Ralph J. Stephenson PE PC
Consulting Engineer

January 31, 1989

Karen G. Carlson
Training Specialist II
Kohler Co.
c/o Training Department
Highland Drive
Kohler, Wisconsin 53044

Re: Handout material for Kohler Construction Claim Avoidance Seminar

Dear Karen:

Enclosed is the handout material for our claim avoidance seminar to be presented for Kohler on February 20 and 21, 1989. Also enclosed is an extra index of the handout material with those handouts for which transparencies are needed indicated by a red asterisk. I have revised much of the material in the book and would like to have transparencies made directly from the originals used in the book. Any help you can give me in providing these new overheads would be of great assistance.

Notice I have inserted a section break sheet at the start of each new number division of the book. The divider tab sheets should be placed just in front of each of these

As a suggestion, at a recent seminar I gave at the University of Wisconsin, the reproduction department printed the notebook index on slightly heavier and differently colored stock than the remainder of the notebook. This worked out well and allowed class members to easily locate the index when needed for reference during the class. You might wish to try this technique.

It would be of help if you could have a notebook for my use at the American Club desk, along with the new transparencies on Sunday afternoon, February 19, 1989 so I can get ready for the Monday class. Since I need a fair amount of table space for putting the class material in order, would you please reserve as large a room as available for me. It would be appreciated.

Ralph J. Stephenson PE PC
Consulting Engineer

January 31, 1989

Prior to traveling to Kohler I will try to have quiz #1 prepared and would like to have it reproduced for use the afternoon of Monday, February 20, 1989. In addition there may be some other notebook items that would be helpful to have as handouts, but which I have not yet prepared. These I shall either bring with me or prepare on the classroom computer for reproduction.

One special request - some of the handout material, particularly in section 8 of the notebook is somewhat faded. Could you please check the final product to see if the copy is as readable as possible.

If you have any questions about the handout material please call me.

My travel plans presently call for me to get to Milwaukee in late afternoon, Sunday, February 19, 1989 on Northwest flight 387 arriving in Milwaukee at 4:45 PM. I would appreciate having a limousine meet me for the trip to Kohler. I shall leave Kohler Tuesday afternoon, February 21, 1989, so as to catch Northwest flight 434, leaving Milwaukee at 6:45 PM. Presently, as we have talked, it would probably be best for the limousine to pick me up at the American Club upper entrance about 4:15 PM on Tuesday, February 21, 1989.

I'm looking forward to the class and to working again in your fine facilities. Thank you for your help, particularly the letter of 1/4/89 and the survey material. Both were of great interest.

Sincerely yours,

Ralph J. Stephenson PE

1. Topic outline for Kohler Claim Avoidance Seminar - d160

2. Six major goals to meet for construction project success

2.1. The client, owner or user must be assured upon completion of his job

2.1.1. Goal #1

That the facility program and the facility design have met his needs, desires and wishes.

Possible subjects
- The program and what it is
- Who writes the program?
- When is the program written?
- The pro forma and how it is prepared
  - Discuss with Don T and Jerry S
- The need, want and wish list
  - Call Ed Parks and get his terminology for this
- What subjects does it cover?

Possible handouts
- Sample program outline
- Sample program detail
- Sample pro forma
- Sample want, need, wish list

2.1.2. Goal #2

That the planning, design and construction work on the project has been accomplished within the time and cost structure required and desired.

Possible subjects
- How to best plan the job to optimize the probablitiy of meeting date targets
- How to best plan the job to optimize the probablitiy of meeting cost targets
- Concepts of the iterative estimate
- Designing to cost - see need, want, wish list

Possible handouts
- Types of cost estimates and how they are prepared
- Sample summary networks of small project
  - Might use Clarion penthouse project
  - Add resources to the diagram

Money
Time
Staff
Equipment
etc

2.1.3. Goal #3

That all relationships on the project have been maintained at a high technical and professional level and have proven rewarding for all concerned.

Possible subjects

- Five basic business relationships
- How to analyze the other organizations with which you work
- The concept of the project manager as a master manager

Possible handouts

- Case study of typical expansion program
  - Should consider building a base study and expanding it for special cases

2.1.4. Goal #4

Tha people involved at all levels of work on the job have realized a financial, professional and technical profit for themselves and their associates by being on the project.

Possible subjects

- Various types of profit
- Importance of recognizing the differing profit motives on the job

Possible handouts

- An essay on differing profit motives and how to reconcile them
- A case study module dealing with project profit and its use as a management tool

2.1.5. Goal #5

That the project has been closed out with little or no residual potential for major problems of maintenance or operation.

Possible subjects

- Preparation of a master close out list
  - Could be a component of the master project manager's check list

- How to punch out a project
  - Discuss this with some of the people at SOM
    - Walter B
    - Fred F
    - Bob McC
    - etc
  - Documentation of the closing out process
  - Third party close out
- Possible handouts
  - Check lists on closing out
  - Typical spec sections on close out procedures
  - Retentions, collections and final payment from the owner view

2.1.6. Goal #6

That the entire process has been free of unresolved contested claims for additional money, additional time, damage payments & of the potential for future financial demands after the job has been closed out.

- Possible subjects
  - Situations that cause contested claims
  - Methods of resolving contested claims
  - Profiling a job to determine its potential for claim
- Possible handouts
  - Claim potential check list - weights and values
  - Essay on the legal processes possible
    - Litigation
    - Mediation
    - Arbitration
    - Retired judge
    - Administrative settlement

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January 19, 1989

a:kocc1010 - Topic outline for suggested seminar on claim avoidance for Kohler - en route from Minneapolis to Detroit and other - October 10, 1988

Items in () indicate related handout material

General premise of seminar approach

The major purpose of planning, designing and constructing facilities is to proceed through the entire process from conception until the point where the building and grounds are in a full and profitable operation that satisfies the user's goals and objectives. (line of action, phases of a job, participants, project delivery systems)

Some of these goals & objectives might be:

1. The facility program and design have met the desires of the user (sample program)

2. Planning, design and construction work has been accomplished within the time and cost structure desired

3. Relationships on the project have been maintained at a high technical and professional level that proved gratifying for all concerned (differences between agent and contractor)

4. People involved at all levels of work on the job have realized a financial, professional and technical profit for themselves by being associated with the project (goals & objectives)

5. The project has been closed out with no residual potential for major problems (closing check list)

6. The entire process and the success enjoyed has been free of unresolved contested claims for additional money, time, damages or future reimbursement (causes of contested claims, claim prone job characteristics)

When the planning, design and construction professionals have accomplished the above they can be said to have enjoyed a truly successful involvement in the project and the user will nearly always have obtained a facility that will fill his needs and expectations.

Subjects to cover

To accomplish a project that meets the six point criteria above, there are some clear cut ground rules that should be examined. Good jobs are experienced quite often in the construction industry. But, they are not noticed quite so much as the poor ones simply because in our contemporary society we have become accustomed to concentrating on what went wrong, often to the exclusion of what went right.

The major purpose of this seminar is to try to show attendees what it is that makes a job move well, and how they can apply the principles of good management to optimize the probability of that happening without major unresolved contested construction claims.

In the class there will be a need to show what some of the problem areas often encountered in a construction project may be. These should be presented along with methods that might be employed to overcome them or to moderated their disruptive and negative influences.

Subjects that would be appropriate to cover in the class might include (at random)

- Glossary of terms related to planning, design and construction
- Definition of goals and objectives
- Retention of competent professional advice
- Roles and relations of the architect, engineer, contractor, owner , consultant, sub contractor.
- Documentation
- Payment methods
- Liens

- Types of claims
- The role of network modeling in avoiding contested claims
- Front end work, including
  - Writing the job program
  - Designing the job
  - Controlling the real estate
  - Preparing and using the pro forma
  - Clearing easements
  - Preparing contract documents
  - Selecting a project delivery system
  - Recognizing the potentially claim prone job
- Case study work
- Documentation
- Project histories
- Use of data base concepts
- Levels of documentation
- Contract document packaging
- The relation of the architect/engineer/contractor/owner
- Methods of settling disputes
- Changes to the work
- Termination of a contract
- Selection of professional services
- Responsibilities of the owner or user
- Participants in the planning/design/construction process
- Assignment of risk
- Stopping the work
- Incentives and disincentives
- Methods of payment
- Retention

Miscellaneous points to consider in preparing seminar outline

- Prepare special glossary of legal construction words and phrases such as
  Common law
  Case law
  Statutory law

Ralph J. Stephenson PE PC
Consulting Engineer

January 19, 1989

Agent
Contractor
Architect
Encumbrances
Variances
Easements
Project delivery system
Litigation
Arbitration
Mediation
Bench trial
Jury trial
Deposition
Indemnification
Inspection
Contract administration
Business relations
Legal relations
Authority
Responsibility
Relations
Clerk of the works
Privity
Strict liability
Third party liability
Impact network
Project history
Document control system
Document
Certificate of occupancy
Certificate of substantial completion
Errors and omission
Bond
Surety
Liquidated damages
Patent-latent test

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Consulting Engineer

January 19, 1989

General Notes

- Study the historical relations between the various participants in the planning, design and construction process (call AIA or AGC for literature references)
- Talk to Tom Keranen re material for a class of this nature
- Read Justin Sweet's book on law
- Find contested claim folder
- Review bonding and the relation of the bond to legal actions
- Review subject with Jerry Shea and Don Templin for points to cover

end

Ralph J. Stephenson PE PC
February 19, 1989

a:kocl0212 - General notes for Kohler claim seminar outline - 2/12/89 - en route to Minneapolis from Detroit

<u>The 37 basic elements of the design and construction business</u>

<u>Goals and objectives</u>

- The G construction profession is a goal and objective oriented business. It is driven by results since the end product is the only measure that is a permanent element of the work done.

- If any other end product of design and construction results that is detrimental to the production of a valuable and profitable asset - the finished building or an environmental improvement - it is generally considered a detraction in value.

- Contested claims are usually a major ~~and very~~ undesirable end product of a G construction effort. Others might be:

  - Poor functional design
  - Poor aesthtic design
  - Cost overruns that have permanent impact on the investor
  - Bankrupt parties to the project
  - Jobs lost due to actual or perceived poor performance
  - Reputations lost due to actual or perceived poor performance
  - Shortened life span of facility due to defective delivery & function
  - Endangered public health, welfare & safety due to defective delivery and function
  - Increased cost of doing business due to actual or perceived poor performance
  - Strained professional relations due to project conflicts
  - Strained personal relations due to project conflicts
  - Reduced market availability resulting from pending resolution of project disputes
  - Etc.

he often

- A major cause of the contested claim seems to be the continued inability of the G construction profession to resolve their differences internally. Thus if the injured party is not part of the technical professions charged with the project planning, design and construction, rightly feels that if he keeps the resolution of his construction problems within the project team ~~that~~ he may not enjoy the benefit of a profitable settlement. Thus the entrance of the objective outside, impartial judger; thus the intrusion of the legal profession into the construction profession's territory

- In essence, the planning, design and construction have lost their PROFESSIONAL homogeity. They are divided among themselves.

- What is the answer? Is there an answer? *Need there be an answer?*

- The whole circle of answers to these questions seems always to return to the basic questions of integrity, skill, perception and ethical behavior of the participants.

- Does the return(?) to a sense of responsible professional and technical behavior seem to be called for?

- It is important to ask at this point - do proper actions result in proper results? It may be germane to ~~relate~~ this question ~~to identifying~~ the ethical action to the ethical result. *consider* [illegible] *by relating*

Profit

- The seven types of profit are so different in their cosmetic characteristics, but so similar in their basic structure as to be worth careful consideration. How does the financial profit, if achieved, affect the value system profit; or inverted, how does the value system profit affect the financial system profit?

- The financial profit conflict with the other 6 profit factors seems to be of critical importance in the capitalistic system. Is what I make for the company in $ of importance to what I make in $ for myself, for my client, *in a safe facility for the bldg dept.*
in a good facility

in similar vein of benefit
for my peers, for my users, for my employees, etc?

- The resolution of the profit motive on the work that you do seems to be of extemely great significance in setting standards of behavior.

- To wind up the discussion of profit and its relation to excellence (which is really what we have been talking about). the truly professional practicioner must meld his professional and technical skills with his own ethical phyche to determine if what he has achieved in the profit mix is right.

- Profit mix determines project success to a great degree (30%)

Line of action

- If we assume the achievement of goals and objectives and the understanding of profit in all of its senses has been considered we can now move to the actions within which the goals and the profit can be achieved.

If we agree the goals, objectives, profit are givens, how do we, as design and construction professionals move toward these goals and profits?

- The line of action gives us all a clear message that certain steps must be taken to be PROJECT SUCCESSFUL. The line of action merely says that things (actions, influences, nudges, abilities, etc.) now must be acted on to make possible what has been defined as the mission and purpose of the job.

- The line of action for most construction projects is relatively fixed. The differential between a successful job and one not so successful is mainly a function of how well the interaction between the individual actions is handled.

- An essential to success on a project in avoiding the claim is to understand and follow properly, the steps in the line of action: and to do your work so the others on the job can also follow their line of action profitably and with confidence in the leadership you are providing.

General notes on the seminar - Tuesday, February 14, 1989

- The reason a seminar like this often appears to concentrate on the contractor as being the oppressed party is that he usually is the one to perceive a hurt and take an action first. The owner controls the payment of the money and the approval of the job actions. Therefore there is little incentive on most jobs for the owner to take claim action against the contractors. Thus the usual role of the owner is to give the job the needed attention and leadership needed to avoid the contractor's adversarial actions without adverse effects on the job.

- The architect/engineer is usually aligned with the owner as a limited agent and thus can usually work out differences of opinion early so as to avoid becoming an enemy of the owner. However, as often happens when the owner seeks help from the architect/engineer to defend the owner against an attack by the contractor, the owner will ~~team~~ up with the architect/engineer and again the contractor is forced to be overtly aggressive in seeking solutions to his actual or perceived difficuties.

end

Ralph J. Stephenson PE PC
February 19, 1989

a:mntx0212 - Time & expenses for Minneapolis trip - Sunday to Tuesday, Februay 12 to 14, 1989

Time

Sunday Feb 12, 1989

14.83 - 15.42	ka Lake Terrace - 89010 - 27
15.42 - 16.00	admin - 8~~8~~9001 - 17
16.00 - 17.00	Kohler claim av - 890 - 03
17.00 - 17.42	Bus - 8~~8~~9002 - 04
17.42 - 18.50	ka Lake Terrace - 89010 - 27
18.50 - 19.00	Admin - 8~~8~~9001 - 17
19.00 - 20.00	Bus - 8~~8~~9002 - 04

Monday - February 13, 1989

07.00 - 07.75	Bus - 8~~8~~9002 - 04
07.75 - 13.00	ka Lake Terrace - 89010 - 00
14.42 - 18.25	ka Lake Terrace - 89010 - 00
18.25 - 20.00	Bus - 8~~8~~9002 - 04

Tuesday - February 14, 1989

06.50 - 07.25	Bus - 8~~8~~9002 - 04
07.25 - 13.42	ka Lake Terrace - 89010 - 00
13.42 - 14.08	Bus - 89002 - 04
14.50 - 15.00	Admin - 89001 - 17
15.00 - 16.00	*ka Lake Terrace - 89010 - 27*
16.00 - 16.25	*Bus - 89002 - 04*
16.25 -- 16.75	*ka Lake Terrace - 89010 - 27*

Expenses

klt - ka Lake Terrace - 89010
bus - Business

Sunday - February 12, 1989

Tip - cash	$ 3.00 - klt
Insurance	$ 3.13 - klt
Tip - cash	$ 1.00 - bus - tip in nw club
Taxi - cash	$ 19.00 - klt
Drinks - chg to hotel	with Dean Winquist - bus

Monday - February 13, 1989

Lunch - chg to hotel	with Dean W & Mark C - 1/3 klt & 2/3 bus
Drinks - chg to hotel	with Dean W & Mark C - 1/2 bus 1/2 klt
Tip - cash	$ 3.00 - klt
Parking - cash	

Tuesday Feb 14, 1989

All air fare charged to klt

Hotel - chg	$	- see bill for charges
Tip - ~~chg~~ cash	$ 3.00	- klt
Tip - cash	$ 1.00	- bus.
Parking - cash		- klt

Ralph J. Stephenson PE PC
February 19, 1989

a:joob0214 - What to look for in job watching - en route from Minnecpolis to Detroit - February 14, 1989

During the 1989 project management seminar at the University of Wisconsin, I had the class analyze at their discretion, a construction project near/the WEX class building. About 10 of the people in the class of 74 prepared analyses and from this group I selected the best and awarded a prize. The student submitting the analysis presented his findings to the class and to my surprise the class seemed strongly impressed by ~~the~~ 4.~ technique/of evaluating a project's health by general inspection.

The ensuing discussion lead into a general interest in what do you look for and how do you interpret it when monitoring and evaluating a job. Some of the members of the class asked that I prepare a check list of the items to look at in such a cursory analysis.

it is to be emphasized that quick analysis must be done carefully and with full recognition that we are merely looking at the outward characteristics of a job and that many deductions or inductions must be made without supporting data.

In essence, if the job looks like it does, what can we deduce is its condtion?

Let us use the building components as a base upon which to build our analysis. These are+

(copy the definition of the components from the handout on laundry lists and contract document matrixes.)

* Front end work
* Design work
* Procurement work
* On site work
* Off site work
* Substructure work
* Superstructure work
* Exterior skin work
* Interior rough work
* Interior finish work
* Unit systems work

This essay starts from the construction process of field actions

To be continued

enda:nts0214 - General notes for Tuesday, February 14, 1989 - en route from Minneapolis to Detroit

To do list

- Discuss the situation surrounding the construction help that may be needed on the Milwaukee Lake Terrace job. Could review it with Dean or with Mark C.

- Clean up the files for Lake Terrace by putting all valid data files on a new double sided disk. Give special attention to the network sheet s*1 for the concrete structure.

end

Ralph J. Stephenson PE PC
Consulting Engineer
March 5, 1989

a:ntx0219 - General notes for February 19, 1989 - en route from Detroit to Milwaukee

Kohler quiz questions

- Basic elements of a project such as profit motives, directed sequencing, quality of participants and others often indicate the degree to which a job can expect to be claim prone.

- A claim prone job is one in which there is a high probability that the combination of project elements will result in detracting contested claims.

- Litigation is the subjecting of a contested claim to a panel of experts in various disciplines, and being bound by their decision.

- The degree of documentation required for a project is independent of its degree of claim proneness

- The owner should specify any intermediate objectives he wishes his contractor to achieve, in the contract documents.

- Closing out a project properly should be the sole responsibility of the architect/engineer and the contractor.

- A detailed network model prepared by the owner & showing the construction sequences and task durations should usually be made a part of the contract documents.

- Prompt processing of submittals by the owner and the architect/engineer will usually help reduce the probability of procurement related claims.

- Ownership of float time frequently is a point in question in contested delays and acceleration claims on a construction project.

- Risk is best assigned the parties to a contract in a manner consistent with the predictability of actions they must take.

- The assignment of risk is best made initially by the owner.

- Risk degree can change during the progress of a project's desig

Ralph J. Stephenson PE PC
Consulting Engineer
March 5, 1989

a:nts0221 - General notes for Tuesday, February 21, 1989 - en route from Milwaukee to Detroit

To do items

- Send information on leadership booklets to Tony Bartol at Kohler - see card for address

- Correct & extend project manager check list

- Add project manager check list items to master laundry list

- Add resp/auth list as appropriate to master laundry list

- Correct handouts as noted from Kohler cav seminar

- Consider writing to Sam Anderson or Jim V re getting actions leading to more effective project management

- Consider writing to Mr Elliot re methods of getting things done in Kohler

- Consider writing letter to American Club re excellent service in the Immigrant Room. - specificallly Larry ?

- Write Karen Carlson re getting roster of people in class

- Write Karen Carlson and thank for help in seminar

- Write Carol ? and thank for duplicating help in kcav seminar

- Outline notes for Kohler seminar & put in business note file.

- Call Karen Carlson and ask her to get my blue mouse pad from the training room table and send it to me.

General notes

- Major items of interest in Kohler cav seminar

    - Liquidated damages
    - People relations - used these diagrams as matter of course in case study evaluations
    - Difficulty of Kohler plant engineering in getting standard systems and procedures set down for day to day use
    - Bonding practices - may or may not require bonding
    - Liquidated damages - require on most jobs - not certain why
    - No identifiable standards by which to measure project performance. How does anyone know if a job is good?
    - Why did Kohler have this seminar? Review set of notes assembled with staff re the class and the class impact.

- It would be interesting to track the entrance of Kohler into the development business. Conversations on the trip to Milwaukee from Kohler seem to indicate a great interest by developers in the Kohler area. Names mentioned were Trammel Crow and Rouse (Water Street Pavilion developers).

- Remind Tony Bartol he promised to send me his beginning check list for the project manager. He is interested in check lists of mechanical items to work on.

- Need to write case studies taken from various participant points of view. This might be an excellent opportunity to make projections into other people's minds as to how they handle situations.

- Find out who my contacts at Kohler should be for ongoing interchange of infromation.

Kohler claim avoidance notebook index

Kohler construction claim avoidance seminar, Kohler, Wisconsin - February, 1989

Kohler claim avoidance notebook index

Section #1

Introduction to Design & Construction Claim Avoidance

Ralph J. Stephenson PE PC
Consulting Engineer

THINKING PATTERNS

Why plan?....................................to evaluate!

Why translate?...........................to communicate!

Why control?...............................to achieve!

Why correct?...............................to maintain!

Why learn?..................................to improve!

An overview of the components of importance in design and construction - ho 341

By Ralph J. Stephenson PE PC

• Six major goals to meet for design & construction project success

The client, owner & user must be assured upon completion of his job that:

1. The facility program and the facility design have met their needs, desires and wishes.

2. The planning, design and construction work on the project has been accomplished within the time and cost structure required and desired.

3. All relationships on the project have been maintained at a high technical and professional level, and have proven rewarding for those involved and affected.

4. The people involved at all levels of work on the job have realized a financial, professional and technical profit for themselves and their associates by being on the project.

5. The project has been closed out with little or no residual potential for major problems of maintenance or operation.

6. The entire process has been free of unresolved contested claims for additional money, additional time, damage payments, and of the potential for future financial demands after the job has been closed out.

• Nine major elements in the design & construction sequence & how they are done

1. **Conceive the basic project**
   Visualize and state the fundamental nature of the proposed project, what purpose it is to serve, and its base characteristics.
2. **Prepare the program**
   Set down the physical characteristics of the total project in written and graphic form so as to be able to translate these characteristics into approval documents from which the full design can proceed.

3. **Articulate the program for approval**
   Merge the concept, and the written and graphic program into written and graphic construction language which can be reviewed and released by the ultimate decision makers for full design.
4. **Approve the basic project**
   Approve the concept, the program, and the merging of the two. This approval by those in authority initiates the full design and construction process
5. **Design the project**
   Prepare full contract documents for construction use.
6. **Construct the project**
   Build the project and make it ready for turnover to the owner or user.
7. **Turn over the project**
   Release the constructed project to the owner or user with full documentation needed to operated and maintain the completed environment.
8. **Operate the project**
   Take over, run in, and make the new environment fully operational.
9. **Maintain the project**
   Keep the new environment in proper operating condition by a well conceived and effectively managed maintenance effort.

• Five major participants in the design & construction process

1. **Conceiver - The ultimate decision making force behind the entire program**
2. **Translators - The parties that translate the project concept into construction documents**
3. **Constructors - Those who build the project**
4. **Operators - Those who operate the completed project**
5. **Regulators - Those who help assure project adherence to the cause of public good**

• Ten major types of design & construction problems

1. **Constructive acceleration**
   An action by a party to the contract that forces more work to be done with no time extension, or the same amount of work and a shorter period of time in which to do it.

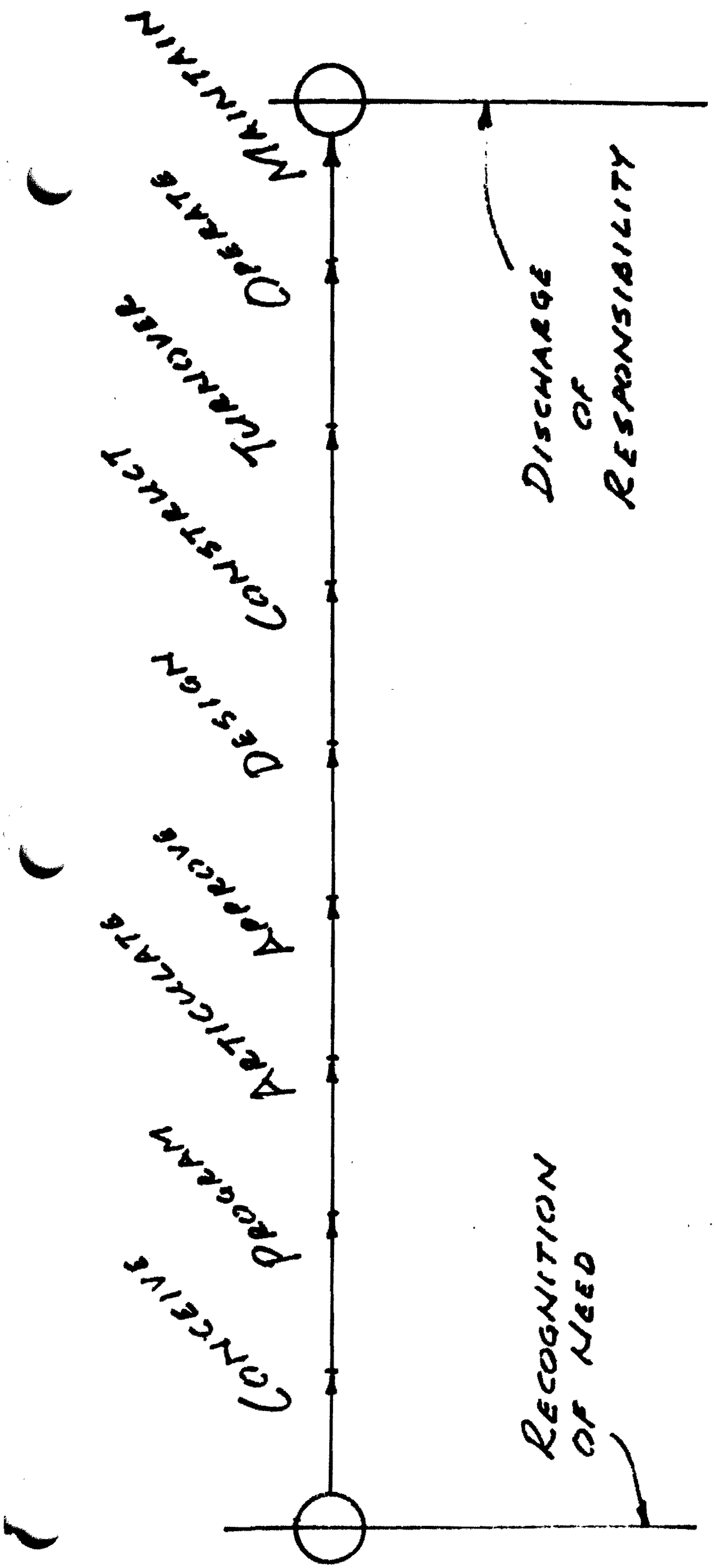
2. **Constructive change**
   A construction action or inaction by a party to the contract that has the same effect as a written order.
3. **Defective or deficient contract documents**
   Contract documents which do not adequately portray the true contract scope.
4. **Delay**
   A situation, beyond the control and not the fault of a contract party, that causes a delay to the project
5. **Differing site condition**
   A situation in which the actual conditions at the site of a project differs from those represented on the contract documents, or from reasonable expectations of a site in that area.
6. **Directed change**
   A legitimate change within the contract scope for which the owner is obligated to pay.
7. **Impossiblity of performance**
   A situation in which it is impossible to carry out the work within the contract requirements.
8. **Maladministration**
   The interference of one contract party with another contract party, that prevents ~~causes~~ the latter party ~~to~~ from enjoying least cost performance within the contract provisions.
9. **Superior knowledge**
   The witholding of knowledge by one party to a contract from another party to the contract during the precontract period, and that, subsequent to contract execution, adversely affects the second party's construction operations in matters of importance.
10. **Termination**
    Dismissal of a party to the project contract for convenience or default.

11. Vendor, selection prohibition

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER

D.S. 2/4/72

LINE OF ACTION



ELEMENTS OF THE LINE OF ACTION

The line of action is a simple statement of the range of tasks necessary to conceive, design, build and operate an environment. The line begins at a point referred to as the recognition of need with these actions following:

- Conceive
- Program
- Articulate
- Approve
- Design
- Construct
- Turnover
- Operate
- Maintain

These all culminate at an end point called discharge of environmental design and construction responsibility. A brief description of each step is appropriate in understanding their importance to the total design and build concept.

Recognition of need is the point at which a requirement for a new environment is first felt. The good design build operation tries to become involved in this creative stage. There is a danger of getting in too early and giving away so much of the early work that the job may be lost through over-exposure at a later date. However, recognition of needs is the starting point and the sales activity starts here. Taking the points in order -

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

Program - During the programming phase, the needs of the concept are put into easily understood tabular form so many square feet for storage, so many square feet for office, so much height for shipping facilities, etc. The actual physical demands of the environment are set forth in the project program or project bible.

Articulate - Now the concept and program are combined into preliminary construction language. Floor plans are drawn in accordance with requirements. The functional arrangement is shown in accordance with the project bible. Materials are called out in terms of the demands of the concept.

Approve - This is a critical point in the line of action. By now sufficient work has taken place so the manager can understand the project and say: "I like this or I don't; change this, revise this; let's increase that a bit; let's cut down here." Finally saying: "OK, I'm satisfied with this set of ideas showing the concept and the program - let's move on!" Approval unlocks the design and construction period.

Design - In the design phase, products of the previous four steps are utilized concurrently to prepare a set of working drawings and specifications that translate concept into steel, concrete and space.

Construct - Next, the actual environment is built. Construction is the first point where something major and tangible happens as a result of the concept.

Turnover - When the project has been built, it is turned over with the appropriate operating manuals to the owner or tenant. Turnover is an important step since if done properly it insures that a valuable commodity, the completed environment, is properly given to those who must use it.

Neglect of good turnover procedures is often the cause of serious callback problems. We certainly wouldn't turn a complex piece of machinery over to

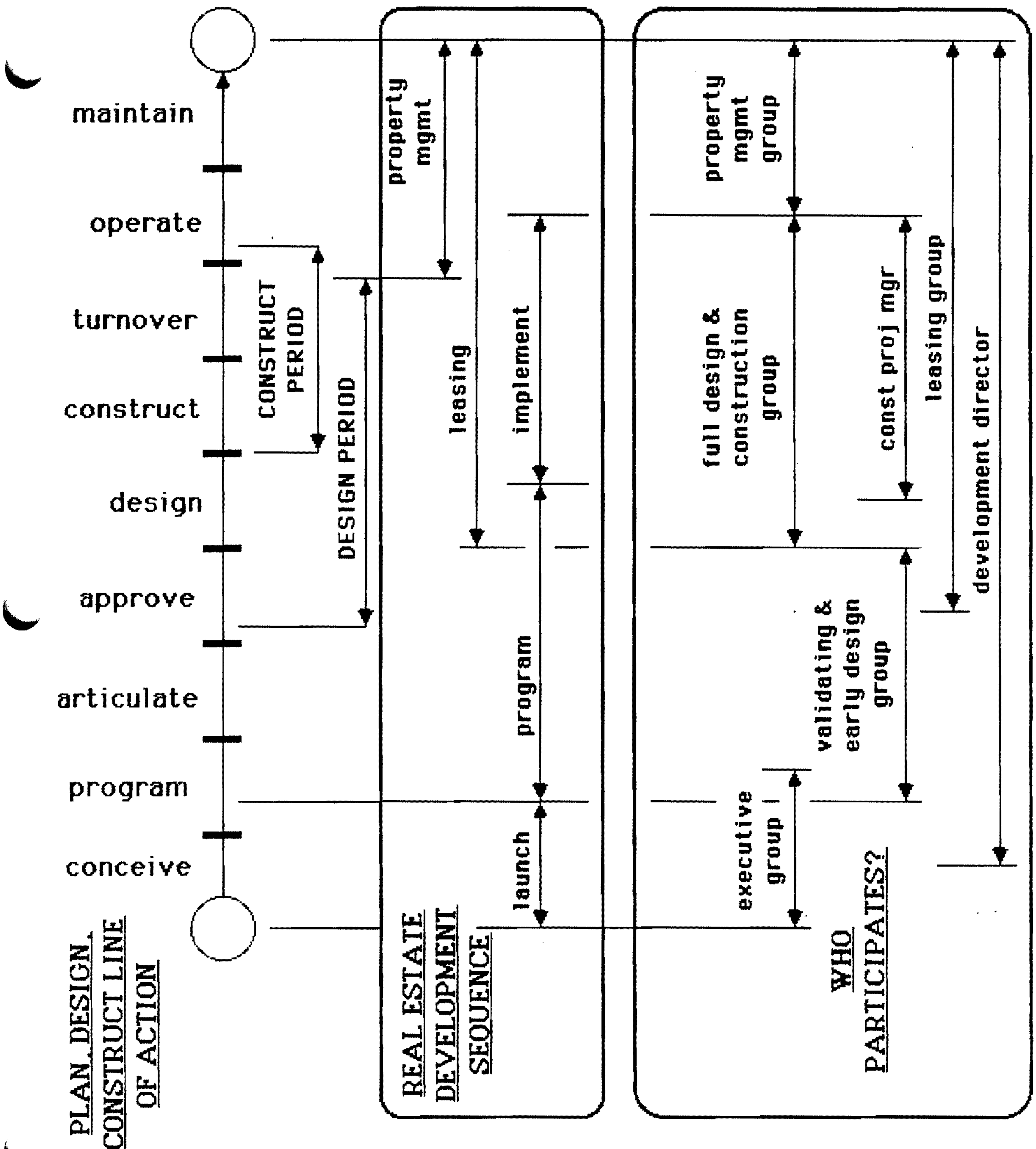
Turnover - (Continued)

an amateur operator and expect he would make it perform 100% right from the start. Neither should we assume that an owner can take a new environment that has just been built for him and immediately operate it at full efficiency. Time should be spent during turnover to explain how this environment is to function.

Operate - The environment is now run-in and begins to achieve its full purpose. Operation can be an important responsibility although the design/build contractor should furnish his operational functions in connection with a new environment only on a paid contract arrangement and provided he is competent to operate the facility.

Maintain - Maintenance of the physical environment is the door opener for future projects. It also assures that the environment that has been nursed through the previous eight stages will be maintained correctly so as to work at its best for those who must use it. The maintenance contract is perhaps one of the least explored areas in the more sophisticated approaches to environmental design and construction.

The end of the line of action is when the designer and builder of environments has discharged his responsibilities. In a continuing trustworthy relationship, the line of action will have no end since before it is finished, a competent professional will be re-involved in another program at its beginning.



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DEVELOPMENT CYCLE ACTIONS & ORGANIZATION Oct, 1988 - ho321

Phase A - Launching a project

The launch phase of the work is concerned primarily with locating & nuturing development opportunities or assets intended for long-term ownership and use. If the company's desire is to create negotiable development assets, the launch group works on the front edge of this effort. The launch group may call upon other functional elements of the organization as needed but the launch group must be independently creative, flexible, knowledgable & understand and enjoy the development process.

The launch group is headed by the chief operating officer of the firm. Upper management members in charge of the other functional elements are members of his launch group. They are charged with locating high potential project opportunities, and screening and profiling them so as to maintain a high percentage of success probability.

The launch group should be relatively unstructured but must maintain a rigorous discipline relative to communication with others in Element A as well as those in their specific area of functional responsibility.

In addition, members of Element A are responsible for maintaining meticulous documentation of opportunities and related action.

Phase B - Developing the project program

The project program staff works closely with the launch group to take over the created and profiled opportunity and substantiate its validity, or justify its rejection. The programming group's job is to bridge the gap between the free wheeling creative actions necessary in the launch action and the project implementation action. They often are the cool voice of business reason.

It is critical to understand that the program phase is where development funds are actually committed. These funds are then spent during another phase. Thus projects that emerge from the program analysis must be those with the highest probability of success.

In a sense the program function forces the project to prove itself as a feasible course of action to produce a negotiable development, or a long-term ownership asset.

Where deficiencies are located in a created opportunity, but there appears to be some soundness to the project, the program function is responsible for effecting acceptable changes to the elements that are their responsibility so as to make the project a go!

In this sense the program group must be every bit as creative as is the launch group.

Phase C - Implementing the project

During the project implementation period the specific contract documentation is produced and the project is built, leased and occupied. In essence, the majority of the funds commited to the project during the launch and program phases are actually spent on design and construction during implementation.

Leasing during project implementation is basically rental work taking place that allows tenant improvements to proceed concurrently, sequentially and in harmony with owner work.

The project implementation staff also carries out major remodeling work to existing properties as compared to minor improvements made by the properties staff. Decisions on what is a major & minor project must be arrived at jointly by the functional groups with the aid of the executive staff.

Phase D - Managing improved properties

The property management group actually exerts management control over improved properties to insure they are successful investments. The property management staff is also responsible for continuous evaluation of each property to determine the best future course of action relative to that property at any given time.

Minor improvements to existing properties in the portfolio are the responsibility of the property management group. Property management determines the scope of work, arrange for the design and construction, and see that the necessary field work is done.

Phase E - Maintaining the ongoing organization

The ongoing organization is an essential supportive staff designed to permit effective functioning of project oriented elements of the organization. It is a relatively high overhead operation built to serve operations.

In a project oriented firm the individual programs or projects drive the company; as such the support or ongoing group must be kept lean but be given all the tools needed to properly buttress line activities.

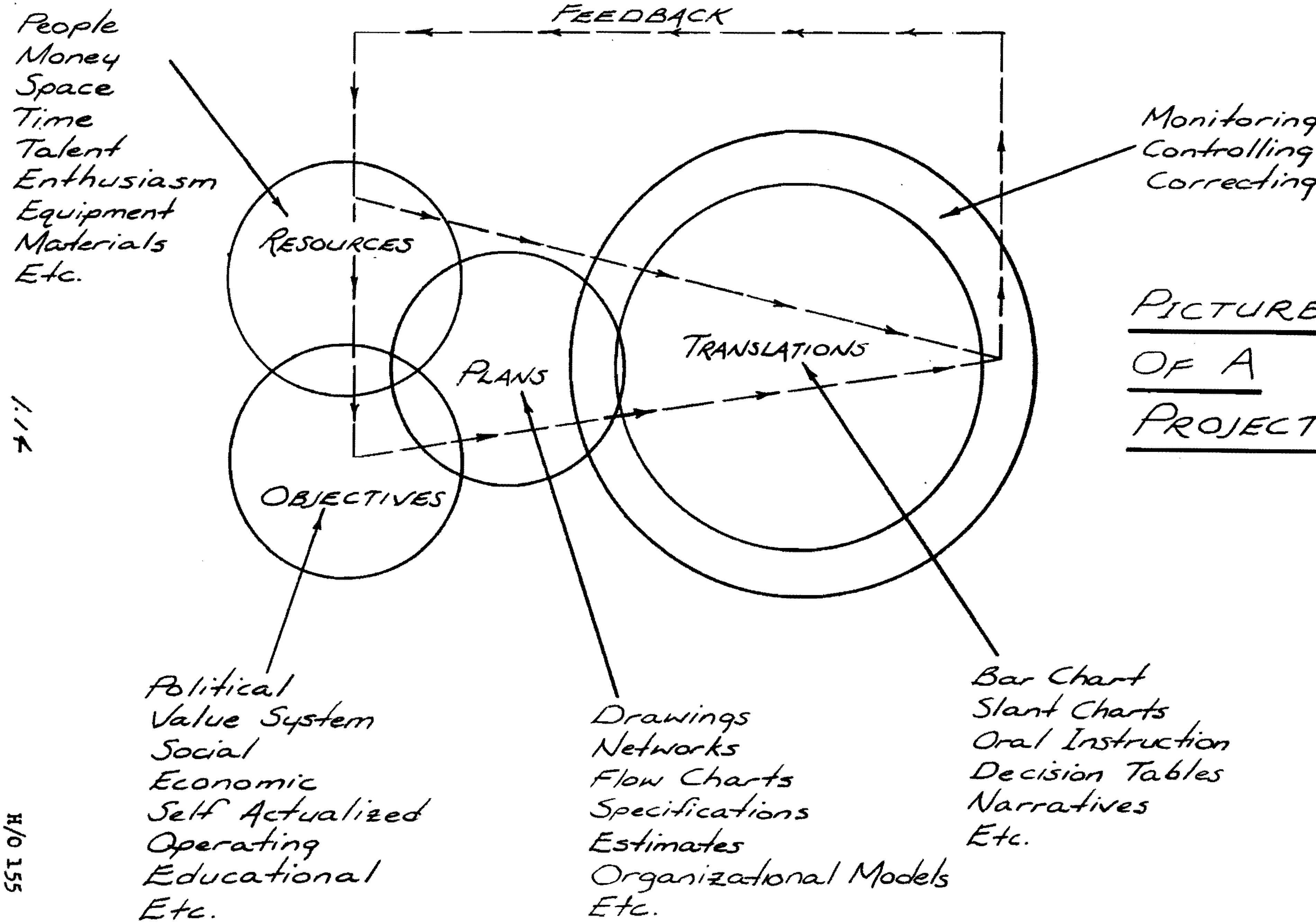
Phase F - Leasing the asset

Leasing of an asset usually signals the start of income flow which can be used to retire outstanding indebtedness. Many of the actions of the leasing program are accomplished in close cooperation with work accomplished in Elements B, C & D. However, final responsibility for leasing results rests with the leasing department and those charged with its managment.

The leasing program usually includes both lease negotiations, and design and construction of the tenant space within the tenant's demised premises.

Tenant design and construction is usually carried out at a different pace than the base or landlord design and construction. For this reason the design and construction of the space may be assigned to a tenant coordinator who acts as the project manager for the tenant space work.

PICTURE OF A PROJECT



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Summary of the Nine Master Keys of Management

(Adapted from the Nine Master Keys of Management by Lester R. Bittel)

Three requirements of the good manager

A. Acquire a discerning (unique) point of view

B. Follow an effective mode of action

C. Employ a sensitive touch in interpersonal relationships

A Discerning Point of View

Action #1 - Apply situational thinking	Result #1 - Your decisions will be more objective and less impulsive
Action #2 - Identify vital targets	Result #2 - You'll quickly recognize turning points in critical situations
Action #3 - Prepare for the probable	Result #3 - You'll be less flappable in difficult situations

An Effective Mode of Action

Action #4 - Focus on performance criteria	Result #4 - You'll better satisfy yourself and your superiors
Action #5 - Act from a plan	Result #5 - You'll be able to get projects under way quickly and with certainty
Action #6 - Manage by exception	Result #6 - You'll accomplish more work than you ever thought possible

A Feeling for People

Action #7 - Develop your confidence in others	Result #7 - You'll find that people cooperate more freely
Action #8 - Employ the power of training	Result #8 - You'll find that employee attitudes improve
Action #9 - Know your true self	Result #9 - When you truly comprehend your whole self you'll find people responding to your ideas more directly and often more favorably

Remember: If you don't care who gets the credit, you can accomplish anything.

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THE NEED FOR PROFIT

A. KINDS OF PROFIT

1. Financial
2. Social
3. Self actualization
4. Value system
5. Technical
6. Enjoyment
7. Educational

B. ELEMENTS OF MULTI VALUE COMPETITION

1. Competence
2. Service
3. Integrity
4. Cost
5. Delivery
6. Understanding

C. HOW DO WE ACHIEVE PROFIT - TRUE PROFIT ?

1. Be smarter
2. Plan better
3. Control closer
4. Achieve more

& profits will be automatic!

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WHAT FACTORS INFLUENCE PROFIT?

Business Volume

Field Efficiency (Effectiveness)

Office Efficiency (Effectiveness)

Executive Competence

Executive Interest

Diversity of Operation (Hedging)

Types of Contracts

Quality of Estimating

Unit Costs

Area Work Volume

Season of Year

Local Economy

National Economy

Governmental Policies

Caliber of Participating Contractors

Caliber of Competing Contractors

Caliber of Suppliers

Delivery Dates

Amount of Warranty Work

Caliber of Owner or Client

Type of Project

Size of Project

Quality of Dwgs & Specs

Location

Labor Relations

Caliber of Field Managers

Expediting Effectiveness

Project Planning

Project Scheduling

Withheld Amounts

Availability of Labor

Billing Procedures

Inventory Practices

Internal Education

Internal Training

Type of Business

Experience

Reputation

Staff Honesty

Caliber of Purchasing Skills

Profiling Procedures

Organizational Plans

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PROFIT POTENTIAL LEVELS

LEVEL 1 - INCLUDE EVERYTHING

LEVEL 2 - PREPARE A GOOD WORK PLAN

LEVEL 3 - PREPARE A GOOD SCHEDULE

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Notes on forerunner & conservatively managed companies

• What are alternative names to forerunner and conservative managed companies? - Proactive & reactive, positive & negative, front & back, do & wait, high risk & low risk, maximum & minimum, go & no go, try & no try, run & walk

• The forerunner managed company tries to optimize the probability of being right

• The conservatively managed company tries to minimize the probability of being wrong

• It is critical to understand that both types of companies can be and often are successful or unsuccessful. The style of forerunner/conservative is merely an indication of the way the organization achieves success or goes through the twinges of failure.

• The principal characteristics of the forerunner vs the conservative company are

Forerunner

Aggressive in their field of work
Young
High risk takers
High leveraging of resources (not necessarily financial)
Good morale
General absence of recognizable management structure
Healthy cooperation among lower management
Strong competitive drive at all levels of management
Strong sense of total purpose
- Financial - roi?

- Social obligation
- Professional integrity
- Technical excellence

Provision of sense of worth to projects
Provision of sense of exciting flux to staff
Exciting environment
Constant forging ahead in their business arena
Desire & ability to adapt to change
Desire & ability to institute change
Desire & ability to accommodate change
Medium to low levels of incompetence tolerance
Strong leaning toward high individual performance levels

Conservative

Usually well managed from top down
Moderately well managed from bottom up
Tends toward paternalistic management
Major decision making centered in top management
Good financial strength, if mature
Dependable
Predictable
Closely controlled employee training
Modest salary structure
Good standard employee financial benefits
Usually stress hygiene as opposed to motivational drive
High levels of employee loyalty in those who like the system

Section #2

Project Delivery Systems

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NINE MAJOR STEPS TO EFFECTIVE PROJECT MANAGEMENT

DEFINITIONS

• PROJECT - A set of work actions having identifiable objectives, and a beginning and an end.

• EFFECTIVE - Of a nature that achieves identifiable goals and objectives in accordance with an action plan, and reaches worthwhile peripheral goals through intermediate accomplishments.

• MANAGEMENT - The identification, assembly and direction of resources to achieve desired results.

QUESTION AND ANSWERS ABOUT PROJECT MANAGEMENT

• What is different about project organization compared to functional organization?

1. Project organization is usually temporary.

2. Project organization is usually based on a different rationale than is functional organization.

3. Project authority positions tend to be vested first and earned later.

• How is a project effectively managed?

A good project seems to require nine major steps, done well, to be successful.

1. Goals and objectives for the project are clearly identified, and starting, intermediate and ending measuring points established early in the project life.

2. A suitable project delivery system is selected as the goals & objectives are defined.

3. An action plan showing desired and necessary courses of action from beginning to end of the project is prepared.

4. The action plan is translated into schedules, and the resources needed are determined and balanced for most profitable performance.

5. A project organization is built under (not over) the resources required to give resource management quality, continuity, and monitorbility.

6. A method of isolating, identifying and correcting deviations from desired performance standards is designed and put into action.

7. The needed resources are assembled and the project team gets to work.

8. Progress and performance of the team is measured and evaluated using management by exception.

9. The project is closed out promptly, cleanly, and totally as work draws to a close.

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PROJECT DELIVERY SYSTEMS & THEIR USERS

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

THOSE WHO USE PROJECT DELIVERY SYSTEMS & INFLUENCE THE SELECTION OF THE SYSTEM

Conceiver - the ultimate decision making force behind the entire project
- Developer
- Owner
- User

Translator - transfers the concept into construction documents
- Programmer
- Designer
- Manufacturer
- Vendor
- Contractor

Constructor - builds the components and the job
- Manufacturer
- Vendor
- Specialty contractor
- General contractor
- Construction manager

Operator - operates the completed project
- Facilities planning
- Operation management
- Plant engineering
- Manufacturing engineering

Regulator - insures project adherence to the public good
- Private
- Public
- Quasi public

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TRADITIONAL PROJECT DELIVERY SYSTEM CHARACTERISTICS

1. Checks and balances normally built in from start

2. Construction decisions usually based on capital costs

3. Participant selection often made by cost competitive bidding

4. Job control is highly centralized in most stages

5. Project usually being built for owner/users

6. Contract documents completed before bidding

7. Bidder selected from short list derived from long list (occasionally use long list)

8. Bonding is often required

9. Site preparation and expense work often by owner before construction starts

Note - Expense work includes those costs that do not directly increase life or value of the facility.

10. Majority of attention given to the need and want list. Wish list usually considered a luxury.

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NON TRADITIONAL PROJECT DELIVERY SYSTEM CHARACTERISTICS

1. Checks and balances evolve as project proceeds and when need arises.

2. Construction decisions based on capital costs, maintenance costs, operating costs, project quality desired, and desired investment return.

3. Lead participant selection made on professional and technical abilities, and on reputation and past performance, along with cost as a secondary consideration.

4. Job control somewhat decentralized during early program and design stages with progressive centralization as the working document and construction phases are approached.

5. Project could be for a variety of conceivers and prime movers including owners, users, investors, developers, funds, syndicates, governmental agencies (privatization), and groups assembling capital to gain desired returns on investment.

6. Construction is often closely dovetailed with design of the project. Design usually proceeds with construction guidance, and advice from a construction discipline.

7. Capital cost is often negotiated from the pro forma base and reduced in stages to a guaranteed maximum price (gmp).

8. Need for bonding is usually minimized or eliminated by careful selection procedures to maximize

probability of success.

9. Site preparation and expense work often done by various members of the selected project or program team.

   Note - Expense work includes those costs that do not directly increase life or value of the facility.

10. Design and construction is heavily influenced by consideration of the needs, wants and wishes of the participants.

Project Management

Functional Management	Project A	Project B	Project C	Project D	Project E	Project F	
	A	B	C	D	E	F	Remarks
1. Data Processing							
2. Proposal Engineering							
3. Purchasing							
4. Engineering							
5. Sales & Marketing							
6. Manufacturing							
7. Service							

PROJECT/FUNCTIONAL MANAGEMENT MATRIX

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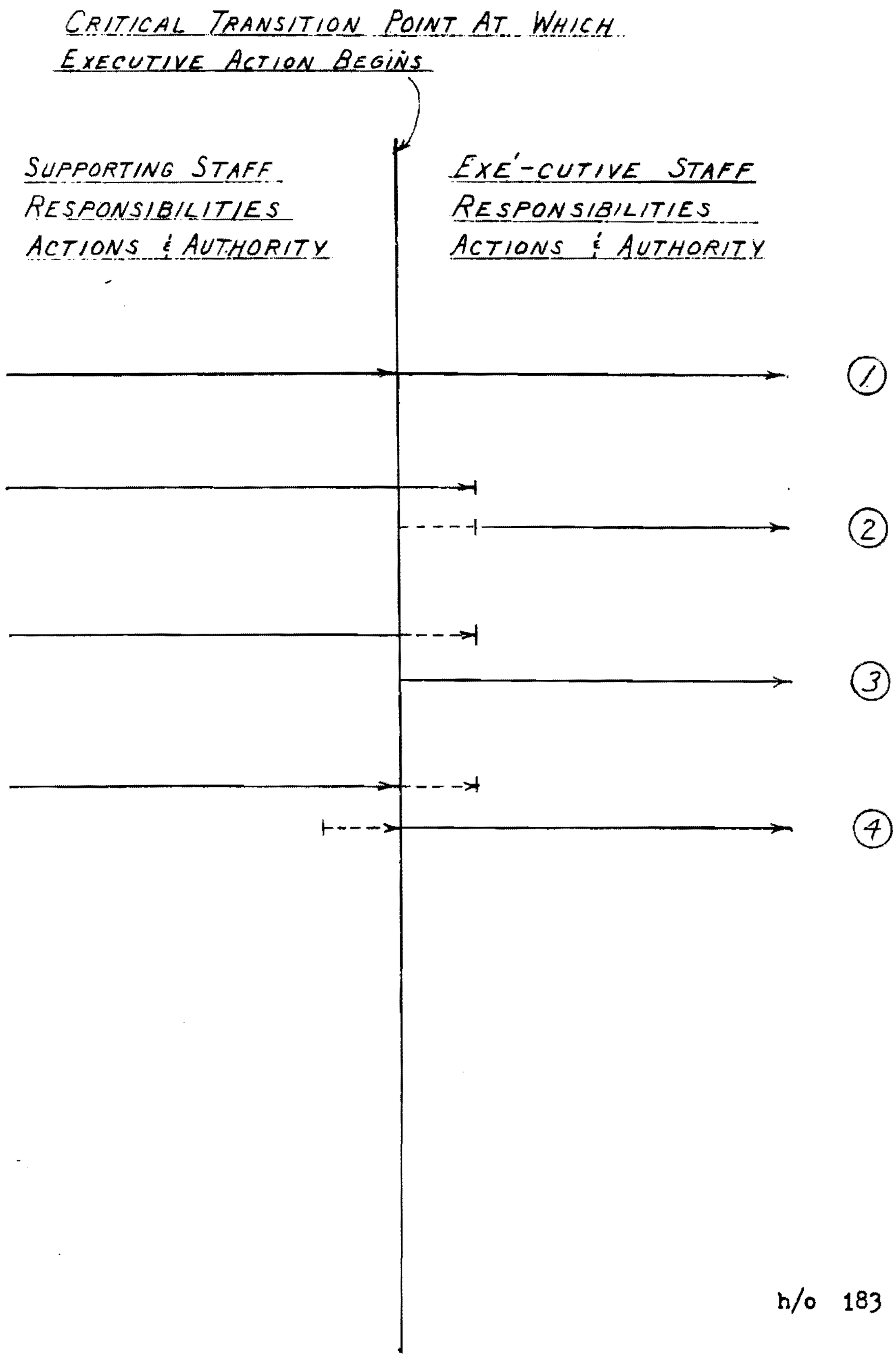

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Characteristics of a Contract

A. Quality of Arrangements Possible

1. Negotiated - value competition only
2. Qualified - limited multiple - value competition possible
3. Unqualified - single value competition demanded

B. Services & Materials Provided

1. Provide all labor, material and management
2. Provide some labor, material and management
3. Provide management only
4. Provide material only
5. Provide labor only

→ a. Limited trades
→ b. All trades

C. Type of Contract Possible

1. Fixed cost - limited trades
2. Fixed cost - all trades
3. Fixed cost - limited trades plus fee for other trades management
4. Time and material plus fee - limited trades
5. Time and material plus fee - all trades

→ a. With upset price
→ b. With upset price and shared saving
→ c. With no upset price

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Exhibit 3
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Goals & Objectives Definition

•Goals •Objectives	•End •Intermediate •Peripheral	•direct •dependent - predictable •dependent - unpredictable

Definitions

- Goals - Unquantified targets to be achieved
- Objectives - Quantified goals to be achieved
- End - Goals & objectives realized upon completion of the project or program
- Intermediate - Goals & objectives achieved at specific points prior to completion of the project or program
- Peripheral - Goals & objectives achieved on an ongoing basis during the project - often are personal, professional, technical, financial or social
- Direct - Goals & objectives to be achieved by internal direct influences
- Dependent - Goals & objectives affecting the project but to be achieved by external influences - usually are predictable or unpredictable

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Setting goals & objectives

To effectively manage a project you must know what is to have been accomplished when the job is complete. The action steps to define these needs are simple. Writing them is not.

Some brief guidelines to identifying and writing out project goals and objectives are given below:

Step 1.
Answer this question - "What is the most important result to be achieved by this project being successfully completed?" Write down your response.

This statement becomes your project mission from which sub goals and objectives can be generated.

Step 2.
Decide upon and write down the major activity classifications within which you wish to achieve the mission stated in Step 1. Possible classifications for subgoal definition in project management might be:

- Company
- Profit
- Individual
- Social
- Financial
- Community
- Technical
- Professional
- Educational
- Personal
- Career
- Organizational

Step 3.
Select the classifications you feel most comfortable with, and write down one or two statements of what you want to achieve within these

categories of activity. Don't think too much about numbers and time frames yet. At this point in defining goals and objectives definition concentrate on getting good content in each statement.

Step 4.
When you have written out as many objectives that you wish or must achieve and that you can comfortably think of, reorganize them into a classification system suited for the project you are on.

Remember every project has many unique goals and objectives to achieve. You are trying to define what they are for your project.

Step 5.
Once you have a list you are satisfied with, begin assigning quantities to the goals in the list. Quantities may be in dollars, manpower, time or space. This is the quantification step that converts non numerical goals to numerical objectives. It is the step you must take to go from wish to reality. Converting goals to objectives is essential for effective project management.

Step 6.
When you have enough quantified goals, or objectives, to satisfy your initial needs, stop defining your goals for a while and concentrate on achieving what you have said your objectives demand you do now! Action is called for at this time.

Step 7.
As you put the goal achievement process into implementation keep adding goals and objectives to the list you have already prepared. Remember, your needs, and the project's needs change continually. In Step 1 you defined the fundamental project mission. Around this base the detailed goal & objective setting continues & often changes as the project unfolds.

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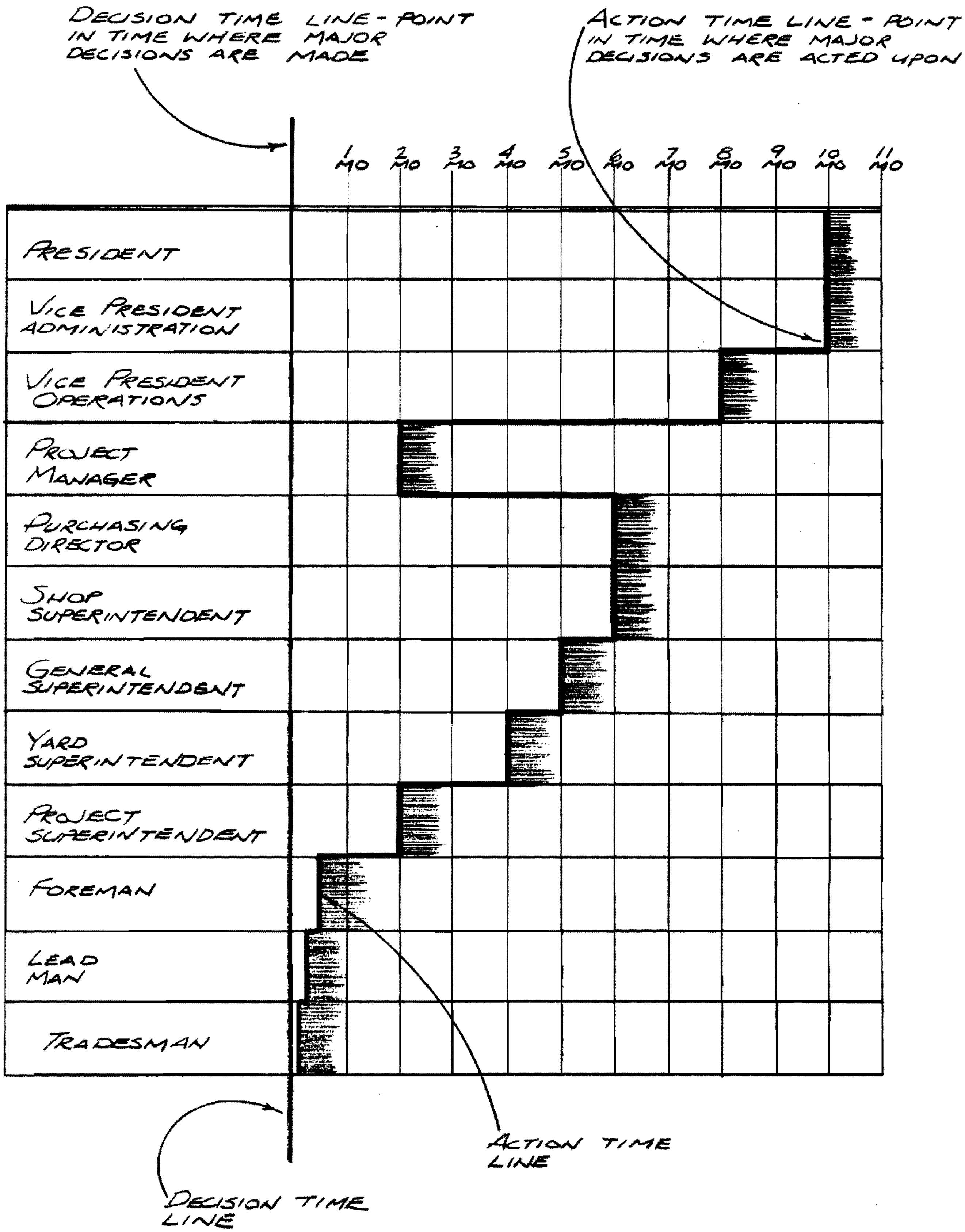
DECISION TO ACTION TIME SPAN



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Decision to action time span explanation

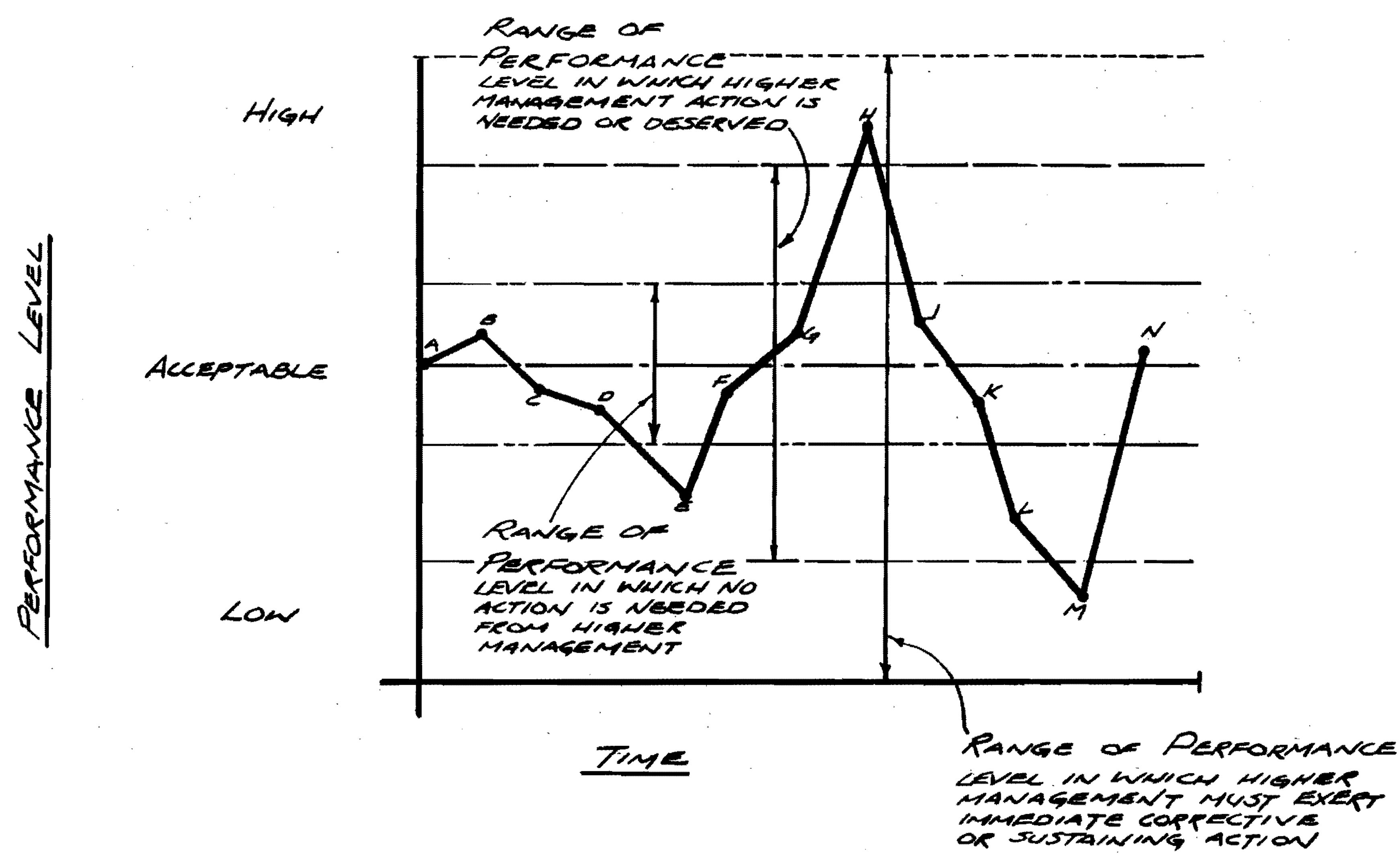
In a well managed company the decision making process should be spread over a proper time span as well as among the appropriate people and groups of people. A decision to action time span chart shows the time dimension between the point where a decision is made and where the decision is acted upon.

Who makes the decisions and who acts on them is another phase of management that is an integral part of the full decision making process. The handout shown here displays the decision maker role for a medium large company with several departments or divisions. Time spans for larger or smaller firms will vary from these. For example in a small construction company doing $15 million volume per year, the president's decision to action time span may only be 4 to 6 months. The variance is generally a function of the degree of involvement by the deciding individual or group.

Good grading of the decision to action time will help assure that the organization has assigned the responsibility for decision making at the proper management level. This assurance leads to proper assignment of tasks and operations at lower levels of management, and to identification of responsibility and matched authority.

In summary the benefits of preparing a decision to action analysis for your firm are:

1. Helps identify responsibility for short, medium and long range planning.
2. Encourages proper assignment of activities to those who are responsible for implementation of decisions
3. Helps identify the people and groups best equipped to make decisions and to implement the decisions
4. Forces careful evaluation of all time scale decisions by showing the time waste potential of a wrong decision
5. Makes all levels of mangement aware of their importance in executing decisions made at other management levels.



MANAGEMENT BY EXCEPTION (MX) AND PERFORMANCE LEVEL ACTIONS

MANAGE BY EXCEPTION

To manage by exception (MX) means to build and use an alarm system that goes off when something is wrong but otherwise remains silent.

A. MX provides management leverage
  1. MX payoff comes from forcing the manager to use forethought and self discipline
  2. Allows multiplying manager's energies and resources (the manager is a multiplier of the work of others)
  3. Allows use of input/output zones (modification of Pareto's Law)
    a. Zone 1 - A relatively small input of managerial resources gives control of a large part of the total results (critical zone for the manager)
    b. Zone 2 - A relatively large input contributes a small portion of the results (good delegation zone)
    c. Zone 3 -The zone where managerial input generates about the same corresponding amount of results (zero leverage, high frustration zone)

B. Examples of MX
  1. Thermostat
  2. Sprinkler system
  3. To do list
  4. Network model (CPM)

C. Questions to answer in MX
  1. What can I as a manager do that will contribute to achieving objectives? (planning)
  2. How can I determine if I am concentrating on the key items? (monitoring)
  3. What actions should I take to be most effective? (controlling and correcting)

D. Watch for the dangers in MX
  1. May encourage excessive conformity and misplaced self satisfaction
  2. May require excessive observation and data collection
  3. Tends to increase paper work
  4. If used incorrectly can give a false sense of security and well being
  5. Is silent only on items predetermined not to be critical. Conditions may change

E. The big advantage of MX is that much of the decision making is done in advance (much like a trouble shooter's manual, a decision tree or a decision table).

F. The manager must understand that once freed by a good MX system from the demands of routine work, he must fill his time with creative effort directed toward improving his plans, organization, staff and decisions.

G. MX is invaluable in detecting trends - movements toward or away from objectives.

H. Beware of overreaction to an MX alert. Remember MX is a tool of the manager, not the manager.

I. Four MX alert levels

1. No unusual difficulties - everything OK
2. Moderate deviations - the situation needs the manager's attention and analysis
3. Above average deviations - the performance is unacceptable and needs corrective action, or is excellent and may be desirable to sustain
4. Unusally large deviations - the performance is vitally disturbed or is so good as to demand investigation by the manager now

J. Methods of reporting with MX
1. Word of mouth
   a. Fast
   b. No record left
   c. Listener may appear to comprehend, but might not
2. Written
   a. Permanent record available
   b. Can be studied anytime
   c. Easily systematized
   d. Irregular reports may allow critical factors to go unnoticed
3. Charted
   a. Good for presentation to large numbers of people with limited amounts of time
   b. Subject to scale misinterpretation
   c. Requires special resources and talents to do well
4. Electronically reported
   a. Easily used on selective basis
   b. Data available quickly
   c. High processing error potential

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IDENTIFY VITAL TARGETS

Which inputs and outputs most affect the results, the conditions and the performance the manager wishes to achieve? In considering these questions the following should be kept in mind.

A. Rarely is more than one problem out of four worth other than a manager's fleeting glance.

B. The good manager must quickly identify where his efforts are going to do the most good.

C. The effective manager must understand Pareto's law - the principle of the vital few and the trivial many.

D. In general, fewer than one third of the people a manager supervises require more than two thirds of his time.

E. Managerial misteps resulting from not understanding the vital target concept include:
1. Following prejudices
2. Sticking with pat systems
3. Doing what is easiest
4. Playing hunches

F. How to pick the vital few
1. Prepare and use to do lists
2. Set priorities
3. Use a rating system
4. Identify the critical tasks in a plan of action

G. Moving from a situational view (macro) to the vital few (micro)

H. What to do with the trivial many
1. Delegate
2. Defer (How long?)

Section #3

Design & Construction Planning

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JOB PLANNING - WHAT IS IT ?

1. PLANNING is to formulate a sequence of actions leading to an end goal.

2. NETWORK PLANNING is to graphically depict this sequence of action.

3. CRITICAL PATH PLANNING is a technique of establishing resource limits on each plan component.

PLAN VISIBLY !

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ADVANTAGES OF GOOD PLANNING

1. Provides accurate simulation of the project.

2. Provides early statement of intent.

3. Encourages good communication on the project.

4. Provides management by exception potential.

5. Allows accurate tracking of project progress.

6. Allows accurate performance evaluation.

7. Provides accurate project history.

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Act From A Plan

- If you can't plan it, you can't manage it.
  - Good plans shape good decisions.

A. **Five essential planning questions for the manager to ask and have answered.**

1. What?
2. Where?
3. When?
4. How?
5. Who?

B. **Essential planning actions for the manager to take**

1. Set goals, objectives, and a project delivery system
2. Prepare, approve and translate an action plan
3. Organize, assemble resources and set project systems
4. Do the job

C. **Set goals, objectives and a project delivery system**

1. Definitions
   a. Goals - targets, desires, wishes and aims expressed without quantification
   b. Objectives - Expressed goals which have been quantified
2. Be specific when setting objectives - projects are objective oriented
3. Set objectives so that movement toward their achievement can be measured

D. **Prepare, have approved and translate an action plan**

1. May be mental, verbal, text written or graphic
2. May be strategic or tactical, summary or tactical

3. May be short, medium or long range (the manager must set the time scale)
    a. The shorter the time interval covered by the plan, the greater is the chance the plan will succeed. However, the shorter the time interval covered, the greater is the probability that longer range needs, which truly measure the manager's effectiveness, will remain unmet
    b. The higher you are in the management structure, the larger and longer are the planning scales you must use (the higher you are the further you are expected to see)
4. A good manager <u>plans the work and then works the plan</u>

E. Organize, assemble the resources, set the project systems & do the job

1. Build plans based on optimum integration of management viewpoints
2. Define relationships through functional diagraming of interconnections
    a. Formal
    b. Informal
    c. Reporting
    d. Staff
    e. Temporary
3. Make clear cut assignments
    a. The manager should not assume a person will automatically know his full pattern of responsibilities.
    b. Don't leave definition of authority and responsibility to chance. Be specific.
4. Build a feedback system
    a. Organizational grapevines are often used for informal feedback
    b. Formal feedback systems should be built by specific assignment (must have a standard of project performance defined before a formal feedback system can be put in place)
5. Keep organization goal and objective oriented
    a. Keep organization lean - avoid unnecessary staffing

b. Provide delegation and training opportunities
c. Tend to build around objectives and needs rather than people (there are major exceptions to this - distinguish these early)
d. Provide for proper grading of decision to action time spans

F. Common planning failures

1. Not touching all organizational and management bases - use the what, where, when, how and who system
2. Committing to too many objectives at one time
3. Underestimating the value and need for good forward planning
4. Failing to challenge plans and actions at the right time
5. Not providing proper escape hatches, mouseholes and safeguards
6. Failure to encourage timely, knowledgeable staff participation
7. Failure to obtain higher level approvals of goals and objectives
8. Inadequate monitoring and control of costs, progress, documentation and resource allocation
9. Poor assignment of duties, authority, responsibilities and actions; and
10. <u>Failure to understand that planning is a major responsibility of the manager</u>

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CONSULTING ENGINEER

QUESTIONS TO BE ASKED

1) WHAT? -- What is the scope of the activity?
-- What is the standard of performance?
-- What are our objectives?
-- What are our goals?
-- What is needed to start?

2) WHERE? -- Where will the work take place?

3) WHEN? -- When does the work start?
-- When is the work supposed to finish?
-- When will the work be completed?

4) HOW? -- How do I know when the job is done?
-- How do I know if we've done a good job?
-- How do I get out of the job when it's done?

5) WHO'S? -- Who's responsible?
-- Who's in charge?
-- Who's doing the work?
-- Who's liable?
-- Who's in charge for my client?
-- Who's the ultimate decision maker? (UDM)

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CONSULTING ENGINEER

CPM EXERCISE #1

Project starts with task A.
D can be concurrent with A.
B must follow A and precede F.
C follows A.
E cannot begin until both C & D are complete.
F precedes G & H.
G Cannot begin until E is complete.
H, G, & I must precede J.
I follows E and precedes L.
K follows D.
L cannot begin until K is complete.
J & L must be complete before M can start.
N cannot start until L is complete.
O follows N.
P is the last task and can start only when M & O are complete.

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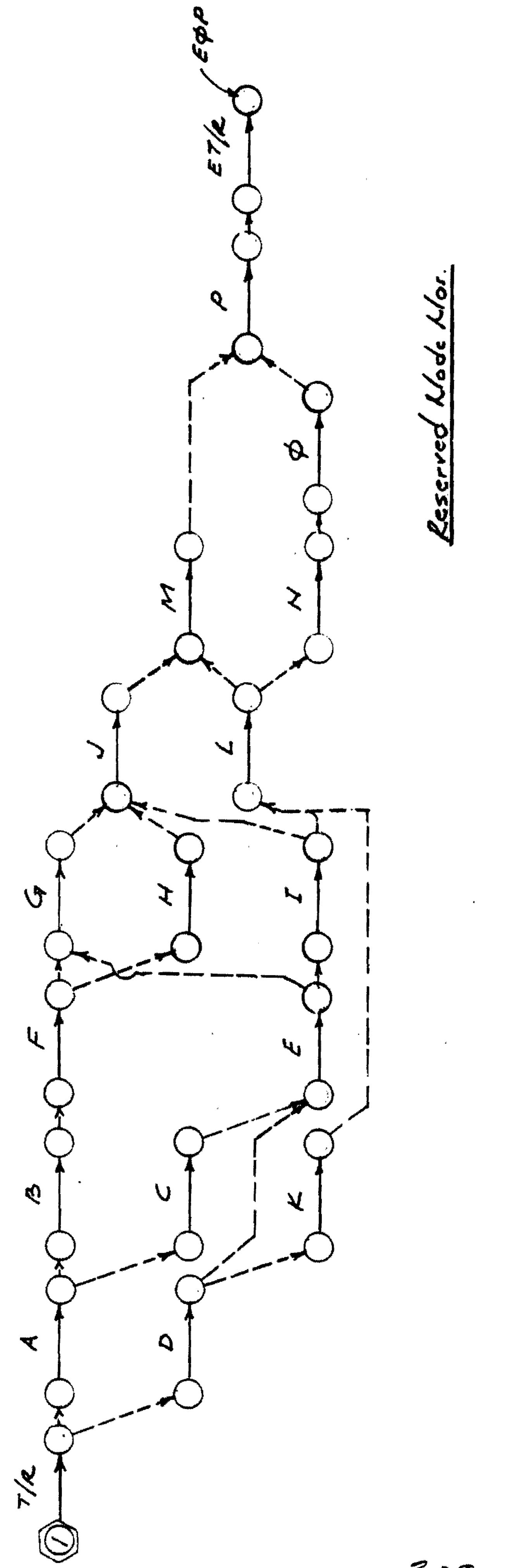

SOLUTION TO EXERCISE #1
ARROW DIAGRAM

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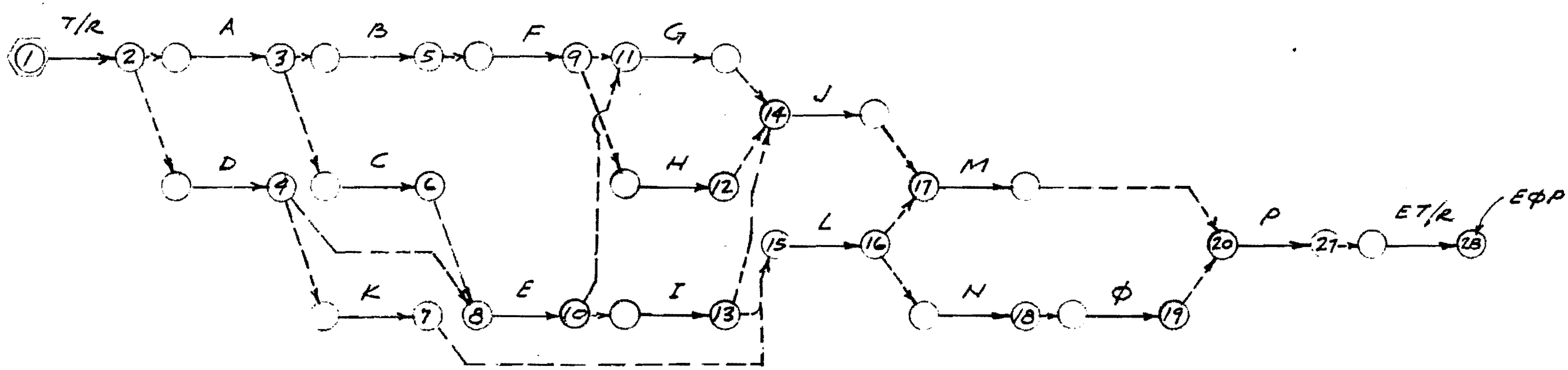
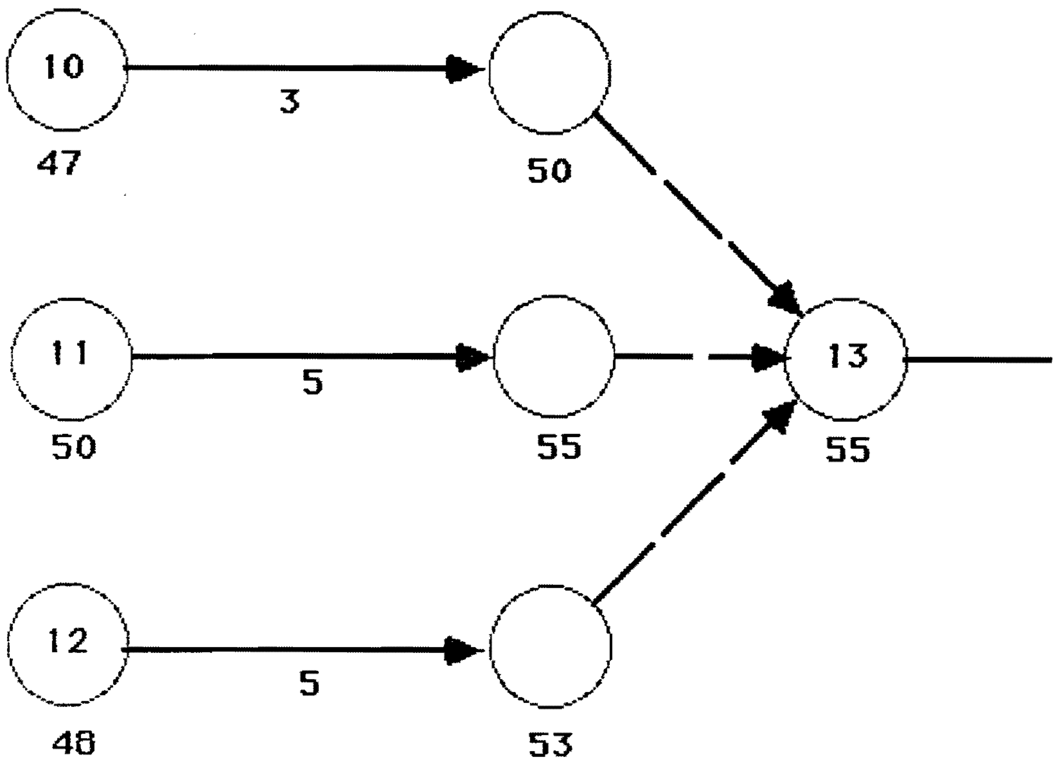


Reserved Node Nos.

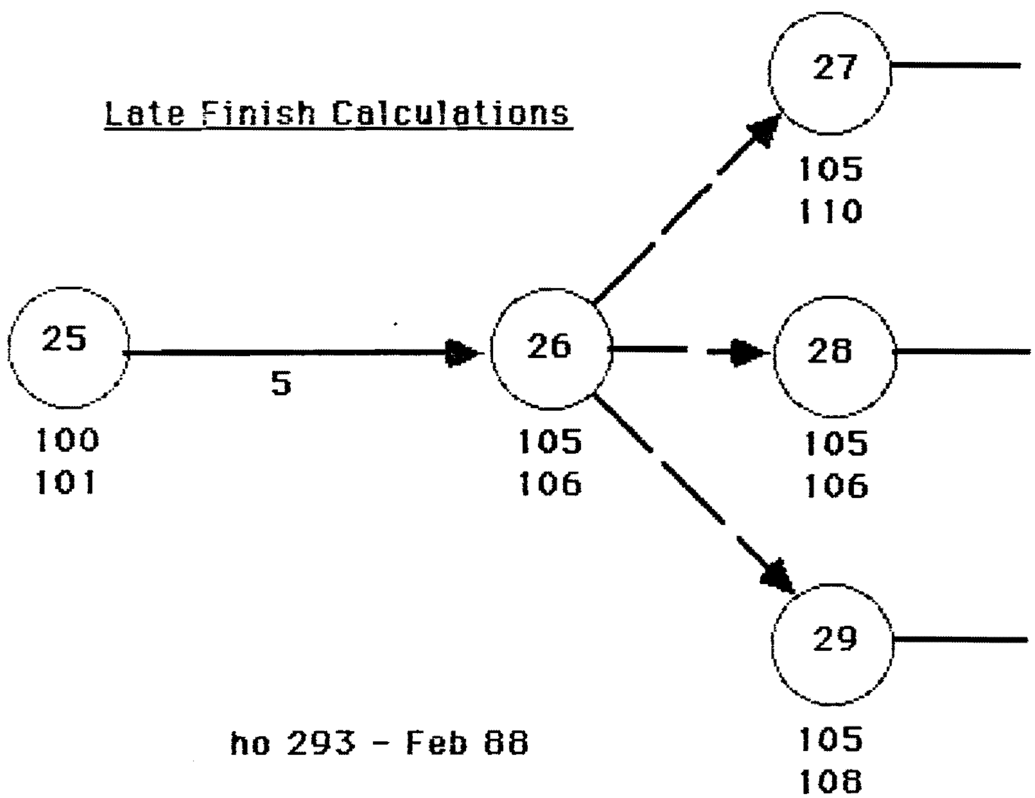
21	24
22	25
23	26

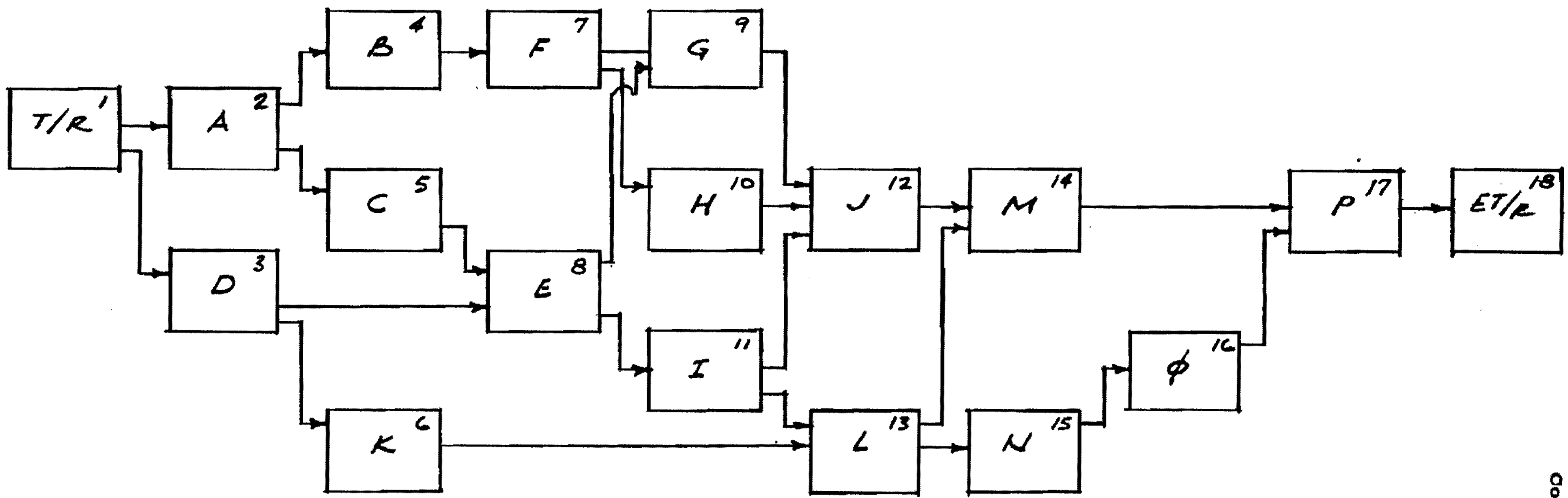
SOLUTION TO EXERCISE #1
ARROW DIAGRAM

Early Start Calculations



Late Finish Calculations





SOLUTION TO EXERCISE #1
PRECEDENCE DIAGRAM

Ralph J. Stephenson, P.E.
15064 Warwick Detroit, Mi. 48223
(313) 273 5026

2-yr. working calendar starting
JAN. 4. 1988

JAN 1988
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04 01
05 02
06 03
07 04
08 05
11 06
12 07
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14 09
15 10
18 11
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FEB
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26 40
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MAR
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03 44
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31 64
APR
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JUNE
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JULY
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AUG
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SEPT
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Ralph J. Stephenson, P.E.
15064 Warwick Detroit, Mi. 48223
(313) 273 5026

2-yr. WORKING CALENDAR STARTING
JAN. 4, 1988

JAN 1989

03	256
04	257
05	258
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FEB

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MAR

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APR

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MAY

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03	342
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JUNE

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JULY

03	384
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AUG

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SEPT

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OCT

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NOV

01	469
02	470
03	471
06	472
07	473
08	474
09	475
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Ralph J. Stephenson, P.E.
15064 Warwick Detroit, Mi. 48223 (313) 273 5026

4-yr. working day calendar starting Jan. 4, 1988

3.14

Date	W/D
JAN 1988	

04	01
05	02
06	03
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FEB	
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MAR	
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11	50
14	51

Date	W/D
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MAY	
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24	102

Date	W/D
25	103
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27	105
31	106
JUNE	
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07	111
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JULY	
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27	146
28	147
29	148
AUG	
01	149
02	150
03	151
04	152
05	153

Date	W/D
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SEPT	
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OCT	
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Date	W/D
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NOV	
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29	254
30	255

Ralph J. Stephenson, P.E.
15064 Warwick Detroit, Mi. 48223 (313) 273 5026
4-yr. working day calendar starting Jan. 4, 1988

Date	W/D
JAN 1989	

03	256
04	257
05	258
06	259
09	260
10	261
11	262
12	263
13	264
16	265
17	266
18	267
19	268
20	269
23	270
24	271
25	272
26	273
27	274
30	275
31	276
FEB	
01	277
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03	279
06	280
07	281
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14	286
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16	288
17	289
20	290
21	291
22	292
23	293
24	294
27	295
28	296
MAR	
01	297
02	298
03	299
06	300
07	301
08	302
09	303
10	304
13	305
14	306
15	307

Date	W/D
16	308
17	309
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21	311
22	312
23	313
24	314
27	315
28	316
29	317
30	318
31	319
APR	
03	320
04	321
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06	323
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27	338
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MAY	
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31	361

Date	W/D
JUNE	
01	362
02	363
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07	366
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JULY	
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AUG	
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Date	W/D
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SEPT	
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OCT	
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Date	W/D
NOV	
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DEC	
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Ralph J. Stephenson, P.E.
15064 Warwick Detroit, Mi. 48223 (313) 273 5026

4-yr. working day calendar starting Jan. 4, 1988

3/5

Date W/D	Date W/D	Date W/D	Date W/D	Date W/D
JAN 1990				
02 510				
03 511	15 562	25 613	07 663	18 714
04 512	16 563	29 614	08 664	19 715
05 513	19 564	30 615	09 665	22 716
08 514	20 565	31 616	10 666	23 717
09 515	21 566	JUNE	13 667	24 718
10 516	22 567	01 617	14 668	25 719
11 517	23 568	04 618	15 669	26 720
12 518	26 569	05 619	16 670	29 721
15 519	27 570	06 620	17 671	30 722
16 520	28 571	07 621	20 672	31 723
17 521	29 572	08 622	21 673	NOV
18 522	30 573	11 623	22 674	01 724
19 523	APR	12 624	23 675	02 725
22 524	02 574	13 625	24 676	05 726
23 525	03 575	14 626	27 677	06 727
24 526	04 576	15 627	28 678	07 728
25 527	05 577	18 628	29 679	08 729
26 528	06 578	19 629	30 680	09 730
29 529	09 579	20 630	31 681	12 731
30 530	10 580	21 631	SEPT	13 732
31 531	11 581	22 632	04 682	14 733
FEB	12 582	25 633	05 683	15 734
01 532	13 583	26 634	06 684	16 735
02 533	16 584	27 635	07 685	19 736
05 534	17 585	28 636	10 686	20 737
06 535	18 586	29 637	11 687	21 738
07 536	19 587	JULY	12 688	23 739
08 537	20 588	02 638	13 689	26 740
09 538	23 589	03 639	14 690	27 741
12 539	24 590	05 640	17 691	28 742
13 540	25 591	06 641	18 692	29 743
14 541	26 592	09 642	19 693	30 744
15 542	27 593	10 643	20 694	DEC
16 543	30 594	11 644	21 695	03 745
19 544	MAY	12 645	24 696	04 746
20 545	01 595	13 646	25 697	05 747
21 546	02 596	16 647	26 698	06 748
22 547	03 597	17 648	27 699	07 749
23 548	04 598	18 649	28 700	10 750
26 549	07 599	19 650	OCT	11 751
27 550	08 600	20 651	01 701	12 752
28 551	09 601	23 652	02 702	13 753
MAR	10 602	24 653	03 703	14 754
01 552	11 603	25 654	04 704	17 755
02 553	14 604	26 655	05 705	18 756
05 554	15 605	27 656	08 706	19 757
06 555	16 606	30 657	09 707	20 758
07 556	17 607	31 658	10 708	21 759
08 557	18 608	AUG	11 709	24 760
09 558	21 609	01 659	12 710	26 761
12 559	22 610	02 660	15 711	27 762
13 560	23 611	03 661	16 712	28 763
14 561	24 612	06 662	17 713	31 764

Ralph J. Stephenson, P.E.
15064 Warwick Detroit, Mi. 48223 (313) 273 5026
4-yr. working day calendar starting Jan. 4, 1988

Date W/D	Date W/D	Date W/D	Date W/D	Date W/D
JAN 1991				
02 765	14 816	24 867	06 917	17 968
03 766	15 817	28 868	07 918	18 969
04 767	18 818	29 869	08 919	21 970
07 768	19 819	30 870	09 920	22 971
08 769	20 820	31 871	12 921	23 972
09 770	21 821	JUNE	13 922	24 973
10 771	22 822	03 872	14 923	25 974
11 772	25 823	04 873	15 924	28 975
14 773	26 824	05 874	16 925	29 976
15 774	27 825	06 875	19 926	30 977
16 775	28 826	07 876	20 927	31 978
17 776	29 827	10 877	21 928	NOV
18 777	APR	11 878	22 929	01 979
21 778	01 828	12 879	23 930	04 980
22 779	02 829	13 880	26 931	05 981
23 780	03 830	14 881	27 932	06 982
24 781	04 831	17 882	28 933	07 983
25 782	05 832	18 883	29 934	08 984
28 783	08 833	19 884	30 935	11 985
29 784	09 834	20 885	SEPT	12 986
30 785	10 835	21 886	03 936	13 987
31 786	11 836	24 887	04 937	14 988
FEB	12 837	25 888	05 938	15 989
01 787	15 838	26 889	06 939	18 990
04 788	16 839	27 890	09 940	19 991
05 789	17 840	28 891	10 941	20 992
06 790	18 841	JULY	11 942	21 993
07 791	19 842	01 892	12 943	22 994
08 792	22 843	02 893	13 944	25 995
11 793	23 844	03 894	16 945	26 996
12 794	24 845	05 895	17 946	27 997
13 795	25 846	08 896	18 947	29 998
14 796	26 847	09 897	19 948	DEC
15 797	29 848	10 898	20 949	02 999
18 798	30 849	11 899	23 950	03 1000
19 799	MAY	12 900	24 951	04 1001
20 800	01 850	15 901	25 952	05 1002
21 801	02 851	16 902	26 953	06 1003
22 802	03 852	17 903	27 954	09 1004
25 803	06 853	18 904	30 955	10 1005
26 804	07 854	19 905	OCT	11 1006
27 805	08 855	22 906	01 956	12 1007
28 806	09 856	23 907	02 957	13 1008
MAR	10 857	24 908	03 958	16 1009
01 807	13 858	25 909	04 959	17 1010
04 808	14 859	26 910	07 960	18 1011
05 809	15 860	29 911	08 961	19 1012
06 810	16 861	30 912	09 962	20 1013
07 811	17 862	31 913	10 963	23 1014
08 812	20 863	AUG	11 964	24 1015
11 813	21 864	01 914	14 965	26 1016
12 814	22 865	02 915	15 966	27 1017
13 815	23 866	05 916	16 967	30 1018
				31 1019

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CPM EXERCISE #2

Z, T, & L are the first tasks and can be concurrent.
X must be complete before N can start.
Q follows H.
C must follow L and precede W.
S follows B & W and precedes D & V.
N must be complete before M can begin.
K & D must be complete before R & X can start.
A must follow Z.
G precedes Q and follows V.
H cannot begin until F & R are complete.
D must be complete before F can start.
U follows B and precedes K.
W cannot start until T is complete.
M is the last task & follows Q.
B cannot begin until A & T are complete.

Z2	C6	M4
T4	W1	R5
L1	S3	U2
X3	B1	A2
N4	D2	F3
Q2	V3	G4
H3	K1	

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EXERCISE #3

1. Project begins with a time restraint (T/R) followed directly by task A.
2. Task A restrains tasks B and G.
3. Task H follows task G.
4. Task M follows task G and restrains task N.
5. Task C is restrained by B and restrains D, E and I.
6. Task I is restrained by H and restrains J, K and O.
7. Task O is restrained by N and restrains P and Q.
8. Tasks D and E restrain F.
9. Task L cannot start until J and K are complete.
10. Tasks P and Q must be complete before R can start.
11. Tasks F, L and R are not related to each other but can be completed simultaneously.
12. When tasks F, L and R are complete the project is complete.

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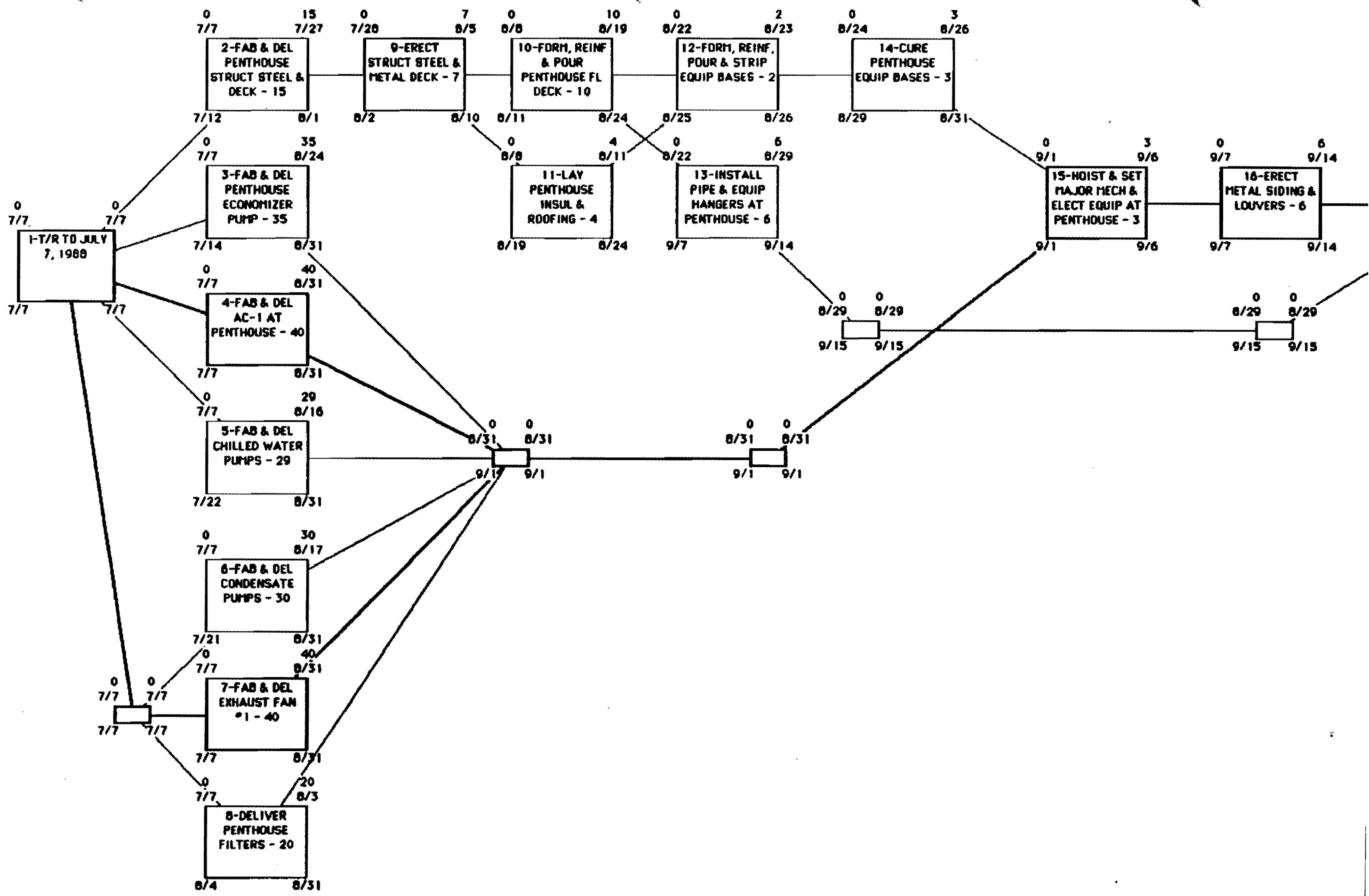
EXERCISE #4

- Project starts with T/R task A
- Tasks B, C, D follow task A directly and can be concurrent
- Task E is restrained by task C and restrains tasks G, H and J
- Task F follows task C and precedes task J
- Tasks G and H are restrained by task D
- Task K is restrained by tasks G, H and J and must be done before tasks N and M can begin
- Task L is restrained by task K and must be complete before task P can start
- Task P is restrained by tasks M and N and restrains task Q from beginning
- Task R cannot begin until task Q is complete and R is the last task in the network
- Task B restrains tasks G, H and J

CPM
9/1/74
H/O 89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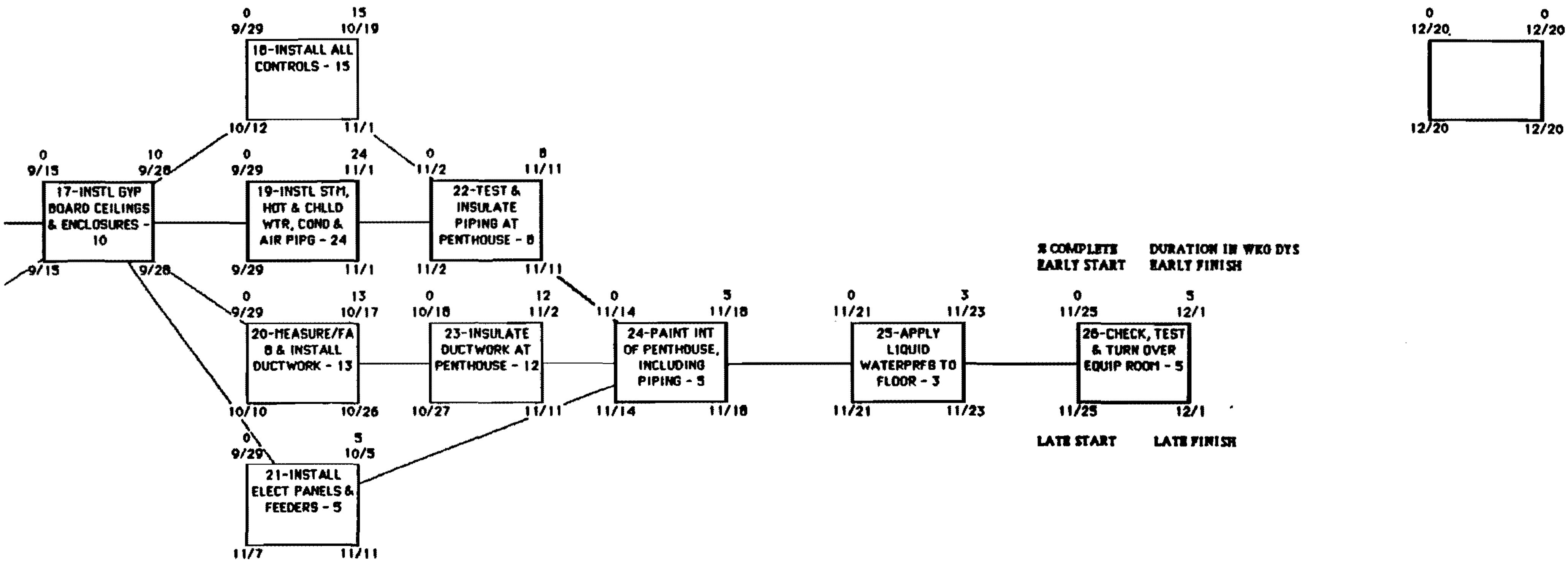
2-FAB & DEL PENTHOUSE STRUCT STEEL & DECK - 15
3-FAB & DEL PENTHOUSE ECONOMIZER PUMP - 35
4-FAB & DEL AC-1 AT PENTHOUSE - 40
5-FAB & DEL CHILLED WATER PUMPS - 29
6-FAB & DEL CONDENSATE PUMPS - 30
7-FAB & DEL EXHAUST FAN #1 - 40
8-DELIVER PENTHOUSE FILTERS - 20
9-ERECT STRUCT STEEL & METAL DECK - 7
10-FORM, REINF & POUR PENTHOUSE FL DECK - 10
11-LAY PENTHOUSE INSUL & ROOFING - 4
12-FORM, REINF, POUR & STRIP EQUIP BASES - 2
13-INSTALL PIPE & EQUIP HANGERS AT PENTHOUSE - 6
14-CURE PENTHOUSE EQUIP BASES - 3
15-HOIST & SET MAJOR MECH & ELECT EQUIP AT PENTHOUSE - 3
16-ERECT METAL SIDING & LOUVERS - 6



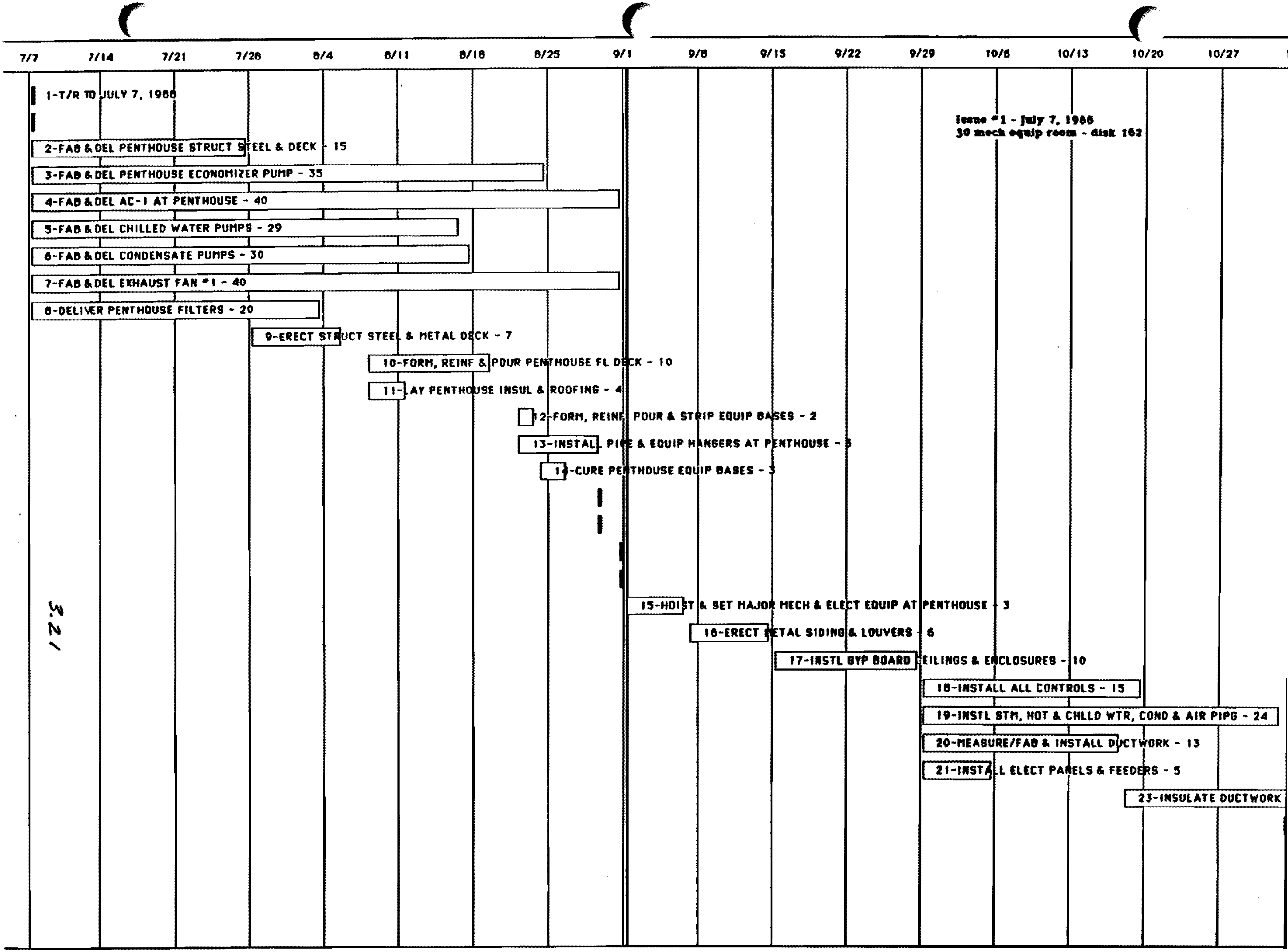
Issue #1 - July 7, 1988
330 mech equip room - disk 162

Base Plan of Action

NETWORK MODEL FOR CLARION OFFICE BUILDING PENTHOUSE MECHANICAL EQUIPMENT ROOM #1

Luther Mechanical Contractors
Detroit, Michigan

sheet
ph-1


7/7
7/14
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Issue #1 - July 7, 1986
30 mech equip room - disk 162
1-T/R TO JULY 7, 1986
2-FAB & DEL PENTHOUSE STRUCT STEEL & DECK - 15
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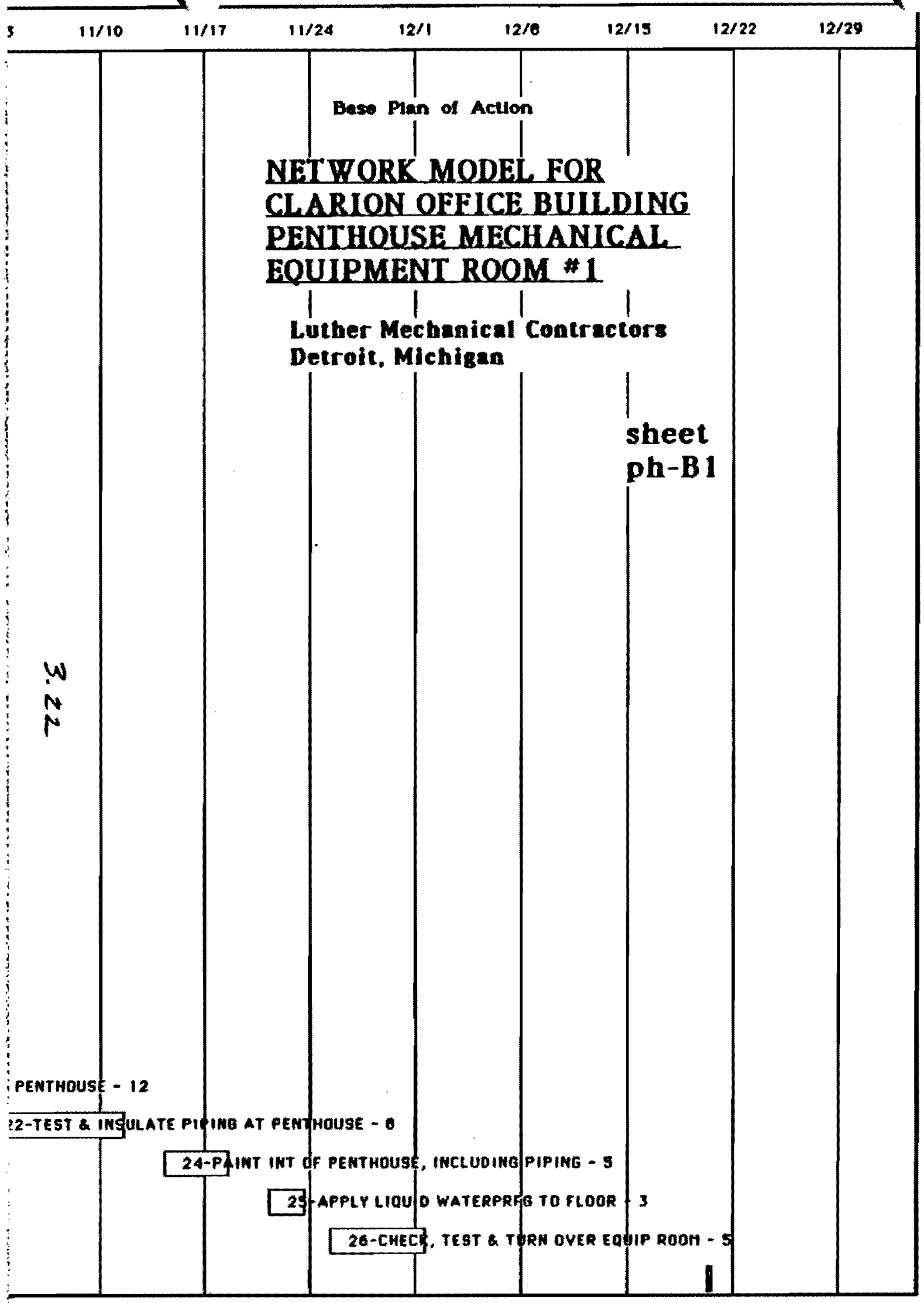
13-INSTALL PIPE & EQUIP HANGERS AT PENTHOUSE -
14-CURE PENTHOUSE EQUIP BASES - 3
15-HOIST & SET MAJOR MECH & ELECT EQUIP AT PENTHOUSE - 3
16-ERECT METAL SIDING & LOUVERS - 6
17-INSTL GYP BOARD CEILINGS & ENCLOSURES - 10
18-INSTALL ALL CONTROLS - 15
19-INSTL STM, HOT & CHLLD WTR, COND & AIR PIPG - 24
20-MEASURE/FAB & INSTALL DUCTWORK - 13
21-INSTALL ELECT PANELS & FEEDERS - 5
23-INSULATE DUCTWORK
3.21

Base Plan of Action

NETWORK MODEL FOR CLARION OFFICE BUILDING PENTHOUSE MECHANICAL EQUIPMENT ROOM #1

Luther Mechanical Contractors
Detroit, Michigan

sheet ph-B1



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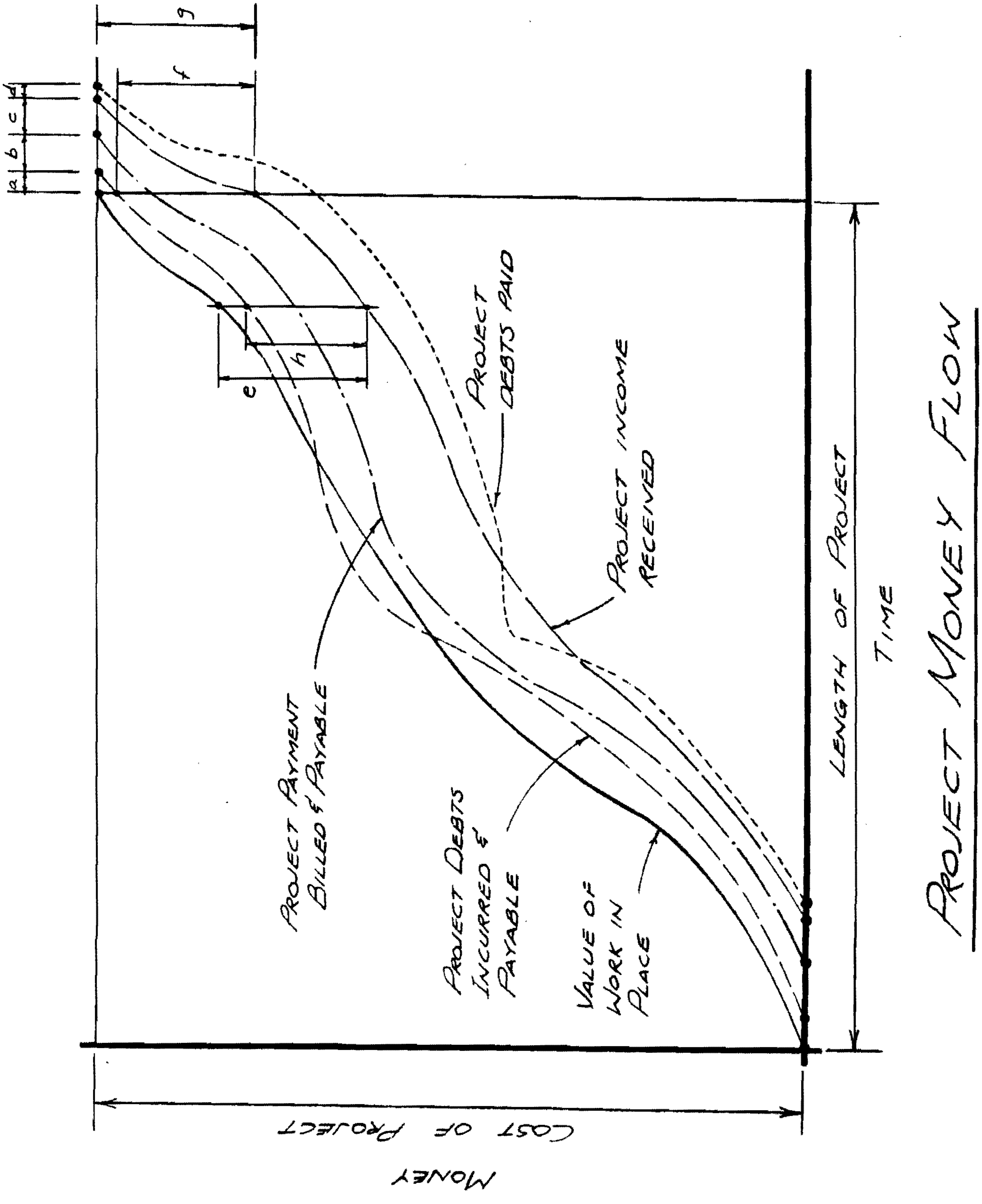
PROJECT MONEY FLOW
a
b
c
d
f
g
e
h
PROJECT DEBTS PAID
PROJECT INCOME RECEIVED
PROJECT PAYMENT BILLED & PAYABLE
PROJECT DEBTS INCURRED & PAYABLE
VALUE OF WORK IN PLACE
LENGTH OF PROJECT
TIME
COST OF PROJECT
MONEY

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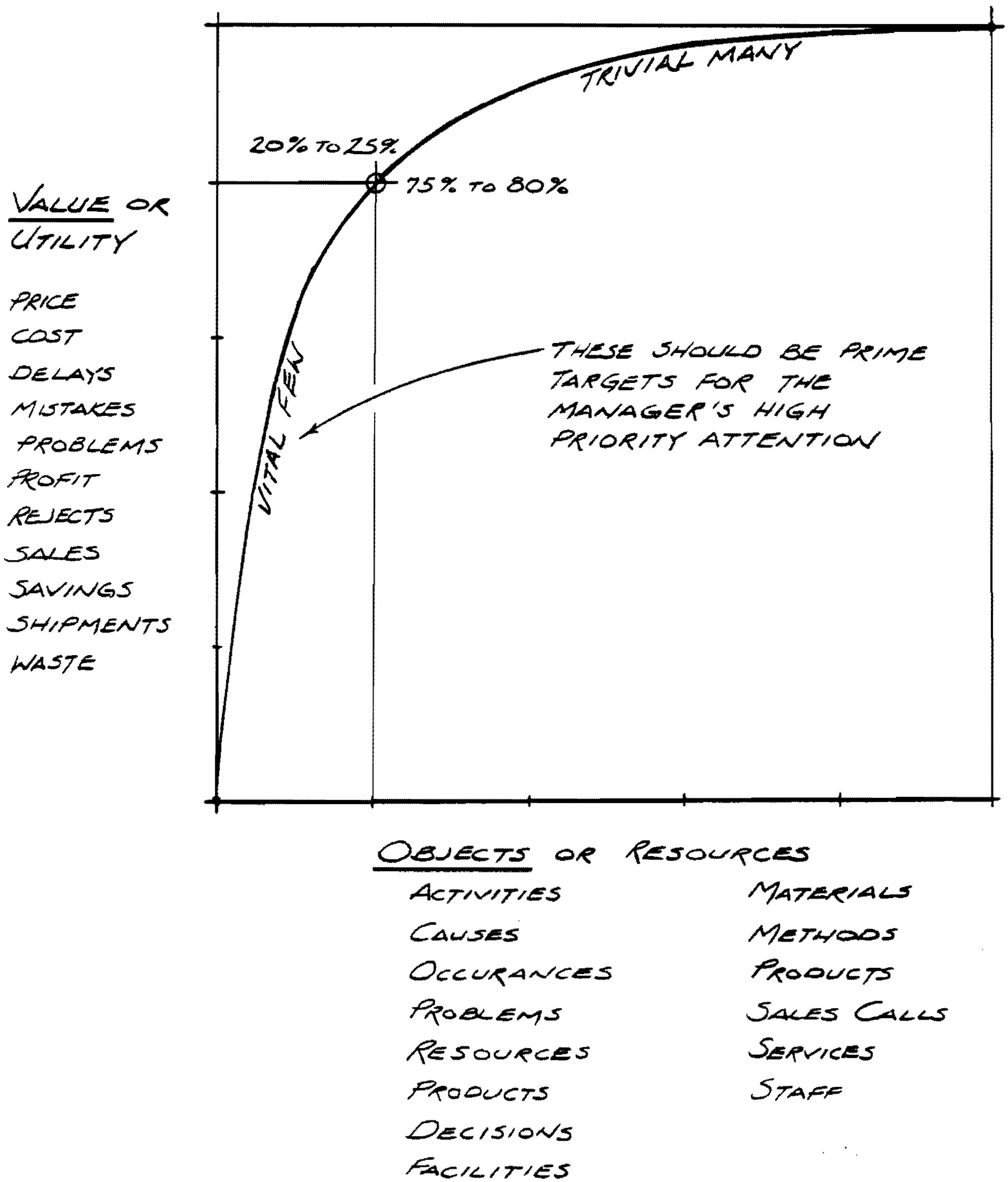
PARETOS LAW - IN AN OBJECT/VALUE SITUATION ONLY A FEW OF THE OBJECTS ACCOUNT FOR THE GREATEST PART OF THE VALUE.



H/C 146

Section #4

Design & Construction Documentation

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• CONSTRUCTION CONTROL DOCUMENTS •

• WORKING DRAWING - Graphically define the contract scope of work & show the appearance of the completed project.

• SPECIFICATIONS - Verbally describe the contract scope of work and define the qualitative standards to be maintained in the completed project.

• CONTRACT DOCUMENTS - Provide a full definition of the scope of project work to be built. Any item included as part of the contract documents becomes a condition of the contract.

• ESTIMATES - Verbally describe the quantitative standards to be achieved in the completed project.

• PLANS & SCHEDULES - Graphically define the sequences, procedures & amount of resources to be used to construct the project.

• SHOP DRAWINGS - Graphically show details of the fabrication, installation and final appearance of building components called for in the contract documents and accepted for use in the work.

PRINCIPLES OF EFFECTIVE AND USEFUL RECORD KEEPING FOR THE PROJECT MANAGER

A. Definition of record - Any retained information that can be effectively used in the future.

B. Types of records used in G construction

1. Estimates
2. Cost reports
3. Field action reports
4. Logs
5. Testing reports
6. Monitoring reports
7. Project action plans
8. Project schedules
9. Money flow reports
10 Priority checklists
11. Phone records and logs
12. Procurement tabulations
13. Document control files
14. Project histories
15. Transmittals
16. Bulletins, change orders, field orders
17. Requests for information
18. Schedules of values
19. Requests for payment
20. Shop drawing logs
21. IOC's
22. Proposed change orders
23. Purchase orders
24. Meeting minutes
25. Proposals
26. Permits
27. Priority lists
28. Resource curves and histograms
29. Progress photos
30. Punch list tabulations
31. Sign offs on contract documents
32. Sample logs
33. Inspection reports
34. Record drawings
35. Bid documents
36. Certified acceptance

C. Reasons good design and construction project record keeping is essential.

1. Sizable increase in the number of people to whom project managers are accountable.
2. Increase in number of contested claims.
3. Higher quality design and construction performance being demanded in an increasingly competitive business and professional environment.
4. Demand for higher levels of cost control than ever before.
5. Documentation demands being made by more complex financing arrangements in design and construction.

6. Constant merging of disciplines with resulting extension of business arrangements into generic (G) construction. Demands better and better communications.
7. Increasing use of electronic equipment allowing easier and better record keeping.

D. Basic classes of records
1. To record history of ex'e-cutive actions
    a. Daily reports
    b. Progress photos
    c. To do lists
2. To record opinions
    a. Daily management logs
    b. Diaries
    c. Phone logs
3. To record document processing
    a. Sample logs
    b. Shop drawing logs
    c. Transmittals
4. To record tabulated data and information
    a. Bid spread sheets
    b. Subcontractor lists
    c. Project directories
    d. Bulletin to change order tracking
    e. Field order to change order tracking
    f. Document control files
5. To record agreements and decisions
    a. Change orders
    b. Field orders
    c. Equipment data tabulations
    d. Meeting minutes
6. To record supportive activities
    a. Phone logs
    b. Management logs
    c. Transmittals
7. To record progress
    a. Color coded network models
    b. Monitoring reports
    c. Schedules of values
    d. Isoquant line comparisons
8. To record changes to the work
    a. Bulletins
    b. Change orders
    c. Field orders
    d. Memos of clarification
9. To record resource flow
    a. Money flow curves
    b. Manpower loading histograms
10 To record approvals
    a. Certificate of occupancy
    b. Shop drawing approvals
    c. Punch list tabulations
    d. Certificate of substantial completion
    e. Document sign off - schematics, design development, preliminaries, final contract documents
11. Record results

a. Testing reports
b. Inspection reports

E. Basic rules for preparing record keeping forms

1. If a standard data form works, use it
2. Display information in a logical sequence
3. Provide adequate space for proper data entries
4. Preprint everything possible - remember, it costs about $85 per hour for your manager if he is not engaged in a profitable management/decision activity. Use the manager's time well
5. Keep the form readable
6. Prepunch the form for binders. Use large hole punches
7. Be certain enough detail is requested; you can always skip non applicable spaces
8. Provide date and signature spaces
9. Review all forms at least every year to see what should be discarded, revised or added

records,d156, ho 215

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Procedures for preparing project documentation

Project documentation is an essential and routine part of every project. However from time to time a project exhibits signs of difficulty which may demand a heavier than normal documentation effort. One way of classifiying the level needed is to give it a rating degree from 1 (the lowest level of documentation) to 10 (the highest level of documentation).

A low level of documentation normally utilizes inexpensive and uncomplicated project communication and record keeping. Level 1 encompasses virtually no documentation at all, a situation not usually encountered. Conventional low level routine documentation on a well operating project is normally rated from 2 to 4.

This memo addresses the higher levels of documentation.

Selecting, designing and maintaining a correct documentation level is called document control. Good document control starts with an appopriate method of filing the large number of documents that flow to, from and within the project. Documents include letters, transmittals, bulletins, requests for information, change orders, field orders, shop drawings, change instructions and on & on infinitum. To file these by subject, by document type, by project, by company, or by any other classification system most helpful to those using them. is necessary & desirable in most cases. The project management and the project team must determine how the main filing system classification is to function.

For a document control system the basic classification system is much simpler. A document irrespective of type or classification is filed by a single number assigned to it as it is received. This number is referenced to the date of its production and filed wherever possible in order according to that date. Thus a document dated July 30, 1987 is set earlier in the stack than one dated July 31, 1987 and receives a lower number in the sequence.

This is the fundamental classification system used in the project documentation system described in this discussion. The system is sometimes called a single number filing system.

The basic physical arrangement within the file system recommended here is in ascending order of date of document. Once consecutively numbered however, there are many other criteria by which the documents might be arranged, the content identified and the document retrieved.

A brief step by step description of the total process is given below:

Step #1- Preparing and arranging the document control material

To start the process a single document control copy is made of all written material received, sent or circulated internally that pertain to the project. These are physically arranged chronologically by their official date (the date of the document).

The documents are next divided into time span packets, punched with an oversized punch and put in loose leaf binders. A packet period of on month has been found to work well in most cases.

Step #2 - Month numbering the documents

Each document is given a number that will identify it uniquely (the only document in the system that has that number). A workable system is to number by the month in which the document was prepared. Using this method a base month is selected and designated as month #1. Month #1 is preferably January of a year in advance of starting major work on the project. Succeeding months are numbered in ascending order. For example if the base date selected is January 1, 1987, then January, 1987 is considered period #1. February, 1987 is period #2, March, 1987 is period #3 and so on.

Thus a document written in June, 1987 and being filed in a document control system using a base date of January, 1987 will be assigned a document number starting with 06. When there are a large number of documents to be filed it is advisable to use a self advancing numbering stamp.

Step #3 - Day numbering the documents

Once the first two digits of the document identification number is assigned, the last three are set. The remaining three digits reflect the chronological position of the document within the month. If a letter is received dated March 20, 1987, with a control system base month #1 date of January, 1987, and it is the 102nd document entered chronologically in March, 1987, it will be assigned a document number 03102.

Now, every document in the entire file has a unique number and will be identified by that number as to the month and the position in the month it was dated. The name of the system, single number filing, is used since every document filed is identified with a single number irrespective of what type of document it is.

Step #4 - Building the document control file format

With the document identification method set & the documents arranged in ascending document number order, a document retrieval system file is designed and built.

A retrieval data base file should contain the following miniumum fields:

1. Document control number (dcn)
2. Document type (dty) - letter (ltr), transmittal (trm), etc.
3. Date document prepared (the basic criteria of the order of the documents in the file) (ddp)
4. Date document received (ddr) - all incoming documents should be date stamped
5. Organization from (ofr)
6. Organization to (oto)
7. Individual from (ifr)
8. Individual to (ito)
9. Subject codes (sco) - Subject codes identify the content nature of the document. For instance a letter concerning mud sills (msi), forming (fmg), supported decks (sde) and building

148 (148) along with a request for information (rfi) would be assigned all the subject codes as indicated above (3 letter & alphabetic).

Step #5 - Entering document data in the document control file

The document records (unit entries in a data base program) are next put into the data base file. Methods of entering data vary but the guidelines below should assist in setting the procedure.

a. Item 1 through 8 in step #4 above are entered directly as a routine data entry task, directly from the master document file material.

b. The subject codes, item #9 in step #4 above, are assigned to the chronological file document by someone familiar with the subject codes and capable of abstracting the subjects to be entered by reading the document. As the documents are read, subject codes should be written directly on the document control copy.

c. Also as the files are read it is helpful to underline and annotate document control file copies to make subject identification as easy and rapid as possible.

d. Once a packet of material has been subject coded (probably one month's file) the subject codes should be entered in the master document control file. Usually the routine entries, items #1 through #8 are entered earlier and in larger batches. Thus subject codes will generally be a later entry.

Step #6 - Preparing the project history

Let us assume the document file has been prepared for several months of document control records and you wish, or are required, to move to the next level of documentation by conditions encountered on the project.

This level of documentation usually involves preparing a project history from the master document file. The project history is an abstracted chronological narrative of important events on the job.

To prepare a project history, the master document file is read and annotated so each document (depending on relative importance) can be abstracted and put in some type of narrative. Often the annotation is completed in step *5 as subject codes are assigned.

The program selected to process the narrative should be a word processor of some type. For example Think Tank or More can be used by entering the document number number as a heading followed by the document date. Next, the main heading is exploded and a brief summary (under 30 words) of the document is entered in the exploded area. Thus when prepared properly, the information can be sorted by document number or date (whichever is typed first). In addition the abstacts can be searched for key words to build subject files for specialized uses.

The important pivot is the unique document control number which allows the document to be filed in ascending order of docment number and to always be found in the file as a numbered file document, no matter how many subject codes it is assigned. For instance document number 09124 can always be found after 09123 and before 09125 in the master chronological file, no matter how many subjects are assigned or what the subject being sought.

An extended use of the project history is to build special reference files for specific uses. For instance one such use is to seach the data base subject codes for a set of documents, and then to call each of the project history abstracts of these documents from the file, and to print and assemble them into a subject file to be used for a deposition.

It is important to understand that not all documents are abstacted in preparing a project history or the special use file. For instance a transmittal may have no impact on the project history and may not have to be made a part of the history. However the transmittal is still available for reference by a seach of the data base file. It is simply not stored in the abstract file.

Step #7 - Preparing specific project problem tracking material

When the project history is partially or wholly available, the document control file can be used at a higher level by selecting major classifications of project problem areas. This selection is made on the basis of the strong positions the preparer of the claim feels he has.

Experience indicates it may be best to concentrate early on the strong positions and win them by good logic and sound documentation. However, additional strong points sometimes emerge by a combination of proper actions taken in a variety of smaller and apparently unimportant points and issues. The analyst must be able to discern and select what information is to be used in any given situation.

Problem areas on a job may cover a variety of situations. It is often of help to use a basic list of normal complaints (causes of contested claims) and to derive from these the specific complaints that are related. Let us take an example:

Presume a project has encountered apparent excessive interference of non liable parties acting as agents of the owner. In this hypothetical example, the agent, say a non liable construction manager, decides that the prime contractors under his control, should be working in a sequence that best suits the owner in the opinion of the non liable constuction manager agent. Say further that the prime contractors have either individually or in concert given the non liable construction manager an intended plan of action, that in their opinion as liable parties to a contract arrangement with the owner (the ultimate decision maker), will satisfy the project contract they have with the owner, their client. This plan conflicts with that of the non liable construction manager.

When the owner's agent, the non liable construction manager, pits his desires against those of the prime contractor's, relative to achieving project objectives, the conditions of the contract must be closely analyzed.

In a hard money, fixed time contract, use of time and money are generally the prerogative of the contractor so long as the ends are achieved. Any interference with how the contractor achieves these ends must be viewed as an interference with the contractor's right to enjoy an optimum profit derived from the job plan which he has signified as his intended plan of work.

Such interference is legally known as maladministration. It is a common occurance and many times is a result of honest misunderstandings about the project. However the dangers of maladministration are felt when the owner and/or his agents, by their actions or inactions affect the potential for a contractor to make an expected profit, within the bounds of agreed upon performance standards. When owner interference occurs the contractor is entitled to reimbursement for the reduction in his ability to earn an intended profit, and to fully cover his costs on the job.

The proof in such situations however, is often difficult to provide. However if the document control system is properly prepared, the subject coding accurately done and the project histories well written, it is a relatively simple matter to retrieve all documents relating to the problem and to build a special maladminstration history for any specific delay or interference.

*   *   *   *   *   *

Not all the above steps are taken in the preparation of project documentation. If the level of documentation called for is at 2 to 3, it is generally adequate to prepare a subject file of the documents and only take Step #1 above if specific minor problems are encountered in a well defined, limited time period.

If the problems mount on the job and a documentation level of 4 or 5 is indicated, Steps #1, 2, 3 might be advisable to implement. A higher level of project difficulty, say a level of 6 to 8 might call for Steps #4 and 5 to be put into work.

When the level of project difficulty is raised to 9 or 10 which indicates a job upon which very serious problems are being encountered, Steps #6 and 7 should be initiated. Hopefully a full Step #6 and 7 program will not be needed, but on especially troublesome jobs, may be necessary.

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Documentation Degree

The degree of needed documentation on any project is determined by the current or potential level of difficulty perceived.

One method of setting documentation degree (dd) is by use of a scale of one to ten, one being a minimum amount consistent with good practice and ten indicating a maximum amount needed to protect those involved from current or potential problems.

Expressed another way, level 1 documentation signifies an absolute minimum is being used. Level 10 documentation indicates the project is being fully documented.

The approximate ranges shown below are reference guidelines for selecting and preparing documentation systems:

- **Levels 1 & 2** - Informal job structure - no planned documentation
- **Levels 3 & 4** - Normal job - documentation as specified
- **Levels 5 & 6** - Claim prone jobs on which trouble is conjectural
- **Level 7** - Claim prone jobs on which trouble is very likely
- **Levels 8 to 10** - Claim prone jobs on which trouble is a reality

Usually the degree of documentation index indicates an opinion as to how much trouble can be expected on the project.

A brief description of job conditions which may be encountered corresponding to a need for the degrees of documentation indicated is given below.

Documentation degree #1 to 2 (dd 1-2) - no planned documentation

At these levels the project usually is informally organized, with full trust by all parties of all other parties. Most instructions and requests are oral. Revisions and cost commitments are made on a full confidence basis relative to scope, expected payment and resolution. The project team understands and communicates well internally and externally, and all on the team exhibit a high degree of honesty, competence and integrity. Usually meetings are held on an as needed basis only.

It should be cautioned that a low dd does not mean the project will not encounter difficulties. The number merely indicates a recommended level of documentation being maintained as of a given point in time.

Documentation degree #3 to 4 (dd 3-4) - normal job - formal documentation as needed; minimal document process clearly established

In a dd 3-4 project the usual procedures for processing work during programming, planning, design and construction are well defined and followed carefully by all parties to the contracts. Usually the project contract documents have been carefully prepared and checked thoroughly. This helps assure that the scope of work is clear and the project is constructible.

Documentation at dd 3-4 during the process of design and construction is maintained at a minimum level consistent with program and contract requirements. An audit trail of approvals, issues, money flow, revisions and quality of construction in place should be able to be followed easily from the system.

An important characteristic of the good level 3 & 4 documentation system is that it must be of a nature that can be increased to a higher level at any time without extensive backtracking and historical research. The fundamental needs of higher level dd's should be able to be easily achieved from the basic work accomplished in a dd 3-4 system. The reason is that the enormous expense and reduced accuracy of later historical research on a troubled construction program should be avoided by setting a good information filing and retrieval system at lower documentation degree level.

Documentation degree *5 & 6 (dd 5-6) - claim prone jobs on which trouble potential is conjectural

Documentation degrees of 5 or 6 should be set early on projects that show potential for claim, but on which no dominant reasons for such problems have yet appeared. For instance a project may be proceeding well despite having a large number of allowance items, several separate prime contractors, and a general trades contractor noted for his sloppy paper work. These are all indicators of potential difficulties but do not necessarily mean trouble.

In a dd 5-6 the level is set high to permit those involved to more quickly react to sudden project difficulties than on a normal project. **To reemphasize, the dd level is set by the nature of the project and is only actually raised or lowered when sufficient justification for a change is noticed.**

Documentation degree *7 (dd 7) - claim prone jobs on which trouble potential is very likely

On a dd 7 project, comments for dd 5-6 apply, with the qualification that a yet higher dd level requirement is highly probable. In other words if the job is claim prone and some of the claim prone characteristics are causing actual problems, the documentation level of 7 indicates a movement into higher levels is near at hand.

An example of this might be a claim prone project dd level of 6 as established by a high spread in proposal prices, poor specialty contractor reputations and an architect/engineer slow in submittal turnaround , which upon moving into the field, promptly runs into late submittals by the questionable subs and a reactionary slowness by the a/e in processing submittals. This combination might be cause to move the dd to 7, with a good chance it could go even higher within the next month or so. The dd 7 could be looked at as a holding plateau which might be lowered by prompt corrective action or might increase as negative positions harden and remain unresolved.

Documentation degree #8 to 10 (dd 8-10) - claim prone jobs on which trouble is a reality

Projects requiring a dd level of 8 to 10 can be considered to be in trouble and subject to present or future third party action resolution. Usually the project that has moved to a dd 8-10 level has done so over a period of time during which the problem levels have progressively intensified. If such a project is encountered, the files for third party resolution action should be built as the work proceeds.

If dd 8-10 needs are met on a day to day basis as the documentation is sent or received, the cost is much less than if it is done later. In addition the analysis will be fresher and more accurate. In addition, the knowledge that such a high level file is being built often acts to dampen the conflict and difficulty and sometimes forces a solution to the difficulties.

* * *

As a general help in documentation a brief resume of procedures for preparing project documentation is given below. These steps may vary from situation to situation but can be summarized within seven basic documentation actions taken to respond to various dd levels.

Step 1 - Prepare and arrange the document file material - Document copies are arranged, usually chronologically, for future entrance into a single number filing system. 500,000

Step 2 - Month number the the documents - Each document is uniquely identified with a number that relates to the month in which the document was prepared. 750,000

Step 3 - Sequence number the documents - When the document has been assigned its month number it is further numbered sequentially by the date within the month. This system is called a single number filing system, since all documents are now uniquely numbered. For instance there would only be one document 04245, a document prepared in the 4th month from the base date, and being the 245th document chronologically entered in that 4th month. 750,000

Step 4 - Build the document control file format - With the document uniquely identified, the document copy of the original is coded and a data base retrieval system established. Code fields to be used might be:

Document control number
Document type
Date document prepared
Date document received
Organization from
Organization to
Individual from
Individual to
Subject codes
Others as needed

1,500,000
2,000,000

Step 5 - Enter the document data in the document control file - If

1,500 ~
2, ~ ~

justified and required, document data is now entered into the data base file for storage and retrieval in whatever manner required.

Step 6 - Prepare the project history - A project history is prepared in the form of a chronological narrative summarizing the entire project from the document control file. Each major document is reviewed, if appropriate, and entered as a brief unit description of an event, or of events, occurring within a given time period.

Step 7 - Prepare project problem tracking histories - Specific problems causing contested claims, say unexpected artesian water, are identified and the document control files and project history files are searched. The material found is used to build special chronological files for each problem area. These are then analyzed to determine the course of settlement action to be taken.

Rough guidelines for the relation of **dd level** to **documentation steps** as outlined above might be as follows:

- **dd levels 1 & 2 - totally informal - no planned documentation** - No special provisions made for preparing and arranging documents

- **dd levels 3 & 4 - normal job** - Take steps 1 and possibly 2

- **dd levels 5 & 6 - claim prone jobs on which trouble potential is conjectured** - Take steps 1, 2, 3 and possibly 4

- **dd level 7 - Claim prone jobs on which trouble potential is very likely** - Take steps 1, 2, 3, 4 and 5

- **dd levels 8 to 10 - Claim prone jobs on which trouble is a reality** - Take steps 1 through 6 and possibly 7 as required

Ralph J. Stephenson PE PC
Consulting Engineer

FORM CONTENT & DESIGN

a. Tips on form content

1. Identify the organization originating the form by showing

    a. Full name
    b. Address & post office box if applicable
    c. Phone number including area code
    d. Telex number if appropriate
    e. Division identification if appropriate
    f. Document identification number if applicable

2. If possible number or letter each item of information to be inputted to the form.

3 Clearly identify at the beginning of the form, who originated the form and to whom it is addressed.

4. Provide a date prepared, date sent and date received space on the form.

5. If possible, always design the form to encourage addressing to a specific individual

6. Provide enough space to record the information needed. If the form is to be generally handwritten it will require more space than if to be typed.

Comment: A form is not always transmitted. It may be prepared for individual use to tabulate or record information or to provide a reference souce in a working situation. In such cases the form should be designed using the above guidelines as if the originating party is both the sender and the recipient.

b. Steps in designing a form

1. Determine the readership of the form.

2. Briefly describe what the form is to accomplish - what is its mission?

3. Rate your perceived importance of the form on a scale of 1 to 10

4. Review description & rating in steps 1 and 2 and determine if form is truly needed. <u>If not don't prepare it</u>.

5. If form is needed, list, <u>at random</u>, all information items needed to fulfil the mission.

6. Arrange the information items in a logical order.

7. Test the list arrangement for input.

Can the form be filled out with an easy, accurate flow of input?

8. Test the list arrangement for readibility.

Can the form be read easily, quickly and accurately?

9. Design the form. Be certain to leave a binding edge at the left or top so data at the edges is not lost in the binding or in the punched holes.

10. Prepare a dummy of the form, make copies and test it a few days in actual use if at all possible. Be certain to explain its purpose and use.

11. Revise the form as needed and have it printed, padded and put into use.

12. Revaluate the form regularly for improving or for discard when no longer needed.

I. General information - to be periodically revised & kept current

General information is to be retained in the notes for the project. If a section of the data is no longer valid it will be noted as such and relocated to the superseded data section of the file, or noted with the change and left in place.

A. Name of project - Trans American Mall

B. Those involved

1. Carlsbad Holding - Center owner
   Frank Rogell - Officer in charge
   Charles Lugow - Project manager
   Tom Brotherton - On site representative
   Lawrence Jones - Mall manager
2. Clemency and Harrigan - Architect/Engineer of record
   Charles Clemency - Principal in charge
   Carl Travis - chief designer
   Lorne MacIntosh - project manager
3. Larkins & Horowitz - Electrical & mechanical engineers
   Art Larkins - Principal
   Fred Karlton - Mechanical engineer
   Ted Horowitz - Electrical engineer
4. Todd & Jones - General contractor
   Jay Harvey - Project manager
   Charles McElvey - Field superintendent
   Harvey Vennalt - General superintendent
5. Lincoln Mechanical - Mechanical contractor
   Larro Nadian - Project manager and estimator
   Niles Mechadian - Project superintendent
6. Sunshine Electrical - Electical contractor
   Stan Sunshine - Principal and project manager
   Lefty Mallett - Superintendent

C. Responsibility codes

1. 001 - Carlsbad Holding - owner
2. 002 - Clemency & Harrigan - architect/engineer
3. 003 - Larkins & Horowitz - electrical/mechanical engineers
4. 004 - Todd & Jones - General contractor
5. 005 - Lincoln Mechanical - mechanical contractor

6. 006 - Sunshine Electrical - electrical contractor

D. **Abbreviations (in alphabetical order)**
1. c&h - Clemency & Harrigan
2. cho - Carlsbad Holding
3. cod - contract documents
4. dp1 - design package 1 (other dp abbreviations similar)
5. dpa - development package
6. etr - end time restraint
7. fen - front end work
8. fiw - finish interior work
9. gmp - guaranteed maximum price
10. l&h - Larkins & Horowitz
11. lme - Lincoln Mechanical
12. pro - procurement
13. riw - rough interior work
14. sbw - shell building work
15. sel - Sunshine Electrical
16. sit - site work
17. ski - exterior building skin
18. sub - building substructure work
19. sus - building superstructure work
20. sys - building systems work
21. t&j - Todd & Jones
22. t&m - Time and material
23. t/r - time restraint
24. tim - tenant improvement work

E. **Project design package content**
1. Design package dp1

   Complete construction documents for 200' x 400' addition to existing tenant building.
2. Design package dp2

   Existing building remodeling from col line 01 to col line 22. Complete interior demolition and construction of new base building space with demising studs erected.

3. Design package dp3
   Extension of north site area including parking and related work for 800 additional cars.
4. Design package dp4
   Renovation of existing mechanical and electrical rooms and replacement of entire electrical distibution system
5. Design package dp5 - to be defined

F. Key dates - as of 3/2/88 (43)

1. Complete prepare & issue design packages (dp)
   3/25/88 (60) - Comp prepare & issue dp1
   4/11/88 (71) - Comp prepare & issue dp2
   4/29/88 (85) - Comp prepare & issue dp3
   5/31/88 (106)- Comp prepare & issue dp4
   To be determined - Comp prepare & issue dp5
2. Submit guaranteed maximum prices (gmp)
   3/25/88 (60) - Submit gmp for dp1
   4/20/88 (78) - Submit gmp for dp2
   5/26/88 (104) - Submit gmp for dp3
   5/31/88 (106) - Submit gmp for dp4
3. Start construction work
   4/25/88 (81) - Start construction of dp1 base building
   6/30/88 (128) - Start renovation under dp4
   9/11/89 (432) - Start site work under dp3 contract
   9/11/89 (432) - Start remodeling under dp2
4. Complete complete work
   6/1/89 (362) - Complete site work under dp3 contract
   6/1/89 (362) - Complete const dp1 work to start of tenant improvemnts
   7/31/89 (403) - Complete base building work under dp1
   8/15/89 (414) - Grand opening of new addition under dp1
   3/1/90 (552) - Complete remodeling dp2 base bldg to start of tenant work
   4/2/90 (574) - Complete remodeling base building under dp2
   4/27/90 (593) - Grand opening of dp2 contract work

G. General characteristics of project

1. Location - Delaton, New Hampshire

Faces on 20th Steet, access to Lohngren on west and Mill Run on east

2. Philosophy
   To constantly maintain an attractive, safe retail environment during const
3. Existing enclosed mall shopping center
   Built about 1971
   Gross existing building area = 150,000 sq ft
   Parking spaces = 1,000
   Anchors
      Travelers Merchandise - general department store
         Strong store
      Robertson Company - catalogue outlet
   25 tenant spaces in addition to anchors
   Areas presently unoccupied and available for construction use
      Col lines 22 to 25/A to D
      Col lines 5 to 6/D to D.5
4. Existing fast food building on outlot belongs to Carlsbad Holding
   To be maintained in operation at all times
5. Problems to be resolved
   Variances needed to remodel electrical and mechanical systems
   Must determine safety condition of existing electrical vaults
6. Laundry lists
   dp1 - new building close in work
   dp4 - mechanical and electrical remodeling work

H. Superceded data

1. Randy East - Carlsbad Holding - project manager - relocated 2/1/88 (21)

<u>II. 8:05:08 - July 27, 1988</u>

A. Project meeting #1 - in Carlsbad offices - July 27, 1988

B. By Jay Harvey

C. 01.0 - Those attending meeting

1. Frank Rogell - Carlsbad officer in charge
2. Charles Lugow - Carlsbad project manager
3. Charles Clemency - C & H principal in charge
4. Lorne MacIntosh - C & H project manager

4.24

5. Art Larkins - L & H principal in charge
6. Jay Harvey - T & J project manager

D. **02.0 - Agenda**
1. 2.01 - Review project characteristics
2. 2.02 - Prep smry netwk model for dp1, 2, 3 & 4 to confirm current key dates
3. 2.03 - Prepare laundry lists for early construction work in dp1
4. 2.04 - Prepare laundry lists for all construction work in dp4
5. 2.05 - Prepare network models for close in work for dp1
6. 2.06 - Prep network models for elect and mech remodelling under dp4

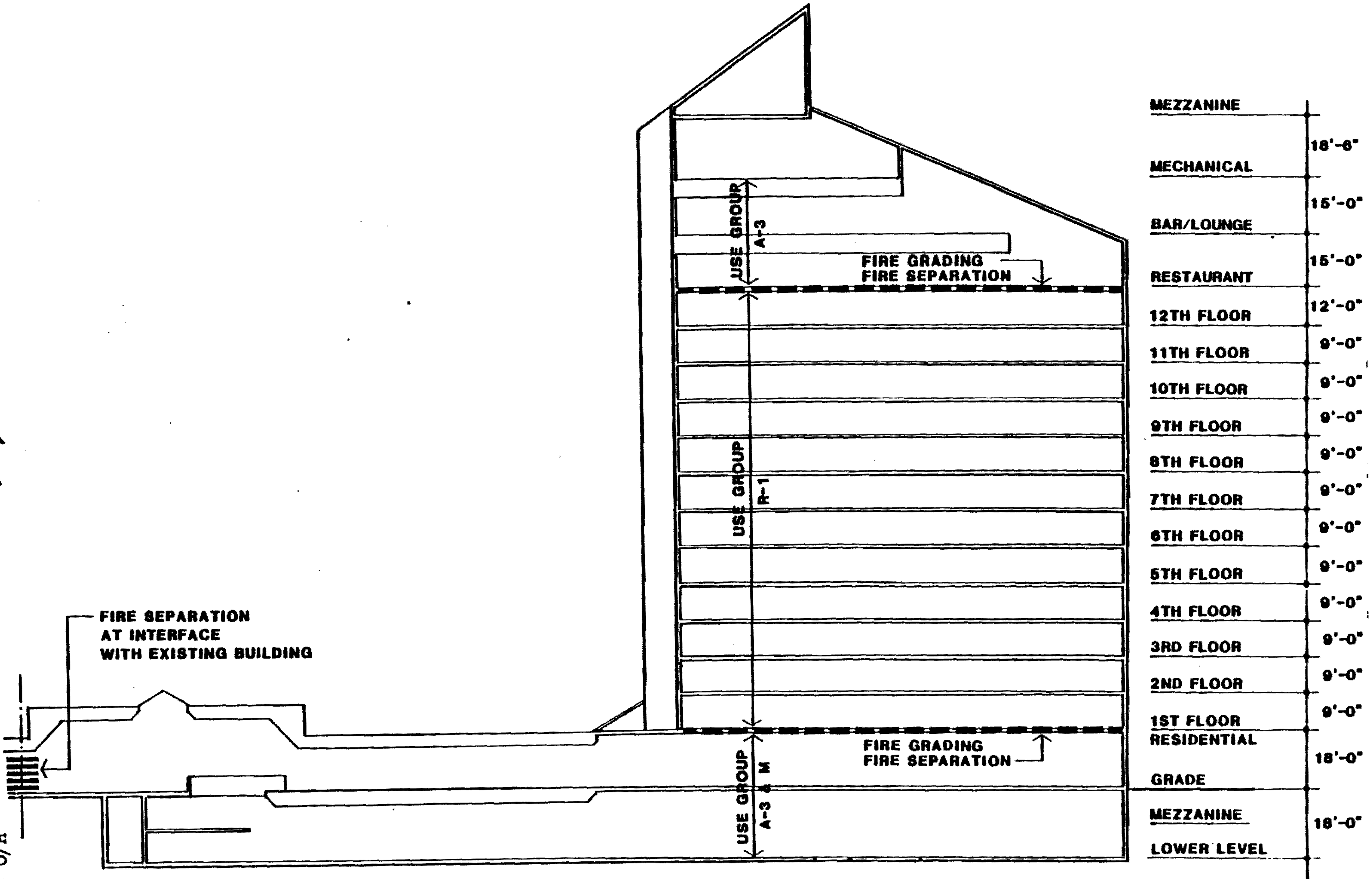
E. **03.0 - Current status of project**
1. 03.01 - Design
   03.0101 - All intermediate design package production dates being met
   03.0102 - Need cost data on alternate roofing details for dp1
2. 03.02 - Construction
   03.0201 - T & J currently preparing early estimates leading to GMP
3. 03.03 Owner working with all to define tenant continuity during const
   03.0301 - Having trouble with the Chocolate Poodle
   03.0302 - Records Inc and Fran's Dresses move set and agreed to

F. **04.0 - Old business**

G. **05.0 - New business**

H. **06.0 - Miscellaneous**
1. 06.01 - All parties agreed to current key dates listed above
2. 06.02 - Carlsbad agreed to review T & J sub prices & release appvl promptly
   06.0201 - Within 2 working days of receipt
3. 06.03 - Abbreviations generally three letters
   6.0301 - For names 1st letter of 1st name and 1st two letters of last name
   6.0302 - Traditional abbreviation to be maintained
4. 06.04 - All construction contracts will be with T & J
5. 06.05 - T & J contract currently on hourly and t & m basis
   06.0501 - Will reduce to gmp by iterative estimates
   06.0602 - gmp to be provided to Carlsbad by package content

4.25


MEZZANINE
18'-6"
MECHANICAL
15'-0"
BAR/LOUNGE
15'-0"
RESTAURANT
12'-0"
12TH FLOOR
9'-0"
11TH FLOOR
9'-0"
10TH FLOOR
9'-0"
9TH FLOOR
9'-0"
8TH FLOOR
9'-0"
7TH FLOOR
9'-0"
6TH FLOOR
9'-0"
5TH FLOOR
9'-0"
4TH FLOOR
9'-0"
3RD FLOOR
9'-0"
2ND FLOOR
9'-0"
1ST FLOOR
RESIDENTIAL
18'-0"
GRADE
MEZZANINE
18'-0"
LOWER LEVEL
USE GROUP A-3
FIRE GRADING
FIRE SEPARATION
USE GROUP R-1
FIRE GRADING
FIRE SEPARATION
USE GROUP A-3 & M
FIRE SEPARATION
AT INTERFACE
WITH EXISTING BUILDING

H/O 240

CONTRACT DOCUMENT MATRIX SUMMARY
GRAND TRAVERSE RESORT VILLAGE TOWER & LOW RISE
D106 - RALPH J. STEPHENSON PE PC - DATE PRINTED: JAN 12 1985

I	S	ACTIVITY DESC	AL	LB	LL	LR	TW	SI	EB	REC#
A	-	SET HORIZ & VERT CONTROLS	A	-	-	-	-	A	-	4
A	-	MASS EXCAVATE TO 677'4	A	-	-	-	-	A	-	5
A	-	HAUL EXCAVATION TO BORROW AREA	A	-	-	-	-	A	-	6
A	-	CONSTRUCT HAUL ROAD	-	-	-	-	-	A	-	7
A	-	KEEP EXISTING ROADS CLEAN	-	-	-	-	-	A	-	8
A	-	REMOVE ABANDONED UTIL IN EXCAV AREAS	-	-	-	-	-	A	-	9
A	-	STRIP BLDG SITE & STOCKPILE TOPSOIL	A	-	-	-	-	A	-	10
A	-	DEMOLISH EXISTING ROAD IN EXCAV AREAS	-	-	-	-	-	A	-	11
B	-	OBTAIN FOUNDATION PERMIT	B	-	-	-	-	-	-	28
B	-	EXCAVATE FOOTINGS-NOT FOR SLB ON GRD	B	-	-	B	B	-	-	14
B	-	ERECT NECESSARY CONSTRUCTION FENCING	B	-	-	-	-	-	-	12
B		PART BACKFILL AT EXT FOUND WALLS	B	-	B	B	B	-	B	72
B	-	LAY OUT BUILDING	B	-	-	-	-	-	-	13
B	-	BACKFILL INT FOUND TO EL ?	B	-	-	B	B	-	-	19
B	-	LAY DRAIN TILE AT PITS	-	-	-	-	B	-	-	22
B	X	EFRP PIT SOG	-	-	-	-	B	-	-	20
B	X	FRP EXT LOWER LEVEL WALLS	B	-	B	B	B	-	-	15
B	X	EFRP COL FTGS	B	-	-	B	B	-	B	17
B	X	EFRP WALL FOOTINGS	B	-	-	B	B	-	-	18
B	X	DRIVE SHEETING AT EXISTING BLDG	-	-	-	B	-	-	B	23
B	X	PART APPLY EXT WALL WATERPROOFING	B	-	B	B	B	-	-	25
B	X	PART INSTL EXT WALL DRAIN TILE	B	-	B	B	B	-	B	34
B	X	FRPS COLS TO LOBBY LEVEL	-	-	-	B	-	-	-	24
B	X	FRPS COLS TO LL MEZZ	-	-	-	B	B	-	-	26
C	-	BACKFILL & COMPACT AT PITS	-	-	-	-	C	-	-	21
C	-	COMP INSTL DRAIN TILE AT EXT WALLS	C	-	-	-	-	-	-	36
C	X	APPLY PIT WATERPROOFING	-	-	-	-	C	-	-	16
C	X	FRPS ELEV 5 WALLS TO LB	-	-	-	-	C	-	-	27
C	X	INSTALL TRENCH DRAIN COVERS	-	-	C	C	-	-	-	29
C	X	INSTALL STEEL STAIRS & FILL	C	-	-	-	-	-	-	31
C	-	COMPLETE PHASE 2 ECAVATION	-	-	C	C	-	-	C	33
C	X	FRP PIT WALLS	-	-	-	-	C	-	-	189
C	-	BACKFILL EXT BUILDING WALLS	C	-	-	-	-	-	-	38
C	-	BACKFILL EXT RETAINING WALL	-	-	-	-	-	C	-	35
C	X	EFRP RETAINING WALL FOOTING	-	-	-	-	-	C	-	37
C	X	FRPS RETAINING WALL STEM	-	-	-	-	-	C	-	39
C	-	EXCAVATE FOR ALL SLABS ON GRADE	-	-	C	C	C	-	-	49
C	-	POUR OUT SUPPORTED DECKS	C	-	-	C	C	-	-	53
C	-	DEMOLISH EXISTING CANOPY	-	-	-	-	-	-	C	77
C	X	CURE, PART & TOTAL STRIP SUPTD DECKS	C	-	-	C	C	-	-	51
C	X	INSTL ELECT GROUNDING SYSTEM	C	-	-	-	-	-	-	52
C	X	FRPS COLUMNS ABOVE LOBBY LEVEL	C	-	-	-	C	-	-	54
C	X	FRPS COLS ABOVE LL MEZZ	-	-	C	C	C	-	-	43
C	X	CURE, STRIP & RESHORE SUPTD DECKS	C	-	-	C	C	-	-	50
C	X	ERECT MISC MTLS RELATED TO SS CONC WOR	C	-	-	-	-	-	-	190
C	X	CONSTRUCT LB SLABS ON GRADE	-	C	-	-	-	-	C	46
C	X	INSTL MISC IRON SKIN EMBEDS & SUPPORTS	C	-	-	-	C	-	-	56
C	X	COMP APPLY EXTERIOR WALL WATERPROOFING	C	-	-	-	-	-	-	42
C	X	FORM & SET IN FLOOR WORK FOR SUPTD DKS	C	-	-	C	C	-	-	55
C	X	INSTL EXPANSION JOINTS & RELATED EMBED	C	-	-	-	-	-	-	44
C	X	CONSTRUCT LL SLABS ON GRADE	C	-	C	C	C	-	-	57
C	X	INSTL MATERIAL & PERSONNEL HOIST	C	-	-	-	-	-	-	47
C	X	PROVIDE CONTRACT C HOISTING	C	-	-	-	-	-	-	48
C	X	CONSTRUCT TOWER LL MEZZ DECK	-	-	C	-	C	-	-	41

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CONTRACT DOCUMENT MATRIX SUMMARY
GRAND TRAVERSE RESORT VILLAGE TOWER & LOW RISE
D106 - RALPH J. STEPHENSON PE PC - DATE PRINTED: JAN 1 2 1985

I	S	ACTIVITY DESC	AL	LB	LL	LR	TW	SI	EB	REC#
D	X	FURNISH ELEVATOR EMBEDMENTS	-	-	-	-	D	-	-	192
D	X	INSTALL ELEVATOR RAILS, EQUIP, CAB	-	-	-	-	D	-	-	58
D	X	INSTALL ELEVATOR HYDRAULIC CYLINDER	-	-	-	-	D	-	-	59
E	X	ERECT LR METAL FLOOR & ROOF DECK	-	-	-	E	-	-	E	108
E	X	ERECT, PLUMB & BOLT LR STRUCT STL & JS	-	-	-	E	-	-	E	107
F	X	INSTL EXT SKIN MISC METALS	F	-	-	-	-	-	-	60
F	X	INSTALL SLIDING DOORS	-	-	-	-	F	-	-	79
F	X	INSTALL CURTAIN WALL GLASS	-	-	-	-	F	-	-	82
F	X	ERECT ALUM SIDING	-	-	-	-	F	-	-	75
F	X	ERECT CURTAIN WALL FRAMING	-	-	-	-	F	-	-	81
F	X	INSTALL BALCONY RAILS	-	-	-	-	F	-	-	78
G	X	INSTL PLUMBING FIXTURES	G	-	-	-	-	-	G	145
G	X	INSTL SPRINKLER HEADS	G	-	-	-	-	-	G	169
G	X	INSTL GRILLS & DIFFUSERS	G	-	-	-	-	-	G	139
G	X	INSTL FAN COIL UNITS	-	-	-	-	G	-	-	142
G	X	PROCURE FAN COIL UNITS	G	-	-	-	-	-	-	99
G	X	PROCURE WATER SOFTENER	G	-	-	-	-	-	-	94
G	X	PROCURE CHILLERS	G	-	-	-	-	-	-	101
G	X	PROCURE DOMESTIC WATER TANKS	G	-	-	-	-	-	-	93
G	X	PROCURE BOILER	G	-	-	-	-	-	-	100
G	X	PROCURE COOLING TOWER (OR COND)	G	-	-	-	-	-	-	98
G	X	PROCURE FIRE PUMPS	G	-	-	-	-	-	-	96
G	X	PROCURE HOT WATER TANK	G	-	-	-	-	-	-	91
G	X	PROCURE DOMESTIC WATER PUMPS	G	-	-	-	-	-	-	92
G	X	PROCURE AIR HANDLING UNITS	G	-	-	-	-	-	-	95
G	-	INST AF DOMESTIC MECH PIPING	G	-	-	-	-	-	G	134
G	-	INSTL HARD CEILING SUSP & BLACK IRON	G	-	-	-	-	-	G	167
G	-	INSTL STUDS & IN WALL WORK	G	-	-	-	-	-	G	164
G	X	EIB UG UTIL AT LL SLAB ON GRADE	G	-	G	G	G	-	-	32
G	X	INSTL WATER HEATING SYSTEM	G	-	-	-	-	-	G	159
G	X	INSTL OUTSIDE GREASE TRAP	G	-	-	-	-	-	-	160
G	X	INSTL HOOD DUCTS	G	-	-	G	G	-	-	136
G	X	EIB UG UTIL AT LB LVL SLAB ON GRADE	-	G	-	-	-	-	G	30
G	X	INSTL INSIDE GREASE TRAP	G	-	-	-	-	-	-	161
G	X	INSTL AF SHT MTL DUCTWK	G	-	-	-	-	-	G	133
G	X	INSTL & PIPE FUEL TANK	G	-	-	-	-	G	G	162
G	X	INSTALL ROOF EQUIP CURBS	-	-	-	G	-	-	-	104
G	X	INSTL SIAMESE CONNECTIONS	G	-	-	-	-	-	G	131
G	X	INSTALL ROOF MOUNTED EQUIP	-	-	-	G	-	-	-	105
G	X	INSTL HOSE BIBBS	G	-	-	-	-	-	G	130
G	-	INSTL MECH SLEEVES	G	-	-	-	-	-	G	125
G	X	INSTL ALL MECH EMBEDS IN C CONCRETE	G	-	-	-	-	-	-	45
G	-	TEST & BALANCE MECHANICAL SYSTEMS	G	-	-	-	-	-	G	188
G	X	INSTL SPRINKLER SYSTEM	G	-	-	-	-	-	G	132
G	X	SET & PIPE CHILLER	G	-	-	-	-	-	-	152
G	X	INSTALL WATER HEATING EQUIP	G	-	-	-	-	-	-	106
G	X	SET & HOOK UP JACUZZIS	-	-	-	-	G	-	-	143
G	X	INSTL TOILET ROOM ACCESSORIES	G	-	-	-	-	-	G	149
G	X	INSTL VV BOXES	G	-	-	-	-	-	G	140
H	X	PROCURE MECH CONTROL SYSTEMS	H	-	-	-	-	-	-	88
H	X	INSTL ELECT TRIM ITEMS	H	-	-	-	-	-	H	123
H	X	INSTL LIGHT FIXT	H	-	-	-	-	-	H	120
H	X	PROCURE EMERGENCY GENERATOR	H	-	-	-	-	-	-	87
H	X	PROCURE TRANSFORMERS	H	-	-	-	-	-	-	102

CONTRACT DOCUMENT MATRIX SUMMARY
GRAND TRAVERSE RESORT VILLAGE TOWER & LOW RISE
D106 - RALPH J. STEPHENSON PE PC - DATE PRINTED: JAN 1 2 '985

I	S	ACTIVITY DESC	AL	LB	LL	LR	TW	SI	EB	REC#
H	X	PROCURE MOTOR CONTROL CENTERS	H	-	-	-	-	-	-	97
H	X	PROCURE UNIT SUBSTATIONS	H	-	-	-	-	-	-	86
H	X	PROCURE SWITCH GEAR	H	-	-	-	-	-	-	89
H	-	INSTL ABOVE FLOOR ROUGH ELECT WORK	H	-	-	-	-	-	H	170
H	-	INSTL HARD CEILING SUSP & BLACK IRON	H	-	-	-	-	-	H	168
H	-	INSTL EXPOSED RUFF ELECT COND & FEEDER	H	-	-	-	-	-	H	119
H	X	INSTL POWER PANEL BOXES	H	-	-	-	-	-	-	117
H	X	INSTL LIGHT PANEL BOXES	H	-	-	-	-	-	-	118
H	X	INSTL STUDS & IN WALL WORK	H	-	-	-	-	-	H	165
H	-	INSTL TV CONDUIT	H	-	-	-	-	-	H	127
H	-	INSTL EMBEDDED ELECT CONDUIT	H	-	-	-	-	-	-	115
H	-	INSTL ELECT SLEEVES	H	-	-	-	-	-	H	124
H	-	INSTL EMBEDDED ELECT BOXES	H	-	-	-	-	-	-	116
H	X	INSTL TELEPHONE CONDUIT	H	-	-	-	-	-	H	126
H	X	INSTL ALL ELECT EMBEDS IN C CONCRETE	H	-	-	-	-	-	-	40
H	X	INSTL FIRE SAFETY CONDUIT	H	-	-	-	-	-	H	128
H	-	TEST & BALANCE ELECTRICAL SYSTEMS	H	-	-	-	-	-	H	141
H	X	PROCURE ELECT CONTROL SYSTEMS	H	-	-	-	-	-	H	114
H	X	INSTL & HOOK UP ELECT EQUIP	H	-	-	-	-	-	-	129
H	X	INSTL GROUNDING MAT	H	-	-	-	-	-	-	121
H	X	INSTL LIGHTENING ARRESTER SYSTEM	H	-	-	-	-	-	-	122
J	X	FRP EQUIP BASES	J	-	-	-	-	-	J	1
J	X	PROCURE TRASH COMPACTOR	J	-	-	-	-	-	-	90
J	-	INSTL HARD CEILING SUSP & BLACK IRON	J	-	-	-	-	-	J	166
J	X	INSTL STUDS & IN WALL WORK	J	-	-	-	-	-	J	163
J	X	ERECT INTERIOR MASONRY	J	-	J	J	J	-	J	62
J	X	INSTL LINEN CHUTE	-	-	-	-	J	-	-	148
J	X	INSTL TRASH COMPACTOR	J	-	-	-	-	-	-	171
J	X	INSTL TRASH CHUTE	-	-	-	-	J	-	-	147
J	X	INSTALL INT HOLLOW METAL FRAMES	J	-	-	-	-	-	-	103
J	X	INSTALL DOCK LEVELLERS	-	-	J	J	-	-	-	61
J	X	INSTL SHOWER PANS	J	-	-	-	-	-	J	146
J	O	INSTALL INSULATION AT EXPOSED SOFFITS	-	-	-	J	J	-	J	63
J	X	INSTALL PLASTER SOFFITS	-	-	-	J	J	-	J	80
J	-	HANG BOARD	J	-	-	-	-	-	J	174
J	-	TAPE & SAND BOARD	J	-	-	-	-	-	J	175
J	X	INSTL ACOUST CLG SUSP & GRID	J	-	-	-	-	-	J	181
J	X	INSTL SIGNAGE	J	-	-	-	-	-	J	183
J	X	INSTL VANITIES	J	-	-	-	-	-	J	173
J	X	APPLY FP TO HOOD DUCT	J	-	-	J	J	-	-	137
J	X	INSTL APPLIANCES	-	-	-	-	J	-	-	150
J	X	INSTALL PLASTIC LAM DOORS & HARDWARE	J	-	-	-	-	-	-	109
J	X	INSTL RESILIENT FLOORING	J	-	-	-	-	-	J	180
J	X	INSTALL DUMBWAITER	-	-	-	-	J	-	-	2
J	X	INSTL MILLWORK & TRIM	J	-	-	-	-	-	J	172
J	X	INSTL INTERIOR LANDSCAPING	J	-	-	-	-	-	J	185
J	X	INSTL CERAMIC TILE	J	-	-	-	-	-	-	144
J	X	INSTL ACOUST CLG PANELS	J	-	-	-	-	-	J	182
J	X	INSTL QUARRY TILE	J	-	-	-	-	-	J	179
J	X	INSTALL INT WOOD DOORS & HARDWARE	J	-	-	-	-	-	-	111
J	X	INSTALL INT HARDWARE	J	-	-	-	-	-	-	112
J	X	INSTALL INT HOLLOW METAL DOORS	J	-	-	-	-	-	-	110
J	X	LAY CARPETING IN CORR & PUBL SPACES	J	-	-	-	-	-	J	177
J	X	INSTL VINYL WALL COVERING	J	-	-	-	-	-	J	187

HO 241 pg 3

CONTRACT DOCUMENT MATRIX SUMMARY
GRAND TRAVERSE RESORT VILLAGE TOWER & LOW RISE
D106 - RALPH J. STEPHENSON PE PC - DATE PRINTED: JAN 1 2 1985

I	S	ACTIVITY DESC	AL	LB	LL	LR	TW	SI	EB	REC#
J	X	PAINT REQUIRED SURFACES	J	-	-	-	-	-	J	176
J	X	INSTL CLOSET DOORS	-	-	-	-	J	-	-	184
J	X	INSTL INT DOORS & HARDWARE	J	-	-	-	-	-	J	157
J	X	INSTL TOILET ROOM PARTITIONS	J	-	-	-	-	-	J	151
K	X	INSTL FOOD SERVICE ROUGH IN	K	-	-	-	-	-	-	154
K	-	FIELD MEASURE FOR FOOD SERVICE EQUIP	K	-	-	-	-	-	-	155
K	X	INSTL HOOD FIRE PROTECTION	K	-	-	M	M	-	-	138
K	-	RUN IN FOOD SERVICE EQUIP & TRAIN STAF	K	-	-	-	-	-	-	186
K	X	INSTALL FOOD SERVICE EQUIP	K	-	-	-	-	-	-	113
K	X	INSTL HOODS	K	-	-	M	M	-	-	135
K	X	FAB & DEL FOOD SERVICE EQUIP	K	-	-	-	-	-	-	156
K	X	INSTL FOOD SERVICE EQUIPMENT	K	-	-	-	-	-	-	153
M	X	ERECT TOWER METAL DK	-	-	-	-	M	-	-	195
M	X	ERECT, PLUMB & BOLT TOWER STRUCT STEEL	-	-	-	-	M	-	-	194
N	X	INSTALL EXT LOUVERS	-	-	-	N	N	-	-	76
N	X	INSTALL ROLLING STEEL DOORS	-	-	N	N	-	-	-	69
N	X	INSTALL EXT HOLLOW METAL DOORS	N	N	N	N	N	-	N	70
N	X	INSTALL EXT ENTRY FRAMING	N	N	-	N	N	-	N	84
N	X	INSTALL EXT HARDWARE	N	N	N	N	N	-	N	85
N	X	APPLY BALCONY TOPPINGS	-	-	-	-	N	-	-	83
N	X	ERECT EXTERIOR MASONRY	N	-	-	N	N	-	N	64
N	X	INSTALL EXT HOLLOW METAL FRAMES	N	N	N	N	N	-	N	71
N	X	ERECT STOREFRONT FRAMING	N	N	-	N	N	-	N	67
N	X	INSTALL STOREFRONT GLASS	N	N	-	N	N	-	N	68
N	X	INSTALL LR INSULATION,SHT MTL & RFG	N	-	-	N	-	-	N	73
N	X	INSTALL ENTRY GLASS	N	N	-	N	N	-	N	74
P	X	INSTALL SKYLITE GLASS	-	-	-	P	-	-	-	66
P	X	INSTALL SLOPED GLAZING	-	-	-	-	P	-	-	193
P	X	INSTL BALCONY GLASS	-	-	-	-	P	-	-	191
P	X	INSTALL SKYLITE FRAMING	-	-	-	P	-	-	-	65
P	X	INSTALL WINDOW WASHING EQUIPMENT	-	-	-	-	P	-	-	3
Z	X	LAY CARPET AT GUEST ROOMS	-	-	-	-	Z	-	-	178

HO 241 pg 4

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER

SUBMITTAL TURN AROUND TIMES

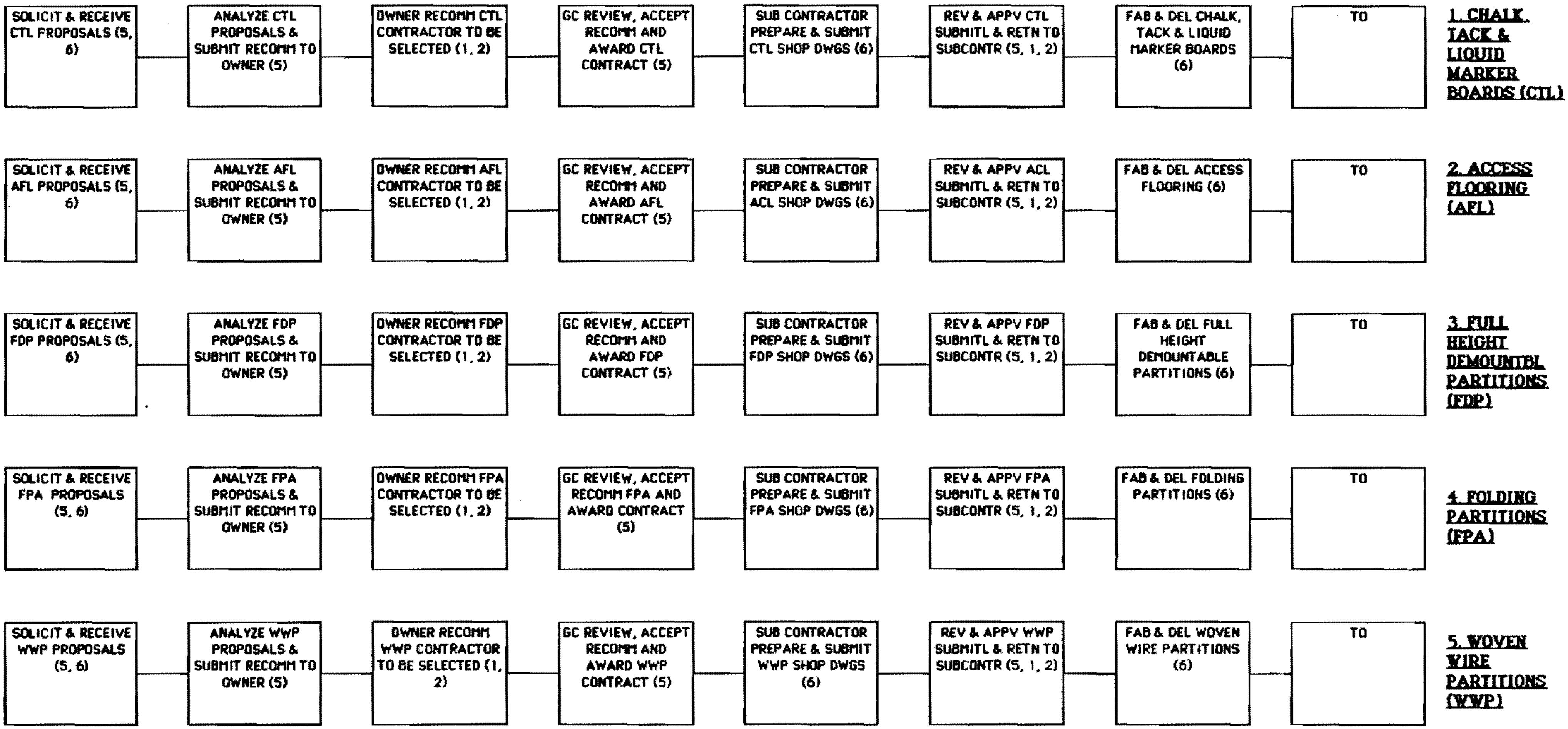
TIME REQUIRED IN WORKING DAYS

	ACTION	NORMAL	EXPEDITED	SUPER EXPEDITED
1	* PRIME CONTRACTOR LOG IN & CHECK	1+2 3	1+1 2	1/2 + 1 1 1/2
2	PRIME CONTRACTOR TRANSMIT TO A/E	3	1	1
3	A/E LOG IN & CHECK	1+15 16	1+10 11	1/2 + 5 5 1/2
4	A/E TRANSMIT TO PRIME CONTRACTOR	3	1	1
5	PRIME CONTRACTOR LOG IN & REVIEW	1+2 3	1+1 2	1/2 + 1/2 1
6	** PRIME CONTRACTOR TRANSMIT TO SUBCONTRACTOR	3	1	1
	TOTALS	31 WKG DAYS	18 WKG DAYS	11 WKG DAYS

* TABULATION TAKEN FROM POINT IN TIME WHERE SUBMITTAL ARRIVES AT PRIME CONTRACTOR'S OFFICE.

** TABULATION ENDS WHEN APPROVED SUBMITTAL ARRIVES AT SUBCONTRACTOR'S OFFICE.

HO 239



A 32

ph J Stephenson PE PC
isulting Engineer
)64 Warwick Road
roit, Michigan 48223
313 273 5026

DIVISION 10

ITEMS INCLUDED

1. Chalk, tack & liquid marker boards (ctl)
2. Access flooring (afl)
3. Full height demountable partitions (fdp)
4. Folding partitions (fop)
5. Woven wire partitions (wwp)

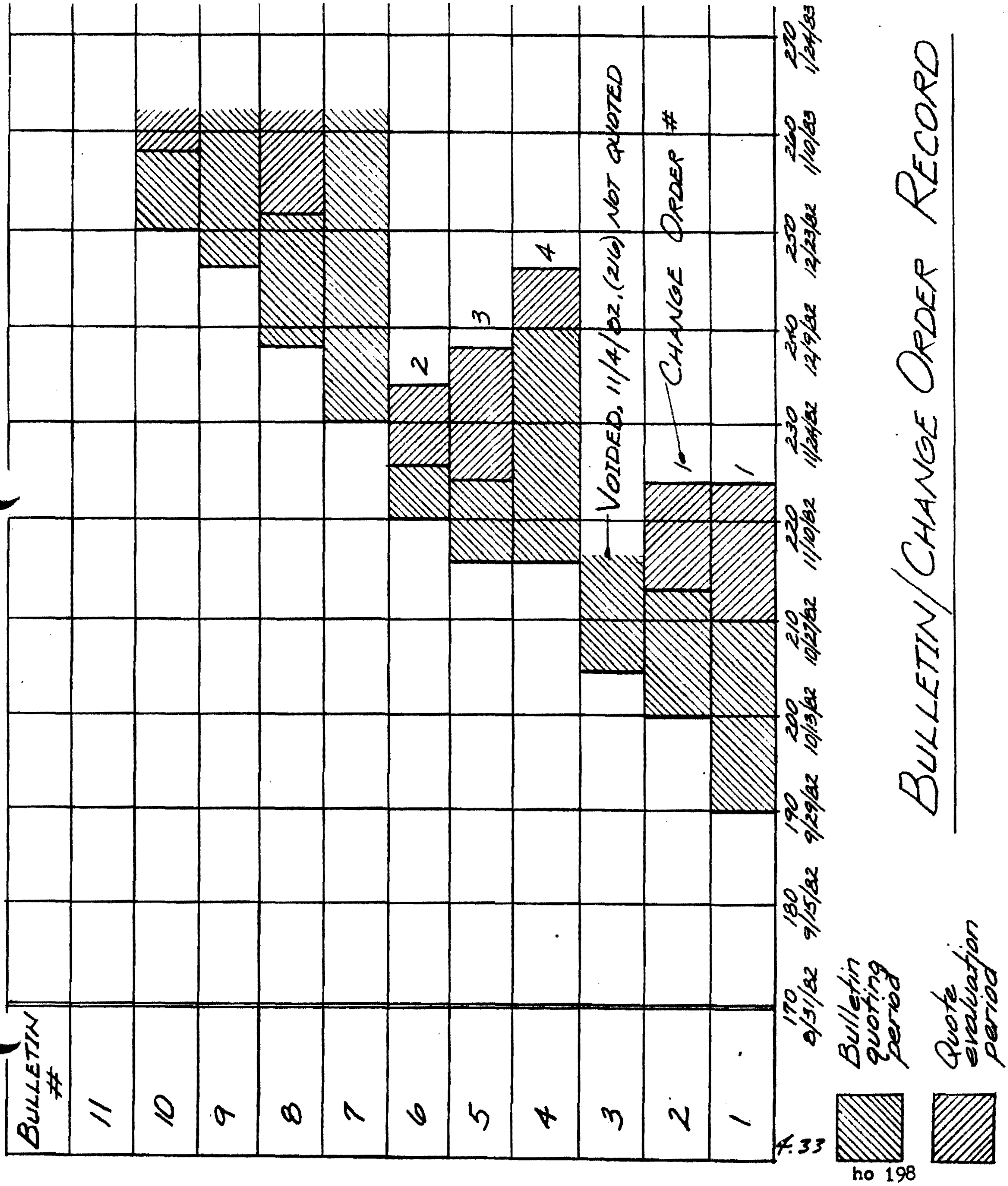
Issue #1 - January 28, 1988
i ldiv 10sht lprocumt - d129
ho 300 - Feb, 88

PROCUREMENT NETWORK MODEL FOR TRINITY LAB & OFFICE BUILDING MARTINLY, OKLAHOMA

Genetoli Construction Company
Contractors - Travis, Oklahoma

SHEET
P10-01

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER



BULLETIN/CHANGE ORDER RECORD

① LINE #	② EQUIPMENT DESCRIPTION & WHO FURNISHES	③ PRESENT LOCATION OF EQUIP	④ FINAL LOCATION	⑤ ACTION TO BE TAKEN & BY WHOM	⑥	⑦ OTHER EQUIP AFFECTED	⑧ REMARKS
1	2 existing compressed air tanks (Telco)	Existing paint shop	New building paint dept	Relocate	Falstaff	New compressors must be ready to run	
				Set	Young & Falstaff		
				Hook up	Falstaff		
2	3 existing paint spray booths (Telco)	NW corner existing building	New building paint dept	Move & Set	Young	—	
				Hook up	Telco		
3	2 new paint spray booths (Falstaff)	New	New building paint dept	Erect	Young	—	
				Hook up	Telco		
4	6 existing column mounted jib cranes (Telco)	Cols 6C 5D 7D 3F 4C 2F	New bldg Cols 10A 11A 10B 11B 10C 11C	Remove	Telco	—	
				Move & Instl	Young		
5	2 new prefab shop offices 10'x15'x8' (Young)	New	1 in new bldg lab area 1 in existg bldg QA area	Erect	Young	In existg bldg after Telco clears space (watch!)	
				Mech/Elect	Telco		

Abbreviations

NW Northwest
QA Quality Assurance

EQUIPMENT ACTIVITY TABULATION

R ARKS 1
F ARKS 2
EL DESCR
LOCATION
REC# ROL# P# DTE YR CAM FLM SPD JOB # F TY

SIDEWALK & ROAD INTO HOTEL AT TRAVERSE BAY RESORT

TRAVERSE RESORT DRIVEWAY
TRAVERSE CITY, MICH
53 0024 00 0904 84 XA ASA 100 84037 PCO

TRAVERSE BAY RESORT DESIGN CONFERENCE. WAYNE BRYAN, ED SIEGEL, CARMINE & JERRY SHEA DISCUSS A POINT WITH A BEAUTIFUL BACKGROUND
WAYNE,ED,CARMINE,JERRY MEET
TRAVERSE CITY, MICH
54 0024 01 0904 84 XA ASA 100 84037 PCO

CONDOMINIUMS AT TRAVERSE BAY RESORT FROM DEVELOPMENT OFFICE BALCONY
TRAVERSE RESORT CONDOMINIUMS
TRAVERSE CITY, MICH
55 0024 02 0904 84 XA ASA 100 84037 PCO

CONCRETE COLUMN CAPITAL IN KLING OFFICE SEMINAR ROOM. TAKEN AT PROJECT MANAGEMENT SEMINAR
NG SEMINAR ROOM COL
LADELPHIA, PENN
56 0024 03 0907 84 XA ASA 100 84034 PCO

PHIL BENNETT ENJOYING MOMENT OF RELAXATION AT KLING PROJECT MANAGEMENT SEMINAR
PHIL BENNET AT KLING SEMINAR
PHILADELPHIA, PENN
57 0024 02 0907 84 XA ASA 100 84034 PCO

BOB & BETTY INSPECT BASEMENT OF FARM HOUSE BEING TOURED BY BOB & BETH

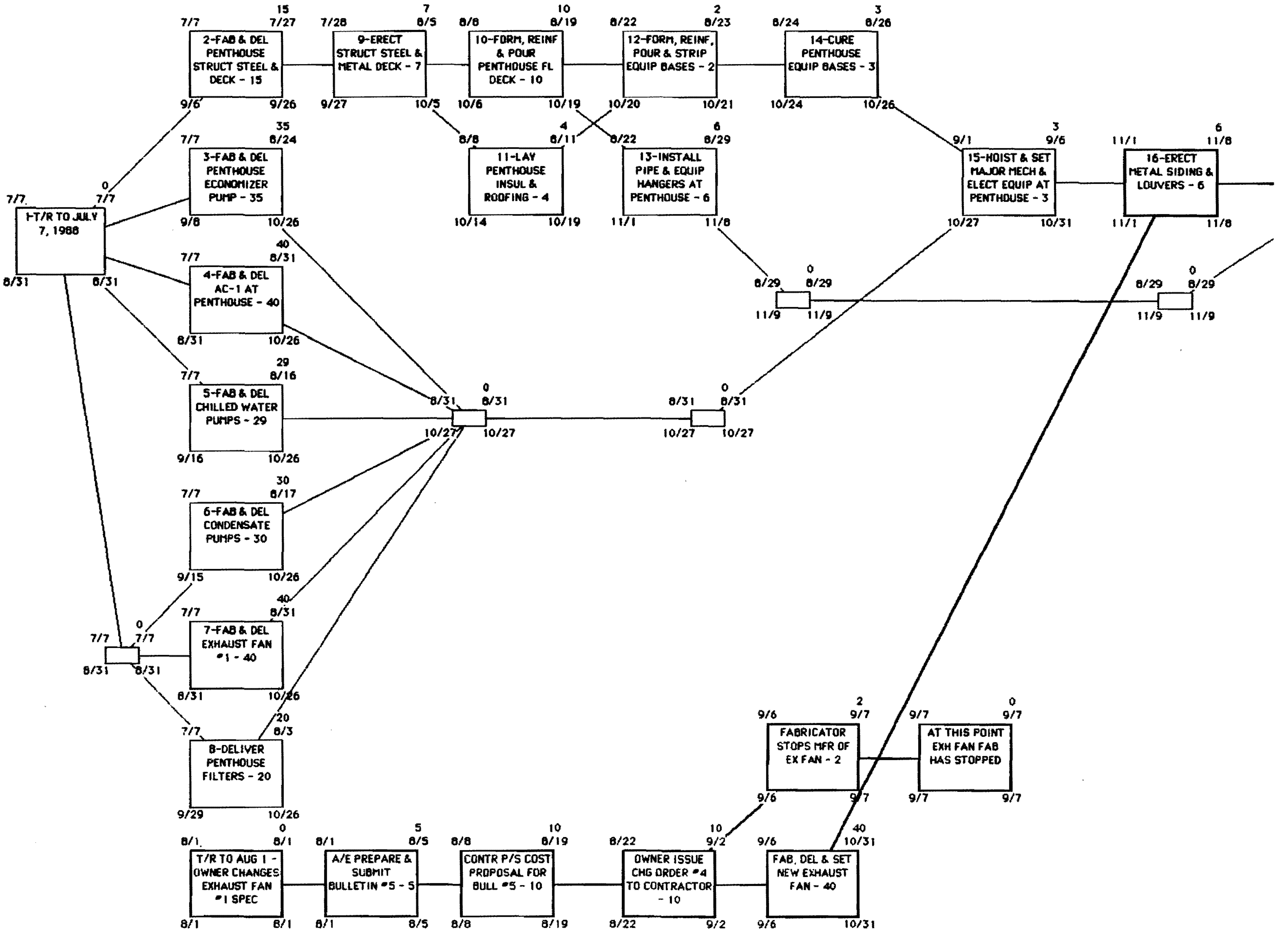
BOB & BETTY IN HOUSE BSMT
NEAR SALINE, MICH
58 0024 05 0909 84 XA ASA 100 P PCO

DEMOLISHED AND REMOVED ROOF SLABS FROM WATER PLANT FLOCULATION TANK ROOFS
WATER PLANT PRECAST DECKS
FLINT, MICH
59 0024 06 0911 84 XA ASA 100 84026 PCO

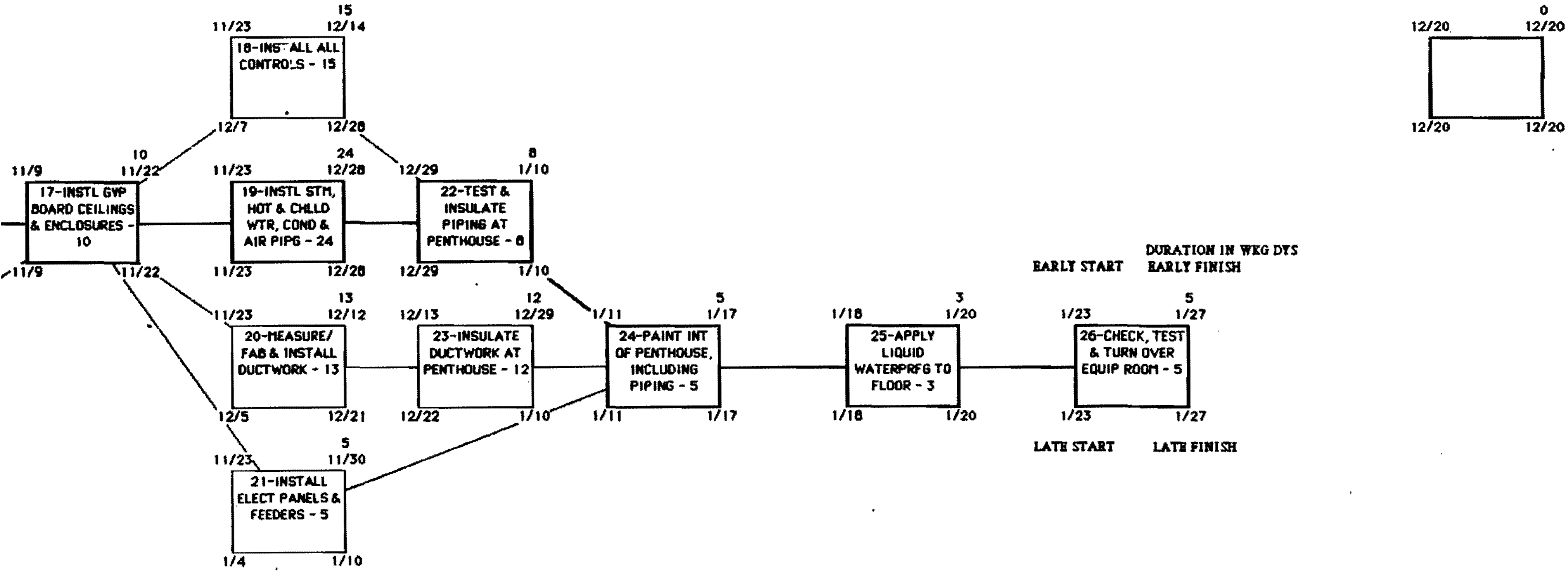
CRANE REMOVING ROOF PLANK FROM FLOCULATION TANKS AT WATER PLANT

REMOVING PC AT WATER PLANT
INT, MICH
60 0024 07 0911 84 XA ASA 100 84026 PCO

H/O 242


1-T/R TO JULY 7, 1988
2-FAB & DEL PENTHOUSE STRUCT STEEL & DECK - 15
3-FAB & DEL PENTHOUSE ECONOMIZER PUMP - 35
4-FAB & DEL AC-1 AT PENTHOUSE - 40
5-FAB & DEL CHILLED WATER PUMPS - 29
6-FAB & DEL CONDENSATE PUMPS - 30
7-FAB & DEL EXHAUST FAN #1 - 40
8-DELIVER PENTHOUSE FILTERS - 20
9-ERECT STRUCT STEEL & METAL DECK - 7
10-FORM, REINF & POUR PENTHOUSE FL DECK - 10
11-LAY PENTHOUSE INSUL & ROOFING - 4
12-FORM, REINF, POUR & STRIP EQUIP BASES - 2
13-INSTALL PIPE & EQUIP HANGERS AT PENTHOUSE - 6
14-CURE PENTHOUSE EQUIP BASES - 3
15-HOIST & SET MAJOR MECH & ELECT EQUIP AT PENTHOUSE - 3
16-ERECT METAL SIDING & LOUVERS - 6
T/R TO AUG 1 - OWNER CHANGES EXHAUST FAN #1 SPEC
A/E PREPARE & SUBMIT BULLETIN #5 - 5
CONTR P/S COST PROPOSAL FOR BULL #5 - 10
OWNER ISSUE CHG ORDER #4 TO CONTRACTOR - 10
FAB, DEL & SET NEW EXHAUST FAN - 40
FABRICATOR STOPS MFR OF EX FAN - 2
AT THIS POINT EXH FAN FAB HAS STOPPED

#36



4.37

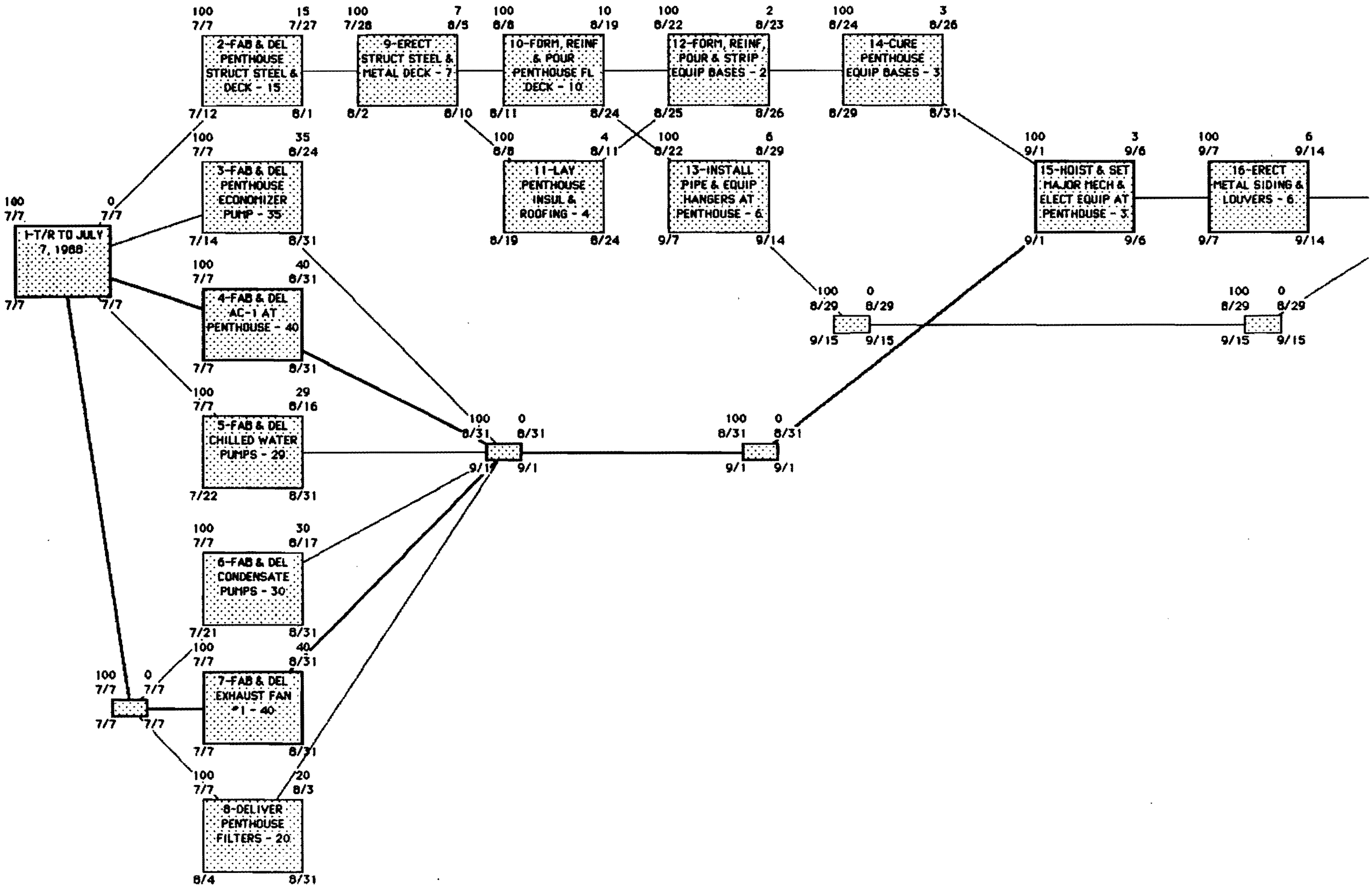
Base Plan of Action

Issue #1 - July 7, 1988
Issue #2 - August 2, 1988
333 - disk 162

NETWORK MODEL FOR CLARION OFFICE BUILDING PENTHOUSE MECHANICAL EQUIPMENT ROOM #1

Luther Mechanical Contractors
Detroit, Michigan

sheet
ph-1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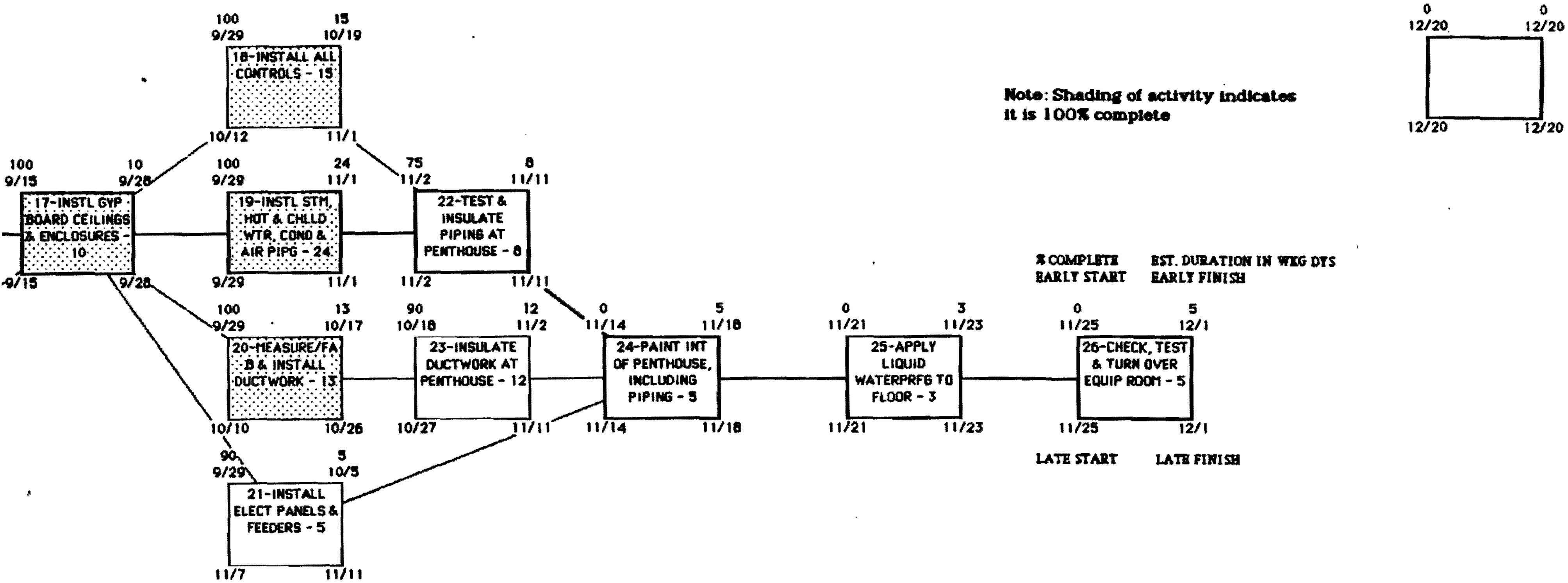
13-INSTALL PIPE & EQUIP HANGERS AT PENTHOUSE - 6
14-CURE PENTHOUSE EQUIP BASES - 3
15-HOIST & SET MAJOR MECH & ELECT EQUIP AT PENTHOUSE - 3
16-ERECT METAL SIDING & LOUVERS - 6

4.38



Note: Shading of activity indicates it is 100% complete

Issue #1 - July 1, 1988
Issue #2 - monitor 11/3/88
332 lcm phi montr - disk 162

Project Status as of November 3, 1988

NETWORK MODEL FOR CLARION OFFICE BUILDING PENTHOUSE MECHANICAL EQUIPMENT ROOM #1

Luther Mechanical Contractors
Detroit, Michigan

sheet
ph-1

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

CONTROL SYSTEM TECHNIQUES

Color Coding

Color coding is used to qualitatively evaluate project status. The status indicator colors described below are drawn on the solid task arrows, with the end of the color line shown at the approximate percentage of the task complete. The color line end is dated with the current calendar date.

Green

Task on time - currently not past early finish (EF) date.

Orange

Task on time - currently past early finish (EF) date.

Blue

Task behind - currently not past late finish (LF) date.

Yellow

Task behind - currently past late finish (LF) date.

Note that the evaluation is made on the basis of the current date. Changes in color are significant, indicating a deteriorating or improving sequence of work depending upon the progression. Color coding is primarily used to locate undesirable trends in work progress and to show job history.

Description of Various Listings

The computer output is issued in five (5) major listings - by ascending order of node numbers (node sequence), by ascending order of early start dates (ES sequence), by ascending order of late start dates (LS sequence), by ascending order of late finish dates (LF sequence), and by ascending order of available float time (TF sequence).

Node Sequence

The node sequence is arranged in ascending order, first by i node number, then by j node number, where i node numbers are the same. This is the master list from which all revisions are made. It is also the listing used when referring from the arrow diagram into the computer printout for information.

CONTROL SYSTEM TECHNIQUES
(Page 2)

Node Sequence (continued)

All dummy arrows are shown in this listing since subsequent changes to the network (updating) must be shown on the node sequence list to revise the computer input.

Early Start (ES) Sequence

The early start sequence lists all tasks in ascending order of their earliest possible starting dates. The ES listing is used most often by field management as a check list.

Late Start (LS) Sequence

The LS sequence lists tasks in ascending order of their latest allowable starting dates. This is a monitoring document and is used by first drawing a line under the current date in the LS column, and next evaluating tasks that have not started and are above that line. These tasks will be those that have not met their latest allowable starting dates.

As a suggestion, all tasks that are in-work can be indicated as such by circling their late start date. When tasks are complete, a check mark can be placed in front of their late start dates or the task can be crossed off. Thus, a quick inspection will show which tasks above the current date have not yet started or been completed.

Late Finish (LF) Sequence

The LF sequence lists all tasks in ascending order of their latest allowable finish dates. This list is used the same as the late start list but by applying the procedure to the late finish column.

Total Float (TF) Sequence

The TF list shows all tasks arranged in ascending order of the amount of float time available to the task. Those tasks indicated by a CP in the total float column are critical.

This list gives a good picture of (1) the relative criticalness of all tasks, and (2) what tasks become critical as a project begins to lag behind late finish dates. For instance, if a project has lost five (5) working days and it is still essential to maintain current anticipated end dates, then all tasks yet to be done and having float time to and including five, are now critical.

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

COLOR CODING

	1	2	3	4	5	6
IS TASK CURRENTLY PAST EF DATE?	N	N	Y	Y	Y	
IS TASK CURRENTLY PAST LF DATE?	N	N	N	N	Y	
WILL TASK MAKE LF DATE?	Y	N	Y	N	—	
COLOR CODE GREEN	X					
COLOR CODE ORANGE			X			
COLOR CODE BLUE		X		X		
COLOR CODE YELLOW					X	

Color coding is used to qualitatively evaluate project status. The status indicator colors described below are drawn on the solid task arrows, with the end of the color line shown at the approximate percentage of the task complete. The color line end is dated with the current calendar date.

Green

Task on time - currently not past early finish (EF) date.

Orange

Task on time - currently past early finish (EF) date.

Blue

Task behind - currently not past late finish (LF) date.

Yellow

Task behind - currently past late finish (LF) date.

Note that the evaluation is made on the basis of the current date. Changes in color are significant, indicating a deteriorating or improving sequence of work depending upon the progression. Color coding is primarily used to locate undesirable trends in work progress and to show job history.

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

Monitoring #1

Project Status as of morning of Sept. 24 (working day 188)

Task	Color Code	Status	Was completed evening of	Will be completed
101 - 107		Comp.	Sept. 15	----
102 - 108		Comp.	Sept. 23	----
103 - 109		Comp.	Sept. 15	----
104 - 110		Comp.	Sept. 13	----
105 - 111		90% comp.	----	in 6 working days
106 - 112		Comp.	Sept. 22	----
107 - 114		Comp.	Sept. 22	----
108 - 115		50% comp.	----	in 4 working days
109 - 116		50% comp.	----	in 2 working days
110 - 117		80% comp.	----	in 2 working days
112 - 119		10% comp.	----	in 4 working days
133 - 139		50% comp.	----	in 4 working days
134 - 140		Comp.	Sept. 21	----
135 - 151		Comp.	Sept. 17	----
2 - 3		Comp.	Sept. 1	----
2 - 4		Comp.	Sept. 7	----
2 - 5		Comp.	Sept. 9	----
2 - 6		80% comp.	----	in 5 working days

NETWORK MODEL FOR NEW OFFICE FACILITY HIGHLAND AND MORAN
KEITH, IOWA

VICTORIA MECHANICAL COMPANY

PROJECT NO 76-10 ISSUE NO. 1 DATED APRIL 26, 1976

RALPH J STEPHENSON P E - CONSULTANT

DATES ARE SHOWN AS MONTH,DAY,YR '0' IN TFT COL INDICATES CRITICAL ITEM

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	NODE SEQUENCE E/S	L/S	E/F	L/F	TF
1	2	106	0		T/R TO START OF PROJECT		1026	1026	5316	5316	0
2	3	65	0	1	T/R POUR OUT 1ST FL SOG		6016	6226	8316	9226	15
2	4	69	0	2	T/R TO POUR OUT 2ND DECK		6016	6166	9076	9226	11
2	5	58	0	R	T/R TO C ER RF MTL DECK		6016	7206	8206	10086	34
2	6	70	0	R	T/R TO C LAY INSUL & RFG		6016	7166	9086	10226	32
2	7	102	0		T/R TO C EXT MSNRY&GLZNG		6016	6016	10226	10226	0
3	101	0	0		D		9016	9286	8316	9276	18
3	102	0	0		D		9016	9246	8316	9236	16
3	103	0	0		D		9016	10016	8316	9306	21
3	104	0	0		D		9016	10066	8316	10056	24
3	105	0	0		D		9016	9236	8316	9226	15
3	106	0	0		D		9016	9306	8316	9296	20
4	101	0	0		D		9086	9286	9076	9276	14
4	102	0	0		D		9086	9246	9076	9236	12
4	103	0	0		D		9086	10016	9076	9306	17
4	104	0	0		D		9086	10066	9076	10056	20
4	105	0	0		D		9086	9236	9076	9226	11
4	106	0	0		D		9086	9306	9076	9296	16
5	132	0	0		D		8236	10146	8206	10136	37
5	133	0	0		D		8236	10116	8206	10086	34
5	134	0	0		D		8236	10196	8206	10186	40
5	135	0	0		D		8236	10196	8206	10186	40
5	136	0	0		D		8236	10126	8206	10116	35
5	137	0	0		D		8236	10186	8206	10156	39
6	125	0	0		D		9096	10256	9086	10226	32
7	125	0	0		D		10256	10256	10226	10226	0
101	107	6	6	1	P INS SPRINKLER PIPG	2880	9086	9286	9156	10056	14
102	108	8	2	1	P INS SHT MTL DCT&FTINGS	4800	9086	9246	9176	10056	12
103	109	3	1	1	P INS DMSTC WTR PPG-CLG	720	9086	10016	9106	10056	17
104	110	4	1	1	P INS HTG&CLNG PPG IN CLG	960	9086	10066	9136	10116	20
105	111	9	1	1	INS TO/R PLUMBG RISERS	2160	9086	9236	9206	10056	11
106	112	4	3	1	P INS RUFF ELEC CNDT&FDRS		9086	9306	9136	10056	16
107	113	0	0		D		9166	10066	9156	10056	14
107	114	5	6	1	C INS SPRINKLER PIPG	2400	9166	10126	9226	10186	18
107	132	0	0		D		9166	10146	9156	10136	20
107	132	0	0		D		9166	10146	9156	10136	20
108	113	0	0		D		9206	10066	9176	10056	12
108	115	8	2	1	C INS SHT MTL DUCT&FTTNGS	4800	9206	10076	9296	10166	13
108	133	0	0		D		9206	10116	9176	10086	15
108	133	0	0		D		9206	10116	9176	10086	15
109	113	0	0		D		9136	10066	9106	10056	17
109	116	3	1	1	C INS DMSTC WTR PPG-CLG	720	9136	10146	9156	10186	23
109	134	0	0		D		9136	10196	9106	10186	26

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I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	NODE SEQUENCE E/S	L/S	E/F	L/F	TF
109	134	0	0		D		9136	10196	9106	10166	26
110	117	5	1	1	C INS HTG&CLNG PPG IN CLG	1200	9146	10126	9206	10186	20
110	135	0	0		D		9146	10196	9136	10186	25
110	135	0	0		D		9146	10196	9136	10186	25
111	113	0	0		D		9216	10066	9206	10056	11
111	136	0	0		D		9216	10126	9206	10116	15
111	136	0	0		D		9216	10126	9206	10116	15
112	113	0	0		D		9146	10066	9136	10056	16
112	119	3	3	1	C INS RUFF ELEC CNDT&FDRS		9146	10146	9166	10186	22
112	137	0	0		D		9146	10186	9136	10156	24
112	137	0	0		D		9146	10186	9136	10156	24
113	118	6	4	1	ER INT MSNRY PARTNS		9216	10066	9286	10136	11
114	120	0	0		D		9236	10196	9226	10166	16
115	120	0	0		D		9306	10196	9296	10186	13
116	120	0	0		D		9166	10196	9156	10186	23
117	120	0	0		D		9216	10196	9206	10186	20
118	121	3	5	1	P ER STUDS FOR DRY WALL		9296	10146	10016	10186	11
119	120	0	0		D		9176	10196	9166	10186	22
120	122	0	0		D		9306	10196	9296	10186	13
121	122	0	0		D		10046	10196	10016	10186	11
121	124	3	5	1	C ER STUDS FOR DRY WALL		10046	10226	10066	10266	14
122	123	4	1	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
122	123	4	3	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
123	125	0	0		D		10086	10256	10076	10226	11
123	126	0	0		D		10086	10276	10076	10266	13
124	126	0	0		D		10076	10276	10066	10266	14
124	161	0	0		D		10076	10286	10066	10276	15
124	161	0	0		D		10076	10286	10066	10276	15
125	128	5	5	1	P HANG DRY WALL		10256	10256	10296	10296	0
126	127	3	1	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
126	127	3	3	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
127	128	0	0		D		10136	11016	10126	10296	13
127	163	0	0		D		10136	11026	10126	11016	14
127	163	0	0		D		10136	11026	10126	11016	14
128	129	5	5	1	COMP HANG DRY WALL		11016	11016	11056	11056	0
129	130	0	0		D		11086	11086	11056	11056	0
129	166	0	0		D		11086	11086	11056	11056	0
129	166	0	0		D		11086	11086	11056	11056	0
130	131	4	1	1	INS FIN TUBE PIPING	960	11086	11086	11116	11116	0
131	400	12	0	1	ET/R		11126	11126	11306	11306	0
131	170	0	0		D		11126	11246	11116	11236	8
131	170	0	0		D		11126	11246	11116	11236	8
132	138	6	6	2	P INS SPRINKLER PIPING	2880	9166	10146	9236	10216	20
133	139	8	2	2	P INS SHT MTL DUCT FTTNGS	4800	9206	10116	9296	10206	15
134	140	3	1	2	P INS DMSTC WTR PPG-CLG	720	9136	10196	9156	10216	26
135	151	3	1	2	P INS HTG&CLNG PPG IN CLG	720	9146	10196	9166	10216	25
136	153	8	1	2	INS TO/R PLMG RISERS	1920	9216	10126	9306	10216	15
137	152	4	3	2	P INS RUFF ELEC CNDT&FDRS		9146	10186	9176	10216	24
138	153	0	0		D		9246	10226	9236	10216	20
138	154	5	6	2	C INS SPRINKLER PIPG	2400	9246	10266	9306	11016	22
139	153	0	0		D		9306	10226	9296	10216	16
139	155	8	2	2	C INS SHT MTL DUCT&FTTNGS	4800	9306	10216	10116	11016	15
140	153	0	0		D		9166	10226	9156	10216	26
140	156	3	1	2	C INS DMSTC WTR PPG-CLG	720	9166	10286	9206	11016	30

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	NODE SEQUENCE E/S	L/S	E/F	L/F	TF
151	153	0	0		D		9176	10226	9166	10216	25
151	157	2	1	2	C INS HTG&CLNG PPG IN CLG	480	9176	10296	9206	11016	30
152	153	0	0		D		9206	10226	9176	10216	24
152	159	3	3	2	C INS RUFF ELEC CNDT&FDRS		9206	10286	9226	11016	26
153	158	4	4	2	ER INT MSNRY PARTNS		10016	10226	10066	10276	15
154	160	0	0		D		10016	11026	9306	11016	22
155	160	0	0		D		10126	11026	10116	11016	15
156	160	0	0		D		9216	11026	9206	11016	30
157	160	0	0		D		9216	11026	9206	11016	30
158	161	0	0		D		10076	10286	10066	10276	15
159	160	0	0		D		9236	11026	9226	11016	26
160	163	0	0		D		10126	11026	10116	11016	15
161	162	3	5	2	P ER STUDS FOR DRY WALL		10076	10286	10116	11016	15
162	163	0	0		D		10126	11026	10116	11016	15
162	165	4	5	2	C ER STUDS FOR DRY WALL		10126	11046	10156	11096	17
163	164	4	1	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
163	164	4	3	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
164	166	0	0		D		10196	11086	10186	11056	14
164	167	0	0		D		10196	11106	10186	11096	16
165	167	0	0		D		10186	11106	10156	11096	17
166	168	6	5	2	P HANG DRY WALL		11086	11086	11156	11156	0
167	168	4	1	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
167	168	4	3	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
168	169	6	5	2	C HANG DRY WALL		11166	11166	11236	11236	0
169	170	0	0		D		11246	11246	11236	11236	0
170	171	4	1	2	INS FIN TUBE PIPG	960	11246	11246	11306	11306	0
171	400	0	0		ET/R		12016	12016	11306	11306	0
0	0	0					0	0	0	0	0

NETWORK MODEL FOR NEW OFFICE FACILITY HIGHLAND AND MORAN
KEITH, IOWA

VICTORIA MECHANICAL COMPANY

PROJECT NO 76-10 ISSUE NO. 1 DATED APRIL 26, 1976

RALPH J STEPHENSON P E - CONSULTANT

DATES ARE SHOWN AS MONTH,DAY,YR '0' IN TFT COL INDICATES CRITICAL ITEM

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	EARLY STRT SEQ E/S	L/S	E/F	L/F	TF
1	2	106	0		T/R TO START OF PROJECT		1026	1076	5316	5316	0
2	3	69	0	1	T/R POUR OUT 1ST FL SOG		6016	6226	8316	9226	15
2	4	69	0	2	T/R TO POUR OUT 2ND DECK		6016	6166	9076	9226	11
2	5	58	0	R	T/R TO C ER RF MTL DECK		6016	7206	8206	10086	34
2	6	70	0	R	T/R TO C LAY INSUL & RFG		6016	7166	9086	10226	32
2	7	102	0		T/R TO C EXT MSNRY&GLZNG		6016	6016	10226	10226	0
101	107	6	6	1	P INS SPRINKLER PIPG	2880	9086	9286	9156	10056	14
102	108	8	2	1	P INS SHT MTL DCT&FTINGS	4800	9086	9246	9176	10056	12
103	109	3	1	1	P INS DMSTC WTR PPG-CLG	720	9086	10016	9106	10056	17
104	110	4	1	1	P INS HTG&CLNG PPG IN CLG	960	9086	10066	9136	10116	20
105	111	9	1	1	INS TO/R PLUMBG RISERS	2160	9086	9236	9206	10056	11
106	112	4	3	1	P INS RUFF ELEC CNDT&FDRS		9086	9306	9136	10056	16
109	116	3	1	1	C INS DMSTC WTR PPG-CLG	720	9136	10146	9156	10186	23
134	140	3	1	2	P INS DMSTC WTR PPG-CLG	720	9136	10196	9156	10216	26
110	117	5	1	1	C INS HTG&CLNG PPG IN CLG	1200	9146	10126	9206	10186	20
112	119	3	3	1	C INS RUFF ELEC CNDT&FDRS		9146	10146	9166	10186	22
135	151	3	1	2	P INS HTG&CLNG PPG IN CLG	720	9146	10196	9166	10216	25
137	152	4	3	2	P INS RUFF ELEC CNDT&FDRS		9146	10186	9176	10216	24
107	114	5	6	1	C INS SPRINKLER PIPG	2400	9166	10126	9226	10186	18
132	138	6	6	2	P INS SPRINKLER PIPING	2880	9166	10146	9236	10216	20
140	156	3	1	2	C INS DMSTC WTR PPG-CLG	720	9166	10286	9206	11016	30
151	157	2	1	2	C INS HTG&CLNG PPG IN CLG	480	9176	10296	9206	11016	30
108	115	8	2	1	C INS SHT MTL DUCT&FTINGS	4800	9206	10076	9296	10186	13
133	139	8	2	2	P INS SHT MTL DUCT FTINGS	4800	9206	10116	9296	10206	15
152	159	3	3	2	C INS RUFF ELEC CNDT&FDRS		9206	10286	9226	11016	28
113	118	6	4	1	ER INT MSNRY PARTNS		9216	10066	9286	10136	11
136	153	8	1	2	INS TO/R PLMG RISERS	1920	9216	10126	9306	10216	15
138	154	5	6	2	C INS SPRINKLER PIPG	2400	9246	10266	9306	11016	22
118	121	3	5	1	P ER STUDS FOR DRY WALL		9296	10146	10016	10186	11
139	155	8	2	2	C INS SHT MTL DUCT&FTINGS	4800	9306	10216	10116	11016	15
153	158	4	4	2	ER INT MSNRY PARTNS		10016	10226	10066	10276	15
121	124	3	5	1	C ER STUDS FOR DRY WALL		10046	10226	10066	10266	14
122	123	4	1	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
122	123	4	3	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
161	162	3	5	2	P ER STUDS FOR DRY WALL		10076	10286	10116	11016	15
126	127	3	1	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
126	127	3	3	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
162	165	4	5	2	C ER STUDS FOR DRY WALL		10126	11046	10156	11096	17
163	164	4	1	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
163	164	4	3	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
167	168	4	1	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
167	168	4	3	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
125	128	5	5	1	P HANG DRY WALL		10256	10256	10296	10296	0

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	EARLY STRT SEQ E/S	L/S	E/F	L/F	TF
128	129	5	5	1	COMP HANG DRY WALL		11016	11016	11056	11056	0
130	131	4	1	1	INS FIN TUBE PIPING	960	11086	11086	11116	11116	0
166	168	6	5	2	P HANG DRY WALL		11086	11086	11156	11156	0
131	400	12	0	1	ET/R		11126	11126	11306	11306	0
168	169	6	5	2	C HANG DRY WALL		11166	11166	11236	11236	0
170	171	4	1	2	INS FIN TUBE PIPG	960	11246	11246	11306	11306	0

NETWORK MODEL FOR NEW OFFICE FACILITY HIGHLAND AND MORAN
KEITH, IOWA

VICTORIA MECHANICAL COMPANY

PROJECT NO 76-10 ISSUE NO. 1 DATED APRIL 26, 1976

RALPH J STEPHENSON P E - CONSULTANT

DATES ARE SHOWN AS MONTH,DAY,YR '0' IN TFT COL INDICATES CRITICAL ITEM

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	LATE STRT SEQ E/S	L/S	E/F	L/F	TF
1	2	106	0		T/R TO START OF PROJECT		1026	1026	5316	5316	0
2	7	102	0		T/R TO C EXT MSNRY&GLZNG		6016	6016	10226	10226	0
2	4	69	0	2	T/R TO POUR OUT 2ND DECK		6016	6166	9076	9226	11
2	3	65	0	1	T/R POUR OUT 1ST FL SOG		6016	6226	8316	9226	15
2	6	70	0	R	T/R TO C LAY INSUL & RFG		6016	7166	9086	10226	32
2	5	58	0	R	T/R TO C ER RF MTL DECK		6016	7206	8206	10086	34
105	111	9	1	1	INS TO/R PLUMBG RISERS	2160	9086	9236	9206	10056	11
102	108	8	2	1	P INS SHT MTL DCT&FTTNGS	4800	9066	9246	9176	10056	12
101	107	6	6	1	P INS SPRINKLER PIPG	2880	9086	9266	9156	10056	14
106	112	4	3	1	P INS RUFF ELEC CNDT&FDRS		9086	9306	9136	10056	16
103	109	3	1	1	P INS DMSTC WTR PPG-CLG	720	9086	10016	9106	10056	17
104	110	4	1	1	P INS HTG&CLNG PPG IN CLG	960	9086	10066	9136	10116	20
113	118	6	4	1	ER INT MSNRY PARTNS		9216	10066	9286	10136	11
108	115	8	2	1	C INS SHT MTL DUCT&FTTNGS	4800	9206	10076	9296	10186	13
133	139	8	2	2	P INS SHT MTL DUCT FTTNGS	4800	9206	10116	9296	10206	15
107	114	5	6	1	C INS SPRINKLER PIPG	2400	9166	10126	9226	10186	18
110	117	5	1	1	C INS HTG&CLNG PPG IN CLG	1200	9146	10126	9206	10166	20
136	153	8	1	2	INS TO/R PLMG RISERS	1920	9216	10126	9306	10216	15
109	116	3	1	1	C INS DMSTC WTR PPG-CLG	720	9136	10146	9156	10186	23
112	119	3	3	1	C INS RUFF ELEC CNDT&FDRS		9146	10146	9166	10186	22
118	121	3	5	1	P ER STUDS FOR DRY WALL		9296	10146	10016	10166	11
132	138	6	6	2	P INS SPRINKLER PIPING	2880	9166	10146	9236	10216	20
137	152	4	3	2	P INS RUFF ELEC CNDT&FDRS		9146	10186	9176	10216	24
122	123	4	1	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
122	123	4	3	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
134	140	3	1	2	P INS DMSTC WTR PPG-CLG	720	9136	10196	9156	10216	26
135	151	3	1	2	P INS HTG&CLNG PPG IN CLG	720	9146	10196	9166	10216	25
139	155	8	2	2	C INS SHT MTL DUCT&FTTNGS	4800	9306	10216	10116	11016	15
121	124	3	5	1	C ER STUDS FOR DRY WALL		10046	10226	10066	10266	14
153	158	4	4	2	ER INT MSNRY PARTNS		10016	10226	10066	10276	15
125	128	5	5	1	P HANG DRY WALL		10256	10256	10296	10296	0
138	154	5	6	2	C INS SPRINKLER PIPG	2400	9246	10266	9306	11016	22
126	127	3	1	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
126	127	3	3	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
140	156	3	1	2	C INS DMSTC WTR PPG-CLG	720	9166	10286	9206	11016	30
152	159	3	3	2	C INS RUFF ELEC CNDT&FDRS		9206	10286	9226	11016	20
161	162	3	5	2	P ER STUDS FOR DRY WALL		10076	10286	10116	11016	15
151	157	2	1	2	C INS HTG&CLNG PPG IN CLG	480	9176	10296	9206	11016	30
128	129	5	5	1	COMP HANG DRY WALL		11016	11016	11056	11056	0
163	164	4	1	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
163	164	4	3	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
162	165	4	5	2	C ER STUDS FOR DRY WALL		10126	11046	10156	11096	17
130	131	4	1	1	INS FIN TUBE PIPING	960	11086	11086	11116	11116	0

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	LATE STRT SEQ E/S	L/S	E/F	L/F	TF
166	168	6	5	2	P HANG DRY WALL		11086	11086	11156	11156	0
167	168	4	1	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
167	168	4	3	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
131	400	12	0	1	ET/R		11126	11126	11306	11306	0
168	169	6	5	2	C HANG DRY WALL		11166	11166	11236	11236	0
170	171	4	1	2	INS FIN TUBE PIPG	960	11246	11246	11306	11306	0

NETWORK MODEL FOR NEW OFFICE FACILITY HIGHLAND AND MORAN
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RALPH J STEPHENSON P E - CONSULTANT

DATES ARE SHOWN AS MONTH,DAY,YR '0' IN TFT COL INDICATES CRITICAL ITEM

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	LATE FINISH SEQ E/S	L/S	E/F	L/F	TF
1	2	106	0		T/R TO START OF PROJECT		1026	1026	5316	5316	0
2	3	65	0	1	T/R POUR OUT 1ST FL SOG		6016	6226	8316	9226	15
2	4	69	0	2	T/R TO POUR OUT 2ND DECK		6016	6166	9076	9226	11
101	107	6	6	1	P INS SPRINKLER PIPG	2880	9086	9286	9156	10056	14
102	108	8	2	1	P INS SHT MTL DCT&FTTNGS	4800	9086	9246	9176	10056	12
103	109	3	1	1	P INS DMSTC WTR PPG-CLG	720	9086	10016	9106	10056	17
105	111	9	1	1	INS TO/R PLUMBG RISERS	2160	9086	9236	9206	10056	11
106	112	4	3	1	P INS RUFF ELEC CNDT&FDRS		9086	9306	9136	10056	16
2	5	58	0	R	T/R TO C ER RF MTL DECK		6016	7206	8206	10086	34
104	110	4	1	1	P INS HTG&CLNG PPG IN CLG	960	9086	10066	9136	10116	20
113	118	6	4	1	ER INT MSNRY PARTNS		9216	10066	9286	10136	11
107	114	5	6	1	C INS SPRINKLER PIPG	2400	9166	10126	9226	10186	18
108	115	8	2	1	C INS SHT MTL DUCT&FTTNGS	4800	9206	10076	9296	10186	13
109	116	3	1	1	C INS DMSTC WTR PPG-CLG	720	9136	10146	9156	10186	23
110	117	5	1	1	C INS HTG&CLNG PPG IN CLG	1200	9146	10126	9206	10186	20
112	119	3	3	1	C INS RUFF ELEC CNDT&FDRS		9146	10146	9166	10186	22
118	121	3	5	1	P ER STUDS FOR DRY WALL		9296	10146	10016	10186	11
133	139	8	2	2	P INS SHT MTL DUCT FTTNGS	4800	9206	10116	9296	10206	15
132	138	6	6	2	P INS SPRINKLER PIPING	2880	9166	10146	9236	10216	20
134	140	3	1	2	P INS DMSTC WTR PPG-CLG	720	9136	10196	9156	10216	26
135	151	3	1	2	P INS HTG&CLNG PPG IN CLG	720	9146	10196	9166	10216	25
136	153	8	1	2	INS TO/R PLMG RISERS	1920	9216	10126	9306	10216	15
137	152	4	3	2	P INS RUFF ELEC CNDT&FDRS		9146	10186	9176	10216	24
2	6	70	0	R	T/R TO C LAY INSUL & RFG		6016	7166	9086	10226	32
2	7	102	0		T/R TO C EXT MSNRY&GLZNG		6016	6016	10226	10226	0
122	123	4	1	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
122	123	4	3	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
121	124	3	5	1	C ER STUDS FOR DRY WALL		10046	10226	10066	10266	14
153	158	4	4	2	ER INT MSNRY PARTNS		10016	10226	10066	10276	15
125	128	5	5	1	P HANG DRY WALL		10256	10256	10296	10296	0
126	127	3	1	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
126	127	3	3	1	C INS IN WLL MECH/ELEC WK	1440	10066	10276	10126	10296	15
138	154	5	6	2	C INS SPRINKLER PIPG	2400	9246	10266	9306	11016	22
139	155	8	2	2	C INS SHT MTL DUCT&FTTNGS	4800	9306	10216	10116	11016	15
140	156	3	1	2	C INS DMSTC WTR PPG-CLG	720	9166	10286	9206	11016	30
151	157	2	1	2	C INS HTG&CLNG PPG IN CLG	480	9176	10296	9206	11016	30
152	159	3	3	2	C INS RUFF ELEC CNDT&FDRS		9206	10286	9226	11016	28
161	162	3	5	2	P ER STUDS FOR DRY WALL		10076	10286	10116	11016	15
128	129	5	5	1	COMP HANG DRY WALL		11016	11016	11056	11056	0
163	164	4	1	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
163	164	4	3	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
162	165	4	5	2	C ER STUDS FOR DRY WALL		10126	11046	10156	11076	17
130	131	4	1	1	INS FIN TUBE PIPING	960	11086	11086	11116	11116	0

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	LATE FINISH SEQ E/S	L/S	E/F	L/F	TF
166	168	6	5	2	P HANG DRY WALL		11086	11086	11156	11156	0
167	168	4	1	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
167	168	4	3	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
168	169	6	5	2	C HANG DRY WALL		11166	11166	11236	11236	0
131	400	12	0	1	ET/R		11126	11126	11306	11306	0
170	171	4	1	2	INS FIN TUBE PIPG	960	11246	11246	11306	11306	0

NETWORK MODEL FOR NEW OFFICE FACILITY HIGHLAND AND MORAN
KEITH, IOWA

VICTORIA MECHANICAL COMPANY

PROJECT NO 76-10 ISSUE NO. 1 DATED APRIL 26, 1976

RALPH J STEPHENSON P E - CONSULTANT

DATES ARE SHOWN AS MONTH,DAY,YR '0' IN TFT COL INDICATES CRITICAL ITEM

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	TOTAL FLT SEQ E/S	L/S	E/F	L/F	TF
1	2	106	0		T/R TO START OF PROJECT		1026	1026	5316	5316	0
2	7	102	0		T/R TO C EXT MSNRY&GLZNG		6016	6016	10226	10226	0
125	128	5	5	1	P HANG DRY WALL		10256	10256	10296	10296	0
128	129	5	5	1	COMP HANG DRY WALL		11016	11016	11056	11056	0
130	131	4	1	1	INS FIN TUBE PIPING	960	11086	11086	11116	11116	0
131	400	12	0	1	ET/R		11126	11126	11306	11306	0
166	168	6	5	2	P HANG DRY WALL		11086	11086	11156	11156	0
168	169	6	5	2	C HANG DRY WALL		11166	11166	11236	11236	0
170	171	4	1	2	INS FIN TUBE PIPG	960	11246	11246	11306	11306	0
2	4	69	0	2	T/R TO POUR OUT 2ND DECK		6016	6166	9076	9226	11
105	111	9	1	1	INS TO/R PLUMBG RISERS	2160	9086	9236	9206	10056	11
113	118	6	4	1	ER INT MSNRY PARTNS		9216	10066	9286	10136	11
118	121	3	5	1	P ER STUDS FOR DRY WALL		9296	10146	10016	10186	11
122	123	4	1	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
122	123	4	3	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
102	108	8	2	1	P INS SHT MTL DCT&FTTNGS	4800	9086	9246	9176	10056	12
108	115	8	2	1	C INS SHT MTL DUCT&FTTNGS	4800	9206	10076	9296	10186	13
126	127	3	1	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
126	127	3	3	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
101	107	6	6	1	P INS SPRINKLER PIPG	2880	9086	9286	9156	10056	14
121	124	3	5	1	C ER STUDS FOR DRY WALL		10046	10226	10066	10266	14
163	164	4	1	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
163	164	4	3	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
2	3	65	0	1	T/R POUR OUT 1ST FL SOG		6016	6226	8316	9226	15
133	139	8	2	2	P INS SHT MTL DUCT FTTNGS	4800	9206	10116	9296	10206	15
136	153	8	1	2	INS TO/R PLMG RISERS	1920	9216	10126	9306	10216	15
139	155	8	2	2	C INS SHT MTL DUCT&FTTNGS	4800	9306	10216	10116	11016	15
153	158	4	4	2	ER INT MSNRY PARTNS		10016	10226	10066	10276	15
161	162	3	5	2	P ER STUDS FOR DRY WALL		10076	10286	10116	11016	15
106	112	4	3	1	P INS RUFF ELEC CNDT&FDRS		9086	9306	9136	10056	16
167	168	4	1	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
167	168	4	3	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
103	109	3	1	1	P INS DMSTC WTR PPG-CLG	720	9086	10016	9106	10056	17
162	165	4	5	2	C ER STUDS FOR DRY WALL		10126	11046	10156	11096	17
107	114	5	6	1	C INS SPRINKLER PIPG	2400	9166	10126	9226	10186	18
104	110	4	1	1	P INS HTG&CLNG PPG IN CLG	960	9086	10066	9136	10116	20
110	117	5	1	1	C INS HTG&CLNG PPG IN CLG	1200	9146	10176	9206	10186	20
132	138	6	6	2	P INS SPRINKLER PIPING	2880	9166	10146	9236	10216	20
112	119	3	3	1	C INS RUFF ELEC CNDT&FDRS		9146	10146	9166	10186	22
138	154	5	6	2	C INS SPRINKLER PIPG	2400	9246	10266	9306	11016	22
109	116	3	1	1	C INS DMSTC WTR PPG-CLG	720	9136	10146	9156	10186	23
137	152	4	3	2	P INS RUFF ELEC CNDT&FDRS		9146	10186	9176	10216	24
135	151	3	1	2	P INS HTG&CLNG PPG IN CLG	720	9146	10196	9166	10216	25

4.53

I	J	DAYS	RSP	LOC CD AND DESCRIPTION		COST	TOTAL FLT SEQ E/S	L/S	E/F	L/F	TF
134	140	3	1	2	P INS DMSTC WTR PPG-CLG	720	9136	10196	9156	10216	26
152	159	3	3	2	C INS RUFF ELEC CNDT&FDRS		9206	10286	9226	11016	28
140	156	3	1	2	C INS DMSTC WTR PPG-CLG	720	9166	10286	9206	11016	30
151	157	2	1	2	C INS HTG&CLNG PPG IN CLG	480	9176	10296	9206	11016	30
2	6	70	0	R	T/R TO C LAY INSUL & RFG		6016	7166	9086	10226	32
2	5	58	0	R	T/R TO C ER RF MTL DECK		6016	7206	8206	10086	34

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER

November 1,

Subject: Monitoring Report #1

New Office Facility

Highland and Moran, Keith, Iowa

Victoria Mechanical Company

Project: 76:10

Monitored from Issue #1 dated April 26,

Date of Monitoring: September 24, (working day 188)

Target Completion Date: November 30, evening (working day 234) for fin tube piping

Actions taken:

- Inspected project
- Reviewed job progress with superintendent
- Evaluated job progress
- Color coded networks

General Summary

As of September 24, (working day 188) the project is basically in healthy condition. An evaluation of the job against late starts and late finishes shows that all major tasks are currently meeting or bettering late starts and late finishes.

Accurate information on exterior masonry and glazing status was not available from the general contractor. This work should be watched carefully since it affects hanging board upon which installation of our fin tube piping depends.

Projecting directly from late start/late finish sequences, it appears activities over the next two weeks should include:

- continuing installation of all major riser and overhead mechanical and electrical work
- installation of interior masonry partitions
- installation of insulation and roofing
- erection of exterior masonry and glazing

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER

It is anticipated that on September 29, according to the current early start schedule, studs for drywall are due to start at the first floor. However, looking at installation progress of toilet room plumbing risers, it appears these are lagging early start/early finish targets. Therefore, interior masonry which restrains installation of studs will probably be late and may delay installation of in-wall work past the current desired early target of October 4, (working day 194).

In a conference with the drywall contractor on September 24 (working day 188) he said he would prefer to erect studs and install one side of the board. We told him that this was not a desirable procedure and asked him if he would leave both sides exposed. He agreed, providing we would be liable for any damage to his studs by our work. We agreed.

In summary, the project is moving fairly well. The superintendent is on top of the job and our projections for work over the next week indicate the job should stay healthy.

Ralph J. Stephenson, P.E.

RJS
m

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER

Monitoring #2

Project Status as of morning of Oct. 8 (working day 198)

Task	Color Code	Status	Was completed evening of	Will be completed
108 - 115		Comp.	Sept. 30	----
109 - 116		Comp.	Sept. 28	----
110 - 117		Comp.	Sept. 30	----
105 - 111		Comp.	Oct. 5	----
112 - 119		Comp.	Sept. 28	----
132 - 138		Comp.	Oct. 6	----
133 - 139		Comp.	Oct. 1	----
136 - 153		10% comp.	----	in 6 working days
137 - 152		Comp.	Sept. 30	----
138 - 154		10% comp.	----	in 20 working days (material problems)
139 - 155		50% comp.	----	in 3 working days
140 - 156		Comp.	Sept. 27	----
151 - 157		Comp.	Oct. 5	----
152 - 159		Comp.	Oct. 7	----
2 - 6		Comp.	Oct. 4	----
2 - 7		70% comp.	----	in 15 working days

Section #5

The Nature & Structure of Design & Construction Claims

Ralph J. Stephenson PE PC
Consulting Engineer

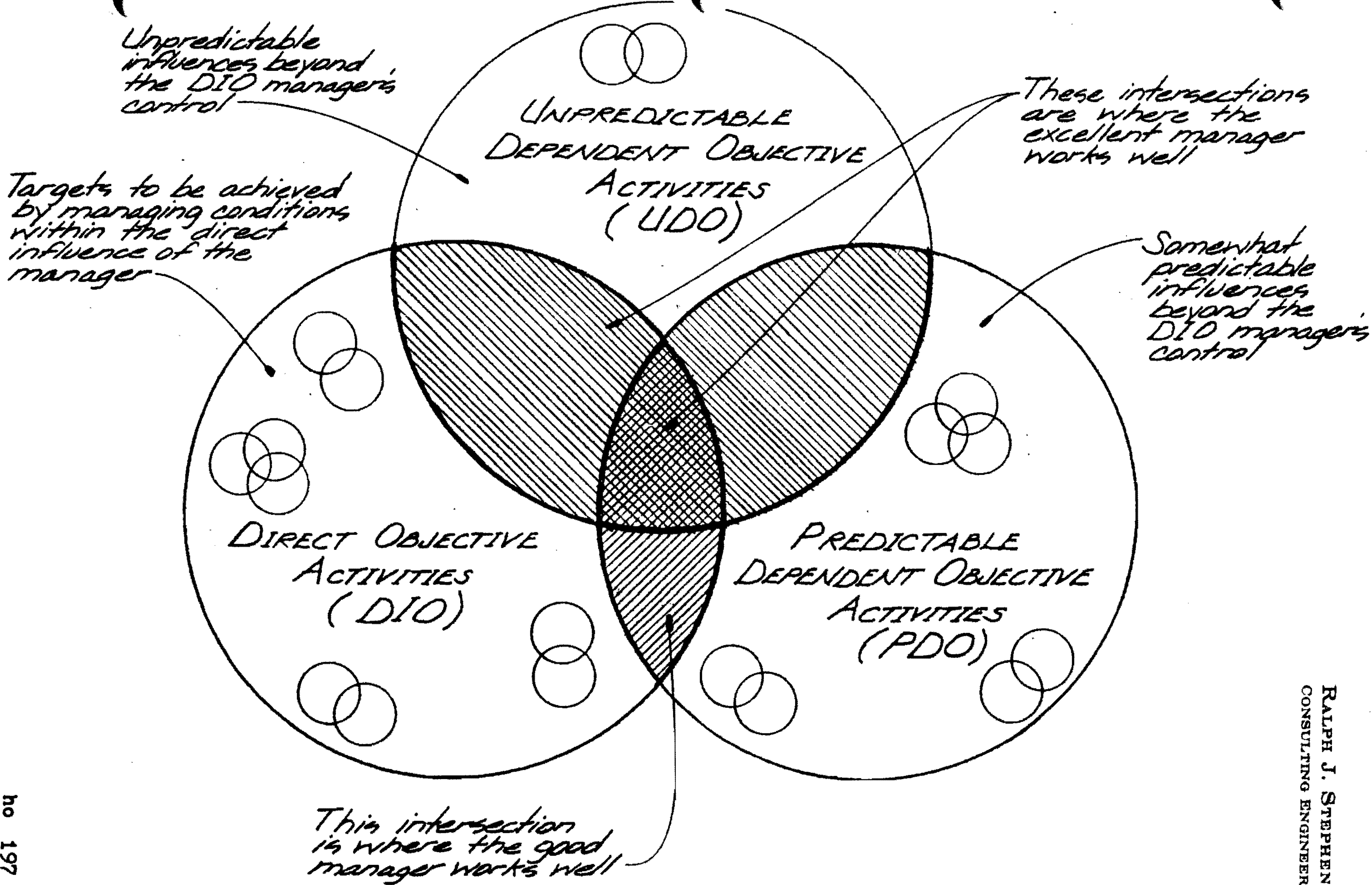
Goals & Objectives Definition

•Goals •Objectives	•End •Intermediate •Peripheral	•direct •dependent - predictable •dependent - unpredictable

Definitions

- Goals - Unquantified targets to be achieved
- Objectives - Quantified goals to be achieved
- End - Goals & objectives realized upon completion of the project or program
- Intermediate - Goals & objectives achieved at specific points prior to completion of the project or program
- Peripheral - Goals & objectives achieved on an ongoing basis during the project - often are personal, professional, technical, financial or social
- Direct - Goals & objectives to be achieved by internal direct influences
- Dependent - Goals & objectives affecting the project but to be achieved by external influences - usually are predictable or unpredictable

ho 316 July, 88



THE DIO/PDO/UDO INTERSECTION

Ralph J. Stephenson PE PC
Consulting Engineer

Use of float time in project planning

What is float time? It is a number of working days determined by the total plan of work, and mathematically set by the logic of the network plan, by the durations assigned to each task, and by the completion date set for the project and its component parts.

Float is the amount of time between the earliest date an activity can start, according to a given plan of work, and the latest date it can start according to the same plan of work. Float time occurs in a task when the activities that restrain it are able to be completed before the latest date by which the restrained task must start, as determined by the latest allowable finish date of the project or project component.

Float time is not assigned by the planner, nor is it automatically allocated to activities that are traditionally critical.

Because of the nature of the construction business in which many normally unrelated organizations and individuals are brought together by agency and contract arrangements to do a job, float or discretionary time is potentially valuable to all parties to the job. Thus ownership of float time often becomes a subject of dispute and controversy.

A few guidelines which have seen general acceptance and some legal concurrence in practice are given below:

1. In a hard money fixed time contract the float time within the contract boundaries belong to the contractor.

2. Ownership of float time should be established very early in a project. Where some question of ownership exists, the ownership rights should be noted on the plans and schedules of work prepared by the contractor.

3. On negotiated projects, where there may be a cost and time span to be

mutually agreed on by the contracting parties as the project gets under way, ownership of float time is usually a matter to be worked out in advance as job conditions demand.

4. Relative to subcontractors, the ownership of float time within a hard money, fixed cost subcontract is usually set by implied consent, but normally rests with the prime contractor under which the subcontractor is working.

In situations where there is very little interface between a prime contractor's tasks and his subcontractor's tasks, it is possible that ownership of self contained float may remain with the subcontractor.

5. Ownership of float time does not release a contractor from the obligation to provide a high quality service to the client. Where poor use of float time to the detriment of the job is encountered, fault for the poor performance will usually temper the ownership of the float.

* * *

In general most problems with float occur where approval delays are encountered, where intermediate project dates are not specified but are desired and imposed, when poor performance pushes tasks beyond scheduled end dates, or where uncontrollable obstacles to meeting project contract obligations appear.

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CONSULTING ENGINEER

Claim Prone Job Characteristics

During the profiling, proposing and negotiating period, it is often possible to gain a good insight into the expected nature of a job if one is fortunate (or unfortunate) enough to be the successful proposer. The problem job is becoming increasingly serious in our business and professional lives and it should be identified early. The problem job generally results in increased costs during the construction period and quite often requires arbitration or litigation to achieve resolution of costs and damages.

Thus, it is good policy for the perceptive owner, architect/engineer and contractor to become familiar with those characteristics that early identify a job as having potential for being a trouble project.

This list of characteristics is by no means complete, nor is it meant to imply that a job having these features will necessarily be claim prone. It is, on the other hand, an honest effort to state certain unique job features that have been identified in projects that have ended up in litigation or arbitration. The list is at random with no attempt to classify or characterize the features.

Claim prone job characteristics may include:

a. A wide spread in proposal prices.

b. Issuance of a large number of pre-bid addenda and instructions.

c. For subcontractors, a poor general contractor reputation if the project is being built by one prime.

d. For projects with separate primes, poor other prime contractor reputations.

e. More than four to six prime contractors involved(applicable on normal building work only).

f. Poor reputation of architect/engineer preparing contract documents.

g. Excessive how-to-do-it emphasis in contract drawings and specifications.

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CONSULTING ENGINEER

h. Non-liable party involvement in responsible positions, i.e. non-liable construction manager.

i. Large numbers of allowance items.

j. Zero (or excessively small) tolerance specifications.

k. Poorly defined authority and responsibility patterns in the offices of the architect/engineer, the owner, the general contractor or other prime contractors.

l. Inexperienced specialty contractors.

m. Excessive number of pre-selected suppliers for key material and equipment.

n. Large dollar amount or numbers of owner purchased equipment.

o. Location in strike prone areas.

p. Location in jurisdictionally sensitive areas.

q. Heavy use specified for untried products and equipment.

r. Non-liable party involvement in establishing delivery commitments, i.e. construction manager, architect/engineer, owner representative.

s. Involvement of politically accountable owners, architect/engineers or other contractors.

t. Multi responsibility payment structures.

u. Excessively long time periods to award contracts after a proposal.

(Note: This often occurs in public work where many non-project approvals and agencies are involved.)

v. Poor owner reputation.

6/23/85

Common Causes of Contested Claims

Contested construction claims have increased over the past few years and now must be recognized as a serious hinderence to proper and profitable construction procedures.

The reasons for the increase in contested claims are many and must be understood in the sense that our society has become somewhat legalistic. That is to say that the recourse to legal resolution, as opposed to interpersonal, technical or administrative resolution of problems has become a common occurance. This is a relatively recent development, and fortunately shows some signs of diminishing as costs and time involvement in legal matters has increased astronomically.

However, there are claims, there always have been claims, and there will probably always be contested claims that those in construction should understand well.

Specifically, contested claims lead to resolution by an administrative settlement, litigation, arbitration, or mediation. There are some common causes of conflict and it is these that stimulate the parties to go to a formal settlement by outsiders. It is important for those in construction to understand how to avoid the mistakes that cause wasteful contested claims.

Several years ago a firm specializing in construction claims and their settlement studied some of the most common causes of disputes. Of two hundred occurrence of contested claims the following percentages were found.

1. Directed Change - 48%

A directed change is a legitimate change within the contract scope for which the owner must pay.

Examples

- owner changes the door color after door is painted.
- owner revises size of electrical room door opening.

Advice

- Required extensions of time should be stated in writing.
- Costs for extended general conditions should be agreed upon early.
- The client or owner is obligated to pay for the change, if there is a charge.
- Payment for the work should be explicitly agreed upon

before starting.

2. Constuctive change - 42%

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

Examples

- Shop drawing corrections, showing additional work not covered in contract documents.
- Owner's representative tells a superintendent to relocate a wall with no payment intended.

Advice

- Don't assume changes will be free. Find out if there is a cost.
- Don't enrich contract documents.
- Don't enrich shop drawings.
- Make certain the scope and costs of additional work is clearly understood.

3. Defective or deficient contract documents - 41%

Contract documents which do not adequately portray the true contract scope.

Examples

- A retaining wall shown dotted on the contract documents and expected by the architect/engineer and the owner to be built as part of the contract.
- Dimensional errors that cannot be resolved by verbal clarification.
- Contract documents that expect performance by default. For instance, specifing a miscellaneous iron ladder but not showing it on the drawings.

Advice

- Expect to pay your architect and engineer for good quality assurance in the production of contract documents.
- Select your design team on the basis of performance not cost.
- Clearly define design and construction delivery methods to be used.
- Don't expect your contractor to design the job unless it is a design/build project.
- Don't make unrecorded corrections to contract documents.

4. Delays - 41%

A delay situation beyond the control and not the fault of the contractor.

Examples

- Rock encountered that delays the job but was not shown on the contract documents.

Advice

- Be as thorough as possible in defining physical conditions of the site upon which the facility is to be constructed.
- Specify weather standards when it is necessary to clarify time extensions that might be caused by inclement weather.
- Determine delay costs quickly and eliminate them as soon as possible.
- Don't stop field work without proper authority and a very good reason.

5. Constructive acceleration - 35%

More work with no time extension or the same work and a shorter time period in which to do it.

Examples

- Owner refuses to grant time extension for work that will take longer to perform.
- Owner makes unauthorized use of critical path time without extension.
- Owner makes use of float time with the expectation that the contractor will not request or require a time extension.

Advice

- Never assume the contractor will do extra work within the contract time.
- Work out an early agreement on the use of float time in the network model.
- Never assume a field order is a no cost, no time extension change.

6. Maladministration - 33%

Owner interference with the contractor's right to enjoy least cost performance.

Examples

- Owner directs contractor to provide a certain space in a facility early without such early turn over having been specified.

- Owner directs contractor to start work on an encumbered site.
- Architect/engineer unresponsive to legitimate requests for information.

Advice

- Always allow the contractor to select construction methods and means.
- Make certain the site is fully available to the contractor before the job begins.
- Promptly process submittals.
- Clearly define the time frame and the sequence by which submittals are to be processed,f and do it early in the job.

7. Differing site condition - 31%

The actual site differs from that represented on the contract documents or deviates from ordinary or normal expectations of such a site in that area.

Examples

- Artesian water encountered in sand seam outside of where soil boring were taken.
- Existing basements encountered but not indicated on contract documents.
- Restrictive easements or assessments on the property not made known to the contractor before contract execution.

Advice

- Expect to pay for and get a good sity survey.
- Make certain soil borings are adequate to show any unusual conditions.
- Locate and define all easements.
- Check the site history for unusual or restricted conditons.
- Take photos of any unusual conditions encountered.

8. Impossibility of performance - 18%

A situation where it is impossible to carry out the contract work.

Examples

- Expecting a contractor to work on an encumbered site.
- Owner refuses to move interfering utilities he is supposed to move by contract.
- Specifying installation of above ceiling work that won't fit in the space provided.

Advice

- Expect the design team to check their work thoroughly for interferences.
- Accept your legitimate duties and responsibilities and take care of them.
- Resolve dimensional differences early.
- Do your homework to presolve expected problems and interferences.

9. Superior knowledge - 18%

Witholding data or information during the precontract period that affects construction on matters of importance.

Examples

- On a steel erection contract not telling the bidders that the steel had been refabricated from a previous job.
- Failing to tell bidders that there is a cost cap on the first two month's costs.
- Not telling bidders that there is a high pressure gas line through the site that must be accommodated during construction.

Advice

- Be certain all bidders know as much as they must know to propose properly.
- Be certain demolition contract documents specify all work to be done.
- Locate, to the best of your ability, all site obstructions before bidding.
- Don't expect the contractor or the architect and engineer to read your mind.

10. Termination - 7%

Dismissal from the project for convenience or default.

Examples

- The section of the project is no longer needed and is removed from the contract.
- The contractor is behind schedule.
- The contractor's performance is unsatisfactory.
- The owner doesn't like the way the superintendent talks back to him.
- The contractor doesn't manage submittals promptly and accurately.

Advice

- Be certain the cause for dismissal is legitimate and

well defined.
- Don't dismiss for minor reasons. Dismissal is serious business.
- If dismissing be certain proper notice is given.
- Insure the contract documents give you the right to dismiss.

Avoiding lawsuits,d161, ho 228

I. Ralph J. Stephenson PE

A. **Construction retentions, collections and final payment - d038 - ho 259**

B. **Introduction - Payment as a lifeline**

Lifeline has many definitions but one in particular strikes me as being most appropriate to the construction profession; "A lifeline is a line or rope for saving life".

Payment or money flow on a construction project can be just that - a line of strength that can preserve the life, vigor and integrity of a project, or a line of weakness that can cast the project adrift.

Successful firms are not often heard complaining about payment. This oddity bears close examination from those seeking to emulate them.

C. **General nature of cash flow in the construction industry**

1. Legal background for progress payments

Governed by the doctrine of conditions

Doctrine of conditions says that a party should not have to perform its promise without obtaining the other party's promised performance. The principle is central to any discussion of progress payments.

Who is required to perform first?

Common law requires that performance of services precede payment

2. Role and obligations of the payer

To maintain strong financial position that allows prompt payment when deserved

Makes people want to work for you

Improves potential for future reductions in proposal prices

To pay promptly and within the context of the contract

3. Role and obligations of the payee
   To perform well and in accordance with your contract
   To bill accurately and promptly
   To follow the ground rules by which payments are to be made
   Frequently the payee holds the key to successful payment for the work
   Points for the payee to consider

   Too often we in the construction industry blame everyone but ourselves for not being paid what we think is owed us promptly.

   Many times the cause of slow or reduced payment lies with the payee, not the payer.

D. Conditions surrounding collections and payments

1. Unsuccessful collections & payments often result from
   Mistrust - Inability to work honestly with unwritten standards
   Cupidity - Inordinate desire to get something for nothing
   Doubtful risk taking - A high risk has a corresponding high penalty
   Ultra conservatism - Excites suspicion and slows cash flow
   Incompetence - Produces a lack of desire to pay or work - no incentive
   Claim prone environment

   The contested claim brings out the worst in everyone, and most particularly makes the payer reluctant to pay.

   Understanding how to reduce the dust, noise and confusion that surround contested claims often can encourage prompt payment even in difficult conflicts.

   Common causes of contested claims and their frequency are
   Directed change - 48%
   Constructive change - 42%
   Defective or deficient contract documents - 41%
   Delays - 41%
   Constructive acceleration - 35%

Maladministration - 33%
Differing site conditions - 31%
Impossibility of performance - 18%
Superior knowledge - 18%
Termination - 7%

Stubborness - A balky mule cannot be depended on to pull the wagon

Dishonesty - Destroys incentives to play fair and pay promptly!

2. Successful collections & payments

Trustful relations

Construction is a give and take situation. By the end of the job the gives and takes must balance out. The construction machinery is lubricated by the exchange of small favors.

Honesty

Honest people select their business associates carefully. Those who pay for services rendered generally recognize honesty in a company or an individual if they themselves are honest.

Competence

Competent people recognize competence in others. On most jobs, given the presence of a reasonable number of high value factors, the competent payee will be compensated fairly and promptly. Financial check and balance systems ask too many "why" questions to allow competent parties to remain unrewarded.

A willingness to give and take

All taking and no giving by either the payer or the payee will sink a project in a swamp of paper and a sea of red ink. The mistrust that results from this lack of informal give and take will grow to a monster unless it is replaced by a mutual confidence by the parties to the situation.

E. Retentions

1. Often used for doubtful reasons

- As a club to assure proper completion
- To save interest payments for 10% of the job cost
- To insure construction damage to completed work is repaired
- To pay for anticipated contested claims

2. The problems of retention are old and will probably remain problems until
    - Properly addressed by the parties involved
    - There is agreement among like parties as to its impact
    - All parties to a contract behave according to their contract
3. Attitudes and realities about retention
    - In 1976 a survey was made of the American Subcontractors Association (ASA)
        - Showed average retention among members was $200,000
        - Members said would reduce bid price 3.7% if retention was eliminated
    - A recent survey of the American Subcontractors Association indicates
        - Subcontractors are willing to give lower bids to generals who
            - Pay them promptly
            - Offer them a fair and equitable contract
        - Of 200 respondents
            - 89% said they give better bids to generals regularly or occasionally
            - 90% did so because the general had prompt payment policies
            - 91% said not paid within 3 days of billings
            - 69% said not paid within 7 days of billings
    - Policies on retention
        - + Recent AGC, ASC and ASA policy calls for payment within 7 days of billing
        - + In 1974 GSA went to zero retention
        - + At one time Department of Defense eliminated retentions
        - + EPA once wrote retention requirements out of its grants
        - + About 1984 Michigan Dept of Mgmt & Budget adopted zero retention
            - Was required by the legislature
            - Department had 2 choices

Put money in escrow
Problem - couldn't use state treasury for holding vehicl
Problem - private holding would have too complicated
Would have thousands of accounts
Prohibitively expensive and cumberson
Adopt a policy of total payment for completed line items
Each line item was to be explicit
On recent $2,000,000 job
Had about 1100 line items
Listed on 27 pages
Ranged in cost from $100 to nearly $70,000
Adopted zero retention route
Some state officials like it, some hate it
Some contractors like it, some hate it
+ In 1983 the Office of Federal Procurement Policy decided that
A uniform governmentwide policy should be implemented
Retainage was not to be used as a substitute for good contract management
An agency cannot withold funds without good cause
Determinations on retainage are to be made on the basis of
Contractor's past performance
Liklihood that such performance will continue in the future
Suggested that
Retainage not exceed 10%
That it be adjusted downwards as the contract approaches completion
When contract is complete all retainages be paid promptly
Summary - there is no single attitude or reality re retentions!

F. Collections, or better yet, payments

1. Direct payment from the owner
Conventional method on self financed projects

Success of method depends on the integrity and compentence of the owner

2. Direct payment from another contractor
   Evolved when general contractor did most of their own work
   The secondary payment process may be used as a club rather than a tool
3. Direct payment from another party
   Usually called the title company method
   Steps in the title company disbursement method
   A. Monthly draw requests received from the contractors
   B. Supporting documents reviewed by the appropriate tier of contractor
   C. Job inspected by inspecting architect retained by payer
   D. Payment made to the contractors directly
      Sometimes direct to subs
      Sometimes to general contractor for disbursement to subs

   Advantages
      Insures prompt payment to contractors
      Provides third party evaluation to gage performance
      Gives financing source full control of the money flow
      Tends to diminish tendency to front load or unbalance billings

   Disadvantages
      Removes some of prime contractor's leverage to get work done
      Creates excessive dependency on attitudes of financing source
      Owner plays secondary role in motivating performance
      Poorly qualified inspecting architect can create havoc
         Bad attitude toward contractors
         Jealousy between architect of record and inspecting architect

G. Final payment

1. Elements of record used in closing out the job
   The punch list and the certificate of occupancy

Usually these provide the rationale behind final payment being made
You should decide early how the job is to be punched out
Who is to do it?
When is it to be done?
What standards of performance are to be used to measure acceptability
When is the contractor's punch list to be prepared?
When is the owner's punch list to be prepared?
The operating and maintenance manuals
Inadequate OMM submittals may be cause for non payment
Get them done and get them submitted!

H. Where successful collections and payment start

1. The agreement

The starting point for cash flow success is preparation and execution of a well understood agreement up front

Often contractors take jobs that specify impossible performance

Leads to getting into a position where the owner, or the architect engineer feel they can withold payment for personal, subjective reasons, using the impossible clause as a legal reason.

Example: the witholding of payment because the contractor did not submit a acceptable schedule within a given period of time - usually an unreasonable time frame for preparation of a good plan of work and schedule.

Infeasible schedules
Inadequate contract documents
Unworkable contract agreements
Multiple primes
Installation of unknown systems
Undefined responsibility patterns

2. The client - either owner or contractor

Most payment-successful contractors profile a prospect before proposing on a job. This is done with any new client, and sometimes on previous clients with doubtful records.

Profiling a client should follows a basic pattern

What factors describe how a client will pay?

- Personal integrity
- Business integrity
- Past payment record with you
- Past payment record with others
- Current financial strength
- Nature of assembled project financing
- Process used for approving payment and releasing funds
- Attitudes of the architect/engineer toward you and paying
- Methods of closing out jobs

3. The project

As with the client, the project must also be profiled. Not every job is for everyone. Be very selective so as to optimize your opportunities for success.

What factors describe a good pay project for you

+ Your past experience in building such facilities
+ The client's past experience in building such facilities
+ Funding sources
  - Individuals
  - Syndicates
  - Trust funds
  - Pension funds
  - Political entities
+ Payment method
  - Direct payment
  - Title company payment
  - Inspecting architect
  - Payment method specified to be used for sub contractors
  - Retention specified

4. Evaluating the job

Once the client and project factors are identified, it is necessary to analyze them for a decision as to whether the job is potentially a good job or a bad job. Good and bad is evaluated as to the risk and the return on investment.

A. Weigh each factor

Weight each from one to ten as to its importance to you

One - totally unimportant to being paid

Ten - most critical to being paid

B. Assign values to the client and the project which you are proposing upon

Values should be from one to ten

One - Client and project produce worst pay potential situation for factor

Ten - Client and project produce best pay potential situation for factor

C. Multiply the factor weight by the value to get a profile number

Example of profiling

How you might profile the payment potential of a new prospect.

Factor weights multiplied by value for client Jones

Honesty in business - 10 x 08 = 80

Past payment record with you 10 x 06 = 60

Past payment record with others 07 x 03 = 21

Current financial strength 07 x 05 = 35

Nature of assembled financing 05 x 07 = 35

Process for approving payment and releasing funds 08 x 09 = 72

Attitudes of the architect/engineer - 06 x 06 = 36

Method of closing out jobs 07 x 05 = 35

Factor weights multiplied by value for Jones project

Your past experience in building such facilities 05 x 08 = 40

Client past experience in building such facilities 04 x 04 = 16
Funding sources 08 x 08 = 64
Payment method 07 x 05 = 35

Total = 529 out of a total possible of 740, or a 71% potential for good payment relationship

I. **Rules for getting paid promptly**
   1. Be certain of your agreement and understand what it says
   2. Be honest in your dealings and your intent
   3. Fulfil your contract
   4. Avoid legal entanglements and threats
   5. Be willing to use the lubricating oil of small favors exchanged

J. **If you aren't entitled to it don't try to get it!**

K. **ho 259 - Dec,87**

Ralph J. Stephenson PE PC
Consulting Engineer

General Steps Taken in Processing A Construction Claim

The starting point of most construction related claims is when one of the parties involved feels they have been harmed in some manner by the actions of another involved party. Of course there are many variations on this basic theme. Due to the number, complexity and combinations of circumstances under which a contested claim may arise, let us first take a specific set of project delivery criteria and examine the steps that might be followed in resolving a typical dispute.

Assumptions - The project is a hard money, fixed time job in which the construction firm doing the work is considered a prime contractor, with a conventional construction contract with the owner. The owner has had his design team prepare a relatively complete set of contract documents from which contractor selection was made by competitive bidding from a short list.

Further assume that at some point in the construction process the owner takes an action that seems to interfere with the right of the contractor to enjoy a maximum profit from his construction efforts (sometimes called maladministration), while, in the contractor's opinion, he is still performing in accordance with his contract obligations.

To describe an instance where this could actually happen, suppose the contract calls for completion of the total facility by September 1st with no specified intermediate dates for owner occupancy of the facility. Part way through the job the owner makes it known to the contractor that he wants the upper floors delivered by July 1st, but will still take the lower floors on September 1st. The owner says this should be at no additional cost to him since the contractor was planning to be done about that time anyway. The contractor proceeds to try and accomodate the owner.

Usually in a good contractor/owner relation a matter of this nature can be worked out amiably and to the mutual operational and financial satisfaction of both parties, the owner and the contractor.

However in this case, assume the revisions apparently cause considerable disruption of sequencing, delivery commitments and manpower assignment to the project over what had been planned by the contractor. An effort to resolve the matter equitably for both parties has been made and was unsuccessful. Clearly, where the financial and other losses of the contractor, real or imagined, is sizable, another method of approaching a settlement must be found.

Now, the first step in a formal resolution takes place - making a decision on the preferred or specified method to use to settle. Usual methods are:

- Administrative settlement
- Mediation
- Arbitration
- Modifications or combinations of the above

Usually the preferred solution by most parties to a dispute is by some type of administrative settlement through discussion among the operational and executive staffs of the owner and the contractor. Where this proves difficult or impossible, succeeding steps are usually taken.

For our example let us start by considering litigation.

Litigation is the settlement of a dispute through the efforts of a third party operating under legal rules governing the presentation, consideration and judgments rendered in the case. It is to be emphasized that the steps outlined below are not to be considered the formal legal steps to be taken, but within the writer's experience are steps most contested claims in which he has been involved with follow to their resolution.

There may be considerable variation in the sequence in which the steps are taken. However at some time in the process each of the following actions must be considered, and if appropriate, taken. The steps are lettered for convenience of reference, but are not necessarily listed in the sequence in which they may be taken.

Step A - The need for a claim emerges and the parties involved discuss the matter. There is either a resolution, a decision to pursue the matter further administratively, or a decision to file for formal action resulting from the discussions.

Step B - If a resolution is not achieved, the contractor will probably prepare additional submittal material identifying the circumstances, the effects, the impacts and the approximate reimbursement felt due him as a result of imposition of other than contract conditions on his work.

Step C - This submittal material is then presented by the contractor to the owner and further discussions are held. These hopefully will lead to an administrative settlement.

If not, the contractor may file through his legal advisors, a request for one of several kinds of formal third party decision actions, such as mediation, arbitration or litigation. The discussion in this paper deals primarily with the technical steps usually followed in litigation.

Step D - The contractor through his legal advisors, then actually files for litigation. This is a complex and formal process, a description of which is beyond the scope of this essay.

Step E - As the petition for litigation is being filed, the contractor selects the issues to be addressed that have contributed to the claim, and the level of documentation he and his technical and legal counsel feel appropriate.

Step F - If a relatively low level of documentation has been deemed adequate, since the causes and proof of the contested claim issues seem apparent, the contractor's staff will usually assemble the claim file and estimate the cost of the damages caused by the owner's apparent interference.

If the nature of the claim is such that many complex and obscure factors have contributed to the claimed loss, or the proof of loss appears excessively complex, the contractor may call in an outside qualified and objective expert to help assemble the documents, the facts and the amounts to be claimed.

Step G - The backup documentation concerning correspondence, transmittals, estimates, change processing, directives, and other pertinent historical records is assembled into a data system which allows the location, printing, abstracting and relative rapid analysis of groups of documents or records relating to any subject, chronology, organization or other classification system desired.

Step H - Concurrent with preparation of detailed document files, the discovery of evidence by both parties is pursued. This discovery period is often characterized by demands for what are called interrogatories and depositions. However it is emphasized that the discovery period in litigation is primarily to uncover evidence, its source, its existence and its nature.

Because of the often difficult nature of activities during discovery in the litigation process it is often an advantage for the contractor to have his outside experts work directly for the legal advisor. This may provide some protection to the consultant work product and thus shield it from those not friendly to the contractor.

Step I - As discovery proceeds, the parties to the dispute should be, and usually are, trying to agree on an administrative settlement as the various claims and counter claims statements emerge.

Also, during the discovery period face to face attempts to uncover evidence are accomplished most commonly by deposition. The deposition consists of testimony and questioning, again aimed at evidence location. The deposition period will usually continue over a period specified loosely by the governing judicial body in the matter.

From depositions, additional documentation is found, and if wanted by a party to the dispute, subject to acquisition by the subpoena process. This process usually does not allow material prepared by a consultant for an attorney to be acquired through subpoena. Thus the reason for having the legal consultant work directly for the legal consultant and prepare confidential work products for the attorneys. This material is sometimes known as a protected work product.

An important feature of the discovery/subpoena process is that few if any documents prepared during the course of the job can be totally shielded from acquisition by the opposition. Therefore there is a strong need for good, intelligently written documentation of the job during its construction.

<u>Step J</u> - At some point, usually determined by the governing legal body, the discovery period is declared closed and formal legal hearings can now proceed. By this time a selection and settlement on the type of litigation decision making process has been made. The two most common methods are the bench trial and the jury trial.

A bench trial is conducted by a judge only, and he makes the decision in the matter after the hearings have been completed. The jury trial uses a jury of lay individuals to hear the testimony and to judge the merits of the case.

In technical matters, such as construction, it is most often found that a bench trial is preferable to the jury trial due to the difficulty in presenting understandable evidence to a group of lay people, who often are not acquainted either with the legal process or the design and construction industry.

<u>Step K</u> - During the formal trial process the parties to the contested claim present their respective views in arguments, displays of evidence, direct questioning and cross examination of witnesses. The judge, in a bench trial, or the jury, in a jury trial, listens to the presentation of evidence and the group continues on in the hearing until the arguments are exhausted, and both sides or the judge calls it quits.

During the hearing process many people may be called to the witness stand to answer questions. Those who have given depositions may be closely questioned on statements made by them during the deposition, particularly in relation to additional information that has come out during subsequent depositions, interrogatories or in court.

Step L - Once the governing legal body declares the trial completed, the case is closed and either the judge, in a bench trial, or the jury, in a jury trial, retires to review the evidence, think about the testimony and the evidence, and to make a decision from the choices presented during the trial.

Step M - When a decision as to the relative merits of each party's case is reached by the judge or the jury, the decision is announced and the settlement of claim is decided on by the governing legal body. This then closes out the case as originally heard and judged upon.

From this point on there are several legal actions possible that could reopen the matter of the contested claim and its merits. A discussion of these is beyond the scope of this paper.

Section #6

People Relations in Design and Construction

Ralph J. Stephenson PE PC
Consulting Engineer

PARTICIPANTS IN DESIGNING & BUILDING ENVIRONMENTS

There are five basic participants in the process of designing and building environments. These are the conceiver, the translator, the constructor, the operator and the regulator.

Conceivers - Those who conceive the idea and provide the wherewithal to bring the environmental program to a successful conclusion. The conceiver may be the owner but it also might be a governmental agency, a financial source, an architect, an engineer, a contractor, a vendor or a potential tenant looking for space. We identify the conceiver since he usually is the key person driving the project on to completion.

Translators - Those who translate the environmental program into construction language. Traditionally we think of the architect/engineer as the translator. However careful consideration of this matter shows there are many others who translate the conceiver's fundamental ideas into understandable, workable construction language. Subcontractors, suppliers, vendors, manufacturers, contractors and the conceiver may all play a role in translating.

Constructors - Those who interpret the construction language and convert it to a actual physical environment. Occupying this role are general contractors, specialty contractors, vendors, suppliers, manufacturers, artists and others who actually put the materials into place in the field.

Operators - Those who operate and maintain the completed physical environment on a continuing basis. Ususally the party responsible for this function is an owner or tenant working through a plant or facilities manager.

Regulators - Those who fill a review & inspection position to help insure protection of the health, safety & welfare of the people. This is usually done by enforcing regulations written and adopted by qualified public or private bodies. Examples of regulators include those who work for building departments, departments of natural resources, public health agencies, fire prevention organizations, technical societies and other such groups.

* * * *

Identification of the parties to a project is important because it assists in defining the important individuals & organizations involved, their functional authority and responsibility so that optimum use can be made of their participation and assistance.

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Consulting Engineer

WORKING WELL WITH PEOPLE

Working well with people is the key to multiplying your effectiveness. The good manager reaches his objectives through the work of those in whom he has confidence.

Some pointers to keep in mind as you work with others are:

- 1. Learn about and understand the behavioral sciences
  - A. Basic sciences are
    - 1.) Anthropology (origin, development and behavior of humanity)
    - 2.) Psychology (attitudes and feelings)
    - 3.) Physiology (body characteristics)
    - 4.) Sociology (environmental & group influences & relations)
  - B. The manager should start with the assumption that most people want to do a good job
  - C. Most people want to share in the success of a common effort
  - D. The good manager learns to avoid people manipulation
    - 1.) Manipulation is excessive management of other's feelings and emotions
    - 2.) Manipulation is often rooted in fear
    - 3.) Genuine interest and willingness to trust people is an effective thought pattern that will help avoid manipulation
    - 4.) Don't play behavioral games with employees or subordinates
  - E.) Motivation and maintenance
    - 1.) Maslow's basic motivational priorities
      - a.) Man wants to be alive and stay alive
      - b.) He wants to feel safe and secure
      - c.) He wants to socialize with other people
      - d.) He wants to feel worthy and respected
      - e.) He needs to do the work he likes
    - 2.) Motivational elements
      - a.) Nature of work
      - b.) Recognition of achievement
      - c.) Utilized abilities
      - d.) Challenging assignments

e.) Extended involvement and responsibility
f.) Production of something of worth

3.) Motivation is introduced into the work place by providing genuinely satisfying conditions that reflect the hierarchy of human values

4.) Maintenance - those job elements that do not in themselves motivate, but when missing, reduce the incentive to produce
a.) Pay and benefits
b.) Security
c.) Working environment
(1.) Status
(2.) Social activity

5.) Use motivation and maintenance to help avoid managing by force
(a.) Force is primitive rather than scientific
(b.) Force kills the qualities a good manager must encourage in his employees. These qualities are
(1.) Confidence
(2.) Spirit
(3.) Self reliance
(4.) Assurance
(5.) Self sufficiency

• 2. Know and understand the people you work with
A. Elements of importance are:
1.) Name, age, address
2.) Employment record
3.) Education
4.) Military service record
5.) Family and dependents
6.) Medical characteristics
7.) Off job interests
a.) Job related
b.) Recreation, hobbies
c.) Community
8.) Personal beliefs

9.) Personal habits
10.) Life goals

B. A good manager does not
1.) Pry for facts people don't want to reveal
2.) Gossip about people
3.) Reveal confidences
4.) Break trusts

C. Knowing a person well can allow you to more properly place confidence in him

• 3. Express your respect and confidence to people when actually deserved

A. Should be expressed publicly and privately
B. Respect and confidence are reciprocal in a good working relation
C. Don't confuse being liked with being respected
D. The minds of people perceive both what management says and what they do
E. The respected employee wants to be treated well and used well

• 4. Communicate freely

A. Within allowable boundaries keep people informed about
1.) What is going on in the larger picture around them
2.) What changes are planned
3.) What objectives are set for their functional activities

B. Listen carefully to what your people are saying. Try to understand
1.) The outward message
2.) Feelings they are attempting to express but don't or can't

C. To watch out for in communications
1.) Use discretion as to what should and should not be conveyed to your people. Don't show off superior access to information.
2.) Generally, base your actions with people on what you actually know about the situation, rather than on what you think others may be thinking.
3.) Your suggestions as a peer are considered conversation: your suggestions as a boss are generally regarded as an order.

• 5. Provide people with challenging assignments

A. To expect a lot from your staff or crew is to show respect for their abilities, initiative and perseverance
B. Be firm but fair in assignment and in follow up. A boss doesn't have to be liked to be effective
C. Usually challenging work is accompanied by a possibility of failure
D. A challenging assignment should be doable

- 6. Delegate important tasks frequently
  A. Don't try to make all decisions about every job by yourself
  B. Let your people accept new responsibilities and to make occasional mistakes; that's the way they will learn and improve
  C. Make it known that the more important jobs that you delegate are training assignments. You then retain control of the activity and can make comparative critiques of performance without offense
  D. Don't be frightened of losing your influence through delegation . Constructive delegation is the path to greater influence and power
  E. The delegation sequence
    1.) Use guided actions. Be available to help the subordinate do the new work
    2.) Show the learners how to do the job, and encourage them to further delegate, where appropriate, by having them train or coach their subordinates in the activity
    3.) Delegate the whole job and involve subordinates in the early planning as well as the activity itself

- 7. Study and understand the benefits and shortcomings of each subordinate's participation

For further study:

1. <u>Hawthorne experiment</u> (1927) - encouraging workers to get things off their chest was proven to increase production

2. <u>IBM</u> (1950's) - job enlargement broadened divisions of labor. Improved quality, output and morale

3. Harwood Manufacturing - controlled experiments in employee participation produced impressive improvement. Measured by using three different methods of conveying information about proposed operational revisions

4. Texas Instruments - emphasized use of goal oriented management rather than authority oriented management. Manager exerts most of his leadership in planning. Subordinates carry out the actual plan, control, do cycle

5. American Telegraph and Telephone - used job enrichment process focusing on the work itself. Encouraged employee decisions on HOW the work was to be done. Resulted in money savings, reduced turnover and improvement in staff utilization.

Ralph J. Stephenson PE PC
Consulting Engineer

ELEMENTS OF EFFECTIVE PROJECT MANAGEMENT

1. Technical competence
2. Proper project planning
3. Good project staff morale
4. Clearly defined authority lines
5. Clearly defined responsibility lines
6. Respected leadership
7. Clear understanding of the project mission
8. A sensitive monitoring system
9. Prompt and effective resolution of problems
10. Discerning points of view
11. Effective modes of action
12. A feeling for people
13. A project wide desire for excellence
14. Inquisitive minds
15. A sense of humor
16. Collective patience
17. Collective endurance

6.08

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QUALITIES OF A GOOD PROJECT MANAGER

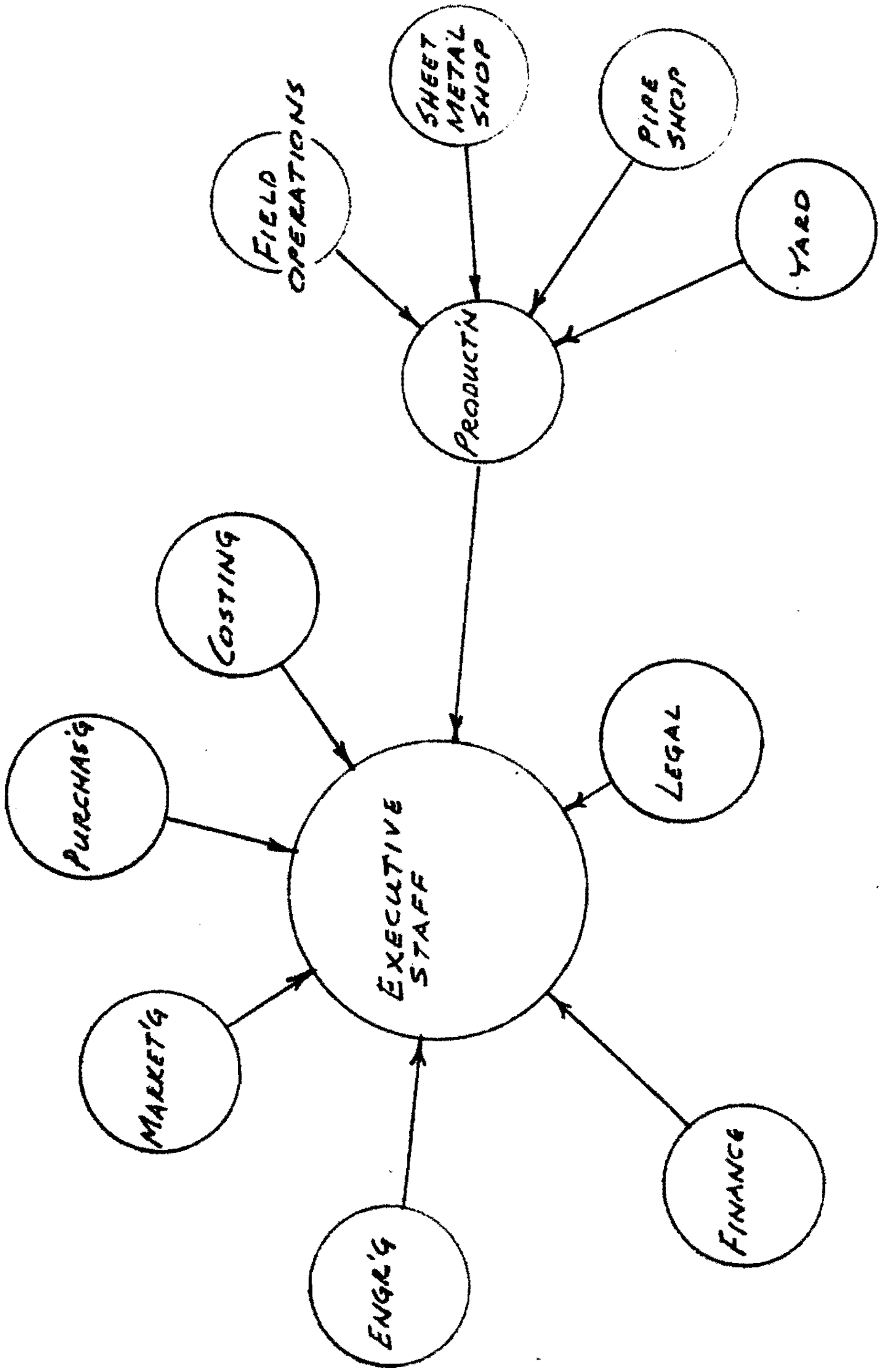
1. A perceptive ability to move from the micro situation to the macro situation, and back again at will.
2. An ability to work well with people.
3. A desire for excellence.
4. An inquisitive mind.
5. An ability to manage conflict.
6. A sense of humor.
7. Good mental peripheral vision.
8. Education in related fields
9. Training in related fields.
10. Leadership ability.
11. Related technical and professional credentials.
12. An understanding of the true role of profit in our society.
13. A potential for being creative.
14. Good communication ability.

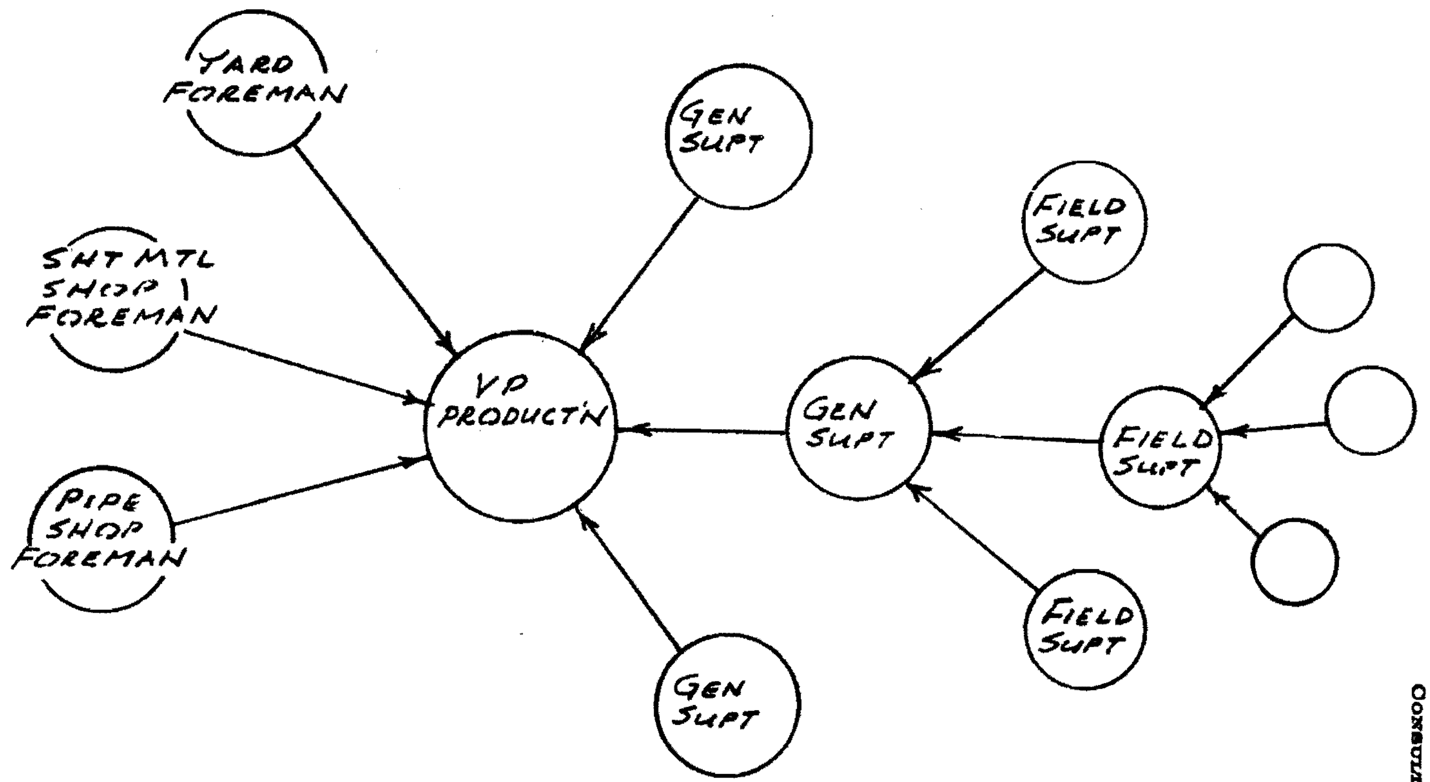
16\. Intelligent consistency.

15\. Honesty and integrity.

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

EXAMPLE OF BASIC
FUNCTIONAL COMPANY
RELATIONS (DEPARTMENTAL)

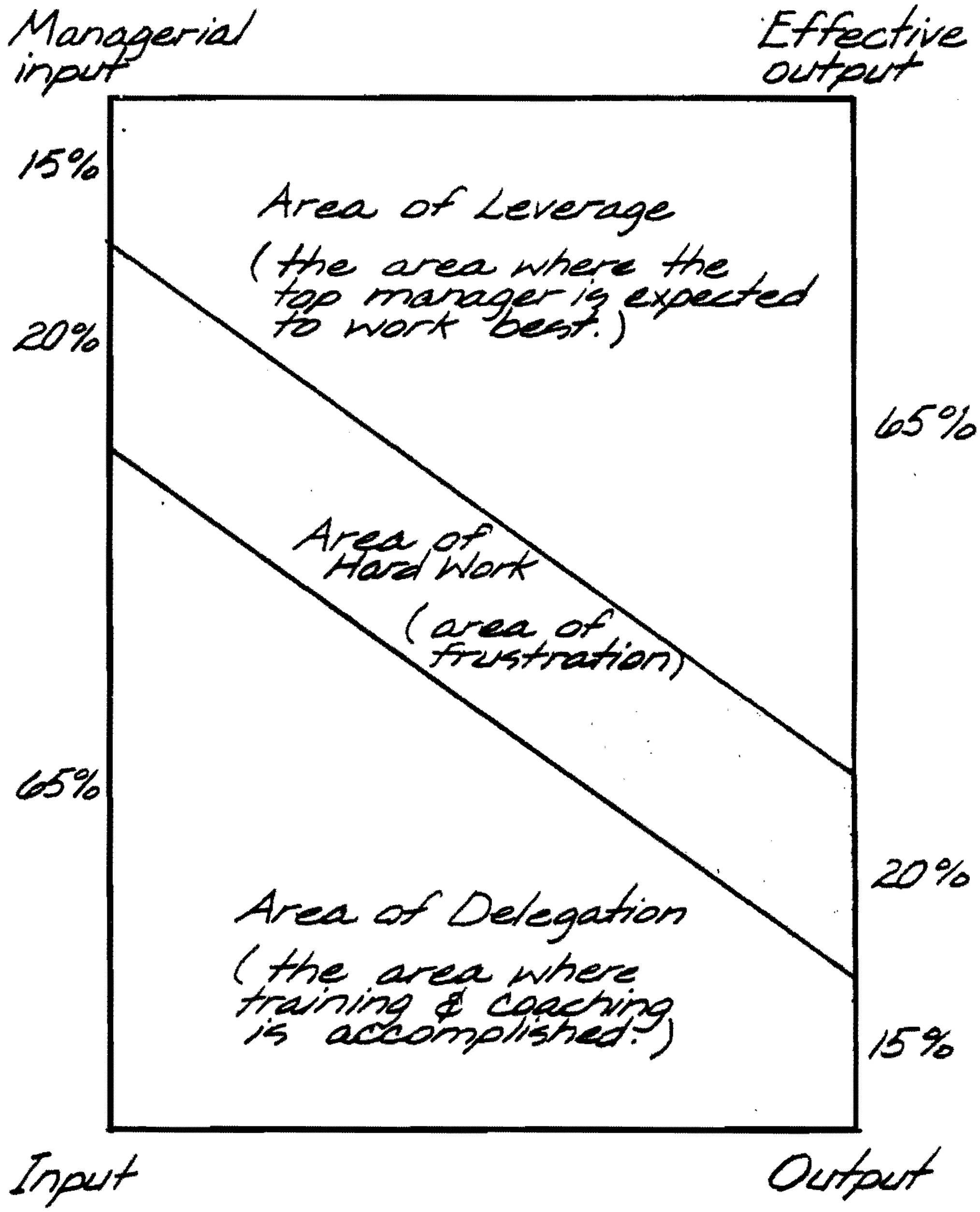




RELATIONSHIPS

- ⟷ FORMAL
- ⟶ REPORTING
- ⇠⇢ INFORMAL
- ⟹ STAFF

EXAMPLE OF BASIC FUNCTIONAL
DEPARTMENT RELATIONSHIPS (INDIVIDUAL)



MANAGERIAL LEVERAGE

HO 210

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APPLY SITUATIONAL THINKING

Continually try to widen the scope of your perceptions. The ability to expand your view beyond the immediate boundaries of a situation is critical in almost any situation. Moving easily from the macro to the micro, and being able to stop anywhere in between, helps insure that the manager viewing the scene gets a full look at what's going on in and around the situation.

Zoom thinking of this type is known as situational thinking. The process allows and encourages you to examine as many aspects of a subject system or decision as time allows.

Some basic ideas related to situational thinking

- A. The reason for failure of Impulsive, narrow minded men and women as managers is often because they don't, can't, or won't look carefully and see what's going on around them.

- B. Most inadequate managerial decisions are a result of

    1. Failure to include enough significant factors for the time available to make the decision
    2. Delaying action until after cause-effect relations have changed

- C. How a manager views a particular problem is likely to determine the individual's and the organization's success or failure in handling it.

- D. Five situational failings the excellent manager must guard against

    1. Views too narrow - mental tunnel vision
    2. Assessments too subjective
    3. Missing moving targets
    4. Failing to allow for momentum
    5. Trying to control the impossible

- E. To think situationally

1. Find the overall picture - get out to the boundaries of the biggest picture available to you
2. Look at the edges of the situation as well as at the center
3. Identify and explore areas of minimum information
4. Seek and locate significant internal and external relationships
5. Use time as an asset, just like you use labor, materials, or money
6. Pretest decisions whenever possible
7. Constantly strive to increase the number and range of your informal interfaces

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Consulting Engineer

PREPARE FOR THE PROBABLE

Optimism, skepticism, and conservatism are ingredients a good manager knows how to mix and use, just as a good cook knows how to prepare and serve food. Although a formal study of probability and statistics is certainly of help to a project manger in the construction industry, it is not essential to understanding many of the basic elements of preparing for the probable.

Some critical probability points to be considered by the effective project manager include:

- A. Over optimism is often the manager's enemy. It can blind him to the true needs for success.

- B. Pessimism is usually the manager's paralyzer. Improperly administered it makes action possible only <u>despite</u> the pessimism

- C. A manager simply cannot afford to be surprised by the unexpected event.

- D. A basic understanding of the statistics of happenings is helpful if you are to manage well.

- E. Pareto's law is an example of a distribution of events - in any give object value situation it can be expected that a small % of the objects (say 20%) will account for a large % of the value (say 80%)

- F. Several event distribution patterns are seen in happenings. Among the better known distributions are

    1. The normal distribution
    2. The Poisson distribution
    3. The binomial distribution

- G. The normal distribution says that in every situation there are two extremes of happenings and a range of probable happenings in between. A game example is throwing dice; it is probable that 2's, 3's, 11's, 12's will come up less frequently than 4's

- G. Distributions can be

    1. Skewed - A distribution where the measure of central tendency departs from the center of the distribution range.

    2. Symmetrical - A distribution where the measure of central tendency is in the center of the distribution range.

    3. Tall - When things go wrong they go wrong quickly. Deterioration is rapid and visible. Instability is easy to detect but usually failure occurs before the average or mediocre manager can do anything about it.

    4. Flat - A large number of things go wrong over a long period of time. Deterioration of the situation is slow and often difficult for the manager to see. Hard to get a fix on. The long run to failure ultimately proves the distribution.

- H. Statistics are important to effectively managing projects

- I. The perceptive project manager finds that several common managerial failings can result from not understanding the meaning of chance and probability. Some of these occur when:

    1. The relation between luck and good fortune is not recognized.

    2. Over optimism casts a false glow on the situation. It may blind the manager to his true chance for success.

    3. Subjective temptations such as ego, greed, and false pride over feed ambition.

    4. The manager loses his cool. (When things are going wrong and

you have overextended yourself, pull back temporarily, calm down the active mode, and objectively evaluate the situation. Stop. and think!)

5. The manager may tend to become overprotective and fearful of risk even when odds are in favor of success. If the probability of success is high, move!

• L. Stabilize your judgments - Use the knowledge of normal expectancies to guide your actions.

1. Set your priorities in terms of the probable rather than the merely possible. Always try to work from a position of strength.

2. Set attainable goals and objectives. Don't put them out of range for either yourself or others.

3. Build safeguards into your plans.

4. Prepare fall back or mousehole positions. These are preselected alternate plans of action that may have seemed initially less desirable.

5. Avoid demands for perfection. All statistical reasoning rules against its achievement.

6. Don't try to manage the impossible; <u>but be careful about who determines it's impossible.</u>

Ralph J. Stephenson PE PC
Consulting Engineer

EMPLOY THE POWER OF TRAINING

A manager multiples his own knowledge and skills when he teaches them to others. When considering a training, educational or coaching effort the following points might be helpful.

• 1. Educating is teaching and learning the generic principals of doing things. It is teaching principles that can be universally applied.

• 2. Training is teaching and learning the specific, explicit process of doing things. It is vocational and procedural.

• 3. Coaching is a limited one on one, or one on few teaching effort to educate, train, or to do both. It is personally guided dialogue between teacher and learner.

• 4. Unguided learning sometimes occurs naturally, but it may turn out to be random, inexact, wasteful and tend to encourage bad habits.

• 5. Good training, educating and coaching usually results in improved staff performance.

• 6. Good staff performance allows the manager to devote more of his time to concentrating upon, initiating action of, and directing and controlling the resources at his disposal.

• 7. The need for good training, educating & coaching is ongoing irrespective of how good or bad business & organizational times are.

• 8. The excellent manager will usually try to teach what he knows to those who wish to learn

• 9. The improvement cycle is an important element of effective training and education. Elements of the improvement cycle - inertia, initiative, insight and improvement (the four I's) - are defined as follows:

A. **<u>Inertia</u>** - resistance to change

1.) Reasons for inertia

a.) Fear for safety

b.) Fear for security

c.) Concern for comfort

d.) Doubts about ability

e.) Old habits and attitudes

f.) Dislike for schooling

g.) Preoccupation with other problems

2.) Overcoming inertia

a.) Use motivation to get going - habit to keep going

b.) Motivation must be mainly furnished by supervision

c.) Neutralize fear that accompanies inertia

(1.) Show that others in similar positions have benefited from learning

(2.) Show that added skills give more, not less, security through added employee value

(3.) Acknowledge doubts as to aptitude or potential

(4.) Criticize constructively and express willingness to tolerate learning mistakes

(5.) Show the employee that training will be truly relevant; that what he learns can be used now, for his and the company's benefit.

(6.) Plan the learning program so the participant is rewarded with some quick and simple success experiences.

B. **<u>Initiative</u>** - the removal of inertia as a barrier to learning. Once the reasons for inertia have been removed by the teacher the desire to learn will begin to appear. Initiative is then the responsibility of the learner.

C. **<u>Insights</u>** - the key elements of a subject that deal with the intellectual, the physical and the procedural requirements of learning. Insights are of different kinds:

1.) Intellectual insights - those that concern the whole concept of what is to be learned
2.) Physical insights - those that concern getting the physical feel of the process - the touch, tone, heft and smell of the job
3.) Procedural insights - those related to sequential demands of the operation

D. **Improvement** - Accelerated learning gained by overcoming inertia, taking initiative, gaining insights. Is encouraged by

1.) Applying learned principals through exercises
2.) Stepping up challenges by increasing levels of difficulty
3.) Accelerating flow of learning challenges until the rate of improvement levels off (this may constitute a return to the inertia plateau and signal the need for a new cycle)

• 10. The basic phases of a training program are planning, instruction, evaluation

A. **Planning**

1.) Survey and analyze needs
2.) Identify and analyze key learning need points
3.) Select training methods
4.) Prepare the training outline

B. **Instruction**

1.) Capture interest and arouse initiative
2.) Give insights
3.) Accelerate improvement

C. **Evaluation**

1.) Review progress
2.) Evaluate results
3.) Make plans to overcome the next inertia plateau

Section #7

Case Studies

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Pointers for Reading, Analyzing and Solving Case Studies

We will be using miniature case studies occasionally to point up various features of project planning and control systems. The suggestions below are to help you gain the most from the case study work.

Pointer 1

Read the case study carefully and try to get an overall managerial feeling for the situation and problems. The first scanning should be rapid with brief returns to specific problems. Underline and highlight key points as you go through the case study the first time.

Pointer 2

Where problems seem to exist in the description, isolate these even though they appear minor, and give them a mental priority ranking as you read through the study the first or second time. Identify problems to be solved and actions to be taken by asterisks or some other identifying mark.

Pointer 3

Clearly identify _your_ position in the case study. What is it _you_ are supposed to be, and how are _you_ supposed to act? This activity is called internal role playing and is a good simulation technique for solving problems from your standpoint.

Pointer 4

Always ask yourself the basic questions about any situation - who?, what?, why?, when?, where? Without the answers to these five fundamental one word questions, an analysis may be incomplete and faulty.

Pointer 5

Be certain to answer the problem questions as fully as time permits. Normally the minutes allocated to a case study will be few and it is important to focus quickly upon the essential elements of the problems presented.

Pointer 6

When the case study is discussed, don't hesitate to bring out points you feel are important. Also learn from other's solutions. Remember there are usually many ways to solve problems and resolve difficulties.

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The Case of the Changing Library - ho 304

A study in the analysis of construction documentation

You work for Joe Gather, the Director of Physical Plant at West Fork University, a state collage in Maine. Currently you are acting as the owner's project manager on a $4 million library addition for the school. It is late March, and the project is to be completed by early July, next year. Construction is proceeding under a traditional project delivery system.

The first three months of the job have gone well. Mobilization and site layout proceeded as scheduled, mass excavation is substantially complete, and all spread footings are installed. Basement wall construction is now moving into full production.

Over the past 3 weeks there have been some concerns on the part of the architect/engineer and the general contractor about possible changes to the project. A new director of library services, Larry Insotel, recently joined the staff and is mildly criticizing the design, privately to you, and by inference in the weekly construction meetings. It is your intent to have these meetings weekly until the substructure is complete and then to conduct them every 2 weeks up to the point when the building is closed to weather.

Mr. Insotel has a moderate knowledge of building design and construction but has never participated in a major facility expansion. He is conscientious about his responsibilities, and seems to respond well to predictable demands made on his time. He reports directly to the Vice President of Administrative Services, the same vice president to whom Joe Gather reports.

You realize that you will soon have to do something about the matter of change implications and rumors, since field work is showing signs of slowing. Nobody on the project apparently wants to go through the trouble and potential expense of unneeded revisions, cost fishing expeditions, bulletins, change orders and long arguments about how to collect for the

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extra money and time that might be involved.

As the owner's project manager and design and construction representative on the job answer the following questions

1. Specifically, what are the potential problems in this situation?

2. What steps would you take now to help resolve any current or potential problems you have identified in question 1 above?

3. What indications are there that any of the problems might be cleared by the use of appropriate documentation.

4. What documentation would you design to permanently (for the full length of the project), or temporarily (tailored specifically to a temporary problem) help restore full and confident job implementation in the field?

5. Write a mission statement for the documentation system you are considering.

6. Prepare a layout and description of one of the documents you must tailor to the current project situation.

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Case Study #1

The Case of the Quality Firm

The Maltan Construction Company is a small general contractor doing moderate size commercial and industrial work. Over the twenty-five years of its existence it has averaged from 6 to 10 million dollars gross in today's dollars. Maltan is a family owned firm and has built a reputation for personally negotiated and supervised conduct of its business.

Competitive bidding accounts for only 15 to 20 percent of its volume and is done primarily to keep in touch with the pricing market. Maltan recently negotiated and was awarded a hospital project of about 8 million dollars total including sub-trades. The hospital, Streetway, recently has had some very difficult construction experiences which affected its attitude toward contractors, architects and engineers. Although conscientious and concerned, it has become super cautious of cost and construction procedure. However, Streetway still realizes it gets what it pays for and prefers negotiating with competent contractors.

Streetway Hospital has retained a part-time consultant for this job to follow and inspect the construction activity. He formerly was an officer in a large construction company and has the concept of a contractor on a job of this size as one who fully staffs the field office with a clerk, an engineer and a superintendent. He expects depth of personnel in the field backed up by a large office staff.

Maltan is not geared to that type of operation. It normally puts one superintendent in the field and he runs the work while all support activities are maintained in the office. Maltan is willing to conform to the hospital consultant's wishes and feels it can recover most of its costs to do this in reimbursable general requirements.

The decision is made to do as the consultant to the hospital wishes. You are a member of the Maltan family, and project manager for the hospital. What should be the major thrust of your early network planning with your subs and the client?

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Case Study #2

The Case of Filigree Company's Remodeled Computer Room

Filigree is a large national manufacturer of yard goods and embroidery supplies. They maintain a basic computer operation in La Crosse, Wisconsin, although their warehouses and manufacturing plants are spread throughout the United States, Canada and the British Isles.

The La Crosse center feeds all sales, inventory and other business statistical data to the far flung plant and office network of Filigree.

The computer center operates on a 24 hour day, 7 day per week basis. Your firm, the Steinman Construction Company, has been called in to suggest the sequence by which the computer room could be remodeled. It is a small job, approximately $700,000, but very critical to Filigree. The architect and engineer are on Filigree's staff and realize the importance of working closely with the selected contractor doing the work. Only very rough layouts have been prepared although Filigree's architect/engineer knows a great deal about the La Crosse office and has identified the location and capacity of most utility services in ceiling work and other elements important to installation of the new computer sector.

The existing operation must be maintained while the new space (gained from vacation of the area by the marketing division) is remodeled. The new space directly adjoins the existing computer room but is separated from it by a demountable partition.

As project manager and superintendent, you will be on the job and responsible for all trades. How would you go about planning this project?

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Case Study #3

The Case of the Sympathetic Doctor

A contract has been let (?) and you have been appointed superintendent of a major two year hospital remodeling. At the first job meeting Dr. Jensin, a woman physician in charge of the hospital, says she cannot let you start work for another four months. The reasons are complex, however, it is apparent she has not been kept informed of the proposed work schedule either by the head of the hospital physical plant or by the architect/engineer, both of whom are present at your meeting.

Her reasons for not allowing you to start are based on some very sound arguments. On the other hand you can see several areas where work actually could begin and probably carry through at least for the four months if not longer. You, of course, must start now by contract, but you sense the architect/engineer and the physical plant director do not want to get involved in what now is a problem between you and the female hospital directress.

Dr. Jensin is a reasonable woman and extremely intelligent. However, she resents being bypassed and is angry about being backed into a corner by the design team. As she talks it becomes increasingly apparent that there are places you could start work now and not endanger her hospital operation.

Oral descriptions of the early work program are difficult and your comments have had little effect since she cannot visualize nor understand your operation and needs. Dr. Jensin is not impatient or unreasonable, but being from Missouri, must be shown. Consider these questions:

1) How would a brief summary network of early work you would like to start be of help at this point?
2) What parties should help you prepare this summary diagram?
3) How far into the job should the diagram (if used) be extended for the present?
4) How do you stabilize and improve your relations with Dr. Jensin?

Case Study #4

The Wasted Treatment Plant

The project is a 25 million dollar waste treatment plant. You are the project manager and superintendent. Your involvement has been especially heavy for the past three weeks right after the job was obtained. It is apparent to you that the contract documents are poor, the owner is painfully indifferent to all influence except political pressures and the job is definitely claim prone.

What steps do you take now (within the first two months of this 2½ year job) to protect your company's interest?

Consider these questions:

1) How would a summary network diagram be of use?

2) What special activities should you be certain to include in the early summary diagram?

3) Who should be invited to the initial network planning session?

4) With whom should you discuss the problems that you see on the horizon?

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Case Study #5

The Sneaky Boiler Contractor

You have just completed and activated a sizable boiler house addition. The contract for boiler installation was a separate agreement with the owner, Carlton State College, with all other contracts direct with your firm, the Shoenite Construction Company, general contractors. As the job is being closed out, Jerry Biel, the physical plant director for the college comes to you confidentially and says the boiler contractor, Laguna, is claiming extra costs because Shoenite Construction interferred with his erection procedure by not providing a slab on grade from which to erect the tube systems and the boiler walls.

Actually Laguna, because of their separate contract with the owner, paid little or no attention to your requests as project manager to keep the area clear and early filled the slab on grade sector with material and equipment before you could possibly have built the slab.

Early in the job you prepared a detailed critical path diagram of all elements of the project including the boiler work. The boiler diagram was prepared in consultation with Laguna, and approved by their superintendent. The network clearly showed the slab on grade being built prior to loading the area with boiler equipment.

Consider these questions:

1) What potential problems exist here for you and Shoenite Construction Company?

2) What steps should you take immediately?

3) What is your own position in this matter? Why?

4) Describe the problem the owner has and how Shoenite Construction and you might help him resolve it.

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Case Study #6

The Case of the Weak Primes

Your firm, the Oldenburg Construction Company, has just negotiated a time and material upset price contract for doing the architectural and structural prime contract work with the local hospital authority for a three story 7 million dollar surgical addition. Contracts are all prime with the other major contractors being mechanical, electrical, communications, food service, and medical equipment.

The owner's representative, Don Larson, has asked your opinion of using a critical path plan for the entire project. He has had a previous good experience with this system and is willing to pay for its cost if you and the other primes want to work with him on it.

The other prime contractors are not as strong as you would like and traditionally tend to underman their work. There is strong feeling in yours and Mr. Oldenburg's mind that the job will not run well unless a well defined plan of action can be prepared that all agree to. You are faced with several decisions:

1) What is your response to Mr. Larson?

2) What factors influenced you in deciding the course of action you would like to take?

3) If it is decided to go ahead with the network diagram, how do you propose to work with the other contractors?

4) Who should prepare the network diagram?

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Case Study #7

The Case of the Generous Owner

The job is a crash program to add a new paint line to the Farnsworth Automobile Company's Olethe Plant. The job was bid and let on a fixed contract to your company, Page Construction, but the nature of this kind of work traditionally is such that you expect as much as 75% of the original bid capital cost of 4 million dollars will be added in changes and additions to the base contract.

The owner has purchased 600 tons of structural steel erected for the job on a separate basis and may add this to your contract paying you a percentage fee for handling the work. The Farnsworth Company is a very production oriented company. They have built hundreds of millions of dollars worth of plants over the past few years and are hard nosed about design and construction.

Some important questions are suggested:

1) If you were the president of Page Construction Company, what would your attitude be toward adding the structural steel fabrication and erection on a percentage fee to your base contract arrangement?

2) What would be the advantages of preparing a network diagram at the early stage of the job?

3) What would be the disadvantages of preparing a network diagram for the project?

4) As a superintendent on the project for Page, how could you insure to the highest degree that the job will be a financial and public relations success for Page Construction Company?

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Case Study #8

The Case of the Color Schedule Argument

As project manager on a new 16 million dollar classroom building at the local state university, you have prepared over the past 4 months (from the beginning of the job) a detailed network diagram for the entire building. It is a good diagram and you and your superintendent are very pleased with it as a job tool. The subcontractors have participated in its preparation and they, too, are happy to have a document to guide them in their work. This is particularly the case since the university and the architect both have reputations for being hard on their contractors.

Copies of the network have been provided to the director of the physical plant for the university and the architect with a covering letter indicating this is your plan of work and soliciting comments.

They respond that they, too, like what they have seen and it is satisfactory. This response is in writing.

Six months into the job the owner and the architect have a severe disagreement with each other on the interior color and finish schedule. You remind them constantly that you need this schedule now. Your network model shows an early receipt of the schedule two weeks from the current date, with a late receipt three months from now. However, you have scheduled purchasing so if you are delayed in receiving it past the early date, it could cause serious delivery problems due to firm commitments with your vendors.

This poses an interesting situation. Some questions of importance might be:

1) What should you do, if anything, to help resolve the dispute between the owner and the architect?

2) What do you do to protect yours and your firm's interest?

3) What obligation do you have in this matter to your subcontractors, many of whom are affected?

4) What is your immediate course of action?

5) Suppose the dispute is not resolved in timely fashion, would you have cause for a claim? How would you present such a claim?

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Case Study #9

The Case of the Dependent Tasks Additions

A small glass firm, Crystal Glass, is constructing a new plant to produce plate glass with a relatively untried water float process. Your company, Douglas Design and Build, has been awarded the superstructure work built upon a substructure by others. You have designed and are building the superstructure exclusive of equipment installation.

There are some minor delay problems attributable to the earlier let foundation work but not serious enough to bother you financially. However, as the job proceeds, the owner begins to revise his work and add to your contract. Some of these owner revisions do not change Douglas' operations but delay completion of your superstructure work since decisions are not made promptly by Crystal. For those revisions which obviously change the price, you are issued change orders. For owner activities that affect you but don't cause apparent increases in your costs, no concern is shown by Crystal whatsoever.

Now, however, you, as the project manager, realize that your costs due to owner imposed restraints are getting serious. You had prepared a good critical path diagram at the start of the project. You also have accumulated all of the information on what delays were imposed, who imposed them and which tasks were affected. Your next course of action calls for considering several questions:

1) Do you do anything? If the answer is no, why?

2) If the answer is yes, what do you do first?

3) What records will be required to support a claim for additional costs?

4) What could you have done to avoid what will be an obviously unpleasant confrontation with your client regarding extra work and extra cost? What should you do now?

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Case Study #10

The Case of the Frozen Job

It is winter and you are temporarily shutting down outside work on this new 190 thousand square foot 2-story reinforced concrete department store (as agreed in early negotiations with the owner). Frank Babbet, the owner's representative, is astonished. He was not aware of the winter shutdown agreement, having been assigned to the job by your client, Lathrup Merchandisers, after it had started in the field. He is very angry that nobody had said anything to him up to now about the shutdown. In fact, when he was assigned to the project about two months after it started, he participated in the critical path diagramming session with you and the other contractors. The diagrams were prepared by an owner's network consultant with whom you get along very well. These diagrams make no mention of a winter shutdown but do allow a comfortable amount of winter weather delay time within the tasks.

Your original agreement with the owner to shut the job down was oral and the man with whom you discussed it has been reassigned to another city so is not available for discussions or confirmation. You sense you are in trouble and, as project manager and superintendent for your company, must sit down and think this problem through.

1) Where did you and your company make your basic mistake if any?

2) What should you have done to protect your original position and agreement?

3) The new owner representative is competent and understanding. He has an excellent reputation for being fair but firm. What should your approach to him be?

4) How do you visualize your company salvaging its reputation, its profit, and the account?

5) Should you have gone on record early about the shutdown agreement? How?

6) Should the procedure have been incorporated in the early network diagram prepared with the owner? How?

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WHERE DO WE GO FROM HERE?

Qitain University, a small private engineering, science, liberal arts school in the northwest United States city of Qitain, is about to embark on a major (for them) expansion plan. It involves the planning, design, and construction of a new university activities building, a modest athletic facility having a gym and indoor pool, along with support facilities, and a small combined library and book store.

The expansion program has been written, the desired planners, architect, and engineers have been selected, and the Board of Regents of the school have given the project a go ahead.

An organizational meeting is in progress with the following people in attendance:

- Frank Carlton - Vice President for University Planning and Operations
- James Tea - Program consultant for the university
- Fred Link - President of the planning/architectural firm of Link and Associates, the possible architects of record for the entire project
- Charles Redrock - Associate, chief architect, and project manager on the project for Link and Associates
- Robert Hagel - President of Hagel Mechanical Engineering Company, the possible mechanical engineers for the project
- Stan Weissman - President of Weissman Electric, the possible electrical engineers for the project
- Richard Goldmark - A wealthy alumnus and key mover in assembling the total funding for the program

The site of the new building group extends across two city public rights of way (ROW), Francis Avenue and Fourth Avenue. Preliminary negotiations have been conducted with the City of Qitain by Mr. Carlton, of the University, and with the city manager, George Dell. It appears that vacation of the ROWs can be accomplished on a reasonable basis. Several live utilities are known to be in the two streets but exact sizes and locations have not yet been determined.

The discussion has generated several questions now being addressed. Some of these include:

1. The only available survey map of the area is an in-house student survey prepared ten years ago as a semester project. A new survey has not been budgeted and might be challanged as an excessive cost by the Board of Regents.

Should a new survey be made?

Why?

What should a new survey contain?

2. Should the University retain a construction manager?

If not, why?

If yes, why?

3. How should the project be organized and what should be the role of the various parties involved?

4. Who should be the ULTIMATE DECISION MAKER (udm) on the project?

5. Should the University appoint a staff representative to the project?

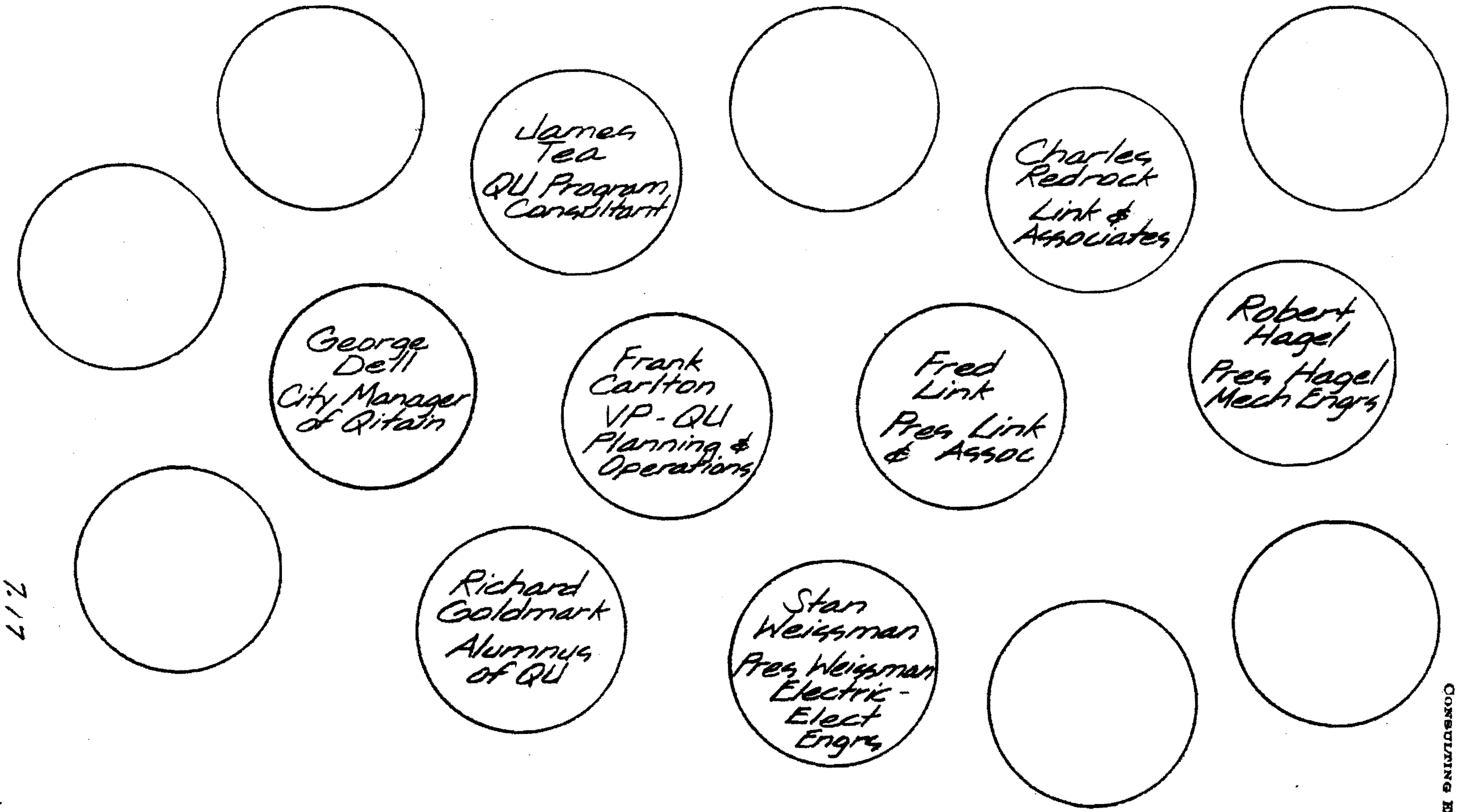
If so, what should be his title, authority, responsibilities and his activities?

6. The contract for architectural, mechanical, and electrical design services are not yet awarded, but all agree that the three firms at the meeting are the ones to do the job. With whom should the architectural, mechanical and electrical engineering contracts be executed?

7. How do answers to the above question affect the claim potential for the project?

8. If you were an alumnus, and a local general contractor serving on the Board of Directors of the University, and acting as an ex officio advisor to the program group, how you have answered questions 1 through 7 so as to maximize the potential for claim avoidance (cav)?

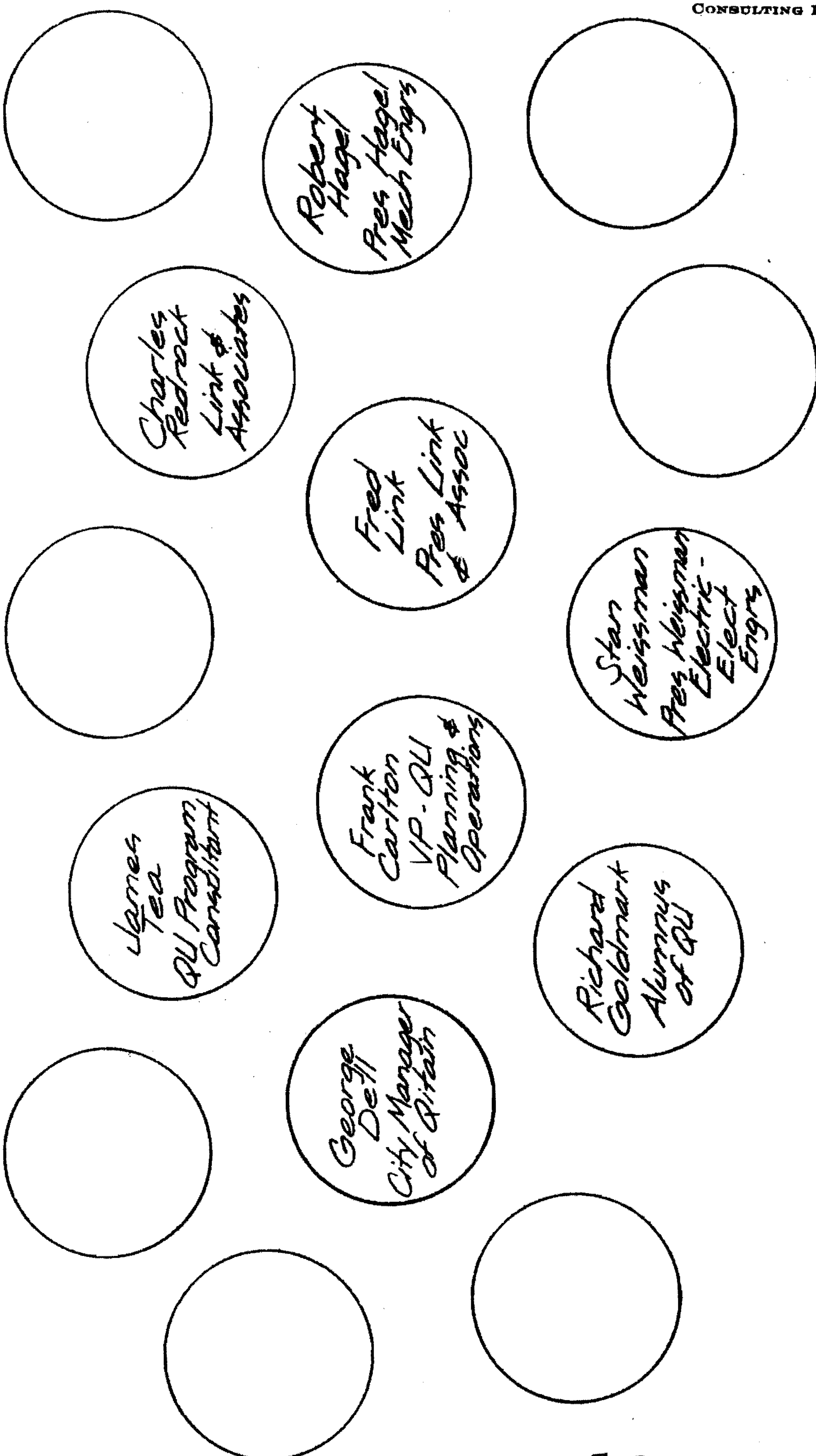
9. What role would you recommend Mr. Goldmark be requested to play in the project?



QITAIN UNIVERSITY - PROJECT

ORGANIZATION STRUCTURE

QITAIN UNIVERSITY - PROJECT ORGANIZATION STRUCTURE



CASE STUDY NUMBER THREE

Keeping the Records Straight

On May 11,1982, The Charles T. Sierra Company was awarded the general contract for installing a new paint system in the Southeastern plant of Hirtwell Ltd., a very large and competitive manufacturer of metal and plastic enclosures for mechanical and electrical equipment.

Hirtwell has a reasonably good reputation as a manufacturer; however on construction projects they have been very harsh on their architects, engineers, contractors and suppliers. This reputation is generally recognized as coming from Franklin Johnson, the former Vice President of Facilities. Mr. Johnson retired several months before you were awarded the contract for the new job. His successor, Paul Rolla, has reorganized the company's facilities department, and most of Mr. Johnson's staff have left.

The project manager for Hirtwell on this job is Tom Begn, a pleasant, but inexperienced graduate engineer. The architect/engineer for Hirtwell is Jones and Higgins, a local firm in Tucson, the location of the new plant.

You are Lee F. James, the project manager for Charles T. Sierra, and your boss, Mr. Sierra, has told you that he wants this job thoroughly documented. He has built six projects ranging in size from one to five million dollars for Hirtwell over the last eight years and has had disputed claims on every one. Mr. Sierra feels the previous Sierra job management has been too loose and sloppy. This time he wants a change. You have never worked on a Hirtwell job before, but have had two similar projects to this one previously. On one you were the engineer and on the other you were the project manager.

Your company is presently experimenting with two microprocessors in addition to the main computer. The main computer is used primarily for accounting and payroll purposes. You have access to one of the microprocessors, and Mr. Sierra has encouraged you to get your imagination to work and find some real and profitable uses for the equipment. You have great interest in the small computers but have never used them.

The project cost is $3,225,000 on a hard money contract. The next lowest bidder on the job, you are told, had a price of four million.

There are three other prime contractors working on the project, all on different parts of the total program.

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Their contracts are smaller than yours, but ultimately much of your work will be required to interface closely with theirs.

Part of your contract is to install a new paint spray system which is relatively untried except for pilot runs made by the fabricator. The owner is purchasing the equipment, but you are totally responsible for its installation, hook up, check run and test. Controls for the system are also in your contract.

Consider the following questions:

1. What characteristics of the project lead you to believe it is possibly claim prone?

2. How would careful documentation of the job help avoid the claim disputes?

3. What document information might you wish to store and retrieve for the job?

4. What must a document control system provide you and Sierra to help avoid the disputed claim?

5. Of what use might a microprocessor be to you in the control and tracking of documents

6. What document records would you keep for the project?

7. The job superintendent has never worked on a Hirtwell job before. What would you discuss with him and when, if you are all trying to avoid the disputed claim?

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RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

SE TUCSON ABB

REC	ABB	MEANING	ORGANIZATION	CAT
49	BUL	BULLETIN		DT
74	COR	CHANGE ORDER		DT
75	HWM	HANDWRITTEN MEMO		DT
46	LTR	LETTER		DT
32	MLG	MAILGRAM		DT
48	PRQ	PAYMENT REQUEST		DT
50	PUO	PURCHASE ORDER		DT
47	SBM	SUBMITTAL		DT
30	TLX	TELEX		DT
69	TMS	TRANSMITTAL		DT
70	BIM	BIOTIC MECHANICS	MECHANICAL CONTRACTORS	NM
52	CAS	STRAND, CHAS. A. CO.		NM
5	CRR	CONTROL AND REGULATOR CO		NM
53	CTS	SIERRA, CHARLES T. CO.	CONSTRUCTORS	NM
6	FRS	FRENCH STEEL		NM
26	FXS	SKONE, FRED X.	TRE ENGINEER	NM
18	HWL	HIRTWELL LTD.		NM
55	JAH	JONES & HIGGINS	ARCH/ENGRS	NM
71	JTD	DARTH, JAMES T.	BIM CHIEF ENGR	NM
7	KLP	PAGE, KARL L.	FRS ESTIMATOR	NM
12	LFJ	JAMES, LEE F.	CTS PROJECT MANAGER	NM
17	PAR	ROLLA, PAUL A.	HWL VICE PRES	NM
8	RGH	HIAL, ROBERT G.	CTS VICE PRESIDENT	NM
9	RTK	KREITZ, ROBERT T.	CRR PROJECT ENGINEER	NM
25	TRE	TRIELECTRIC CO.	ELECTRICAL CONTRACTORS	NM
56	TSS	STIRTON, TOM T.	JAH PROJECT MGR	NM
13	TTB	BEGN, TOM T.	HWL PROJECT MANAGER	NM
66	ANB	ANCHOR BOLTS		SU
34	APV	APPROVAL		SU
60	CFR	COMPANY FROM		SU
2	COI	COILS		SU
22	CON	CONTRACT		SU
36	COS	COLOR SELECTION		SU
10	CST	COIL STEEL		SU
3	CTL	CONTROLS		SU
61	CTO	COMPANY TO		SU
65	CWK	CONCRETE WORK		SU
54	DAM	DAMAGED		SU
59	DCT	DOCUMENT TYPE		SU
31	DEF	DEFECTIVE		SU
11	DEL	DELIVERY		SU
67	EMB	EMBEDMENTS		SU
44	ENG	ENGINEERING		SU
1	FAN	FANS		SU
14	FRA	FOR REVIEW AND APPROVAL		SU
68	HLD	HOLD		SU
62	IFR	INDIVIDUAL FROM		SU
23	IST	INSTRUMENTATION		SU
63	ITO	INDIVIDUAL TO		SU
28	MCC	MOTOR CONTROL CENTER		SU
72	MEC	MECHANICAL		SU
27	MTR	MOTORS		SU
38	OLP	OFF LINE PRODUCTION		SU
45	PCH	PURCHASING		SU
73	PIT	PITS		SU
37	PNT	PAINT		SU
42	PRT	PROTOTYPE		SU
41	PSS	PAINT SPRAY SYSTEMS		SU

7.21

SE TUCSON ABB PAGE 2

REC	ABB	MEANING	ORGANIZATION	CAT
39	QUA	QUALITY ASSURANCE		SU
33	REL	RELEASE		SU
21	REV	REVISIONS		SU
29	RFI	REQUEST FOR INFORMATION		SU
19	RFP	REQUEST FOR PROPOSAL		SU
40	SAF	SAFETY		SU
43	SAL	SALES		SU
35	SBM	SUBMITTAL		SU
24	SFW	SOFTWEAR		SU
20	SHL	SHELL		SU
4	SPD	SHIPMENT DATES		SU
51	STS	STRUCTURAL STEEL		SU
58	TUO	TURNAROUND-SUBMITTALS		SU
57	UFV	FAN UNIT FIVE		SU
15	UON	FAN UNIT ONE		SU
16	URG	URGENT		SU
64	YR	YEAR		SU

FM50: PFILE=SORTHABB
FFILE=HABB
TITLE=SE TUCSON ABB
TYPE=R
ROUTE=P

FM51: ABB
MNG
ORG
CAT

Charles T. Sierra Company 9/13/82
Constructors, Frigate, Indiana

MINUTES OF PROJECT MEETING #9 - SE Hirtwell, Tucson

Date of meeting: Friday,September 10, 1982
Place: Job site, Tucson
Time: 8:00 AM to 9:45 AM
Attending:

Paul A. Rolla VP, Hirtwell
Tom T. Begn Project Manager, Hirtwell
Robert T. Hial VP, Sierra
Lee F. James Project Manager, Sierra
Fred Teal Superintendent, Sierra
James T. Darth Chief Engineer, Biotics
Fred X. Skone Engineer, Trielectric
Tom T. Stirton Project Manager, Jones & Higgins

From: Lee F. James, Sierra

To: All attending, Robert T. Kreitz, CRR

General Summary:

Lee James reported that all pit and foundation work was meeting dates between early and late starts and finishes. Still having difficulty getting dimensional information about mechanical and electrical sleeve and thimble sizes and locations.

Tom Stirton reviewed bulletin/change order tracking and said that of 11 bulletins issued to date, 6 had been quoted and 5 had been converted to change orders. A change order for the sixth will be issued later this week.

James Darth discussed equip delivery from his procurement tracking sheets (copy attached). All equipment ordered and 40% of the shop drawings have been submitted, with 20% returned. Mr. Darth asked for selective improvement in submittal turnaround times.

Fred Skone reported that ....

can be improved.

Old Business:

9.5.10 The additional software data needed for instrumentation has been received and sent to Tom Begn for owner review. Mr. Begn will confer directly with the architect/engineer re design characteristics. Action by TTB, TTS

9.8.3 Low strength concrete tests.......

resolved with no increase in cost.

New Business:

9.1 Paul Rolla said that a sizable addition to the work was under consideration by, and that it had been decided by Hirtwell to have it done under bulletin procedures, but that if the cost was more than budgeted it might be reissued for.........

good job.

Closing:

The next project meeting will be held Friday, September 24, 1982 at the job site, Tucson.

This report is the writer's interpretation of the matters discussed. The account will be considered agreed to by those attending the meeting and those receiving the report, unless Lee James of Sierra is notified within 2 weeks of your receipt of the report.

Lee F. James

Lee F. James, Project Manager,
Sierra

76011

April 5, 19[redacted]

[redacted]
3131 South State Street
[redacted]

Attention: [redacted]

RE: [redacted] W.W.T.P.
Contract 77 [redacted]

Gentlemen:

We refer to your letter of March [redacted] 19[redacted] regarding worn equipment at existing primary tanks.

We received Field Order No. 191-7 on March [redacted] 19[redacted] authorizing us to proceed with purchase and installation of new rails for these tanks.

When material has been received and installed we will notify you of the impact of this delay to the project.

Very truly yours,

[redacted]RS

[redacted]ce

XPT
FIO
DLY
MEC
PRC

[redacted]111

7.25

HIRTWELL SE TUSCON


```
REC#  DOC #         DATE  YR  DCT  CFR  CTO  IFR  ITO
SUBJ CLASS
SUMMARY A
SUMMARY B
-----------------------------------------------------------------------
   1  07115         0726  82  LTR  CRR  CTS  RTK  RGH
CTL/COI/SPD
COIL CONTROL ASSEMBLY SHIPPED 7/16/82


   2  07116         0730  82  LTR  CTS  FRS  RGH  KLP
STS/DEL/DAM/RFI
STRUCTURAL STL DEL TO JOB DAMAGED. WHAT TO DO?


   3  07117         0730  82  SBM  CTS  JAH  LFJ  TSS
SHD/FRA/UON/URG/FAN
DWG D2287433SBM FAN 1 SUBMITTED FOR APV. URGENT!


   4  08001         0802  82  PRQ  CTS  HWL  RGH  PAR
PRQ
PYMT REQ 2. AMOUNT = 47243.45


   5  08002         0802  82  BUL  JAH  CTS  TSS  LFJ
RFP/SHL/REV/FAN/UFV
BULL 8 REVISE SHELL SHAPE/FAN SIZE FOR UNIT 5


   6  08003         0802  82  PUO  CTS  CRR  RGH  RTK
CON/CTL/IST/RFI/SFW
PURC ORD ISSUED FOR ADDTNL INSTRUMNTN
NEED MORE DATA RE:SOFTWARE

   7  08004         0804  82  LTR  CTS  TRE  LFJ  FXS
MTR/MCC/RFI
REQUEST FOR MOTOR START REQUIREMENTS


   8  08005         0804  82  MLG  FRS  CTS  KLP  RGH
STS/DAM
RESPONSE TO 07116.  REFABBED STEEL SHPPD 8/4/82
RETURN ACTION MAILGRAM TO FOLLOW

   9  08006         0805  82  HWM  CTS  CTS  RGH  LFJ
REL/APV/SBM/COS/PNT
INSTRUCTIONS TO RELEASE PAINT COLORS FOR PURCHASE


  10  08007         0806  82  LTR  HWL  CTS  PAR  RGH
SAF/PSS/RFI
REQUEST CHECK OF SAFETY REQMTS FOR PAINT SPRAY SYSTEM
```

REC# DOC # DATE YR DCT CFR CTO IFR ITO
SUBJ CLASS
SUMMARY A
SUMMARY B

---

11 08008 0809 82 LTR CTS HWL LFJ TBB
SHD/TUO
REQUEST TO EXPEDITE SHOP DWG TURNAROUND
PRESENTLY TAKING TOO LONG

12 08009 0810 82 BUL JAH CTS TSS LFJ
RFP/CWK/ANB/EMB/PIT
BULLETIN #15-PRICE SOUTH PIT REVISIONS

13 08010 0810 82 LTR JAH CTS TSS LFJ
HLD/CWK/ANB/EMB
ENGINEER PUTS HOLD ON CONCRETE WORK AT SOUTH PITS
PENDING PRICING AND RELEASE OF COR

14 08011 0811 82 TMS CTS TRE LFJ FXS
BUL/RFP/EMB/ELE
REQUEST TO QUOTE BULL 15-S PIT REVISIONS

15 08012 0811 82 TMS CTS BIM LFJ JTD
BUL/RFP/ENB/MEC
REQUEST TO QUOTE BULL 15-SOUTH PIT REVISIONS

16 08013 0812 82 COR JAH CTS TSS LFJ
CWK/REV/ELV
CHANGE ORD 1-REVISE CONCRETE WALL ELEVATIONS

7.27

Friday July 9, 1982

Hitwell SE Tucson, Arizona

- All new bldg ftgs complete today at NE corner. Moving to NW corner ftg concrete work Monday.
- Still having trouble with delivery of embedments in pit walls. Biotic supp dimension on dwgs wrong. Must clarify. I am meeting with Tom Monday to review. CT 7/9/82
- Hit flowing water at 9:00 ~~P.M.~~ A.M. on ℄ 8-C. Began pumping at 10:15 A.M. today. Notified Tom Began of Hitwell and Tom Stirton of Jones and Higgins of water at 9:45 AM today. Still pumping at 5:30 P.M. Will check Sat & Sunday on water levels.
- Rod buster & carpenter held up by water. Sent them home at 11:00 AM.
- Mr. Rolla and Mr. Stirton visited job at 1:15 P.M. Left at 2:30 P.M. Complimented housekeeping and progress (except water!)

Project History for Period #8 - August

Schedules or Networks in Effect During Period:
Network model issue #4 dated 3/8/82, sheets 1, 2, 3, 4, 5

08001 8/2/82 - CTS submits payment request #2 to JAH. Amount of $47,243.45.

08002 8/2/82 - Bulletin #8 issued for revisions to shell shape and fan size for fan unit #3.

JAH APPEAR TO BE ASKING FOR A NO COST CHANGE. IS THIS SO?

08004 8/4/82 - CFR requests motor starter information from TRE. Need data for HWL electrical engineering department.

WHY COULDN'T HWL GET THIS INFORMATION FROM THE ARCHITECT/ENGINEER?

08005 8/4/82 - FRS writes CTS that structural steel delivered to the job damaged on 7/30/82 has been refabbed and will be shipped on 8/4/82. Instructions for return of damaged steel to follow.

08006 8/5/82 - RGH gives CTS instructions to release paint colors for purchase of materials.

WERE THE COLOR AND FINISH SCHEDULES RELEASED BY THE OWNER AND THE ARCHITECT PREVIOUSLY? IF NOT, WHY?

08007 8/6/82 - HTL writes CTS requesting check of safety requirements for the paint spray system. Checked these earlier but are concerned about possible violations in the proprietary equipment being used.

WAS THIS PART OF CTS CONTRACT REQUIREMENTS? WHAT WAS THE RESULT OF THE CHECK?

08008 8/9/82 - CTS requests HWL expedite shop drawing approvals. Presently taking an average of 24 working days from leaving CTS office to receipt back. Had agreed on 16 working days in June 1982.

HOW WERE THE SUBMITTALS TO BE DELIVERED AND PICKED UP BY CTS?

pjt his, d156, ho 218

CASE STUDY NUMBER TWO

What Do We Do With All This Equipment?

You are the general contractor (Young Construction Company), field superintendent on a new 140,000 square foot manufacturing plant being built for Telco, a large metal fabricating company,on a site adjoining its main manufacturing facility. The contract has been somewhat splintered by the desire of the owner to reuse several pieces of machinery and equipment now located in various. parts of the existing plant. They also wish to provide several pieces of new equipment, some of which you and your subcontractors must set and hook up. Telco presently has several other contractors under direct contract to them on the job in the existing plant.

The contract drawings and specifications for your work are not very clear on who does what in this equipment installation and you are disturbed by the possibility that you may be middled into doing a sizable amount of work that is not really your responsibility.

In addition, the job to date has not gone too well for you and your subs, and they are reluctant to do any additional work, not clearly their responsibility. The mechanical contractor, Falstaff Inc., is proving to be particularly difficult. Gold Electric, the electrical contractor has been easy to get along with so far.

Typical of the problems that the equipment conditions pose can be seen by the following section from the specification:

> "Several pieces of equipment presently located in the present plant are to be relocated to the new plant and made operative there. Some of the existing equipment must not be deactivated until the new plant is operating. Work to be done includes, but is not limited to the following
>
> a. Two compressed air tanks located in the existing paint shop are to be reused. They are to be taken out of service only when the compressors in the new building are ready to run.
>
> b. Three paint spray booths were deactivated by the owner 4 years ago and removed and stored in the northwest corner of the existing building. The contractor is to reerect these in the locations designated on the drawings. Connections to the spray booths will be made by the owner."

The specification continues on in a like fashion describing nearly two dozen other items similar to those given in an example above. You are concerned that nobody in the owner's office, your office, or among your subs has read this spec closely enough to clearly see the full scope of work for each party.

The owner's representative on the job is intelligent, interested in doing well for his company, and is well known for his fairness in dealing with contractors, architects, engineers, and other parties to his projects. He intensely dislikes surprises.

Consider the following questions:

1. How could you bring the full scope of work into view easily and clearly for each party to the job?

2. How would you convey your understanding of the scope of work to the owner?

3. How are your subcontractors involved in the clarification process?

4. What steps should you take to prevent the equipment problem from developing into a disputed claim?

5. How do you convey your concerns to the owner?

cav cst 2,d156

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LINE #	EQUIPMENT DESCRIPTION & WHO FURNISHES	PRESENT LOCATION OF EQUIP	FINAL LOCATION	ACTION TO BE TAKEN & BY WHOM		OTHER EQUIP AFFECTED	REMARKS
1	2 existing compressed air tanks (Telco)	Existing paint shop	New building paint dept	Relocate	Falstaff	New compressors must be ready to run	
				Set	Young & Falstaff		
				Hook up	Falstaff		
2	3 existing paint spray booths (Telco)	NW corner existing building	New building paint dept	Move & Set	Young	—	
				Hook up	Telco		
3 7.32	2 new paint spray booths (Falstaff)	New	New building paint dept	Erect	Young	—	
				Hook up	Telco		
4	6 existing column mounted jib cranes (Telco)	Cols 6C 5D 7D 3F 4C 2F	New bldg Cols 10A 11A 10B 11B 10C 11C	Remove	Telco	—	
				Move & Instl	Young		
5	2 new prefab shop offices 10'x15'x8' (Young)	New	1 in new bldg lab area 1 in existg bldg QA area	Erect	Young	In existg bldg after Telco clears space (watch!)	
				Mech/Elect	Telco		

Abbreviations

NW Northwest
QA Quality Assurance

EQUIPMENT ACTIVITY TABULATION

Ralph J. Stephenson PE PC
Consulting Engineer

UNIVERSITY OF QITAIN ACTIVITIES BUILDING

Monitoring #1 - Morning of working day 133

Task	Status	Color Code	Was comp	Will be comp
2 - 3	Comp		123	---
2 - 4	Comp		123	---
11 - 12	Comp		126	---
17 - 19	In work		---	138
18 - 20	In work		---	138
2 - 5	Comp		122	---
2 - 6	In work		---	135
2 - 7	In work		---	137
2 - 8	In work		---	140
2 - 9	Comp		129	---
2 - 10	In work		---	No info

Ralph J. Stephenson PE PC
Consulting Engineer

UNIVERSITY OF QITAIN ACTIVITIES BUILDING

Monitoring #2 - Morning of working day 143

Task	Status	Color Code	Was comp	Will be comp
17 - 19	Comp		142	---
18 - 20	Comp		140	---
25 - 26	In work		---	155
19 - 27	In work		---	155
20 - 28	In work		---	150

Section #8

Miscellaneous Materials

- **ho 309 - November, 1988**
- **Definitions**
  - Acceleration

    Contract work performed in a time period shorter than that originally contemplated by the contract; or contract work performed on time when the contractor is entitled to an extension of time for his performance.
  - Administration

    Those activities considered to be supportive of the ex'e-cutive operations in an organization. Administrative costs may be considered the cost of management.
  - Administrative Settlement

    A resolution of a dispute through discussion between the disputing parties and agreement upon a mutually satisfactory settlement.
  - Advisory Relations

    The interaction of parties related to each other by an obligation, either contractural or informal, where the service performed is of an advisory nature only.
  - Agency Authority

    A relation in which one person or organization acts on behalf of another with the other person's or organization's formal authority.
  - Apparent Authority

    A situation in which one person or organization acts on behalf of another person or organization without the other person's or organization's formal authority.
  - Arbitration

    A method for settling disputes whereby an officially designated third party (usually one to three people) hears and considers arguments and determines an equitable settlement. Usually considered binding upon the parties.
  - Assigned Contractural Relations

    The interconnection of those parties bound by subsequent assignment of a contract to other than the initial parties.
  - Authority

    The prerogatives, either vested or acquired over a long period of time, that allows an individual to carry out their responsibilities and duties. This includes the right to determine, adjucicate, or otherwise settle issues or disputes; the right to control, command, or determine.

- Basic Contractural Relations
  The interconnection of those parties bound by the initial contract to perform in a certain manner for certain considerations to be paid.
- Bench Trial
  A trial before a judge without the benefit of a jury.
- Bulletin
  An official notice that a change is being considered and that it is desired that those affected parties to the contract provide an estimate of the cost of the proposed change. The bulletin is often given other names such as change estimate request, request for proposal, or proposed change notice.
- Business Model
  A graphic depiction of the elements which make up a business entity. The model usually identifies premises, objectives, and implementation. It recognizes basic business functions, business activities and manager activities.
- Cardinal Change
  A change that is outside the scope of the contract.
- Change
  Any revisions to the contract documents that alter the scope of work agreed to.
- Change Order
  An official notice that the changes specified in the change order are to be done. A properly executed change order is a revision to the scope of work and the contract documents.
- Claim
  A demand for something as due; an assertion of a right or an alleged right. In construction generally a demand for something as due, or in which the demand is disputed.
- Claim Avoidance
  A technique and procedure for generation of situations in which the demand for what is due as a result of a contract agreement is honored without formal dispute, or in which the dispute is settled by

an administrative settlement.

- Claim Potential
  The measure of potential that any project has to encounter disputes during its implementation.
- Closed Shop
  A work area in which only union workers can be employed on the job.
- Closed System
  A system in which there is no import or export of information or physical materials, and in which, therefore, there is no change of components.
- Construction Management
  A system of attempting to better manage the construction process by providing expert construction knowledge and resources throughout all phases of the project. The goal of the process is to make available to the participants, information best provided by an expert skilled in construction practices, so that when the project moves into the field the managers can provide the owner with the highest potential for project success.
- Constructive Change
  An owner's action or inaction that has the same effect as a written directive.
- Continuous
  Uninterrupted in time; without cessation.
- Continuum
  A continuous or ongoing series of actions, normally uninterrupted.
- Contract Document Matrix
  A two dimensional grid in which the rows contain action items for the various project components and the columns usually designate the geographic location of the item. At the intersection of a row and a column is inserted the designation of the contract document package in which the information is contained.
- Contract Documents
  Usually considered to be the documents which provide the full definition of the scope of work for which the parties are legally responsible. Could include the agreement, the drawings, the specifications, instructions to bidders, addendum, and any other

material included by mutual agreement and clearly identified as part of the contract.

- Control

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

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

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

  Excerpts from catalogs, drawings, or flyers that depict a configuration to be used in the construction process.
- Daily Reports

  Daily technical reports about the project containing data on manpower, weather, major activities, equipment on job, and other job related statistical information. Usually the daily report form is preprinted and in loose leaf form.
- Decision Table

  A tabular display of information depicting a defined situation which permits alternative courses of action to be evaluated by yes or no answers to explicit questions.
- Decision Tree

  A graphic device showing alternate courses of action from beginning a given situation point. The decision tree is used to graphically show the impact of various possible decisions at any given point in the decision process. It can be quantified or unquantified.
- Decision-To-Action Time Span

  The amount of time required from the point at which a decision is made to the point where the decision is implemented. In a management structure it is important to insure that the full span of time from decision to action is covered, from shortest to longest.

8.04

- Defective or Deficient Contract Documents
  Contract documents which do not adequately portray the true scope of work to be done under the contract.
- Delay
  A problem or situation beyond the control of the contractor, and not resulting from the fault or negligence of the contractor, which prevents him from proceeding with part or all of the work.
- Deposition
  A written record of sworn testimony, made before a public officer for purposes of a court action. Usually the deposition is in the form of answers to questions posed by a lawyer. Depositions are used for the discovery of information, or as evidence at a trial.
- Development
  A business operation in which the primary goal is to locate and produce profitable and marketable real estate assets.
- Diary
  Similar to a log but dealing more with personal observations of the individual writing it relative to his feelings about the job and the people.
- Differing Site Conditions
  Where actual site conditions differ materially from those indicated in the contract documents; or where unknown physical conditions at the site differ materially from those ordinarily expected to be encountered in work of the nature contemplated by the contract.
- Directed Change
  A written or verbal change that falls within the scope of the contract. The owner has the responsibility of paying for the change.
- Discrete
  Consisting of, or characterized by distinct or individual parts; discontinuous.
- Document Control System
  A method of receiving, classifying, marketing, storing, and retrieving documents received and sent on a project.
- Dysfunction - Organizational
  An organizational problem that hinders or prevents achieving objectives. May be temporary or permanent.

- Early Finish (EF)
  The earliest possible date by which a task can finish in a network model if it has been started at its early start date.

- Early Start (ES)
  The earliest possible date at which a task can begin in a network model if all tasks immediately preceding it have been completed by their early finish dates.
- Education
  The teaching and learning process by which the principles of doing things are conveyed to the learner.
- Effective
  Of a nature that achieves identifiable goals and objectives in accordance with an action plan, and achieves worthwhile peripheral goals through intermediate accomplishments.
- Elapsed Duration
  The estimated or actual amount of calendar or clock time an activity requires to accomplish, considering all direct and indirect influences upon the task's activities. Includes temporary work delays and stoppage due to influencing actions on the task.
- Enrichment
  Adding to the scope of work originally contracted for with the intent to avoid being charged or paying for the extra work. Often seen in as-noted remarks on submittals, or on inadequate identification of scope of work in a bulletin or change order.
- Ex'-e cutive
  The executing arm of the organization closest to the flow of expense and income experienced in achieving the organization's prime objectives. Closely related to line operations.
- Feedback Loop
  The loop of communication around a project through which information is conveyed to and through the various components of the project.
- Field Order
  An official notice that the actions or changes described in the field order are to be done. The field order is usually issued only in

8.06

emergency situations where the time between decision and action does not permit issuance of a bulletin followed by a change order. A method of payment is usually specified in the field order.

- Free enterprise system

  An economic system under which the means of production, distribution and exchange are in large measure privately owned and directed.
- Functional - as related to management

  Designed or adapted to perform some specialized activity or duties, usually concerned with the continuous operation of the company.
- Functional Operations

  Management and staff direction of the application of resources to accomplish each specialized activity. Usually defined as a department or division of the company. Usually concerned with continuous operations of the organization. Contrasts with project operations.
- General Conditions

  The portion of the contract agreement that contains contractural-legal requirements for the work.
- General Requirements

  The portion of the contract agreement that contains overall technical support specifications governing work on the job.
- Generic Construction (G)

  The field of business practice that encompasses all phases of the construction industry, including programming, planning, designing, building, operating, and maintaining facilities. Described best as the full set of activities shown in the line of action. (See line of action.)
- Goals

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

  Data processing in which the majority of the information is entered or gained by the use of a joy stick, mouse or other control which gives direct hand related movement and entry onto a console screen.

- Guaranteed maximum price (gmp)
  The price for a specified scope of work to be provided by a contractor that contracturally binds his performance to a specified guaranteed maximum price. Often the guaranteed maximum price is tied to a time and material performance with the price not to exceed the agreed upon maximum.
- Hard Money
  A total price agreed to for the entire work, and to be paid in a mutually satisfactory schedule of payments.
- Histogram
  A graph showing a quantity on the vertical axis measured against equal intervals of time shown on the horizontal axis. In construction, often a depiction of the resources required per day over a period of time.
- Horizontal Growth (integration)
  A management system that emphasizes diversifying by expanding existing functions by classes. For instance a design office could accomplish horizontal integration through dividing their operations into various kinds of projects such as commercial, institutional and industrial. These all use the same or similar functional disciplines but the organization is divided into separate groups that concentrate mainly on one of the three main building types.
- Hygiene
  The elements in an organizational situation that are acceptable to an individual but do not necessarily motivate him. These same elements, if unacceptable to the individual, may act as negative influences.
- Interfaces
  Points at which different but related activities exert direct influences upon each other. Interfaces are often the points where direct objective activities contact dependent objective activities. Poor management of interface situations ususally causes problems and dysfunctions.
- Jury Trial
  A trial before a jury.

- Late Finish (LF)
  The latest allowable date by which a task can be completed in a network model without forcing those tasks that follow past their latest allowable start dates.
- Late Start (LS)
  The latest allowable date by which a task can be started in a network model without forcing those tasks that follow past their latest allowable starting dates.
- Leverage
  The effective use of vested and earned authority to solve problems and achieve goals and objectives.
- Life Cycle Cost
  The total cost of a system over its entire defined life.
- Line Activities
  Those activities that are most closely identified with the flow of basic expense and income related to the prime objectives of an organization.
- Line of Action
  A sequential statement of activities necessary to conceive, design, build and operate an environment. Related to the generic (G) construction process.
- Litigation
  The process of contending in court, either as a plaintiff or a defendant.
- Log
  A permanently bound, dated, hand written record of job related events that have occured on a project. The log is ususally in ink, and is maintained by an individual in responsible charge of the work with which the record deals.
- Maladministration
  The interference of the owner in the right of the contractor to develop and enjoy the benefits of least cost performance.
- Manage
  To define, assemble and direct the application of resources.
- Management
  The act and manner of managing.

- Management by Exception (MX)
  A measuring and monitoring system that sounds an alarm to the manager when problems have appeared or are about to appear, and remains silent when there are no problems. The system identifies the problem area, thus permitting the effective manager to manage the exception while leaving the smoothly running operations to continue running smoothly.
- Managerial Grid
  A numerical grid which positions a manager in a matrix by defining his concern for people as compared to his concern for production. This grid has been highly developed by Blake and Mouton and is useful in establishing managerial systems that are desirable and needed.
- Marketing
  The process of conceiving, formulating and implementing a process by which the ultimate service or product of an organization can be successfully sold.
- Matrix
  A two or more dimensional display of related data.
- Matrix Management
  A management technique that employs a multiple command system. Usually results in one employee having two or more bosses on a time to time basis.
- Mediation
  An attempt to effect a settlement between disputing parties through the unbiased efforts of an objective third party, usually well known to those in dispute and acceptable to them. Mediation differs from arbitration in that it generally involves a single individual as the ruling party, is less formal, and is generally not binding. (This definition of mediation varies with the degree of legal significance attached the resolution of disputes, and the dispute location.)
- Merit Shop
  A work area in which the workers may be either union or not, and in which there are no major jurisdictional boundaries governing assignment of work.
- Money Flow
  The flow of income and expense measured against time.

- Monitoring

  Measurement of current project conditions and position against the standards of performance set for the job.
- Motivation

  The elements of a given situation that encourage and make effective, successful and meaningful, the activities of those engaged in the situation.
- Network

  A system of interconnected, interacting components. Usually a part of an open system.
- Network Plan

  A graphic statement of the action standard of performance to be used in achieving project objectives.
- Network Planning

  A graphic technique of showing necessary and desired actions needed to achieve end, intermediate and peripheral objectives.
- Objectives

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

  Objectives to be achieved that are affected by major influences beyond the manager's direct control. The dependent goal may be predictable or unpredictable.

  Dependent goals, while usually beyond the manager's control, may well be within the companys's ability to reach. Lack of correlation between company and individual effort to achieve a manager's goals that are affected by others, may cause severe dysfunctions.
- Objectives - Direct

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

  Objectives realized from and upon total completion of the defined project work.

- Objectives - Intermediate

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

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

  The arrangement and interrelationships of people charged with providing supportive action on an ongoing basis within the company. Examples of functions contained within the ongoing design or construction organization are estimating, administration, legal, marketing, sales, purchasing, and accounting.
- Open Shop

  A work area in which both union and non union workers can be employed on similar tasks.
- Open system

  A system which exchanges energy, information and physical components with its environments.
- Organization

  The arrangement of resources (talent, skill, money, time, space, people, et al) that has evolved, or been selected, to accomplish the functions, activities, and management, and goals and achieve the objectives of a business or institution.
- Organizational Structure

  The catagories of parties to the planning/design/construction/operation process and how they are organized for the work. The organizational structure is shown by a set of relations between the parties that identifies the responsibility and authority lines along which the project is to be implemented.

- Owner Furnished Items
  Those items furnished by the owner according to the contract documents.
- Percentage Fee
  A fee determined ultimately by a percentage of project cost, all as specified by the contract.
- Planning
  Establishing and arranging necessary and desired actions leading to end, intermediate and peripheral objectives.
- Prime Contractor
  A contractor whose business agreement is directly with the organization providing primary financing for the project.
- Problem
  A deviation from an accepted and/or approved standard of performance.
- Profit - Educational & Training
  Fulfillment of learning and teaching goals held by individuals and their companies.
- Profit - Financial
  Fundamentally, the difference between organizational cash income and organizational cash expense. Further definitions of financial profit are complex and often unique to an organization or project.
- Profit - Self Actualization
  Personal fulfillment realized after basic needs of shelter, safety, protection, love and freedom from hunger are achieved.
- Profit - Socio Ecomonic
  Company, group or individual achievement of social objectives within a financially profitable set of activities.
- Profit - Value System
  Company and project fulfillment of personal, professional, technical, social and financial values held important by individuals and groups related to the company.
- Program
  A narrative oriented statement of the needs and character of the proposed user operation, the requirements of the user and owner, the nature of the environment to be planned, designed and built, and the

corresponding characteristics of the space that will satisfy these needs and requirements.

- Project

  A set of work actions having identifiable objectives, and a beginning and an end.
- Project - as related to management

  A specific management assignment to achieve a set of objectives by accomplishing a group of related, discrete operations which have a defined beginning & end.
- Project Delivery System

  A method of assembling, grouping, organizing & managing project resources so as to best reach project goals & objectives.
- Project Director

  The individual responsible for implementation of several projects upon which his company is engaged.
- Project History

  A tabulation of the major events on the job, chronologically arranged for easy reference. Subjects included in the history should be:

  -The plan or schedule governing the subperiod of the history.
  -A brief recap of the major activities having an impact on the job.
  -A reference to the documents in which the activities referred to are shown in detail.
  -A summary of important job related conferences.
  -Notes regarding points that may help resolve potential problems.
  -Problems impacting on the job including reasons why the problems prevented proper progress.

  The purpose of the project history is to give a quick, accurate look at past job events in a glance. The degree of detail is dictated by the potential for trouble that exists.

- Project Manager

  One who helps establish objectives generated by a need, plans how these objectives are to be reached through a set of work actions, and then assembles and directs the application of available resources to achieve the objectives on one or more projects.

Usually the project manager is most concerned with supportive actions which bring resources to the point of effective use.

- Project Operations
  Management and staff direction of resources to accomplish overall project activities. Contrasts with functional operations.
- Project Organization
  The arrangement and interrelations of people charged with actually achieving project objectives. (See organizational structure.)
- Project Stages
  The groupings of actions that make up the entire project work sequence.
- Project Superintendent
  The manager involved in the actual construction process and most directly responsible for the expenditure of funds to carry out the project. Usually the superintendent is responsible for field execution of the work.
- Question - Closed
  Questions that can be answered with a yes or no, or with a simple statement of fact.
- Question - Direct
  Asked with strong indication as to who or whom should answer.
- Question - Open
  Questions that cannot be answered with a yes or no, or a simple statement of fact.
- Question - Overhead
  Asked of a group without indication as to who or whom is to answer.
- Question - Relay
  Passed along to someone else by the party originally asked.
- Question - Reverse
  Returned to the questioner by rephrasing or rewording the original question.
- Record
  Any retained information that can be effectively used in the future.

- Relations - Formal Functional

  Organizational connections that concern distribution and use of data, information and decisions that flow along formally defined transmission lines. Formal functional communications are usually written and are normally both from and to individuals and groups.

  Formal relations are precisely defined and most day to day business is accomplished within the formal relation framework. The line expressing a formal functional relation usually has an arrowhead at each end to show a mutual exchange of responsibility and authority. If there is a higher authority to be implied a single arrowhead can be used pointing to the superior party.
- Relations - Informal

  The natural channels along which organizationally related material is most easily and comfortably transmitted. The informal relation exists by mutual consent of the parties to the relation, and is stimulated to maximum effectiveness by a mutal profit gained from the relation.

  Little, if any, authority normally is expressed in informal relations. Communications are usually oral and one to one. Often informal relations define the hidden organization structure. A line defining an informal relation is usually shown dotted with an arrowhead at each end.
- Relations - Reporting

  The official channels through which each individual conveys, or is given raises, appraisals and evaluations; is fired, assigned or is provided professional, vocational and personal identity in the organization. The true organizational superior of an employee is usually that individual with whom he maintains a reporting relation. The line expressing reporting relations has an arrowhead at one end pointing to the superior.
- Relations - Staff

  The business patterns through which a person or group provides consulting services necessary to achieve goals and objectives. Staff personnel usually have little or no authority over those outside the staff group. The line expressing staff relations has an arrowhead at each end.

- Relations - Temporary

  Those relations created when extraordinary or unusual management demands must be met. The temporary relation is usually unstable and should be kept active for only short periods of time. The line expressing a temporary relation can have an arrowhead at one or both ends depending on the nature of the relations.

  Extensive use of temporary relations creates business dysfunctions, breaks down morale and causes internal tensions.

- Resource allocation

  The assignment of project resources such as money, time, space, people and equipment to activities that must be done to achieve project objectives. Ususally resource allocation is done to achieve effectiveness in project work measures such as profitability, timely completion and quality of work.

- Resource levelling

  The use of resource allocation to even out the use of resources within a given set of time, money, space, people or equipment conditions. Resource levelling is a special form of resource allocation with its prime use being to maintain a nearly equal assignment of resources to activities and projects for their entire duration.

- Resources

  The tools of the supportive and ex'e-cutive manager. Resources include time, talent, tools, equipment, time, money, experience, space, materials, as well as intangibles, such as enthusiasm, morale and leverage.

- Responsibility

  The assignment, spoken or understood, that a person in an organization has as his part in maintaining the organization's health and vitality.

- Schedule

  A graphic or written tabulation of project activities showing where the activities are to start and finish. The schedule is derived from the plan of action and the network model by locking the tasks and the resources they require into a specific time position.

- Selling
  The physical process of closing the negotiation for services and products for a consideration.
- Shop Drawing
  A submittal in the form of a drawing, usually made specially for the application shown. Shop drawings usually show details of fabrication and installation.
- Situational thinking
  The ability to accurately evaluate a set of project influences by mentally moving from a long overview (macro) of them to a detailed picture (micro) and back, and being able to stop anywhere in between to consider other scale pictures of these influences and their relationships.
- Span of Control
  The number of organizationally related individuals a manager directly controls on a one to one basis.
- Specialized Construction (S)
  The field of business practice that encompasses single phases of the construction profession. Examples of "S" construction organizations are architectural/engineering offices, mechanical contractors, plastering contractors, and planning consultants, among others. Includes nearly any single organizational unit active in design, planning, construction or related fields.
- Specification
  A narrative description of the various materials and systems to be incorporated in the work. The specification concentrates on identifying quality of materials, source of materials, allowable practices, and general requirements and conditions of the contract performance.
- Staff
  A supportive unit of any organization in which the basic function is usually advisory in nature. Staff functions are occasionally defined as overhead or non production. They are considered to be the organizational partner of line operations. (See staff relations and

line activities.)

- Standard of Performance
  A well defined, explicitly stated, approved and accepted statement of the measurements to be used as a gage of performance, and goal and objective achievement.
- Sub Contractor
  A contractor whose business agreement is directly with a prime contractor
- Submittal
  Any document submitted by contracting parties to the owner's agents for review for accuracy, responsibility of design, general arrangement, and approval. Submittals are used by the fabricator and the installer to show adequate details so the intent of the contract documents can be achieved. There is a mild ongoing professional controversy as to whether approved submittals are contract documents. Generally they are not considered contract documents, but aids to better fabrication and installation procedures.
- Superior Knowledge
  The owner's withholding specific data on matters of substance not known to contracting parties during the pre contract period.
- Supportive
  The administrative group of the project organization which is responsible for bringing resources to the point of use by the ex 'e-cutive project group.
- Suspension
  An owner's or owner's agent action of stopping all or a part of the work.
- System
  An assemblage or combination of things or parts forming a complex or unitary whole.
- Talent
  A capacity for achieving identifiable success. Usually talent is considered an abstract resource.
- Termination
  The dismissal of a contractor, from a project, for convenience, resulting from factors beyound the contractor's control, or for

default when the contractor's performance is not acceptable.

- Text Oriented Data Processing

  Data processing in which the majority of information is entered or gained by the use of a key operated control panel such as a keyboard. The signals are usually entered in discrete elements.

- Time and Material Contract

  An agreement in which payment for services and material is made only for those services and materials actually furnished. There may, or may not, be imposed a not-to-exceed amount on the total cost.

- Total Float (TF)

  The amount of discretionary time available to a task. The total float is the difference between the early and late starts or finishes. Formally, it is defined as the duration of the task, subtracted from the difference between the late finish (LF) and the early start (ES): i.e. (LF-ES)-DURATION=TF.

- Training

  The teaching and learning process by which specific, explicit methods and systems of doing something, usually by rote, are conveyed to the learner.

- Translation

  Recasting standard of performance information and data into graphic, narrative, mental, oral or other forms, to insure optimum use by those involved.

- Turnaround Time

  The amount of time required to process submittals.

- Turnover Cycle

  In the construction or fabrication of several similar units, the amount of time required from the completion of one unit to the completion of the succeeding unit.

- Ultimate Decision Maker (UDM)

  The individual or group at the lowest management level that has the authority to make a final binding decision in any job related matter.

- Unilateral Meetings

  A decision meeting at which only a portion of the parties affected are invited to participate.

- Union Shop
  A geographic work area in which all labor classified participants are required to belong to a specified union.
- Upset Price
  A quaranteed maximum price agreed to in a time and material contract. (See time and material contract.)
- Vertical Growth (Integration)
  A management system that encourages divesifying by adding new functions to existing functions. New functions added usually bear an organizational relation to the existing. An example of vertical integration is incorporating real estate control, building design, financing, construction, leasing and asset management into a single development operation.
- Vested Authority
  The endowing of privileges, strength and leverage from a superior, usually to a subordinate. Generally gained quickly, rather than being earned by long and proven service in a related field within the organization.
- Working Drawings
  The set of contract drawings that pictorially show the intended appearance of a job when complete.

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NETWORK PLANNING ABBREVIATIONS

A	Area
ABV	Above
AC	Air condition
ACCESS	Accessories
ACOUST	Acoustic
ACT	Activate
AD	Approve, deliver
AFD	Approve, fabricate, deliver
AL	All
ALT	Alteration
ALUM	Aluminum
AP	Approve
ASMBLY	Assembly
ASP	Asphalt
/	And
⌿	At
BAL	Balance
BALC	Balcony
BD	Board
BKFL	Backfill
BKFLG	Backfilling
BLDG	Building
BLKG	Blocking
BLT	Bolt
BM	Beam
BRG	Bearing
BRK	Brick
BSE	Base
BSMT	Basement
CASD	Check and approve shop drawings
C/B	Columns and beams
CER	Ceramic
CL	Column line
CLG	Ceiling
CLKG	Calking
CNTL	Control
CO	Cutoff
COATG	Coating
COL	Column
COMP	Complete
CONC	Concrete
CONCT	Connect
COND	Conduit
CONN	Connection
CONST	Construct
CONT	Continue
COOLG	Cooling
CONVTR	Convector
CP	Cap
CP	Complete
CT	Ceramic tile
CVR	Cover
D	Dummy
D	Duration
DAFD	Detail, approve, fabricate, deliver
DEMOL	Demolish
DIFF	Diffuser
DK	Deck
DPPRF	Damp proof
DR	Door
DRINKG	Drinking
DRN	Drain
DUCTWK	Ductwork
DWG	Drawing
E	East
EF	Early finish
EFRP	Excavate, form, reinforce, pour
EIB	Excavate, install, backfill
ELEC	Electric
ELEV	Elevator
ENERG	Energize
EQUIP	Equipment
ERCT	Erect
ES	Early start
E T/R	End time restraint
EXC	Excavation
EXP	Exposed
EXT	Exterior
EXTG	Existing

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F	For
FAB	Fabricate
FD	Fabricate, deliver
FDN	Foundation
FFG	Fill, fine grade
FINL	Final
FL	Floor
FLL	Fill
FLSHG	Flashing
FM	Form
FMG	Forming
FN	Finish
FOG	Floor on grade
FP	Fire protection
FRM	Frame
FRP	Form, reinforce, pour
FRPS	Form, reinforce, pour, strip
FTG	Footing
FX	Fixture
GLAZG	Glazing
GRD	Grade
GRDR	Girder
GRDG	Grading
GRLL	Grill
GRATG	Grating
GUT	Gutter
HD	Head
HDWE	Hardware
HM	Hollow metal
HTR	Heater
HU	Hookup
I	Iron
I/C	In ceiling
IFW	In floor work
INCLDG	Including
INSTL	Install
INSTLG	Installing
INSUL	Insulation or Insulate
INT	Interior
ITMS	Items
JC	Janitor closet
LAYG	Laying
LF	Late finish
LN	Line
LS	Late start
LT	Light
LTH	Lath
LVL	Level
MACH	Machinery
MECH	Mechanical
MEMBRN	Membrane
MEZZ	Mezzanine
MH	Manhole
MLLWK	Millwork
MISC	Miscellaneous
MK	Make
MSNRY	Masonry
MTL	Metal
MTR	Motor
N	North
NLR	Nailer
NT	Not
OFD	Order, fabricate, deliver
OH	Overhead
OPNG	Opening
PARTN	Partition
PC	Precast
PERIM	Perimeter
PH	Penthouse
PHS	Phase
PILG	Piling
PIPG	Piping
PKG	Parking
PL	Plate
PLCP	Pile cap
PLG	Plug
PLSTC	Plastic
PLSTR	Plaster
PLTFM	Platform
PLUMBG	Plumbing
PNL	Panel
PNT	Paint
PNTG	Painting

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POURG	Pouring
PRES	Pressure
PRM	Primary
PROT	Protection
PRS	Piers
PVG	Paving
RAD	Radiant
RAILG	Railing
RD	Road
REINF	Reinforcing
REL	Relocate
REQD	Required
RESIL	Resilient
RESTL	Reinforcing steel
REMV	Remove
RFG	Roofing
RISR	Riser
RM	Room
RR	Railroad
RSC	Rolling steel curtain
RUBB	Rubber
RUFF	Rough
S	South
SBSTNTLY	Substantially
SDWK	Sidewalk
SETTG	Setting
SEWR	Sewer
SHT	Sheet
SIDG	Siding
SLB	Slab
SOG	Slab on grade
SPDRL	Spandrel
SPRNKLR	Sprinkler
SS	Structural steel
SS	Substation
ST	Start
ST	Street
STD	Stud
STL	Steel
STM	Steam
STR	Stair
STRP	Strip
STRUCT	Structural
SUPT	Support
SURF	Surface
SUSP	Suspension
SWTCHGR	Switchgear
SYS	System
TEMP	Temporary
TFT	Total float time
TK	Tank
TO/R	Toilet room
TPG	Topping
T/R	Time restraint
TR	Trim
TRANSFRMR	Transformer
TRD	Tread
TST	Test
TWR	Tower
UG	Underground
ULG	Unloading
UTIL	Utility
US	Underside
U T/R	Updating time restraint
VB	Vapor barrier
VENTILTR	Ventilator
VEST	Vestibule
W	West
WASHG	Washing
WK	Work
WLKWY	Walkway
WLL	Wall
WNDW	Window
WP	Waterproofing
WTR	Water
W T/R	Weather time restraint

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Weights and values as a decision making tool

The weight-value decision making process

In a decision making process the selection is often best made by a multidimensional process based on situational characteristics and factors that are nominally variable.

The purpose of decision making for the responsible project manager is to insure that an objective recommendation is provided to his or her upper management. Upper management is then responsible for adjusting the objective decisions of the project manager to a decision in line with what upper management staff personally, politically, professionally, subjectively, and technically feel is the appropriate selection.

The area addressed in this essay is the application of an orderly procedure to objective decision making. The technique is called the weight-value or WV process.

The WV process is clearly defined by describing the steps necessary to reach project level decisions. These steps are:

1. Select, write down, and verify the various decisions possible. What courses of action are available?

2. Select the major factors of importance in making an objective selection of a best course of action. What are the items that are important to making a proper decision? It is recommended there be no more than 10 of these. If you have selected any more than ten try to combine factors having similar evaluation characteristics.

3. Assign a weight to each factor that describes numerically, to those to whom the recommendation will be made, how important the project

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manager and his team think this factor is in selection of a course of action. Factors should be given a weight of one to ten. One means the factor is of minimum importance in the evaluation. Ten indicates the factor is crucial to the evaluation.

It is essential to realize that the factors selected and screened for use must all be of relative importance and that the assignment of weights should spread from one to ten. A help in doing this properly is to determine the most important and critical of the factors and assign it a value of eight to ten. Next select the least important factor and give it a weight of from three to one. The remainder should fall somewhere in between. Remember more than one of the factors being weighed can receive the same number. You are not ranking the factors, you are weighing them.

4. Assign a value to each potential course of action or each decision possible for each of the factors selected and weighed. If there are three courses of action possible, and you have selected five factors by which these are to be judged, you will have to assign 3 x 5 = 15 values to the entire array. This can be seen by consideration of the following matrix.

Project delivery system being considered &its value in satisfying the demands of the factor (v)

Factor	Weight	1.Hd money	2.Non liable cm	3.Prog pricing to gmp
1. Capital cost	08 x	08(v) = 064	04(v) = 032	06(v) = 048
2. Functional effectiveness	10 x	09(v) = 090	06(v) = 060	10(v) = 100

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Project delivery system being considered &its value in satisfying the demands of the factor (v)

Factor	Weight	1.Hd money	2.Non liable cm	3.Prog pricing to gmp
3. Esthetic effectiveness	02 x	06(v) = 012	04(v) = 008	07(v) = 014
4. Life cycle cost	04 x	06(v) = 024	03(v) = 012	08(v) = 032
5. In house staff demands	08 x	04(v) = 032	03(v) = 024	07(v) = 056
Totals		**222**	**136**	**250**

The objective selection above, based on A WV system would be project delivery system *3, the progressive pricing system, arriving ultimately at a guaranteed maximum price.

It should be emphasized that the validity of factor selection, their weighing, the selection of alternatives and their valuing depend totally on the exercise of good technical and practice judgments by those making the analysis. Usually for each decision such an analysis is made by several qualified staff. Some may not even be associated with the project directly but only acquainted with the key demands of the project program and mission. This wider range of views and ideas often lends strength to the recommendations.

Chicago Area Weather

Source: Jack Kolstadt

Week		Working Day	Total Working Days Worked	Loss in Working Days
Dec.	1	234	3½	1½
	2	239	3½	1½
	3	244	4	1
	4	249	3	2
Jan.	1	256	2-1/5	2-4/5
	2	261	2-1/5	2-4/5
	3	266	3½	1½
	4	271	3	2
Feb.	1	277	3	2
	2	282	3	2
	3	287	4	1
	4	292	3½	1½
Mar.	1	297	4½	½
	2	302	4½	½
	3	307	4	1
	4	312	3½	1½
Apr.	1	320	3½	1½
	2	325	4½	½
	3	330	4	1
	4	335		0

The following codes were developed by the Construction Specifications Institute (CSI) to define types of construction. These codes are an accepted method of determining construction classifications.

Please select the category that best describes the services of your firm, and write in the corresponding five digit number on the CAM survey form. Select a second category that would also apply to your business, and write the five digit number in the "secondary business" section of the survey form.

DIVISION 1—GENERAL REQUIREMENTS

01010 SUMMARY OF WORK
01020 ALLOWANCES
01025 MEASUREMENT AND PAYMENT
01030 ALTERNATES/ALTERNATIVES
01040 COORDINATION
01050 FIELD ENGINEERING
01060 REGULATORY REQUIREMENTS
01070 ABBREVIATIONS AND SYMBOLS
01080 IDENTIFICATION SYSTEMS
01090 REFERENCE STANDARDS
01100 SPECIAL PROJECT PROCEDURES
01200 PROJECT MEETINGS
01300 SUBMITTALS
01400 QUALITY CONTROL
01500 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS
01600 MATERIAL AND EQUIPMENT
01650 STARTING OF SYSTEMS/COMMISSIONING
01700 CONTRACT CLOSEOUT
01800 MAINTENANCE

DIVISION 2—SITEWORK

02010 SUBSURFACE INVESTIGATION
02050 DEMOLITION
02100 SITE PREPARATION
02140 DEWATERING
02150 SHORING AND UNDERPINNING
02160 EXCAVATION SUPPORT SYSTEMS
02170 COFFERDAMS
02200 EARTHWORK
02300 TUNNELING
02350 PILES AND CAISSONS
02450 RAILROAD WORK
02480 MARINE WORK
02500 PAVING AND SURFACING
02600 PIPED UTILITY MATERIALS
02660 WATER DISTRIBUTION
02680 FUEL DISTRIBUTION
02700 SEWERAGE AND DRAINAGE
02760 RESTORATION OF UNDERGROUND PIPELINES
02770 PONDS AND RESERVOIRS
02780 POWER AND COMMUNICATIONS
02800 SITE IMPROVEMENTS
02900 LANDSCAPING

DIVISION 3—CONCRETE

03100 CONCRETE FORMWORK
03200 CONCRETE REINFORCEMENT
03250 CONCRETE ACCESSORIES
03300 CAST-IN-PLACE CONCRETE
03370 CONCRETE CURING
03400 PRECAST CONCRETE
03500 CEMENTITIOUS DECKS
03600 GROUT
03700 CONCRETE RESTORATION AND CLEANING
03800 MASS CONCRETE

DIVISION 4—MASONRY

04100 MORTAR
04150 MASONRY ACCESSORIES
04200 UNIT MASONRY
04400 STONE
04500 MASONRY RESTORATION AND CLEANING
04550 REFRACTORIES
04600 CORROSION RESISTANT MASONRY

DIVISION 5—METALS

05010 METAL MATERIALS
05030 METAL FINISHES
05050 METAL FASTENING
05100 STRUCTURAL METAL FRAMING
05200 METAL JOISTS
05300 METAL DECKING
05400 COLD-FORMED METAL FRAMING
05500 METAL FABRICATIONS
05580 SHEET METAL FABRICATIONS
05700 ORNAMENTAL METAL
05800 EXPANSION CONTROL
05900 HYDRAULIC STRUCTURES

DIVISION 6—WOOD AND PLASTICS

06050 FASTENERS AND ADHESIVES
06100 ROUGH CARPENTRY
06130 HEAVY TIMBER CONSTRUCTION
06150 WOOD-METAL SYSTEMS
06170 PREFABRICATED STRUCTURAL WOOD
06200 FINISH CARPENTRY
06300 WOOD TREATMENT
06400 ARCHITECTURAL WOODWORK
06500 PREFABRICATED STRUCTURAL PLASTICS
06600 PLASTIC FABRICATIONS

DIVISION 7—THERMAL AND MOISTURE PROTECTION

07100 WATERPROOFING
07150 DAMPPROOFING
07190 VAPOR AND AIR RETARDERS
07200 INSULATION
07250 FIREPROOFING
07300 SHINGLES AND ROOFING TILES
07400 PREFORMED ROOFING AND CLADDING/SIDING
07500 MEMBRANE ROOFING
07570 TRAFFIC TOPPING
07600 FLASHING AND SHEET METAL
07700 ROOF SPECIALTIES AND ACCESSORIES
07800 SKYLIGHTS
07900 JOINT SEALERS

DIVISION 8—DOORS AND WINDOWS

08100 METAL DOORS AND FRAMES
08200 WOOD AND PLASTIC DOORS
08250 DOOR OPENING ASSEMBLIES
08300 SPECIAL DOORS
08400 ENTRANCES AND STOREFRONTS
08500 METAL WINDOWS
08600 WOOD AND PLASTIC WINDOWS
08650 SPECIAL WINDOWS
08700 HARDWARE
08800 GLAZING
08900 GLAZED CURTAIN WALLS

DIVISION 9—FINISHES

09100 METAL SUPPORT SYSTEMS
09200 LATH AND PLASTER
09230 AGGREGATE COATINGS
09250 GYPSUM BOARD
09300 TILE
09400 TERRAZZO
09500 ACOUSTICAL TREATMENT
09540 SPECIAL SURFACES
09550 WOOD FLOORING
09600 STONE FLOORING
09630 UNIT MASONRY FLOORING
09650 RESILIENT FLOORING
09680 CARPET
09700 SPECIAL FLOORING
09780 FLOOR TREATMENT
09800 SPECIAL COATINGS
09900 PAINTING
09950 WALL COVERINGS

DIVISION 10—SPECIALTIES

10100 CHALKBOARDS AND TACKBOARDS
10150 COMPARTMENTS AND CUBICLES
10200 LOUVERS AND VENTS
10240 GRILLES AND SCREENS
10250 SERVICE WALL SYSTEMS
10260 WALL AND CORNER GUARDS
10270 ACCESS FLOORING
10280 SPECIALTY MODULES
10290 PEST CONTROL
10300 FIREPLACES AND STOVES
10340 PREFABRICATED EXTERIOR SPECIALTIES
10350 FLAGPOLES
10400 IDENTIFYING DEVICES
10450 PEDESTRIAN CONTROL DEVICES
10500 LOCKERS
10520 FIRE PROTECTION SPECIALTIES
10530 PROTECTIVE COVERS
10550 POSTAL SPECIALTIES
10600 PARTITIONS
10650 OPERABLE PARTITIONS
10670 STORAGE SHELVING
10700 EXTERIOR SUN CONTROL DEVICES
10750 TELEPHONE SPECIALTIES
10800 TOILET AND BATH ACCESSORIES
10880 SCALES
10900 WARDROBE AND CLOSET SPECIALTIES

DIVISION 11—EQUIPMENT

11010 MAINTENANCE EQUIPMENT
11020 SECURITY AND VAULT EQUIPMENT
11030 TELLER AND SERVICE EQUIPMENT
11040 ECCLESIASTICAL EQUIPMENT
11050 LIBRARY EQUIPMENT
11060 THEATER AND STAGE EQUIPMENT
11070 INSTRUMENTAL EQUIPMENT
11080 REGISTRATION EQUIPMENT
11090 CHECKROOM EQUIPMENT
11100 MERCANTILE EQUIPMENT
11110 COMMERCIAL LAUNDRY AND DRY CLEANING EQUIPMENT
11120 VENDING EQUIPMENT
11130 AUDIO-VISUAL EQUIPMENT
11140 SERVICE STATION EQUIPMENT
11150 PARKING CONTROL EQUIPMENT
11160 LOADING DOCK EQUIPMENT
11170 SOLID WASTE HANDLING EQUIPMENT
11190 DETENTION EQUIPMENT
11200 WATER SUPPLY AND TREATMENT EQUIPMENT
11280 HYDRAULIC GATES AND VALVES
11300 FLUID WASTE TREATMENT AND DISPOSAL EQUIPMENT
11400 FOOD SERVICE EQUIPMENT
11450 RESIDENTIAL EQUIPMENT
11460 UNIT KITCHENS
11470 DARKROOM EQUIPMENT
11480 ATHLETIC, RECREATIONAL AND THERAPEUTIC EQUIPMENT
11500 INDUSTRIAL AND PROCESS EQUIPMENT
11600 LABORATORY EQUIPMENT
11650 PLANETARIUM EQUIPMENT
11660 OBSERVATORY EQUIPMENT
11700 MEDICAL EQUIPMENT
11780 MORTUARY EQUIPMENT
11850 NAVIGATION EQUIPMENT

DIVISION 12—FURNISHINGS

12050 FABRICS
12100 ARTWORK
12300 MANUFACTURED CASEWORK
12500 WINDOW TREATMENT
12600 FURNITURE AND ACCESSORIES
12670 RUGS AND MATS
12700 MULTIPLE SEATING
12800 INTERIOR PLANTS AND PLANTERS

DIVISION 13—SPECIAL CONSTRUCTION

13010 AIR SUPPORTED STRUCTURES
13020 INTEGRATED ASSEMBLIES
13030 SPECIAL PURPOSE ROOMS
13080 SOUND, VIBRATION, AND SEISMIC CONTROL
13090 RADIATION PROTECTION
13100 NUCLEAR REACTORS
13120 PRE-ENGINEERED STRUCTURES
13150 POOLS
13160 ICE RINKS
13170 KENNELS AND ANIMAL SHELTERS
13180 SITE CONSTRUCTED INCINERATORS
13200 LIQUID AND GAS STORAGE TANKS
13220 FILTER UNDERDRAINS AND MEDIA
13230 DIGESTION TANK COVERS AND APPURTENANCES
13240 OXYGENATION SYSTEMS
13260 SLUDGE CONDITIONING SYSTEMS
13300 UTILITY CONTROL SYSTEMS
13400 INDUSTRIAL AND PROCESS CONTROL SYSTEMS
13500 RECORDING INSTRUMENTATION
13550 TRANSPORTATION CONTROL INSTRUMENTATION
13600 SOLAR ENERGY SYSTEMS
13700 WIND ENERGY SYSTEMS
13800 BUILDING AUTOMATION SYSTEMS
13900 FIRE SUPPRESSION AND SUPERVISORY SYSTEMS

DIVISION 14—CONVEYING SYSTEMS

14100 DUMBWAITERS
14200 ELEVATORS
14300 MOVING STAIRS AND WALKS
14400 LIFTS
14500 MATERIAL HANDLING SYSTEMS
14600 HOISTS AND CRANES
14700 TURNTABLES
14800 SCAFFOLDING
14900 TRANSPORTATION SYSTEMS

DIVISION 15—MECHANICAL

15050 BASIC MECHANICAL MATERIALS AND METHODS
15250 MECHANICAL INSULATION
15300 FIRE PROTECTION
15400 PLUMBING
15500 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)
15550 HEAT GENERATION
15650 REFRIGERATION
15750 HEAT TRANSFER
15850 AIR HANDLING
15880 AIR DISTRIBUTION
15950 CONTROLS
15990 TESTING, ADJUSTING, AND BALANCING

DIVISION 16—ELECTRICAL

16050 BASIC ELECTRICAL MATERIALS AND METHODS
16200 POWER GENERATION
16300 HIGH VOLTAGE DISTRIBUTION (Above 600-Volt)
16400 SERVICE AND DISTRIBUTION (600-Volt and Below)
16500 LIGHTING
16600 SPECIAL SYSTEMS
16700 COMMUNICATIONS
16850 ELECTRIC RESISTANCE HEATING
16900 CONTROLS
16950 TESTING

A The contractor, the general contractor is to prepare the schedule with the input from subcontractors, suppliers and others.

Q When is it due?

A That is part of the master schedule and it's due when the master schedule is submitted, which was within 60 days from the beginning of the notice to proceed.

Q Did [redacted] provide this document within the 60-day period?

A No. There was no schedule submitted within the 60-day period of the project that would qualify for master schedule.

Q How important is a working schedule diagram?

A It's very important. It's just the plan for the project. It details out where this job is going and indicates the contractor's sequence of the project. It's the contractor's way of communicating with everyone regarding what his plans are for the project and enables everybody to coordinate their activities. Basically what happens without it, you have a disorganized and unmanaged project.

Q Once produced, and with the sequence of activities, which has priority, the proposed sequence set forth in the contractual document or the contractor's sequence set forth in the working schedule document?

A The working schedule is what controls the project because that's what everybody will follow during construction and will look to for direction.

Q Turning to Paragraph 4.1.2, which is the third paragraph under tab two, that's entitled or has the first three words critical path diagram. What is a critical path diagram?

A Critical path diagram is the presentation of your critical path method schedule. Critical path method scheduling is a technique that enables you to define the critical areas of the project. Once you've gone through the process of scheduling the project using CPM techniques, you are able to tell which areas are critical, what areas have to be performed immediately, and what areas have float time, float time basically meaning that the activity may be delayed to the extent that he has float without impacting the project completion.

And the way that is achieved is by identifying all the activities that have to be performed in order for the project to be completed and establishing the relationship between these activities, defining how long each activity should take in order to be completed. Once all that information is available, then you can assess -- you can prepare your CPM schedule.

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STATE OF INDIANA)
)SS:
COUNTY OF GIBSON)

IN THE GIBSON CIRCUIT COURT

1984 TERM

TERRE HAUTE INDUSTRIES, INC.,

Plaintiff, Counterdefendant and Cross-Defendant

vs.

INDIANA & MICHIGAN ELECTRIC COMPANY, et. al.,

Defendants, Counterplaintiffs and Third-Party Plaintiffs

vs.

INSURANCE COMPANY OF NORTH AMERICA,

Third-Party Defendant and Cross-Plaintiff

FILED

JAN 9 1983

Don L. Lutz
Clerk Gibson Circuit Court

CAUSE NO. C-81-13

The Court, having had under advisement this cause, and now having considered evidence heard and having reviewed authorities cited now enters the following:

FINDINGS OF FACT

The Court in rendering Findings of Fact and Conclusions of has reviewed, among other things, the Briefs filed by the ties, the Proposed Findings of Fact and Conclusions of Law filed by the parties, selected portions of the transcript of the evidence in this case, as well as the Court's extensive notes taken during testimony which in themselves comprise two volumes of several hundred pages.

The Court believes the evidence in this case, presented ably by the attorneys for both sides, is so extensive that it could render these findings into impossible detail if each minute point were to be analyzed or rebutted. Therefore, it is the intent of this Court that these findings shall be as detailed as necessary to provide the reasoning of the trial Court and finder of fact's rationale to whomever may review the same, without causing that review process to bog down in detail of this trial Court's making.

1. At all times relevant, Plaintiff Terre Haute Industries,

Inc. (THI) was a corporation having locations in Terre Haute, Indiana and Livonia, Michigan. THI was engaged in fabrication and erection of steel projects, including pollution control equipment on electrical utility plants as well as other industries.

2. At all times relevant, Indiana & Michigan Electric Company (I&M) was a public utility organized pursuant to the laws of the State of Indiana, and was authorized by the State law to generate, produce, transmit, sell and distribute electricity. American Electric Power Service Corporation (AEPSC) as well as I&M are wholly owned and controlled subsidiary corporations of American Electric Power Company, Inc. (AEP).

3. Defendants at the time in question here owned and operated a fossil-fueled electric generating station in Sullivan County, Indiana named Breed Power Plant (Breed).

4. In July, 1977, THI and I&M entered into a contract which provided for Plaintiff to erect an electrostatic precipitator at Breed in consideration for payment by I&M of certain monies specified in the written document signed by the parties. Defendant AEPSC, acting for I&M wrote this contract (Plaintiff's Exhibit #1) and all amendments thereto. Said contract provides that the parties thereunder be governed by law of the State of New York.

5. A review of applicable authority cited to the Court reveals the State of New York applies the so-called "center of gravity" choice of law theory, reviewing the facts of the particular case to see where the significant contacts between the parties arose. In the instant case, this Court now finds that it is required to apply the substantive law of the State of Indiana according to the locus of all significant acts of the parties, and that this finding is in keeping with the application of the law of the State of New York.

6. The project herein had been the source of long on-going concern to the Defendants, Breed being among the last power generating stations in the state unequipped with electrostatic precipitators. As a result, the Indiana Air Pollution Control Board had exerted tremendous pressure upon Defendant to install the devices. The contract herein was originally let for bids in 1976, but no contract

was awarded due to funding problems of Defendants.

7. By the time bids were again let to prospective bidders, Defendants were aware they were far behind schedule. At one point, Witness Lopez told his superiors they should, "...blow the whistle!", and that the project was getting out of Defendants control.

8. In March, 1977, Defendant AEPSC let bid documents to various contractors, including Plaintiff, with these documents showing a schedule or timeframe for the entire project, referred to as Lopez Revision #5 which was dated March 4, 1977. This bid schedule provided that the erection contract ultimately awarded to Plaintiff would encompass 21 months, based on a 5 day-40 hour week totalling 441 work days. It is not clear from ambiguity, but this Court finds this was the intent of this written contract which was prepared by Defendant AEPSC. Further, the contract of the parties provided for Plaintiff to absorb fifteen days of lost time due to bad weather, and that the schedule of the contract thereafter was to be equitably extended for all days lost beyond Plaintiff's control.

9. Plaintiff THI did not contract with Defendants to meet dates imposed upon Defendants by the Indiana Air Pollution Control Board, although certain dates contained in Lopez #5 schedule track approximately with Air Pollution Control Board dates, and Plaintiff did know of the compliance requirement Defendants were under.

10. Plaintiff THI submitted its bid to Defendant AEPSC April 18, 1977. Lopez #5 required the award of the contract to take place May 1, 1977, which did not occur. Instead negotiations took place between the parties lasting til late June, 1977.

11. The actual award of the contract to THI by Defendant AEPSC was on July 1st, 1977 and sent to the President of THI on July 5, 1977 for review. On July 25, 1977, it was accepted and signed by THI and returned to Defendant, whereupon Plaintiff commenced mobilizing for the job.

12. This Court finds that Plaintiff expressed its concern with both the lateness of the award and its problem with erection of lower support steel because the concrete constructor was behind in laying the foundations. Further, Plaintiff was required to furnish its proposed Contract Schedule, referred to as Schedule

A, which noted the late start. This Court specifically finds that the Plaintiff is entitled under the facts and evidence in this case to an extension of the contract commensurately.

The Court notes that Defendant in its Proposed Finding #6 quotes at length the letter from THI dated June 28, 1977, exp ess the concern of THI with the lateness, which letter, when placed in the context of a small contractor attempting to acquire what was for THI a large contract from a multi-billion dollar firm, appears to this Court as the heighth of diplomacy, but cannot stand for the proposition that THI waived the lateness of the award of the contract.

13. This Contract was, by agreement of all parties, a lab r contract, whereby Defendant furnished materials which Plaintiff then provided the labor and know-how to erect according to the contract design furnished by Defendants.

14. The Contract provided certain specific dates, at least according to Lopez #5, which were to be met by Plaintiff. These were:

a.) Complete and available for checkout by 9/17/78;

b.) Complete and ready for tie-in by 11/16/78;

c.) Complete and ready for operation within 10 weeks of start of tie-in.

However, during the process of negotiation of the contract Defendant asked and received from THI two (2) options, one of which would delay tie-in until after the winter heating season (and concomitant high sales period of Defendant), and the other which required THI to finish by November, 1978 then stop work until after the winter season. Both options would cost Defendant more due to increased costs to Plaintiff, but the former to cost Defendant the lesser amount. As appears to be the policy of Defendants throughout the evidence in this case, they gave THI no decision, which effectively reserved whatever options they wished unto Defendants, but gave Plaintiff nothing to go on.

15. Plaintiff provided Defendants its Proposed Contract Schedule, Revision A, as required on August 29, 1977. Neither this or any other schedule furnished by Defendant was ever actually accepted

by Defendants, thus committing them to a position. They did, however, request another schedule that would look better to the Air Pollution Control Board. This resulted in Revision B, which was sent with a cover letter from Plaintiff that informed Defendant it was only a goal, and that Revision A was Plaintiff's contractual responsibility. Both included nine (9) weeks claimed for late start.

16. Evidence received by discovery from Defendants reveals Defendants agreed there was merit to the Plaintiff's claim for delay due to late award. The Contract Section of AEPSC itself in internal memoranda agreed Plaintiff had a valid reason for delay, as did Witness Lopez in his notes of meeting of January 5, 1978, although Mr. Lopez in testimony disagrees with this interpretation of what his writing obviously says.

17. This Contract provided, as previously stated that the Plaintiff be given extensions of time for delay beyond their control with the exception that THI is specifically responsible for delay caused by weather up to fifteen (15) days.

18. Plaintiff received delays in the execution of this Contract for several categories of problems. It claims days lost due to bad weather, mismanagement of Defendants or their contractors, misfabricated or mislabelled parts and labor problems.

19. It is important to note at this point that this Contract was based upon a method of schedule evaluation of a particular job called the Critical Path Method, which is the manner in which the job was described by Defendants in their bid documents sent to the bidders as well as to THI, the previously referred to Lopez #5 schedule. This appears to be the engineering tool of choice used to describe any construction project for purpose of either planning or analysis. Thus, to see whether THI lost time to a particular part of a job or the whole job for a period of time, it is necessary to analyze the CPM for the job, or to prepare one with the existing facts added to the planned one.

20. An examination of the record of evidence in this case shows beyond doubt there was misfabrication of materials furnished

to Plaintiff to erect, the question being the impact. While the evidence does not show THI to be without fault upon occasion, the evidence does establish the loss of time by Plaintiff due to misfabricated or mislabelled materials, which loss of time was to the Critical Path of Plaintiff on this job. It should be noted that the agreement Plaintiff had was to take various pieces furnished to them and erect those pieces. Plaintiff had a right to assume the parts would perform as they were supposed to, or be allowed for the delay caused if the pieces did not. That is, if piece "A" is supposed to exactly fit in a certain manner in conjunction with piece "B" and "C", and does not, the delay is beyond the control of Plaintiff.

21. As previously stated, this was a labor-intensive contract, with the labor, primarily boilermakers, having been hired pursuant to a contract for the entire project with the different Unions and the Defendants, prior to Plaintiff being awarded the contract.

It appears there was quite a bit of inter-fraternal jealousy between the different crafts at the job site. This is reflected in the testimony at trial which appeared at times to degenerate almost into petulance. This can be understood, perhaps, if placed in the context of the rigorous and admittedly dangerous occupations involved. It **does appear**, however, time was cost to the critical path of this project due to labor unrest beyond the control of Plaintiff. Testimony was received at one point that if Plaintiff had disciplined or fired craftsmen, they would have then have had "real trouble". The Court also notes occasions in the testimony when craftsmen witnesses were impeached. They testified as to observations they made at the job site, when the records reflect they were not there to have made the observations.

22. The evidence in this case concerning weather is directly contradictory, the question at least partially revolving around the severity of the winters of 1977-78 and 1978-79. Part of the contradiction is testimony as to whether Plaintiff used sufficient alternative planning to have work take place elsewhere in inclement weather. This is further complicated by the necessity of understanding

the concept of whether time is lost to the Critical Path of a project even if work is being done on another part of the project not on the Critical Path.

Evidence here reflects testimony that workers performing other trades under other contractors appeared to work when Plaintiff craftsmen did not. Aside from a question the Court has as to any degree of lost time this may be, this Court believes this cannot be generalyzed, and that a worker who doesn't work on high steel erection because of ice, snow and subfreezing temperatures should not be compared to another who is performing an inside job.

23. The evidence is quite clear to the Court that there was a great deal of weather days lost to Plaintiff beyond the 15 day they were required to absorb, and that evidence preponderantly shows the winters in question were among the worst in recent history in this area. The meteorologist called in rebuttal by Plaintiff to testify made the telling point that comparison of precipitation figures as advanced by Defendants, are misleading, in that inches of snow does not translate directly into inches of precipitation; that is, a ratio of about ten (10) inches of snow is needed to yield one (1) inch of melted water or precipitation. Hence, to speak in terms of precipitation does not demonstrate the snow and accompanying cold or sub-zero weather and winds that would have existed on the steel to be walked upon and erected.

24. The project by the end of January, 1978 was behind the schedule evidenced by Lopez #5, although not behind Revision A as extended by time lost beyond control of Plaintiff. At Defendant's request, Plaintiff on February 16, 1978 submitted a written program for accelerating the project, making use of an additional crane, overtime, and extra personnel. The primary goal of this plan was to obtain release of the west and east penthouse roofs to other contractor's use on 9/4/78 and 9/25/78, respectively. It is clear to this Court that the proposal put forward by Plaintiff on 2/16/78 was an <u>acceleration proposal</u> to the project, but what was finally agreed to in payment by Defendant in October, 1978,

after Plaintiff had already implemented the proposal without Defendants directly agreeing, was in fact a roof release agreement. It is further clear to the Court that the result obtained, at additional cost to Defendants, was that desired at the time, namely, the release of the roofs to other contractors to allow them to fulfill their agreements with Defendants. It also is clear to this Court that Defendants believed Plaintiff had the obligation to give the additional services necessary to speed up release of the roofs and also at the same time speed up the entire contract as well at no additional cost to Defendants.

The Defendants did not agree to the program advanced by Plainti in February, but let them proceed to bring on an additional crane perform overtime, personnel increases until Plaintiff threatened to shut down activities on site completely unless paid. Thereaf. a meeting took place on site 7/14/78. The Defendants thereafter agreed to sponsor the increases, and the parties negotiated then for three months. It is clear from Mr. Hunter's letter of July 24, 1978, Defendant's Exhibit 211, that the concern of Defendants was achieving acceleration of the roof releases and only that. The negotiations finally arrived at provided a payment by Defendants after the releases took place, but evidence was received showing Defendants thereafter considered withholding all or part of this amount from Plaintiff from the amounts they retained at the end of the contract. (Defendant's Exhibit #683)

25. The roof release agreement did purchase for Defendants some "float" or extra time in the Schedule, Plaintiff's version being 18 days, Defendant's version being 43 days. This Court is convinced the evidence on this point is sufficiently vague and contradictory to be almost useless, but does believe the prepon-derance would support a value somewhere between those two positions.

It is also the opinion of this Court that this value of days lost is not so important, given this conclusion, in determining the questions required for this case, that is, whether the actions of Defendants in firing Plaintiff were justified. If the position of Plaintiff was correct that on February 22, 1979, it was not behind a schedule extended because of events and circumstances beyond Plaintiff's control, and this Court finds Plaintiff was correct in this position, then whether it be one day or one hundred days is irrelevant to that one decision, although the Court believes the evidence supports lost time in excess of 125 days.

Further, this Court finds the roof releases as described by the secondary agreement of November, 1978 were not the Critical Path of the contract originally made between the parties. There is no question that Defendants considered this to be an essential item for their purposes, as shown by the Hunter letter of July 24, 1978, "...the release of the precipitator roofs for mechanic and electrical work is critical for I&M to meet the requirements of the State of Indiana (Air Pollution Control Board)." Since Plaintiff was not bound to a schedule set up by the Board, but only to the contract of the parties, it was not reasonable for Defendants to expect them to match any such Air Pollution Control Board requirements, especially since Defendants drafted the contract in the first place.

26. Two further points should be explained by this Court at this time. The first of these is a comparison of the method of time lost in this project by Plaintiff and Defendants.

Plaintiff took the position, correctly, that a contract bid and awarded on the basis of a Critical Path Analysis (Lopez #5), should be analyzed at trial by the same method. Defendants' witnesses Nielsen and Leverette prepared, at great cost, a study based upon man hours analysis. Each stated their position was buttressed by their study. The problem this Court has with Defendants' man hour analysis is that it ignores the obvious, that one man hour is not the same as another man hour. To say a total project was due in, e.g., one thousand man hours and party A did 400 hours and party B did 600 hours and then postulate A did 40% and B 60% ignores the efficiency of those hours, as work hours spent does not translate directly or even proportionately into work done, the ultimate objective. Worker A may accomplish many times more or less in work done than B. Further, based upon the evidence, it appears hours spent will differ upon when they are done, as in the case of overtime work being a severe loss of efficiency. Thus, to state Plaintiff spent far too many man hours, or to show the number spent at a given point is mere number-crunching, a generation of statistics, empty of the analysis of any meaning, without more. The CPM analysis done by Plaintiff showed the same as that in the contract awarded. Absent a contrary analysis done by Defendants, this appears as the only proper analysis in evidence of the time lost to the contract. This is not to say that Defendants did not do such analyses. There is much evidence in the record that the Defendants all through the term of the contract analyzed the lost time and work performed, and also that the Witness Lopez used the same figures as advanced by Plaintiff as time lost in reporting to the Indiana Air Pollution Control Board as Defendants reasons for non-compliance, but in trial stated as his testimony that he didn't believe these numbers and felt he wasn't under obligation to correct them in reporting them to a State agency.

The second point this Court wishes to clarify at this point is that it finds the evidence put forward by Defendants on the question on how much time was lost is wrong fundamentally. Witnesses for the Defendants repeatedly made the point to this Court that they undertook no independent analysis of how much time was lost, they merely attempted to rebut that put forward by Plaintiff. In other words, the days lost according to Plaintiff were all Defendants were concerned about, answering not what were the days lost or whether the analysis was correct. This appears to avoid what is to this Court the most obvious approach to the problem, that is, start with day one, analyze all time lost, compare with each claim made at the time made, and determine agreement or disagreement, or what in fact happened.

26. The evidence is clear to this Court that the Plaintiff was within its extended schedule for this contract when discharged and that as a result Defendants breached the contract and by doing so proximately caused Plaintiff's damages.

27. Damages: This Court now determines the evidence in this case establishes by a preponderance that Plaintiff has suffered compensatory damages from Defendants in this case as follows:

a.) Amounts retained by Defendants for work performed by Plaintiff for which proper invoices were submitted but not paid by Defendants which amount to the amount of $766,100. In addition, the Court now finds that Plaintiff is entitled under the evidence to an award of prejudgment interest on this amount at the statutory rates from the date of each invoice.

b.) Plaintiff should receive the profit they would have received from the contracts of their subcontractors upon completion of the rest of the project due to the markup of those contracts, which amount is $95,230.

c.) Plaintiff should receive the profit it would have received for the remainder of the job had it finishe that is, the amount remaining on the contract less Plaintiff's cost (which did not occur), in the sum o $381,653.

d.) Plaintiff incurred expenses for delays in job progress caused by Defendants for overhead, supervision, small tools and crane useage in the amount of $105,000.

e.) Plaintiff incurred additional unreimbursed expense due to work being pushed into winter which was uncontemplated, due to Defendants making late award of the contract, in the amount of $151,000.

f.) Plaintiff was furnished materials for erection that differed from that contemplated, that is improperly fitting penthouse panels, revised silo access ladders and weld-up construction steel causing additional expense to Plaintiff not contemplated in the contract in the sum of $108,000.

g.) Plaintiff is entitled to recover from Defendants damages caused by not having proper drawings and for having to perform work due to revisions in drawings not contemplated in the contract in the sum of $11,900.

h.) The contract here provided the shell wall panels to have bolt-up construction, rather than requiring welding and the fabrication actually turned out improperly causing Plaintiff to expend extra time, and extra cost to Plaintiff of $234,000.

i.) While it is true that Plaintiff received reimbursement for Extra Work Orders performed for the most part, the payments received did not include time for payment for discovery of the problem. That is, when a piece doesn't fit, time and labor were expended discovering what was wrong, how to fix it, and then getting Defendants to approve. Defendants' policy was to only time to actually cure the problem. Under a f construction of the contract, Plaintiff should receive these discovery payments in the sum of $102,000.

j.) Plaintiff was damaged by Defendants when Defendants wrongfully cancelled Extra Work Order Number 64 after issuing it to Plaintiff and after Plaintiff had already performed the work, in the sum of $4,900.

k.) Plaintiff should recover the sum of $20,600 from Defendants because Defendants required Plaintiff to install turning vanes in ducts which was work not required by the contract.

l.) Plaintiff should receive the sum of $8,000 from Defendants for interruptions in work as shown by the testimony of Kennedy and Stephenson other than covered elsewhere in these findings, caused by mismarking, misdesigning, or other defects in materials furnished by Defendants.

m.) Defendants required Plaintiff to interrupt its work and move out of an area to allow others to work on slabs on grade, causing delay and expense to Plaintiff in the sum of $12,000.

n.) The Contract provided for shop-assembled walkways and guardrails, which takes less time to unload than as they actually arrived, that is, unassembled. Plaintiff was required by Defendants to unload them, causing extra expense to Plaintiff in the sum of $5,500.

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o.) The evidence in this case establishes conclusively that Plaintiff was damaged by the firing in its future business, that is, the business which it sought after being discharged. Defendants' officers, including Mr. White, admit such is the case, although denying, of course, any liability for such damage. Inasmuch as this Court has determined the firing by Defendants was a breach of contract, the Court now finds that the damages from loss of post-discharge business and profits are an element of damage to be awarded to Plaintiff.

The question then arises as to placing a value on such damages, if that can be done. If the amount is too speculative, then this Court may not concoct an amount out of thin air.

This Court reviewed the transcript of testimony and notes taken during trial and is convinced that the injury occurred and that the amount of damage was substantial. This Court has also reviewed extensively the citations of authority on this point. A review of the evidence offered by witness Stephenson convinces this Court that the amount of damage for this cause is at least $2,900,000.

p.) This Court determines the act of discharge wrongfully caused Plaintiff to be required under its contract with INA to indemnify said insurer, at a cost to Plaintiff of $27,817.

q.) The Court further finds, in addition to amounts described herein, that the damages of Plaintiff described in paragraphs (b.) and (c.) herein were within the contemplation of the parties to the extent of being ascertainable with certainty and exactitude as demanded by Plaintiff as of June 30, 1979. The Court thus finds Plaintiff should receive prejudgment interest as to these amounts at the statutory rates of interest from and after June 30, 1979.

28. Punitive Damages: This Court has reviewed extensively

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the evidence in this case, along with the citations of authority presented to determine whether the conduct of I&M and AEPSC were such as to justify an award of punitive damages herein, especially bearing in mind the caveat of our Supreme Court in Travelers Indemnity Co. v. Armstrong (1982), ___IN.___, 442 NE2d 349, as to the burden of proof on such an issue, that is, the evidence must rise to the level of being clear and convincing as opposed to mere preponderance.

To find the necessity of punitive damages in this contract case by the standard of proof described, it must be shown that Defendants' breach of contract also is such as to establish an independent tort or that the presence of elements of fraud, malice, gross negligence or oppression exist, coupled with the public need to make such an award, as opposed to merely Plaintiff's inter in the matter. Plaintiff postulates both possibilities exist here, i.e., an independent tort and the egregious conduct provided for in Vernon Fire and Casualty Ins. Co. v. Sharp (1976), 349 NE2d 173.

Plaintiff postulates the Defendants committed independent torts herein, more specifically, conversion, interference and libel. Inasmuch as this Court does not believe there is a separation between I&M and AEPSC sufficient to be distinct entities other than for the purposes of a corporate naming, this Court does not believe there was tortious interference. The acts of personnel of AEPSC were in essence also the acts of I&M such that there was no independent will to influence in I&M. The contract of Plaintiff may have been with the legal entity of I&M, but certainly the entire contract activity was that of AEPSC acting in its own name and for I&M. The Court therefore finds there was no independent tort, as alleged, of tortious interference.

The allegations of libel made by Plaintiff revolve around a letter written by Mr. Robert Hunter to the Indiana Air Pollution Control Board on February 2, 1979. This Court has examined the letter several times and is unable to determine that this letter in and of itself constitutes the malice necessary to overcome the qualified privileges which Defendants claim, at least not by the standard of proof required. The Court is convinced that the mot imputed to Defendants by this action were wrong, and further that these motives were part of a pattern of conduct whereby the interests of the Corporation were placed ahead of any and all other considerations. It is clear to this Court that this letter was part of the pattern of conduct whereby the parties, for their Corporation, were placing the "best face" on the situation, that is, their interpretation of the situation, without consideration to Plaintiff or what were the facts.

As to the allegations of tortious conversion, this Court does find there to have been an independent tort committed. The evide clearly and convincingly shows that on February 22, 1979, Defenda seized THI's cranes, elevators and other equipment for their own use, and for the use of THI's successor, Union Boiler. Since THI was not in default at the time of the seizure, Defendants' actions were in defiance of the lawful title of Plaintiff to the property. The fact is, Defendants didn't care whether their actions were proper. As previously stated, this action, as well as others, were part of a pattern whereby Defendants operated in total disregard for the rights of THI. The deposition of Witness Hunter taken April 14, 1982 at pp. 131-132 shows that Defendants intended to keep Plaintiff's equipment because that was the cheapest, quickest way to get equipment for Union Boiler to use, rather than waiting for Union Boiler to get there with equipment of their own. Couple this with the fact that no one seems to have done an estimation of what the actual responsibility of Plaintiff was as to finishing the contract, and it appears Defendants were totally unconcerned with anything other than what they perceived as best for the Corporation.

The next issue in reaching punitive damages is whether the actions of Defendants were shown by the evidence clearly and convincingly to have been done with oppression, malice, abusiveness or recklessness such as to warrant the finding of punitive damages.

Oppressiveness is defined as, "...an act of cruelty, severity, unlawful exaction or excessive use of authority." Vernon, p. 184.

This Court believes this has been shown by this evidence clearly and convincingly.

The evidence in this case is replete with examples of how Defendants' employees attempted to exact from Plaintiff that which they were not due. The following are some examples:

a.) Before firing THI, neither I&M or AEPSC made any examination of lost time to see whether THI was in fact delinquent.

b.) The previously described letter of Hunter to the Indiana Air Pollution Control Board on February 2, 1979 was part of the pattern of conduct as previously stated.

c.) The contract bid provided that miscellaneous steel be shop-assembled rather than assembled at the site. THI requested extra pay to assemble at the site. Lopez asked Safi of the New York Contracts Office of Defendant AEPSC what the contract said. Safi agreed with Plaintiff's position. Lopez then indicated to Plaintiff they should continue with the work while the price they were to be paid was negotiated even though Defendants had decided not to pay it. As a result, Plaintiff worked for some four months on these parts, then Lopez told them it was Plaintiff's obligation to do it under the contract. When Plaintiff refused, Lopez hired another contractor to assemble and then backcharged THI for the work. This was an obvious exaction from Plaintiff of something Defendants had no right under the contract to do, at a cost to Plaintiff in excess of $40,000.

d.) The bid specifications required a tolerance of 1/4", but Defendants thereafter required Plaintiff to meet tolerance of 1/8", a much more costly and arduous task, at no increase in pay, simply using its superior leverage to exact acquiescence from Plaintiff.

e.) After the parties had agreed to the roof release

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agreement but before Defendants had made payments to Plaintiff, Lopez threatened to withhold payments to Plaintiff under that agreement unless THI accelerate the contract at its own expense quoting from his memo to Lehrer of November 16, 1978, Defendant's Exhibit #683, "I think they got the message...".

f.) Witness Lopez testified that at no time did he put any credence in the lost time reports filed by Plaintiff, yet these same reports were furnished directly to the State of Indiana as Defendants' reports as per Witnes LeMasters, with no clarification at all. Lopez test: he saw no responsibility to report the true facts to the State. This Court sees this as further clear and convincing evidence of the willingness of Defendant to do whatever was necessary to gain advantage to Defendants.

g.) Statements were made by witnesses Hunter and Lopez that Defendants had no obligations under this Contract, that THI was the only one bound by this Contract.

h.) That the evidence establishes that termination of a construction contractor never occurs without warning and/or ultimatum and chance to negotiate or cure the complaint, yet that is precisely what was done here.

i.) In testimony by Witness LeMasters concerning Defendants' Exhibit 815, his notes reflect that Hunter had told Mr. LeMasters to report to the Indiana Air Pollution Control Board that Defendants had threatened to fire Plaintiff on several occasions, a patently false statement. While this arguably does not rise to the standard of proof required for punitive damages by itself, this Court certainly considers it cumulative of the Defendants' intent towards the Plaintiff.

j.) The Defendant gave Plaintiff a small contract to erect some parts of the hoppers, a total contract of $25,600, prior to the award of the main contract, with the intent of getting Plaintiff to fully mobilize, at their own expense, prior to even knowing whether they would get the contract. Evidence at trial shows the disappointment of Defendants that THI only partly mobilized. Further, evidence at trial showed Defendants were upset that Plaintif did not fully assemble the hoppers, rather than just a few parts of them as contracted. This was totally unwarranted.

29. The one recurring point this Court has seen in this case is the Defendants operation by means of a corporate mentality. Throughout the trial, the evidence clearly shows no instance of any one of Defendants employees taking responsibility. It refers always to a "...meeting at which we agreed..." or "...everyone felt....". Witness White, by means of deposition stated he signed both t contract and the dismissal, but even he left this Court with the impression he was unaware of the particulars, that he was merely acting on advice given him, and then the process of tracing the location of that advice leads again to the same amorphous corpor mentality. It is this mentality, this "we-ness", that shows itself in the actions of employees who sometimes coercively tried to save Defendants relatively small sums of money and thus caused problems later costing much more. An example of this is the action by Defendants of first accepting the penthouse roof, then rejecting the acceptance for a few days to avoid payment to Plaintiff of a few thousand dollars for being early, or another time agreeing to give Plaintiff an Extra Work Order, and then withdrawing it after Plaintiff did the work. This same mentality acts almost without volition in that it continues to move, seemingly without direction. The evidence is clear in this case that Plaintiff was not without its fault in this matter, but the final picture that emerges is that of a huge company, operating on conflicting demands to, on one hand make the largest profit possible, and on the other hand abide by Air Pollution Control Board regulations. This Corporation then contracted with a small construction company that was unconcerned with these pressures. When the pressure exerted upon the Defendants became too extreme, then something had to give, and since the people involved in this corporate

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mentality are not going to blame themselves, the obvious candidate was the Plaintiff, resulting in the firing and then this lawsuit.

30. The effect of the award of punitive damages is to provide Plaintiff a windfall, in that it is not compensatory in nature. Therefore, it is considered public damages, rather than private relief to one of the parties. It can only be used where there exists a public need to do so.

Here, such a public need exists. The Defendants, a multi-billion dollar public utility conglomerate, arguably one of the largest such utilities in the world has injured the Plaintiff. However, the evidence here clearly reflects they did more.

Whether it be an individual, a business or a nation, all must live in the society, and all must yield to the common good. This is the inherent reason for all rules and laws. Here, the Defendants place themselves above such rules, riding roughshod over all concepts of fair play in order to accomplish their own goal. The Court further notes this is not the first time the Courts of this State have levied such a penalty against defendants.

31. This Court finds that THI was not in breach of its contract with Defendants when fired, and was in fact ahead of schedule when equitably given credit for time lost beyond its control. Hence, Defendants, and each of them, were wrong to terminate the contract, and thus may not recover upon their counterclaim.

CONCLUSIONS OF LAW

1.) Defendants breached the contract with Plaintiff and wrongfully converted Plaintiff's equipment to its own use.

2.) As a result of Defendants' breach of contract, Plaintiff is entitled to recover compensatory damages, and is further entitled to recover punitive damages from Defendants due to the clear and convincing evidence of Defendants' oppressiveness, malice and reckless disregard of Plaintiff's rights under the contract and further because of the commission of the independent tort in connection with the breach.

3.) That Plaintiff is entitled to recover the specific amount of compensatory damages as hereinbefore detailed.

4.) That Defendants I&M and AEPSC are separate legal entities, but their wrongful actions herein in concert and cooperation were the joint, concurrent and proximate cause of the damages sustained by Plaintiff as described, such that judgme herein must be rendered jointly and severally against both Defendants.

5.) That Plaintiff proved the actions of Defendants herein by a preponderance of the evidence, and that further the actions of tort, malice, oppression and recklessness were proved clearly and convincingly.

6.) As Plaintiff had not breached the contract at the time of firing, Defendants may take nothing by way of their countercla

JUDGMENT

IT IS THEREFORE ORDERED, ADJUDGED AND DECREED BY THIS COURT that Terre Haute Industries, Inc. be granted judgment against Indiana & Michigan Electric Company and American Electric Power Service Company, and the Court assesses damages as follows:

ITEM	AMOUNT	
a.)	$766,100.00	(plus prejudgment interest at the statutory rates from the date of each invoice)
b.)	$ 95,230.00	(plus prejudgment interest at the statutory rates from the date of each invoice)
c.)	$381,653.00	(plus prejudgment interest at the statutory rates from the date of each invoice)
d.)	$105,000.00	
e.)	$151,000.00	
f.)	$108,000.00	
g.)	$ 11,900.00	
h.)	$234,000.00	
i.)	$102,000.00	
j.)	$ 4,900.00	
k.)	$ 20,600.00	
l.)	$ 8,000.00	
m.)	$ 12,000.00	
n.)	$ 5,500.00	

o.)	$2,900,000.00
p.)	$ 27,817.00
TOTAL:	$4,933,700.00

This Court further ADJUDGES Plaintiff receive punitive damages against I&M and AEPSC in the sum of $12,000,000.00, and ORDERS costs of this action taxed against Defendants.

WALTER H. PALMER, JUDGE
GIBSON CIRCUIT COURT

Dated January 9, 1984.

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Ralph J. Stephenson PE PC
Consulting Engineer

Closing Out A Construction Project

Summary close out guidelines for owners, architects, engineers and contractors

The process of closing out a construction project has emerged as one of the most important sequences of events a project team may encounter during the course of the project. Reasons for this are:

- The close out process usually results in a formal and legal acceptance of the facility by the owner or occupant. Thus responsibility for the correctness of the work passes from the design and construction team to the owner. The transition must be clear and indisputable to avoid contested claims and residual obligations.

- The conditions imposed by the warranties on workmanship, systems and equipment must be clearly defined and accepted by all concerned if adequate guarantees of performance are to be placed in force.

- The design and construction team must have a definitive point in time where their contractual obligations have been fulfilled and they can consider their legal relations closed out so far as project design and construction administration and operations are concerned.

- The owner must have a specific point in time where he can consider the project legally his without any hang over potential encumbrances from the design or construction team.

- The design and construction team must be able to use the project as a facility which they have no hesitation in describing or showing to prospects and current clients.

• A well closed project is insurance of future good relations with specialty contractors on the job as subcontractors of the prime contractors.

• The properly closed project makes no unreasonable or unpredictable demands on the design and construction staff subsequent to the close out.

Many steps to be taken to properly close out a project are given below. The list is for all parties to the contract, since most are involved in the close out phase. Parties indicated in ( ) are those most concerned with the item. Where multiple parties are indicated it does not necessarily indicate the parties must participate together in the action.

The list is at random.

1. Prepare a construction record package. This set of documents was formerly called the as built drawing set. (contractor)

2. Obtain, where appropriate, a certificate of occupancy from the local building department, or other regulatory and enforcement agency. (owner, architect/engineer, contractor)

3. Prepare, distribute and have approved by the owner, the architect/engineer and the contractors, a punch out procedure. (contractor, architect/engineer, owner)

4. Punch out the project and complete the punch list requirements. (architect/engineer, contractor, owner)

5. Prepare, submit and accept the operating and maintenance manuals for the total project. (contractor, owner)

6. Clear final payments on the project and obtain proper waivers of lien. (contractor, owner)

7. Provide the owner with a proper set of construction documents for reference use. (contractor, owner)

8. Collect and store job logs, diaries, daily reports, test reports and all other documentation generated by the job activities. (contractor, owner, architect/engineer)

9 . Bring all meeting minutes and record files up to date so as to permit easy use and retrieval of needed information. (contractor, owner, architect/engineer)

10. Collect and bind all official and unofficial project photos. (contractor, owner, architect/engineer)

11. Collect and record all project network plans, schedules and bar charts by issue number, subject and date. (contractor, owner)

12. Close out and store all correspondence and other record files. (contractor, owner, architect/engineer)

13. Assemble and properly store all shop drawings and other job related submittals. (contractor, owner, architect/engineer)

14. Request the architect/engineer of record to make an inspection resulting in the granting of a certificate of substantial completion. This may be required to to obtain a certificate of occupancy. (contractor, owner)

15. Obtain a partial or full certificate of occupancy from appropriate local and state agencies. (contractor, owner, architect/engineer)

16. Each party should conduct their own job critique during which responsible parties to the project meet and identify points of strength and

weaknesses in carrying out the job. One major product of this critique should be a set of recommendations for improvement of future performance, and documentation of the problems encountered and how they were resolved. (contractor, owner, architect/engineer)

17. Relinquish, or account for, all client owned tools, spare parts, and extra stocks of materials, rightfully the property of the owner. (contractor, owner)

18. Provide the owner copies of all releases, including final inspection certificates, occupancy permits, operating certificates, health department approvals and permits, and all other similar documents to allow the owner to occupy the building under full understanding of the conditions of the turnover. (contractor, owner, architect/engineer)

19. Label all electrical panel boxes, plumbing lines, valves and equipment as required for proper operation and maintenance. (contractor)

20. Provide all keys and keying schedules. (contractor, owner)

21. Submit a final statement of accounting, as required, to the owner and the architect/engineer. (owner, contractor, architect/engineer)

22 Obtain, prepare or issue a final change order reflecting adjustments to the contract sums not previously made by change orders. (contractor, architect/engineer, owner)

23. Send sincere thank you letters as appropriate to the owner, to the design team and to various contractors involved on the job. (contractor, architect/engineer)

24. Provide the owner a complete list of contractors and vendors participating in the job and indicating their installation responsibilities. (contractor)

25. Insure the owner is placed on the marketing call list, mailing list and other action tickler files as appropriate. (contractor, architect/engineer)

26. Arrange for such open house activities as may be desired or required (owner, contractor, architect/engineer)

27. Insure that your company identification is shown somewhere in the building if permitted. (owner, a/e and contractor)

28. Insure the project is as clean or better than called for in the specifications when your staff moves off the job. Don't lose the good will of the owner by leaving him a dirty job. (contractor)

29. Properly train and turn over the facility to the owner's representatives. Depending on the size and complexity of the project, the training process should begin from one to three months before occupancy. (owner, contractor)

30. Establish and approve the start of all warranty and guarantee periods for all material and equipment on the job prior to owner making the facility operative. (owner, contractor, architect/engineer)

31. Prepare and submit to the owner a Construction Record Package. This package should contain the following: (contractor)

a. The construction record set referred to above.
b. Specific warranties required by the specifications
c. Workmanship or maintenance bonds required
d. Maintenance agreements called for by the specifications
e. Damage and settlement surveys of the site and the facilities
f. Final property surveys of the site.

32. Submit a final billing to the owner containing a list of all incomplete items and a properly assigned cost to each item. (contractor)

33. Advise the owner of any insurance changes over existing or past requirements or dates. (contractor, architect/engineer)

34. Complete all pre start up testing, run in and instruction along with submission of operating and maintenance manuals. (contractor, owner)

Note: All pre start up and start up requirements should be fully described in the contract documents.

35. Submit final meter readings for utilities, and measured records of stored fuel at the time of substantial completion. (contractor)

36. Submit to owner, the consent of surety to final payment if required. (contractor)

37. Have final inspection made by an experienced exterminator to rid the job of rodents, insects or other pests. (contractor, owner)

38. Read the full contract document requirements (drawings, specifications, and contract) for closing out the job. (contractor, owner, architect/engineer)

Ralph J. Stephenson PE PC
Consulting Engineer

Technography

The practice of preparing displayed and structured meeting notes and related material as discussions proceed

• OVERVIEW

Technography material display may be shown on a single computer screen viewed by one to four people, or on multiple screens, controlled by a live computer and viewed at remote terminals, or on a large screen projected from a computer by one of several kinds of devices, and viewed by as many people as can be accommodated by the facilities.

Current popular equipment such as the Kodak and the Sharp, use a compact flat transparent display which rests on the light bed of an overhead transparency projector, and shows the computer screen image on a conventional projector screen.

Whatever equipment is used, the main elements of the system are

1.) Displayed information.

2.) Hardware and software to permit graphic preparation of the information as it evolves.

3.) A meeting leader who can either accurately type or draw, or have typed or drawn, the main thought flow of the meeting.

4.) Key people who can participate in the session and produce a desired end product.

The process objective is to generate an ongoing set of notes from which all people in the gathering can obtain information and to which they can provide input. The end product of a technography session is a complete, accurate and accepted (accepted does not necessarily mean approved) hard copy report of the proceedings for immediate distribution and use.

The resume of a meeting conducted using technography may be recorded in different modes - text, graphic, tabular, chart or other desired form. The end result, properly identified, dated and referenced provides an accurate record of what went on in the meeting, and what was decided there.

In addition the record if properly prepared, implies acceptance, approval or consensus of those participating without forcing such approval or consensus (a forced technography decision defeats the purpose of the system).

• ADVANTAGES

Some of the advantages (listed at random) of centrally displayed meeting notes as used in technography include:

- Encourages heavy concentration of participants on accurately recording the ideas and suggestions of involved individuals and groups. Individual note taking is reduced over conventional meeting formats.

- Documentation from the session can be printed at any point in the session, and duplicated and distributed to the group to permit review of material covered to that point.

- At the close of the session the document can be printed, duplicated and distributed to the group to encourage immediate action on material covered.

- Opportunities are given to all at the session to input to the group document. This helps minimize individual and organizational hidden agendas.

• Accurate reporting is encouraged since the display permits instant evaluation of statements and decisions. This ease of review encourages participants to refine ideas throughout the meeting since changes can be made at any time, providing there is agreement on the changes.

• Where there is disagreement about an issue, the entire range of conflict can be recorded for all to see. Thus points of view that may normally be obscured are often encouraged and displayed to the group.

The benefit here is that participants know that through such displayed material there are improved probabilities that the true goals and objectives of the group will be achieved. <u>Everybody works to the same agenda and from the same set of notes.</u>

• Ideas are captured while they are still fresh in the minds of the originator.

• Details can be added to earlier topic discussions as the meeting progresses.

• At the close of the meeting those at the meeting know what they and the others have agreed on and who is to do what.

• The method encourages problem attacks to be made directly on the most likely areas to bring success. The reason? - problem characteristics and the ideas of others tend to encourage synergistic thinking. This happens because the displayed ideas and approaches of each individual participating encourage others to individually think better about the subject at hand.

• SUGGESTIONS

The dynamic characteristics of technography are often helpful in overcoming inertia, encouraging initiative and stimulating new insights into a subject at hand. Rapid improvement in results from the note taking system then come about when you actually use the method in your daily work.

Some suggestions to help you to get a good start in using displayed stenography are given below:

1. Learn to listen, think, type and lead simultaneously. This is particularly important if you are to do the note taking.

2. Generally the hardware used is a conventional computer fitted with special display devices, as noted above, that allow a large number of participants to directly view the note display on a screen.

3. Recommended software for note taking includes one of the standard word processors such as MacWrite or Microsoft Word. Others to use in technography includes outlining programs such as Think Tank or More. Software valuable for graphic and tabular displays includes standard project planning, data base, free graphics and spread sheet programs such as MacProject, Microfile, MacPaint, MacDraft or Excel.

4. If you cannot do the typing, thinking, leading and operational job yourself select a bright, alert, perceptive member of your staff or of those participating in the meeting to record the main body of material, while you apply your talents to the special leadership and display work required by other than the note taking process.

5. Have a previously prepared information needed and information desired template from which to conduct the discussion.

For example, if you are conducting an initial design and construction project planning meeting, the various information you might wish to gather could include such topics as:

a. Project identification, date and location

b. Author of notes

c. Proposed distribution of notes

d. Those attending the meeting

e. Those involved in the total effort - this information and other material that is revised and updated continually as the project moves along is usually kept in a general section that is constantly updated to reflect the latest data available.

f. Key dates - in construction this data is always critical to proper job understanding and management - should include contract execution dates, start of design work, start of construction work, key completion targets, and intermediate dates required.

g. Documents used for reference in the sessions and on the project Includes plans and schedules in effect, contract documents currently in effect, special reports and material referred to in the meeting, and other similar items of reference importance.

h. Current status of project work - includes:

- Real estate control
- Financing
- Contract awards
- Acquisition of permits
- Procurement
- Design and planning
- Field construction
- Closing out the project

i. Work to be done in immediate future

j. Actions to be taken and who is to take them

k. Superseded data - A section of the ongoing file where superseded data is stored. Never remove any published information from the record.

l. Responsibility codes

m. Laundry lists defining the scope of work for network modeling

n. Easements and zoning information

O. Abbreviations

p. Mission statements

q. Project characteristics

r. Agenda

s. General notes