Professional Development
Program on Project Management

Effective Project Management for Building Design and Construction

An "in-depth" study of the critical management methods and procedures used during project (1) DEVELOPMENT, (2) PRODUCTION and (3) DELIVERY. Designed for representatives from architectural, engineering and construction offices in private and government agencies responsible for delivering high quality facilities on schedule.

Major Areas of Study Are:

- **Monitoring and Controlling Costs**
- **Roles and Responsibilities**
- **Documentation and Recordkeeping**
- **Systematic Project Planning**
- **Communication and Decision Making**
- **Coordinating Procedures**
- **Measuring Performance**
- **Scheduling and Budgeting**
- **Use of Automation**

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The College of Engineering, University of Wisconsin-Madison

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• *SECTION 1 - INTRODUCTION TO PROJECT MANAGEMENT FOR BUILDING DESIGN & CONSTRUCTION*

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THINKING PATTERNS

Why plan?.....to evaluate

Why translate?.....to communicate

Why control?.....to achieve

Why correct?.....to maintain

Why learn?.....to improve

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APPROACH PATTERNS

1. Improve capabilities
2. Gain control
3. Expand your conceptual grasp
4. Be creative
5. Experiment - in the low leverage areas
6. Continue to learn
7. Solve problems
8. Define goals & turn them into objectives
9. Teach others to achieve what is important

ho 271 - December, 93

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GROUND RULES

1. Open your mind to new ideas & to new applications of old ideas.

2. Listen well & ask helpful questions.

3. Be selective in which techniques you use.

4. Learn more about the subjects of interest to you.

5. Relax and enjoy the company of your professional friends.

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LINE OF ACTION

1.04

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

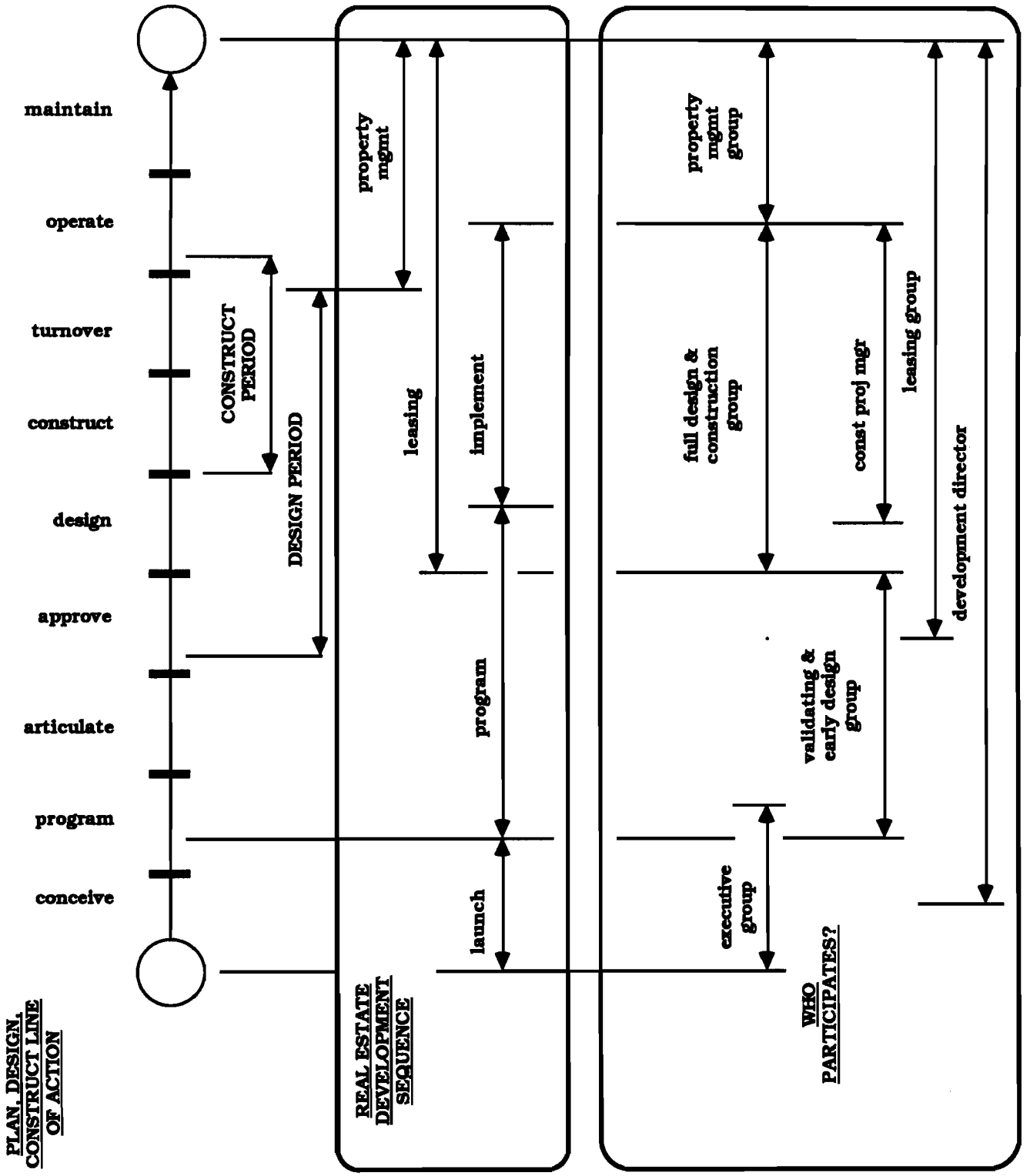
Turnover - (Continued)

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

- **ho 336 - disk 162**
  - **Development phases - Ralph J. Stephenson PE - ho 336**
    - **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.

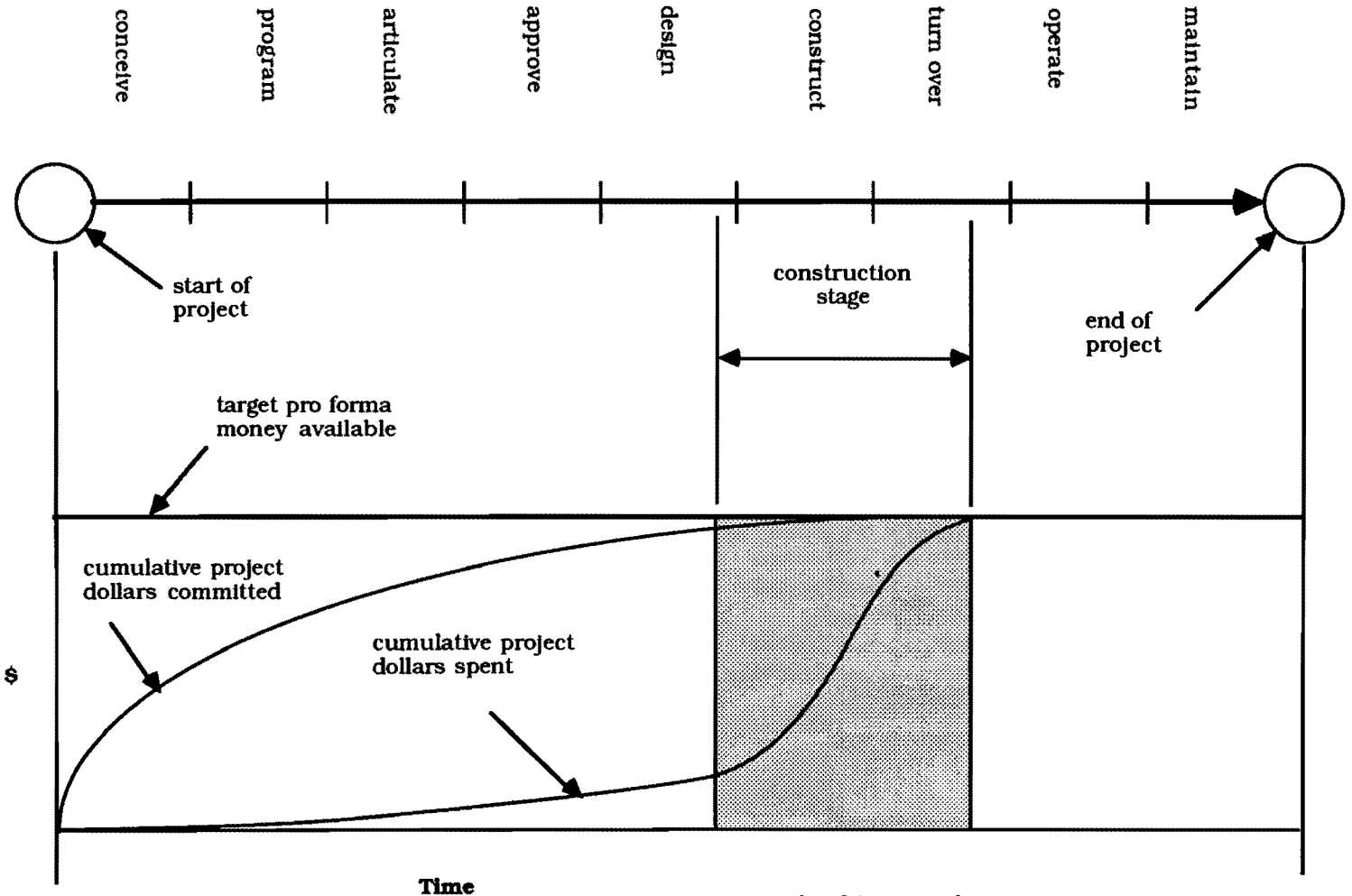
- **Phase F - Leasing the asset**

  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.



Costs Committed Compared to Money Spent on Construction Projects

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ho 350 Jan 90

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Costs Committed vs. Money Spent

Committed costs are promised funds for purposes, that if such purposes are aborted a penalty must be paid, and a loss is often incurred.

Penalties and losses may include such items as:

- OPTION COSTS
- RIGHT OF FIRST REFUSAL COSTS
- LEGAL FEES
- EARLY ENGINEERING FEES
- EARLY PLANNING FEES
- DISPLEASURE OF POLITICAL ENTITIES
- STAFF TIME EXPENDITURES
- LOSS OF CREDIBILITY
- LOSS OF OPPORTUNITY

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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. Usually 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.

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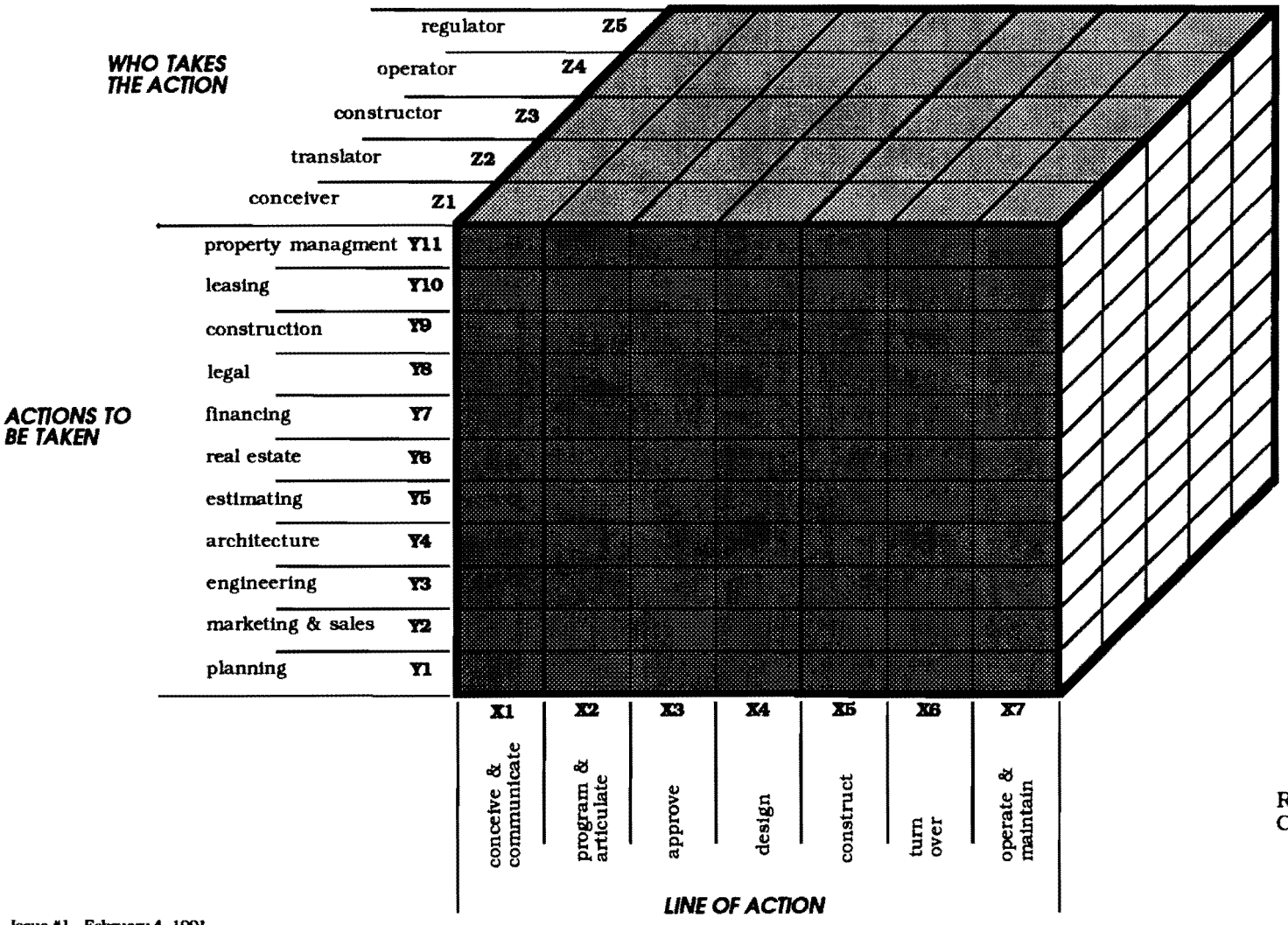
MACRO MATRIX BOUNDARIES OF DESIGN & CONSTRUCTION



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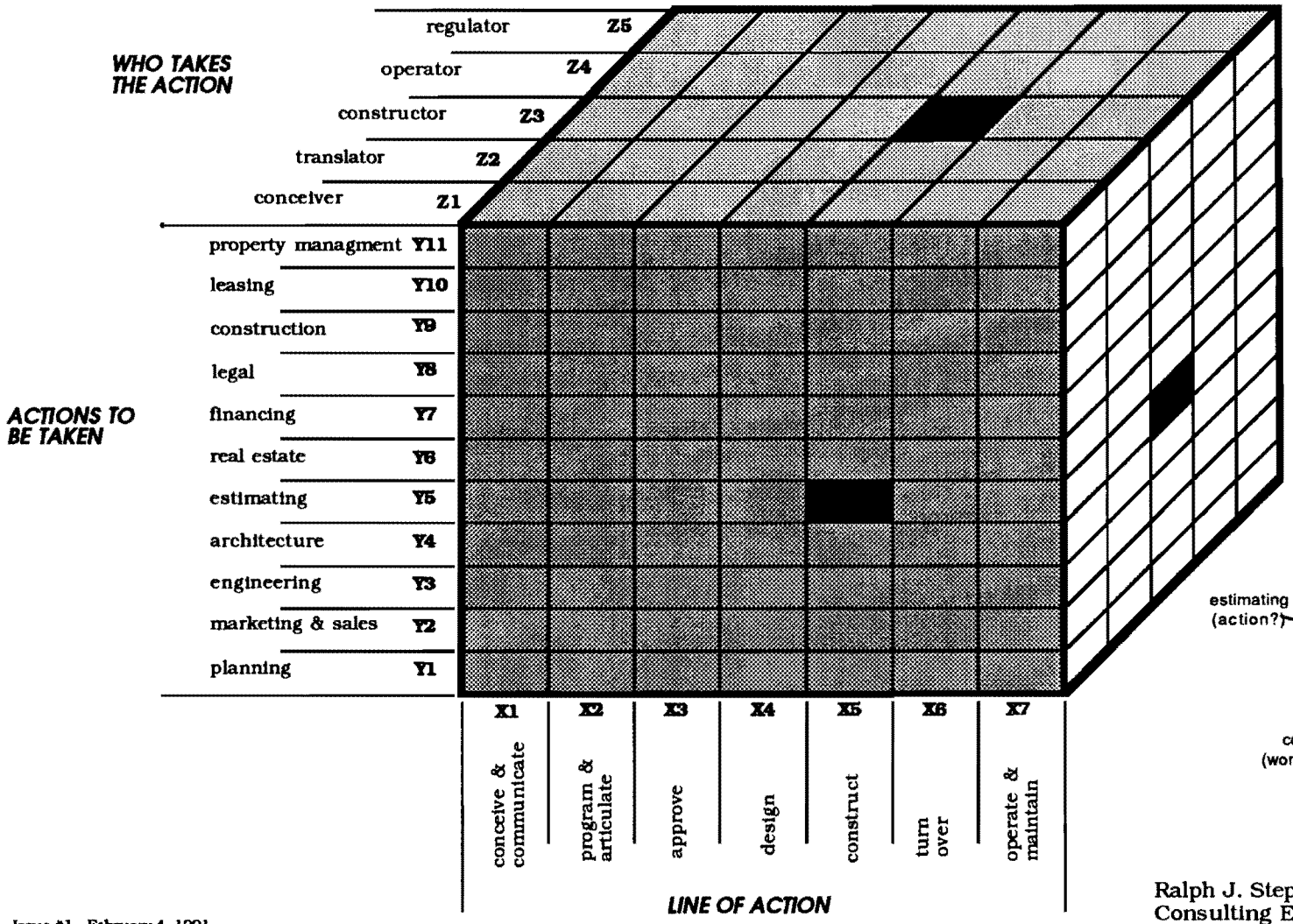
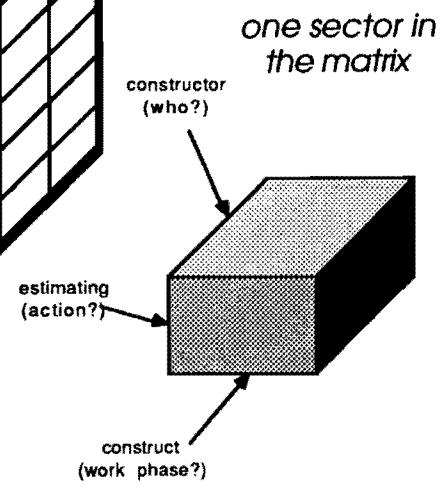
MACRO MATRIX BOUNDARIES OF DESIGN & CONSTRUCTION





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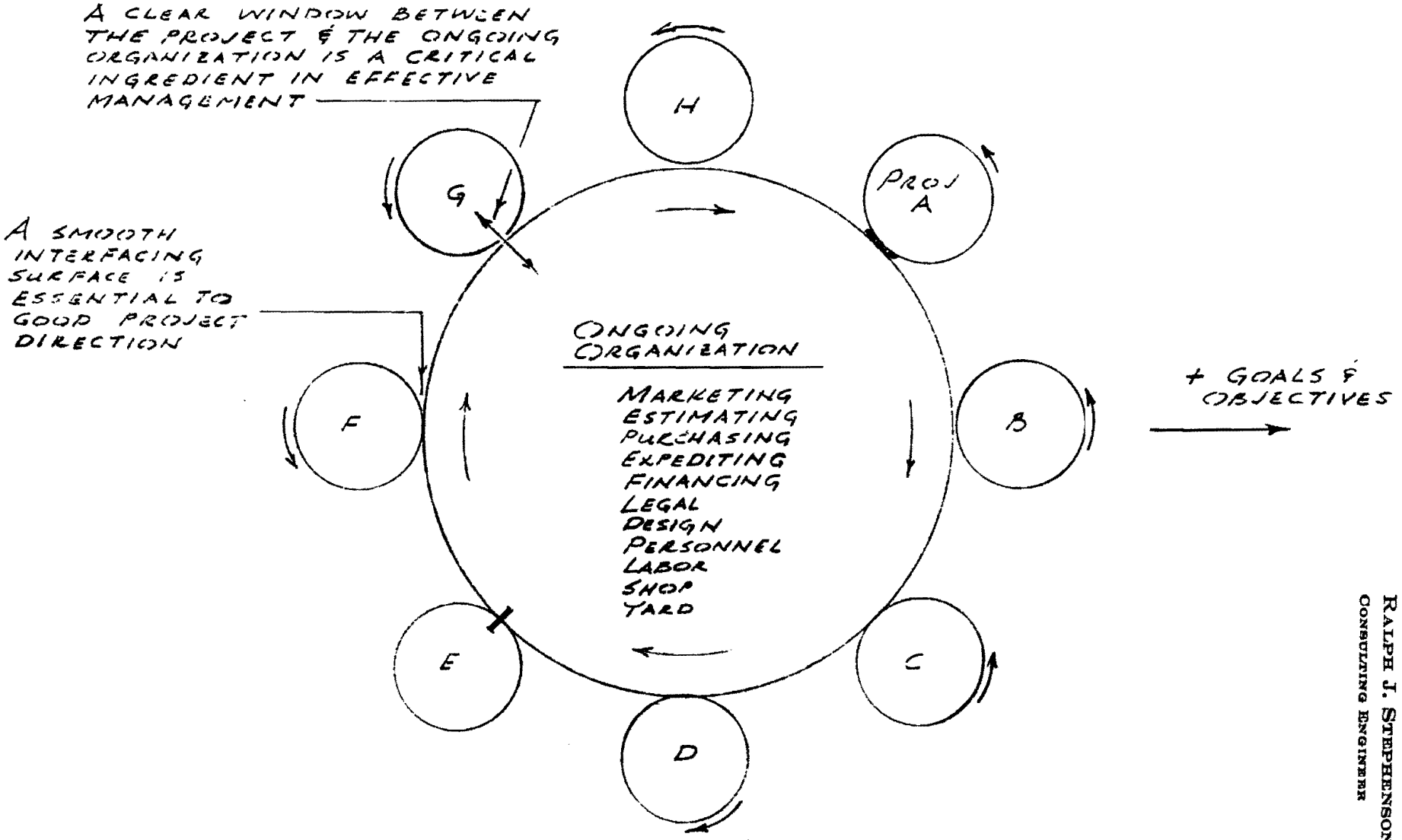

THE RELATION OF PROJECT MANAGEMENT TO ONGOING MANAGEMENT

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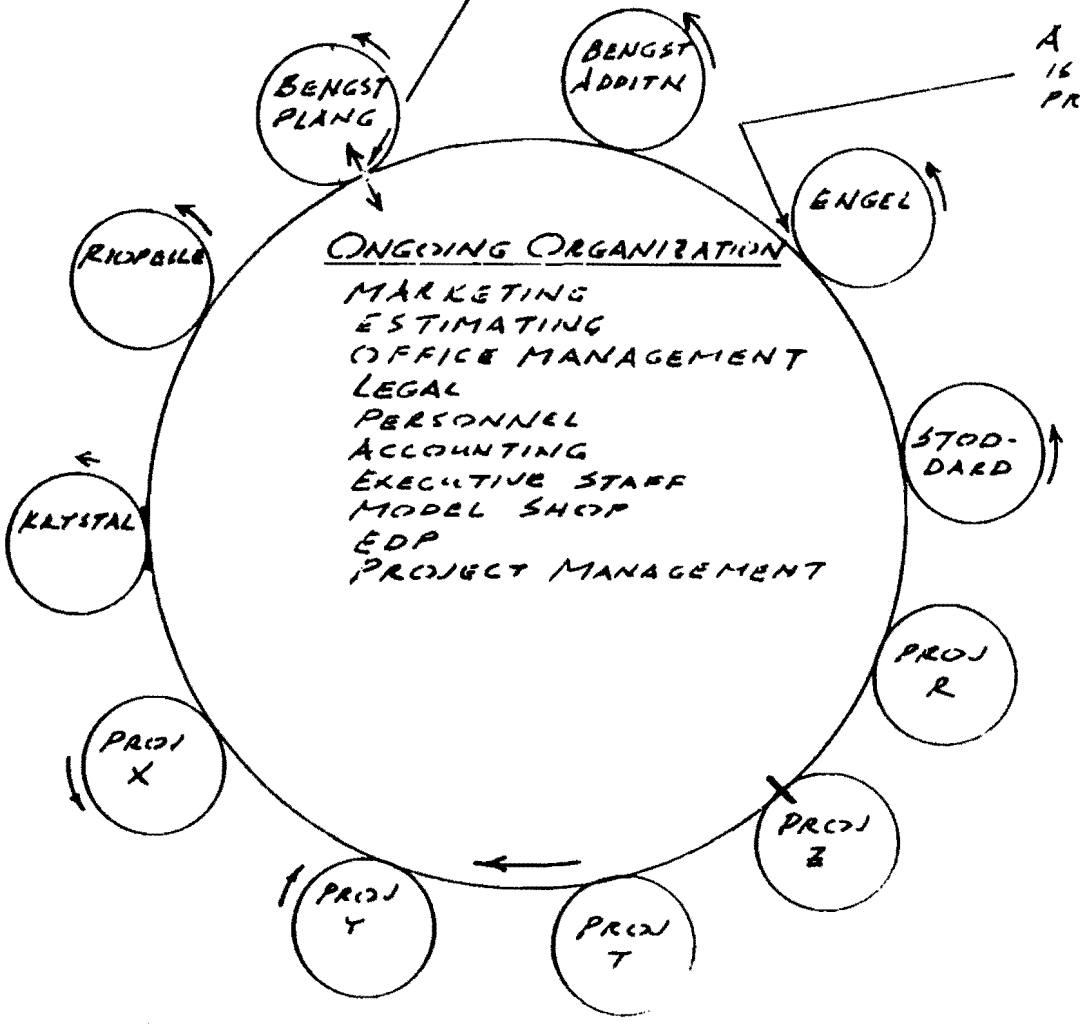
A CLEAR WINDOW BETWEEN THE PROJECT & THE ONGOING ORGANIZATION IS A CRITICAL INGREDIENT IN EFFECTIVE MANAGEMENT

A SMOOTH INTERFACING IS ESSENTIAL TO GOOD PROJECT DIRECTION



+ GOALS & OBJECTIVES

THE RELATION OF PROJECT MANAGEMENT TO ONGOING MANGEMENT - A/E

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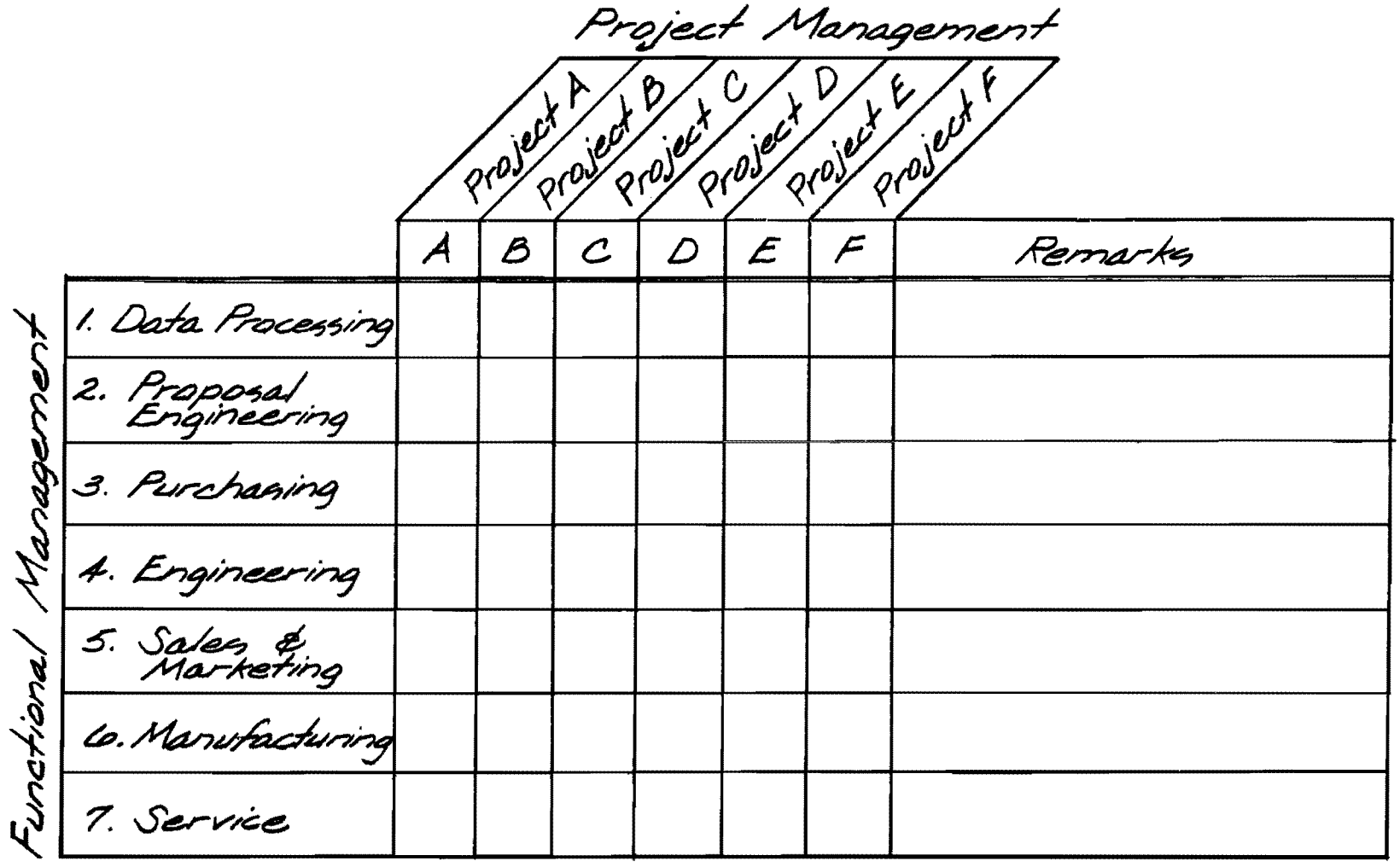

PROJECT/FUNCTIONAL MANAGEMENT MATRIX

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A/E MANAGEMENT MATRIX

FUNCTIONAL DEPT HEADS	PROJECT MANAGERS								
	BENGST PLNG	BENGST ADDITION	ENGEL OFFICE	STODDARD MFG	PIOPELLE WELD MO	KATSTAL SCHOOL			
PROGRAMMING									
LAND PLANNING									
ARCH DESIGN									
ARCH PRODUCTION									
STRUCTURAL									
MECHANICAL									
ELECTRICAL									
GRAPHICS									
SPECIFICATIONS									
CONST ADMIN									
CAD PRODUCTION									
PROJ MGMT									
EST/MATING									
INT. DESIGN									
MODEL MAKING									
CIVIL									

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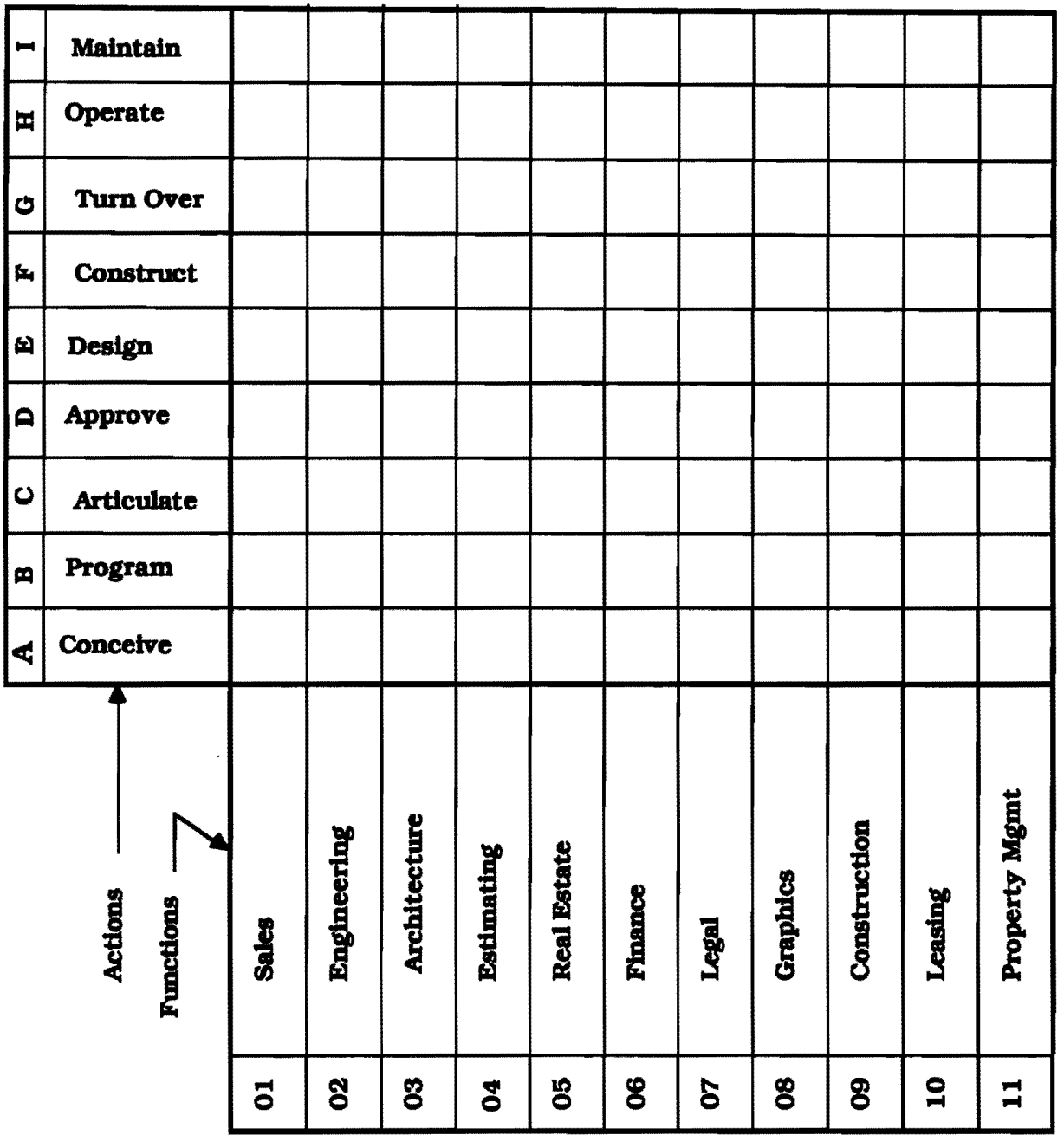
DESIGN/BUILD MATRIX



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TYPES OF MANAGEMENT IN PROJECT ORIENTED BUSINESSES

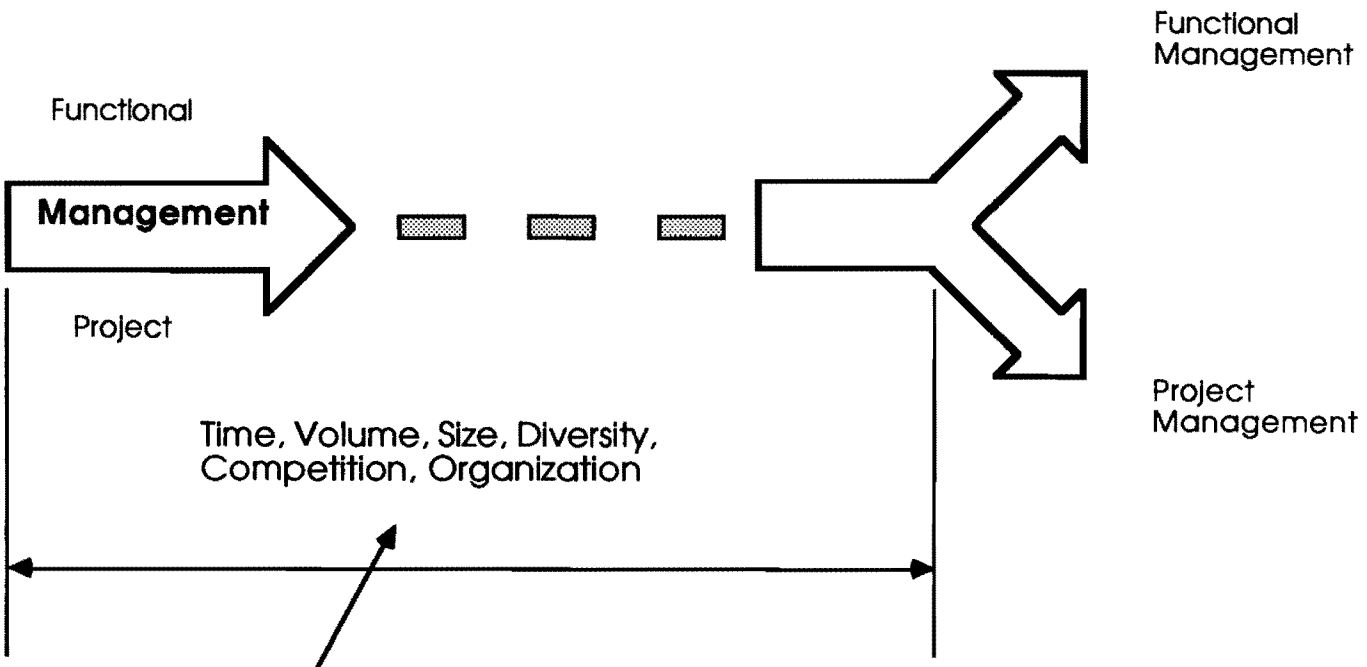
• **FUNCTIONAL** - as related to continuous management

A business operation designed or adapted to perform a specialized activity or duty usually exerting a direct influence on the continuous operations of the company.

Examples are departments of estimating, accounting, legal, office administration and similar ongoing functions.

• **PROJECT** - as related to discrete management

A specific management assignment designed to achieve defined objectives by accomplishing a group of related, discrete project operations. Project operations have well defined beginning and ending points.



- These are some of the factors that initiate changes in the method by which a planning, design, construction organization is managed .

Relation between functional and project management in the evolving organization

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ho 364, Feb, 90

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PROJECT DELIVERY SYSTEMS & THEIR USERS

DEFINITION - A method of assembling, grouping, organizing and managing project resources so as to best accomplish 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. Bidders 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 estimated project cost.

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 (privatisation), 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.

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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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PROFIT POTENTIAL LEVELS

LEVEL 1 - INCLUDE EVERYTHING

LEVEL 2 - PREPARE A GOOD WORK PLAN

LEVEL 3 - PREPARE A GOOD SCHEDULE

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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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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

• 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.

STEPS TO GOOD PROJECT MANAGEMENT

• A good project seems to require 9 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 provide 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 project 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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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

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QUALITIES OF A GOOD PROJECT MANAGER

01. A perceptive ability to move from the micro situation to the macro situation, and back again at will.
02. An ability to work well with people.
03. A desire for excellence.
04. An inquisitive mind.
05. An ability to manage conflict.
06. A sense of humor.
07. Good mental peripheral vision.
08. Education in related fields
09. 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.

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November 27, 1993

Design and construction elements

37 Elements of importance to success in design and construction - ho 341

By Ralph J. Stephenson PE PC

• **Summary**

In the design and construction industry there exist many factors which influence the degree of success achieved on a project. They deal with project goals, profit types, project sequencing, the nature of the participants and the kinds of problems most likely to be encountered.

If the parties to a planning, design and construction program recognize the nature and importance of these factors, a major step will have been made toward their proper and effective combination and management.

Below are listed 37 basic influences on project delivery systems. Project management concerns how to combine these into a successful job of which all participants are proud.

• **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.

• **Seven types of profit**

1. **Financial** - an improvement in a money position
2. **Social** - a gratifying experience contributing to society's well being
3. **Self actualization** - a gain in personal non financial satisfaction by contributive work
4. **Value system** - reward gained by application of values in which one believes
5. **Technical** - acquisition of technical skill or technical data of value

6. **Enjoyment** - personal enjoyment of a situation gained from involvement in it
7. **Educational** - learning made possible only by efforts exerted in any given situation

• <u>Nine major elements in the design & construction sequence & how they are done</u>

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.

• <u>Five major participants in the design & construction process</u>

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

• <u>Ten major types of design & construction problems</u>

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. **Impossibility 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's rights, that prevents the latter party from enjoying the benefits of least cost performance within the contract provisions.
9. **Superior knowledge**
   The withholding 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.

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• *SECTION 2 - SETTING PROJECT GOALS & OBJECTIVES*

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END, INTERMEDIATE & PERIPHERAL OBJECTIVES

2.01

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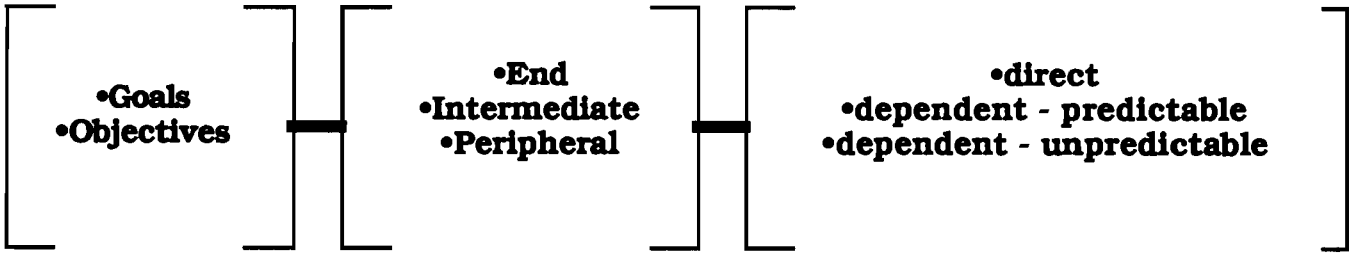
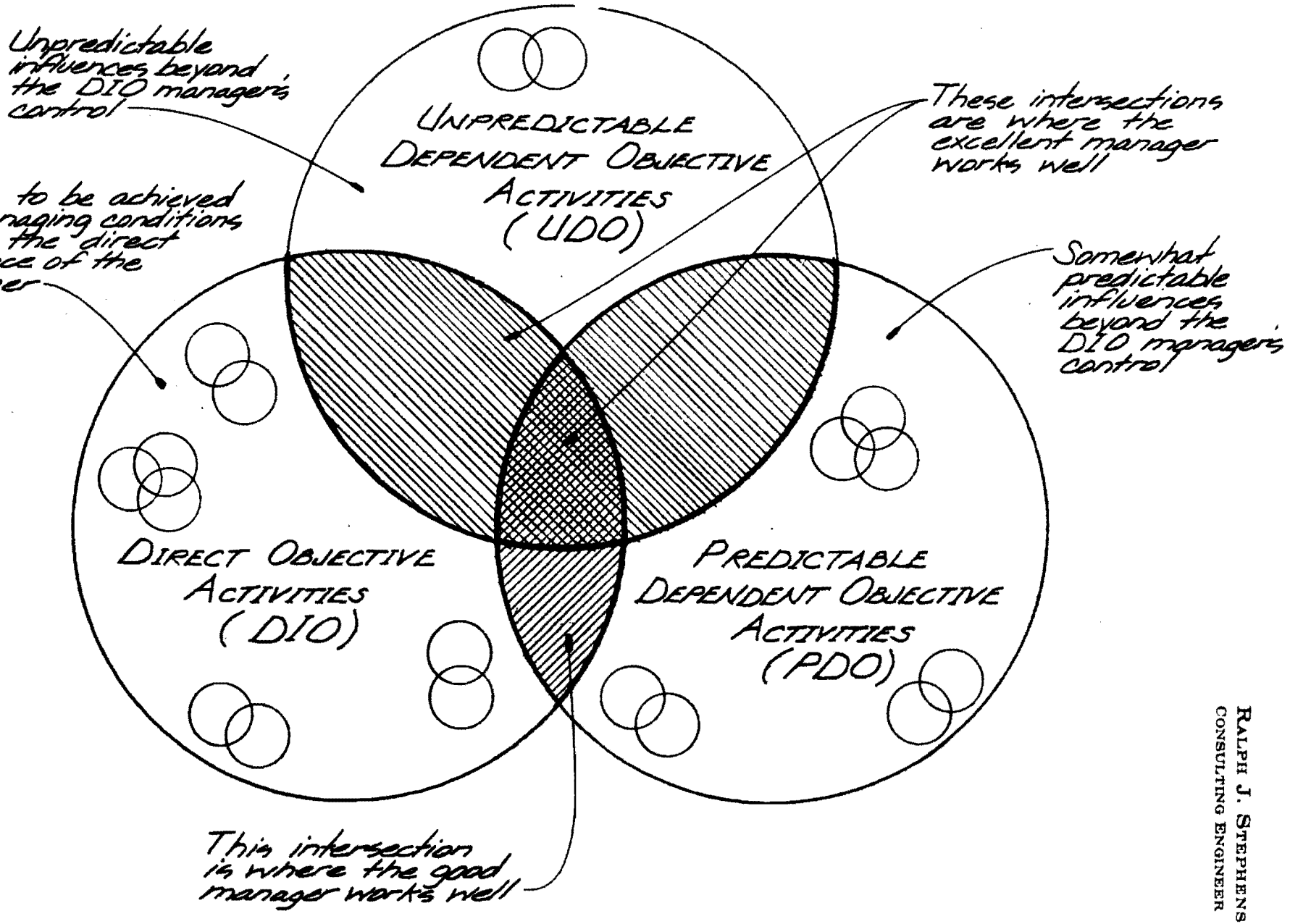
Goals & Objectives Definition



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



THE DIO/PDO/UDO INTERSECTION

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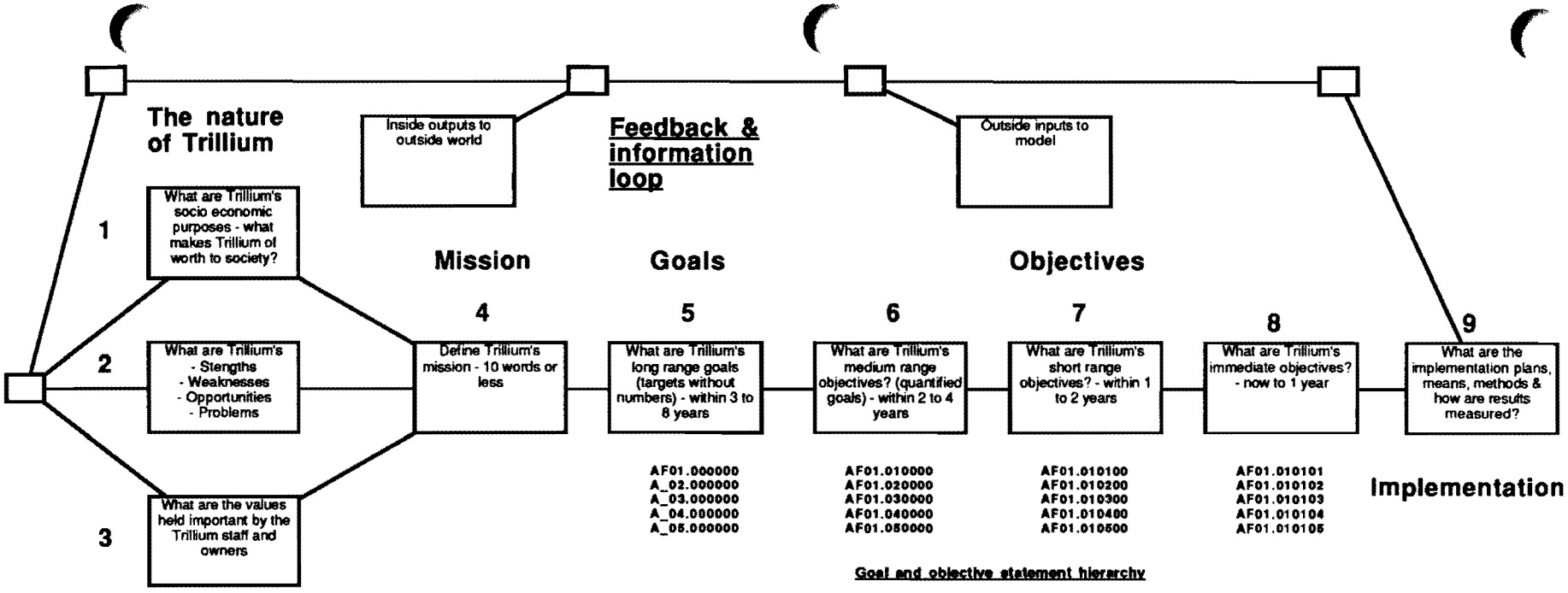

Goal and objective statement hierarchy

Major functional areas within which Trillium's goals & objectives could be framed.

A. Administration
B. Construction
C. Corporate planning
D. Development - real estate
E. Fee (& perhaps internal) services
F. Marketing & sales
G. Training & education

2.04

Trillium Company Model

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Issue #1 - 1/3/89
Issue #2 - 12/12/90
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Setting goals & objectives

To effectively manage a project you need to know what is to have been accomplished when the job is complete.

Some 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 your response.

Your statement now becomes a project mission from which detailed goals and objectives can be generated.

Step 2.
Decide upon and write the major activity classifications within which you wish to achieve the mission stated in Step 1. Some classifications for detailed goal definition in project management might include:

- Company
- Organizational
- Departmental
- Project
- Social
- Financial
- Community
- Technical
- Professional
- Educational
- Personal
- Project staff
- Career

Step 3.

Select the classifications you feel most comfortable with, and write several brief statements of what you want to achieve within these activity categories. Don't think about numbers and time frames yet. Concentrate on getting good content in each statement. Typical statements might be:

For the project:
- To implement a job data base tracking system for submittal turn around
- To significantly reduce job meeting times and improve follow up results.
- To design and implement a structured job inspection and reporting system procedure

For your career:
- To learn and use network modeling techniques
- To work specifically toward using this project experience to move to the next higher position rating
- To diagram and study the organizational structures of effective design and construction firms on the project

Step 4.
When you have written out as many targets you wish or must achieve, and that you can comfortably think of, reorganize them into a classification system best suited for the project you are on. Classification can be by the original groups, or you may wish to rearrange them by subject, time span, people involved, degree of achievability, people influencing their achievement, or any other common qualities that allows you to work comfortably in converting the desires to accomplishments.

Step 5.
Once you have a satisfactory list of desires, begin assigning quantities to the goals in the list. Quantities may be in dollars, manpower, time, space, talent, opportunity, or any other you may wish. This quantification step converts non numerical goals to numerical objectives. It is a step you must take to get from wish to reality. Remember project management is objective oriented. Converting goals to objectives is essential for effective project management.

For example the unquantified target stated in Step 3 above, "To significantly reduce job meeting times and improve follow up results.", might now be amplified by such specific objectives as:

- Within 3 weeks of field job start to have all project minutes being done on an

IBM compatible word processor.
- Within 6 weeks of field job start to be using technography methods to record and approve job meeting notes.
- Within 7 weeks of field job start to publish job minutes by late afternoon of the meeting day.
- Within 1 week of field job start to be discussing in job meetings only job matters having a minimum decision to action time span of one week.

Step 6.
When you have enough objectives, to satisfy your initial needs, stop for a while and concentrate on achieving what your objectives demand of you. The call now is for action!

Step 7.
As you put the goal and objective achievement process into operation, keep adding goals and objectives to the list you have prepared.

Remember, your needs, and the project's needs change continually. In Step 1 you defined the fundamental project mission. Around this stable base the detailed goal & objective setting must continue as the project unfolds.

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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.

H/O 163 9/77

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Case Study A1 - Definition of Objectives

You work in the properties department of a firm of reputable, moderate size developers who specialize in financing, constructing and managing commercial properties. The company has just contracted to build and will be the owner and landlord of a new three story commercial office building measuring 150' x 150'. The building contains a core utility space which houses elevators, stairs, riser shafts, toilet rooms and telephone, electrical and janitor closets. Perimeter spaces consist of standard rental areas and will be finished with a smooth concrete floor, acoustic ceiling, lights and a modular diffuser pattern.

As the space is leased, you, the landlord, will install tenant improvements consisting of carpeting, partitions, doors and other items covered by the lease. The tenant will have an opportunity to add additional cost items to the basic tenant allowances at his expense, subject to your approval.

You have let contracts on the job to three prime contractors, architectural/ structural, mechanical and electrical. Your duties are as the properties department full time project manager. The properties department is new and you have only been with the firm a few months. You recognize you have the right education for the job, are interested in the work and are anxious to learn. However, you also recognize you are somewhat inexperienced, a little young for the responsibilities you have been given and have a tendency to be more stubborn than is necessarily good for you and those who must work with you.

Cost of the office building is about $3 million. It represents a sizable investment, one of the largest your company has ever made. In conjunction with your superiors in the properties department, you have decided you would like to have occupancy of the building from the top floor down and out at the first level and on a staggered basis with the floors being delivered in sequence.

This is your first major project with your new firm, although your experience includes the project management of several successful jobs for a moderate size general contractor in the community. These were accomplished over the previous four years of your employment.

You have met the three superintendents for the three prime contractors and each appears competent in his own discipline.

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The superintendent for the architectural/structural trades contractor is about ten years older than you, has extensive experience and probably will tend to be very aggressive on the job. However, his reputation is excellent and he appears very cooperative.

The mechanical superintendent is about fifteen years older than you. He has not said much in your meetings and you sense that he is highly concerned with protecting his company's rights on the job. He is, however, you judge, very competent, although you have also heard that he has a stubborn streak that tends to show up frequently during decision situations.

The electrical superintendent is about your age, a graduate electrical engineer, but with good journeyman experience since he started in the trades very young. He probably is the sharpest of the three superintendents and you have already noticed that he tends to look to you as his peer rather than the other two superintendents.

All three primes will have their detailing and accounting work done in the home office and will maintain a very small field administrative operation. You, as the owner, want quality work and are willing to pay to get it. Your architect/engineer has a moderately good technical reputation, designs economically and is very cooperative so long as he is given the legitimate help that he has come to expect from congenial and competent owners and contractors. You have never worked with him before.

Your personal goals in this project are to do an excellent job and to gain additional good reputation as a competent, conscientious field project manager. Hopefully, the experience and stature will encourage the company to help you with your ongoing education. You have had two years of college in construction engineering, are married and have a small child two years old.

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The Bengst Corporation Expansion

Bengst Corporation has been in the computer hardware and software manufacturing business for about 15 years. It occupies two principal facilities. One is a modest one story remote testing lab of 40,000 square feet in Tarry, Montana. The second is the main office and plant in Billings, Montana, about 150 miles from Tarry. The Billings complex contains nearly 25,000 square feet of office space and an adjoining manufacturing plant of 150,000 square feet.

The Tarry lab is visited frequently by Bengst middle and top managers. Many of them have shown a liking for the small community, and it has been tentatively decided by Mr. Bengst to gradually shift Bengst headquarters to Tarry.

Bengst has been successful in developing and manufacturing quality medical computer hardware, and have now begun to design and market related software programs for technical, business and home computer use. Their products have been well received and the Tarry building will be expanded to take care of some of the temporary design space needs being experienced. The cost of the program has been established from carefully prepared pro forma information.

The Tarry facility is located on a beautiful 160 acre parcel of land bought several years ago by Mr. Bengst. The existing building is a one story structure with a steel frame and an attractive masonry and curtain wall exterior skin. It was designed by a Philadelphia architectural/engineering firm, who also designed the Billings plant and office.

Bengst Corporation wants to add one story of similar construction to the building and to concurrently develop a master plan for the entire site. Ultimately most major design and production facilities of the company are intended to be moved to Tarry. In two years the volume of business done by the software division is expected to increase 300%. The hardware division is expecting a 200% expansion within the next five years.

The president of the company, Mr. Steel Bengst, is very active in the expansion program and will watch the expansion work carefully. He has appointed a young systems engineer at the Tarry plant, Karl Jong, to be the owner's project manager. Mr. Jong is 28 years old, has advanced degrees in electrical engineering and business. He is considered one of the bright stars of the emerging manager group at Bengst. (end)

Please note any questions you may have about the above information in the space below.

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The Bengst Corporation Expansion - Situation OW

You are Karl Jong a 28 year old software & systems designer at the Bengst Corporation. The founder of the firm, and currently its chief operating officer is Steel Bengst, a dynamic man of 53. You work at the company headquarters in Billings, Montana.

You have exhibited a strong interest in the company product and its facilities for several years. Mr. Bengst has observed your work and has taken a personal interest in your career. He decided, after several conversations with you to appoint you project manager for the expansion program being contemplated in Tarry. You have been made aware of the confidential decision made to shift the headquarters and operations of the company to Tarry. You also have some concerns about the selection of Tarry, but these have not been expressed by you to anyone. You however, know that one of the expanded Bengst main market targets is to be the mid size & large medical computer users in Southwest USA.

The building in Tarry was designed to receive a future second floor on the present one story structure. The structure occupies a position at the northwest corner of the site and has access to local roads, and through them, to the freeway about 1/2 mile to the east. The building, as well as the site would probably be readily salable in the current Tarry area real estate market.

Mr. Bengst enjoys working to well defined guidelines and expects his staff to clearly identify goals & objectives for their projects. On this assignment he has given you the following assignment.

1. To develop detailed program statements about the building expansion

2. To decide on the building project delivery system to be used.

3. To select the project delivery team to implement the program

4. To set an authentic time table for the total expansion in conjunction with the Bengst facilities engineering staff

5. To develop and implement a progress tracking and communications program that will keep top management at Bengst fully informed about the program on a weekly and on an as demand basis.

6. To establish the approach to be used in preparing a master plan for expansion

of the company on the Tarry site.

7. To play an active role in establishing future hardware and software design strategy in conjunction with Bengst's marketing and sales group.

Some of the people involved in the program are:

• Tom Bengst - VP of marketing & Steel Bengst's son - determined and competent man of your age. Somewhat disappointed at not being appointed to be the expansion program manger, but seemingly satisfied with your appointment.

• Frank Berenski - Facilities engineer for the company - competent individual, older than you, bright and enthusiastic. Likes order & method.

• John Donovan - Administrative VP - thrives on confusion, but makes things happen. You have not worked with him previously.

• Trosta Miraldo - Your boss in the hardware & software systems design division - highly educated and a very competent doer. She had hoped to get the program manager's job for the expansion. However she has a high regard for you and is only marginally upset with your appointment. Still expects you will work for her in your systems design activities.

Define the following:

1. Three main goals of the company in this program
2. Three main goals you have on this assignment

Derive the following from the goals you have defined above

1. One major intermediate & one major end objective of the total program
2. One major intermediate & one major end objective of the building addition.

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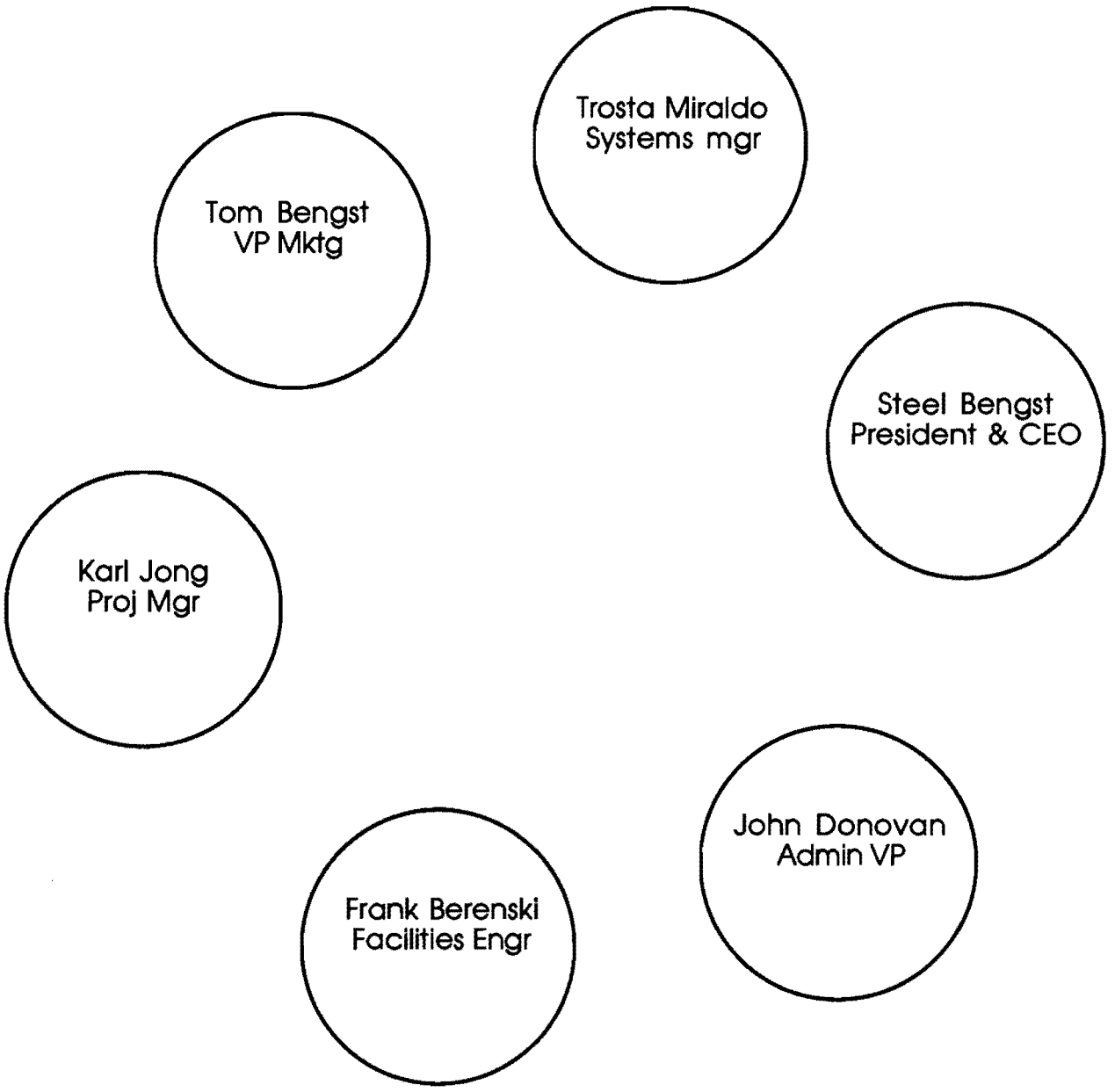
Bengst Corporation Expansion
Organizational Relations



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CASE STUDY - DEFINITION OF GOALS & OBJECTIVES

You have just been promoted to senior project manager for Vyvyan and Associates, a moderate size architectural firm of about 120 people. You are a registered architect with a bachelor's degree in architecture and a master's degree in urban planning. Your strong features brought you to the forefront of the project management group at Vyvyan and now you are recognized as the possible future vice president in charge of operations and projects.

Vyvyan is organized around strong functional operations, but has a management that understands and appreciates the value of project management. The firm has a good reputation for competent architectural design and good technical backup.

The design department under Jon Teleman tends to design expensively, but will listen if sound, rational reasons are given for disagreeing with their concepts.

The architectural production department head, Carl Trilar, is a hard headed man of 39, who has a wealth of experience and is well thought of by his staff. He does not always agree with the design group and frequently revises major details without consulting the design team. This leads to hard feelings and recently has caused budget overruns on several weakly managed projects.

The engineering departments have tended to follow patterns set by the design and architectural department without too many problems or conflicts. However, Mr. Vyvyan just brought in a new chief engineer, Bob Lott, who has already clashed with Carl Trilar in a dispute in which Mr. Lott sided with Jon Teleman.

Your firm has been contacted by a moderate size developer, The Dreyfus Corporation, and offered an architectural and engineering commission to design a new 8 story office building of 240,000 square feet. The building is to be a tenant occupied structure with a core utility space containing elevators, stairs, riser shafts, toilet rooms, telephones, and electrical and janitor closets. Perimeter spaces will consist of standard rental areas, and will be finished with a smooth concrete floor, acoustic ceiling, lights and diffusers.

As the space is leased Dreyfus will install tenant improvements consisting of carpeting, partitions, doors and other items covered by the standard lease. Tenants will have the option of adding additional items in the space subject to Dreyfus approval.

You have worked for several months cultivating the Dreyfus organization in the hope Vyvyan would be awarded this project. When Mr. Dreyfus called yesterday and said they had selected Vyvyan and Associates to do the work you were delighted. Mr. Vyvyan has told you he wants you to be the project manager and to develop a solid ongoing business and professional relation with Dreyfus.

Your pleasure has been somewhat dulled by the news that Dreyfus has also retained a general contracting firm, Spencer Brothers, a traditional old line but reliable organization, to advise the design team on costs and construction materials and systems during the design period. Mr. Dreyfus is known to want Spencer to build the job on a negotiated basis. The chances of this happening are about 90%.

You have no bone to pick with Spencer but certain people in your firm, particularly Carl Trilar, feel Spencer's appointment as a peer indicates a lack of confidence in you by Mr. Dreyfus. You don't share this opinion and feel there is a good chance to profit from the association with both Dreyfus and Spencer.

With this background address the following questions:

1. What goals would you set for the design work of Vyvyan and Associates?

2. What goals would you set for the relations between Dreyfus and Vyvyan?

3. Translate the goals in 1, and 2 into some specific objectives.

4. What personal goals would you define for yourself in this situation?

5. Identify some of the department related peripheral goals that might emerge from the project organization.

6. Could you shape the goal setting of Dreyfus and Spencer? How, and in what direction?

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THE CASE OF THE CHANGING GENERAL CONTRACTOR

A project management study of goals and objectives

You are 35 years old and a project manager for Bishop Construction, a general contractor. You have completed 3 years of engineering school at a good local college. However you have not been able to complete your university work because of the time demands of raising a family, and the pressures of day to day work at Bishop; but you have always had a desire to go back to school and get your degree in engineering.

You have worked for the company about 8 years, and are considered a prime candidate, along with 2 others, for a vice presidential position to be available in about 1 year.

Yesterday your firm was successful in negotiating a general contract for a new 6 story office building with a 150' x 150' footprint. The structural frame will be steel with a conventional glass and masonry exterior. The building contains a core utility space which houses elevators, stairs, riser shafts, toilet rooms and telephone, electrical and janitor closets. Perimeter spaces are standard rental areas to be finished in base building work with smooth finished, exposed concrete floors, acoustic ceiling grid, light fixtures, and a modular diffuser drop pattern. Acoustic panels are to be stockpiled on each floor for the use of tenants as they occupy the space.

Bishop has an opportunity to construct most of the tenant improvements, but this work is to be awarded as space is leased. No final selection of the tenant improvement architect or contractor has been made.

The owner is a reputable local development firm that will do about $50 million in new projects next year. They have told your president that they are trying to develop a project delivery system that places their design and construction needs under a single responsibility.

The owner's project manager is a son of the development company's president, has just turned 30 and is a business and law graduate of the same college you attended.

He is energetic, fair and knowledgeable about development. He knows little about either design or construction. He has been assigned to this job to help train him in the development business.

The architect on the project is about 40 years old and has a fairly successful local practice. He is fair, competent and a good business man. He is very concerned about his exposure to unjustified liability expenses. You have worked together in the past and have come to know each other well, and to have a mutual respect for each other.

Market absorption projections indicate your company has about exhausted their potential for obtaining hard money bid work in your area for the next 5 years and must begin diversifying either geographically, functionally or both.

The owner wants quality work and is willing to pay to get it. You intend to use your best subcontractors and suppliers on the job. You are also instituting more rigorous planning, scheduling and cost control systems on this job than on any other in Bishop's history.

Address the questions and considerations below and be prepared to answer them as a team.

1.) What are the common characteristics shared by the prime members of this project team?

2.) Define your company's mission on this project.

3.) Define two important goals for your company on this project

4.) Define two important goals for yourself on this project

5.) Explicitly state two objectives for your company on this project

6.) Explicitly state two objectives for yourself on this project

Note: Goals and objectives on a project like this may be classified into one or more of several categories including:

a.) Financial
b.) Quality of finished product
c.) Organizational
d.) Planning and scheduling
e.) Career desires
f.) Personal desires
g.) Company growth and expansion

I. Alternative Dispute Resolution and Partnering - an overview - ho 388

A. Introduction

1. Why has construction become so adversarial?
   a) The process of dispute resolution is not well understood
   b) We are having increasing difficulty controlling the indirect predictable, and the unpredictable impacts on our jobs.
   c) Professional success requires we consider the following:
      (1) The design and construction professional is obliged, above all, to protect the health, welfare and safety of the public.
      (2) The legal professional is obliged, above all, to protect the interest of his or her client. These interests are defined by the body of law. Thus the body of law, not the law professional, is depended upon in legal resolutions to protect the health, welfare & safety of the public.
      (3) The legal process has moved too far outside the control of those depending on its proper use to fairly resolve damaging conflict.
   d) Business success requires we take certain business actions.
      (1) Provide a quality process leading to a well constructed facility.
      (2) Focus on profitable production of services and facilities.
      (3) Provide a mechanism by which destructive conflict can be managed by intelligent leaders.
      (4) Encourage early action on potentially damaging events.
      (5) Reduce exposure to professional liability claims and costs.
2. The existence of unresolved conflict and disputes often requires that a neutral view be considered useful as a tool for positive change.

B. Partnering is a system of conducting business with minimal destructive conflict.

1. Other names for partnering
   a) A gentleman's agreement
   b) "Let's look at the drawings a bit more closely."
   c) "Let's tally up the favor score?"
   d) "Let's settle this over a beer."
   e) A handshake agreement.

C. Why is partnering applicable in today's construction industry?

1. What value is added by partnering?
   a) Lower costs to resolve conflicts.
   b) Quicker settlement of conflicts.
   c) Knowledgeable professionals make the resolution decisions.
   d) Decision makers are closer to the resolution process.
   e) Nature of decisions rendered lessen the probability of appeal.
   f) Participants gain privacy in the resolution process.
   g) Probability of fair resolution is increased by more timely consideration of the dispute.
   h) Helps cross critical transition points by setting the ground rules for the crossing
2. Where and why has partnering been successful?
   a) Comments on partnering from the Albuquerque District Corps of Engineers staff in a guide to partnering dated February, 1991

"Our experience is positive based on six contracts with four of them substantially complete." Benefits include:

(1) Disputes reduced - no formal claims.
(2) Common objectives achieved (schedule, safety, etc.).
(3) Increased responsiveness.
(4) Higher trust levels.
(5) Improved communication.
(6) Excellent cooperation & teamwork.
(7) Increased value engineering proposals.
(8) Developed expedited process for tracking and resolving open items.

b) Comments on partnering by Colonel Charles E. Cowen - Commander Portland District Corps of Engineers in a strategy for partnering in the public sector - April 15, 1991
(1) 80 to 100 % reduction in cost growth over the life of major contracts.
(2) Time growth in schedules virtually eliminated.
(3) Paper work reduced by 66%.
(4) All project engineering goals met or exceeded.
(5) Completion with no outstanding claims or litigation.
(6) Safety records significantly improved.
(7) Pleasure put back in the process for all participants.

c) Combination partnering relationships surveyed & studied by the Construction Industry Institute and reported in the publication ("In Search of Partnering Excellence" - July 1991).
(1) Shell Oil/SIP Engineering - 1984.
(2) DuPont/Fluor Daniel - 1986.
(3) Proctor & Gamble/Fluor Daniel - 1986.
(4) Proctor & Gamble/BGP - 1986.
(5) Shell Oil/Bechtel - 1987.
(6) DuPont/MK - Ferguson - 1987.
(7) Shell Oil/The Ralph M. Parsons Company - 1987.
(8) Alcan/Fluor Daniel - 1988.
(9) Union Carbide/Bechtel - 1988.
(10) DuPont/Day & Zimmerman - 1988.
(11) Great Northern Nekoosa/Rust International - 1988.
(12) Pillsbury/Fluor Daniel - 1989.
(13) Hoffman-LaRoche/Day & Zimmerman - 1989.
(14) Chevron/Bechtel - 1989.
(15) Bethlehem Steel/United Engineers & Constructors - 1989.
(16) Proctor & Gamble/M. W. Kellogg - 1989.
(17) Chevron/Besteel - 1990.
(18) DuPont/H. B. Zachry.

3. Situations in which partnering may be difficult to use
a) Where the parties intend to pay lip service only to the partnering effort.
b) Where individuals in key technical or management positions choose to resist intelligent discussion and fair decision making.
c) Where early commitments by the owner have made made good intercontract relationships difficult or impossible to maintain.
d) Where construction contracts are let as the documents are being released for field use.
e) Where several parties to the contract prefer to resolve disputes by contested claiming & binding resolution.
f) Where poor contract documents are made the basis of the partnering effort.

g) Where excessive, one sided conditions are placed on sub contractors by prime contractors.
h) Where unfair or obscure payment processing systems are specified and enforced.
i) Where risk has been poorly defined and unfairly allocated.

D. What are some of the ingredients of a successful partnering effort plan ?
1. Develop and maintain a strong desire to achieve project success for all.
2. Make intelligent commitments.
3. Avoid accepting or imposing unreasonable risk.
4. Work and act ethically, morally, and with integrity.
5. Work and act from a position of fairness rather than a position of power.
6. Suppress greed.
7. Try to establish an honest feeling of trust among participants.
8. Assign experience, competent people to responsible management positions.
9. Have empathy.
10. Prepare a good charter, a good partnership evaluation system, and a good issue resolution process.

E. Experiences and applications of the partnering concept.
1. What actions do others engage in that create problems for us, or do we engage in that create problems for others? (sample responses from an actual charter meeting.)
a) Giving directions to proceed without a timely change order.
b) Failing to establish clear chain of command.
c) General contractor covering general conditions costs by charging subs.
d) Lack of timely acceptance of work.
e) Lack of timely responses to
(1) RFI's.
(2) Approval of shop drawings.
(3) Site activity restrictions.
(4) Change orders.
(5) Value engineering.
(6) Acceptance of work.
f) Improper passing of general conditions responsibility to subs.
g) Lack of forum to evaluate and resolve open issues.
h) Slow submittal turn around.
i) Unreasonable punch lists.
j) Failure to recognize impact of changes on ongoing work.
k) Late submission of proposals.
l) Untimely submission of as-builts, operating & maintenance manuals, and training of user personnel.
m) Failure to maintain clean efficient, safe working conditions.
n) Do your own punchlists.
o) Pretest special systems - equipment start-up.
p) Untimely delivery of owner equipment.
q) Slow payment.
r) Design errors and omissions.
s) Resistance to solving problems perceived as *contractor problems.*
t) Changes issued in incomplete form (sketches & narrative).
u) Slow owner response to concurrent reviews & changes.
v) Pass through attitude by general contractor.
w) Bid shopping.

2. Recommendations to help resolve some of the problems we or others cause. (samples from an actual charter meeting.)
   a) Better communications.
   b) Less defensiveness/more openness.
   c) Fast dispute resolution.
   d) Don't take issues personally.
   e) Contractor review requests for information & submittals before processing.
   f) Be willing to propose/suggest solutions.
   g) Submittal schedule provided.
   h) Prioritization of submittals.
   i) Complete/thorough questions.
   j) Positive attitude.
   k) Recognition of owner's need to eventually occupy, operate and maintain facility/systems.
   l) Recognition of importance of paper work.
   m) Allowing necessary contract time for training.

F. Guidelines for the application and use of partnering concepts.
1. Determine the need for a partnering system.
2. Set goals and objectives to be gained from a partnering system.
3. Obtain management commitment for use of a partnering system.
4. Develop a partnering plan of action (the charter).
5. Obtain management commitment to a partnering plan.
6. Train and educate project participants in the partnering concept.
7. Create and implement an issue resolution system.
8. Create and implement a partnering review and evaluation process.
9. Charters - provided by courtesy of project management and staff as noted
   a) *Veteran's Administration Medical Center Replacement Hospital* - Detroit, Michigan
      (1) Mission statement

• We the undersigned recognize that we all have common objectives. We therefore agree to strive together to construct the Detroit VAMC safely, on time and within budget to the highest quality standards commensurate with its mission of serving veterans and the community.

• To achieve our mission we believe in the following principles
  - Commitment
  - Mutual trust
  - Integrity
  - Personal pride

      (2) Charter objectives
         (a) 01. Maintain open lines of communications.
            i) a. Recognize the need for quality information
            ii) b. Minimize submittal and response times in all matters
         (b) 02. Keep paper and administrative work to a minimum.
         (c) 03. Develop and implement an alternative conflict resolution system.
            i) a. Prompt resolution of conflicts at lowest possible level
            ii) b. Eliminate need for Contracting Officer decisions
            iii) c. Fair interpretation of ambiguities

iv) d. Be proactive (not reactive) in problem solving
v) e. Maintain objective attitude toward constructability and practicality
vi) f. Accept responsibility for your actions or inactions
vii) g. Have empathy in all matters
viii) h. Clearly describe changes to contract work

(d) 04. Limit cost growth.
i) a. Develop cost effective measures

(e) 05. Maintain clean, efficient, secure work site.
i) a. No lost time due to accidents
ii) b. Properly staff project
iii) c. Be a good neighbor

(f) 06. Seek to maintain good job morale and attitudes.
i) a. Promotion of partnering attitudes at all levels of contract administration
ii) b. Have fun
iii) c. Have pride in your product

(g) 07. Commit to quality control in all project related matters.
i) a. Do it right the first time
ii) b. Maintain proper work sequence
iii) c. Meet design intent
iv) d. Recognize owner's needs in occupation and operation of the facility

(h) 08. Close out job in proper and timely manner.

(i) 09. Maintain and implement a partnering evaluation system.

b) *Michigan Millers Mutual Insurance Addition & Renovation* - Lansing, Michigan

(1) Mission
(a) We the Project Team commit to construct a quality facility, on time and within budget, maximizing safety, communication, & cooperation so that all participants can be proud and profitable in their accomplishments.

(2) Objectives - to accomplish our mission we recognize a need to work to the following goals and objectives.
(a) Submittals
i) Clarify objectives and expectations of the submittal process.
ii) Minimize submittal and approval times.
iii) Provide accurate, prompt, clear, concise approvals.

(b) Payments
i) Make payments in accordance with the published flow chart process.

(c) Information processing & paperwork
i) Expedite all information and indicate desired response times .
ii) Maintain open lines of communication among Project Team members.
iii) Be available.
iv) Attempt to offer possible solutions to questions within a proper scope.
v) Provide clear responses to requests for information.

(d) Legal matters
i) No litigation.
ii) Settle disputes at originating level .

(e) Abatement
i) Establish, approve and publish a plan of abatement.
ii) Abate promptly.

(f) Planning and scheduling
  i) Provide, obtain, and use accurate activity information.
  ii) Clearly monitor the project against the plan and schedule.
  iii) Commit to, and fulfill man hour projections.
(g) Decision making
  i) A/E team to regularly inspect work and advise compliance.
  ii) Define and clearly communicate quality expectations.
  iii) Properly empower those at all decision making levels.
(h) Policies and procedures
  i) Prepare, review, approve and publish policies and procedures that will serve as guidelines to manage the project.
(i) Site layout and management
  i) Formulate and publish a trash removal & parking plan.
  ii) Properly establish and maintain bench marks and control lines.
(j) Processing revisions
  i) Provide written authorization prior to work proceeding.
  ii) Respond to requests for information, bulletins and change orders promptly.
  iii) Prepare, approve & publish a flow chart for processing revisions.
(k) Be a good partnering neighbor
  i) Commit to protecting your work and the work of others.
  ii) Show all participants due respect and acknowledgement.
  iii) Maintain proper work sequences.
(l) Total quality management (TQM)
  i) Prepare, approve, publish, and commit to a TQM program.

G. Alternative dispute resolution (ADR) systems and their application in construction.
1. What is ADR?
  a) In broadest terms, ADR is a method of resolving disputed design and construction claims outside the courtroom.
2. Why are disputes often not resolved promptly and fairly.
  a) Differences in goals and objectives of parties to the project
  b) Lack of clear understandings about the design and construction industry needs.
  c) Lack of value-added for outside interests through prompt and fair settlements.
  d) Excessive resort to legal based delays and road blocks to resolution.
  e) Excessive demands on resolution resources (courts, arbitrators, judges and other agencies involved).
  f) Greed.
3. The origin of the negotiated methods of dispute resolution.
  a) Informal negotiation *was* the delivery technique before excessive legal systems were imposed upon the industry. (or were accepted by us)
  b) Varies with the time.
    (1) In periods of exceptionally high economic activity money can be spent on expensive resolution methods to gamble on a high return on the investment.
    (2) In periods of low economic activity money must not be wasted on high risk, uncontrollable methods of expensive resolution.
  c) Today we cannot afford to spend our, nor our client's, money on high risk gambles. Therefore relatively low cost. non binding resolution processes have become popular.
  d) The acrimonious atmosphere surrounding binding resolution methods has proven demeaning, unpopular, negative, and harmful to how the professional can best do

business.

4. ADR guidelines for effective project use
   a) A basic ADR principle - The earlier in a construction project that the participants employ dispute resolution techniques, the more these techniques will contribute to project success.
   b) Even when problems turn into disputes, litigation should not be the initial method used to resolve them.
   c) Non-binding dispute resolution should be attempted before resorting to binding dispute resolution.
   d) Advance commitment to ADR methods, contributes to effectively and fairly solving problems as they arise.
   e) A cooperative project environment helps prevent disputes.
   f) Jobsite dispute resolution often helps dispose of problems as they arise & before they multiply.
   g) Dispute resolution proceedings should be conducted expertly, and effectively by experienced design and construction practitioners.
5. Some resolution methods available
   a) Non binding
      (1) *Prevention methods* - produces maximum harmony - usually least cost.
         (a) Intelligent and proper risk allocation
            i) Risk should be assigned to the parties that can best manage or control the risk, i.e.
               (1) The owner, where construction begins before construction documents are complete - the contractor, where full, well prepared, and checked construction documents are available.
               (2) The architect, if the owner has prepared a well conceived and clearly stated program - the owner, if the a/e is expected to assemble and write the program.
            ii) Attempts to shift risks to architects, engineers or contractors not able to absorb these risks is not cost-effective
               (1) Reduces competition
               (2) Increases costs due to greater contingency allowances.
               (3) Increases costs and reduces effectiveness because of the potential for increased numbers and intensity of design & construction project disputes.
         (b) Incentives for cooperation
            i) Incentives or bonus provisions
            ii) Disincentives or penalty provisions
         (c) Partnering
            i) Stresses good faith agreements
            ii) Emphasizes teamwork
            iii) Encourages good communications
      (2) *Internal negotiation methods* - parties involved conduct negotiations - requires consensus - relatively cost free.
         (a) Direct negotiations (often starts at UDM level)
         (b) Step negotiations (starts at dispute originating level)
      (3) *Informal external neutral methods* - preselected external neutral serves as a informal dispute-resolver - relatively low cost.
         (a) Architect/engineer rulings

i) May be respected even though not legally binding.
ii) Must be impartial

(b) Dispute resolution board
i) One member selected by owner and approved by contractor; one by the contractor and approved by the owner; a third by the first two members. Third selection usually acts as chairman.
ii) Those selected should be from the design & construction industry.
iii) Must have no conflict of interest.
iv) Conduct investigations and hearings on disputes and publish prompt opinions re the dispute.

(4) *Formal external neutral method* - preselected external neutral(s) serves as formal dispute resolver - relatively low cost - usually requires considerable preparation, and may require legal assistance.
(a)
(b) Mediation - settlement conferences and informal hearings conducted by a neutral third party.
(c) Minitrial - private settlement method usually initiated by an agreement between the parties - less formal than mediation.
(d) Advisory opinion - neutral expert meets with both parties, obtains information from both, and render prediction as to the ultimate outcome if adjudicated.
(e) Advisory arbitration - abbreviated hearing before neutral expert(s). Arbitrator(s) issue advisory award, and render prediction as to ultimate outcome if adjudicated.

b) Binding
(1) *Outside of courtroom* - dispute given to knowledgeable third party - moderate cost - may require legal assistance.
(a) Binding arbitration
(b) Private judge
(2) *Inside of courtroom* - most expensive - usually requires legal assistance.
(a) Bench trial - before a judge
(b) Jury trial - before a jury

6. What is needed for success in resolving disputes?
a) A desire for a win - win resolution.
b) A desire for a fair resolution.
c) People in charge who want a resolution.
d) A dispute resolution technique that is acceptable to those involved.
e) Knowledge of how to arrive at a resolution system that can produce a decision.
f) An understanding of the belief that if you aren't entitled to it don't try to get it!

Ralph J. Stephenson PE PC
Consulting Engineer

OBLIGATIONS

Hierarchy of professional obligations as formulated by Dean Freund

- *Prime - Protection of public health, welfare & safety*
- *Secondary - Your employer or client*
- *Tertiary - Your peers*

Ralph J. Stephenson P.E. P.C.
Consulting Engineer

OBLIGATIONS & PROFESSIONAL NEEDS

- **The design and construction professional is obliged, above all, to protect the health, welfare and safety of the public.**

- **The legal professional is obliged, above all, to protect the interest of his or her client. These interests are supposed to be defined by the body of law. Thus the body of law, not the legal professional, is depended upon to protect the health, welfare & safety of the public - relative to the law.**

OBLIGATIONS & BUSINESS NEEDS

- **To profitably produce services & facilities.**
- **To provide solutions.**
- **To measure the quality of the process you provide.**
- **To help manage destructive conflict.**
- **To encourage early action on potentially damaging events.**
- **To reduce professional liability costs.**

Ralph J. Stephenson PE PC
Consulting Engineer

PEOPLE

Most people are honest, concerned, desirous of challenge, need attention, and welcome help in times of turmoil.

Ralph J. Stephenson PE PC
Consulting Engineer

DESTRUCTIVE CONFLICT

Animosity or disagreement which results in lowering the potential for an individual or organization to succeed.

Ralph J. Stephenson PE PC
Consulting Engineer

POSITIVE CONFLICT

Hostility that is managed so that its resolution raises the potential for individuals or organizations to succeed at being excellent.

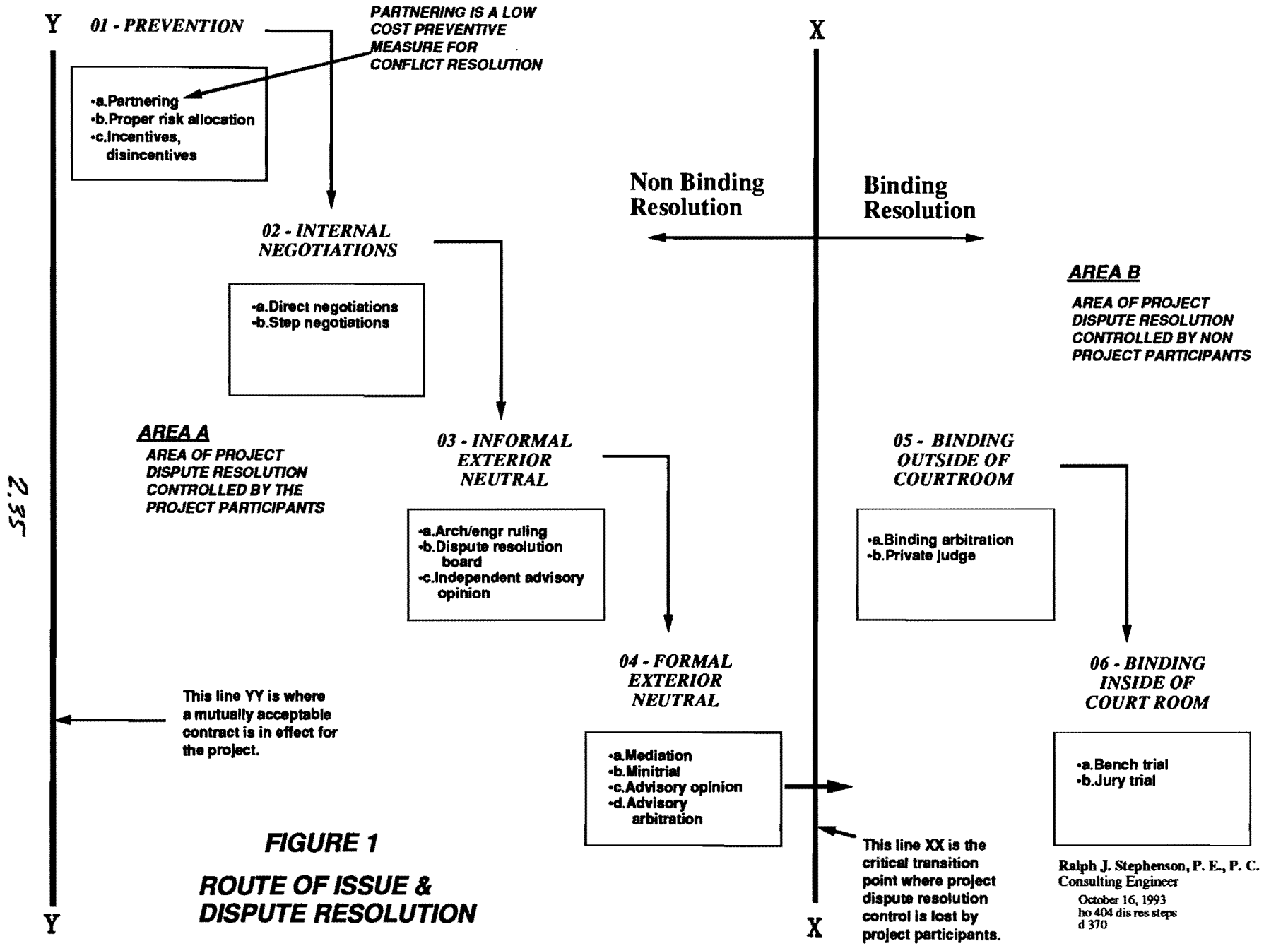

FIGURE 1

ROUTE OF ISSUE & DISPUTE RESOLUTION

Ralph J. Stephenson, P. E., P. C.
Consulting Engineer
October 16, 1993
ho 404 dis res steps
d 370

Ralph J. Stephenson, P. E., P. C.
Consulting Engineer
November 27, 1993

Partnering Case study #1 - The World Wide Data Business

I. **Client - Northern States Economic Data Systems (NSEDS)**
NSEDS is a private business devoted to collecting, analyzing, and disseminating economic information for the business, government, and volunteer sectors in political geographic units worldwide.

The information they collect, process, and sell is primarily concerned with methods by which wealth, value, currency or other equivalents interact with the market places in which they are used as a medium of exchange.

The company maintains information collection and market operations from offices located in 25 cities world wide. The home office is in the community of Telitreck, North Dakota. Telitreck has a population of 120,500 people. Of these 1,500 work for NSEDS.

All data analysis is done at the home office and dispatched to the point of use electronically, and by mail, courier, or special messenger. 60 % of the dispatch volume is electronic.

The mission of the company is:

"To derive useful micro to macro global economic information from statistical data, and to provide this information to our clients in accurate, easily used, and highest value-added form."

The company is family founded, owned, and operated. Family members have been actively involved in the direction of the firm for 51 years.

II. **Facility types**
   A. **New office and data processing center building.**
      1. **200,000 square feet on three floors and a lower level.**
      2. **Reinforced concrete frame.**
      3. **Patterned masonry exterior skin and panelized curtain wall.**
      4. **Full amenities for employees and visitors.**
   B. **Remodel existing building after move in to new building.**
      1. **Existing building.**
         a) 160,000 square feet on two floors and a lower level.
         b) Structural steel frame with concrete floors
         c) Plain face brick exterior skin. Good brick appearance. Punched windows.
         d) Minimal amenities for employees and visitors
      2. **Remodeled building.**
         a) Each floor completely gutted and remodeled.
         b) Add full amenities for employees and visitors compatible with new addition.
         c) Exterior skin fully renovated, pointed, and cleaned.
   C. **Site work for new office and for remodeled building.**
      1. **Construct new parking - 1050 cars.**
      2. **Rebuild existing parking lot - 500 cars.**
      3. **Construct new retention pond.**
      4. **Construct new employee recreation area.**

III. Those involved
  A. From NSEDS staff
    1. Mr. Lindsay Dreyfuss - President and chief operating officer - NSEDS
    2. Vice president of operations
    3. Facilities manager
    4. Security manager
    5. Office manager
    6. Data processing manager
    7. Public relations manager
  B. From computer systems contractor staff - Datacomp, Inc.
    1. Computer hardware project manager
    2. Computer software project manager
    3. Space designer
  C. From architect/engineers - Loring & Metzer
    1. President and chief operating officer - architect
    2. Architectural designer - architect
    3. Project Manager - architect
    4. Field Inspector - architect
    5. Interior designer - interiors design
    6. Project Manager - structural
    7. Project Manager - mechanical and electrical
    8. Project Manager - civil engineer
  D. From testing agencies - Strendel - geotechnical, and Mechbal - balancing
    1. Geotechnical - Vice president
    2. Geotechnical - Field and project engineer
    3. Mechanical balancing - Project engineer
  E. From general contractor - Tiltsen and Greene
    1. President
    2. Vice president of operations
    3. Project manager
    4. Field superintendent
  F. From specialty contractors - Brown Mechanical and Powers Electric
    1. President
    2. Estimator and project manager
    3. Field superintendent
  G. From fixtures, furniture, and equipment contractor - Efficiency Design, Inc.
    1. President
    2. Project manager for design
    3. Project manager for installation
    4. Field superintendent
IV. Contract types
  A. Architect engineer - with NSEDS
    1. Partially qualified - selected and negotiated from prequalified list prepared by NSEDS facilities manager.
    2. Authority limits - as limited agent.
    3. Payment method - Payroll costs x 2.75, plus expenses with cap.
    4. Single responsibility - in house and outside consultants

B. General contractor - with NSEDS
   1. Partially qualified - selected and negotiated from prequalified list prepared by Mr. Dreyfuss and facilities manager.
   2. Authority limits - as contractor.
   3. Payment method - time and material with fixed fee and guaranteed maximum price - share in savings over gmp - 80/20.
   4. Single responsibility - manage all subs to provide and install labor and materials for all building and site work.

C. Computer system contractor - with NSEDS
   1. Partially qualified - selected and negotiated from prequalified list prepared by data processing manager.
   2. Authority limits - as contractor.
   3. Payment method - fixed cost.
   4. Single responsibility - provide all management, design, materials and equipment, and install all materials and equipment.

D. Fixtures, furniture, and equipment contractor - with NSEDS
   1. Partially qualified - selected and negotiated from prequalified list by Mr. Dreyfuss.
   2. Authority limits - as contractor.
   3. Payment method - time and material with fixed fee and guaranteed maximum price - no share in savings
   4. Single responsibility - provide all management, design, materials and equipment, and install all materials and equipment.

E. Testing agencies - with NSEDS
   1. Partially qualified - selected and negotiated from prequalified list prepared by architect/engineer and NSEDS facilities manager.
   2. Authority limits - as contractor.
   3. Payment method - time and material with fixed fee and guaranteed maximum price
   4. Single responsibility - provide all labor, materials, testing for building and site work.

F. Specialty contractors - with general contractor
   1. Partially qualified - selected by competitive bids from prequalified list by general contractor.
   2. Authority limits - as contractor.
   3. Payment method - fixed price
   4. Single responsibility - provide and install labor and materials for building and site work according to purchase order from general contractor.

V. Current status of project
   A. Contract documents for new building complete.
   B. General construction contracts for new building awarded.
   C. Construction sub contracts for new building awarded.
   D. Testing contracts awarded.
   E. Remodeling for existing building in design development,
   F. Construction consultant contract for existing building awarded to general contractor for new building - to be converted to guaranteed maximum construction contract as design proceeds.
   G. Specialty sub contractors for new building in favored position for existing building remodeling, if they perform well on new building - this is well known by the subs

2. Charter for Northern States Economic Data Systems project

1. Mission.
   Create a quality working environment for NSEDS safely, on time, and within budget, which satisfies the objectives of owners, users, contractors, designers, and the community during and after construction.
2. Objectives
   1. Be a good neighbor
      1. Maintain a sensitivity to community concerns.
      2. Respect everyone's needs to make a fair profit.
      3. Be a team player.
   2. Closing out
      1. Complete punch list items and close out items promptly and completely.
      2. Promptly provide as builts and accurate documentation.
   3. Communicating
      1. Be willing to open informal lines of communication.
      2. Promote clear written communication of plans, schedules, changes and issues.
      3. Respond promptly to requests by others.
      4. Clearly define roles and responsibilities of all parties to the project.
      5. Be a good listener.
   4. Construction document quality
      1. Provide accurate and cross checked construction documents including change orders.
      2. Read, thoroughly understand and abide by all contract documents.
   5. Cost management
      1. Proactively pursue ways to provide the owner a better value.
   6. Good work site
      1. Make safety and good housekeeping a priority.
   7. Job morale & attitude
      1. Project improvement
         1. Keep an open mind and be innovative in problem solving.
         2. Recognize opportunities to contribute and do it!
      2. Job morale
         1. Accept responsibility for our actions.
         2. Have fun!
   8. Establish and maintain regular partnering evaluations.
   9. Payments
      1. All partiesl submit proper pay applications promptly and pay promptly
   10. Planning and scheduling
      1. Abide by current schedules.
      2. Plan well.
      3. Commit adequate resources to the project.
   11. Policies and procedures
      1. Attend job meetings.
      2. Establish methods for effective and timely decision making.
      3. Keep project management focused on the project goals and objectives.
      4. Be consistent and predictable.
      5. Provide fair and prompt evaluation of proposed substitutions and field problems.

12. Quality management
    1. Provide a trained work force that has pride in craftsmanship.
    2. Correct deficiencies promptly.
    3. Establish and maintain an early warning system to flag potential problems.
    4. Do it right the first time.
13. Submittal processing
    1. Avoid unnecessary resubmittals.
    2. Solicit, review and distribute submittals in a timely manner.
14. Group interactions
    1. Be available and accessible.
    2. Adhere to all commitments.
    3. Promote a team environment.
    4. Deal with everyone openly and honestly.
    5. Respect others and their opinions.
    6. Commit to resolving disagreements - don't take personally.
15. Using alternative dispute resolution - ADR
    1. Establish a conflict resolution procedure without litigation.
    2. Settle all disputes promptly and fairly and at the originating level if possible.

Partnering evaluation for current period

1 - objective	2 - par weight (w)	3 - par quality (q)	4 - par (w) x (q)	current quality	current (w) x (q)
01. Be a good partner	4.00	3.50	14.00	3.25	13.00
02. Closing out	4.50	3.75	16.88	3.50	15.75
03. Communicating	4.00	4.00	16.00	4.00	16.00
04. Construction document quality	4.25	3.75	15.94	3.00	12.75
05. Cost managment	3.50	4.00	14.00	4.00	14.00
06. Good work site	4.50	3.75	16.88	2.25	10.13
07. Job morale & attitude	3.50	3.00	10.50	3.25	11.38
08. Establish & maintain regular partnering evaluations	4.00	3.00	12.00	2.00	8.00
09. Payments	4.00	3.75	15.00	3.25	13.00
10. Planning & scheduling	4.50	3.75	16.88	3.00	13.50
11. Policies & procedures	3.75	3.50	13.13	3.75	14.06
12. Quality management	3.75	4.00	15.00	4.00	15.00
13. Submittal processing	3.00	4.00	12.00	4.25	12.75
14. Group interactions	4.25	4.00	17.00	4.00	17.00
15. Using alternative dispute resolution	4.00	3.50	14.00	3.50	14.00
Average:	3.97	3.68	14.61	3.40	13.35

Suggested contract language for incorporating the standing neutral concept in construction specifications - from the work of the Michigan Society of Professional Engineers task force on standing neutrals.

In an effort to resolve any conflicts that may arise during design or construction of the project, and as a condition precedent to the initiation of any action, litigation, or formal arbitration between the parties, the Owner, the Designer, and the Contractor agree that that all disputes between them arising out of, or related to, this agreement shall be first submitted to non-binding mediation according to the procedures of the Michigan Society of Professional Engineers Standing Neutral Program, unless the parties mutually agree otherwise.

The Owner, the Designer, and the Contractor further agree to include a similar mediation provision in all agreements with independent consultants, contractors, and subcontractors retained for the project, and to require all such consultants, contractors, and subcontractors to include similar mediation provisions for all of their subcontractors and subconsultants so retained.

• Michigan Society of Professional Engineers - Standing Neutral Procedures - March 7, 1994

HOW TO SECURE THE ASSISTANCE OF AN MSPE STANDING NEUTRAL TO HELP YOU ON YOUR JOB:

1. Call James Kolb, P. E., Executive Director of MSPE at 517 487 9388, Lansing, Michigan.

2. Provide Mr. Kolb basic information about the project problems to be addressed. This information will be submitted to the Standing Neutral Steering Committee for their review.

3. All parties involved will also jointly prepare a written brief describing the project problems for review by the MSPE Standing Neutral Steering Committee.

4. The MSPE Standing Neutral Steering Committee will recommend to the parties the names of three Standing Neutrals who are available and are qualified to address the problems outlined.

5. The parties involved will jointly agree on, and select one Standing Neutral from the three available.

6. The parties then sign MSPE's indemnity agreement protecting MSPE and the Standing Neutral from any negative reactions resulting from their work.

7. The MSPE Standing Neutral will arrange for a time and place for a resolution meeting between the parties.

8. The MSPE Standing Neutral will chair the resolution meeting, and render an opinion on the problem matters within 15 calendar days, if these are not resolved at the meeting.

Ralph J. Stephenson, P. E., P. C.
Consulting Engineer

General Format for Partnering Specification

I. **Sample Construction Partnering Specification**

The NSEDS Corporation, and their design and construction consultants intend to encourage, support and implement a partnering system on their expansion program with the full participation of the contractors and their subcontractors.

Partnering is a performance system designed to achieve an optimal relationship between all parties to a construction contract. Further, it is a method of conducting business in the planning, design and construction profession without unnecessary, excessive or disruptive external party involvement.

The partnering system is structured to draw on the strengths of each participating organization to identify and achieve mutually profitable objectives.

The partnering system will consist of three main elements, preparation of a partnering charter, establishing and implementing a partnering effectiveness evaluation technique, and establishing and implementing an issue resolution procedure.

Contractors will be required to participate in establishing these three elements of the partnering system in conjunction with the NSEDS Corporation and its consultants.

It is anticipated that within 14 calendar days of the issuance of a notice to proceed with construction, the NSEDS Corporation, its consultants, and the prime contractors on the project will participate, with their subcontractors, in a one day meeting to write a partnering charter.

The partnering charter is the basic manual for operating a partnering system. It includes at a minimum the mission of the project, and the objectives of the project team. In addition it outlines in broad terms, the project evaluation methods to be used, and the dispute resolution process to be applied to conflict issues as they arise on the job.

It is anticipated that within 14 calendar days after the partnering charter meeting that a partnering evaluation task force will be appointed by mutual agreement among the partnering charter participants, and will meet to establish and publish a partnering effectiveness evaluation method. This partnering evaluation method will set guidelines for measuring project performance as periodically measured against the mission and objectives set out in the charter.

Also within 14 calendar days after the partnering charter meeting a mutually selected issue resolution task force will be appointed from the partnering charter participants. This task force will establish and publish an issue resolution procedure encouraging the use of alternative dispute resolution (ADR) techniques.

Alternative resolution methods are voluntary, and designed to help resolve conflicts quickly, satisfactorily, and as near as possible to the originating level of the conflict.

As a part of their expected contract performance each party will be expected to participate in the preparation and maintenance of the charter, the periodic evaluations, and the issue resolution process. Outside costs for effectuating the partnership will be mutually agreed to by all parties.

Ralph J. Stephenson, P.E., P.C.
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WHAT IS PARTNERING?

• 1. Partnering is a **system of conducting business** that maximizes the potential for:

a) Achievement of project **intent**.

b) Obtaining specified **quality**.

c) Encouraging healthy, ethical customer/supplier **relationships**.

d) Adding **value**.

e) Improving **communication**.

f) Providing methods of project condition **measurement & feedback**.

g) Providing methods of quickly **resolving conflicts** by non destructive means at optimal levels of management.

• 2. Partnering provides the basis for **preventive** methods of **dispute resolution**.

• 3. Partnering is an agreement in **principle**, and **must not supersede** or supplant the planning, design, and construction **contracts** in place or to be written and executed.

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November 28, 1994

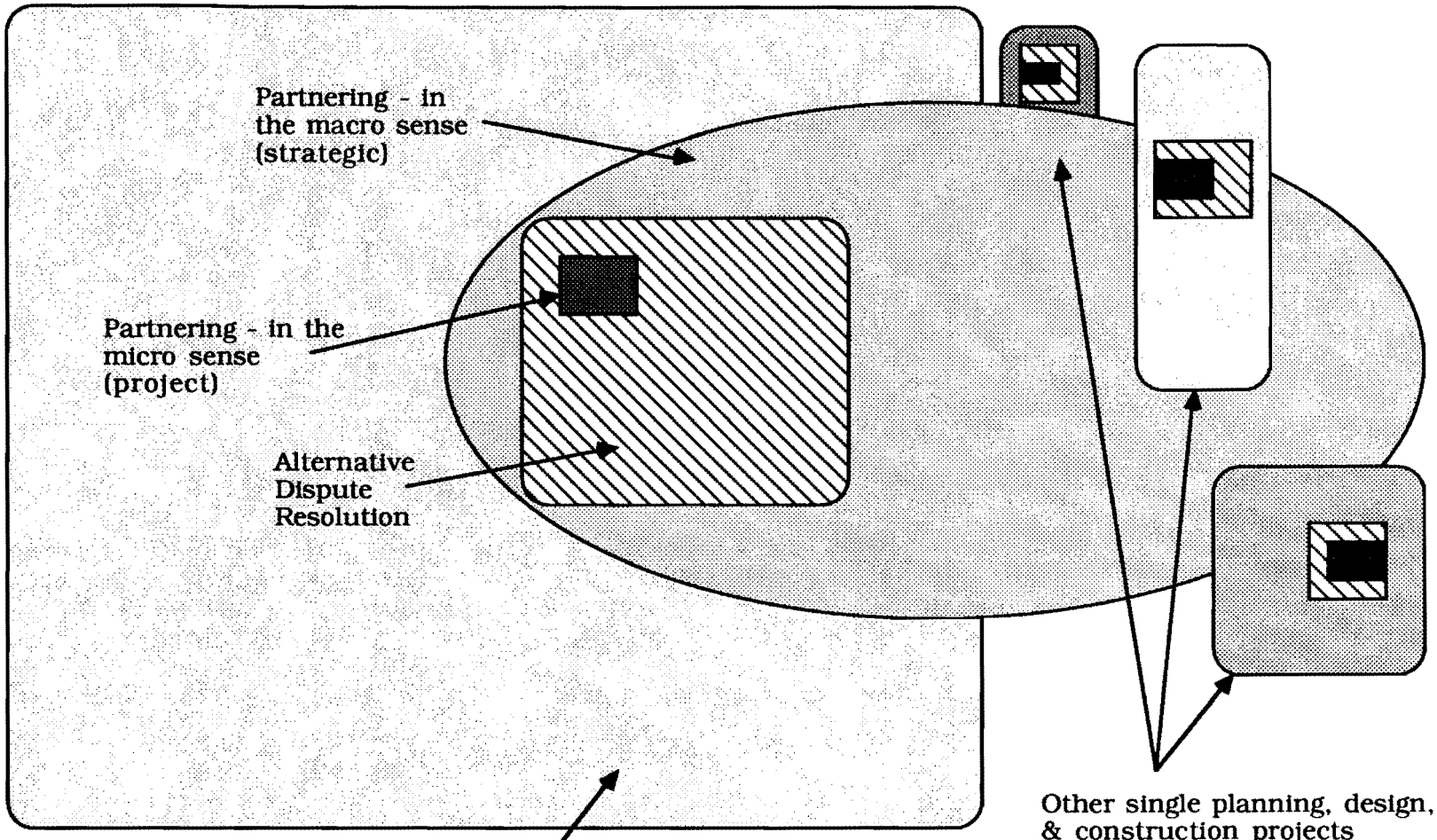
Partnering systems in use today

Project partnering

A method of conducting business in the planning, design, and construction profession without the need for unnecessary, excessive and/or debilitating external party involvement. Mainly used project-by-project, and tailored to specific job conditions. It addresses a moral agreement in non contract matters.

Strategic partnering

A formal partnering relationship specifically designed to enhance the success of multi-project experiences on a long term basis. Just as each individual project partnering system must be maintained, strategic partnerships must also be maintained by periodic review of all projects currently being performed.



Projects, Partnering, and ADR

Ralph J. Stephenson, P. E., P. C.
Consulting Engineer

ho 433, November, 27, 1994

Sheet #S1

Ralph J. Stephenson, P.E., P.C.
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THE SEVERAL FACES OF PARTNERING - IT IS:

- 1. A preventive action to reduce destructive conflict.

- 2. A preconstruction management system to set operating ground rules not covered by the contract.

- 3. A predesign management system to set operating ground rules not covered in the professional services contract.

- 4. A marketing tool to assist competent planning, design, and construction firms reduce the potential for debilitating competition.

• 5. A preprogram system to set concept, ideas, intent and direction for the internal staff of the owner and client.

• 6. A revisiting & updating action to validate, confirm, reinforce, or revise original operating ground rules that need review.

• 7. A planning, design, construction, and turnover guide for the unspecified, non contract conduct of the project team.

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Consulting Engineer

THE COMPONENTS OF A PARTNERING SYSTEM ARE:

- 1. A **project mission** statement.

- 2. A set of **specific goals and objectives** to be achieved within the requirements of the project contract documents.

- 3. An **evaluation system** that encourages and permits regular, well based evaluations of how well the project team is achieving the mission, the goals, and the objectives defined in the charter.

- 4. An **issue resolution system** that encourages agreement and the closing out of disputes promptly, at the lowest possible management level, and with little, if any, potential for damage to the parties.

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Problem categories - types of situations identified as impacting on construction project success. - from approximately 2000 problem statements.

1. **Staff morale & attitudes.**
2. **Approval processes.**
3. **Backcharges.**
4. **Being a good off-site neighbor.**
5. **Being a good on-site neighbor.**
6. **Closing out the project**
7. **Communicating with others**
8. **Constructibility.**
9. **Construction document quality.**
10. **Contract interpretation.**
11. **Cost growth.**
12. **Decision making.**
13. **Documentats & documentation.**
14. **Equipment and material problems.**
15. **Inspecting and testing.**
16. **Issue resolution**
17. **Job management.**
18. **Legal matters.**
19. **Maintaining regular project evaluations.**
20. **Organization, authority & responsibility.**
21. **Paper and administrative work.**
22. **Payment processing.**
23. **Personnel quality and problems.**
24. **Planning and scheduling.**
25. **Policies and procedures.**
26. **Procurement of materials and equipment.**
27. **Program conditions.**
28. **Project cost structure.**
29. **Quality management.**
30. **Regulatory agency matters.**
31. **Revision processing.**
32. **Submittal processing.**
33. **Substitutions and alternates.**
34. **Time growth.**
35. **User group interaction.**
36. **Work site conditions.**

1501
Problem Statement

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Codes for problems other cause us - number of times mentioned in 21 charter workshop meetings (may have more than one problem code per problem statement.)

1. 493 cwo - Communicating with others.
2. 413 jma - Job management.
3. 224 pas - Planning and scheduling.
4. 173 sma - Staff morale & attitudes.
5. 173 oar - Organization, authority & responsibility.
6. 171 pqp - Personnel quality and problems.
7. 166 rev - Revision processing.
8. 141 tac - Timely action
9. 141 onn - Being a good on-site neighbor.
10. 135 cdq - Construction document quality.
11. 109 prg - Program conditions.
12. 108 wsc - Work site conditions.
13. 098 spr - Submittal processing.
14. 083 doc - Documents & documentation.
15. 073 emp - Equipment and material problems.
16. 069 dma - Decision making.
17. 068 prc - Procurement of materials and equipment.
18. 060 ofn - Being a good off-site neighbor.
19. 058 ire - Issue, conflict, and problem resolution.
20. 058 clo - Closing out the project.
21. 056 pco - Project cost structure.
22. 055 paw - Paper and administrative work.
23. 052 ppr - Payment processing.
24. 051 qma - Quality management.
25. 050 ite - Inspecting and testing.
26. 050 apv - Approval processes.
27. 044 tgr - Time growth.
28. 044 coi - Contract interpretation.
29. 036 ugi - User group interaction.
30. 030 saf - Safety
31. 030 pop - Policies and procedures.
32. 025 sal - Substitutions and alternates.
33. 023 stf - Staffing and manpower
34. 019 reg - Regulatory agency matters.
35. 018 cgr - Cost growth.
36. 013 ven - Value engineering
37. 009 tng - Training
38. 009 leg - Legal matters.
39. 009 cbl - Constructibility.
40. 005 war - Warranty conditions
41. 004 wea - Weather conditions
42. 004 lab - Labor conditions
43. 004 bch - Backcharges.
44. 002 mpe - Maintaining regular project evaluations.
45. 001 fin - Financial problems

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• *SECTION 3 - PLANNING THE PROJECT*

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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!

Ralph J. Stephenson PE PC
Consulting Engineer

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 plans the work and then works the plan

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. Failure to understand that planning is a major responsibility of the manager

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NETWORK PLANNING MINITEXT

Symbols

1. Arrow or task ⟶

   A single definable action (or a single grouping of a number of definable actions) requiring resources.

2. Circle or node ◯

   The starting or ending point of a task .... a momentary point in time.

3. Dotted or dummy arrow ----⟶

   A symbol representing the existence of a relationship between tasks. Dummies have no resources allocated.

   Note: 95% of time a dummy goes from end of one task to start of another.

KEEP SYMBOLS SIMPLE !

Rules of Job Planning

1. All tasks preceding any single task must be complete before that single task can start.

2. The logic plan represented by a series of single tasks, nodes and dummies must be explicit.

Steps in Network Planning

1. Define scope of work.
2. Draw logic plan.
3. Approve logic plan.
4. Assign durations.
5. Compute ES, LF and TF
6. Analyze and recompute, if necessary. (May make additional resource allocation)
7. Issue.

Rules for Numbering Nodes

1. It is recommended the numbering sequence move down and to the right.

2. Normally, twenty numbers per hundred should be reserved for future use, and noted on diagram.

3. A node, having two or more arrows entering, or two or more arrows leaving, is numbered.

4. A node, having a single arrow entering, and a single arrow leaving, does not have to be numbered unless required by rule 5.

5. No more than one node in a sequence should be without a number.

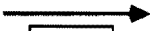
Note: Node numbers are used to identify tasks. The final measure of whether node numbers are assigned correctly is whether any task in the network can be identified uniquely (the only one in the network) by its pair of node numbers.

i is the initial node number designation.

j is the end node number designation.

NETWORK PLANNING MINITEXT

Symbols

1. a. Task - for arrow diagramming 

   b. Task - for precedence diagramming 

   Definition - A single definable action (or a single grouping of a number of definable actions) requiring resources.

2. a. Circle or node - for arrow diagramming 

   b. No comparable symbol for precedence diagramming

   Definition - The starting or ending point of a task .... a momentary point in time.

3. a. Dotted or dummy arrow - for arrow diagramming 

   b. Solid relation arrow - for precedence diagramming 

   Definition - A symbol representing the existence of a relationship between tasks. Dummies and relational arrows have no resources allocated to them.

KEEP SYMBOLS SIMPLE!

Rules of Job Planning

1. All tasks precededing any single task must be complete before that single task can start.
2. The logic plan represented by a series of tasks, nodes, and dummies or relational arrows must be explicit.

Steps in Network Planning

1. Thoroughly define the scope of work - use random laundry list technique.
2. Draw the logic plan.
3. Approve the logic plan.
4. Assign durations to each task..
5. Compute the early start (ES), early finish (EF), late start (LS) and late finish (LF) for each task.
6. Analyze the network for its validity and revise as required.
7. Issue the network model and the appropriate translations.

Rules for numbering nodes (for arrow diagramming) and tasks (for precedence diagramming)

The i node is the initial node, and the j node is the end node of a task in arrow diagramming. In precedence diagramming the task has only a single identification number.

1. The numbering sequence should move down and to the right.
2. Normally, 20 numbers per 100 per sheet should be reserved for future use.
3. In arrow diagramming a node having two or more arrows entering or leaving is numbered.
4. In arrow diagramming a node having a single arrow entering or leaving does not have to be numbered unless the immediately preceding node has not been numbered.
5. In precedence diagramming all activities are numbered.

ho 261 Dec, 90

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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.

H/O 37

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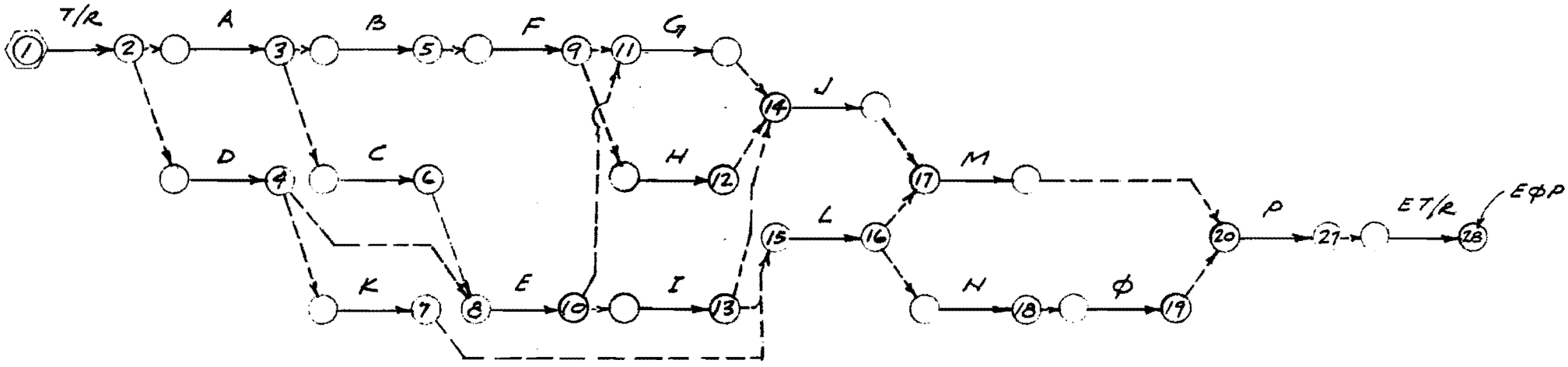
Reserved Node Nos.

SOLUTION TO EXERCISE #1
ARROW DIAGRAM

H/O 187



Reserved Node Nos.	
21	24
22	25
23	26

SOLUTION TO EXERCISE #1
ARROW DIAGRAM

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3/1

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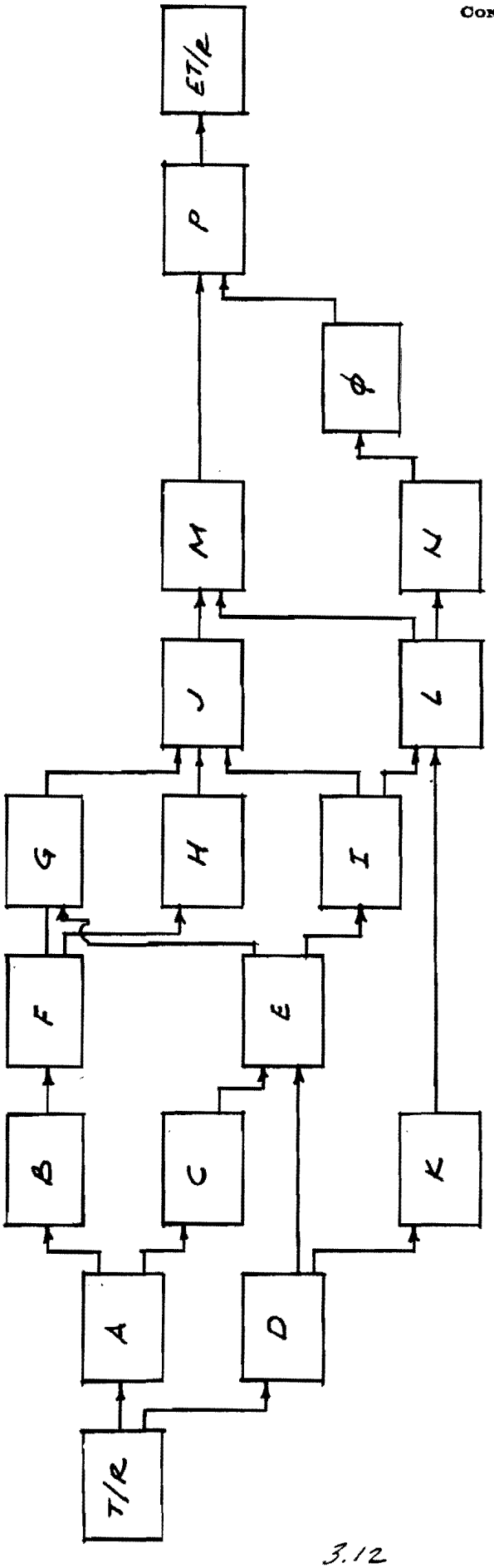

SOLUTION TO EXERCISE #1
PRECEDENCE DIAGRAM

H/O 129

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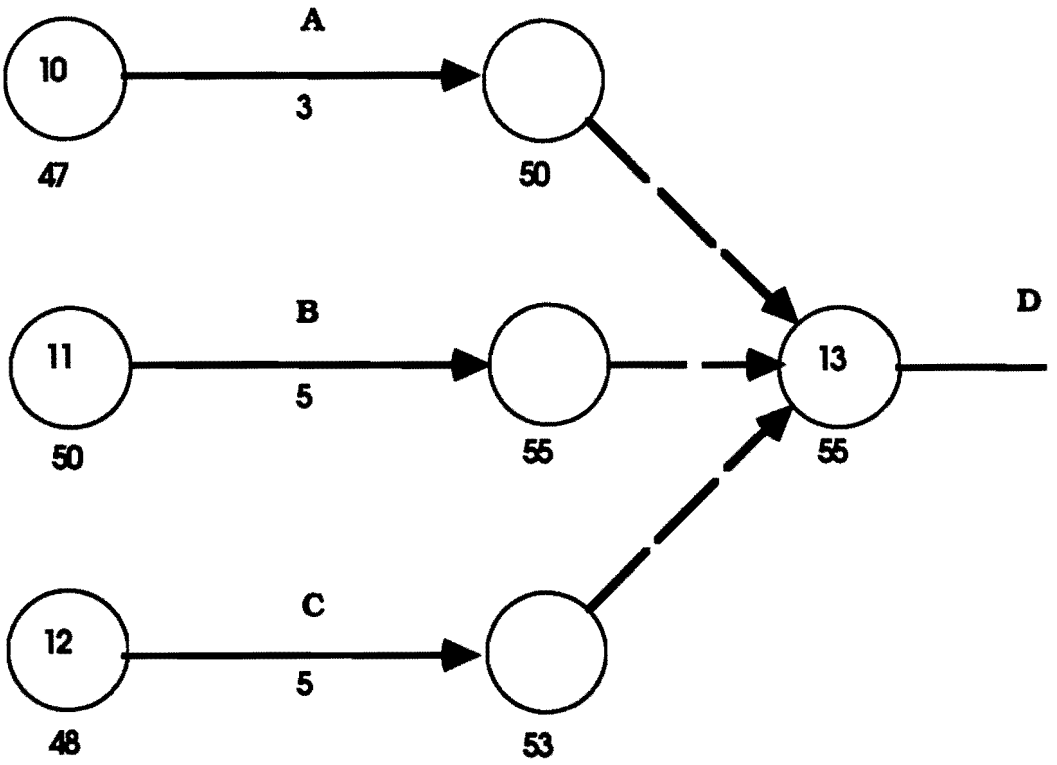
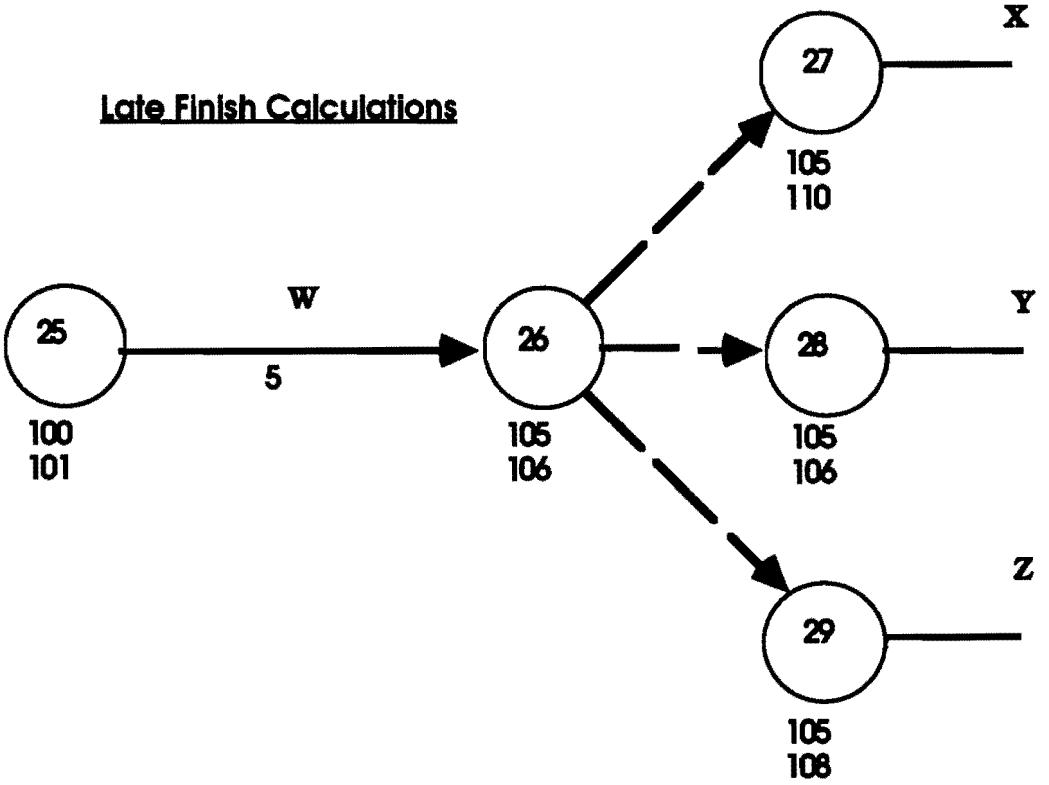
Consulting Engineer

Early Start Calculations



Late Finish Calculations



4 year working day calendar starting on January 4, 1993

Ralph J. Stephenson PE PC - 323 Hiawatha Drive,
Mt. Pleasant, Michigan 48858, ph 517 772 2537

Jan, 1993		15	051	25	102	05	152	19	204
04	001	16	052	26	103	06	153	20	205
05	002	17	053	27	104	09	154	21	206
06	003	18	054	28	105	10	155	22	207
07	004	19	055	**Jun, 93**		11	156	25	208
08	005	22	056	01	106	12	157	26	209
11	006	23	057	02	107	13	158	27	210
12	007	24	058	03	108	16	159	28	211
13	008	25	059	04	109	17	160	29	212
14	009	26	060	07	110	18	161	**Nov, 93**	
15	010	29	061	08	111	19	162	01	213
18	011	30	062	09	112	20	163	02	214
19	012	31	063	10	113	23	164	03	215
20	013	**Apr, 93**		11	114	24	165	04	216
21	014	01	064	14	115	25	166	05	217
22	015	02	065	15	116	26	167	08	218
25	016	05	066	16	117	27	168	09	219
26	017	06	067	17	118	30	169	10	220
27	018	07	068	18	119	31	170	11	221
28	019	08	069	21	120	**Sep, 93**		12	222
29	020	09	070	22	121	01	171	15	223
Feb, 93		12	071	23	122	02	172	16	224
01	021	13	072	24	123	03	173	17	225
02	022	14	073	25	124	07	174	18	226
03	023	15	074	28	125	08	175	19	227
04	024	16	075	29	126	09	176	22	228
05	025	19	076	30	127	10	177	23	229
08	026	20	077	**Jul, 93**		13	178	24	230
09	027	21	078	01	128	14	179	26	231
10	028	22	079	02	129	15	180	29	232
11	029	23	080	06	130	16	181	30	233
12	030	26	081	07	131	17	182	**Dec, 93**	
15	031	27	082	08	132	20	183	01	234
16	032	28	083	09	133	21	184	02	235
17	033	29	084	12	134	22	185	03	236
18	034	30	085	13	135	23	186	06	237
19	035	**May, 93**		14	136	24	187	07	238
22	036	03	086	15	137	27	188	08	239
23	037	04	087	16	138	28	189	09	240
24	038	05	088	19	139	29	190	10	241
25	039	06	089	20	140	30	191	13	242
26	040	07	090	21	141	**Oct, 93**		14	243
Mar, 93		10	091	22	142	01	192	15	244
01	041	11	092	23	143	04	193	16	245
02	042	12	093	26	144	05	194	17	246
03	043	13	094	27	145	06	195	20	247
04	044	14	095	28	146	07	196	21	248
05	045	17	096	29	147	08	197	22	249
08	046	18	097	30	148	11	198	23	250
09	047	19	098	**Aug, 93**		12	199	27	251
10	048	20	099	02	149	13	200	28	252
11	049	21	100	03	150	14	201	29	253
12	050	24	101	04	151	15	202	30	254
						18	203		

4 year working day calendar starting on January 4, 1993 -

Ralph J. Stephenson PE PC - 323 Hiawatha Drive,
Mt. Pleasant, Michigan 48858, ph 517 772 2537

Jan, 1994		15	306	26	358	09	409	21	461
03	255	16	307	27	359	10	410	24	462
04	256	17	308	31	360	11	411	25	463
05	257	18	309	**Jun, 94**		12	412	26	464
06	258	21	310	01	361	15	413	27	465
07	259	22	311	02	362	16	414	28	466
10	260	23	312	03	363	17	415	31	467
11	261	24	313	06	364	18	416	**Nov, 94**	
12	262	25	314	07	365	19	417	01	468
13	263	28	315	08	366	22	418	02	469
14	264	29	316	09	367	23	419	03	470
17	265	30	317	10	368	24	420	04	471
18	266	31	318	13	369	25	421	07	472
19	267	**Apr, 94**		14	370	26	422	08	473
20	268	01	319	15	371	29	423	09	474
21	269	04	320	16	372	30	424	10	475
24	270	05	321	17	373	31	425	11	476
25	271	06	322	20	374	**Sep, 94**		14	477
26	272	07	323	21	375	01	426	15	478
27	273	08	324	22	376	02	427	16	479
28	274	11	325	23	377	06	428	17	480
31	275	12	326	24	378	07	429	18	481
Feb, 94		13	327	27	379	08	430	21	482
01	276	14	328	28	380	09	431	22	483
02	277	15	329	29	381	12	432	23	484
03	278	18	330	30	382	13	433	25	485
04	279	19	331	**Jul, 94**		14	434	28	486
07	280	20	332	01	383	15	435	29	487
08	281	21	333	05	384	16	436	30	488
09	282	22	334	06	385	19	437	**Dec, 94**	
10	283	25	335	07	386	20	438	01	489
11	284	26	336	08	387	21	439	02	490
14	285	27	337	11	388	22	440	05	491
15	286	28	338	12	389	23	441	06	492
16	287	29	339	13	390	26	442	07	493
17	288	**May, 94**		14	391	27	443	08	494
18	289	02	340	15	392	28	444	09	495
21	290	03	341	18	393	29	445	12	496
22	291	04	342	19	394	30	446	13	497
23	292	05	343	20	395	**Oct, 94**		14	498
24	293	06	344	21	396	03	447	15	499
25	294	09	345	22	397	04	448	16	500
28	295	10	346	25	398	05	449	19	501
Mar, 94		11	347	26	399	06	450	20	502
01	296	12	348	27	400	07	451	21	503
02	297	13	349	28	401	10	452	22	504
03	298	16	350	29	402	11	453	23	505
04	299	17	351	**Aug, 94**		12	454	27	506
07	300	18	352	01	403	13	455	28	507
08	301	19	353	02	404	14	456	29	508
09	302	20	354	03	405	17	457	30	509
10	303	23	355	04	406	18	458		
11	304	24	356	05	407	19	459		
14	305	25	357	08	408	20	460		

4 year working day calendar starting on January 4, 1993

Ralph J. Stephenson PE PC - 323 Hiawatha Drive,
Mt. Pleasant, Michigan 48858, ph 517 772 2537

Jan, 1995		15	561	25	612	07	662	18	713
03	510	16	562	26	613	08	663	19	714
04	511	17	563	30	614	09	664	20	715
05	512	20	564	31	615	10	665	23	716
06	513	21	565	**Jun, 95**		11	666	24	717
09	514	22	566	01	616	14	667	25	718
10	515	23	567	02	617	15	668	26	719
11	516	24	568	05	618	16	669	27	720
12	517	27	569	06	619	17	670	30	721
13	518	28	570	07	620	18	671	31	722
16	519	29	571	08	621	21	672	**Nov, 95**	
17	520	30	572	09	622	22	673	01	723
18	521	31	573	12	623	23	674	02	724
19	522	**Apr, 95**		13	624	24	675	03	725
20	523	03	574	14	625	25	676	06	726
23	524	04	575	15	626	28	677	07	727
24	525	05	576	16	627	29	678	08	728
25	526	06	577	19	628	30	679	09	729
26	527	07	578	20	629	31	680	10	730
27	528	10	579	21	630	**Sep, 95**		13	731
30	529	11	580	22	631	01	681	14	732
31	530	12	581	23	632	05	682	15	733
Feb, 95		13	582	26	633	06	683	16	734
01	531	14	583	27	634	07	684	17	735
02	532	17	584	28	635	08	685	20	736
03	533	18	585	29	636	11	686	21	737
06	534	19	586	30	637	12	687	22	738
07	535	20	587	**Jul, 95**		13	688	24	739
08	536	21	588	03	638	14	689	27	740
09	537	24	589	05	639	15	690	28	741
10	538	25	590	06	640	18	691	29	742
13	539	26	591	07	641	19	692	30	743
14	540	27	592	10	642	20	693	**Dec, 95**	
15	541	28	593	11	643	21	694	01	744
16	542	**May,95**		12	644	22	695	04	745
17	543	01	594	13	645	25	696	05	746
20	544	02	595	14	646	26	697	06	747
21	545	03	596	17	647	27	698	07	748
22	546	04	597	18	648	28	699	08	749
23	547	05	598	19	649	29	700	11	750
24	548	08	599	20	650	**Oct, 95**		12	751
27	549	09	600	21	651	02	701	13	752
28	550	10	601	24	652	03	702	14	753
Mar, 95		11	602	25	653	04	703	15	754
01	551	12	603	26	654	05	704	18	755
02	552	15	604	27	655	06	705	19	756
03	553	16	605	28	656	09	706	20	757
06	554	17	606	31	657	10	707	21	758
07	555	18	607	**Aug, 95**		11	708	22	759
08	556	19	608	01	658	12	709	26	760
09	557	22	609	02	659	13	710	27	761
10	558	23	610	03	660	16	711	28	762
13	559	24	611	04	661	17	712	29	763
14	560								

4 year working day calendar starting on January 4, 1993

Ralph J. Stephenson PE PC - 323 Hiawatha Drive,
Mt. Pleasant, Michigan 48858, ph 517 772 2537

Jan, 1996		13	815	23	866	05	916	17	968
02	764	14	816	24	867	06	917	18	969
03	765	15	817	28	868	07	918	21	970
04	766	18	818	29	869	08	919	22	971
05	767	19	819	30	870	09	920	23	972
08	768	20	820	31	871	12	921	24	973
09	769	21	821	**Jun, 96**		13	922	25	974
10	770	22	822	03	872	14	923	28	975
11	771	25	823	04	873	15	924	29	976
12	772	26	824	05	874	16	925	30	977
15	773	27	825	06	875	19	926	31	978
16	774	28	826	07	876	20	927	**Nov, 96**	
17	775	29	827	10	877	21	928	01	979
18	776	**Apr, 96**		11	878	22	929	04	980
19	777	01	828	12	879	23	930	05	981
22	778	02	829	13	880	26	931	06	982
23	779	03	830	14	881	27	932	07	983
24	780	04	831	17	882	28	933	08	984
25	781	05	832	18	883	29	934	11	985
26	782	08	833	19	884	30	935	12	986
29	783	09	834	20	885	**Sep, 96**		13	987
30	784	10	835	21	886	03	936	14	988
31	785	11	836	24	887	04	937	15	989
Feb, 96		12	837	25	888	05	938	18	990
01	786	15	838	26	889	06	939	19	991
02	787	16	839	27	890	09	940	20	992
05	788	17	840	28	891	10	941	21	993
06	789	18	841	**Jul, 96**		11	942	22	994
07	790	19	842	01	892	12	943	25	995
08	791	22	843	02	893	13	944	26	996
09	792	23	844	03	894	16	945	27	997
12	793	24	845	05	895	17	946	29	998
13	794	25	846	08	896	18	947	**Dec, 96**	
14	795	26	847	09	897	19	948	02	999
15	796	29	848	10	898	20	949	03	1000
16	797	30	849	11	899	23	950	04	1001
19	798	**May, 96**		12	900	24	951	05	1002
20	799	01	850	15	901	25	952	06	1003
21	800	02	851	16	902	26	953	09	1004
22	801	03	852	17	903	27	954	10	1005
23	802	06	853	18	904	30	955	11	1006
26	803	07	854	19	905	**Oct, 96**		12	1007
27	804	08	855	22	906	01	956	13	1008
28	805	09	856	23	907	02	957	16	1009
29	806	10	857	24	908	03	958	17	1010
Mar, 96		13	858	25	909	04	959	18	1011
01	807	14	859	26	910	07	960	19	1012
04	808	15	860	29	911	08	961	20	1013
05	809	16	861	30	912	09	962	23	1014
06	810	17	862	31	913	10	963	24	1015
07	811	20	863	**Aug, 96**		11	964	26	1016
08	812	21	864	01	914	14	965	27	1017
11	813	22	865	02	915	15	966	30	1018
12	814					16	967	31	1019

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CONSULTING ENGINEER

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

Laundry list for pile test

Pueblo Plant
Nebraska Public Power Distribution District
Oaski, Nebraska

Introduction

You are a facilities engineer for the Nebraska Public Power Distribution District. Your boss has assigned you to be project manager for construction of a new Pueblo Plant in Osaki, Nebraska. He has asked you to plan and execute the installation of test piles to help decide the final design characteristics of the power plant foundation.

You have completed selection of the type of test pile to be used and must now write the test specification, select the number of piles and their location, and lay out the piles in the field. There is a possiblility of saving & using the test pile cluster for the total building foundation group. Therefore you plan to retain a test contractor that could also be awarded the full piling installation contract

Plan the entire test pile installation process.

Laundry list - at random unnumbered

- Select test pile locations
- Record test load results
- Load piling
- Order testing equipment
- Decide whether test piles remain as permanent piles
- Select number of test piles
- Deliver test pile materials
- Retain test pile contractor
- Prepare test procedures
- Approve test pile results
- Remove test loads
- Approve test procedures
- Order test pile materials
- Lay out test piles in field
- Deliver testing equipment
- Drive & fill test piles

Laundry list - at random numbered in rough action sequence

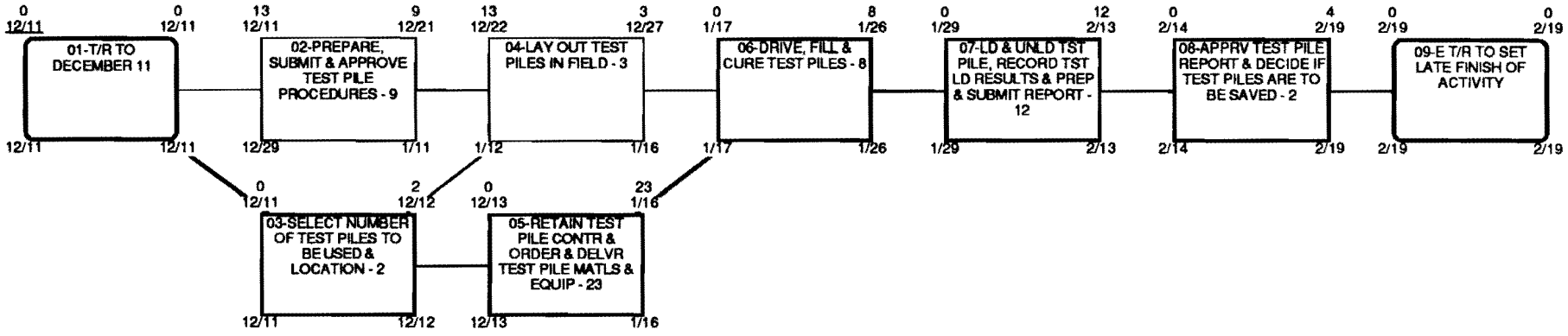
- 002 - Select test pile locations
- 010 - Record test load results
- 008 - Load piling
- 005 - Order testing equipment
- 011 - Decide whether test piles remain as permanent piles
- 001 - Select number of test piles
- 006 - Deliver test pile materials
- 004 - Retain test pile contractor
- 001 - Prepare test procedures
- 011 - Approve test pile results
- 009 - Remove test loads
- 003 - Approve test procedures
- 005 - Order test pile materials
- 004 - Lay out test piles in field
- 006 - Deliver testing equipment

007 - Drive & fill test piles

Laundry list - numbered & ordered

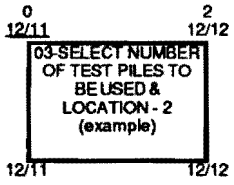
001 - Prepare test procedures
001 - Select number of test piles
002 - Select test pile locations
003 - Approve test procedures
004 - Lay out test piles in field
004 - Retain test pile contractor
005 - Order test pile materials
005 - Order testing equipment
006 - Deliver test pile materials
006 - Deliver testing equipment
007 - Drive & fill test piles
008 - Load piling
009 - Remove test loads
010 - Record test load results
011 - Approve test pile results
011 - Decide whether test piles remain as permanent piles

HO 317 Dec 1990



3.23

Total float time **Duration**
Early start **Early finish**



- **Activity number**
- **Activity description**
- **Activity estimated duration in elapsed working days**

Late start **Late finish**

ACTIVITY KEY

Issue #1 - November 12, 1989
353 tst pl ntwk - disk 203
ho 353 - Nov 89

Reserved activity numbers

41	46
42	47
43	48
44	49
45	50

SUMMARY NETWORK MODEL FOR TEST PILE INSTALLATION - NEBRASKA PUBLIC POWER DISTRIBUTION DISTRICT PUEBLO PLANT - OSAKI, NEBRASKA

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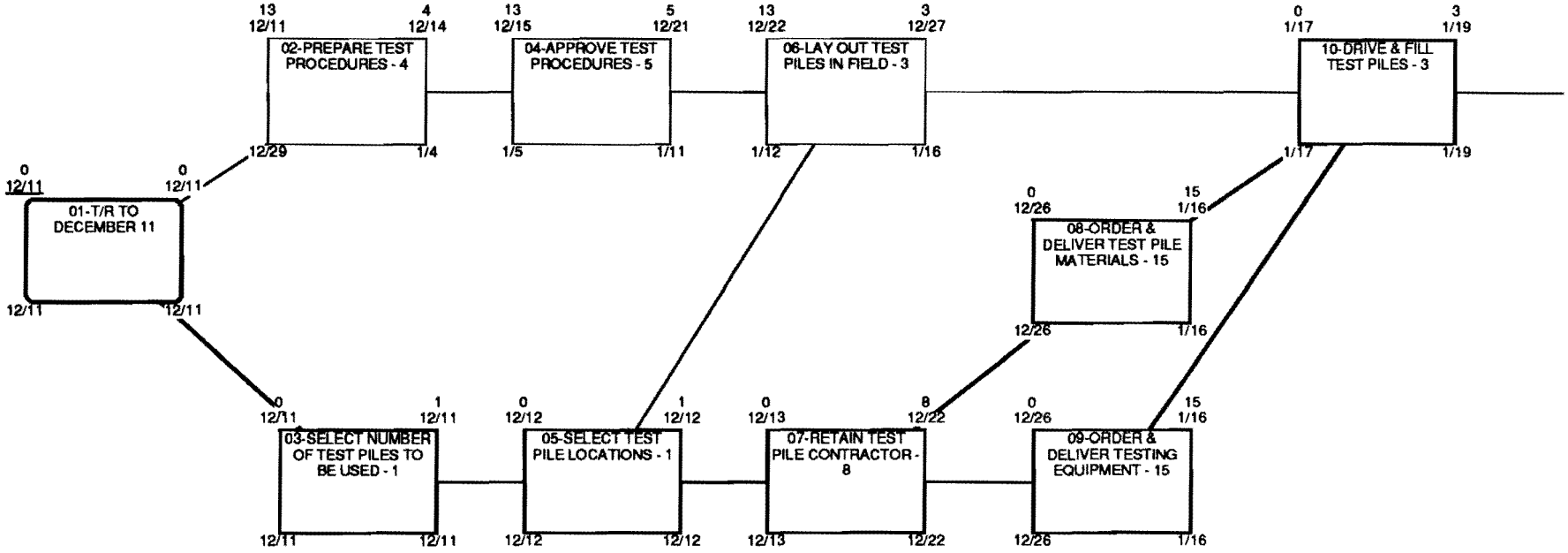
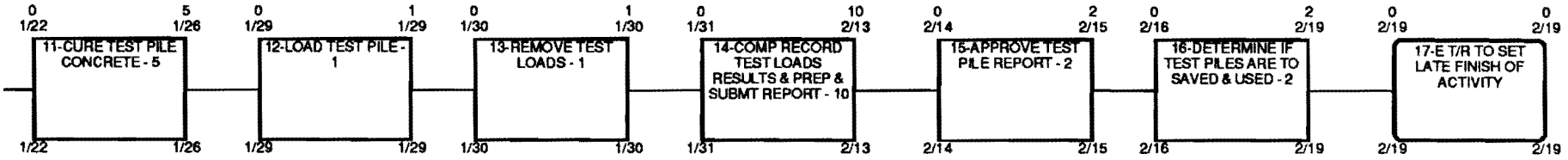
ph 517 772 2537

SHEET SM-1

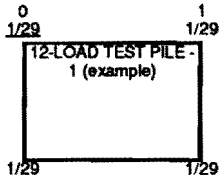

01-T/R TO DECEMBER 11
0 12/11
0 12/11
12/11
12/11
02-PREPARE TEST PROCEDURES - 4
13 12/11
4 12/14
12/29
1/4
03-SELECT NUMBER OF TEST PILES TO BE USED - 1
0 12/11
1 12/11
12/11
12/11
04-APPROVE TEST PROCEDURES - 5
13 12/15
5 12/21
1/5
1/11
05-SELECT TEST PILE LOCATIONS - 1
0 12/12
1 12/12
12/12
12/12
06-LAY OUT TEST PILES IN FIELD - 3
13 12/22
3 12/27
1/12
1/16
07-RETAIN TEST PILE CONTRACTOR - 8
0 12/13
8 12/22
12/13
12/22
08-ORDER & DELIVER TEST PILE MATERIALS - 15
0 12/26
15 1/16
12/26
1/16
09-ORDER & DELIVER TESTING EQUIPMENT - 15
0 12/26
15 1/16
12/26
1/16
10-DRIVE & FILL TEST PILES - 3
0 1/17
3 1/19
1/17
1/19

5.24



9.25

Total float time **Duration**
Early start **Early finish**



- **Activity number**
- **Activity description**
- **Activity estimated duration in elapsed working days**

Late start **Late finish**

ACTIVITY DATA KEY

Issue #1 - November 11, 1989
354 tst pl ntwk 318 - disk 203
ho 354 - Nov 89

Reserved activity numbers

41 46
42 47
43 48
44 49
45 50

NETWORK MODEL FOR TEST PILE INSTALLATION - NEBRASKA PUBLIC POWER DISTRICT PUEBLO PLANT - OSAKI, NEBRASKA

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SHEET #1

FIRST LEVEL NETWORK - Summary Management Diagram

A diagram prepared very early in the project life. The summary network provides an overall look at the entire program, grouping major operations and containing tasks with durations from 10 to 50 working days. This network should normally contain 25 to 70 tasks exclusive of dummies.

SECOND LEVEL NETWORK - Working Diagram

A diagram prepared when most data about major tasks is available and the actual project work is about to begin or is underway. The working network should be sufficiently detailed so as to define key points or milestones at closely spaced intervals. It should contain tasks with durations of one to 10 working days. The second level network is the one most commonly used during project implementation.

THIRD LEVEL NETWORK - Key Operation Sub Diagram

A diagram prepared for the detailed planning of smaller operations within the second level network. Task durations usually range from one to five working days. Most often these networks are prepared by or for sub-contractors, vendors, suppliers, manufacturers and conform to established early start/late finish limits determined from the second level network.

Factors in evaluating network models - ho 260

Factors are to be rated from 1 to 10 with 1 meaning the network fails to satisfy even mininum requirements of the factor. 10 means the factor is satisfied fully and expertly.

__1. Quality of goal & objective definition
Do the goals & objectives meet the needs of the project & of the project organization?

__2. Completeness of laundry list
Does the laundry list contain all reasonable activities to be accomplished for successful completion of the project?

__3. Accuracy of logic relationships
Are the interrelationships between activities shown correctly? Are concurrent and sequential tasks properly diagrammed?

__4. Completeness of activity description
Is the exact definition of each activity apparent from reading the description?

__5. Reasonablness of duration assignment
Do the durations shown represent times to do the activity that are reasonable, and achieve the objectives of the project?

__6. Correctness of calculations
Are the ES/EF's & LS/LF's properly computed?

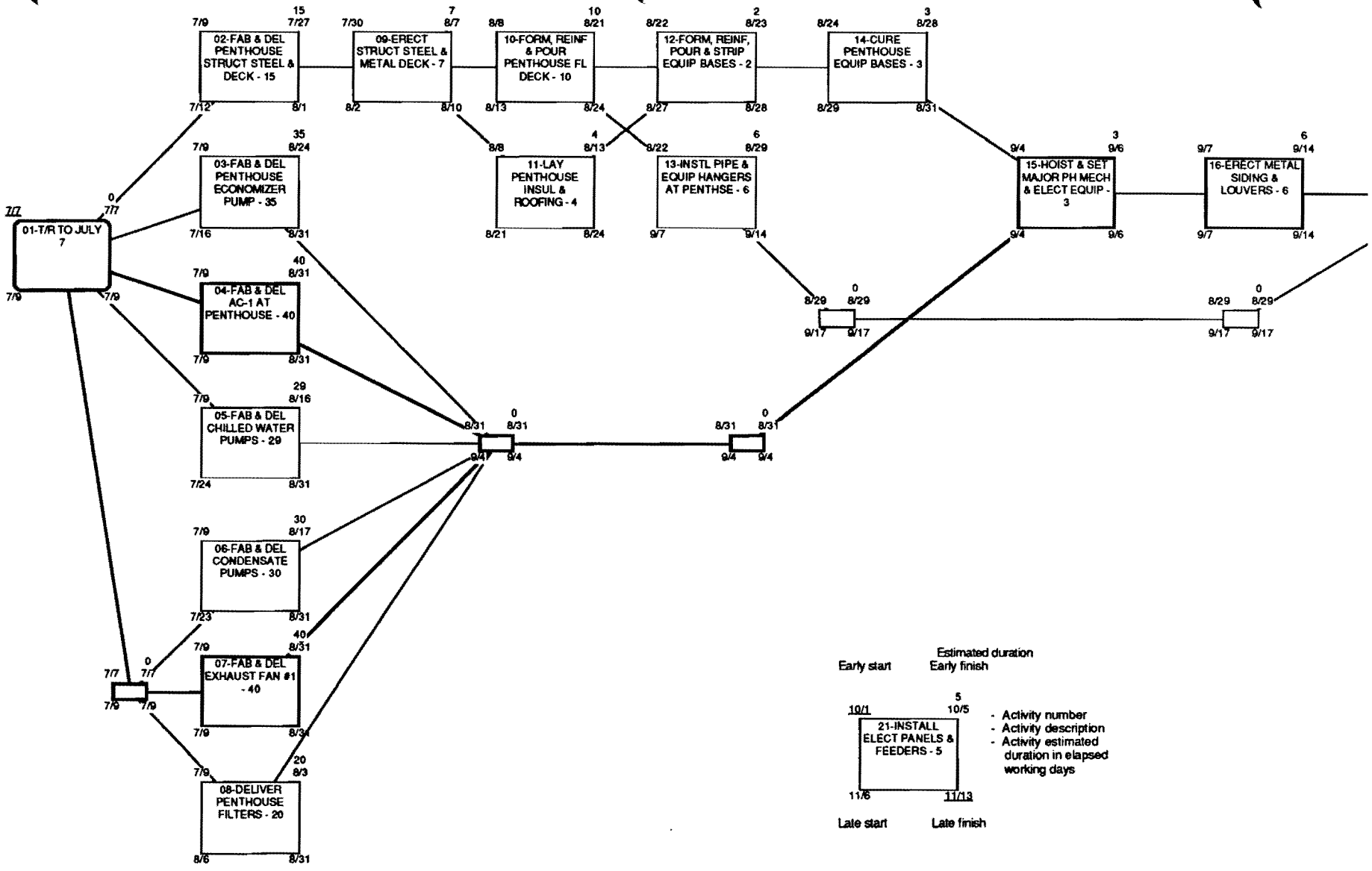
__7. Quality of network appearance
How well was the diagram presented? Could you understand what the job was all about from reading the network without explanation?

__8. Presence of abbreviations,task #'s,issue #'s,sheet #'s,codes & dates
Is there enough supplementary information on the logic plan so you can read it without having someone explain it to you?

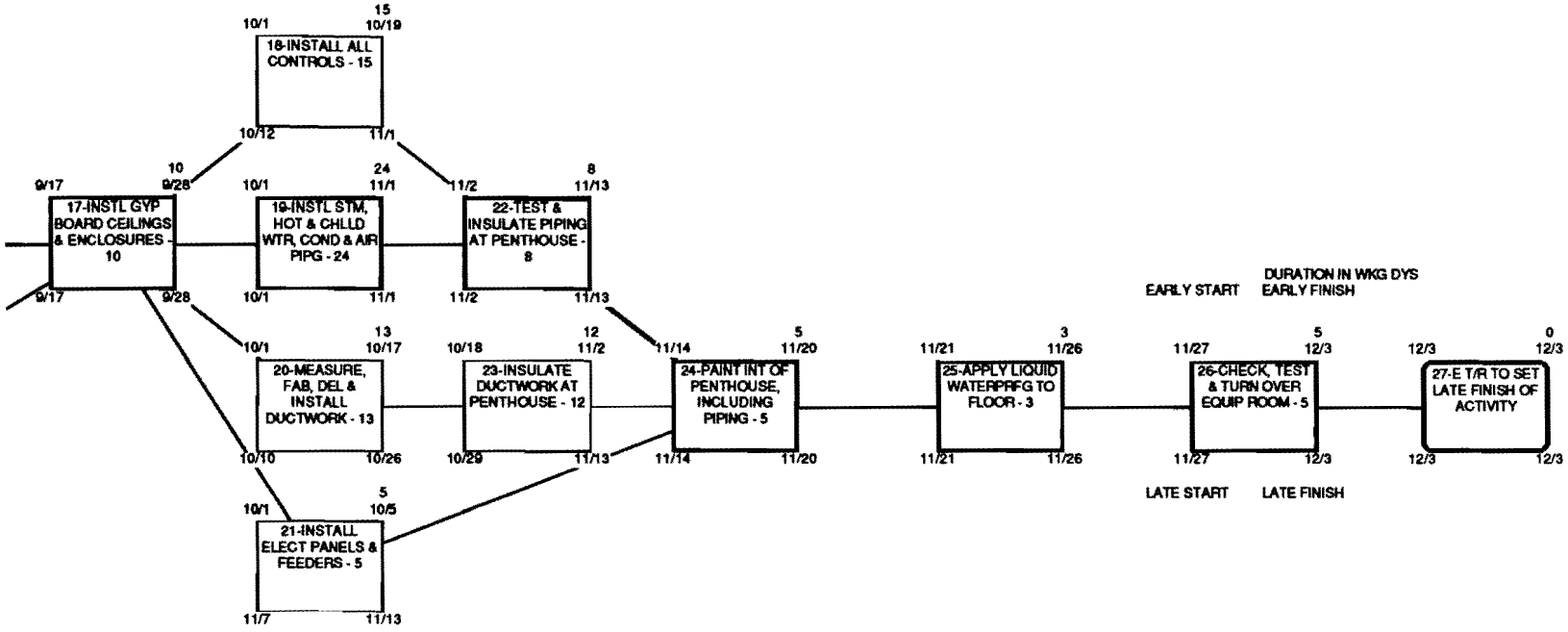
__9. Overall appearance of network
Does the overall plan appearance reflect quality & competence of execution? Does it give you confidence that the person who prepared it knew what they were doing?

_____ Total
*****

_____ Average (total divided by 9)



ACTIVITY DATA KEY



3.24

Base Plan of Action

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

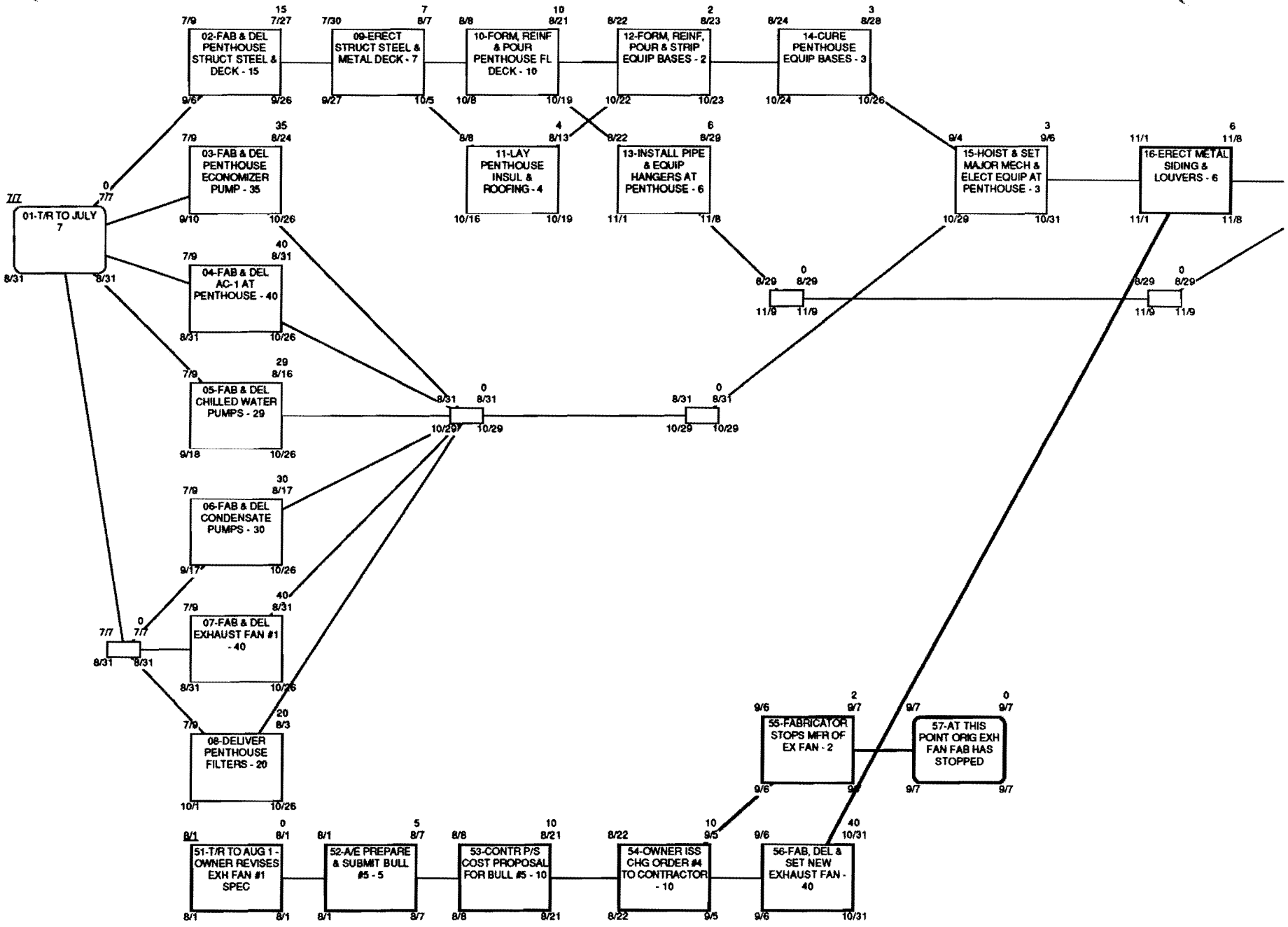
Luther Mechanical Contractors
Washington D.C.

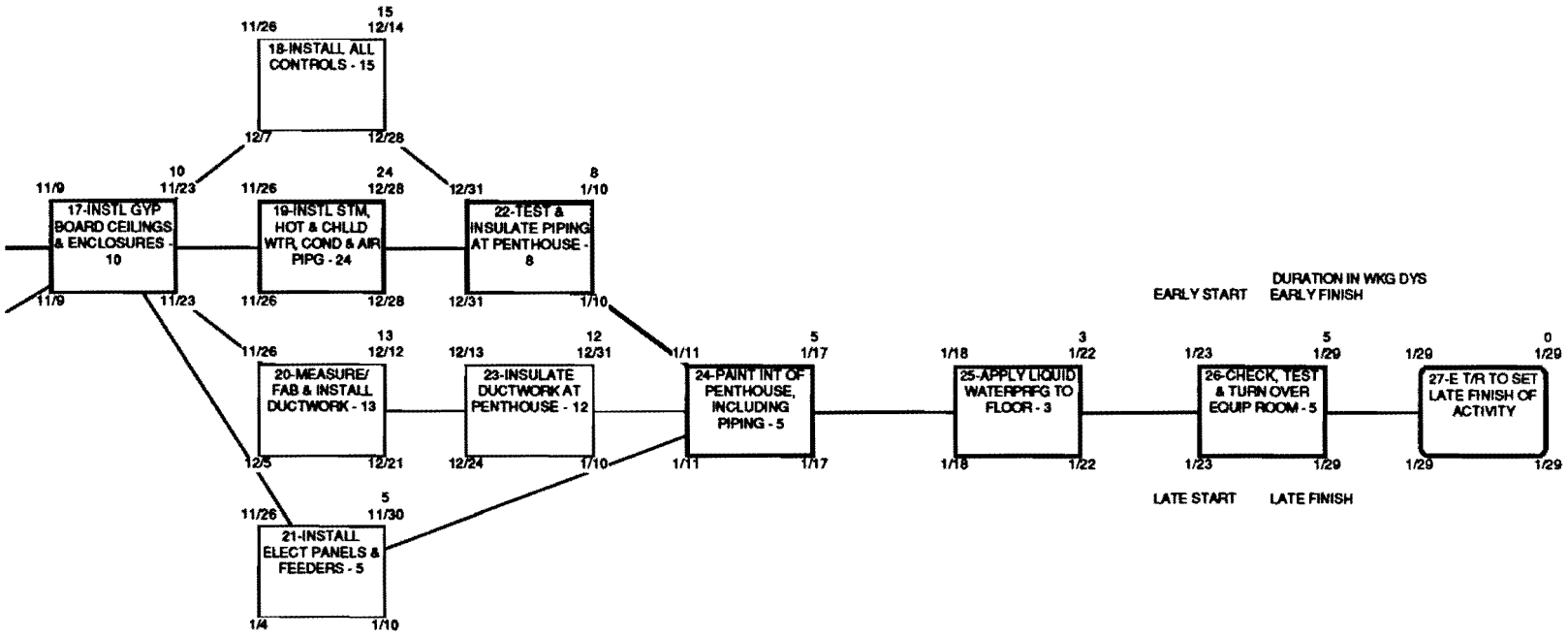
Issue #1 - July 7
330 clarion base plan
disk 162

Reserved Activity Numbers

041 046
042 047
043 048
044 049
045 050

sheet
ph-1


02-FAB & DEL PENTHOUSE STRUCT STEEL & DECK - 15
09-ERECT STRUCT STEEL & METAL DECK - 7
10-FORM, REINF & POUR PENTHOUSE FL DECK - 10
12-FORM, REINF, POUR & STRIP EQUIP BASES - 2
14-CURE PENTHOUSE EQUIP BASES - 3
03-FAB & DEL PENTHOUSE ECONOMIZER PUMP - 35
11-LAY PENTHOUSE INSUL & ROOFING - 4
13-INSTALL PIPE & EQUIP HANGERS AT PENTHOUSE - 6
15-HOIST & SET MAJOR MECH & ELECT EQUIP AT PENTHOUSE - 3
16-ERECT METAL SIDING & LOUVERS - 6
01-T/R TO JULY 7
04-FAB & DEL AC-1 AT PENTHOUSE - 40
05-FAB & DEL CHILLED WATER PUMPS - 29
06-FAB & DEL CONDENSATE PUMPS - 30
07-FAB & DEL EXHAUST FAN #1 - 40
08-DELIVER PENTHOUSE FILTERS - 20
55-FABRICATOR STOPS MFR OF EX FAN - 2
57-AT THIS POINT ORIG EXH FAN FAB HAS STOPPED
51-T/R TO AUG 1 - OWNER REVISES EXH FAN #1 SPEC
52-A/E PREPARE & SUBMIT BULL #5 - 5
53-CONTR P/S COST PROPOSAL FOR BULL #5 - 10
54-OWNER ISS CHG ORDER #4 TO CONTRACTOR - 10
56-FAB, DEL & SET NEW EXHAUST FAN - 40

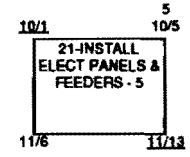


3.9 /

Change order impact on base plan of action

Estimated duration

Early start — Early finish



- Activity number
- Activity description
- Activity estimated duration in elapsed working days

Late start — Late finish

ACTIVITY DATA KEY

Issue #1 - July 8
Issue #2 - August 1
333 clarion chg order
disk 162

Reserved Activity Numbers

041 046
042 047
043 048
044 049
045 050

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

Luther Mechanical Contractors
Washington, D.C.

sheet ph-1

RALPH J. STEPHENSON, P.E.
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)

RALPH J. STEPHENSON
CONSULTING ENGINEER

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

RALPH J. STEPHENSON
CONSULTING ENGINEER

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

H/O 2

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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

H/O 136

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The Domino Move Case Study

(An exercise in planning successive moves)

You are the project manager on a domino move realignment of space in a new 2nd floor addition to the Lucky, Florida social security office. The addition has been closed in and base building work is complete ready for tenant fit up.

The moves needed to complete tenant fit up involve shifting from 1st floor occupancy to a combined 1st and 2nd floor use. Each move from one space to another is estimated to require 2 working days.

Remodeling will require the following times:

• Remodeling existing A & B to new C	30 working days
• Remodeling existing C to new D	15 working days
• Remodeling existing E to new west F	20 working days
• Remodeling existing D to new north F	10 working days

Note: The F space is to be remodeled in two phases while being occupied by staff.

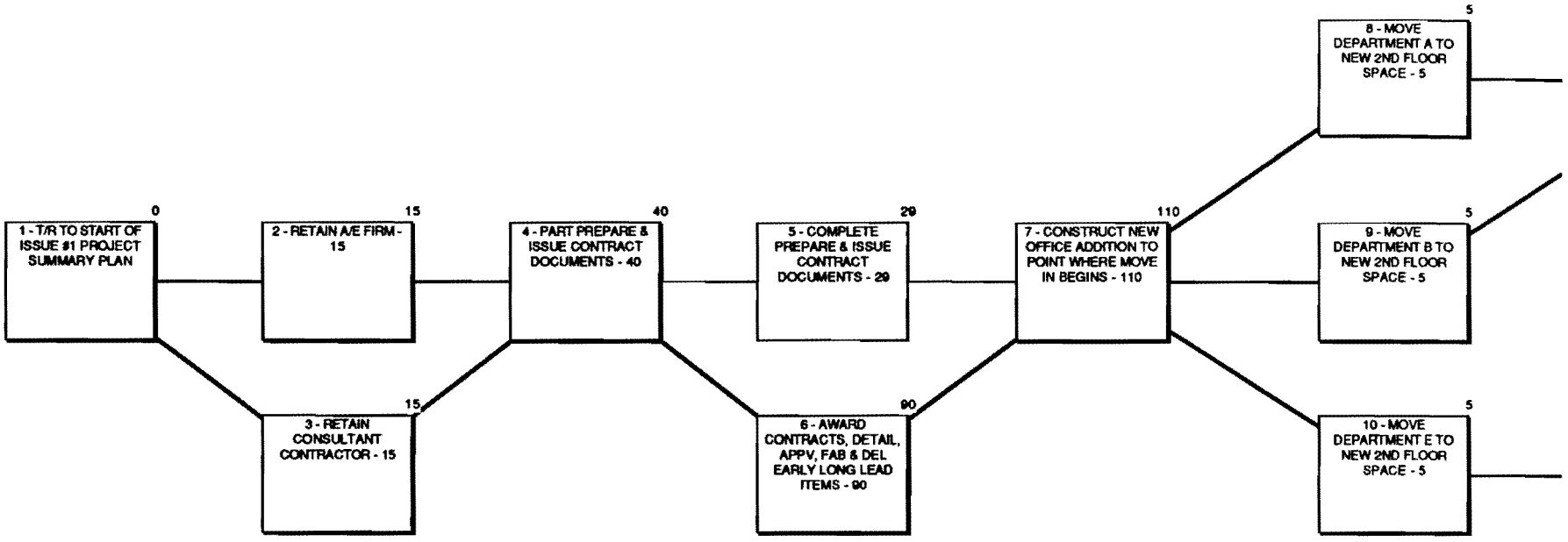
To do

1. Prepare a network logic model for the move and remodeling sequence.
2. Quantify and calculate the logic model.
3. Analyze the move sequence and identify when you want to move E and remodel F.

ho 372 July, 90

RALPH J. STEPHENSON, P.E., P.C.
CONSULTING ENGINEER

SUMMARY MOVE PLAN



3.39

Duration

0

15 - INSTALL MASTER LOCK SYSTEM (4, 5, 6) - 0 (sample activity)

- Activity number
- Activity description
- Resource codes
- Estimated duration in elapsed working days

Activity Key

Reserved activity numbers

041 046
042 047
043 048
044 049
045 050

Issue #1 - January 10
247 bengst amry plan - disk

SUMMARY NETWORK MODEL - BENGST CORPORATION EXPANSION PLAN TARRY, MONTANA

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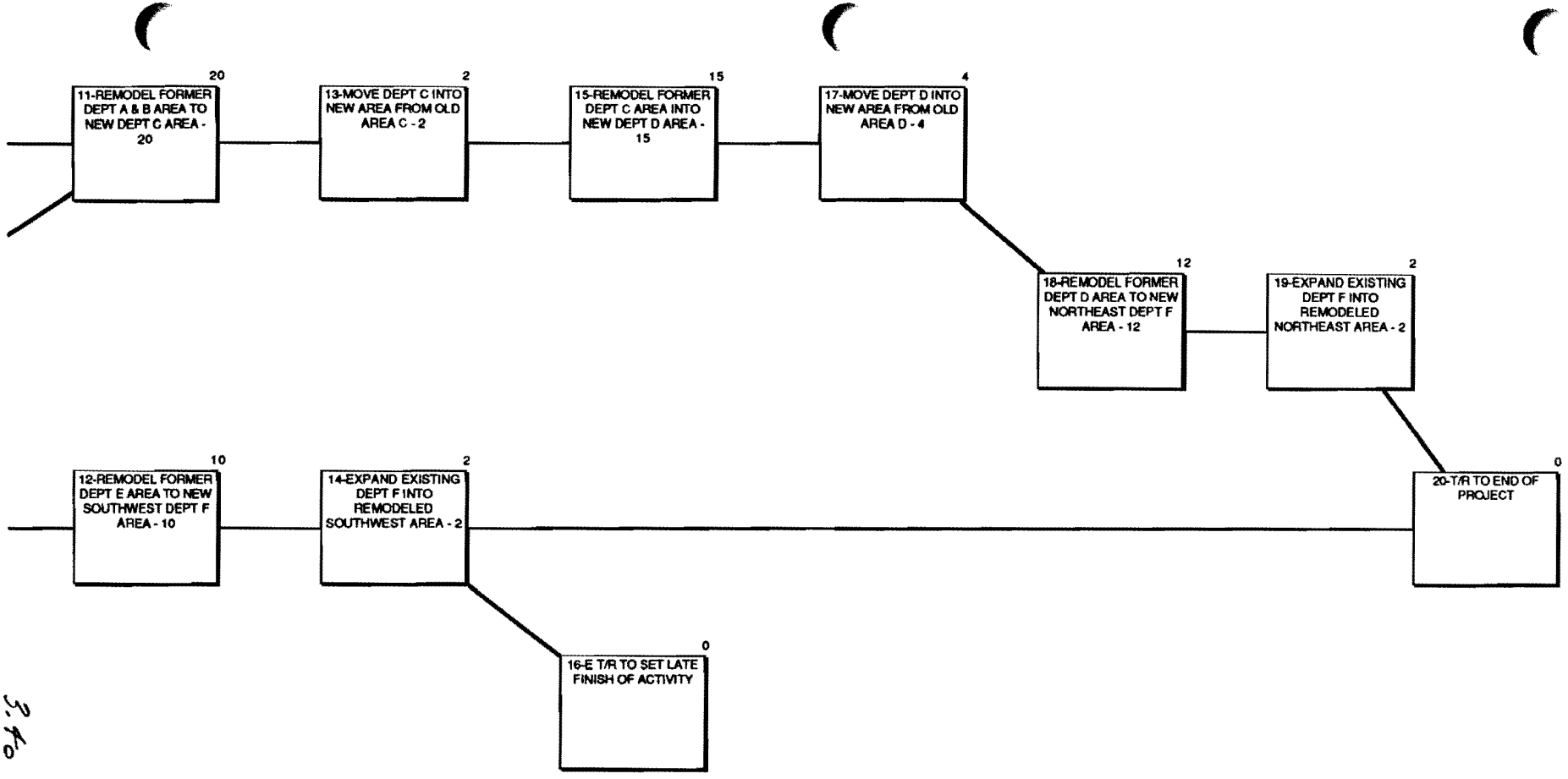
323 Hiawatha Drive
Mt. Pleasant, Michigan 48858
ph 517 772 2537

SHEET #SM1


20
11-REMODEL FORMER DEPT A & B AREA TO NEW DEPT C AREA - 20
2
13-MOVE DEPT C INTO NEW AREA FROM OLD AREA C - 2
15
15-REMODEL FORMER DEPT C AREA INTO NEW DEPT D AREA - 15
4
17-MOVE DEPT D INTO NEW AREA FROM OLD AREA D - 4
12
18-REMODEL FORMER DEPT D AREA TO NEW NORTHEAST DEPT F AREA - 12
2
19-EXPAND EXISTING DEPT F INTO REMODELED NORTHEAST AREA - 2
10
12-REMODEL FORMER DEPT E AREA TO NEW SOUTHWEST DEPT F AREA - 10
2
14-EXPAND EXISTING DEPT F INTO REMODELED SOUTHWEST AREA - 2
0
20-T/R TO END OF PROJECT
0
16-E T/R TO SET LATE FINISH OF ACTIVITY

	CATEGORY	ACTION ITEM	RESP
1	AE	-ARCHITECT/ENGINEER	
2	CM	-CONSTRUCTION MANAGER	
3	OW	-OWNER	
4	PM	-PROJECT MANAGER	
5	RE	-REGULATORY AGENCIES	
6	SU	-SURVEY ITEMS	
7	UT	-UTILITY ITEMS	
8	RE/SU	CHECK AND CLEAR EASEMENTS	
9	RE/SU	CHECK AND CLEAR ZONING	
10	RE	CHECK OUT WITH BUILDING DEPARTMENT	
11	UT/SU	CHECK OUT WITH CABLE TV COMPANY	
12	UT/SU	CHECK OUT WITH ELECTRICAL UTILITY	
13	UT/SU	CHECK OUT WITH GAS UTILITY	
14	RE/SU	CHECK OUT WITH PLANNING & ZONING	
15	UT/SU	CHECK OUT WITH TELEPHONE UTILITY	
16	UT/SU	CHECK OUT WITH WATER & SEWER DEPARTMENT	
17	RE	DECIDE ON HOW APPROVALS ARE TO BE PROVIDED	
18	OW/AE/PM/CM	DECIDE ON TOTAL ORGANIZATIONAL STRUCTURE	
19	AE	DEVELOP DESIGN CONCEPT & SCHEMATIC STUDIES	
20	OW/PM/AE/CM	ESTABLISH PRELIM TOTAL PROJECT MONEY FLOW EXPECTED	
21	OW/PM/AE/CM	ESTABLISH REPORTING SYSTEMS	
22	OW/PM/AE/CM	ESTABLISH WHO THE UDM'S ARE FOR EACH PARTY	
23	OW/PM/AE/CM	GET APPROVALS ON TOTAL ORGANIZATION	
24	AE	GET APPROVALS ON VYVYAN'S ORGANIZATION	
25	AE	HAVE HEART TO HEART TALK WITH OFFICE STAFF	
26	AW/RE	MAKE BUILDING CODE REVIEW	
27	SU/UT	OBTAIN ALL UTILITY LOCATIONS	
28	OW/AE/PM/CM	OBTAIN PRO FORM FROM OWNER	
29	SU/UT	OBTAIN PROPERTY SURVEY	
30	SU	OBTAIN SOIL BORINGS & SOILS ANALYSIS	
31	SU	OBTAIN TOPO SURVEY	
32	OW/PM/CM/AE	OWNER REVIEW AND APPROVE CONCEPT & SCHEMATIC STUDIES	
33	AE	PLAN DRAWING ISSUE PROCEDURES WITH DEPTS	
34	OW/AE/PM/CM	PREPARE & ISSUE PRELIM ORGANIZATION STRUCT	
35	OW/AE/PM/CM	PREPARE & ISSUE PROJECT DIRECTORY	
36	AE/CM/PM	PREPARE BASE LINE ITEM ESTIMATE	
37	OW/AE/CM/PM	PREPARE LIST OF RESPONSIBILITIES OF EACH PARTY	
38	OW/AE/CM/PM	PREPARE MATRIX OF PARTICIPANTS & RESPONSIBILITIES	
39	AE/PM	PREPARE PLAN OF ARCH/ENGR ACTION FOR 3 MONTHS AHEAD	

	CATEGORY	ACTION ITEM	RESP
40	OW/AE/PM/CM	PREPARE PLAN OF COSTING ACTION FOR 3 MONTHS AHEAD	
41	OW/AE/PM/CM	PREPARE PLAN OF OWNER ACTION FOR 3 MONTHS AHEAD	
42	AE/CM/PM	PREPARE PRELIM DESIGN SCOPE PACKAGE & ISSUE	
43	OW/AE/CM/PM	PREPARE PRELIMINARY CONTRACT DOCUMENT PACKAGING MATRIX	
44	AE	PREPARE PRELIMINARY FEE BREAKDOWNS BY DEPT	
45	OW/AE/CM/PM	PREPARE PROJECT PROGRAM	
46	OW/AE/CM/PM	PREPARE TOTAL PROJECT PLAN & SCHEDULE	
47	OW/AE/CM/PM	REVIEW & APPROVE BASE COST ESTIMATE	
48	OW/AE/CM/PM	REVIEW & APPROVE PROJECT PROGRAM	
49	OW/AE/PM/CM	REVIEW PROGRAM REQIREMENTS WITH SPENCER	
50	OW/AE/PM/CM	SET MAJOR BUILDING SYSTEMS	
51	OW/AE/PM/CM	SET TOTAL PROJECT DELIVERY SYSTEM	
52	OW/CM/PM	SPENCER EXECUTE CONTRACT WITH OWNER	
53	AE/CM	VYVYAN AND SPENCER MEET & REVIEW ROLES ON JOB	
54	OW/AE/PM	VYVYAN EXECUTE CONTRACT WITH OWNER	
55	AE	VYVYAN HAVE INTERNAL ORGANIZATIONAL MEETING	

1. **Planning & scheduling case study - ho258 - cpmcsty - d116**
2. **CPM case study**
   - **2.1. Project case study details**
     - 2.1.1. Name of project - The Tulsa Rivers
     - 2.1.2. Location - Tulsa, Oklahoma
     - 2.1.3. Owner & developer - Tulsa Pioneers Inc. - TIP
     - 2.1.4. Designer - Goebel & Associates - Architects, Engineers & Planners
     - 2.1.5. Contractor - Drucker Construction, Inc.
     - 2.1.6. Type of building - speculative office building
     - 2.1.7. Key dates
       - 2.1.7.1. Current date - October 9, 1986 (working day 198)
       - 2.1.7.2. Mobilize & move on site - October 20, 1986 (working day 205)
       - 2.1.7.3. Completion dates
         - Landlord or base building work - May 9, 1988 (601)
           - Must be ready at this point to start tenant work at 1st occupied floor
             - All site work and parking areas complete
             - All elevators operable
             - All mechanical systems operable
             - All electrical systems operable
             - All core areas finished and ready for use
             - All landlord work forces off job
         - Total completion date - July 21, 1988 (working day 639)
           - All tenant work complete
           - All tenants moved in and satisfied
           - Total job cleaned up and turned over to TIP property management department
     - 2.1.8. Characteristics of project
       - 2.1.8.1. General information
         - Location - Tulsa, Oklahoma
         - Site size - Approximately 15 acres - expansion planned
         - 6 stories plus basement
         - Finish floor to finish floor heights
           - Basement to first floor - 16' 0"
           - First floor to second floor - 12' 0"
           - Second through sixth each - 11 ' 0"
           - Sixth to high point of main roof - 12' 0"
           - Sixth to machine room floor - 16' 0"
         - Footprint = 150' x 150' = 22,500 sq ft per fl
         - Gross floor area in building = 7 x 22,500 = 157,500 sq ft
         - Parking spaces to be provided in phase 1 = 900

Building to be leased as it is being built
Currently have letters of intent in hand for about 30% of space.
Special owner requirements
Curtain wall
The curtain wall is an important design feature of the project and a mock up must be built, tested and approved by the owner prior to final fabrication, delivery and installation.
Building service core materials
There is a possibility that some of the core rooms, toilets and tenant common conference space may have to be mocked up and approved before full production work can be initiated on finishes in these areas. Must be investigated!

2.1.8.2. Front end work (fe)
Definition - All non construction project related work concerning real estate, financing and pre construction leasing.
Real estate
Title to property to be in hand in 2 days
Some rea's (reciprocal easement agreements) to be worked out
Must clear underground electrical easement in parking lot area
Financing
Completed and set - construction funding available now
Permits required - to be obtained by Drucker Construction
Foundation
Full building
Mechanical
Électrical

2.1.8.3. Design work (de)
Definition - /Project related work that concerns production and issuing of contract documents
Construction documents 70% complete
Substructure drawings & specs ready to issue
Superstructure drawings and specs to be issued in 1 week
Major mech and elect contract document package to be issued in 3 weeks
Full architectural contract documents to be issued in 3 1/2 weeks

2.1.8.4. Procurement (pr)

Definition - Work related to solicitation of proposals, award of subcontracts, preparation of submittals, approval of submittals, and fabrication and delivery of materials & equipment to the job site.

Contracts already let for

Emergency generator - delivery in 22 weeks
Chiller - delivery in 12 weeks
Transformers - delivery in 16 weeks
Substation - delivery in 23 weeks

All other contracts to be let as contract documents are issued

2.1.8.5. Substructure (sb)

Definition - All foundation work upon which the superstructure bears directly or indirectly. Also includes site preparation for start of field work on the building area.

Spread footings with top of footings 2' below bottom of slab on grade

Basement walls reinforced concrete on concrete strip footings

Subsoil sandy with some clay - no major water problems

2.1.8.6. Superstructure (ss)

Definition - All major structural load carrying components that bear on the substructure directly or indirectly.

Frame to be structural steel erected in 2 story tier sections

Decks to be light weight concrete slabs

Decks to be formed with metal deck - no shoring required

2.1.8.7. Exterior skin (sk)

Definition - All elements needed to close the building to weather.

Exterior walls

From 2nd floor spandrel to roof spandrel - alum and glass curtain wall

Spandrel glass to be opaque
Floor glass to be glare and heat resistant
Aluminum frame to be anodized
Field measurements of aluminum may be necessary

At 1st floor

Aluminum entries
Some storefront & glass at commercial tenant areas
Brick masonry at exterior service and non commercial areas

All exterior glass and glazing to be calked

No exterior field painting

Roofing
Single ply ballasted
Roof equipment
Some roof top equipment with screening
Roof screens to be prefinished metal panels
Curbs to be installed with roofing
Equipment can be set later

2.1.8.8. Rough interior work (ri)
Definition - All interior building components that can be exposed totally or in part to weather.
Above floor rough interior work conventional as for base office building
Interior partitions all metal stud and dry wall
All rolled shapes to receive spray on fireproofing
No spray on fireproofing on metal deck

2.1.8.9. Finish interior work (fi)
Definition - All building components that must be protected totally or in part from weather.
Core area
Partitions - stud walls with dry wall taped, sanded & painted
Ceilings
Toilets - painted dry wall
Other areas - aoustic lay in
Floors
Toilet rooms - ceramic
Service areas - resilient tile
Other areas - carpeted
Tenant area
No ceilings - acoustic materials to be stockpiled on floor
Exterior dry wall sill walls to be installed, taped & sanded

2.1.8.10. Systems work (sy)
Definition - All work that can be installed as a system somewhat isolated from other system components of the building
Three elevators
Two steel stairs
Mechanical and electrical room at basement

2.1.8.11. Site work (si)
Definition - All work outside the building line and inside the property or hoarding (contract boundary) line. Site work outside the property or hoarding line is called off site work (os)
All utilities brought into site underground
Electric

Gas
Water
Domestic
Fire protection
Sanitary sewer
Storm sewer
Landscaping sprinklers
Phone
All full depth asphalt paving
Parking lots striped and lit
Site fully landscaped
Sidewalks around building
Landscaped islands throughout parking areas
No wheel stops to be used

2.2. Laundry lists

2.2.1. Procurement - early

Work related to solicitation of proposals, award of subcontracts, preparation of submittals, approval of submittals and fabrication and delivery of materials & equipment to the job site.

2.2.1.1. Solicit proposals and award contracts (SP/AW) for

Early substructure resteel
Concrete supply
Testing
Structural steel
Metal deck
Curtain wall
Early superstructure resteel
Elevator (need dimensions & embeds for pits)
Mesh
Others?

2.2.1.2. Detail, approve, fabricate and deliver

Early substructure resteel
Structural steel
Metal deck
Curtain wall components
Aluminum
Glass
Early superstructure resteel
Elevator (need dimensions & embeds for pits)
Mesh
Others?

2.2.2. Substructure work - at random - unnumbered

All foundation work upon which the superstructure bears directly or indirectly. Also includes site preparation for start of field work on the building area.

2.2.2.1. Mass excavate for building
2.2.2.2. Clear building site
2.2.2.3. Layout building site
2.2.2.4. Excavate, form, reinforce & pour exterior wall & column footings
2.2.2.5. Excavate, form, reinforce & pour interior wall footings
2.2.2.6. Excavate, form, reinforce & pour elevator pit slab on grade
2.2.2.7. Form, reinforce,pour and strip elevator pit walls
2.2.2.8. Excavate, form reinforce & pour interior column footings
2.2.2.9. Form, reinforce, pour and strip footing piers
2.2.2.10. Set anchor bolts at piers for structural steel
2.2.2.11. Waterproof elevator pit walls
2.2.2.12. Backfill interior of basement to rough grade
2.2.2.13. Excavate, install and backfill underground mechanical work
2.2.2.14. Excavate, install and backfill underground electrical work
2.2.2.15. Form, reinforce, pour and strip perimeter basement walls
2.2.2.16. Fill and fine grade for basement slab on grade
2.2.2.17. Lay vapor barrier and set in floor work for basement slab on grade
2.2.2.18. Pour out basement slab on grade
2.2.2.19. Mobilize & move on site

2.2.3. Substructure work - at random - numbered for sequencing

All foundation work upon which the superstructure bears directly or indirectly. Also includes site preparation for start of field work on the building area.

2.2.3.1. 04 - Mass excavate for building
2.2.3.2. 03 - Clear building site
2.2.3.3. 02 - Layout building site
2.2.3.4. 05 - Excavate, form, reinforce & pour exterior wall & column footings
2.2.3.5. 05 - Excavate, form, reinforce & pour interior wall footings
2.2.3.6. 06 - Excavate, form, reinforce & pour elevator pit slab on grade
2.2.3.7. 07 - Form, reinforce,pour and strip elevator pit walls
2.2.3.8. 05 - Excavate, form reinforce & pour interior column footings
2.2.3.9. 06 - Form, reinforce, pour and strip footing piers
2.2.3.10. 06 - Set anchor bolts at piers for structural steel
2.2.3.11. 08 - Waterproof elevator pit walls
2.2.3.12. 09 - Backfill interior of basement to rough grade
2.2.3.13. 10 - Excavate, install and backfill underground mechanical work
2.2.3.14. 10 - Excavate, install and backfill underground electrical work
2.2.3.15. 06 - Form, reinforce, pour and strip perimeter basement walls

2.2.3.16. 11 - Fill and fine grade for basement slab on grade
2.2.3.17. 12 - Lay vapor barrier and set in floor work for basement slab on grade
2.2.3.18. 13 - Pour out basement slab on grade
2.2.3.19. 01 - Mobilize & move on site
2.2.4. Substructure work - in rough order - numbered
Estimated durations are given after the activity description in elapsed working days (student to provide durations).
2.2.4.1. 01 - Mobilize & move on site -
2.2.4.2. 02 - Layout building site -
2.2.4.3. 03 - Clear building site -
2.2.4.4. 04 - Mass excavate for building -
2.2.4.5. 05 - Excavate, form reinforce & pour interior column footings -
2.2.4.6. 05 - Excavate, form, reinforce & pour exterior wall & column footings -
2.2.4.7. 05 - Excavate, form, reinforce & pour interior wall footings -
2.2.4.8. 06 - Excavate, form, reinforce & pour elevator pit slab on grade -
2.2.4.9. 06 - Set anchor bolts at piers for structural steel -
2.2.4.10. 06 - Form, reinforce, pour and strip footing piers -
2.2.4.11. 06 - Form, reinforce, pour and strip perimeter basement walls -
2.2.4.12. 07 - Form, reinforce,pour and strip elevator pit walls -
2.2.4.13. 08 - Waterproof elevator pit walls -
2.2.4.14. 09 - Backfill interior of basement to rough grade -
2.2.4.15. 10 - Excavate, install and backfill underground electrical work -
2.2.4.16. 10 - Excavate, install and backfill underground mechanical work -
2.2.4.17. 11 - Fill and fine grade for basement slab on grade -
2.2.4.18. 12 - Lay vapor barrier and set in floor work for basement slab on grade -
2.2.4.19. 13 - Pour out basement slab on grade -
2.2.5. Superstructure work - at random - unnumbered
All major structural load carrying components that bear on the substructure directly or indirectly.
2.2.5.1. Erect structural steel - tier 1 - basement through 2nd floor
2.2.5.2. Erect structural steel - tier 2 - 2nd through 4th floor
2.2.5.3. Erect structural steel - tier 3 - 4th through 6th floor
2.2.5.4. Erect structural steel - tier 4 - 6th through roof levels
2.2.5.5. Detail & trim structural steel - tier 1 - basement through 2nd floor
2.2.5.6. Detail & trim structural steel - tier 2 - 2nd through 4th floor
2.2.5.7. Detail & trim structural steel - tier 3 - 4th through 6th floor
2.2.5.8. Detail & trim structural steel - tier 4 - 6th through roof levels
2.2.5.9. Erect metal deck - tier 1 - basement through 2nd floor
2.2.5.10. Erect metal deck - tier 2 - 2nd through 4th floor
2.2.5.11. Erect metal deck - tier 3 - 4th through 6th floor
2.2.5.12. Erect metal deck - tier 4 - 6th through roof levels

2.2.5.13. Form & set in floor work for 1st floor
2.2.5.14. Form & set in floor work for 2nd floor
2.2.5.15. Form & set in floor work for 3rd floor
2.2.5.16. Form & set in floor work for 4th floor
2.2.5.17. Form & set in floor work for 5th floor
2.2.5.18. Form & set in floor work for 6th floor
2.2.5.19. Form & set in floor work for elevator machine room floor
2.2.5.20. Set elevator machine room sheave beams

2.2.6. Front end work

Definition - All non construction project related work concerning real estate, financing and pre construction leasing.

2.2.7. Procurement - later

Definition - Work related to solicitation of proposals, award of subcontracts, preparation of submittals, approval of submittals, and fabrication and delivery of materials & equipment to the job site.

2.2.8. Exterior skin work - at random - numbered

All elements needed to close the building to weather.

To be defined by the project teams as table work. List the individual activities making up installation of the exterior curtain wall, the roof system, roof mounted equipment and screens, and the first floor enclosure in the blank space below.

2.2.9. Rough interior work - at random - numbered

All interior building components that can be exposed totally or in part to weather.

2.2.10. Finish interior work - at random - numbered

All buiding components that must be protected totally or in part from weather.

2.2.11. Systems work

Definition - All work that can be installed as a system somewhat isolated from other system components of the building

2.2.12. Site work

Definition - All work outside the building line and inside the property or hoarding (contract boundary) line. Site work outside the property or hoarding line is called off site work (os)

2.2.13. ho 258 - 87

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Consulting Engineer

• *SECTION 4 - TRANSLATING THE PROJECT PLAN & SCHEDULING THE WORK*

04.01	Translation definition
04.02	Schedule definition
04.03 & 04.04	Case of resource sensitive school proj
04.05	Single resource allocation plan
04.06	Full resource allocation plan
0407 & 04.08	Resource allocation bar chart form
04.09	Calculated resource allocation network
04.10	Resource allocation ES/EF bar chart solution
04.11	Resource allocation leveled solution
04.12	Profit potential levels
04.13 & 04.14	Use of float time in project planning
04.15	Clarion base network data
04.16	Clarion base bar chart
04.17	Pavilion drawing issue
04.18	GTRV section
04.19 to 04.22	GTRV contract document matrix
04.23 to 04.27	Guidelines to preparing contract document matrixes
04.28	Slant chart
04.29	Item processing chart
04.30	Procurement network model
04.31	Submittal turn around
04.32	Bulletin/change order record
04.33	Equipment activity tabulation
04.34	Money flow
04.35	Turnover cycle analysis

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Consulting Engineer

TRANSLATE

To recast project planning & management information into other graphic, narrative & oral forms to insure effective use by those involved.

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Consulting Engineer

SCHEDULE

To lock individual project tasks & the resources needed to do them into a specific time position.

Ralph J. Stephenson PE PC
Consulting Engineer

The case of the resource sensitive school project

A project management case study in the allocation of resources

You and your partner own a small flat work firm, Regal Construction, Inc. located in northern Missouri. You are Alan Dobson, president ,and your partner is Fred Mikello, vice president. Both of you came from a large general contractor, the Rasmussen Company, where you were a senior project manager, and Fred was a senior field superintendent. The general superintendent for Rasmussen was George Bushnell, a good friend to both of you.

You each left Rasmussen about eight months ago to start Regal, and have done reasonably well constructing a small volume of sidewalks, drives and masonry work along with some earthwork and carpentry. You've been able to purchase a front loader and are now actively involved in finding ways to keep your equipment and tradesmen, mostly laborers and cement finishers, busy.

This morning George Bushnell called and said Rasmussen had just been awarded the general contract on a large educational park. The first of the projects is three moderate size masonry wall bearing buildings. They must start in the field immediately, but George says he cannot man the job for another 2 weeks. He asked if Regal could start within two days on layout, clearing the site and constructing the concrete and masonry foundations for the first three buildings, A, B & C. Footprint sizes of the buildings are for A - 150' x 200', B - 200' x 250' and C - 200' x 200'.

You reply that you could move on site immediately. George says to give him a rough budget estimate along with a plan of work, a schedule and an idea of how Regal would man the job all by tomorrow noon. If the cost and the schedule are in the ball park you have a job.

The business and management objectives you are thinking about as you consider how to plan the job include:

1. Maintain the plan of work finally agreed on. Plan the work and then work the plan!

2. Maintain crew integrity. Don't split a composite work crew.

3. Don't interrupt an activity once it has started.

4. Keep the total time of the job to no more than four and a half weeks.

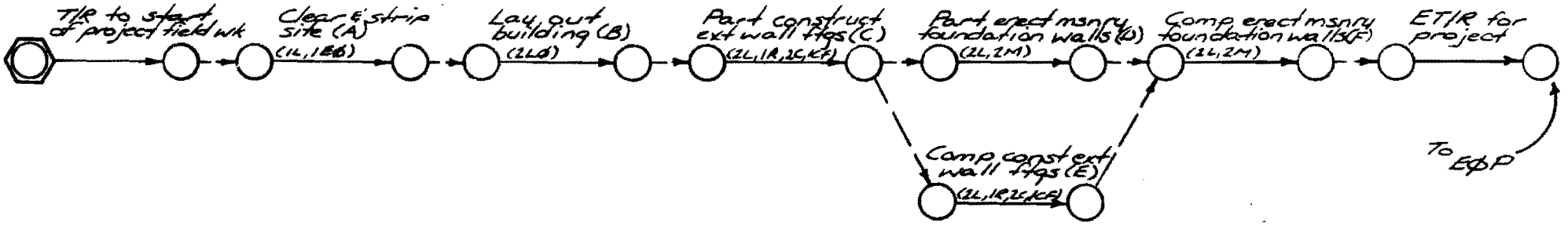
5. Balance tradesmen use on the job, particularly laborers, to maintain as constant level as possible.

6. Use equipment you own. Don't rent anything you don't absolutely have to.

7. Minimize the risk of lost profit potential.

8. Do a first rate job for school and for Rasmussen.

You have just put down the phone. How do you proceed from here?

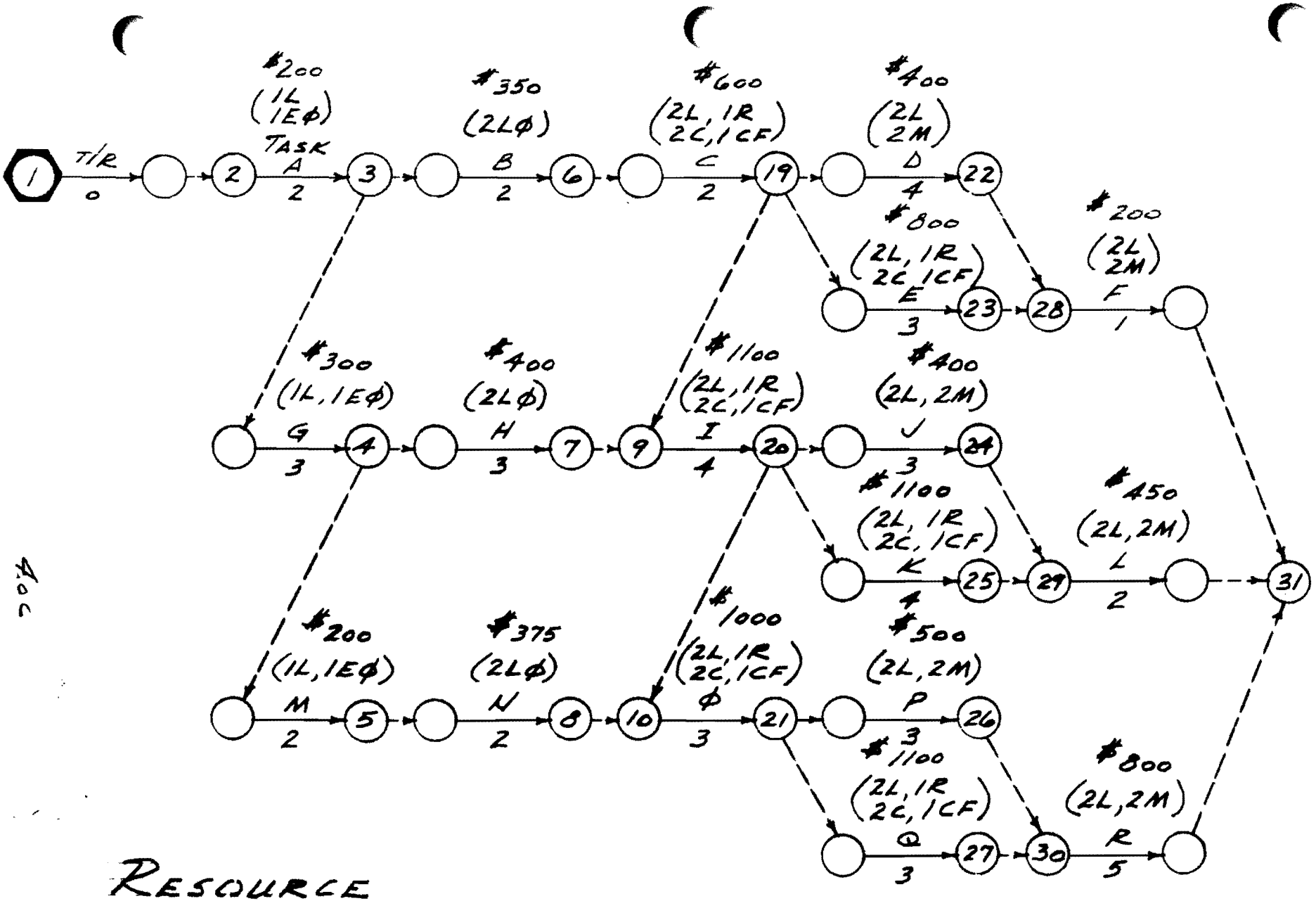


RESOURCE CODE

L Laborers
EØ Equipment operators
LØ Layout engineers
R Reinforcing stl workers
C Carpenters
CF Cement finishers
M Masons

RESOURCE ALLOCATION

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER



RESOURCE ALLOCATION

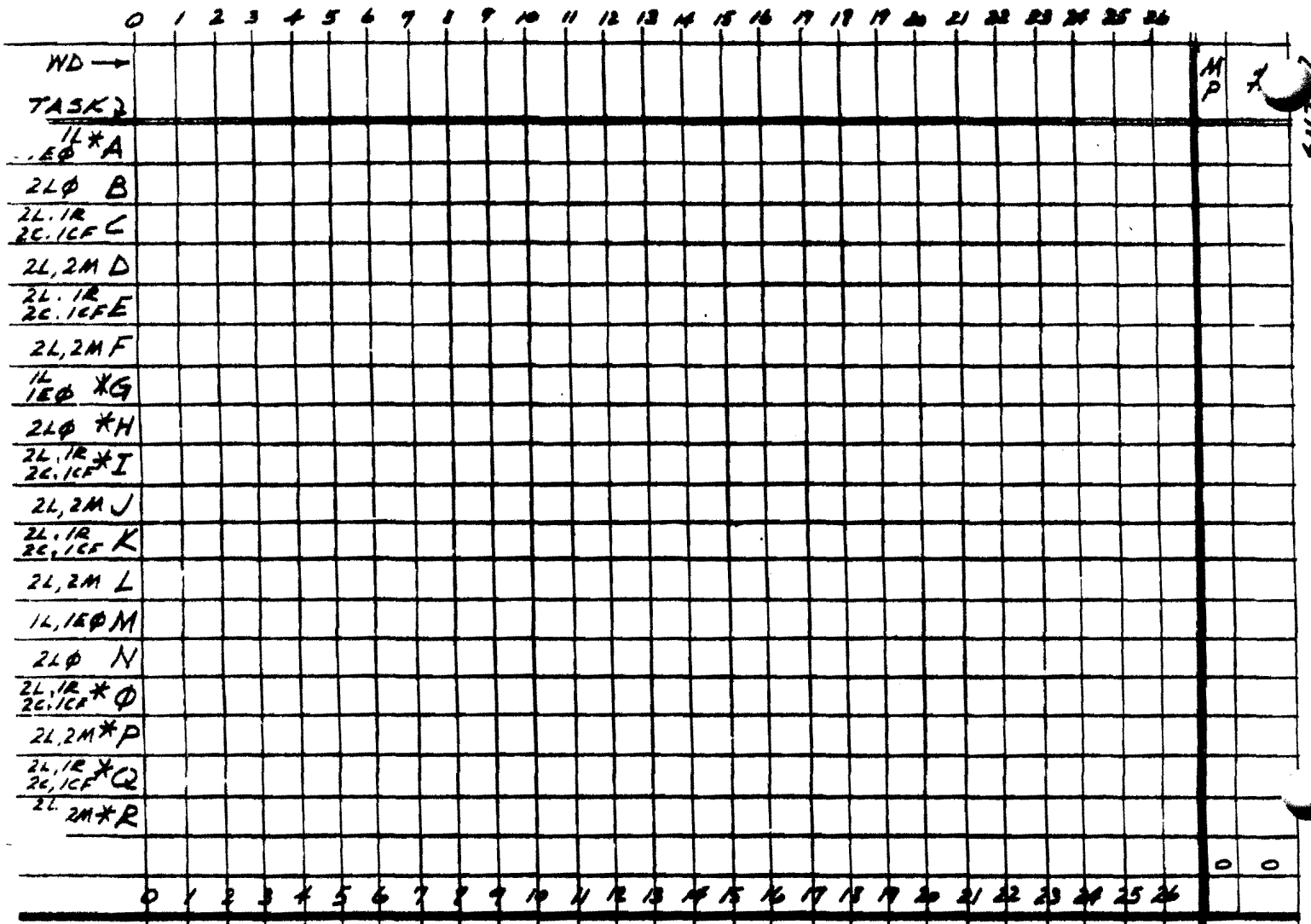
RALPH J. STEPHENSON, P.E.

MAY 29, 1968

RESERVED NODE NOS.

11	15
12	16
13	17
14	18

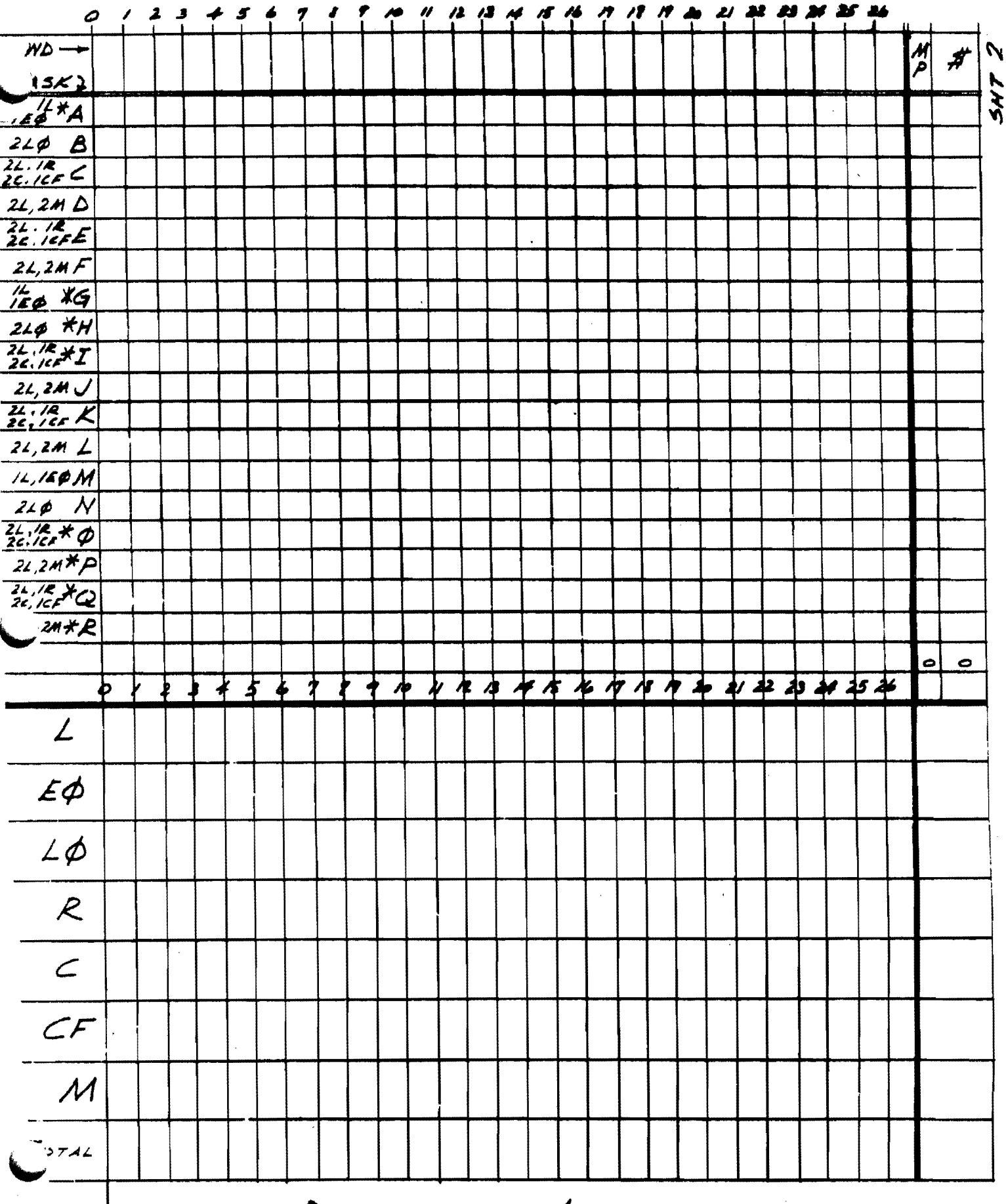
H/O 25



RESOURCE ALLOCATION

MAY 29, 1968 4.07 RALPH J. STEPHENSON, P.E.

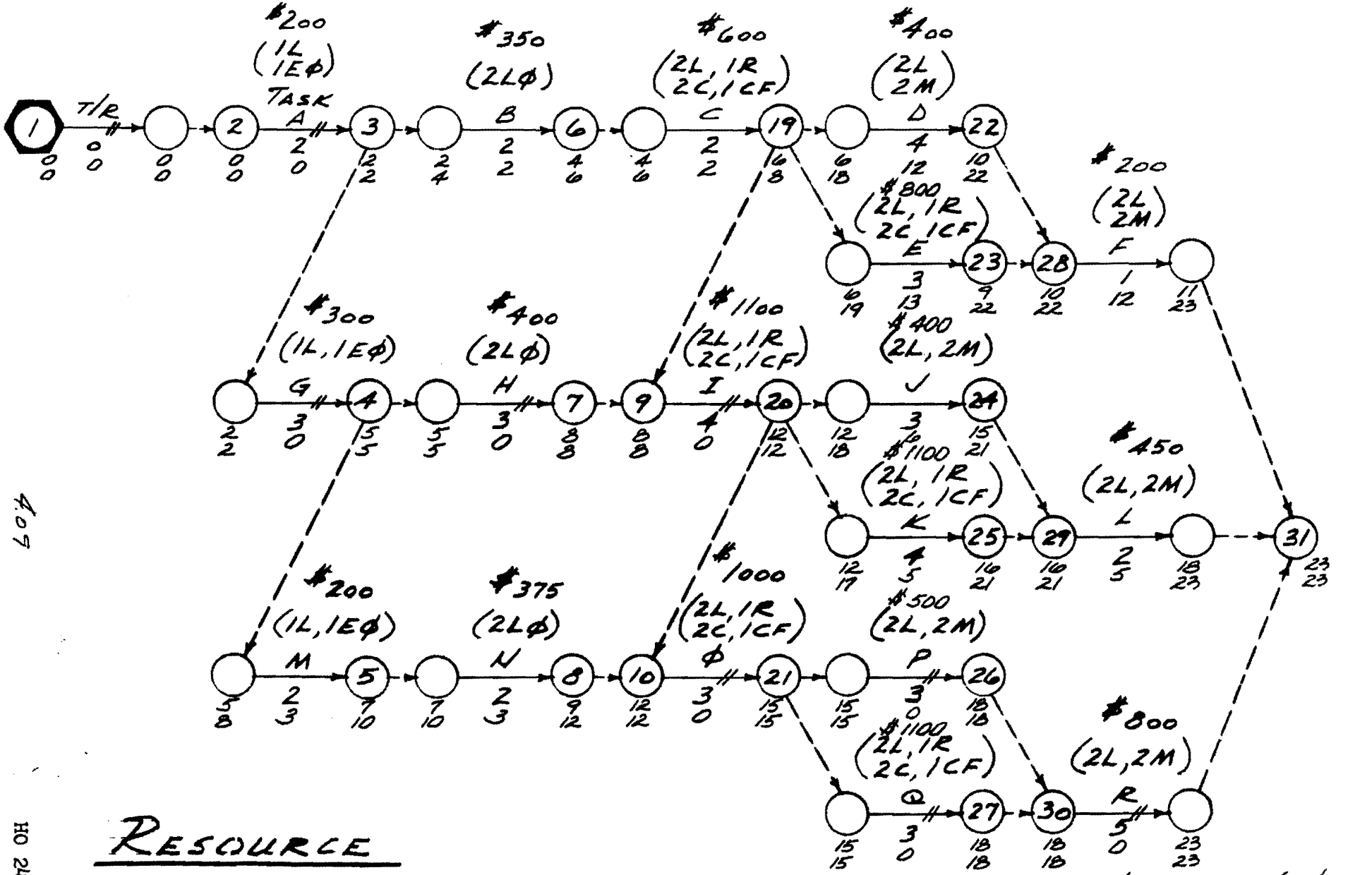
HO 26



RESOURCE ALLOCATION

MAY 29, 1968 4.08 RALPH J. STEPHENSON, P.E.

HO 26



RESOURCE ALLOCATION

RESERVED NODE NOS.

11	15
12	16
13	17
14	18

RALPH J. STEPHENSON, P.E.

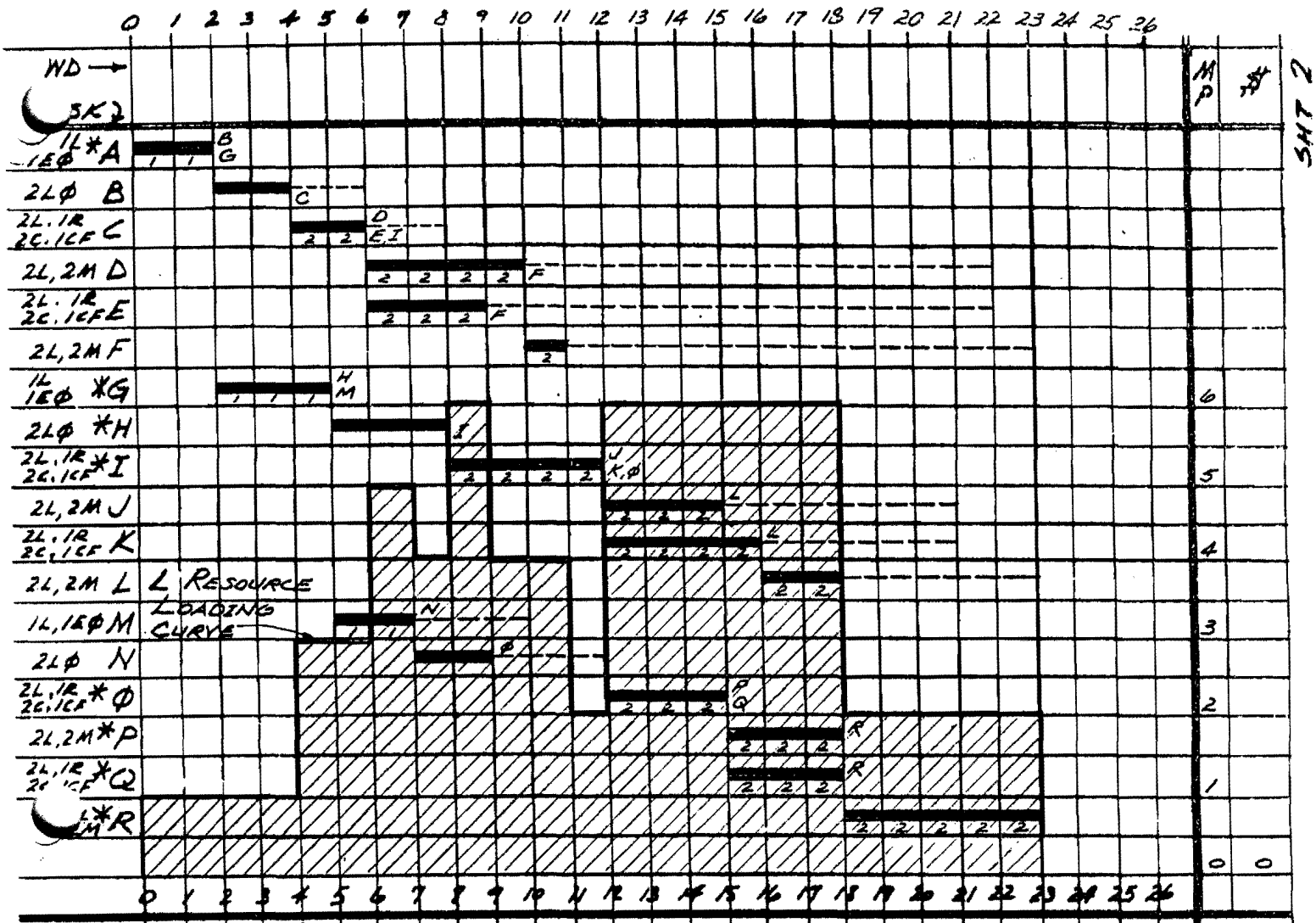
MAY 29, 1968

407

HO 244

H/O

ES/EF SCHEDULE



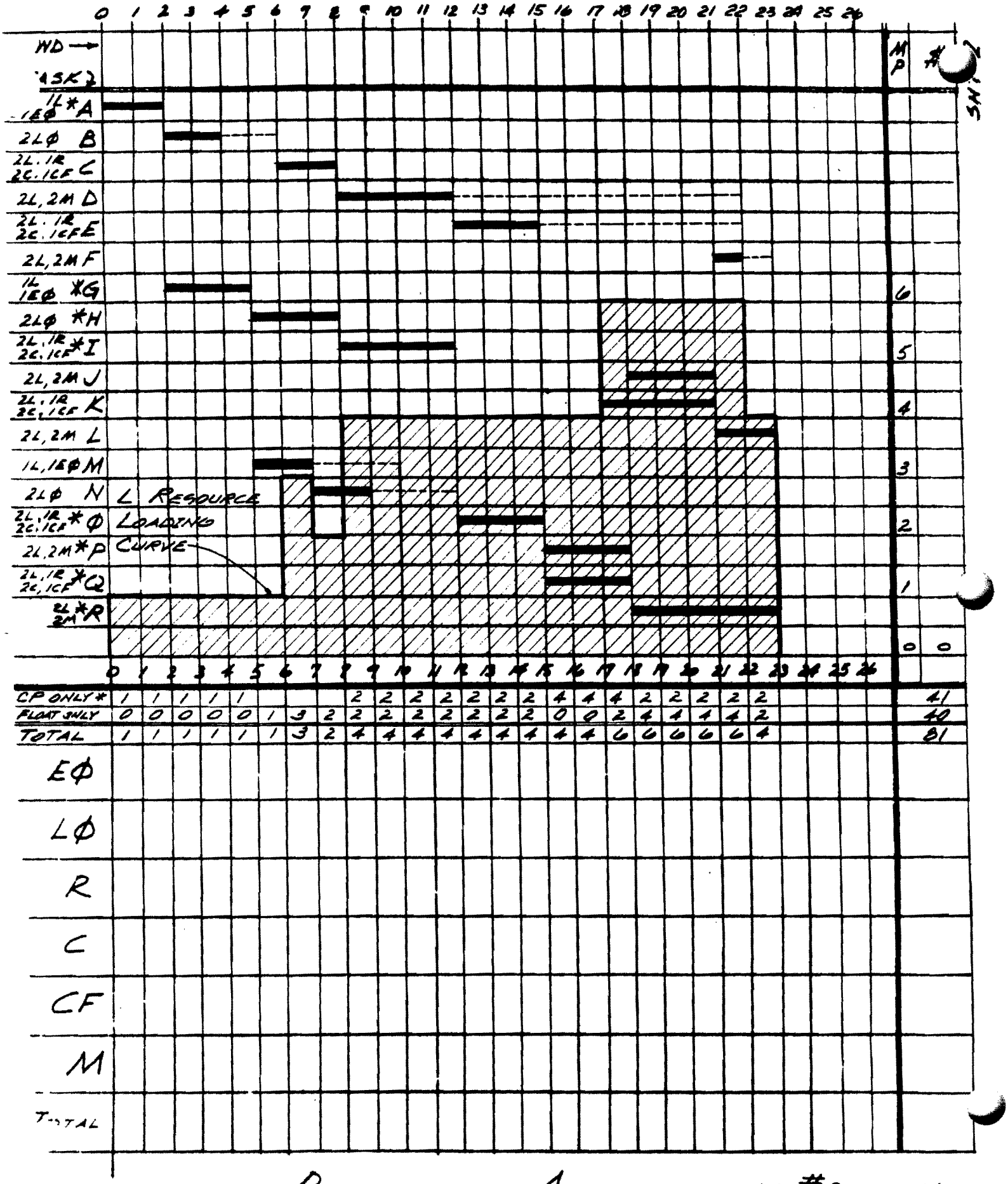
L	1	1	1	1	3	3	5	4	6	4	4	2	6	6	6	6	6	6	2	2	2	2	2				81
EØ	1	1	1	1	1	1	1																				7
LØ			2	2		2	2	4	2																		14
R					1	1	1	1	2	1	1	1	2	2	2	2	1	1									19
C					2	2	2	2	4	2	2	2	4	4	4	4	2	2									38
CF					1	1	1	1	2	1	1	1	2	2	2	2	1	1									19
M							2	2	2	2	2		2	2	2	2	4	4	2	2	2	2	2				36
AL	2	2	4	4	8	10	14	14	18	10	10	6	16	16	16	16	14	14	4	4	4	4	4				214

RESOURCE ALLOCATION #1

HO 245

MAY 29, 1968 F.10 RALPH J. STEPHENSON, P.E.

LEVELED SCHEDULE



RESOURCE ALLOCATION #2

HO 246

MAY 29, 1968 4.11 RALPH J. STEPHENSON, P.E.

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

PROFIT POTENTIAL LEVELS

In construction the concept of profit is complex and often misunderstood. There are many kinds of profit - financial, socio-economic, value system, self-actualization, education, enjoyment, technical and probably as many more equally important but less obvious.

If we view the various kinds of returns on investments relative to project management, it appears there are three major levels of profit potential available, that achieved by being certain to consider and include all elements of the project, that achieved by arranging these elements in an effective action sequence and the profit achieved by making effective use of discretionary or float time. These are identified as levels A, B and C respectively.

A brief discussion of each is given below.

Level A Profit Potential

The basic profit potential is realized when the manager and his project team have made certain to include all project elements in the estimating, planning and control process; when they have made certain that everything is counted and there are no missing pieces. Every element missed erodes the profit picture just as a missing piece of a jigsaw puzzle spoils the pleasure of assembling it.

Level B Profit Potential

Once project elements are accounted for, they must be properly arranged in a logic pattern to produce the most effective plan of action. In any plan there are identified desired and necessary relationships. The proper expression of desired relations is a major factor in realizing level B profit potential. Here is where the true skill of the project manager begins to impact upon the job. The experienced, intelligent, knowledgeable manager will explore, simulate and select the most effective ways of assembling the job under his control. The level B profit potential is highest when the best ways have been selected.

Level C Profit Potential

This profit is highest when the job is scheduled well and a selection made as to where each task should be done in relationship to the discretionary time available to it. Often discretionary time is identified as float time. Where the good manager schedules the task when he has resource options (time, money, manpower, equipment, etc.) will largely determine how profitable the level C management work has been.

In a nutshall, level A profit potential deals with identifying all the elements involved. Level B profit potential is concerned with arranging these elements in a logical and effective action plan. The C level profit potential is engaged when the project is managed well by proper scheduling within allowable resource limits.

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 belongs 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.

* * *

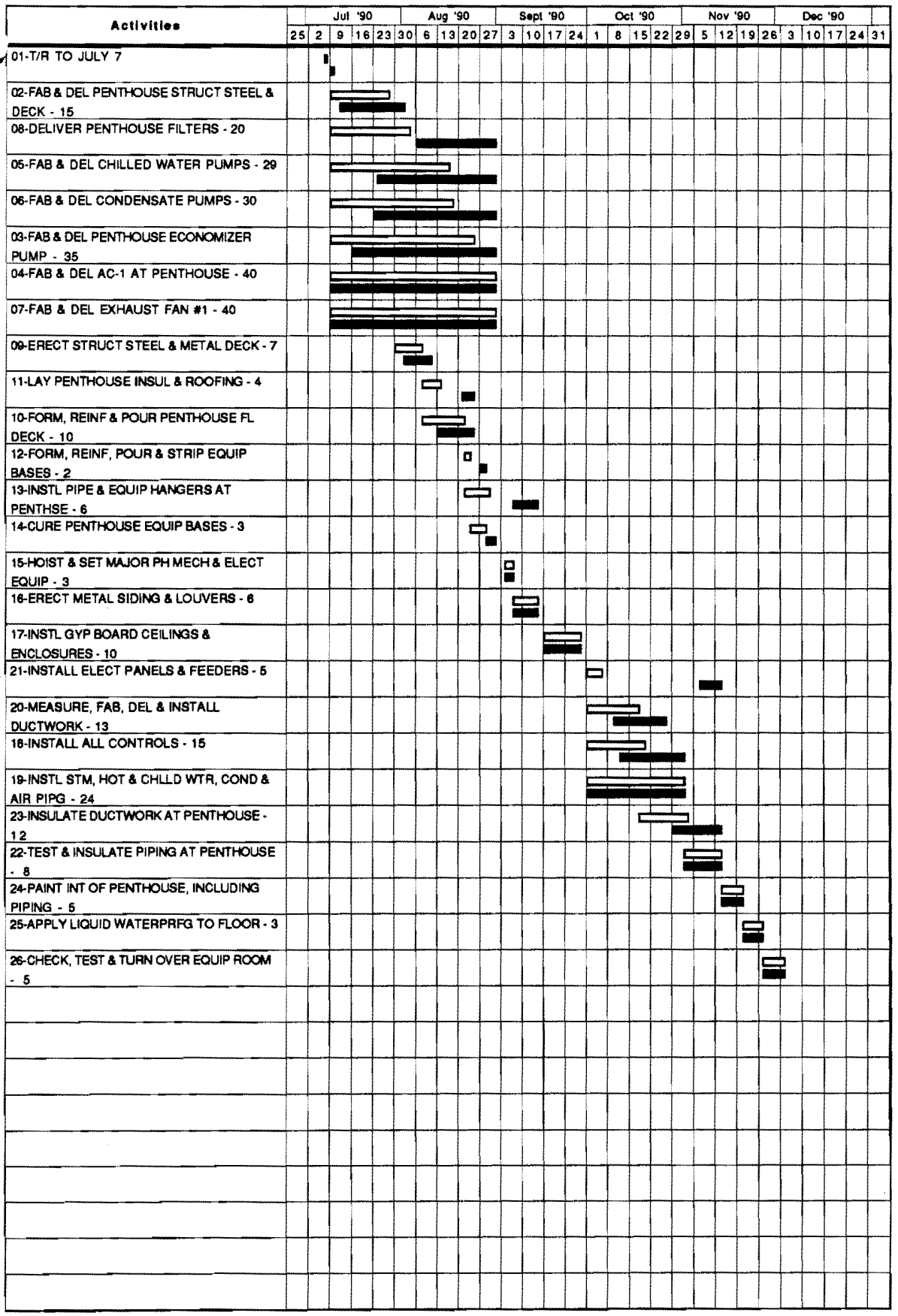
In general most problems with float occur where approval delays are encountered, where intermediate project dates are not specified but are desired and imposed, when poor performance pushes tasks beyond scheduled end dates, or where uncontrollable obstacles to meeting project contract obligations appear.

	activity	early start	early finish	late start	late finish
1	01-T/R TO JULY 7	7/7/90	7/7/90	7/9/90	7/9/90
2	02-FAB & DEL PENTHOUSE STRUCT STEEL & DECK - 15	7/9/90	7/27/90	7/12/90	8/1/90
3	08-DELIVER PENTHOUSE FILTERS - 20	7/9/90	8/3/90	8/6/90	8/31/90
4	05-FAB & DEL CHILLED WATER PUMPS - 29	7/9/90	8/16/90	7/24/90	8/31/90
5	06-FAB & DEL CONDENSATE PUMPS - 30	7/9/90	8/17/90	7/23/90	8/31/90
6	03-FAB & DEL PENTHOUSE ECONOMIZER PUMP - 35	7/9/90	8/24/90	7/16/90	8/31/90
7	04-FAB & DEL AC-1 AT PENTHOUSE - 40	7/9/90	8/31/90	7/9/90	8/31/90
8	07-FAB & DEL EXHAUST FAN #1 - 40	7/9/90	8/31/90	7/9/90	8/31/90
9	09-ERECT STRUCT STEEL & METAL DECK - 7	7/30/90	8/7/90	8/2/90	8/10/90
10	11-LAY PENTHOUSE INSUL & ROOFING - 4	8/8/90	8/13/90	8/21/90	8/24/90
11	10-FORM, REINF & POUR PENTHOUSE FL DECK - 10	8/8/90	8/21/90	8/13/90	8/24/90
12	12-FORM, REINF, POUR & STRIP EQUIP BASES - 2	8/22/90	8/23/90	8/27/90	8/28/90
13	13-INSTL PIPE & EQUIP HANGERS AT PENTHSE - 6	8/22/90	8/29/90	9/7/90	9/14/90
14	14-CURE PENTHOUSE EQUIP BASES - 3	8/24/90	8/28/90	8/29/90	8/31/90
15	15-HOIST & SET MAJOR PH MECH & ELECT EQUIP - 3	9/4/90	9/6/90	9/4/90	9/6/90
16	16-ERECT METAL SIDING & LOUVERS - 6	9/7/90	9/14/90	9/7/90	9/14/90
17	17-INSTL GYP BOARD CEILINGS & ENCLOSURES - 10	9/17/90	9/28/90	9/17/90	9/28/90
18	21-INSTALL ELECT PANELS & FEEDERS - 5	10/1/90	10/5/90	11/7/90	11/13/90
19	20-MEASURE, FAB, DEL & INSTALL DUCTWORK - 13	10/1/90	10/17/90	10/10/90	10/26/90
20	18-INSTALL ALL CONTROLS - 15	10/1/90	10/19/90	10/12/90	11/1/90
21	19-INSTL STM, HOT & CHLLD WTR, COND & AIR PIPG - 24	10/1/90	11/1/90	10/1/90	11/1/90
22	23-INSULATE DUCTWORK AT PENTHOUSE - 12	10/18/90	11/2/90	10/29/90	11/13/90
23	22-TEST & INSULATE PIPING AT PENTHOUSE - 8	11/2/90	11/13/90	11/2/90	11/13/90
24	24-PAINT INT OF PENTHOUSE, INCLUDING PIPING - 5	11/14/90	11/20/90	11/14/90	11/20/90
25	25-APPLY LIQUID WATERPRFG TO FLOOR - 3	11/21/90	11/26/90	11/21/90	11/26/90
26	26-CHECK, TEST & TURN OVER EQUIP ROOM - 5	11/27/90	12/3/90	11/27/90	12/3/90

Listed in early start early finish order

Clarion Office Building
Equipment Room

Clarion base network model • ho 381
derived from issue 1, dated July 7



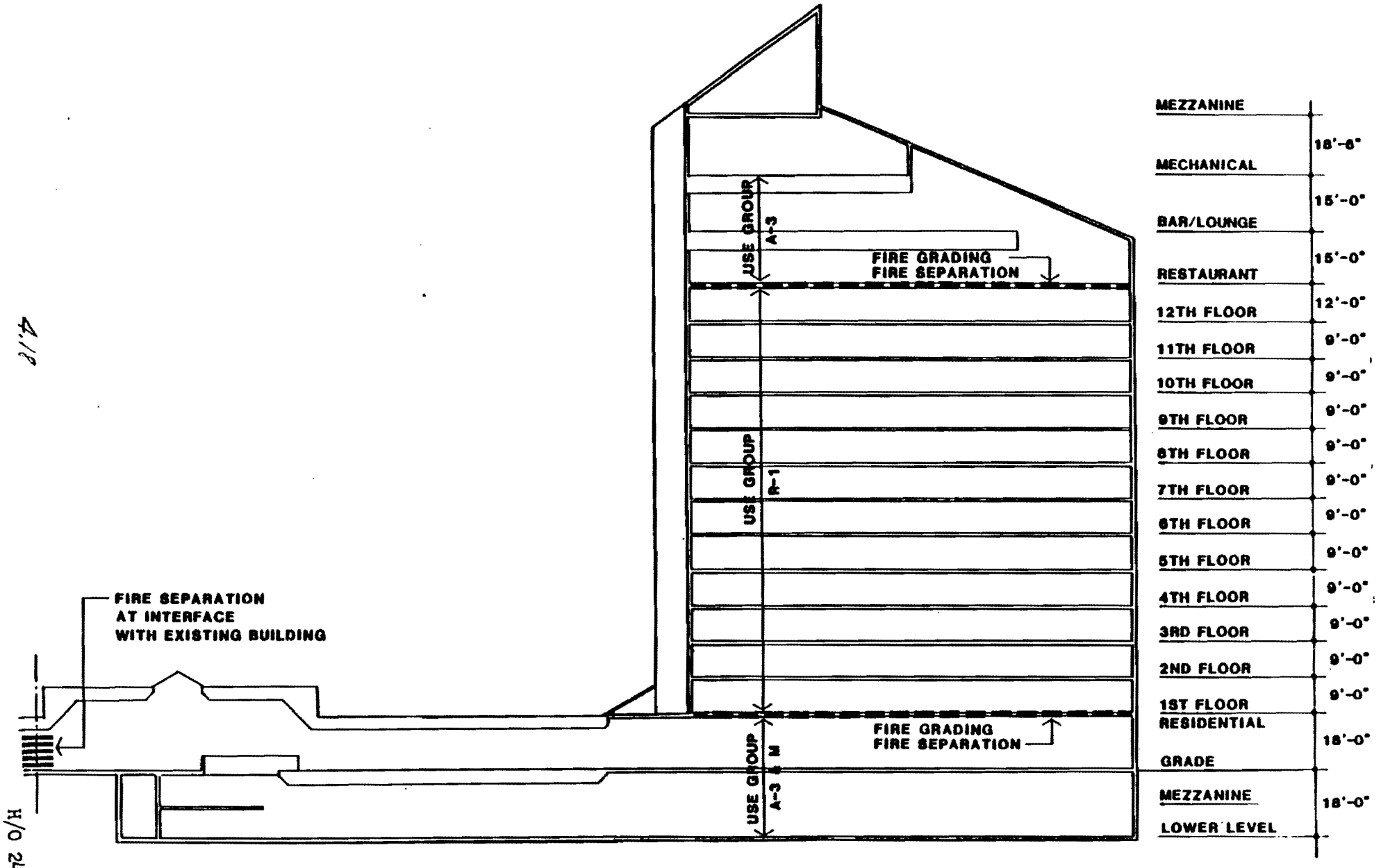
• Open bar shows early starts & finishes
• Solid bar shows late starts & finishes

4.16

PAVILLION PROJECT DRAWING ISSUE PAGE 1
LISTED BY DATE OF ISSUE - DATE PRINTED: [illegible] 1982
RALPH J. STEPHENSON PE PC

ITEM	ISS DWG	AW CT	SUB SHD	REV APP
PILING	11/22/83			
ANCHOR BOLTS	11/22/83			
PILE CAP RESTL	11/22/83			
ER SPACE FRAME	11/22/83	11/22/83	12/07/83	12/14/83
STEEL JOISTS	12/06/83	12/08/83	12/20/83	12/27/83
STRUCT STEEL	12/06/83	12/08/83	12/20/83	12/27/83
ROOF/FL MTL DK	12/06/83	12/08/83	12/22/83	01/09/84
EXT WALL PANELS	12/06/83	12/08/83	01/09/84	01/16/84
RF TOP MECH EQP	12/06/83	12/08/83	12/22/83	01/09/84
SPRINKLER MATLS	12/06/83	12/08/83	12/30/83	01/23/84
FLAG POLE	12/06/83	12/08/83	12/30/83	01/16/84
EXT WALL FRAMG	12/06/83	12/08/83	01/09/84	01/16/84
TRANSFORMERS	12/06/83	12/08/83	12/30/83	01/09/84
ETB FAB STR STL	12/15/83	12/22/83	01/09/84	01/16/84
MISC IRON	12/30/83	01/09/84	01/30/84	02/06/84
HM FRAMES	12/30/83	01/09/84	01/23/84	01/30/84
LIGHT FIXTURES	12/30/83	01/09/84	01/23/84	01/30/84
ER FABRIC ROOF	12/30/83	01/09/84	01/30/84	02/13/84
HARDWARE	12/30/83	01/09/84	01/23/84	01/30/84
ETB FABRIC ROOF	12/30/83	01/09/84	01/30/84	02/13/84
HM DOORS	12/30/83	01/09/84	01/23/84	01/30/84
SECURITY GATES	01/16/84	01/23/84	02/13/84	02/27/84
LOUVERS	01/16/84	01/23/84	02/13/84	02/27/84

HO 238


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

CONTRACT DOCUMENT MATRIX SUMMARY
GRAND TRAVERSE RESORT VILLAGE TOWER & LOW RISE
D106 - RALPH J. STEPHENSON PE PC - DATE PRINTED: JAN 12 1988

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	-	-	-	[illegible]
B	X	FRPS COLS TO LL MEZZ	-	-	-	B	B	-	-	[illegible]
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	-	-	[illegible]
C	X	INSTL MATERIAL & PERSONNEL HOIST	C	-	-	-	-	-	-	[illegible]
C	X	PROVIDE CONTRACT C HOISTING	C	-	-	-	-	-	-	48
C	X	CONSTRUCT TOWER LL MEZZ DECK	-	-	C	-	C	-	-	41

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 — PAGE —
GRAND TRAVERSE RESORT VILLAGE TOWER & LOW RISE
D106 - RALPH J. STEPHENSON PE PC - DATE PRINTED: JAN 1 0 '935

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	-	-	-	-	-	-	[illegible]
J	-	INSTL HARD CEILING SUSP & BLACK IRON	J	-	-	-	-	-	J	[illegible]
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	-	-	-	-	-	-	[illegible]
J	X	INSTALL INT HOLLOW METAL DOORS	J	-	-	-	-	-	-	[illegible]
J	X	LAY CARPETING IN CORR & PUBL SPACES	J	-	-	-	-	-	J	177
J	X	INSTL VINYL WALL COVERING	J	-	-	-	-	-	J	187

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GUIDELINES TO PREPARING CONTRACT DOCUMENT & PROJECT LAUNDRY LIST MATRIXES

DEFINITIONS

Contract document matrix - A two dimensional grid of rows and columns. The rows contain action items required to design, procure, and build the various project components The columns usually designate the geographic location of the item.

At the intersection of a row and a column, the designation of the contract document package in which the information appears is inserted .

Project laundry list matrix - A matrix listing of the actions that must be taken within various project components to execute the plan of action for a project. In the matrix form, the action is shown in the row. Supplementary information regarding the action is shown in in the action row under the appropriate columns.

Supplementary information often given, is listed below under possible fields to be included in matrixes. Frequently the contract document matrix and the project laundry list are combined.

PREPARING THE MATRIX

The first step in building a contract document matrix is to prepare a detailed random laundry list of component actions required to design, procure and construct all project work. Actions are usually classified by the major building component to which they belong. For instance, constructing wall footings is a substructure work component (sbw); forming a supported deck is a superstructure work (ssw) component; preparing and submitting a design development package is a design work (des) component. A suggested range of components is given below in the list of possible fields to be used in the contract document and laundry list matrix.

As the laundry list is prepared, items of work are classified by the contract document package to which they are assigned. Usually assignment to a specific package is made to those items which are interdependent within the package. A typical package assignment is illustrated below:

COD (contract document) package A - Foundation concrete (at random)

- Form, reinforce, pour & strip concrete wall footings

- Form, reinforce, pour basement walls
- Set basement wall miscellaneous iron embeds
- Install basement wall electrical sleeves
- Install basement wall pipe sleeves
- Form, reinforce, pour & strip column footings
- Set anchor bolts
- Form, reinforce, pour & strip column piers
- Form, reinforce, pour & strip truck dock footings
- Form, reinforce, pour & strip truck dock walls

Note that the list may includes action items requiring work on several trades in addition to concrete work. This definition of related activities is one of the main reasons a contract document matrix is valuable - it encourages the owner, designer and constructor team to properly assign actions, and consequently, drawings and specifications that depict the action, to the correct issue package.

The list is constantly refined and items added and relocated when necessary so as to ultimately produce a document packaging plan that allows that allows the most effective procurement and installation processing.

It is important to understand that the contract document package prepared by the design team is not the same as a trade bid package assembled and issued by the contractor.

• A contract document package may contain the drawing and specs needed for several trade contracts.

• Solicitation of proposals within a contract document package may encompass many trades.

It is the responsibility of the manager of construction operations (depending on the delivery system being used) to assemble the issued contract document packages in such manner that individual specialty contractors can propose on their work accurately, and with full confidence that their proposals will contain the full scope of work to be accounted for in the package.

Several advantages are gained by joint preparation of a contract document matrix by the owner, and the design and construction team. These include:

1.) The design team is guided toward preparing a set of documents that best fits the project delivery method selected and the proposal strategy desired by the owner and the construction team.

2.) The matrix provides a detailed reference check list to help insure that all items in the project are placed in the most effective portion of the documents.

3.) The laundry list prepared can be arrayed in approximate construction sequence within components to provide an excellent planning check list (laundry list) from which detailed and summary network models can be prepared.

4.) The matrix helps identify the timing of the package issues and allows most effective use of the design and owner team's attention in making project related decisions.

5.) The matrix will often point the way to the most effective project delivery method for the circumstances surrounding the job.

6.) Submittal requirements can be anticipated in advance and planned for by the design team when identified properly in the matrix. This has the effect of alerting all concerned with procurement that is truly needed to properly bring critical materials and equipment to the site.

* * *

The laundry list matrix is a natural extension of the contract document matrix and is often prepared concurrently. It contains supplementary column data about each task as defined in the list of suggested data fields given below.

POSSIBLE FIELDS TO BE INCLUDED IN MATRIXES

1. Actions required to accomplish the intended construction - act
2. Geographic area in which the action is to be taken - area
3. Responsibility codes of those who are to take the action - rsp
4. CSI specification section number for major trade items used in action - csi

5. Submittals required for action to be taken - sbm

Submittal types include
Design submittal - dsb
Shop drawings - shd
Samples - smp
Cuts & equipment brochures - cut
Mock ups - mup
Color & material boards - cmb
Warranties - war
Operating and maintenance manuals - omm

6. Major planning, design or building component to which an action belongs - cpt

Typical building components include:

• Front end work - fen - All non construction project related work concerning such items as real estate & financing

• Design work - des - Project related work that concerns production and issuing of contract documents.

• Procurement work - pro - Work related to solicitation of proposals, award of contracts, preparation of submittals, and fabrication and delivery of materials and equipment to the job site

• Substructure work - sbw - All foundation work upon which the superstructure bears directly or indirectly. May also include site preparation for start of field work on the building area.

• Superstructure work - ssw - All major structural load carrying components that bear on the substructure directly of indirectly.

• Exterior building skin work - esk - All elements needed to close the building to weather.

• Interior rough work - irw - All interior building components that can be exposed totally or in part to the weather without damage to their prime

function.

• Interior finish work - ifw - All interior building components that must be totally or partially protected from damage by weather

• Unit systems work - usy - All work that can be installed as a unit somewhat isolated from other component work inside or outside the building.

• On site work - ons (sometimes called site work - siw) - All exterior work outside the building line and inside the property or contract boundary lines.

• Off site work - ofs - All exterior work outside the property or contract boundary lines.

7. Responsibility codes - The identification code of those who are to take the action (rsp).

8. Contract document package - The document package in which the action to be taken appears (cdp).

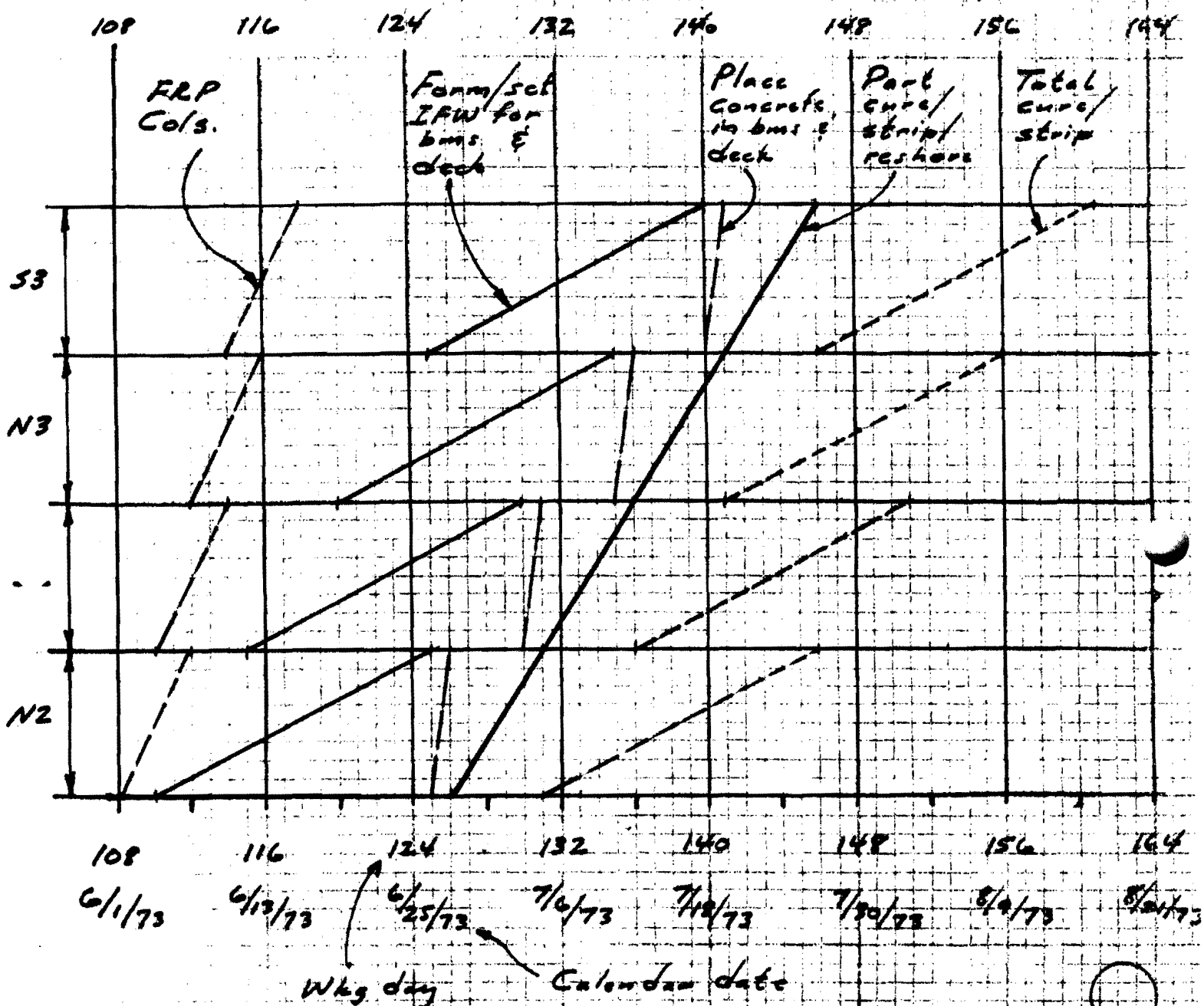
9. Construction sequence - A number showing roughly the installation sequence within a set of related actions (csq).

RALPH J. STEPHENSON CONSULTING ENGINEER 15064 WARWICK ROAD DETROIT 23, MICHIGAN PHONE 27[illegible]

Subject Slant Chart - Floor Pours Date 3/1/73

N2, S2, N3, S3 Page (1)

Data from Summary Network - sht's 1, 2, 3, 4



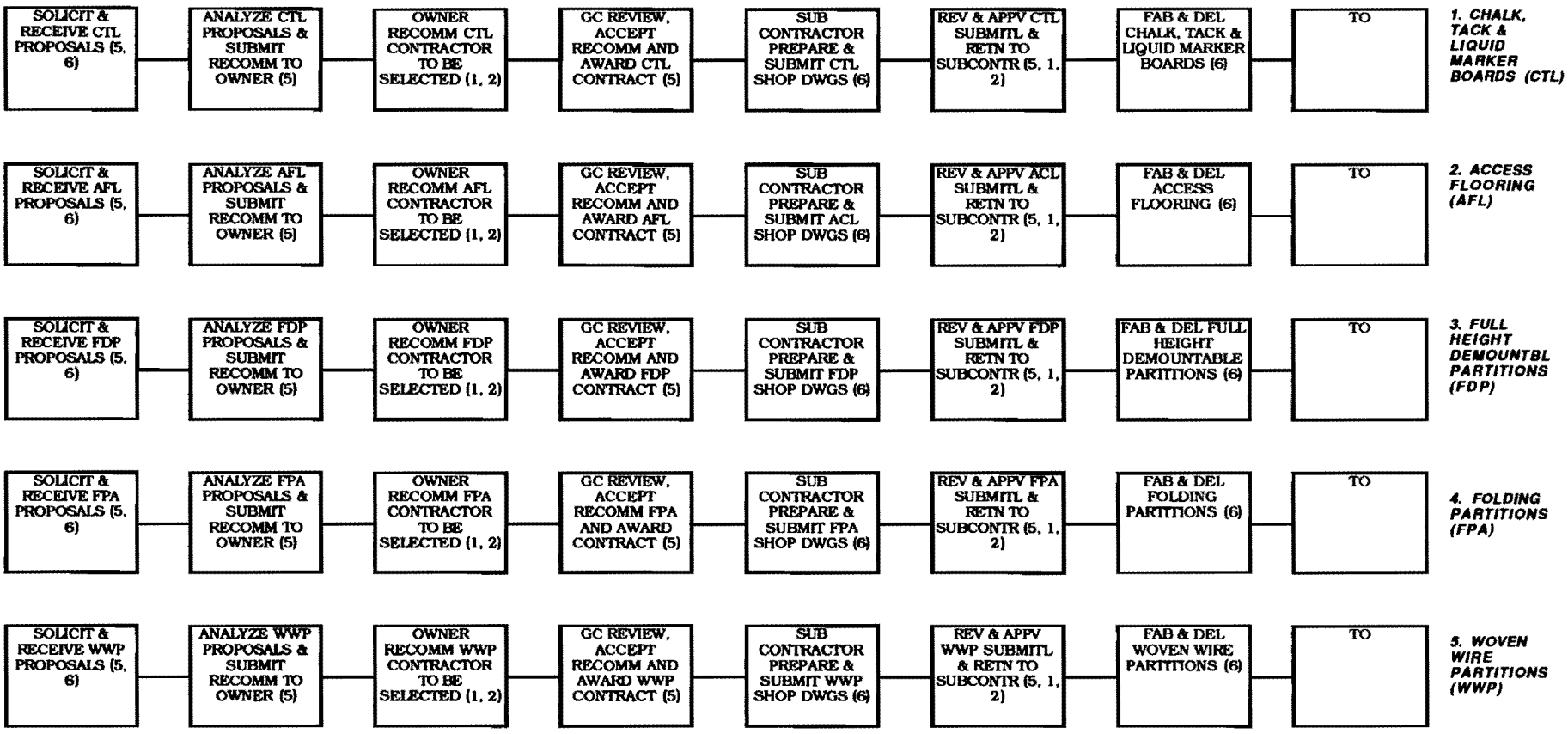
8/28/73

Project ______________________ Date ____________ RALPH J. STEPHENSON

Sht ____________ CONSULTING ENGINEER

ITEM PROCESSING SCHEDULE

Item	Date shop dwgs to be submitted			Date of shop dwg approval			Date fabrication complete	Date item on job site
	Subm 1	Subm 2	Subm 3	Subm 1	Subm 2	Subm 3		



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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)

PROCUREMENT NETWORK MODEL FOR TRINITY LAB & OFFICE BUILDING MARTINLY DNR HEADQUARTERS GENERAL SERVICES ADMINISTRATION MARTINLY, OKLAHOMA

Issue #1 - November 15
i1div10sht1procumt
ho 300 - Dec 90

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.

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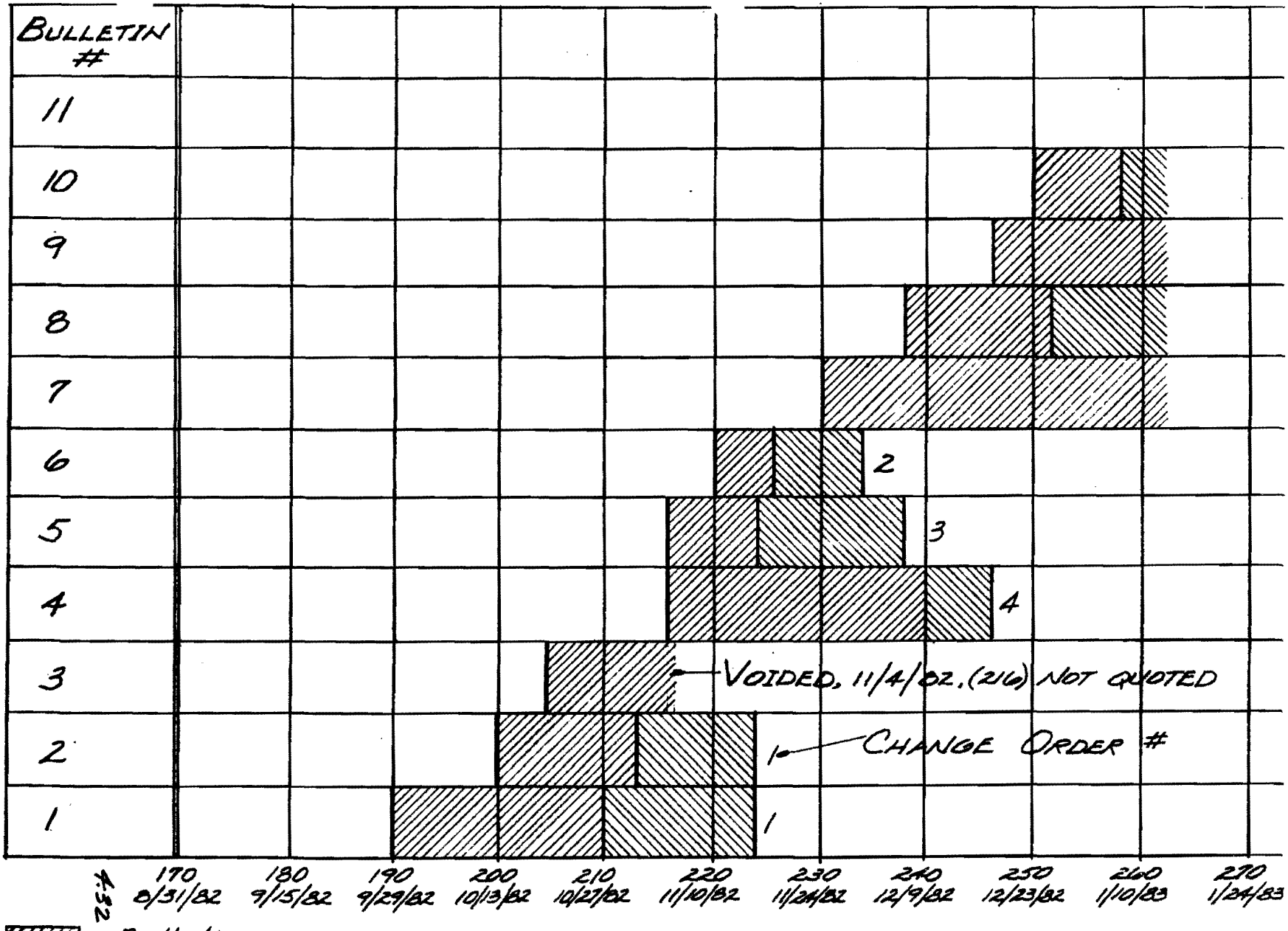

BULLETIN/CHANGE ORDER RECORD

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER

ho 198

(1) Line #	(2) Equipment Description & Who Furnishes	(3) Present Location of Equip	(4) Final Location	(5) Action To Be Taken	(6) & By Whom	(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 4.33	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

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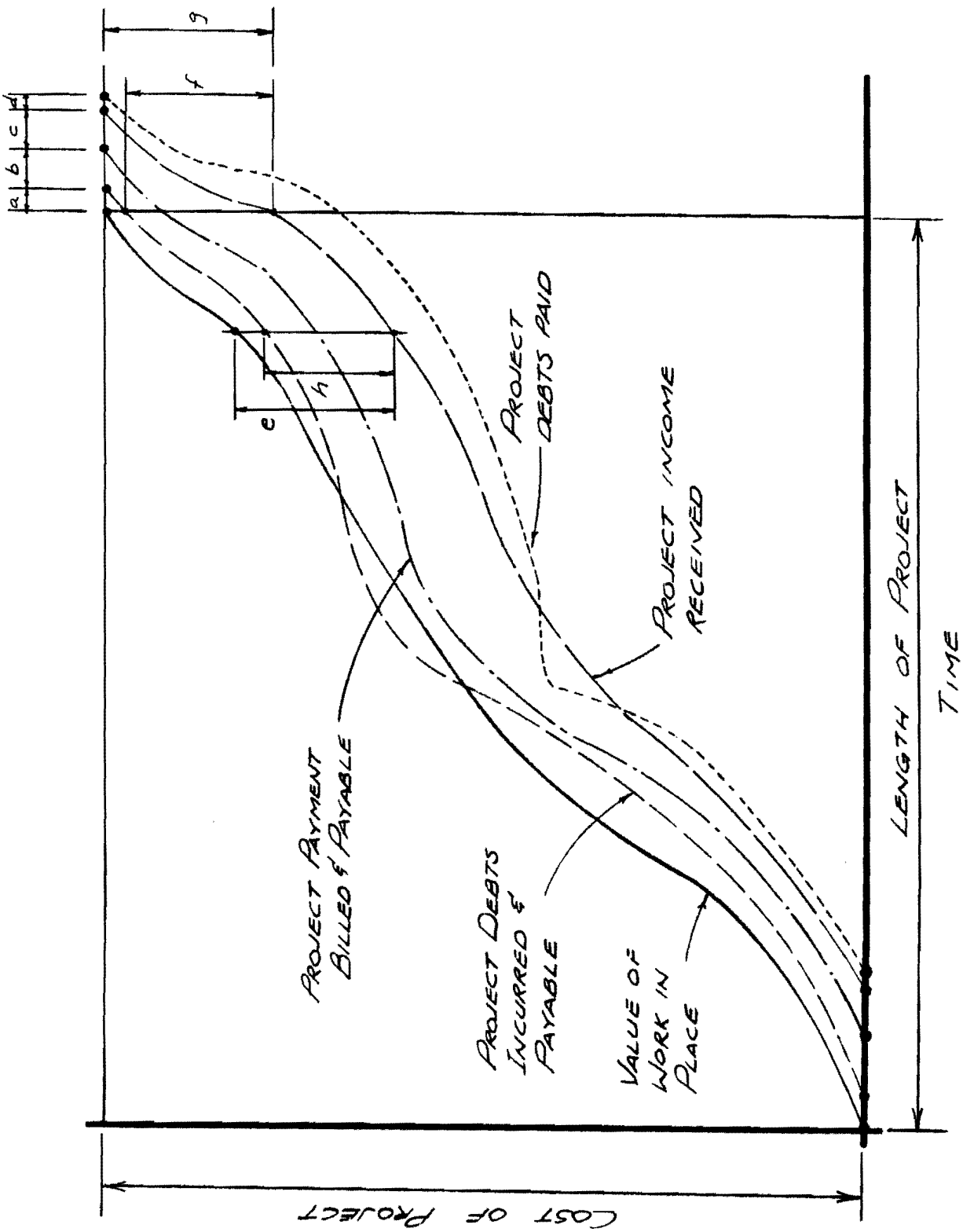

PROJECT MONEY FLOW

H/O 147

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Turnover Cycle (t) Example

Definitions:

x = completion date in working days (wd)

i = starting date in working days

d = duration in elapsed working days to complete one unit

t = turnover cycle in working days (the number of working days between the completion of one unit and the completion of the next)

n = number of units

Basic equations:

$$x = i + d + t(n-1)$$

$$i = x - d - t(n-1)$$

$$t = \frac{x - i - d}{(n-1)}$$

Examples:

For x unknown

i = 160

d = 7 wd

t = 4 wd

n = 11 units

For i unknown

x = 325

d = 10 wd

t = 6 wd

n = 21 floors

For t unknown

x = 352

i = 280

d = 9

n = 15 sectors

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	7
N	X	INSTALL STOREFRONT GLASS	N	N	-	N	N	-	N	
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

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• *SECTION 5 - ORGANIZING THE PROJECT STAFF & THE WORK*

05.01	Elements of business & management
05.02 & 05.03	Traditional organization chart
05.04	Functional company department relations
05.05	Functional company individual relations
05.06	A/E funct relationships - major activity
05.07	Project delivery work phases
0508	Professional service contract characteristics
05.09	Construction contract characteristics
05.10	The iterative costing sequence
05.11 & 05.12	Span of management explanation
05.13	Span of management graphics
05.14	Decision to action time span graphics
05.15	Decision to action explanation
05.16 to 05.18	Where do we go from here? U of Q case study
05.19 & 05.20	U of Q organization blanks
05.21 & 05.22	Bengst expansion case study - situation AE
05.23 & 05.24	Bengst expansion case study - situation db
05.25	Bengst organizational graphics
05.26	Unstructured organization chart
05.27	The concerned owner & the separate primes

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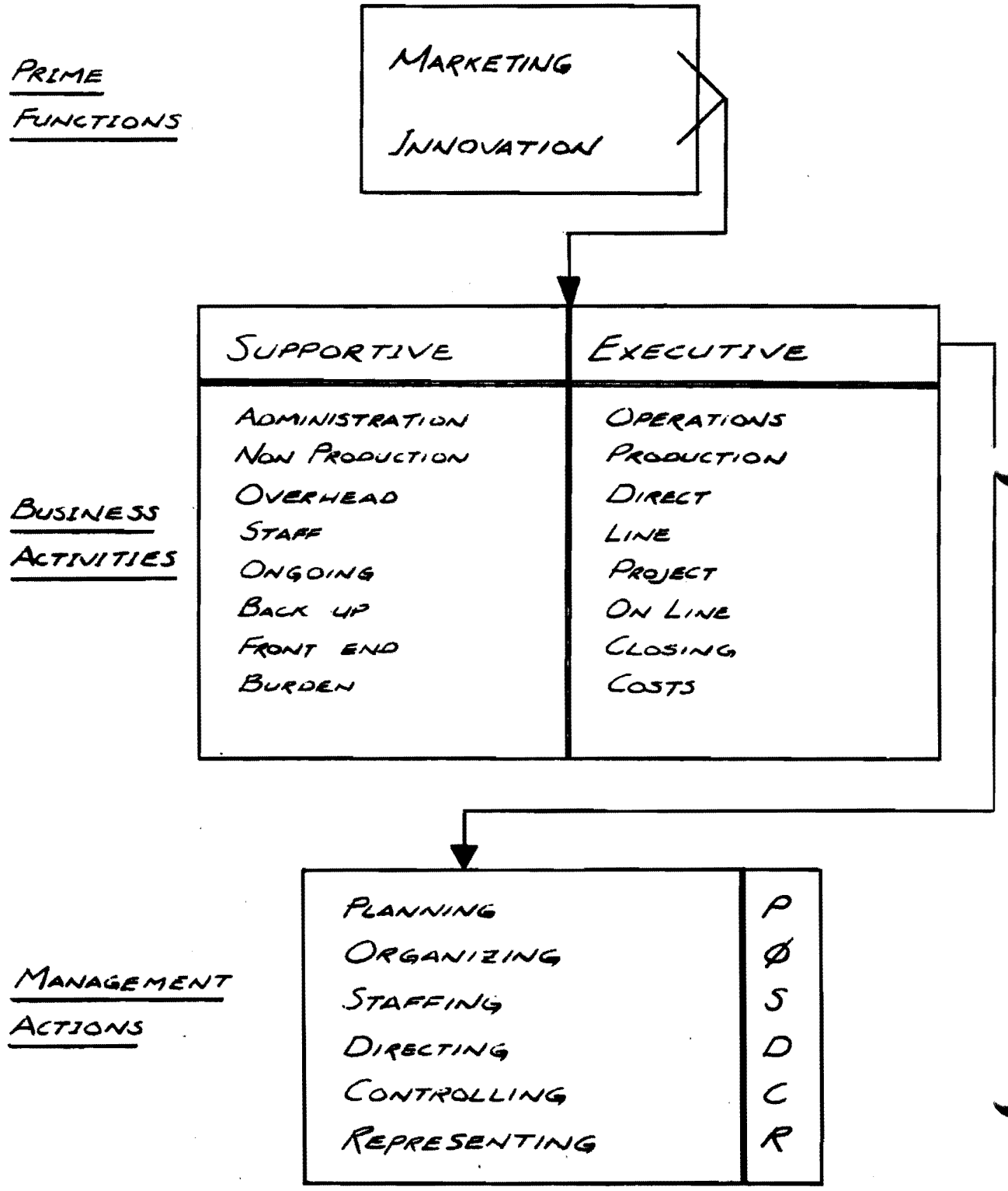
ELEMENTS OF BUSINESS & MANAGEMENT



H/C 145 2/77

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FUNCTIONAL ORGANIZATION OF A MODERATE SIZE ARCHITECTURAL ENGINEERING (A/E) FIRM

RJS-AGCK EXHIBIT G

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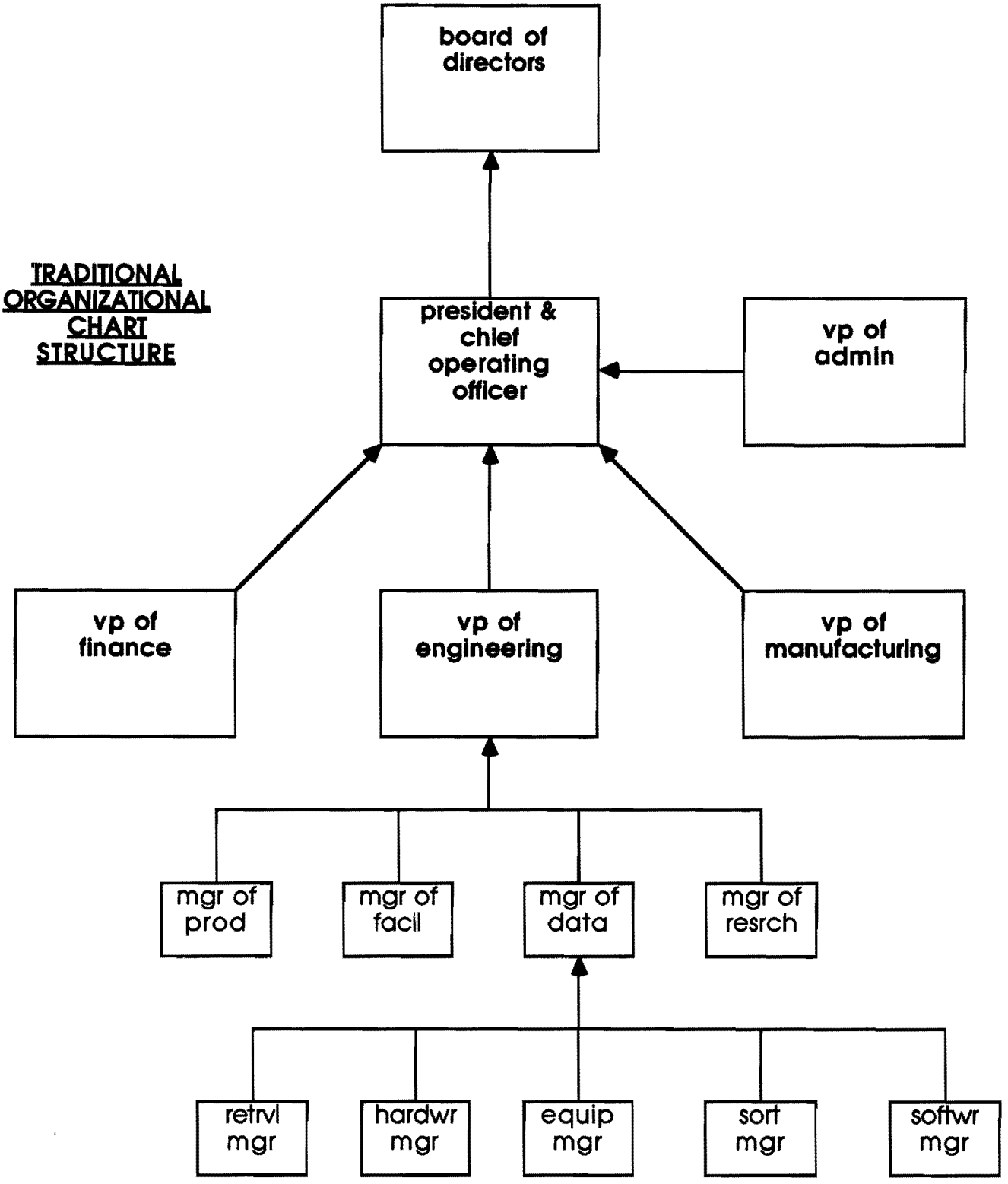
Consulting Engineer

TRADITIONAL ORGANIZATIONAL CHART STRUCTURE



HO 311 - April, 1988

EXAMPLE OF BASIC FUNCTIONAL COMPANY RELATIONS (DEPARTMENTAL)

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

EXAMPLE OF BASIC FUNCTIONAL DEPARTMENT RELATIONSHIPS (INDIVIDUAL)

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A/E FUNCTIONAL RELATIONSHIPS
BY MAJOR ACTIVITIES

H/O 236

1. Project Delivery Work Phases

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Phase	Needs
A. Conceive The need for the project is identified and a broad plan for its implementation is formulated.	1. Market analysis 2. Real estate analysis 3. Financing analysis 4. Cost analysis, and Others
B. Validation The project financial feasibility is confirmed, land is controlled, and a formal pro forma made. Some confirmation site and building design studies are made. This phase produces a go or no go decision.	1. Programming 2. Real estate control 3. Financing acquisition 4. Cost analysis 5. Approval 6. Architectural design 7. Land planning 8. Traffic analysis 9. Go or no go approval, and Others
C. Design The design & construction delivery system is selected and documents adequate to construct the project are prepared & issued for construction.	1. Design development 2. Schematics 3. Preliminaries 4. Construction document production, and Others
D. Construction The project is built & given to the owner & occupant using the delivery system selected earlier.	1. Procurement 2. Construction 3. Turnover 4. Warranty, and Others

ho 363 Dec, 92

2. Professional Service Contract Characteristics

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A. Agreement premises

1. Totally negotiated - broad multivalue competition
2. Partially qualified - moderate multivalue competition
3. Totally qualified - narrow multivalue value competition

B. Authority limits

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

C. Payment methods

1. Fixed total including payroll + overhead + profit + (expenses)
   a. Expenses included
   b. Expenses separate
2. (Payroll costs) x multiplier + fixed fee + expenses
   a. Limit on
   1.) Payroll hours
   2.) Expenses
   b. No limit on
   1.) Payroll hours
   2.) Expenses
3. (Payroll costs) x multiplier for payroll costs & overhead
   a. Expenses included
   b. Expenses separate
4. % of total construction cost
   a. Expenses included
   b. Expenses separate

D. Scope of services

1. Single responsibility
   a. All in house
   b. In house & outside consultants
2. Split responsibility
   a. In house, client & other prime consultants
   b. In house & other prime consultants
   c. In house & client

ho 362 Jan, 90

3. Construction Contract Characteristics

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A. Agreement premises

1. Totally negotiated - broad multivalue competition
2. Partially qualified - moderate multivalue competition
3. Totally qualified - narrow multi valuevalue competition

B. Authority limits

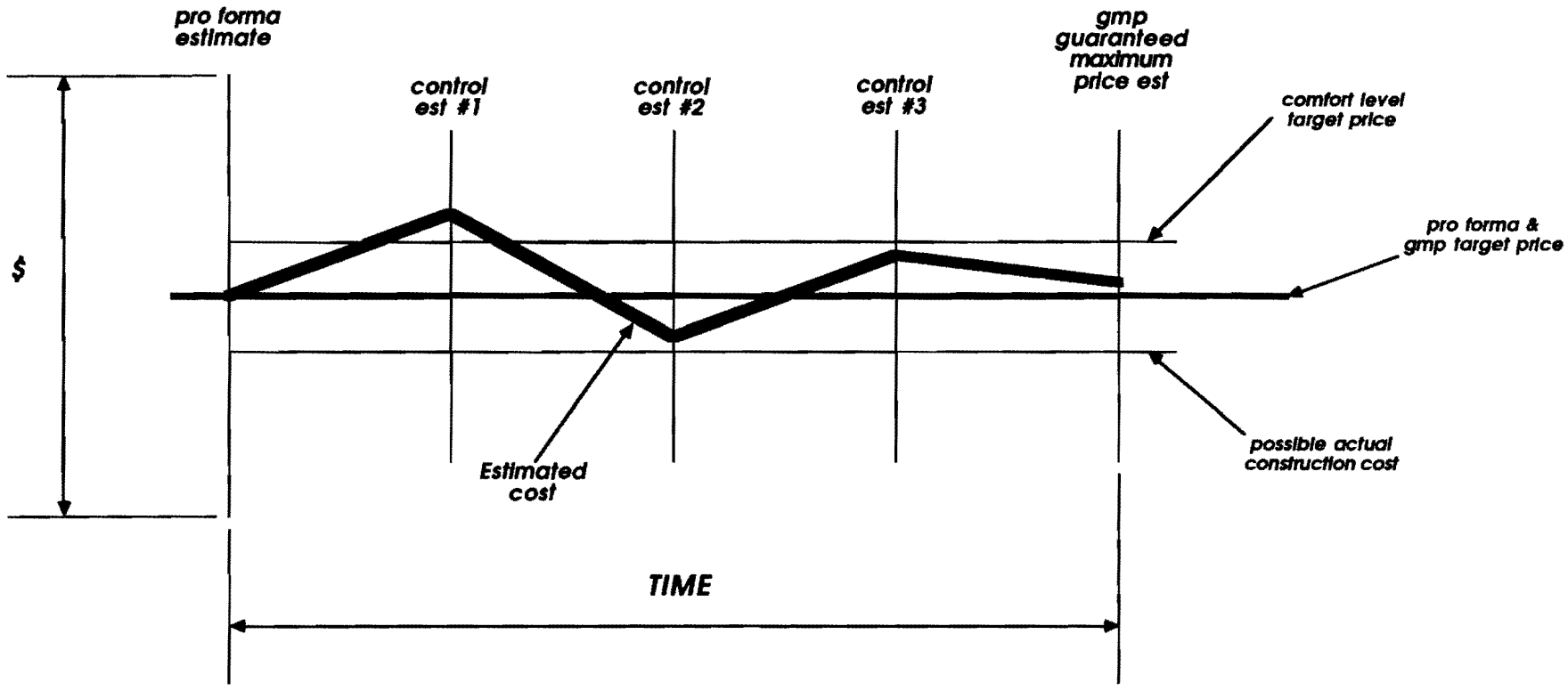
1. As full agent
2. As limited agent
3. As contractor

C. Payment methods

1. Fixed cost (hard money)
2. Time & material + fixed fee
   a. Limit on
      1.) Time & material (gmp) with no shared savings
      2.) Time & material (gmp) with shared savings
   b. No limit on time & material
3. Time & material + % fee
   a. Limit on
      1.) Time & material (gmp) with no shared savings
      2.) Time & material (gmp) with shared savings
   b. No limit on time & material
4. Conditional payments or penalties
   a. Incentive/disincentive
   b. Liquidated damages

D. Scope of services

1. Single responsibility - in house & subcontractors
   a. All trades
      1.) Provide management
      2.) Provide design
      3.) Provide construction labor
      4.) Provide construction materials
   b. Limited trades
      1.) Provide management
      2.) Provide design
      3.) Provide construction labor
      4.) Provide construction materials
2. Split responsibility - in house, subcontractors & other primes
   a. All trades in contract
      1.) Provide management
      2.) Provide design
      3.) Provide construction labor
      4.) Provide construction materials
   b. Limited trades in contract
      1.) Provide management
      2.) Provide design
      3.) Provide construction labor
      4.) Provide construction materials



THE ITERATIVE COSTING SEQUENCE

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IT1 - ho aspe 1.10

Sheet #IT1

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Span of management explanation

Span of management can be defined as the number of people whose activities you are able to manage and supervise by direct and relatively continuous contact. Relatively continuous contact is direct communication on a day to day basis that allows you to evaluate performance at desired and needed intervals. Usually direct management implies a closely spaced geographic relation to those being managed.

Main factors that influence an effective span of management are:

1.) The degree of need for those you manage to communicate with each other
2.) The amount of time required to be spent by you with each of those you manage, and
3.) The effort required of you by your subordinates to assist them to work well with those outside your direct management system.

If there is a large degree of intercommunication between those you manage with each other, and with you, an effective span of management is usually limited to from 4 to 6. Where there is little or no intercommunication between those under your direct management, you may be able to manage 20 to 30 people. This was proven in an analysis of Sears middle management many years ago. There it was found that where department managers had little if any contact with each other that store managers could properly handle the responsibility for as many as 30 of these isolated managers and still be profitable and effective.

The number of links between subordinates determines how complex is their management. If have 4 subordinates reporting directly to you and there are no links between the subordinates, the number of two way communication channels in the system is 4, one for each of your subordinates to and from you. This requires management of $4 \times 2 = 8$ relations - well within the capabilities of even an inexperienced manager.

If 2 way links must be maintained among both you and your subordinates within a managerial span of control of four, you are now managing 20 paths. Still not too many, provided any one link or set of links does not require excessive time.

As the number of participants increases the number of 2 way communication links rises rapidly. For total linkage and 6 subordinates the number of 2 way links is 21 and

the number of communication channels is 2 x 21 = 42. If you move to total linkage for 10
subordinates the number of full communication channels is 110, a number very difficult for even an experienced manager to handle.

If you are managing 20 people with links limited to one from them to you and none from them to others, you are only managing 20 x 2 = 40 communication channels. If you must manage total links between 20 subordinates under these conditions you may find yourself trying to keep in touch with so many communication channels that you never do gain control of the management process.

The span of management has many historical precedents that have repeatedly proved the difficulties in trying to directly manage too many people. One of the earliest examples of formal span of control analysis is found in the Bible. The book of Exodus 18:12 - 27 tells of Jethro warning his son in law, Moses, that he has stretched his span of management too far and is in danger of losing control of the Exodus mission, leadership and quality.

Military management for thousands of years has proven that careful attention must be paid direct control numbers for the safety and effectiveness of troops under each level of the military hierarchy.

Today's managers in construction find their span of control measurement is far more complex than that of the traditional internal manager. This is primarily due to the need for the manager in construction to be responsible for, and have authority over, many parties outside the organization. In addition he or she often does not have strong, well defined, formal organizational clout and must exert direction through technical excellence, persuasion, fairness, firmness and good judgment.

This is possible for the experienced and excellent manager, but is hardly ever achieved by the emerging manager without help from his or her's superior management staff and the company executive staff.

Keeping the span of management to a controllable size is the responsibility of both top and middle management.

AL MANAGES INDIVIDUAL RELATIONSHIPS & GROUP RELATIONSHIPS.

KARL MAY HAVE TO MANAGE INDIVIDUAL RELATIONSHIPS & GROUP RELATIONSHIPS.

SPAN OF MANAGEMENT PRINCIPLES

Ralph J. Stephenson PE PC
Consulting Engineer

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.

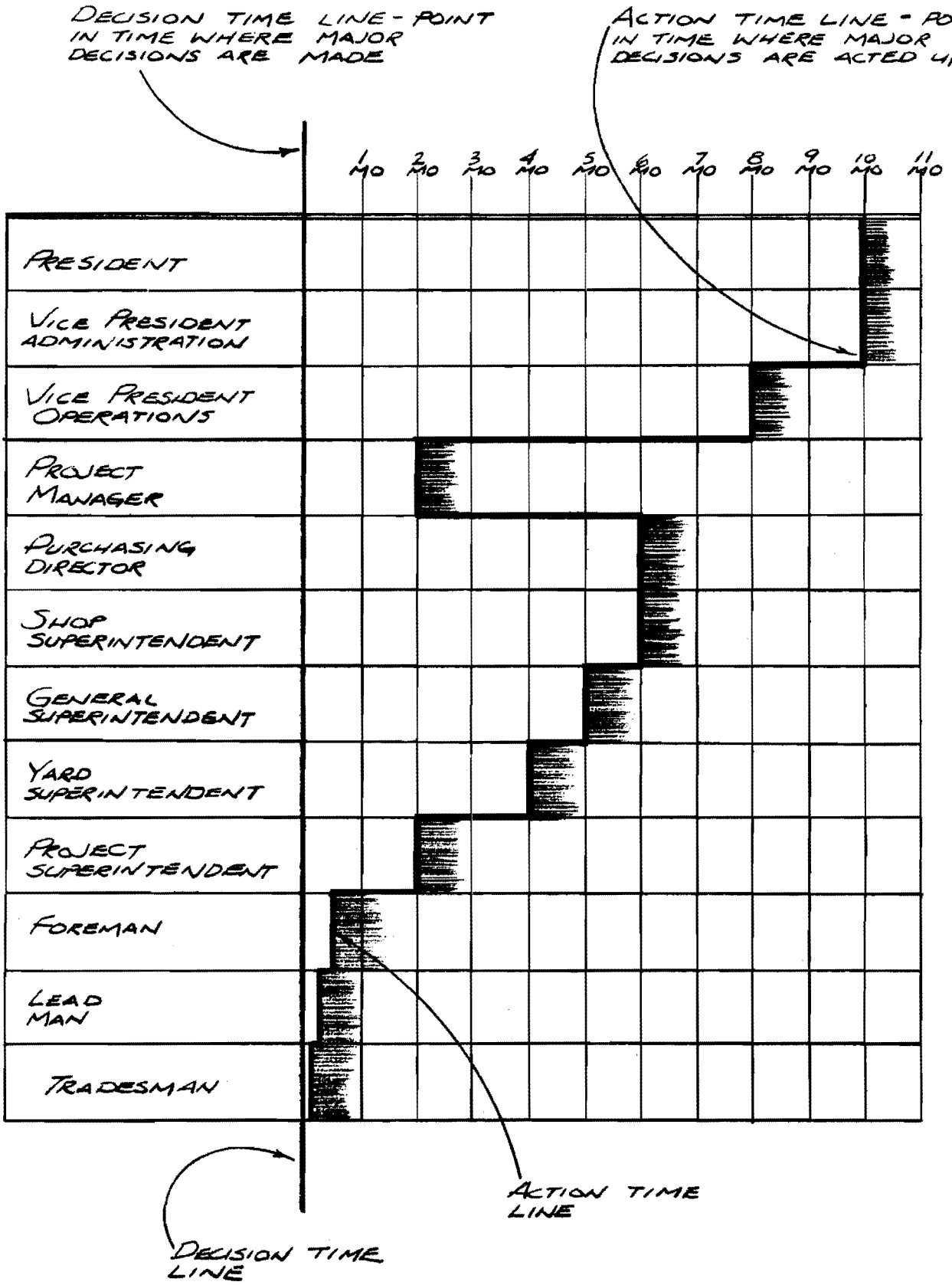
Good grading of the decision to action time will help assure that the organization has assigned the responsibility for decision making at the proper management level. This assurance leads to proper assignment of tasks and operations at lower levels of management, and to identification of responsibility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

The benefits of preparing a decision to action analysis for your firm include:

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 management aware of their importance in executing decisions made at other management levels.

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

DECISION TO ACTION TIME SPAN



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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 has 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 challenged 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 Regents of the University, and acting as an ex officio advisor to the program group, how would 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?

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER

QITAIN UNIVERSITY - PROJECT

ORGANIZATION STRUCTURE

Robert Hagel
Pres Hagel Mech Engrs

Charles Redrock
Link & Associates

Fred Link
Pres Link & Assoc

Stan Weissman
Pres Weissman Electric-Elect Engrs

James Tea
QU Program Consultant

Frank Carlton
VP - QU Planning & Development

Richard Goldmark
Alumnus of QU

George Deff
City Manager of Qitain

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER

QITAIN UNIVERSITY - PROJECT

ORGANIZATION STRUCTURE

Robert Hagel
Pres Hagel Mech Engrs

Charles Pedrick
Link & Associates

Fred Link
Pres Link & Assoc

Stan Weissman
Pres Weissman Electric - Elect Engrs

Richard Goldmark
Alumnus of QU

George Deff
City Manager of Qitain

Frank Carlton
VP - QU Planning & Operations

James Lee
QU Program Coordinator

Ralph J. Stephenson PE PC
Consulting Engineer

The Bengst Corporation Expansion - Situation AE

Your firm Jonquil & Associates, designed the original lab building eight years ago, but have done no work for Bengst in the intervening period.

You are to be the Jonquil project manager for the Bengst program if your firm is awarded the contract. You met Mr. Bengst during one of the regular marketing tours required of Jonquil project managers each year. However he is not well known to you, nor you to him.

Jonquil has been asked by Mr. Bengst to meet with him and Karl Jong to discuss designing the lab expansion, along with doing the master planning for the Tarry site. You have been asked by the president of Jonquil to outline your approach to planning, organizing, designing, and launching the expansion plan, completing the move in on time, and meeting the quality standards of Bengst and your firm.

Some of the questions you will be expected to answer include:

1. How will you organize to do the building design and the master site planning?

2. Will Bengst be able to occupy the building while the second floor addition is being built?

3. What is the time frame within which design and construction will occur?

4. What is the best method of letting construction contracts?

5. What organizational and decision making structure do you desire the owner to establish?

6. What ownership arrangement is best for Bengst of the new facility as well as their existing facilities in Billings? Ready operating capital is essential to Bengst.

7. What pattern do you wish Jonquil's future relations with Bengst to take?

8. As an internal question, what steps will you take to insure that Jonquil's future relations with this client will remain as you wish them to be?

9. What level of staff talent will you assign to the job?

10. The home office of Jonquil is in Philadelphia. What local Tarry affiliations, if any, would you try to establish for the project work?

11. What are your comments on the Tarry and Billings locations relative to Bengst's long range planning?

Ralph J. Stephenson PE PC
Consulting Engineer

The Bengst Corporation Expansion - d/b

You are a project manager with a NOCMA, a moderate size design/build & development firm with offices in Minneapolis and Milwaukee. The current work load of the firm is high but the backlog has dropped and project managers are being encouraged to look for work of a suitable nature to improve the firm's base of operations & volume over the next one and a half years.

Your company has been working hard to encourage the concept of the expanded profit center organization. Presently company management is considering how best to be an umbrella manager that can truly leverage the abilities and efforts of others to accomplish a mission of worth to all involved.

It's 1:45, Tuesday afternoon and you are sitting in your office thinking over the relation of design, construction, financing, land ownership, equity and debt, legal factors, and real estate, all relative to how to best improve your chances of producing construction assets of value. Your phone rings and it is Karl Jong calling from Bengst Corporation. You went to school with Karl, and were good friends throughout college. Now you exchange holiday greetings and an occasional letter. He knows you are in construction and you know he is in software/hardware design.

Mr Jong describes a project to which he has been assigned and asks for your help and advice. He adds that he has reviewed the purpose of his call with Mr. Steel Bengst and has Mr. Bengst's permission for you to spend a day or so with them on a fee basis to help establish the best project delivery system for the project. Mr. Jong adds that he expects you, Larry Mark, to be directly involved in the short term consulting and if any construction results, it also.

You have just put the phone down from Mr. Jong's call and are outlining a course of action and an agenda for a two day meeting with Mr. Jong. At the end of the meetings it is your intent that Mr. Jong be able to use your

recommendations to satisfy assignments #1, 2 and 3 given to him by Mr. Bengst. Please outline your agenda & suggestions as to how Karl Jong should proceed to complete these assignments and what he should recommend. How should you be involved?

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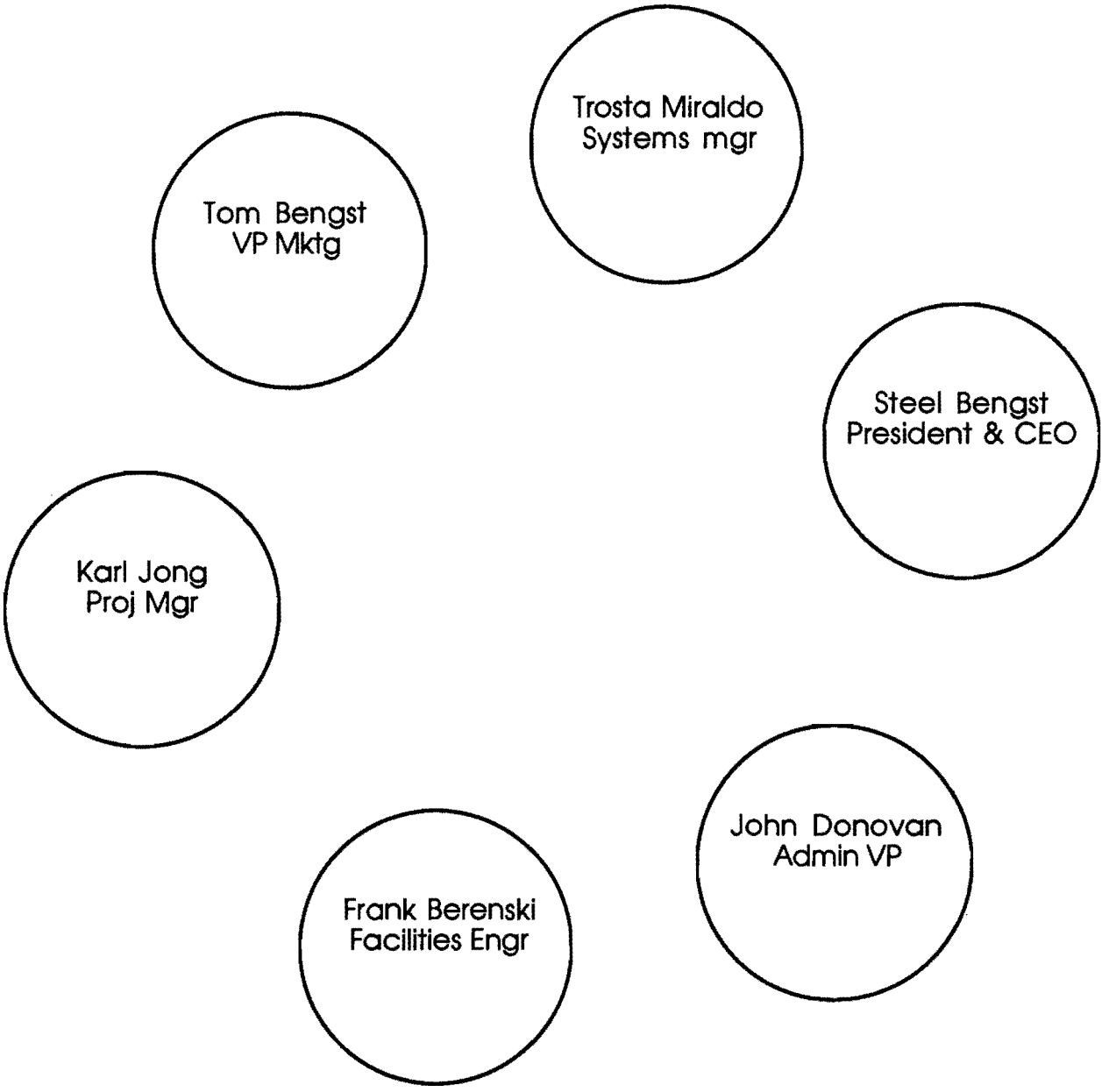
Consulting Engineer

Bengst Corporation Expansion Organizational Relations



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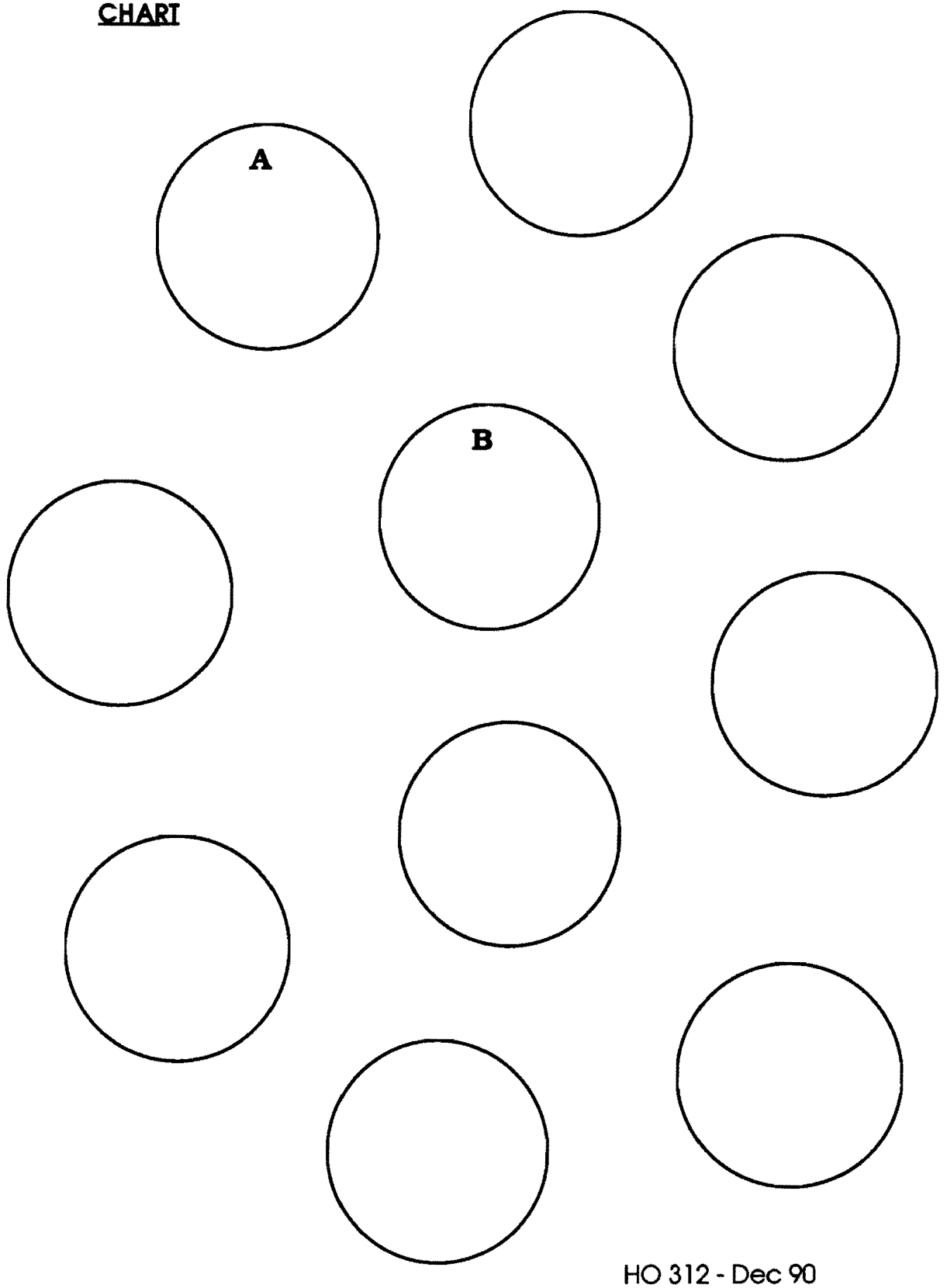
GRAPHICALLY UNSTRUCTURED ORGANIZATIONAL CHART



HO 312 - Dec 90

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THE CASE OF THE CONCERNED OWNER AND HIS SEPARATE PRIME CONTRACTORS

a management case study in working well with owners and other prime contractors

Your firm, the Oldenberg Construction Company, has just negotiated a time and material upset price contract for the architectural and structural construction work on a large local hotel. The other contracts for plumbing, heating, ventilation and air conditioning, fire protection, electrical, security systems, food service equipment and fixtures, furnishings & equipment (FFE) are to be awarded as prime contracts to local, well qualified contractors. None of these except yours have been awarded as yet.

The owner's representative, Stanley Wozniak has asked your opinion of how the entire project could best be delivered and how you would organize the job if you were in his position. Mr. Wozniak has had about 5 years of experience constructing shopping centers for your client He is somewhat uneasy about this job since at $27 million it is the largest job he has worked on to date, and it is a new type of project for him.

Although you know that most of the primes perform well, the mechanical and electrical contractors traditionally are known to underman their work whenever they sense a project is going poorly in trades other than their own.

Please answer these questions in as much detail as possible

1.) What factors will influence your answer to Mr. Wozniak?
2.) What kind of planning and scheduling would you expect to do on job like this?
3.) What can you do to help Mr. Wozniak in his decisions?
4.) What type of contract would you have used if you were the owner on the project?
5.) What is your response to Mr. Wozniak questions?

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Consulting Engineer

Red transparencies

• *SECTION 6 - MANAGING THE PROJECT STAFF & THE WORK*

06.01	Construction control documents
06.01a	Design work phasing
06.01b	Scope of design work phasing
06.01c & d	The project program
06.02	The role of the manager
06.03	Managerial leverage
06.04	Critical transition point
06.05 & 06.06	Notes on forerunner & conservatively managed companies
06.07 & 06.08	Creativity & how it is used in project managment
06.09 & 06.10	Apply situational thinking
06.11	Ethics - questions to ask to guide ethical decision making
06.12 & 06.13	PMI thinking
06.14 to 06.16	Prepare for the probable
06.17	Paretos law
06.18 & 06.19	Manage by exception
06.20 to 06.23	How to spring the time trap
06.24 to 06.28	Working well with people
06.29 to 06.31	Employ the power of training
06.32	4 i's improvement cycle
06.33 to 06.35	Weights & values as a decision making tool
06.36	Effective record keeping for the project manager
06.37 & 06.38	Record types & their uses
06.39 to 06.45	Procedures for preparing project documentation
06.46 to 06.50	Documentation degree
06.51 & 06.52	Case study - keeping the records staight
06.53 & 06.54	Case study - krs abbreviations
06.55 & 06.56	Case study - krs project minutes
06.57	Case study - krs job log
06.58	Case study - coded letter
06.59 & 06.60	Case study - document control file
06.61	Case study - project history
06.62 & 06.63	The case of the changing library - documentation case study
06.64	Photo file
06.65 & 06.66	To do lists
06.67 & 06.68	Claim prone job characteristics
06.69 to 06.73	Common causes of contested claims

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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.

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DESIGN WORK PHASING

The following list is a commonly used combination of design document phases for preparation and processing of construction contract documents. Other phases may be added to, or substituted for those listed depending on the needs of the project, the owner, the user, and the project team. Further modifications may also be made to suit special requirements of the project delivery system being used.

- **PROGRAM PHASE** - Narrative statement of facility characteristics.
- **SCHEMATIC DESIGN PHASE** - Conceptual development of the design.
- **DESIGN DEVELOPMENT PHASE** - Refined details of conceptual design
- **CONSTRUCTION DOCUMENT PHASE** - Full construction documents.
- **CONSTRUCTION ADMINISTRATION PHASE** - Construction presence.

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Consulting Engineer

SCOPE OF DESIGN WORK PHASING

The following list is a commonly used combination of design document phases for preparation and processing of construction contract documents. Other phases may be added to, or substituted for those listed depending on the needs of the project, the owner, the user, and the project team. Further modifications may also be made to suit special requirements of the project delivery system being used.

• **PROGRAM PHASE** - A narrative statement of the project requirements, characteristics, and allowable costs. During the program phase rough estimates of total cost may be made by various costing techniques.

• **SCHEMATIC DESIGN PHASE** - The conceptual development of the project in accordance with the program requirements. Usually review and approval of schematics in part or completely allows design development work to begin. During schematic design the rough program phase estimates are refined to a level of detail consistent with the information available. These kinds of estimates may be known as order of magnitude estimates.

• **DESIGN DEVELOPMENT PHASE** - The program and schematics are used to fully develop preliminary architectural and engineering details of the facility. Approval in part or fully of design development documents allows preparation of construction documents, or working drawing to begin.

Estimates may now be refined to a point where early stages of construction, such as site preparation, mass excavation, grading, foundations may be moved into final construction document design. Occasionally the design development phase documents can be used for providing a guaranteed maximum proposal for selected portions of the project.

• **CONSTRUCTION DOCUMENT PHASE** - The full set of construction contract documents are prepared in such detail to allow the project construction contracts to be awarded and field work to begin. At the point where part or all of the construction documents are completed, hard money proposals, or fixed cost proposals may be solicited. The type of project delivery system selected determines how the work is to be awarded.

• **CONSTRUCTION ADMINISTRATION PHASE** - The contractor or subcontractor construction proposals are evaluated, contracts are let and submittals on items to be used in the project are made, reviewed, checked, and approved. During this period the design firm of record usually provides an inspection or review presence on the project site. This may be for part or full time depending on the nature of the project, and the requirements of the owner, user, and contractor.The delivery system selected also influences the amount of construction administration required.

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- ## The Project Program - summary outline
  - ### Definition of a project 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. Sometimes called the brief.

  - ### Contents of the project program - listed alphabetically
    The program for facility work contains specific information about the following items. For special uses the list below should be expanded to accommodate the unique needs of the facility.

1. **Addresses, and phone and fax numbers of key people.**
2. **Advertising needs.**
3. **Aesthetic needs.**
4. **Backup needs**
5. **Codes and ordinances applicable.**
6. **Communication needs.**
7. **Community needs.**
8. **Cost goals - pro forma**
   A financial model unusually built early in a design and construction program to show by projecting income and expenses, how the money flow to and from the project will occur. It is often used to establish the capital amount to be allocated to a project based on simulated operating conditions. The term pro forma means according to form.

9. **Dimensional needs - horizontal and vertical**
10. **Employee facilities and amenities**
11. **Expansion needs.**
12. **Functional needs - what design will make the project behave the way it is supposed to when it is built and in operation?**
13. **Handicapped needs.**
14. **Heating and air conditioning needs.**
15. **Horizontal transportation needs.**
16. **Lighting needs.**
17. **Location of project.**
18. **Logistical needs**
    Logistics - The design and implementation of operations that deal with the procurement, distribution, maintenance, and replacement of material and personnel.

19. **Name of project.**
20. **Nature of the project - what is it supposed to do when it is built and in operation?**
21. **Parking needs.**
22. **Participants - specifically, who are they now and in the future?**
    1. 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 might also 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.

2. 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.
3. Constructors
   Those who interpret the construction language and convert it to an 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.
4. Operators
   Those who operate and maintain the completed physical environment on a continuing basis. Usually the party responsible for this function is an owner or tenant working through a plant or facilities manager.
5. 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.
6. Users
   Those who use the facility either directly or remotely. Direct use is permanent or temporary occupancy of the facility. Indirect use is any interface with the building's occupants that is conducted from a location other than at the facility.

23. **Personnel special needs.**
24. **Plumbing needs.**
25. **Power needs.**
26. **Project delivery systems to be considered.**
    A method of assembling, grouping, organizing & managing project resources so as to best achieve project goals & objectives.
27. **Public transportation needs.**
28. **Receiving needs.**
29. **Recreational needs.**
30. **Security needs**
31. **Shipping needs.**
32. **Special hazards and environmental problems.**
33. **Stand by needs.**
34. **Storage needs.**
35. **Structural needs.**
36. **Surveillance needs**
37. **Trash disposal and recycling needs.**
38. **Vertical transportation needs.**

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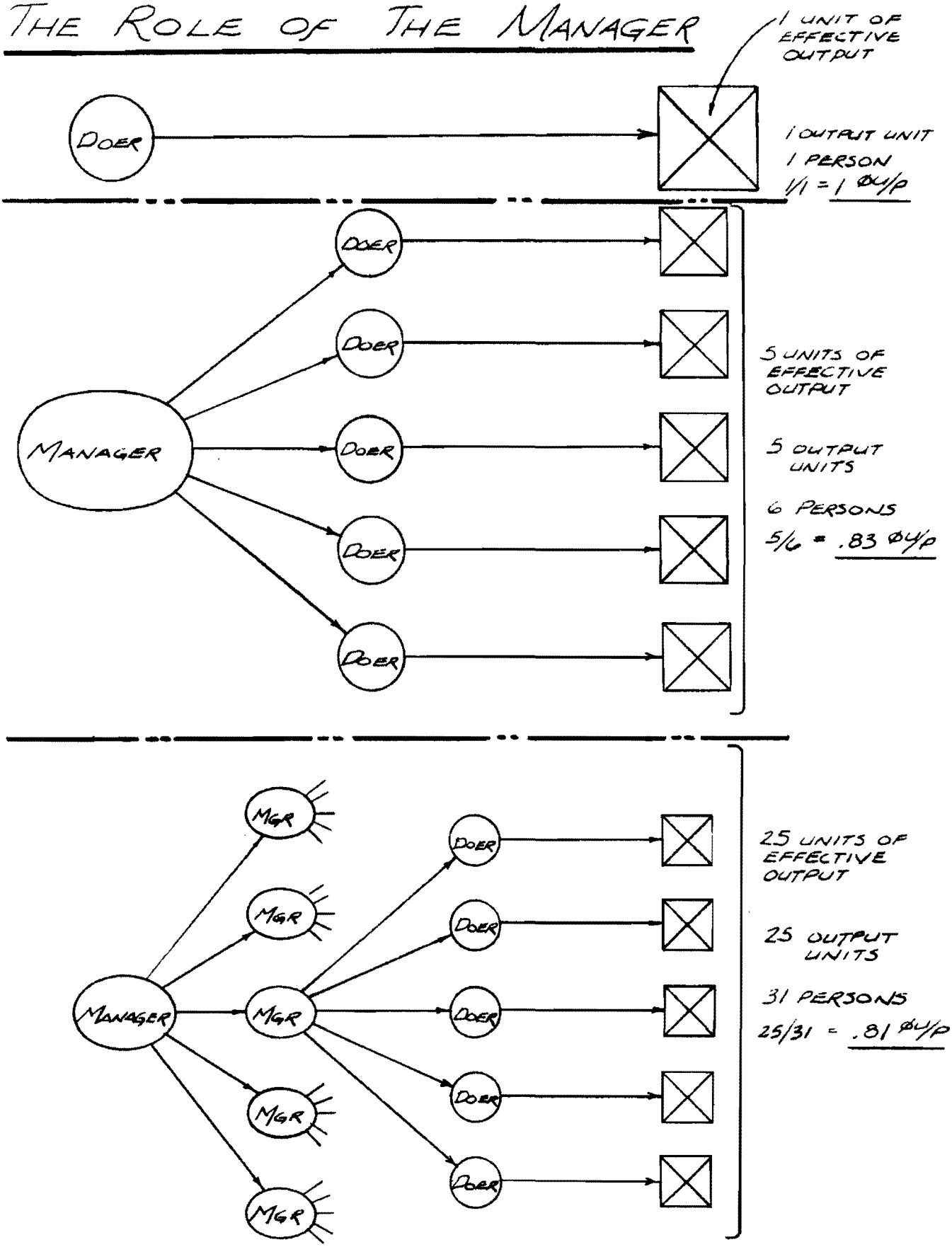
THE ROLE OF THE MANAGER



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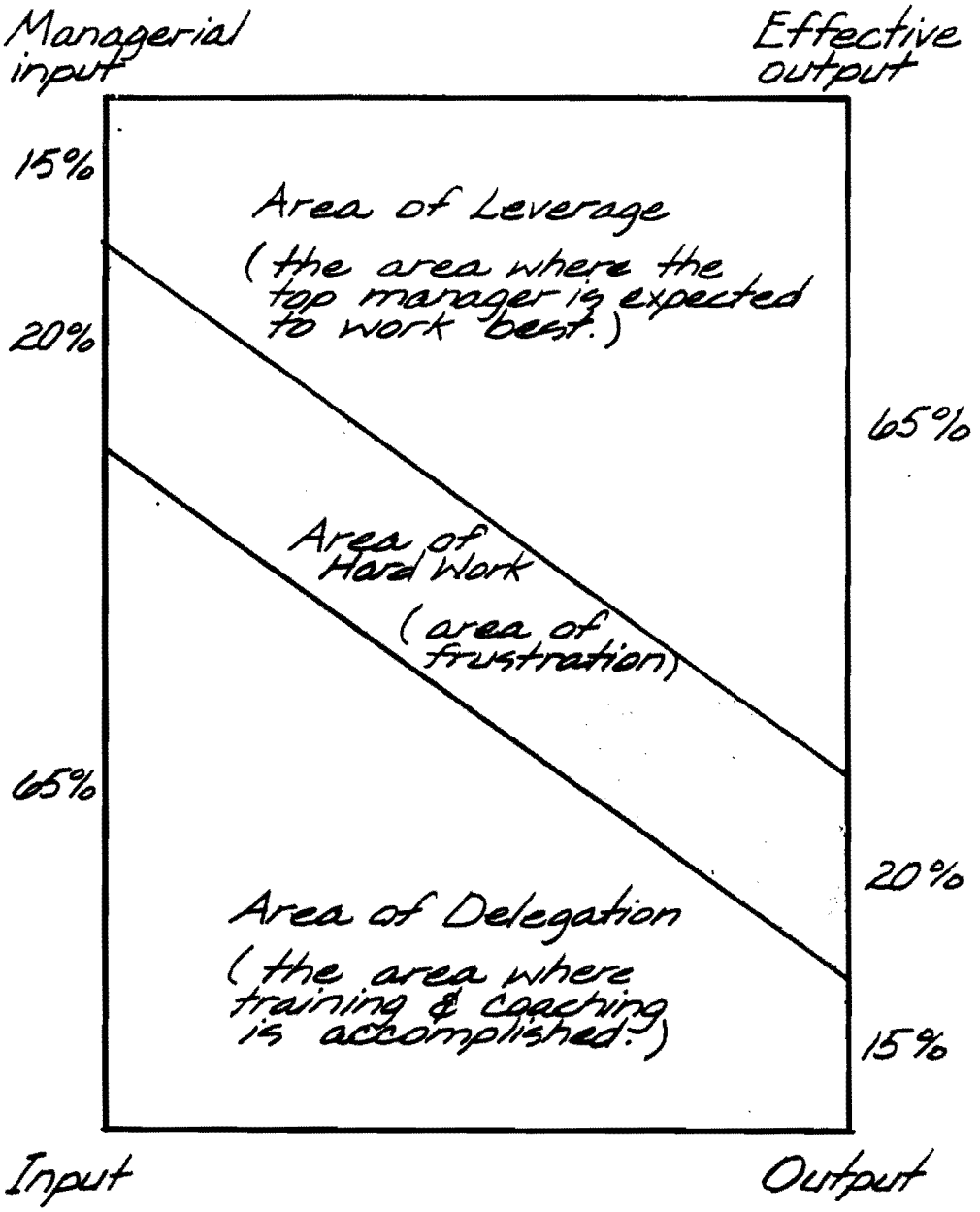

MANAGERIAL LEVERAGE

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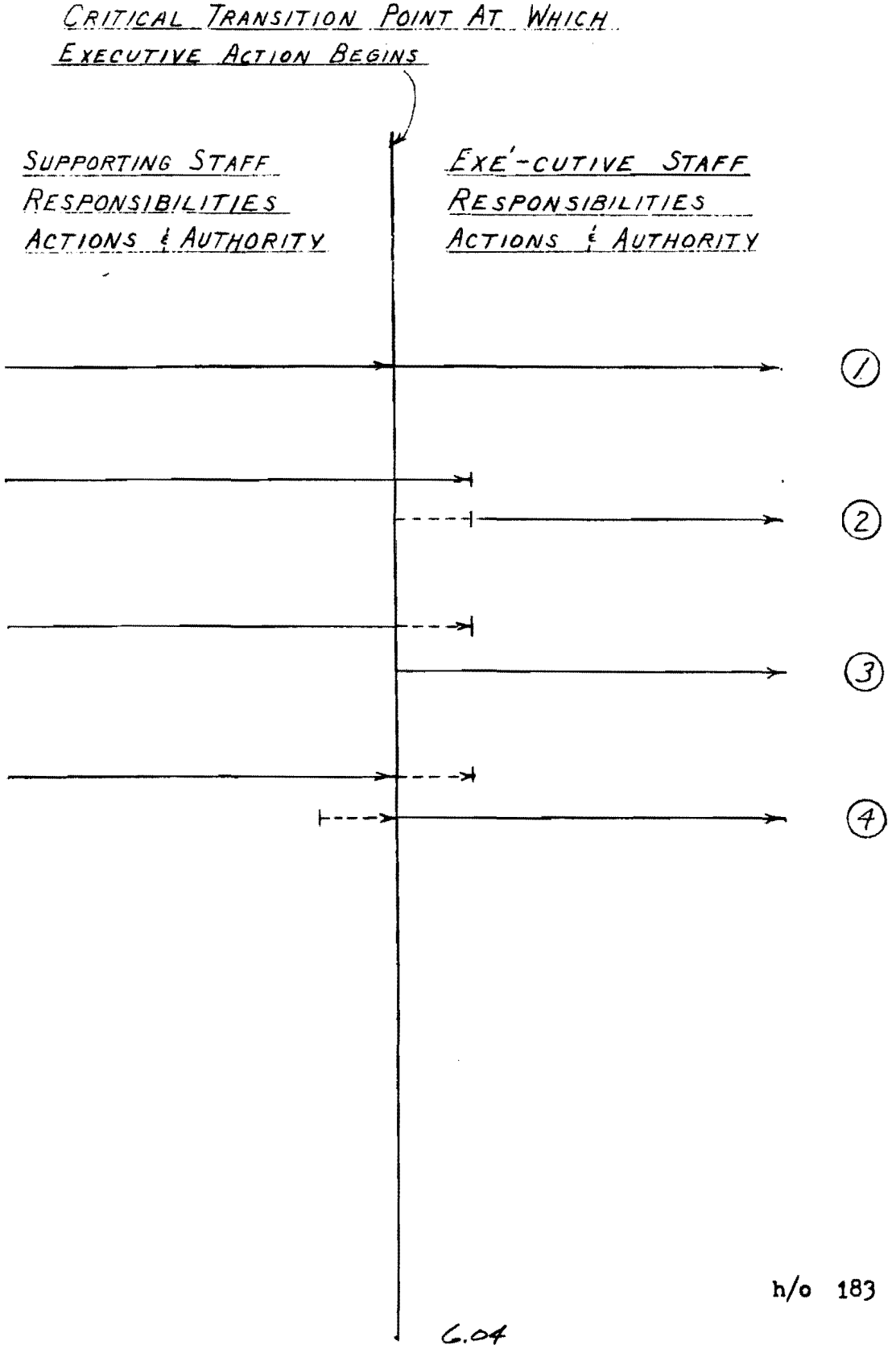

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Notes on Forerunner & Conservatively Managed Companies

• What are alternative names to forerunner and conservatively 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 or conservative is merely an indication of the way the organization achieves success or goes through the twinges of failure.

• Some characteristics of the forerunner vs the conservative company are:

Forerunner
- Aggressive in their field of work
- Young
- High risk takers
- High leveraging of all resources
- Good morale
- General absence of recognizable management structure
- Healthy cooperation among lower management
- Strong competitive drive at all levels of management
- Strong sensing (not necessarily knowledge) of total purpose about
  - Financial return on investment
  - Social obligation
  - Professional integrity
  - Technical excellence
  - Ethical behavior
- Provision of sense of worth to projects
- Provision of sense of exciting flux to staff
- Maintenance of an exciting environment
- Constant forging ahead in their business arena

- Desire & ability to adapt to positive 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
- Low level of interest in business planning
- Often learn by mistakes

<u>Conservative</u>

- 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
- Provision of employee security
- Generally pretest decisions at executive management levels

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CREATIVITY AND HOW IT IS USED IN PROJECT MANAGEMENT

Creative thinking is an essential ingredient to successful project management. It helps the alert project manager to solve problems, establish management patterns, provide leadership and motivation, and to insure that design, quality and cost integrity of a project is maintained.

Creative thinking is applied to the management process on a routine basis by continuing to learn with an open mind; being among the first to accept something new while being among the last to discard the old.

There is also a special requirement for creative thinking that demands getting rid of what Roger von Oech in his book, A WHACK ON THE SIDE OF THE HEAD, calls mental locks. These mental locks are recognized by such familiar phrases as:

1. I'm looking for the right answer.
2. That isn't logical.
3. Be certain to follow the rules.
4. Let's be practical about this.
5. And don't make any mistakes.
6. Playing is a waste of time.
7. That's not my area of work.
8. Don't be silly.
9. But I'm not a creative person

The above statements indicate a set pattern of thinking, that when used blindly, get in the way of the creative process.

Other major obstacles to thinking creatively include making premature judgments, and excessive use of the self fulfilling prophecy. The self fulfilling prophecy usually indicates you have your mind made up before even starting any heavy thinking about the idea. You then never give your brain a chance to do any creative thinking.

Remember, it is nearly impossible to be creative and judgmental at the same time. So, in project management it is a good idea when creatively considering a complex matter to prepare a random, or non judgmental, laundry list of things that have to be done or thought about. The list should include all items within reason, whether or not you and the others involved think it should be included. Often the combination of a single idea

of doubtful merit is a brilliant thought in league with other ideas.

Processes of creatively tackling a problem have been used for hundreds of years by many excellent thinkers. The creative procedure can be described in six major steps.

1. Gather all facts that time will allow, about the subject under consideration. Try not to be judgmental while you are collecting information.

2. Think hard about the data and the other information you have gathered in relation to the problem or situation you are involved with.

3. Forget about the problem! Let the material looked at so far, and the ideas you might have, get mulled over by your subconscious. This period is called gestation.

4. Ideas (illumination!) will usually start springing to mind soon after the gestation period starts. However, in some cases it might take several days, weeks, or even months. Be alert for the sudden revelation of the solution. When the solution or idea or lost thought appears grab it and write it down!

5. Act on the solution, idea or thought!

6. Follow up and check to see if the solution was a good one and if it has worked.

Creativity is a simple, elegant way of life. All you must do to enjoy it is to unlock your thinking, exercise your mind and use your imagination!

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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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QUESTIONS TO CONSIDER

Guides to Ethical Decision Making

1. Is my decision legal?

- Does it violate civil law or company policy?

2. Is my decision balanced?

- Is it fair to all concerned in the short and long term situation. Does it avoid sum zero situations?

3. How will my decision make me feel about myself?

- Will it make me proud?
- Will I feel good if it is published in the newspaper?
- Will I feel good if my family finds out about it?

Adapted from "The Power of Ethical Management"
by Kenneth Blanchard & Norman Vincent Peale

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PMI Thinking - from Mr. DeBono's book on thinking

Mr. DeBono, an expert in the analysis and improvement of thinking patterns and methods, suggests a simple method of improving your decision making by improving your thinking habits

Mr. DeBono calls his technique PMI. It involves a short pause period before answering a prime question, during which the decision maker examines three aspects of the question, its pluses (P), its minuses (M), and its interesting features. Use of PMI on a specific question should take only a
relatively short time. For practice exercises, Mr. DeBono suggests 3 to 5 minutes for the whole PMI process. However the time period will vary depending on the time available and the nature of the question.

PMI is not a decision making process; it is a thinking process to be combined with other decision tools to help improve your thought processes, and consequently make better decisions than you do now.

A point to be stressed before using PMI, according to Mr. DeBono is to think slower but think better! Most of us jump too rapidly to a position that must then be defended irrespective of our second thoughts on the conclusions reached. Thus are born the often destructive self fulfilling
prophecies. PMI can help reduce the probability of taking indefensible stands on critical issues.

To use PMI first frame the question or situation you are addressing in clear, easily understood terms. For instance in considering a project delivery system, let us assume there is a choice available between using traditional, hard money methods compared to non traditional dovetailed guaranteed maximum price methods.

Taking each method individually let us see how our thinking about the systems can be improved with PMI. Again to be stressed is that PMI is not a decision making technique; it is a thinking technique from which more effective decisions can result.

1.) Select one of the methods to consider first, say, the non traditional, hard money delivery method (method 1).

2.) Visualize or write all of the good points (the pluses) you can think of about method 1. Keep your mind only on the positives. This is called directional thinking.

3.) Visualize or write all the negatives or detracting points of method 1. Keep your mind directed toward the negatives.

4.) Visualize or write all the interesting features about method 1 you can conjure up in a few minutes of thought. Mr. DeBono suggests you say to yourself. "It would be interesting in considering method 1, if....."

5.) Repeat the process with project delivery method 2.

6.) Make the decisions you are charged with using any of the decision making tools available to you.

Notice the stress in the above step by step procedure on **thinking** about the matter. It is thinking that encourages better use of the powerful scientific management tools available.

Think more slowly - think better!

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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 despite 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

- H. 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.

• I. Statistics are important to effectively managing projects

• J. 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!

• K. 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; but be careful about who determines it's impossible.

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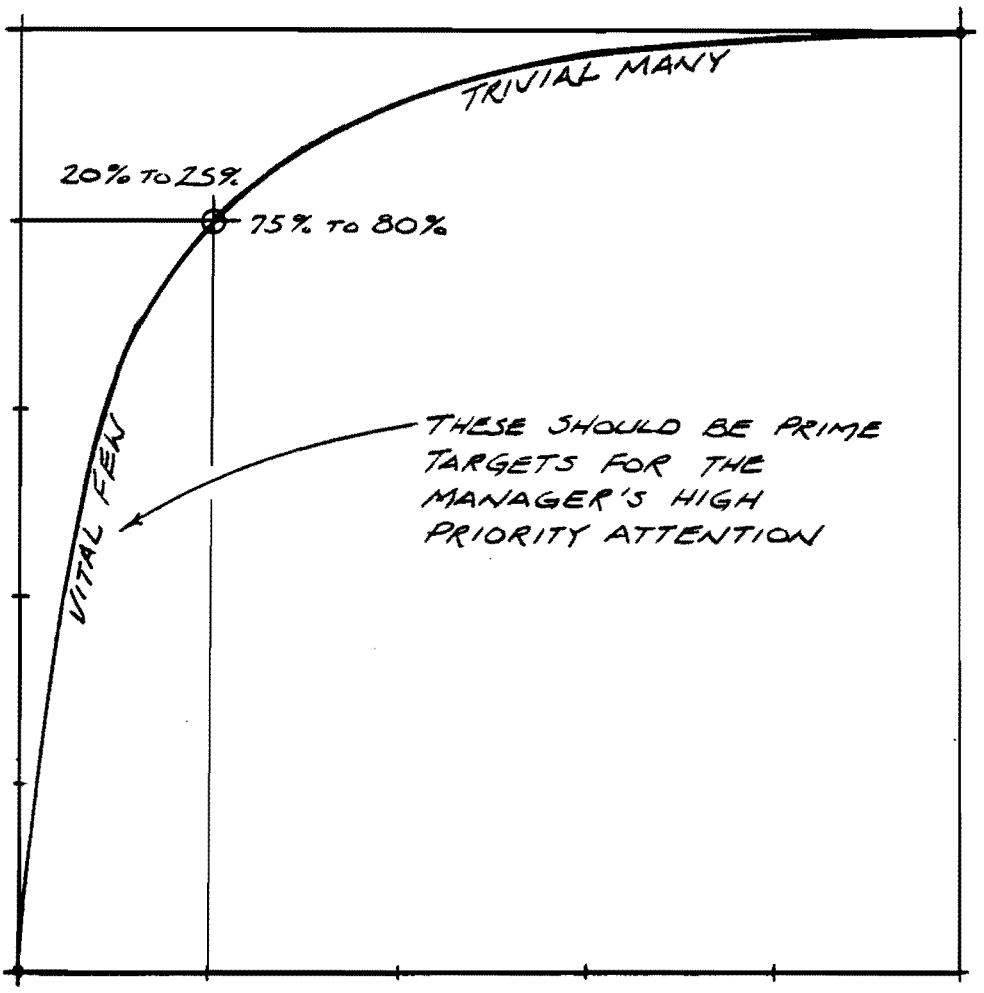
PARETOS LAW - IN AN OBJECT/VALUE SITUATION ONLY A FEW OF THE OBJECTS ACCOUNT FOR THE GREATEST PART OF THE VALUE.



VALUE OR UTILITY

PRICE
COST
DELAYS
MISTAKES
PROBLEMS
PROFIT
REJECTS
SALES
SAVINGS
SHIPMENTS
WASTE

OBJECTS OR RESOURCES

ACTIVITIES
CAUSES
OCCURANCES
PROBLEMS
RESOURCES
PRODUCTS
DECISIONS
FACILITIES
MATERIALS
METHODS
PRODUCTS
SALES CALLS
SERVICES
STAFF

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October 23, 1993

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. Three 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.

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. Graphics
      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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HOW TO SPRING THE TIME TRAP

Adapted from R. Alec Mackenzie's book "The Time Trap"

Time waster
Possible causes
Solutions

A. Lack of planning
1. Failure to see the benefit
   a. Recognize that planning takes time but saves time in the end
2. Action orientation
   a. Emphasize results, not activity
3. Success without it
   a. Recognize that success is often in spite of, not because of planning

B. Lack of priorities
1. Lack of goals and objectives
   a. Write out goals and objectives
   b. Discuss priorities with subordinates

C. Overcommitment
1. Wide span of interests
   a. Say no
2. Confusion in priorities
   a. Put first things first
3. Failure to set priorities
   a. Develop a personal philosophy of time
   b. Relate priorities to a schedule of events

D. Management by crisis
1. Lack of planning
   a. Apply the same solution as for lack of planning (see A above)
2. Unrealistic time estimates
   a. Allow more time
   b. Allow for interruptions
3. Problem orientation

a. Be opportunity oriented
4. Reluctance of subordinates to break bad news
   a. Encourage fast flow of important information as essential for timely corrective action

E. Haste

1. Impatience with detail
   a. Take time to get it right. Save the time required to do it again
2. Responding to the urgent
   a. Distinguish between the urgent and the important
3. Lack of planning ahead
   a. Take time to plan. It repays itself many times over
4. Attempting too much in too little time
   a. Attempt less
   b. Delegate more

F. Paperwork and reading

1. Knowledge explosion
   a. Read selectively
   b. Learn speed reading
2. Computeritis
   a. Manage computer data by exception
3. Failure to screen material
   a. Remember Pareto's law
   b. Delegate reading to subordinates

G. Routine and trivia

1. Lack of setting and adhering to priorities
   a. Set and concentrate upon goals and objectives
   b. Delegate non essentials
2. Oversurveillance of subordinates
   a. Delegate; then give subordinates their head
   b. Look to results, not details or methods
3. Refusal to delegate
   a. Recognize that without delegation nothing can get done thru others

H. Visitors

1. Enjoyment of socializing
   a. Do it elsewhere
   b. Meet visitors outside
   c. Suggest lunch if necessary
   d. Hold stand up conferences
2. Inability to say no
   a. Screen
   b. Say no
   c. Be unavailable
   d. Modify your open door policy

I. Telephone

1. Lack of self discipline
   a. Screen and group calls
   b. Be brief
2. Desire to be informed and involved
   a. Stay uninvolved with all but essentials
   b. Manage by exception

J. Meetings

1. Fear of responsibility for decisions
   a. Make decisions without meetings
2. Indecision
   a. Make decisions even when some facts are missing
3. Overcommunication
   a. Discourage unnecessary meetings
   b. Convene only those people needed for matters at hand
4. Poor leadership
   a. Use agendas
   b. Stick to the subject
   c. Prepare and distribute minutes immediately after the meeting

K. Indecision

1. Lack of confidence in the facts
   a. Improve fact finding
   b. Improve validating procedures
2. Insistence on all the facts - paralysis by analysis
   a. Accept risks as inevitable

b. Decide without all the facts
3. Fear of the consequences of a mistake
   a. Delegate the right to be wrong
   b. Use mistakes as a learning process
4. Lack of a rational decision making process
   a. Get facts
   b. Set goals and objectives
   c. Check alternatives
   d. Check negative consequences
   e. Make decision
   f. Implement decision

L. Lack of delegation

1. Fear of subordinate inadequacy
   a. Train
   b. Allow for mistakes
   c. Replace if necessary
2. Fear of subordinates' competence
   a. Delegate fully, but within the subordinate's competence
   b. Give credit
   c. Plan corporate growth to maintain challenge
3. Work overload on subordinates
   a. Balance workloads
   b. Staff up
   c. Reorder priorities

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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. Hawthorne experiment (1927) - encouraging workers to get things off their chest was proven to increase production

2. IBM (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.

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EMPLOY THE POWER OF TRAINING

A manager multiples his or her own knowledge and skills by teaching 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. **Inertia** - resistance to change
   1.) Reasons for inertia
      a.) Fear for safety

b.) Fear for security
c.) Concern for comfort
d.) Doubts about ability
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. **Initiative** - 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. **Insights** - 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

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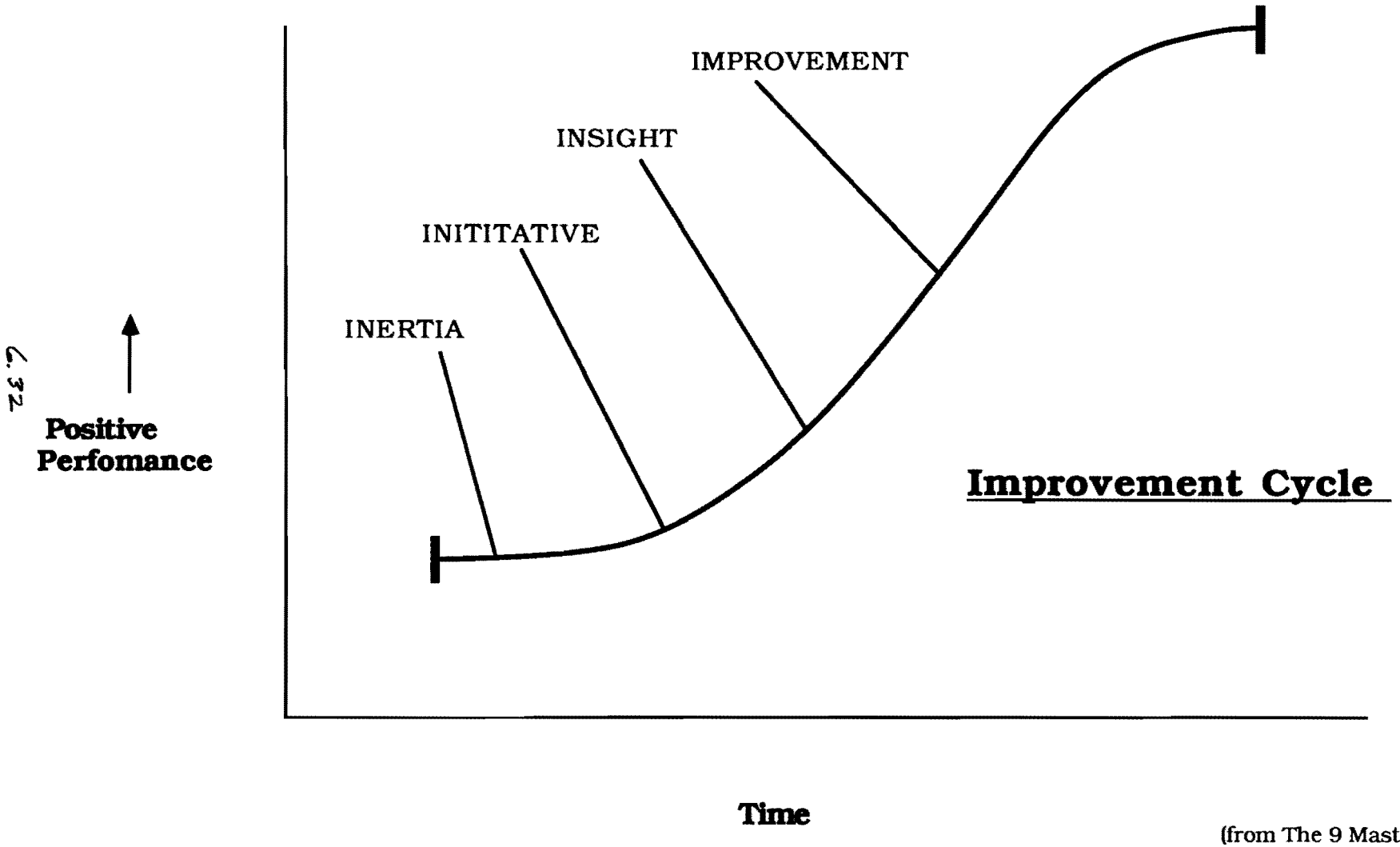

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(from The 9 Master Keys to Management - Lester R. Bittlel)

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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 implemented by taking well defined 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 ten of these. If you have selected 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 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 in the following matrix example where alternative project delivery systems for constructing a warehouse are being considered.

The three delivery systems under consideration are an award of a hard money contract from a full set of contract documents, retention of a non liable construction manager to run the project, or use of a liable general contractor involved early as a construction consultant and providing iterative estimating help leading to submission and acceptance of a guaranteed maximum price.

Project delivery systems being considered & their value in satisfying the demands of each factor of importance - warehouse project

Factors	Wts.	Values		
		Hd money	Non liable cm	Prog pricing to gmp
1.Capital cost	08 x	08 = 064	04 = 032	06 = 048
2.Function	10 x	09 = 090	06 = 060	10 = 100
3.Appearance	02 x	06 = 012	04 = 008	07 = 014
4.Life cycle cost	04 x	06 = 024	03 = 012	08 = 032
5.In house staff reqmts	08 x	04 = 032	03 = 024	07 = 056
Totals		**222**	**136**	**250**

The selection analysis above indicates the best delivery method of the three being considered is a progressive pricing system leading to submission of a guaranteed

maximum price for which the contractor will construct the project.

It should be emphasized that the validity of factor selection, the factor weighing, the selection of alternatives and their valuing depend totally on the exercise of sound judgments by those making the analysis. Usually for each decision to be made such an analysis as above 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.

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Effective Record Keeping for the Project Manager

Definition - A record is any retained information that can be effectively used in the future.

Reasons that good design and construction record keeping is essential include:

1. The increasing numbers of people and organizations to whom the project manager is responsible.
2. A dramatic an continuing increase in the number of contested design and construction claims.
3. Higher quality and well documented design and construction performance is being demanded in an increasingly competitive business and professional environment.
4. An increased demand for higher levels of cost control than ever before.
5. The documentation demands being made by more complex financing and ownership arrangements in design and construction.
6. Use of multiple firm syndicates and joint ventures in design and construction demands particularly good documentation to protect the combined and individual business entities.

Basic guidelines for preparing record keeping forms.

1. If a standard form works, use it.
2. Display information in a logical, readable sequence.
3. Provide adequate space for proper data entries.
4. Preprint everything possible - remember it costs the organization about $90 per hour for your managers when they are not engaged in a profitable managing/decision activity. Use the manager's time well.
5. Make the form readable.
6. Prepunch the form for loose leaf binders. Use the oversize hole punch. It will save time and money.
7. Be certain the form, when complete, will provide the data you need: the user can always skip non applicable spaces.
8. Provide a specific place on the form for a date and the users signature.
9. Review all forms at least once per year to see if they should be discarded, revised or kept as is.

IF A RECORD IS NOT NEEDED DON'T KEEP IT!

	document	record action	record suptv action	record opin	record chnge	record dec & agrmts	record appvls	record progrs	record resrce flow	record data	record doc procsg	record results
1	Appraisals		x	x					x			x
2	Bulletins				x		x		x		x	
3	Certificates of completion					x	x	x				x
4	Certificates of occupancy					x	x	x				x
5	Change orders				x	x	x		x			x
6	Check lists			x					x	x	x	
7	Claim notification letters	x	x	x	x	x				x		x
8	Clarifications		x	x	x					x		x
9	Color coded network models	x		x			x	x	x	x		x
10	Construction record drawings	x				x	x	x		x	x	x
11	Construction site plan	x	x									
12	Consultant lists		x							x		
13	Contract document sign offs	x				x	x				x	x
14	Contract drawings				x	x	x		x			x
15	Contract specifications				x	x	x		x			x
16	Contractor lists		x							x		
17	Contracts	x	x		x	x	x		x			x
18	Cost estimates		x	x	x		x	x	x	x		x
19	Cost reports		x		x		x	x	x	x	x	x
20	Diaries	x	x	x	x	x	x	x			x	x
21	Document control files									x		x
22	Equipment data tabulations							x		x		
23	Expense reports		x						x	x		
24	Field orders	x			x	x	x					x
25	Field reports	x			x	x	x	x		x		x
26	Guarantees		x									
27	Impact reports	x	x	x	x	x		x	x			x
28	Interoffice memos (IOC)	x		x	x		x					
29	Isoquant line comparisons						x	x	x	x		
30	Letters	x		x							x	
31	Logs	x	x	x	x	x	x	x	x		x	x
32	Maintenance manuals										x	
33	Meeting minutes	x	x	x	x	x	x	x	x		x	x
34	Money flow curves		x					x	x	x		x
35	Monitoring reports	x		x	x	x	x	x	x			x
36	Operation manuals									x		
37	Performance evaluations	x		x		x	x					x
38	Permits		x			x	x	x			x	x
39	Phone records and logs	x	x	x	x		x	x				x
40	Photos	x			x	x		x	x			x

	document	record action	record suptv action	record opin	record chngs	record dec & agrmts	record appvls	record progrs	record resrce flow	record data	record doc procsg	record results
41	Post job critiques	x		x	x		x	x	x		x	x
42	Pro forma financial analyses		x			x			x	x		
43	Project directories									x		
44	Project histories	x			x		x	x	x	x	x	x
45	Project network plans			x	x	x	x	x	x			
46	Project schedules			x	x	x	x	x	x	x		
47	Proposal spread sheets		x							x		x
48	Punch lists	x		x	x	x	x	x		x		x
49	Purchase orders		x			x	x		x			
50	Quantity takeoffs		x						x	x		
51	Requests for change orders	x	x		x	x	x		x			
52	Requests for information		x		x		x					
53	Requests for payment	x	x				x	x	x			x
54	Requests for proposals		x									
55	Resource histograms								x	x		
56	Risk management data		x									
57	Sample logs	x	x		x				x	x	x	x
58	Schedules of values				x				x	x	x	
59	Shop drawing logs				x			x	x	x	x	x
60	Site evlaluation data sheet	x	x	x								x
61	Specifications					x						
62	Testing reports		x	x	x					x		x
63	Time cards	x						x	x	x		x
64	To do lists	x						x				x
65	Transmittals	x			x	x	x	x	x		x	x
66	Waivers	x				x						x
67	Warranties					x						
68	Work orders	x			x	x	x					x

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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 classifying 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 appropriate 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 one 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 file 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 01 as 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 then assigned. The remaining three digits reflect the approximate chronological position of the document within the month. If a letter is received dated March 20, 1987, with a control system base month #01 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 approximate 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 minimum 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 indicated.

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. Subject codes will generally be assigned at a later date.

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 abstracts 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 document 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 search 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 related documents are abstracted 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 search 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 construction 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 occurrence 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 is however often difficult to provide. But 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 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.

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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 with formal documentation as needed; minimal documentation level well defined by contract

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 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 than 7 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 who is 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 will be 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 may even lead to quick resolution of 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.

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.

Step 3 - Day 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.

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 include:

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

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

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.

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?

cav cssty three ho

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

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

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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

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 says dimension on dwgs wrong. Must clarify. Le am meeting with Tom Monday to review.
- Hit flowing water at 9:00 A.M. ~~P.M.~~ on E & S-C. Began pumping at 10:15 A.M. today. Notified Tom Begy 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. CT 7/9/82
- Rod busters & carpenters 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!)

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

XPT
FIP
DLY
MEC
FRC

[redacted]:e

[redacted]111

REC# DOC # DATE YR DCT CFR CTO IFR ITO
SUBJ CLASS
SUMMARY A
SUMMARY B

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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

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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

Project History for Period #8

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

Ralph J. Stephenson PE PC
Consulting Engineer

The Case of the Changing Library

A study in the analysis of construction documentation

You work for Joe Gather, the Director of Physical Plant at West Fork University, a state college 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, the 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 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 would tailor to the current project situation.

REMARKS 1
REMARKS 2
SHOT 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 ING 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 FLINT, MICH								
60	0024	07	0911	84	XA	ASA 100	84026	PCO

H/O 242

CURRENT TO DO LIST - D124 - PRINTED: PAGE 1

PR	S	TIME	WHAT TO DO	DATE	REC#
10	0	.70	UPDATE MCAULEY DATA SHEETS	41117	9
10	0	4.00	ASSEMBLE WEX HO & SEND BY 1/15/84 (1/4)	41217	14
10	0	.30	CALL BOB VAN PEEREN FOR MEETING DATE	50103	46
10	0	.40	CHECK RATE TABULATION	50104	58
10	0	.50	UPDATE JOB LIST	50107	66
10	0	.80	COMPLETE REVIEW OF GTRV B	50110	84
10	0	.20	GET SEPIAS OF NORTHVILLE C FOR 1/11/84	50110	76
		6.90			***7
09	0	2.00	SET FLINT WATER FORMAT & RUN 5 ANALYSES	41110	24
09	0	1.00	START TRANSCRIBING CHINA TAPE	41222	10
09	0	1.00	INPUT REDUCED WORK LOAD TO DO ITEMS	41231	12
09	0	.50	UPDATE ICM TO DO LIST	50103	43
09	0	.40	DICTATE U OF M DOW MONITORING REPORT	50103	49
09	0	.40	UPDATE DRAFTING LIST	50103	41
09	0	.40	PREPARE 854 WKG DAY CALENDAR	50107	71
09	0	.20	MAIL OUT GTRV CONTRACT B NETWORK	50110	85
09	0	.30	SET DATE TO MEET WITH DICK DILAURA	50110	75
		6.20			***9
08	0	.70	SET UP FOLDER FOR ESD CLAIM TALK	41231	19
08	0	.20	TALK TO CURT H RE NEW ICM RATE	50103	44
08	0	.20	READ LETTER FROM TEDD CASE	50103	42
08	0	.20	HAVE SHARON PREPARE 854 CALENDAR	50104	61
08	0	.30	CHECK DATING OF VICTORIA	50110	79
08	0	.30	CHECK RESIDENTIAL NETWORK	50110	78
08	0	1.50	START REVIEW OF MERCY CLAIM DOCUMENTS	50110	81
		3.40			***7
07	0	.20	START GAIL YOUNG ON UPDATING PHONE BOOK	41228	35
07	0	1.50	RUN NEW 85-86-87-88 WKG DAY CALENDAR	41231	22
07	0	.40	START BETH ON UPDATING ADDRESS LIST	50107	67
07	0	.20	THANK CARMINE FOR SMALL SECTIONS OF GTRV	50110	77
07	0	1.00	CHECK FLINT DECISION TREE	50110	82
07	0	1.00	GO OVER MC AULEY UPDATE WITH JESSICA	50110	83
		4.30			***6
06	0	.30	CHECK WITH O.P. RE NEXT DESIRED MTG	41217	25
06	0	.30	CALL BOB WILSON RE JOB FOR JAN M	41222	26
06	0	.30	CALL MR. KRAUSE RE MEETING ON MGMT STUDY	41231	29
06	0	.30	SET LUNCH WITH MARIO FERNANDEZ	41231	28
06	0	1.00	START OUTLINING MSPE LIT TALK 1/29/85	50104	57
06	0	.30	SEND TIM GE BOTT THI AWARD DECISION	50110	80
06	0	.30	HAVE GTRV B DRAFTED	50110	86
06	0	.20	SET NEXT DATE WITH DICK SLY ON PKG DK	50110	74
06	0	.20	CALL BOB STRAND FOR MTG 491 6600	50110	73
		3.20			***9
05	0	.10	CALL CURT HACIAS FOR DATE FOR LUNCH	41122	30
05	0	.10	SET LUNCH WITH JOHN WIELAND	41213	31
		.20			***2

H/O 243

	Pri	Date	Activity	Phone #	Type	w
1	100	2/14/90	Write letter on preparing documentation to lb, at & bf		wrt	m
2	98	2/14/90	Get info on CSI/UCI codes from AGC or AIA and their history for efa class		tac	b
3	98	12/7/90	Write or call Joe K & thank for procurement booklet		phn	m
4	95	4/17/90	Have new business photo taken		tac	m
5	93	11/27/90	Write essay on information services		ho	m
6	91	8/29/90	Write essay about ON A SCALE OF 1 TO 10		wrt	m
7	90	11/27/89	Complete prepare Bornmouthe Company project manager check list		tac	m
8	90	5/9/90	Add legal abbreviations to list of abbreviations		tac	j
9	86	2/18/90	Write procedures for converting MacProject to Micro File		tac	m
10	85	2/14/90	Write Stanton thank you for close out info		wrt	m
11	83	2/18/90	Bring courthouse construction notes up to date - see a:nts0211 epson file		tac	m
12	80	2/28/90	Prepare ho re management principles for const proj mgrs & superintendents		top	m
13	80	11/21/90	Complete adding client abbreviations to master job list		tac	m
14	70	12/6/90	Review management balance profile for management time & cost		edc	m
15	69	2/28/90	Prepare cash flow on resource allocation for handout		ho	m
16	64	12/7/90	Get monitoring networks from Ben J		tac	m
17	63	7/12/90	Set meeting with Bob Franchot to see presentation	612 464 6710	mtg	m
18	62	1/23/90	Respond to Mark's letter re possible law subjects from Curt's friend		rea	m
19	60	6/28/90	Set breakfast with Jack C.	212 514 8272	mtg	m
20	57	11/27/90	Write up planning, scheduling and monitoring procedures for Telequarry	258 2156	wrt	m
21	53	11/1/90	Prepare superstruct network model for Drucker case study - ho258		ho	m
22	51	11/21/90	Have lunch or breakfast with Ollie S.	956 3420	mtg	d
23	50	2/19/90	Assemble & return TL's educational material	614 296 9467	tac	m
24	50	3/14/90	Send for Canadian Building Thesarus - see Phil B's book for reference data		tac	m
25	48	2/14/90	Send Paul T. material on organizational relations		tac	m
26	42	2/22/90	Get book or books by W. Edward Demming - recommended by Carl B.		tac	m
27	35	11/21/90	Print out networks for teams A, C & E		run	d
28	25	12/6/90	Get handout made of systems drawing prepared by Frank Tobias		ho	m

RALPH J. STEPHENSON, P.E.
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.

Claim Prone Job Characteristics
(continued)

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.

6.68

Ralph J. Stephenson PE PC
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COMMON CAUSES OF CONTESTED CLAIMS

Contested construction claims have increased over the past few years and now must be recognized as a serious road block 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, the recourse to legal resolution, as opposed to interpersonal, technical, or administrative resolution of problems has become a common fortunately shows some signs of diminishing as costs and time involvement in legal matters have increased astronomically.

However, there are claims, there always have been claims, and there will probably always will be contested claims. Those in construction should however, thoroughly understand the structure of the contested claim.

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 settlements 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 legitimate change within the contract scope for which the owner must pay.

Examples
- Owner changes the door color after the 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. Constructive 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, specifying 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 extensions, 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 - 35%

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 in contract documents.
- 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.
- Process submittals promptly.
- Clearly define the time frame and the sequence by which submittals are to be processed, and do it early in the job.

7. Differing site conditions - 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 borings 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 site 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 conditions.
- 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 relocate 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 design and administrative duties and responsibilities and take care of them.
- Resolve dimensional difference early.
- Do your homework to presolve expected problems and interferences.

9. Superior knowledge - 18%

Withholding data or information during the pre contract 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 months 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.

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Consulting Engineer

• *SECTION 7 - MONITORING, MEASURING AND CONTROLLING THE PROJECT*

07.01	Management by exception graphics
07.02	Identify vital targets
07.03 & 07.04	Clarion penthouse monitored network
07.05 & 07.06	Control system techniques
07.07	Color coding
07.08	Monitoring #1
07.09 to 07.19	Computer run - Highland & Moran
07.20 & 07.21	Status analysis - Highland & Moran
07.22 & 07.23	Monitoring report #1
07.24	Monitoring #2

date printed: November 29, 1994

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

MANAGEMENT BY EXCEPTION (MX) AND PERFORMANCE LEVEL ACTIONS

Ralph J. Stephenson PE PC
Consulting Engineer

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 missteps 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

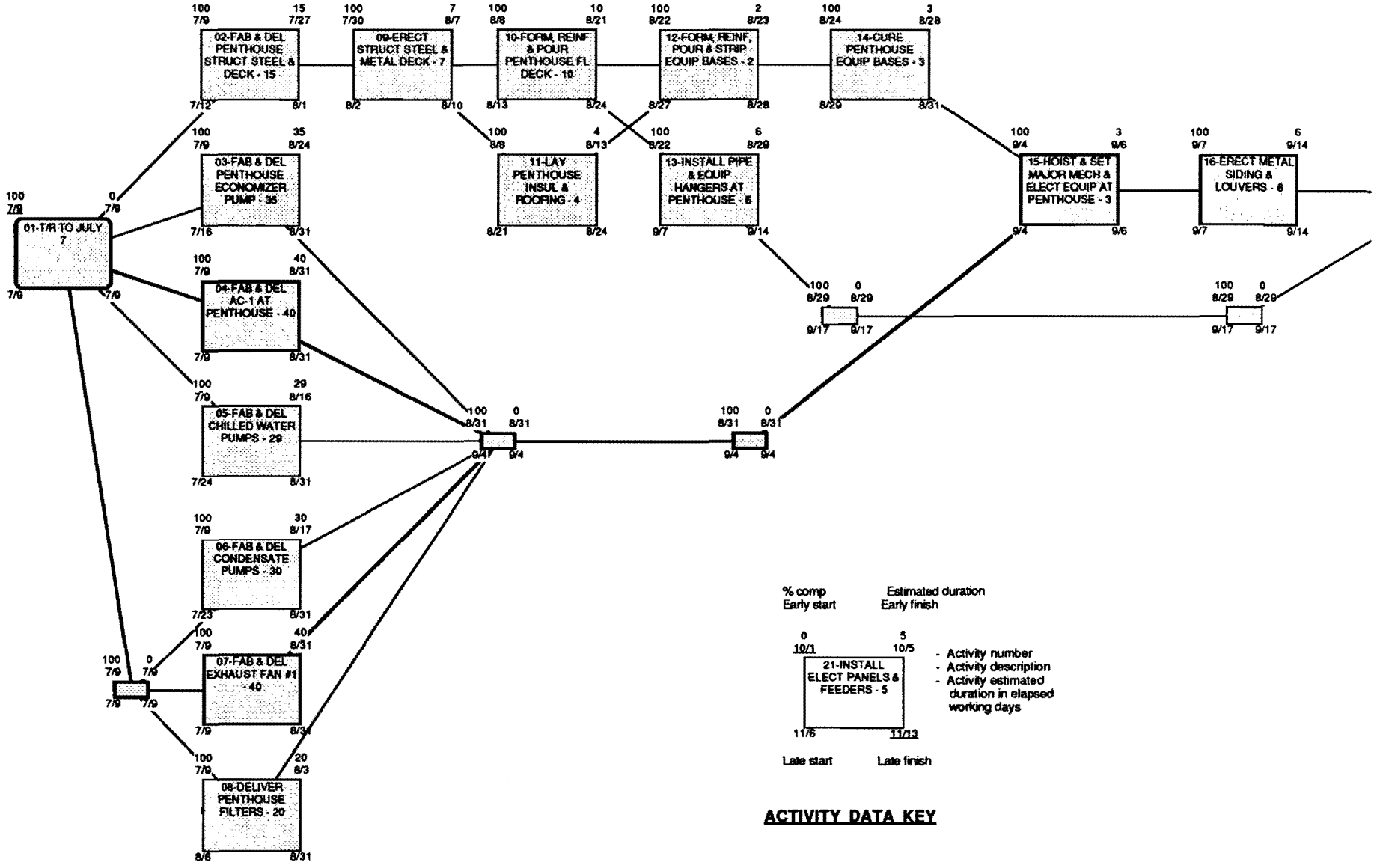
F. How to pick the vital few

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

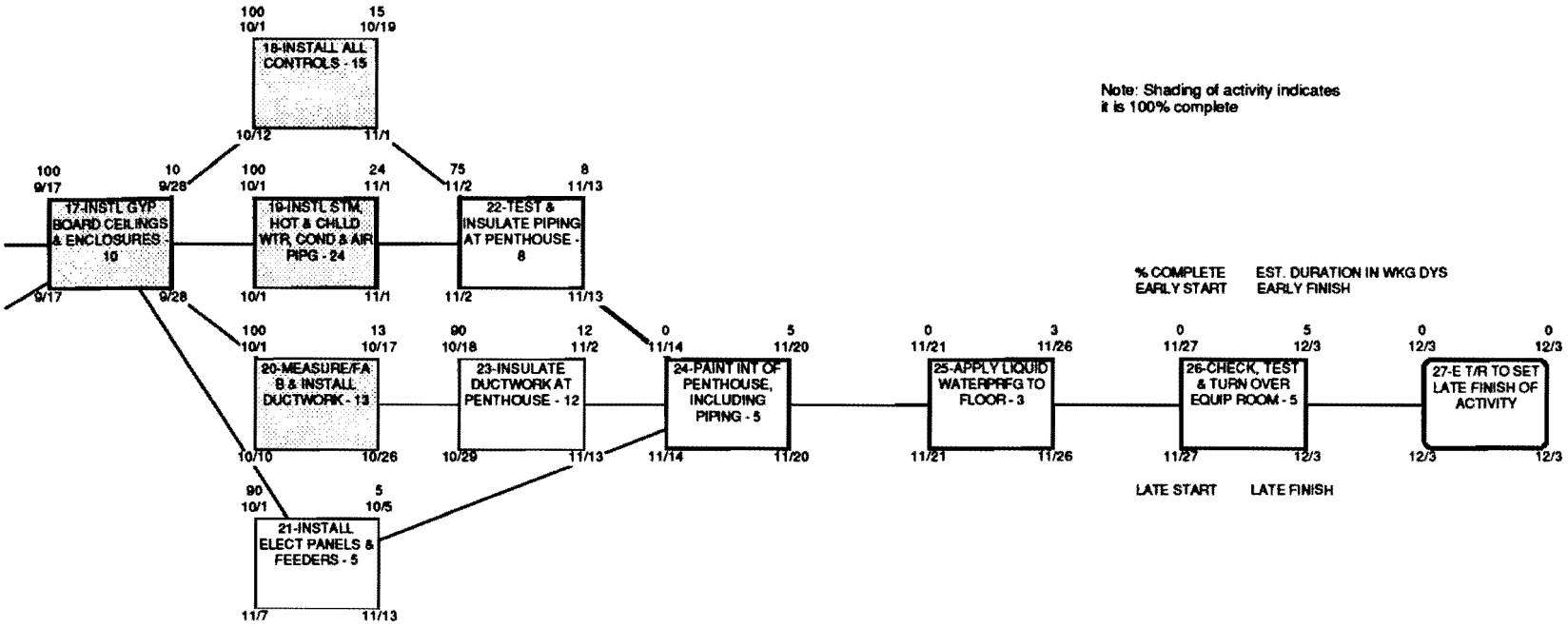
G. Moving from a situational view (macro) to the vital few (micro)

H. What to do with the trivial many

1. Delegate
2. Defer (How long?)


02-FAB & DEL PENTHOUSE STRUCT STEEL & DECK - 15
09-ERECT STRUCT STEEL & METAL DECK - 7
10-FORM, REINF & POUR PENTHOUSE FL DECK - 10
12-FORM, REINF, POUR & STRIP EQUIP BASES - 2
14-CURE PENTHOUSE EQUIP BASES - 3
03-FAB & DEL PENTHOUSE ECONOMIZER PUMP - 35
11-LAY PENTHOUSE INSUL & ROOFING - 4
13-INSTALL PIPE & EQUIP HANGERS AT PENTHOUSE - 5
15-HOIST & SET MAJOR MECH & ELECT EQUIP AT PENTHOUSE - 3
16-ERECT METAL SIDING & LOUVERS - 6
01-T/R TO JULY 7
04-FAB & DEL AC-1 AT PENTHOUSE - 40
05-FAB & DEL CHILLED WATER PUMPS - 29
06-FAB & DEL CONDENSATE PUMPS - 30
07-FAB & DEL EXHAUST FAN #1 - 40
08-DELIVER PENTHOUSE FILTERS - 20
% comp
Early start
Estimated duration
Early finish
21-INSTALL ELECT PANELS & FEEDERS - 5
- Activity number
- Activity description
- Activity estimated duration in elapsed working days
Late start
Late finish
ACTIVITY DATA KEY

7.03



Note: Shading of activity indicates it is 100% complete

7.04

Project Status as of November 5

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

Luther Mechanical Contractors
Washington, D.C.

Issue #1 - July 7
Issue #1 - monitor 11/5
332 11/5 mtr phl ltehtph1
disk 162

Reserved Activity Numbers

041	046
042	047
043	048
044	049
045	050

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.

706

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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

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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.

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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	LOC RSP	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&FTTNGS	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	10186	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

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	10186	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	10186	18
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	LOC 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 CNDTSFDRS		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 E/S	L/S	SEQ 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
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	LOC RSP	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	11096	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	LOC RSP	CD	AND DESCRIPTION	COST	LATE E/S	STRT L/S	SEQ 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	9286	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	10186	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	28
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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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 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	10086	10276	10126	10296	13
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	11056	17
130	131	4	1	1	INS FIN TUBE PIPING	960	11086	11086	11116	11116	0

I	J	DAYS	LOC RSP	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
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VICTORIA MECHANICAL COMPANY

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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	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	10066	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	10126	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

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	10066	34

WORK SHEET FOR UPDATE

PROJECT STATUS REPORT FOR NEW OFFICE FACILITY HIGHLAND AND MORAN
KEITH, IOWA

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

RALPH J STEPHENSON P E - CONSULTANT

LISTING IS IN LATE START SEQUENCE

1 VICTORIA MECHNL
2 HVAC CONTRCTR
3 ELEC CONTRCTR
4 MASONRY CONTRCT
5 DRY WALL CONTRCT
6 SPRNKLR CONTRCTR
99 NOT ASSIGNED

SHOULD START AND FINISH	1
SHOULD START AND CONTINUE	2
SHOULD FINISH	3
JOB STARTED WILL CONTINUE	4
START IS LATE	5
FINISH IS LATE	6
JOB STARTED EARLY	7
TASK SUBSTANTIALLY COMPLT	8

1	2	106	0		T/R TO START OF PROJECT		1026	1026	5316	5316		C
2	7	102	0		T/R TO C EXT MSNRY&GLZNG		6016	6016	10226	10226		C
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	56	0	R	T/R TO C ER RF MTL DECK		6016	7206	8206	10086	34	
105111	9	1	1		INS TO/R PLUMBG RISERS	2160	9086	9236	9206	10056	11	
102108	6	2	1		P INS SHT MTL DCT&FTTNGS	4800	9086	9246	9176	10056	12	
101107	6	6	1		P INS SPRINKLER PIPG	2880	9086	9286	9156	10056	14	
106112	4	3	1		P INS RUFF ELEC CNDT&FDRS		9086	9306	9136	10056	16	
103109	3	1	1		P INS DMSTC WTR PPG-CLG	720	9086	10016	9106	10056	17	
104110	4	1	1		P INS HTG&CLNG PPG IN CLG	960	9086	10066	9136	10116	20	
113118	6	4	1		ER INT MSNRY PARTNS		9216	10066	9286	10136	11	
108115	8	2	1		C INS SHT MTL DUCT&FTTNGS	4800	9206	10076	9296	10186	13	
133139	8	2	2		P INS SHT MTL DUCT FITNGS	4800	9206	10116	9296	10206	15	
107114	5	6	1		C INS SPRINKLER PIPG	2400	9166	10126	9226	10186	18	
110117	5	1	1		C INS HTG&CLNG PPG IN CLG	1200	9146	10126	9206	10186	20	
136153	8	1	2		INS TO/R PLMG RISERS	1920	9216	10126	9306	10216	15	
109116	3	1	1		C INS DMSTC WTR PPG-CLG	720	9136	10146	9156	10186	23	
112119	3	3	1		C INS RUFF ELEC CNDT&FDRS		9146	10146	9166	10186	22	
118121	3	5	1		P ER STUDS FOR DRY WALL		9296	10146	10016	10186	11	
132138	6	6	2		P INS SPRINKLER PIPING	2880	9166	10146	9236	10216	20	
137152	4	3	2		P INS RUFF ELEC CNDT&FDRS		9146	10186	9176	10216	24	
122123	4	1	1		P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11	
122123	4	3	1		P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11	
134140	3	1	2		P INS DMSTC WTR PPG-CLG	720	9136	10196	9156	10216	26	
135151	3	1	2		P INS HTG&CLNG PPG IN CLG	720	9146	10196	9166	10216	25	
139155	8	2	2		C INS SHT MTL DUCT&FTTNGS	4800	9306	10216	10116	11016	15	
121124	3	5	1		C ER STUDS FOR DRY WALL		10046	10226	10066	10266	14	
153158	4	4	2		ER INT MSNRY PARTNS		10016	10226	10066	10276	15	
125128	5	5	1		P HANG DRY WALL		10256	10256	10296	10296		C

138154	5	6	2	C INS SPRINKLER PIPG	2400	9246	10266	9306	11016	22	
126127	3	1	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13	
126127	3	3	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13	
140156	3	1	2	C INS DMSTC WTR PPG-CLG	720	9166	10286	9206	11016	30	
152159	3	3	2	C INS RUFF ELEC CNDT&FDRS		9206	10286	9226	11016	28	
161162	3	5	2	P ER STUDS FOR DRY WALL		10076	10286	10116	11016	15	
151157	2	1	2	C INS HTG&CLNG PPG IN CLG	480	9176	10296	9206	11016	30	
128129	5	5	1	COMP HANG DRY WALL		11016	11016	11056	11056		C
163164	4	1	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14	
163164	4	3	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14	
162165	4	5	2	C ER STUDS FOR DRY WALL		10126	11046	10156	11096	17	
130131	4	1	1	INS FIN TUBE PIPING	960	11086	11086	11116	11116		C
166168	6	5	2	P HANG DRY WALL		11086	11086	11156	11156		C
167168	4	1	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16	
167168	4	3	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16	
131400	12	0	1	ET/R		11126	11126	11306	11306		C
168169	6	5	2	C HANG DRY WALL		11166	11166	11236	11236		C
170171	4	1	2	INS FIN TUBE PIPG	960	11246	11246	11306	11306		C
-99	-9										

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

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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

H/O 141 11/76

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

Ralph J. Stephenson, P. E.
Consulting Engineer

- *SECTION 8 - GENERAL REFERENCE MATERIAL*

date printed: November 29, 1994

- ***Definitions*** - project management glossary
  - **Abatement**
    The process of correcting a perceived and/or hazardous condition at a geographic location. For instance the removal of a hazardous spill of toxic chemicals.

    The question of hazard or not, required correction or not, the appropriateness or not of the abatement action required is often in dispute.
  - **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 contractual 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.
  - **Agent**
    A person or firm whose acts are asserted by the third party to bind the principal.
  - **Agreement - partially qualified**
    An agreement made based on a moderately broad range of measuring values used somewhat consistently by the principal. The selection of an agent or contractor is normally made with some or full visible competition.
  - **Agreement - totally negotiated**
    An agreement made based on a very broad range of measuring values applied as desired by the principal. The selection of an agent or contractor is usually made with very little visible competition.
  - **Agreement - totally qualified**
    An agreement made based on very narrow range of measuring values, i.e. price, but used consistently by the principal. The selection of a agent or contractor is normally made with full visible competition.
  - **Alternative dispute resolution - adr**
    In its generic form, is a method of resolving disputed construction claims outside the courtroom.

    Includes systems of resolving disputes in planning, design and construction by cooperative, internal, or third party assistance methods that are alternatives to conventional dispute resolution methods currently in common use. Conventional methods are usually considered to be litigation and binding arbitration.

    Alternative dispute resolution may make use of non traditional combinations of conventional dispute methods.

- **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 Contractual Relations**
  The interconnection of those parties bound by subsequent assignment of a contract to other than the initial parties.
- **Audit - as applied to projects**
  Inspect, analyze & evaluate project status, management and health against criteria established as a standard of performance for any give point in time. The audit encompasses such measurements as:

  - Physical condition of project
  - Project progress
  - Procurement status relative to needs
  - Project management techniques in use as reflected by project health
  - Project team performance as reflected in project health
  - Where appropriate, progress measured against expected money flow
  - Resources allocation
  - Status of interrelations between major parties to the project
  - Trends in project progress
  - Trends toward or away from claim prone status

  Each auditing situation is unique and the scope of the audit should be determined as specially fits each individual project and project team. All, or a part of the above measurements might be used to make the audit.

  Auditing usually is done through the following steps listed in rough order

  - Make pre inspection review of measurement standards to be used
  - Inspect project
  - Discuss inspection observations & perceived project status with key project staff
  - Evaluate current interrelation between procurement and field installation needs
  - Identify areas of administrative (supportive) operational difficulty & strength
  - Identify areas of line (ex'e'cutive) operational difficulty & strength
  - Prepare monitoring documents from current network issues
  - Evaluate need for project plan update
  - Update current network models as may be appropriate or required
  - Prepare & submit report of project audit

- **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, adjudicate, or otherwise settle issues or disputes; the right to control, command, or determine.

- **Basic Contractual 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.
- **Building Components**
  The basic units into which most building construction projects can be divided. Usually the components represent distinct construction & construction related actions that have common characteristics.
  - Front end work (few)
    All non construction project related work concerning real estate, financing and pre construction leasing.
  - Design work (des)
    Project related work that concerns production and issuing of contract documents
  - Procurement (pro)
    Work related to solicitation of proposals, award of subcontracts, preparation of submittals, approval of submittals, and fabrication and delivery of materials & equipment to the job site.
  - On site work (osi)
    All project work outside the building line and inside the property or hoarding (contract boundary) line.
  - Off site work (ofs)
    All work outside the property or hoarding line that is included in the project contract scope of work.
  - Substructure work(sbw)
    All foundation work upon which the superstructure bears directly or indirectly. Also includes site preparation for start of field work on the building area.
  - Superstructure work (ssw)
    All major structural load carrying components that bear on the substructure directly or indirectly.
  - Exterior skin (esk)
    All elements required to close the building to weather.
  - Interior rough work (irw)
    All interior building components that can be exposed totally or in part to weather.
  - Interior finish work (ifw)
    All interior building components that must be protected totally or in part from weather.
  - Unit systems work (usy)
    All work that can be installed as a unit & is somewhat isolated during construction from other components of the building
- **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.
- **Color coding**
  - Green - Activity on time - currently not past earliest possible finish date.
  - Orange - Activity on time - currently past earliest possible finish date, but will make or better scheduled or latest possible finish date.
  - Blue - Task behind - will not make scheduled or latest allowable finish date
  - Yellow - Task behind - currently past latest allowable finish date
- **Commitment**
  The state of giving a tangible or intangible benefit in a trusting and honorable manner. The act of pledging oneself.
- **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.
- **Contested claim**
  A demand or claim in which the demand is disputed.
- **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.
- **Contractor**
  The party, where there is a principal and a contractor, who agrees to the doing or not doing of some definite thing for a stipulated sum.
- **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.
- **Culture - business**
  A way of doing business that has been generated by a group of human beings and is passed along from one business generation to another, generally by unstructured communication.
- **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.
- **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.
- **Design/build**
  A method of providing total design and construction services under one cost and liability umbrella. Usually a design/build contract is based on a scope of work performance specification prepared by the owner or user. The ultimate aim of the design and build system is to provide a single source management and liability for the total facility program.
- **Destructive conflict**
  Animosity or disagreement which results in lowering the potential for an individual or organization to succeed.
- **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.
- **Dispute resolution board - drb**
  A method of dispute resolution where project participants establish procedures, by contract, to proactively settle disputes as they arise during the course of the project.

  drb's seek to anticipate problems and get the parties to resolve them before the problems harden into formal claims.
- **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 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 contractually 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 usually causes problems and dysfunctions.
- **Isoquant Line**
  A line drawn on a network model and connecting some or all equal date or resource points on the activities shown. The date isoquant line is the equivalent of a straight line in a time scaled bar chart.
- **Issue resolution**
  A method of reaching agreement and closing out disputes and problems at the lowest possible management level, in the shortest possible time, and with the lowest potential for residual hard feelings.
- **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.
- **Laundry list**
  A list of items, usually at random, that are to be classified, rearranged and used to build specifically sequenced tabulations, network models, narrative schedules or other systems of which the items in the laundry list are a component.
- **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.
- **Limited agent**
  The individual or organization acting as an agent and authorized to do only what is specified or what is reasonable to believe the principal wants done. A contract can be used to define the amount of authority to be granted an agent.
- **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 occurred on a project. The log is usually 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.
- **Minitrial**
  A private process where opposing parties present condensed versions of their cases, both to designated executive representatives, and to an impartial advisor, and then negotiate.

  The executives hear both sides, thus gaining a first hand perspective of the parties positions. The impartial advisor then points out possible outcomes an helps the parties to settle, if possible. Minitrials provide a structure to negotiate and ground rules to facilitate settlement.
- **Mission**
  A statement of the most important result to be achieved by the project being successfully completed.
- **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.
- **Must list**
  Those items that must be included in the scope of work to make the project a go. If any of the items in the must list are not able to be included the project is a no-go.
- **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 company's ability to reach. Lack of correlation between company and individual effort to achieve a manager's goals that are affected by others, may cause severe dysfunctions.
- **Objectives - Direct**
  Objectives that can be achieved by managing conditions within the manager's direct influence.
- **Objectives - 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 categories 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.
- **Partnering - Associated General Contractors**
  A way of achieving an optimum relationship between a customer and a supplier. A method of doing business in which a person's word is their bond, and where people accept responsibility for their actions.

Partnering is not a business contract, but a recognition that every business contract includes an implied covenant of good faith.

- **Partnering - Construction Industry Institute**
  A long term commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant's resources.

  This requires changing traditional relationships to a shared culture without regard to organizational boundaries. The relationship is based upon trust, dedication to common goals, and an understanding of each other's individual expectations and values. Expected benefits include improved efficiency and cost effectiveness, increased opportunity for innovation, and the continuous improvement of quality products and services.
- **Partnering - suggested base statement**
  A method of conducting business in the planning, design, and construction profession without the need for unnecessary, excessive and/or debilitating external party involvement.
- **Partnering charter**
  The basic manual for operating a partnering system. Contains at a minimum, the mission of the project team, and their objectives for the project. Usually is signed by those writing the document.

  The charter is an agreement in principle and must not supersede or supplant the design and construction contracts in place or to be written.
- **Peer Review**
  A partial or full audit evaluation of the project done by objectively based individuals or organizations outside those owning, designing, building or operating the facility.
- **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.
- **Positive conflict**
  Hostility that is managed so that its resolution raises the potential for individuals or organizations to succeed at being excellent.
- **Prime Contractor**
  A contractor whose business agreement is directly with the organization providing primary financing for the project.
- **Principal**
  A person who authorizes another to act as his agent, or a person primarily liable for an obligation.
- **Pro Forma - In real estate development**
  A financial model unusually built early in a construction program to show by projecting income and expenses, how the money flow to and from the project will occur. It is often used to establish the capital amount to be allocated to a project based on simulated operating conditions. The term pro forma means <u>according to form</u>.
- **Problem**
  A deviation from an accepted and/or approved standard of performance.

- **Profiling**
  The preparation and use of a selective, flexible and tailored systems of screening projects for potential participation.
- **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 Economic**
  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 - as defining a step in the design process**
  A narrative oriented statement of the needs and character of the proposed user operation, the requirements of the user and owner, the nature of the environment to be planned, designed and built, and the corresponding characteristics of the space that will satisfy these needs and requirements. Sometimes called the brief.
- **Program - as defining a total environmental effort**
  A major environmental construction effort made up of several projects
- **Project - as a set of work actions**
  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 achieve 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 sub period 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 Schedule Report**
  A narrative listing of network activities and the corresponding data re each action. The project schedule report is normally developed in a data base format from which selective reports and arrays can be prepared.
- **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 mutual 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.
- **Resolve**
  To find and implement a solution to a problem, a dysfunction or an issue of conflict.
- **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. Usually resource allocation is done to achieve effectiveness in project work measures such as profitability, timely completion and quality of work.
- **Resource Leveling**
  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 leveling 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**
  Establishing and implementing the strategy of achieving the objectives of the marketing plan. 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.

- **Sum zero**
  A situation in which there is a winner and a loser. The loser often will lose what the winner wins.
- **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 beyond 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.
- **Third Party**
  A party to a contract or agency agreement other than the principal or agent.
- **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.
- **Total quality management (TQM)***
  The managing process which helps insure that the quality of all components, and of the final product in the planning, design and construction of any facility is maintained at a level which meets the client's program performance requirements.
- **Traditional**
  Pertaining to those qualities of an organization, civilization or other culture that are handed down from generation to generation. Usually the transfer is by word of mouth or by practice.
- **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.

- **Trust**
  Reliance on an organizational or individual or integrity, justice, fairness, good judgment, and other relational qualities that give confidence in the performance of the duties demanded of the organization or the individual.
- **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.
- **Updating**
  The process of revising and reissuing a project network model to bring it into conformance with a current desired and necessary plan of action. Updating often, but not always, results from monitoring and evaluating the project. Usually the updating is done when it is found that the current plan of work does not adequately depict the actual conditions under which the project is being executed.
- **Upset Price**
  A guaranteed maximum price agreed to in a time and material contract. (See time and material contract.)
- **Value**
  The increase in worth of an open system to which an item of value has been added. Often multiplied by the weight of a factor to give the weight & value rating of a factor to help determine a choice of alternatives.
- **Value added**
  The improvement in the worth of anything that results from the efforts, contribution and involvement of specific people, processes, materials and ideas.
- **Vertical Growth (Integration)**
  A management system that encourages diversifying 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.
- **Want list**
  Those items that are wanted and can be included in the scope of work, over and above the must list items, since they provide a definable and acceptable rate of return on their cost.
- **Weight**
  The relative importance of a factor being used to help evaluate a choice. The importance is frequently measured by a numeric scale from 1 to 10, in which a very high positive

influence is indicated by a rating of 10. A very low influence is indicated by a rating of 01.

Degrees of importance between the highest and the lowest are indicated by number ratings from 02 through 09. The weight of a factor multiplied by the value added by the decision choice being considered gives a weight & value rating of a factor to help determine a choice of alternatives.

- **Win - win**
  A situation in which there are no losers. Usually some parties win more than other parties win.
- **Wish list**
  Those items that the owner and the user wish they could include but might not be able to due to budgetary or other reasons. Wish list items are best added, not deleted, as the project moves into construction.
- **Working Drawings**
  The set of contract drawings that pictorially show the intended appearance of a job when complete.

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THE CONCEPT OF THE LINE OF ACTION

A project being a series of tasks and milestones can often be broken into major components, the combination of which constitute the project whole. Components in turn can be identified by detailed characteristics which vary depending on the nature of the project and the disciplines which are used to achieve the project goals and objectives.

An example of a line of action that retains relative consistency is the purchase of a home.

There is first an action or desire that triggers the thought of a new home. Next, the decision about where to locate the home is addressed. A part of the overlapping thoughts consider how much can be spent, along with what is desired in the home. This process is sometimes called the need, want, wish list. Certain things are needed as an absolute minimum such as one and a half bathrooms. The want list may include two full size bathrooms to allow the family to enjoy a bit more privacy at a cost that they can afford. The ultimate is three bathrooms, one of which contains a whirlpool and a sauna. This is on the wish list and may not be possible, but is certainly a probability depending on the conditions surrounding the project and its financing and design.

Then the needs, wants and wishes come together in the search for the home. This is often the reality of the project. It is the moment when we realize that what we need is readily available, but what we want or wish may need to be made to happen.

Once the concept is merged into the practicalities of what is possible we search, offer and buy. Then the actual move in happens. So in great, broad steps the process looks something like this:

1. The need or desire for a new home is established
2. The location is decided upon
3. The amount of money to be spent is established
4. A search for the home is made
5. A home is found, decided on, an offer made, accepted and the home is bought
6. You move into the home
7. You live in and maintain the home

Thus the entire generic process of purchasing new quarters is summarized in seven

fundamental steps that probably will occur in nearly all cases where a family is going through such a change in environments. The major phases are incorporated in what, in project management, is called a line of action.

Each project oriented discipline, irrespective of its nature, will have a line of action. If the major steps in this discipline can be identified, articulated and expanded, the project manager can effectively work to establish the tasks needed to successfully achieve the goals and objectives for which the project team was established.

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Closing Out A Construction Project

A random summary of 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.

The close out process does not start as the construction phase is being completed but long before. Closing out is an ongoing action. Throughout all phases of the job the experienced construction team studies the documents and the work so as to set how each element can best be turned over to the owner in accordance with the contract.

Some of the 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. (Note: This list will be arranged by categories as it is added to)

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, or equivalent document, 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 within an agreed upon time frame. (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. Plan and implement grand opening or preview festivities for major team members, company principals and others contributing to the planning, design and construction of the facility. (owner, contractor)

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 and clearly referenced to the warranty period.

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)

39. Provide the owner a certification as to the building area calculations including gross square footage,

leasable square footage, and area use assignments.

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

Ralph J. Stephenson PE PC
Consulting Engineer

Suggested Bibliography of Management Related Books

a starter list for the project manager's library

- **Managing Yourself Creatively** — Ted Pollock
  Hawthorn Books, Inc.
  260 Madison Avenue
  New York, New York

- **The Nine Master Keys of Management** — Lester Bittel
  McGraw Hill Book Company
  330 West 42nd Street
  New York, New York

- **It All Depends** — Harvey Sherman
  University of Alabama Press
  University of Alabama

- **Management - Tasks, Responsibilities, Practices** — Peter F. Drucker
  Harper & Row, Publishers, Inc.
  10 East 53rd Street
  New York, New York 1002

- **The Managerial Grid** — Blake & Mouton
  The Gulf Publishing Company
  Houston, Texas 77001

- **Top Management Planning** — George R. Steiner
  The MacMillan Company
  866 Third Avenue
  New York, New York 10022

- **Management by Exception** — Lester R. Bittel
  McGraw Hill Book Company
  330 West 42nd Street
  New York, New York 10036

- **Critical Path Method** — Radcliff, Kawal, Stephenson
  Cahners Publishing Company

Boston, Massachusetts 02116

- **Effective Psychology for Managers** — Mortimer R. Feinberg
  Prentice Hall, Inc.
  Englewood Cliffs, New Jersey

- **The Time Trap** — R. Alec MacKenzie
  Amacon
  135 W. 50th Street
  New York, New York 10020

- **Management - Theory and Practice** — Ernest Dale
  McGraw-Hill Book Company
  330 West 42nd Street
  New York, New York 10036

- **An Introduction to Decision Logic Tables** — Herman McDaniel
  John Wiley & Sons, Inc.
  605 Third Avenue
  New York, New York 10016

- **Management by Objective** — George S. Odiorne
  Pitman Publishing Company
  20 East 46th Street
  New York, New York 10017

- **How to Attract Good Luck** — A.H.Z Carr
  Cornerstone Library
  Divison of Pocket Books, Inc
  Rockerfeller Center
  670 Fifth Avenue
  New York, New York 10020

- **Synectics** — William J. J. Gordon
  Harper & Row Publishers, Inc
  49 East 33rd Street
  New York, New York 10016

- **The Speech Writing Guide** — James J. Welsh

John Wiley & Sons, Inc
605 Third Avenue
New York, New York 10016

- **The Executive Deskbook** — Auren Uris
  Van Nostrand Reinhold Company
  450 West 33rd Street
  New York, New York 10001

- **Formal Organization - a systems approach** — Carzo & Yanouzas
  Irwin - Dorsey Press
  Homewood, Illinois

- **Managing Architectural Projects** — David Haviland
  The American Institute of Architects
  1735 New York Avenue NW
  Washington, DC 20006

- **Before You Build**
  Her Majesty's Stationery Office
  Government Bookshops, England

- **A Professional Guide for Young Engineers** — William E. Wickenden
  Engineers Council for Professional Development

- **Legal Apects of Architecture, Engineering and the Construction Process** — Justin Sweet
  West Publishing Company
  St. Paul, Minnesota

- **Managing in Turbulent Times** — Peter F. Drucker
  Harper & Row, Publishers, Inc.
  10 East 53rd Street
  New York, New York 10022

- **Effective Meetings for Busy People** — William T. Carnes
  McGraw Hill, Inc.
  New York, New York

- **Give & Take** — Chester L. Karrass
  Thomas Y. Crowell Company
  New York

- **Smart Questions** — Dorothy Leeds
  McGraw Hill Book Company
  New York, New York

- **Managing Organizational Conflict** — Stephen P Robbins
  Prentice Hall, Inc.
  Englewood Cliffs, New Jersey

- **Ralph J. Stephenson PE**
  - **Construction retentions, collections and final payment - ho 259**
  - **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.

- **General nature of cash flow in the construction industry**
  - 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

  - 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

  - 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.

- **Conditions surrounding collections and payments**
  - 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!

  - 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.

- **Retentions**
  - 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
  - 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
  - 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!

- **Collections, or better yet, payments**
  - Direct payment from the owner
    Conventional method on self financed projects
    Success of method depends on the integrity and compentence of the owner
  - 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
  - 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
- **Final payment**
  - 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!

- **Where successful collections and payment start**
  - 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

  - 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

- 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

- 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

- **Rules for getting paid promptly**
  - Be certain of your agreement and understand what it says
  - Be honest in your dealings and your intent
  - Fulfil your contract
  - Avoid legal entanglements and threats
  - Be willing to use the lubricating oil of small favors exchanged
- **If you aren't entitled to it don't try to get it!**
- **ho 259 - Dec, 87**

	abb	meaning	abb type
1	a	a - those having authority to take the action	ind
2	act	act - action	gen
3	adm	adm - administration	fun/wct
4	apv	apv - approvals	act
5	art	art - articulation period - loa	phs/loa
6	ccv	ccv - conceptual period - loa	phs/loa
7	clo	clo - close out	act/phs/wct
8	con	con - construction - loa	act/phs/wct/fun/loa
9	cor	codes & ordinances	doc
10	cos	cos - costing	act/fun/wct
11	cot	cot - contracts	doc/wct
12	cty	cty - category	gen
13	d	d - those doing the action	ind
14	des	des - design	act/phs/wct/fun/loa
15	dre	dre - document review	act
16	eas	eas - easements	gen/wct
17	fen	fen - front end activity	act
18	fin	finance	gen
19	fun	fun - functional	gen
20	gco	gco - general conditions or requirements	gen/wct
21	gen	gen - general abbreviation	gen
22	ind	ind - individual	gen

	abb	meaning	abb type
23	ins	Insurance	gen
24	loa	loa - line of action term	gen
25	mgt	mgt - management	fun/wct
26	mkt	mkt - marketing activity	act/fun
27	mtn	mtn - maintenance period - loa	phs/loa
28	oen	oen - original entry number	gen
29	opr	opr - operating period - loa	phs/loa
30	p&s	p&s - planning & scheduling	act/wct
31	per	per - permits	doc/wct
32	phs	phs - phase of work	gen
33	pos	pos - post construction activity	act/phs
34	prg	prg - project design program work - loa	phs/loa/wct
35	pro	pro - procurement	act/phs/wct
36	r	r - those having responsibility for the action	ind
37	reg	reg - regulatory	org/wct
38	res	res - real estate	fun
39	res	res - real estate	phs/fun
40	tov	tov - turnover period - loa	phs/loa
41	wct	wct - work category	gen
42	wrk	wrk - work	gen

	wrk cty	action	owner	arch/ engr	contr	regul	opertr
1	adm	- Administration					
2	adm	Assign job numbers					
3	adm	Bind edges of frequently used sets of drawings					
4	adm	Determine financial soundness of client					
5	adm	Determine scope & nature of labor agreements & discuss with proj team					
6	adm	Establish and implement project meeting note procedure					
7	adm	Establish level of documentation to be maintained on project					
8	adm	Establish project cost acctg system and account numbers					
9	adm	Establish remote project bank accounts					
10	adm	Establish request for payment, approval & payment procedures					
11	adm	File bid set of contract documents in safe, protected location					
12	adm	Insure internal staff wage agreements are in place					
13	adm	Insure that all drawing deposits are returned					
14	adm	Maintain inventory of tools & equipment					
15	adm	Obtain and distribute site addresses					
16	adm	Obtain bonds, insurance & licenses as required					
17	adm	Obtain builder's risk and liability insurance					
18	adm	Obtain contractor bonds as required					
19	adm	Obtain emergency phone numbers for subcontractors					
20	adm	Obtain field office phones and distribute number					
21	adm	Obtain fire and theft insurance					
22	adm	Obtain subcontractor bonds as required					
23	adm	Obtain subcontractor insurance certificates					
24	adm	Prepare & distribute project directory					
25	adm	Prepare & submit approval procedures to be used					

	wrk cty	action	owner	arch/ engr	contr	regul	opertr
26	adm	Prepare and distribute subcontractor list					
27	adm	Prepare employee site conduct guidelines					
28	adm	Prepare requests for payment					
29	adm	Prepare schedule of values for payment requests					
30	adm	Provide field staff with job log books and set procedures for entries					
31	adm	Provide field staff with up to date contract drawing set					
32	adm	Provide owner with insurance certificates as required					
33	adm	Provide project staff with copies of office field procedure & policy manuals					
34	adm	Review & distribute all subsoil reports as required					
35	adm	Review applicable lien laws & convey information to those concerned					
36	adm	Review billing procedures with subcontractors					
37	adm	Review bulletin, change order & field order procedures with subcontractors					
38	adm	Review employee site conduct guidelines with internal staff					
39	adm	Review employee site conduct guidelines with subcontractors					
40	adm	Set field project filing system					
41	adm	Set format for project document files					
42	adm	Set job meeting schedules					
43	adm	Set office project filing system					
44	adm	Set procedures for submission of daily and weekly reports					
45	adm	Set up field bank accounts as needed					
46	adm	Set up field petty cash account & provide cash to field staff					
47	adm	Set up required courier service for local delivery of critical material					
48	adm	Validate your firm's ability to meet insurance requirements					
49	clo	- Close out					
50	clo	Assist in start up process for equipment (define carefully)					

	wrk cty	action	owner	arch/ engr	contr	regul	opertr
5 1	clo	Define job conditions to be met for obtaining certificate of occupancy					
5 2	clo	Define job conditions to be met for substantial completion					
5 3	clo	Establish & publish construction record set preparation procedures					
5 4	clo	Establish & publish operating & maint manual (OMM) submittal procedures					
5 5	clo	Establish and publish punch list procedures					
5 6	clo	Establish and publish warranty procedures					
5 7	clo	Follow up on corrective work required during warranty period					
5 8	clo	Follow up project during warranty period					
5 9	clo	Follow up with public relations call after const					
6 0	clo	Obtain certificate of occupancy					
6 1	clo	Obtain certificate of substantial completion					
6 2	clo	Obtain guarantees					
6 3	clo	Obtain operating & maintenance manuals					
6 4	clo	Obtain project operations and maintenance manuals					
6 5	clo	Obtain warranties					
6 6	clo	Plan & implement systems training programs as required					
6 7	clo	Prepare and publish as appropriate, full project critique & debriefing					
6 8	clo	Prepare const document record set (as builts)					
6 9	clo	Provide owner with set of construction record documents					
7 0	clo	Punch out project					
7 1	clo	Review consent of surety reqmts & distribute info as apporpriate					
7 2	clo	Set project close out procedures					
7 3	clo	Turn over project to client					
7 4	con	- Construction					
7 5	con	Arrange for & take ongoing construction photos					

	wrk cty	action	owner	arch/ engr	contr	regul	opertr
76	con	Determine location of storage, const roads, stockpile, parking and fab areas					
77	con	Inspect job site before move in					
78	con	Install job site temporary water					
79	con	Label & safely store intact bid set of contract documents					
80	con	Notify those concerned, particularly field staff re alternates selected					
81	con	Obtain all waivers of leins					
82	con	Prepare & distribute job site plan					
83	con	Prepare & maintain general conditions material analyses					
84	con	Prepare & maintain past & current adminstrative labor analyses					
85	con	Prepare & review requests for payment with client's representative					
86	con	Prepare & submit daily reports					
87	con	Prepare & submit summary construction reports					
8	con	Prepare and maintain past & current field labor analyses					
89	con	Prepare project construction network model					
90	con	Prepare project construction schedules					
91	con	Provide subcontractors with adequate construction documents					
92	con	Read construction specifications and contracts					
93	con	Request and implement special inspections of project					
94	con	Review site plan and site space allocation with subcontractors					
95	con	Set & implement safety program					
96	con	Set location for all job offices, trailers , storage facilities & other funct areas					
97	cor	Apply for & obtain plan code reviews required					
98	cor	Make code searches for document compliance					
99	cos	- Costing					
00	cos	Confirm owner's budget relative to the project delivery system selected					

	wrk cty	action	owner	arch/ engr	contr	regul	opertr
101	cos	Prepare & distribute buy out estimate as required					
102	cos	Prepare and distribute code of accounts					
103	cos	Prepare field cost, hour, quantity budget targets					
104	cos	Prepare list of allowances and review with project staff					
105	cos	Prepare master labor & material budgets					
106	cos	Provide field with field budgets					
107	cos	Tabulate all bid qualifications & review with project staff					
108	cot	- Contracts					
109	cot	Execute client contract					
110	cot	Execute client letter of intent if appropriate					
111	cot	Execute construction contracts with clients					
112	cot	Negotiate construction contracts with clients					
113	cot	Obtain notice to proceed if appropriate					
114	cot	Prepare & issue subcontract purchase orders					
115	cot	Prepare & submit client proposals					
116	cot	Provide const supt with subcontract purchase orders showing full work scopex					
117	cot	Review client contract					
118	cot	Review purchase order conditions with subcontractors					
119	des	- Design					
120	des	Check design development package for constructibility					
121	des	Check final design package for constructibility					
122	des	Check preliminary design package for constructibility					
123	des	Check schematic design package for constructibility					
124	des	Make full review of construction drawings					
125	des	Prepare & submit elevator studies					

	wrk cty	action	owner	arch/ engr	contr	regul	opertr
126	des	Prepare & submit performance specs for life safety and automation systems					
127	des	Prepare & submit value engineering analysis					
128	des	Prepare ALTA/ASCM land title survey					
129	des	Prepare design development package					
130	des	Prepare final construction documents					
131	des	Prepare preliminary design package					
132	des	Prepare schematic design package					
133	des	Retain curtain wall/testing consultant					
134	des	Retain elevator consultant					
135	des	Retain life safety & automation consultant					
136	des	Retain window washing consultant					
137	des	Select construction design characteristics & systems					
38	eas	- Easements					
139	eas	Determine applicable utility easements & confirm clearance to start work					
140	eas	Determine maintenance easements and confirm clearance to start work					
141	eas	Determine reciprocal easements & confirm clearance to start work					
142	eas	Identify easments & restrictions that impact on field work					
143	fin	- Finance					
144	fin	Check all assements and resolve outstanding liability commitments					
145	fin	Obtain permanent & interim financing information as required					
146	fin	Obtain temporary & permanent financing					
147	fin	Prepare pro forma analyses					
148	gco	- General conditions & requirements					
149	gco	Arrange for project progress photos and video & sound records to be made					
50	gco	Design, fabricate and erect site identification sign					

	wrk cty	action	owner	arch/ engr	contr	regul	opertr
151	gco	Establish photo taking responsibilities and procedures on project					
152	gco	Install job site phones					
153	gco	Install job site temporary permanent power					
154	gco	Install job site temporary power					
155	gco	Install job site temporary toilets					
156	gco	Make video tape reconassaince of site before starting construction					
157	gco	On time & material jobs, identify all general requirement & condition items					
158	gco	Set & hook up job site clothes changing facilities for trades					
159	gco	Set & hook up job site offices					
160	gco	Set & hook up job site storage facilities					
161	gco	Take photos of all site conditions prior to beginning on & off site work					
162	mgt	- Management					
163	mgt	Assemble and organize project team					
	mgt	Establish & implement procedures for keeping field logs, diaries & reports					
165	mgt	Identify construction ultimate decision maker					
166	mgt	Identify design ultimate decision maker					
167	mgt	Identify relations among parties during construction					
168	mgt	Identify relations among parties during design					
169	mgt	Prepare and distribute project organization chart					
170	mgt	Revalidate your firm's ability to do job					
171	mgt	Set & implement client review procedures					
172	mgt	Set procedures for all job related meetings					
173	mgt	Set project delivery system to be used					
174	mgt	Set project mission, goals & objectives					
175	p&s	- Planning & scheduling					

	wrk cty	action	owner	arch/ engr	contr	regul	opertr
176	p&s	Confirm owner or end user time table for construction & occupancy					
177	p&s	Confirm owner or end user time table for design					
178	p&s	Determine scope of work for all off site construction required					
179	p&s	Establish and tabulate key project dates, and review with project team					
180	p&s	Obtain required approvals of work plans and schedules					
181	p&s	Prepare summary & detailed network models of work to be done					
182	p&s	Review work plan and schedules with subcontractors					
183	per	- Permits					
184	per	Apply for & obtain curb cut permits					
185	per	Apply for & obtain curb cut permits					
186	per	Apply for & obtain demolition permits					
187	per	Apply for & obtain electrical permits					
188	per	Apply for & obtain environmental permits required					
189	per	Apply for & obtain erosion control permits					
190	per	Apply for & obtain food service permits					
191	per	Apply for & obtain foundation permits					
192	per	Apply for & obtain full building permit					
193	per	Apply for & obtain health department permits					
194	per	Apply for & obtain highway right of way work permits					
195	per	Apply for & obtain mechanical permits					
196	per	Apply for & obtain site work permits					
197	per	Apply for & obtain street restriction permits					
198	per	Apply for & obtain temporary parking permits					
199	per	Apply for & obtain waterway work permits					
200	per	File contract document building permit set in safe, protected location					

	wrk cty	action	owner	arch/ engr	contr	regul	opertr
201	per	Label & safely store intact permit sets of drawings					
202	per	Obtain all site clearances needed to begin and maintain work					
203	prg	- Project design program work					
204	prg	Establish scope of off site work required by you and by others					
205	prg	Prepare market studies					
206	prg	Review project program needs and desires with architect/engineer					
207	prg	Review project program needs and desires with owner					
208	prg	Write facility program					
209	pro	- Procurement					
210	pro	Apply for permanent utility services					
211	pro	Apply for temporary utility services					
212	pro	Determine mock ups required and make arrangements for their design & const					
213	pro	Determine warehousing needs and obtain space					
214	pro	Establish & publish submittal procedures					
215	pro	Establish & publish submittal processing procedures					
216	pro	Establish format and content of procurement logs					
217	pro	Establish hoisting needs and procure hoisting equipment					
218	pro	Establish plan room procedures for project					
219	pro	Establish rental equipment needs and procure equipment					
220	pro	Estimate revision costs to work					
221	pro	Expedite all deliveries					
222	pro	Expedite deliveries					
223	pro	Follow up and receive permanent utility services					
224	pro	Follow up and receive temporary utility services					
225	pro	Identify all allowance items & distribute list to those concerned					

	wrk cty	action	owner	arch/ engr	contr	regul	opertr
226	pro	Identify all owner furnished equipment items & distribute to those concerned					
227	pro	Identify equip & material furnished by others & review with proj staff					
228	pro	Identify long lead or hard to procure items and discuss with project staff					
229	pro	Identify nature of labor force for project					
230	pro	Obtain & distribute approved long lead item color & finish schedules					
231	pro	Obtain delivery dates for material & equipment furnished by others					
232	pro	Obtain site topographic, boundary & utility surveys					
233	pro	Obtain soil borings and analyses					
234	pro	Obtain subcontractor information					
235	pro	Package const documents for soliciting sub proposals					
236	pro	Prep & issue sub contractor construction contracts & po's					
237	pro	Prepare bidder's lists					
238	pro	Prepare blanket purchase order system					
239	pro	Prepare contract award tabulation sheet where appropriate					
240	pro	Prepare contract document matrix					
241	pro	Prepare list of early submittals needed and assign to project staff for doing					
242	pro	Prepare list of vendors providing bidding information					
243	pro	Prepare material procurement purchase orders					
244	pro	Prepare over/under analysis of proposals and buy out					
245	pro	Prepare subcontractor selection criteria					
246	pro	Prepare subcontractor selection list					
247	pro	Process client & sub contractor change orders					
248	pro	Process submittals					
249	pro	Receive and file all executed sub contracts					
250	pro	Retain engineering survey services required					

	wrk cty	action	owner	arch/ engr	contr	regul	opertr
251	pro	Retain testing services					
252	pro	Review all exotic materials to be used with project staff					
253	pro	Review and evaluate const sub contract proposals					
254	pro	Review submittal processes with subcontractor & obtain their agreement					
255	pro	Review testing needs and obtain testing services					
256	pro	Set & implement sub contr payment procedures					
257	pro	Set normal, expedited and special submittal turnaround times to be used					
258	pro	Set storage & insurance reqmts for material & equip furnished by others					
259	pro	Solicit & receive const sub contract proposals					
260	pro	Tabulate accepted alternates & insure applicable drawings are availablex					
261	reg	- Regulatory					
262	reg	Apply for regulatory agency approvals					
263	reg	Determine restricted load requirements on site access roads					
264	reg	Follow up and obtain regulatory approvals					
265	reg	Obtain copies of applicable codes and ordinances					
266	reg	Provide notice of start of work as required					
267	res	Check land ownership to determine if project can be built on site					
268	res	Locate sites					
269	res	Prepare and obtain required easements					
270	res	Resolve property use restrictions					

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
1	abb	- Abbreviations			
2	abb	agr - Agreements			
3	abb	bus - Business negotiations			
4	abb	ccu - curb cut			
5	abb	cde - Code work			
6	abb	cmpt - Component			
7	abb	cod - Contract documents			
8	abb	csq - Construction sequence			
9	abb	dde - Design development			
10	abb	des - Design work			
11	abb	eas - Easements			
12	abb	esk - Exterior skin work			
13	abb	fen - Front end work			
14	abb	fin - Finance work			
15	abb	ifw - Interior finish work			
16	abb	irw - Interior rough work			
17	abb	mk up - Mock up			
18	abb	mkt - Market considerations			
19	abb	ons - On site work			
20	abb	pde - Preliminary design			
21	abb	per - Permit work			
22	abb	pro - Procurement			
23	abb	reg - Regulatory work			
24	abb	res - Real estate			
25	abb	sbw - Sub structure work			
26	abb	sde - Schematic design			
27	abb	siw - Site work			
28	abb	ssw - Superstructure work			
29	abb	swo - Systems work			
30	abb	usy - Unit systems work			
31	abb	vac - Vacation of buildings or land			
32	abb	zon - Zoning			
33	cde	- Code & ordinance work			

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
34	cde	Check parking requirements			
35	cde	Make prelim code review of early design packages			
36	cde	Obtain variances to building codes as required			
37	cos	- Cost & estimating work			
38	cos	Prepare base cost estimates to correlate with design program			
39	cos	Prepare pro forma cost analyses			
40	ctr	- Contract preparation and execution work			
41	ctr	Execute design architectural contract			
42	ctr	Execute elect engineer contract			
43	ctr	Execute geotechnical engineer contract			
44	ctr	Execute mechanical engineer contract			
45	ctr	Execute production architect contract			
46	ctr	Execute site engineer contract			
47	ctr	Execute structural engineer contract			
48	ctr	Execute traffice engineer contract			
49	ctr	Negotiate & execute agreement on traffic signalization			
50	ctr	Negotiate and execute construction advisor contracts as reqd			
51	ctr	Negotiate and execute design/build contracts as required			
52	ctr	Negotiate and execute guaranteed maximum prices as required			
53	ctr	Prepare & execute all license agreements			
54	dem	- Demolition work			
55	dem	Demolish & remove all existing above grade obstructions as required			
56	dem	Demolish and remove all below grade obstructions as required			
57	dem	Demolish existing structures as required			
58	dem	Locate, remove, relocate all existing cable tv lines as required			
59	dem	Locate, remove, relocate all existing electrical lines as required			
60	dem	Locate, remove, relocate all existing phone lines as required			
61	dem	Locate, remove, relocate or cap all existing gas lines as required			
62	dem	Locate, remove, relocate, cap all existg special use utilities as reqd			
63	dem	Locate, remove, relocate, cap all existing sanitary lines as required			
64	dem	Locate, remove, relocate, cap all existing storm lines as required			
65	dem	Locate, remove, relocate, cap all existing water lines as required			
66	des	- Design work			

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
67	des	Certify gross building areas			
68	des	Determine electrical demand loads			
69	des	Determine elevator requirements			
70	des	Determine gas demand loads			
71	des	Determine phone demand loads			
72	des	Develop surrounding road improvement plans with city			
73	des	Develop surrounding road improvement plans with XDOT			
74	des	Prepare & issue contract document package			
75	des	Prepare & issue design development package			
76	des	Prepare & issue elevator entrance and cab design	14		
77	des	Prepare & issue elevator fixture design, materials & colors	14		
78	des	Prepare & issue preliminary design package			
79	des	Prepare & issue schematic design package			
80	des	Prepare and submit early design studies to city for comment			
81	des	Prepare and submit early design studies to XDOT for comment			
82	des	Prepare project program			
83	des	Review & approve contract document package			
84	des	Review & approve design development package			
85	des	Review & approve preliminary design package			
86	des	Review & approve schematic design package			
87	des	Review and approve project program			
88	eas	- Easement work			
89	eas	Decide on and describe all private easements at site			
90	eas	Decide on and describe all public utility easements at site			
91	eas	Decide on and describe all reciprocal access easements at site			
92	eas	Decide on and describe all semi public utility easements at site			
93	eas	Negotiate and execute all private easements at site			
94	eas	Negotiate and execute all public utility easements at site			
95	eas	Negotiate and execute all reciprocal access easements at site			
96	eas	Negotiate and execute all semi public easements at site			
97	esk	- Exterior skin work			
98	esk	Apply exterior insulation and finish systems (dryvit and others)	07		
99	esk	Apply plaster to exterior surfaces	09		

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rep code
100	esk	Calk exterior doors	07		
101	esk	Calk exterior masonry	07		
102	esk	Calk exterior sash	07		
103	esk	Caulk exterior precast panels	07		
104	esk	Caulk storefronts and entries	08		
105	esk	Clean exterior masonry	04		
106	esk	Erect exterior granite	04		
107	esk	Erect exterior masonry	04		
108	esk	Form and pour exterior entry columns	03		
109	esk	Install building mounted security cameras	16		
110	esk	Install building mounted security lighting	16		
111	esk	Install dock seals and bumpers	11		
112	esk	Install expansion joint assemblies at roof as required	07		
113	esk	Install ext hard ceiling soffit framing	09		
114	esk	Install exterior door hardware	08		
115	esk	Install exterior glass in storefront & entries	08		
116	esk	Install exterior man doors	08		
117	esk	Install louvers in exterior walls	10		
118	esk	Install miscellaneous iron for exterior skin work	05		
119	esk	Install roof drains and overflow drains	15/07		
120	esk	Install roof flashings & trim	07		
121	esk	Install roof mounted mechanical equipment	15		
122	esk	Install roof scuppers and downspouts	15/07		
123	esk	Install roof shingles	07		
124	esk	Install sheet metal curbs	15/07		
125	esk	Install sheet metal roof flashings and trim	07		
126	esk	Install sliding metal fire doors	08		
127	esk	Install standing seam metal roof deck	05		
128	esk	Install storefront & entry alum framing	08		
129	esk	Install wood overhead doors	08		
130	esk	Lay built up roofing	07		
131	esk	Lay roof insulation	07		
132	esk	Lay single ply roof membrane	07		

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
133	esk	Paint required exterior surfaces	09		
134	esk	Set exterior precast panels	03/05		
135	fen	- Front end work			
136	fen	Decide on project delivery system to be used			
137	fen	Determine site access requirements during construction			
138	fen	Make preconstruction site reconnaissance - photo, sound, tv			
139	fen	Obtain soil borings and subsoil analyses			
140	fen	Prepare ALTA/ACSM land title survey			
141	fen	Prepare and submit market absorbtion rate studies			
142	fen	Prepare and submit traffic studies of site area			
143	fen	Select construction advisors or consultants as reqd			
144	fen	Select design architect			
145	fen	Select electrical engineer			
146	fen	Select geotechnical engineer			
147	fen	Select mechanical engineer			
148	fen	Select production architect			
149	fen	Select site engineer			
150	fen	Select structural engineer			
151	fen	Select traffic consultant			
152	fin	Obtain interim financing			
153	fin	Obtain permanent financing			
154	ifw	- Interior finish work			
155	ifw	Apply concrete floor sealer	03		
156	ifw	Apply gypsum floor topping	03		
157	ifw	Apply plaster brown and scratch coat to interior walls	09		
158	ifw	Apply plaster finish coat to interior walls	09		
159	ifw	Apply plaster skim coat to interior walls	09		
160	ifw	Apply wall covering	09		
161	ifw	Complete hook up elevator and equipment room machinery	13		
162	ifw	Complete hook up elevator and equipment room machinery	13	x	
163	ifw	Dry plaster surfaces	09		
164	ifw	Erect elev shaft studs, in wall work & dry wall to part enclose shafts	09/15/16		
165	ifw	Hang ceiling gyp board	9		

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rep code
166	ifw	Hang stud wall gyp board	09		
167	ifw	Hook up & test fire protection 3rd party supervisory system	13		
168	ifw	Hook up & test fire protection 3rd party supervisory system	13	x	
169	ifw	Hook up elevator machine room equipment	14	x	
170	ifw	Hook up food service equipment	11/15/16	x	
171	ifw	Hook up snack bar equipment	11/15/16		
172	ifw	Install acoustic ceiling panels	09		
173	ifw	Install acoustic ceiling suspension & grid	09		
174	ifw	Install and adjust sprinkler heads	15		
175	ifw	Install carpet	09		
176	ifw	Install ceiling grills & diffusers	15		
177	ifw	Install ceramic tile walls and floors	09		
178	ifw	Install compactor and bailer equipment	11		
179	ifw	Install convector covers	15	x	
180	ifw	Install dock levelors	11		
181	ifw	Install door hardware	08		
182	ifw	Install draperies	12	x	
183	ifw	Install drapery tracks	12		
184	ifw	Install elevator doors at floors	14	x	
185	ifw	Install elevator entrances (minus doors)	14	x	
186	ifw	Install elevator equipment room machinery	13		
187	ifw	Install elevator equipment room machinery	13	x	
188	ifw	Install elevator pit equipment	14	x	
189	ifw	Install elevator rail brackets & car & counterweight rails	14	x	
190	ifw	Install elevator rails	14		
191	ifw	Install elevator rails	14	x	
192	ifw	Install fin tube piping	15		
193	ifw	Install fire extinguishers	10		
194	ifw	Install folding partitions	10		
195	ifw	Install hangers & grid for acoustical ceiling	09		
196	ifw	Install hardware cloth walls	06		
197	ifw	Install hose rack stations	15		
198	ifw	Install in rack sprinkler piping and heads	15		

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
199	ifw	Install insulation at exterior wall spandrels	07	x	
200	ifw	Install int wood doors	08		
201	ifw	Install interior building pavers		x	
202	ifw	Install interior hollow metal doors	08		
203	ifw	Install lay in light fixtures	16		
204	ifw	Install marble floor and wall finishes	04	x	
205	ifw	Install millwork & trim	06		
206	ifw	Install plumbing fixtures	15		
207	ifw	Install quarry tile floors	09		
208	ifw	Install recessed light fixtures	16	x	
209	ifw	Install signage	10		
210	ifw	Install surface mounted light fixtures	16		
211	ifw	Install toilet room accessories	15		
212	ifw	Install toilet room partitions	10		
213	ifw	Install traffic doors	10		
214	ifw	Install viewports	10		
215	ifw	Install vinyl strip doors	10		
216	ifw	Install window blinds	12		
217	ifw	Install wood handrails and trim	08		
218	ifw	Install, glaze & caulk interior windows	08		
219	ifw	Instl elevator car enclosures	14	x	
220	ifw	Instl elevator car frames	14	x	
221	ifw	Instl hoistway wiring	14	x	
222	ifw	Lay resilient flooring	09		
223	ifw	Make elevators operative	14		
224	ifw	Paint required interior surfaces	09		
225	ifw	Provide temporary permanent power to machine rooms for elev installation	16		
226	ifw	Set elevator machine beams	14	x	
227	ifw	Set elevator machine room equipment	14	x	
228	ifw	Set food service equipment	11		
229	ifw	Spray on fireproofing at elevator hoistway struct steel framing	07		
230	ifw	Spray on fireproofing at interior struct steel members	07		
231	ifw	Spray on fireproofing at perimeter struct steel members	07		

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
232	ifw	Tape & sand ceiling dry wall	09		
233	ifw	Tape & sand wall gyp board	09		
234	irw	- Interior rough work			
235	irw	Erect metal wall studs for dry wall partitions	05/09		
236	irw	Erect misc iron handrails	05		
237	irw	Erect misc iron ladders	05		
238	irw	Erect misc iron stairs	05		
239	irw	Install above clg electrical distrubution conduit	16		
240	irw	Install above clg interior domestic sewer piping	15		
241	irw	Install above clg interior domestic water piping	15		
242	irw	Install above clg interior gas piping	15		
243	irw	Install above clg interior roof drain leader	15		
244	irw	Install above clg sheet metal ductwork for hvac	15		
245	irw	Install above clg support for folding partition, and toilet partitions	05/06		
246	irw	Install and test above floor fire sprinkler laterals and drops	15		
247	irw	Install and test above floor fire sprinkler risers	15		
248	irw	Install below floor electrical rough in to above floor equipment	16		
249	irw	Install below floor mech rough in for above floor equipment	15		
250	irw	Install borrowed light hollow metal frames	08		
251	irw	Install dock levelers (to form leveler pit)	11		
252	irw	Install electrical lighting distribution panels	16		
253	irw	Install electrical power distrubution panels	16		
254	irw	Install electrical power equipment disconnects	16		
255	irw	Install fire extinguisher cabinets	10	x	
256	irw	Install hard ceiling suspension & channels	09		
257	irw	Install hard ceiling suspension and framing	09		
258	irw	Install hollow metal door frames	08		
259	irw	Install in wall rough domestic plumbing work	15		
260	irw	Install in wall rough elect work	16		
261	irw	Install in wall rough electrical conduit and feeders	16		
262	irw	Install in wall rough hvac work	15		
263	irw	Install in wall rough medical gas piping	15		
264	irw	Install in-wall wood blocking	06		

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
265	irw	Install metal stairs and handrails	05		
266	irw	Install plumbing stub outs	15		
267	irw	Install temporary closures at elevator shafts to protect from weather	01		
268	irw	Pull electrical distribution wire in conduit	16		
269	per	- Permit work			
270	per	Apply for & obtain site improvement permit			
271	per	Apply for & obtain site utility permit			
272	per	Apply for & obtain soil erosion permits			
273	per	Apply for and obtain all sign permits			
274	per	Check and clear all assessments against the property			
275	per	Obtain permits from Corps of Engineers as required			
276	pro	- Procurement work			
277	pro	Evaluate elevator proposals and award contract	14		
278	pro	Fab & deliver elevator brackets & rails	14	x	
279	pro	Fab & deliver elevator cab interior finishes	14	x	
280	pro	Fab & deliver elevator car frames	14	x	
281	pro	Fab & deliver elevator entrances	14	x	
282	pro	Fab & deliver elevator machine room equipment	14	x	
283	pro	Fab & deliver elevator machine room equipment anchor bolts	14	x	
284	pro	Fab & deliver elevator pit equipment	14	x	
285	pro	Fab & deliver elevator pit tie down steel & embeds	14	x	
286	pro	Fab & deliver elevator plunger casings	14	x	
287	pro	Prep & submit contractor dwgs for elev fixture design, mtls & colors	14	x	
288	pro	Prepare & submit contractor drawings of elevator doors, frames & cabs	14	x	
289	pro	Prepare & submit elevator hoistway, pit & machine room shop drawings	14	x	
290	pro	Prepare & submit elevator machine room anchor bolt shop drawings	14	x	
291	pro	Prepare & submit elevator pit tie down steel & embeds shop drawings	14	x	
292	pro	Propare & issue elevator proposal package	14		
293	pro	Review & approve contractor drawings of elevator doors, frames & cabs	14	x	
294	pro	Review & approve contractor dwgs for elev fixtures	14	x	
295	pro	Review & approve contractor dwgs for elevator entrances	14	x	
296	pro	Review & approve elevator hoistway, pit & machine room shop drawings	14	x	
297	pro	Review & approve elevator machine room anchor bolt shop drawings	14	x	

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
298	pro	Review & approve elevator pit tie down steel & embeds shop drawings	14	x	
299	pro	Solicit & receive elevator proposals	14		
300	reg	- Regulatory work			
301	reg	Apply for and obtain site plan approval			
302	reg	File notice of project start	01	x	
303	reg	Inspect & approve elevator car operation	14		
304	reg	Obtain certificate of occupancy	01	x	
305	reg	Obtain certificate of substantial completion	01	x	
306	reg	Obtain curb cut permits	01		
307	reg	Obtain electrical permit	01/16		
308	reg	Obtain foundation permits	01		
309	reg	Obtain full building permit	01		
310	reg	Obtain highway permits for road improvements	01		
311	reg	Obtain or prepare all easements for street relocation	01		
312	reg	Obtain plumbing permit	01/15		
313	reg	Obtain site work permits	01/02		
314	reg	Obtain variances to land use ordinances as required			
315	reg	Prepare & submit environmental impact statement	01	x	
316	reg	Remove contaminants from site as required	01		
317	reg	Review & approve environmental impact statement	01	x	
318	res	Acquire control of property			
319	res	Negotiate & execute transfer agreements as required			
320	res	Negotiate and execute land or building lease agreements as reqd			
321	res	Negotiate and execute rail row vacations as required			
322	res	Negotiate and execute utility row vacations as required			
323	rsp	- Responsibility codes			
324	rsp	Acoustic contractor	9/		001
325	rsp	Architect/engineer	1/		002
326	rsp	Caisson contractor	2/		003
327	rsp	Carpentry contractor	6/		004
328	rsp	Concrete contractor	03/		005
329	rsp	County agencies			006
330	rsp	Data phone system			007

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
331	rsp	Department of Public Works			008
332	rsp	Department of Transportation			009
333	rsp	Dock leveller contractor	11/		010
334	rsp	Drywall contractor	9		011
335	rsp	Electrical contractor	16/		012
336	rsp	Excavation contractor	2/		013
337	rsp	Federal agencies			014
338	rsp	Fire extinguisher contractor			015
339	rsp	Fire marshall	1/		016
340	rsp	Folding partition contractor	10/		017
341	rsp	Food service equipment contractor	11/		018
342	rsp	Gas company	2/		019
343	rsp	General contractor	1/		020
344	rsp	Glass and glazing contractor	8/		021
345	rsp	Hard tile contractor	9/		022
346	rsp	Hardware	8/		023
347	rsp	Hollow metal fabricator	8/		024
348	rsp	HVAC contractor	15/		025
349	rsp	Insurance rate setter	1/		026
350	rsp	Irrigation contractor	2/		027
351	rsp	Landscape contractor	2/		028
352	rsp	Mechanical contractor	15/		029
353	rsp	Metal deck contractor	5/		030
354	rsp	Millwork contractor	8/		031
355	rsp	Miscellaneous iron contractor	5/15/		032
356	rsp	Municipal agencies			033
357	rsp	open			034
358	rsp	osr (on site representative)	1/		035
359	rsp	Overhead door contractor	8/		036
360	rsp	Painting contractor	9/		037
361	rsp	Paving contractor	2/		038
362	rsp	Power company	1/		039
363	rsp	Precast erector	3/		040

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rep code
364	rsp	Resilient floor tile contractor	9/		041
365	rsp	Resteel supplier	3		042
366	rsp	Rolling curtain contractor	8/		043
367	rsp	Roof top unit fabricator	15/		044
368	rsp	Roofing contractor	7/		045
369	rsp	Signage contractor			046
370	rsp	Site utility contractor	2/		047
371	rsp	Sliding door contractor	8/		048
372	rsp	Sprinkler contractor	15/		049
373	rsp	State agencies			050
374	rsp	Steel erector	5/		051
375	rsp	Striping contractor	2/		052
376	rsp	Structural steel contractor	5/		053
377	rsp	Telephone company			054
378	rsp	Toilet partition contractor	10/		055
379	sbw	- Substructure work			
380	sbw	Apply sealer to slab on grade	03	x	
381	sbw	Apply waterproofing to exterior foundation walls	07	x	
382	sbw	Backfill and compact at exterior of substructure walls	02	x	
383	sbw	Backfill ext col & wall footings & piers	02	x	
384	sbw	Backfill grade beams	02	x	
385	sbw	Backfill int col footings & piers	02	x	
386	sbw	Blast rock and remove as required	02		
387	sbw	Brace basement walls for early backfilling as required	02	x	
388	sbw	Cure slab on grade to allow construction traffic	03		
389	sbw	Cut off piling	02		
390	sbw	Design, submit and approve concrete mixes	03	x	
391	sbw	Drill and fill caissons	02	x	
392	sbw	Drill, install and grout rock anchors	02	x	
393	sbw	Drive & fill steel shell piles	02	x	
394	sbw	Drive and brace soldier beams and install lagging	02	x	
395	sbw	Drive prestressed concrete piles	02	x	
396	sbw	Drive sheet piling	02	x	

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
397	sbw	Drive steel H piles	02	x	
398	sbw	Drive test piling & load	02	x	
399	sbw	Drive wood piles	02	x	
400	sbw	Excavate, form, reinforce, pour & strip ext wall & col ftgs	03	x	
401	sbw	Excavate, form, reinforce, pour & strip interior col footings	03	x	
402	sbw	Excavate, form, reinforce, pour and strip grade beams	03		
403	sbw	Excavate, install & backfill ug electrical conduit	16	x	
404	sbw	Excavate, install, test & backfill ug bldg roof storm drain lines	15	x	
405	sbw	Excavate, install, test & backfill ug bldg sanitary sewer	15	x	
406	sbw	Excavate, install, test & backfill ug fire protection lines	15		
407	sbw	Fill & fine grade for interior slab on grade	03	x	
408	sbw	Form, reinf, pour & strip col footing piers	03	x	
409	sbw	Form, reinforce & pour caission caps	03		
410	sbw	Form, reinforce & pour pile caps	03		
411	sbw	Install underpinning	02		
412	sbw	Install water stops in substructure walls as required	03		
413	sbw	Lay and part backfill footing drain tile	02	x	
414	sbw	Lay out column lines & interior elevations	01		
415	sbw	Lay vapor barrier for slab on grade	07		
416	sbw	Mass excavate for substructure work	02	x	
417	sbw	Mobilize and move driving rig on site	02		
418	sbw	Poison subbase	02		
419	sbw	Pour out interior slab on grade	03	x	
420	sbw	Rub exposed foundation concrete	03		
421	sbw	Saw cut slab on grade	03		
422	sbw	Seal slab on grade saw cut joints	03		
423	sbw	Set anchor bolts in footings, piers and walls	03		
424	sbw	Set col anchor bolts	05	x	
425	sbw	Set embeds in ext wall footings	05	x	
426	sbw	Set embeds in substructure walls as required	03/15/16	x	
427	sbw	Set in floor work for interior slab on grade	03	x	
428	sbw	Set perim insulation at substructure walls	07		
429	sbw	Set sleeves in substructure walls as required	15/16	x	

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
430	sbw	Stabilize soil	02		
431	siw	- Site work			
432	siw	Apply sprayed concrete for pool basin	03		
433	siw	Balance building areas	02		
434	siw	Balance exterior site areas	02		
435	siw	Clear & grub site	02		
436	siw	Clear and grub site	02		
437	siw	Construct exterior building planters	02/04	x	
438	siw	Construct service area enclosure	02/03/04		
439	siw	Cut & fill main bldg area to final sub grade elevation	02		
440	siw	Cut & fill site areas outside bldg to sub grade elevation	02		
441	siw	Energize primary transformer	16		
442	siw	Erect flagpole	10		
443	siw	Excav, instl & backfill site elect & telephone conduit	16		
444	siw	Excavate, install & backfill light pole bases	16		
445	siw	Excavate, install & backfill site lighting conduit	16		
446	siw	Excavate, install, test & backfill site ug domestic water lines	02	x	
447	siw	Excavate, install, test & backfill site ug fire protection lines	02	x	
448	siw	Excavate, install, test & backfill site ug gas lines	02	x	
449	siw	Excavate, install, test & backfill site ug sanitary sewer lines	02	x	
450	siw	Excavate, install, test & backfill site ug storm sewer lines	02	x	
451	siw	Fill & fine grade for pool perim deck	02		
452	siw	Fine grade site areas to bottom of base paving course	02		
453	siw	Form, reinforce & pour transformer bases	02	x	
454	siw	Form, reinforce, pour & finish concrete curbs & gutters	02		
455	siw	Form, reinforce, pour & finish concrete sidewalks	02		
456	siw	Form, reinforce, pour & finish concrete truck aprons	02	x	
457	siw	Install acceleration & deceleration lanes on adjoining roads	02	x	
458	siw	Install bike racks	06		
459	siw	Install curb cuts & aprons	02		
460	siw	Install flagpole foundation	02	x	
461	siw	Install landscaping	02	x	
462	siw	Install site ditch drains and culverts	02		

	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
463	siw	Install site pavers	02	x	
464	siw	Install telephone cable to building	16		
465	siw	Install temporary utilities	01		
466	siw	Install traffic signals & controllers	16		
467	siw	Instl & lamp site light fixtures	16		
468	siw	Lay asphalt base course	02		
469	siw	Lay asphalt wearing course	02		
470	siw	Lay out building	01		
471	siw	Mass excav, instl undergrd util and grade for pool sprayed conc	02		
472	siw	Pour out pool perim slab on grade deck	02		
473	siw	Pull primary cable and connect transformer	16		
474	siw	Remove existing below grade concrete as required			
475	siw	Remove existing concrete foundations			
476	siw	Rough grade site areas as required	02		
477	siw	Set & embed vehicle guard posts	05		
478	siw	Set horiz & vertical controls	02		
479	siw	Set transformers on base	16		
480	siw	Stockpile excavated material	02		
481	siw	Strip site	02		
482	siw	Stripe parking and roadway areas	02		
483	siw	Stripe vehicle and pedestrian areas	02		
484	ssw	- Super structure work			
485	ssw	Align & weld exterior precast panels	03/05		
486	ssw	Cure & strip concrete core walls			
487	ssw	Cure supported concrete deck to post tension			
488	ssw	Cure supported concrete deck to strip & reshore			
489	ssw	Erect light guage steel walls and suppported decks			
490	ssw	Erect metal floor & roof deck	05		
491	ssw	Erect struct steel and joists	05		
492	ssw	Form & set in floor work for supported concrete deck			
493	ssw	Form, reinforce & pour concrete columns			
494	ssw	Form, reinforce & set in fl work for supported concrete decks	03		
495	ssw	Form, reinforce and pour concrete core walls			

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	cmpt	activity description, name or meaning	csi div	sbmtl reqd	rsp code
496	ssw	Form, reinforce, pour & strip cols to floor deck above	03		
497	ssw	Form, reinforce, pour & strip concrete shaft & shear walls to floor deck above	03		
498	ssw	Form, reinforce, pour & strip concrete supported decks on wood forms	03		
499	ssw	Grout base plates	03		
500	ssw	Grout exterior precast panels	03		
501	ssw	Install roof equipment curbs	07		
502	ssw	Install shear studs	05		
503	ssw	Plumb, bolt & detail structural steel & joists	05		
504	ssw	Pour conc slabs and curbs on metal deck	03		
505	ssw	Pour out supported concrete deck			
506	ssw	Rough wood frame walls and floor system			
507	ssw	Rub exposed concrete surfaces on supporting structures	03		
508	ssw	Set embeds in supported concrete deck			
509	ssw	Strip & reshore supported concrete deck			
510	ssw	Strip concrete columns			
511	ssw	Total strip supported concrete deck			
512	usy	- Unit systems work			
513	usy	Install data phone system			
514	usy	Install emergency generator	16		
515	usy	Instl & wire guard station panel & equipment?	16	x	
516	usy	Instl elevator control systems	14	x	
517	usy	Instl elevator fire command room	16	x	
518	usy	Instl elevator life safety systems	15/16	x	
519	usy	Obtain information on baler	13/		
520	usy	Obtain information on owner's pallett stacker	13/		
521	usy	Obtain information on trash compactor	13/		
522	usy	Order/detail/approve/fab & deliver elevator	14/		
523	usy	Order/detail/approve/fab & deliver emergency generator	16/		
524	usy	Run in food service equipment	11	x	
525	usy	Test & balance air systems	15/		
526	usy	Train staff on food service equipment use and maintenance	11	x	
527	zon	- Zoning work			
528	zon	Rezone properties as required			

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General Steps Taken in Processing A Construction Claim

Review and study draft only

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 accommodate 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. It is to be 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 usually 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. This is the main reason for having the legal consultant work directly for the legal consultant and prepare confidential data and analyses 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.

• **Step J** - At some point, usually determined by the governing legal body, the discovery period is declared closed and formal legal hearings now begin. 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.

• **Step K** - 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 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, retire 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.

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 displays may be shown on a single computer screen viewed by one to four people, 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 listening and absorbing 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 reviewing material covered to that point.

- At the close of the session the documents produced can be printed, duplicated and distributed to the group to encourage immediate action on material covered.

- Opportunity is 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 rapid 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. Everybody works to the same agenda and from the same set of notes.

- 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. Use good hardware and software that allows all participants to clearly view the screen display.

3. Recommended software for note taking includes one of the standard word processors such as MacWrite or Microsoft Word. Other word processing programs that are easily used in technography include outlining programs such as Think Tank or More. Software for graphic and tabular displays includes standard project planning, data base, free graphics and spread sheet programs such as MacProject, Micro File, MacPaint, MacDraft and 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

0. Abbreviations

p. Mission statements

q. Project characteristics

r. Agenda

s. General notes

I. <u>Trans America Mall Notes - disk 129 - ho 297</u>

A. **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.

1. Name of project - Trans American Mall
2. Those involved
   a) Carlsbad Holding - Center owner
      (1) Frank Rogell - Officer in charge
      (2) Charles Lugow - Project manager
      (3) Tom Brotherton - On site representative
      (4) Lawrence Jones - Mall manager
   b) Clemency and Harrigan - Architect/Engineer of record
      (1) Charles Clemency - Principal in charge
      (2) Carl Travis - chief designer
      (3) Lorne MacIntosh - project manager
   c) Larkins & Horowitz - Electrical & mechanical engineers
      (1) Art Larkins - Principal
      (2) Fred Karlton - Mechanical engineer
      (3) Ted Horowitz - Electrical engineer
   d) Todd & Jones - General contractor
      (1) Jay Harvey - Project manager
      (2) Charles McElvey - Field superintendent
      (3) Harvey Vennalt - General superintendent
   e) Lincoln Mechanical - Mechanical contractor
      (1) Larro Nadian - Project manager and estimator
      (2) Niles Mechadian - Project superintendent
   f) Sunshine Electrical - Electical contractor
      (1) Stan Sunshine - Principal and project manager
      (2) Lefty Mallett - Superintendent
3. Responsibility codes
   a) 001 - Carlsbad Holding - owner
   b) 002 - Clemency & Harrigan - architect/engineer
   c) 003 - Larkins & Horowitz - electrical/mechanical engineers
   d) 004 - Todd & Jones - General contractor
   e) 005 - Lincoln Mechanical - mechanical contractor
   f) 006 - Sunshine Electrical - electrical contractor
4. Abbreviations (in alphabetical order)
   a) c&h - Clemency & Harrigan
   b) cho - Carlsbad Holding
   c) cod - contract documents
   d) dp1 - design package 1 (other dp abbreviations similar)
   e) dpa - development package
   f) etr - end time restraint
   g) fen - front end work
   h) fiw - finish interior work
   i) gmp - guaranteed maximum price
   j) l&h - Larkins & Horowitz
   k) lme - Lincoln Mechanical
   l) pro - procurement
   m) riw - rough interior work
   n) sbw - shell building work
   o) sel - Sunshine Electrical
   p) sit - site work

q) ski - exterior building skin
r) sub - building substructure work
s) sus - building superstructure work
t) sys - building systems work
u) t&j - Todd & Jones
v) t&m - Time and material
w) t/r - time restraint
x) tim - tenant improvement work

5. Project design package content
   a) Design package dp1
      Complete construction documents for 200' x 400' addition to existing tenant building.
   b) 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.
   c) Design package dp3
      Extension of north site area including parking and related work for 800 additional cars.
   d) Design package dp4
      Renovation of existing mechanical and electrical rooms and replacement of entire electrical distibution system
   e) Design package dp5 - to be defined
6. Key dates - as of 3/2/88 (43)
   a) Complete prepare & issue design packages (dp)
      (1) 3/25/88 (60) - Comp prepare & issue dp1
      (2) 4/11/88 (71) - Comp prepare & issue dp2
      (3) 4/29/88 (85) - Comp prepare & issue dp3
      (4) 5/31/88 (106)- Comp prepare & issue dp4
      (5) To be determined - Comp prepare & issue dp5
   b) Submit guaranteed maximum prices (gmp)
      (1) 3/25/88 (60) - Submit gmp for dp1
      (2) 4/20/88 (78) - Submit gmp for dp2
      (3) 5/26/88 (104) - Submit gmp for dp3
      (4) 5/31/88 (106) - Submit gmp for dp4
   c) Start construction work
      (1) 4/25/88 (81) - Start construction of dp1 base building
      (2) 6/30/88 (128) - Start renovation under dp4
      (3) 9/11/89 (432) - Start site work under dp3 contract
      (4) 9/11/89 (432) - Start remodeling under dp2
   d) Complete complete work
      (1) 6/1/89 (362) - Complete site work under dp3 contract
      (2) 6/1/89 (362) - Complete const dp1 work to start of tenant improvemnts
      (3) 7/31/89 (403) - Complete base building work under dp1
      (4) 8/15/89 (414) - Grand opening of new addition under dp1
      (5) 3/1/90 (552) - Complete remodeling dp2 base bldg to start of tenant work
      (6) 4/2/90 (574) - Complete remodeling base building under dp2
      (7) 4/27/90 (593) - Grand opening of dp2 contract work
7. General characteristics of project
   a) Location - Delaton, New Hampshire
      (1) Faces on 20th Steet, access to Lohngren on west and Mill Run on east
   b) Philosophy
      (1) To constantly maintain an attractive, safe retail environment during const

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

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

B. **8:05:08 - July 27, 1988**

1. Project meeting #1 - in Carlsbad offices - July 27, 1988
2. By Jay Harvey
3. 01.0 - Those attending meeting
a) Frank Rogell - Carlsbad officer in charge
b) Charles Lugow - Carlsbad project manager
c) Charles Clemency - C & H principal in charge
d) Lorne MacIntosh - C & H project manager
e) Art Larkins - L & H principal in charge
f) Jay Harvey - T & J project manager
4. 02.0 - Agenda
a) 2.01 - Review project characteristics
b) 2.02 - Prep smry netwk model for dp1, 2, 3 & 4 to confirm current key dates
c) 2.03 - Prepare laundry lists for early construction work in dp1
d) 2.04 - Prepare laundry lists for all construction work in dp4
e) 2.05 - Prepare network models for close in work for dp1
f) 2.06 - Prep network models for elect and mech remodelling under dp4
5. 03.0 - Current status of project
a) 03.01 - Design
(1) 03.0101 - All intermediate design package production dates being met
(2) 03.0102 - Need cost data on alternate roofing details for dp1
b) 03.02 - Construction
(1) 03.0201 - T & J currently preparing early estimates leading to GMP
c) 03.03 - Owner working with all to define tenant continuity during const
(1) 03.0301 - Having trouble with the Chocolate Poodle
(2) 03.0302 - Records Inc and Fran's Dresses move set and agreed to
6. 04.0 - Old business
7. 05.0 - New business
8. 06.0 - Miscellaneous
a) 06.01 - All parties agreed to current key dates listed above
b) 06.02 - Carlsbad agreed to review T & J sub prices & release appvl promptly
(1) 06.0201 - Within 2 working days of receipt

c) 06.03 - Abbreviations generally three letters
   (1) 6.0301 - For names 1st letter of 1st name and 1st two letters of last name
   (2) 6.0302 - Traditional abbreviation to be maintained
d) 06.04 - All construction contracts will be with T & J
e) 06.05 - T & J contract currently on hourly and t & m basis
   (1) 06.0501 - Will reduce to gmp by iterative estimates
   (2) 06.0602 - gmp to be provided to Carlsbad by package content

C. **ho 297 - Feb 88**

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Consulting Engineer

Computer Disk File & Control System

A disk control system starts with selection of a suitable method of identifying each disk and extends through the process of labeling, naming files, backing up, preparing directories and catalogs, maintaining confidentiality, cross referencing, & physically managing the check out, return, update & storage of each specific disk.

The general elements recommended for such a system are outlined below.

1.) Numbering disks - It is recommended that each disk be assigned a unique number in sequence beginning with disk 001. The 3 digit number should be used as a text field in the disk directory, permitting supplementary alpha information to be added as descriptive qualifiers. Each disk should be numbered as it is added to the disk file. Dependent on size it is usually desirable to reserve a disk for one client, one user, or if the size of a job warrants, for one project.

Where several different makes of computers or disk operating systems or drive sizes are used, identification of disks should be set according to the using hardware. For example if one of the systems in use is a MacIntosh configuration the disk numbering could be prefaced by the letter **M**.

he master disk list, in which all disks should be recorded and described, should contain a field in which the disk type and hardware can be identified, i.e., a single sided, MacIntosh disk #9 in the series might be identified in the disk type field by the code - **SM009**.

If desired the disk size, 3 1/2". 5 1/4" or 8" might also be included in the disk identification field. The numbering system, however, should be kept as simple as possible.

2.) Back up procedures - Each time a disk is used and information is added, a back up copy should be made of the disk. If a selective hardware/software program is available that will back up only new or revised files, these new and revised files should be backed up.

Inexpensive tape backup machines are available, as is hard drive back up hardware. Whatever equipment is used, I suggest the basic backup configuration consist of at least one floppy disk copy containing all files currently on the disk being backed up.

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Back up disks should be stored at a different geographical location than the base data disks.

Back up disks should always be made as soon after data is added to a base data disk as possible. It is helpful to write the dates of the latest backup on the label of the disk, crossing out the previous date as a new one is added.

3.) **Disk type coding** - A label color coding method for quick, accurate identification of disks may be helpful. One color code method consists of attaching a self sticking color dot to the label. Color codes can be as follows:

- Blue dot - A base data disk that has a back up disk in file

- Red dot - A back up of a base data disk - Back ups should be kept disk locked when not in use. The back up disk is given the same number as the base disk but is given an "x" preceding and following the disk number; i.e. if the base disk number is d005 the back up disk number is dx005x.

- Gold dot - Denotes program disk. It is not usually necessary to number program disks, although if desired it can be done.

- Orange dot - Denotes double sided disk. Early hardware configurations used only single sided disks. However double sided disks are now most common. If both types are contained in your disk files a distinction should be made between the two types for both program and data disks.

Dots should be firmly attached to the disk label to minimize the risk of the dot coming off in the disk drive.

4.) **Disk cataloging** - For disk labeling and listing disk contents, a program such as MacLabeler or other similar software is recommended. Such programs will produce disk labels and disk catalogs to whatever degree of detail and in whatever arrangement is desired. The printed catalog gives an convenient reference list of all folders and individual files stored on the disk.

Whenever data is added to a base disk, an updated disk content list should be prepared for the updated disk A loose leaf disk directory notebook is most convenient for the disk directories, particularly if frequent reference is made to the

disk list.
Suggested contents of a disk directory include:

- Disk number
- Disk type - single sided (ss), double sided (ds), hard drive (hd), etc.
- Disk name - What is contained on the disk in very brief terms
- Project numbers - The project identification numbers for all jobs for which data is stored in the disk

It should be reemphasized that generally a single disk should be devoted to one project or to one client, company or user. In some cases a single disk may be devoted to single uses such as education, training, management analysis, or special record keeping.

Disks are relatively inexpensive. Ease of retrieval and availability of reserve working space should not be sacrificed for a confusing mix of too many unrelated files on a single disk.

5.) **Physical control of disks** - It is suggested that one person be made responsible for maintaining the disk control system. A central storage facility for all disks should be maintained, and the disks kept in a safe and accessible location. The person responsible should also be charged with the job of tracking disks to insure the file remains intact.

Those using disks should sign out for the base data disk, or copies. The user should also be responsible for informing the disk librarian of any changes or additions they have made to the data disk. The disk librarian is responsible for all disk back up, cataloging, directory updating, storage, and other essential record keeping activities related to disk file upkeep.

It is most important that the librarian make the total office disk records available quickly and at any time to those who must use them and are permitted access to the information Remember the disk files are made to be used.

6.) **File names** - File names for projects and other data are best kept short, descriptive and reasonably recognizable. The following guidelines might be of use in assigning file names:

As an example let us look at a network model file for construction of a component of the Tell Mall shopping center. The file name should start with the issue number. i1 for instance, followed by the sheet number (sht #1), and ending with an abbreviation of the project name (tel mll). Thus the file described here would be written **i2 sht #1 telmll**. This tells the user that the file contains a network model issue #1, shown on sheet #1 for the Tell Mall project.

For files made from the multitude of other software such as spread sheets, word processors, data base programs cad programs, estimating systems and special use material, names are assigned using similar principles. Whatever system of coding and naming is used, it should be generated from some easily explained and identified rationale for ease of use.

7). Disk storage - The master floppy disk file should be kept in a convenient location, available to those authorized to use them. As noted above a method of insuring their safe return to the master file should be set early.

Back up disks or tapes should be kept in a fire and theft safe location separate from the location of the base file material. Back up disks should not be allowed out of their file unless there is a demonstrated need for the data or during backup.

You probably will not need the back up disks or tapes often, but when you do you will be very glad you stored them safely.

* * * *

In summary the key elements of effective disk control are:

- Number new disks when they are initialized. Don't delay assigning the number.

- Immediately after entering data on a new disk and at the close of the session, make a disk catalog of the disk and enter the disk information and catalog in the disk directory.

- Keep disks in their plastic envelopes. The disk gate is a mechanical apparatus and subject to impact damage. Additional plastic envelopes are usually available from upon request and at a nominal cost.

• Keep disks under the watchful eye of one or two responsible persons. Make certain all disks are accounted for. Losing disks is disruptive.

• Back up disks when you are through using them in a working session. Don't delay making back ups.

• Standardize your abbreviations and publish a list of those commonly used, so the people using the disk files can easily determine the meanings of disk and file names.

Ralph J. Stephenson PE PC
Consulting Engineer

FORM CONTENT & DESIGN

a. Tips on form content

01. 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

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

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

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

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

06. Provide enough space to record the information needed. If the form is to be 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 source 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

01. Determine the readership of the form.

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

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

04. Review description & rating in steps 1, 2 and 3, and determine if form is truly needed. If not don't prepare it.

05. If form is needed, list, at random, all information items needed to fulfill the mission.

06. Arrange the information items in a logical order.

07. Test the arrangement for input

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

08. Test the arrangement for readability

Can the form be read easily, quickly and accurately?

09. Design the form.

Be certain to leave a binding edge at the left or top

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.

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Case Study for Preparing Forms

Define a situation in which it may be necessary for you to prepare a form for transmitting, receiving or tabulating information on a regular and somewhat standardized basis. The need can be taken from your own work experience, or you may choose to select one of the situations listed below to use as a basis for the form design.

Situation #1 - Owner - Review and approval of submittals (turnaround) is being delayed by an inadequate understanding of the paper flow which is from the general contractor, to the owner, to the architect/engineer of record, to the owner and back to the general contractor. You are the owner. Design a form that may help alleviate the situation.

Situation #2 - Architect/engineer - It is time for you as the architect/engineer to begin punching out the back-of-house ballroom, meeting room, restaurant, lobby and food service areas of a new hotel. The owner is expecting clear cut sign off points so he can begin installing his fixtures, furnishings and equipment (FFE) with no residual complaints from the general contractor,and clear cut acceptance of the space from the FFE contractor. Design a punching out system and form that will satisfy yours, the contractor's & the owner's needs.

Situation #3 - General contractor - As the project manager for the general contractor on a new 5 story office building you are responsible for keeping the official construction meeting minutes at job meetings with the owner, the architect/engineer and the major sub contractors. You feel it might be well to devise a standard form to use for each meeting so you are certain to include all the agenda items necessary to cover at each meeting. Design an outline form on which you could hand write the minutes directly and efficiently for later typing by the field office receptionist.

Situation #4 - Construction manager - Procurement of critical materials and equipment has become very critical on a large research and development project for which you are the liable construction manager. It is felt important by all that a comprehensive check list be provided to all major contractors on the job for them to indicate procurement status twice per month on all critical items. One of the items of importance is to provide an index of procurement criticality. Design a form that will provide you the information you need.

Situation #5 - General contractor - You are a general contractor on an addition to a new city hall in a middle size mid west town. For several reasons the owner is not communicating well with you, particularly so far as payment procedures, supplemental instructions to you and your subcontractors, and items that concern checking of shop drawings and the flow of submittals from and to you through the architect and engineer. It is early in the job and you want to channel communications so you can operate effectively. Design a form that will indicate the proper flow of information between you and the other parties where owner input is essential.

Situation #6 - Design build - You are the vice president of operations of a moderate size design build firm. The company is being asked with increasing frequency to evaluate potential sites that might be available to your clients and prospects for building, or to you to add to your own property portfolio. Design a site survey and information form that will give you the information needed to quickly and thoroughly locate a site with given characteristics and allow you to quantitatively evaluate its value for a given use.

Situation #7 - Owner - As an owner of a chain of franchised fast food restaurants you are beginning to lose valuable data on proposal tabulations of major contract work on your facilities. You have built 12 restaurants and have available in your files, contractor proposal data on each, along with a detailed description of each site facility developed to date. Design a form that will allow you to tabulate the essential information so as to help in selecting contractors on your future jobs. You will soon be building 15 more restaurants in locations within a radius of 50 miles of your office.

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Residential house plan case study

You are a developer currently building a small residential subdivision containing 15 single unit homes. Your firm, Newland Estates, is a quality developer of residential properties averaging about 200 living units per year put in place. You market the properties as they are improved.

This current project of 15 homes is a high priority program since it is the first of several hundred modest two story colonial homes you intend to put on a recently acquired site. The site work for the first part of the development was completed about 2 months ago and you are anxious to get the first 15 units built and sold to help your cash flow.

The individual units occupy lots with dimensions of about 120' x 400' each. The houses are 2 story plus full basement with a footprint of about 35'x40'. Taps for utilities are to the street in front where all services are underground and available.

The houses each have a moderate sized front porch, a 10'x20' patio at the rear, a two car garage and a full apron driveway from the front to the garage at the rear.

The structure is conventional stick framing with prefab wood roof trusses. The exterior skin is board and insulation with brick veneer at the first floor and wood sheathing at the second floor and attic space. Exterior sash is pre glazed and all exterior millwork & hardware is high quality. Roofing is shingles over a plywood substrate.

Interior finishes are conventional with gyp board ceilings and walls painted or textured. Most light fixtures and mechanical trim are surface mounted. Floors are generally finished oak over plywood. Bathrooms are tiled on floors and wainscots.

Basement areas are unfinished. The furnace is gas heat with cooling and heating air exchangers and an air distribution system.

The houses are fully landscaped and ready for owner move in upon completion.

Because of the key position of the early units you wish to plan their construction well and sequence them on a clearly defined turnover cycle of

one unit per week. All permits have been obtained, most materials are either on site or available and the area of the first 15 units has been rough graded ready to build.

How would you plan the job?

Miscellaneous ideas to consider:

- What are some of the methods of planning possible?
- How would you translate your plan?
- About how many working days should construction of one unit take?
- What is the implication of a turnover cycle of 5 working days on the crew sizes needed?
- How would you determine a reasonable and profitable turnover cycle?

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Consulting Engineer

SUGGESTIONS ON SELLING TO DESIGN/BUILD CLIENTS

During a seminar several years ago, Dr. Harvey Thomas, a behavioral psychologist, outlined several suggestions as to how the designer/builder could best cope with customer motivation and pricing problems. The words of advice from Dr. Thomas are excellent, and are reproduced below for consideration in generic (G) construction sales situations where motivation and pricing are potential problems.

To Increase Customer Motivation:

1. Give the prospect or customer a role to play.

2. Make intangible benefits you are offering, real.

3. Eliminate or minimize distractions to your discussions.

4. Emphasize the advantages of what you are offering.

5. Allow catharsis of the prospect or customer's fears.

6. Stimulate the prospect or customer's discontent with anything less than what you are offering.

To Deal with Pricing Problems:

1. Investigate possible smokescreens.

2. Use sandwich technique (i.e. advantages vs. disadvantages).

3. Broaden the customer's perspective to all advantages of your suggestions.

4. Match his or her needs against your offering and its advantages.

5. Examine costs - item by item. Don't hesitate to show your pricing work sheets.

6. Don't negotiate on the basis of generosity.

7. Create favorable illusions (i.e., give the prospect or customer a throwaway if

appropriate).

8. Give the prospect or customer a less attractive choice.

9. Overstate the prospect or customer's objections.

10. Explore the cost of a bad decision or no decision.

Each point above should be examined and reviewed in detail. As quick reminders, they serve to emphasize the need to always be aware of what it is your prospects and customers require. Make sure you understand what motivates them; then always indicate and convey your desire to work with them to achieve the things that can be best obtained from you and you alone.

MIND PROBER

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Agree	Disagree	
		Talkative - chatty, always speaking
		Egotistic - self-centered, individualistic
		Empathetic - aware of another, compassionate
		Apprehensive - fearful, worried, afraid
		Unconventional - unusual, not the norm, rebellious
		Kind - gentle, considerate, warmhearted
		Rigid - still, unchanging, inflexible
		Impatient - excitable, unable to wait
		Sympathetic - comforting, understanding
		Reserved - restrained, self-controlled, shy
		Adventuresome - daring, willing to take chances
		Uncaring - lacking in warmth or sympathy
		Quiet - still, silent, not talkative
		Sarcastic - joking in a biting or cynical way
		Concerned - aware, caring, interested
		Distant - remote, inaccessible, removed
		Competitive - seeking to win, ambitious, achieving
		Apologetic - sorry, regretful, makes excuses
		Outgoing - sociable, friendly
		Independent - self-reliant, autonomous
		Sensitive - perceptive, touchy, nervous
		Meek - humble, submissive, patient
		Meticulous - extremely careful, scrupulous
		Suspicious - doubtful, distrust, uncertainty
		Fun-loving - playful, carefree, spontaneous
		Help-seeking - looking for assistance or comfort
		Charitable - generous, kind, giving
		Neighborly - friendly, amicable, familiar
		Achieving - accomplishing, persevering, striving
		Approval-seeking - wanting acceptance and praise
		Self-blaming - guilt, fault finding
		Precise - clearly defined, exact
		Guarded - kept safe, protected, watched over
		Carefree - free of worry or responsibilities
		Dependent - needing aid or assistance
		Comforting - soothing, relieved, consoling

MIND PROBER

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Agree	Disagree	
		Affiliative - associated, connected
		Ambitious - enterprising, striving, eager
		Status-conscious - attentive to position and wealth
		Humble - reserved, self-conscious, modest
		Accurate - correct, clear-cut, beyond doubt
		Defensive - protective, shielded, careful
		Joking - witty, wisecracking, jesting
		Defenseless - unguarded, unprotected, needing shelter
		Consoling - solace, to cheer up
		Hospitable - welcoming, warm, receptive
		Goal-oriented - seeking success and achievement
		Seeks Attention - wanting to be noticed
		Obedient - compliant, amenable, dutiful
		Responsible - accountable, trustworthy
		Wary - cautious, watchful, on guard
		Playful - implish, mischievous, frivolous
		Trusting - confident, committed
		Protective - defended, guarded, careful
		Loyal - steadfast, faithful, devoted
		Striving - contending, exerting effort
		Seeks Recognition - wanting to be praised
		Yielding - deferring, relenting, gives in
		Tidy - neat, orderly, clean
		Secretive - covert, underhanded, concealed
		Pleasure-seeking - seeking gratification or delight
		Insecure - inadequate, unsure, shaky
		Nurturing - nourishing, supporting, fostering
		Individualistic - one-of-a-kind, independent
		Accomplishing - successful, to bring to completion
		Socially Striving - seeking respectability