

A ROADMAP TO SUCCESSFUL CONSTRUCTION PROJECTS For Non-Residential Construction Contractors

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The **F**risby Group

ACKNOWLEDGMENTS

Mike Richardson read the material and made written comments. He then took a great deal of time to discuss the material, his own experiences, and thoughts about best practices. His most important financial number in a construction company is “physical percentage of completion” – if that number is not accurate, it means you don’t know where you are on a project. And a term he lives by is one found throughout the materials and that is “real time”. If trends can be identified early—in real time—there is opportunity to take management steps to reverse an unfavorable trend or to continue to improve a positive one. Mike is committed to training all employees, and finds it to be his greatest challenge as an executive in an electrical construction company. His experience cuts across federal and private construction projects, which motivated the author to decide to add a federal section at a later point in time.

David Gregory was the CFO of a mechanical construction company for over a quarter of a century, and during much of that time I had the opportunity to visit with him, professionally and personally. So his influence on these materials is not just his editorial suggestions, but what I learned from him over the years. David understood his role as financial manager was not to count beans, but to be an integral part of all operations in the company, to contribute to top management and the field alike. Reliability, accuracy, trust and honesty were not buzz words but a way of life with Dave. He also had the courage that Section IV will highlight - the courage to sometimes tell the boss what the boss doesn’t want to hear. David knew the construction industry and was not just a numbers guy. He was insightful about the operations in his company and was respected and loved by the employees.

Mona Flowers is the Executive Director of Mechanical Contractors Association of South Carolina. She is dedicated to its members as well as their families. She is also committed to education and training and was the influence for me preparing these materials and making them available to the membership of MCA/SC.

INTRODUCTION

This series of articles relates to managing every aspect of a construction company, from the role of the President through project acquisition and management, contract and variance management and financial management, surety and bonds, payment issues, digital technology and robotics. The articles may be thought of as a “**playbook,**” similar to the ones used in football, which contain diagrams of plays that may be called in different situations. Airline pilots have checklists, which are also really “playbooks.” Sully used his training and “playbook” to maneuver the Miracle on the Hudson. The thing about playbooks, as Sully I am sure would say, is that they provide room for human initiative and creativity. They provide the fundamentals, but it is the human’s response to different challenges, which results in success or failure.

- **And as in football, each team is different and each game is different.** So the information contained in these articles is generic, that is the functional steps that should be taken, but the details should be customized to the individual company, its market, its culture, and its own value systems.

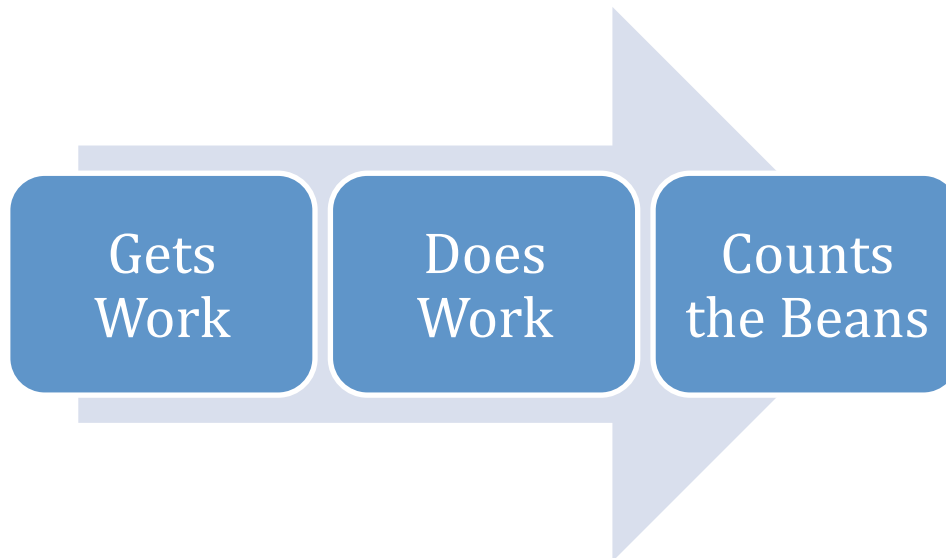
The material is slanted toward non-residential craft contractors, although most of it is sufficiently generic that general contractors could find it useful. Separate sections will be added for earthwork contractors and those doing federal and other governmental projects.

It begins with **Top Management** because the dynamics and usually the ethics and values of an organization are established with the President and often (not always) with the president’s staff. ***It starts where the buck stops!***

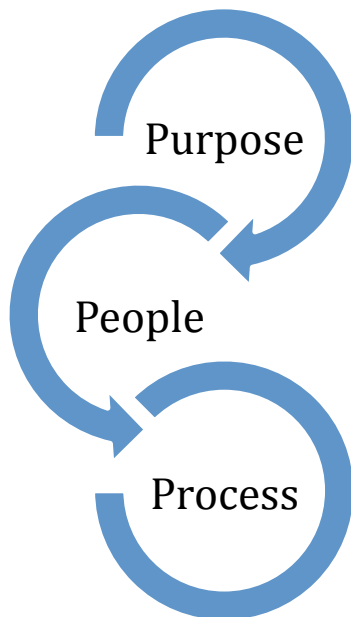
- **Mind Sharing.** It is a modern trend for top management to encourage input from every level of the organization. In addition, management often seeks objective input from customers and others (**called *mind sharing***) with whom it does business for ideas about how to better organize and improve how to more effectively serve its customers. ***Some companies require managers to visit routinely with customers to***

gain their insight on how to do a better job for them. Companies require managers to visit routinely with customers to gain their insight on how to do a better job for them.

A construction company performs three key functions:

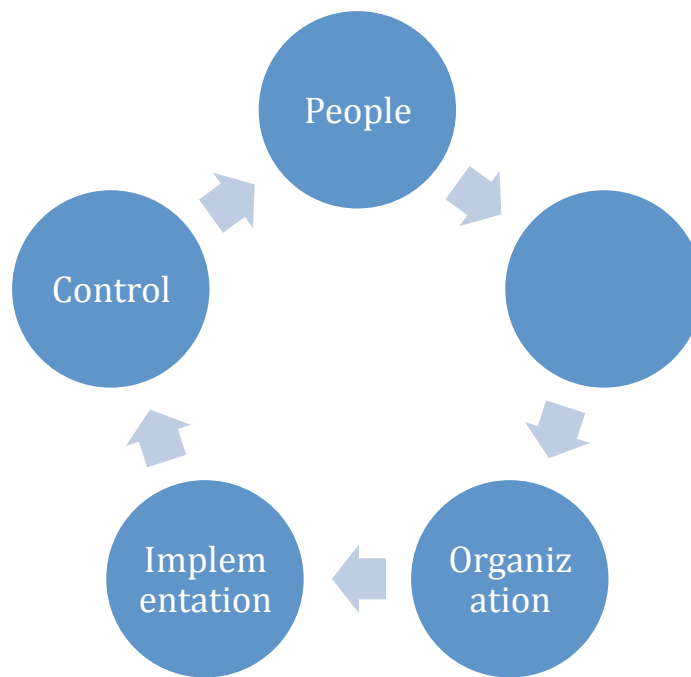


Of course, in order to be successful at these activities, three other overarching functions must be considered:



- **Purpose** relates to the value systems, the type of company you want to be.
- **People** of course is what a company is all about—how to develop the best people at every level in our organization and continue to motivate and improve their abilities to perform competitively.
- **Process** is how we run the railroad, how we do things.

Discussions of all these functions and one more (PPOIC), will find their way into the material:



HOW TO USE THIS MATERIAL

It is emphasized that the material is to be used as **guidelines** and **hopefully thought provokers**, and not as a “this is the only way to do things.” There is no one size fits all approach to managing a company or a project. There are certain basics, but how to perform them, how to customize them to a given organization is the role of creative management. “Me Too, Look Alike Companies” seldom grow in our competitive market. **The companies, which are dedicated to continual improvement, to doing things a bit differently, to also do things a bit better, are the ones who are the most sustainably successful.** Interestingly enough, it is worth it at the outset to comment that the octogenarian companies, the ones which have been around a hundred years or more, have always been known for very strong values and customer commitment. Companies often reinvent themselves. A few years ago we had mostly command and control, autocratic leadership type organizations and most of those have moved into a more collaborative approach. Most now do some level of design and build. So they evolve as demographics and technology evolves. However, the companies

with sustainability normally have a very strong set of values and ethics around which all management practices revolve. **So, how to use the materials:**

- **Handing out material and a nickel gets you a five-cent cigar.** It is important to have **discussions** with members of the organization from home office, through field operations. Even the Section dealing with the role of the president or financial management. Field people are interested in what management is doing, what management intends to do, how management is planning for the future. In addition, transparent organizations seem to keep personnel together in more of a team mode.
 - **Have discussions and questions like:** Is this a good idea? What are we doing, and what should we be doing?
 - **Are we living up to our mission statement and statement of values?** Do all of our people even have a copy of those statements? When did we last have a meeting to discuss them? Do we talk about them to our new employees?
 - **Develop action items,** if appropriate, that perhaps your company should undertake to improve a given function. All operations can be improved – the history of progress in this country and our industry is that of continual improvement. All improvement is change and of course we must be careful to remember that all change is not improvement.
- **NOTE: TO REEMPHASIZE, THIS IS NOT A PRESCRIPTION FOR RUNNING A CONSTRUCTION COMPANY OR PROJECT. IT IS FOR MANAGEMENT TO THINK ABOUT, AND TO BE CHALLENGED A BIT ABOUT WHAT IT MIGHT DO DIFFERENTLY, MAYBE A LITTLE BETTER. OR MAYBE IT IS JUST A VALIDATION OF HOW WELL YOU ARE PRESENTLY DOING. THERE IS NOT A ONE SIZE FITS ALL FOR ANY COMPANY. THERE ARE FUNDAMENTAL CONCEPTS, BUT THESE MUST BE MOLDED TO FIT YOUR COMPANY.**

SUBJECTS COVERED

Section I covers Principles and Roles of Management. It is aimed at top management, which continues to strive to have the best approach to organization and development of its resources, and execution by those resources so that it is and continues to be competitive and profitable.

Section II relates to Project Management and covers the functions and roles from the Estimate to Close-out and Warranty. It covers the functions of the acquisition and turnover phase into the job set up and performance of the project by the project manager, superintendent and foremen. Instead of individual manuals for each (estimating, project manager, superintendent, etc) the function of management will be set forth, and the individual companies can divide among the various layers within its own organization. For example, a disputed change involves: the superintendent identifying that a scope variance has occurred through an inspection or otherwise and he documents it, notified the project manager who sends a letter of notification to the appropriate party. The superintendent then keeps record of the impact of the change, which is transmitted to the Project Manager who prices the change, and updates the schedule accordingly. *In this manner, there is always, in every function, a collaborative approach between field and home office.*

Section III is about the Identification and Management of Variances. It is about contractual right and duties, the performance of them by the parties to the contract, and how to deal with variances from them. Several attachments to Section III are in depth discussions of contracts, claim issues such as scope of work, labor impact, and delay damage claims, and should be read in conjunction with the manual.

Section IV Deals with Financial and Technology Issues. Financial is not on a separate planet but an integral part of the operations and management decision making process. As digital and robotic technology is improving productivity on one hand and potentially displacing personnel on the other, it is vital to understand what is presently available and what is in the pipeline.

SECTION I

Management of the Company

A. ATTRIBUTES OF GREAT COMPANIES

Surveys show that great companies have the following characteristics (there are others but these seem to be the ones which stand out):

1. **Management *intends* for the company to be great.** Greatness is not an accident but well conceived, planned and executed. In some companies, failure is not an option. **In great companies, mediocrity is not an option. INTENTIONALITY is the key.** Great football teams intend to win the Super Bowl and begin developing the personnel and plays long before the first scrimmage.
2. **These companies have a *culture of principles and ethics*.** In fact, just about everything they do is shrouded with their principles. Being obsessed with satisfying their customers is considered an ethical value, so they organize in such a way to satisfy that value. Safety is not an economic issue, but an ethical issue, so their safety programs are developed to fulfill that ethical value.
 - **Reality check:** There are many companies that have succeeded and truly do not have such a culture and make profit by whatever means are available. Reliable and trustworthy companies unfortunately must compete against such scalawags and can only do so through practices of productivity and continued improvement.
3. **The first priority is to *internal customers*; that is *employees*** (Kelleher, the founder of Southwest Airlines, which has had only one year in the red ink, was obsessed with his internal customers. He felt if he took care of them, they would take care of the outside customer—the passenger in the seat of the plane). **This priority is reflected in:**
 - Hiring practices

- Continual improvement for all employees from top management throughout the organization
 - Recognition and respect for all employees
 - A fear-free environment where all employees' ideas and opinions are sought
 - Not treating employees as disposable commodities
 - And of course, a major priority is to develop a **work place environment** that will attract new and young people into your company. Your edge may just be the ability to attract employees when other companies are failing to do so.
4. **The second priority is to develop *processes and systems* which produce the most best results, and then to continue to evaluate them to seek ways to improve, to do better this year than last, and to do better next year than this. Productivity and its improvement are functions of analyzing the steps in each work activity with an end to improving the time and hours it takes to perform that function. **Great companies seem to be very focused on how to perform, what are the steps in that performance—keeping track of hours is only a tool. The focus is on means and methods, processes, continually thinking about how best to perform those steps, mechanisms to improve them.****
- **Technology** will be presented in the fourth section. It is important that the company stays on the leading edge of technological developments, but it is also important for the management to properly instruct its employees on new procedures and technology so that it will be effectively implemented. Many computerized cost control systems are great, except they are not properly implemented because of lack of training of the personnel using them. CPMs fall into the same category—we have had this great tool for almost one hundred years, and it is still not being routinely, effectively utilized by the construction team, seldom properly updated. **New technology can be counterproductive and frustrating unless properly introduced to the employees.**
5. **The realization that being committed to the outside customer means to develop an excellent internal organization, which can perform its**

- work in an excellent manner. The realization that mission statements are just hype without the strength of an ever improving organization behind those statements.** A philosopher said that freedom is like bread, you go on earning it day by day. Well, that is what a construction company has to do for sustainability in this industry: day by day to organize and perform like your mission statement says you will perform.
6. **They take on work they have the *capability to perform*,** meaning they grow their internal capabilities before they go after more revenue; they grow people and systems before revenue.
 7. **They are credible.** At every level, they are credible, reliable.
Accountability is cultural.
 - We see the emergence of the *reliable promise* as the lynchpin for highly successful projects, and companies as well.
 8. **They intend to be sustainable,** that is to continue to thrive generation after generation. They do this through **successorship development programs.**
 9. **The great ones also contribute back to their communities,** and participate in associations that help improve their industries.
 10. **Let's emphasize continual improvement.** The great companies not only stay abreast of the changes in their industry, in demographics, and in their culture, **they also prepare themselves and all their employees for those changes.** They are obsessed with education and training at every level in the company.

This isn't to say that less than outstanding companies may not fare well year in and year out, for perhaps most construction companies are in the average range. It is the thesis of this manual that all companies should at least strive for being above average, should strive for excellence and sustainability.

But what is the level of performance you desire for your company?

Perhaps the first questions to be asked are:

- What are our values? Are we living up to them?
- Is it the intent of this company to be excellent?
- If not, at what level of performance should we aim for?
- So where are we now? Excellent? Above average? Average? Below average?

- Are you and your staff satisfied to be at this level?
- Are you willing to sit in front of a potential customer and say: “we are only mediocre, but we want the job anyway”; or “in all probability I will try to get away with not fully complying with all the requirements of the contract but that is the only way I can be the low bidder and make a decent profit.”
- Do we have the makings of sustainability? Can this company thrive into the next generation?

The value of the material in this manual is to provide guidance to the management of companies and projects to achieve the goals they seek. **It is not a prescription but a pathway. Often it is not an answer, but a challenge.**

B. ATTRIBUTES OF A GREAT PRESIDENT

The following are just a few of the more significant characteristics of an excellent President:

1. **The ability to organize a team.** All of the other characteristics flow into this one absolutely vital component. Can the president put together people and develop processes that produce profitably year in and year out? This is the bottom line of an NFL coach: he may know all about football, but can he field a team that will win game after game. **Organizational ability is one of those attributes great leaders should possess or develop.** Vince Lombardi was indeed a genius when it came to the game, but it was his ability to bring in the right players, coach them into being as good as they could be with the passion to win ball games, which made him a legend in the sport.
2. **The ability to adapt. To technological change, demographic and cultural changes.** Maybe the company needs to change course or take advantage of new opportunities previously unforeseen. Maybe there are significant changes and disruptions happening on that project you thought was going to be a winner. There is not one-size fits all but there is also seldom one plan that fits all. Plans have to be modified along the way.

3. **Development of People.** In construction, we do not invent products, and we are not computer programmers. We put together stuff others make. And **WE is people**, the people who work for your company. As your competitors will be putting together the same stuff as your company, to stay in business **you must have a differential advantage, an edge in performance over others.** The only resource at your disposal to use to be better is not people because everyone is hiring from pretty much the same pool, from project managers to clean up personnel. So if it is not equipment or the pool of people, what can be your edge, what can separate you from competitors? ***The resource is an approach to the people:***

- **It is the President who realizes it is how people are developed, how they are trained, motivated, treated that is the edge over others.** The resource is the president who accepts enthusiastically the challenge of fielding the best team in the league through having the best squads in the league, the best coached players in the league. The edge is how the president develops the people at every level.
- **The resource is the commitment to provide the employees with the training, the tools, and the support they need to perform productively.** The resource is the work place environment where people are proud to work, are proud to wear the Tee shirt.
- Vince Lombardi was pretty good at developing strategy, but his genius was in selecting and coaching players. Jack Welsh of General Motors felt his mission was to develop young talent to be the best it could be.
- ***The president's passion is key to having the best players in the league.***
- **And the great president is going to be able to attract an adequate work force,** including younger personnel, because he sees this as a challenge for which he has the creativity to solve better than the competition.
- **And successorship planning is part of strategic planning.**

4. **Principles.** Walt Disney drew Mickey Mouse but Roy Disney gave Mickey a home. It was Roy who oversaw the creation of the capital projects that draw millions of visitors each year. Roy Disney said that **once one's values and principles were in place, it was never again necessary to make a decision.** Gather the facts and the decision came pretty much automatically because one didn't need to debate what was right or wrong: with principles in place that was an automatic. Excellent presidents seem to have those principles locked in and every decision flows from them, from the type of people who are hired (**hire character and develop skills**) to the commitment to giving the specified quality and honest pricing of change orders, to treating employees with respect.
5. **Balance. The president balances priorities between three functions:**
 - **Leadership**, which is always figuring out how to improve, how to be competitive, which direction he should lead the company. In fact a common characteristic of great presidents is the commitment to improve. One thinks of Peyton Manning between offensive series, sitting on the bench with the playbook figuring how to do better on the next time he gets the ball.
 - **Management**, which is establishing the processes and procedures for running each phase of the company, monitoring to assure the proper implementation.
 - **Doing**, which is exactly that: completing an expense report, maybe helping the estimator take off a job or the electrician pulling the wire. But there is a procedure for doing each of those and a process for making sure each was done properly. That is management. Leadership is figuring out how to do it more effectively.
 - **Salesmen: *Actually, there is a fourth: being a salesman.*** They believe in the quality of their company and its values and people, so they have a real message to get across and they do, both inside and outside the company.
6. **Critical Thinking: Presidents should be critical thinkers, but then so should the managers and supervisor below them.** Critical thinking is an

extremely important attribute of construction personnel; it is a skill that can and should be taught. **The critical thinker:**

- *Sorts out facts from opinion*
- Is objective and not bound by traditions without foundation or reason
- Seeks out the important facts
- Listens actively for other opinions
- Challenges statements through research, use of facts and reason; uses analysis to find inconsistencies and errors, but also to find value and good ideas.
- Is not an obstructionist but looks for the best solutions to issues
- Looks for ultimate cause of issues.
- *Learns from mistakes; open to input from others.*

7. **Having a Mentor. Most presidents have, or have had, mentors.**

Sometimes it has been the parent or person they have succeeded as president. Often it is an outsider, either a consultant, or a peer group to which they belong. The importance of having a sounding board for the development and testing of ideas is one of the hall marks of most highly successful presidents who may be very independent and strong willed but do not live in a bubble.

8. **Not Doing Anything – the Role of Pause. Presidents become so busy, so much on their plate that they are always doing something, always trying to get new work or solve a problem. And yet one of the best things a president can do is, well, do nothing.**

To from time to time PAUSE, take a break, go fishing, leave the office and take a walk in the park or along a stream. Pause. Stop doing and just rest and let the mind that is going at 10,000 rpm rest for a few moments. It is amazing how restful this can be, how much you can improve your attitude and performance by taking this short little “vacation” during the day and during the week. It is often during the pause that the best part of our brain takes over—the subconscious—and comes up with ideas that we don’t think of when we are so busy fighting our fires.

- **Health: Along those lines, if the role of the president is to take care of his employees through his leadership,**

marketing and other efforts, he does that best when he is healthy, both physically and emotionally. Each president should develop a plan for taking care of himself. The best way to be unselfish is sometimes to be very selfish: in this case, put yourself first, so that you can help run your company with the stamina and mental toughness that is required.

LET'S FACE IT. THE PRESIDENT IS THE MAJOR DRIVING FORCE IN THE COMPANY. THE FIRST DOMINO IN THE CHAIN OF COMPANY DEVELOPMENT IS THE PRESIDENT. BEFORE WE EMPHASIZE THE ROLE OF ANYONE ELSE, IT IS IMPERATIVE TO REALIZE THAT THE ENHANCEMENT OF THE ABILITY OF THE PRESIDENT TO PERFORM HIS OR HER FUNCTIONS IS INDEED THE CRITICAL PATH OF SUCCESS AND IMPROVEMENT IN ANY CONSTRUCTION COMPANY. LET'S ALSO FACE THAT PRESIDENTS CAN BE THE MOST NEGATIVE INFLUENCE IN A COMPANY, DUE TO PREJUDICES, BEING LOCKED INTO THE PAST, A BULLYING APPROACH TO PERSONNEL, MY WAY OR THE HIGHWAY APPROACH. SUSTAINABILITY IS NORMALLY AN OUTGROWTH OF PRESIDENTS WHO ADAPT TO DEMOGRAPHICS, CHANGES IN THE SOCIETY AS WELL AS TECHNOLOGY. FOR EXAMPLE, MORE THAN HALF OF THE WORKERS IN THE INDUSTRY ARE 50 AND OVER. ONLY AROUND 7% ARE 21-27. WE ARE NOT ATTRACTING THE YOUNGER WORKERS—THE MILLENTIALS—INTO THE INDUSTRY. ADAPTATIVE PRESIDENTS TRY TO UNDERSTAND WHY AND WHAT IT TAKES TO CHANGE THAT TREND.

C. MANAGEMENT APPROACHES

Fundamentally there are two approaches to management. The following is an oversimplification:

Command and Control

Ideas come from the Top
Strong authority at the Top
My way or the Highway
Emphasis *on bottom line*

Principled (Top Line Management)

Ideas come from all over
Authority at lowest levels
Develop the best way
Emphasis on development of people/processes

- ❖ **Principled or top line management** is most likely to produce a *fear free environment* where creativity and new ideas are expressed, and in which improvement occurs as a matter of culture. (Deming, perhaps the father of current international management said simply: “*Drive fear out!*”) **The success of the command and control approach is the leadership of the company who is always on top of what is happening in the industry and has the ability to communicate the best way to get things done to all employees. And of course there are hybrid companies which practice a bit of both.** Each of these approaches has had both success and failure.

The point is this:

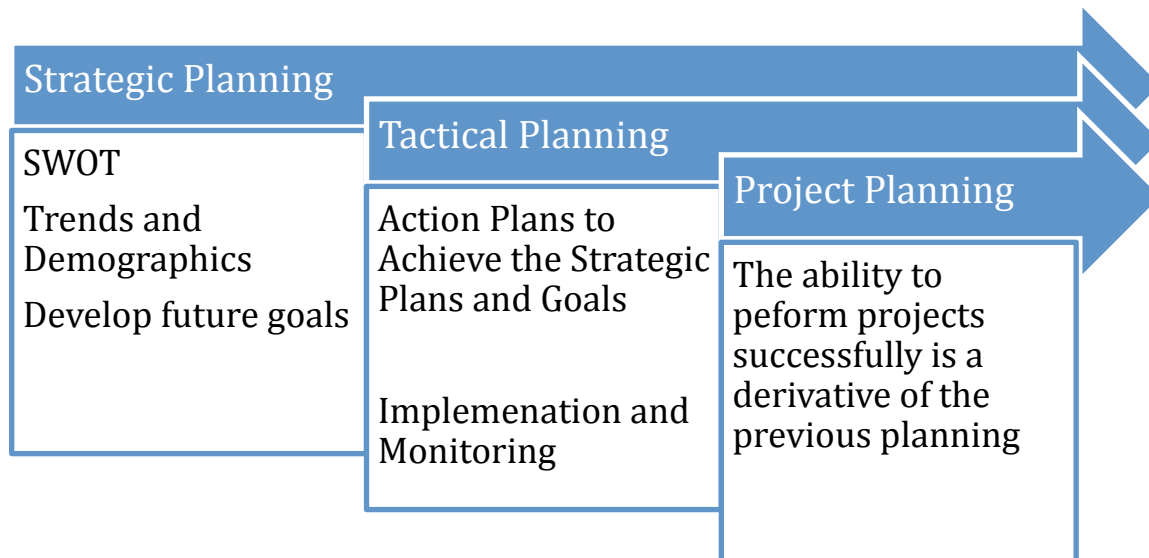
- What is the management style of your company?
- Is it working?
- If it is command and control, is that style attracting young people into your company? How is the turnover rate affected? What is the esprit level in the company?
- If it is principled management, are you having difficulties because you are empowering people who are not doing the job as they should? Is delegating authority to the lowest organizational level working for you?

There are three features that both must have in common and both will fail if these are not implemented:

- **Treat all employees with respect. And dignity.** Listen to them, recognize them, make them feel good about themselves. One of the key reasons for employee turnover at every level in the company is just this: lack of recognition and respect. A recent survey of presidents of construction companies regarding the lessons they have learned over the last few years is almost universally this: “that even in construction, you can be civil and respectful and be effective, even more effective than being intimidating.”
- **Enable employees before empowering them.** That is, don’t set up an employee for failure by giving him or her authority that the employee is not yet capable of exercising. This is the role of training, establishing criteria for development, coaching, evaluating performance are vital.

- **The *Peter Principle* still holds true: we place people into positions of mediocrity or even failure, because we do not develop them to have the skill level necessary to perform the function they have been placed in.** The old saw of “being taught to swim by being thrown into the pool” never taught the Mike Phelps to win the gold, only to survive – at least those who did.
- Perhaps one of the most common flaws of management is to promote people to their area of mediocrity, or even failure.
Enable before empowering!
- **The role of *governance*.** Even the most democratic type company must still have discipline and levels of authority. No successful entity can be an anarchy where it is each person for him or herself. Decisions can be the result input from the troops but eventually there must be a decision, and once made, it is to be implemented – the debate is now over and execution is the order of the day. Processes and procedures are important in this regard, because they should be the result of input from the employees and opportunities for improvements to them should be provided, but in the final analysis, a procedure is a thought out approach to how best to perform a function and should be followed until a reason provided for doing something a different way.
 - If the President makes a decision or gives direction which is controversial, it is wise for him to say: “I understand that everyone doesn’t agree with this approach, but we are going to implement it as best we can. After six months or so, let’s get back and evaluate the results. If this needs modification or change, I am open to input and making necessary revision.”

D. THE THREE STAGES OF PLANNING



Strategic Planning Steps: Strategic planning is looking to the future and figuring out how your company will take advantage of its opportunities and manage against its challenges and risks. Such planning sessions should be conducted annually and involve a real analysis of how your company is performing now, what it needs to do to improve, what markets should it be considering for the future, how to penetrate those markets.

The steps involved should be:

- ✓ **Prepare for annual meeting**
 - **Review financials**
 - **Review trends in market** (on a macro basis, see <https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/improving-construction-productivity> and for the future trends, see [www3.weforum.org/docs/WEF shaping the future of construction](http://www3.weforum.org/docs/WEF_shaping_the_future_of_construction)).
 - **Review trends in technology**
 - **Evaluate Personnel**
 - **Do lessons learned on bad jobs:** what do we want to improve on

- **Do lessons learned on great jobs:** what do we want to continue
- **Input** from others in organization
- **What are our edges:** Why would a client choose us over others?
 - Why would a client NOT choose us over others?
 - Would Millennials want to join our company?
 - What is our plan for attracting new personnel?
 - What is our plan for motivating our personnel?
- **Develop agenda**
- ✓ **Meeting with key personnel**
 - **Open discussion as to issues and goals**
 - **Develop consensus of strategic plan**
 - **What is our strategy for growth:** revenue or profit (through growing the ability to perform productively)
 - **Develop action items to achieve goals**

Tactical Planning Steps: Tactical Planning is a list of action items to achieve strategic goals. A strategic goal may be to break into the design build market. A tactical goal may be to learn the techniques of BIM or to hire an engineer with design build experience.

The steps involved should be:

1. **Break down by quarter for next year**
 - Eating the elephant bite size provides the greatest opportunity for success
2. **Assign responsibility and schedule for completion**
3. **Periodic Meetings to review action items**
 - Training on new concepts is essential. It takes a while for a new software program or new approach to take hold. Coaching is an important part of the implementation process.
4. **Measure effectiveness**

- Benchmarking of before and after gives you reliable data on whether this is a great idea or should be trash canned.
5. **Reevaluate and revise as necessary**
- If something really doesn't work, then it is okay to dump it rather than hold on to it out of ego.

Project Planning: (to be set forth under Project Management Section)

Personal Improvement Plan. Each individual should have for his or her own improvement plan for the year. Some companies require at least 40 hours of self-study. Some companies have the **Rule of 5**, meaning that employees will spend five hours a week reading material which may relate to their jobs or self-improvement of just intellectually stimulating.

- Peter Drucker spoke almost fifty years ago of the *knowledge worker*—that is, each individual must take responsibility to stay abreast, or ahead, of what is happening in the industry and to continue to upgrade skill levels, including interpersonal skills.
- If a person or company is at the same performance level at the end of the year as when he/she started the year

Adaptability. Times change, demographics change, circumstances in a project change sometimes overnight. Adapting to changing circumstances is an essential characteristic. For example, how do you adapt to a new generation called the Millennials? It is your job to do so.

SUMMARY OF SECTION I A – D

- Excellent companies *do not occur accidentally*
- Excellent companies come about as a result of the *intent* of the leadership of the company
- Excellent leadership has great *organizational ability*
- Excellent leadership has its *principles* in place and developed a culture of *accountability*
- A culture of *respect* for all employees exists
- A culture of *continual improvement* exists

- Excellent companies do *strategic and tactical planning*
 - They are committed to *Purpose, Planning and People*
 - They have a working culture of their values and principles. It is walk the walk.
- Excellent companies stay *abreast* of the industry and demographics
- They have a work place environment where they feel good about work, in which they feel pride, and are treating with respect. The internal customer is treated as well as the external one.
- Presidents prioritize leadership, managementship and doingship
- Most have read at least the following (many have the rule of 5, that is reading five hours a week articles and books that are enlightening about business, management, human relations, adventure, technology or whatever interests them:
 - *Seven Habits of Highly Successful People* by Stephen Covey
 - *How to Win Friends and Influence People* by Dale Carnegie (An oldie but it still is an important resource)
 - *Working with Emotional Intelligence* by Daniel Goleman
 - *Good to Great* by Jim Collins
 - *Deming's 14 Points* (American Society for Quality has a good synopsis)

APPENDIX

- *Characteristics of Great Companies*, a summary of the key characteristics of highly successful construction companies, and a bullet list of important concepts from “must read” books of the last couple of decades.
- *Leadership*, an article on the attributes of modern managers.
- *What Does a President Do* which lists some of the functions and then asks the President what HE or SHE does?

E. ROLE OF MISSION STATEMENTS, VISION STATEMENTS, & VALUES STATEMENTS

In general, none is important if just a piece of paper or part of a social media approach to attract customers. However, **each is extremely important if each**

is well thought out by members of the team and not just the president or the consultant, and if discussed with all members of the company, and if implemented as a part of the operations and culture of the company. And executed. It is an overused term but it is spot on: walking the walk is what wins ball games, not talking about winning ball games. It is execution, performance. Then each has great value.

MISSION STATEMENT: A short but powerful statement of WHY the company exists, and its purpose. Assume the mission statement is “the mission of XYZ is to be the preferential mechanical or electrical company in the region, and that it is customer committed and on top of new technology.” This means that management must do the things necessary to make that happen. It means that you live up to who you say you are, and perform work you have the capability to perform. A mission statement is not self-executing. It must be fleshed out by continual efforts to cause every operation in the company to perform properly and productively.

VISION STATEMENT: *Where are we heading? What is our future? Assume the vision statement is to develop a company that leads the competitors in technology and has added fire protection as a profit center.* The vision statement is a product of well-conceived strategic sessions, which then develop tactical action plans that enable the company to achieve these goals. Again, such statements are not self-executing and involve the commitment of all in the company.

VALUES STATEMENT: What are our guiding principles? What are our core values? What conduct should our employees expect, and what conduct should our customers expect from this company? And how do we make sure we live up to these values?

Assume the values statement lists credibility as one of its principles. *The question is walking the walk:* do you price change orders fairly? Do you accept accountability for doing work that is in the contract but you missed in the estimate? Are all new employees briefed on your values? Is the basis of hiring new personnel on the basis of values and principles or just skills? Is your business philosophy “bottom line” in that you do whatever it takes to make that profit, or is it “top line” meaning that profit is a function of a well-

developed and productive organization which knows the right thing to do and does it?

Summary: The three statements above are not simply bumper sticker slogans. They are actually blue prints for how the company functions and will function. They actually convert into action, how we do things, how we treat each other, the level of our performance, our attitudes. And they are not just for the president and the management staff, but guidelines for all personnel in the company. And that means that the president and the staff recognize the importance of each member of the organization. There is no unimportant function or person in a company.

Companies actually have cultures one can feel when walking through the door or on the job site the first day. When that culture is one of true professionalism, of mutual respect, and the practice of the company values, it can be literally felt by a blindfolded stranger. That sock turns inside out as well. When the president is in the game just for himself, has little interest in anything except the bottom line . . .well, that can also be felt, by those inside and outside the company.

Ethics have been discussed as a basis of humans working effectively with each other since Socrates and Aristotle. Adam Smith, who wrote the *Wealth of Nations*, had been an ethics professor and philosopher. The very simplistic view of ethics is that if you treat others well, you also will benefit. If you train your people so they do a good job for the client, you have a loyal work force, but also a client who wants you to be his or her contractor of choice.

F. THE ROLE OF PROCESSES/PROCEDURES

Everything that is done involves a process. Everything we do involves a systematic series of steps, functions that must be done. We call this a process, and we set forth processes in written procedures so that they are known and understood by all who perform the work. A schedule (CPM) sets forth the process of the steps and the timing of those steps in building a project. A quality plan establishes the steps in meeting the contract requirements for an installation. A safety plan has the steps for making sure our people go home at night in the same condition as they left this morning.

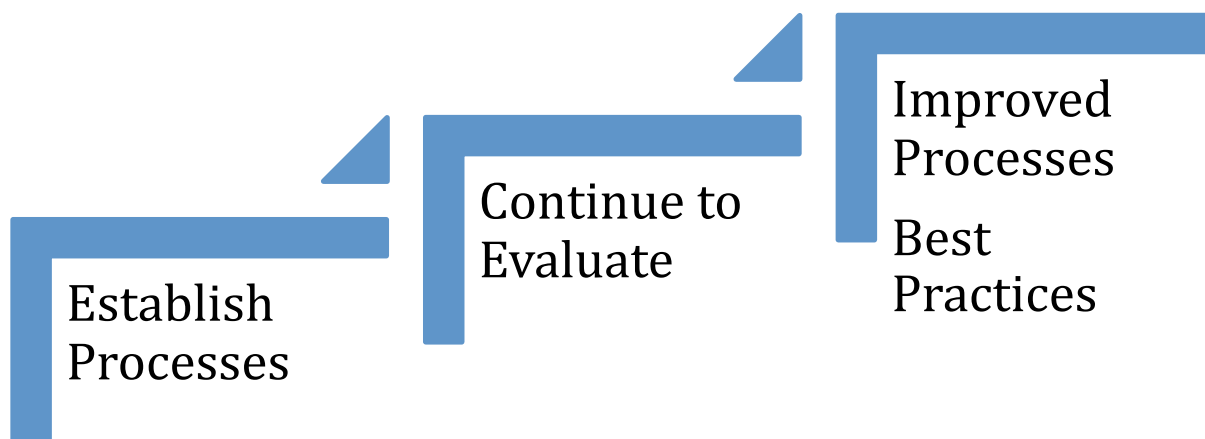
The value of having processes (which are in the forms of procedures) is as follows:

1). They put everyone in the company on the same page

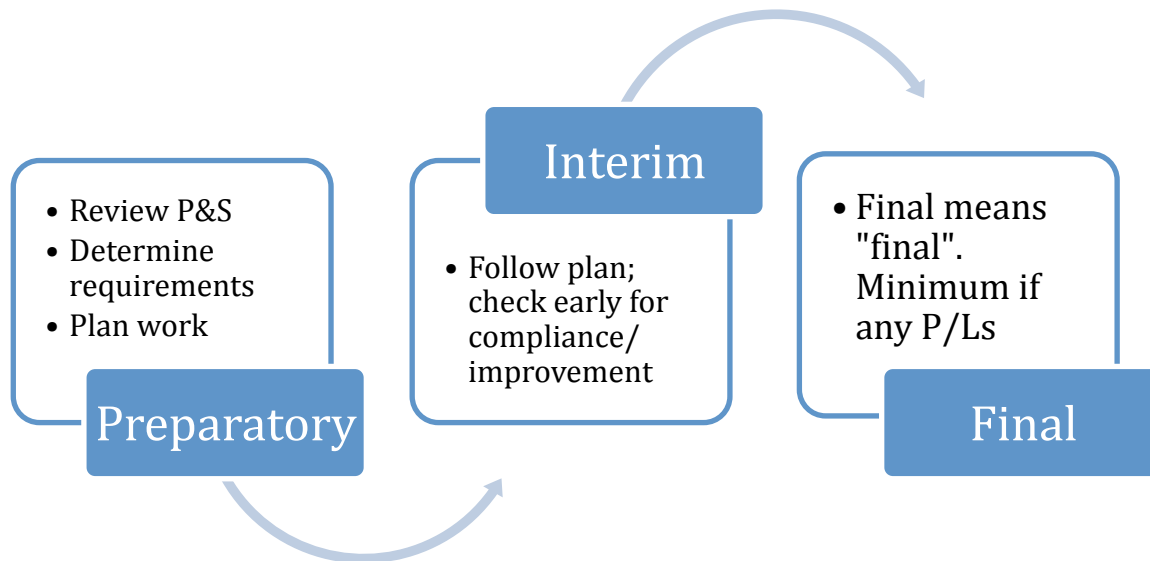
2) They provide a basis of establishing predictable performance goals and durations on all projects that are being performed consistently with the processes that have been established. If the processes have been well considered, they are called *best practices*.

3) They provide the basis for improvement. Analyzing which steps can perhaps be eliminated, or modified in some manner to shorten duration or the number of hours it takes to perform the task. When best practices have been evaluated for ways to improve, we can call those *better practices*.

- The quickest and most permanent approach to improvement of an operation or productivity is through processes: that is HOW it is done. And when an improvement is made, let everyone in the organization be aware of the improvement so that it becomes a best practice of the entire organization. This will be discussed in detail in the project management section.



For example, Built in Quality follows a process which is aimed at “doing it right the first time” and not an “inspect and correct” approach of waiting until punch list time to correct the deficiencies. The process generically consists of:



Experience shows that the three step quality process above generally results in a high probability of contract compliance, reduced cost and schedules when the plan for performing the work is well conceived and communicated to the crew and supporting personnel (supply chain). And at the interim phase, again an opportunity to evaluate the plan, making suggestions for improvement.

The point to be made here is that processes have an important role and are the responsibility of management to assure are in place and are being periodically reviewed for continual improvement.

Processes in place do not mean that the supervisors and managers have their hands tied as to creative approaches to various issues. Processes are baselines but are also triggers to cause staff to think about how things get done and how they can be improved. A CPM schedule is a process which can be used to figure out how to recover from delays and interferences, so like all processes, it is **a tool to follow, but a tool to use to constructively think about how best and how better to perform an activity or series of activities.** All construction companies should have a mentality of “edges”; that is, **how can we do something better, more productive, safer than our competition.** What

might we do to more completely satisfy the needs of our customers? Those are “edges”, but they begin with sound practices, which can be evaluated and improved.

- ✓ The lowest price may get you the job, but not the profit from the job unless the project team is creative and diligent in putting together and implementing a plan that continues to meet the unfolding challenges from Notice to Proceed to Close-out. **If the bid is the lowest price, the performance must be at the highest level.**

SUMMARY: Processes are like a game plan for each activity that needs to be performed in the company. They set forth the steps that, if taken, will have the highest probability of having a successful outcome. They are management tools, and as all management tools, they can and should be evaluated and improved over time. They should not limit creativity but be a baseline to use in exercising creative approaches to performing a task.

Two gentlemen by the name of Frederick (one Fayol and the other Taylor) gave us “**scientific management.**” The former developed fourteen elements of the management process, and the latter time in motion studies, adopted by Henry Ford in mass-producing the automobile. Both saw that everything in manufacturing and construction involves a series of steps, a process for getting the job done. And when those steps are laid out, and the employees trained on what they are and how to achieve them, the workflow improves. At first the processes were developed by the top management and *dictated* by it. **In the last few years, the concept of *participatory management* has caught on, whereby employees involved in the tasks are encouraged to make input as to how best and how most safely to perform tasks. Yet, construction remains a democratic dictatorship, and the input is made, one person must make a decision and the rest must follow.**

G. THE ROLE OF POLICIES

A *procedure* is an outline of the *steps* necessary to getting a task performed. A *policy* is a statement of the company’s ground rules for playing on this team, such as: Non-Discrimination in Employment, or Personnel issues

relating to sick leave or vacation, or how the company intends for its employees to perform certain functions, such as documentation or e-mails.

1) Just take e-mails as an example. The policy regarding e-mails may state among other things:

- Do not use for personal purposes unless extremely important.
- Use sparingly and only when necessary.
- Think out the content and don't just fire from the saddle as soon as a thought hits you.
- Always be respectful.
- Remember that e-mails are discoverable so be careful of making statements that may end up in the office of the attorney for the other side.
- Organize by category or issue.

An enumeration of the various *policies* a construction company should develop is set forth below. Examples of *key policies* will be set forth throughout the material.

PERSONNEL

Hiring
Terminations
Hours
Sick Leave
Equal Opportunity
Medical Insurance
Vacations
Training
Retirement Plans
Drug Abuse
New Employees orientation
Managing Outsourced Employees

PROJECT

Documentation
E-mails
Compliance Requirements
Non-discrimination
OSHA
Codes
Safety
Quality
One Company Concept
Role of Mission Statements

H. PEOPLE

Having a team of great people is again a very intentional and challenging of management and supervisors. All are involved in the process of development and retention of personnel.

- Presidents of excellent companies never blame problems on the employees. As most experts in construction will say: the productivity problem in construction is not in field labor but in management.

Having excellently performing personnel is obviously the edge a company has. Jim Collins in *Good to Great* said that once you have the right people in the right seats on your bus, you can pretty much get anything done.

The process for achieving that goal is:



Many of the factors that enable that process to be accomplished successfully are set forth below:

Work Place Environment

- **A fear free environment**
- **A place everyone is given respect**
- **A place everyone is shown dignity**
- **An opportunity to learn and advance**
- **Where high quality work is produced**
- **Where People are Proud to Wear the Tee Shirt**
- **A reputation for being a good place to work**

For each position, develop criteria:

- **Values expected**
- **Qualifications**

For estimating and management positions, give careful consideration to the importance of having or acquiring field experience
- **Expectations**

This is different from job descriptions, which list the things that a person is expected to do. Expectations relate to the results one is expected to achieve. For a welder it is the ability to perform the function in such a manner that the welds meet the rigid inspection requirements of the contract. For the project manager, it is the ability to manage conflicts on a project and still achieve its goals.
- **Potential career paths.** This is vital for many employees who want to know that they can advance in the organization.
- **Successorship development.** The president, but also the chief estimator, the general superintendent and the Financial Officer, all need to begin the process of developing people who can succeed them one day.
- **Pay ranges**
- **Develop and Update approach to developing *a pool of potential employees***
- **Internship and apprenticeship Programs**

- **Involvement with educational institutions**

Evaluation Process

Annual evaluation programs are not as effective as quarterly get-togethers to discuss how the employee is doing. And real time discussions are even better. The important thing is for the employee to understand his or her goals and expectations, have feedback on the accomplishment and how that accomplishment is taking place, what improvement is needed in the future.

Recognition and Motivation Program

Recognition is a major motivation. That can be a pat on the back, a bonus, a promotion. But the company should have a culture in the management of people a program for letting its employees know when they have done a good job and a reward program for that recognition.

Alcohol and Drug Abuse Program

Unfortunately, employees abuse these things. Some companies recognize this and have programs to assist employees get through their addictions and remain important contributors to the organization. This approach seems to let all the employees know that the company leadership really cares about its people and is there for them in crises the same as the company expects the employees to be there for the company during tough projects.

Grievance and Complaint Program

Conflicts between employees arise. Some employees may feel they are not treated properly. Two alternatives: one is to ignore these things and let them fester or have employee turnover. The other is to have a process for employees to register their complaints or conflicts and have a forum for getting them resolved.

Suggestion and Improvement Box Program

Most employees have ideas on how some activity can be improved. Many are reluctant to voice their ideas. So the

suggestion box has worked out well for many companies. A policy is developed, a form which identifies the activity needing attention and suggestions for achieving that is made available to all employees who may just complete the form and insert it into boxes made available throughout the company's operations. It is essential that a management team review the suggestions and respond – even if the suggestion is not accepted. It shows that management cares and takes seriously the comments made by its employees. That is the important part of such a program: to ask for and take seriously the participation of all employees in continuing to be the preferential contractor in their area.

Training Program for every level, including president (ENABLEMENT BEFORE EMPOWERMENT) may consist of some or all of the following topics:

The Role of Coaching and Mentoring (the idea is to continue to provide *guidance* to employees):

- Mentors to new employees
- Coaching to all employees to be able to optimize the performance of the employee in *real time* rather than deferring downstream the benefit of the coaching will be lost.

Managing outsourced Personnel

- Mentor who briefs the employee on the company, the project
- Continues to make the employee feel a part of the operation

PRIORITY TRAINING: Sometimes it seems that there is a common problem and it is important to deal with it in real time with a group of employees. Jump on it. *Time Management* is often one of those priority topics, from the president throughout the organization.

Introduction of **new technology training**. Technology is in Section IV.

Continual safety programs. Stay abreast of technology that can really improve the safety function.

Interpersonal Relationship Program

- Conflict Management
- Trade Coordination
- How to Manage Others

Communications Written and oral.

The expression by construction personnel, “Well, I don’t like to write” should no longer be tolerated. Communication is an essential ingredient of company and project management.

Project Management Process

- Productivity Improvement Process
- Claims Prevention
- Contract Management

Insurance (often by the company’s agent)

Surety (often by the company’s agent)

Being a Role Model to Others

Some of the most effective training actually comes from how supervisors and managers perform their work, and their attitudes in doing so. An indifferent attitude toward safety by supervisors and/or management results in unsafe practices by the workforce. When presidents or managers yell at others because of a cost code that overran, expect that supervisors will yell at the crew as well. **When the president of the company is known for high standards, treating others with respect, generally that is reflected in the employees.**

Coaching/Mentoring is one of the best approaches for real time training. Peer groups do this at the management-to-management level, a foreman does it an apprentice or new hire. Normally, the smaller the group, the more effective the training.

SUMMARY: In Emotional Intelligence, it is suggested that the most successful employees are the ones most adept at managing others. Certainly, top management must have a genius for hiring, motivating, training and retaining excellent personnel at every level. The bully manager is an endangered species, not quite extinct but on the way out. In fact, turnover of personnel in construction companies and on projects is largely related to poor relationships that managers and supervisors have with employees. **Those who have interpersonal management skills are the ones most probably to consistently succeed in their functions. Those with interpersonal management skills are also committed to helping others succeed.**

Reference: *Working with Emotional Intelligence* by Daniel Coleman.

I. MANAGEMENT OF EXTERNAL RELATIONSHIPS

The President has definite responsibilities for interfacing with the following outside entities:

1. **Surety:** The life's blood of most construction contractors is enforced by **credibility and the ability to routinely forecast costs.** It is of great importance for sureties to not be surprised by sudden shifts in profit/loss statements. Be up front, have honest conversations about the condition of projects and the condition of the company.
2. **Bank:** Depending upon the cash flow requirements of the contractor, the banker is another contributor to the survivability of the contractor. The bank is usually more conservative because of its nature and its lack of experience with the risks in the industry. Meeting the conditions of a loan agreement is essential, with minimum deviation.
3. **Principals in other contracting entities:** Getting to know owner representatives, the principals of construction companies you are dealing with, and suppliers.
4. **The community.** Having a commitment to the community, being involved in various local activities develops a reputation of integrity.
5. **Industry Associations** enable the president to stay abreast of demographic trends, technological trends. Peer groups are excellent to be a part of.

6. **Educational Institutions.** Many contractors have pipelines into colleges, vocational and community schools from which they can always have interns and apprentices available. Many teach in such schools as well.

SUMMARY: The Role of Management is to build the team. The construction team is comprised of a number of entities, all of whom are vital to continued profitable performance. Managing all of those team members is a vital role of management. A construction company is not an island, but an archipelago, a stream of islands commonly connected. If you don't think so, try going a year without bonding, or all of your vendors on COD.

J. THE ROLE OF MEASUREMENT

It is said that each task must have metrics, that it must be measurable, although those such as Deming suggest that by developing the right people and processes, and empowering the employees, projects will be performed successfully and continue to improve. Let's assume that for now, experience with most companies demonstrates that measurable goal setting, monitoring and evaluation have been the pathway to improved productivity.

Earned Value and Benchmarking will be further discussed in the Project Management and Financial Sections. However, for purpose of this section, it is recommended that companies consider developing and implementing goals for various activities and then check to see how well those goals are being met.

1. **Benchmarking.** An example of bench marking might be pre-planning meetings. Over the course of a year, see how well the projects fared where there was pre-planning compared with those that did not have pre-planning. Or those with a built in quality approach versus an inspection and correct approach.
2. **Target Setting.** Earned value is an example. Instead of budget versus actual manhour approach to determine progress (estimated 100 hours, spent 50, therefore I must be 50% complete), an earned value measures performance of the function. It is a measurement of planned

- performance versus actual performance.** A cost report showing that I have spent 50 out of 100 budgeted manhours is no measure of performance. But a cost report showing that I have spent 50 of 100 hours and have only installed 40 of the 100 widgets indicates a negative trend. By identifying early trends, management and supervision have an opportunity to determine the cause of the negative trend and take remedial action. This is an oversimplification but points out the importance of using targets such as earned value to predict, track and improve productivity and should be considered as one of the management tools in a company.
3. **Financial tracking of the financial health of company.** There are key performance indicators that give insight into how well the company is faring, such as current ratio, gross profit margin and others discussed in Section IV. *CFMA* releases an annual Benchmark report that provides a summary of how well other companies in your size range are doing so you can compare how you are faring among your peers. *CFMA* and others also provide Construction Benchmark Reports that may be of value; your CPA, surety and banker also have their own indicators. Section IV will provide a summary of the key indicators and at least a range companies should be shooting for.
 4. **Recommend reviewing *ASTM Standard of Practice for Job Productivity Measurement* as you go about establishing productivity goals and job budgets.**

K. THE ROLE OF INFORMATION

Construction is all about reliable and current information – that is actually used on a timely basis. Pre-bid evaluation of site conditions and contractual terms provide information about risks of the work that may need to be priced or/or managed. Job site information can provide real time trends that enable management to turn around a negative condition or take actions to protect its contractual rights. Daily Reports provide real time information as to what is actually happening right now on the project and a picture of those conditions which may be used in a claim years from now. **So, one of the tools for company management and supervisors is an information system which is reliable, accurate and current.** Examples will be discussed further in the

sections on Project Management and Financial. For purposes of this section, it is mentioned to remind management of the need for such a system and to cause management to think about the effectiveness of its present system.

1. **Real Time.** Real time information is emphasized. If the labor cost report is published a week after the work is completed, it is what is called “tombstone” data. It is historical only. But if information is provided in real time while management still has an opportunity to perhaps modify a negative trend, or to assure contractual notices are being given, now the data has value. ***So it is real time, dynamic data that is essential for effective management.***
2. **Technology.** The awesome role of digital technology and information will be set forth in detail in Section IV. However, suffice it to say that **top management must stay aggressively on top of what is happening in digital technology.** Whether it be cloud computing or 3D printing, technology will be the driving force of the construction industry. Section IV will contain a very extensive summary of the technology that is here now and on the way. The genius will be to determine works for your company on the basis of a cost benefit ratio study, as well as the training that must be done to equip employees with the knowledge needed to effectively implement the new technology. CPMs aren’t being extremely well implemented and they have been around for decades.
3. **Checks and Balances.** In Kipling’s Poem *If*, he suggests that you should put your trust in others but none too much. It is not necessarily that others may be dishonest, but perhaps not always up to the task, so having insights into performances becomes important to be able to check early how if there are variances which need correction, in real time.
 - **Honesty in reporting is extremely important;** otherwise the president is not really certain of the status of the work. Physical completion of work is based on reliable reporting of work performed against various cost codes. So often we find that the reporting is at best not reliable.
 - **Theft on construction sites is not a rare occurrence** and more than one construction company has gone out of business or

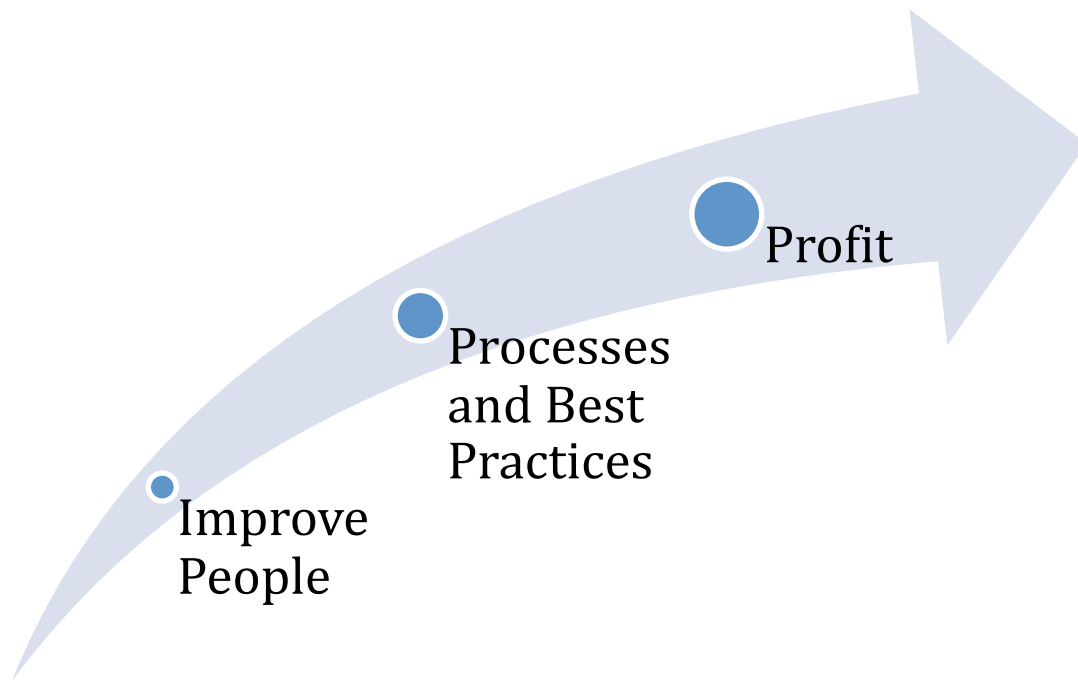
almost bought the farm because of a *reliable* executive who slipped money out of the company.

- **So, follow the advice of Kipling: place your trust in others but not totally.** Have a system for checking the reliability and accuracy of information.

SUMMARY: People and Projects are managed through communication of information. Data. The operative word is “managed” – which is an active verb aimed at achieving future goals. So the data must be credible, and must be current, so that it can be useful for making future goals happen. It can't change history, but can influence the future if the information is provided accurately and currently.

L. THE MANAGEMENT OF GROWTH

Companies that are well organized and operate within their sphere of capability seem to be the ones that are continually successful. However, *a tendency exists to grow revenue instead of the capability of producing that revenue profitably.* This often happens in very good economic times when work is bountiful but resources limited. Or a company has been growing successfully and management seems to think it will just continue to do so, without really giving adequate consideration to its capability to do so. It is often said that the cause of failure is success—success that causes one to believe it will go on forever without evaluating areas of improvement, or demographic or technological changes. *So, before revenue is grown, grow the capability to grow is the conventional wisdom. Grow people, processes and technology that then can produce revenue profitably.*



The Management of Growth should always be a topic in strategic planning meetings. There is a tendency to plot potential growth using percentages: “Well, we should be able to grow 20% next year,” whereas questions should first be asked: “Do we have the people and the technology to bring on additional work? Do we have the capability of performing the additional work when we are stretched now? We can’t get adequate workforce now, so how do I expect to run this new project?”

And a bit about the role of PROFIT. It seems that in the most successful companies, profit is used along these lines:

First: Use to reward the people who earned it.

Second: Use some for reinvestment in the company, plant and equipment, new technology.

Third: Consider training and continual improvement an investment in the company, and use some for that.

Fourth: Put some aside for a rainy day.

Fifth: What is left can be used to buy the new boat for the owner.

SUMMARY: The history of the world is one of change, improvement, and at the same time, abandonment. The telegraph no longer exists except in

museums and now no one would even consider trading off a smart phone for such an antiquated device. The capability we had to build projects two years ago may have changed or diminished because of a dwindling labor pool or loss of key personnel, or because there is so much work we have acquired it is difficult to manage. Being ready for the future is one of the management challenges all construction companies face.

M. MANAGE AS THOUGH YOU INTEND TO SELL

If you were to intend to sell, what are the criteria a buyer would want to evaluate? The same criteria that any successful construction company should have in place even if it never intends to sell, just wants to have profitable sustainability. It doesn't mean you intend to sell; it is just the development of criteria for developing an outstanding company:

1. **At least a three-year record of profitable work**
2. **EBITDA** (earnings before interest, taxes, depreciation, amortization) is often the first yardstick.
 - This is really showing the capability of the company to earn profitable work over time.
 - It says you are in the right market, understand the market and how to penetrate it and perform in it. And you have had the organization to do so.
3. **An evaluation of G&A** to see if it has grown out of proportion to sales, indicating a plush home office perhaps at the expense of field operations.
4. **A backlog of profitable work.** When one asks "what is your backlog?" the answer should really be: "Our projection for gross operating margin is \$____. A concern should always be the reliability of projections of percentage of completion.
5. **An organization of top flight people with minimum turnover**
6. **Excellent field supervision**
7. **Successorship program in place**
8. **A concept of customer for life as evidenced by repeat clients**
9. **Good liquidity (current ratio of over 1.0, preferably 1.5)**
10. **Excellent financial institution relationships**

- **Some companies review the monthly surety reports to see how reliable the forecasts of profit are.** Reports which shown repeated variances from bid profit to actual profit, especially the latter months of a job which show profit fade, causes concern. The question is: how good is the company at truly forecasting cost?

If this is the criteria of an acquiring company, it is a pretty good yardstick for top management to use in evaluating its own performance, plans for improvement. It doesn't suggest intent to sell, but rather to manage as though you intended to at top dollar.

SUMMARY: The very criteria a potential buyer would evaluate are the ones present management should be evaluating as well. A solid organization continually striving to be as good or better than the competition, repeat customers, low turnover of personnel, good cash flow.

N. MANAGE AS THOUGH ANOTHER RECESSION IS AROUND THE CORNER

There are **two types of recessions:**

1. **The first is the one caused by the bad job(s).** Even in well-managed companies, it is expected that a pretty bad financial hit will be occur at least every decade. Such an event has all the earmarks of a down turn in the economy.
2. **The general economy recession.** The lapse between peak-to-peak and trough-to-trough in the economy is not scientifically measurable, but historical one can expect a down turn within a given decade. Some are worse than others, of course.

How Does One Prepare?

Like everything else, have a game plan, which consists of:

1. A measure of liquidity that is adequate to take you through a year or so of a downturn of say 20% in revenue as a rule of thumb. Management of debt within reasonable limits.
2. Staying on top of billings so your aging of receivables is within the contract framework.
 - The game plan is for the job—not the bank—to finance the projects
3. A good mix of jobs, with some quick turnover and others longer term that can support overhead if things go south for a while.
4. Maintaining a very good relationship with subcontractors, suppliers, and financial institutions.
5. The game plan should include an approach for keeping on your best players so that when things get better, you don't have to go to the street to bring on top performers.

O. SOME CONCEPTS TO THINK ABOUT

Peter Drucker said that organization follows concept, so a few that might be of value to consider are:

The concept of unity. Sum plus arithmetic is that $1+1=3$, meaning that two minds are better than one. However, for that to work, first $1 + 1$ must equal 1, that is *unity*.

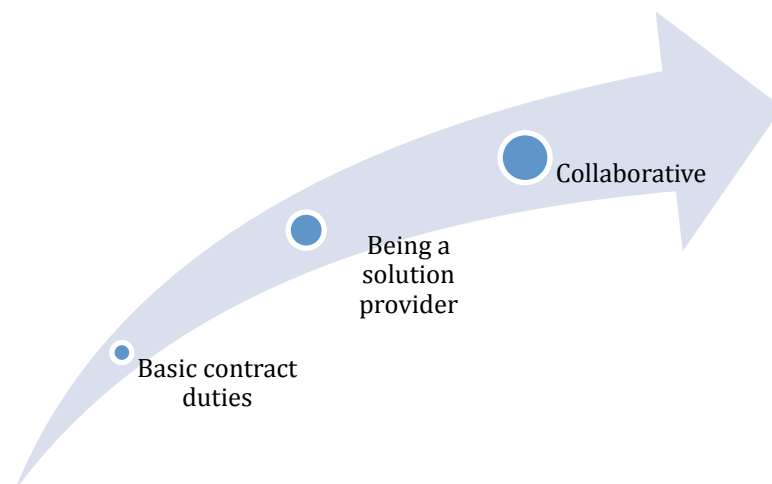
1. **Unity exists when there is a *one-company concept*.** Not a home office and field office but one office, all committed to common goals.
2. **Unity exists when all employees are on board to the company mission statement and values statement, which has become a *culture*.** It does not mean that diverse opinions are not welcome: it does mean that all are driving toward the same overall goals of company and project success.
3. **Unity exists when all employees are treat with respect in a fear free environment.**

Assistant For: Each in the company has a duty to provide assistance to others. So, each has a role as assistant for . . .

1. The president is the assistant for the entire organization, to provide leadership and opportunities for growth.
2. The project manager is the assistant for the field to provide resources, information and conflict resolution where required and when required.
3. The field superintendent is the assistant for the project manager and the Financial Manager to provide current and reliable information regarding field operations.
4. The warehouse is the assistant for the field operations by providing tools and equipment in good repair when needed and the field is the assistant for the warehouse to maintain those tools and equipment while in use.
5. The Estimator is the assistant for the entire operation by acquiring profitable work based on the ability of the company to perform and the field is the assistant for the estimator by providing it information on what it really takes to do the work.

Kano's Delight. The concept of Kano's delight is going a step beyond customer satisfaction by providing service in such a manner the customer is glad you were the provider of the service. It does not mean doing more than the contract requires, but often in such a manner that the entire construction process is a more enjoyable, collaborative and less adversarial experience. This is the basis of customer for life marketing.

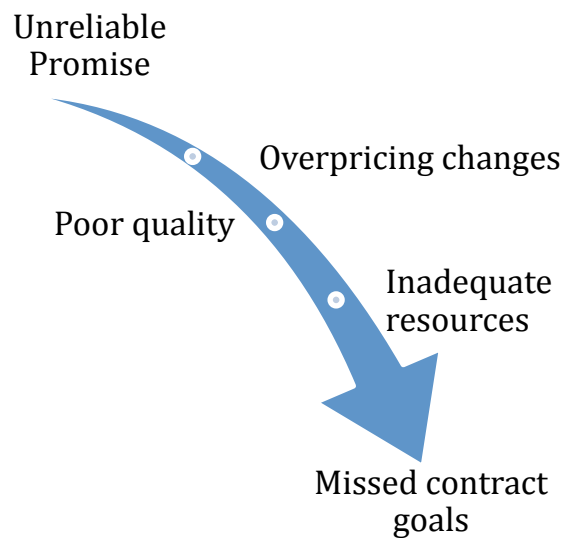
Each company must reckon with its approach to "delighting" the owner. When the company culture is truly committed to being



obsessed with building a strong organization that will consistently produce outstanding work, the foundation is laid. When the mission statement is a work in progress every day, the foundation is laid.

On the other hand, there are DISSATISFIERS, when “Kano is not delighted”:

The claims oriented contractor often falls into the Kano Undelight



category, and certainly does the contractor who does not accept accountability, has a pile of punch lists.

The “delighters” are a derivative of intentionality – and to delight both internal and external customers. Without competent, motivated employees, the external customer is seldom delighted.

The Fundamentals: Vince Lombardi believed that football was about blocking and tackling – the fundamentals. He was legendary for handing a football at the beginning of practice to his great quarterback, Bart Starr, and saying: “Mr. Starr, this is a football” and then going through the drill of calling signals, taking the snap . . . **So construction is like football, a lot of fundamentals which are sometimes not treated as very important, like:**

1. **The Contract**, which is often not read or understood by the people performing its requirements. The Contract is the football, for performing pursuant to its terms is the basis of success or failure.
2. **Planning**. The word is so often used and so seldom given its due. But it is the first domino in all a company does, from strategic planning to daily planning. From safety to productivity, from schedule attainment to quality. It all begins with effective planning. Intention is the energy behind planning: the intention to perform this function on a timely and workmanship manner, the intention to have a safe project. It is the basis of developing and maintaining a highly competent work force. It is the cardiovascular system of a company for without it, the company and its projects do not perform well.

Passion for what we do. Surveys in every industry demonstrate that the leaders really are committed to what they do, and really believe in its importance. Gates was committed to provide available information to everyone in the world, and Jonas Salk believed that research was the answer to dread diseases, like polio. Leonard Bernstein that music would soothe the soul, and I guess Hershey felt the same way about his candy bar. Ford felt that mass production would enable most Americans to be able to drive. Do we feel that way about our industry and do we communicate our passion to our employees? It might be worthwhile to get a copy of the short movie *Monument to a Dream*, the story of the design and construction of the Arch at St. Louis, one of the most motivation construction film ever made. And perhaps post the following, which is a reminder of what we do in this industry:

I SALUTE YOU

I have been with you at 3:00 in the morning when you were estimating a job; I have celebrated with you when you were low bidder even though you left 20% on the table. I have shivered with you on the site when the snow and cold came early in the season; sweated with you as the iron men played tinker toy in the summer's sun; felt the same pain in my gut as you when the cost reports confirmed your visceral feeling that this one was going to be a loser;

sat nervously with you as the banker and surety grilled you as to why you bid this job in the first place; fought the owner with you as we pursued what was rightfully due you; celebrated with you when we settled the claim at 3:00 in the morning . . .even though we left 20% on the table.

I, too, cannot explain that I had rather climb the mountains in this industry than ski down those in Aspen, nor can I explain to my wife why on those few vacations we take she finds me puttering around job sites, trading lies with men who work with their hands, who sweat instead of perspire, who wear calluses on their hands instead of gloves, and who tell it like it is.

I, too, cannot explain that this is the only place I can earn a living because it is the only place I want to earn a living. For:

- You are the dice-rolling, hard-hitting, last frontiersmen of the Free Enterprise System.
- You are the spine of American commerce.
- You are almost the largest portion of the GNP – some years you have been.
- You have built the structures which produce the goods; the highways on which the commerce travels; the banks which finance the goods; the schools which educate and train the people who invest, mine, fabricate, market and sell the goods; the structures which house families, and in which the people are treated when ill, entertained when sad.
- Because of you there are power plants which provide light to read books which criticize contractors, in libraries which you built.
- Without the construction industry, there would have been no industrial revolution, no Salk vaccine, no man on the moon, no Statue of Liberty to welcome the weak, the poor, the oppressed.
- Without the construction industry and its capacity to create integrated communities of industry, worship, business, housing, schooling and transportation, civilization would

never have progressed beyond a largely nomadic and rural peoples.

- The critical path of progress in the world has been construction.
- And to those of you who build, I SALUTE YOU.

Tom Frisby
1976

SECTION II

Project Management

INTRODUCTION

This section relates to project management from acquisition to close-out and warranty; however, it is for the executive manager to review, think about and develop the approach to project management that works best for THIS COMPANY, as again, **there is no one size fits all**. The material that follows is a summary of best practices of numerous companies, but it is not intended to be a prescription for your company. It is material to think about, to use perhaps as a standard, no more than that. Each company should customize its approach to the nature of its work, its personnel, its market and its culture.

- **The following are discussions of functions that should be performed. Indeed, many of these functions are now performed through digital applications;** for example, estimating, tracking of materials and equipment, project management software. But many companies still do it the old fashioned way, **so what is set forth are functions that should be done and considered, no matter whether by computer or by hand.** Section IV will have a complete run down of various technologies that one might wish to investigate, but the material below is only a discussion of what needs to be done, by human or otherwise.
- **Further, the material is generic, in that most of it will apply to general contractors as well as craft contractors. However, there are differences, which the individual contractors will realize and need to take into consideration.** For example, an earthwork contractor needs to pay a lot more attention to soils investigations and reports in the estimating phases than say, an insulation contractor. A mechanical contractor must heed more the requirements of commissioning and closeout than say a drywall contractor. And a

contractor performing federal and/or state work must heed the statutory and regulatory requirements of the sovereign.

- A separate section will be added for contractors involved in excavation (including trenchless utilities).
- A separate section will be added for contractors doing federal and state work.

THE ACQUISITION OF WORK

A. THE ROLE OF THE ESTIMATING IS TO:

- **Maintain adequate backlog**
- **Acquire work that the company has the existing capability to perform . . .**
- **. . .within the risks and obligations set forth in the contract documents . . .**
- **. . . within the challenges presented by the site conditions . . .**
- **. . .and the challenges caused by industry shortages . . .**
- **. . . and be the low bidder against competition without having made a mistake in bid . . .**
- **. . .produce an **ACCURATE** estimate**
- **. . .and to do so **PROFITABLY****
 - **Note: The profit that is added to the direct cost that has been estimated should be a *management decision*, which reflects the risk and opportunities provided by this project. It may reflect the present need of the company to acquire backlog, or other business considerations as well. Even home office overhead may flux a bit, as a job that is very labor intensive requiring reporting such as Davis Bacon may require more overhead assistance than one in which a large portion of the job is subbed out.**

When Franklin Roosevelt was running for president the first time, he gave a speech that an aide found disappointing. “Governor Roosevelt, what you said in that speech was just to get votes. It didn’t set forth your policies, some of which are controversial, which you intend to implement.”

Roosevelt replied: “Yes, that is correct, young man, but before you can do things as president, first you must become president.” And so before guidelines on how to manage projects, we must first acquire projects; and to do so with **estimates which are accurate and complete, and consider project challenges and risks.** And that is what this first section is about.

NOTE: In the bidding process, there are differences from the private sector and the government sector. And in the government sector, variances occur between Federal, State, Municipal and Political Subdivisions such as Municipal Public Works. Some of these may be noted in the material below, but certainly not all. It is imperative to understand and comply with the specific bidding requirements set forth in the Instructions to bidders and applicable laws and regulations. Failure to do so may cause your bid to be rejected as non-responsive.

B. BACKLOG REPORT

Maintaining a backlog report (revenue and manhour projections) keeps in front of management work in process and when that backlog either starts to diminish or building up to a crescendo where it may be difficult to perform with current resources. It might be a tool to indicate that estimating may need to be a tad more aggressive or on the other hand, if backlog is large, to ease off or load a bit more profit.

Some backlog reports are broken down by revenue, others by manhours, and some by supervisors (that is, when work is running out for the foremen and superintendents). Some backlog reports are misleading because they do not accurately reflect the percentage of completion of work. For example, overbillings may give a false picture of the company’s actual position. The **dangers of overbillings** will be discussed in the project management section under Billings and Payment. **Suffice it to say here that the cost accounting system should reflect reasonably accurate**

physical percentages of completion—that is projected versus actual performance—so management always knows in pretty much real time how the job is doing and what the trends are. If the contractor is simply measuring progress on the amount of cash he can bill, he is without a true measuring stick for managing future performance.

C. THE BID/NO BID

Not every job should be bid. Often companies get into trouble because they take on work they are not capable of performing, or they are already so saturated with backlog that it is straining resources and management attention. When economic times are booming, the resources to perform that work are lean. And it is not unusual to discover a lot of jobs make meager, if any, profit, in such times. **So the decision to bid – or not to bid – is an important one. Factors to consider:**

1. **Our experience in this type of work**
2. **Adequate and qualified labor pool**
3. **Qualified field supervision and project management**
4. **Location of Project**
 - If off site, will *per diem* for employees be so great that you may be non competitive.
5. **Size and complexity of project**
 - Reputation of owner or general, contractor or construction manager?
6. **Availability of subcontractors, suppliers**
7. **Backlog**
 - Revenue backlog
 - Profit Backlog
8. **Cash flow**
9. **Competition.** Competition is an important consideration. If there are a lot of contractors on the bidders list, or if there are some known “scalawags” with a reputation for underbidding everyone, it may be a waste of time and money to even consider bidding this job. But not necessarily, so each situation must be carefully analyzed.

- However, management must be aware that it may be overburdening its estimating staff by taking on too many projects to estimate. Often a better “hit” or “win” rate is the result of being more selective and providing the estimating staff the ability to properly analyze the project and develop a well considered estimated.

Some contractors, on larger projects especially, will do a For and Against Analysis, lining up all the favorable and negative favorites involved in both estimating and acquiring the project. Some use a scorecard, others simply go on “gut,” but they nevertheless do some form of analysis prior to deciding to bid. On the larger projects, the decision to bid is made by the team of management, estimating and project management. And of course, it may be that during the estimating process itself, it is determined that the risk is too high and it is never too late to fold up the drawings and spend your resources elsewhere.

D. PRE-QUALIFICATION REQUIREMENTS

In **two step procurements** and others as well, the owners are trending toward pre-qualification statements by potential offerors. A summary of previous similar projects should always be kept on file and updated, which outline, among other things:

- The nature of the work and structure
- Schedule and attainment
- Challenges and how they were met
- Improvement made during the course of the project
- Conflicts encountered and how they were met
- Quality issues and results

Such compilations also enable management to periodically review its past work for lessons learned, types of projects to be avoided and those to be pursued.

E. PRE-BID SITE INVESTIGATIONS

The contract and best practices require a pre-bid site investigation that includes becoming aware of site information that a reasonably prudent contractor should discern. This information may have an effect on pricing, and if a claim is later filed, the contractor will be required to defend its estimate by demonstrating from its file that it made a prudent pre-bid investigation and took into consideration the issues it found, such as:

1. **Site access**
 - Parking
 - Storage
2. **Site restrictions and material handling obstructions**
3. **Environmental issues**
4. **Traffic issues**
5. **Utilities**
6. **Potential safety issues to employees and third parties**
7. **Subsurface conditions as indicated in contractual documents**
 - See Section III, Variances, for discussion of changed conditions
8. **Constrained work environment**
9. **User operations still going on; other contractors on site**
10. **Climatic conditions**

Note: Excavation contractors need to pay special attention to the subsurface conditions. In some cases the Owner attaches a soils report and others he leaves it up to the contractor to perform its own investigation. If a soils report is attached but not included as a contract document, it may very well be that the contractor cannot rely upon its accuracy or contents.

F. SPECIFIC LABOR FACTORS TO CONSIDER

Labor, or course, is the big variable. Productivity is its aim but often falls short. Studies show that out of a 40-hour week, there are only about 22 to 25 really productive hours. How to manage will be discussed in the section of productivity, but the estimator must be aware of the history of its work forces in performing similar work. **Empirical data, including earned values, will be helpful and so will discussions with field personnel to gain input on**

crew sizing, durations, tools and equipment required. **Factors to be considered in pricing are:**

1. Location of project

- Availability of personnel
- Transportation to site
- Per Diem

2. Security Requirements which may affect ability to get adequate crews

3. Crew size and composition

- Availability of competent work force

4. Supervision

- Availability of competent supervisors

5. Supervisor to crew ratio

6. Duration of tasks

- Both extended and compressed durations from normal take additional hours to perform
- Rate of production

7. Flow of work

- Potential stacking of trades
- Crowding

8. Potential overtime; how to manage a very tight schedule should be reflected in estimate

9. Access

- Parking for employees
 - a. Busing to site?
- Site access
- Work access
- Elevators
- Lifts

10. Material Handling

- Off site storage
- Distance and conditions
- Protection

11. Environmental Issues

- Labor is weather sensitive and affects productivity

- Material handling on muddy job sites (when work is to be performed in rainy seasons, for example)

12. The number of crafts on the project

- On large projects, there is a greater drain on local pools of workforce
- On large projects, there are more subcontractors requiring more intense coordination and the likelihood of interferences and delays. This is one of the reasons that most mega projects experience massive overruns of time and money.

13. Installed Material and Equipment. This is mentioned because in a labor impact claim, the first step an evaluator undertakes is to check the cost report for material and equipment quantities. If there was a bust in the estimator regarding quantities of material, then there is necessarily a bust in the labor estimate for installing those quantities. *Always worth a double check on quantities.*

14. Productivity units. This involves labor but also operating equipment. On earth moving projects, the use of older equipment with lower productivity because of additional maintenance and out of service time. The condition of equipment is an important factor in productivity.

G. SOME SPECIAL ISSUES AND DEGREE OF DIFFICULTY TO CONSIDER

- 1. Multiple Story Buildings.** As elevations increase, so does the time to move crews and materials to and from work areas. NECA has a multiplier by floors above the third that can be considered.
- 2. Renovation projects have less specificity and often more unknowns.**
- 3. Projects with on-going operations, from plants and hospitals to airfields.**
- 4. Multiple Structures on One Site.** When there are several buildings going on at once, there is additional burden on supervision, material handling, crew movement, work flow. As soon as the schedule gets out of whack just a small amount, the labor impact can be significant.
- 5. Coming out of the Ground.** Especially on larger projects with challenging subsurface conditions, it is almost inevitable that the

project will not get out of the ground in accordance with the schedule and at the same time no time extension given.

6. **Closing in the building.** And the same is true about closing in the building and having conditioned air available per the schedule. Seldom actually occurs.
7. **LEEDS projects have special considerations and the estimate should so reflect.**
8. **Mega Projects.** They are going to overrun as indicated above. So how does a small to medium size contractor estimate a very large and/or unusual project? Must be thought about carefully in bid phase.
9. **Numerous subcontractors.** Coordination and meeting milestones always a real risk.
10. **The tyranny of numbers.** Projects with multiple structures, numerous subcontractors and a large work force have all the makings of a high-risk project.
11. **Renovation projects.** Will often run into a multitude of dimensional and other discrepancies and almost always an engineer says: “That is means and methods – it is the contractor’s risk.”
12. **Cash flow: the ability to have the owner fund the project, including start up.**
 - **Retainage.** Does the contract require retainage being withheld for the duration of the project? If you are a subcontractor, check both the general contract and subcontract agreement for retainage provisions. Retainage can “eat you up” so think about how to handle in the estimate.
 - **Mobilization billing:** Does the contract permit a mobilization billing to enable you to pay for those front-end costs?

The point is that these and other special issues will confront the estimator who must perhaps later defend the estimate, to his or her own supervisory personnel or to the owner in a claim, demonstrating that they were recognized and in some manner dealt with. Emphasize again: when such risks are apparent from the site investigation and bidding documents, there is a duty to demonstrate that they have been identified and the estimator took them into consideration in some manner in the estimate. And the estimate file should so reflect.

- **High-Risk Projects.** Some companies assign a senior manager to oversee high-risk projects, to be another set of eyes and a sounding board for the project supervisory team.

H. THE CONTRACT DOCUMENTS

A summary of *“Everything you need to know about contracts”* is set forth in the link to Contracts. Becoming familiar with the material in that article is important for all personnel estimating and/or managing projects.

Risk Allocation and the Duty to Seek Clarification: The contract is a risk allocation document, spelling out which party has the risk (duty) for various activities. The role of the estimator is to clearly understand and price those risks undertaken by the contractor and those that are the liability or responsibility of others. The estimator has a duty to seek clarification of ambiguities and inconsistencies when they are obvious, and failure to do so transfers the risk to the contractor. But the operative word is “obvious.” The contractor has no duty to investigate the documents with a fine-tooth comb looking for such ambiguities. But if one is spotted, the estimator should seek clarification, in writing, from the owner’s representative.

- **Point to ponder:** when the contractor has superior knowledge, for example having worked in an area or provided an estimate for the owner, he may be bound by that knowledge and it puts him at a disadvantage. He may wish to request the engineer to issue an addendum containing the facts which may be peculiarly in his possession so all the bidders will be on the same footing.

Nature of contracts

1. **Design bid build.** It is important, especially on public projects, to be completely *responsive* to the requirements of the document. Bidding on equipment, other than specified (unless pre-approved), or taking exceptions will be a basis of bid rejection. If the low bidder is non-responsive, this is the basis of a bid protest by other unsuccessful bidders.

2. **Design Build.** The contractor is responsible for developing the design solution; however, if there is a *bridging* specification (criteria document prepared by owner's representative), the owner remains liable for the accuracy of information in that document. Among other questions, what is the basis of a scope change in a design build contract? And will subcontractors be tied to prescription specifications or performance documents – for the risk factors are much different?
3. **Design Assist.** What are the functions in the design assist and to what extent does this transfer risk to the contractor? How is that priced?
 - As to the foregoing three items: develop a pricing statement of work that establishes the baseline for pricing and your proposal. Baseline should also be level of quality.
4. **“Plans are not complete but will be finalized and issued later in the project.”**
 - In design build and fast track, this is not an uncommon approach. What steps should be taken to establish a scope of work that can be priced and protected?
5. **Bidding off schematic or incomplete drawings.** The contractor's bid should set forth in detail the basis of the bid, both as to quantity and standard of quality that can become the baseline for performance and for changes. One of the requirements of a contract is adequate specificity that its requirements can be performed and enforced with little if any doubt.
6. **Pre-Approval of Equipment Substitutions**
 - Check contract for time limitations and steps necessary to obtain pre-approval
 - Remember that the designer had months to decide on equipment and to select it on the basis of fulfilling the requirements of the owner and the operational personnel. Bidding on substitutions because you can lower the price is not always a great idea for that reason.
7. **Value Engineering.** Value engineering proposals may be offered as a part of a tender or subsequent to award. Consider them as a

strategy for job acquisition. However, in a fixed price, advertised procurement, bidding on the basis other than the specifications is a basis of rejecting the bid as non-responsive.

8. Things to Watch Out for:

- **Unusual requirements** such as tighter than normal tolerances, requiring building to be closed in before finish work can begin.
- **Risk shifting clauses**
 - No damages for delay
 - Unusual indemnification clauses
 - Transfer of design through catch all phrases
 - Unusual warranty provisions
- **Pay when paid clauses** and other restrictions on payment
- **Liquidated Damage Provisions**
- So, all of the foregoing add risk (and risk morphs into dollars) to the project. **What is the strategy of your company for pricing such provisions or managing against them? Remember: all risks do not need to be priced. Some can be managed. Others should be priced.**

I. THE SCHEDULE

Many companies produce a preliminary schedule (even where one may be incorporated in the bid documents), to have the visibility of:

- Durations
- Work Flow. Job sequence.
- Seasonal conditions which may affect productivity
- Labor peaks and valleys (the distribution of labor has pricing consequence)
 - a. Potential wage rate escalation
- Equipment durations
- Potential need for overtime or shift work
- General conditions
- Cash flow projections
- Durations for inspections/commissioning/training/OFE

- Potential for liquidated damages being assessed (if very tight schedule, sometimes a month of LDs will be added to estimate)

Nevertheless, whether or not a bid schedule is produced, the foregoing factors should be considered. **(We says that time is money and then often do not prudently take it into consideration in our estimating).**

1. If schedule shows beginning during rainy season, coming out of the ground will normally be delayed and moisture sensitive activities may be either delayed or steps taken to protect.
2. If much of the work will be outside during the very height of the summer, studies show that productivity is significantly affected by heat; further, protection for workers will be required and some operations (such as concrete) require special treatment.
3. The relationship of the installation schedule and the availability of purchased equipment must be evaluated. In a tight supply market, it may be the availability of the equipment will be delayed beyond the need date on the project.
 - Note that in a tight supply market, vendors will attempt to protect their pricing by limiting the durations the prices will hold or a PIE (price in effect clause).

J. APPROACHES TO ESTIMATING

There are two approaches to getting a job.

1. One is to just take off with complete accuracy quantities and multiply takes a labor factor from a pricing guideline, with management adding a profit percentage based on risk and business considerations.
2. Two is to think out how to build the job, where are the edges you can find other than just making a bigger mistake than the competition. And there are two ways to handle levels of difficulty: one is to price and the other to figure out a productive way to handle it within normal productivity ranges. In other words, yes, develop an accurate estimate, but also think about edges, how you

can perform the job less expensively to enable you to be the low bidder and still maintain an acceptable profit margin.

K. DELIVERABLES WITH TENDER

Check bidding documents to determine deliverables required with bid, such as:

- Bid bond
- Certificates which must be executed

Note: In Federal and other infrastructure projects, failure to provide certain deliverables may be a cause for rejecting the bid as non-responsive. On such projects, conditions and alternatives may not be added to the requirements of the bid documents and any effort to give the contractor what is known as “second bite at the apple” will also be a basis of rejection, or a bid protest.

K. ESTIMATE FILE

The estimate file should contain:

1. All bidding documents
 - All addenda
 - Pre-Bid meeting minutes
2. Memorandum of pre-bid site investigation
3. All work sheets, summary and recaps
 - **This article, as stated, is generic. It is recognized that most estimates today are done electronically and this information is in the electronic file. There are still contractors who actually “take off the job”, or “strip it” for quantities the old fashioned way. So the terms “work sheets . . .” are generic and would apply to either approach.**
4. Minutes of telecons regarding documents with owner’s representative, clarifications
5. Supplier quotes
6. Subcontractor Quotes
7. Preliminary schedule if one prepared
8. Baseline for pricing for commodities, such as copper and steel

9. Baseline for labor rates at time of bid
10. Calculation of general conditions

SUMMARY: The estimate is the first planning document on a project. It is the first shot at managing the project risks, either through pricing or finding a way to handle it (an edge) without adding cost to the estimate. It is an assessment of the company's capability to perform the work and manage the risks and challenges in a profitable manner. It should represent the thinking of the estimator in looking for edges over the competition through its internal capabilities, its ingenuity in how to handle challenges and obstacles, etc. It is simply the beginning of a journey and is the triggering mechanism for all the systems that follow: schedule, budget and schedule of values; subcontractor and supplier management. Every function that follows will be compared with the elements of cost set forth in that estimate. In all probability it will need to be defended, either by one's own field forces who complain about missed quantities or anemic labor; or by an owner in a claim situation. And this is the reason that many contractors do a re-estimate after being notified of an award, to assure the accuracy of quantities and an evaluation of other risks.

Some companies have a strategy of bidding everything they can get their hands on, others believe a more deliberate approach of selecting projects for which they are suited, and have the highest probability of managing profitably is the best approach, and they estimate fewer projects monthly but normally have a higher hit rate . . .and normally have higher margins on the projects they do acquire. These companies use what might be termed an "engineering estimate," that is, they really look at the tasks to be performed, effective manloading of those tasks, material handling, and how to manage most productively the challenges in the bid documents.

Some Special Things to Consider:

1. *The double whammy of missed equipment.* If the material and equipment quantities are inaccurate, then so is the labor to install it. The first thing an owner's claims consultant does in evaluating a labor claim is to check the cost report for material and equipment. If there is an overrun in those categories, he reasonably can assume that there is a bust in labor as well.

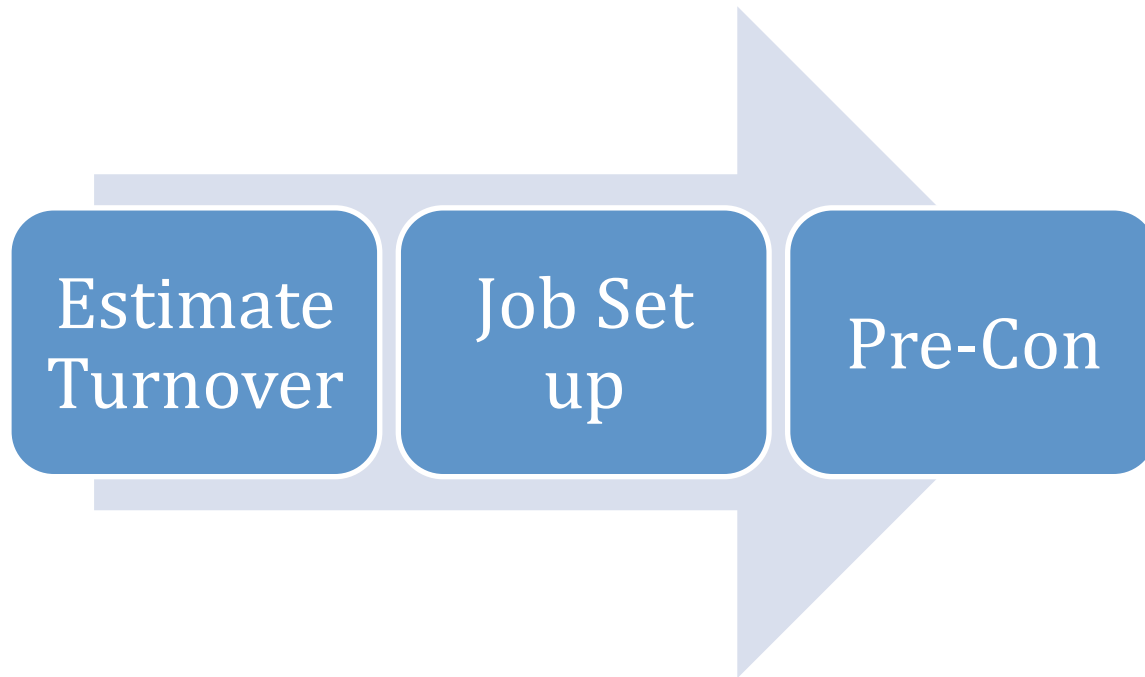
2. **Metrics.** Many contractors are developing metrics to check the general accuracy of the estimate, and also as key performance indicators for project management. A metric may be manhours per square foot (based on the type of structure, as a health care facility will be more than a plain office building), or rate of production for a given work activity. This is simply a keyhole into the estimate, for if the estimate is pretty close to the metric that is the result of historical data of the company's performance, that is a good indication that it is at least in the ballpark and there is no significant bid bust.
3. **Bid Protests.** This is for your lawyer to help you with, but remember that on public work, your proposal must be responsive to the bid documents with no deviations or exceptions taken. If so, and you are the low bidder, the higher bidder may protest your bid which may very well be rejected. The sword cuts both ways as you have the same right to protest the award of a bid to a non-responsive low bidder. In addition to responsiveness, you must also meet the requirements of responsibility and prior experience . . .and so must the other bidders. Failure to meet those requirements may also result in being rejected even if you are the low and responsive bidder. The section on government projects will deal more with this subject.

THE PROCESS OF MANAGING A PROJECT

An excellent and thorough discussion of productivity is set forth in web.mit.edu/Pub/NRCan/NRcc37001.pdf, a Canadian publication through its NRC. It is a great refresher course on the elements of productivity and the impact of variances to schedules and plans. Each company should have its own resource document setting forth the basic information contained in that publication.

Baton Passing. Relay racers and quarterbacks practice the handoff, the passing of the baton, because it is so critical. It is a continuation of the momentum of the event. In years gone by, the estimator often did the estimating, job set up and sometimes change order pricing. He had the basic knowledge of the project as a result of his take off, had a good idea on how to build it. Now, the estimator is just

that – an estimator, and then he passes off his information (passing the baton) to the project supervisory team. The superintendent and the project managers have



a lot of baton passing to do during the project as well (job variances occur which the project manager needs to be aware of, change order and supply chain information from the project manager to the field, e.g.).

The initial phases of planning a project are vital. Parker and Oglesby, the early giants in construction productivity, found that **every dollar spent in planning yields 8 to 10 dollars in bottom line profit.** It is probably more. And the inverse is frightening: how much does the failure to plan take away from the bottom line? We plan to attain goals: one of those goals relates to the contractual schedule and quality and another is cost. **But there is also another huge one: *having a customer for life, being the choice contractor of this owner. Plan for the customer being delighted with performance and want us back for the next projects.*** A lot can be learned from service personnel, ***for their entire success is based on pleasing the customer and being called back when other work arises.***

The phases of front end planning are:

A. INFORMATION TRANSFER FROM ESTIMATOR TO FIELD TEAM

- 1. The estimate is the first planning phase of a project, for the estimator has reviewed and analyzed** (in fact, because of the detailed knowledge of the estimator, in some companies the estimator still sets up the job, does the construction schedule and budget, schedule of values. In some, the estimator still takes over the change order pricing as well. However, with the size and complexity of projects, the norm today is for the estimator to estimate, then turn over to the project team which will manage it). **If the estimate is low and the contractor has been notified of the Owner's intent to award it, it is now time to transfer the knowledge gained by the estimator and management to the team that will manage the project.**

- 2. Turnover Meeting: The supervisory team needs to be brought up to speed as quickly as possible on all of these factors. This occurs through an Information Transfer Phase** (*a baton passing exercise- and remember, the estimator's finger prints are on that baton all the way through the project, so it behooves the estimator to make sure his approach to building the project, including productivity units, is clearly understood by the project team*) where, after it is evident the contractor has won the bid and will be awarded the contract, the estimator debriefs the project team, discussing all of the foregoing elements.

- 3. All documents (electronic and paper files) and certificates will be made available to the project team.** The nature of the team may be a function of the size and risk of the project and may vary from company to company. But the estimator, representatives of top management and the project team should all attend, being given an opportunity for discussion of:
 - Key challenges and how they were approached
 - Ambiguities and clarifications and how they were approached
 - Unique contract terms and conditions

- a. Payment provisions
 - b. No damages for delay clauses
 - Delivery issues of key equipment
 - Manpower requirements, especially start up
 - Material handling limitations
 - a. Non-productive material handling is not uncommonly 20-40% of labor cost. It is important to carefully think out the material handling approach on each project.
 - Potential safety hazards. Your safety plan should always include a safety hazard analysis, which is updated throughout the project.
 - Potential environmental issues.
 - Potential relationship issues based on experience. There are owner's representatives who perennially are difficult to deal with and those who are real assets to the project.
 - Critical issues which will need immediate attention
 - Productivity targets
 - A list of deliverables, such as insurance certificates, performance bonds, etc required before work can begin.
4. **Owners often dictate certain means and methods in the bid documents, from the schedule and all its requirements, to cost and communication systems.** Some of these may be different from those your organization is accustomed to and should be addressed by the estimator in the turnover meeting, as well as the job set up meeting.
5. **In fact, the turnover process is a good activity to benchmark – that is to see how projects fare without it compared with those that do.** Most companies find that there is measurable benefit to the estimate transfer phase; even small projects seem to benefit. Normally the benefit is in direct proportion to the quality of the handover phase and the attitude of the personnel involved. If management believes these are a waste of time, then they will be a waste of time. If it is just “another meeting”, then it will just be another meeting. If the entire team takes it seriously, then normally it will have a meaningful outcome.

B. JOB SET-UP BY THE PROJECT TEAM

- 1. The *Quality Project*.** The mission should be more than just meeting budget, schedule and workmanship. The mission should be a *quality project*: that encompasses relationships, building trust, effective decision making, problem prevention and problem solving. A safe project. A win-win project based on a collaborative instead of an adversarial approach. The goal of each project is to identify what quality project means to the team managing it, and develop the steps to achieve a *quality project*, and then to actually do it.
- 2. *Plan – What does it mean? A plan is an intention about what one is going to do.*** So, first one must know what he is going to do, that is what are the results and when are the results. Second, it is the organization of the steps to get it done. It is thinking about the best way to get it done. Third, it is getting it done. **EVERYTHING MUST BE PLANNED** – things don't just happen and elves don't come out at night and help the cobbler repair shoes. ***Planning is not about the end result, but the steps to achieve the end result. It is not about writing down some stuff on a piece of paper but thinking about how best to do the job, being creative, being open to input for suggestions and ideas.***
 - **Empire State Building.** The story of the construction of the tallest building in the world in the 1930s, built in 12 months, is the story of planning every step of the way, innovative and creative planning with input from all members of the team. It remains the gold standard of creative team planning. And execution.
 - **Pre-Mortem.** All jobs should be reviewed after their completion for lessons learned experience that can be either implemented or avoided in the future. It is recommended that a Pre-Mortem—prevention of disaster—be held at the onset so that management and supervisors can discuss risks and challenges on this project and talk about how best to manage them.

3. **The Function of *Mission*:** Those who served in the military relate to the term *mission*. It basically means to take on a very important assignment and *make it happen*.
4. **A project team does just that: it takes on an important job with the commitment to make it happen. And then makes it happen.**
 - ***Making it happen is a function of leadership, planning, organization, execution.*** And commitment to get the job done. The point is that just getting the crew, tools and material together is not enough. There needs to be an attitude accompanying the planning, one of enthusiasm and success.
 - ***Establish the project staff. There is a tendency to be too stingy with staffing in the name of saving a few dollars.*** Often the superintendent is also burdened with being the safety representative and/or the quality manager. Together with today's paper work requirements, consideration should be given as to whether such an approach is really prudent. On larger, more complex projects the additional of a project engineer, and/or time keeper and/or administrative assistant or other staff often more than pays for itself.
5. **The first pre-planning function is to quickly provide as much information to the project team as possible through the information turnover meeting. The second is for the project team to take that information and run with the ball, including the following:**
 - ***Often the field does a re-take off of quantities in the development of a budget.*** This gives it a more detailed insight into the job – besides the way a job is built is sometimes different from how it is seen by the estimator.
 - a. **The Budget Process:** Different companies and different software programs handle this differently. Again, the budgeting process set forth below is generic, whether done electronically, or otherwise. But the important point is to establish realistic targets that are bought into by project

and field personnel who will be responsible for managing the project on a profitable basis.

- i. Begin with the original estimate. We know a couple of things: one is that we generally don't build exactly the way the project is estimated.**
- ii. Second, it is important to know how accurate the estimate is, how well it takes into consideration factors and risks that may affect productivity.**
- iii. Therefore, at a point in time, especially on larger jobs, it is generally best practice for the field to review the estimate for accuracy, adequacy of labor for the various cost codes (plus and minus). Some companies have a 90 window in which to perform this function, others try to do so as soon as the project gets underway. Certainly it is a good idea to review the plans and estimate for the priority work issues that will be upcoming the first part of the project (including any items which may be pre-fabricated or pre-assembled early on).**
- iv. With that review in place, a revised budget that is "owned" now by the project team (subject to review and approval by top management) is in place. It reflects a budget for direct cost and a target for the gross operating margin that the project team has a duty to deliver.**
- v. The budget is periodically adjusted for change orders, of course.**
- vi. Actual cost is reviewed in real time to evaluate performance against the goals set forth in the budget.**
- vii. A word about "cost codes". Some companies refer to the individual cost codes as "buckets." Layout is a cost code, for example, which is**

“bucket for budgeting and collecting cost.” The more sophisticated company will spread that cost code (or bucket) through the project, for example, floor by floor, building by building. This provides great visibility, an opportunity to understand trends as they are occurring and a great tool for claims if one were to develop. Other contractors feel this is too much trouble for the field and have fewer cost codes or buckets. Certainly on larger projects, it is highly recommended that an adequate number of cost codes be used for collecting cost and measuring performance. A simple approach is to budget activities off the CPM and collect cost against them.

- **Job number**
- **Review the Contract (RTC)**
 - a. **Review estimate**
 - b. **Review risks and plan to handle**
- **Prepare Deliverables**
 - a. **Return of executed contract documents**
 - b. **Insurance certificates**
 - c. **Bonds**
 - d. **Plans as required before mobilizing such as**
 - i. **Permits**
 - ii. **Safety Plans**
 - iii. **Quality Plans**
 - iv. **Environmental control plans**
 - v. **Material Handling Plan**

Note: The company has numerous plans from previous jobs, so these need not be done from scratch. But each project is different, so each plan must take into consideration the uniqueness and special requirements of this particular project.

- **Begin purchasing process.** Establish as a priority moving from budgeted to *committed costs*!
- **Begin getting subcontractors on board**
 - a. Assure deliverables such as insurance certificates, etc are being provided
- **Crew Development and Leveling**
 - a. Labor Budget. Set up cost codes – that buckets of cost referred to above.
 - b. Earned value targets
 - i. **Short interval forecasting.** The most effective approach to scheduling and controlling cost is to control the work activity. It has been shown that tasks whose durations are not more than three to four weeks are most susceptible of effective planning, performing and monitoring. Liquidated damages two years distant are not highly motivational to the front end crews, but completing the lay out for the first elevation of the building is right in front of the nose of the supervisor who has the responsibility of completing the task on time and per the plans and specification.
 - c. ***A little secret about productivity: The role of the foreman or the lead of the small crew in achieving performance goals cannot be adequately emphasized. Selecting, training, motivating that supervisor who is maybe over a 5-10 person crew is essential. When they are a real part of the team, schooled in what to do, what the goals are, and provided adequate recognition, they can really make a job hum . . .and the inverse is also true.***
 - i. ***Impacts on small crews versus large crews:*** Studies also show that variances or external events have a smaller percentage impact on productivity on small crews versus a large crew. So the lesson is to provide smaller, well-trained

hard-hitting crews with a very competent leader as opposed the larger crew or one with an untrained or unmotivated leader.

- **Billing Procedures Established**
 - a. **Schedule of Values**
 - i. Prepare in advance to revise the schedule of values for change orders that occur.
 - b. **Mobilization Billing**
 - c. **Stored material. What protective measures are required to be paid for stored material?**
 - i. As a note, when the project begins, sometimes material and equipment brought in too early must be moved several different times because of job progress. Material handling and protective costs may be significant.
- **Schedule Review and Development**
 - a. Establish priorities for first 25% of project
 - b. Establish responsibilities
 - c. Review for work flow and reasonable durations
 - d. Review for areas additional workforce or overtime might be required
- **Establish Logs**
 - a. Submittals
 - b. Procurement
 - c. RFIs
 - d. Changes
 - e. Claims
- **Establish filing system (See appendix)**
- **What is needed from Others:**
 - a. Tools and equipment
 - b. Work force
 - c. Decisions
 - d. Access
- **Discussions with the project team, getting input and ownership in the plan.**

- a. The **EMPIRE STATE BUILDING** mentality.
 - b. **DECISION THINKING.** When a plan can be discussed with the people responsible for its performance, and they can make input, and have a sense of ownership, the likelihood of meeting the goals is increased dramatically.
 - c. **RECOGNITION.** Following that up with recognition of their efforts and a process for continual input (see the section on Built in Quality and Built in Productivity) to further enhance the probability of success.
 - d. **Risks and Challenges:** what are they and how do we manage?
- **CLOSEOUT.** Yes, the time to start getting ready for the closeout of the project is at the outset of it. Read the contract to determine close out requirements and make a list of them, as well as the tests and inspections required. Begin developing a closeout procedure. **Closeout has taken on new dimensions in that Owners are understandably and reasonably demanding that all of the items set forth for closeout and final acceptance are met. Documentation is as real a requirement as an MCC, so do not neglect it!**
 - a. **As-builts:** Who maintains them? How are they to be maintained?
 - b. **Commissioning:** If this project requires commissioning, set forth the requirements and include on schedule. Maintain records of commissioning events.
 - i. Schedule all tests, including the process for them (for example, there may be a requirement to submit test procedures so comply but also show on schedule). Include FATs, mockups on schedule.
 - c. Manufacturers instructions.
 - d. O&M Manuals
 - e. Material data sheets
 - f. Start-up procedures
 - i. Scheduling factory start-up personnel

- g. Training requirements
- h. FF&E: Include on schedule
- i. Contractor inspection, tests and punch list records
- j. Spare parts, special tools
- k. Include requirements for subcontractors and vendors in their contracts

C. PROJECT KICK-OFF (PRE-CONSTRUCTION CONFERENCE)

The pre-con is an opportunity for a collaborate pre-planning meeting with all the players, from owner/owner representatives/contractors and key suppliers, and depending on the nature of the project, operational and user representatives. Commitments to attempt to prevent claims and overruns through effective and collaborative project management should be discussed. In addition to the routine agendas, it is an important time for the following:

1. **Priorities Established. The first 25% of the project is vital to project success.** Get behind in the early phase of the project and you pay a price later on, with stacking of trades, overtime and unproductive practices in trying to catch up. A reason for profit fade in the last 10% of the project is often that we get behind in the first part of the project, still have the same end date and have therefore pushed work into that last segment of the project – it is like putting two pounds of stuff in a one pound bag. **Establish the priorities necessary to stay on track during the first part of the project:**
 - Temporary facilities, utilities.
 - Decisions required
 - Access needed and state of readiness
 - Workforce size and supervision
 - a. Consider doing a **planned versus actual workforce curve, which shows in real time the planned workforce compared with the actual work force.** In most labor impact and delay claims, the claims consultant for both sides will do such a planned versus actual curve and if it such a deficiency of manpower at the front end, the assumption is that the

project simply got behind because the contractor failed to resource it.

- **Tools and equipment**
 - **Work activities**
 - **Material handling.** Spend some time on laydown areas, storage as this is a productivity eater if not handled well.
 - **Lifts and cranes.** Discuss the availability and how priorities will be established for use.
 - **Use of elevators.** In a functional building, such as a hospital, can crews use and when; can material and tools be taken up in elevators and when.
2. **Get those submittals in and processed. If meetings between the trades are necessary for coordination of interfaces between equipment, schedule and get it done!**
 - This also goes for certifications (such as welding or med gas as an example)
 - Complete the procurement process early on.
 3. **Review the drawings to identify discrepancies quickly.** The first part of a project sometimes is simply completing the design before construction and procurement can begin. So as quickly as possible, convert from a completion of design to a construction project. Emphasize getting the drawings cleaned up, submittals approved and the supply chain moving.
 4. **Get your subcontractors on board.**
 5. **Plan it. Do it.**
 6. **Be obsessed with identifying and completing those activities to get on and stay on schedule that early part of the project!**
 7. **And beware of confusing billing percentages with actual physical percentage of complete.**
 8. **The pre-con is a good time to take a lead in establishing a *collaborative approach* to managing the project.** Subcontractors often take such a lead and are often the driving forces behind successful projects. It is because they establish goals, meet them, and work collaboratively with others towards working through difficult problems.

SUMMARY: WHAT BEGINS WELL HAS A GREATER LIKELIHOOD OF ENDING WELL MORE SO THAN THAT WHICH DOES NOT START OFF SO WELL. GETTING THE MOMENTUM STARTED EARLY AND THEN MAINTAINING IT ARE ESSENTIAL TO PROJECT SUCCESS. IN CONSTRUCTION, WE DON'T MAKE UP LOST TIME ONE FOR ONE; IT SEEMS THERE IS ALWAYS A MULTIPLE. STARTING OFF WELL IS A FUNCTION OF THE PATHWAY OF PRE-PLANNING BEGINNING WITH THE ESTIMATE, TO TURNING IT OVER TO THE PROJECT TEAM WHICH THEN TAKES THE BALL AND CONTINUES TO FLESH OUT THE ORGANIZATION PLAN THROUGH THE PROJECT KICK OFF AT THE PRE-CONSTRUCTION MEETING. THE CONSTRUCTION DOESN'T NORMALLY START UNTIL THE PAPER WORK IS DONE (SAFETY AND OTHER REQUIRED DELIVERABLES SUCH AS BONDS AND INSURANCE CERTIFICATES, PERMITS, ETC), AND UNTIL THE REQUIRED APPROVALS ARE OBTAINED (SUCH AS EQUIPMENT SUBMITTALS, CERTIFICATIONS—WELDER, MED GAS, ET AL). SIMPLY DO NOT BE LACKSADAISICAL ABOUT THOSE INITIAL PAPER WORK REQUIREMENTS—THEY CAN BE PROJECT KILLERS BECAUSE THEY ARE OCCURRING AT THE FRONT END OF THE PROJECT AND OFTEN DELAYS ARE NOT EXCUSABLE AND THE END DATE OF THE JOB DOES NOT MOVE—SO YOU END UP IN AN ACCELERATION WITH LABOR IMPACT.

AND AS YOGI BERRA SAID, THE GAME AINT OVER UNTIL IT IS OVER. PLANNING AND EXECUTION IS A NEVER ENDING PROCESS, AND THE GAME AINT OVER UNTIL FINAL ACCEPTANCE AND THE END OF THE WARRANTY PERIOD. AND IN THE CASE OF CLASS ACTION LITIGATION, SOMETIMES YEARS AFTER FINAL ACCEPTANCE AND WARRANTY.

A COLLABORATIVE PROCESS IS ALMOST ALWAYS MORE PRODUCTIVE THAN AN ADVERSARIAL ONE. BEING COLLABORATIVE IS MORE THAN JUST BEING FRIENDLY, BUT WORKING TOGETHER TOWARD SOLUTIONS THAT ARE IN THE BEST INTEREST OF THE PROJECT. BUT IT TAKES ALL OF THE PARTIES TO THE PROJECT FOR THIS TO OCCUR. There will be a section on how to motivate collaboration and more effective relationships.

APPENDIX. See The Role of Collaboration in Construction Projects.

The 25/10 Process

The Scheduling Process

<http://www.constructioncompany.com/historic-construction-projects/empire-state-building>

D. Knowing the Right Thing to Do and Doing the Right Thing at the Right Time – The Quad

The conceptual basis of excellent performance is found in this phrase: **KNOW THE RIGHT THING TO DO, MAKE SURE OTHERS DO AS WELL, DO THE RIGHT THING AT THE RIGHT TIME, DOCUMENT THAT YOU DID AND LEARN FROM IT SO YOU DO IT BETTER NEXT TIME.** This is a way of life that applies to everything that is done on a project; it is an overarching concept for project management. The following QUAD depicts the nature of where you are or should be throughout the project. Ask yourself, or others, in meetings: What Quad are we in right now? Are we in a quad that will bring success or a quad that will lose money and create adversarialness? What Quad should be move into?

QUAD I
Makes Money
Knowing the Right Things
Doing the Right Things
Team
Core Values
Trust
Content Conflict Resolution
Built-in Quality
Decision-Making
Accountability

QUAD II
Loses Money
Re-Work
Inspect & Correct
Decision Delaying

QUAD III
Loses Money
Relationship Conflicts
Defensiveness
Not Accepting Accountability
Living in the Past

QUAD IV
Makes Money
Raising the Bar of Performance
Training
Lessons Learned
Assisting Others to do Their
Jobs

Quad I: Knowing the right thing to do. You make money when operating in QUAD I

- Planning the right thing when it should be done
- Doing it right the first time
- Documenting that you did
- In conflicts, attack the issue and never the person
- Make and keep promises (the reliable promise)
- Accountability

Quad II: Rework: You LOSE money when in Quad II

- Punch lists
- Repeating the same mistakes
- Not managing outsourced employees

Quad III: Conflicts: Attacking people and not Issues: The probability is that you lose money and respect when in QUAD III

- Unreliable promises
- Unethical behavior
- Adversarialness

Quad IV: Improvement: In QUAD IV you are developing sustainability – future success

- Lessons Learned
- Realistic recovery schedules
- Using 20/20 foresight instead of being a Monday Morning quarterback

E. TIME MANAGEMENT

Management of time is the mark of the successful supervisor and manager. But it is not time that is managed.

- 1. Time management is activity management.**
- 2. Identifying priority activities**
 - This begins with the identification of short-term goals. What must be done this day or this week?
 - Priority activities are ones that push the ball further down the field, not just busy work or consume time.
- 3. Bite-size things that have a short cycle time.** People are motivated to short interval tasks; liquidated damages at the end of a two-year job are hardly motivation to a crew. But put a task in front of them that has less than three weeks duration and you have the best chance for success.
- 4. Put your priorities on your daily to do list.** The “to do list” is the gold standard for managing time.
- 5. Managing others who may absorb your time** (this is a reason to develop people under and around you to do their jobs properly, so they don’t

- interfere with yours). In other words, **for you to be a time (activity) manager, you must train those around you to be also.**
6. Doing those priority activities come hell or high water.
 7. Do them right, as rework simply adds to the backlog.
 8. At the end of the day, check off the stuff you did and the stuff you didn't. Why didn't you? Figure out how to get it done without interference tomorrow.
 - So I have daily bookends: a to do list in the morning and a check off at night to see how I did.
 9. **Avoid the inconsequential stuff.**
 - Not that stuff that seems insignificant doesn't become so. Maybe it is not so important today to get that purchase order out, but it may be soon. So keep an intermediate look out list . . .coming attractions.
 10. At the end of the week, evaluate how you did. Did you meet the goals you set for yourself? In other words, **your weekly goals and to do list are really report cards you set up for yourself; at the end of the week, give yourself a grade.**
 11. The to do list and developing the discipline daily to perform those tasks is the beginning of a habit of performance which overpowers procrastination.
 12. **Take some breaks during the day.** Step back when you feel jammed, if you find yourself reading the same thing over and over again. If your use of time is ineffective, it is wasted. Having a small break is effective use of time. Concentrating on the big goals: "I've got to get this TAB done by next week" instead of "I will pull out the plans and highlight supply registers and return grilles" which is a tiny, but necessary step toward the end result.
 13. **Time or activity management is a learned discipline.** It is an essential one.
 14. One must stop saying: "Oh, I just don't have the time to do this." It is a self-executing fate. **One determines the priorities, and does them.**

F. THE ROLE OF TRUST

Excellent projects are characterized by TRUST. Trust is the result of the algorithm: $C + C + C = T$, where:

C stands for Competence

Competence as a welder, sure, but also as a supervisor, a manager, a scheduler and planner, a decision maker.

C stands for Character

The concept of the reliable promise. When you say something, it can be taken to the bank. And being credible in changes order pricing and accountable for performing as required.

C stands for Consistency

So you mend a punch list item that costs a hundred bucks but rebel if it is a thousand even if it doesn't meet spec?

T is the derivative and stands for TRUST

In excellent projects, all the parties meet this test. The owner is competent in decision-making, the engineer in timely and objective responses to RFIs, and the Owner may gulp but pays for the design deficiency and grants a justified time extension. The general contractor does a good job of scheduling, updating and coordinating, and treating subcontractors fairly, corrects poor workmanship in a heartbeat and does not gouge change order pricing. This may seem like fairyland, but over 15-20% of non-residential projects have excellent results and ALL are so characterized. *It should be the mission of all projects.*

ATTACHMENT: The Role of Trust

G. THE ROLE OF THE RELIABLE PROMISE

Someone said that a project is just a series of promises, hopefully fulfilled.

The Owner promises to make timely and objective decisions; the general contractor to update schedules effectively and to manage and coordinate the project; the craft contractors make promises to have manpower available at given times and to perform work timely so that follow-on contractors are not impeded.

It should be a culture of your company to be known for fulfilling promises, for others to be able to “take it to the bank” when your company makes a promise or commitment that others rely on. And your company should take the leadership role in project management to encourage the concept of the “reliable promise”. **The reliable promises is simply an extension of the**

C+C+C=Trust algorithm above, but it is an essential extension of it. A reliable promise is further a demonstration of the company ethics and values.

H. THE ROLE OF THE COMPANY MISSION STATEMENT AND STATEMENT OF VALUES

If the company has these statements, they may be printed on a card, which the employees have tucked away in their wallets, where somehow they are of little benefit. Review them and make the principles stated on that card flow into your decisions and actions throughout the project.

Accountability is normally one of the values a company espouses. It really means “the buck stops here.” Being quick to blame others or to play lawyer and attempt to shift responsibility to others is inconsistent with a value of accountability and is also inconsistent with productivity. Look at endless punch lists at the end of the job with the contractor continuing to try to find reasons he is not at fault, instead of stepping up, taking accountability and getting the job done. **Accountability is the overarching dynamics of highly successful projects and companies. Companies that have a culture of accountability strive constantly to be the best they can be, quality work and quality projects and quality of life are a way of life, continual improvement to stay ahead of the competition, safety as a moral commitment to employees and third parties . . .all of this flows from a deep seated commitment to being accountable as individuals, as a team, as a company. The concepts of C+C+C=T, and the reliable promise all are under the umbrella of Accountability. The companies that follow this pathway are the ones most likely to indeed have customers for life.**

Being accountable does not cost more, it costs less because all members of the project are always seeking to do the best they can, provide quality, safe and productive practices throughout the project.

I. THE ROLE OF MEETINGS

Meetings will happen on any project. Some are attended by project personnel, others are internal meetings. You will be a leader of some, a participant in others. Some will be a waste of time, others of vital importance. **So, the common attributes of any meeting:**

1. An agenda setting forth *purposes and outcomes*

- **Delays and accelerations destroy any probability of a successful project.** Each meeting should begin with a resolve to deal with issues in such a manner to maintain momentum and sequence and avoid impact to schedule and labor.
- One of agenda items is to close out any issue that has been hanging out there, unresolved.
- An agenda item is a commitment to not let open items remain unresolved!
- If you come out of meetings with the puzzled look saying, “What was that all about?” you know it was not a worthwhile meeting.
- **Effective meetings push the ball further down the field. Ineffective meetings sometimes cause the team to be thrown for a loss.**

2. Preparation by all

3. Leadership at the meeting:

- **Sets guidelines**
 - Respectful
 - Open, but focused, communication
 - Attacking issues and not people
 - Aimed at resolving issues
 - Be an active listener
- **Sticks to the subject;** keeps meeting on track of issues.
- If meeting starts going out of control, **call a time-out.**
- Summarizes each issue
- Submits minutes for review

4. **Participants actually participate.** Attendees have a duty to be of value at the meeting, not just note-takers.

- **When people come out of meetings saying, “Well, I could have said . . .or I wish I had said,” we might not have the right leaders on the team.** The only bad question or thought is the one not expressed. Even ideas that are rejected have value just in the process of thinking through the response.
- **Come prepared**

- **Treat others respectfully. THE RULE IS TO ATTACK CONTENT ISSUES, NOT PEOPLE.**
 - **Don't rehash, but aim for solutions**
 - **Be willing to compromise on positions**
 - **Read and make changes in minutes of meeting where justified**
 - **Key issues affecting the project should be identified and filed separately.** For example, if there is a continual delay in making a decision regarding a drawing issue, give it a name and continue to file copies of all meeting minutes under that subject.
 - **Meetings are often about promises:** "I will have ten electricians on the job next Monday"; "We will have this building closed in by the middle of the month"; "We are ready for TAB beginning Friday." **Make promises that are reliable that others can count on.**
 - You can make conditional promises: "If the studs are installed by this Monday, we will have a rough-in crew immediately following."
5. **Solutions developed and recorded.**
 6. **Actions to be accomplished identified, scheduled, with responsible parties named.**

Always ask the question at the end of planning meetings: "How can we do better?"

J. THE ROLE OF DOCUMENTATION

1. **There should be a beneficial reason for any documentation.** If there is not, then don't bother with it.
2. **The role of ethics.** Ethics, simply stated, is a way we deal with each other, treat each other. Honesty and reliability are indeed ethical issues. **And the reason that ethics are a part of business, and a reporting or documentation system, is that if the information is accurate, then prudent business decisions can be made in the best interest of the project;** if the information is misleading or inaccurate, decisions are

either not even made, or most like flawed decisions. So ethical practices are good business practices. **Sometimes it takes courage to be ethical, but that is also a part of good business practices.**

3. Documentation is communication: it *actually* speaks to you:

- **Labor cost reports** (earned value) tell you trends so that action can be taken while the work is still in progress and you can improve unfavorable results.
- **Daily reports** tell you what is happening for the same reason: events or trends that are affecting schedule and/or productivity so action can be taken to reverse an unfavorable trend, or protect yourself through a request for change or claim.
- **Submittal logs** tell you when the submittal is due and act as tickler systems to bug the subcontractor or supplier in advance to make sure it is on time; and again it is historical enabling you to know the impact of delays in the submittal process which may have affected deliveries and installation.
- **Schedule updates** tell you what the challenges ahead are, and steps you can take to meet them.
- **Plans** (look ahead plans, daily plans) are the result of thinking out the best approach to performing functions
- And a year or so after a project is over, it may tell arbitrators or a jury what happened on the project. **A daily diary** is in effect a witness who can speak from the grave long after the building is complete and the construction team has moved on.
- **Meeting minutes** say: “This is what is been going on and some stuff that needs to be done if we are to finish this project timely and on budget. Let’s get our act together.”
- **Manufacturers instructions** say: “Look, I am the expert on this equipment, including the new technology associated with it. Pay attention to what I am telling you or you will have problems now and maybe a long time to come!” (As a note, many of the class action lawsuits along the coast resulted from contractor’s failure to read and heed the manufacturers’ instructions. Technology is changing and so is equipment and installation, so pay attention to what those instructions are telling you!)

4. **Written Notices**

- There is a reason for written notices regarding a variance, whether a delay or change in scope: it is to let the owner or general contractor know in advance of the variance or potential variance to enable them to make trade off decisions regarding the steps to take in regard to it, to track progress and cost. It is not just a legal nicety. **Notice is a tool to provide information to others that may be used in the management of the project.**

5. **Documentation is shared information.** The field must provide accurate information to the home office, but the home office must read the information and take action as appropriate. If project managers do not read daily reports, then why do them?

- **Like meeting minutes, it is helpful to have separate issue files that may affect cost and schedule.** For example, if the workflow is being changed, that should be noted in the planning meeting minutes, daily reports, and hopefully on a labor cost report. Copies of each should be filed separately under the appropriate subject. The folder can be a valuable source of information for schedule updates and a tool for evaluating why progress on a project is not as planned.

6. **Documentation can be misused:**

- **E-mails** can swarm the place, often not well thought out and containing erroneous information.
- **Daily diaries and letters** may have harmful information, often unnecessarily damning and derogatory attacks on others.
- **Labor cost reports** are often inaccurate, unfortunately, intentionally so.
- **Schedule updates** may manipulate wrongfully logic.
- The lesson is simple: documentation is to help effectively manage a project. It must be timely, objective and accurate. Do not even think about “playing around with it for your advantage.” It is wrong and it will be discovered. And it will cost you.
- And it must actually be used, acted on. **Daily reports unread by project managers are worthless as to managing the job.** Submittal logs showing late receipt of responses from Engineer

without letting him know that this is affecting adversely the project are of little value.

7. Documentation for Claims Purposes

- **The same documentation used to manage the project is all that is generally needed for a construction claim.** Documentation prepared to get ready for litigation, or changing the company accounting practices to try to get overhead cost into direct costs normally is inadmissible, seen as a credibility issue. Being credible is still the best approach.

8. Section III sets for documentation forms and sample letters

APPENDIX: *The Role of Documentation in Construction Projects*

K. THE FUNCTIONS TO MANAGE

So what is now managed once the project is set up (In addition *variances* and *claims* are to be managed, and are set forth in detail in Section IV):



PEOPLE MANAGEMENT

People Management is the most important of all as it is only through people (until robots come along) that everything gets done, and how well it gets done. It is in this section that SAFETY is discussed for safety is more than about an EMR rate, or a procedure. It is about a commitment to humans that all of them will go home at night in the same condition as they left this morning.

Loading the Bus with the Best People Possible

1. **Qualifications:** Each function is qualification specific. A superintendent needs to have skills that perhaps a journeyman does not have; a project manager perhaps needs contract management and computer skills at a different degree than the field supervisors. **It is essential that the qualifications are well considered and that the hiring process evaluate thoroughly the applicant's qualifications.**

For example:

- **Job Experience.** Match the nature of the work with the experience of the applicant. If the applicant has been a supervisor for commercial facilities, does that experience match the need for a supervisor or project manager for a hospital project, or a manufacturing facility with clean rooms? If the applicant has been at a very large company, it may be that the tasks needed by your company would have been done by others with his previous employer. The applicant needs to be able to run a job and sweep the floors here but most of the menial tasks were done elsewhere.
- **Complexity of projects.** If the nature of your work is more complex and challenging projects, does the applicant have the kind of experience that will fit in, be able to handle the challenges and pressures?
- **Scheduling and Planning.** Construction is about scheduling and planning what qualifications should the applicant possess.

2. Expectations. In addition to skill levels, there are other expectations that must be ascertained:

- **Values.** Values is a part of everything one does. How one treats others, commitment to quality performance, pricing of changes, continuously improving to be able to deliver the goods as promised. Excellent projects are characterized by the performance of values by all members of the team.
- **Getting along with others – a team player. Strong interpersonal relations. All levels of management and supervision require interpersonal relationship strengths.** This means being: a team leader but also a team player who understands the value and power of unity of purpose by the team; who can communicate clearly what needs to be done, organize for it getting done, and motivate everyone to do so.
- **The “assistant for” concept. Everything we do is interdependent. Others are there to assist your function – you are to assist the function of others who need your input.**
 - The project manager needs reliable, accurate labor cost reporting – the superintendent is an assistant for the project manager in using such reliable, real time information for scheduling, claims, and other purposes. The superintendent needs updated schedules, expedited equipment deliveries, tools and equipment in good repair. The project manager is an assistant for the superintendent to provide the needed resources to the field. The manager of the warehouse is the assistant for the field in providing tools to the field in good repair; the field is the assistant for the warehouse manager in properly maintaining those tools, letting the shop know issues when they are returned...and not to gunny sack them on the job when not needed.
- **Conflict management and resolution.** The first approach is to prevent conflicts, but then to deal with them when they are small and still emerging, before they become storms.

- **Being a solution provider.**
 - **Being open to improvement**
 - **The potential for growth – the expectation of growth – actually growing (improving)**
3. **“What if” Interviews.** One of the best techniques for interviewing is the *what if* mode. Think of several scenarios that test the ability of the applicant to solve issues and the values used in those solutions. For example: “Assume you estimated this project and had two AHUs included in the estimate. After contract award, the owner says: “You know, I only had one AHU specified in the documents I think. So give me a price for a second one.” How does the applicant respond: “Sir, I already have the second one in the estimate. No charge for that.” Or, “Wow, this is a chance to pick up some profit – I will give him a price in a New York second!” Or, “If on your project a large number of the work force will be outsourced, how will you manage them to assure we have the best productivity possible?”

Hiring Potential – Realizing Potential

Good hiring practices are aimed at getting people with good values and potential on board. The genius is helping them to realize their potential and keeping them on board. One of the expectations of managers and supervisors is to do just that: help employees work toward their full potential and have opportunity for continued growth. Turnover at every level is the enemy of productivity. Field turnover is most often related to the relationship of the workforce to supervisors. When that relationship is professional and one of respect, the turnover (and absenteeism) is often minimal. Personnel development at level at every level is a collaborative effort between management/supervision and the employee. Management must be committed to its people in every respect and employees must do their part as well. It takes both to make it happen. **Steps in the process involve:**

- **Mentoring/Coaching**
 - Real time feedback and correction

- **Developing training program**
 - Skill training
 - Supervisory
 - Management
 - Leadership
 - Technology
- **Recognition**
 - Pat on the back
 - Put in the bank
- **Fear free work environment where employees are encouraged to make constructive input**
 - Yelling and cursing are not tolerable practices
 - Attacking people instead of issues is not a tolerable practice
 - Harassment and bullying are not acceptable practices
 - Discrimination is not an acceptable practice
- **A sense of belonging in the company**
- **Being treated with respect**
- **Pride in the company and in the work it does.** A study by Professor Borcharding of the University of Texas showed that a **highly disciplined project where everyone knew what to do, was doing it, and given recognition** (including be a part of the decision making process) was highly motivational to field personnel and supervisors alike and an important factor in retention of personnel.
- **Communication.** Transparency, letting employees know what is going on, even when the news is not always good. Honest, reliable communication.
- **Understanding the big picture of construction.** When workers realize they are doing more than pulling wire or welding a couple of pipes together, but are a vital part of the infrastructure of their community – providing health care and education, entertainment and housing – they often see their jobs in a different light.

SUMMARY. Construction is all about people. We are now in the 21st century and old methods (“the muleskinner”; “manage with the toe of my boot”) are not effective approaches. It is challenging to attract and maintain an adequate workforce and staff and is not done accidentally or by outsourcing or putting an ad in social media. It takes intentionality, creativity, and commitment the same as every other activity in a construction operation. It takes unity, the concept of “assistant for”, conflict prevention and conflict management. It takes thinking out how to handle each layer of management and supervision, and then implementing the plan.

APPENDIX: Link Expectations for the Foreman, Superintendent, Project Manager Performance Evaluations

MANAGING THE CONTRACT

Contract management is not legal management. It is project management. (There are no legal problems, only legal solutions to management problems. If we properly manage problems, we start developing claims lawyers and consultants into an endangered species). **The contract lays out: WHAT is to be done, often HOW it is to be done, WHO is to do it, and WHEN.** It is an **EXPECTATIONS** document, laying out duties and rights in such a manner that each party knows what is expected of it and the other. It is a **GAME PLAN** document. It is a **MANAGEMENT TOOL**. And the **CONSEQUENCES** for failing to live up to those expectations.

1. Therefore, the first rule step in the management process is to **READ THE CONTRACT.** To **UNDERSTAND THE CONTRACT.** (Section III contains a summary of contractual rights and duties)
2. The second step is to make sure that **OTHERS** administering it have also read it.
3. The third step is simply to **COMPLY** with the contract.
 - For your organization to do so
 - *To cause other parties to also do so.*

The contract also performs as a *management tool*. For example, the Notice Provision of the Changes Clause is there initially as a management function,

not a legal device for owners to avoid claims. When there is timely notice of a pending change or delay, the owner is given the opportunity to consider trade off decisions, other options, and to be able to keep track of cost. The owner is entitled to have that advance notice to allow it to manage alterations to the structure.

1. There are certainly legal consequences for failing to abide by the contract, *but it is to be stressed that first and foremost it is written as a tool getting a capital structure built. It is imperative that it be read and complied with.*
2. You may believe that a contract requirement is too strict or unnecessary. You may feel the owner already knows you are running into unexpected site conditions and it is a waste of time to give notice and maintain document. Don't fall into that trap.
COMPLY with the contract.
 - **Remember the algorithm above: Know the right thing to do and do it.**
 - a. **Knowing the contract requirements is the right thing to do and complying with them is the right them to do.**

And remember also, that usually for a contractor to have a valid claim for additional compensation, *his hands must be clean, meaning that he must demonstrate that he complied with the contract before being able to complain that the other party did not.* There are exceptions, but do not manage on the basis of "trying to get away with something." In every activity the formula for success is:

Estimate of Work = Cost of Performance = Contract Requirement

In fact, that is the *best claims prevention program: an accurate estimate that recognizes risks and areas of difficulty; organization of a competent project team that pre-plans and then executes according to the contractual requirements.*

And there are *way stations* to assure that the contract requirements are being built-in:

- 1. Making sure subcontracts and purchases agreements flow down contract requirements**
- 2. Deliverables such as safety and quality plans**
- 3. Review of submittals for contract compliance**
 - Remember that delays in the submittal process account for most of equipment deliveries and most of delays relate to submittals not conforming to contract
 - Remember also that the engineer does not “approve” submittals so that if it turns out the submittal is non-conforming and the equipment is also non-conforming, the contractor remains liable
- 4. Checking delivered equipment to make sure it complies with the contract**
- 5. Reviewing manufacturers instructions as required.** As technology becomes more sophisticated it is very important to review and understand these instructions.
- 6. Making sure construction schedule is per contract and updates are as well.**
- 7. At the preparatory phase in built-in-quality, check contract plans and specifications (and codes if applicable) to make sure all understand requirements**
 - Ask for clarification if necessary
 - Finding discrepancies in office and not in the field is a contract requirement
- 8. Developing test and commissioning procedures**
- 9. Close-out requirements**

Some of the key contractual issues a project team should be aware of are:

- 1.** The nature of the contract (Prescription or Performance Specifications, eg)
- 2.** What constitutes a change in scope is design build or design assist, or “drawings incomplete and will be finalized at a later date ...”
- 3.** Deliverables required and when

4. Notice requirements for changes, differing site conditions, delays
 - Timeliness of notification is important in procurement as well. When material and equipment are delivered to the job site, timely inspections should be made as applicable to call any defects or non-conformance to the attention of the manufacturer quickly before installation.
5. Turnaround times for Requests for Information, submittals, payments
6. Equipment specified
7. For each task, quality and acceptance requirements
8. Inspections/Commissioning
9. Processes which are specified
 - Schedule process, including updates
 - Built in Quality (P-I-F)
 - Payment
 - Disputes

The management of *variances* from the contract (changes, delays, differing site conditions, accelerations, terminations, backcharges, including *pricing*) is set forth in Section III.

THE MANAGEMENT OF THE SCHEDULE AND UPDATING THE SCHEDULE

We need to stop think of schedules as simply an exercise of putting some bubbles on a sheet of paper, but indeed a collaborative approach to developing a road map to a successful and profitable project. Although we hire schedule consultants, they do build schedules and not projects. The project team builds projects, and they should make the input on how best to do that.

NOTE: Most professional scheduling and claims consultants say they rarely see scheduling done very well at all. One of the specific reasons a general contractor is hired is not to self perform work, but to schedule, manage and coordinate. If the scheduling is anemic at best, it makes sense that often the projects are also mediocre. Scheduling is a collaborate process, a thinking process, not just an input process. Contractors must decide at the outset if the schedule documents is to be used for pay and claims purposes or as a true management tool.

Most schedules are logic diagrams, which set forth tasks to be done, durations, interrelations between tasks, and flow of work. They are also procurement driven, showing submittal durations and delivery of at least major equipment. They are to be updated at least monthly, so they are often not adequate for field personnel to actually build the project by. Plans are the tools for that, to be discussed. (TOM, PUT IN REFERENCE TO LEAN MANAGEMENT)

Most contracts now specify the nature of scheduling to be used, including often number of activities, updating. So read the contract and determine its requirements. Payment withholdings are authorized when schedules are not timely submitted or done in accordance with the contract.

Subcontractors should review and comment on schedules submitted to them by general contractors. On the other hand, general contractors should assure that the duration provided in the contract is attainable using reasonably prudent means. If you are a subcontractor, review and evaluate and submit your comments. All schedules should be checked for:

1. Completeness: Are all tasks identified?

- If the design is not yet complete, date for submission of final plans
- If precedent work needs to be complete by others, set forth times
- Permits, architectural reviews

2. Identify restraint issues. For example, if schedule shows equipment pads being installed before overhead work is installed, movement of equipment (forklifts, scaffolding) may be impeded. If schedule shows walls being erected in equipment rooms before equipment delivered, are doors adequate in sizes to accommodate equipment being moved in? If LEEDS, will building need to be dried in before weather sensitive work can be installed? If facility is still operational, does schedule recognize down times, and restraints with on going operations?

3. Access dates

4. Durations. Tasks that are four weeks in duration or under are the most effective in planning and executing. People are

motivated to short-term goals and the CPM itself should be a series of sequential short-term events that are resourced with equipment and workforce.

5. **Flow of work.** When the sequence or flow of work is changed, there is almost always an impact to labor.
6. **Procurement schedule:** Does it show submittals, deliveries of equipment?
 - Make sure purchase agreements have dates for submittal process and deliveries.
 - Emphasize to suppliers the need to comply with contract to avoid delays in submittal process
 - Prioritize that equipment essential for the first part of the project, and equipment that is in short supply and high demand.
7. **Down times when facility's operation on going**
8. **Tests, commissioning, TAB, personnel training, FF&E installation**
9. **Punch List.**
10. **Manloading if required by the contract documents** (Even if not contractually specified, assigning manhours to each task is an excellent forecast and control mechanism.)

At the outset, it is imperative to set forth the key events which need to be accomplished the first 25%, establish responsibility and *nail those activities.*

Updating the schedule is a contract requirement. Often it is just a billing exercise, but it shouldn't be. The most effective ones use the concept of Time Impact Analysis (TIA) that shows the progress and key events that occur each month so that each update is like a brand new schedule, using the previous month schedule as a baseline for projecting forward progress. **Updated schedules should reflect actual progress and also without regard to which party is responsible for the following:**

- **Change Orders**
- **Decision delays** (RFIs, changes, differing site conditions, submittals)
- **Equipment deliveries** (no matter who is responsible)
- **Access**

- **Weather**
- **Third party delays** (precedent work for example)

Daily reports and logs will be the basis of schedule updating. The daily report will have the event and the effect on the job at the time of occurrence; logs will show the duration of decision making (such as RFIs, Changes, Submittals); and when equipment was scheduled and when it was delivered. **So those tools must be maintained currently and accurately.**

Earned value reporting tells you the progress that has been made this period so it can be integrated into the schedule update. Progress billing (or overbilling) is often not an accurate tool for that purpose.

If the schedule is to be a management tool, it must be accurate and timely. It should never be manipulated. We must know accurately where we are to be able to plan our resources as to where we are going. Faulty information leads to faulty planning and forecasting, and is often a reason for profit fade at the end of the project.

- The schedule update process should be both a factual review evaluation (this is what we scheduled, this is where we are, and these are the factual reasons for it), and also a powwow for the parties to look ahead and see what the challenges may be (late equipment delivery, e.g.) and figure out how to deal with them.
- In a claim situation, if the schedule has been manipulated the other party's consultant will discover it quickly.
- And if there is a claim situation, and the contractor has not updated the schedule, or failed to do so properly, the odds of being successful have diminished enormously.
- *Tie suppliers into the process. Communicate with suppliers.* One of the most frequent complaints by suppliers is that contractors do not talk to them, keep them up to date on what is happening on the project.

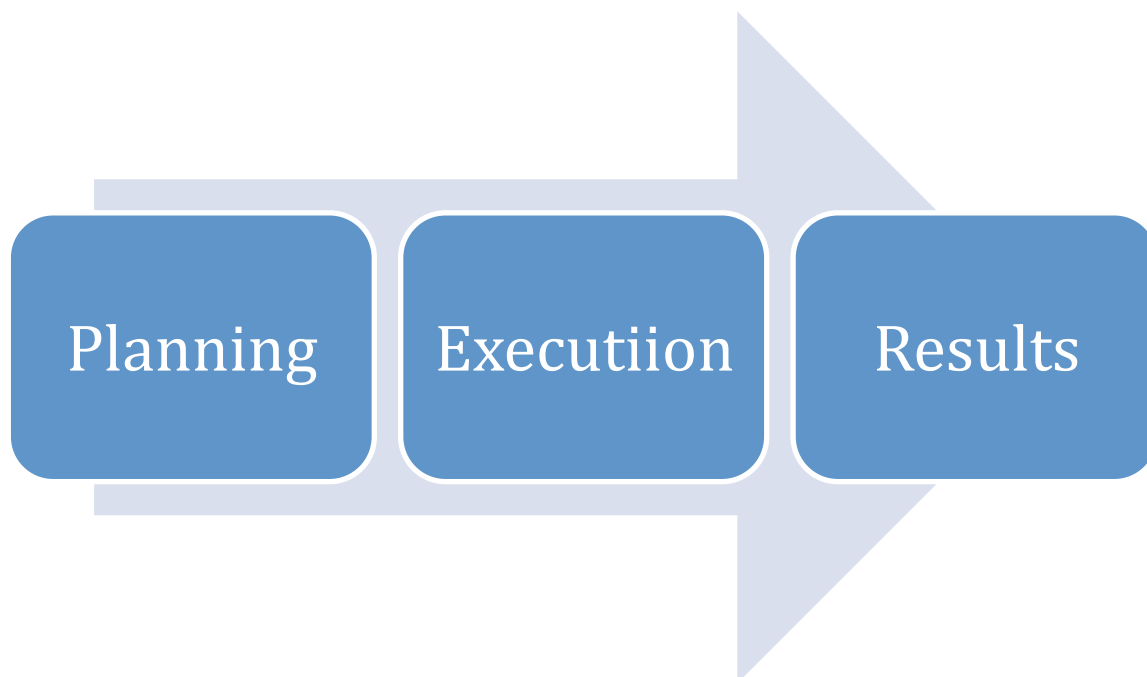
THE ROLE OF THE RECOVERY SCHEDULE

1. **It is rare that projects actually follow and perform precisely as set forth in the logic diagrams.** Sometimes due to acts or omissions of the owners, often due to delivery delays or work performance issues, they get off track.
2. **Being off track is not a disaster if real time, objective and honest information is available and the parties are willing to work together to attempt to get the train back on track, or as close as possible, and without catastrophic consequences.**
3. **Developing a recovery schedule is the test of leadership and a collaborative approach to developing the best approach to overcoming obstacles. It is not:**
 - Thoughtlessly adding overtime or crew
 - Simply directing a contractor to get back on schedule, or threatening liquidated damages
 - About blaming or shirking accountability
 - Changing work flow, or “well, there is always some place to work” statements
 - Unreasonable accelerations which can impact labor 50% or more
4. **Developing a recovery schedule IS about:**
 - A solid team approach
 - Shared risks
 - Going to the white board and discussing options
 - Attempting to accelerate deliveries
 - Perhaps shift work instead of overtime work
 - Being creative and bold and leaving no stone unturned.
 - The attempt to achieve targets without wasteful and unproductive costs.
 - Accelerations are wasteful costs for the most part
 - Work flow changes which create stop and go, sending crews all over the entire building to do what they can rather than a sequential stepping stone approach is unproductive and wasteful

5. **Often subcontractors simply rely on the general contractor to schedule and update, and make no input, or creative input to it.** Even with a reliable general contractor this is not the most prudent approach. It is helpful to the general to have constructive input.
- **A subcontractor should request that it receive all change orders and schedule related letters to review;** it may be that a change which does not directly impact the sub's work can have overall impact on the schedule or work flow.
 - **If all members of the team look at scheduling as a collaborative management process instead of a legal exercise, the benefits to the potential success of the project are increased.**

THE ROLE OF PLANNING

Results don't just happen.



Planning is about using our heads. When we hear for the 1000th time, work smarter, not harder, it means, “use your head”, “think”, “be creative”, “be a solution provider.” **Planning is a logical process (think about it, the schedule is**

called a “logic diagram”), but it is also a creative process. It is about a series of steps on that diagram, that logically flow one to another; but it should also be about thinking how those steps can be performed more effectively. **Plans flesh out the details of how to meet the schedule.**

Planning is the function of identifying the end result first.

What is the *physical goal* to be attained?

- Completion of a specified task
- In accordance with the specified requirements

What are the *steps* to achieve the task?

What is the process that must be followed?

What is the best workflow to perform the work?

What is *needed* for that process to be followed?

1. Information
2. Tools & Equipment
3. People
 - How many
 - What qualifications
 - What certifications
 - Crew mix
4. Access
5. Input from others – collaborative planning
 - Input from your people
 - Input from third parties (such as coordination drawings or meetings)

Other *crafts* involved

Who is to do what?

When is it to be performed?

What are the *inspections* required?

What are *productivity goals*?

What **flexibility is in the planned crew loading?** Most good supervisors allow for 15-20% flexibility in the schedule, meaning that they expect some tasks to be complete a bit sooner, some later than planned, so having some flexibility is productive.

Crew loading and balancing is important as crew overloading can eat up productivity as much or more as a crew a bit short on resources.

Managing **against holidays** (and hunting seasons) is important, as absenteeism is a real drain on productivity.

Making sure the **supervisors are respectful** of the crews is **extremely important**, as a key reason for turnover is the attitude of the supervisor. This can reduce productivity by over 15-25%.

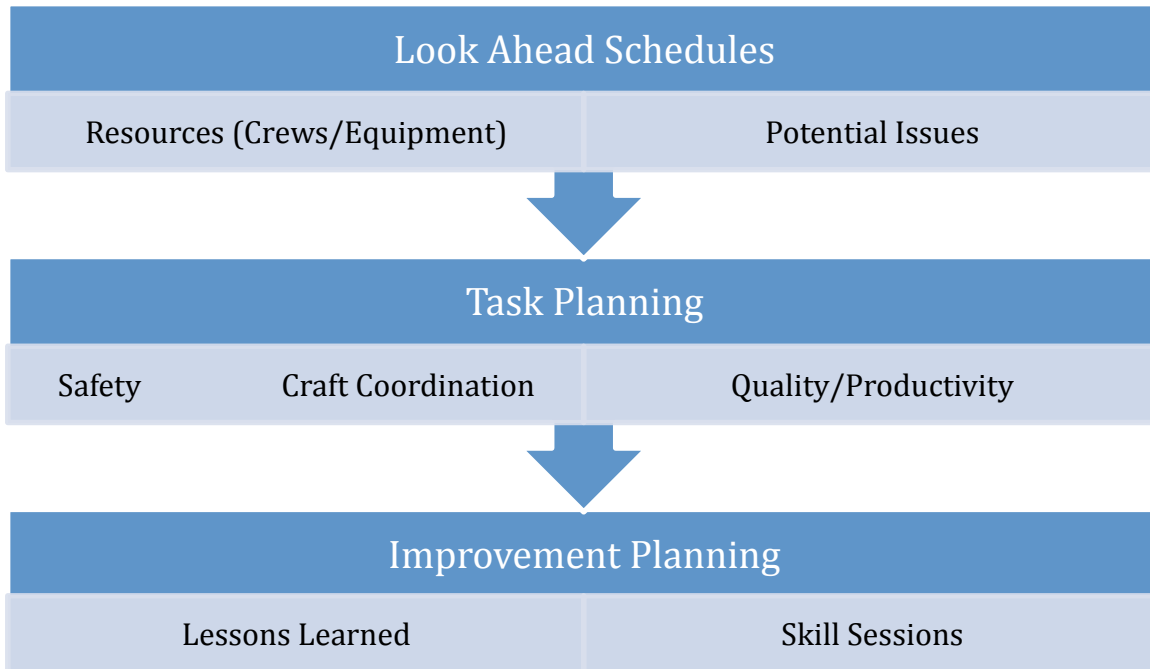
But planning without execution is meaningless, so planning and execution should be considered as a continuous process.

This means that another function of planning is **Control**, that is checking to make sure that the plan is being executed. To have control, one must have *reliable communication or input* to have the information necessary to determine that the plan is being achieved and what, if any, corrective action needs to be taken.

So, think **PLEX: Planning + Execution as one continuous function**. We never stop thinking about how to do it right, how to do it better. We never stop performing to achieve what is the right outcome. A contractor is hired to do just that: do it right.

The role of the field supervisory team is being enhanced as projects and technology become more complex. Their ability to plan, cause execution and work with others is of extreme importance on all projects.

Planning is not a one-time activity. Planning is not putting some stuff on a piece of paper or inputting a computer. **It is a thoughtful exercise in how to achieve the goals of a mission.** On the job site, it should encompass the following:



Each week will begin with a review of the plan for that week and an analysis of last week’s performance. Each day will begin with a plan for the day that is communicated to the crews, and a review of the performance of the previous day’s performance.

L. PLANNING FOR QUALITY

There are two approaches to workmanship: one is “inspect and correct” and the other “built-in-quality.”

In inspect and correct, the crews just build as quickly as possible with a view toward quality but knowing that workmanship issues will be detected during inspection and corrected during the punch list phase. Punch lists were often thick enough to choke a mule. In most contracts, a substantial completion date is scheduled and then thirty days later final completion. This thirty-day gap often extends for months as punch lists are completed, argued about, and a source of irritation to the owner and counter productive to a “customer for life” approach.

The concept of built-in quality is exactly that: to plan quality and then execute the work every step of the way to eliminate or minimize punch lists.

It is a three-step process: Preparatory, Interim, and Final, all of which should be included in the schedule. *It is the modern version of measure twice, cut once.*

The concept is again one of intentionality. To intend to perform the steps to accomplish the work consistent with the contract documents from beginning of the task to its final completion, and to plan those steps at the outset. And go back to the concept of 25/10. If the first part of the project is not completed as scheduled, it pushes work downstream causing stacking of crews and other inefficiencies, which tend to have a negative impact on quality and productivity. So emphasize getting the job started and momentum maintained to assure a productive workflow throughout the project.

If quality is to be planned, then productivity should also be planned simultaneously. The concept of Pre-Task Analysis is the approach that is used in the planning or preparatory phase. New technology can greatly assist this process, but the steps below should be undertaken:

PRE-TASK ANALYSIS (PREPARATORY PHASE)

- **Meeting with appropriate personnel including owner's representative**
- **WHAT is the task to be performed?**
 - **Drawings**
 - **Specifications**
 - **Codes**
 - **Submittals**
 - **Manufacturers Instructions** (with technological advances, it becomes even more important to review these instructions and understand them)
- **Is the task CLEAR?**
 - **Does RFI need to be sent to engineer for instruction or clarification?**
 - **This is a good time to find any ambiguities or discrepancies in the drawings. Contractors have a duty to exercise diligence in finding such problems "in the office and not in the field."**
- **What are the specified ACCEPTANCE REQUIREMENTS?**

- **Nature of inspections involved?** (For example, there are varying levels of acceptance for a weld).
- **If commissioning is a part of the contract, what is set forth in the commissioning document for test and acceptance?**
- **If acceptance requirements are not clear, seek clarification by an RFI or RFC.**
- **What specific STEPS are to be taken?**
 - **Set forth in detail from procurement to layout to completion and inspection**
 - **Review submittals and manufacturers' instructions**
- **HAZARD ANALYSIS** to look for safety issues and plan against them
 - **Site environment or conditions that need to be considered**
- **What PRECEDENT WORK** should have been performed?
 - **Has it been?**
 - **Does it meet required tolerance?**
 - **Access requirements?**
- **COORDINATION** with other trades, and review of coordination drawings
 - **How we collectively work more effectively together**
- **What TOOLS AND EQUIPMENT** are required and when?
 - **Is warehouse on board?**
 - **Plan for checking equipment as delivered to assurance compliance**
- **What is MATERIAL HANDLING plan?** What are material handling issues? Are there pre-loading restrictions?
 - **What steps should be taken to protect the material and equipment?**
- **What steps should be taken to protect work ALREADY INSTALLED?**
- **What is DURATION?**
- **What is FLOW or SEQUENCE of Work?**
- **Review the SCHEDULE** to determine that your durations and workflow are consistent with it.
- **Develop OPTIMUM CREW size and SUPERVISION**
 - **Give highest skilled tasks to highest skilled crew members**
- **Assign RESPONSIBILITIES and INTERIM DATES** for Performance

- Develop **production TARGETS**
- **CLEAN UP plan**
- Have mechanism for **FEEDBACK** to make sure work is going according to plan and protect against variances to the plans
- **AVOID** factors which have a potential adverse effect on quality and productivity, such as:
 - Extensive over time
 - Outsourced labor with inadequate supervision
 - Stop and Go operations

DIALOGUE WITH CREW IN ADVANCE SO THEY CAN MAKE INPUT AND HAVE **A SENSE OF OWNERSHIP**. THIS IS CALLED **DECISION THINKING**. HOWEVER, ONCE THE PLAN IS MADE, IT WILL BE FOLLOWED UNLESS CHANGED BY THE SUPERVISOR. IN CONSTRUCTION, THERE IS A DEMOCRATIC DICTATORSHIP, THAT IS THE CREW SHOULD BE INVITED AND ENCOURAGED TO GIVE IDEAS BUT AFTER THE DECISION HAS BEEN MADE REGARDING THE PLAN, THEN EVERYONE FOLLOWS THAT PLAN UNLESS CHANGED BY THE SUPERVISOR OR A SAFETY ISSUE ARISES.

INTERIM PHASE

The interim phase is a **designated checkpoint** at which an inspection will be conducted to see how things are going and to make necessary corrections or improvements. It is an important *control point* to assure work is going as planned, but it is also a place for the crew to talk about how things can go better, interferences that need to be resolved. It is a checkpoint for your work as well as that of others whose work may be affecting yours, and to get any hindrances resolved. Again, the idea is to build in quality (**measure twice and cut once**) instead of doing the work and then inspecting and doing a ton of punch lists. And a good spot to think again about safety!

FOLLOW-UPS

Daily checks should, of course, be a part of the program, to assure that all resources are available, that work is going as it should.

M. PLANNING FOR PRODUCTIVITY AND IMPROVEMENT

When doing pre-task analysis, productivity evaluation can and should also be done.

Esain Bolt beat world records twice in the 200 meters, setting it at 19.30 in 2008 and 19.19 in 2009. His is the secret of continued improvement: commitment to do so. Ted Williams, the last .400 hitter in baseball, took hundreds of practice swings a day and Peyton Manning spent offseason throwing to receivers. Often Tom Brady's last ten minutes is better than his first ten minutes on the field. **That is just the way it is: great people do little things every day to try to get better, to improve, to win the ball game. So like everything else, it is about intent to get better.**

And improvement may be little things. In football, the quarterback looks for separation for the receiver – just an inch of separation from the defender. Maybe on the job, just having to make one move of the material instead of two, maybe really bearing down on quality and reducing punch lists to a handful instead of a bucketful.

There is a process for improvement of work activities:

- It begins with a culture at every level to try to get better. To be the quickest draw in the west.
- That culture begins at the top but is an attitude with everyone.
- Top management must recognize and reward that attitude.
- It begins with the process for doing the work, the pre-task analysis above.
- The quickest one is to identify steps in the process that can be eliminated.
- The steps that can be done by apprentices and not craftsmen.
- Tasks which can be done off-site
 - Improving offsite fabrication quality and timeliness
 - Provide prompt feedback to shop if prefabricated units have to be redone in the field.
- The steps that can be shortened? What can be done concurrently?
- What is the most effective sequence and flow of work?

- **Identifying areas of WASTE.** Waste gobbles up manhours. It is a virus in our industry.
 - **Material handling takes over 20-30% of productive time**
 - **Rework**
 - **Back charges – both ways.** Back charges we cause and back charges against others.
 - **Pick up orders resulting from failure to plan and order timely**
 - **Failure to check dimensions, for example, before beginning work**
 - **Finding problems in the field instead of the contract requirement to search for them first in the office**
 - **This is a double whammy because it causes stop and go in the field, and further you are not going to be compensated either because the contract requires you to check the plans before you begin work and you are not entitled to compensation for field impact if you have not done so.**
 - **Inadequate work force.** And a continued counterclaim by owners is that we do not manage outsourced personnel well.
 - **Decision making delays.** There is the delay itself and then often the impact of a change in work sequence that is even more costly.
 - **Absenteeism**
 - **Turnover of personnel**
 - **Often from overtime but not always. Sometimes short-term overtime can be effective in given circumstances.**
 - **Stress of personnel**
 - **Stacking of trades; crowding**
 - **Factors affecting motivation of personnel (this is often unseen but absolutely a real factor)**
 - **Safety Incidents**
 - **The Einstein Learning Curve.** We tend to repeat our mistakes. Einstein said that insanity is continuing to do the same thing and expecting a different result. What are our repetitive mistakes?

- **The use of technology and upgraded tools**
 - **Lack of tools when needed, wrong tools, tools not in good repair are disasters to the crew, not only in being able to do the work but in morale as well. A hundred years ago someone said the essence of productivity is having the right workman with the right tool and right equipment at the right place at the right time. Well, that still holds true.**
- **Effective use of skilled personnel**
 - **Highest skilled tasks to highest skilled personnel. Other tasks, including material handling, should be done by apprentices or less skilled personnel**
- **Training is a part of the work process itself**
 - **It is never too late to train, to coach in real time.**
- **Management of outsourced personnel**
 - **Indoctrinate and make to feel a part of the operation quickly. Assign mentors.**
- **Management of personnel to avoid turnover, absenteeism.**
 - **At the field level, most turnover is related to relations with supervision**
 - **Absenteeism and turnover can impact labor by 25% or more.**
- **Daily Planning and Feedback—trend analysis (earned value, for example) to provide early warning signals in time to improve the operation**
- **Time out meetings to think about how to do a better job**
- **Time in motion studies to analyze what are unnecessary or unproductive steps**

N. PLANNING FOR CREW RETENTION AND AVOIDANCE OF TURNOVER

Turnover and absenteeism can have a monumental negative impact on productivity. Like over 20-30%. In labor claims, the owner's claim consultant always takes a look at turnover and absenteeism, for if high, that is a signal of poor management which is responsible for poor productivity.

The key reasons for turnover seem to be the following:

- **The supervisor**

- Disrespectful
- Unorganized
- Not on top of safe practices
- Not competent
- **Job not well planned**
- **Poor workmanship; lots of rework**

O. SUPPLY CHAIN MANAGEMENT

We should really be called “installers” as we largely install equipment and materials some other entity has fabricated. However the present trend is for the contractor to reduce labor costs – and time – through both modular construction and pre-assembly. **So supply chain management is both internal, that is, to manage the components that the contractor will prefabricate or preassemble, and external, that is the equipment that the contractor will contract to acquire from others.**

Internal Acquisition (That is contractor pre-fabrication or pre-assembly)

1. **Begin by identifying which components can effectively be fabricated or installed off site by the contractor (others may be purchased from third parties – to be discussed later).**
2. **Assure that your company has the internal capability to pre-fabricate or preassemble** (this includes the entire process, from purchasing to the accuracy and timeliness of CAD drawings to the fabrication process, and the delivery, handling and safeguarding on site.)
 - **In some cases, prefabrication can be done on site.** If so, assure that your company has the equipment, that there is adequate space on site for the work and storage.
3. **If components are not to specification, and have to be re-done in the field, the cost can more than double. So quality control in the shop is vital.** How often do we see ductwork piled up in a scrapheap because it was not fabricated properly or spools that are not done correctly? **The word “prefabrication” is not synonymous with “quality workmanship” – the same process of assuring that the**

work is in accordance with the contract applies to every facet of the construction process, including prefabrication. So quality begins with the fabrication drawings and flows into the shop before delivery to the field.

4. The prefabrication process should be identified on the construction schedule.
5. Modular construction may be a great time saver and budget reducer, but it has its own set of challenges.

External Acquisition (Purchasing from a Third Party)

There are two categories of external acquisition.

1. **Buying the product but not installation by the vendor required.** A purchase order is used for this purpose, but here is a caveat: *One of the productivity eroders (called Profit Eaters) on a project is the category we find on cost reports entitled "Pick up orders."* Pick up orders often occur because of lack of planning for needed material and/or tools, and often impact labor while someone runs to a big box and picks up the need material. Pick up orders may be convenient but they are symptomatic of inadequate planning.
2. **Buying both the product and its installation.** Review estimate file for quotes. These acquisitions should be through a purchase agreement, which should contain:
 - **Specification and drawing requirements**
 - If there are special requirements, it is wise to highlight these.
 - Too often contractors bid on products different than the specified equipment and then run into conflicts during the approval cycle after award. A very dangerous practice.
 - Value engineering changes can be very productive, but so often they actually add time and cost to a project. The VE change is made in a vacuum, as the contractor does not have access to all the information as the designer. So, the change may

work for the mechanical contractor, but may delay electrical or structural.

- Submittal requirements (attach to PA)
- General and special condition flow down
- Dates for submittals and deliveries
- Requirements, if any, for coordination with other suppliers
- Transportation requirements (and f.o.b, that is the risk of transportation)
 - In flourishing economic times, the availability of truckers themselves may be a bottleneck to delivery. Stay on top of such things.
- Taxes
- Tests, including factory acceptance tests
- On site attendance at commissioning and training, if required.
- Protection during transit
- Warranty
- Payment provisions
 - Damages for failure to deliver on time?
- Training requirements

3. Procurement schedules

- To avoid delays, some owners are pre-ordering equipment so it is on site by the time the contractor needs it. Others are assigning purchase agreements to contractor and attempting to make him responsible for timely deliveries. These contractual issues will be discussed in Section III but for now review the contract to determine if there are such assignments, and what your rights and duties may be.
- The procurement flow should be included on the CPM, including the submittal cycle. **About 40% of equipment delays are directly associated with submittal issues, so this should be monitored strictly.** Equipment delays are also often tied to critical path activities, and a delay in

submittals can lead to delays in project schedule. A commitment should be: no work activity will be delayed because of submittal issues or delivery delays.

- All construction personnel should learn more about the manufacturing process. Manufacturers also have schedules (often called Number One Flow Charts) and schedule your product on line with other orders. If the production is delayed because of lack of an approved submittal, the delay is not one for one. The time is from the time the product was scheduled to go on line until it now actually goes on line, as other orders are not put in front of yours.
- **Communication between contractors and suppliers is among the most anemic in the industry. Contractors will be well served to talk to suppliers about what is happening on the job, changes coming up which may affect the product or schedule. If about 30-40% of a project is delivered equipment, it seems wise to talk to those parties who are such a large part of the job.**
- **At pre-con, discussions should include how the supplier can expedite clarification of specifications with design team prior to submittal of shop drawings. This can expedite the process.**

4. Payment provisions for stored equipment.

- Review contract for requirements for payment for stored equipment and follow to be able to be paid promptly upon delivery to site or bonded storage facility.
- In cases of expediting equipment to site, be careful that it will not involve multiple handlings as the available storage areas may shift around.

5. Inspections.

- Is there a factory acceptance test (fat)? Schedule on CPM and make arrangements to attend and receive documentation on a timely basis.

- As soon as practicable, check equipment for damage and contract requirements. Late inspections may jeopardize your rights.
6. **Manufacturers instructions.**
- Review with crew before beginning the installation process.
 - Many claims arise just because of inattention to what manufacturer said to do.
7. **The role of delivery dates in craft coordination meetings.**
- In the best or projects, equipment may be delivered for whatever reason. If this information is reported honestly and timely at craft coordination meetings, work arounds can be planned to reduce the negative impact. The concept of **lean management** is to use the late delivery as a point to work back from as productively as possible, rather than senselessly using overtime and other costly practices to “push” the work forward – a technique that often fails.

P. SUBCONTRACT MANAGEMENT

Even subcontractors have subcontractors, so the following is applicable if you are a general contractor or a subcontractor. See section IV attachments for contractual issues related to subcontracts.

- **Scope of Work.** No different from the general contract, the scope of work in a subcontract must be clear and unambiguous. The nature of the delivery system (design-bid-build, design-build, design assist, guaranteed max et al) will influence the responsibilities of the parties and must be well defined and understood.
- Have a **schedule for all deliverables**, from submittals to equipment, as well as work performance.
- **Liquidated damages** should be tied to the size of the contract and nature of the work.
- **Back charges.** The approach for assessing back charges, including clean up, should be a part of the scope of work. Back charges should

normally not be assessed unless there is direct or strong presumptive evidence that the subcontractor was responsible. LDs should not be charged to a subcontractor who did not delay the critical path.

- **Who does what for Whom? In the scope of work, the mutual tasks of the parties should be delineated:**
 - Who provides lift services (crane, hoists)
 - Temporary facilities: what and who provides
 - Equipment interfaces (e.g. power requirements)
 - Clean up
- **Scheduling requirements.** The flow of work, durations, logic of the work are the contributors to productivity and timely performance. If you are a subcontractor, assure that the schedule properly portrays these elements. Study the schedule to assure it is consistent with your ability to perform productively. And make your input in writing. Assure that the updated schedules are complete and accurate and follow the contractual requirements. If you are managing a subcontractor(s), assure that they have the resources to perform the work, request manloading of work activities.
- **Many subcontracts contain “as directed” and “go where I tell you to go” clauses,** apparently giving the general contractor the authority to deviate from the construction schedule and cause the subcontractor to bounce around the project at the whim of the general. In fact, every clause in a contract is modified by the word “REASONABLE.” Directing the subcontractor to increase the labor force or work overtime to make up for another craft contractor’s delays is not reasonable; changing the work sequence to the point that the subcontractor is working unanticipated multiple locations is not reasonable.
 - **What to Do If Such Unreasonable Direction is Given:** It may be in your best interest to comply (this is a management and often a legal decision), but if you do, give notice that you consider this to be out of the scope of your contract, provide the justification, update your

own schedule to show the impact, and record the impact and events leading up to it in your daily reports.

- **Most subcontracts have a procedure for handling contractors whose work is defective or behind schedule. Review the contract. Then establish what is the baseline for performance** (if it is a quality issue, research the requirements for acceptance; if it is schedule, and/or resource loading, analyze the planned versus as built and demonstrate how the contractor is failing to meet the schedule or provide adequate resources). **Provide notice (cure notices) as required by the contract; notify the surety as set forth in the contract and or/performance bond.**
- **Coordination.** Sometimes the general contractor does a pretty good job coordinating the craft contractors; other times not so much. But coordination among subcontractors, working together in developing look ahead schedules and sharing spaces can overcome even the most ineffective general contractor's project manager. **Coordination drawings can be a very productive tool for working together, resolving conflicts and figuring out better ways to get things done.**

Q. THE ROLE OF MEASUREMENT

It is just this simple: establishing production (performance) goals is essential to developing effective plans for performing tasks, forecasting and controlling how well you do. Measuring just on the basis of hours forecast and hours spent (the budget was 1000 hours, we spent 500 hours to lay 100 feet of pipe and therefore we are 50% complete) is not only 19th century, it just doesn't work. What if you spent 500 hours and have only installed 25 feet of pipe: are you 50% complete or do you possibly have a serious budget overrun? And when do you want to learn that you have an overrun? When the work is complete and it is too late to do anything about it, for in real time while you still have time to determine the cause of the problem and do something about it?

- **Each company should develop its own approach for monitoring performance. Management must demonstrate to the field the value of some form of earned value reporting, that it is an excellent tool to assist the field attain their goals.**

- The system should be developed on the basis of at least the key performance indicators for the particular job
- Accurate input of hours to cost codes is essential; otherwise, such an exercise is meaningless. Stress *accurate*.
- Tracking as close to real time is also essential for it gives supervision and management an early insight into trends that they can evaluate to understand causes and potential remedial action or contract management needs to kick into action.
- There should be a correlation between daily diaries and the cost codes. If an external event (delay in a decision or extra work, etc) is causing the problem, the daily reports should take note of that event.
- The tracking of performance can also send signals to potential schedule delays or workflow changes that should be picked up on schedule updates.

Put even more simply: when performance tracking starts showing a negative trend, it is yelling out: HEY, HOUSTON, WE'VE GOT A PROBLEM! LET'S GET THIS THING FIXED.

SUMMARY: Contractors are hired to provide capital projects that meet the contract specifications. Contractors compete and survive because they do so productively and continue to get better. Being productive and getting better is a matter of intent to do so, of planning to do so and then doing so. A good bourbon or wine is a function of the calendar: let the stuff just age for a while. Improvement in the construction industry requires constant attention to getting the job done right, constant thinking about how it can be done better.

Waste is the enemy of productivity as well as quality, and takes many forms, from punch lists to rework to delivery delays, inadequate workforce. The foe of waste is planning to avoid it, execution of the plan, monitoring to assure it is not infecting your work. Think about it: what if you could reduce just one hour per day of wasted time for each member of the crew . . .just one. That means one hour per day, five per week closer to your schedule, closer to your productivity targets. For a crew of ten, that is 50 hours weekly, over 200

monthly. That one hour a day can almost always be found in more effective planning, in material handling, built in quality instead of inspect and correct and the avoidance of back charges.

- To be able to control waste, it is important to have a baseline, a target such as earned value against which you can measure progress, as well as improvement.

Performance Measurement is the rudder on the ship; by sensing currents that affect progress, the ship can be steered to calmer water away from the rapids or cascades.

R. PROJECT CONTROLS

Management is a function of PPOIC as previously discussed. The right motivated people plan and organize the work, then execute it, and we check up to make sure they are doing what was planned.

P: People

P: Planning

O: Organization

I: Implementation

C: Control

Projects begin with long-term goals: schedule, budget and cost. These are then divided into tasks through a CPM, tasks that follow a given sequence. These tasks have certain subcomponents:

1. Quality requirements
2. Duration
3. Manhours and resources to achieve
4. Each of these needs to be monitored to determine trends and compliance. That is where **CONTROLS** come up. Controls are mechanisms that provide visibility as to progress, quality, and cost.
 - Built in Quality (the three step approach) discussed above is both a planning and a control mechanism, as a standard of performance is established and monitoring and feedback allows supervision and management know in real time the status of the plan.

- Labor cost reporting and earned value give us trends on productivity
- The CPM is a mechanism to determine planned versus actual performance
- Logs show when something should have been done and when it was
- Daily reports and PICTURES are of great value
 - Pictures should be dated and the photographer identified.
 - It is helpful to have a drawing reference of the area being as well.

5. **Variance control.** The effective and timely use of the control mechanisms gives us early warning as to potential variances, so corrective or protective action can be taken while there is still time to do so. Section III will detail the contractual aspects of variances.

But accurate and real-time communication, no matter what the form, is the ultimate control. The best management is that which works to prevent problems, and when issues arise, to identify quickly and do something about them, solving problems while they are small. That is one of the key reasons for control. If reporting is untimely, or inaccurate, the very reason for controls fails and often so does the project.

In every sport, including the octagon ring, there is a time-out to review with the coach on the sideline how things are going and how things can get better. The control mechanisms in construction are the tools for those time-outs.

APPENDIX: [Link to Project Quality](#)
[Link to Field Productivity](#)

S. MANAGING SAFETY

Managing safety is a creed by everyone in the company, beginning with the president, that each person goes home at night in the same physical condition as when leaving home that morning. Unlike acceptable tolerances

in a specification, this is a no tolerance creed. Safety is a mission. Safety commitment and practices are the most ethical things a company does.

- Safety performance is the ultimate test of the character of the company. Saving a few bucks at the cost of an injury to a workman is unacceptable.
- Safety programs are not installed and enforced to maintain a low EMR, have better insurance rates, to be prequalified for certain projects that are very stringent where safety is concerned. Those are all direct benefits. But safety programs are installed and enforced for one singular reason: to protect each individual from injury.
- Priorities: OSHA categories the major areas of safety incidents for each trade so make sure you look at these and manage against them. But the concept is to prevent all injuries, so don't neglect any phase of the project which can contribute to any form of injury.
- Each individual must take that pledge as well: one to do all necessary to prevent injuries to others, but also TO PREVENT INJURIES TO HIM OR HER SELF. Individual accountability for safety is absolutely essential to an injury free project. Mentoring to the individuals that each has this duty to him or her self is a meaningful part of supervision.
- *Totally believing that there are no accidents.* Every injury is a result of a glitch in the system; every injury is preventable. In every safety incident, trace back the *ultimate cause*, and it will always be determined that a preventable act caused it.
- Safety is a result: the result of a planned and executed approach that is developed on each project. It must be *project specific*, not simply a marked up copy of the safety plan from the last project. *It should be thought out and tailored to this project.*
 - A *hazard analysis* should be performed at the outset of each project, before the first work is performed, and then continually thereafter.

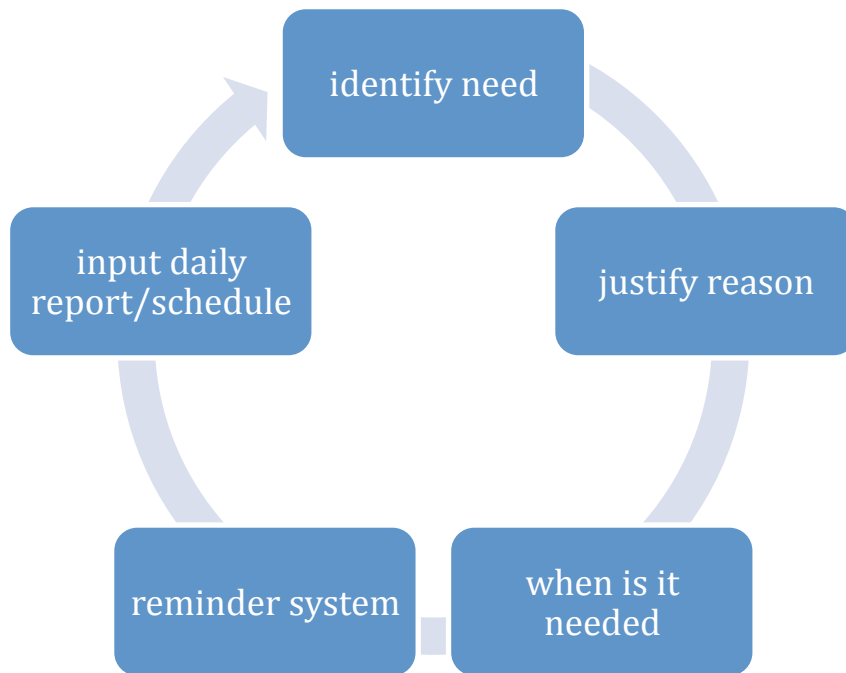
- **There are factors other than physical safety. *Stress* and *fatigue* are often contributors to safety incidents and need to be dealt with as well.**
- **Quality performance is a contributor to safety for work force and third parties.** Hotel fires killing hundreds of people result from fire code violations. Properly shoring trenches would prevent countless deaths each year.
- **Role models are important, as those around us have a tendency to copy what their leaders do.** A project manager who does not wear a hard hat or safety goggles, or a supervisor who does not tie himself off when climbing steel is giving a license to others to do the same.
- **Friends don't let friends drive drunk. Workers don't let coworkers do unsafe things. It is a place where we look out for ourselves and each other. A construction site may be for the strong but not the macho.**
- ***Ultimate Cause: Ultimate cause is a process that traces an injury back to the first domino that sets in motion events that may lead to injury.*** For example, in the case of the unshored ditch that caves in causing injury or death, the apparent cause is that the ditch was unshored. But tracing it back, it was unshored because the superintendent thought he could save some money by avoiding that precaution. But tracing it back further, the project manager was aware that the ditch would be unshored and felt it was a way of improving the profit picture a bit. And tracing it back further, the president of the company, walking the job without a hard hat or goggles, has preached profit over safety. So the ultimate cause: the president who did not demand safety first on all projects.

Safety is planned, but safety is lived. By all.

T. DECISION-MAKING MANAGEMENT

Timely decision-making keeps the momentum going and construction is all about momentum and sequence. Labor costs increase with delays, accelerations to make up for delays, with sequence changes. Productivity is a function of a well-planned schedule and decision-making delays often are

the factors that derail the train. At the kickoff or partnering meeting, one of the mutual commitments is to work diligently to avoid impact to the schedule due to untimely decision-making. Decision-making management is claims prevention management. So, what is the flow of timely decisions:



Early Identification of a need for a decision or action. The contractor should be diligent in trying to identify potential issues quickly to avoid impact to the schedule or sequence of the work:

- **Specification and Drawing Issues:**
 - Desk top reviews at beginning of project
 - Submittal cycle (ask for clarification before submittals)
 - Coordination drawings
 - Review in office before beginning field installation
 - Enter on logs, daily reports as appropriate
- **Actions Needed:**
 - State action needed, such as:
 - Access to an area
 - Precedent work to be performed
 - Owner actions such as inspections
 - Responses to submittals, RFIs

- Authority to perform changed work

Justify the reason for your request for a decision or action to be taken by others

- Do your homework, set forth the pertinent data upon which the decision can be made.
 - Cite specification/drawings/code involved
 - Cite other data and correspondence that may shed light or give a history of the issue
 - If a craft coordination issue, think in terms of what is best for project, not just your interest
- Present clearly the issues
 - Make personal contact in advance of a request to make as clear as possible the issues involved
- Present your solution to the issue, if it is reasonable for you to have a solution

When do you need a decision or action?

- Don't cry wolf. Be realistic and reasonable. As to those priority walls, why shouldn't the drywaller be first in?
- Tie to CPM node. What activity is affected?
 - What activities downstream may be affected
 - What are negative effects if decision or action not timely?
What are positive effects if it is?
- Information should be provided for use in schedule update

Reminder System

- Don't wait until the lack of a decision is affecting the outcome of the project to "bug" or remind the decision maker of the need to issue a decision by a given date. Have a "tickler system" that is an automatic reminder a few days or so in advance of the need date; don't hesitate to use the phone or e-mail to push for a timely decision.

BUT IF THE DECISION IS NOT MADE TIMELY"

- ✓ Written notification

- ✓ Enter into daily records, including effect on project
 - Keep record of labor productivity and equipment impact
- ✓ Add as an item to the updated schedule
- ✓ Make note of the issue in planning meetings.
- ✓ Escalate to higher management if necessary

So, decisions or need for action must be identified prior to the project schedule being negatively impacted.

Adequate information should be provided so that the decider can act with minimum additional research, if in fact any.

The need date, based on a current updated schedule establishes when the decision or action is required without impact to the critical path of the project.

Bug the decider.

Document the decision making process.

Update schedule.

The important thing: decisions don't just materialize out of thin air. They must be managed, with timely and accurate information. Making timely and objective decisions is a *shared responsibility* between the one requesting the decision and the decision-maker.

And the party requesting the decision doesn't always get the decision he was asking for, or when he needed it. How are these decisions and sometimes non-decisions handled?:

- **Disputed scope of work.** The contractor claims that a directive by the Owner adds to the scope of work, or that the inspector has rejected work as non-conforming that is actually within the tolerances of the contract. The Owner disagrees. The contractor simply writes a letter stating its position from a contractual point of view, the facts that support that point of view, and the impact to

the schedule, stating that he “protests the decision of the owner, however he will comply with it and submit a claim for additional compensation.” In this manner, the contractor has protected its rights, documents its position and pursues the claim through the venues established in the contract . . .and performs the work in accordance with the Owner’s directive and keeps the momentum of the project going. It is essential that this process of notification and protest or reservation of rights is pursued.

- **Request for schedule delay.** Again, assume the contractor has submitted a request for additional time and it is denied by the Owner. The contractor submits a letter justifying that the act or omission of the owner has extended the critical path, and that the denial of the request for additional time is a constructive acceleration to the schedule. And then with daily reports, labor cost reports and updates to the schedules, it records the impact of this decision by the owner.
- **Late Payments.** The contract sets forth payment provisions. If payment is wrongfully delayed in the opinion of the contractor, he submits a justified request pursuant to the contractual provisions (and or the statutes of that particular state) justifying that it is entitled to an amount being wrongfully withheld or is untimely. It is important to follow precisely the provisions of the contract and or statute government payments.

There is a process for managing decisions, and remedies under the contract if the decision-maker wrongfully or untimely issues decisions. Or just doesn’t do anything. In all cases, the operative word is “managing” the decision maker through a timely and justified presentation. The importance of field documentation cannot be overstated.

U. CRAFT COORDINATION

Although there is a sequence of work, there is also sometimes competition among crafts for space, and which craft is first in line. And there are often drawing and specification conflicts between the craft contractors that create congestion or physical conflicts between structures and equipment.

Coordination drawings are prepared to find these conflicts in advance of the crews running into them in the field. And coordination meetings are held to develop the most effective working relationship between the crafts. There is a better chance of project success when the parties take these two functions very seriously. Electronics, such as CAD and BIM are great tools for this purpose, but crafts from the various disciplines discussing and making input for how best to work together in a collaborative manner, the utilization of space, the importance of the reliable promise can never be replaced by the picture of a drawing on a screen.

V. MANAGING CASH FLOW

The management of cash flow is not the responsibility of the financial officer. It is the responsibility of each member of the team. In all that they do.

- **Selection of work:** when the company selects work to bid for that it is not qualified for or for which it lacks resources, often that job loses money resulting in a negative impact on cash flow.
- **The estimate.** When quantities are missed, so is the labor to install them. That takes money out of the budget.
- **Progress billing.** Being underbilled is a mortal sin in the construction industry. At least getting a mobilization cost so the contractor is not cash flowing the front end cost out of its piggy bank. The contractor should never be the bank for the project.
 - Retainage. Check contract to see when and if retainage is reduced.
 - Final billing that is timely because you have completed on time.
- **Performance.** Rework, back charges, excessive material handling costs . . .all are holes in the pocket.
 - All forms of waste as previously identified take money out of the contractor's pocket.
 - Quality workmanship in prefab shops to avoid redoing in the field.
 - Field productivity affects cash flow: overrunning labor budgets is a drain.

- Owner can withhold payments if project lags behind or workmanship not accordance with contract requirements
- Coordination issues with other craft contractors.
- **Change Order identification and billing.** Contractors should timely propose, negotiate and bill change orders so the owner is the bank for changed work.
- **Delays to performance and increased cost** due to work flow and sequence changes. All these are a drain on cash coming in.
- Supply chain management, getting paid for stored material where permitted under the contract.
- **Claims.** Labor impact claims eat up manhours, which are paid for by the company ATM. Avoiding where possible, proper and timely resolution a must. Claims are a double whammy in that the contractor carries the cost until resolved and because of claims, the contractors bonding capacity may be reduced. A contractor may go out of business waiting for the resolution of a claim he finally wins in court, but it is to sustain his business.
- Maintaining tools and equipment to prevent down time.
- Profit fade the last 10% of the project because the job just keeps going until the contract work is finally complete and the punch lists done – this is a frequent drain on the cash reserves of the company. Pay attention to the 25/10 concept previously discussed, and the close out section below.

Managing cash flow is about how well the company manages everything it does. Managing cash flow goes back to the algorithm “know the right thing to do, make sure all the troops know the right thing to do, do the right thing, document that you did.” On a timely basis.

The contractor has payment rights under the contract and in the laws in the states where it works. Read the contract to determine what those rights are and how they are preserved. And understand those rights, as well as those under the Miller Act, which are discussed in Section III.

W. MANAGING CLOSEOUT

Managing closeout began at the outset of the project, with the development of a closeout plan. At about the 75% mark on a project, it is well to review that plan and what has been done to fulfill its requirements, and then to schedule the remaining items that are required. The updated schedule should reflect:

- Develop a list of all deliverables, make sure the subcontract and purchase agreements contain closeout requirements, and then get those documents in on a timely basis!
- All tests (DALT, Commissioning, TAB, Start-up) that are required
 - Normally the contractor is required to submit a procedure for all these tests and receive approval from the design engineer in advance. **A good thing to include in the schedule.**
 - And all the things necessary for those tests to be successful, including on site manufacturers' personnel, review of documents
- A very detailed plan to complete so that all the parties are on board and have committed to the tasks, inspections, and punch lists performance.
- **The plan should be well coordinated and as productive as possible for the last 25% can become very congested and sequences may have gone astray. Prudent scheduling and planning as well as motivation of the troops are essential to a successful closeout.**
- **Commitment is a big part of closeout:** the commitment to perform quality work on time, and not to drag on endlessly. Accept accountability for those punch list items that are yours and stop arguing about them hoping they will go away. They won't.
- Negotiate outstanding changes.
- **Motivate owner to not add changes during this phase.** If he has important ones, how about retrofitting.
- Have a list of documents to be turned over and make sure it is complete and accurate.
- Schedule training as required.
- If OF&E, include in schedule

- **Motive your own troops.** If there is not another job coming up, what can you do to keep the momentum going when crews may not see another job on the horizon?
- Job site meetings may become more rowdy and tensions on the surface. Keep your cool.

Most projects have two points of completion: the first is Substantial Completion which means the project is finished to the point it can be used for the purpose intended. The second is Final Completion and often only 30 days after Substantial Completion. It is during this thirty days that the contractor has the opportunity to complete punch lists, get all submittals processed. And if not, owners are likely to assess liquidated damages. The punch lists in that 30-day window then need to be few and minor; most of the deliverables should have been prepared or are in the state of preparation long before this window begins. Owners more and more are being less tolerant of deliverables and punch lists dragging on.

X. PUNCH LISTS AND WARRANTY CALLS

- A punch list is incomplete or defective work located during the construction, before substantial completion (or during the period between Substantial and Final, usually a thirty day window.)
 - The owner may take a deduct in some cases for the work not being completed, but this is discretionary, and the cost being assigned to the incomplete work often is in contention. It is best for the contractor to do it right the first time, or at least be accountable to complete or correct on a timely basis.
- Warranty work is aimed at assuring the structure and equipment is going to function, and they take different forms depending upon the nature of the work.
 - Often roofs are bonded for as much as 25 years
 - Equipment, such as pumps, panels, etc carry equipment warranties; that is, that they will function for some period of time (some as short as a year, others for three to five or more).

- It is important for a contractor to provide the owner with operating and maintenance instructions to the facilities and the equipment and discuss with the owner and his maintenance/operational personnel at turn over.
 - It is also wise in certain circumstances to have an interim warranty walk through at the mid point of its term and then at the end and make note of any operational abuses.

SECTION II SUMMARY

Project management is not just the management of one project. There are a series of projects to manage.



The elements of managing any project are the same:

- ✓ It begins with intention. Intention to be successful
- ✓ Doing work you have the capability and resources to perform...profitably.
- ✓ Success is broken down into short term and measurable increments.
- ✓ Each step is planned. Each risk identified and handled.

- ✓ Each step is performed by competent people who perform as a team.
- ✓ Competent people who take accountability for their actions
- ✓ Competent people who are motivated to be successful because of being treated respectfully and rewarded appropriately
- ✓ Competent people who are provided training and a culture of continuous improvement.
- ✓ A culture of safety.
- ✓ A culture of ethical values
- ✓ Planning productivity, then meeting the plan . . .or bettering it.
- ✓ Planning to do it right, then doing it right.
- ✓ Scheduling and meeting the schedule. Or beating it.
- ✓ Managing cash flow.
- ✓ Managing others.
- ✓ Managing the contract.
- ✓ Managing variances.
- ✓ Waste avoidance management.
- ✓ Managing getting and keeping good people, reducing turnover and absenteeism.
- ✓ Every day is a project. Every hour is a project.
- ✓ Effective project management takes time and a lot of thought.
- ✓ The results of ineffective project management will take a lot more time and the thoughts of other people, like lawyers.

SECTION III

Variances

INTRODUCTION

Attached to this section is a series of articles relating to the Contract and Variances (delays, sequence changes, accelerations, pricing). It is important to review those articles in context of the outlined information below. It is also important to seek the advice of a good construction attorney—an attorney familiar with the nature of construction, scheduling, productivity and methods of proof. A great corporate or collection attorney may not be able to effectively cope with a complex labor impact claim and the intricacies of doing a Time Impact Analysis. It is also advised that one of the best uses of the construction attorney is the review of contract documents, and bringing the attorney (there are some very good female construction attorneys as well as male, by the way), as soon as a problem raises its ugly head, to be able to either assist you in avoiding significant damages or to guide you through the process. It is not the thesis of this article, however, to convert contractors from building structures to building claims. It is the thesis that by everyone doing their jobs properly, objectively and with accountability, claims can largely be avoided and when they occur, they can be resolved amicably among the parties without litigation.

- Surety Bonds will be discussed in Section IV.
- A separate section is forthcoming relating to Alternative Dispute Resolution, Protection of Lien and Bond (such as Miller Act) Rights.

The Fences. A fence establishes boundaries. In the ole west, the farmer protected the fruits of his labor by fencing out the cowboy. If the farmer's fence was breached, he was compensated for any damages through monetary compensation or lead. Often, it was the latter. In construction, we have two fences to deal with: our internal budget based upon the estimate and re-take offs after the contract award. To be successful on any project, the contractor must understand rights and duties established by the contract (the fence),

perform the duties and exercise the rights set forth. The same is true as to the budget: if productivity is consistent with the estimated performance and if others do not “invade or breach the fence without compensation,” then the contractor should earn the estimated profit. But if there are variances caused by others (the owner, other contractors, or the contractor himself), then there will be profit erosion.

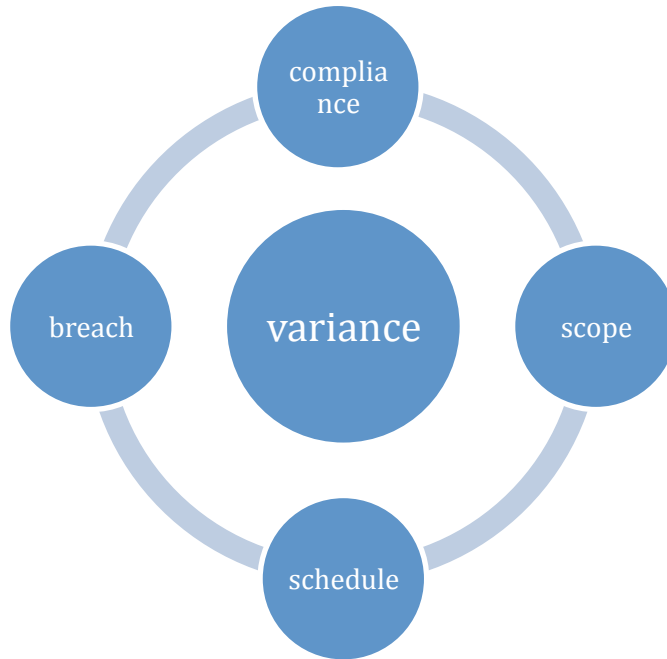
KNOW THE CONTRACT (RTC)

A contract is a fence: we speak of the “four corners of the contract.” Inside the four corners are the rights and duties of the parties. Theoretically, if each party performs its duties and honors the rights of the other party, the project should be successful. When one of the parties fails to perform a duty, or do so timely, this is a *variance* from the contract. The cost for that variance is a function of which party is liable. (See the attached articles listed in this section).

THE MANAGEMENT OF DUTIES INSIDE THE FENCE

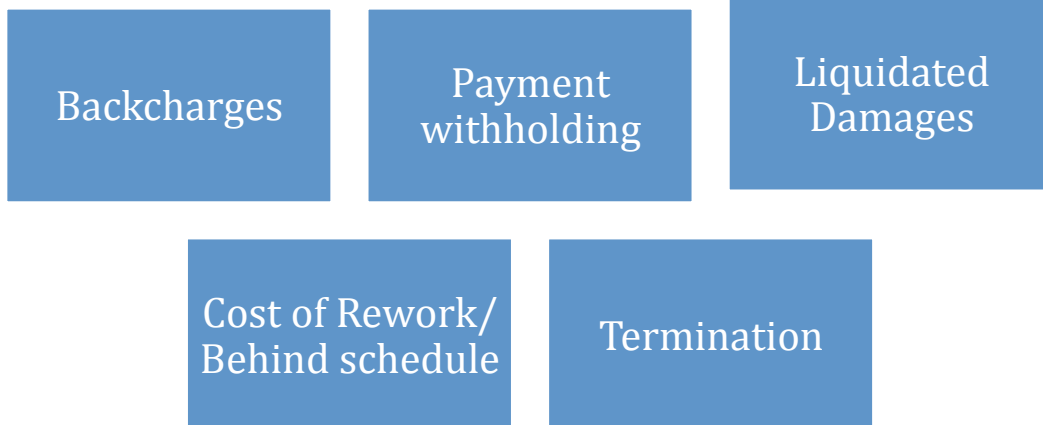
The responsibility of the project team is to discharge the duties inside the fence – to give the customer what he contractually and rightfully expects, but also to protect the fence from encroachment by others without due compensation: in other words, know your rights and protect and/or assert as the case may be. That is, for the scope of work to not be enlarged or the schedule and work sequence changed without receiving an adequate price. For payments to be made promptly, decision-making must be timely. **The fence is important, then: do what is inside it properly. Protect it from intrusion by others without just reward.**

A *variance* for purpose of this section is a departure from the terms and conditions of the contract. It comes in a variety of flavors:



COMPLIANCE BY THE CONTRACTOR

The role of the project team is to comply with the terms and conditions set forth inside the “fence.” The first potential variance over which the contractor has control is **his own failure to meet the terms of the contract**, to fail to provide the required workmanship, supervision, timely performance. Failure to do so can lead to:



The prevention of any and all such variances begins with properly setting up the project with competent supervision and crews, a quality and safety plan rigidly executed. **In fact, most of the losses contractors incur relate to problems for which they alone are responsible.** Pipes that leak, alligating concrete or failing to meet specified strength, DALT tests that fail, alignment issues, not being out of the way for a follow-on craft, missed schedule milestones, not fulfilling the administrative requirements of the contract documents (such as timely written notice or deliverable submissions). **These are all variances from the contract, the costs of which, when due to the contractor's failures, come out of his pocket.**

Stay on top of the usual suspects that are within the contractor's domain.

- Failing to **adequately mobilize** and perform the early part of the project (see the 25/10 Rule)
- **Submittal** problems cause close to 50% of equipment delivery delays
- **Rework** because of an inspect and correct rather than built in quality approach
- **Personnel issues, including inadequate work force or supervision, competency, absenteeism, and turnover**
- **Slacking the last 10%** of the project
- For the record, **material handling** is often a major profit eater on a project, is also often the least monitored (how many cost reports have a code for material handling?), and almost never recorded as an activity on a daily report. Yet, non-productive material handling may be as much as 20% or more of labor on a project.
- **And most of the projects that don't do well for the above and other reasons are not well planned.**

If variances occur due to your own problems, or delivery delays for which the manufacturer is responsible, these need to be recorded and indicated on the updated schedule for several reasons: it provides credibility to all else you do showing that you are accepting your own responsibility; it provides the insight for work around and recovery schedules; it may provide the basis of a back charge against another contractor or a supplier.

The first advice in this section, then, is:

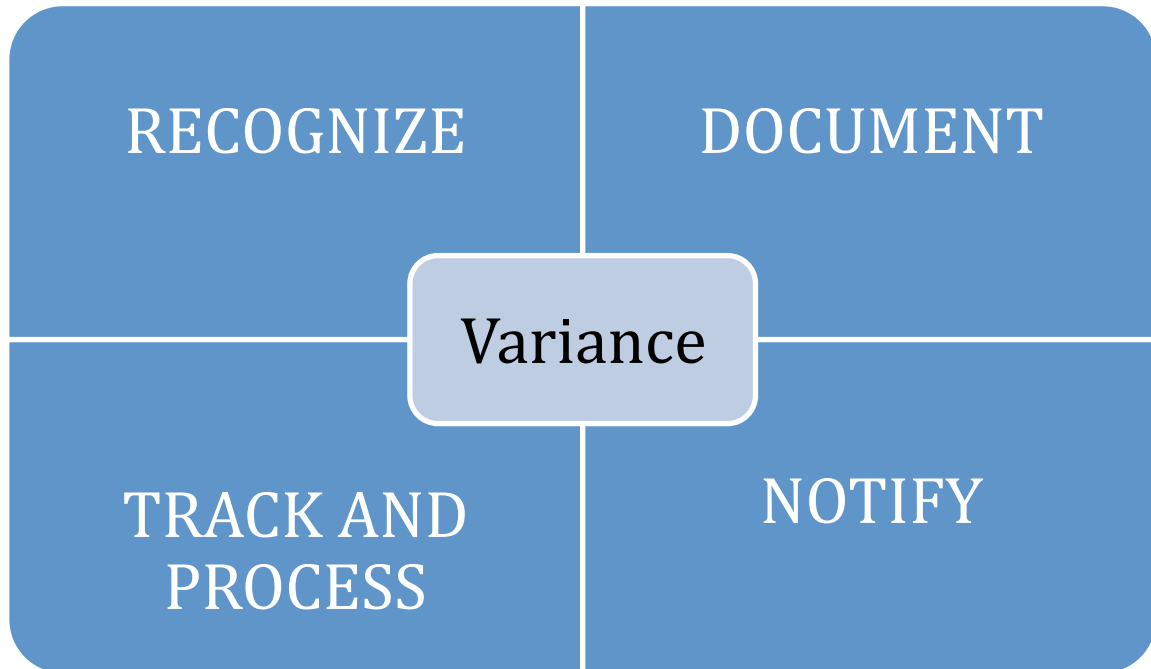
- **DON'T VARY FROM THE TERMS OF THE CONTRACT.**
- **KNOW WHAT TO DO**
- **MAKE SURE OTHERS KNOW WHAT TO DO . . .AND WHEN**
- **DO WHAT YOU KNOW TO DO . . .AND WHEN IT SHOULD BE DONE**
- **DOCUMENT THAT YOU DID**

As a further note, **terminations for default are often fatal.** Even the threat of a termination for default to your surety can have negative consequences. If you are terminated for cause, you may lose bonding capacity and bank loans are not so easy to come by. On the other hand, if you terminate a contractor for default and it is wrongful, you could possibly incur significant damages.

Variations from the contract caused by your improper performance almost always lead to variations from the budget, meaning losses. Variations from prudent workmanship and project management lead to variations from the budget. Contractors seldom get away with anything, and they shouldn't because they gave their work to do the job according to contractual requirements with an adequate and competent project management and supervisory staff and competent and adequate work force.

VARIANCES CAUSED BY OTHERS – THE PROCESS

However, often variations from the contract, scope of work or schedule are caused by others. **There is a system or process for handling variations, whether scope of work or otherwise, and it is set forth below.** However, first realize that a variance may result in a lose-lose: sometimes the owner doesn't get the project on time because of variations, and the budget is overrun. Sometimes the contractor is not fully compensated for variations. **So when a variance occurs, it is well for the project team to be collaborative and put their heads together to attempt to mitigate the negative consequences of it.** For example, keeping the original workflow, avoiding overtime and crowding go a long way to reduce the negative impact of a variance. Coordination meetings with the craft contractors, in which they are actually encouraged to participate instead of being dictated to are also very helpful. **The process is pretty simple:**



ATTACHMENT: See these articles

Contract Interpretation

Scope Changes

Differing Site Conditions

Schedule (time) impact

Terminations

Pricing

The Science of Negotiation

References AACE Practice No. 25R-03, Estimating Lost Labor Productivity in Construction Claims

Calculating Lost Labor Productivity in Construction Claims, William Schwartzkopf, published by Wiley Law Publications

RECOGNIZE THE CATEGORIES OF VARIANCES

Scope of Work

Quality
Quantities
Means and Methods
Overinspection
Changed Condition
Design Deficiency

Time Related

Delay
Precedent Craft
Suspension
Acceleration
Sequence Change

Interferences

Untimely
Non-Compliant
Untimely Access

And further recognize that one can morph into another: for example, a scope change can create a delay to the critical path but if a time extension is not granted, this becomes an acceleration. But the first point is: recognize that a variance is occurring **IN REAL TIME**. And then try to avoid or at least mitigate. Always document.

DOCUMENT IT

WRITE IT DOWN. Record it. Document it. *Review Documentation in Section II.* The following are the documents that should be used to track impacts that may occur:

- Daily Reports
- Logs
- Input to Schedule.
- Photograph where applicable
- Labor cost report
- Schedule of values
- Planning meetings Minutes
- Quality Planning Meeting Minutes
- Safety Planning Meetings Minutes

NOTIFY

Check the contract for written notification requirements, and *comply*. More and more owners are demanding compliance with the notification requirements, and it seems so are arbitration and legal venues as well. **This is**

no longer a “handshake world.” The contract requires written notification, so comply! Further, there are multiple reasons for written and timely notification. First and foremost it is a contractual requirement! Second, it is important for the owner to know that a variance is occurring so he can possibly look at other options or participate in mitigating coordination meetings, and for him to be able to track cost.

1. Timeliness of notification
2. Written nature of notification
3. Contents of notification (which may require time impact and cost impact)

TRACK

Tracking the variance is essential. *Tracking is simply a time line of all the events that are involved in a variance.* Remember that a log is not just another document someone has to maintain. *The log is also a management tool, to give you and others insight on what needs to be done, when it needs to be done, and to use that information to cause it to be done. In fact, all the steps set forth below are not just exercises in writing down stuff on a piece of paper, but vehicles for best managing a project, and protecting the contractor’s fence. See Documentation article.* Most contracts today require time impact analysis (TIA) as the preferred method of schedule updating: the use of tracking to develop a *fragnet* showing the history and impact of a variance is helpful in the development of TIA schedule updates. The following is the track for an undisputed change that results from:

Request for Information

- Discrepancy in plans found
 - WHEN did this occur? The contract requires the contractor to use reasonable diligence in finding problems in the office and not in the field so as to minimize impact to field operations. This is not always practical but it should be the standard: review the plans and specifications in the planning process before the crew begins the installation of the activity. So most discrepancies should be found in the office and not once the field operations get started. If the contractor fails to comply with this requirement, he may be denied the impact

on field operations event though the scope of work may be revised by change order.

- Issue RFI fully documented. Reference contract documents provide clearly what the issue is so there is not ambiguity about what you are asking. Do your own homework and do not expect engineer to do it for you. Provide where practical suggested solutions or alternatives.
 - Include a *realistic* return date to avoid impacting schedule. Operative term is “realistic.” Do not cry wolf.
 - Reference CPM activity number
 - Enter into log
 - Make note in daily report
 - Provide to scheduler to track
- **Momentum Management**
 - If this issue may hold up other work or impact the schedule, get on the telephone and let the engineer know the RFI is on the way to give him a heads up.
 - Use planning meetings to review outstanding RFIs, emphasizing the ones critical to the schedule.
 - Consider working with the engineer and owner to issue a construction change directive (CCD) to begin work to avoid schedule impact while waiting for the full change order process to unfold.
 - A collaborative project management approach where all the parties are committed to develop the most effective and timely solutions provides the best system for maintaining momentum on a project.
- If no change to contract is required, but work could not proceed on an activity until response, record in daily diary. RFI log should indicate the requested response and actual response Schedule could still be affected if there was an unreasonable delay in responding to an RFI affecting a critical activity.
- RFP issued if it is determined that response to RFI will result in a change to the contract (of course the process could begin with the Owner requesting a price for a change to the contract).

- If a work activity is delayed until an authorization for the changed work is issued, make sure that this information is clearly and justifiably made known to the Owner and his representative.
 - Enter in daily log which CPM activity(ies) being affected
 - Respond with pricing data with dispatch. Assure that all other affected parties have received the RFP and have a deadline for pricing responses.
 - Have list of open RFI and Change Requests to present in weekly planning minutes and maintain in minutes of meetings
 - Have tickler system to remind Owner of need dates for responses
 - Work closely with affected suppliers as a change can take your product out of his production line and the delay is often not a one for one ratio. You have lost your place in the fabrication line so you go back in when other orders are taken care of.
 - In daily report, track activities being directly affected *pending issuance of authorization* (for example, the elevated slab is being delayed awaiting directive by Owner):
 - Stop work
 - Crew demobilization and remobilization
 - Equipment down time
 - Material Handling and Storage issues
 - Crew movement
 - In daily report, track activities being indirectly affected pending issuance of authorization. For example, in the case of the elevated slab, what other crafts are being affected, such as drywall standing by for stud installation, and MEP to perform rough-in, et al.
- **Schedule analysis.** The tendency is to just agree on pricing and leave schedule adjustments for later resolution. It is recommended that a forward evaluation of the impact on the schedule be included in the contractor's cost proposal so that the schedule can be updated and

continue to be an effective management tool for the project. The basic information for schedule updating is:

- Remobilization time
 - Remember, it may take a while to become reorganized, get crews that have been reassigned to other work or locations, update planning etc. Remobilization is definitely an activity that needs serious consideration.
 - Will submittals or re-submittals be necessary?
- Delay to a work activity pending authorization
- Time to re-do any work already installed
 - E.g. as the time you had to stop work on the activity, were there things done necessary to protect the work until the RFI is resolved or authorization given: capping off or protecting work already installed; work had already been roughed-in that now has to be re-routed.
 - Additional testing or re-testing that is required
- Duration of extra work
- Delay to crafts not directly affected
- Procurement – delivery – delays
 - Shelf life issues
- Effect of possibly being pushed into a different weather zone

It may not be perfect, but it is generally prudent to have a reasonably meaningful time baseline to work against than a schedule that does not contain the effects of current conditions.

- **Pricing** (See attached article entitled [Pricing](#) – it is important to review this article before variance occurs to assure you are properly tracking and recording cost and know how to prove your cost in the pricing proposal)
- **Negotiation.** Maintain negotiation notes. [See attached article on Techniques of Negotiation](#)
- **Implement Authorization**
 - Change orders to subcontractors and suppliers if required
 - New submittals or re-submittals if required.
 - Provide to field supervision

- Update quality plan as required
- Update safety plan as required
- Update budget
 - Separate cost code in some instances
- Update schedule of values
- Update as-built drawings
- Update construction schedule using TIA

Disputed Change

- Assume the owner contends that the contract provides two AHUs to be provided; you contend just one.
- Inform Owner of your reason that just one is required
- Assume Owner rejects your position
 - Owner may direct you to provide the second AHU.
 - If so, give immediate notice that you consider this to be a change to the contract; reaffirm your contractual basis of this position.
 - Comply with the directive, as this is required under the contract
 - Give pricing and impact on schedule within written notice requirements of contract
 - Maintain data regarding all cost items (see clause in contract, which lists the costs that are needed to support time and material type claims)
 - If you request a time extension as well and it is denied, give owner notice that this is constructive acceleration
 - Maintain field records of additional cost
 - Owner may not actually give direction. Just rejects your installation on the basis of only one AHU.
 - State your contractual position in writing
 - State that you will not provide the second AHU unless he provides direction and authorization
 - If Owner does not do so, then write letter stating that you consider the rejection of the installation

as beyond the contract scope, that you will provide the second AHU unless he states in writing within five days that this is not necessary, and that the cost thereof is to his account.

- Maintain records of cost and impact to other work
- Update schedule as indicated above

Even in the case of a disputed change, the parties may keep the momentum going with minimum impact by following the steps in the construction change directive, or if the Owner just sits on his tail and does nothing, the contractor can continue with minimum interruption using the foregoing approach.

Changed Condition

- If the contractor discovers a condition believed to be different than that represented in the contract documents (including a soils report referenced as a contract document), the contractor must *give immediate notice of the condition*, and stating reasons it believes the actual conditions are different than those represented in the contract. The contractor should also ask for direction (and or provide recommendations for the steps that need to be taken to deal with the changed condition).
 - Record in daily records
 - Take pictures
 - Set up separate cost code if applicable
 - Awaiting a decision or direction from the owner may be a constructive suspension of work. Make sure it is recorded in daily reports
 - Keep a record of all stand point equipment and tools
 - Keep record of standby personnel awaiting decision

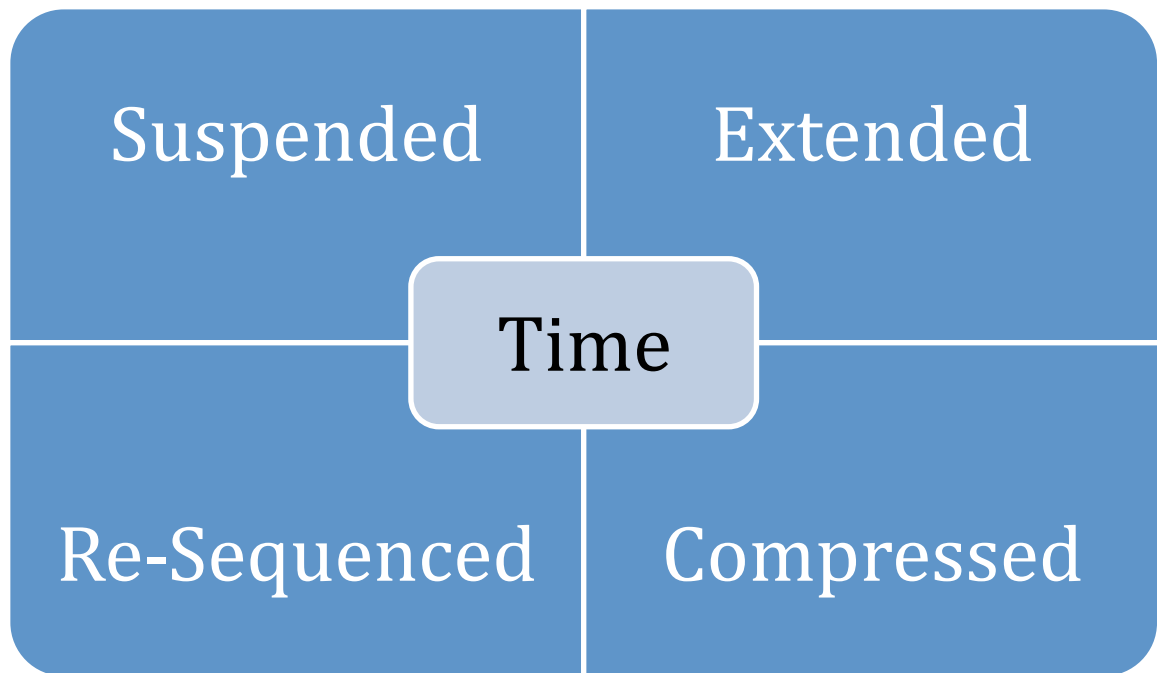
- Keep record of protective steps that may need to be taken
- When the owner makes as decision, it may come as an RFP to be priced, or a directive that the contractor can immediately begin implementing.
 - If an RFP, then the pricing will include both the scope of work to perform, the changed condition work (see Pricing), and the impact on the schedule, including standby awaiting a decision or direction.
 - If a direction, then the contractor should begin to track the cost on daily reports, get signed time sheets from the owner's project representative, set up separate cost code to track all cost including fungibles that may be involved.
- Especially in changed conditions, which so often occur at the front end of the project, the owner either denies a time extension request (sometimes because the contractor does a poor job of updating the schedule) and the contractor is constructively accelerate.
- If owner denies that it is a changed condition, then follow steps above for disputed change. A changed condition is indeed a scope change.

Means and Methods

- On the one hand, owners want to claim that everything is means and methods and nothing is a scope change. On the other hand, they bow up when the contractor claims that the owner's trying to change the means and methods employed by the contractor. See Contracts article for discussion of the entitlement issues. This section just relates to the tracking process.

- **Assume that the contractor bases its bid for excavation on using a trench box to protect its workers in utility trenches for a given project. The owner disapproves this method of protection and directs that hydraulic shoring be used which will be more costly. The contractor, to protect its position:**
 - **Reviews the estimate to show that it bid on the basis of a trench box**
 - **Demonstrates that a trench box will provide adequate protection against the nature of the subsurface conditions**
- **If the owner insists on the hydraulic shoring, the contractor then tracks the differences in:**
 - **Material and equipment cost**
 - **Productivity rates between the two**
 - **Additional time that may be required for procuring, installing and the productivity differences that may be involved.**
- **The important thing is to demonstrate that the contractor's choice of means and methods was both reasonable and the basis of its estimate. So means and methods is not a scope of work change (though it could involve that) but the method by which the scope of work was to be performed. Unless otherwise specified in the contract, the contractor has the choice of means and methods. But as will be seen in the section on Contracts, "means and methods" is not a grease trap to force the contractor to perform work that is indeed outside its scope of work, or to correct design errors and omissions.**

Time Changes: Time can be in one of the following buckets:



The contractor should begin the project with a good schedule. It should conform to the contract requirements and have the input of all the major players. Its durations and logic should be reasonable. It should **establish a production flow – or job synthesis – which is the most productive sequence for building the project within the time limits.** The schedule should be a **procurement schedule**, that is, showing the entire procurement process from award of contracts, submittals and deliveries. The schedule should show **access requirements, the quality three step process** if used, **inspections, commissioning and start-up**. If in fact, such a schedule exists, it should also be **routinely updated (per the contract)** and preferably using a **Time Impact Analysis** approach as discussed. For a contractor to be entitled to additional time on a project, or cost for an impact to its method of operations, it must begin with a valid, and hopefully approved, baseline. And hopefully it will continue to be updated, games will not be played with logic and reporting of all impacts, whether caused by the owner or the contractor, will take place. For the contractor to be entitled to additional time or cost due to schedule issues, then, this is the first criteria: a valid baseline schedule, appropriately updated as required. If that criteria is met, then there may be adjustments to

the schedule if the foregoing occur, and not the responsibility of the contractor.

Suspensions of Work

- A suspension occurs when the owner directs work to be suspended (known as a formal suspension), or **when the owner takes an unreasonable amount of time performing a duty, such as decision making or granting access (known as a constructive suspension)**. For example, if the owner's representative fails to show up for an inspection for a few hours that is not unreasonable. If a day, well, not so good. A week is most likely unreasonable and would be considered a constructive suspension of that work activity. **The usual suspects for unreasonable constructive suspensions are: response to RFIs, Change Orders, response to differing site conditions, but there are others in the areas of access, inspections, and even *delayed payments* that can be a cause for suspension of work. Check the contract. So, if there is an event creating a suspension, do the following:**
 - Record the event that caused the suspension.
 - Time line, from the day it arose until the completion of the suspension
 - Enter on daily report
 - Identify CPM activity or activities affected (**remember, that time extensions are only justified when the critical path of the project is extended. Absorption of float does not entitle the contractor to a time extension unless the end date is extended by the suspension or delay**).
 - Provide written notification
 - Update schedule
 - On field documents, show the activities being directly and indirectly affected such as:
 - Stand by
 - Crew movement

- Demobilization
- Remobilization
- Make note that such events often have effect on *learning curve* (See Pricing) but there is quantifiable time loss as well associated with planning and replanning work.
- Material handling issues
- Impact on other work activities
- When suspension is over, update schedule and request time extension if applicable
 - If justifiable time extension not provided, determine if your work is being accelerated.
 - Let daily report reflect the events that are occurring and productivity factors
- So, like other events discussed, a suspension can morph into an extension to the contract, or possibly an acceleration. It is prudent to attempt to avoid such effects through a collaborative relationship with the project team

Delays

- There is a cluster of delay types (Review the article entitled Contracts in the attachments)
 - Delays that consume float but do not affect the critical path
 - Delays that affect the critical path of the project
 - Delays that are compensable
 - Delays that are non compensable
 - Delays that are concurrent
 - Delays that are parallel.
 - Delays caused by other contractors for which the owner is not responsible
 - Delays that you solely cause

But for tracking purposes, all are treated the same and follow the steps set forth in the foregoing checklist for Suspensions. The time line for recognition, documentation, notification, tracking and processing is the same. The difference lies in being competent at updating on a timely and objective basis the schedule. *Begin with the understanding that for the contract completion date to be extended, the delay must be to the critical path of the project. Delays that simply absorb float are not a basis for a schedule extension. Delays that simply add workforce without impact to the critical path do not necessarily affect critical path. And contractors who attempt to manipulate the schedule to their own advantage will be identified, for the owner's scheduling consultants are savvy enough to quickly identify attempts of massage the schedule for one's one advantage. Credibility remains the name of the game.*

- Remember also that it is the *burden of the contractor to demonstrate with field data and reliable schedule updating that the critical path has been impacted.* This is one of the reasons that periodically updating the schedule using the TIA approach is important as it provides a credible and running baseline of the status and critical path of the project.
- Also, remember that in pricing change orders, the easy way out is for the contractor to price the changed work and “reserve its rights” to claim time extension and/or impact at a later time. It is recommended that the contractor do his best job of impacting the schedule and requesting additional time when the change order proposal is submitted. As indicated above, the result may not be precise but it provides a continuing update baseline of the status and the flow of work of the project. It then continues as a tool for managing the project in the most collaborative and prudent manner.
 - *And certainly, the field supervisors can add the activities that are being affected to the look ahead schedules, and in coordination meetings try to figure out how to handle as productively as possible.*

- It is not uncommon that after a fairly lengthy delay, crews have departed for other jobs, and it may be difficult to re-mobilize with sufficient or competent work force. Keep this in mind in evaluating the impact of a delay. It is also not rare that a delay may push work into a different climatological time zone that should be taken into consideration in assessing the full impact of a delay. And extending the duration of a task often rubber bands labor, increasing the cost of performing it (including material handling and clean up).
 - *The point is: recognize, be aware of all the consequences that the delay is causing, record (document) them, use for updating the schedule.*
 - *Take pictures of conditions.*

Compression

Compressions or accelerations also come in different flavors. The Owner can direct the contractor to perform a task or the project earlier than scheduled – a formal acceleration. Or the Owner can fail to grant a justified time extension (operative term is *justified*) holding the contractor to the original completion date—a constructive acceleration. The results are the same and the steps are the same to recognize, document and give timely notice. So follow the tracking format for delays above. But the need to be more attentive to recording the impact in daily reports and labor cost records is of real importance. This is because almost by definition, an acceleration impacts *labor productivity*. Owners don't understand "loss of productivity" or "labor impact" claims, and contractors seldom do a good job of presenting them. Often contractors simply use a total cost approach, which are not favored by the owner or the courts. And then contractors will only rely on statistical data such as NECA or the Corps of Engineers studies. The problem with the studies is that they are the result of empirical data from a vast number of different types of projects, and are not necessarily pertinent to this particular set of

events. However, by being aware of consequences that might occur, the field personnel can record in reports what is actually happening on this job. At least record WHAT is the consequence, even if you cannot quantify it at the time. The following are typical consequences of an acceleration, so see which ones apply to this job and then make note of it in the daily report.

Consequence Document

Supervision	Added to maintain foreman crew ratio
Safety	Added safety personnel due to hazard assessment
Crew Size	Increased crew size
Manhours	Lost productivity due to: <ul style="list-style-type: none">❖ Overtime (indicate prem time hours)❖ Down time (duration, crew size)❖ Movement (from where to where?)❖ Learning Curve (Give reasons)❖ Congestion (show crew size and dimensions)❖ Additional Material Handling (why?)

The point is: if these actual conditions are recorded in the daily reports as they are occurring, and a method of demonstrating earned value, then the pricing can occur with a level of reasonableness and credibility. It is one thing to tell the owner that the acceleration had a 40% impact on labor and another to detail out every day the factors that have diminished productivity. **Establish the causal connection between the cost and the reason for the cost having been occurred with reliable, real time information.**

Sequence Change

- **There are no big jobs, only a series of small jobs. And they are done, or should be done, in the most effective sequence. We might call it *flow of work*.**
 - The contractor does the layout on floor one and moves to floor 2 and up he goes
 - The layout is followed by the rough-in crew on floor one, moving up to floor 2 and continuing there on.

- Fixtures and finish follow floor by floor.
 - And that is the way projects are priced and scheduled.
 - That is called “job rhythm” or sequencing.
- **When the sequence is changed so that instead of a logical progression up and through the building, and crews are all over the place with the Owner or General Contractor saying: “well, you always have some place to work,” the job has now gone to hell.**
- **The first goal is to do all possible from preventing this scenario.**
 - **The second, if it does occur, is to:**
 - **Give written notice and explain the damaging effect that the abandonment of the planned sequence is having on the project**
 - **Update the schedule or provide information to be used in updating the schedule to show what is happening**
 - **Bring this up in planning meetings and partnering sessions if they occur**
 - **Change of sequence, because of impact on productivity, often results in a project delay. And often the owner refuses to grant a time extension and this then morphs into an acceleration.**
 - **Let your daily reports reflect what is happening:**
 - **Where crews are being spread**
 - **Stop and go**
 - **Additional workforce required**
 - **Additional tools and equipment**
 - **Additional material handling**
 - **Additional clean up**
 - **Interference with other crews**
 - **Additional testing that may be required**
 - **Additional supervision to attempt to intensify planning and mitigate damages.**

SECTION III SUMMARY

The best laid plans of mice and men go astray, someone once said. They may go astray because of acts or omissions of other parties, or your own forces. So, project and field management personnel need to be vigilant to:

