"BEST PRACTICES HANDBOOK"

Published January 21, 2003

By an Educational & Training Partnership of the Following members of Michigan Construction -- The Opportunity Industry

- Michigan Chapter Associated General Contractors of America (AGC)
- Greater Detroit Chapter, Associated General Contractors of America (AGC)
- Michigan Road Builders Association
- National Electrical Contractors Association, Michigan Chapter (NECA)
- Michigan Plumbing & Mechanical Contractors Association
- Greater Michigan Plumbing & Mechanical Contractors Association
- Michigan Concrete Association
- Michigan Building Trades Council
- MUST / Great Lakes Construction Alliance
- Operating Engineers Labor Management Education Committee
- American Institute of Constructors
- Michigan Chapter Sheet Metal & Air Conditioning Contractors, National Association
- Metro Detroit Plumbing & Mechanical Contractors Association
- Construction Association of Michigan
- Architectural Contractors Trade Association
- Michigan Construction Users Council
- International Masonry Institute
- Construction Financial Management Association - Lansing Chapter
- American Consulting Engineers Council, Michigan, Michigan (ASEC/M/)
- Michigan Society of Professional Engineers (MSPE)
- American Institute of Architects (AIA) Michigan Chapter
- Construction Innovation Forum
- Construction Specification Institute (Lansing Chapter)
- Michigan State University -- CM program
- Ferris State University
- Eastern Michigan University

ROAD BLOCKS THAT SCHOOL OFFICIALS MAY ENCOUNTER WHEN THEY ARE PROGRAMMING, PLANNING, DESIGNING, CONSTRUCTING, AND RENOVATING SCHOOL FACILITIES

PLUS THE OTHER 400 THEY DIDN'T FORESEE!

Sect. #01 Lack of support from the general community; and lukewarm emotional support from school district staff, employees, students and parents.

Sect, #02 Flawed delivery systems.

- A. For professional service contracts,
- B. For construction service contracts,
- C. Payment methods,
- D. Adequate definition of the scope of services.

Sect. #03 Inadequate documents from which to construct the facility.

Sect. #04 Why are good design and construction records essential & why do good managers usually keep good records?

Sect. #05 Making poor project team selection and inadequate staffing

Sect. #06 Poor execution of the line of action.

Sect. #07 Inability to tie the project elements together.

Sect. #08 Decisions about value engineering and life cycle costing - important or not?

Sect #09 Missing project ingredients and where did they go?.

Sect #10 Deficient programming and planning.

SECTION 1

#01

~~Section 1~~ -- Lack of support from the general community; and lukewarm emotional support from school district staff, employees, students and parents.

Preface

Many different construction problems can plague a project design, renovation, and building program. One of the most pressing decisions in construction and management is deciding how to minimize the least damaging of the management decisions available or, put in a somewhat different, and less desirable light - how to select the best choice among several inferior alternatives!

This **yes -- no** decision process often starts with struggling to answer the programming question **"to build or not to build?"**

However an open discussions leading to a **go -- no go** decision may actually encourage poor thinking and inferior decision making, even when superior talent is available within your project team.

Do not use simplistic thinking when deciding on an answer to the build -- no build question. What mishaps most frequently occur in such a situation? Searching out and helping answer this question is the basic purpose of the The Michigan Construction **"Best Practices Handbook"** -- a valuable how--to first edition document for the professional designer and builder.

In this "Best Practices Handbook" ~~you are now holding~~ we will try to help you build a design and construction decision process that clearly defines the factors essential to implement a successful school building program, ~~whether it be large or small.~~ We hope to show you how intensive planning incorporating these concepts should be an integral part of early and ongoing study if your project is to be successful. Inadequate attention to early details will almost guarantee glitches, and may lead to major project blunders along the way.

Section #02. **Lack of support from the general community, and lukewarm emotional support from school district staff, employees, and students will undoubtedly influence the quality of the delivery system.**

Lack of enthusiasm for the project and the program, from the general community, and from the school district staff, employees, students and and parents will usually doom an educational program from its very start. Intelligent support of the project from the school population must be available and visible if those to be educated wish to

participate in the benefits of an excellent educational process.

Likewise the upper professional, and middle management of the school staff must generate a visible incentive by which their work will gain respect, and support, from those who must pay the bill for school funding.

#05. Flawed delivery systems by which the project is conveyed to the owner, the designer, the constructor and other critical participants:

Provision of a well conceived project program, design, and construction delivery system that fits the needs of the school population are essential to project success. An excellent delivery system defines the scope of each contract portion of the program for professional and for construction services. Professional services usually include for fee design work normally provided by planners, architects, engineers, consultants and other members of the other-than-construction team. Construction services most often include the construction trades and the management direction of these trades that produces the completed facility as conceived by the program and the design.

A working delivery system will usually contain the following:

A. For Professional Service Contracts

1.)Premises that define the characteristics of the contracts between the principals They may be:

1. Totally negotiated - using broad multi value competition
2. Partially qualified - defined by moderate multi value competition
3. Totally qualified - identified by very narrow value description as in competitive financial bidding.

2.) Authority limits that identify the relations the provider of such services is to maintain with the principal participants: These could include:

1. As a full agent
2. As a limited agent.
3. As a contractor.

3.) Fee arrangements that define how payment for services and materials are to be conveyed to the professional provider of services. These might include:

1. As a fixed project cost including payroll, overhead, profit, and expenses.
2. As a variable project cost including a multiplier for payroll, overhead, profit and expenses
3. As a % of the total construction cost) x a multiplier for payroll, overhead. profit and expenses.
4. Other combinations of payment systems.

D.) Payment of fees as desired, agreed upon, and allocated to the professional service provider in various ways including:

1. Single responsibility
   a). All in-house services
   b). In-house & outside consultants
2. Split responsibility
   a). In-house, and other prime consultants
   b). In-house and client assistance

A. For Construction Services Contracts

B.) Agreement Premises - may be:

1. Totally negotiated - broad multi value competition
2. Partially qualified - moderate multi value competition
3. Totally qualified - narrow multi value competition (usually fixed cost)

B.) Authority limits - may delegate authority:

1. As a full agent for the principal
2. As a limited agent for the principal
3. As a contractor for the principal

C.) Payment methods - can be in one or more of the following formats.

1. Fixed cost (hard money):
   a). Expenses included
   b). Expenses separate
2. Time and material + fixed fee:
   a). Limit on time and material - with no shared savings:
   b). Limit on time and material - with shared savings:
   c). Expenses included
   d). Expenses separate
3. Percent of total construction cost:
   a). Expenses included
   b). Expenses separate
4. Conditional payments or penalties with:
   a). Incentives/disincentives
   b). Liquidated damages

D.) Scope of services - defines which of the parties do what part of the work.

1. Single responsibility - in house and subcontractors
   a. All trades by limited responsibility and providing:
      1.) Management
      2.) Design
      3.) Construction labor
      4.) Construction materials

b. Some trades by limited responsibility and providing
   1). Management
   2.). Design
   3). Construction labor
   4). Construction materials

2. Split responsibility - in house, subcontractors, and other primes providing
   1). Management
   2). Design
   3). Construction labor
   4). Construction materials

b. Limited trades - providing
   1). Management
   2). Design
   3). Construction labor
   4). Construction materials

#04. Inadequate Documents from which to construct the facility.

A document is any retained information
that can be effectively used in the future.

Major problems in the preparation, issue, and frequent use of poor documents usually originate from lack of sufficient data to support the document analysis. Inadequate data are usually generated by lack of up-front planning, insufficient funding, absence of good conceptual estimates, and/or failure to follow and properly evaluate the progress of crucial items such as:

- 01. Changes
- 02. Contract drawings and specifications
- 03. Cost reports
- 04. Correspondence
- 05. Design documents
- 06. Estimates
- 07. Field orders
- 08. Impact records
- 09. Logs of all types
- 10. Meeting minutes
- 11. Monitoring reports
- 12. Operation and maintenance manuals
- 13. Performance evaluations
- 14. Photos
- 15. Pro forma financial analyses
- 16. Project network models and schedules
- 17. Purchase orders

- 18. Requests for information
- 19. Requests for payments
- 20. Requests for proposals
- 21. Shop drawing logs
- 22. Specifications
- 22. Testing reports and evaluations
- 23. Transmittals
- 24. Waivers
- 25. Warranties

Section #05 - <u>Why are good design and construction records essential, and why do good managers maintain good records?</u>

- 01. Increasing numbers of people and organizations to whom the project management is responsible.
- 02. A dramatic and continuing increase in the number of contested design and construction claims.
- 03. Demand for higher quality and better documented design and construction
- 04. Increased demands for higher levels of cost control than ever before.
- 05. Documentation demands being imposed by more complex financing and ownership arrangements in design and construction.
- 06. Use of multiple firm syndication and joint ventures in design and construction
- 07. Records provide basic guidelines for preparing consistent record keeping forms.
- 08. If an easily used standard form works, use it: it simplifies business procedures.
- 09. Information can be easily displayed on a form in a logical, readable sequence.
- 10. A good record encourages providing adequate space for readability in data entry.
- 11. Pre printing is easily accomplished. Remember it costs your organization almost $100 per hour to pay your managers when they are not engaged in a profitable managing/decision activity. <u>Use the manager's time well.</u>
- 12. Good forms are usually readable forms.
- 13. The form lends itself to ease in binding in a variety of notebooks.
- 14. Use an oversize hole punch. It will save you time and money.
- 15. Be certain the form, when complete, provides the data you need: the user can always skip non-applicable spaces.
- 16. Provide a specific place on the form for the date, and for the user's and the sender's signature.

Section #06. <u>Inadequate or deficient project team selection and staffing:</u>
Early selection of a qualified group of competent construction professionals is an important step in building an excellent team to manage and execute the project and the program.

School officials and facilities managers, along with other responsible members of the

project team must carefully research the proposed team's track record. This should include the characteristics of main and secondary managers who will be assigned to the project.

An early analysis of great importance requires checking the employment history of key people proposed for employment on the job. Superintendents, project managers, project engineers, foremen, and support staff from the major lower tier organizations, and subcontractors on the project must have qualifications that include a potential for:

- **Loyalty to the project,**
- **Loyalty to the client,**
- **Loyalty to the design, construction, school and management,**
- **Expert abilities on other similar jobs,**
- **An understanding of their current job requirements.**

A revealing early exercise in the selection process is to simulate what might happen if various key members of the potential staff leave the project for some reason at intermediate critical points in the planning, programming, procurement, and submittal process.

This crucial work as part of early procurement and documentation must demonstrate almost immediately upon award of the design and construction contracts that the team has strong management abilities. A contractor, his subcontractors, and other lower tier suppliers are considered key members of the early support staff and must be managed well, with careful attention paid to meticulous performance of their ongoing responsibilities.

All members of the school staff on the project team should be given specific assignments for their duties during the life of the project. These members should be selected carefully and their talents must fit closely with the particular needs of the jobs to which they are are assigned.

Section #07. <u>Poor planning execution of the the line of action:</u>
The line of action is an elementary statement of the range of tasks necessary to conceive, design, build, and operate an environment. The line begins at a point designated as the recognition of need, with eleven actions following, making up the full line of action:

Step 01. Recognition of need
Step 02. Conceive
Step 03. Program
Step 04. Articulate
Step 05. Approve
Step 06. Design

Step 07. Construct
Step 08. Turnover
Step 09. Operate
Step 10. Maintain
Step 11. Discharge of design and construction responsibilities.

A brief description of each of the steps is given below:

Recognition of need is the point at which a requirement for a new environment is first felt. The planning, design and construction professional should be heavily involved in this creative stage since recognition of need is the starting point of the entire line of action -- the process of producing the facility begins here.

Recognition of need is the point at which a requirement for a new, a remodeled, or a renovated environment is first felt. The planning, design and construction professional is a key figure in these actions and must be one of the leaders in creating a proper work environment.

Conceive
During the conceptual period the need, which may be for increased facilities, larger dollar volume of business, more efficient handling systems or a variety of other demands is visualized, and put down in rough form. It may be a pencil sketch or may remain an idea in someone's mind. Here the project sees its origin and it is this early idea in someone's mind that most often carries on through the whole program. A good conceptual grasp of the program concept is essential at this point in the program if the project is to be successfully completed.

Program
In the programming phase, the needs of the concept are put into tabular space form -- so many volume for storage, so many square feet for office, so much floor to ceiling height for various areas, etc. The actual physical demands of the environment are set forth in the project program or project bible. Often this graphic depiction of the program is called an adjacency diagram.

Articulate
Now the concept and program are combined into preliminary construction language. Floor plans are drawn in accordance with program requirements. The functional arrangement of areas is shown in accordance with the project needs and is sometimes called the brief Materials are called out as the concept requires and as the final planning configurations are evolved out of the program statements.

Approval is a critical point. By now sufficient work has taken place so the manager and the ultimate decision makers thoroughly understand the project -- can say: "I like this -- or I don't like it; change this, revise this; let's increase this area a bit; let's

cut down here": *finally saying: "O.K." I'm satisfied with this set of ideas the concept, and the program; we have financing, and control the land - let's move on!"*

Design

In the design phase, products of the previous steps are utilized to prepare a set of working drawings and specifications that translate the concept into steel, wood, stone, concrete, space and masonry.

Construct

Next, the actual environment is built. Construction is the point at which the end product begins to appear, and is felt to be a physical entity by the construction team.

Turnover

When the facility has been built, it is turned over with appropriate operating, maintenance and commissioning manuals to the owner, tenant and operator. Turnover is an crucial step and when done properly, insures that a valuable commodity, the completed environment, is properly handed to those who own it.

Neglect of good turnover procedures is often the cause of serious callback problems. We certainly wouldn't turn a complex piece of machinery over to an amateur operator and expect he or she would make it perform properly from the start.. Neither should we assume that an owner or client can take a new environment that has just been built and immediately operate it at full effectiveness.

Time should be spent during turnover to explain to the operator and user how this newly-built environment is to function. After all our brand new facility is very valuable, and should be treated with care.

Operate

The facility is now commissioned, run-in, and begins to achieve its ultimate purposes. Operation can be an important responsibility and often the design and construction team will be asked to furnish operational knowledge in connection with a paid contract arrangement with the Owner.

Maintain

Maintenance of the physical environment is the door opener for future work for the project team. It also assures that this environment that has been nursed through the previous stages will be maintained correctly so as to work at its best for those who depend on it.

The maintenance contract is perhaps one of the least explored areas in the more sophisticated approaches to environmental design and construction. It is a profitable business that many construction professionals are now offering as an

additional service if they are competent to provide them.

Discharge of design and construction responsibilities

Completion of the line of action is achieved when the programmer, the designer, the builder and the owner of the environment has discharged his or her responsibilities. In a continuing and trustworthy relationship, the line of action will have no clearly defined finish, since before a project is finished, a competent professional will usually be reinvolved in another program for the client.

Successful completion of a school project and consequently a school design and construction program must take into account many factors that may at first appear unrelated to the construction process. However, as we assemble the elements of the school project and program, we often notice a specific pattern in the use of project tools that can be replicated to effectively duplicate a project action plan and build copies of a well-functioning facility, that makes good use of multiple duplicating techniques to effect cost savings and best practices.

To do this however, the school management must carefully assess the local economy, labor market, design work load, and contractor work load to determine the best time to propose and launch their projects in the market place.

Section #08. Poor use of partnering concepts:

In the early days of contemporary construction practice, (generally assumed about the early 1900's) the logistics of the building business were an integral part of the engineering, architecture, planning, and building processes. Concepts were relatively simple, easy-to-understand elements that today comprise what are often called the checklists of construction. Occasionally they are known as laundry lists or things-to-be-done.

The problem with using such a simplified approach to construction is that the criteria for properly building a building is not always clearly defined. Often the words needed to describe something exactly, seems to be unavailable or inappropriate: The words may even be unknown to the participants who must use them in their work.

A study of this particular problem, that unfortunately, is embedded in most of today's building and design techniques, reveals that we are very often talking about words and concepts -- those that convey, their uses, their legal implications, and the processes that are described by them. So many people seem to know so little about words and phrases that often the meanings are lost in a flurry of words that may obscure their true meanings. This is particularly true during complex technical discussions.

For just a moment, let us consider one or two elementary documents that have an

enormous influence on the proper use of components of a project. One of these semantic messages is outlined below. The explanation of these two pages summarize a logical sequence of thought in one specific, yet complex set of operations called partnering.

In this example we show how an adequate project support system requires a structure similar to that of a sturdy three-legged milking stool with a comfortable seat. A good partnering system is represented by the mission (leg A). The partnering goals and objectives are depicted by the partnering goals and objectives (leg B); and the program management methodologies by leg C, and the seat component by assembly D.

The example describes how the project and program partnering status will be measured, evaluated and maintained. It clearly outlines what steps are to be taken when it becomes necessary to resolve job disputes. An analysis of the milking stool components shows the specific elements or legs that are also needed in a partnering action. The functions of the stool compare roughly to the functions of the support legs and seat of the stool. To emphasize the functions of our milking stool --

- Leg A of the stool is comparable to a well written charter
- Leg B of the stool resembles an authentic, accurate, easily understood project evaluation system at any given point in time.
- Leg C of the stool forms a clearly stated, easily understood problem or issue resolution system.
- Component D, the seat, provides support for a proper and effective stance while milking the cow.

As with most supported systems all structural members in our example should be in place if the cow is to be milked properly.

The validity of this analysis potential of a partnering system can be seen in statistical information gained by studying more than 3,000 partnering responses to questions about negative impacts of team actions and individuals on partnered jobs. This information was derived from a study of causes resulting from failures to properly manage the job as a whole. Most deficiencies originate from us and are caused by others in the list of the top eight problem statements within the list of negative impacts.

Section #09. The importance of a good working team:

A need for excellent building and site supervision appears very early in most projects. Without good leadership, extensive experience, knowledge, training, and properly delegated authority most projects and programs will probably fail to meet their site and building work, goals and objectives. The failure is usually due to team members failing to adequately understand the critical relationship of site work and building work

to the building construction process as a whole. Attention to detail as it fits into outdoor weather patterns is particularly critical during winter construction. Bad construction weather, such as winter, rain, snow, sleet, and other unfriendly weather conditions usually exacerbate the impact of deficient winter site management. Of particular importance is the timing of cold weather trades and their installation as winter accelerates.

Section #10 -- Value Engineering and Life Cycle Costing - Important or Not?:

Value analysis and life cycle costing are two relatively new techniques that were introduced into our engineering world in the early 1950's. As Mr. James J. O'Brien, P.E., describes in his book Value Analysis in Design and Construction, the Navy Bureau of Ships was one of the first government organization to formulate well defined value-analysis programs. Lawrence Miles, a staff engineer with the General Electric Company, was instrumental in the development of that program.

An armed forces definition of "value engineering is that it is a branch of engineering whose objective is to effect economy in the cost of constructing a project, evaluating a system's objectives, and bettering the objectives in terms of dollars and functional performance.

As the success of value engineering, principally in the construction field, was documented, other federal agencies began to take tentative steps toward adoption of value engineering.

In 1965 the Bureau of Reclamation undertook value engineering training for its engineering staff and in 1966 placed a value engineering incentive clause in its construction contracts. In 1967 the Post Office set up a value engineering staff in its bureau of research and engineering. In that same year the Senate Committee on Public Works held hearings on the use of value engineering in the government in which many of the major agencies exchanged information on how they used value engineering.

These features were contrasted with the incentive clause used by the Department of Defense. GAO considered this process too complicated and generalized for use in construction. The GAO noted however, there is a need to circulate proven value engineering proposals both within and among federal agencies. A major benefit of value engineering is its potential for repetitive use on other projects.

The Public Building Service describes functional analysis in this way:

"A user purchases an item or service because it will provide certain functions at a cost he is willing to pay. If something does not do something it is supposed to do, it is of no use to the purchaser and no amount of cost reduction will improve its value. Actions

that sacrifice needed utility actually reduce the value to the user. On the other hand, expenditures to increase the functional capacity of an item beyond that which is needed are also of little value to the user".....

The Value Management Office of the Public Building Service sees anything less than the necessary functional capability (value) as unacceptable -- and anything more, as unnecessary and wasteful. A project or part of a project which is to receive functional analysis is usually addressed by a few basic questions of value balance.

What is it?
What does it do?
What is its worth?
What does it cost?
What else would work?

Section #11 Where do the missing ingredients of total commitment disappear to under stress and force?

A lack of commitment from the entire project team to perform all building functions and services well, will almost always force the job and job management into situations where achieving full satisfaction is almost impossible.

Architects, engineers, planners, and systems analysts must of necessity perform according to their multitude of contracts, and agreements into which they have entered. Lack of commitment and below par performance of these duties will weaken a project, often to a point where successful completion of the work becomes difficult or impossible within a total commitment framework School board executives must be aware of the need for their constant attention to providing such commitment if they are going to produce excellent facilities.

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What does it cost?
What else would work?

The issue of why school board officials need to know about value engineering revolves around the need for public agencies to show concern for optimizing methods and competitive comparisons. It should be realized that not all public agencies face this challenge to prove their use of best practices. Thus not all public agencies are interested in what might not prove to be useful value optimization in relation to its cost. However value optimization is a valid technique for some to explore, particularly when improvement of methodology and cost is of high importance.

Road block #11 **Where do the missing ingredients of total commitment disappear to under stress and force?**

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CHAPTER 2 -MORE TIPS FOR MICHIGAN SCHOOL BOARD EXECUTIVE'S FROM THE "HANDBOOK OF BEST PRACTICES"

What are some of the most important questions that a school facilities staff should ask of their advisors at the start of a project?

a. How do we balance our project evaluations between price, quality and value?

b. How do we select contractors and consultants early enough to get full value from their expertise in matters of budgeting/scheduling and phasing, all properly meshed with ongoing design and construction operations.

c. Do we have enough owner construction knowledge to discern significant differences in proposals, qualifications, and costs

d. Have we investigated the qualification of the company, or more importantly, the specific teams under consideration. (due diligence), that we are considering as candidates for our construction team?

e. Are we using all the strong points an available construction consultant and advisor can bring to the project.?

f. Have we allocated adequate funding for contingency plans, management oversights, estimating busts, and administration oversights?.

g. Have we accurately measured the abilities of the project architects, engineers, and other professional consultants?

h. If you were asked now for advice from your local school board about how to successfully build new, or renovate existing school buildings. what would you say first?

i. Have you based your selections on known qualifications and ability to deliver value in all phases of the program and project process?

j. Do you have available a proven planning system by which to establish needs, goals, objectives, expectations and proposed scope of work and are you able to prepare budgets that fit the project criteria.

k. Have you based your costs and established your expectations on realistic expectation?. (Remember -- accurately determining how far several million dollars will go in a construction program is often not comprehendible to the layman, but the analysis must be made understandable. Always ask yourself what is a realistic definition of what you can buy for the funds you have available)?

l. Really try to understand the result of the proposed renovations, and acknowledge where necessary that they may never yield a "new" building.

m. Develop a wish list of attractive, but not essential, items and prioritize how to add them to the project if cost allows. Do not convince yourself you will get these items, but set yourself up for disappointment and/or unwarranted dissatisfaction if that's what happens.

n.. Define the **wish list**, the **want list** and the **must lists** before preparing the project program. (see glossary of terms.)

n If you could advise your local school board about how to build or renovate school buildings, what items would you stress as being the most important?

o. Complete the documents. (depending on the delivery system used).

p. How would you improve the quality of construction documents (over the past 15 to 20 years), and how would you prevent them from getting worse?

q. Improving the construction knowledge and abilities of your design and construction staff is important. How are you doing this?

r. The on-site manager sometimes doesn't know how to read drawings! (Not always true). How to correct this if it exists?

s. Everything that a qualified general contractor does is a known cost and not a "reimbursable cost." (interesting observation). How do we improve the delivery system to correct this faulty practice?

t. Unfortunately, CM's may often occasionally cover the errors of design firms instead of pointing fingers (? faulty management) in the right direction. How would you correct this deficiency?

u. Construction Management may go hand in hand with poor construction documents. School boards need to concentrate on their real business of education -- not necessarily administrating the project through use of

Construction Management. (Note: This is not always a legitimate criticism, nor is it always true). Do you agree?

v. Retaining large companies that already have too much work and too little experienced supervision poses high risks and the chance of unexpected cost overruns.

w. Have you checked out all references and experience resumes thoroughly to see if value engineering was used, and if it so was it properly applied by competent professionals?

x. Ask yourself if your project has a chance of being completed within budget, and on schedule. Can you prove it?

y. Get a qualified construction consultant on board first, and see that they work with the owner on the hiring of the architect/engineer. Often construction managers know more about costs and construction methods than do architects or engineers.

#5 Poor planning

a. Lack of a well thought-out program that understands the facilities and construction needs and resources to accomplish the goals of the project and the program.

b. Provide planning that meets goals and objectives must be accomplished in both pre and post bond periods.

c. All participants in the planning process (faculty, staff, administrators and professionals) need to understand that if the recommendations resulting from the planning process require an expenditure of funds, that those funds are most often derived from the bill payers, i.e. taxpayers, donors, foundations, consumers of the product, and perhaps others. This understanding must be reflected in the use of the funds allocated to facilities design and construction.

d. Clearly understanding that planning encompasses all activities needed to provide for the commencement and continuation of design and construction.

e. Early portions of the design process may have to occur prior to the completion of all planning functions.

f. Planning is necessarily a strategic function. Both long and short term goals and objectives need to be identified, verified, quantified and articulated.

g. Planning includes program definition that must drive all major decisions in the planning process. Programming should include financial planning, objective definition, facilities planning, and decision making.

h. The planning process requires leadership on the part of all members of the planning team. Leadership includes "leading" and "following."

i. In order for final recommendations to be viable, the research and staff work supporting the recommendations must be thorough, accurate, comprehensive and complete. (again, due diligence is needed - see glossary of terms)

the planning process. Programming should include financial planning, objective definition, facilities planning, and decision making.

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ii. Have you prepared a planning funding model? What has been done to obtain funding?

CHAPTER 4 -GLOSSARY OF TERMS FOR MICHIGAN SCHOOL BOARD EXECUTIVE'S -- FROM THE "HANDBOOK OF BEST PRACTICES"

Glossary of terms

Agent
A person or firm whose acts are asserted by the third party to bind the principal.

Apprentice
A person who works under a skilled craftsman for a number of years and is taught to be a tradesman or journeyman.

At-Risk construction manager
A manager of a construction program who takes the responsibility for paying for the construction of the project and then collecting his costs from his client under a contract with the client.

Bench marking
The search for those best practices that will lead to superior performance by an organization; a new way to establish operating targets, striving to be the best of the best.

Bench marking is divided into two parts: practices and metrics. It should be approached on the basis of investigating industry practices first. What is fundamental is recognizing that bench marking involves uncovering best practices wherever they exist. (See Robert C. Camp book on Bench marking-- the Search for Industry Best Practices that Lead to Superior Performance.)

Bond
A form of bid security executed by the bidder as principal and by a surety. Sometimes called a "bid security" or "surety."

Brainpower Companies
Companies that sell creative thought services.

Caveat
A legal notice to a court or public officer to suspend a certain proceeding until the notifier is given a hearing. Any warning or caution.

Change order
An official notice that the changes specified in the change order are to be done. A properly executed change order is a revision to the scope of work and the contract documents.

Command--as related to the organizational style adopted or required by a design,

planning, or other construction-related firm
This definition usually relates to the arrangement of resources (talent, skill, money, time, space, people, et. Al.) that has evolved or been selected to accomplish the functions, activities, and management and goals designed to achieve the objectives for a business or institution.

Contested Claim
A demand or claim in which the demand is disputed.

Company Culture
A way of doing business that has been generated by a group of people, and is passed along from one business generation to another, generally by unstructured communication.

Commissioning
An inspection and testing system designed to independently evaluate a facility's mechanical or electrical system to insure that its installation and performance is in conformance with the requirements of the contract documents.

Contingency
A program of action set out against the possibility that an unlikely or unintended event may occur.

Constructive Change
An owner's action or inaction that has the same effect as a written directive.

Control
Maintaining firm, competent managerial direction of any given situation. Controlling leads to achievement. It is usually accomplished by the invisible use of leverage.

Construction Management
A system of attempting to better manage the construction process by providing expert construction knowledge and resources throughout all phases of the project. The goal of the process is to make available to the participants, information best provided by an expert skilled in construction practices, so that when the the project moves into the field the managers can provide the owner with the highest potential for project success.

Construction Manager
One who provides a system of managing the construction process by providing expert construction knowledge and resources throughout all phases of the project. The goal of the process is to make available to the participants, information best provided by an expert skilled in construction practices so that when the project moves into the field the managers can provide the owner with the best potential for project success. Services can be for construction at-risk or on a service management basis. The construction manager is responsible for delivering the project to his client.

Conventional Management Theory
Management processes that choose not to use forward looking techniques to plan, program, monitor and update best current practices in their design operations

Contract
A legally enforceable oral or written agreement between two or more parties specifying goods or services to be provided by one or more of the parties to others of the contract parties.

Contract document matrix
A two dimensional grid in which the rows contain action items for the various project components and the columns usually designate the geographic location of the item. At the intersection of a row and a column is inserted the designation of the contract document package in which the the information in contained.

Contractor
The party, where there is a principal and a contractor, who agrees to the doing or not doing of some definite thing for a stipulated sum.

Contract documents
Usually considered to be the construction documents which provide the full definition of the scope of work for which the parties are legally responsible.Could include the agreement, the drawings, the specifications, instructors to bidders, addendum, and any other material included by mutual agreement and clearly identified as part of the contract.

Coordinate
To harmonize in a common action or effort. Many design and construction consultants recommend the word not be used in contracts since it has indistinct meanings as related to management in design and construction.

Credentials
A formal certification for a qualified person to do something for which special training and education is required.

Critical Path Method
A mathematical modeling technique which allows the user to establish ranges within which resources can or must be used.

Critical transition point
The point in a project delivery system at which the responsibility and authority for the work passes from the supportive group to the ex'e'cutive group.

Cuts
Excerpt from catalogs, drawings, or flyers that depict a configuration to be used in the construction process.

Design
The exercise of making a continuous effort to conceive in the mind, to form a plan, and to create in an artistic and highly skilled manner a visually coherent set of images, shapes, colors, materials, and other components of which a building is comprised.

Disincentive
A penalty imposed on a contract party for less-than-satisfactory performance on a project. The disincentive is usually coupled to a bonus or incentive.

Documentation
An organized collection of historical records that describe the events comprising

a project or program. Also the act of preparing or supplying documents or supporting references in a project or program for future reference.

Due Diligence

A process by which the legal affairs of a business are investigated and reported as part of the preparation for commercial transactions such as acquisitions, mergers, joint ventures, privatizations or general commercial contracting.

Force Majeure

An unexpected or uncontrollable event.

Goals

The unquantified desires of an organization or individual expressed without time or other resources assigned. (See objectives for related definitions.)

Hierarchy

Any system of persons or things in a graded order.

Incentive

A bonus paid to a contract party for performing its work in a superior manner to that specified. The incentive is usually coupled to a penalty or disincentive.

Journeyman

A skilled worker competent in his or her trade who has usually served as an apprentice to learn his skill.

Labor force

The force consisting of individuals working, or looking for work.

Life Cycle Cost

The total cost of a system over its entire defined life. A branch of engineering whose objective is to effect economy in the cost of constructing a project by evaluating any system's objectives, and bettering the objectives in terms of dollars and functional performance.

Liquidated damages

The amount established by the parties to a contract which must be paid, by one or either of the parties, in the event of a default or a breach. Is related to the damages suffered by late performance.

Logistics

That branch of mathematical art and science, generally of a military nature, which defines the details of moving and supplying equipment for military purposes, including execution of strategies and tactics.

Make-and-sell companies

Those organizations which manufacture a product such as pencils, paper, art supplies, and other disposable items that are used to produce other products that are in themselves valuable as commodities.

Measurers

Companies that sell logistical services as a thought process

Objectives, dependent

Objectives to be achieved that are affected by major influences beyond the

manager's direct control. The dependent goal may be predictable or unpredictable. Dependent goals, while usually beyond the manager's control, may well be within the company's ability to reach. Lack of correlation between company and individual effort to achieve a manager's goals that are affected by others, may cause severe dysfunctions.

Objectives, direct

Objectives that can be achieved by managing conditions within the manager's direct influence.

Objectives, intermediate

Objectives achieved at specific and identifiable stages of the project, i.e. partial occupancy of a building, turnover of a mechanical system for temporary heat, or completion and issuance of foundation plans for early start of construction.

Objectives, peripheral

Objectives realized on an ongoing basis through the life of the project and achieved as an indirect result of project activities. Peripheral objectives may be personal, professional, technical, financial or social. Peripheral objectives might include staff promotion, profitable subcontractor operations, specialized experience, or achievement of design excellence in a special field.

Objectives, quantified targets

Quantified targets derived from established goals (see goals). The most commonly used resources in converting goals to objectives are money, time, human abilities, human actions, equipment, and space.

Program - as defining a step in the design process

A narrative oriented statement of the needs and character of the proposed user operation, the requirements of the user and owner, the nature of the environment to be planned, designed and built, and the corresponding characteristics of the space that will satisfy these needs and requirements. Also a major planning, design, construction, and operational construction effort made up of several projects.

Project

A set of work actions having identifiable objectives, and a specific beginning and ending point.

Project Delivery System

A method of assembling, grouping, organizing, and managing project resources so as to best achieve project goals and objectives.

Project Component

A set of related objectives achieved by a defined work group, and gained by accomplishing a set of related discrete operations which have a specific beginning and end. Examples include designing the project, constructing the foundations, putting the building in the dry, closing out the job, and others similar in nature.

Project Operations

The arrangement and interrelations of people charged with actually achieving

project goals and objectives.

Project or Program Director

The individual responsible for implementation of several projects upon which his or her organization is engaged.

Project Stages

The groupings of actions that make up an entire project work sequence such as conception, programming, approval, design development, contract document preparation, and other similar sequential operations.

Project Team

A specific management group assigned to achieve a set of objectives by accomplishing a group of related, discrete operations which have a defined beginning and end. Examples include the design team, the program team, the construction team, the tenant work team, and others similar in nature.

Profit, educational and training

Fulfillment of learning and teaching goals held by individuals and their companies.

Profit, financial

Fundamentally, the difference between organizational cash income and organizational cash expense. Further definitions of financial profit are complex and often unique to an organization or project.

Profit, self actualization

Personal fulfillment realized after basic needs of shelter, safety, protection, love and freedom from hunger are achieved.

Profit, socioeconomic

A company, group or individual achievement of social objectives within a financially profitable set of activities.

Profit, value system

Company and project fulfillment of personal, professional, technical, social and financial values held important by individuals and groups related to the company.

Profitability plateau

The leveling off of profit over a period of time due to a need for increased overhead caused by an increase in operations costs. These operations cost increases are often generated by an increased work load and the resulting added management staff required without a corresponding increase in production or direct cost income.

Program--as defining a generic construction effort

A major planning, design, construction, and operational construction effort made up of several projects.

Programmed construction

A project management system which provides:

a. a proactive team atmosphere

b. a strong and a trustful relation between project parties
c. a high profit potential
d a strong and continuous emphasis on good project planning and scheduling
e encouragement to develop full project team participation

Project--as a set of work actions

A set of work actions having identifiable objectives and a beginning and an end.

Semantics

The study of meaning and changes of meaning, or, that branch of modern logic which studies the relations between signs and what they denote or signify.

Sellers

Companies that elevate sales to an essential function of leadership, covering marketing strategies, sales presentations, and negotiating.

Shared goals

Where a real sense of authority and its exertion is evident, a firm will probably have some vesting of that authority. With a real sense of shared goals most of the participants are willing to exert authority without having that authority exerted by other individuals. The role of managers is to coordinate (see above for coordinate) work--work that is often performed by people whose skills are greater and more specialized than those of the managers themselves. (This is a complex definition and must be reviewed carefully to assure that it is being used properly.)

Simulate

To assume or have the appearance of.

Stereotyped organizational structure

Any less than effective organizational structure that fails to provide flexible guidelines for proper application of good management practices.

Stratagem

A plan, scheme or trick for deceiving an opponent

Strategic

A method of conducting operations especially by the aid of maneuvering or stratagem.

Surety

One who has contracted to be responsible for another, especially one who assumes responsibilities or debts in the event of default.

Top-down pyramidal structure

Organizational structures that use an inverted triangular polygon to graphically identify the components of the structural frame.

Vesting

To pass into possession; to devolve upon a person as possessor.

With what is a project manager generally most concerned?

A project manager is generally most concerned with supportive actions which bring resources to the point of use most rapidly, and effectively.

What does a project manager do?

In conjunction with the project team, establishes objectives generated by a need, plans how these objective are to be reached through a set of work actions, and then assembles and directs the application of available resources to achieve the objectives on one or more projects.

Michigan Construction -- The Opportunity Industry

"Best Practices Handbook"

Topics -- and -- Responsibilities

- 1. The Ten Difficulties School Officials Most Often Encounter
  Ralph & industry representative to edit
- 2. Other Tips & Issues to Consider
  Ralph & industry representative to edit
- 3. Collecting Adequate Information
  Ralph & industry representative to edit
- 4. A Guide to Asking Questions That Will Deliver Useful Information
  Ralph & industry representative to edit
- 5. Responsible Contractor Policy
  Dick
- 6. Check Lists
  Ralph & industry representatives to edit
- 7. Planning and Scheduling Tips
  Ralph & Industry rep to edit
- 8. Monitoring, Measuring, & Controlling the Project
  Ralph
- 9. Case Studies
  Ralph
- 10. Glossary
  Ralph - Dick - industry representatives

- 11. Resource list
  Ralph - Dick - industry representatives
- 12. General Reference Material
  Ralph -- Dick -- Industry Representatives
- 13. Appendix
  Ralph & Dick

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09. Resource List
10. General Reference Material

Top Ten Elements Necessary to Achieve a Successful School Construction Project

Focus Group Meeting Notes

1. **Date of Meeting:** Thursday October 10, 2002, Sheraton Hotel, Lansing

2. **Present:** Olga Holden, Kathy Hayes, Co Directors Leadership Development, MAST, Deborah Keys-Davis, Conference/Exhibit & VIP Program Manager MAST, Chris Lamarino, Thrum Match & Nor berg, Tim Hall, Granter Construction, Hot School Board, Rob Turner, Turner Electric, Chelsea School Board Member, Sandra Miller, Greater Michigan APM, Mike Crawford, NECA/M, Dick Brunvand, Michigan Chapter AGC, Steve Serkaian & Brian, Kolt & Serkaian.

3. **Discussion:** Dick Brunvand stated the purpose was to review the "Top Ten" list in preparation for the proposed video conference workshop planned for February 2003 directed to members and school officials of both the MAST and MSBO.

Items discussed included:

- A check list, glossary, resource list and questions schools should need to ask.
- Develop a planning funding model, schools have problems getting money for planning.
- Schools need an overall long-range master plan (prior to construction) similar to what is used for higher education facilities (MSU, U of M, etc.).
- Hire a designer/construction team early and get "partners" to buy into the project so the Designer, Owner, Contractor, Sub Contractor & Suppliers are all "on the same page."
- There may be a need for a separate Scheduling and Coordination top ten point list.
    - Keep on task.
    - What is it really going to take to have a successful project?

- What does quality mean to all team players and the community?
- What will the project really cost?

- AIA "out of the box" documents need to be revised specific to a schools project.
- Our presentation at the workshop needs to to be specific, positive and offer proven solutions.
- Well done needs assessment is vital.
- Building good community support is linked to planning.
  - Project may have to be delayed if support is not there.
  - Documents.
    - Quality and completeness issues.
    - Safety and security issues
    - Extras
    - Schools frequently focus on price rather than "right fit."
  - How do schools research all delivery and other options that are available to them?

4. Action.

Input from this group and others who have reviewed the top ten list and proposed program will be reviewed and a final list and program with speakers, proposed handouts and assignments for the remote sites developed. Thursday, February 20, 2002, is to be proposed for the workshop.

5. Minutes submitted by: Dick Brunvand.

"Comments from contractors"

1. What are the three biggest mistakes school boards make when purchasing construction services?

1 Focus on price rather than qualifications and value.

2. Not selecting constructor early enough in planning to get full value from our expertise (budget/scheduling/phasing/coordinate w/ongoing operation).

3. May not have enough "construction knowledge" to discern differences in proposals, qualifications, etc. Don't really investigate in detail the qualifications of the company, or more importantly, the specific team.

2. If you could give advice to your local school board about how to build or renovate school buildings, what items would you discuss?

1. Select both designer and constructor early and based on qualifications and ability to deliver value at all phases of process.
2. Invest, if possible, up front, in a more thorough planning process to establish needs, goals and expectations first then budgets.
3. Get educated on costs and establish realistic expectations. How far several million dollars will go is often not comprehendible.
4. Really try to understand results of proposed renovations and acknowledge they will never yield a "new building."
5. Develop wish list of nice but not essential items and priorities how to add if cost allows. Do not convince yourself you will get these items and set yourself for disappointment and/or unwarranted dissatisfaction with a successful project.

END

"Comments from General Contractors re using Construction Services."

A.. What are the three biggest mistakes school boards make when purchasing construction services?

1. Utilizing a construction management firm.
2. Allowing construction managers to include large allowances to cover for poor plans and administration.
3. Retaining a potentially poor architect. without thoroughly investigating their

capabilities.

B. If you could give advice to your local school board about how to build or renovate school buildings, what are some of the main items you would recommend discussing?

Complete documents! - not the computer generated non detailed trash that 90% of the design firms put out. The quality of construction documents in the last 10 to 15 years has been in a vertical free fall. Construction managers have no practical construction knowledge - hell(? pretty strong language?) the on-site manager usually doesn't know how to read drawings! Construction Management is the biggest lamp-shade that a school board can put on their head. Everything that a qualified General Contractor does is a known cost and not a "reimbursable." Unfortunately, Construction Managers cover the errors of the architectural firms many times instead of pointing the fingers in the right direction.

Construction Management goes hand-in-hand with poor construction documents. School Boards need to concentrate on their business - not administering the project or Construction Manager.

END

A. What are the three biggest mistakes school boards make when purchasing construction services?

1. Going with very large companies that already have too much work and inexperienced supervision.
2. Not reading the fine print , and ending up with numerous hidden costs through multipliers.
3. Check out references thoroughly and see if value engineering was used. Also if under budget and on schedule.

B. If you could give advice to your local school board about how to build or renovate school buildings, what items would you discuss.

Get the qualified Construction Manager on board first and they work with the

owner on the hiring of the architect. Most Construction Managers know more about costs and methods than any architect.

MICHIGAN CHAPTER, ASSOCIATED GENERAL CONTRACTORS (DRAFT)

PROPOSAL FOR MICHIGAN ASSOCIATION OF SCHOOL BOARDS AND MICHIGAN BUSINESS OFFICIALS

Top ten mistakes schools make when they are building or renovating school buildings

Planning -- There is a lack of development of a well thought-out program that considers facilities and construction needs and resources to accomplish the goals. This planning needs to be available in order to accomplish both pre and post bond front end work.

- All participants in the planning process (faculty, staff, administrators and professionals) need to understand that if the recommendations resulting from the planning process require the expenditure of funds, these funds are derived from those paying the bill, i.e. taxpayers, donors, foundations, consumers of the product

and perhaps others.

- Planning encompasses all activities preparing for the commencement of design.
- Early portions of the design process may occur prior to the completion of all planning functions.
- Planning is necessarily a strategic function. Both long and short term goals need to be identified, verified, quantified and articulated.
- Planning includes program planning that should drive all decisions in the planning process. It also includes financial planning and facilities (physical) planning.
- The Planning Process requires leadership on the part of all members of the planning team. Leadership includes "leading" and "following"
- In order for the final recommendations to be viable, the research and staff work supporting the recommendations needs to be thorough, accurate, comprehensive and complete.

• **Support** -- There is often a lack of support for the program from the general community and the school district employees.

- As stated above, program planning should drive all major decisions in the planning process. If it doesn't there is a good chance that the project and the program will fail.
- Program deficiencies should be quickly identified, verified, and corrected.
- The public along with school district faculty and staff may require information and education concerning perceived program deficiencies.
- The public along with school district faculty and staff need to be part of the planning process if they are to "buy in" with the final recommended solution(s) coming out of the planning process.
- Those performing staff or professional functions need to have all the information and resources required to "do the job."

Delivery System

• There is a lack of an appropriate construction delivery systems that fit the program needs and resources available to the school district.

- The selection of a specific project delivery system should include staff,

administrators and professional designers, as well as an appropriate construction professional, someone with an extensive background in institutional or public construction projects.

- The selection of a specific project delivery system is a strategic decision, the consequences of which, along with project timing, will undoubtedly have project cost implications. In most situations involving publicly funded school projects, law or regulation requires competitive bidding. However competitive bidding may be accomplished in more than one way. General Contracting, Construction Management (the Construction Manager is an agent of the owner who holds all trade contracts and bonds the project) and Construction/Management (The CM/c holds all trade contracts and bonds the project) are three types of project delivery that include competitive bidding.
- The Construction Professional should be retained early in the planning/design process to permit an informed decision to be made related to the selection of a specified project delivery method or system.
- Members of the design professions, although they are close to the construction industry, do not have all background information related to the latest techniques, availability of materials or systems, availability of construction labor and knowledge of the "pricing" climate of the region in which the project is to be executed.
- Selection of the construction professional is as important as the selection of a design professional.
- It is more important for the professional selected to design the project to have experience in the project type than for the construction professional to have such experience. The track record of the constructional professional in similarly sized projects (scope and complexity) is more important than a specific project type.

<u>Documents</u> -- Inadequate drawings and documents caused by lack of up front planning, insufficient funding, lack of a conceptual estimate and not checking the track record of the Architect to determine how close their estimates they are on past school projects.

- Inadequate drawings and specifications produced by professional designers (architects and engineers) due to errors or omissions are inexcusable. Although excuses will be offered that include no time, no experienced design or production

personnel, insufficient"face time" with the client, etc., as to why the documents are inadequate. All such excuses are "bogus" if the parties mutually agree on a schedule.

- The client needs to understand that the design process is a "creative" process, meaning there is an art component as well as a "science/engineering " component in the process of preparing documents. However, the professional designer needs to consider all such factors before agreeing to a schedule for the production of documents.
- Inadequate documents normally are "incomplete" documents. That is, not enough information is contained in the documents to enable the construction team to execute the project. The construction team must be able to reasonably understand the intent of the design/construction drawings and specifications to made decisions on how to build the project.

Project Team -- Selection of an unqualified construction delivery team. Again schools need to research the track record of the entire team and the key players who will be assigned to their project and determine what happens if any member of the team leaves prior to completion of the project.

- During the selection process, the owner should demand evidence of successful completion of similar projects from each candidate's construction team. Evidence may include project descriptions with project costs and photographs, client references, with phone numbers, architect/engineer references with phone numbers.
- Additionally, the owner should demand from each candidate's construction team, current resumes' of key members who will be assigned to the owner's project. Resumes' must include educational and professional background as well as relevant experience in the type of project similar to the owner's. Note, that it is more important for members of the design team to have experience in the project type than members of the construction team. However, experience in the project type by members of the construction team will enhance the chances of a successful project for the owner.
- Following selection of the construction team and during negotiations on an

agreement, the owner should demand a commitment from the principals of the construction team, that team members identified in the selection process will indeed be assigned to the project and will only be changed following subsequent negotiations and with the approval of the owner.

Local Building Conditions -- Schools need to assess the local economy, labor market, and contractor work load to determine the best time to propose their project to get the best services and prices.

- Experience has shown that when the local construction market is "flooded" with work the cost for all construction in that market increases. This is due to lack of either labor or material or both and consequently the need to import either or both from outside the local area.
- Local projects originating from the federal or state level, manufacturing, business, municipalities and other entities all impact the availability of labor for the owner's project. With a greater construction volume, the prices increase with less competition, and conversely, with lower construction volume, prices typically decrease with increased competition.
- Unless included in the agreement, normally all permits required for the execution of the project other than building permits are the owner's responsibility. These include land use permits, environmental impact permits, wetland modification permits,etc. Normally such permits are required prior to the commencement of construction.

Partnering -- Lack of an appropriate partnering philosophy prior to the start of construction. This can be a formal Partnering process or an informal agreement on how the team will work together to avoid disputes and meet budget, quality, safety and schedule issues.

- A formal Partnering process is encouraged to establish at the project's outset a climate of cooperation and mutual understanding among team members. Such cooperation will enhance the chances for the successful execution of the project. However, leadership plays an important role in establishing any climate of cooperation.

- Leadership is the ability to motivate members of a team to function as a single organization with accomplishing the mutually agreed assignment as its sole purpose.
- The Traits of leadership include:
  1. Integrity.
  2. Knowledge of the assignment.
  3. Courage to pursue the successful completion of the assignment without regard to outside distractions.
  4. Arriving at justifiable decisions in a timely manner.
  5. Dependability.
  6. Taking the initiative.
  7. Using tact in all interpersonal relationships within the team.
  8. Enthusiasm.
  9. Situational awareness.
  10. Endurance to see the project to conclusion.
  11. Selflessness to share accolades.
  12. Loyalty to the team.
  13. Exercising prudent judgment.
  14, Encouraging all team members to learn and exhibit these traits.
- The principals of leadership include
  01. Assuming responsibility for your own actions and the actions of your team.
  02. Knowing yourself, your capabilities, deficiencies, and seeking self-improvement.
  03. Set the example in your behavior and demeanor.
  04. Encourage team members to develop traits and principles.
  05. Ensure assignments are understood , and then provide supervision to a successful conclusion.
  06. Know your team members and make sure they have the resources to be successful including materials, equipment, training and time.
  07. Keep your team members informed about the assignment.
  08. Set intermediate attainable goals.
  09. Make sound and timely decisions and encourage team members to do the

same.

10. Know your assignment and encourage members of the team to know theirs.

Site Team -- Lack of a fully trained and qualified on-site project superintendent with the knowledge and authority to solve all problems related to the day-to-day operations of the project

- During the construction team selection process , the position of on-site project superintendent is one of the key members of the construction team and the owner should focus a significant portion of his or her research and investigation on those proposed to fill this spot.
- Experience has show that seasoned knowledgeable individuals with extensive experience in construction and who exhibit strong leadership traits are the best candidates for on-site superintendents.

Life cycle costs -- Lack of knowledge and understanding of the long-term life cycle costs of the the variety of materials, systems, and other building components available for the school's project.

- Life cycle cost analysis, as applied to building construction, is a technique to evaluate the total cost of constructing and operating a facility based upon a set of assumptions related to the selection of specific building materials and systems.

The analysis includes investment costs (bond proposal preparation, bond sales, depreciation for private entities, and taxes for private entities), capital construction costs (the cost for completed construction in place ready for use) and operational costs (energy and utility service consumption, and building and site maintenance).

- The identification of of the "life cycle period" is an important decision for the owner. This is the period during which the costs listed above are evaluated for their economic impact on those who are paying the bill. The period selected for a public entity typically is longer than that selected for a private entity because the private entity is able to consider certain costs permitted by the tax codes,

where a public entity does not concern itself with "paying taxes". Therefore the public entities' capital expenditure and maintenance components of the life cycle cost analysis are the focus of the analysis.

- Life cycle cost analysis may be applied to any functional building material or system a a variety of materials and systems with varying levels of performance over time for many building components are available in the market place.

- The concept of "Life Cycle Cost Analysis" is one with which the owner should become familiar early in the project developmental process.

Total Commitment -- Lack of commitment from the entire project team to perform all functions and services throughout the entire project. Architects and Engineers need to perform inspections as required by state law. Contractors, sub contractors, suppliers and owners must perform according to their contracts and their partnering agreements.

- Refer to "Leadership" above. While contracts and agreements form the legal framework of how the various parties relate to one another, leadership provides cohesion that along with the contracts and agreements enhance the chances for success on the project.

ADDITIONAL ITEMS FOR CONSIDERATION

Do not let the Design Team (or anyone else?) talk you into including expensive elements in the design that do not contribute to your program or goals for the project --
This includes design elements, selecting a building form that does not contribute to the building's function, or selecting materials or systems that are not consistent with the budgetary constraints. Examples of this may include:

• Special brick shapes that are expensive and do not materially contribute the appearance of the building. At one school district in Michigan the architect for a new high school included some special shape "bull nose" brick with round ends, each of which was hand made and cost $10,000 per thousand and the field brick for the rest of the building for the rest of the building was $700 per thousand. With 200,000 of the special shape extending around the entire perimeter of the building in a "soldier fashion" and at a cost difference of $9,300 per thousand resulted in an expenditure of at least $1,860,000 more than was necessary.

• Avoid curved masonry walls, either interior of exterior, unless the program calls for such shapes. They are expensive to construct and do not contribute to the functionality of the program.

• Do not be a "guinea pig" for the design team. Agree to use only traditional building materials and systems with a proven history of performance.

• Require the design team to explain potentially controversial recommendations and provide back-up calculations to support the recommendations, regardless of the system.