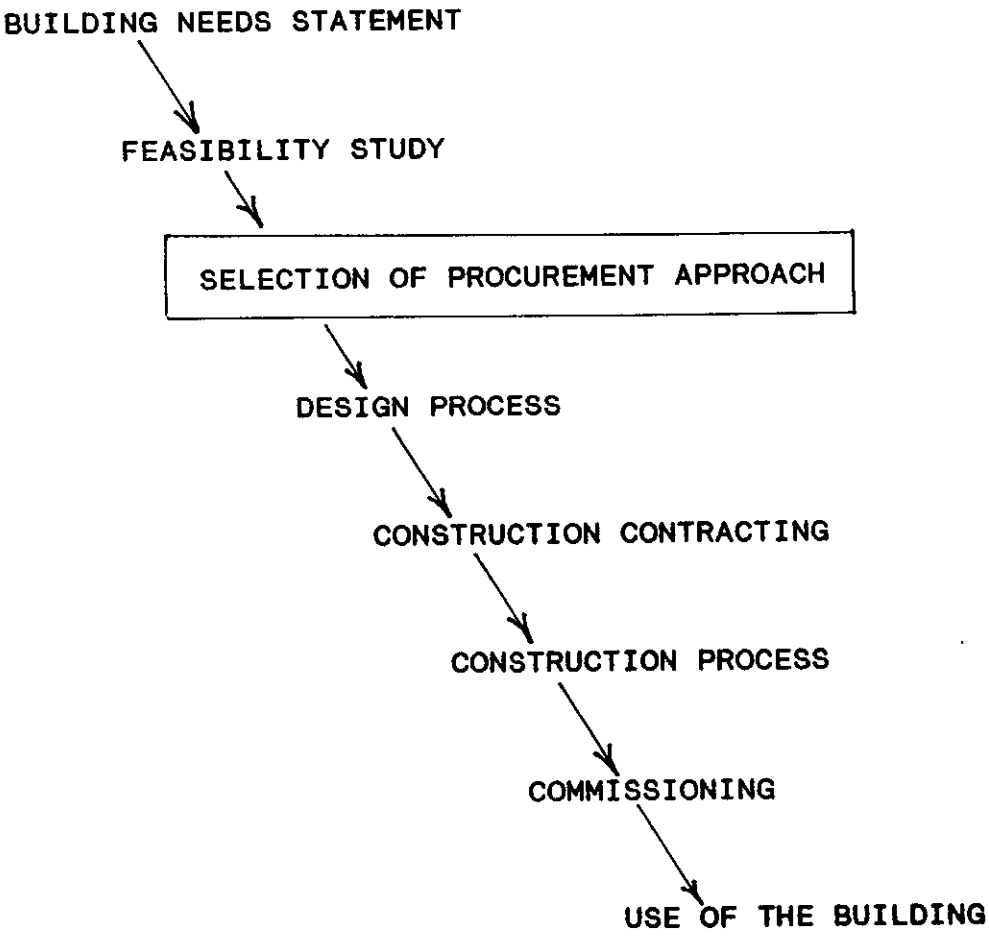
This choice of which procurement process to use sets the strategy of how design, contracting, construction, and commissioning will be carried out and how they will interact with each other.

Put simply, there is (i) the client for the building and (ii) the array of specialist designers each of whom designs a specialized subsystem of the building, and (iii) the array of subtrade contractors each of whom builds a particular trade package in the construction process. What each of the following procurement approaches does, is to create an alternative pattern of managerial and contractual linkages between (i) the client and (ii) and (iii) the above arrays of fundamental, required roles and activities. This includes selecting the party, or major parties, who will primarily manage the procurement process for the client and how they will interact with both (i) the client and (ii) and (iii) the above required specialists.

If the feasibility study shows that it would be beneficial to go ahead with the building, the client should then consider and

select the most appropriate procurement approach for his building from the alternative approaches described below prior to beginning the remaining phases of its procurement. The choice of which procurement process to use is based on (a) the needs of the major phases and their sub-phases in the building procurement process (described above), (b) the characteristics and variables within each alternative approach (described below), and (c) the nature of the particular building to be procured and (d) the current situation of the client.

Probably a good analogy to this choice is when one is faced with choosing a new suit of clothes. Your current and future physical shape, mental and emotional type, the situations in which you wish to wear it, how much it will cost, and how much time is available before you need the suit are all considerations. There is an array of available clothes from, at one extreme, custom-tailored suits, through an array of alternative sources, to the other extreme of buying one off the rack or renting it.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VIII COMMON TYPES OF CONTRACTS FOR PROFESSIONAL SERVICES AGENTS AND CONSTRUCTION CONTRACTORS

(a) Contracts For Professional Services Agents

Professional agents such as designers, generally architects and engineers, construction managers and project/program managers, are usually contracted for on a fee basis or a cost plus fee basis or percentage basis.

The crucial aspect of their selection prior to hiring is to establish the capabilities of their organization, the skills of specific people they will provide and their past experience with the type of building to be built in order to satisfy the requirements of the procurement of the client's specific building.

Once these professional capabilities have been evaluated in relation to the requirements at hand, the client can establish the appropriate mode of reimbursement for the agency services as per the quality and quantity required. Usually payments are based on an average dollar rate per hour for categories of skills employed, or the professional agent may be paid a negotiated fee or a fee based on a percentage of the construction price. Also, hybrids and permutations of these two major approaches can be used.

Other approaches have been tried to select and pay professional advisors, such as lump sum bidding for professional advisor contracts. However, these tend to founder on the issue of the client acquiring appropriate and adequate expertise for yet to be performed professional work. Furthermore, the fundamental issue

is the variety of the quality of advice which can be had for about the same price, but which results in wide differences in the performance, quality and the cost (capital and functioning) of the resulting building over its lifetime of use.

(b) Contracts For Construction Contractors

There are a number of different contract formats for construction work which can be used either for (a) the whole of the construction work or (b) defined parts or packages of the construction work. Such defined packages of construction work can be for (i) individual trades work required in the whole building, or (ii) all construction on separate, specific physical segments of the building, or (iii) a permutation of trades and physical segments of a building. Such choices are available depending on the nature of the proposed building, the client's situation, and the expertise of whoever is analyzing the entire building into the separate packages for construction contracts.

The process of arriving at the price of a construction contract is usually by bidding or negotiation or a combination of both. Bidding is by the construction contractors who wish to be considered for a role in the construction team bidding their total price or unit prices from which to establish their total price to the client. Negotiating is between (a) the client or his agent and (b) one contractor or simultaneously with a number of potential contractors. These bids or negotiations can be for either the

whole construction process or each defined part or package of the whole construction process.

(i) Lump Sum Price Contract

The lump sum price contract format results from the contractor bidding to or negotiating with the client which produces a final single lump sum as his price for carrying out all construction work defined in the contract. This will be the price between the client and the contractor for the contracted work regardless of how much it costs the contractor to carry out the work. The price is usually based on a complete contractual package of contract conditions, specifications, and complete design drawings for the building or work package provided to him by the client or his agent. In some procurement approaches the underlying contractual package will not be completely detailed prior to lump sum price finalization.

It is usual that a lump sum contract is based on a competitive bidding process by prospective contractors. Thus, this type of contract allows the client to benefit from the competitive forces of the construction marketplace. Also, the lump sum contract can result from a negotiated form of contracting.

If, it is anticipated that during construction, there will be very few changes to the underlying contractual package or few disputes between the client and the contractor, the lump sum contract is the simplest contract (a) between the client and the general contractor and (b) between the general contractor and each

trade subcontractor he uses within his bid for the whole construction process. Also, the lump sum contract can be used between the client and a specific trade contractor for a package or part of the work in the construction process. In situations not involving the client, there is probably more post bid negotiating between these construction industry parties than is normal between the client and the general contractor. Again, the competitive forces of the marketplace are harnessed by the general contractor seeking bids from a number of trade contractors.

(ii) Guaranteed Maximum Price Contract

This variation to the lump sum contract is usually used to finalize a negotiated contract for construction, especially when the design work is not complete prior to the contractual agreement required to begin construction. Usually, at some point in the evolution of design drawings and specifications, but prior to their completion, the negotiating contractor or contractors are willing to bid a guaranteed maximum price for the construction of the whole building. The guarantee given by the contractor is that the complete building will cost the client no more than the guaranteed maximum amount stipulated in the contract, but the contractor has control over subsequent completion of, and changes in, design and quality specifications.

Alternatively, the construction work may cost the client less than the guaranteed maximum price, but it is the contractor who

states the amount of the guaranteed maximum price in his bid to or negotiations with the client.

In some guaranteed maximum contracts, the contractor is provided an incentive to keep costs down by the contractor sharing with the client (e.g. on a 50% - 50% basis) the savings made by the contractor's suggestions to reduce construction costs by design or other changes to the contract. However, this incentive type clause should only be used by the client who can fully appraise the impact of such suggestions on matters such as (i) the subsequent efficiency of use of the building, (ii) its annual maintenance and operating costs, (iii) its value in the future, as well as (iv) the immediate effect of the suggestion, as pluses and minuses, on the cost of construction across all sub trades work.

(iii) Unit Price Contract

The unit price contract format is one in which either party (usually the client or his agent) produces a bill of quantities of work required in the building from the design, and includes that document in the contract package for the building. Each bidding contractor places his unit price for each quantified item of work in that bill of quantities and his bid is summed arithmetically from the result of multiplying each quantity by each unit price. From this can be produced a lump sum by which to differentiate bids. However, the unit prices are the major contractual elements by taking precedence over the total sum price. The unit prices are used as the contractual price interfaces between the client and the

contractor for settlement of change orders on the contract, as well as disputes between them and settlement of the final cost of each contract.

Under this contract format, optimum price risk sharing takes place between the client and the contractor. Should there be a dispute between these parties about the sum price for a piece of work done, it is simple to measure that piece of the building and the contractor is paid for that work at his contracted unit prices. Complementing this, the client receives and pays for the work completed in the building for him by the contractor at these contracted unit prices.

(iv) Cost Plus Contract

Cost plus is a contract format in which the client selects a contractor to do the work and to whom he will reimburse all costs incurred plus a percentage or fee. If desired, competitive bidding or negotiating can be based on the size of the percentage or fee. In this format it is crucial to define in the contract which work and management activities (on-site and off-site) are considered reimbursable costs and which are included under the fee or percentage. Because of the reimbursement of all costs under this contract, the client should use it sparingly, and really only in emergency situations or where cost is inconsequential or if the client is very knowledgeable in the managing of construction work.

If this form of contract is used, all types of human and equipment resources should be listed along with their costs per

hour and all wage and time sheets checked for validity as should all material invoice quantities and prices be checked with suppliers. There is potential for the client to be paying for underemployed resources involved in the construction process.

IX THE ARRAY OF MAJOR PROCUREMENT APPROACHES

(a) INTRODUCTION

The major approaches to building procurement described below are similar to variations of carrying out the same general theme described above. The alternative approaches to procuring buildings within the above general theme are

(i) Traditional Approach,

(ii) Design/Build Approach,

(iii) Vendor/Provider Approach,

(iv) Construction Management Approach, and

(v) Project/Program Management Approach.

The description of each approach will comprise an outline description, and its major advantages and disadvantages.

These various approaches to procuring the design, contracting, construction, commissioning and overall procurement management of a future building are not completely separate approaches. Rather, each is like the colors in a rainbow. At one point of the spectrum, there is predominantly one color which then melts gradually into another color and it into another color.

Normally, the client should choose one of these major approaches for each building's procurement. However, a client who is extremely knowledgeable, capable and experienced in all of them may create permutations and variations of these approaches, or even hybrids, to suit the needs of his buildings. However, if he does so he must communicate how he is procuring each phase to all other

participants involved in the procurement of that particular building.

(b) TRADITIONAL APPROACH

Outline Description

The major feature of this approach is that the client hires a design agent, usually an architect, as his primary professional advisor and is advised by him throughout the duration of the whole procurement process.

In this approach, the procurement phases are carried out sequentially as described above, and one phase is usually completed before the next begins. The sequential nature and emphasis on design by the client's primary agent, the architect, should add value to the quality of the eventual building to be used for many years compared to the other procurement approaches. However, the overall calendar duration of procurement under this approach may be longer than taken by the other approaches.

The total price of construction, the client's major capital expenditure, is usually fixed contractually by selecting a general contractor by his competitive bid price. Thus, the client has a fixed construction price for a completed design prior to the beginning of construction.

During construction the selected general contractor will tend to perceive the client as an adversarial party under the specifics of their construction contract and the client may behave in a

similar manner, with or without the advice of his architect agent. Such a situation may inhibit the most cost effective procurement of the building.

This approach is suitable for buildings in which: the needs can be fully defined before design; the building is a reasonably common type; the client does not have enough in-house design and construction capacity to handle the work; the client wants to know before construction what his capital cost will be for the building; and that the client will not make changes to the building design during construction.

Major Advantages of the Traditional Approach

The client has a single knowledgeable design agent working for him. That agent should be carefully chosen for professional knowledge and ability, as well as compatibility with the client's needs and objectives for the building and for good communications between them. There should be trust between them and having a single prime agent should simplify the client's involvement in the procurement process.

There will be single source continuity of advice to and decisions on behalf of the client by the one design agent throughout the whole procurement process and the hiring and involvement of all specialist designers will be handled by that one design agent. Further, he will create the final building by writing all documents in the contract package, giving advice on the hiring of specific contractors, carrying out the final inspections at

commissioning time and those during construction, approving all payments to contractors, and assisting in the settling of all claims, disputes and changes to the design and contract on behalf of the client.

The sequential nature of executing the phases of the traditional process is advantageous for quality of the building in that the output of each phase can be evaluated and checked prior to the beginning of the next phase which may enable the whole process to gain speed.

The major capital investment by the client is the construction price. Under this traditional approach there will be a known, contracted, fixed dollar figure as a bid price to be accepted or rejected before the construction work begins.

Major Disadvantages of the Traditional Approach

The traditional process is a sequential process and while that can be good for clarity and thoroughness of execution, normally it also will create a longer calendar duration for procurement than can be had by other approaches.

While the primary agent of the client is usually the designer, as should be, he may be less knowledgeable on matters pertaining to contracting and construction. Thus, that single prime agent may be less able to provide or consider cost and construction advice during the crucial design process. Also, the client, by relying on only one major agent for advice during the whole procurement

process may limit potential alternatives in the building and its procurement.

As the contract between the client and the general contractor or contractors for construction will tend to be adversarial, the client will have to rely on his one major advisor, the architect, to handle all of these matters even though his major skills are in design. In this regard, if there will be many design changes or claims during construction, the cost interests of the client will be in jeopardy.

(c) DESIGN/BUILD APPROACH

Outline Description

The major feature of this approach is that the client hires one organization to carry out the design phase, the construction contracting phase, the construction phase, and the commissioning phase. Here the client is relying on the capabilities of the entrepreneurial design/builder with whom he will have a contractual relationship to produce the whole building ready for use.

The ability of the design/build company to integrate and expedite the design, contracting and construction phases should reduce calendar procurement duration which enables occupancy and use of the building as early as possible.

The client has a single source of interaction and information regarding the procurement of the project, i.e., the design/builder. During the execution of the procurement process, the client can have minimum involvement with it, except making the interim

payments agreed upon with his design/builder. At the end of this process, the client should be able to move into and use the building as a complete entity.

Usually the client will call for proposals comprising (i) a conceptual design and (ii) a total price for completion of design, contracting, construction, and commissioning work from a single source. Alternatively, the client may seek such proposals from a few design/build companies and then choose one of them to carry out his building procurement for him.

The design/build contract is usually signed by the client based upon the conceptual design in drawings and text, an outline specification of quality of building, and a price that may be of a lump sum or guaranteed maximum type.

The risk exists for the client that at the time of selecting a design/builder he may not fully understand the implications of the nature of the building from each conceptual design presented to him by each of the various potential design/builders bidding to him or negotiating with him. In this design/build approach, these crucial selection decisions by the client have to be made no later than the end of the conceptual design sub-phase, and may be made during the conceptual design sub-phase. The client can easily distinguish between the different bid amounts of prospective design/builders, but he has to use his own comparatively limited expertise of design and construction in choosing which conceptual design proposed to accept to match his needs. Because of this potential problem in choosing a design/builder, the client should

also carefully consider and give weight to the integrity, as well as the professional capabilities, of each design/builder whose proposal is being evaluated. This is because the work of turning the design into construction drawings, fixing the exact quality of specifications in the contract for the building, and the construction and commissioning inspection of work is in the hands of the entrepreneurial design/builder and will be decided by him within the price agreed in his proposal to the client.

The design/builder will usually use construction sub-contracts for the specific trades and/or contract work packages he considers appropriate for the work to be carried out, and he will be entreprenuerially responsible for these within his price and contract to the client.

This approach is most suitable for buildings: which are of a common type; when specialized details or design or specific quality are not too important; and when a building is needed very quickly for use by the client. Alternatively, it can be suitable for: buildings for which the design/builder is a specialist; if the building is unique; and if the client and the design/builder can work together to create the required design; a client wishes to take quick delivery of the building, or delivery within a fixed duration; a building which has been designed to the client's budget; and that the client need not pay for the building until he begins to use it.

Major Advantages of the Design/Build Approach

The chosen design/builder, by having good and fast communications between his designers and builders, should be able to achieve a minimum of conflicts between them leading to a relatively short duration of the whole procurement process.

The client will know what will be the cost of his building as a total package for design, construction, and even land when he is presented with a conceptual design.

There will be single source of contact with the procurement process for the client, i.e., the design/builder. Unless he wishes to be, the client need not be involved in the procurement process from the time he hires the design/builder until he walks into the building to use it.

For buildings which are comparatively unique in a locality, there may be specialist design/builders who have expertise in such buildings at the national or international levels.

Major Disadvantages of the Design/Build Approach

It may be more difficult to achieve the expected benefits of rapid design and construction integration and execution if the designer/builder is an ad hoc joint venture compared to a continuing entrepreneurial organization comprising all the required professional disciplines in design and construction.

The client will need the capability of evaluating the appropriateness of a conceptual design because he is buying the effect of that design on the needs and objectives he seeks from

the building and on the activities he wishes to carry out in it, over many years. Such costs are not primarily the capital costs of construction and design, but can be from incompatibility between operational functioning and the building, and perhaps higher annual operating and maintenance costs to be paid by the client. Equally important, these costs can stem from the loss of value in achieving the desired aesthetic or real estate significance from the building over the duration of its use or upon its sale.

Subsequent to accepting a conceptual design and lump sum price proposal, the client will tend to be uninvolved in making decisions in the design, contracting and construction which can affect the functionality, aesthetics and quality of his future building. Also, the specification of materials' quality and design details of the building will be variables in the hands of the designer/builder.

As both the design and construction work is carried out and integrated by people who have very probably worked together on many previous buildings, there tends to be the use of design features from previously conceived buildings which may or may not best serve the needs of the client. Also, there is a probability that design will lean towards fast and easy construction rather than to most appropriate design for user functioning of the building.

(d) VENDOR/PROVIDER APPROACH

Outline Description

The client may have a specific or general need for building space of functional type, and locational needs that have to be met

to house his activities. However, for whatever reasons, he may not want to own the building or participate directly in its procurement. In such a situation, the client may contract with a vendor/provider of buildings to provide him with the building of required features, usually by leasing for a specified number of years. This approach is somewhat similar to a sales/leaseback approach, but it begins with only a written statement of what and where the building will be rather than being the sale and leaseback of an existing building.

In this approach to procuring a building, the client will provide a written building needs statement to the vendor/provider, or they may jointly create that statement. Then the vendor/provider will make a proposal on the specific or general location for the building with a rental statement. He will clearly state what functioning and maintenance costs and taxes will be paid by the vendor/provider and which by the client who is the prospective renter of the specified spaces or whole building.

The success of this approach for the client will depend on his ability, with or without internal or external advice, to make a valid statement of the performance required and sizes of the user spaces in the building and its surroundings. Also, he will have to judge the validity of the rental rate in relation to the value to him and his activities of the spaces and building location.

After agreement between the parties, the vendor/provider will then execute the whole building procurement with land, design, contracting, and construction expertise under his control by one

of or a permutation of the other procurement approaches described in this guide. The vendor/ provider will operate as an entrepreneur who will receive or has contracted to receive a rental rate for the building for a specified period of time regardless of its cost to him.

Apart from the above features the procurement process will be somewhat similar to the design/build approach for both the vendor/provider and the client.

This approach is suitable where the client does not necessarily want a building specially designed to his own specific needs; wants user space but does not want to spend his capital; does not want ownership of real estate or involvement in the building procurement process and is suitable for buildings of a somewhat common type. Rather, the client sees a building as an expense of doing business by his organization for the duration of the lease.

Major Advantages of Vendor/Provider Approach

The building client will not be required to pay the capital cost of procuring his needed building. All capital expenditures and risks will be handled by the vendor/provider as will the whole procurement process.

The client will not have to consider how to dispose of the building when or if it becomes redundant to his needs. Nor will the client have to worry about real estate capital losses at the end of the rented usefulness of the building to the client or

finding a tenant for his unneeded space. The client can focus his energies on the operations of his main business without having the concern of running a real estate and construction division within his own organization.

Major maintenance and repair costs will tend to be handled by the vendor/provider who is actually a landlord to the client. For his own benefit, the landlord may be trying to keep the building in a state of good repair and image to protect his capital investment, hence benefitting his tenant, the client. Towards that same objective, the vendor/provider will look closely at the ratio of (i) capital to (ii) maintenance and operating costs e.g. he may spend more capital on the building to lower the major annual maintenance and operating costs which he will have to pay. That may imply a higher quality of finishes in the building than would be expected from another approach but the above cost ratio will tend to be reflected in the leasing terms offered.

Major Disadvantages of the Vendor/Provider Approach

The client may not have the expertise to properly evaluate the rental rate proposed by the vendor/provider other than to compare it to rents for equivalent generic space. Nor may he have the expertise to evaluate the effect of the conceptual design on the efficiency of the functional operations he wishes to house in the building. Given that the trade off between (i) capital costs and (ii) maintenance and operating costs is expressed in the quality of construction in the building, the client may not have the

expertise to evaluate these matters as a constituent of evaluating the proposed rental agreement and his share of paying maintenance and operating costs. However, the client has to make these choices for his future when using this approach.

Another crucial issue for the client is that the building will be designed to his needs based on his needs statement, but without detailed input and monitoring by his organization in the subsequent design process. Furthermore, the vendor/provider, to some extent, might qualify the design from the specific needs of the client towards a generic design which can be rented to others after the client's rental contract has expired.

The client will not be creating a portfolio of real estate which could be a valuable capital asset to his organization in the future. He will derive no depreciation benefits for his taxes from a building procured by this approach.

(e) CONSTRUCTION MANAGEMENT APPROACH

Outline Description

Overall, the construction manager is an agent of the client, advising and helping him to satisfy his needs from the building project and increase the efficiency of its procurement.

The construction manager will usually be paid a fee for his work just like the designer, and will tend not to have an entrepreneurial interest in the efficiency of the design, contracting and construction processes. This can be a variable for the client

depending on the quality and attitude of the chosen construction manager.

The construction manager may be hired and called upon to advise on construction costs as input to the feasibility study prior to the design process. His success in this type of work will depend on his abilities to handle construction costs in a manner compatible with real estate decisions and the needs of the design process, as distinct from the costing of a future construction process from a given design.

For design, the client will hire a design agent usually about the same time as he hires the construction manager as an agent. He can utilize their services (i) separately, or (ii) give one priority over the other, or (iii) jointly but have them report singly to him. The client's choice from these variations can have considerable implications on the design of the resulting building as well as its quality and construction costs.

To maximize benefits to the building, especially during design, the client should allow himself to be drawn into the triumvirate of client, designer and construction manager. The client should make choices between alternative conceptual designs and design features, each with their qualities, costs and durations of construction implications provided to him by his separate agents.

The major beneficial uses of the services of the construction manager should accrue to the client in the design and contracting phases rather than from his work in the construction process

itself. The normal duties of a construction manager are to advise the client and his design team on construction costs and constructability aspects of the proposed building design as it evolves in the design phase. He will be influencing the design according to the construction budget already set to maximize the value to the client from the building. This will be done by his suggesting alternative constituents in the design to minimize construction costs and durations. He will also watch for expansion of the design scope in relation to the original design scope and construction budget.

Once the conceptual design is complete (with or without input from the construction manager, but hopefully with such advice) and accepted by the client, the designer and the construction manager may expedite design drawings for particular construction contractual packages e.g. site work, substructure, superstructure, or for separate buildings under a multi-building contract. By focussing on those contract packages or buildings which can be executed early in the construction process, the overall procurement calendar duration can be shortened or, at least, the duration of negative cash flow can be minimized. As part of such analysis of the building to contractual packages, the construction manager should also advise on and match them with the capacity and availability of the local trade contractors in order to minimize costs and duration of the construction work. The primary author of the contract documents for all construction packages should be the construction manager.

The whole construction process being carried out by the trade contractors may be (a) managed by the construction manager as a quasi-general contractor or (b) the construction manager will be the client's agent monitoring progress of the traditional general contractor and his team of subcontractors or (c) his duties may be specified somewhere between these two polarities. For effectiveness of procurement, whichever is chosen must be clearly stated to all parties involved including the trade contractors. If the construction manager is to manage the construction process, then the required general site management services work would best be let as one of the many separate contract work packages similar to a trade package.

The construction management approach best serves clients: who have very complicated or large or expensive buildings to procure; buildings in which the details are meaningful to the use of the building; where the site or location could cause considerable construction logistical problems; where either design and construction or both require the services of many specialist consultants and/or contractors whose work has to be coordinated; where there is considerable variety or changeability in the information required from the client's large or dispersed organization; when the client is comparatively lacking in knowledge of building procurement; when the client is interested in having constructability and cost advice in the feasibility study and in the design process; when a reasonably short duration of procurement is desired.

Major Advantages of the Construction Management Approach

The major advantages and benefits from construction management accrue to the client through the combined work of the client, the designer and the construction manager rather than from what the construction manager can do alone for the client.

The client has the services of a construction knowledgeable agent to advise him and the designer on constructability, costs and schedule implications of the design as it is being created and types of construction compatible to budgeted construction costs. Also, the astute construction manager is able to provide realistic costs of construction prior to design inception for input into real estate and feasibility calculations.

Calendar duration of building procurement can be reduced by overlapping parts of each of the design process, the contracting process, and the construction process.

If trust and team spirit exists, or can be created, among the client's team of agents, then expertise from individual agents can be brought to full fruition in service of the client. If even only careful, realistic advice is provided on overlapping design, contracting, and constructing, then building quality may remain high while the overall procurement duration can be shortened under this approach.

The construction manager can advise on analysis of the building for separating appropriate packages of construction to minimize construction costs and to expedite the whole procurement process. Also, this packaging can be related to providing expert

advice on the capability of various local trade contractors who wish to participate on the construction team.

Whether the client is evaluating and buying contracts for the whole construction process from an array of potential general contractors who will manage the whole construction process, or is buying each trade package contract from numerous arrays of trade contractors for each trade or work package to be managed by the construction manager, the client should be able to receive expert construction and contracting advice from his agent, the construction manager.

The construction manager can either be a knowledgeable advisor/monitor for the client during construction and commissioning by a general contractor, or manage the actual construction process as a quasi-general contractor with an array of trade subcontractors. Whichever sub-approach is used for managing construction, the client has his agent involved in managing and advising him as the actual contracting and construction processes occur.

Major Disadvantages of the Construction Management Approach

The construction work, which is the major part of the capital investment by the client, will tend to begin based on an estimate of the capital cost of construction of the building and an incomplete design, contract, and specification. Also, expertise in managing construction or skills in estimating costs of a future construction process are not enough to provide constructability and

construction cost advice in the real estate feasibility and design processes.

The construction management approach is a mixture of similarities and differences from the traditional approach from which most of its participants come, therefore there is potential for confusion among them. Also, as there is potential for choice from a variety of sub-combinations between roles in each of the design, contracting and construction phases, there is considerable potential for problems to occur through misunderstandings among participants. These problems can be made worse if the chosen construction manager is unskilled in management other than in his original area of skills e.g. a general contractor trying to manage design or a design architect trying to manage construction work. Sometimes construction phase experts have difficulty blending into the interactive and iterative design process rather than continuing as experts in the somewhat deterministic construction process and vice versa.

During design there can be problems if the communication pattern among the team of advisors has not been thoroughly and properly thought out, crystallized, and conveyed to and agreed by all parties involved. Also, if the client does not want to be drawn into the triumvirate in the design process, then the beneficial use of construction management is considerably diminished.

If trust does not exist among the client's team of agents in design, or if incongruous trade contracts have been written, or if poor advice is provided on the overlapping of design, contracting,

and construction, then the overall duration of the building's procurement may not be shortened by the expected duration. Also, the quality of the building may be jeopardized by emphasis on construction speed, or construction costs to the client may be increased by claims from contractors who operate early in the construction process and who have to change work already built under their contracted work scopes by the subsequent design of later trade packages.

To some extent, in the contracting phase, the client is substituting the expertise of the construction manager for some of the competitive forces of bidding in the market place.

If the client opts for the construction process to be managed by a general contractor and his team of subcontractors, then lack of definition of the construction manager's specific duties of being a monitor for the client will lead to redundancy, confusion and conflict between the construction manager and the general contractor to the detriment of the client interests.

If the client opts for the construction process to be managed by the construction manager, there may be contractual complications due to discontinuities of responsibility among all roles involved in construction. Where the trade contractors are contracted with the client, but are being managed by the construction manager who is an agent of the client but not entrepreneurially involved in the construction process creates one set of potential problems. Where the trade contractors are contracted with the construction manager, but who is only the agent of the client rather than being contract-

ually and entrepreneurially responsible for the whole construction process to the client creates the potential of a different set of problems. In such ill defined circumstances, it may be that only trust and goodwill (or ignorance) among the parties fulfilling the roles have enabled the completion of the construction process and overcoming these discontinuities in contractual relationships under either situation. Under construction management, without such trust and goodwill, there can be greater potential for losses to the client and all participants from disputed contractual situations in the building procurement process.

(f) PROJECT/PROGRAM MANAGEMENT APPROACH

Outline Description

A client may choose a project or program manager to be his prime agent in managing the whole procurement process for him. The major function of the project or program manager is to help expedite and appropriately coordinate the work of all experts whose input is required to successfully complete the major phases of procurement. His task is to manage the procurement through the various professional experts required in the potential complex interactions among all required sub-phases of all the major phases of the procurement process described above.

This project manager is a manager of the whole procurement process for the client. He may extract needed information from the client's organization or present alternatives to the client for his choice at numerous points in the procurement process. The

project manager may help select the various professional agents and contractors for both the design team and the construction team. He may also be involved in selecting the most appropriate approach to procuring each phase of the procurement and may select a procurement process which is one of or a permutation of the other approaches presented in this guide.

Much of the work of the project manager is to ensure that the required work of each specialist in design, contracting and construction does his work with little time lost between his work and the work of all other experts who worked before, after, and simultaneously with him. He will also try to minimize redundant information flows and iterations among these required experts, while ensuring that what is required does occur expeditiously.

The use of such a project manager may be more beneficial to the client when there is a program of many somewhat similar buildings to be constructed. Each building project should be best managed by a specific procurement approach, but within the context of efficient execution of the whole program of buildings. However, there will be advantages to the client with such a program of buildings if a common managerial process has been created and is used on each building within the program. Thus there can be a project manager to expedite and coordinate each building, while the work of all project managers is coordinated within the whole program of buildings by a program manager.

This approach is useful when the procurement of the building is needed to match a strict timetable for its completion and when

the client does not have his own in-house building procurement expertise to expedite the process. It is suitable for a building comprising a number of somewhat similar parts which can be treated as separate buildings to be built simultaneously or in sequence. It is useful when the client has a large budget available but is required to put into service a number of somewhat similar buildings in a comparatively short duration.

Major Advantages of the Project/Program Management Approach

By having a project manager who is knowledgeable of building procurement phases, the client can expedite the whole procurement process. The whole procurement process can be faster and more accurate by minimizing calendar time losses between required activities, and minimizing overlooked essential ingredients in all aspects of all procurement phases which may hold up subsequent phases. Where the project/program manager has expertise and experience in the type of building to be constructed or with the clients organization, he can add to the quality of the building and efficiency of the procurement process. This is especially valid as input to the design and contracting sub-processes.

If there is a program of a number of somewhat similar projects, it is advantageous that each phase of each building be managed in the same pattern. There can be duration savings and lower administrative cost advantages by using a program manager to set up such a system and control the program of buildings in this way. Each such building should have a project manager leading it

through its preset program of procurement. The lessons learned in designing, contracting and constructing the buildings early in the program can be more quickly utilized in the later buildings.

Major Disadvantages of the Project/Program Management Approach

This process adds at least one additional layer of management on top of all the required design, contracting and construction experts between the client and the necessary design professionals, agents, and contractors. If the project manager lacks knowledge of design and construction procurement but is involved, in these processes, the client may not receive the expected efficiency benefits to offset the communication filter losses and costs derived from that extra layer of management. The project managers may inhibit the work of the various design and construction agents and contractors or even put too great an emphasis on program organization efficiency or calendar time speed rather than on quality of work in creating the most appropriate building for use by the client.

The use of a program manager creates a second additional layer of management between the client and each building's basic procurement process. This further extends and filters the lines of communications between (i) the client and his organization with (ii) the necessary agents and contractors carrying out the design, contracting and construction of his building.

Regardless of these additional layers of management, all of the major procurement phases and processes still have to be carried

out for each building and could, and should, fit under the umbrella of the project manager (and the program manager) should they be employed.

X GENERAL SUCCESS FACTORS FOR CLIENT

(a) Needs From The Building

Very early in the procurement process the client should clearly establish his requirements from the building. That should include: functionality of use, aesthetic image, price, delivery duration, quality of materials, economic profitability, store of capital, use longevity, and even potential tax benefits. This needs statement should include negative features that should not appear in the building as well as the more obvious positive needs which should be in the building.

Most clients want a permutation of these abstract and concrete benefits, but they would be well advised to establish a list of all benefits they seek from each building. Clients should clearly establish and state the relative weightings between such interactive benefits and features so that as clear a target as possible can be provided to his agents and advisors by the client.

This clarity of objective can be created within the client's organization or in conjunction with consultant advisors who may or may not become part of his procurement team. This clarity of objective should exist through all phases and sub-phases of procurement and is especially important in the earlier phases. This needs objective should be known by all participating agents of the client. By regularly focussing on this clear objective, there will be a minimum of unnecessary changes in work already completed, the procurement process can gain momentum rather than stumble along, and quality can be maximized and duration minimized.

(b) Quality of Agents

The client will have to live with the building's abstract and concrete benefits and inefficiencies over its life. Usually, the more complicated the building or the more divergent it is from the types of buildings normally handled by the client, the more reason the client should seek additional advice from specialized agents. At an extreme, even with a somewhat simple building, if the client is unfamiliar with the building procurement process, he should ensure that he receives advice from an expert agent rather than rely on muddling through such a major capital investment by himself with contracts with entrepreneurs who are carrying out parts of the work.

For the efficient and successful procurement of a building, the quality and knowledge of individual people operating in the chosen procurement process, are at least as important as the differences between the various procurement process approaches. Within the specific approach chosen, the client should examine and ensure the reality of the required high quality of the capabilities of each person performing major work for him in an agent's organization.

The client should try to blend these individual expert agents to a team approach regarding their interactions and relationships while working for him. He should ensure that expertise in building procurement is in the qualifications of those agents closest to him.

(c) Communications Patterns

It is advantageous to the effectiveness of the whole procurement that the flows of (a) information/communication, (b) authority and (c) money between all the parties involved, follow the same pattern. While there can be slight variations in the common pattern of these flows, major variations from a common pattern will inhibit effectiveness and efficiency of work execution in and between procurement phases and among the participants. This common pattern of flows should match the carefully chosen sub-combinations of roles to carry out the design, contracting and construction phases of procurement.

As a constituent of the above communications pattern, the client should set up a single source to and from his own organization through which passes all information between his organization and whatever procurement process he has chosen to use. No intake or output of information for the building should be tolerated through any other information source in his own organization. The client should also try to ensure that all other roles only provide or receive information within the lines of communications set up by his choice of pattern within his procurement process.

The client should clearly state the degree and position of his own involvement in the procurement process. It is essential that the client be deeply involved in establishing the building needs statement and in carrying out the feasibility study with or without consultant agent advice. This client involvement is also

beneficial and desirable during, at least, the early parts of the design phase and formulating the contracting documents.

(d) Parameters and Process of Monitoring Procurement

The three major parameters of monitoring procurement should be duration, cost, and quality of the building. Prior to beginning procurement, the client should set up in his own mind, the ratio he desires between these three parameters.

While cost and duration tend to come from the building being designed and constructed, quality tends to come from the needs and desires of the client and his agents. The agents will take their quality cues from the client, hence, it is the client who is the primary source of the desired quality of the building. He should input his desired quality standards to all sub phases of procurement and also monitor that his desired quality is being included in his building.

As early as possible in whichever procurement process the client chooses, he should, with the advice of his agents, set up a duration monitoring framework for the desired procurement. Adequate but tight durations should be set for each sub-phase and main phases of the chosen procurement approach. At the end of each sub-phase or work component in that monitoring plan, a calendar milestone should be established. When actual time reaches a milestone, actual progress should be checked against the plan to ensure coordination at these calendar dates. The client's primary agents may be called upon to report progress more frequently than

these milestones, but such calendar dates should be established at the beginning of the chosen procurement approach as the framework of duration monitoring.

Required quality will be established in the project needs statement and feasibility study and its status in the actual building should be regularly monitored at each time milestone throughout the design, contracting, construction, and commissioning phases. Special attention should also be paid to the scope of the building, i.e. the volume and quantity of the building as well as its quality, at each milestone. Scope expansion creep can be a problem and cost budget and duration targets may have to be changed to make the scope change. By making these milestone monitoring checks, the level of mental discipline can be maintained among all participants in procurement.

Realistic construction costs, and costs of procurement, can be predetermined by the client or established as part of the feasibility study. At each subsequent milestone check through the design, contracting, and construction phases, the original construction budget should be used as the datum against which to compare the latest available expected costs. It should be the party with entrepreneurial responsibility who decides to hold to or to change the datum building scope and cost against current information.

Required quality and cost of the building tend to be somewhat interactive and both are affected by the duration given to each sub-phase of procurement. Therefore, it is wise to monitor the

status of both quality and cost at all duration monitoring milestones established for the procurement process.

XI CHOOSING A PROCUREMENT APPROACH

By understanding (a) the overall procurement process with the constituents of its major and minor phases and (b) each major alternative procurement process with its (i) sub-processes, (ii) advantages, and (iii) disadvantages, and relating these to (c) the nature of the building to be procured and (d) the current situation of (i) the client and (ii) his needs for that building, the client can make the best choice from the described alternative procurement processes for that building.

In the above, (c) and (d) are current variables in the activities of the client, but (a) and (b) are relatively fixed from the nature of the overall design and construction industry.

This guide has provided a description of (a) and (b) so that the prospective client can make the best choice of an alternative procurement process in whatever current situation he is placed.

** The End **