HOW TO TAKE THE GUESSWORK OUT OF YOUR BUILDING PROJECT

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Introduction

Most building projects start with a simple realization -- "We need more space..."

Getting that space isn't simple, however. Because constructing or remodeling a facility is a major investment, and because most companies occupy a building for many years, the decisions you make now are among the most important you will ever make.

A quick, arbitrary decision to build based on incomplete information or a whim could be a financial disaster for your firm. Millions of dollars have been wasted by companies stuck in buildings that aren't what they need, cost too much to build, or that shouldn't have been built at all.

They didn't know what this report will tell you -- how to take the guesswork out of your building projects.

Basic Questions

Five basic questions must be answered before you can determine the feasibility of any building project:

What do you need?

How do you want it to look?

How soon do you need it?

Can you legally build it?

How much will it cost?

In order to save time, money and aggravation, answer those questions fully before committing to a solution to your needs. Outside consultants, like architects, engineers or contractors can help you find the answer but it is important that **you** determine the answers.

Obtain information and as you begin to form decisions, write them down! Until you write things down, plans are just free-form ideas. Written ideas become the plan that others can execute for you.

A written plan which expresses what you want and how much you can afford to spend will allow the proposals and bids you receive to be based on identical information. You will be comparing apples to apples when you compare bids.

Then you can evaluate and analyze the information you receive and select the best way to proceed.

WHAT DO YOU NEED?

Summary

The first and perhaps most important step in your building project is to decide exactly what you need. This section will help you address a number of issues. In several instances, we have provided check lists or work sheets to help you make your decisions. Complete these and give them to your architect. They will give him key information with which to begin the design.

The areas discussed in this section are:

Intended Use

What functions will your new building serve--now and in the future?

Site

The selection of the location for your building is probably the key decision. You will want to investigate these issues:

A. Access
B. Size
C. Zoning
D. Characteristics
E. Cost

Existing Buildings

Can you use an existing building? There may be some advantages in either cost or location, but it may be hard to get a good fit or to pin down final costs.

Activities In The Building

List the activities which will take place in your building, and consider how they relate to each other.

Determining Needed Space

We give you some rules of thumb and a worksheet to help.

Space Planning Worksheet

Space Saving Options

Alternative space utilization systems can save construction dollars.

Environmental Controls

Different activities have different requirements. Factors to consider include:

- Power
- Lighting
- Communication
- Heating, Ventilation and Air Conditioning (HVAC)
- Water and Sanitation
- Special Needs for Computer Rooms
- Clean Environments

Smart Buildings

Although smart buildings cost more initially, the extra investment can be offset by reduced operating costs.

Easily Overlooked Areas

Some areas are overlooked because they are taken for granted, but they will affect costs.

Special Facilities and Features

Does your business require special facilities that must be included in your design?

Safety Features

Building codes and the nature of your business will dictate certain safety features.

Security Features

There are a number of security features you may want to consider.

Intended Use

The first step is to describe the present and future functions of your new building.

Bring your department heads, plant engineers and others together to brainstorm about your new building's functions. Talk with the people who work throughout your company -- they have ideas about how to design their areas to operate at maximum efficiency.

Later, you can always throw out impractical ideas from these discussions; but, when construction is under way, you can't always add something you forgot.

If the use will change in the future, decide whether needed space or features can or should be included in the current building project, or whether you will have to expand again. Foresight is much cheaper than hindsight.

	REQUIRED AREA		
INTENDED USE	NOW	5 YRS	10 YRS
Office Space			
Warehouse Space			
Sales Space			
Manufacturing Space			
Research Or Lab Space			
Show Room			
Training Room			
Other			

Site

The selection of the location for your building is probably the key decision. It will affect nearly everything else that you decide; and once the selection is made, it cannot be changed without a great deal of time and expense. You will want to investigate these issues:

A. Access
1. Quality of adjacent road systems.
2. Proximity to major traffic corridors.
3. Proximity to interstate highways, rail, airport, and freight terminals.
4. Proximity/convenience to employees.
5. Availability of electric, water, sewers, telephone, gas, etc.

B. Size
1. Area and dimension adequacy for building and vehicular requirements.
2. Adequate land for setbacks, green space, and easements.
3. Adequate room for expansion.

C. Zoning
1. Permitted uses of the land.
2. Requirements for setbacks and green space.
3. Parking and loading/unloading requirements.
4. Height limitations.
5. Zoning of nearby land.
6. Deed or development restrictions.
7. Sign, fence and outdoor storage limitations.

D. Characteristics
1. Topography
2. Previous land use
3. Compatibility of adjacent land uses.
4. Drainage
5. Orientation to wind, sun, views.

E. Cost
1. Cost of the land.
2. Cost of improvements.
3. Cost to maintain.

Existing Buildings

The selection of an existing building and site can be an easier way to proceed if you can find a facility just like the one you might build. But it can also be more difficult if your criteria are numerous or specific. You will need to analyze the building's location in terms of the site criteria listed previously. You will also need to evaluate its potential according to function, appearance and cost.

The advantage of an existing building almost always boils down to either lower cost or ideal location. Because your criteria will usually be both numerous and specific, it will take a lot of "shopping" to find a good "fit" for your needs. Where the existing facility requires remodeling or renovation, the final cost will be very hard to pin down early in the process. A contingency of as much as 25% is usually necessary to cover the unknowns that invariably crop up, such as:

1. Structural deficiencies
2. Deteriorated roofing
3. Uncharted utilities
4. Building code deficiencies
5. Forgotten underground conditions

Activities In The Building

Because most buildings house several functions, you must consider:

- How those functions should be arranged;
- How each function relates to the others;
- Whether special construction is required for specific functional areas;
- What furniture or equipment is needed in each area.

Develop a plan of the activities you will need to house -

List them.

Diagram them

Try to visualize traffic patterns within and between areas that you will need.

If your new building will be used for light assembly or distribution, a one-story structure may be appropriate. If it will be used for processing paperwork or data, a multi-level structure that covers less ground may be preferable.

Remember that some functions must be closer to the outside of the building than others--incoming material handling, shipping, and customer service for example. Proper location of these functions is fundamental to the success of your building project.

Determining Needed Space

To estimate how big your new building should be, you can generally use the following rules of thumb:

- 250 square feet per employee for office space.
- 1,000 square feet per employee for manufacturing.

Included in those figures are allowances for walls and aisles. You also need to allow for various auxiliary spaces:

- 100-300 square feet for each toilet area (male & female)
- 200-400 square feet per stairs per floor (2 are usually required)
- 100-300 square feet for janitorial space
- 200-400 square feet for mechanical and electrical equipment

For parking, you will need an area 1.5 to 2.5 times as large as your office building; or 0.33 to 0.66 times as large as your manufacturing facility.

If after considering all the factors your current and future needs are unpredictable or initially less than 10,000 square feet for manufacturing or 3000 square feet for offices, it may be preferable to lease space.

Preliminary Space Planning Worksheet

OFFICE SPACE:

Number of employees.._____..X..250 S.F. = _____[1]

MANUFACTURING OR ASSEMBLY SPACE:

Number of employees..____..X..1,000 S.F. = _____[2]

AUXILIARY SPACES:

Toilet areas

No. employees..X..0.01..X.. 400 S.F. = _____[3]

Stairs

No. floors..___..X..400 S.F. = _____[4]

Janitorial & Building Supplies

100 S.F.(min) or 1% of area in [1] above = _____[5]

Mechanical/Electrical Equipment

100 S.F...+..1% of area in [1] above = _____[6]

Total Auxiliary Area (sum of [3] thru [6]) = _____[7]

==========

TOTAL BUILDING AREA (sum of [1]+[2]+[7]) = _____[8]

PARKING REQUIREMENTS

Office Parking Requirements:

Office Area [1]..X..1.75..=...._____[9]

Plant Parking Requirements:

Plant Area [2]..X..0.5..=……._____[10]

TOTAL PARKING AREA (sum of 9 + 10) =_____[11]

SITE REQUIREMENTS

Office [1] + Aux.[7] divided by no. floors =_____[12]

Plant Area [2] = _____[13]

Parking Area [11] = _____[14]

Future Expansion Area

[12]+[13]+[14] X ___% Growth Planned.=_____[15]

Open Area [12]+[13]+[14]+[15] X 0.35 = …….._____[16]

TOTAL SITE AREA REQUIRED..... _____S.F.

{1 ACRE = 43,560 S.F.}

_____ACRES

Space Saving Options

Alternative space utilization systems can save construction dollars because they maximize efficient use of space. They are designed for many different functions, such as record-keeping for offices, and material handling for manufacturing. Some of these systems include:

	NOT APP.	USE NOW	PLAN FOR	RESEARCH	
MICRO-FICHE	[__]	[__]	[__]	[__]	
CONVEYORS	[__]	[__]	[__]	[__]	
ELEVATORS AND LIFTS	[__]	[__]	[__]	[__]	
CRANES	[__]	[__]	[__]	[__]	
MATERIAL HANDLING SYSTEMS		[__]	[__]	[__]	[__]
AUTOMATED STORAGE/RETRIEVAL		[__]	[__]	[__]	[__]
OTHER AUTOMATION SYSTEMS		[__]	[__]	[__]	[__]
OPEN OFFICE PLANNING	[__]	[__]	[__]	[__]	

Another way to save space and money, is to locate resources such as toilets, storage, stairs, conference areas, training rooms, special utilities, and other features so they can be used by several departments or functional areas.

Environmental Controls

Different functional areas have different requirements for power, lighting, communication and heating, ventilation and air conditioning (HVAC).

Some businesses, like electronic component manufacturers or users of certain types of computers, must have strict environmental controls for humidity, temperature and air purity.

Factors to be considered are:

Power

- Power types and consumption for each space;
- Equipment used in each area;
- Power transmission by cable or conduit;
- Allowable voltage variances;
- Emergency power;
- Uninterruptible power source (UPS) system;
- Amount of flexibility needed in power access;
- Viability of a modular power system.

Lighting

- Light level required in each space;
- Methods of control (e.g. switch, circuit breaker or automatic);
- Type of light in each space (e.g. natural, color-controlled, non-glare, dramatic, uniform, highlight, indirect, adjustable);
- Type of ceiling used and aesthetics of lighting devices;
- Flexibility desired;
- Modular design such as a power grid, with pigtail connections for moveable lights.

Communication:

- Number of stations;
- Number of lines for data and for telephone;
- Long distance lines such as usage recording, WATS, 1-800 and 1-900 service;
- Special features, like those found in sophisticated phone systems, including intercom, programmable dialing, conferencing, message indicator, speakers, and expandability;
- Other considerations (e.g. fiber optics trunk cable, with or w/o branch cabling);
- Switchboard vs. direct line for incoming calls;
- Security system tie-in.
- Teleconferencing

Heating, ventilation and air conditioning (HVAC):

- Temperature and humidity ranges desired in each space;
- HVAC and environment-controlled zones;
- Desired degree of control over HVAC and environmental factors such as dust, air purity and static electricity;
- Future needs;
- Energy sources available - gas, electricity, coal, oil, solar, and wood.
- Is cooling required? In what parts of the facility?
- Is a central plant more desirable than remote units?
- Would a heat recovery system be practical?

Water and sanitation:

- Needs in various spaces--offices, manufacturing, dining and kitchen.

Special needs for computer rooms:

- Static control;
- Temperature control;
- Humidity control;
- Power control;
- Back-up power;
- Type of computer (main-frame, mini, micro);
- Network within the building (Local Area Network - LAN).

Clean environments:

- Laminar air flow for required air purity level;
- Separate humidity, temperature, static and dust controls;
- Vestibules, air showers & positive air pressure.
- Filtration of incoming and outgoing air.

Smart Buildings

"Smart buildings" are equipped with computers and sensors that manage peak loads and use of energy, telecommunications, data processing and security. They operate within a pre-determined, programmable set of priorities, limits, and schedules.

Although smart buildings cost 5 to 15 percent more initially, the extra investment can be offset by reduced utility, maintenance and remodeling costs in three to seven years.

Easily Overlooked Areas

Some areas of a building are overlooked in the early design stages because they are taken for granted. But they do take up space and therefore affect the cost of your building:

- Toilet rooms;
- Coat storage and locker rooms;
- Corridors and stairs;
- Mechanical equipment rooms;
- Electrical and telephone equipment rooms;
- Coffee and lunch areas;
- Fire-proof storage;
- Sprinkler riser rooms;
- Handicapped access; and
- Storage... storage... storage.

Special Facilities and Features

Does your business require special facilities that must be included in your design?

Educational, teleconferencing, audio-visual areas, and showrooms can often be combined to save space, depending on the frequency of their use.

Other areas and features may be critical to your daily production operations. Remember to consider:

NEED	NOT APP.	
[__]	[__]	COMPUTER ROOM
[__]	[__]	INTERIOR DOCK(S)
[__]	[__]	CRANES
[__]	[__]	MONORAIL
[__]	[__]	CLEAN ROOM(S)
[__]	[__]	HIGH BAY AREAS
[__]	[__]	CATWALKS
[__]	[__]	RAIL DOCKS
[__]	[__]	LONG CLEAR SPANS
[__]	[__]	SUPER FLAT FLOORS
[__]	[__]	RACK-SUPPORTED BUILDING
[__]	[__]	DEEP MACHINE FOUNDATIONS
[__]	[__]	PAINT SPRAYING FACILITIES
[__]	[__]	UNDERFLOOR UTILITIES
[__]	[__]	ACCESS FLOORING
[__]	[__]	AIR-MAKE-UP SYSTEMS
[__]	[__]	HAZARDOUS MATERIAL STORAGE/DISPOSAL
[__]	[__]	OTHER:

Safety Features

Local building codes may require new construction to include some safety features, like minimum corridor widths, fire extinguishers and emergency exits. Other safety features and special construction devices are dictated by the size of the building and the types of work being done in your building. For example:

- Sprinklers;
- Fire pumps;
- Deluge sprinklers;
- Dust removal;
- Fire walls & fire doors;
- Smoke removal;
- In-rack sprinklers;
- Halon system.

Special Construction may be required if your building will house large numbers of people, stockpiles of combustibles, combustible dust, fuel gas, flammable materials or explosives.

Security Features

Some firms need extensive security because of the sensitive nature of their business. Others simply wish to provide additional protection for their facility or employees. Security features to consider include:

NEED	NOT APP.	
[__]	[__]	LIMITED ACCESS AREAS
[__]	[__]	ALARM SYSTEM
[__]	[__]	MOTION DETECTORS
[__]	[__]	KEY OR CARD ACCESS SYSTEM
[__]	[__]	FENCING
[__]	[__]	GUARDS/CHECKPOINTS
[__]	[__]	SCREENING
[__]	[__]	AUDIO MONITORING
[__]	[__]	CLOSED CIRCUIT TELEVISION
[__]	[__]	EMPLOYEE LOCKERS
[__]	[__]	SUPPLIES LOCKER
[__]	[__]	SAFES/VAULTS
[__]	[__]	_____

CAN YOU LEGALLY BUILD IT?

Summary

Before you get too far along in your building project, there are a number of legal issues which must be addressed. This section discusses the following:

Land Ownership
If you don't own land, you will have to acquire it, by purchase or lease. You will need a surveyor and a lawyer to ensure that your interests are served.

Zoning
Zoning can stop your project, so you must find out whether you can build what you want to build where you want to build it.

Building Codes
Building codes establish minimum requirements of performance and construction of your building.

Permits
Permits from local government are needed at several stages during planning and construction. This section lists types of permits, the authority which grants the permit, and the requirements for the permits.

Special Codes
Other codes may apply to your building.

Nuisance and Civil Laws
Beware of actions by which third parties may be damaged.

Land Ownership

If you don't own land, you will have to acquire it, either by purchase or lease.

Either way, you will need a surveyor to uncover existing easements and restrictions such as a flood plain, drainage problems, and severity of the site's topography.

You should have a lawyer to help you uncover deed restrictions, industrial park restrictions and liens against the property, and to prepare and to interpret deeds, leases and mortgages. This will ensure that your interests are served, now and in the future.

Zoning

Because zoning can be complex, and because it can stop your project, find out whether you can build what you want to build where you want to build it as early in the planning process as possible.

Even if you don't anticipate any major problems, knowing what you're up against will allow your lawyer and other consultants to plan ways to get around any obstacles before they become barriers.

If zoning restrictions exist that will stop your building project, you must modify your plans to work within those restrictions, or work to have the restrictions changed.

Zoning restrictions are established by local governments, based on criteria such as existing land uses, desired land uses, traffic patterns, population density, existing community resources, and availability of utilities.

Although zoning can be changed because it is political in nature, it rarely is changed simply because the owner of a specific piece of property can increase the development potential of his land. That isn't perceived as a community **planning** consideration.

Zoning regulates:

- land use;
- types of structures and businesses located in specific areas;
- exterior activities;
- parking and loading/unloading facilities;
- access points and curb cuts;
- traffic patterns;
- size, type and location of signs;
- size, type and location of fences.

To minimize or avoid zoning problems:

- ensure that someone in your organization is in charge of maintaining compliance;
- learn local restrictions and design around them;
- obtain variances or conditional-use permits and work within those constraints;
- pursue a planned unit development or a phased zoning concept;
- or work to get the zoning changed.

Building Codes

Building codes protect the health, safety and welfare of your employees, customers, area residents and others who come in contact with your building. They establish minimum requirements of performance and construction of your building.

Although building codes are often enforced by local agencies, they are usually established by the state. Changes and variances are rare. Be careful of negotiating variances--they can come back to haunt you later.

Can you Legally Build It?

Building Codes regulate:

- Construction types;
- Use group classifications;
- Building height and area restrictions;
- Fire limits;
- Special use requirements;
- Lighting and ventilation;
- Exits;
- Structural loading;
- Material quality standards;
- Fire resistance requirements;
- Mechanical equipment and system characteristics;
- Fire protection and sprinklers;
- Electrical systems;
- Plumbing systems;
- Elevators;
- Energy use and insulation;
- Handicapped accessibility.

To minimize or avoid building code problems, consider:

- The lowest-cost construction type that will satisfy codes;
- A higher-cost construction type than required in order to save costs in future expansions;
- Sprinkler systems;
- An accessible perimeter around your building;
- The unlimited area requirements for one story buildings;
- Mixed-use options;
- Separate structures for different functions;
- Double ceilings;
- Corridors serving fewer than 30 people;
- Monitored sprinkler systems in lieu of rated corridors;
- Phased permits.

Permits

At several stages during planning and construction, you will need permits from local government to proceed to the next phase. (Note: Fire departments rarely have jurisdiction during the permitting process. This is a recent change.)

Stage	**Permit**	**Authority**	**Requirements**
Planning	Zone change or text amendment	City or local after county review	Application, fee, concept drawing
	Encroachment (if on state or federal highway)	Dept. of Transportation	Application, site plan, bond
	Dimensional Variance or Change of Non-conforming Use	Local Board of Adjustments	Application, fee, hearing
Pre-construction	Zoning Permit	Local zoning authority	Application, fee, site plan
	Building Permit (often can be phased by request-ing approval of site/foundation, then building shell then final building permit)	Usually state, sometimes local building inspector, or both	Complete working drawings from architect or engineer, based on size and use
Pre-Occupancy	Certificate of Occupancy	Building Inspector	Final inspection of: building plumbing electric boiler

Special Codes

Your building project may have to conform to other codes as well, including:

Environmental Protection Agency (EPA), which regulates:

- Emissions of smoke and fumes;
- Disposal of solid and liquid wastes, toxic and non-toxic.

Life Safety Code for:

- Many new and existing buildings:
- Hospitals;
- Nursing homes;
- Day care centers;
- Out-patient treatment centers.

Occupational Safety and Health Administration (OSHA):

- Worker safety (paint spray, electricity, flammable materials);
- Equipment safety (guards, clearances, operating controls);
- Building safety (steps, ladders, exits).

National Fire Protection Association Codes:

- Paint spraying;
- Flammable and combustible liquids;
- Liquefied petroleum gases;
- Dipping operations;
- Combustible dusts.

Nuisance and Civil Laws

Even though you comply with all of the codes and requirements listed above, neighbors and other third parties may still claim damages from your actions. Use common sense when planning your building, and give consideration to the impact that your development will have, such as: appearance, noise, odors, contaminants, drainage, and traffic. Beware of these inconspicuous, potential problems.

HOW DO YOU WANT IT TO LOOK?

Summary

Any style of design can be used for your building, but you must give it careful thought. This section discusses the following:

Image
Your building will convey an image, and you should decide what that image should be.

Design and Cost
The design of your building and the materials used will affect the cost. There are also ongoing maintenance costs to consider.

Interior Considerations
These cost factors are especially important when considering your interior design style, because the interior requires more frequent maintenance than does the exterior.

Image

Any style of design can be used for your new building, but it should be selected with careful thought about the:

- Image you wish to convey;
- Building's location and compatibility with the area around it;
- Durability of desired finish material;
- Level and ease of maintenance of the style selected.

Although a one-story warehouse obviously cannot be designed as a twin for your glass-enclosed headquarters tower, your new building can improve, change or reinforce your company's image. So think of your building as a marketing tool, making an impression on both your clients and the community. A new facility can also be a source of pride and motivation for your employees.

Your building can convey any image: rustic, high-tech, elegant, practical, classical, organic, simple, complex, inviting or powerful. It's important that you don't leave too much to the architect because you know your company better. You may want your building to be traditional, contemporary, high-tech or simply functional in design. Or perhaps you prefer a combination of those or other styles.

Keep in mind that the appearance of your building must not interfere with its function. And the style of its interior should be compatible with the exterior. Rooftop equipment and other outside service equipment or areas can be visible or hidden. Specify your preference. The exterior can be glass, brick, stucco, concrete, metal, or any other finish which gives you the appearance you're after.

Design and Cost

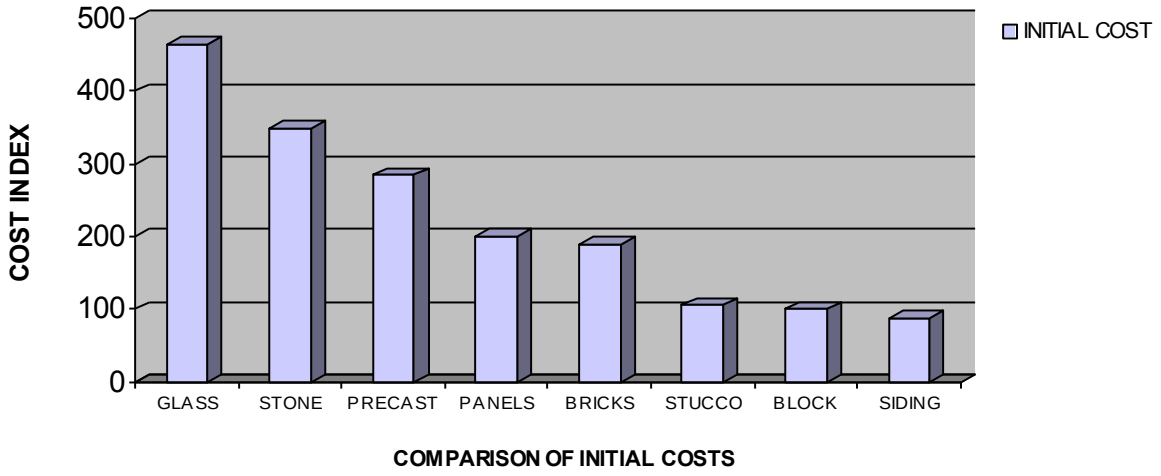
Although few hard and fast rules exist about building aesthetics, several assumptions can be made about design and cost:

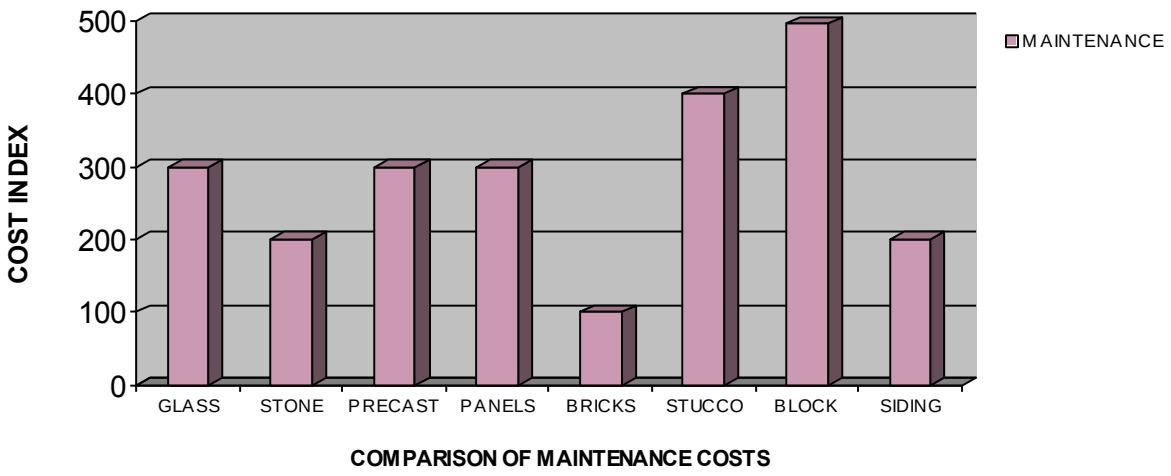
- Some materials cost more than others
- Some materials become expensive when used in certain ways
- Simple designs generally cost less than complex designs.

A building's shape and exterior wall profile will affect cost--the more complicated it is the more it will cost. However, a building could be designed as a series of connected, repeating modules for a complex look at nominal additional cost.

Truly authentic traditional design features are also expensive because they represent construction techniques of a bygone era. The craftsmanship required to reproduce those features comes at a premium.

Finally, some features have a high initial cost, but little ongoing maintenance cost. Others require little initial investment, but are costly to maintain and repair. You must weigh these competing factors.

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STUCCO
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SIDING
MAINTENANCE
COMPARISON OF MAINTENANCE COSTS

Interior Considerations

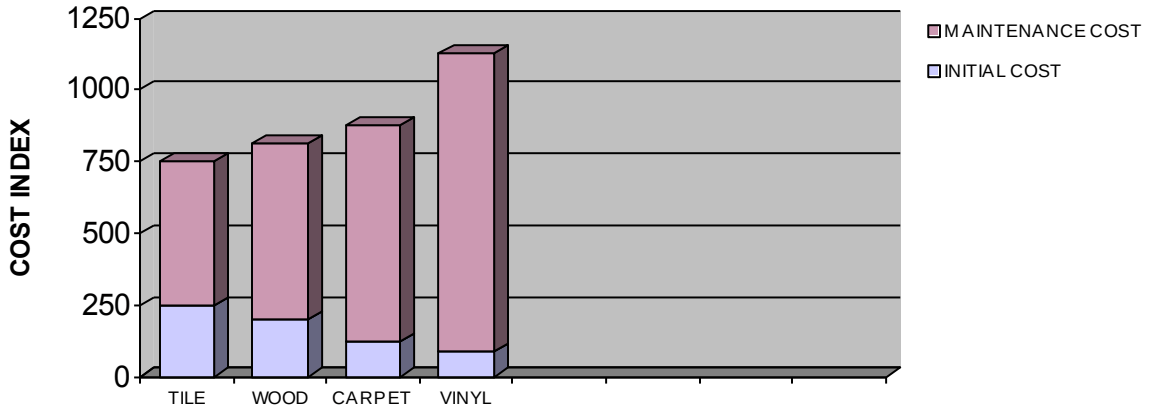
Initial and maintenance cost factors are especially important when considering your interior design style. The interior of a building generally requires more frequent maintenance than does the exterior, because it comes in daily contact with people and activities.

The use of exterior-type materials on the interior can create a feeling of permanence and solidity, but at a higher initial cost.

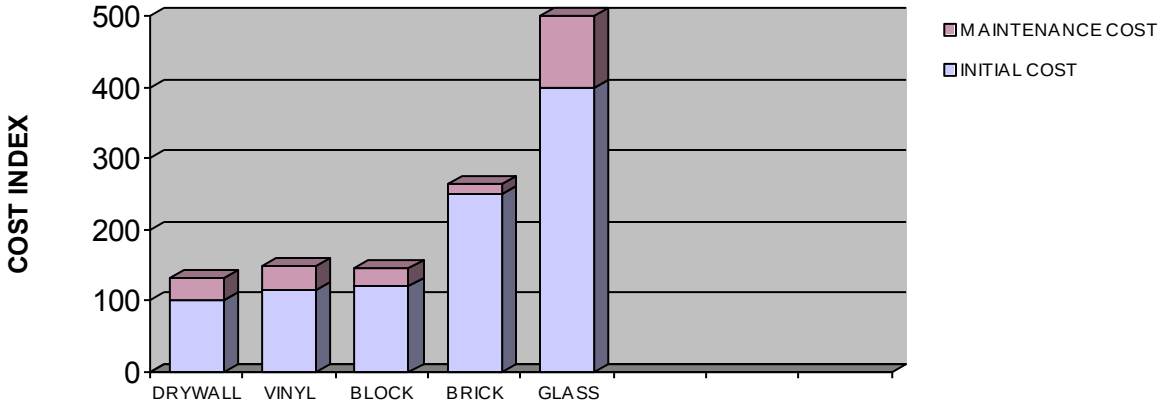
Most low maintenance materials are more expensive than high maintenance materials. But there are also utilitarian low maintenance materials from which your design could be created.

Some materials are both expensive & high maintenance, such as glass.

Demountable cubicles are more expensive than drywall partitions but they can often be moved around without the use of outside help. They can also be "expensed" rather than depreciated. Power and lighting require special attention when cubicles are used.



COMPARISON OF FLOORING COSTS OVER 5 YEARS



COMPARISON OF PARTITION COSTS OVER 5 YEARS

The interior of your building can make an even more powerful impression on your clients or customers. Few of us have enough knowledge of how exteriors are created to truly appreciate them. However, we all have lived and worked in spaces that we have "customized" - if not created.

Make sure you think beyond the practicality of cost and layout so that your interior makes the proper statement for your company.

Many architects are adept at interior design; but, if your requirements are demanding, you may need the services of an interior designer.

HOW MUCH WILL IT COST?

Summary

All of the factors discussed so far affect the cost of your project. This section discusses the following cost-related issues:

Setting The Project Budget
Included is a list of items which should be included.

Sample Project Budget

Other Costs
There are costs after the building is complete, such as operating expenses.

Financing Construction
Several sources of funding may be available for your building project.

Cost-Saving Strategies
Your architect can help you find cost saving strategies for your new building.

Sample Construction Cost Estimate
To aid in your own costing, we have included cost estimates on a sample project.

Setting the Project Budget

You do get what you pay for.

Although you shouldn't spend more than you can afford, plan ahead. Don't ignore future needs without considering what that will mean 2, 5 or even 15 years from now.

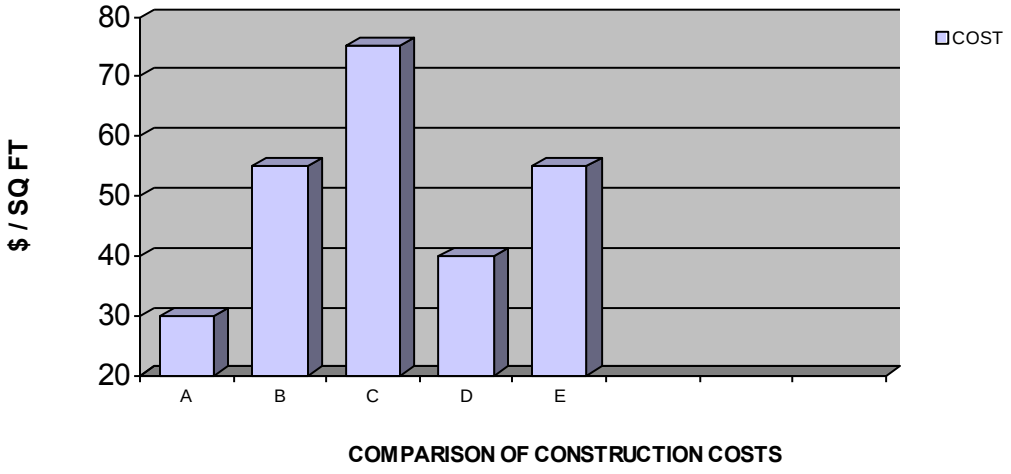
All of the factors discussed so far--building use and features, legal considerations, appearance--affect the cost of your project.

Many variables go into setting a construction project budget. It's more than just the cost of putting together bricks and mortar. Remember:

- Site acquisition, if you don't have land;
- Site work like grading, drainage, utilities , parking and landscaping;
- Degree of finish (roughed-in vs. completed);
- Special systems and features (computer rooms, super-flat floors, deep machine foundations);
- Durability and material quality;
- Building height (multi-story structures are more expensive but can be more efficient);
- Number of doors and windows;
- Extent of interior partitioning;
- Storage requirements;
- Utility construction (water lines, sewer lines, electric power substations and transformers);
- Permits and inspections;
- Testing; (soil, concrete, roofs, pavement)
- Blueprints;
- Architect's and engineer's fees;
- Artist's sketches.

The chart below shows how the major component of the project budget--construction cost--varies by building use.

KEY: -A-INDUSTRIAL
-B-COMMERCIAL
-C-INSTITUTIONAL
-D- RETAIL
-E-RESIDENTIAL



Sample Project Budget

The following will give you a general idea of how to arrive at a budget for your project.

ITEM	BUDGET	$/UNITS	QUANTITY
LAND	$300,000	50,000	6 acres
REAL ESTATE COMMISSION	$21,000	300,000	7.00%
SURVEY	$4,500	750.00	6 acres
ZONING CHANGE / APPEAL	$0	75.00	0 hours
SOILS INVESTIGATION	$5,750	500.00	8 holes
ENCROACHMENT PERMIT	$5,000	5,000.00	1 each
LEGAL FEES	#3,500	3,500.00	1 unit
ACCOUNTING FEES	$2,500	2,500.00	1 unit
FUND RAISER'S FEES	$0	.00	2.00%
ARCHITECTURAL FEE	$205,837	3,430,614	6.00%
REIMBURSABLE EXPENSES: $11,686			
BLUEPRINTING	$1,250	25.00	50 copies
SPECIFICATION	$1,400	35.00	40 copies
PHOTOCOPIES	$36	.15	240 copies
REPROGRAHICS	$0	15.00	0 each
DIGITIZING	$0	300.00	0 each
LONG DISTANCE CALLS	$120	10.00	12 month
POSTAGE	$60	5.00	12 month
TRAVEL OUT OF TOWN	$120	60.00	2 trip
RENDERINGS	$1,500	1,500	1 each
PHOTOGRAPHY	$7,200	300.00	24 each
MODELS	$0	2,000.00	0 each
INSURANCE	$0	.00	0 unit
PERMITS: $9,945			
ZONING	$920	.01	90,000 SF
LOCAL BUILDING	$6,325	.07	90,000 SF
STATE BUILDING	$2,700	.03	90,000 SF
PROJECT INSURANCE	$17,153	3,430,614	.50%
PERFORMANCE/PAYMENT BONDS	$85,765	3,430,614	2.50%
CONSTUCTION COSTS: $3,430,614			
UTILITIES	$40,000	100.00	400 LF
SITE IMPROVEMENTS	$176,650	1.96	90,000 SF
LANDSCAPING	$22,500	.25	90,000 SF
REMODELING	$0	.00	90,000 SF
GENERAL CONSTRUCTION	$2,587,464	28.75	90,000 SF
EQUIPMENT	$40,000	.44	90,000 SF
FURNISHINGS/FIXTURES	$564,000	6.27	90,000 SF
QUALITY CONTROL: $21,240			
SOILS TESTING	$9,000	.10	90,000 SF
CONCRETE TESTING	$4,500	.05	90,000 SF
STEEL INSPECTIONS	$4,500	.05	90,000 SF
ROOF INSPECTIONS	$2,640	300.00	9 days
PAVEMENT TESTING	$600	150.00	4 each
CONSTRUCTION LOAN COST	$150,947	18,868.38	8 months
REAL ESTATE TAXES	$5,400	450.00	12
MOVING EXPENSES	$25,000	500.00	50 hours
CONTINGENCY	$430,584	4,305,837	10.00%

TOTAL PROJECT BUDGET $4,736,421

Other Costs

When the building is completed, you will also face:

- Debt service, unless the building was paid for with existing capital;
- Taxes;
- Maintenance and repair costs;
- Insurance premiums;
- Utility costs.

Financing Construction

Several sources of funding may be available for your building project:

- Existing funds or equity (cash on hand, current income, equity in other facilities and equipment that could be re-financed);
- Money obtained from private sources (sale of stock or of an interest in your business);
- Industrial revenue bonds;
- Lease-back arrangements;
- Enterprise zones (the state in which you plan to build may offer incentives--tax abatement, land development, or loans) to attract your business and its employment;
- A combination of the above.

Resources to assist you with funding are your accountant, attorney, chamber of commerce, banker and architect.

Cost-Saving Strategies

Your architect can help you find cost-saving strategies for your new building. Some examples are:

- Fast construction methods;
- Financing options;
- Rack-supported buildings;
- Work station panels in lieu of walls;
- Simple design;
- Open areas.

Sample Construction Cost Estimate

The following cost estimate is based on a hypothetical project consisting of 90,000 sq. ft., which includes 60,000 SF of specialized manufacturing space and 30,000 SF of offices.

Statement of Probable Construction Cost

MANUFACTURING PLANT AND CORPORATE OFFICES

DESCRIPITION	TOTAL EST COST: 3,430,614	UNIT COST 38.12	QUANTITY/UNITS
Overhead & Profit	171,531	5.00	%
General Conditions	98,018	3.00	%
General Requirmt	65,345	2.00	%
Site Clearing	9,000	.15	60,000 SY
Earthwork	37,500	2.50	15,000 CY
Termite Control	1,900	.10	19,000 SF
Foundation Drnge	2,250	5.00	450 LF
Asphalt Paving	72,000	12.00	6,000 SY
Concrete Paving	15,000	15.00	1,000 SY
Fencing	39,000	13.00	3,000 LF
Landscaping	22,500	.25	90,000 SF
Concrete Ftgs	37,500	150.00	250 CY
Concrete Fnds	65,000	200.00	325 CY
Concrete Slabs	245,000	175.00	1,400 CY
Elevated Slabs	43,875	195.00	225 CY
Conc Flr Topping	1,700	.85	2,000 SF
Masonry Ext	35,750	5.50	6,500 SF
Masonry Int	28,000	4.00	7,000 SF
Structural Steel	82,500	1,500.00	55 TON
Steel Joists	76,500	900.00	85 TON
Metal Decking	7,700	.70	11,000 SF
Metal Fabrications	19,800	1.50	13,200 LB
Handrails/Railing	16,450	35.00	470 LF
Rough Carpentry	3,300	2.50	1,320 LF
Finish Carpentry	7,500	5.00	1,500 SF
Arch Woodwork	12,500	25.00	500 SF
Damproofing	900	1.00	900 SF
Water Repellents	2,275	.35	6,500 SF

DESCRIPTION	TOTAL EST COST: 3,430,614	UNIT COST 38.12	QUANTITY/UNITS
Insulation	76,241	.75	101,655 SF
Flexible Roofing	155,250	2.25	69,000 SF
Flashing, Sht Mtl	9,900	7.50	1,320 LF
Fasciae & Coping	3,000	15.00	200 LF
Roof Accessories	18,750	15.00	1,250 SF
Joint Sealers	7,500	1.00	7,500 LF
Stl Doors & Frms	6,250	250.00	25 LEAF
Wood Doors	17,875	275.00	65 LEAF
Folding Partitions	2,880	20.00	144 SF
Sectional Doors	10,800	1,200.00	9 EA
Al Entr, Strfront	25,500	30.00	850 SF
Hardware	11,250	125.00	90 LEAF
Window Wall	70,875	17.50	4,050 SF
Gypsum Drywall	7,200	1.00	7,200 SF
Tile	11,475	8.50	1,350 SF
Acoustic Ceiling	45,000	1.50	30,000 SF
Resilient Flooring	8,055	.90	8,950 SF
Carpeting	56,250	2.25	25,000 SF
Painting	57,750	.35	165,000 SF
Wall Coverings	17,500	1.00	17,500 SF
Chalk/Tackboards	800	4.00	200 SF
Toilet Partitions	3,000	250.00	12 SF
Access Flooring	6,300	9.00	700 SF
Flagpoles	2,000	2,000.00	1 SF
Specialty Signs	3,000	20.00	150 SF
Metal Lockers	7,000	35.00	200 SF
Fire Extinguishers	3,000	100.00	30 EA
Wire Partitions	3,500	35.00	100 SF
Toilet Accessories	2,250	45.00	50 EA
Projection Screens	1,950	650.00	3 EA
Loading Dock Eqp	28,000	3,500.00	8 EA
Solid Waste Eqp	9,500	9,500.00	1 EA
Unit Kitchens	2,500	2,500.00	1 EA
Furniture	300,000	2,500.00	120 PERSON
Wk St Partitions	240,000	2,000.00	120 PERSON
Accessories	24,000	200.00	120 PERSON
Kitchen cabinets	4,200	120.00	35 LF
Window Treatments	20,250	5.00	4,050 SF
Entrance Mats	3,000	1,000.00	3 EA
Plumbing	135,000	1.50	90,000 SF
Sprinklers-Off	30,000	1.00	30,000 SF
Sprinklers-Plant	45,000	.75	60,000 SF
HVAC-Office	150,000	5.00	30,000 LF
Heating-Plant	150,000	2.50	60,000 SF

DESCRIPITION	TOTAL EST COST: 3,430,614	UNIT COST 38.12	QUANTITY/UNITS
Compressed Air	33,000	.55	60,000 SF
Gas Piping	45,000	.75	60,000 SF
Elect Serv & Dist	67,500	.75	90,000 SF
Lighting-Plant	75,000	1.25	60,000 SF
Power-Plant	90,000	1.50	60,000 SF
Lighting-Office	37,500	1.25	30,000 SF
Power-Office	52,500	1.75	30,000 SF
Emergency Power	67,500	.75	89,523 SF
Security System	45,000	1.50	30,000 SF
UPS System	10,500	.35	30,000 SF

HOW SOON DO YOU NEED IT?

Summary

Designing and building a new facility can take from six months for a simple one-story building up to three years for a high rise office building.

This section discusses the following:

Project Delivery Methods

Your time frame is a major determinant in deciding which project delivery method you select. The methods are:

- Traditional Design-Bid-Build
- Design/Build
- Fast Track
- Construction Management

Project Time Frames

All building projects involve several phases:

1. Planning
2. Design
3. Bidding
4. Construction
5. Move-In
6. De-bugging

Sample Project Schedule

A typical project schedule would look like the sample shown here.

Scheduling Considerations

Designing and building a new facility takes time. A simple, one-story industrial building can take from six months to one year to complete. A complex, high-rise office building can take two or three years.

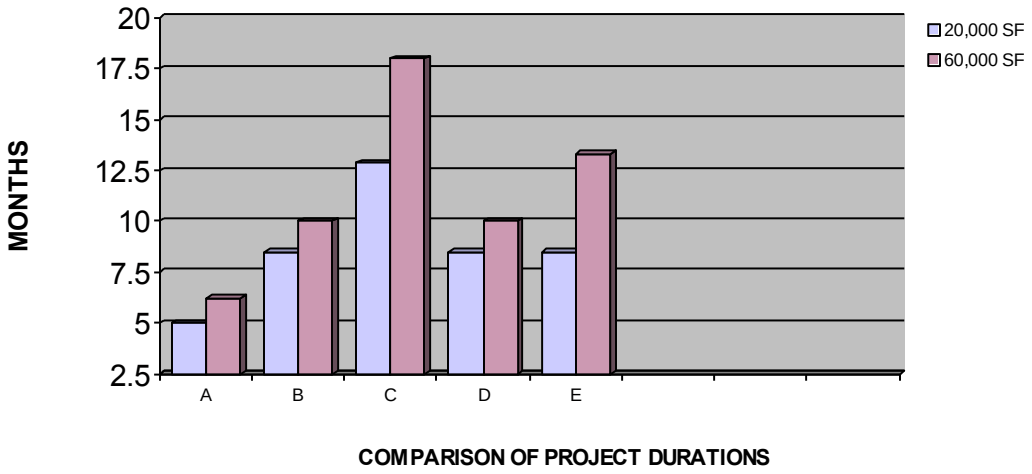
Your time frame is a major determinant in deciding which project delivery method you select. By "project delivery method" is meant the process by which a project is planned, designed, and constructed.

When a short time frame is the most important consideration, cost suffers because time isn't available for exploring alternatives, or competitive bidding.

The following graph shows the difference in time required to plan, design and construct

-A- INDUSTRIAL,
-B- COMMERCIAL,
-C- INSTITUTIONAL,
-D- RETAIL, and
-E- RESIDENTIAL

projects of 20,000 square feet and 60,000 square feet in size.



Project Delivery Methods

The project delivery methods are as follows:

Traditional
Design-Bid-Build

1. You commission an architect to design the building.
2. When plans are approved, the architect sends out drawings to general contractors for bids.
3. With your architect, you select a general contractor based on the bids; the general contractor hires subcontractors to complete your project. The cost of construction becomes fixed when you select the general contractor's bid.

   Throughout the traditional method, the architect represents you, the owner. He or she works on your behalf.

   This method offers you the most control over the building in general and its quality in particular. It is the traditional approach.

Design/Build

1. You hire an architect/general contractor team to complete your project.
2. Early in the design, the general contractor establishes a cost for the work by his estimating costs and taking bids on the schematic design.
3. The contractor hires the subcontractors to complete your project.

   In this method, the contractor has nearly complete control of ways & means because his commitment to you is based on a schematic design.

   Normally, the architect represents the contractor's interests, because his contract is with the contractor. However, you may hire him directly.

Because you agree to a total price for the entire project near the outset, the quality of the end product is determined by the general contractor as he works against the guaranteed cost.

This method gives you total cost control -- sometimes at the expense of quality and time.

It is faster than the traditional method because the design of the building shell is finished, and construction started, before the interior design is completed. Also, many time-consuming decisions, which would normally be made by the architect before construction starts, are made by subcontractors on the job during construction.

Fast-track

1. You hire an architect and a general contractor who work together from the beginning of the project.
2. The cost is based upon your budget and the architect's and general contractor's estimates. A total cost is usually not guaranteed. The final cost depends on the ability of those involved to manage the budget.
3. Work is bid and started for each component of the building as soon as it is designed.
4. The owner, architect and general contractor jointly decide on which subcontractors to hire--sometimes on a time and material basis.

Although the fast-track approach offers you the greatest time control, it is the most prone to changes. Because work is ordered and components are built before the overall design is completed, those changes can be costly. It is especially important to have an experienced team working for you, particularly your architect/engineer. They can minimize the changes and help you make early decisions that you can live with.

Construction Management

1. You hire a construction manager and an architect; the construction manager coordinates schedules and budgets all work.

2. The architect and construction manager work together to select construction systems that are affordable within the budget and buildable within the schedule.
3. When the architect completes parts of the design, the construction manager obtains bids, recommends the best bidder, and coordinates the contractors to build the facility.

This method is used on the biggest jobs and when quality, time and cost all have equal importance.

Seek Recommendations from Your Colleagues

The best way to determine which method will work best for you is to talk with other companies who recently built facilities similar to the one you are planning. Take the time to explore this fundamental decision or you may find yourself in the middle of a process that is not right for your needs. An architect will also help you through this decision.

Project Time Frames

All building projects involve several phases:

1. Planning

- Determine project scope and features;
- Set budget and schedule.
- Select site.

2. Design

- Fine-tune information from planning phase;
- Design space arrangement;
- Determine materials, equipment, building appearance;
- Finalize budget and schedule;
- Determine site preparation work to be done;
- Select materials for all components, construction types and details like flooring and wall covering, down to the electrical outlet covers and door hinges.

3. Bidding

- Set the rules and format for bids to ensure equal comparison;
- Publish drawings or submit them to selected firms;
- Receive and analyze bids carefully, then select who will be the general contractor.

4. Construction

- Preparation of the site-clearing, grading, excavation.
- Footings, foundations and underground utilities.
- Structural frame, roof and walls.
- Interior walls and mechanical/electrical systems.
- Finishes and final site improvements, parking and landscaping.

5. Move-in

- Take possession of building following inspections;
- Set up furniture, equipment and systems;
- Final clean-up.

6. De-bugging

- Adjust doors, windows, and hardware;
- Touch-up marred finishes;
- Adjust or replace accessories, equipment or devices that do not work properly when put into service;
- Balance HVAC system;
- Correct system control problems.

Sample Project Schedule

A typical project schedule looks like this: