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 development, production and 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:

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

January 8-12, 2001 **Madison, Wisconsin**

Department of Engineering Professional Development
The College of Engineering, University of Wisconsin-Madison

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EFFECTIVE PROJECT MANAGEMENT FOR BUILDING DESIGN AND CONSTRUCTION

Madison, Wisconsin
January 8-12, 2001

PHILIP M. BENNETT

Registered Architect
Professor and Program Director
Department of Engineering Professional Development
University of Wisconsin-Madison

Mr. Bennett began his college education with one and one-half years of study in the fields of Forestry and Conservation. This was followed by a Bachelor of Architecture degree from the Illinois Institute of Technology. He received his Master of Environmental Design degree from the University of Wisconsin-Madison. Mr. Bennett has also studied Landscape Architecture at the University of Wisconsin-Milwaukee and Madison, and has done some work in Form Perception toward a possible Ph.D. degree in Environmental Design. Postgraduate studies and research have also been undertaken in color, lighting, and vision. He is a recipient of the Wisconsin Architects Foundation Scholarship, Alpha Rho Chi Medal from the Chicago Chapter AIA and grants from the University of Wisconsin and the Optometric Extension Foundation Inc.

His earlier professional experience includes work for organizations specializing in hospital laboratory and equipment design, electrical engineering, and landscaping. He has also worked several years in the architectural design field at architectural offices in Chicago, Illinois; Stevens Point, Milwaukee, and Madison, Wisconsin. Two years of the architectural design experience were spent as a Project Coordinator. He also participated as an architectural consultant on a design team in preparing performance specifications based on human function for the Reston Low Income Housing Project, Reston, Virginia.

In 1967, Mr. Bennett was employed by the University of Wisconsin as a Subject Area Coordinator at the Environmental Design Center for the Educational Resources Information Center/Clearinghouse on Educational Facilities Project (ERIC/CEF). This project was structured to develop a national clearinghouse on educational facility design information. As coordinator, he was involved in setting up a manual and computerized search and retrieval system. The resulting program provided the opportunity for instantaneous information searches and bibliographic preparation for design professionals. During this project, he also served as editor for the 1968 AIA Architect -- Researcher's Conference Proceedings and coordinator for the Bibliography of Environmental Design References. He represented ERIC/CEF and the University of Wisconsin at the Fourth Triennial Congress of the International Council for Buildings Research Studies and Documentation (CIB) in Ottawa, Canada and Washington, D.C.

Mr. Bennett joined University of Wisconsin-Extension in 1970. He is presently on the faculty of University of Wisconsin's Department of Engineering Professional Development, with responsibilities for programming in areas of Architecture, Land Use Planning, Urban Development and Housing. Over the past 30 years, Mr. Bennett has developed and conducted over 450 continuing education programs and is also involved in research projects. Special research studies have been completed on Working Drawings, a Continuing Education Study for the Construction Specifications Institute, and a Construction Information Systems Study for the Construction Sciences Research Foundation. Under his direction, annual continuing education programs were developed and presented on Working Drawing Production and CADD Management, Specification Writing and Construction Contracts, Construction Inspection and Field Administration, Project and Construction Management, Housing and Building Inspection, Planning and Zoning for Community Land Use Management, Effective Zoning Administration, Integrated Mining and Land Reclamation, and Design of Functional R&D Laboratories. These programs have become recognized on a national basis and are presently serving representatives from across the United States, Canada and Australia.

(Continued)

Philip M. Bennett - (Continued)

Thirty years of Land Use Planning and Zoning programs have served representatives of many communities. These programs have enabled departments to structure land use programs that manage and direct impacts and growth. Professor Bennett has prepared and conducted special land use programs in Colorado, California, North Carolina and New Mexico. Each year, his programs deal with land use impacts that can be accomplished through comprehensive planning and zoning. In 1991, a new educational program focusing on Integrated Mining and Land Reclamation was started in Reno, Nevada. This program is dedicated toward the planning of resource extraction and land reclamation to support human and environmental requirements.

In 1977 and 1979, Mr. Bennett developed and conducted two 11-day housing inspection training programs for Indian Housing Authorities. Each program was specially designed to provide housing authority representatives an opportunity to understand the basic techniques and methods that are critical for implementing effective housing inspection programs in their communities. These two unique workshops presented in Madison, Wisconsin and Phoenix, Arizona served 120 representatives from 55 Indian communities across the nation. In 1979, Mr. Bennett received the National University Extension Association's "Creativity Award" for development of the Existing and New Residential Housing Inspection courses.

In 1980, he was made a member of the Editorial Advisory Board for a new publication titled "Building Failures Forum" published in Ithaca, New York. Mr. Bennett was made a member of the Colorado Association of Code Enforcement Officers and a "distinguished" member of the Construction Specifications Institute. Since 1987, Mr. Bennett has served as a member of the Architectural Technology Advisory Committee for the Southern Illinois University at Carbondale, Illinois. Mr. Bennett also serves as a member of the Board of Directors for the new Association for Project Managers. In 1994, he was invited to serve as an Advisory Board Member for the new CADD Management Institute. He is co-author of "Construction Materials Evaluation & Selection -- A Systematic Approach" and author of a 1984 manual titled "Construction Detail Banking -- Systematic Storage and Retrieval" both published by John Wiley & Sons, Publishers.

Special educational programming for the planning and designing of R&D facilities was undertaken by Mr. Bennett in 1984. This innovative professional development program focuses on planning and programming functional laboratory environments and the design development of successful R&D laboratories. Mr. Bennett keeps the content of this program state-of-the-art and relevant to research needs by conducting national surveys of R&D facilities, such as in 1992. During the fourteen years of presenting this program, Mr. Bennett has taken it on location to incorporate first-hand inspection of a wide variety of R&D facilities in Madison, Philadelphia, Chicago, Boulder, Dallas, Research Triangle Park, Palo Alto, Detroit, Charlotte, Cincinnati, Hartford, and Denver. This unique program serves representatives from industry, government, and universities across the United States, Canada and several foreign countries. In 1998, Mr. Bennett was invited to develop a special R&D Facility Design program to be presented in conjunction with the XV IASP World Conference on Science and Technology Parks in Perth, Australia in October 1998.

EFFECTIVE PROJECT MANAGEMENT FOR BUILDING DESIGN AND CONSTRUCTION

January 8-12, 2001
Madison, WI

HOWARD G. BIRNBERG

President
Birnberg & Associates
Chicago, Illinois

EDUCATION:
The Ohio State University, B.S. Architecture, 1972
Washington University (St. Louis), M.B.A., 1974

PROFESSIONAL EXPERIENCE:
Mr. Birnberg is president of Birnberg & Associates, a management consulting, association management and publishing firm serving the design and construction industry. He is a frequent speaker to many design and construction organizations, and his articles have frequently appeared in industry publications. He has been a guest lecturer at many universities including Harvard University, Northwestern University, the University of Illinois, Arizona State University, Andrews University (Michigan) and the University of Wisconsin. Mr. Birnberg served as an Adjunct Assistant Professor at the University of Illinois, Chicago, as a lecturer on project management for the Harvard University Graduate School of Design and as a lecturer on project management for the past 16 years at the University of Wisconsin, Madison.

Mr. Birnberg served as the general editor for *New Directions In Architectural and Engineering Practice* (McGraw-Hill, 1992) and is the author of *Project Management For Small Design Firms* (McGraw-Hill, 1992) and *Project Management for Building Designers & Owners* (CRC Press, 1998). He served as the advisor to the American Institute of Architects and the Pennsylvania State University in the development of a self-assessment system on project administration.

He has been the executive director of several associations and is currently serving in that role with the Association For Project Managers, an international organization of project managers in the design and construction industry. Mr. Birnberg was a founder of the association in 1991. He has also served as Director of Conferences for the Council on Federal Procurement for Architectural & Engineering Services (COFPAES).

He is the author of more than a dozen manuals on various aspects of architectural and engineers firm management and marketing. Mr. Birnberg is listed in *Who's Who In The Midwest.*

CLUBS AND MEMBERSHIPS:
American Institute of Architects, former chair of the Chicago Chapter Office Practice Committee, Insurance Committee, Membership Benefits Committee, 1993 AIA Convention Planning Committee, former member of the Board of Directors, Chicago Chapter and of the National AIA Practice Management Committee.

EFFECTIVE PROJECT MANAGEMENT FOR BUILDING DESIGN AND CONSTRUCTION

January 8-12, 2001
Madison, WI

RALPH J. STEPHENSON, P.E.

Consulting Engineer
Mount Pleasant, Michigan

Mr. Ralph J. Stephenson is an engineering consultant who has a diversified background in land planning, facilities location, and building design and construction.

Mr. Stephenson earned degrees at Lawrence Institute of Technology (Bachelor of Science, Mechanical Engineering) and Michigan State University (Master of Science, Civil Engineering). He has been associated with such firms as Smith, Hinchman & Grylls; Victor Gruen Associates; Benjamin Schulz Associates; and the H.F. Campbell Company. With the latter three organizations, Mr. Stephenson occupied executive positions as Vice President. In 1962, he started his own consulting practice, specializing primarily in operational and management direction to owners, designers and contracting firms.

He is a registered professional engineer in Michigan, Wisconsin, Illinois, Indiana, Ohio, Pennsylvania, West Virginia, Virginia, Florida and Minnesota. He is a member of the Engineering Society of Detroit, the Michigan and National Society of Professional Engineers, the American Planning Association and the Mid-America Economic Development Council.

Since 1952, Mr. Stephenson has been involved at middle and upper management levels with the planning, programming, design, construction and operation of several billion dollars worth of construction-related projects. These include work on industrial, commercial and institutional programs throughout North America.

Mr. Stephenson has also chaired more than 60 partnering charter meetings for both public and private sector projects, and has lectured extensively on the subjects of alternative dispute resolution and partnering.

He has taught hundreds of technical and management seminars in the United States, Canada and Europe and is the author of several magazine articles and is the co-author of a book entitled "Critical Path Method." He has also presented two professional papers on Alternative Dispute Resolution to the 1998 and 1999 National Society of Professional Engineers Annual Convention. His broad experience has given him an understanding of the nature of small, medium and large companies, and of the need to solve their management problems through creative, systematic, and workable approaches.

Mr. Stephenson has completed more than 60 Project Partnering Charters and has recently completed a book on "Partnering" for John Wiley & Sons.

EFFECTIVE PROJECT MANAGEMENT FOR BUILDING DESIGN AND CONSTRUCTION

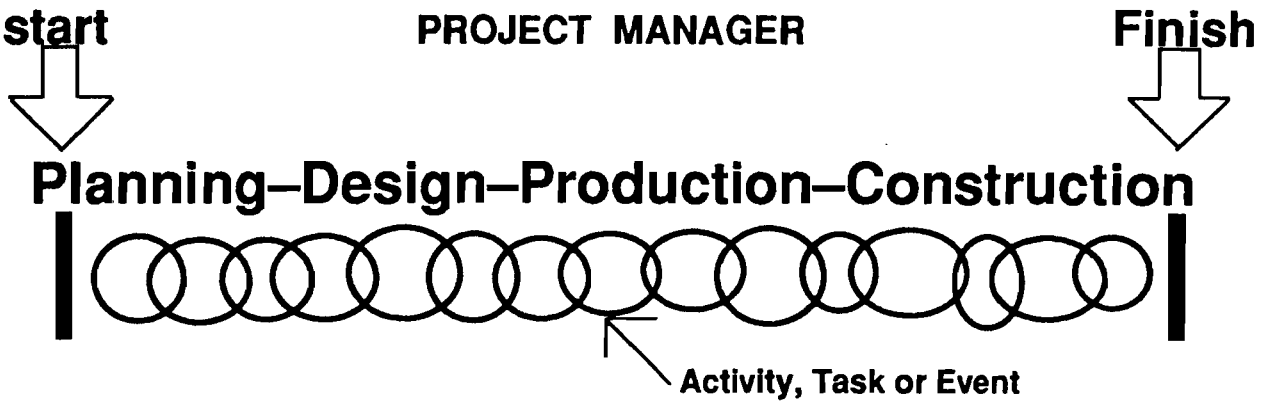
January 10-14, 2000
Madison, WI

INTRODUCTION
and
CRITICAL PROJECT MANAGEMENT RESPONSIBILITIES

Philip M. Bennett
Program Director

University of Wisconsin Department of Engineering Program Development

PROJECT MANAGEMENT



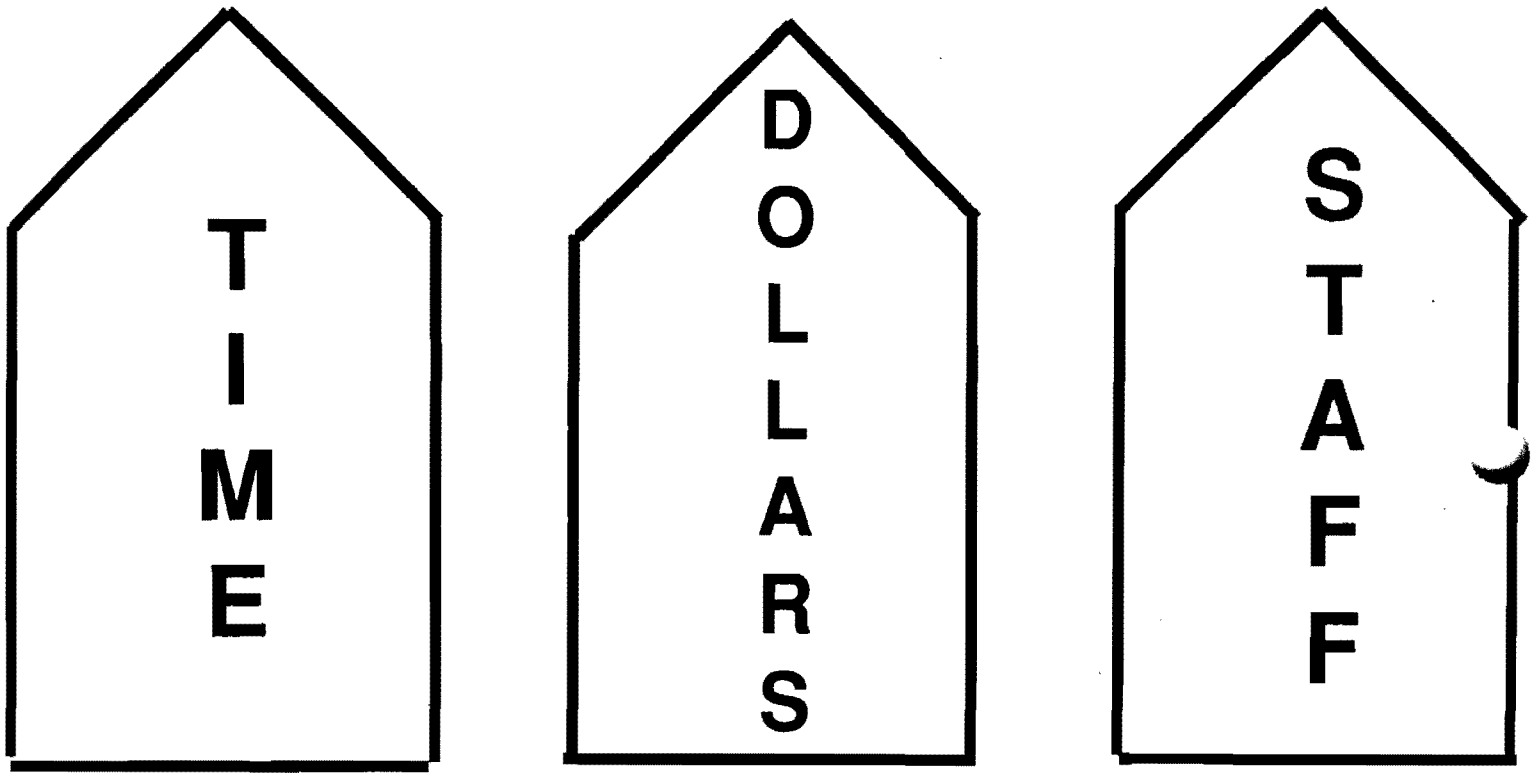
Chain of Activities Required to Complete the "Project"

KEY ISSUE:

Successful Linkage of Each Activity in the "Project Development Process"

CREATING THE LINKAGE

Essential Information Required for each Activity



CHAIN OF ACTIVITIES

ATTRIBUTES:

The Successful Project Manager

ABILITY TO:

1. Comprehend Scope of Project – Scale of Activities
2. Understand Relationship of Activities & Events
3. Organize & Schedule Activities
4. Plan Ahead
5. Perceive Problems
6. Work with People
7. Express Ideas
8. Be Innovative
9. Respond to Demands
10. Listen & Learn
11. Make Decisions
12. Lead & Manage

CAPABILITIES:

THE EFFECTIVE PROJECT MANAGER

ABILITY TO:

1. Plan & Organize a Series of Events or Actions to Fullfill Goals & Objectives
2. Identify the Overall Scope of Activities Needed to Complete a Project
3. Blend Hindsight & Foresight to Structure a Plan of Action
4. Foresee Problems & Conditions that would Alter a Plan of Action
5. Tap into Information Sources & Provide Critical Facts for Decision Making
6. Communicate Concepts and Responsibilities to All Members of the Project Team
7. Unite Members of the Design/Construction Team for Successful Working Relationship
8. Prevent & Resolve Problems without Interferring with the Work Flow
9. Collect Essential Information for Planning and Programming Activities
10. Lead & Motivate Other Members of the Project Team

CRITICAL RESPONSIBILTIES OF THE PROJECT MANAGER

1. Planning
2. Scheduling
3. Coordination
4. Communication
5. Documentation
6. Management
7. Leadership

MINIMIZING STRESSFUL CONDITIONS

1. Systematically Plan Activities

2. Develop Comprehensive Overview of Project

3. Know What is Going On at All Times

4. Design a Program that is Achievable

5. Keep People Informed as to Where Things Stand

DON'T LEAVE ANYTHINGTO CHANCE

A PROJECT MANAGER'S SELF EVALUATION

1. Do You Know Your Role?

2. Are You Performing Your Role?

3. Rank & Weight the Value of each Action before It is Performed

4. Follow Up & Evaluate each Action after It has been Performed

5. Ask Yourself: Is Your Presence Helping or Hindering the Project?

CRITICAL:

Determine Whether You Are Putting Out Fires, Solving Problems or Creating Problems for Other Staff & the Construction Team

Ralph J. Stephenson, P. E.
Consulting Engineer

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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

Ralph J. Stephenson PE PC
Consulting Engineer

GROUND RULES

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

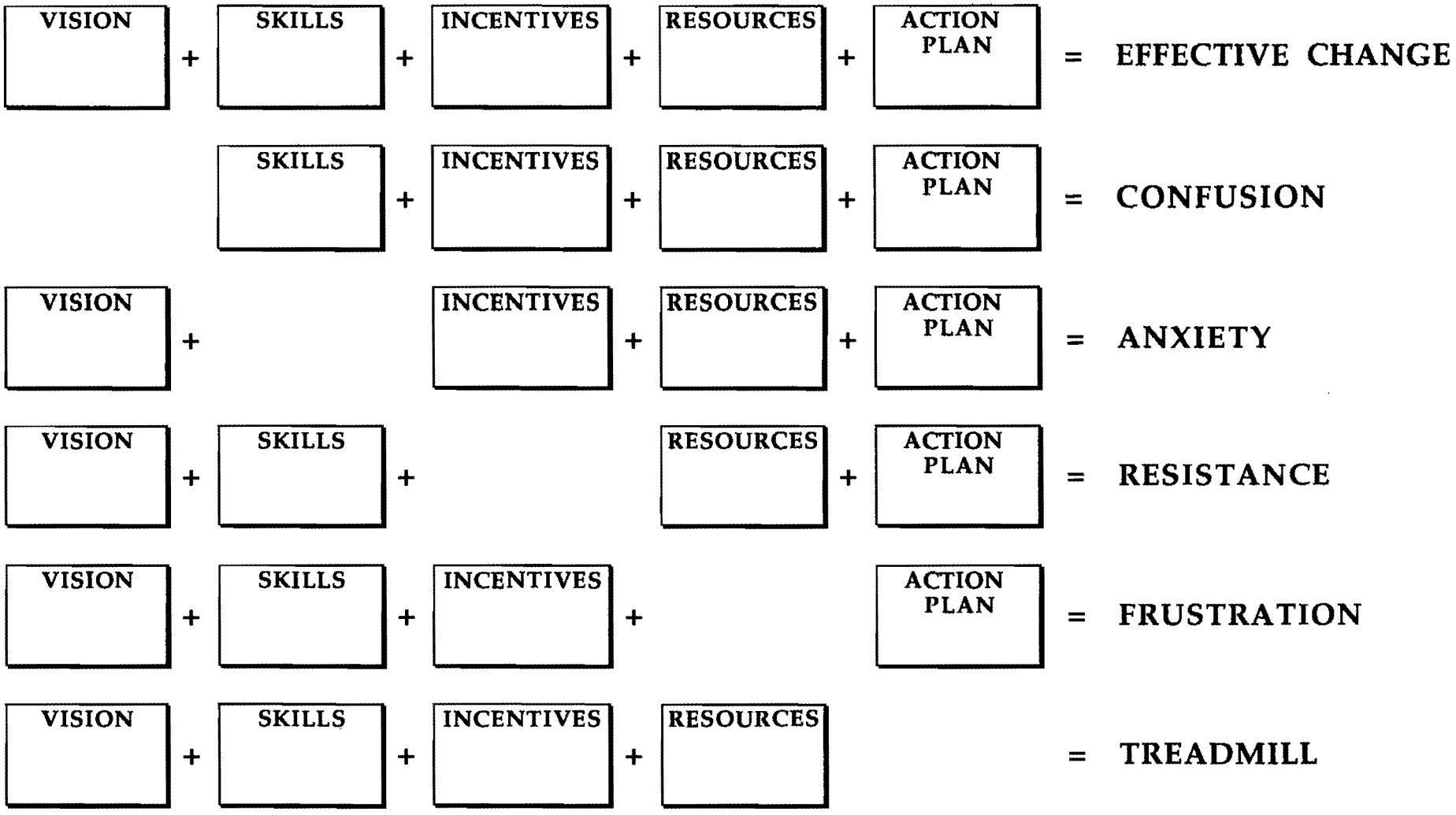
2. Listen well & ask helpful questions.

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.

MANAGING COMPLEX CHANGE



Adapted from T. Knoster (1991)

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Basic tools for successful project management - ho 507

Project managers have several fundamental management tools with which they can effectively implement a project action plan, and build a well-functioning team. These include:

- Actions to be taken
- Concepts to effect change
- Functions
- Interrelations - organizational structure
- Participant resources
- People behavior
- Performance measurement
- Planning & scheduling systems
- Thinking processes

Project management tools such as the above are usually very complex: They must be skillfully applied by the project team to be effective. Thus the leader of the project, the project manager, should be well versed in what these tools are, how they are best used, and what they are designed to help accomplish.

Excellent project managers realize that the list is merely a good starting point on which to build a usable project management approach. Each individual should determine what goes into their tool box, and then fill it with those implements that best suit that individual's talents, abilities and needs.

I. • **Actions to be taken**
   - A. Conceive
   - B. Program
   - C. Translate
   - D. Approve
   - E. Design
   - F. Construct
   - G. Turn over
   - H. Operate

II. • **Concepts to effect change**
   - A. Vision
   - B. Skills
   - C. Incentives
   - D. Resources
   - E. Action plan

III. • **Functions**
   - A. Planning
   - B. Organizing
   - C. Staffing
   - D. Directing
   - E. Controlling
   - F. Representing

IV. • **Interrelations - organizational structure**
   - A. Formal functional
   - B. Informal functional
   - C. Reporting
   - D. Staff
   - E. Temporary

V. • **Participant resources**
- A. Conceiver
- B. Translator
- C. Constructor
- D. User
- E. Operator
- F. Regulator

VI. • **People behavior**
- A. Motivation
- B. Hygiene
- C. Learning
- D. Value systems
- E. Personal goals & objectives
- F. Personal growth
- G. Social relatedness

VII. • **Performance measurement**
- A. Measurement units
- B. Performance standards

VIII. • **Planning and scheduling systems**
- A. Network modeling
  1. Arrow diagraming
  2. Classic precedence system
  3. Modified precedence system
- B. Bar or Gantt chart
  1. Non scalar - not time scaled
  2. Scalar - time scaled
- C. Slant charts
- D. Narrative schedules
- E. Project data arrays
- F. Money flow curves

IX. • **Thinking processes**
- A. Plan
- B. Translate
- C. Control
- D. Correct
- E. Learn

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Consulting Engineer

The Project Manager - d494

I. **Project related definitions**

A. **Project**
A set of work actions having identifiable objectives, and a specific beginning and end.

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

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

D. **Project director**
The individual responsible for implementation of several projects upon which his organization is engaged.

E. **Project operations**
Management and staff direction of resource use to accomplish overall project activities.

F. **Project organization**
The arrangement and interrelations of people charged with actually achieving project objectives.

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

II. **What does a project manager do?**

In conjunction with the project team, establishes 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.

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER

LINE OF ACTION

1.04

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

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 and 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 design and construction responsibility. A brief description of each step is appropriate in understanding their importance to the total project program, design, and build concept.

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

In 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 floor to ceiling 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 program requirements. The functional arrangement is shown in accordance with the project functional analysis. Materials are called out as the concept requires.

Approve

This is a critical point in the line of action. By now sufficient work has taken place so the manager and the ultimate decision maker can understand the project - can say: "I like this or I don't like it; 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, and we have the financing and the land - let's move on!" Approval unlocks the full design and construction of the project.

Design

In the design phase, products of the previous four steps are utilized 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 the project end product begins to visibly and tangibly appear.

Turnover

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

On the other hand, neglect of good turnover procedures is often the cause of serious callback problems. We certainly wouldn't turn a complex piece of machinery over to an amateur operator and expect he 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 to the operator and user how this newly-built environment is to function.

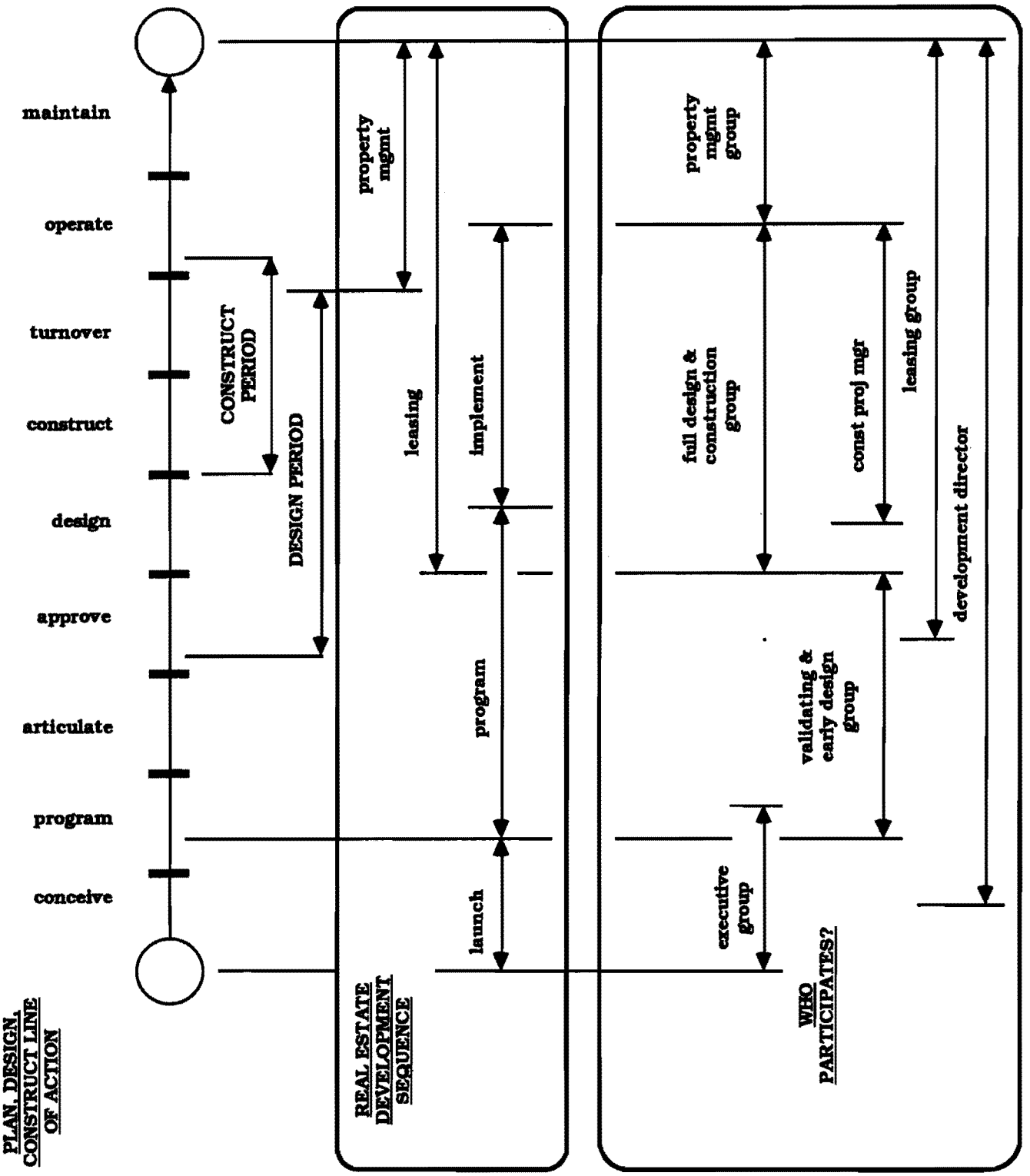
Operate

The facility is now run-in and begins to achieve its full purpose. Operation can be an important responsibility and often the design build contractor will furnish his operational functions in connection with a new environment on a paid contract arrangement.

Maintain

Maintenance of the physical environment is the door opener for future projects for the project team. It is 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. It is a profitable business that many contractors are now offering as an additional service.

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



Ralph J. Stephenson PE
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DEVELOPMENT CYCLE ACTIONS & ORGANIZATION

Oct, 1988 - ho321

1 OF

- **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.

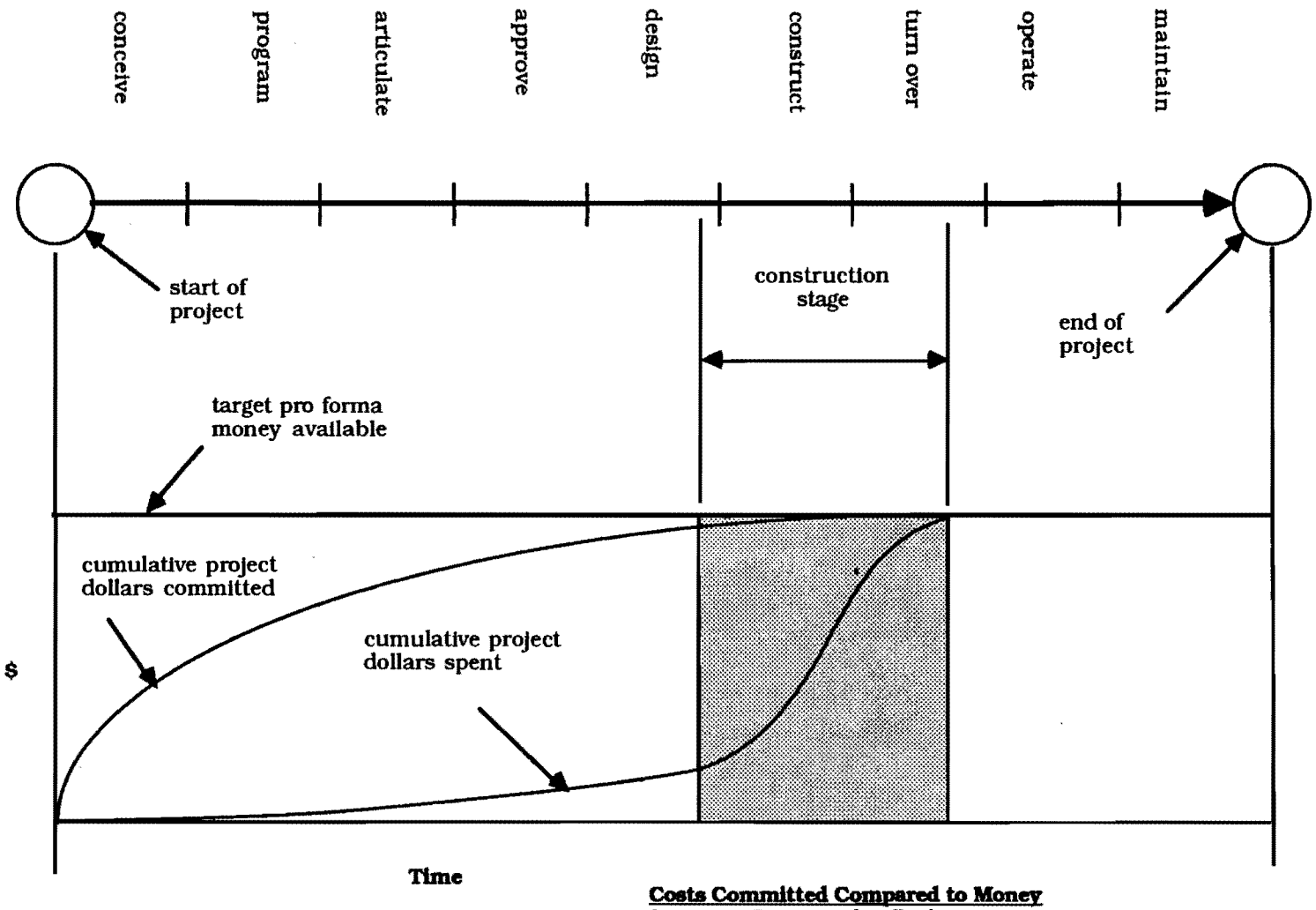
- **Phase F - Leasing the asset**

  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

Ralph J, Stephenson PE
Consulting Engineer

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

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

Ralph J. Stephenson PE PC
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PARTICIPANTS IN DESIGNING & BUILDING ENVIRONMENTS

There are six basic participants in the process of designing and building environments. These are the conceiver, the translator, the constructor, the user, 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.

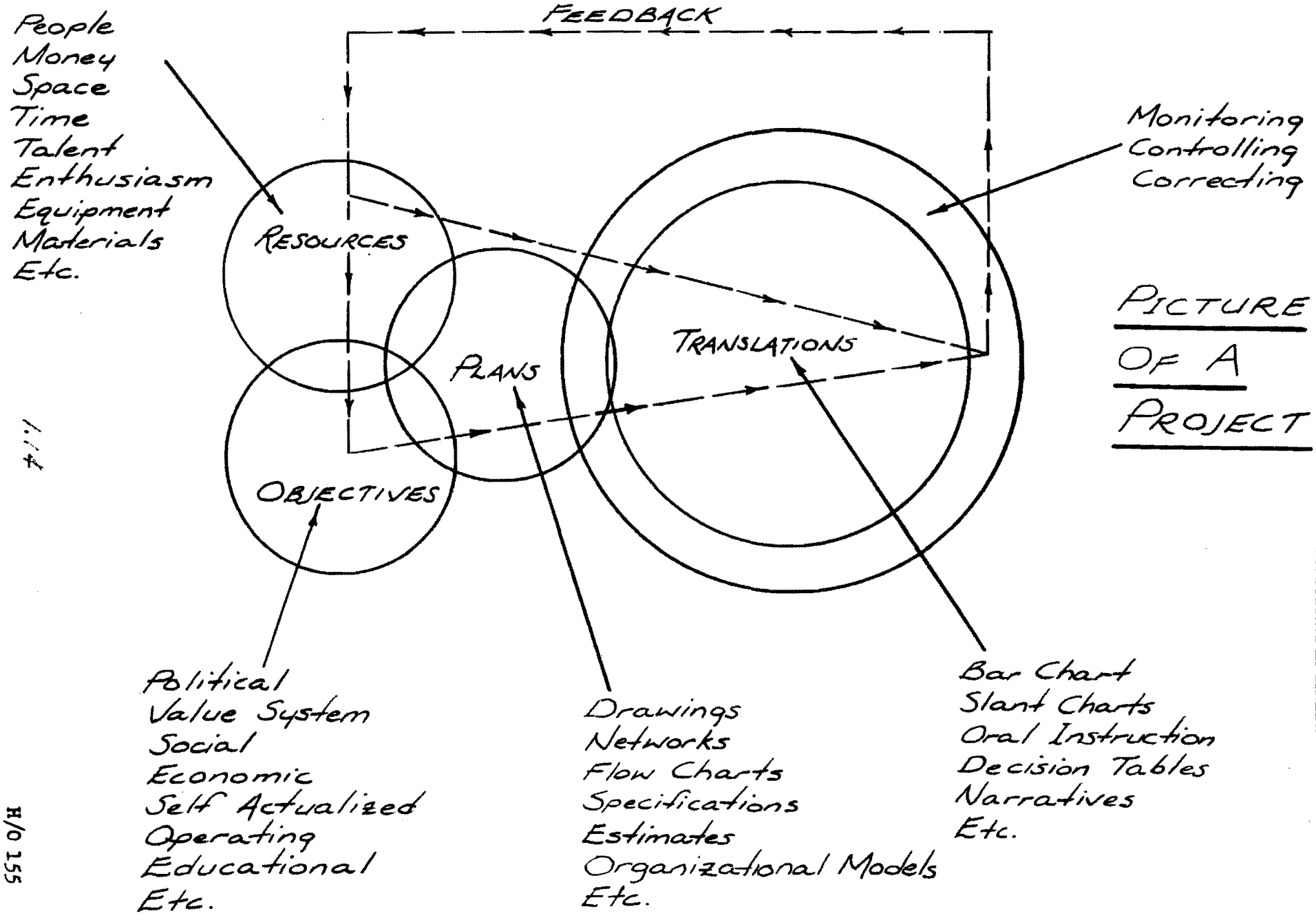
Translators - Those who translate the environmental program into construction language. Traditionally we think of the architect/engineer as the translator. However careful consideration of this matter shows there are many others who translate the conceiver's fundamental ideas into understandable, workable 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.

Users - Those who occupy and use the completed facility to conduct their work, their recreation, their domestic living, or other activities for which the facility was specifically designed and built.

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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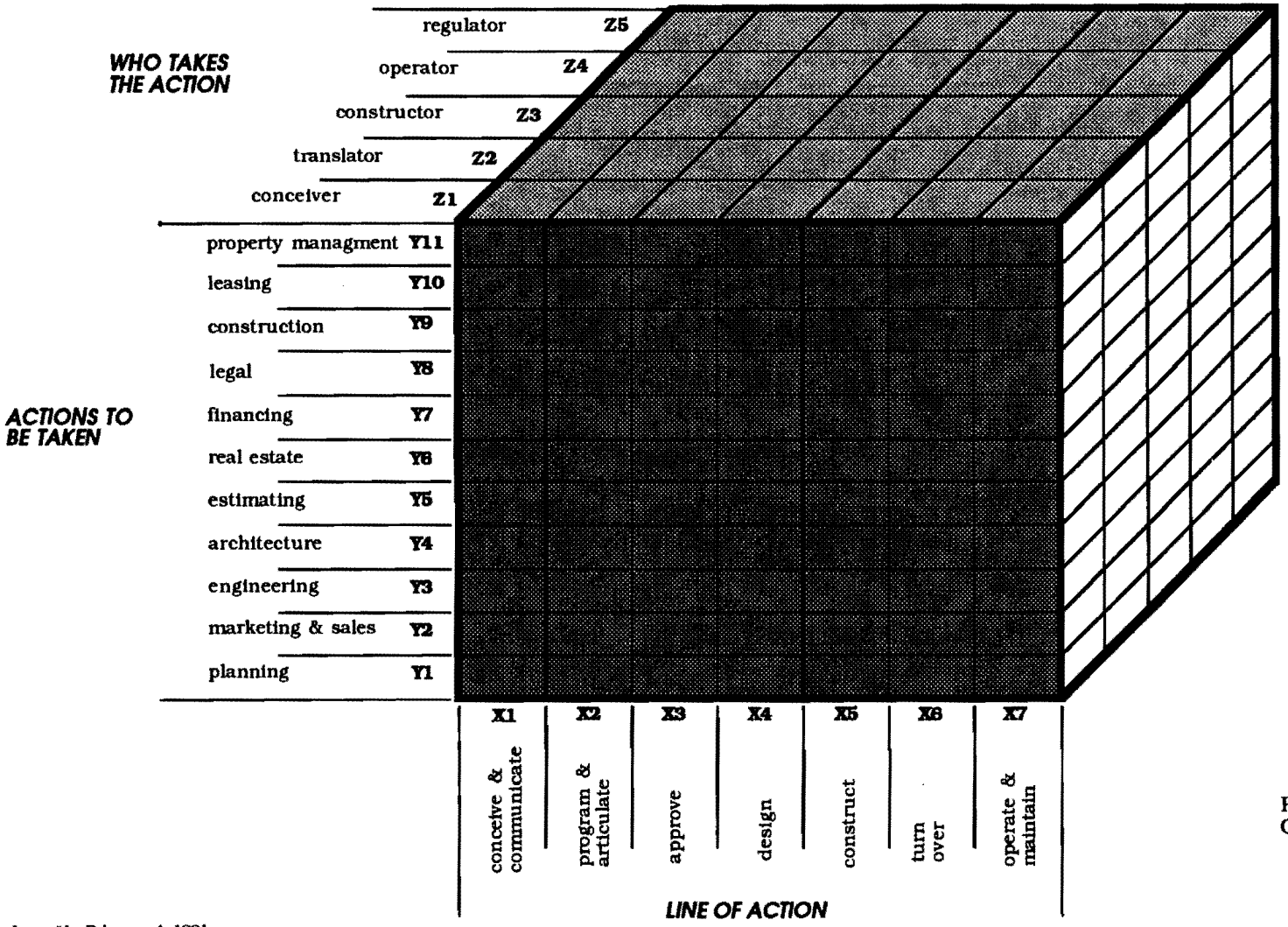
H/O 155

MACRO MATRIX BOUNDARIES OF DESIGN & CONSTRUCTION



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Issue #1 - February 4, 1991
MM-1 - ho aspe 01

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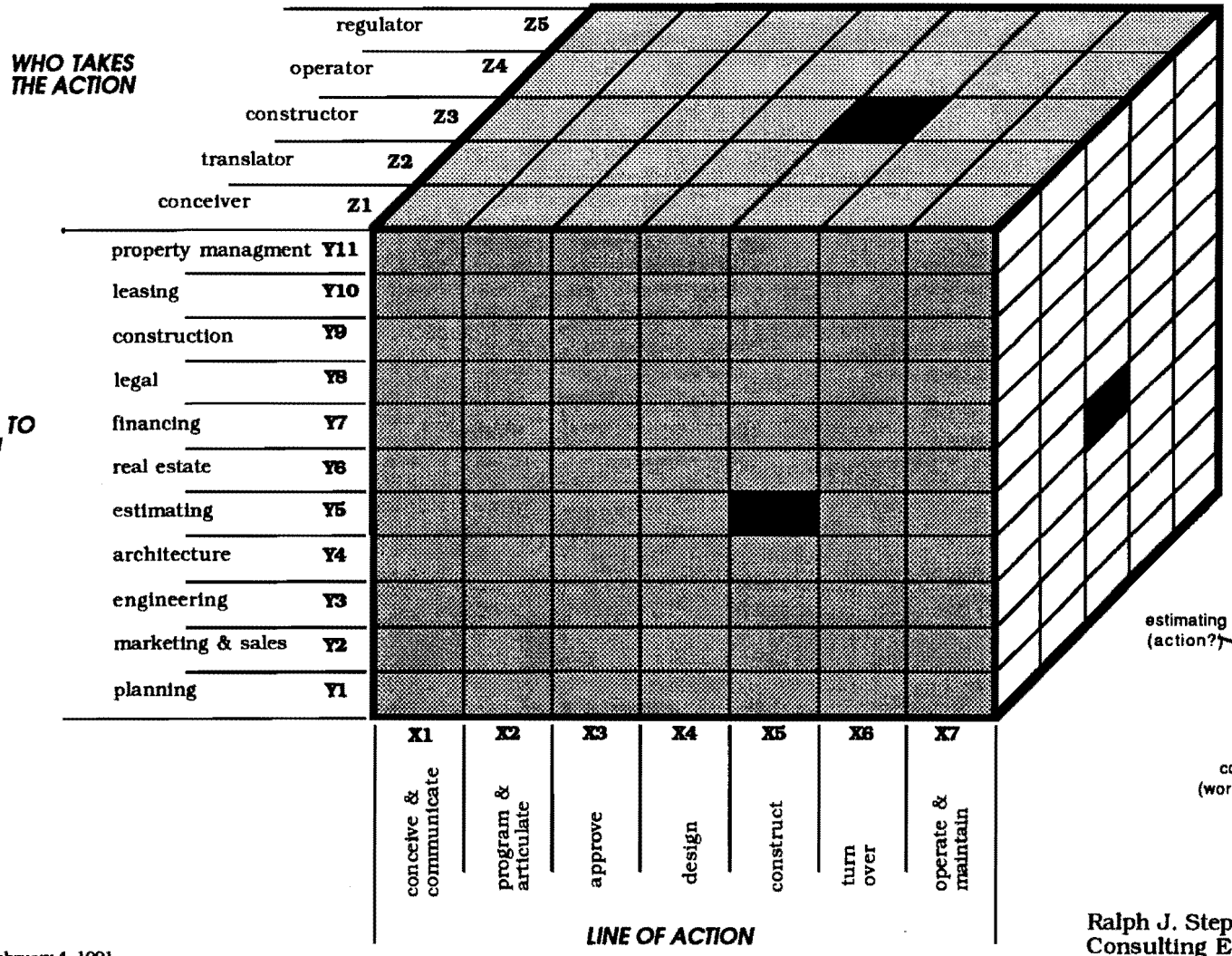
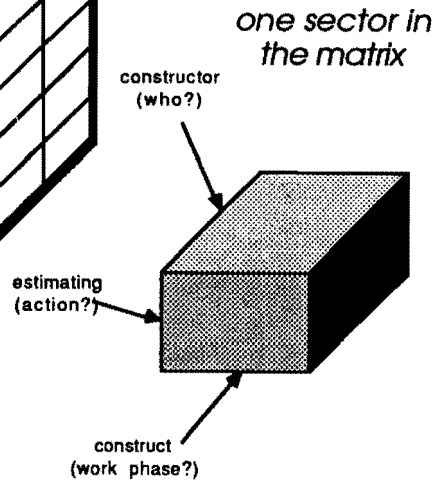
MACRO MATRIX BOUNDARIES OF DESIGN & CONSTRUCTION





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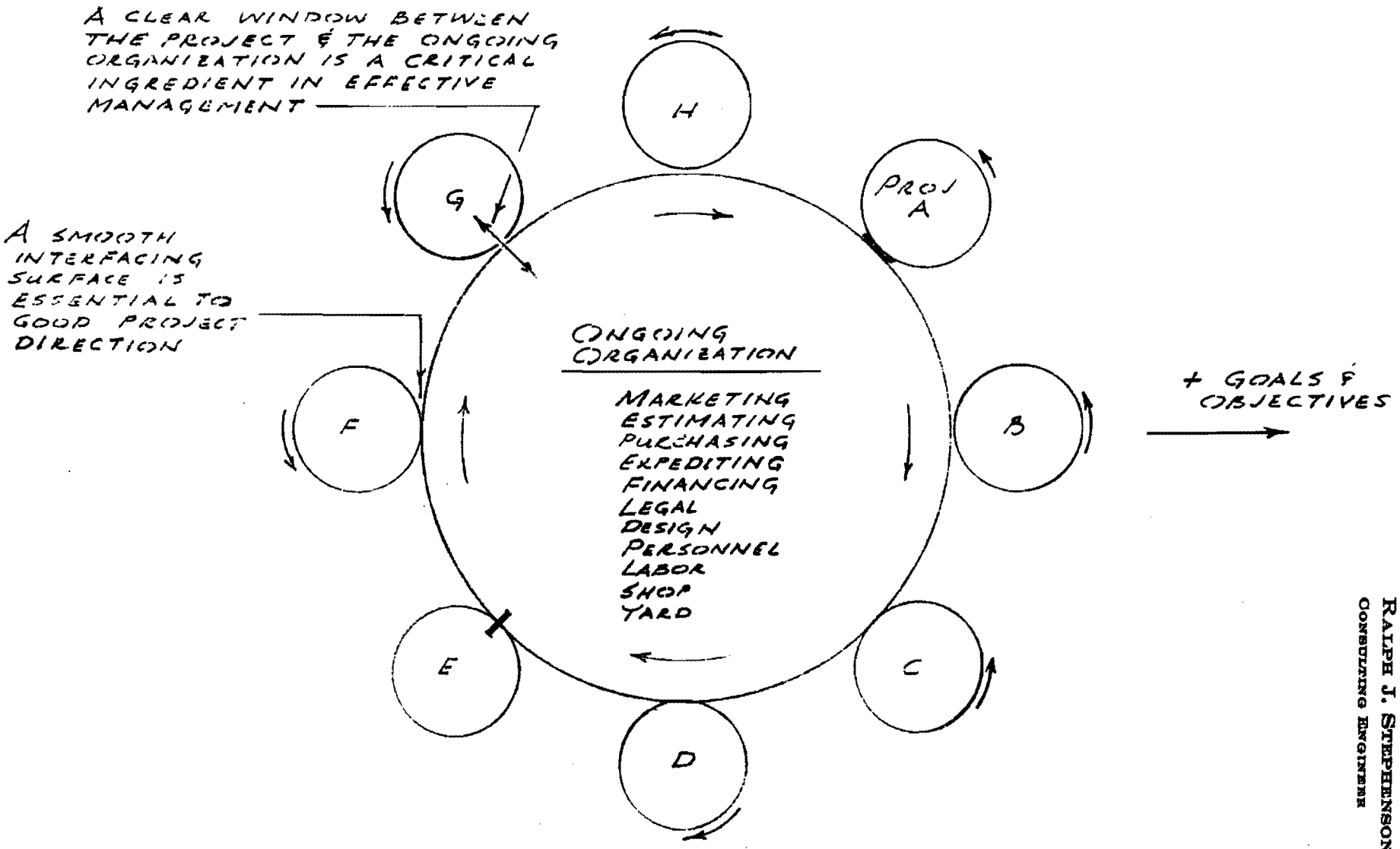

THE RELATION OF PROJECT MANAGEMENT TO ONGOING MANAGEMENT

RALPH J. STEPHENSON, P.E.
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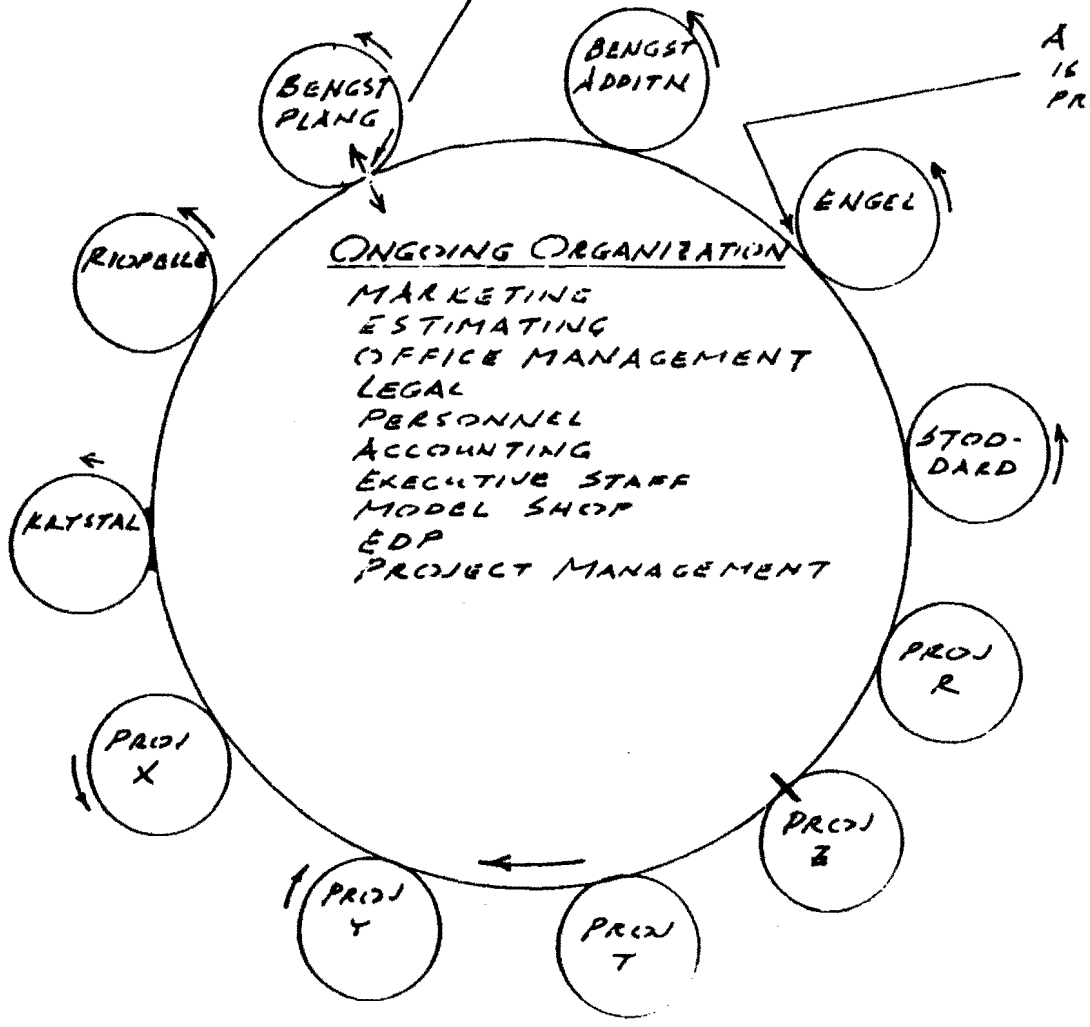
HO 118 10/76

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

RALPH J. STEPHENSON, P.E.
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H/O 235

1.18

PROJECT / FUNCTIONAL MANAGEMENT MATRIX

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

Project A
Project B
Project C
Project D
Project E
Project F

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A/E MANAGEMENT MATRIX

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

H/O 234

Ralph J. Stephenson PE

DESIGN/BUILD MATRIX

	Actions / Functions	01 Sales	02 Engineering	03 Architecture	04 Estimating	05 Real Estate	06 Finance	07 Legal	08 Graphics	09 Construction	10 Leasing	11 Property Mgmt
I	Maintain											
H	Operate											
G	Turn Over											
F	Construct											
E	Design											
D	Approve											
C	Articulate											
B	Program											
A	Conceive											

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TYPES OF MANAGEMENT IN PROJECT

ORIENTED BUSINESSES

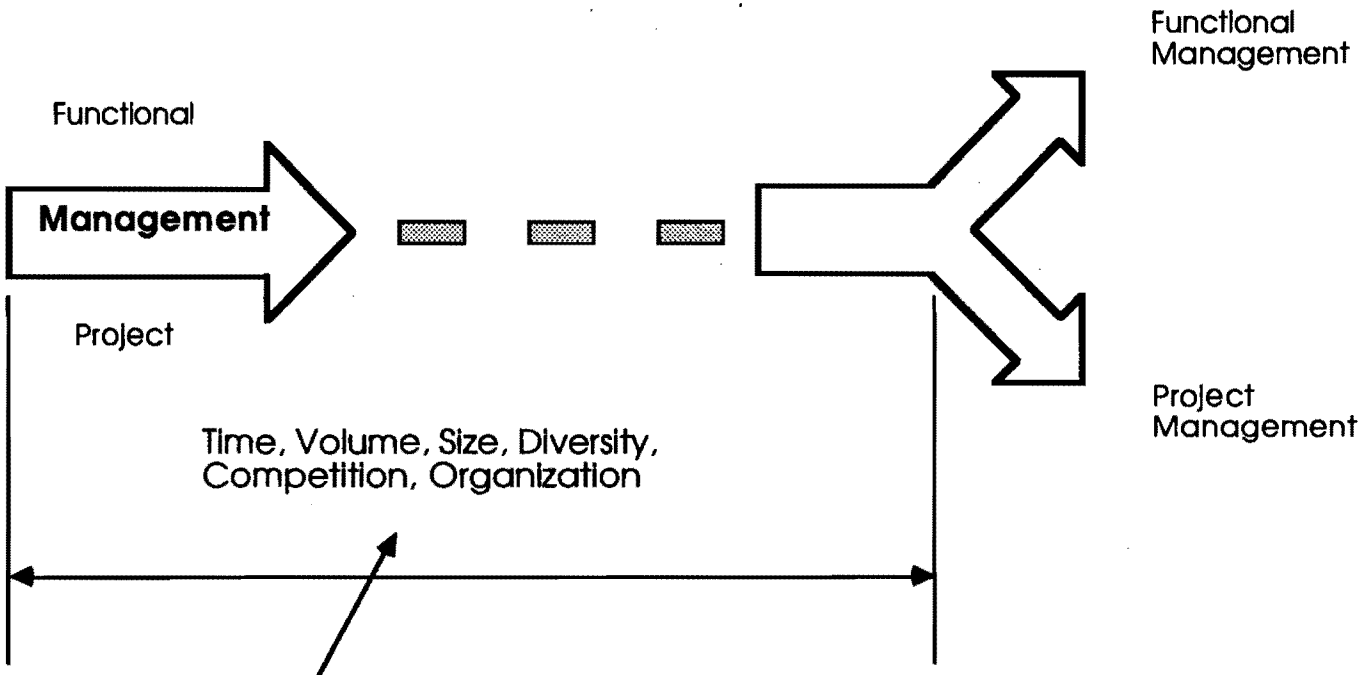
• **FUNCTIONAL** - as related to continuous management

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 #1 - 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 form 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.

ho 195 December 1997

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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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Consulting Engineer

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

- **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 38 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

- Nine major elements in the design & construction sequence & how they are done
  1. **Conceive the basic project**
     Visualize and state the fundamental nature of the proposed project, what purpose it is to serve, and its base characteristics.
  2. **Prepare the program**
     Set down the physical characteristics of the total project in written and graphic form so as to be able to translate these characteristics into approval documents from which the full design can proceed.
  3. **Articulate the program for approval**
     Merge the concept, and the written and graphic program into written and graphic construction language which can be reviewed and released by the ultimate decision makers for full design.
  4. **Approve the basic project**
     Approve the concept, the program, and the merging of the two. This approval by those in authority initiates the full design and construction process
  5. **Design the project**
     Prepare full contract documents for construction use.
  6. **Construct the project**
     Build the project and make it ready for turnover to the owner or user.
  7. **Turn over the project**
     Release the constructed project to the owner or user with full documentation needed to operated and maintain the completed environment.
  8. **Operate the project**
     Take over, run in, and make the new environment fully operational.
  9. **Maintain the project**
     Keep the new environment in proper operating condition by a well conceived and effectively managed maintenance effort.
- Six major participants in the design & construction process
  1. **Conceiver** - The ultimate decision making force behind the entire program
  2. **Translators** - The parties that translate the project concept into construction documents
  3. **Constructors** - Those who build the facility
  4. **Operators** - Those who operate the completed facility
  5. **Regulators** - Those who help assure project adherence to the cause of public good
  6. **Users** - Those who occupy and use the facility for the purpose for which it is intended
- Ten major types of design & construction problems
  1. **Constructive acceleration**
     An action by a party to the contract that forces more work to be done with no time extension, or the same amount of work and a shorter period of time in which to do it.
  2. **Constructive change**
     A construction action or inaction by a party to the contract that has the same effect as a written order.
  3. **Defective or deficient contract documents**
     Contract documents which do not adequately portray the true contract scope.
  4. **Delay**
     A situation, beyond the control and not the fault of a contract party, that causes a delay to the project

5. **Differing site condition**
   A situation in which the actual conditions at the site of a project differs from those represented on the contract documents, or from reasonable expectations of a site in that area.
6. **Directed change**
   A legitimate change within the contract scope for which the owner is obligated to pay.
7. **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, AND USING PARTNERING IN PROJECT MANAGEMENT*

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END, INTERMEDIATE & PERIPHERAL OBJECTIVES

2.01

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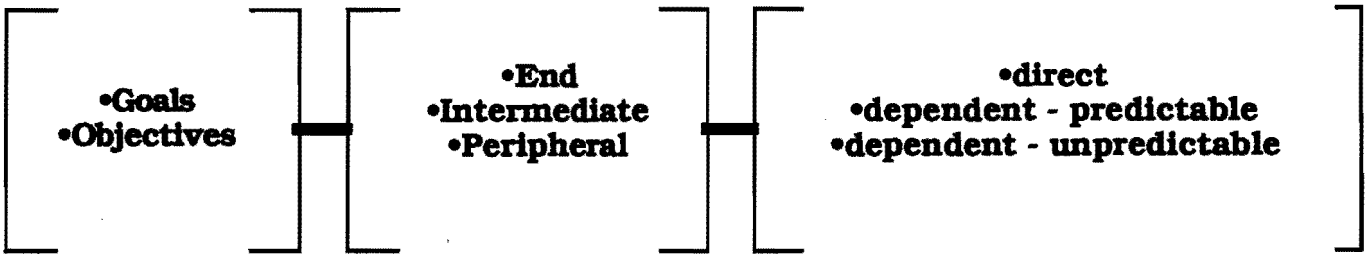
Goals & Objectives Definition



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**

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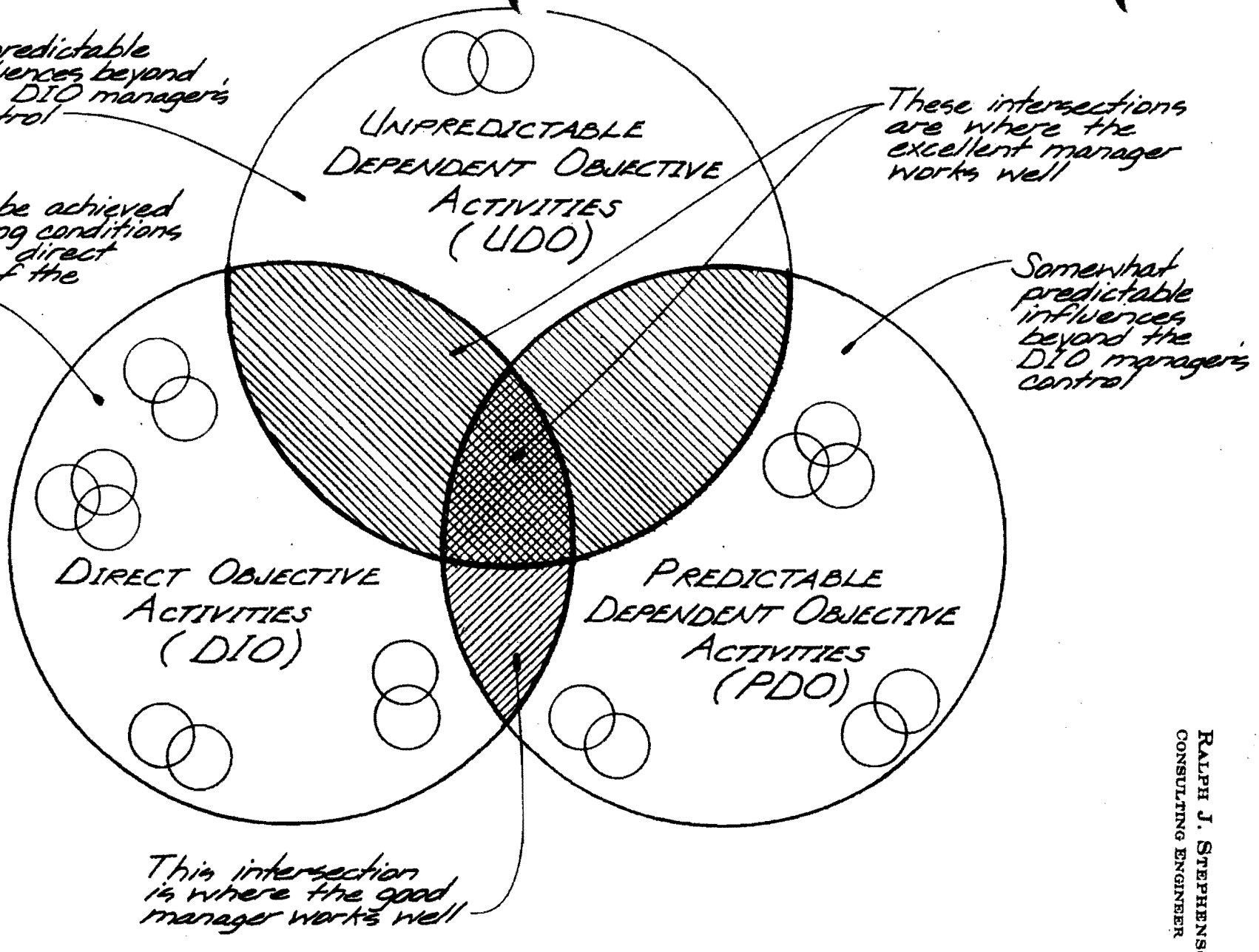

THE DIO/PDO/UDO INTERSECTION

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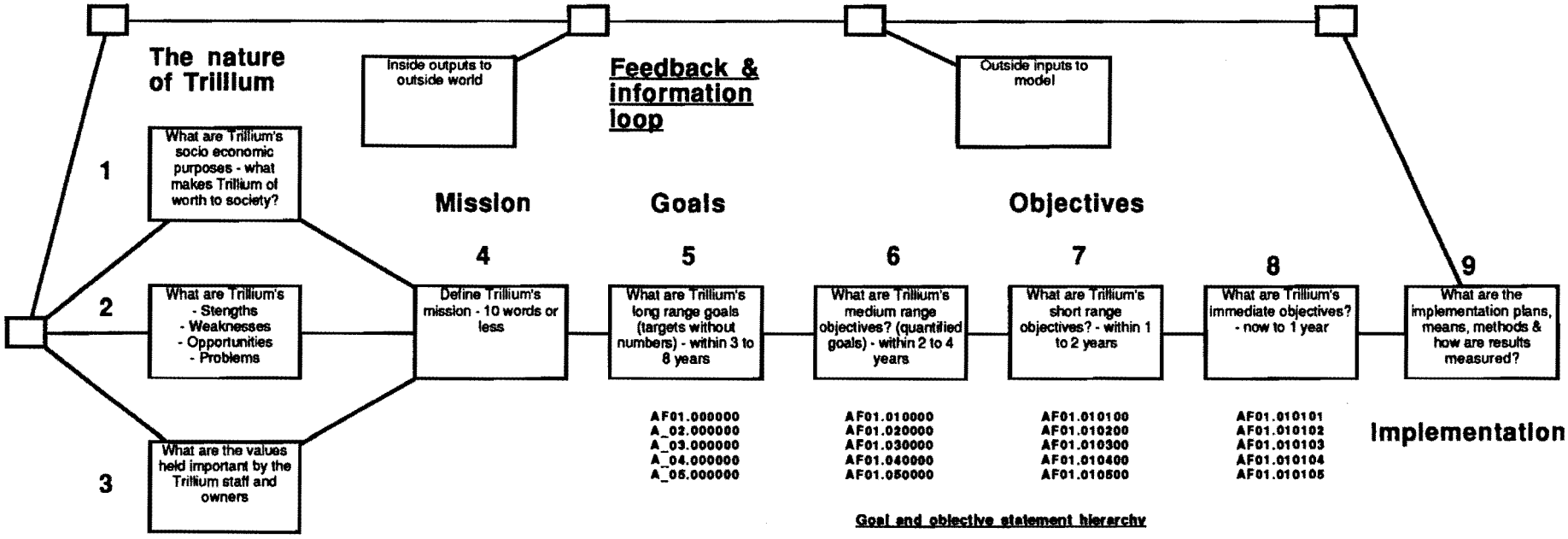

Goal and objective statement hierarchy

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 #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.

1. **Pointer 1**

   Read the case study carefully and try to get an overall managerial feeling for the situations 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.

2. **Pointer 2**

   Where problems seem to exist in the description, isolate these even though they appear minor, and give them 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.

3. **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.

4. **Pointer 4**

   Always ask yourself the basic questions about any situation - who?, what?, when?, where? Without the answers to these questions, an analysis may be incomplete and faulty.

5. **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.

6. **Pointer 6**

   When the case study is discussed, don't hesitate to bring out points you feel are important. Also learn from other's solutions. Remember there are usually many ways to solve problems and resolve difficulties.

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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.

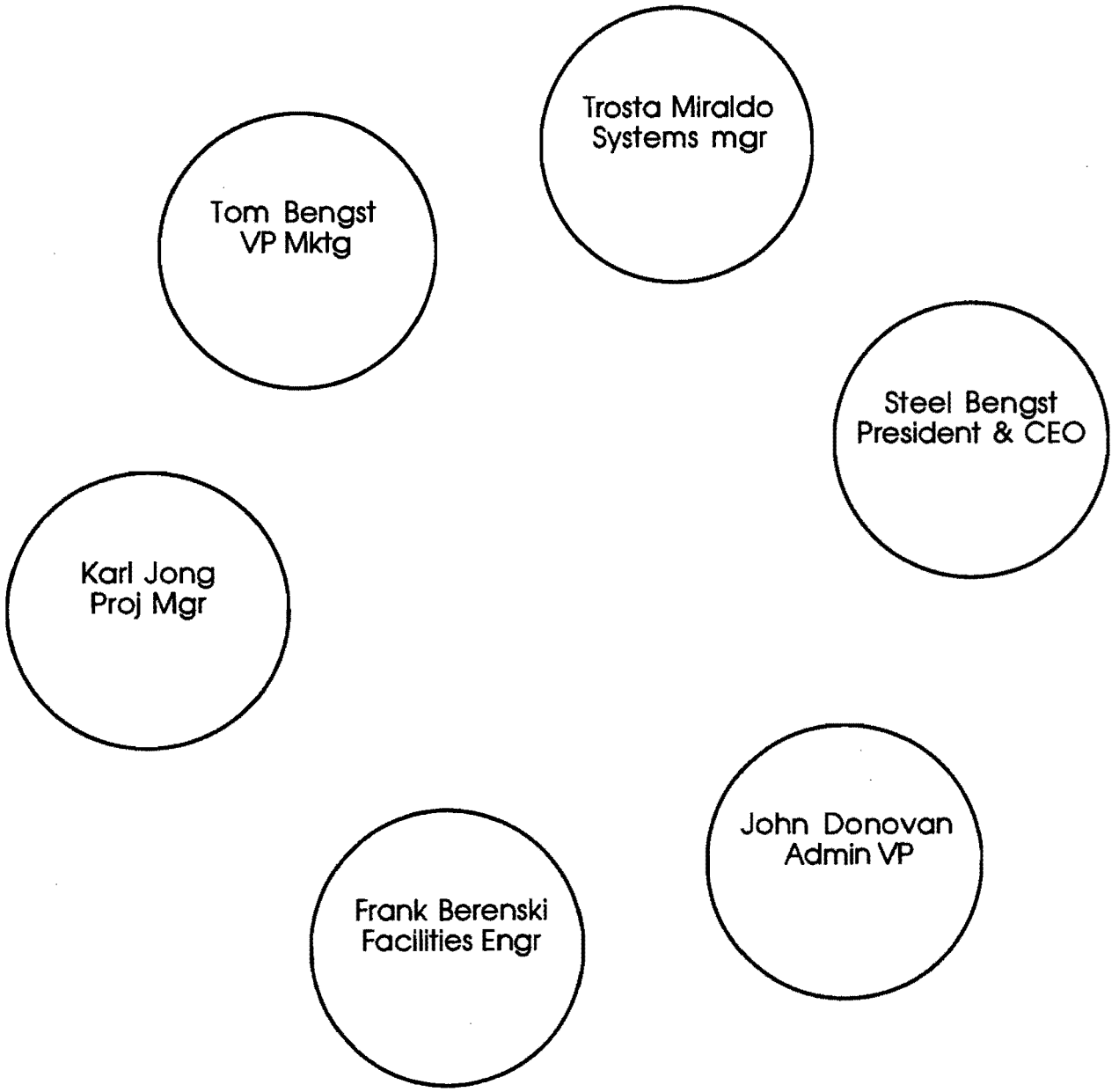
Define the following:

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.

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

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December 3, 1997

Alternative Dispute Resolution and Partnering - an overview

I. Definitions

A. Alternative dispute resolution.

In broadest terms, ADR is a method of resolving disputed design and construction claims outside the courtroom.

B. Neutral.

A technically trained, educated and credentialed professional who is active in the planning, design, and construction disciplines. The neutral must be capable of objectively listening, analyzing, and evaluating construction related demands or claims which are in dispute.

The product of the neutral's work is usually a recommendation as to a course of action to be followed based on the neutral's opinion as to the outcome of the action. Neutral's recommendations are generally not considered binding.

C. Partnering

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.

D. 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.

E. Resolution

A course of action determined or decided upon that can result in clearing conflict or dispute.

F. Strategic partnering.

A formal partnering relationship that is designed to enhance the success of multi-project experiences on a long term basis.

As each individual project must be maintained, a strategic partnership must also be maintained by periodic review of all projects currently being performed - Ida B. Brooker 1994 WEX

II. Alternative dispute resolution (ADR) systems and their application in construction.

A. Some resolution methods available

1. Non binding

a) *Prevention methods* - produces maximum harmony - usually least cost.

(1) Intelligent and proper risk allocation

(a) Risk should be assigned to the parties that can best manage or control the risk, i.e.

i) The owner, if the architect/engineer is expected to assemble and write the program.

ii) The architect/engineer, if the owner has prepared a well conceived and clearly stated program.
iii) The owner, where construction is expected to begin before construction documents are complete.
iv) The contractor, where full, well prepared, and checked construction documents are available prior to the start of construction.

(b) Attempts to shift risks to architects, engineers or contractors not able to absorb these risks is not cost-effective
i) Reduces competition
ii) Increases costs due to greater contingency allowances.
iii) Increases costs and reduces effectiveness because of the potential for increased numbers and intensity of design & construction project disputes.

(2) Incentives for cooperation
(a) Incentives or bonus provisions
(b) Disincentives or penalty provisions

(3) Partnering
(a) Stresses good faith agreements
(b) Emphasizes teamwork
(c) Encourages good communications

b) *Internal negotiation methods* - parties involved conduct negotiations - requires consensus - relatively cost free.
(1) Direct negotiations (often starts at UDM level)
(2) Step negotiations (starts at dispute originating level)

c) *Informal external neutral methods* - preselected external neutral serves as a informal dispute-resolver - relatively low cost.
(1) Architect/engineer rulings
(a) May be respected even though not legally binding.
(b) Must be impartial

(2) Dispute resolution board
(a) 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.
(b) Those selected should be from the design & construction industry.
(c) Must have no conflict of interest.
(d) Conduct investigations and hearings on disputes and publish prompt opinions re the dispute.

(3) Independent advisory opinion.
(a) Mutually agreed upon neutral expert meets informally with interested parties, obtains information from both, and render prediction as to the ultimate outcome if not resolved at meeting level.

d) *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.
(1) Mediation - settlement conferences and informal hearings conducted by a neutral third party.

(2) Minitrial - private settlement method usually initiated by an agreement between the parties - less formal than mediation.
(3) Advisory opinion - neutral expert meets with both parties, obtains information from both, and render prediction as to the ultimate outcome if adjudicated.
(4) Advisory arbitration - abbreviated hearing before neutral expert(s). Arbitrator(s) issue advisory award, and render prediction as to ultimate outcome if adjudicated.

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

B. To achieve successful dispute resolution requires:
   1. A desire for a win - win result;
   2. A desire for a fair settlement;
   3. People in charge who want a fair resolution;
   4. A negotiation technique that is acceptable to those involved;
   5. Knowledge of how to arrive at a resolution system that can produce a decision;
   6. Understanding that unresolved conflict and disputes often requires that a neutral view be considered as a tool for positive change;
   7. A belief that if you aren't entitled to it don't try to get it!

III. Partnering is a system of conducting business with minimal destructive conflict.
   A. Other names for partnering
      1. A gentleman's agreement
      2. "Let's look at the drawings a bit more closely."
      3. "Let's tally up the favor score?"
      4. "Let's settle this over a beer."
      5. A handshake agreement.

IV. Why is partnering applicable in today's construction industry?
   A. What value is added by partnering?
      1. Lower costs to resolve conflicts.
      2. Quicker settlement of conflicts.
      3. Knowledgeable professionals make the resolution decisions.
      4. Decision makers are closer to the resolution process.
      5. Nature of decisions rendered lessen the probability of appeal.
      6. Participants gain privacy in the resolution process.
      7. Probability of fair resolution is increased by more timely consideration of the dispute.
      8. Helps cross critical transition points by setting the ground rules for the crossing
   B. Where and why has partnering been successful?
      1. 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:

a) Disputes reduced - no formal claims.
b) Common objectives achieved (schedule, safety, etc.).
c) Increased responsiveness.
d) Higher trust levels.
e) Improved communication.
f) Excellent cooperation & teamwork.
g) Increased value engineering proposals.
h) Developed expedited process for tracking and resolving open items.

2. 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
   a) 80 to 100 % reduction in cost growth over the life of major contracts.
   b) Time growth in schedules virtually eliminated.
   c) Paper work reduced by 66%.
   d) All project engineering goals met or exceeded.
   e) Completion with no outstanding claims or litigation.
   f) Safety records significantly improved.
   g) Pleasure put back in the process for all participants.
3. Combination partnering relationships surveyed & studied by the Construction Industry Institute and reported in the publication ("In Search of Partnering Excellence" - July 1991).
   a) Shell Oil/SIP Engineering - 1984.
   b) DuPont/Fluor Daniel - 1986.
   c) Proctor & Gamble/Fluor Daniel - 1986.
   d) Proctor & Gamble/BGP - 1986.
   e) Shell Oil/Bechtel - 1987.
   f) DuPont/MK - Ferguson - 1987.
   g) Shell Oil/The Ralph M. Parsons Company - 1987.
   h) Alcan/Fluor Daniel - 1988.
   i) Union Carbide/Bechtel - 1988.
   j) DuPont/Day & Zimmerman - 1988.
   k) Great Northern Nekoosa/Rust International - 1988.
   l) Pillsbury/Fluor Daniel - 1989.
   m) Hoffman-LaRoche/Day & Zimmerman - 1989.
   n) Chevron/Bechtel - 1989.
   o) Bethlehem Steel/United Engineers & Constructors - 1989.
   p) Proctor & Gamble/M. W. Kellogg - 1989.
   q) Chevron/Besteel - 1990.
   r) DuPont/H. B. Zachry.

C. Situations in which partnering may be difficult to use
   1. Where the parties intend to pay lip service only to the partnering effort.
   2. Where individuals in key technical or management positions choose to resist intelligent discussion and fair decision making.
   3. Where early commitments by the owner have made made good intercontract relationships difficult or impossible to maintain.
   4. Where construction contracts are let as the documents are being released for field use.

5. Where several parties to the contract prefer to resolve disputes by contested claiming & binding resolution.
6. Where poor contract documents are made the basis of the partnering effort.
7. Where excessive, one sided conditions are placed on sub contractors by prime contractors.
8. Where unfair or obscure payment processing systems are specified and enforced.
9. Where risk has been poorly defined and unfairly allocated.

V. What are some of the ingredients of a successful partnering effort plan ?
   A. Develop and maintain a strong desire to achieve project success for all.
   B. Make intelligent commitments.
   C. Avoid accepting or imposing unreasonable risk.
   D. Work and act ethically, morally, and with integrity.
   E. Work and act from a position of fairness rather than a position of power.
   F. Suppress greed.
   G. Try to establish an honest feeling of trust among participants.
   H. Assign experience, competent people to responsible management positions.
   I. Have empathy.
   J. Prepare a good charter, a good partnership evaluation system, and a good issue resolution process.

VI. Experiences and applications of the partnering concept.
   A. 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.)
      1. Giving directions to proceed without a timely change order.
      2. Failing to establish clear chain of command.
      3. General contractor covering general conditions costs by charging subs.
      4. Lack of timely acceptance of work.
      5. Lack of timely responses to
         a) RFI's.
         b) Approval of shop drawings.
         c) Site activity restrictions.
         d) Change orders.
         e) Value engineering.
         f) Acceptance of work.
      6. Improper passing of general conditions responsibility to subs.
      7. Lack of forum to evaluate and resolve open issues.
      8. Slow submittal turn around.
      9. Unreasonable punch lists.
      10. Failure to recognize impact of changes on ongoing work.
      11. Late submission of proposals.
      12. Untimely submission of as-builts, operating & maintenance manuals, and training of user personnel.
      13. Failure to maintain clean efficient, safe working conditions.
      14. Do your own punchlists.
      15. Pretest special systems - equipment start-up.
      16. Untimely delivery of owner equipment.
      17. Slow payment.
      18. Design errors and omissions.
      19. Resistance to solving problems perceived as *contractor problems.*

20. Changes issued in incomplete form (sketches & narrative).
21. Slow owner response to concurrent reviews & changes.
22. Pass through attitude by general contractor.
23. Bid shopping.

B. Recommendations to help resolve some of the problems we or others cause. (samples from an actual charter meeting.)
1. Better communications.
2. Less defensiveness/more openness.
3. Fast dispute resolution.
4. Don't take issues personally.
5. Contractor review requests for information & submittals before processing.
6. Be willing to propose/suggest solutions.
7. Submittal schedule provided.
8. Prioritization of submittals.
9. Complete/thorough questions.
10. Positive attitude.
11. Recognition of owner's need to eventually occupy, operate and maintain facility/systems.
12. Recognition of importance of paper work.
13. Allowing necessary contract time for training.

VII. Guidelines for the application and use of partnering concepts.
A. Determine the need for a partnering system.
B. Set goals and objectives to be gained from a partnering system.
C. Obtain management commitment for use of a partnering system.
D. Develop a partnering plan of action (the charter).
E. Obtain management commitment to a partnering plan.
F. Train and educate project participants in the partnering concept.
G. Create and implement an issue resolution system.
H. Create and implement a partnering review and evaluation process.

VIII. Charters - provided by courtesy of project management and staff 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.
(1) a. Recognize the need for quality information
(2) 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.
   (1) a. Prompt resolution of conflicts at lowest possible level
   (2) b. Eliminate need for Contracting Officer decisions
   (3) c. Fair interpretation of ambiguities
   (4) d. Be proactive (not reactive) in problem solving
   (5) e. Maintain objective attitude toward constructability and practicality
   (6) f. Accept responsibility for your actions or inactions
   (7) g. Have empathy in all matters
   (8) h. Clearly describe changes to contract work
d) 04. Limit cost growth.
   (1) a. Develop cost effective measures
e) 05. Maintain clean, efficient, secure work site.
   (1) a. No lost time due to accidents
   (2) b. Properly staff project
   (3) c. Be a good neighbor
f) 06. Seek to maintain good job morale and attitudes.
   (1) a. Promotion of partnering attitudes at all levels of contract administration
   (2) b. Have fun
   (3) c. Have pride in your product
g) 07. Commit to quality control in all project related matters.
   (1) a. Do it right the first time
   (2) b. Maintain proper work sequence
   (3) c. Meet design intent
   (4) 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
         (1) Clarify objectives and expectations of the submittal process.
         (2) Minimize submittal and approval times.
         (3) Provide accurate, prompt, clear, concise approvals.
      b) Payments
         (1) Make payments in accordance with the published flow chart process.
      c) Information processing & paperwork
         (1) Expedite all information and indicate desired response times .
         (2) Maintain open lines of communication among Project Team members.
         (3) Be available.
         (4) Attempt to offer possible solutions to questions within a proper scope.
         (5) Provide clear responses to requests for information.

d) Legal matters
   (1) No litigation.
   (2) Settle disputes at originating level .
e) Abatement
   (1) Establish, approve and publish a plan of abatement.
   (2) Abate promptly.
f) Planning and scheduling
   (1) Provide, obtain, and use accurate activity information.
   (2) Clearly monitor the project against the plan and schedule.
   (3) Commit to, and fulfill man hour projections.
g) Decision making
   (1) A/E team to regularly inspect work and advise compliance.
   (2) Define and clearly communicate quality expectations.
   (3) Properly empower those at all decision making levels.
h) Policies and procedures
   (1) Prepare, review, approve and publish policies and procedures that will serve as guidelines to manage the project.
i) Site layout and management
   (1) Formulate and publish a trash removal & parking plan.
   (2) Properly establish and maintain bench marks and control lines.
j) Processing revisions
   (1) Provide written authorization prior to work proceeding.
   (2) Respond to requests for information, bulletins and change orders promptly.
   (3) Prepare, approve & publish a flow chart for processing revisions.
k) Be a good partnering neighbor
   (1) Commit to protecting your work and the work of others.
   (2) Show all participants due respect and acknowledgement.
   (3) Maintain proper work sequences.
l) Total quality management (TQM)
   (1) Prepare, approve, publish, and commit to a TQM program.

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, P. E., P. C.
Consulting Engineer

Destructive conflict in today's technical world is often caused by:

- Not understanding that conflicts lead directly to results.
- Frustration over a lack of control of events affecting performance.
- Differences in goals and objectives of parties in the project.
- Lack of understanding about the needs of others also involved in the planning, design, and construction process.
- Resentment or dislike resulting from a perceived lack of value added to projects by those responsible for adding value.
- Excessive technical and legal delays to resolution of conflict.
- Excessive demands on resources normally depended on to assist in the resolution of conflict.

- Greed.
- Incorrect assumptions made from biased perceptions.
- Demands for higher quality than specified.
- Failure to meet commitments.
- Insufficient time to make required decisions.
- Lack of ability to do the job.
- Poor or inadequate training.
- Inadequate credentials to do the job.
- Indifferent leadership.
- Actual or perceived overwork.
- Bad blood among participants.
- Desire to take advantage of those in weaker positions.
- Misplaced attempts to demonstrate who is in charge.

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Consulting Engineer

Seven actions to smooth out and resolve potentially destructive conflict

- Action 1) Understand the cause of the conflict.
- Action 2) Put yourself in the other person's shoes.
- Action 3) Understand the relative importance of resolution vs. nonresolution.
- Action 4) Become competent in properly applying the technical and professional management tools of our profession.
- Action 5) Don't lie. Always tell the full truth.
- Action 6) Thoroughly understand the obligations you have to society and to your clients, your employer, and your peers.
- Action 7) Understand everything you can...not just your own field, and work to be effective in managing intersections of diverse interests.

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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*

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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.**

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

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.

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Consulting Engineer

PEOPLE

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

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Consulting Engineer

POSITIVE CONFLICT

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

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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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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.

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• Organizational partnering

A system of internal relationships established when the spirit of project partnering is incorporated into the total operating mode of an organization. Organizational partnering, well done, is designed to improve the probability of short and long term operating success. Often organizational partnering is applied with little awareness of it being in use. Organizational partnering should be made an integral part of project and strategic partnering applications for it to add its full value to the organization.

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THE THREE LEGS OF A PARTNERING SYSTEM

- LEG #1 - THE CHARTER
- LEG #2 - THE EVALUATION SYSTEM
- LEG #3 - THE ISSUE RESOLUTION SYSTEM

AS WITH ANY THREE-LEGGED STOOL, ALL THREE LEGS MUST BE IN PLACE TO PROPERLY SUPPORT THE USER.

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COMPONENTS OF A PROJECT PARTNERING SYSTEM

Charter - Defines the mission and the partnering goals and objectives of the project team

Evaluation System - Describes how the project partnering status will be measured, evaluated and maintained.

Issue Resolution System - Defines steps to be taken to resolve project disputes as they occur on the job.

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PROBLEM MENTIONS

Total assignments of problem types from 2,855 responses to the questions, "What job difficulties are caused by us and by others?" Listed by frequency of mention.

01. 1146 - Job management
02. 0984 - Communicating with others
03. 0684 - Staff morale and attitudes
04. 0593 - Personnel quality and problems
05. 0475 - Being a good on-site neighbor
06. 0467 - Timely action
07. 0396 - Planning and scheduling
08. 0371 - Organization, authority, and responsibility
09. 0288 - Work site conditions
10. 0268 - Revision processing
11. 0267 - Construction document quality
12. 0233 - Program conditions
13. 0205 - Submittal processing
14. 0166 - Issue, conflict, and problem resolution
15. 0166 - User group interaction
16. 0145 - Equipment and material problems
17. 0141 - Documents and documentation
18. 0133 - Decision making
19. 0125 - Procurement of materials and equipment
20. 0116 - Project cost structure
21. 0112 - Closing out the project

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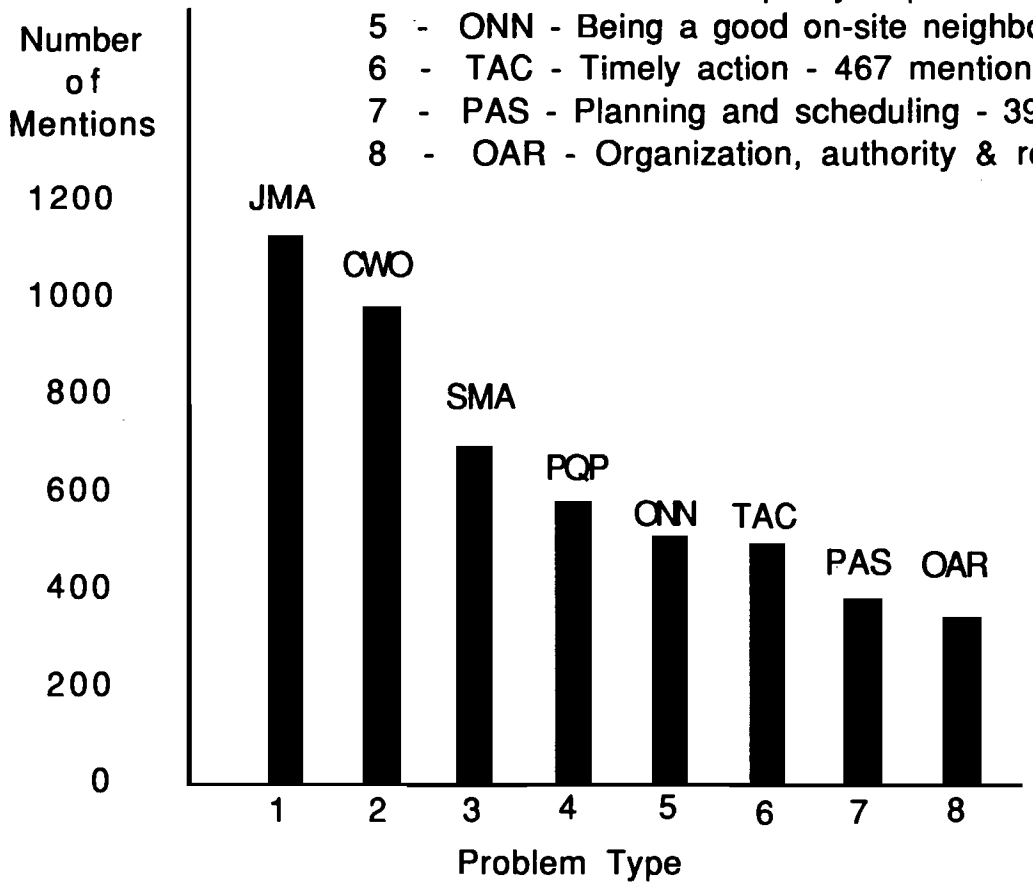
22. 0097 - Contract interpretation
23. 0097 - Quality management
24. 0095 - Payment processing
25. 0092 - Paper and administrative work
26. 0090 - Approval processes
27. 0088 - Being a good off-site neighbor
28. 0073 - Time growth
29. 0070 - Policies and procedures
30. 0069 - Inspecting and testing
31. 0069 - Staffing and manpower
32. 0064 - Cost growth
33. 0058 - Substitutions and alternates
34. 0052 - Maintaining regular project evaluations
35. 0052 - Safety
36. 0049 - Regulatory agency matters
37. 0022 - Constructibility
38. 0022 - Training
39. 0022 - Value engineering
40. 0014 - Labor conditions
41. 0014 - Legal matters
42. 0011 - Backcharges
43. 0011 - Financial problems
44. 0010 - Weather conditions
45. 0005 - Warranty conditions

- The eight most frequently mentioned design &construction problems. From a total of 2,855 responses to the question "what job difficulties are caused by us and by others?"

Problem Type

1 - JMA - Job management - 1146 mentions
2 - CWO - Communicating with others - 984 mentions
3 - SMA - Staff morale & attitudes - 684 mentions
4 - PQP - Personnel quality & problems - 593 mentions
5 - ONN - Being a good on-site neighbor - 475 mentions
6 - TAC - Timely action - 467 mentions
7 - PAS - Planning and scheduling - 396 mentions
8 - OAR - Organization, authority & responsibility - 371 mentions



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Partnering Charter Objectives

The list of objectives below is designed to assist the stakeholders to write a sound, well expressed charter. If a numbered objective fits a particular recommendation your team wishes to make, note the number of the objective and any revisions you wish to make to it. We will then consider the objective for inclusion as we write the project charter.

Topics appearing below include:

A. Approval Processes
B. Being A Good Off/On Site Neighbor
C. Closing Out the Project
D. Communicating With Others
E. Decision Making
F. Documents and Documentation
G. Financial Matters
H. Inspection and Testing
I. Issue, Conflict, and Problem Resolution
J. Job Management
K. Legal Matters
L. Maintaining Regular Project Evaluations
M. Organization, Authority, and Responsibility
N. Planning and Scheduling
O. Payment Processing
P. Personnel Quality and Problems
Q. Regulatory Agency Matters
R. Revision Processing
S. Staff Morale and Attitudes
T. Submittal Processing
U. Work-site Conditions

Don't hesitate to change wordings since it is entirely possible that your expression of a desired objective may be different than that of the original.

A. Approval Processes

1. Provide required documentation and approvals within the mutually agreed upon time frame.
2. Make and document all decisions, and provide all approvals at their management level promptly, fairly and with consideration of the requirements

of the project.

B. Being A Good Off/On Site Neighbor

3. Maintain a clean, safe, accessible , and well-planned work site.
4. Recognize that project conditions and decisions affect other partners in achieving the overall design intent.
5. Maintain, in conjunction with other stakeholders, a work area plan to be implemented by affected stakeholders.

C. Closing Out the Project

6. Establish close-out guidelines that provide clearly understood direction for punching out the job, issuing Certificates of Substantial Completion, establishing intermediate occupancy dates, and maintaining and transmitting contract record documents.
7. Prepare and specify a close out plan.
8. Prepare and specify a rolling punch list and close out procedure.
9. Establish and implement guidelines that provide direction for accepting the work and closing out the job.
10. Do it right the first time and strive to achieve a minimal punch list.

D. Communicating With Others

11. Prepare, publish, keep current and respect a chart of channels of communication, responsibility, and authority.
12. Limit the release of public information through the owner's designated representative only.
13. Anticipate, identify, and accurately communicate potential job problems
14. Ask questions and request information clearly and accurately
15. Be sensitive to the informational needs of the design and construction team partners.
16. Communicate all issues in a timely fashion to all those affected by the issues.
17. Communicate clearly, accurately and in a timely manner through appropriate project channels.
18. Communicate effectively in an open, honest manner with all appropriate stakeholders.
19. Anticipate and communicate the conditions and disruptive circumstances inherent in demolition and construction activities, to the staffs of the various facilities that are a part of this total program.
20. Communicate the principles of partnering on this project to all participating

organizations and individuals.
21. Identify planned and required shut downs, and outages from and to the designers, builders, and the Capitol Complex operations staffs.
22. Ensure the design is understood and acknowledged by all the partners.
23. Maintain open lines of communication
24. Make progress and technical meetings productive and brief by preparing well, and bringing both problems and solutions to the table.
25. Prepare and publish a communications flow chart showing roles and responsibilities of all project team members.
26. Prepare well for progress meetings and make them brief and productive.
27. Promptly prepare and respond to requests for information, substitutions, and clarifications of project documents.
28. Provide adequate data re: user-furnished equipment for construction to proceed as desired.
29. Provide timely communications, responses, decisions... and be available.
30. Recognize that project conditions and decisions affect other partners in achieving the overall design intent.
31. Regularly monitor and discuss, all anticipated outages with utility company and subcontractor input and provide maximum possible notice to the user of anticipated outages.
32. Respond promptly to requests for information and clarifications of contract documents.
33. Stay in touch with the project, i.e. reading meeting minutes, attending meetings as needed, and being available for input
34. Prepare, publish and adhere to the lines of communication, authority, and responsibility for the school building partnering team.
35. Prepare and respond promptly and completely to requests for information and clarification of contract documents.

E. Decision Making

36. Make decisions in a timely manner and stand by the agreements you have made.
37. Make timely decisions in all project related matters.
38. Provide adequate backup data, within expectations, to allow timely and accurate decisions to be made by members of the project team.
39. Recognize that project conditions and decisions affect other partners in achieving the overall design intent.

F. Documents and Documentation

40. Accurately prepare and properly distribute project documentation in a timely manner

G. Financial Matters

41. Practice fairness in price proposals, backcharges, and all other financial matters.

H. Inspection and Testing

42. Provide for timely and professional technical inspection services with appropriate documentation and feedback to those affected.

I. Issue, Conflict, and Problem Resolution

43. Maintain the current issue resolution policy. (The current policy stresses the resolution of conflict at the originating or lowest possible working level.)
44. Minimize disputes and resolve conflicts quickly and at the lowest possible management level.
45. Prepare and publish an issue resolution policy which stresses the timely resolution of conflict at the originating or lowest possible management level and seeks to avoid litigation.
46. Prepare, publish, and implement a dispute resolution system designed to resolve conflicts at the lowest possible management level.
47. Strive to resolve job conflicts quickly and at the originating or lowest possible level.

J. Job Management

48. Anticipate events - be proactive.
49. Avoid surprises!
50. Be familiar with the contract documents.
51. Carefully evaluate and be sensitive to the impact that construction activities may have on the environmental integrity and safety of all ongoing hospital operations.
52. Continue to implement the partnering evaluation system (involving new participants).
53. Continue to improve and implement agreed-upon project procedures that provide all stakeholders guidelines for:
54. Time commitments for procedures.
55. Prioritizing assignments.

56. Design and construct a facility that is built so as to recognize the need for the builders and the designers to achieve a reasonable financial profit on their work.
57. Design and construct a facility that is built within the time and cost terms of the lease-purchase documents.
58. Develop a organizational matrix showing lines of communication and responsibility to be maintained on the project.
59. Encourage the participation of all parties at all project levels in the partnering process and the partnering spirit.
60. Enforce the construction traffic and parking plans.
61. Foster understanding of construction documents
62. Identify and remedy incorrect performance in a timely manner.
63. Insure that each of their management team members is fully aware of the requirements of the project.
64. Keep current with project status and requirements.
65. Keep paperwork to a minimum.
66. Maintain a close relationship between expectations and reality
67. Maintain a continuous and efficient work force and effective procurement to ensure quality, sequence, and schedule
68. Maintain an adequate management and work force to fulfill contract commitments.
69. Maintain client safety and user satisfaction during construction.
70. No surprises
71. Plan for and meet the human resource requirements of the project, and maximize opportunities for women and minorities.
72. Plan for future service access to equipment during mechanical, electrical and plumbing installation.
73. Plan for the future not for the past.
74. Prepare and publish a calendar of project events indicating when key personnel are required to participate in project management activities. Partners will attend and participate in all required meetings and provide backup management where necessary.
75. Preplan work recognizing the impact plans have on achieving the design intent.
76. Properly staff and maintain competent personnel, and equipment required on the project.
77. Provide proper resources to support the agreed-upon plan and schedule of work.
78. Provide resources to fulfill contract & charter obligations.
79. Recognize and be sensitive to the needs of other stakeholders on the project.
80. Strive for a zero punch list.
81. Use human and technological resources to their maximum effectiveness.

82. Meet individual and organizational obligations.
83. Maintain a clean, safe, accessible and well-planned job site.
84. Maintain a clean, secure, accessible and well-planned job site.
85. Continue to improve... a. Submittal and request for information (rfi) processing, including agreed-upon schedules and response times to meet the needs of all parties.
86. Continue to improve... b. Prompt payment processing including retention.
87. Continue to improve... c. Revision and change order processing, including a streamlined process for minor changes ($1000 or less).

K. Legal Matters

88. Strive to avoid litigation.
89. No litigation.

L. Maintaining Regular Project Evaluations

90. Prepare, publish, and implement a partnering evaluation system by which the effectiveness of the system is regularly monitored. (stakeholders task force)
91. Prepare, publish and implement a project partnering evaluation system.

M. Organization, Authority and Responsibility

92. Be accountable for your actions.
93. Fulfill respective responsibilities and commitments to permit on-time completion of the project.
94. Maintain continuity of key job personnel.
95. Prepare and publish a project directory showing people, work category, position and alternate contact.
96. Prepare, publish, and use a project chain of command
97. Prepare, publish, and keep current a chart of channels for communication, responsibility, and authority.

N. Planning and Scheduling

98. Adhere to agreed upon schedules and resource commitments.
99. Adhere to the current master construction schedule in effect on the project.
100. Develop a realistic plan of work and project schedule and honor it.
101. Distribute and regularly monitor and discuss, with subcontractor input, a master project schedule, and update schedules as required.
102. Mutually prepare, publish, implement, and keep current a project action

plan and schedule of work that is useful to all stakeholders.
103. Prepare, distribute and regularly monitor and discuss, with subcontractor input, a master project schedule, and update schedule as required.
104. Solicit all team member's input for planning and scheduling

O. Payment Processing

105. Promptly prepare, submit, and process all payment requests.
106. Submit properly prepared requests for payment.

P. Personnel Quality and Problems

107. Do it right the first time and strive to achieve a zero punch list.
108. Prepare, publish, promote, and adhere to standards of work place conduct.

Q. Regulatory Agency Matters

109. Work closely with all regulatory agencies to assure compliance to their current standards and regulations.

R. Revision Processing

110. Accurately price changes to the project in a timely, reasonable and fair manner.
111. Approve and process changes in a timely manner.
112. Approve changes in a timely manner including formal issuance of supplemental agreements.
113. Control revisions being considered for the project to maintain the planned budget.
114. Prepare and implement guidelines for screening proposed changes to the project prior to requesting formal pricing of the changes. (owner, user, designers)
115. Provide accurate data and adequate time to ensure pricing changes that are fair and timely.
116. Provide reasonable change request budgets and identify insufficient budgets promptly.
117. Provide reasonable field change orders and change issue budgets, and accurately price changes to the project in a timely, reasonable, and fair manner.

S. Staff Morale and Attitudes

118. Be available.

119. Be cooperative.
120. Be willing to suggest and consider cost and time effective options.
121. Establish a trustful work environment with other stakeholders.
122. Establish and maintain good informal working relations on the job.
123. Extend the spirit of partnering to all project participants.
124. Have fun!
125. Have fun and celebrate the successful completion of the project.
126. Maintain high job morale and cooperative attitudes among all project participants.
127. Make the project a fun place to work and to meet new friends.
128. Promote and adhere to acceptable standards of conduct by the project team on the site.
129. Recognize individual and team accomplishments.
130. Respect all project participants and their work.
131. Respect and treat other's and their work as you wish you and your work to be treated; accept responsibility for damage to other's work.
132. Respect design and construction excellence as a fundamental goal to be achieved.
133. Respect financial profit as an incentive for private sector stakeholders.
134. Respect other team members' work and abilities.
135. Take pride in our work, respect the ideas and work of others and treat others as you would have them treat you.
136. Treat others as you would have them treat you.
137. Practice fairness in price proposals, back charges, and all other financial matters.

T. Submittal Processing

138. Prepare, package, and process submittals in a timely, fair, and considerate manner consistent with the priorities of the contractors, designers, and owner.
139. Promptly review and determine the merit of properly submitted requests for extensions of time.

U. Work-site Conditions

140. Continue to maintain continuity of work points between trades. (Work points refer to building control coordinates and elevations.)
141. Maintain a safe, orderly, well organized work site.
142. Maintain a well planned and clean work site.
143. Maintain continuity of work points between trades.
144. Maintain, in conjunction with other stakeholders, a work area plan to be

implemented by affected stakeholders.
145. Prepare and publish a construction traffic and parking plan.
146. Prepare, publish, and implement a project clean up program for contractors on site.
147. Promote a clean and safe job environment.
148. Provide complete and unencumbered access to needed work areas in accordance with the project schedule.
149. Respect and treat others and their work as you wish you and your work to be treated. Take responsibility for damage to other's work. Amen!

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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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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 under gmp - 80 % to owner and 20% to contractor.
   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

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.

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Sample charter

I. Charter for new Detroit, Michigan Post Office, Area P

A. Mission

This partnering team commits to deliver a quality project on time, within budget, safely, profitably for all, and of the intended quality, through mutual cooperation among the participants.

B. Objectives

1. Maintain a clean and well maintained work site
   a) Experience no lost time from accidents.
   b) Be a good neighbor.
   c) Use good construction site housekeeping practices.
2. Effectively administer the project
   a) Prepare & publish an acceptable payment procedure.
   b) All parties submit complete, accurate & timely billings.
   c) Prepare & publish an acceptable submittal processing procedure.
   d) Treat each other fairly
3. Close out the project in a proper & timely fashion
   a) Prepare & publish acceptable close out guidelines.
   b) Establish clearly defined punch out procedures and standards early in the project.
4. Maintain effective lines of communication.
   a) Recognize the need for quality information.
   b) Minimize response times in all matters.
   c) Maintain an appropriate level of documentation.
   d) Be available.
5. Resolve problems effectively
   a) Develop, approve, and implement a responsive conflict resolution system
   b) Resolve disputes and conflicts at the originating level if at all possible.
   c) Resolve disputes and conflicts as quickly as possible.
   d) Eliminate the need for third party legal involvement
6. Limit cost growth
   a) Maintain objective attitude toward constructability.
   b) Develop cost effective measures to apply to all job related activities.
   c) Recognize owner's needs in occupation and operation of project.
7. Maintain technical excellence in all program, design & construction work.
   a) Owner abate promptly as required
   b) Define and clearly communicate quality standards expected
   c) Maintain constructability of the project.
   d) Properly plan and schedule the work.
   e) Do it right the first time.
8. Maintain good job morale & attitudes
   a) Promote partnering attitudes at all levels of contract administration.
   b) Have pride in your work.
   c) Have fun.

9. Maintain partnering effectiveness
   a) Prepare and publish a partnering effectiveness measurement system.
   b) Meet on a scheduled, regular basis and formally evaluate partnering effectiveness.
   c) Take prompt steps to correct any deterioration of partnering effectiveness on the project.

II. Issue resolution

A. Policy

It is the objective of the Area P Post Office project team management to first and foremost avoid unnecessary disputes and conflict on the job. It is the intent to do this by achieving the objectives of the charter, particularly to resolve an issue promptly and at the level at which it originates. If this is not possible the issue will be referred promptly to the next highest level for resolution.

In all cases, individuals who are involved in a difference should be businesslike and not resort to personal attack. The principles outlined in the Partnering Charter mission and charter should be followed at all times in resolving differences.

Upon request, site meetings will be convened to discuss any unresolved issue and to attempt to reach resolution. Any issue presented should be clearly defined and alternative solutions suggested. The resolution process is to work through open communication and looking at the other side's point of view. In addition, issues are to be kept in the forefront to ensure resolution in a timely manner. A log of unresolved issues will be maintained from meeting to meeting.

if resolution cannot be reached at the job site, the principals of the involved firms or agencies should attempt to reach resolution through informal discussion before the formal process outlined in the contract documents is used.

In seeking resolution to an issue, involved parties will attempt to:

- Thoroughly understand the issues.
- Maintain empathy for the other point of view.
- Communicate thoughts openly and clearly.
- Clearly document the issue resolution.

B. Methodology

Goal - To encourage and provide a forum for resolution of issues at the lowest possible level, but to provide a mechanism to elevate the issue if needed.

If resolution is not achieved at the lowest level forum, the principals in the firms in conflict will attempt to reach resolution thorough informal discussion.

III. Partnering evaluation

Each objective in the Charter is to be initially given a par weight. The par weight indicates how important the item is perceived by the charter partners in relation to achieving the project mission. Weights are assigned from 1 to 5. A weight of 5 indicates that the objective is of critical importance in

achieving the project mission. A weight of 1 indicates that the objective is of least importance when evaluated against the highest weighted objectives.

The weights assigned to the objectives remains constant throughout the project. Therefore care must be taken in assigning them properly at the start of the evaluation process.

The quality of the project performance in relation to the Partnering Charter objectives is to be measured once per month by representatives of all organizations participating in writing the Charter. Partnering performance quality ratings are to be from 1 to 5.

A quality rating of 1 indicates very poor performance with little adherence to the standards set out by the objectives. A quality rating of 5 indicates high and excellent adherence to standards set by the objectives.

The total evaluation of the objective is the constant weight multiplied by the quality rating for each objective for each evaluation. The total partnering performance is measured at each evaluation.

Total partnering performance = total of the objective weights x the total of the objective quality for the period.

A comparison of current to past performance and to the expected par should be carefully analyzed by the charter partners for trends both good and bad. Action on trends should be taken promptly after the analysis - maintaining good performance if the trend is up, and correcting poor performance if the trend is down. The charter is the report card standard of performance.

1 - objective	2 - par weight (w)	3 - par quality (q)	4 - par (w) x (q)	current quality	current (w) x (q)
01. Maintain a clean and well arranged work site	3.00	2.50	7.50	2.25	6.75
02. Effectively administer the project	4.50	3.75	16.88	3.50	15.75
03. Close out project in a proper and timely fashion	4.00	3.50	14.00	2.00	8.00
04. Maintain effective lines of communication	4.25	3.75	15.94	3.00	12.75
05. Resolve problems effectively	4.50	4.00	18.00	4.00	18.00
06. Limit cost growth	2.50	2.25	5.63	2.25	5.63
07. Maintain technical excellence in all program, design and construction work	3.50	3.00	10.50	3.25	11.38
08. Maintain good job morale and attitudes	2.50	2.25	5.63	2.00	5.00
09. Maintain partnering effectiveness	4.00	3.75	15.00	3.25	13.00
Average:	3.64	3.19	12.12	2.83	10.69

25.2

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Consulting Engineer

Types of alternative dispute resolution

1. Prevention methods - usually produce maximum harmony at the least cost
   - a. Intelligent and proper risk allocation
   - b. Incentives and disincentives
   - c. Partnering
2. Internal negotiation methods - relatively low-cost, requires consensus for success
   - a. Step negotiation, usually starting at the dispute originating level
   - b. Direct negotiations usually starting at the ultimate decision maker level (UDM)
3. Informal external neutral methods - relatively low-cost but effective - requires good neutral participation
   - a. Architect/engineer of record rulings
   - b. Dispute resolution board rulings
   - c. Independent advisory opinion

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4. Formal external neutral methods - relatively low-cost system but may require greater preparation time than other less formal methods - requires good neutral participation

- a. Mediation
- b. Minitrial
- c. Advisory opinion
- d. Advisory arbitration

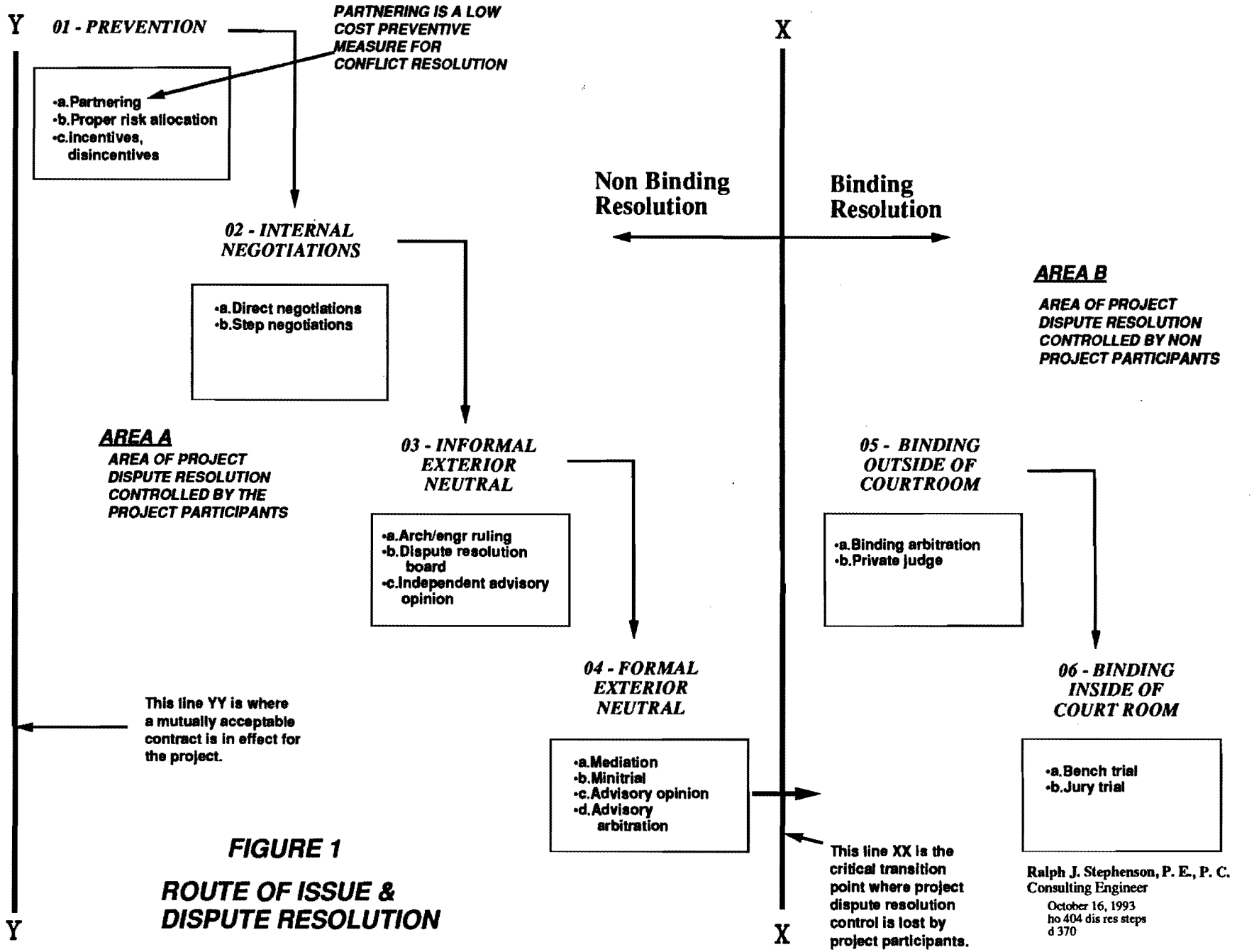

FIGURE 1

ROUTE OF ISSUE & DISPUTE RESOLUTION

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Consulting Engineer
October 16, 1993
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WE HAVE MET THE ENEMY AND HE IS US.

From Walt Kelly and Pogo

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2.60

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RECOMMENDATIONS TO IMPROVE OUR PROFESSIONAL AND BUSINESS PRACTICES

- Manage the job as if all team members are working toward the same project end objectives.

- Set a good example for other managers on your project.

- Exercise intelligent, consistent decision-making tempered with good judgment and empathy for others.

- Plan the project well, communicate the plan, & know yourself what your plan says.

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2.61

- Listen well.

- Avoid using emotional words in project discussions.

- Try to match your non-word world with your world of words.

- Submit properly prepared pay requests.

- Learn to close out your job quickly and cleanly.

- Properly manage the submittal system.

- Consider the regulatory agencies as

friends and important participants in your project.

- Educate and train your staff in partnering principles.

- Take the project mission and the partnering charter seriously and work hard to accomplish both.

- Set a good example to industry newcomers. They are the hope of today, and the you of tomorrow.

- Be available.

- Believe that others on the job want to do well -- it's contagious.

- Keep the job clean and the site well organized.

- Keep good people on the job by making them want to stay.

- Be honest and open with the project team about your plans and schedules.

- Determine early in the job what each party's profit motive is, and then help them achieve that specific profit.

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"If you don't care who gets the credit you can accomplish anything"

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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!

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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 <u>end</u> of one task to <u>start</u> of another.

<u>KEEP SYMBOLS SIMPLE !</u>

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 

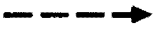
   b. Task - for precedence diagramming 

   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.

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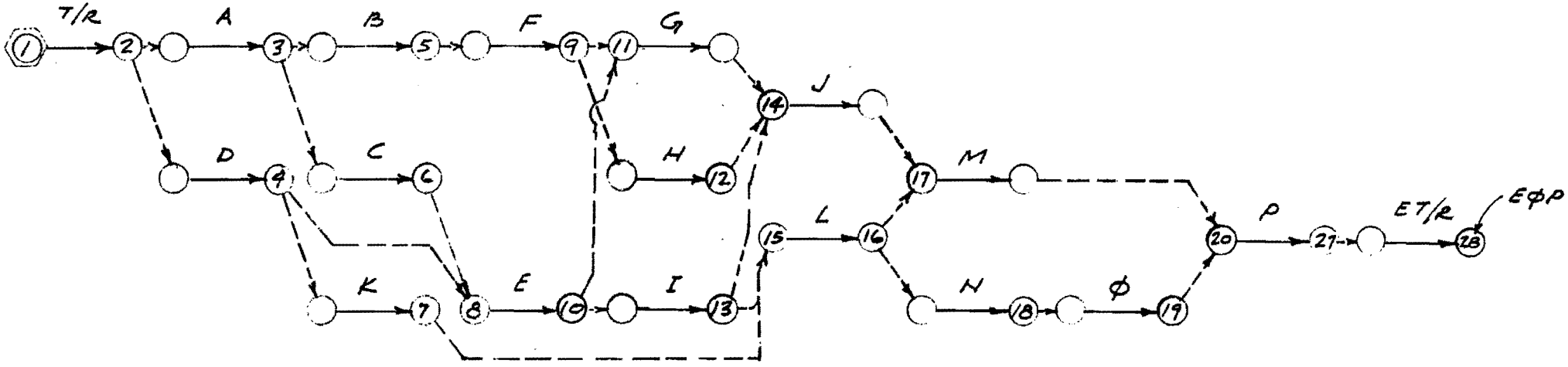
CPM Exercise #1

- 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 and D are complete
- F precedes G and H.
- G cannot begin until E is complete
- H, G, and I must precede J.
- I follows E and precedes L.
- K follows D.
- L cannot begin until K is complete.
- J and 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 and O are complete.

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

SOLUTION TO EXERCISE #1
ARROW DIAGRAM

Reserved Node Nos.



Reserved Node Nos.	
21	24
22	25
23	26

3/11

SOLUTION TO EXERCISE #1
ARROW DIAGRAM

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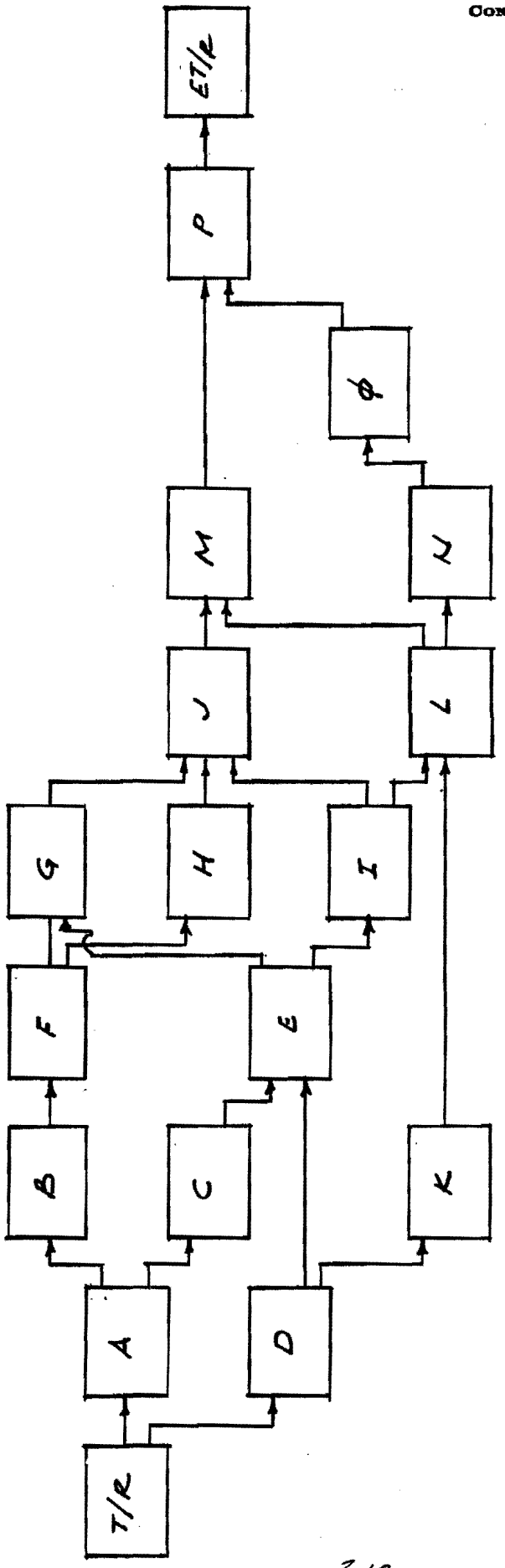

SOLUTION TO EXERCISE #1
PRECEDENCE DIAGRAM

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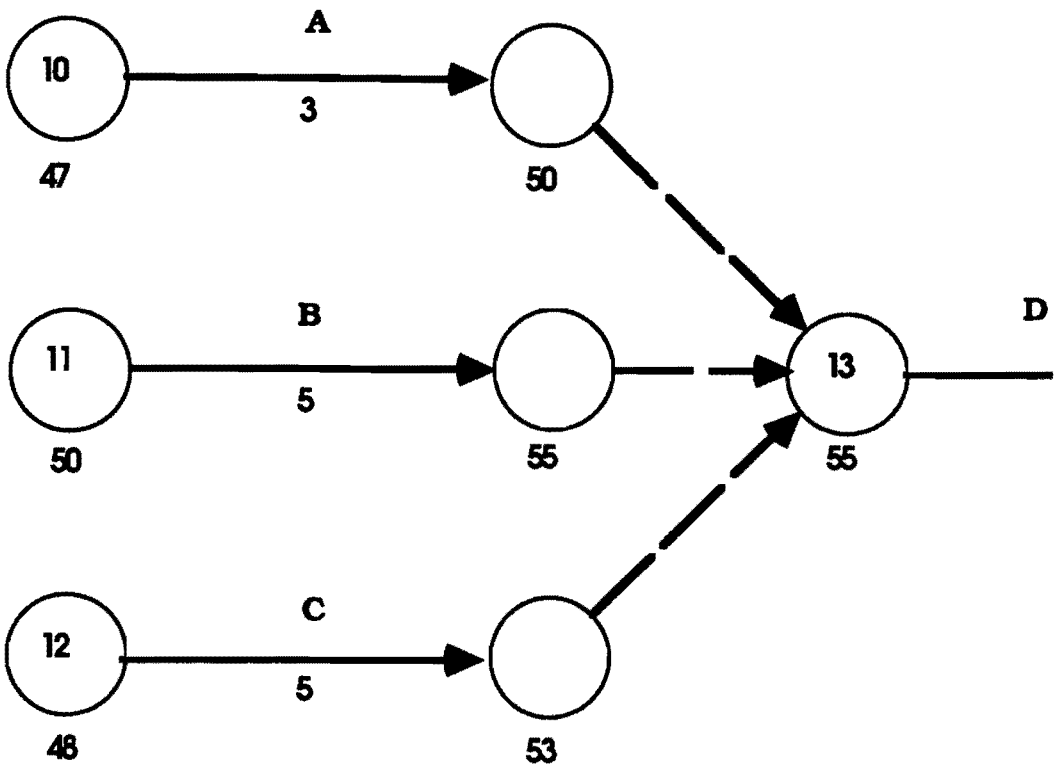
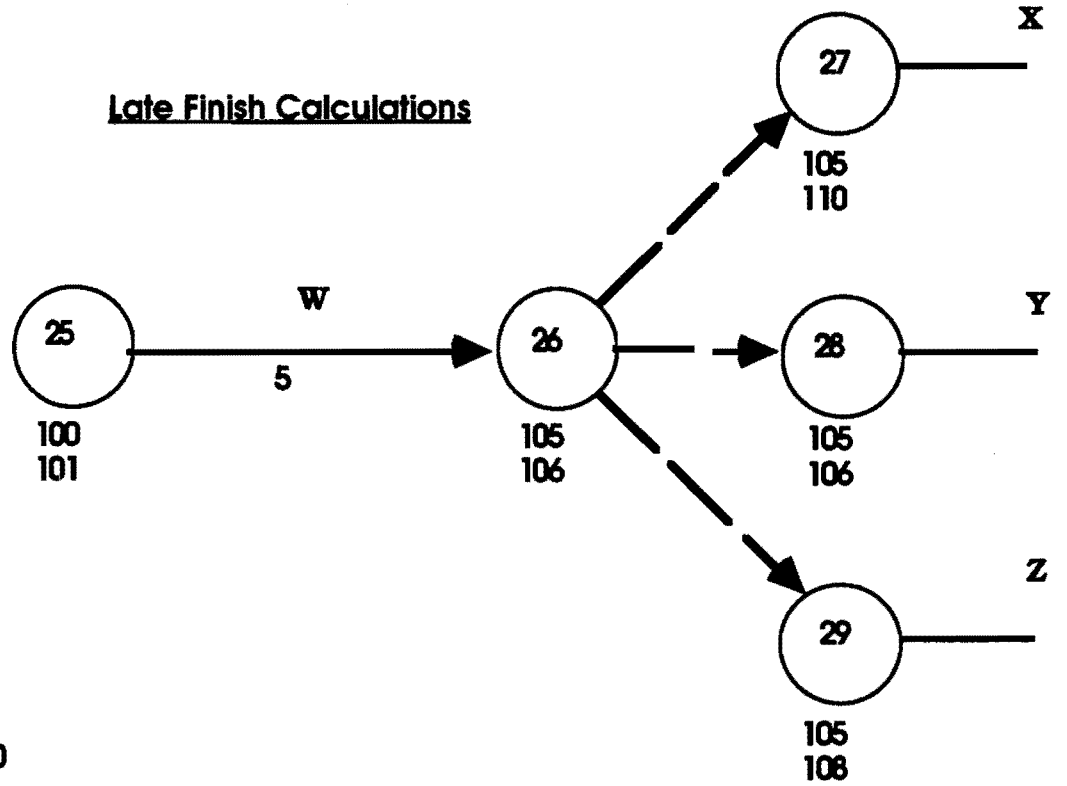
Consulting Engineer

Early Start Calculations



Late Finish Calculations



JAN	2000	3	45	5	90	11	135	13	180	15	225
3	1	6	46	8	91	12	136	14	181	16	226
4	2	7	47	9	92	13	137	15	182	17	227
5	3	8	48	10	93	14	138	18	183	20	228
6	4	9	49	11	94	17	139	19	184	21	229
7	5	10	50	12	95	18	140	20	185	22	230
10	6	13	51	15	96	19	141	21	186	24	231
11	7	14	52	16	97	20	142	22	187	27	232
12	8	15	53	17	98	21	143	25	188	28	233
13	9	16	54	18	99	24	144	26	189	29	234
14	10	17	55	19	100	25	145	27	190	30	235
17	11	20	56	22	101	26	146	28	191	DEC	2000
18	12	21	57	23	102	27	147	29	192	1	236
19	13	22	58	24	103	28	148	OCT	2000	4	237
20	14	23	59	25	104	31	149	2	193	5	238
21	15	24	60	26	105	AUG	2000	3	194	6	239
24	16	27	61	30	106	1	150	4	195	7	240
25	17	28	62	31	107	2	151	5	196	8	241
26	18	29	63	JUN	2000	3	152	6	197	11	242
27	19	30	64	1	108	4	153	9	198	12	243
28	20	31	65	2	109	7	154	10	199	13	244
31	21	APR	2000	5	110	8	155	11	200	14	245
FEB	2000	3	66	6	111	9	156	12	201	15	246
1	22	4	67	7	112	10	157	13	202	18	247
2	23	5	68	8	113	11	158	16	203	19	248
3	24	6	69	9	114	14	159	17	204	20	249
4	25	7	70	12	115	15	160	18	205	21	250
7	26	10	71	13	116	16	161	19	206	22	251
8	27	11	72	14	117	17	162	20	207	26	252
9	28	12	73	15	118	18	163	23	208	27	253
10	29	13	74	16	119	21	164	24	209	28	254
11	30	14	75	19	120	22	165	25	210	29	255
14	31	17	76	20	121	23	166	26	211		
15	32	18	77	21	122	24	167	27	212		
16	33	19	78	22	123	25	168	30	213		
17	34	20	79	23	124	28	169	31	214		
18	35	21	80	26	125	29	170	NOV	2000		
21	36	24	81	27	126	30	171	1	215		
22	37	25	82	28	127	31	172	2	216		
23	38	26	83	29	128	SEP	2000	3	217		
24	39	27	84	30	129	1	173	6	218		
25	40	28	85	JUL	2000	5	174	7	219		
28	41	MAY	2000	3	130	6	175	8	220		
29	42	1	86	5	131	7	176	9	221		
MAR	2000	2	87	6	132	8	177	10	222		
1	43	3	88	7	133	11	178	13	223		
2	44	4	89	10	134	12	179	14	224		

JAN	2001	5	300	7	345	11	390	13	435	15	480
2	256	6	301	8	346	12	391	14	436	16	481
3	257	7	302	9	347	13	392	17	437	19	482
4	258	8	303	10	348	16	393	18	438	20	483
5	259	9	304	11	349	17	394	19	439	21	484
8	260	12	305	14	350	18	395	20	440	23	485
9	261	13	306	15	351	19	396	21	441	26	486
10	262	14	307	16	352	20	397	24	442	27	487
11	263	15	308	17	353	23	398	25	443	28	488
12	264	16	309	18	354	24	399	26	444	29	489
15	265	19	310	21	355	25	400	27	445	30	490
16	266	20	311	22	356	26	401	28	446	DEC	2001
17	267	21	312	23	357	27	402	OCT	2001	3	491
18	268	22	313	24	358	30	403	1	447	4	492
19	269	23	314	25	359	31	404	2	448	5	493
22	270	26	315	29	360	AUG	2001	3	449	6	494
23	271	27	316	30	361	1	405	4	450	7	495
24	272	28	317	31	362	2	406	5	451	10	496
25	273	29	318	JUN	2001	3	407	8	452	11	497
26	274	30	319	1	363	6	408	9	453	12	498
29	275	APR	2001	4	364	7	409	10	454	13	499
30	276	2	320	5	365	8	410	11	455	14	500
31	277	3	321	6	366	9	411	12	456	17	501
FEB	2001	4	322	7	367	10	412	15	457	18	502
1	278	5	323	8	368	13	413	16	458	19	503
2	279	6	324	11	369	14	414	17	459	20	504
5	280	9	325	12	370	15	415	18	460	21	505
6	281	10	326	13	371	16	416	19	461	24	506
7	282	11	327	14	372	17	417	22	462	26	507
8	283	12	328	15	373	20	418	23	463	27	508
9	284	13	329	18	374	21	419	24	464	28	509
12	285	16	330	19	375	22	420	25	465	31	510
13	286	17	331	20	376	23	421	26	466		
14	287	18	332	21	377	24	422	29	467		
15	288	19	333	22	378	27	423	30	468		
16	289	20	334	25	379	28	424	31	469		
19	290	23	335	26	380	29	425	NOV	2001		
20	291	24	336	27	381	30	426	1	470		
21	292	25	337	28	382	31	427	2	471		
22	293	26	338	29	383	SEP	2001	5	472		
23	294	27	339	JUL	2001	4	428	6	473		
26	295	30	340	2	384	5	429	7	474		
27	296	MAY	2001	3	385	6	430	8	475		
28	297	1	341	5	386	7	431	9	476		
MAR	2001	2	342	6	387	10	432	12	477		
1	298	3	343	9	388	11	433	13	478		
2	299	4	344	10	389	12	434	14	479		

JAN	2002	5	555	7	600	11	645	13	690	15	735
2	511	6	556	8	601	12	646	16	691	18	736
3	512	7	557	9	602	15	647	17	692	19	737
4	513	8	558	10	603	16	648	18	693	20	738
7	514	11	559	13	604	17	649	19	694	21	739
8	515	12	560	14	605	18	650	20	695	22	740
9	516	13	561	15	606	19	651	23	696	25	741
10	517	14	562	16	607	22	652	24	697	26	742
11	518	15	563	17	608	23	653	25	698	27	743
14	519	18	564	20	609	24	654	26	699	29	744
15	520	19	565	21	610	25	655	27	700	DEC	2002
16	521	20	566	22	611	26	656	30	701	2	745
17	522	21	567	23	612	29	657	OCT	2002	3	746
18	523	22	568	24	613	30	658	1	702	4	747
21	524	25	569	28	614	31	659	2	703	5	748
22	525	26	570	29	615	AUG	2002	3	704	6	749
23	526	27	571	30	616	1	660	4	705	9	750
24	527	28	572	31	617	2	661	7	706	10	751
25	528	29	573	JUN	2002	5	662	8	707	11	752
28	529	APR	2002	3	618	6	663	9	708	12	753
29	530	1	574	4	619	7	664	10	709	13	754
30	531	2	575	5	620	8	665	11	710	16	755
31	532	3	576	6	621	9	666	14	711	17	756
FEB	2002	4	577	7	622	12	667	15	712	18	757
1	533	5	578	10	623	13	668	16	713	19	758
4	534	8	579	11	624	14	669	17	714	20	759
5	535	9	580	12	625	15	670	18	715	23	760
6	536	10	581	13	626	16	671	21	716	24	761
7	537	11	582	14	627	19	672	22	717	26	762
8	538	12	583	17	628	20	673	23	718	27	763
11	539	15	584	18	629	21	674	24	719	30	764
12	540	16	585	19	630	22	675	25	720	31	765
13	541	17	586	20	631	23	676	28	721		
14	542	18	587	21	632	26	677	29	722		
15	543	19	588	24	633	27	678	30	723		
18	544	22	589	25	634	28	679	31	724		
19	545	23	590	26	635	29	680	NOV	2002		
20	546	24	591	27	636	30	681	1	725		
21	547	25	592	28	637	SEP	2002	4	726		
22	548	26	593	JUL	2002	3	682	5	727		
25	549	29	594	1	638	4	683	6	728		
26	550	30	595	2	639	5	684	7	729		
27	551	MAY	2002	3	640	6	685	8	730		
28	552	1	596	5	641	9	686	11	731		
MAR	2002	2	597	8	642	10	687	12	732		
1	553	3	598	9	643	11	688	13	733		
4	554	6	599	10	644	12	689	14	734		

JAN	2003	5	810	7	855	11	900	15	945	17	990
2	766	6	811	8	856	14	901	16	946	18	991
3	767	7	812	9	857	15	902	17	947	19	992
6	768	10	813	12	858	16	903	18	948	20	993
7	769	11	814	13	859	17	904	19	949	21	994
8	770	12	815	14	860	18	905	22	950	24	995
9	771	13	816	15	861	21	906	23	951	25	996
10	772	14	817	16	862	22	907	24	952	26	997
13	773	17	818	19	863	23	908	25	953	28	998
14	774	18	819	20	864	24	909	26	954	DEC	2003
15	775	19	820	21	865	25	910	29	955	1	999
16	776	20	821	22	866	28	911	30	956	2	1000
17	777	21	822	23	867	29	912	OCT	2003	3	1001
20	778	24	823	27	868	30	913	1	957	4	1002
21	779	25	824	28	869	31	914	2	958	5	1003
22	780	26	825	29	870	AUG	2003	3	959	8	1004
23	781	27	826	30	871	1	915	6	960	9	1005
24	782	28	827	JUN	2003	4	916	7	961	10	1006
27	783	31	828	2	872	5	917	8	962	11	1007
28	784	APR	2003	3	873	6	918	9	963	12	1008
29	785	1	829	4	874	7	919	10	964	15	1009
30	786	2	830	5	875	8	920	13	965	16	1010
31	787	3	831	6	876	11	921	14	966	17	1011
FEB	2003	4	832	9	877	12	922	15	967	18	1012
3	788	7	833	10	878	13	923	16	968	19	1013
4	789	8	834	11	879	14	924	17	969	22	1014
5	790	9	835	12	880	15	925	20	970	23	1015
6	791	10	836	13	881	18	926	21	971	24	1016
7	792	11	837	16	882	19	927	22	972	26	1017
10	793	14	838	17	883	20	928	23	973	29	1018
11	794	15	839	18	884	21	929	24	974	30	1019
12	795	16	840	19	885	22	930	27	975	31	1020
13	796	17	841	20	886	25	931	28	976		
14	797	18	842	23	887	26	932	29	977		
17	798	21	843	24	888	27	933	30	978		
18	799	22	844	25	889	28	934	31	979		
19	800	23	845	26	890	29	935	NOV	2003		
20	801	24	846	27	891	SEP	2003	3	980		
21	802	25	847	30	892	2	936	4	981		
24	803	28	848	JUL	2003	3	937	5	982		
25	804	29	849	1	893	4	938	6	983		
26	805	30	850	2	894	5	939	7	984		
27	806	MAY	2003	3	895	8	940	10	985		
28	807	1	851	7	896	9	941	11	986		
MAR	2003	2	852	8	897	10	942	12	987		
3	808	5	853	9	898	11	943	13	988		
4	809	6	854	10	899	12	944	14	989		

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RALPH J. STEPHENSON, P.E.
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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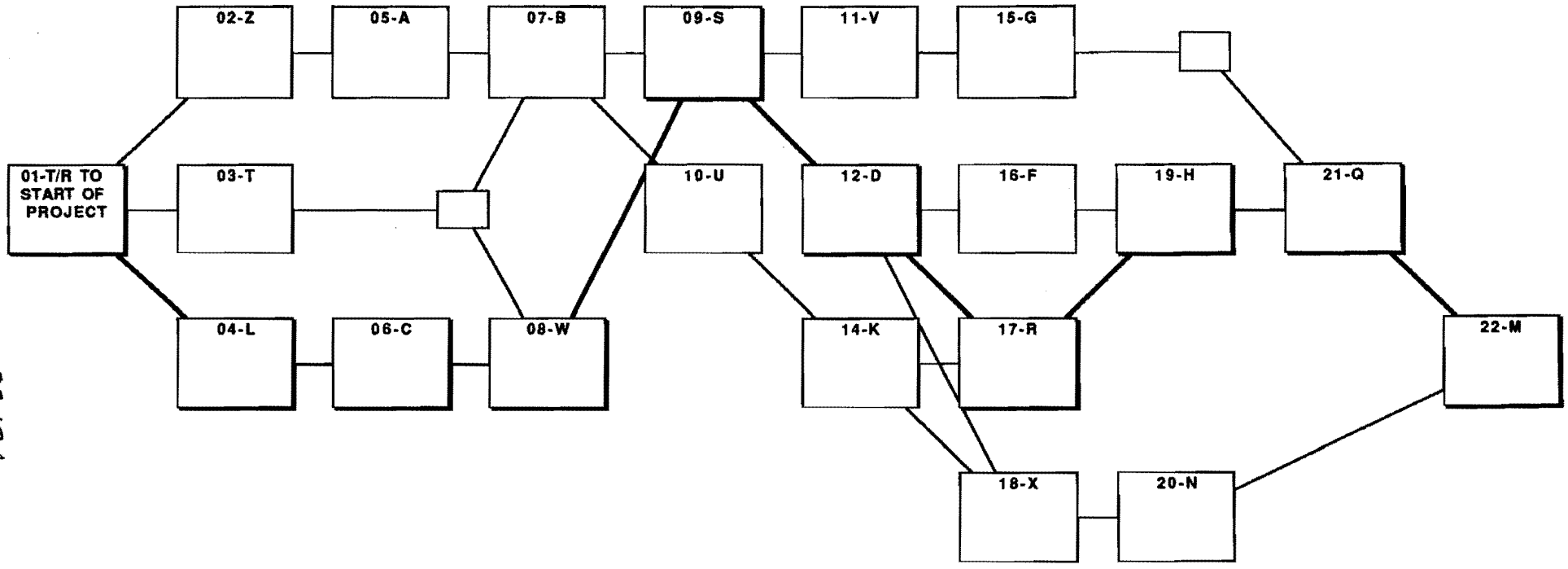
EXERCISE #3

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.



05.19A

Reserved activity numbers

41	46
42	47
43	48
44	49
45	50

lan 01
han 22

ACTIVITY LEGEND

Issue #1 - January 13, 1998

exercise #2

NETWORK MODEL FOR EXERCISE #2

WEX PM 99 Project Team

Ralph J. Stephenson P.E.
Consulting Engineer
323 Hiawatha Drive
Mt. Pleasant, Michigan 48223-9096

Note:
Float time shown in this network model is for the sole use of the WEX PM 99 project team. Use of float time by others is to be only by written permission of the WEX PM 99 team management.

ho #527

RALPH J. STEPHENSON, P.E.
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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

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

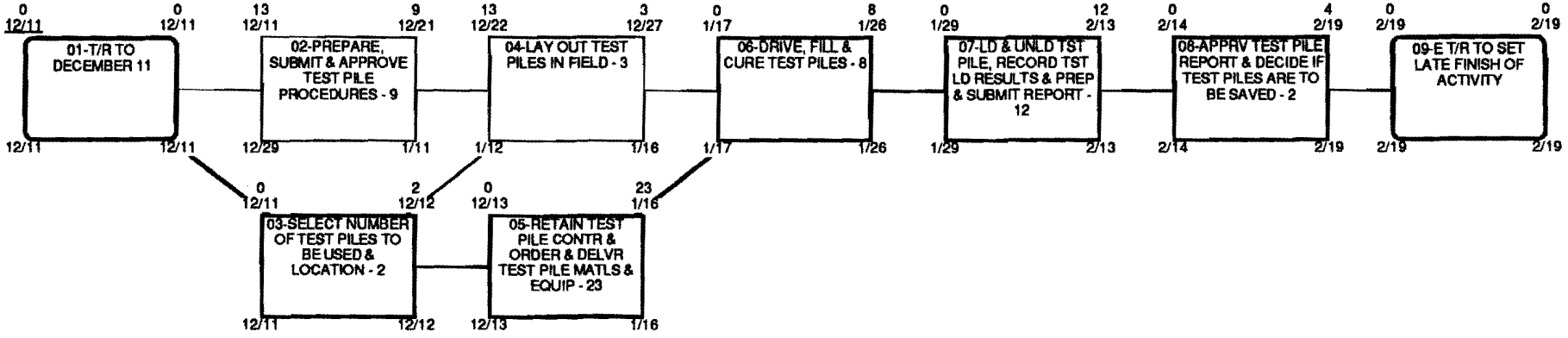
- 002 - Select test pile locations
- 010 - Record test load results
- 008 - Load piling
- 005 - Order testing equipment
- 011 - Decide whether test piles remain as permanent piles
- 001 - Select number of test piles
- 006 - Deliver test pile materials
- 004 - Retain test pile contractor
- 001 - Prepare 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

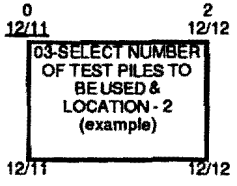
001 - Prepare test procedures
001 - Select number of test piles
002 - Select test pile locations
003 - Approve test procedures
004 - Lay out test piles in field
004 - Retain test pile contractor
005 - Order test pile materials
005 - Order testing equipment
006 - Deliver test pile materials
006 - Deliver 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



E-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

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

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

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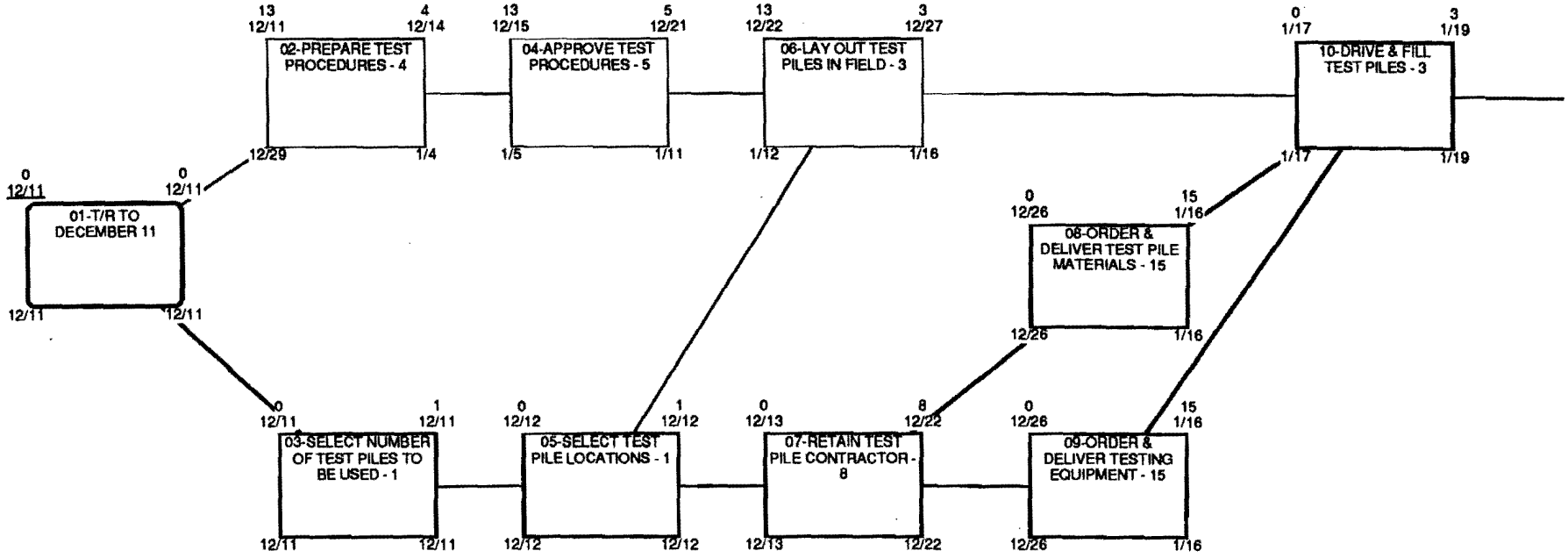
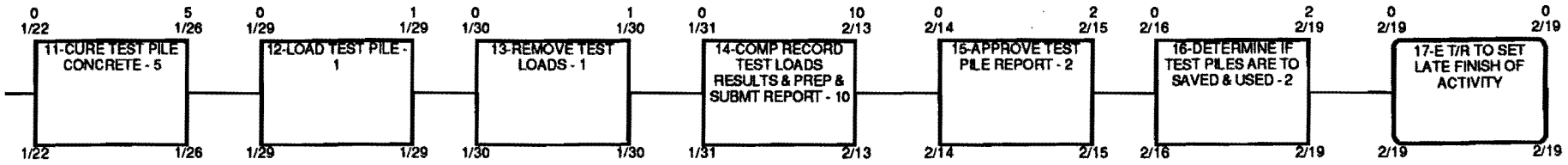
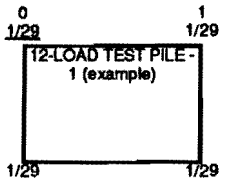
SHEET SM-1


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



3.25

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 DISTRIBUTION 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?

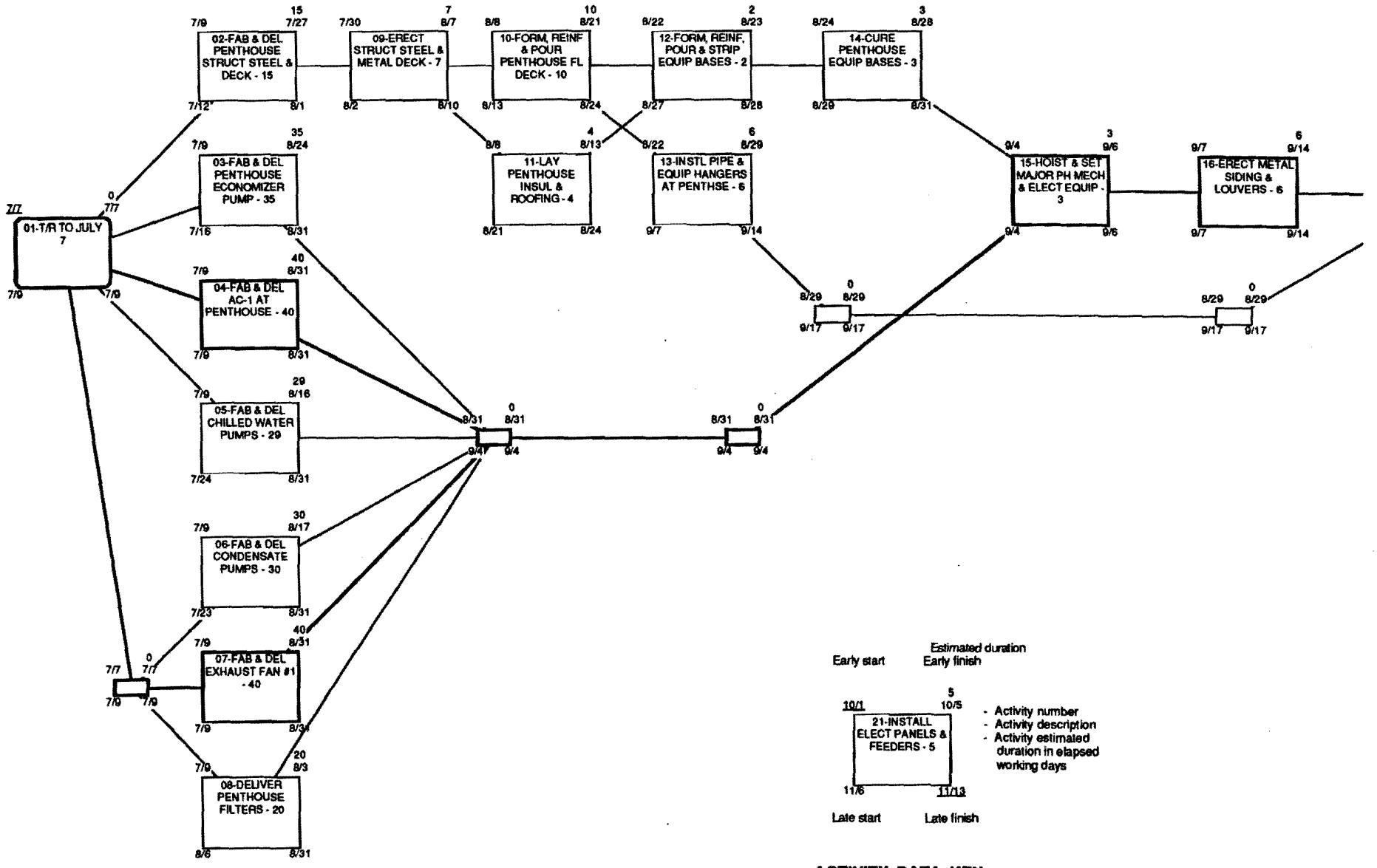
__8. Presence of abbreviations,task #'s,issue #'s,sheet #'s,codes & dates
Is there enough supplementary information on the logic plan so you can read it without having someone explain it to you?

__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?

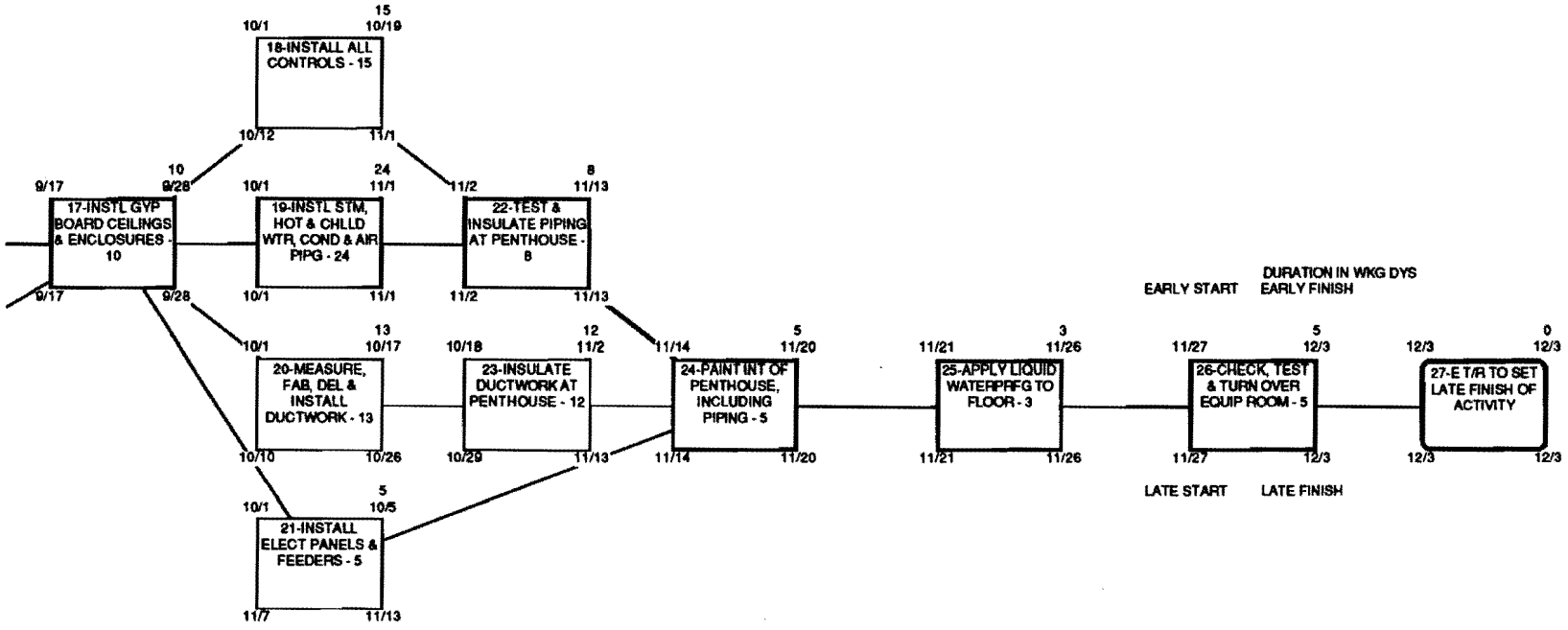
_____ Total

*****

_____ Average (total divided by 9)



ACTIVITY DATA KEY



32.29

Base Plan of Action

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

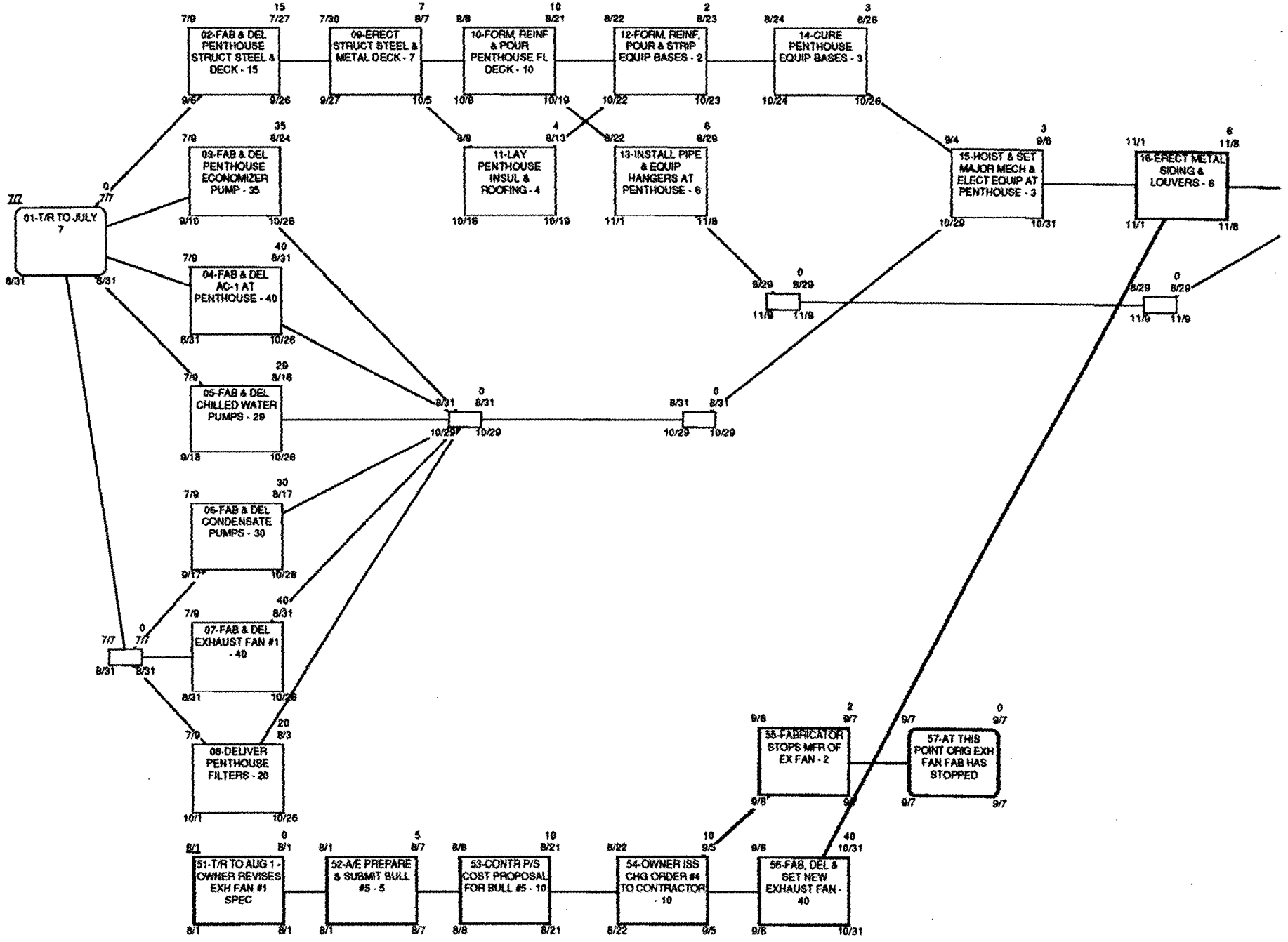
Luther Mechanical Contractors
Washington D.C.

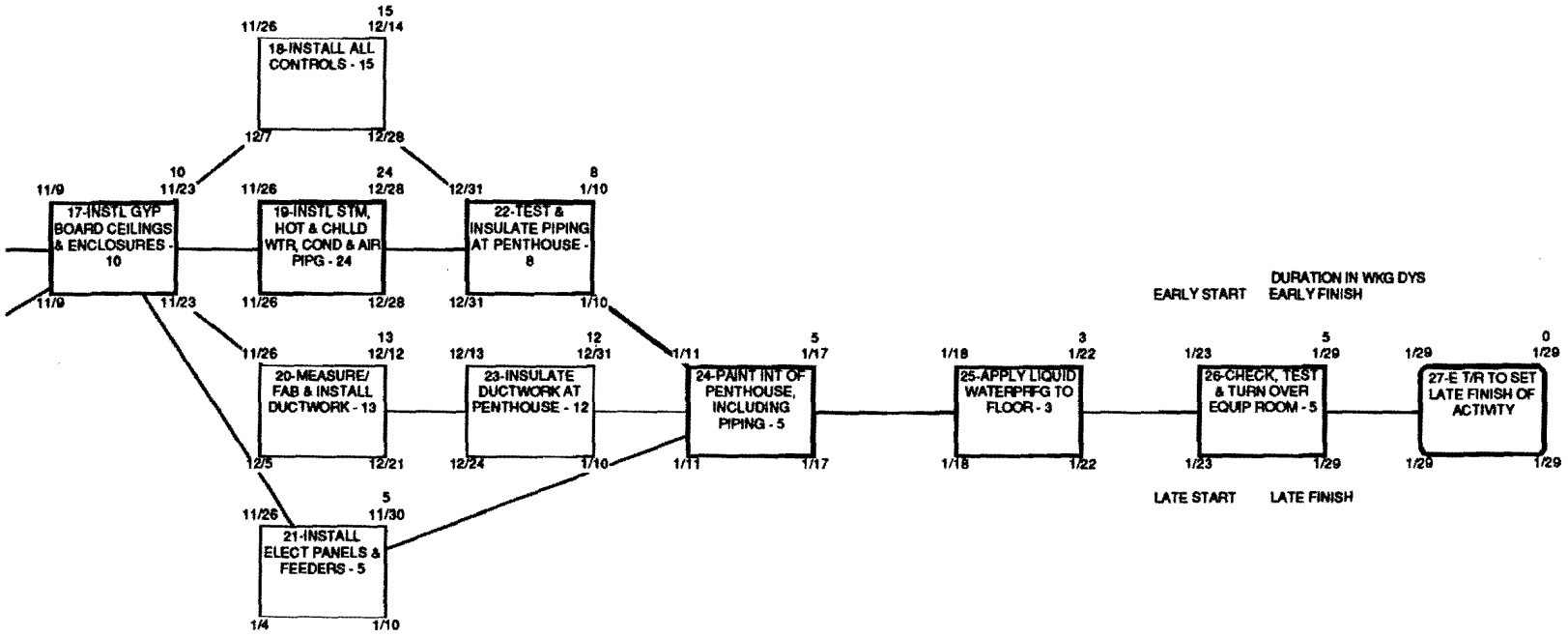
Issue #1 - July 7
330 clarion base plan
disk 162

Reserved Activity Numbers

041	046
042	047
043	048
044	049
045	050

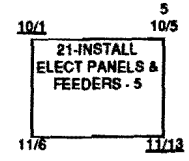
sheet
ph-1


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



3.3 /

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 9
Issue #2 - August 1
333 clarion chg order
disk 182

Reserved Activity Numbers

041	046
042	047
043	048
044	049
045	050

Change order impact on base plan of action

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)

H/O 186 4/80

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

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F	For
FAB	Fabricate
FD	Fabricate, deliver
FDN	Foundation
FFG	Fill, fine grade
FINL	Final
FL	Floor
FLL	Fill
FLSHG	Flashing
FM	Form
FMG	Forming
FN	Finish
FOG	Floor on grade
FP	Fire protection
FRM	Frame
FRP	Form, reinforce, pour
FRPS	Form, reinforce, pour, strip
FTG	Footing
FX	Fixture
GLAZG	Glazing
GRD	Grade
GRDR	Girder
GRDG	Grading
GRLL	Grill
GRATG	Grating
GUT	Gutter
HD	Head
HDWE	Hardware
HM	Hollow metal
HTR	Heater
HU	Hookup
I	Iron
I/C	In ceiling
IFW	In floor work
INCLDG	Including
INSTL	Install
INSTLG	Installing
INSUL	Insulation or Insulate
INT	Interior
ITMS	Items
JC	Janitor closet
LAYG	Laying
LF	Late finish
LN	Line
LS	Late start
LT	Light
LTH	Lath
LVL	Level
MACH	Machinery
MECH	Mechanical
MEMBRN	Membrane
MEZZ	Mezzanine
MH	Manhole
MLLWK	Millwork
MISC	Miscellaneous
MK	Make
MSNRY	Masonry
MTL	Metal
MTR	Motor
N	North
NLR	Nailer
NT	Not
OFD	Order, fabricate, deliver
OH	Overhead
OPNG	Opening
PARTN	Partition
PC	Precast
PERIM	Perimeter
PH	Penthouse
PHS	Phase
PILG	Piling
PIPG	Piping
PKG	Parking
PL	Plate
PLCP	Pile cap
PLG	Plug
PLSTC	Plastic
PLSTR	Plaster
PLTFM	Platform
PLUMBG	Plumbing
PNL	Panel
PNT	Paint
PNTG	Painting

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CONSULTING ENGINEER

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

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

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

Ralph J. Stephenson PE PC
Consulting Engineer

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 project adding a 2nd floor to the Bengst Corporation office in Tarry, Montana. The addition has been closed in and base building work is complete ready for tenant fit up.

The moves needed to complete Bengst tenant fit up involve shifting from 1st floor occupancy to a combined 1st and 2nd floor use.

Moves will require the following times

• Moving A and B to new 2nd floor space	5 working days - concurrent
• Moving E to new 2nd floor space	5 working days
• Moving C into new area	2 working days
• Moving D into new area	4 working days
• Expanding F into new SW area	2 working days
• Expanding F into new NE area	2 working days

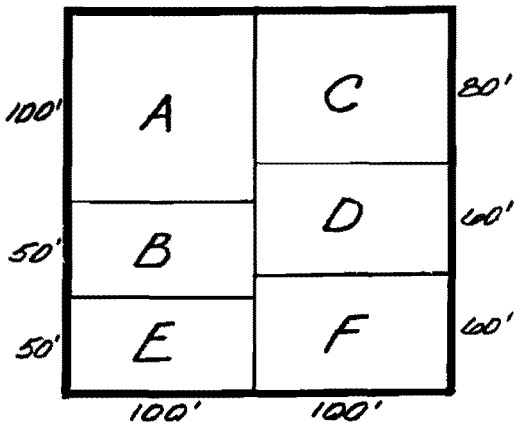
Remodeling will require the following times:

• Remodeling former A & B to new C	20 working days
• Remodeling former C to new D	15 working days
• Remodeling former E to new southwest F	10 working days
• Remodeling former D to new northeast F	12 working days

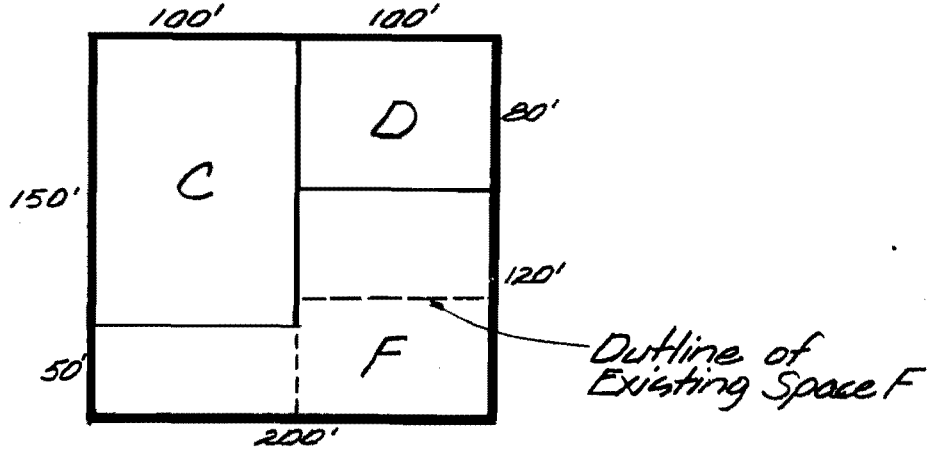
Note: The F space is to be remodeled in two phases while being occupied by staff.

To do

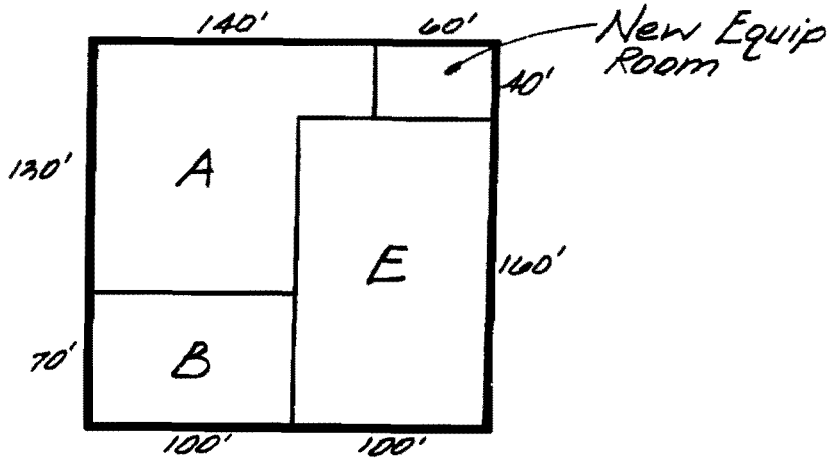
1. Prepare a network logic model for the move and remodeling sequence.
2. Quantify and calculate the logic model.
3. Analyze the move sequence and identify when you want to move E and remodel F.



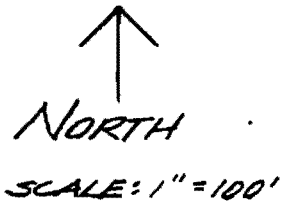
EXISTING 1ST FL



NEW 1ST FL



NEW 2ND FL

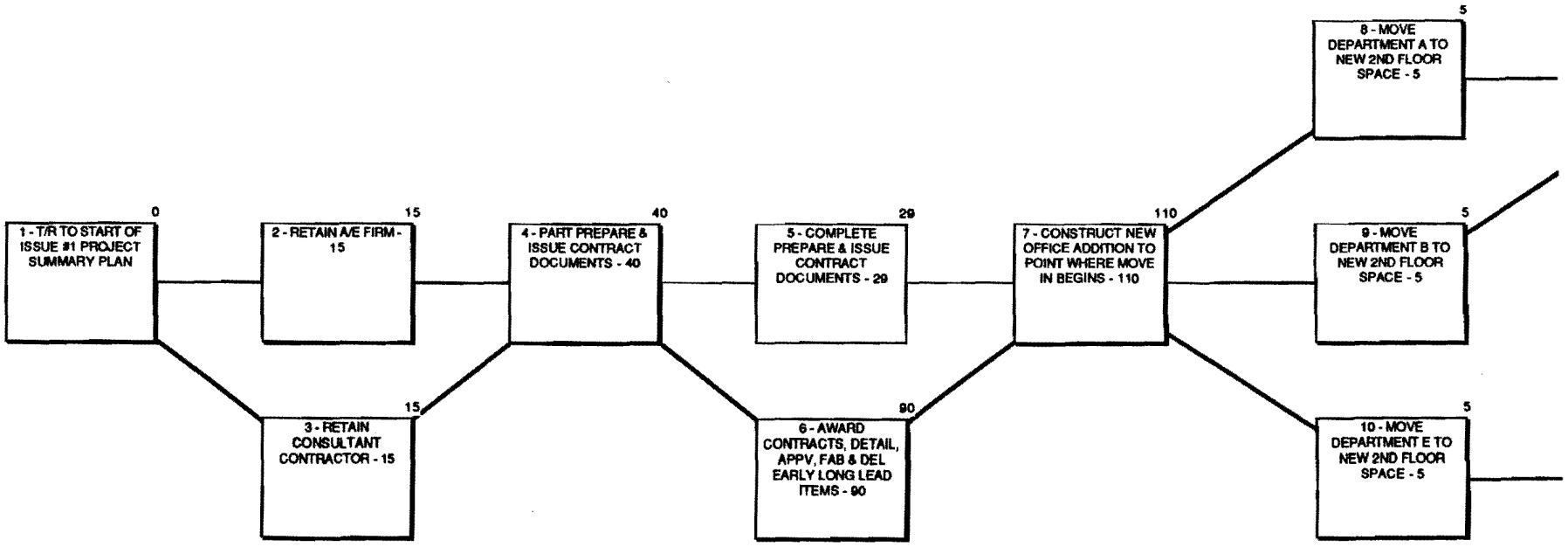


SUMMARY MOVE PLAN

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

3.38

HO 209



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 smry plan - disk

SUMMARY NETWORK MODEL - BENGST CORPORATION EXPANSION PLAN TARRY, MONTANA

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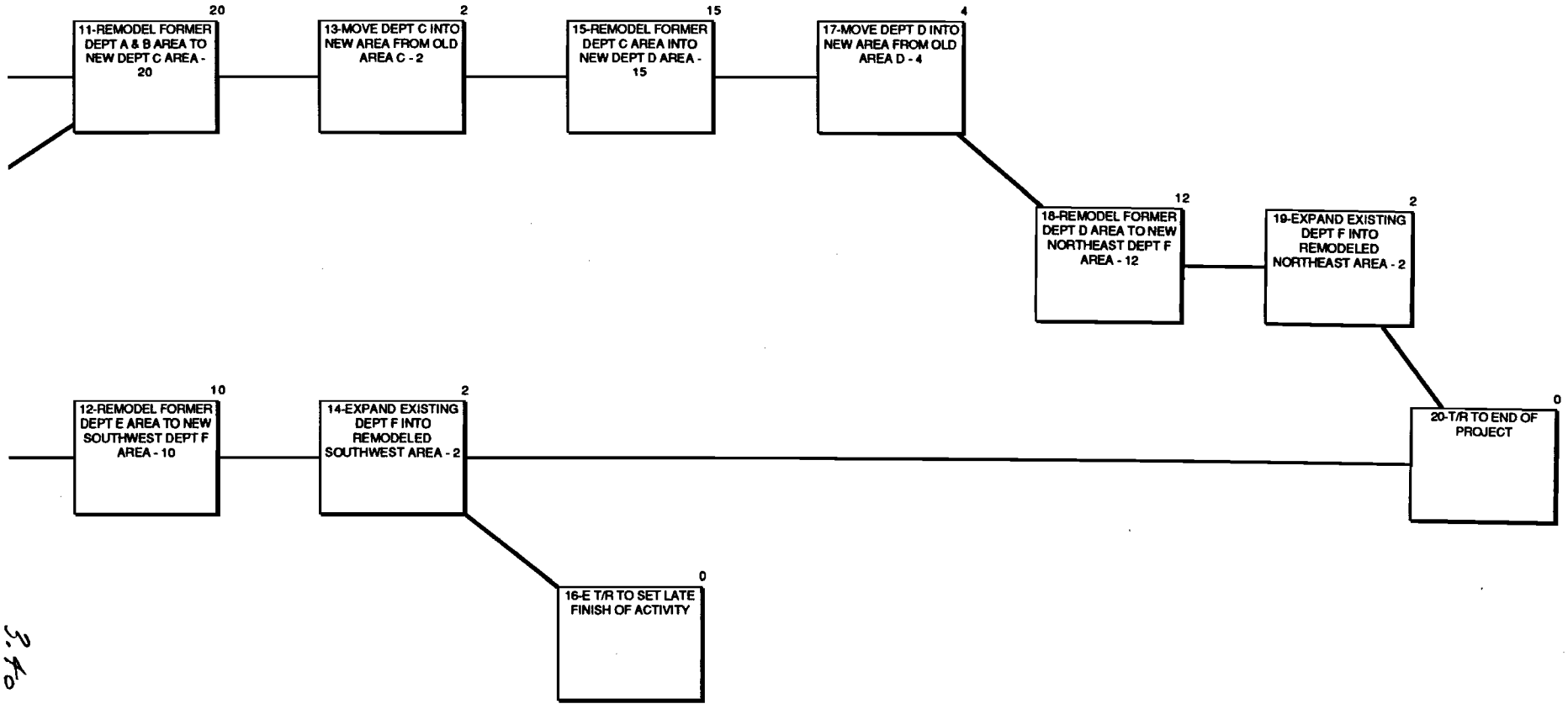
Consulting Engineer
323 Hiawatha Drive
Mt. Pleasant, Michigan 48858
ph 517 772 2537

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

3.40

	CATEGORY	ACTION ITEM	RESP
1	AE	-ARCHITECT/ENGINEER	
2	CM	-C0NSTRUCTION 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
Electrical

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

Ralph J. Stephenson, P. E.
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
04.07 & 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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TRANSLATE

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

SCHEDULE

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

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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.

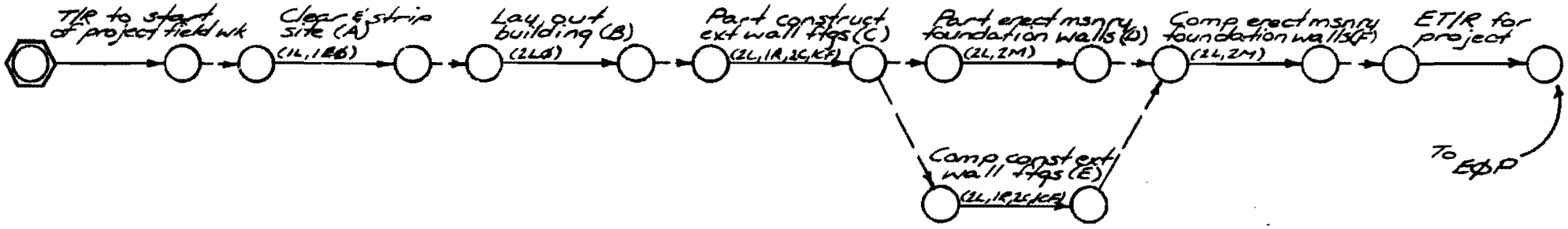
5. Balance tradesmen use on the job, particularly laborers, to maintain as constant level as possible.

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?

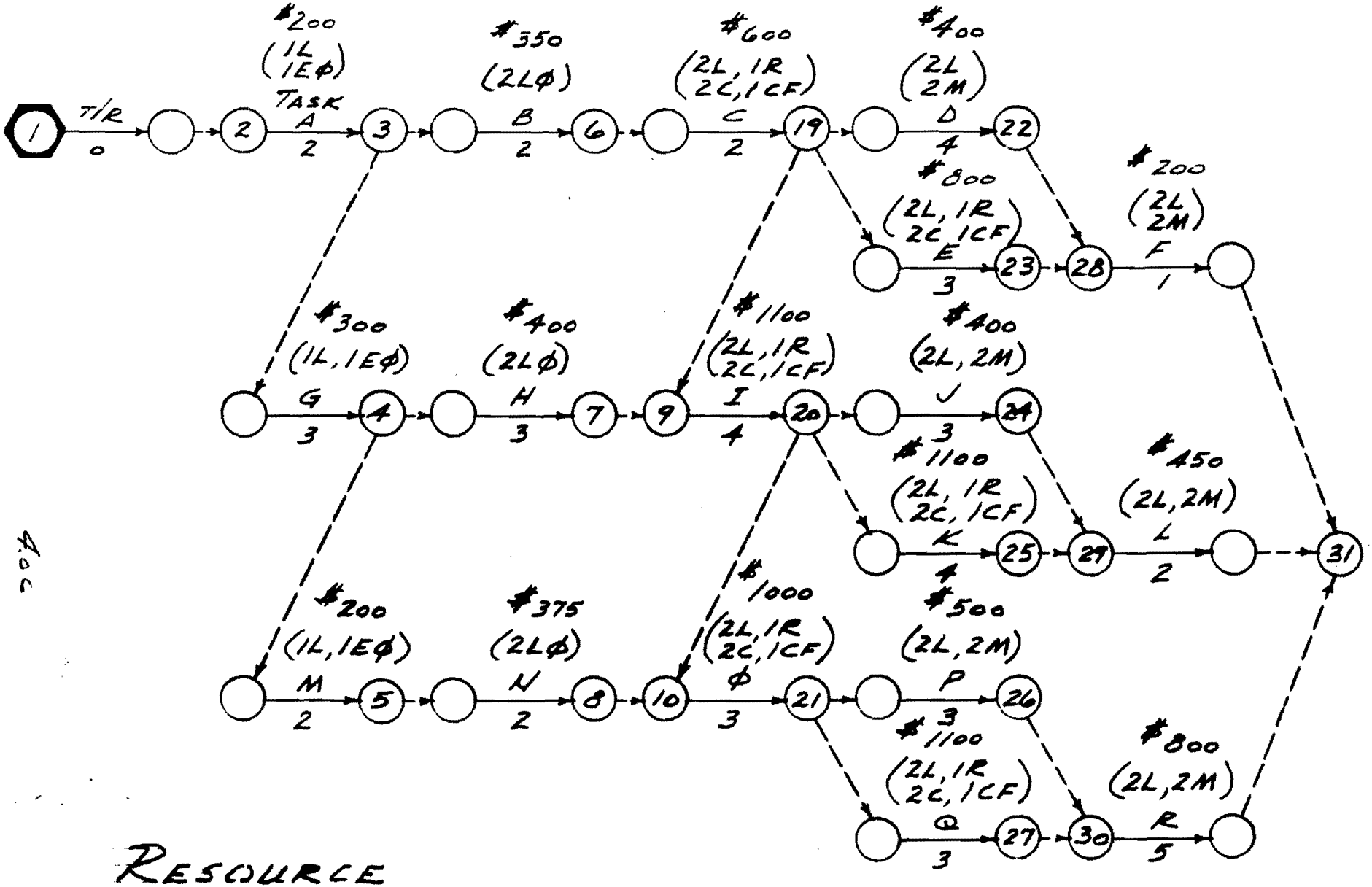


RESOURCE CODE

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

RESOURCE ALLOCATION

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER



RESOURCE ALLOCATION

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MAY 29, 1968

RESERVED NODE NOS.

11	15
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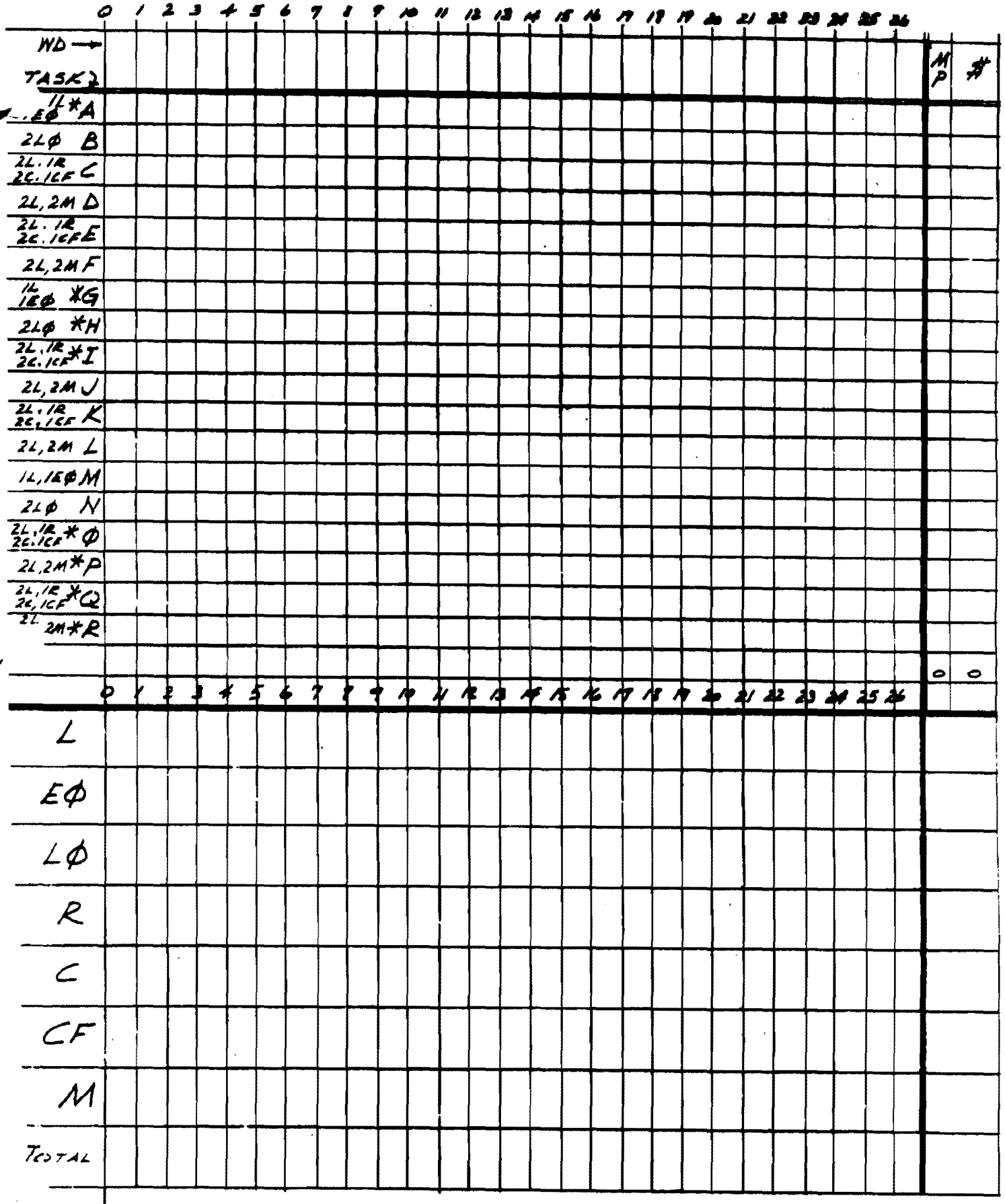
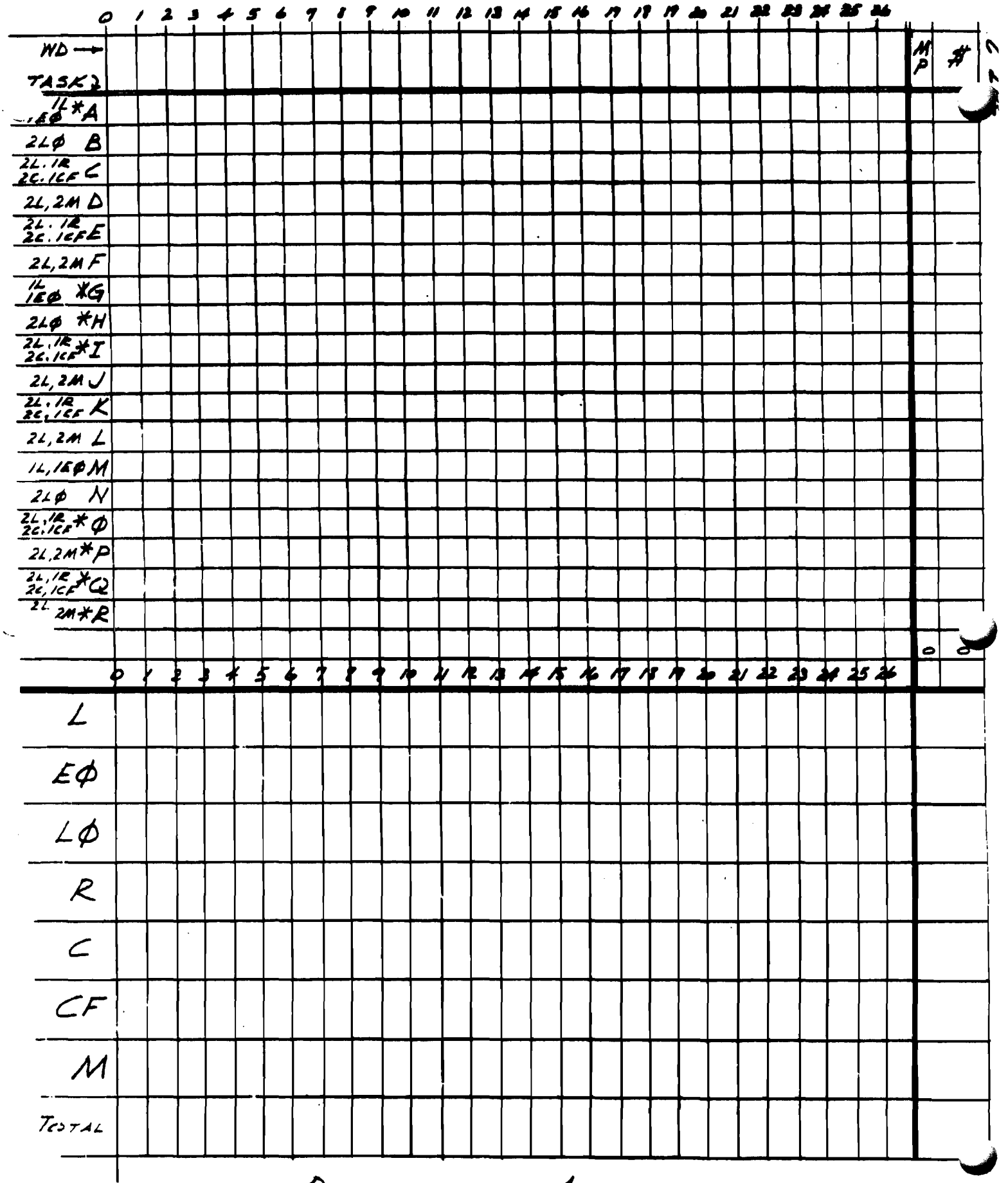
13	17
14	18



RESOURCE ALLOCATION

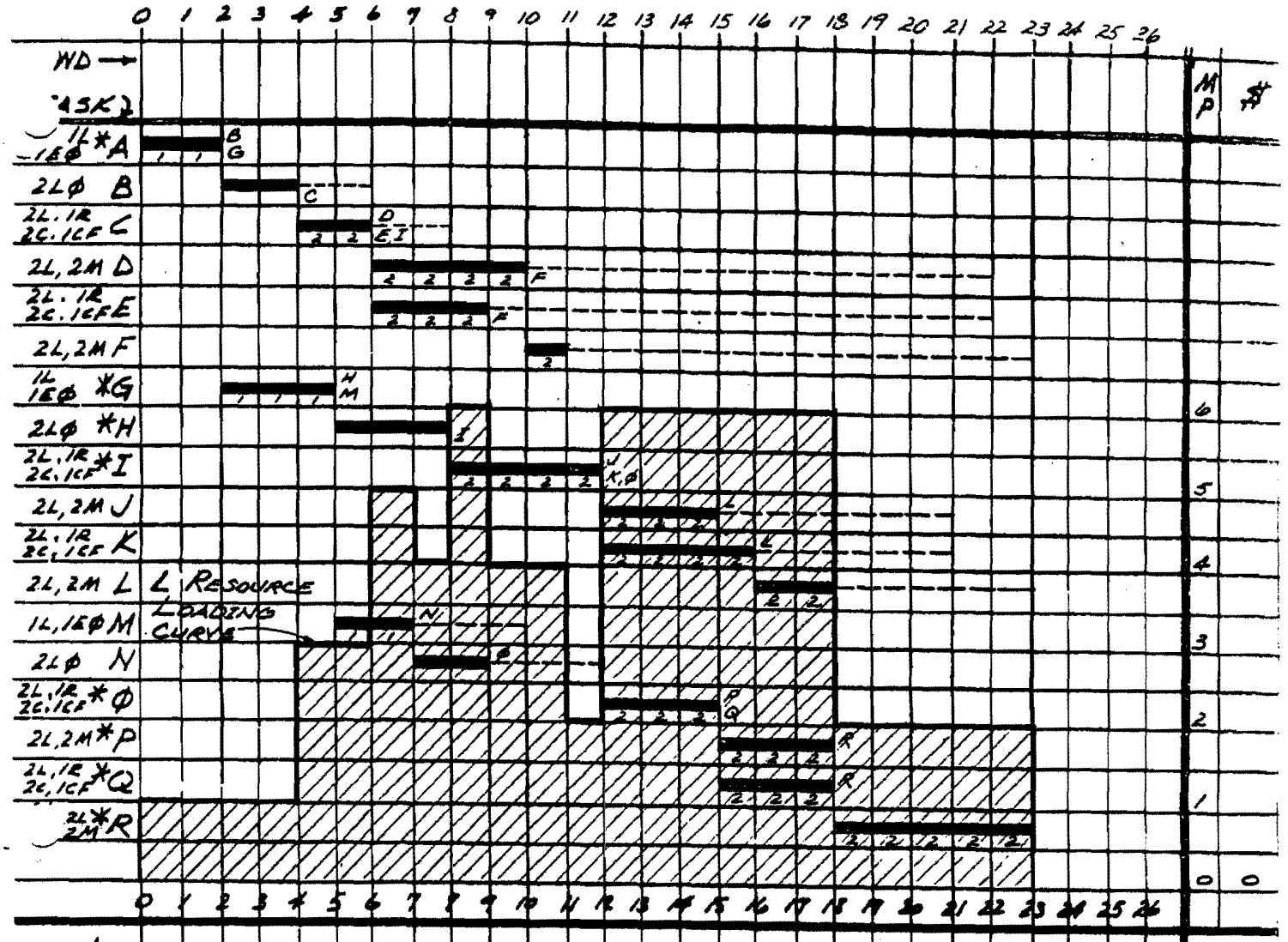
MAY 29, 1968 4.07 RALPH J. STEPHENSON, P.E.



RESOURCE ALLOCATION

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

ES/EF SCHEDULE



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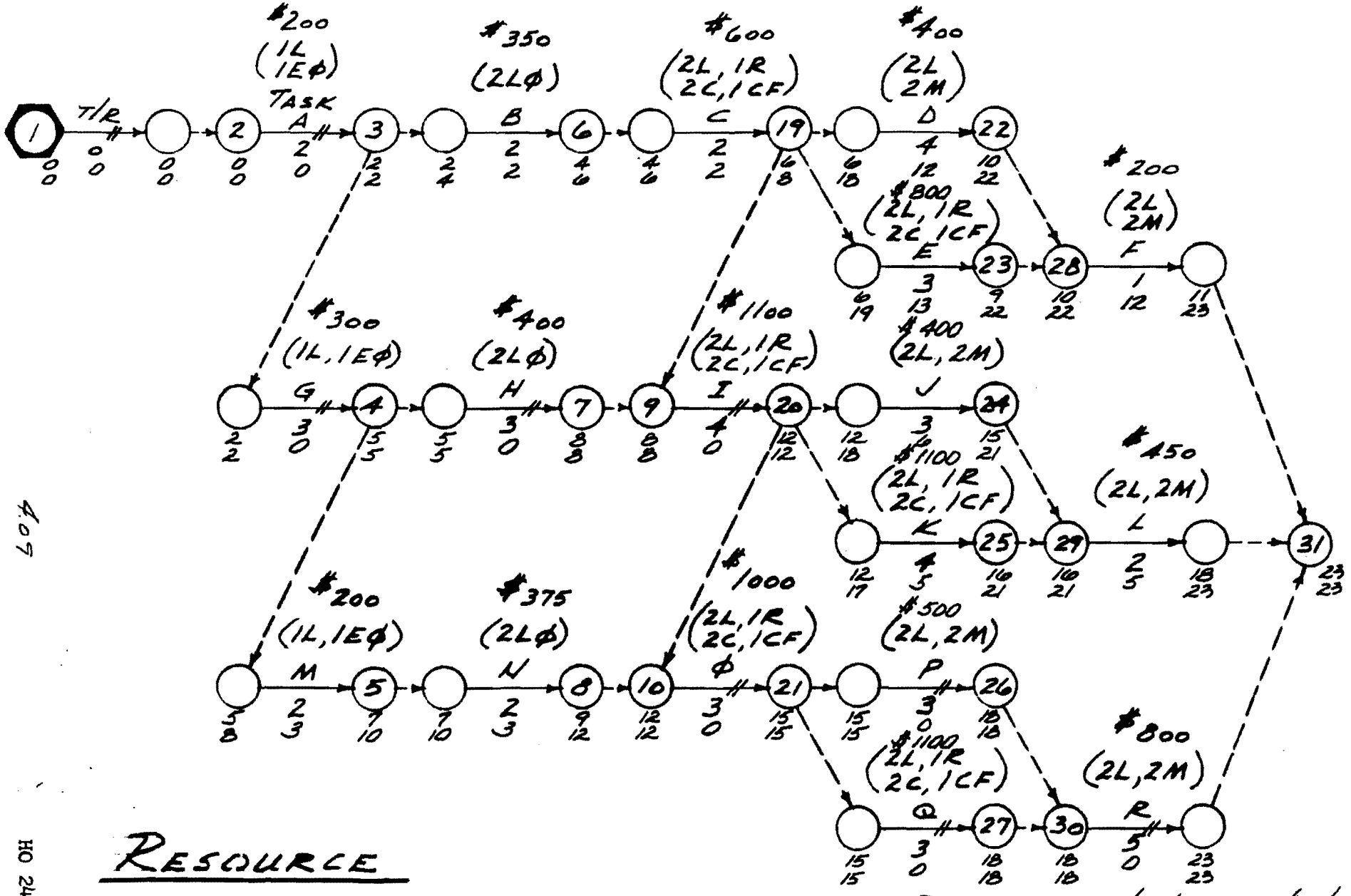
L	1	1	1	1	3	3	5	4	6	4	4	2	6	6	6	6	6	6	2	2	2	2	2					81
EΦ	1	1	1	1	1	1	1																					7
LΦ			2	2		2	2	4	2																			14
R					1	1	1	1	2	1	1	1	2	2	2	2	1	1										19
C					2	2	2	2	4	2	2	2	4	4	4	4	2	2										38
CF					1	1	1	1	2	1	1	1	2	2	2	2	1	1										19
M							2	2	2	2	2		2	2	2	2	4	4	2	2	2	2	2					36
TOTAL	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, PE



RESOURCE ALLOCATION

RESERVED NODE NOS.

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12	16
13	17
14	18

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MAY 29, 1968

407

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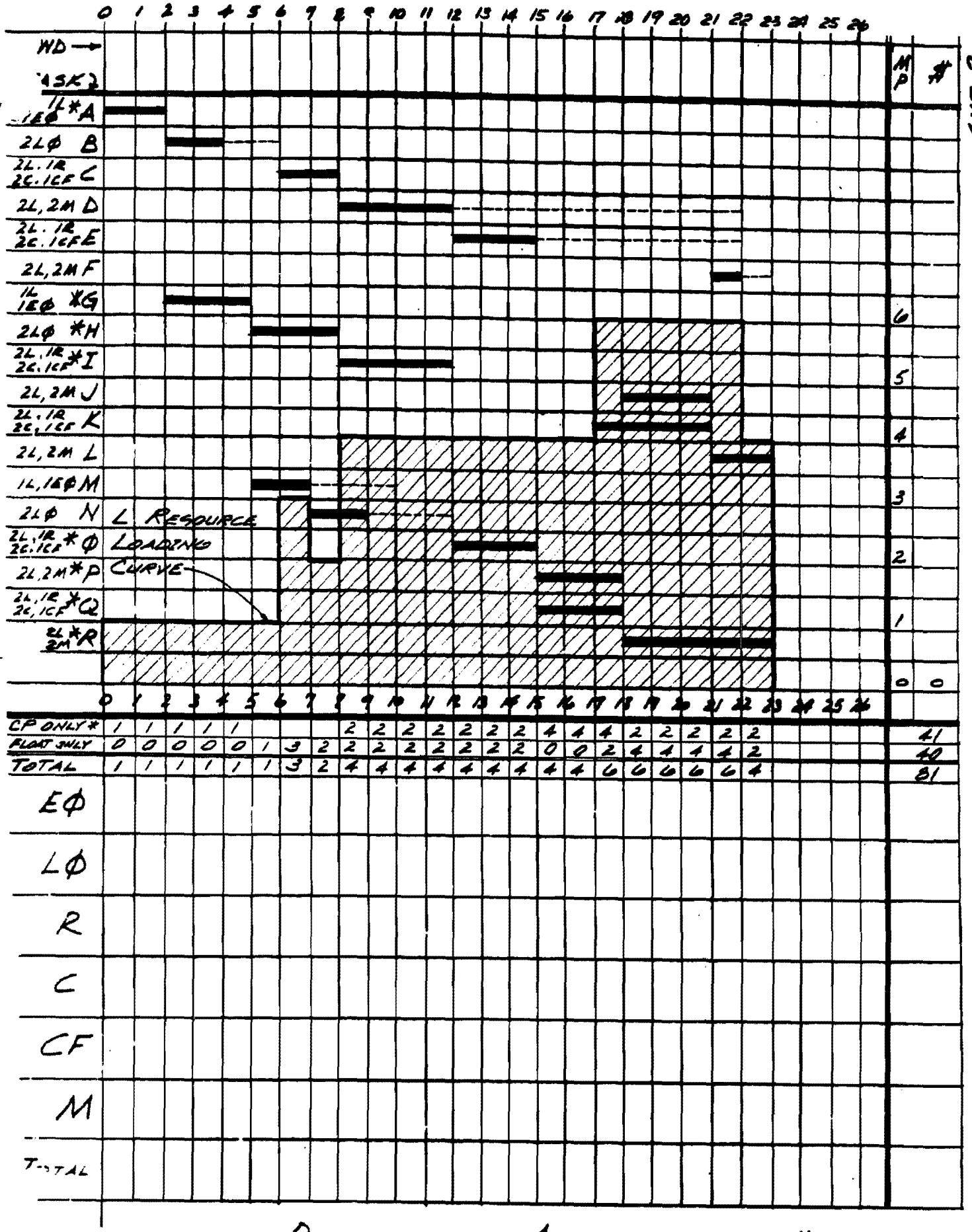
LEVELED SCHEDULE



RESOURCE ALLOCATION #2

HO 246

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

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Consulting Engineer

Profit Potential Levels

In construction the concept of profit is complex and often misunderstood. There are many kinds of profit - financial, socioeconomic, 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 arranging these elements in an affective action sequence and the profit achieved by making effective use of discretionary of float time. These are identified as levels A, B, 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 in 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, stimulate 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, equipment, etc.) will largely determine how profitable the level C management work has been.

In a nutshell, 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 level C profit potential is achieved when the project is managed well by proper scheduling within allowable resource limits.

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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.

* * *

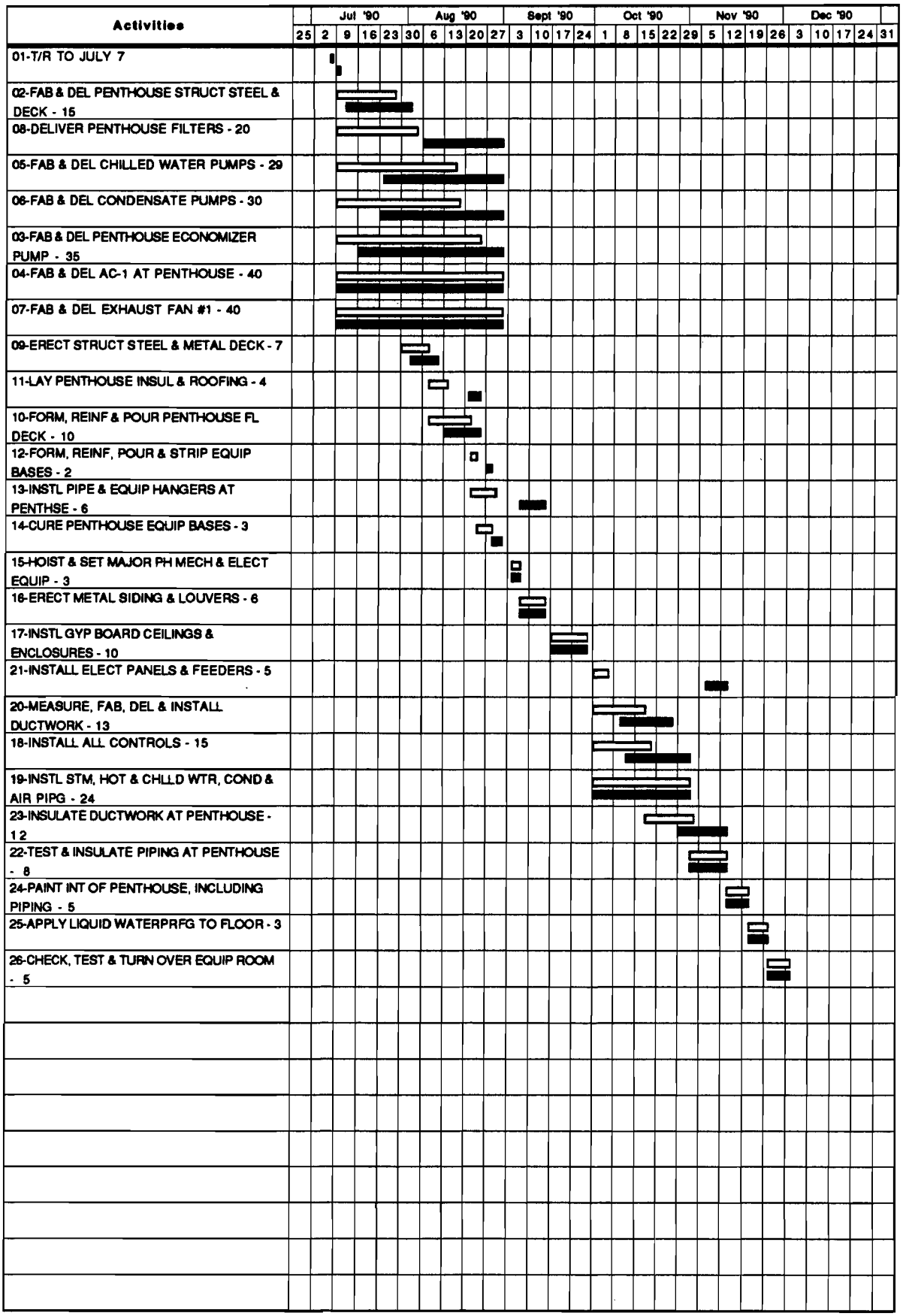
In general most problems with float occur where approval delays are encountered, where intermediate project dates are not specified but are desired and imposed, when poor performance pushes tasks beyond scheduled end dates, or where uncontrollable obstacles to meeting project contract obligations appear.

	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

PAVILLION PROJECT DRAWING ISSUE PAGE 1
LISTED BY DATE OF ISSUE - DATE PRINTED: [illegible] 1983
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

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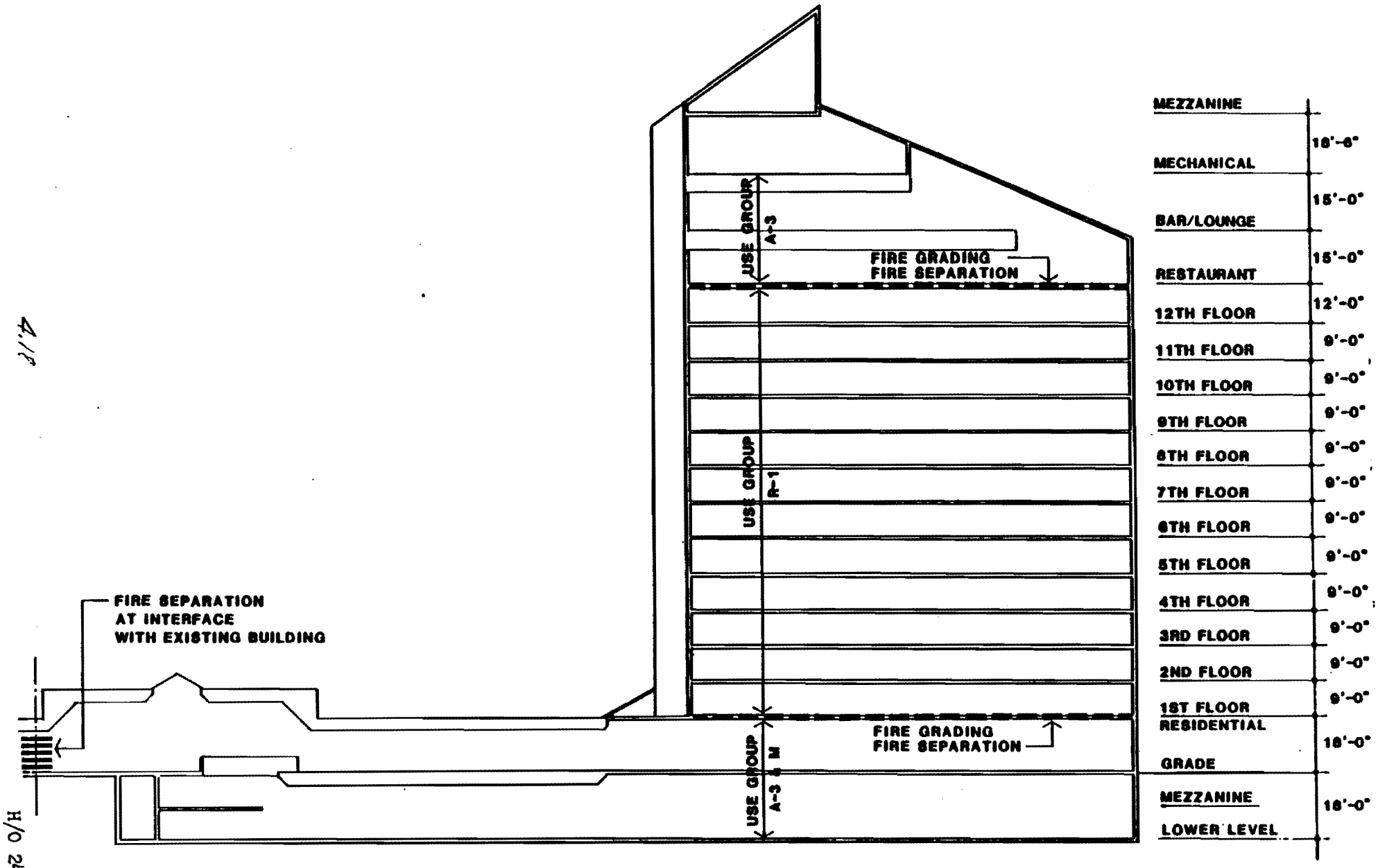
MEZZANINE
MECHANICAL
BAR/LOUNGE
RESTAURANT
12TH FLOOR
11TH FLOOR
10TH FLOOR
9TH FLOOR
8TH FLOOR
7TH FLOOR
6TH FLOOR
5TH FLOOR
4TH FLOOR
3RD FLOOR
2ND FLOOR
1ST FLOOR
RESIDENTIAL
GRADE
MEZZANINE
LOWER LEVEL
18'-0"
15'-0"
15'-0"
12'-0"
9'-0"
9'-0"
9'-0"
9'-0"
9'-0"
9'-0"
9'-0"
9'-0"
9'-0"
9'-0"
9'-0"
18'-0"
18'-0"
USE GROUP A-3
USE GROUP A-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 PAGE 1
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	-	-	-	24
B	X	FRPS COLS TO LL MEZZ	-	-	-	B	B	-	-	26
C	-	BACKFILL & COMPACT AT PITS	-	-	-	-	C	-	-	21
C	-	COMP INSTL DRAIN TILE AT EXT WALLS	C	-	-	-	-	-	-	36
C	X	APPLY PIT WATERPROOFING	-	-	-	-	C	-	-	16
C	X	FRPS ELEV 5 WALLS TO LB	-	-	-	-	C	-	-	27
C	X	INSTALL TRENCH DRAIN COVERS	-	-	C	C	-	-	-	29
C	X	INSTALL STEEL STAIRS & FILL	C	-	-	-	-	-	-	31
C	-	COMPLETE PHASE 2 ECAVATION	-	-	C	C	-	-	C	33
C	X	FRP PIT WALLS	-	-	-	-	C	-	-	189
C	-	BACKFILL EXT BUILDING WALLS	C	-	-	-	-	-	-	38
C	-	BACKFILL EXT RETAINING WALL	-	-	-	-	-	C	-	35
C	X	EFRP RETAINING WALL FOOTING	-	-	-	-	-	C	-	37
C	X	FRPS RETAINING WALL STEM	-	-	-	-	-	C	-	39
C	-	EXCAVATE FOR ALL SLABS ON GRADE	-	-	C	C	C	-	-	49
C	-	POUR OUT SUPPORTED DECKS	C	-	-	C	C	-	-	53
C	-	DEMOLISH EXISTING CANOPY	-	-	-	-	-	-	C	77
C	X	CURE, PART & TOTAL STRIP SUPTD DECKS	C	-	-	C	C	-	-	51
C	X	INSTL ELECT GROUNDING SYSTEM	C	-	-	-	-	-	-	52
C	X	FRPS COLUMNS ABOVE LOBBY LEVEL	C	-	-	-	C	-	-	54
C	X	FRPS COLS ABOVE LL MEZZ	-	-	C	C	C	-	-	43
C	X	CURE, STRIP & RESHORE SUPTD DECKS	C	-	-	C	C	-	-	50
C	X	ERECT MISC MTLS RELATED TO SS CONC WOR	C	-	-	-	-	-	-	190
C	X	CONSTRUCT LB SLABS ON GRADE	-	C	-	-	-	-	C	46
C	X	INSTL MISC IRON SKIN EMBEDS & SUPPORTS	C	-	-	-	C	-	-	56
C	X	COMP APPLY EXTERIOR WALL WATERPROOFING	C	-	-	-	-	-	-	42
C	X	FORM & SET IN FLOOR WORK FOR SUPTD DKS	C	-	-	C	C	-	-	55
C	X	INSTL EXPANSION JOINTS & RELATED EMBED	C	-	-	-	-	-	-	44
C	X	CONSTRUCT LL SLABS ON GRADE	C	-	C	C	C	-	-	57
C	X	INSTL MATERIAL & PERSONNEL HOIST	C	-	-	-	-	-	-	47
C	X	PROVIDE CONTRACT C HOISTING	C	-	-	-	-	-	-	48
C	X	CONSTRUCT TOWER LL MEZZ DECK	-	-	C	-	C	-	-	41

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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

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

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

Ralph J. Stephenson PE PC
Consulting Engineer

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).

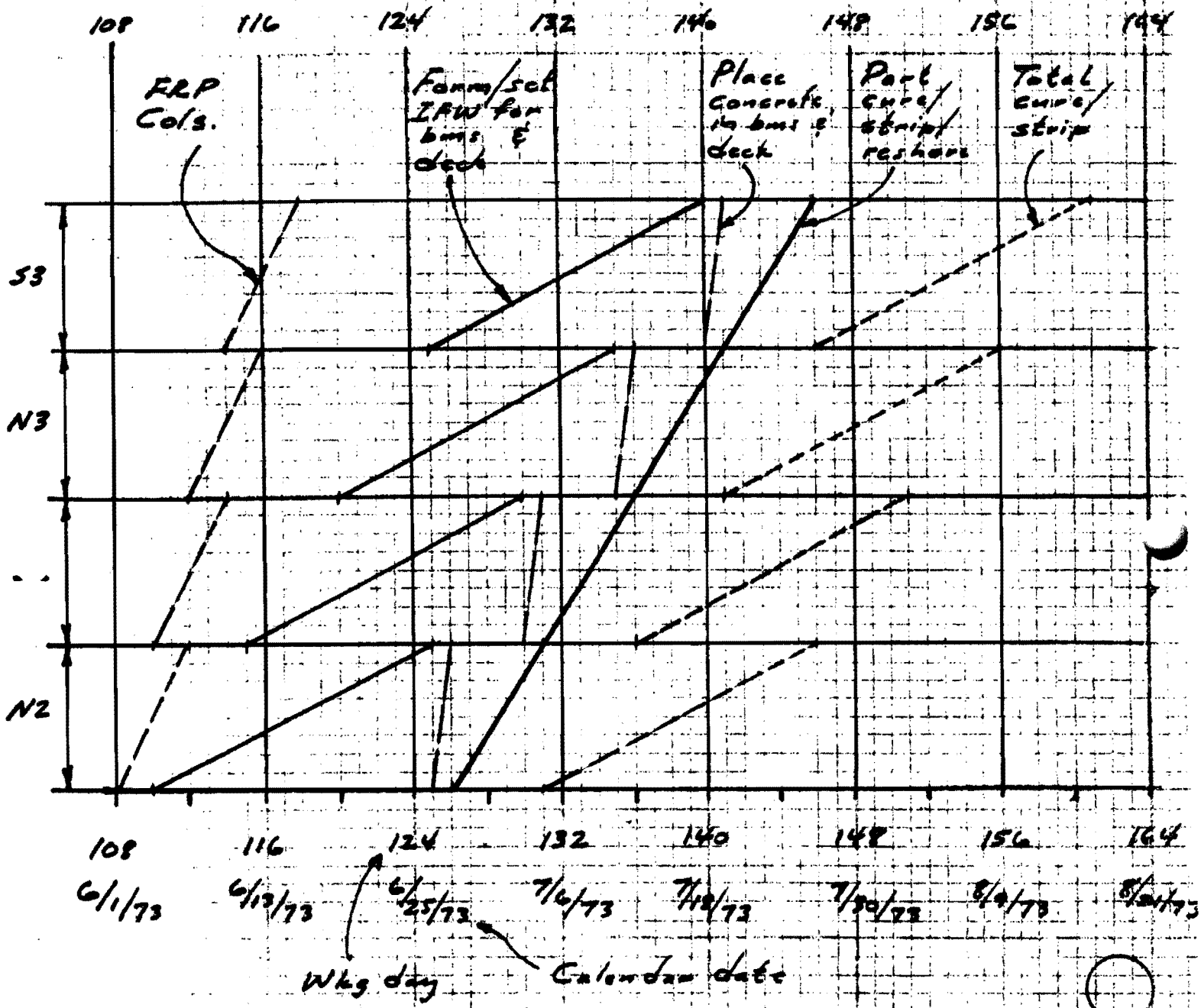
9. Construction sequence - A number showing roughly the installation sequence within a set of related actions (csq).

RALPH J. STEPHENSON CONSULTING ENGINEER 15064 WARWICK ROAD DETROIT 23, MICHIGAN PHONE 273-500

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

N2, S2, N3, S3 Page (1)

Data from Summary Network - Sets 1, 2, 3, 4



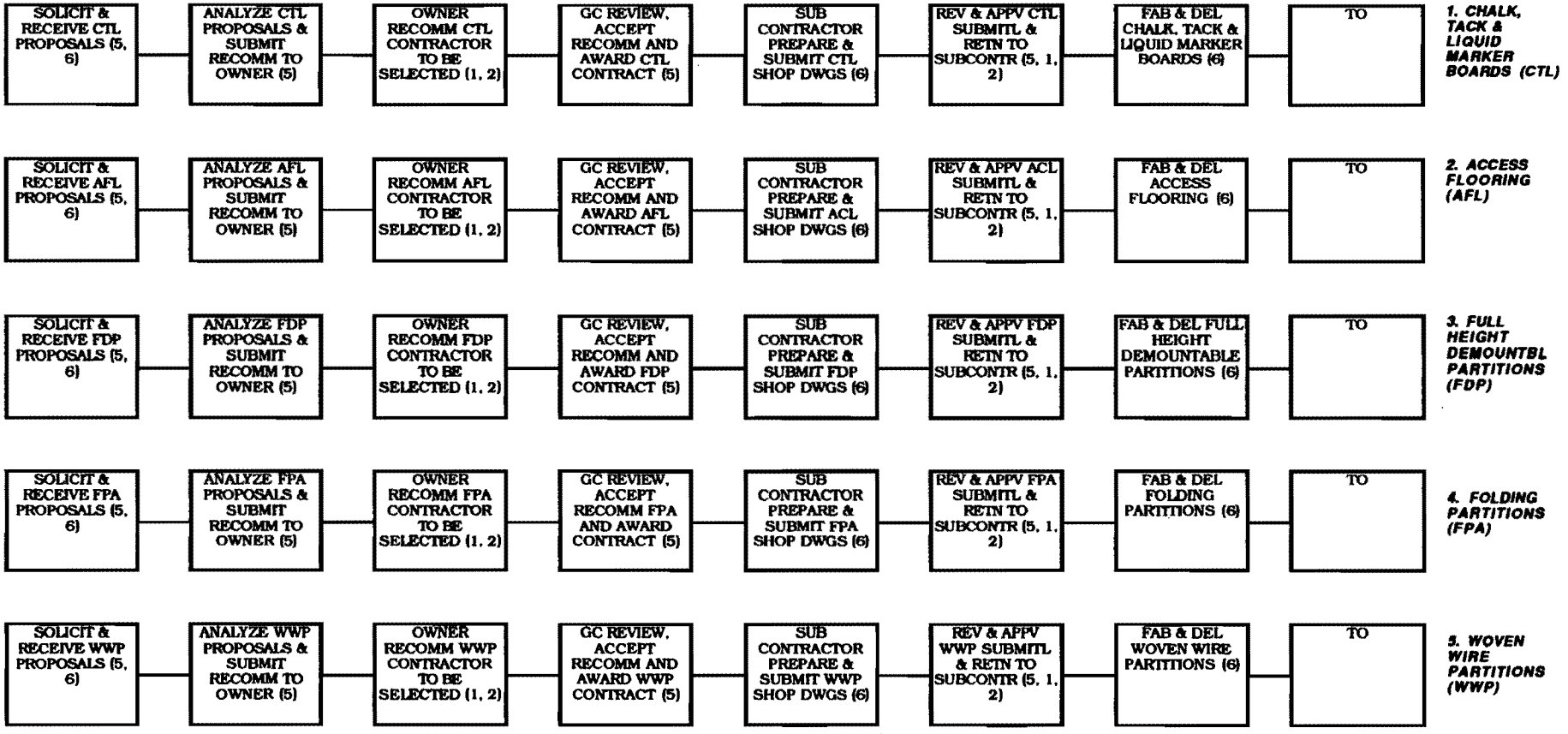
8/28/73

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	Subm3		



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

Ralph J. Stephenson PE PC
Consulting Engineer
323 Hiawatha Drive
Mt. Pleasant, Michigan 48588
ph 517 772 2537

DIVISION 10

ITEMS INCLUDED

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

Issue #1 - 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.

4.31

HD 239

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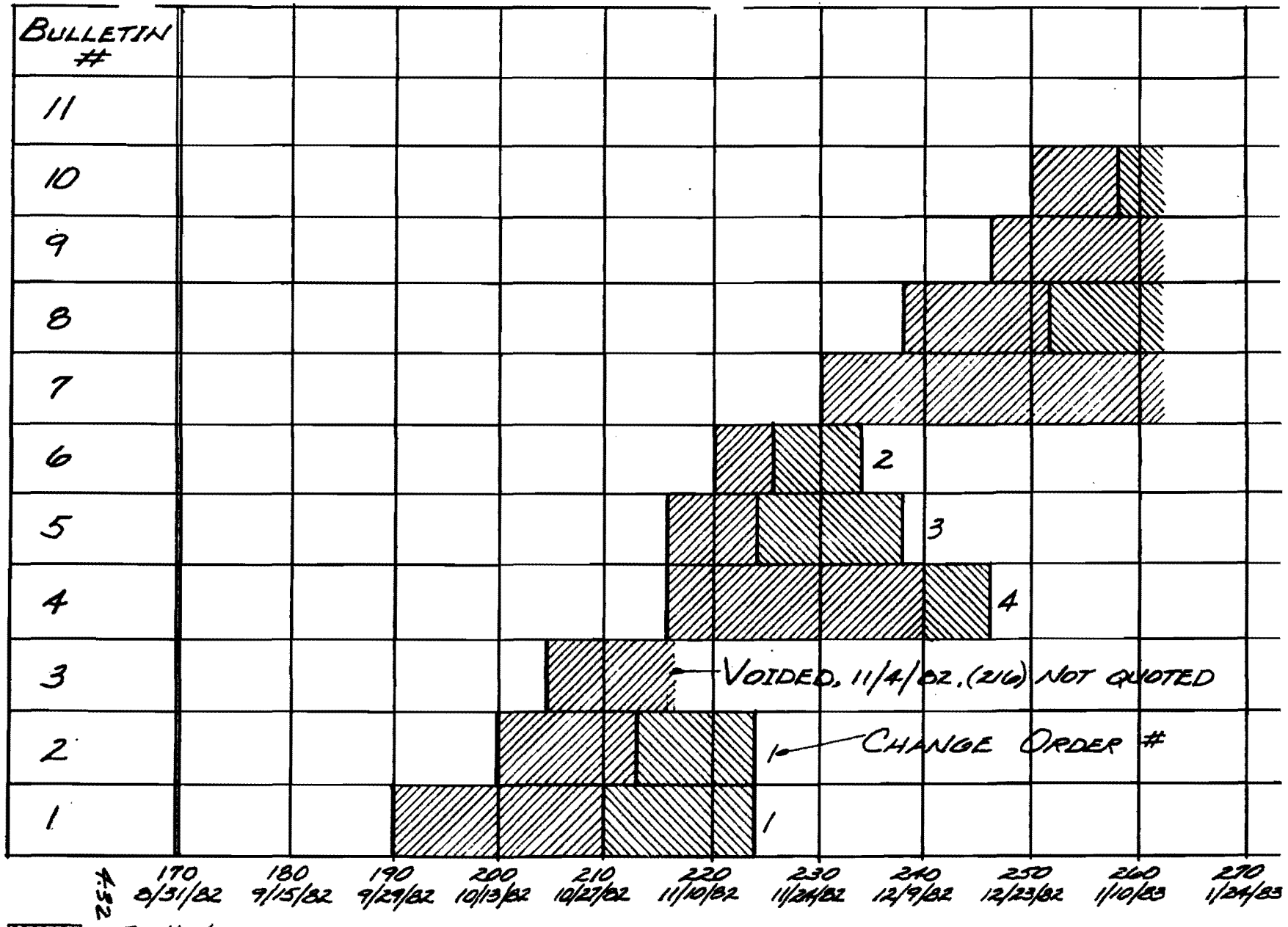

BULLETIN/CHANGE ORDER RECORD

RALPH J. STEPHENSON, P.E.
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ho 198

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LINE #	EQUIPMENT DESCRIPTION & WHO FURNISHES	PRESENT LOCATION OF EQUIP	FINAL LOCATION	ACTION TO BE TAKEN & BY WHOM		OTHER EQUIP AFFECTED	REMARKS
1	2 existing compressed air tanks (Telco)	Existing paint shop	New building paint dept	Relocate Set Hook up	Falstaff Young & Falstaff Falstaff	New compressors must be ready to run	
2	3 existing paint spray booths (Telco)	NW corner existing building	New building paint dept	Move & Set Hook up	Young Telco	—	
3	2 new paint spray booths (Falstaff)	New	New building paint dept	Erect Hook up	Young Telco	—	
4 4.33	6 existing column mounted jib cranes (Telco)	Col's 6C 5D 7D 3F 4C 2F	New bldg Col's 10A 11A 10B 11B 10C 11C	Remove Move & Instl	Telco 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 Mech/ Elect	Young Telco	In existg bldg after Telco clears space (watch!)	

Abbreviations

NW Northwest
QA Quality Assurance

EQUIPMENT ACTIVITY TABULATION

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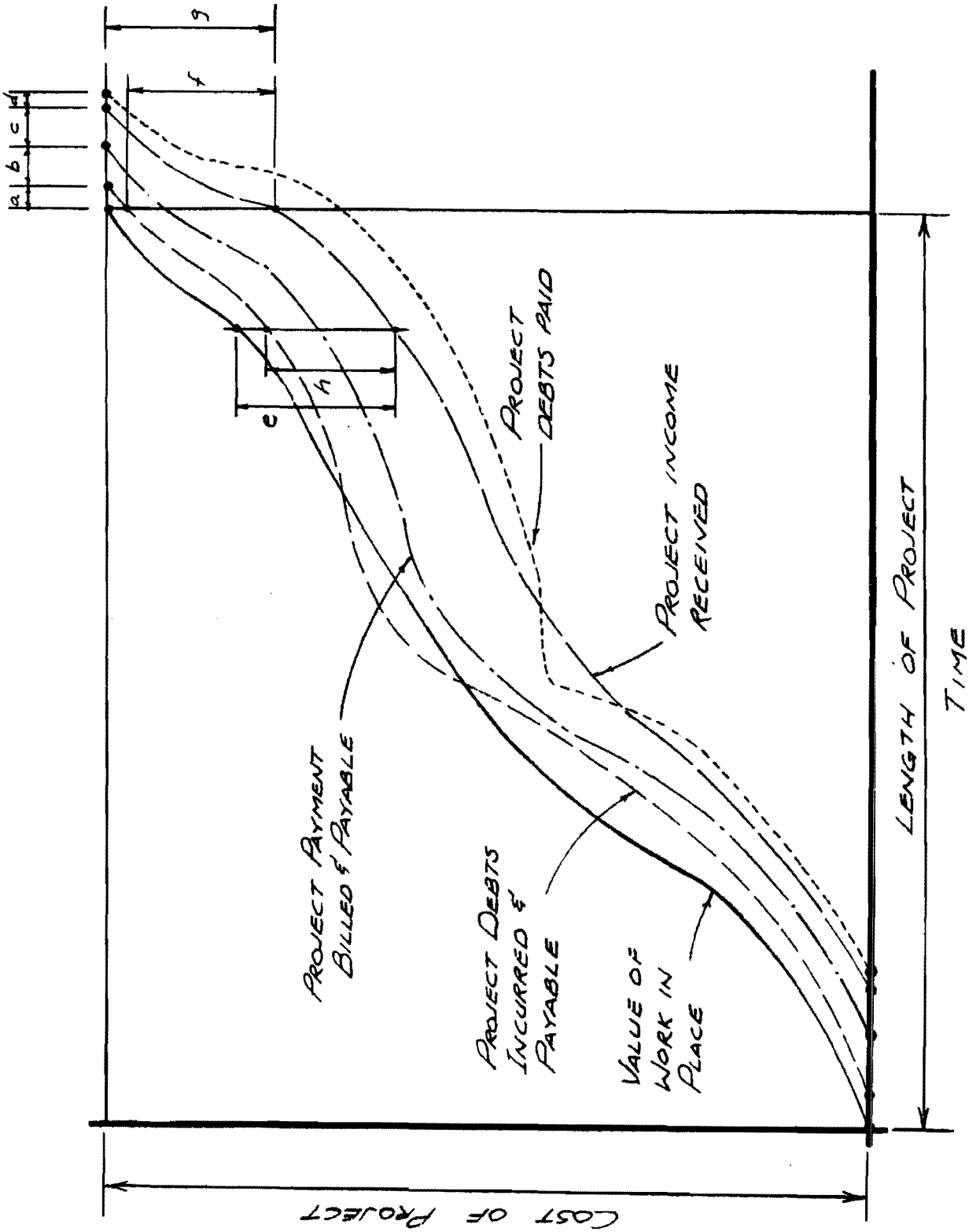

PROJECT MONEY FLOW

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

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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 functional 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 explanation
05.15	Decision to action time span graphics
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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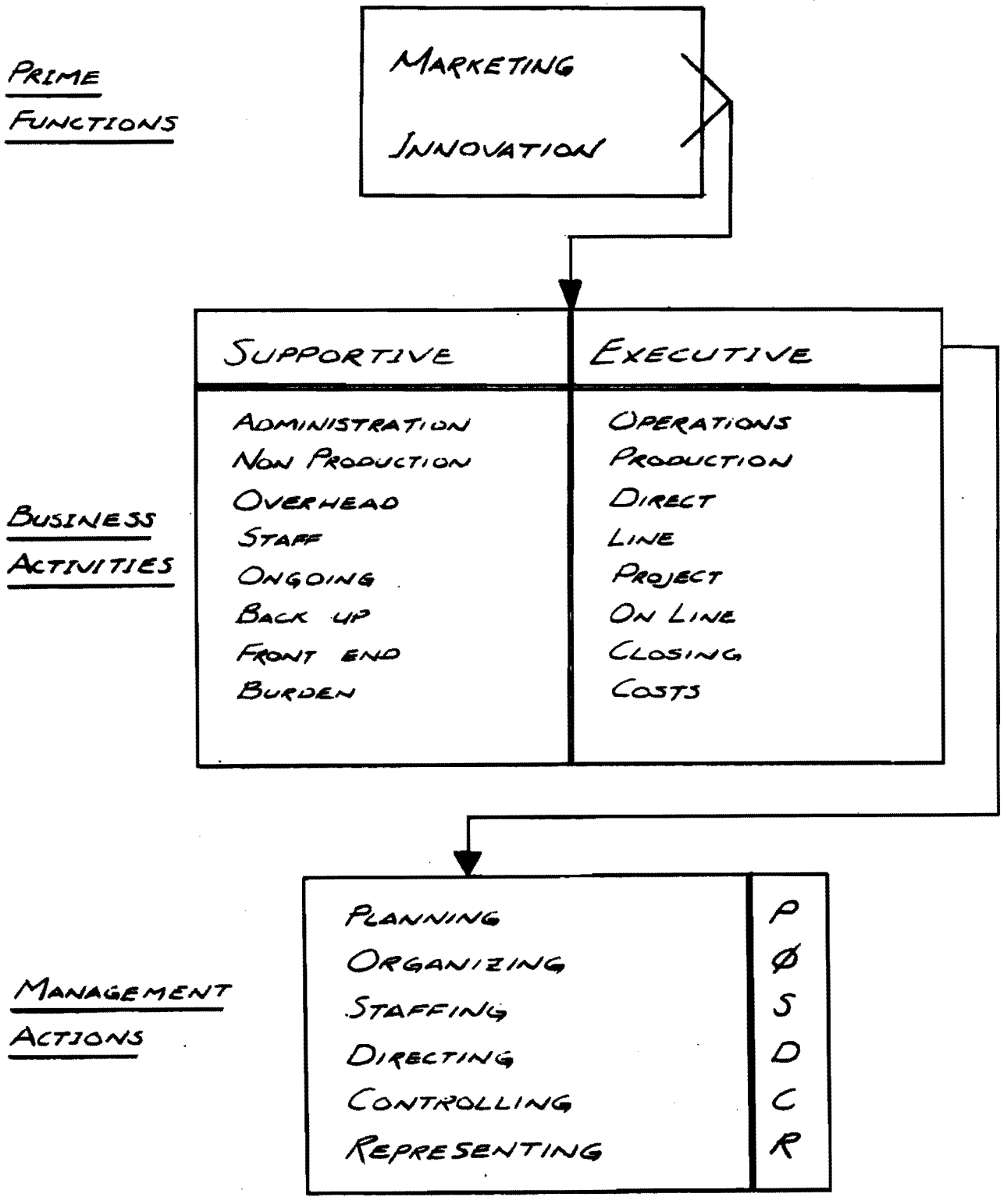
ELEMENTS OF BUSINESS & MANAGEMENT



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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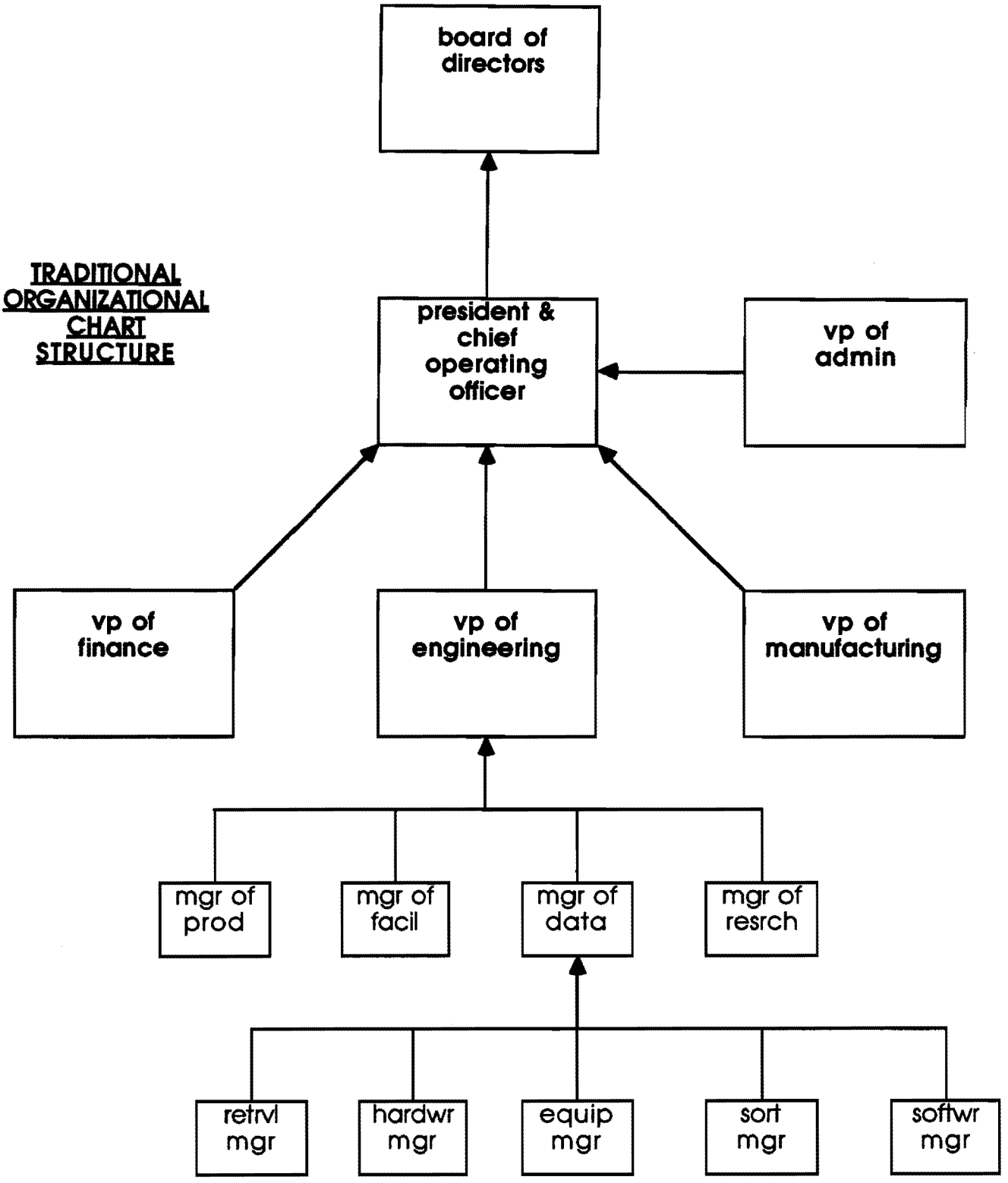
Consulting Engineer

TRADITIONAL ORGANIZATIONAL CHART STRUCTURE



HO 311 - April, 1988

RALPH J. STEPHENSON, P.E.
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EXAMPLE OF BASIC FUNCTIONAL COMPANY RELATIONS (DEPARTMENTAL)

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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

2. Professional Service Contract Characteristics

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Consulting Engineer

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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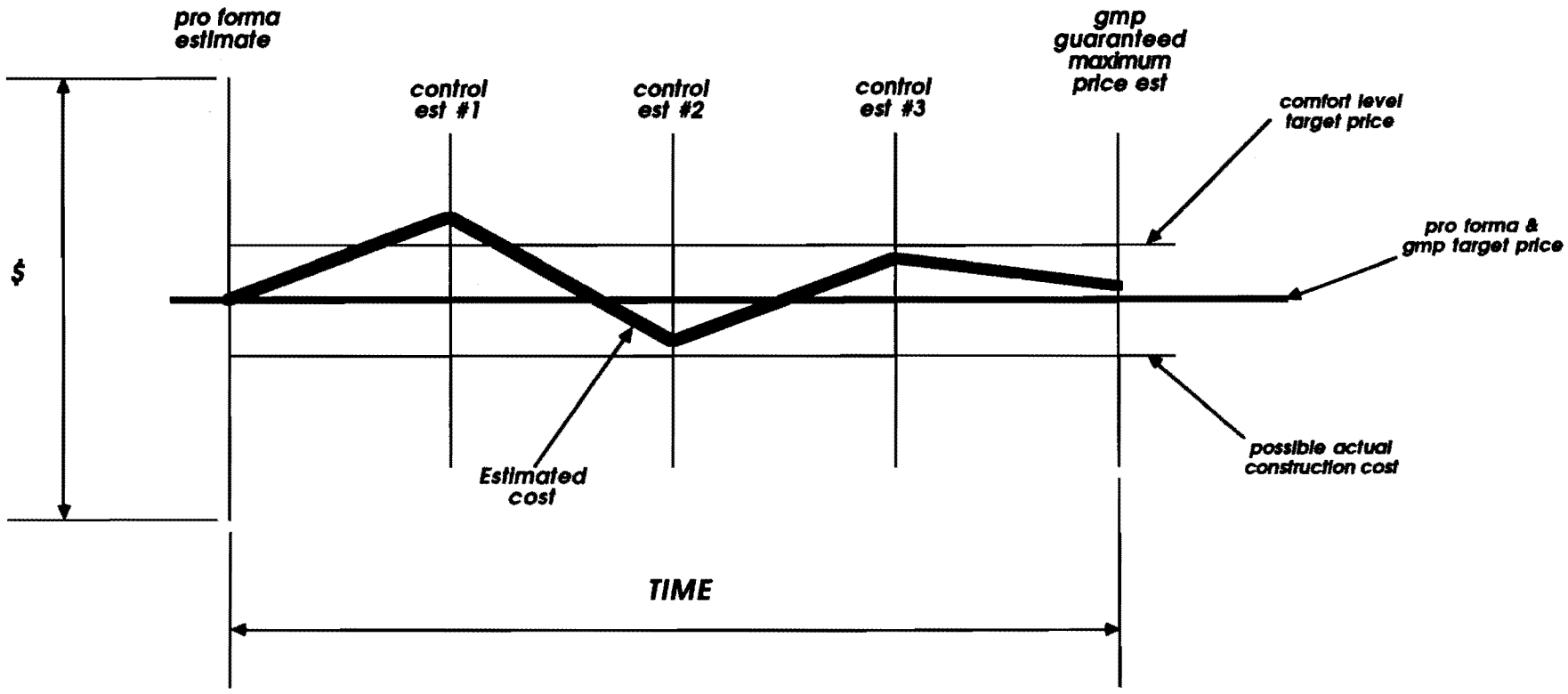
Consulting Engineer

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



5.10

THE ITERATIVE COSTING SEQUENCE

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Issue #1 - February 5, 1991
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 x 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.

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

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.

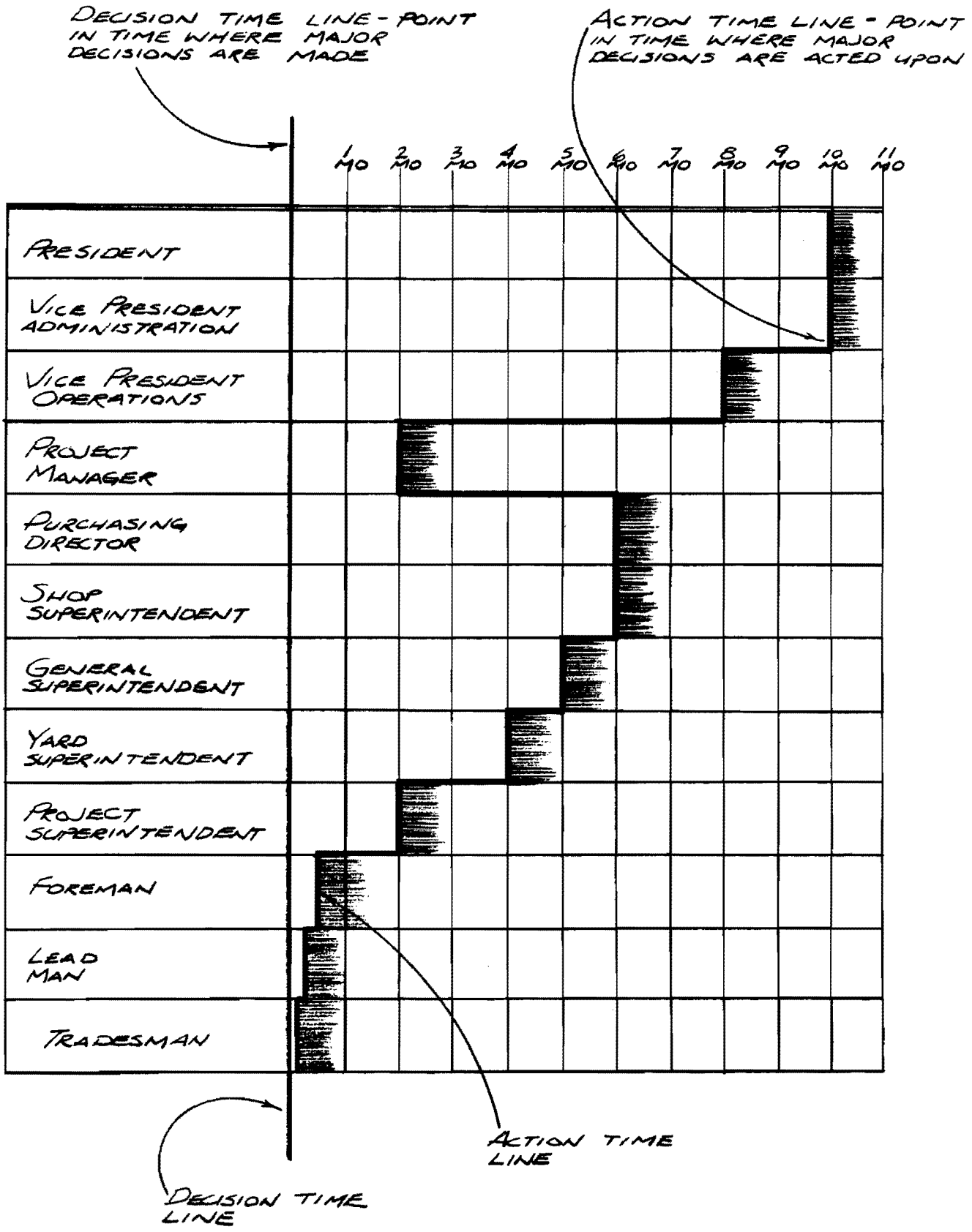
Good grading of the decision to action time will help assure that the organization has assigned the responsibility for decision making at the proper management level. This assurance leads to proper assignment of tasks and operations at lower levels of management, and to identification of responsibility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



Ralph J. Stephenson PE PC
Consulting Engineer

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

Frank Carlton
VP - QU
Planning & Development

James Lea
QU Program Consultant

George Dell
City Manager of Qitain

Richard Goldmark
Alumnus of QU

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

Frank Carlton
VP-QU Planning & Operations

James Tea
QU Program Consultant

George Deff
City Manager of Qitain

Richard Goldmark
Alumnus of QU

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.

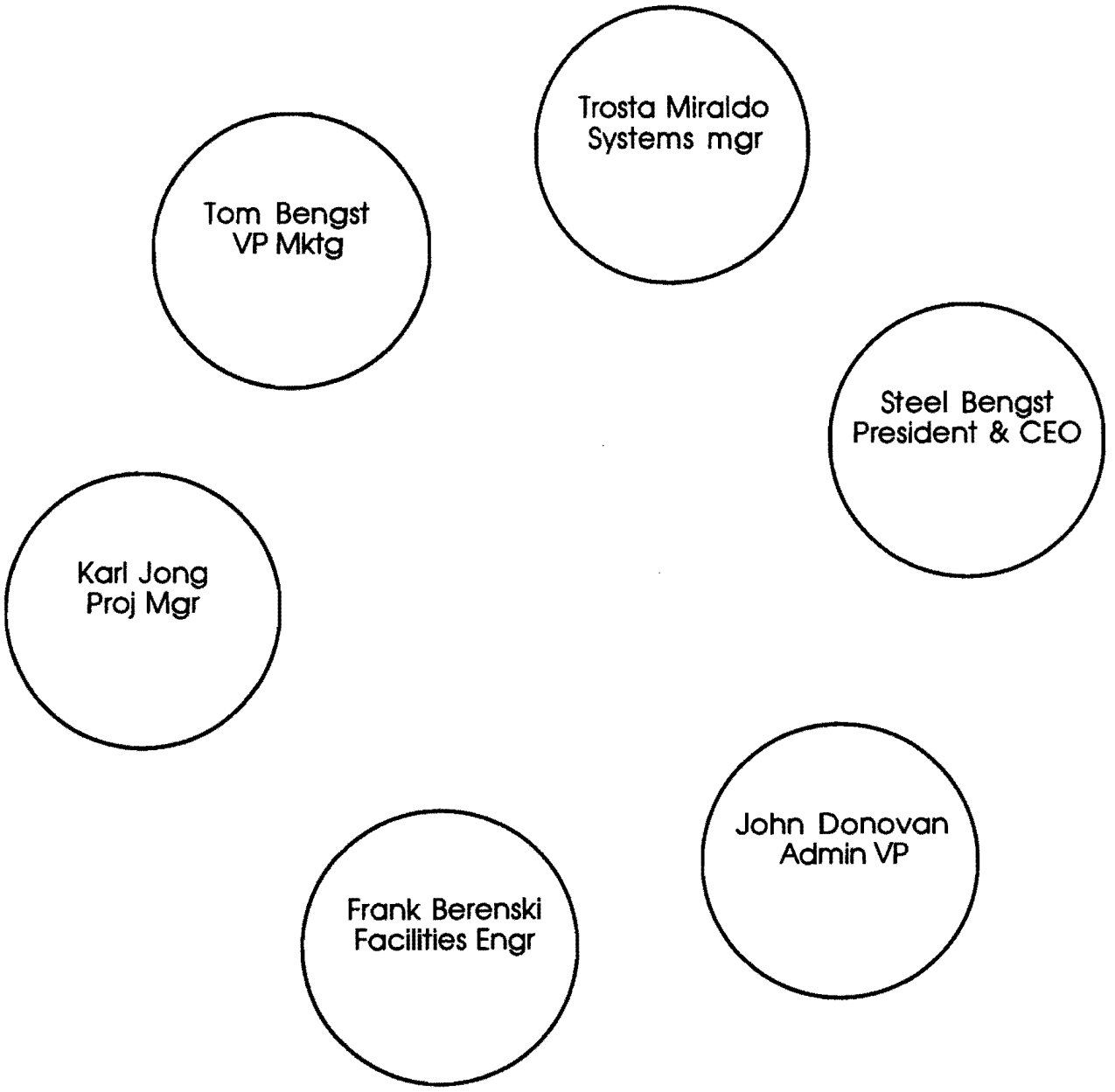
Mr Jong describes a project to which he has been assigned and asks for your help and advice. He adds that he has reviewed the purpose of his call with Mr. Steel Bengst and has Mr. Bengst's permission for you to spend a day or so with them on a fee basis to help establish the best project delivery system 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?

Ralph J. Stephenson PE PC
Consulting Engineer

Bengst Corporation Expansion Organizational Relations



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GRAPHICALLY UNSTRUCTURED ORGANIZATIONAL CHART

Ralph J. Stephenson PE PC
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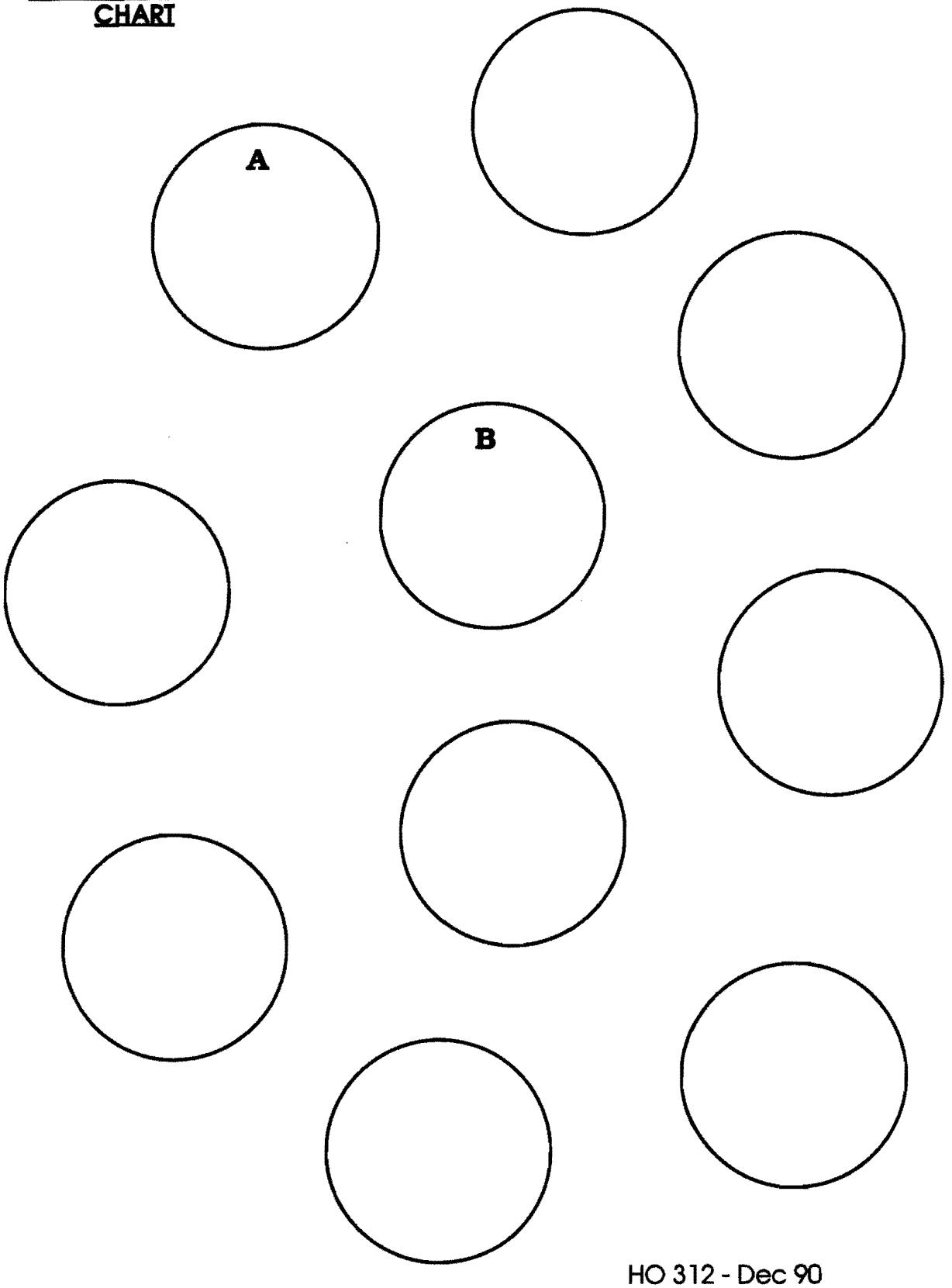

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Ralph J. Stephenson P.E ., P.C.
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THE CASE OF THE CONCERNED OWNER AND HIS SEPARATE PRIME CONTRACTORS

(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 being considered 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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- *SECTION 6 - MANAGING THE PROJECT STAFF & THE WORK*

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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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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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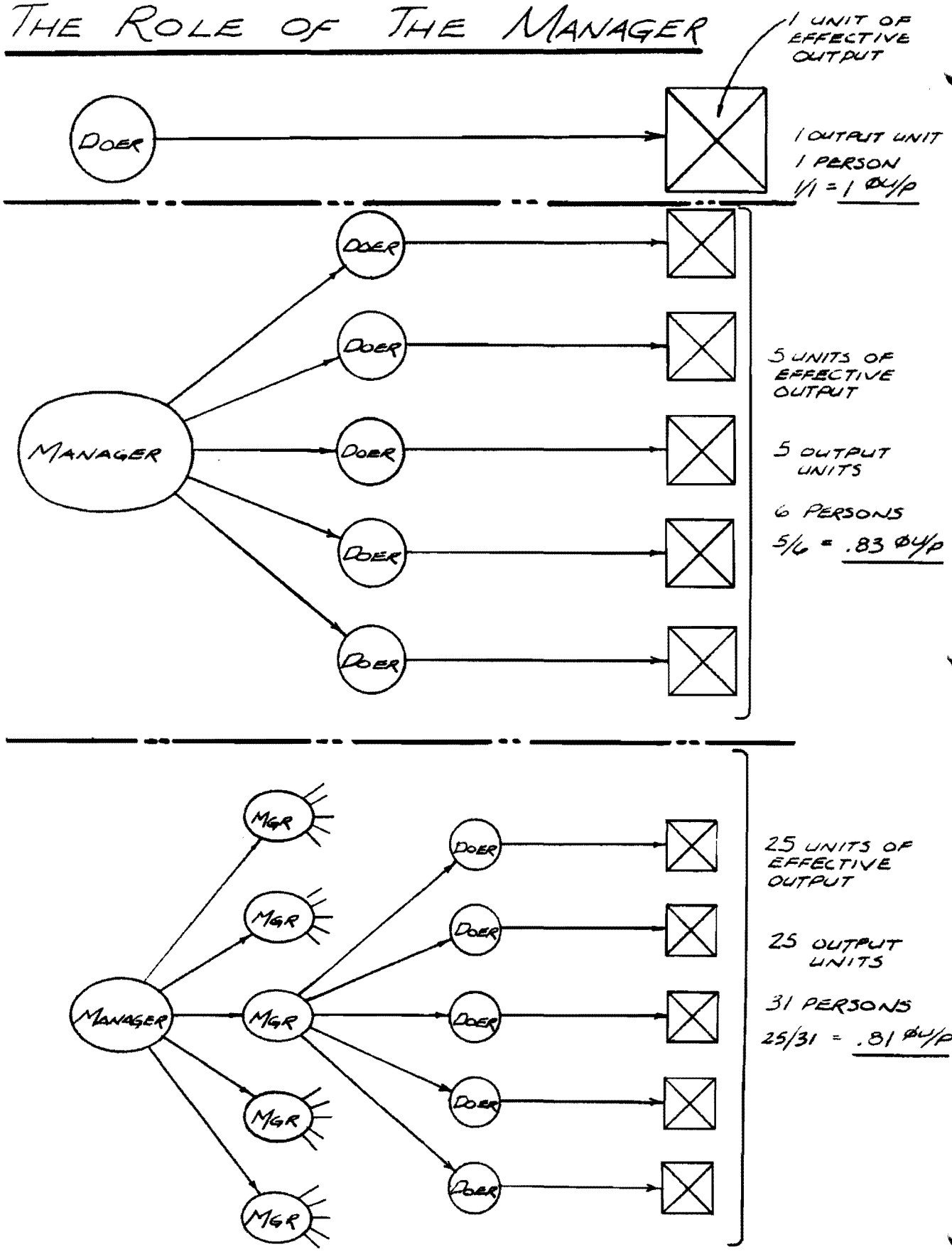
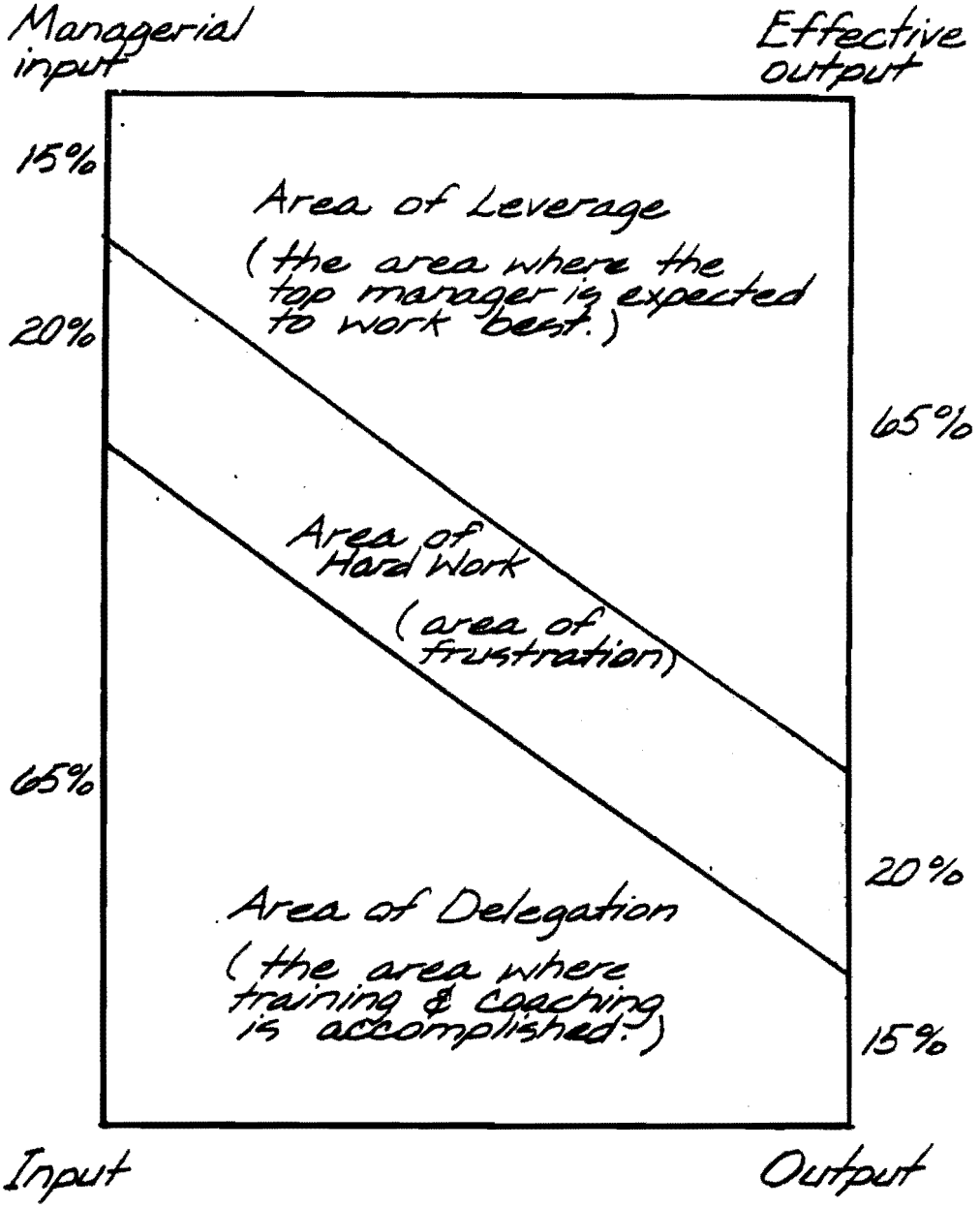
THE ROLE OF THE MANAGER





MANAGERIAL LEVERAGE

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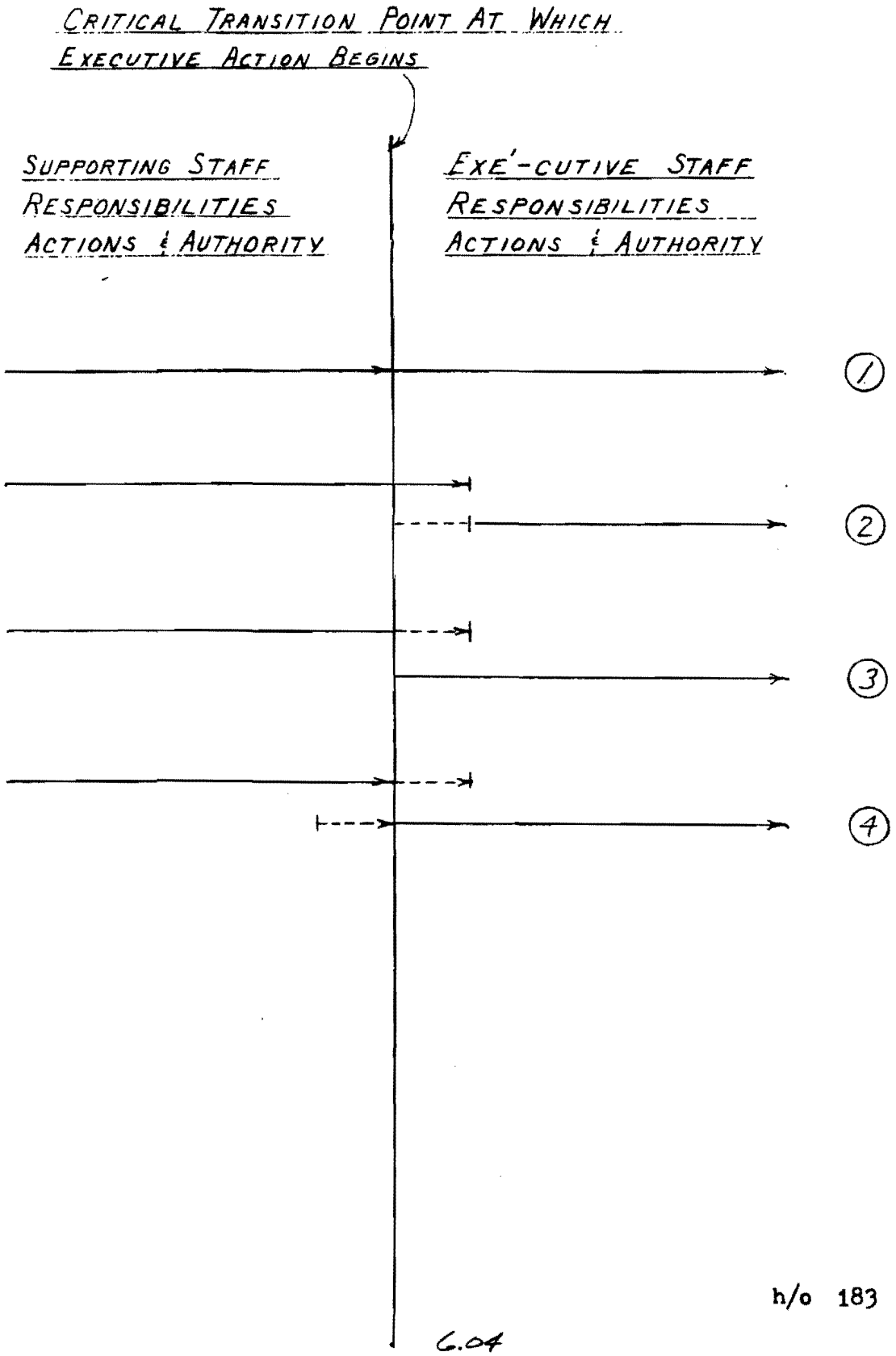

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Notes on Forerunner & Conservatively Managed Companies

• 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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Consulting Engineer

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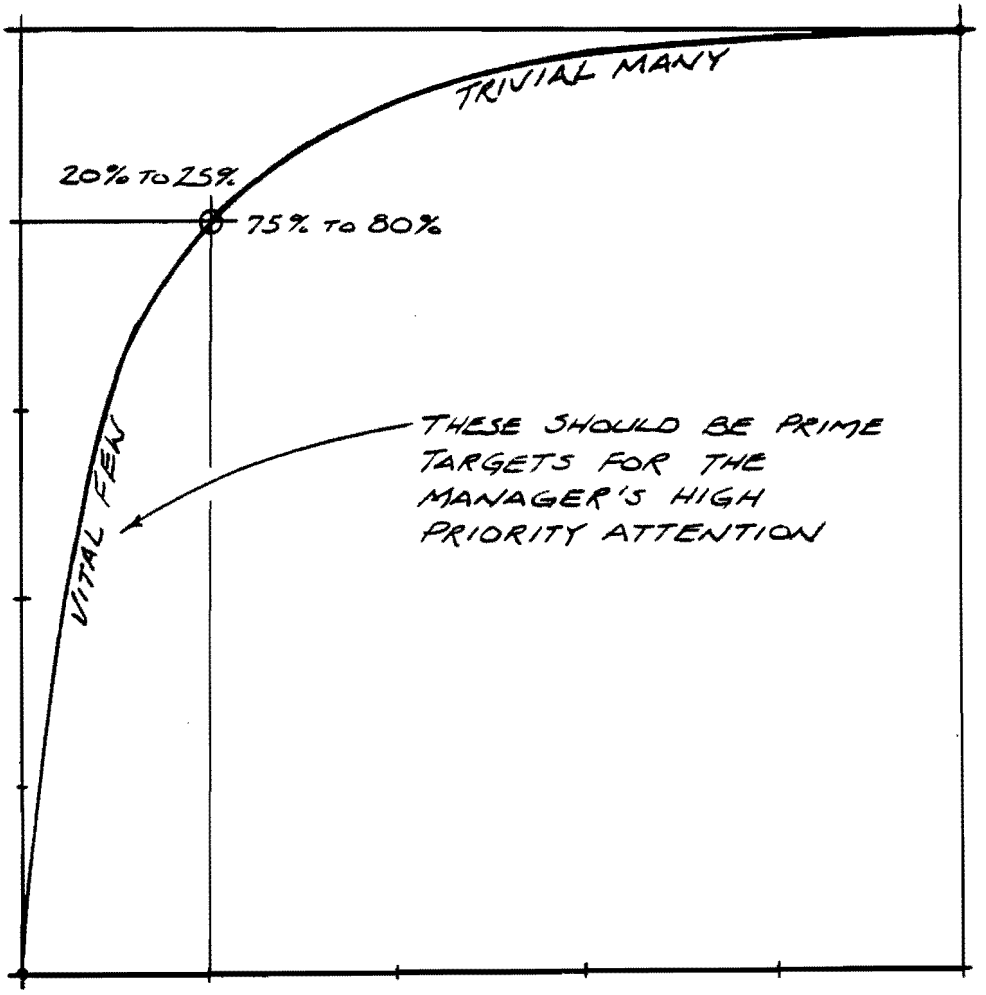
PARETOS LAW - IN AN OBJECT/VALUE SITUATION ONLY A FEW OF THE OBJECTS ACCOUNT FOR THE GREATEST PART OF THE VALUE.



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

H/C 146

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Consulting Engineer

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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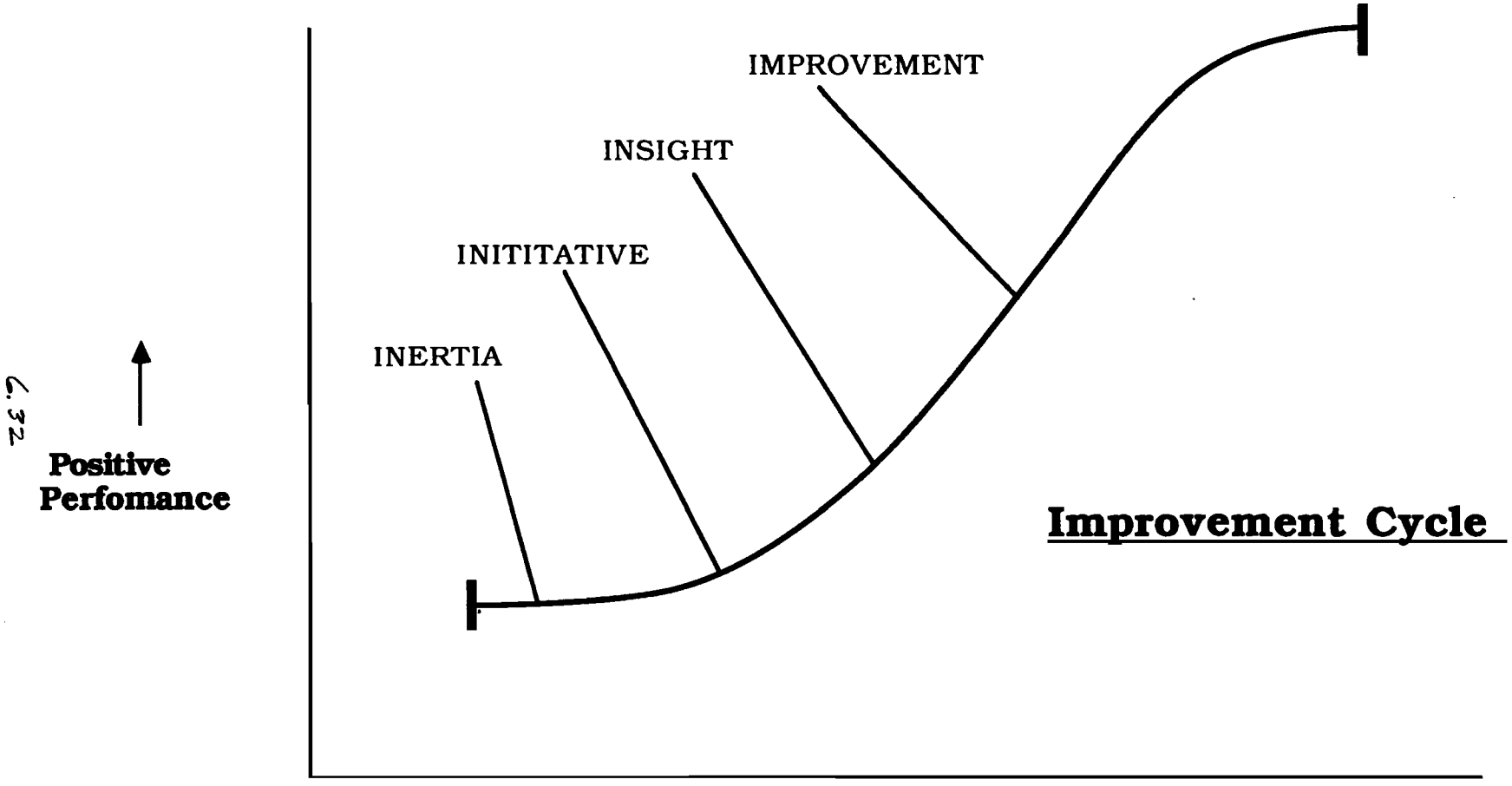

Improvement Cycle

(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 chngs	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.

Ralph J. Stephenson PE PC
Consulting Engineer

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.

GAC

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

```
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

6.5C

Friday July 9, 1982

Hitwell SE Tucson, Arizona

- All new blg ftgs complete today at NE corner. Moving to NW corner fty concrete work Monday.
- Still having trouble with delivery of embedments in pit walls. Biotic says dimension on dwgs wrong. Must clarify. Have meeting with Tom Monday to review.
- Hit flowing water at 9:00 ~~P.M.~~ A.M. on E & S-C. Began pumping at 10:15 A.M. today. Notified Tom Begay 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. CF 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!)

78011

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

XAT
FIB
DLY
MEC
FRC

[redacted]:e

[redacted]111

G 58

HIRTWELL SE TUSCON

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

---

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
EL DESCR
LOCATION

REC#	ROL#	P#	DTE	YR	CAM	FLM SPD	JOB #	F TY

SIDEWALK & ROAD INTO HOTEL AT TRAVERSE BAY RESORT

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

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

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

CONCRETE COLUMN CAPITAL IN KLING OFFICE SEMINAR ROOM. TAKEN AT PROJECT MANAGEMENT SEMINAR
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

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

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	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

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Consulting Engineer

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.

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- 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.

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

Risk - its nature & managment in the construction profession - ho 440

I. **Definitions**
   A. ***Conflict***
      A state of disagreement and disharmony.
   B. ***Destructive conflict***
      Animosity or disagreement which results in lowering the potential for an individual or organization to succeed.
   C. ***Positive conflict***
      Hostility that is managed so its resolution raises the potential for well intentioned individuals or organizations to succeed at being excellent.
   D. ***Responsibility***
      The assignment, spoken or understood, that a person in an organization has as their part in maintaining the organization's health and vitality.
   E. ***Risk***
      Any exposure to the possibility of harm, danger, loss or damage to people, property, or other interest. To expose to a chance of loss or damage.

II. **Why are disputes often not resolved promptly and fairly.**
   A. Differences in goals and objectives of parties to the project.
   B. Greed.
   C. Improper assignment of risk.

III. **Some actions entailing risk in the planning, design, and construction profession.**
   A. Approval processes.
   B. Being a good neighbor.
   C. Closing out a project.
   D. Communicating with others.
   E. Maintaining constructibility of a project.
   F. Maintaining construction document quality.
   G. Managing cost growth.
   H. Maintaining a good work site.
   I. Keeping job morale & attitudes healthy.
   J. Managing and resolving legal matters.
   K. Paper and administrative work.
   L. Payments.
   M. Planning and scheduling the work.
   N. Setting and maintaining policies and procedures.
   O. Processing revisions.
   P. Material and equipment procurement.
   Q. Maintaining integrity of the design and engineering program.
   R. Establishing a profitable cost structure.
   S. Managing quality.
   T. Processing submittals.
   U. Controlling time growth.

IV. **How to recognize risk on a project (adapted from Mr. Papageorge, R. A.'s comments on risk)**
   A. Identify as many potential threats to project success as early as possible.
   B. Identify where problems will be caused by taking risks to help assure project success.
   C. Evaluate and analyze the project team's ability to take the risks identified.
   D. Evaluate and analyze the project team member's abilities to take the needed risks.

date printed: November 30, 1998

E. Identify the impact of legal contractual obligations on the risks being considered.
F. Evaluate and analyze existing project conditions and the restraints they exert on the project.
G. Establish and implement a systematic procedure for identifying and adjusting risk to acceptable levels to assure a high probability of project success.

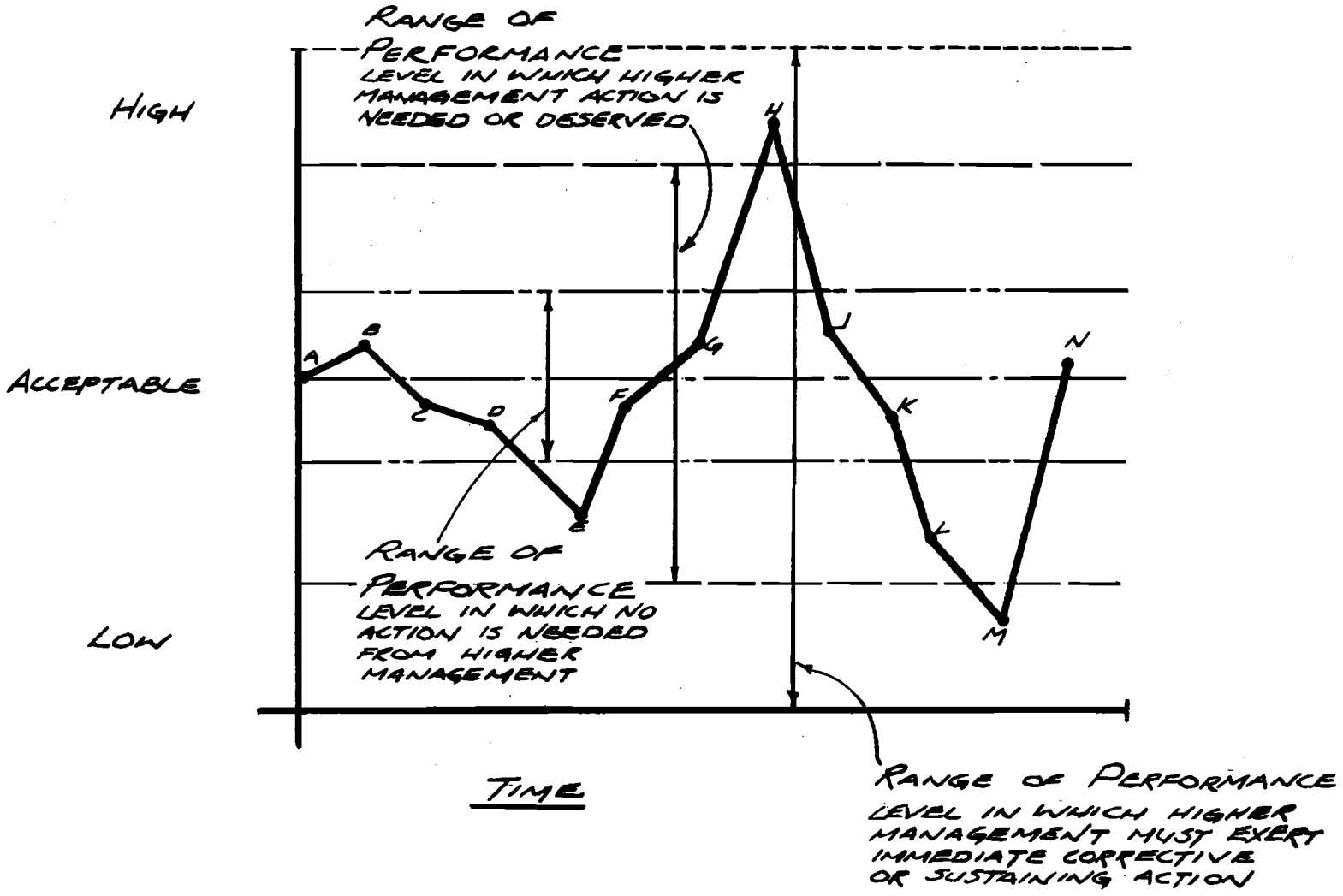
V. **Helpful hints to effectively manage risk in construction**
A. Start the job at the right time.
B. Profile the job before committing resources.
C. Always remember - good management is risk control.
D. Don't lose your personal intellectual grasp of risk on your job.
E. To manage risk correctly, read the documents.
F. Evaluate the quality of the total contract documents.
G. Be certain to obtain and read all pertinent contract documents.
H. Match your price to the project delivery system being used.
I. Avoid being made a limited agent on a hard money job.
J. Avoid over-the-wall management.
K. Keep abreast and aware of current industry trends, particularly organizational patterns.
L. Be aware of your client's must, want, and wish list, and respect them.
M. Understand and account for other project participant's profit needs and desires.
N. Don't hesitate to scrub your proposal if the risk is excessive relative to the rewards.

date printed: November 30, 1998

Ralph J. Stephenson, P. E.
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	Monitoring report #1
07.22	Monitoring #2



MANAGEMENT BY EXCEPTION (MX) AND PERFORMANCE LEVEL ACTIONS

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CONSULTING ENGINEER

H/O 150 3/77

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

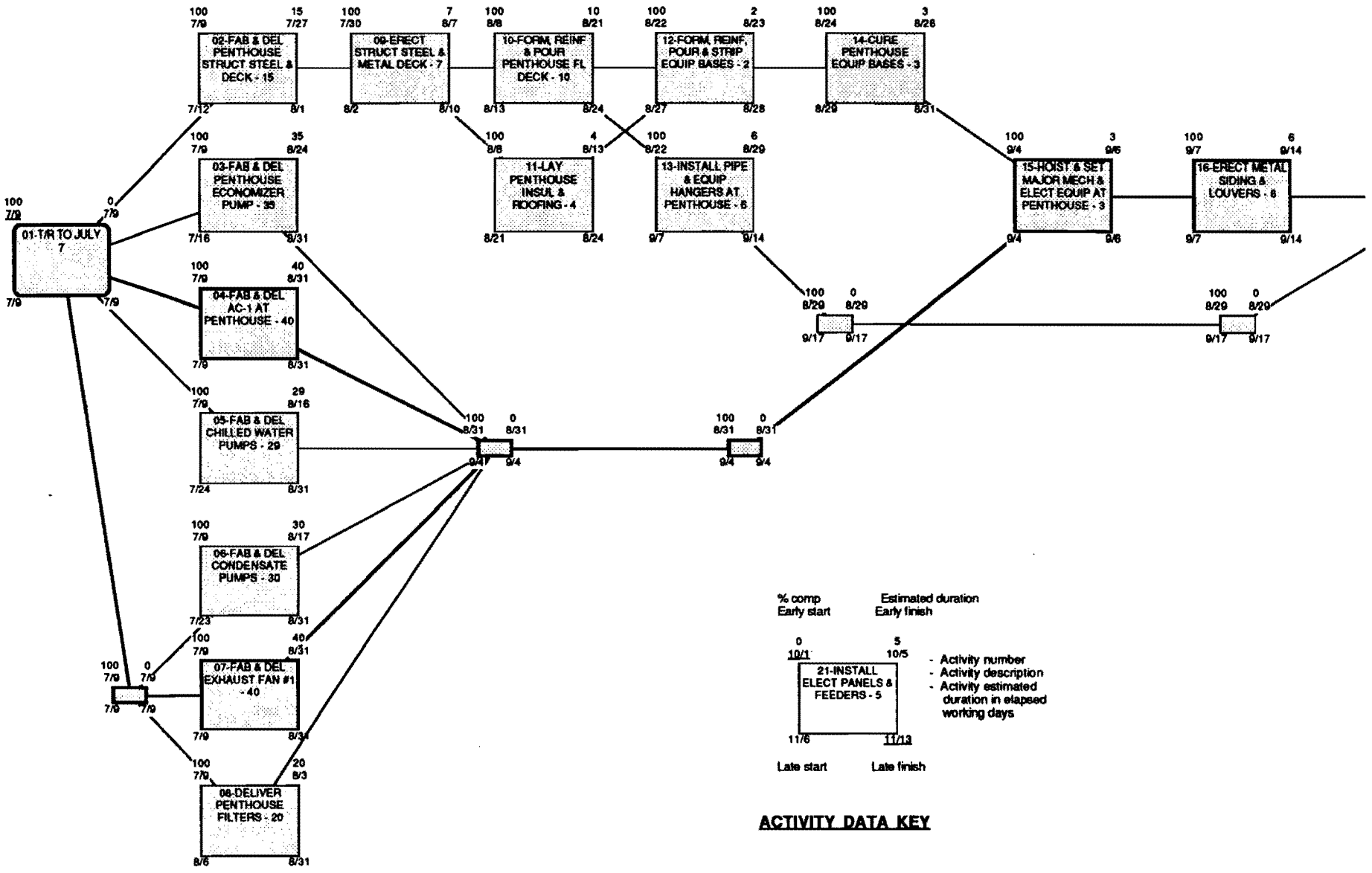
F. How to pick the vital few

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

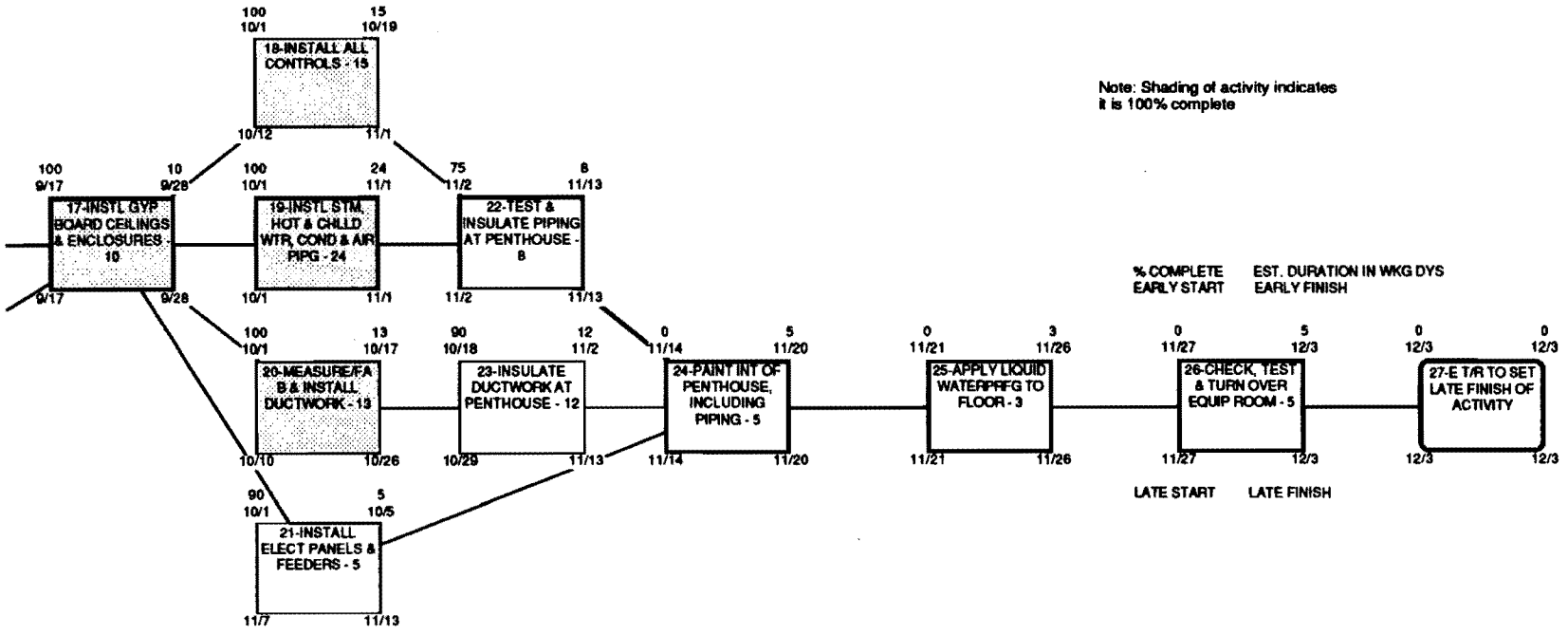
G. Moving from a situational view (macro) to the vital few (micro)

H. What to do with the trivial many

1. Delegate
2. Defer (How long?)


01-T/R TO JULY 7
02-FAB & DEL PENTHOUSE STRUCT STEEL & DECK - 15
03-FAB & DEL PENTHOUSE ECONOMIZER PUMP - 35
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
09-ERECT STRUCT STEEL & METAL DECK - 7
10-FORM, REINF & POUR PENTHOUSE FL DECK - 10
11-LAY PENTHOUSE INSUL & ROOFING - 4
12-FORM, REINF, POUR & STRIP EQUIP BASES - 2
13-INSTALL PIPE & EQUIP HANGERS AT PENTHOUSE - 6
14-CURE PENTHOUSE EQUIP BASES - 3
15-HOIST & SET MAJOR MECH & ELECT EQUIP AT PENTHOUSE - 3
16-ERECT METAL SIDING & LOUVERS - 6
% 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



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 phi i1shtph1
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.

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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

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

Orange

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

Blue

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

Yellow

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

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

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

Monitoring #1

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

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

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

VICTORIA MECHANICAL COMPANY

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

RALPH J STEPHENSON P E - CONSULTANT

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

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	NODE SEQUENCE E/S	L/S	E/F	L/F	TF
1	2	106	0		T/R TO START OF PROJECT		1026	1026	5316	5316	0
2	3	65	0	1	T/R POUR OUT 1ST FL SOG		6016	6226	8316	9226	15
2	4	69	0	2	T/R TO POUR OUT 2ND DECK		6016	6166	9076	9226	11
2	5	58	0	R	T/R TO C ER RF MTL DECK		6016	7206	8206	10086	34
2	6	70	0	R	T/R TO C LAY INSUL & RFG		6016	7166	9086	10226	32
2	7	102	0		T/R TO C EXT MSNRY&GLZNG		6016	6016	10226	10226	0
3	101	0	0		D		9016	9286	8316	9276	18
3	102	0	0		D		9016	9246	8316	9236	16
3	103	0	0		D		9016	10016	8316	9306	21
3	104	0	0		D		9016	10066	8316	10056	24
3	105	0	0		D		9016	9236	8316	9226	15
3	106	0	0		D		9016	9306	8316	9296	20
4	101	0	0		D		9086	9286	9076	9276	14
4	102	0	0		D		9086	9246	9076	9236	12
4	103	0	0		D		9086	10016	9076	9306	17
4	104	0	0		D		9086	10066	9076	10056	20
4	105	0	0		D		9086	9236	9076	9226	11
4	106	0	0		D		9086	9306	9076	9296	16
5	132	0	0		D		8236	10146	8206	10136	37
5	133	0	0		D		8236	10116	8206	10086	34
5	134	0	0		D		8236	10196	8206	10186	40
5	135	0	0		D		8236	10196	8206	10186	40
5	136	0	0		D		8236	10126	8206	10116	35
5	137	0	0		D		8236	10186	8206	10156	39
6	125	0	0		D		9096	10256	9086	10226	32
7	125	0	0		D		10256	10256	10226	10226	0
101	107	6	6	1	P INS SPRINKLER PIPG	2880	9086	9286	9156	10056	14
102	108	8	2	1	P INS SHT MTL DCT&FTINGS	4800	9086	9246	9176	10056	12
103	109	3	1	1	P INS DMSTC WTR PPG-CLG	720	9086	10016	9106	10056	17
104	110	4	1	1	P INS HTG&CLNG PPG IN CLG	960	9086	10066	9136	10116	20
105	111	9	1	1	INS TO/R PLUMBG RISERS	2160	9086	9236	9206	10056	11
106	112	4	3	1	P INS RUFF ELEC CNDT&FDRS		9086	9306	9136	10056	16
107	113	0	0		D		9166	10066	9156	10056	14
107	114	5	6	1	C INS SPRINKLER PIPG	2400	9166	10126	9226	10186	18
107	132	0	0		D		9166	10146	9156	10136	20
107	132	0	0		D		9166	10146	9156	10136	20
108	113	0	0		D		9206	10066	9176	10056	12
108	115	8	2	1	C INS SHT MTL DUCT&FTTNGS	4800	9206	10076	9296	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	10166	26
110	117	5	1	1	C INS HTG&CLNG PPG IN CLG	1200	9146	10126	9206	10186	20
110	135	0	0		D		9146	10196	9136	10186	25
110	135	0	0		D		9146	10196	9136	10186	25
111	113	0	0		D		9216	10066	9206	10056	11
111	136	0	0		D		9216	10126	9206	10116	15
111	136	0	0		D		9216	10126	9206	10116	15
112	113	0	0		D		9146	10066	9136	10056	16
112	119	3	3	1	C INS RUFF ELEC CNDT&FDRS		9146	10146	9166	10186	22
112	137	0	0		D		9146	10186	9136	10156	24
112	137	0	0		D		9146	10186	9136	10156	24
113	118	6	4	1	ER INT MSNRY PARTNS		9216	10066	9286	10136	11
114	120	0	0		D		9236	10196	9226	10166	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	RSP	LOC CD	AND DESCRIPTION	COST	NODE SEQUENCE E/S	L/S	E/F	L/F	TF
151	153	0	0		D		9176	10226	9166	10216	25
151	157	2	1	2	C INS HTG&CLNG PPG IN CLG	480	9176	10296	9206	11016	30
152	153	0	0		D		9206	10226	9176	10216	24
152	159	3	3	2	C INS RUFF ELEC CNDT&FDRS		9206	10286	9226	11016	26
153	158	4	4	2	ER INT MSNRY PARTNS		10016	10226	10066	10276	15
154	160	0	0		D		10016	11026	9306	11016	22
155	160	0	0		D		10126	11026	10116	11016	15
156	160	0	0		D		9216	11026	9206	11016	30
157	160	0	0		D		9216	11026	9206	11016	30
158	161	0	0		D		10076	10286	10066	10276	15
159	160	0	0		D		9236	11026	9226	11016	26
160	163	0	0		D		10126	11026	10116	11016	15
161	162	3	5	2	P ER STUDS FOR DRY WALL		10076	10286	10116	11016	15
162	163	0	0		D		10126	11026	10116	11016	15
162	165	4	5	2	C ER STUDS FOR DRY WALL		10126	11046	10156	11096	17
163	164	4	1	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
163	164	4	3	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
164	166	0	0		D		10196	11086	10186	11056	14
164	167	0	0		D		10196	11106	10186	11096	16
165	167	0	0		D		10186	11106	10156	11096	17
166	168	6	5	2	P HANG DRY WALL		11086	11086	11156	11156	0
167	168	4	1	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
167	168	4	3	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
168	169	6	5	2	C HANG DRY WALL		11166	11166	11236	11236	0
169	170	0	0		D		11246	11246	11236	11236	0
170	171	4	1	2	INS FIN TUBE PIPG	960	11246	11246	11306	11306	0
171	400	0	0		ET/R		12016	12016	11306	11306	0
0	0	0					0	0	0	0	0

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

VICTORIA MECHANICAL COMPANY

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

RALPH J STEPHENSON P E - CONSULTANT

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

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	EARLY STRT SEQ E/S	L/S	E/F	L/F	TF
1	2	106	0		T/R TO START OF PROJECT		1026	1076	5316	5316	0
2	3	69	0	1	T/R POUR OUT 1ST FL SOG		6016	6226	8316	9226	15
2	4	69	0	2	T/R TO POUR OUT 2ND DECK		6016	6166	9076	9226	11
2	5	56	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 DCTG&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	10166	20
112	119	3	3	1	C INS RUFF ELEC CNDT&FDRS		9146	10146	9166	10186	22
135	141	3	1	2	P INS HTG&CLNG PPG IN CLG	720	9146	10196	9166	10216	25
137	142	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&FTTNGS	4800	9306	10216	10116	11016	15
153	158	4	4	2	ER INT MSNRY PARTNS		10016	10226	10066	10276	19
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 E/S	SEQ L/S	E/F	L/F	TF
128	129	5	5	1	COMP HANG DRY WALL		11016	11016	11056	11056	0
130	131	4	1	1	INS FIN TUBE PIPING	960	11086	11086	11116	11116	0
166	168	6	5	2	P HANG DRY WALL		11086	11086	11156	11156	0
131	400	12	0	1	ET/R		11126	11126	11306	11306	0
168	169	6	5	2	C HANG DRY WALL		11166	11166	11236	11236	0
170	171	4	1	2	INS FIN TUBE PIPG	960	11246	11246	11306	11306	0

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

VICTORIA MECHANICAL COMPANY

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RALPH J STEPHENSON P E - CONSULTANT

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

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	LATE STRT SEQ E/S	L/S	E/F	L/F	TF
1	2	106	0		T/R TO START OF PROJECT		1026	1026	5316	5316	0
2	7	102	0		T/R TO C EXT MSNRY&GLZNG		6016	6016	10226	10226	0
2	4	69	0	2	T/R TO POUR OUT 2ND DECK		6016	6166	9076	9226	11
2	3	65	0	1	T/R POUR OUT 1ST FL SOG		6016	6226	8316	9226	15
2	6	70	0	R	T/R TO C LAY INSUL & RFG		6016	7166	9086	10226	32
2	5	58	0	R	T/R TO C ER RF MTL DECK		6016	7206	8206	10066	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	9086	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	9266	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	16
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	156	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
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 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
116	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	6	1	2	INS TO/R PLMG RISERS	1920	9216	10126	9306	10216	15
137	152	4	3	2	P INS RUFF ELEC CNDT&FDRS		9146	10186	9176	10216	24
2	6	70	0	R	T/R TO C LAY INSUL & RFG		6016	7166	9086	10226	32
2	7	102	0		T/R TO C EXT MSNRY&GLZNG		6016	6016	10226	10226	0
122	123	4	1	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
122	123	4	3	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
121	124	3	5	1	C ER STUDS FOR DRY WALL		10046	10226	10066	10266	14
153	158	4	4	2	ER INT MSNRY PARTNS		10016	10226	10066	10276	15
125	128	5	5	1	P HANG DRY WALL		10256	10256	10296	10296	0
126	127	3	1	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
126	127	3	3	1	C INS IN WLL MECH/ELEC WK	1440	10066	10276	10126	10296	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	166	4	3	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
162	165	4	5	2	C ER STUDS FOR DRY WALL		10126	11046	10156	11076	17
130	131	4	1	1	INS FIN TUBE PIPING	960	11086	11086	11116	11116	0

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

7.18

I	J	DAYS	LOC RSP	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	7164	9086	10226	32
2	5	58	0	R	T/R TO C ER RF MTL DECK		6016	7206	8206	10066	34

Ralph J. Stephenson, P. E., P.C.
Consulting Engineer
September 25

Subject: Monitoring Report #1
New Office Facility
Highland and Moran, Keith, Iowa
Victoria Mechanical Company

Project: 76:10

Monitored from Issue #1 and 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 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

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.

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

Monitoring #2

Project Status as of morning of October 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*

Ralph J. Stephenson, P. E.
Consulting Engineer

- ***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 operations**
    Actions performed by those persons who provide the support services which make possible the production of products or performance of services by the line operations staff of an organization or business.
  - **Administrative settlement**
    A resolution of a dispute through discussion between the disputing parties and agreement upon a mutually satisfactory settlement.
  - **Adversarial**
    Taking the position of an opponent or enemy. Opposing one's interests or desires.
  - **Advisory arbitration**
    An abbreviated hearing before a neutral expert or a group of neutral experts acting as arbitrators. The neutral arbitrator or arbitrators issues an advisory award and renders prediction of the ultimate outcome if the matter is adjudicated.
  - **Advisory opinion**
    An abbreviated hearing before a neutral expert or a group of neutral experts acting as advisors. The neutrals render an advisory opinion and often predict the ultimate outcome if the matter is moved to binding resolution.
  - **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.
- **Approval**
  An official or formal consent, confirmation, or sanction.

- **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.
- **Architect, engineer ruling**
  The ruling of the architect or engineer in an issue or dispute on a construction project on which he or she is the design professional of record. Where specified the ruling may be binding if accepted as specified in the contract.
- **Articulate**
  To express oneself easily in clear and effective language
- **As-builts**
  See construction record documents
- **Assigned contractual relations**
  The interconnection of those parties bound by subsequent assignment of a contract to other than the initial parties.
- **At-risk**
  A position or action that puts an individual or organization in the position of possibly suffering harm , loss,or danger. Often the hazard poses an uncertain but potential danger.
- **At-risk construction manager**
  A manager of a construction program who takes the responsibility for paying for the construction of the project and then collecting his costs from his client under a contract with the client.
- **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 general sequence.

- 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.
- **Binding arbitration**
  A process in which opposing parties submit disputes to binding determinations by a neutral third person or panel.
- **Binding resolution**
  A third-party imposed solution to a contested claim in which the conditions are legally binding on the parties.
- **Breach of contract**
  Failure to perform all or part of a contract where there is no legal excuse for such failure.

- **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.
  - Design work (des)
    Project related work that concerns production and issuing of contract documents
  - Exterior skin (esk)
    All elements required to close the building to weather.
  - Front end work (few)
    All non construction project related work concerning real estate, financing and pre construction leasing.
  - Interior finish work (ifw)
    All interior building components that must be protected totally or in part from weather.
  - Interior rough work (irw)
    All interior building components that can be exposed totally or in part to weather.
  - Off site work (ofs)
    All work outside the property or hoarding line that is included in the project contract scope of work.
  - On site work (osi)
    All project work outside the building line and inside the property or hoarding (contract boundary) line.
  - 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.
  - 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.
  - 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.
- **Centralized project management**
  The concentration of project management authority and responsibility under one control.

- **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.
- **Charter**
  A document prepared and agreed to, by the project partnering stakeholders and containing a set of informal guidelines to successful performance in the execution of noncontract project matters. The charter is normally signed by the stakeholders and is used in conjunction with a mission statement from which the guidelines are derived, a partnering evaluation system by which noncontract practices are periodically evaluated, and an issue resolution system containing guidelines to the settlement of contested disputes about project matters.
- **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.
- **Claim prone job**
  A design and construction project that has a relatively high potential for the generation of contested claims by or against any of the at risk parties to the project.

- **Close out**
  The process of completing a construction project. Usually extends from the start of preparing the contractor's punch list through receipt of final payment to the designers and constructors. May occasionally extend through the warranty period.
- **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

- **Commissioning**
  An inspection and testing system designed to independently evaluate a facility mechanical or electrical system to insure that its installation and performance is in conformance with the requirements of the contract documents.
- **Commitment**
  The state of giving a tangible or intangible benefit in a trusting and honorable manner. The act of pledging oneself.
- **Committed costs**
  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
  - Legal fees
  - Early planning fees
  - Displeasure of political entities
  - Staff time expenditure lost
  - Loss of credibility
  - Loss of opportunity
- **Communicate**
  To convey information about, to make known or to impart knowledge, ideas, or thoughts.
- **Competition**
  The rivalry between two or more organizations to secure the patronage of prospective clients
- **Competitive**
  The act of being able to engage in competition with a reasonable probability of winning the prize awarded for being successful.
- **Conceive and communicate**
  To mentally form and develop an idea for construction of a facility, to initiate the effort to provide resources needed for design and construction of the facility, and to translate the concept of the facility into a common language from which the project can proceed through to completion and occupancy.
- **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.
- **Conflict**
  A state of disagreement and disharmony.
- **Construct**
  To convert a concept and its related plans and specifications into an actual physical environment.

- **Construction advisor**
  one who provides, as required & on request, the teaching, coaching, and guidance needed by those who manage the actual construction process from conception through programming, approval, design, construction, turnover, operation and maintenance.
- **Construction consultant**
  one who provides on an ongoing contract basis for the life of the project, the teaching, coaching, and guidance needed by those who manage the actual construction process from conception through programming, approval, design, construction, turnover, operation and maintenance.
- **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.
- **Construction manager**
  one who provides a system of managing the construction process by providing expert construction knowledge and resources throughout all phases of the project. The goal of the process is to make available to the participants, information best provided by an expert skilled in construction practices, so that when the project moves into the field the managers can provide the owner with the highest potential for project success. Services can be for construction at risk or on a services management basis only. The construction manager is responsible for delivering the project to his client.
- **Construction record documents**
  A set of annotated contract documents showing the as-constructed sizes and locations of all elements of the project which differ from the original, and subsequently issued contract documents. As-built drawings are generally called construction record drawings or documents.
- **Construction services contract**
  A legally enforceable oral or written agreement between two or more parties specifying construction-related services to be provided by one or more of the parties to other contract parties. The services generally relate to services that directly concern the relation, nature, cost, performance, or installation of specified work into specific facilities construction.
- **Constructive change**
  An owner's action or inaction that has the same effect as a written directive.
- **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.
- **Consulting services contract**
  A legally enforceable oral or written agreement between two or more parties specifying design and construction related services to be provided by one or more of the parties to other contract parties.
- **Contested claim**
  A demand or claim in which the demand is disputed.

- **Contingency**
  A program of action set out against the possibility that an unlikely or unintended event may occur.
- **Continuous**
  Uninterrupted in time; without cessation.
- **Continuum**
  A continuous or ongoing series of actions, normally uninterrupted.
- **Contract**
  A legally enforceable oral or written agreement between two or more parties specifying goods or services to be provided by one or more of the parties to others of the contract parties.
- **Contract document matrix**
  A two dimensional grid in which the rows contain action items for the various project components and the columns usually designate the geographic location of the item. At the intersection of a row and a column is inserted the designation of the contract document package in which the information is contained.
- **Contract documents**
  Usually considered to be the construction documents which provide the full definition of the scope of work for which the parties are legally responsible. Could include the agreement, the drawings, the specifications, instructions to bidders, addendum, and any other material included by mutual agreement and clearly identified as part of the contract.
- **Contract services**
  specialized services provided on demand or by request to clients by individuals or groups within the company to individuals and groups outside the company. These are provided by contract with the client.
- **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.
- **Coordinate**
  To harmonize in a common action or effort. Many design and construction consultants recommend the word not be used in contracts since it has indistinct meanings as related to management in design and construction.
- **Core ethic**
  the fundamental value statement upon which the company is built, managed and does business.
- **Cost growth**
  An increase in project costs from the expected costs, and occurring during the planning, design, construction, and occupancy phases of the line of action.
- **Cost/benefit**
  A comparative measure of benefits to be gained at a cost. A cost/benefit analysis usually establishes standards by which the benefits are given a value, and standards by which value-added is measured against what is desired, and what can be afforded. This allows the highest benefit/cost ratios to be identified within the standards adopted.

- **Credentials**
  A formal certification for a qualified person to do something for which special talents, training and education is required.
- **Critical path method**
  A mathematical modeling technique which allows the user to establish ranges within which resources can or must be used.
- **Critical transition point**
  The point in a project delivery system at which the responsibility and authority for the work passes from the supportive group to the ex'e'cutive group.
- **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.
- **Decentralize**
  To undo the centralization of management and decision making.
- **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.
- **Delegate**
  To commit powers or functions to another as one's agent or substitute.
- **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**
  Generically, to conceive in the mind, to form a plan for, and to create in an artistic and highly skilled manner.
- **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.
- **Direct negotiations**
  Conflict in which the matter in dispute is taken immediately to those that have the authority to make a final binding decision in any project related matter. These are called the ultimate decision makers.
- **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.
- **Discovery**
  The act of disclosing or being compelled to disclose data or documents that a party to a legal action is compelled to disclose to another party, often an unfriendly one, either prior to or during a legal proceeding.

- **Discrete**
  Consisting of, or characterized by distinct or individual parts; discontinuous.
- **Disincentive**
  A penalty imposed on a contract party for less-than-satisfactory performance on a project. The disincentive is usually coupled to a bonus or incentive.
- **Dispute**
  To engage in argument or discussion. To quarrel or fight about.
- **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.
- **Documentation**
  An organized collection of historical records that describe the events comprising a project or program. Also the act of preparing or supplying documents or supporting references in a project or program for future reference.

- **Due diligence**
  A process by which the legal affairs of a business are investigated and reported as part of the preparation for commercial transactions such as acquisitions, mergers, joint ventures, privatizations or general commercial contracting.
- **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. To do the right things.
- **Efficient**
  Exhibiting a high ratio of output to input. To do things right.

- **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.
- **Empathy**
  Identification with and understanding of another's situation, feelings, and motives.
- **Engineer or architect of record**
  The legally licensed architect or engineer who oversees the production of drawings and specifications from which something is to be built. The architect or engineer of record is usually required to sign and seal the documents and is liable for their correctness.
- **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.

- **Ethical**
  In accordance with the accepted principles of right and wrong that govern the conduct of individuals in a profession and in their relationships with others.
- **Everyone-must-know communications**
  An organizational communications system based on the managerial belief that if everyone in the organization knows what all or most other people in the organization are doing and working on, the organization's overall output quality will be superior.
- **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.
- **Executive**
  Of, relating to, capable of, or suited for carrying out or executing. The executing arm of the organization is that 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.
- **Financing**
  Providing the funding either or both interim and permanent for planning, designing, and constructing a facility.
- *Force majeure*
  An unexpected or uncontrollable event.
- **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 continuous management**
  Designed or adapted to perform some specialized activity or duties, usually concerned with the continuous operation of the company.
- **Functional component**
  A group 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.
- **Functionally diversified operations**
  Services that provide many specialized activities offered under one or more management organizational structures.

- **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**
  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.)
- **Geographically diversified operations**
  Services that provide specialized activities offered under one or more management organizational structures located in different physical locations.
- **Goals**
  The unquantified desires of an organization or individual expressed without time or other resources assigned. (See objectives for related definitions.)
- **Grapevine**
  The communication line for informal transmission of information, gossip, or rumor from person to person. The grapevine is often more accurate and rapid than formal transmission lines.
- **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.
- **Growth measures**
  The measurable factors which account for increased business activity of an organization. In the architectual - engineering - planning business these growth factors may include
  - Competitive forces
  - Dollar volume
  - Fee levels
  - Number of offices
  - Organizational structure
  - Productivity
  - Profit levels
  - Resource availability
  - Services offered diversity
  - Staff diversity
  - Staff size
- **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.
- **In-house work**
  Relating to activities that are managed and directed by a permanent staff of an organization.
- **Incentive**
  A bonus paid to a contract party for performing its work in a superior manner to that specified. The incentive is usually coupled to a penalty or disincentive.
- **Incentive-disincentive system**
  A payment system used in construction to pay a bonus or incentive to a contract party for performing their work in a superior manner to that specified. The bonus may relate to cost, time, quality, safety, or other such measurable component of the total job performance. If the standards set are not reached by a measurable point on the project, a disincentive is triggered where the contract party is penalized for inferior performance on the project.
- **Independent advisory opinion**
  An opinion rendered by a qualified neutral of what outcomes can be expected if certain courses of action are followed.
- **Industrial revolution**
  A complex of socioeconomic changes, such as the ones that took place in America in the 19th century and which were brought about by extensive mechanization of production systems and the use of large-scale factory production.
- **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**
  A point or matter of discussion, debate, or dispute.

- **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.
- **Judicial system**
  Of, relating to, or proper to courts of law or to the administration of justice. Decreed by or proceeding from a court of justice which is vested with the authority for such action by a set of legally dictated processes established by laws enacted by a legislature.
- **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.
- **Law**
  The actions or processes by which the rules of a society are enforced and through which redress for grievances is obtained
- **Leadership**
  The process of persuasion or example by which an individual induces a group to pursue objectives held by the leader or shared by the leader and his or her followers. - John W. Gardner

  "The art of getting someone else to do something you want done because he wants to do it" - Dwight D. Eisenhower
- **Leverage**
  The effective use of vested and earned authority to solve problems and achieve goals and objectives.
- **Liable**
  Legally obligated or responsible.
- **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.

- **Liquidated damages**
  The amount established by the parties to a contract which must be paid, by one or either of the parties, in the event of a default or a breach. Is related to the damages suffered by late performance.
- **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.
- **Long list**
  The initial list of those participants offering professional planning, design, and construction services for a particular project. This list is usually prepared by the conceiver of a proposed project from those having qualifications to do the job. The long list is narrowed to a short list from which the final selection is made. (See short list.)
- **Luck**
  Preparation meeting opportunity
- **Macro matrix elements**
  The individual elements or components of a three dimensional matrix that defines the actions needed, the skills that must be applied to do the action, and those who must take the action.
- **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 to achieve specific goals and objectives.
- **Management**
  The act and manner of defining, assembling and directing the application of resources to achieve specific goals and objectives.
- **Management by exception**
  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.
- **Manager**
  One who defines, assembles and directs the application of resources to achieve specific goals and objectives
- **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.)
- **Mentor**
  A wise and trusted counselor, coach, or teacher.
  [Mentor - a tutor in Homer's Odyssey]
- **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.
- **Mockup**
  A full-sized scale model of a structure, used for viewing, demonstration, study, or testing. Usually used in construction to obtain approval of a system, materials or a product.

- **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.
- **Multiplier**
  A number usually applied to a direct cost by someone providing a service. The product of the multiplier and the direct cost determines the actual charge to be billed for the service. The multiplier adds the overhead and profit to the direct cost.
- **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.

- **Need-to-know communications**
  An organizational communications system based on the managerial belief that information should only be offered and provided to those who truly need it and can use it to add value to the product they are responsible for producing.
- **Negotiated contract**
  A contract obtained through offering multi-value benefits in addition to cost benefits to the prospective client. Usually conditions of the final contract are negotiated after an offer has been conditionally accepted.
- **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.
- **Neutral**
  An unbiased outside expert capable of objectively listening, analyzing, and evaluating construction-related demands or claims which are in dispute and rendering an opinion or decision as to its disposition.
- **Nonbinding arbitration**
  Involves an evidentiary hearing before one or more third parties who draw conclusions regarding issues in dispute. The presentations may be condensed, as in a minitrial. The third renders a decision, but the decision is not binding on the parties. The intent is to predict the probable adjudicated outcome of the case as an stimulus to a settlement.
- **Nonbinding resolution**
  A suggested solution to a contested claim or problem in which the conditions are not legally binding on the parties but are an expert's recommendations for resolution.
- **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.
- **Off-site**
  Located outside the contract site boundaries.
- **On-site**
  Located within the contract site boundaries.
- **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.
- **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.
- **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.
- **Over-the-wall management**
  A management style which subscribes to the actions of participants completing their work responsibilities and duties, and then passing the work product along to others (or throwing it over the wall) without adequate briefing for the successors to do their work effectively. Often identified by statements such as "We did our job and now they can do theirs", or, "That's not my job."
- **Overhead**
  That portion of an organization's cost that cannot properly and accurately be allocated to any specific operation on any specific project.
- **Owner furnished items**
  Those items furnished by the owner according to the contract documents.
- **Par**
  An amount or a level considered to be average; a standard.

- **Par performance**
  A rating, usually numerical, that expresses the level of performance that will be accepted as the normal degree of competence expected of an individual or organization in the performance of an action.
- **Partnering - a 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 - 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 - organizational**
  The application of partnering systems and methods to the ongoing work and staff activities of an organization. An internal partnering system within an organization as applied to the internal work effort of the company staff.
- **Partnering - project or tactical**
  A method of applying project-specific management in the planning, design, and construction profession without the need for unnecessary, excessive and/or debilitating external party involvement.
- **Partnering - strategic**
  A formal partnering relationship that is designed to enhance the success of multi-project experiences on a long term basis.

  As each individual project must be maintained, a strategic partnership must also be maintained by periodic review of all projects currently being performed - Ida B. Brooker 1994 WEX
- **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.
- **Perception**
  The process of becoming aware of something through any of the senses. To become aware of in one's mind; to achieve an understanding of.
- **Performance document**
  A document which provides information as to the performance desired and the amount that is to be spent.

  Compare to prescriptive -oriented documents which provides detailed information as to the methods and means by which something is to be done or produced.
- **Planning**
  Establishing and arranging necessary and desired actions leading to end, intermediate and peripheral objectives.
- **Planning - in the management sense**
  Establishing and arranging necessary and desired actions leading to end, intermediate and peripheral objectives.
- **Plant Engineering Retainer Services**
  Services offered by professional architects, engineers, planners and constructors to small and medium size industries and designed to keep the organizations facility records up-to-date, and to provide on-call assistance and advice to those organizations who do not have nor can afford to maintain a full-time plant engineering staff.
- **Positive conflict**
  Hostility that is managed so that its resolution raises the potential for individuals or organizations to succeed at being excellent.
- **Prepare and publish**
  A phrase often inserted into the partnering charter to direct the stakeholders to write and implement a policy, procedure, or guideline for accomplishing a performance that may be required by contract but whose detailed nature is not specified. An example of such a charter provision might be–"Prepare and publish invoicing procedures for all levels of project operations."
- **Prescriptive document**
  A document which provides detailed information as to the methods and means by which something is to be done or produced. The document explicitly identifies the material and equipment components of the finished product.

  Compare to performance-oriented documents which describe the performance desired and the amount that is to be spent to achieve the performance in the finished product.
- **Preventive law**
  A technique for minimizing contract problems in the construction industry.
- **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.
- **Problem**
  A deviation from an accepted and/or approved standard of performance.
- **Production management**
  The action of defining, assembling and directing the application of resources to achieve design production goals and objectives. These goals and objectives are set for producing the end product of a design effort - usually a set of documents that define the construction of an environmental improvement.
- **Professional**
  Having great skill or experience in a special contributive field of work.
- **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.
- **Profit plan**
  A management tool for formalizing the firm's financial objectives in order to establish yearly financial goals, and to provide intermediate financial targets throughout the year. (adapted from Howard C. Birnberg - Project Management for Building Designers and Owners)
- **Profitability plateau**
  The leveling off of profit over a period of time due to a need for increased overhead caused by an increase in operations costs. These operations cost increases are often generated by an increased work load and the resulting added management staff required without a corresponding increase in production or direct cost income.
- **Proforma - 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>.
- **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

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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 generic construction effort**
  A major planning, design, construction, and operational construction effort made up of several projects
- **Programmed construction**
  a project management system which provides:
  - A proactive team atmosphere
  - A strong and trustful relation between project parties
  - A high profit potential
  - Strong and continuous emphasis on good project planning & scheduling
  - Encouragement to develop full project team participation

- **Project - as a set of work actions**
  A set of work actions having identifiable objectives, and a beginning and an end.
- **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 component - as related to management**
  Project component - as related to management
  A group established to achieve a set of objectives by accomplishing a set 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 management**
  The art, science and profession of defining, assembling and directing the application of resources so as to profitably execute a work effort that has identifiable objectives, and a well defined beginning and end.

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

- **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.
- **Resolution**

  A course of action determined or decided upon that can result in clearing conflict or dispute.
- **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.
- **Revisiting**
  When applied to the partnering charter, revisiting means the current project decision makers are assembled, and the present charter is reviewed, revised, and reissued as might be called for by changed project conditions.
- **Risk**
  Any exposure to the possibility of harm, danger, loss or damage to people, property, or other interest. To expose to a chance of loss or damage.

- **Risk management**
  The management and conservation of a firm's assets and earning power against the occurrence of accidental loss.
- **Safety and drug testing**
  the provision of testing, coaching, training and monitoring required to maintain a safe and legal work site.
- **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.
- **Shared savings**
  An arrangement by which a construction contractor and its client share in any savings realized by building a facility for a lower cost than the guaranteed maximum cost.
- **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.
- **Short list**
  The final selection list of those participants offering professional planning, design, and construction services, usually to the conceiver of a proposed project. Usually the final selection is made from the short list. (See long list.)

- **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**
  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.
- **Sponsor - partnering**
  In the partnering context, a person or organization that strongly supports or champions an activity and assumes responsibility for its implementation.
- **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.)
- **Stakeholders**
  The parties at risk financially and legally or in an extended sense, those affected and potentially put at risk during the execution of a planning, design, or construction contract. Stakeholders are also those who participate in writing a partnering charter and are a signatory to the charter.
- **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.
- **Standing neutral**
  A technically trained, educated, and credentialed professional who is active in the planning, design, and construction disciplines. The standing neutral must be capable of objectively listening, analyzing, and evaluating construction related demands or claims which are in dispute.
- **Standing neutral system**
  A process where neutral third parties are available to assist with resolution of all disputes arising during the course of a contractual relationship. The intent which includes dispute review boards and standing neutrals is to have one or more individuals on call to address disputes as they arise. It usually requires the neutral to render a nonbinding determination of the issues in dispute, although in some cases, and upon request, the neutral can act as a binding arbitrator.

- **Strategy**
  Applies to the management skills required to attain an macro result. Strategy is sometimes considered the action take to plan, direct, and implement larger and longer range programs, particularly in the military.

- **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 game**
  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.
- **Surety**
  One who has contracted to be responsible for another, especially one who assumes responsibilities or debts in the event of default.
- **Suspension**
  An owner's or owner's agent action of stopping all or a part of the work.
- **Synergism**
  The action of two or more substances, organs, or organisms to achieve an effect of which each is individually incapable.

- **System**
  An assemblage or combination of things or parts forming a complex or unitary whole.
- **Tactics**
  Applies to the management skills required to attain a micro or current result. Tactics may be considered the actions taken to plan, direct, and implement the day-to-day action itself.
- **Talent**
  A capacity for achieving identifiable success. Usually talent is considered an abstract resource.
- **Task force**
  A temporary grouping of individuals and resources who are responsible for accomplishing a specific objective.
- **Technography**
  The action of preparing meeting notes and related material on electronic equipment as the notes and materials are generated. Often the recorded material is projected on a screen for viewing by those in the meeting.

- **Tenant coordinator**
  The title usually given to developer's owner representative. The tenant coordinator is responsible for integrating and directing the lease execution, construction process, tenant move in, and operational start up of tenant spaces in the base building.
- **Tenant work**
  Work done by the landlord inside a tenant space, and paid for by an allowance negotiated by the landlord with the tenant when preparing and executing the lease for the space.
- **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.

  Also refers to an individual or group that is not primarily engaged in facilities programming, design, construction, or operations.
- **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**
  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.
- **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.

- **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.
- **Turn key**
  A project delivery system in which a single contractor is given the total responsibility to plan, design, construct, and turn the key over to the owner upon its completion. Often, a turnkey contractor will provide land and financing, and in some cases, operate the facility for a specified time after construction.
- **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.)
- **User**
  Those who occupy and use the completed facility to conduct their work, their recreation, their domestic living, or other activities for which the facility was specifically designed and built.

- **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.

- **Value engineering**
  An engineering and architectural cost analysis process designed to achieve minimum total cost while maintaining maximum product quality within the price constraints.
- **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.
- **Warranty**
  A legally enforceable assurance of the duration of satisfactory performance or quality of a product, a piece of equipment, or of work performed. Often the warranty period begins when the installation is turned over to the owner.
- **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.
- **World of nonwords**
  The world in which we live by our physical actions.
- **World of words**
  The world in which we live by simulating actions through words and other symbols what might happen in the world of nonwords.

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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

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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 items are added)

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.

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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

- **Project Partnering for the Design and Construction Industry** — Ralph J. Stephenson, P.E.
  John Wiley and Sons, Inc.
  New York, New York

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Retentions, Collections and Final Payment

I. **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.

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

A. **Legal background for progress payments**

1. 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..

2. Who is required to perform first?

Common law requires that performance of services precede payment.

B. **Role and obligations of the payer**

1. To maintain strong financial position that allows prompt payment when deserved
   a) Makes people want to work for you
   b) Improves potential for future reductions in proposal prices
2. To pay promptly and within the context of the contract

C. **Role and obligations of the payee**

1. To perform well and in accordance with your contract
2. To bill accurately and promptly
3. To follow the ground rules by which payments are to be made
4. Frequently the payee holds the key to successful payment for the work
5. 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.

III. **Conditions surrounding collections and payments**

A. **Unsuccessful collections & payments often result from**

1. Mistrust - Inability to work honestly with unwritten standards
2. Cupidity - Inordinate desire to get something for nothing
3. Doubtful risk taking - A high risk has a corresponding high penalty
4. Ultra conservatism - Excites suspicion and slows cash flow
5. Incompetence - Produces a lack of desire to pay or work - no incentive
6. Claim prone environment

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

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

a) Common causes of contested claims and their frequency are
   (1) Directed change - 48%
   (2) Constructive change - 42%
   (3) Defective or deficient contract documents - 41%
   (4) Delays - 41%
   (5) Constructive acceleration - 35%
   (6) Maladministration - 33%
   (7) Differing site conditions - 31%
   (8) Impossibility of performance - 18%
   (9) Superior knowledge - 18%
   (10) Termination - 7%

7. Stubbornness - A balky mule cannot be depended on to pull the wagon
8. Dishonesty - Destroys incentives to play fair and pay promptly!

B. **Successful collections & payments**

1. 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.

2. 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.

3. 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.

4. 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.

IV. **Retentions**

A. **Often used for doubtful reasons**

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

B. **The problems of retention are old and will probably remain problems until**

1. Properly addressed by the parties involved
2. There is agreement among like parties as to its impact
3. All parties to a contract behave according to their contract

C. **Attitudes and realities about retention**

1. In 1976 a survey was made of the American Subcontractors Association (ASA)
   a) Showed average retention among members was $200,000
   b) Members said would reduce bid price 3.7% if retention was eliminated

2. A recent survey of the American Subcontractors Association indicates
   a) Subcontractors are willing to give lower bids to generals who
      (1) Pay them promptly
      (2) Offer them a fair and equitable contract
   b) Of 200 respondents
      (1) 89% said they give better bids to generals regularly or occasionally
      (2) 90% did so because the general had prompt payment policies
      (3) 91% said not paid within 3 days of billings
      (4) 69% said not paid within 7 days of billings
3. Policies on retention
   a) Recent AGC, ASC and ASA policy calls for payment within 7 days of billing
   b) In 1974 GSA went to zero retention
   c) At one time Department of Defense eliminated retentions
   d) EPA once wrote retention requirements out of its grants
   e) About 1984 Michigan Dept. of Msm. & Budget adopted zero retention
      (1) Was required by the legislature
      (2) Department had 2 choices
         (a) Put money in escrow
            i) Problem - couldn't use state treasury for holding vehicle
            ii) Problem - private holding would have too complicated
               (1) Would have thousands of accounts
               (2) Prohibitively expensive and cumbersome
         (b) Adopt a policy of total payment for completed line items
            i) Each line item was to be explicit
               (1) On recent $2,000,000 job
                  (a) Had about 1100 line items
                  (b) Listed on 27 pages
                  (c) Ranged in cost from $100 to nearly $70,000
      (3) Adopted zero retention route
         (a) Some state officials like it, some hate it
         (b) Some contractors like it, some hate it
   f) In 1983 the Office of Federal Procurement Policy decided that
      (1) A uniform government wide policy should be implemented
      (2) Retainage was not to be used as a substitute for good contract management
      (3) An agency cannot withhold funds without good cause
      (4) Determinations on retainage are to be made on the basis of
         (a) Contractor's past performance
         (b) Likelihood that such performance will continue in the future
      (5) Suggested that
         (a) Retainage not exceed 10%
         (b) That it be adjusted downwards as the contract approaches completion
         (c) When contract is complete all retainage be paid promptly
4. Summary - there is no single attitude or reality re retentions!

V. Collections, or better yet, payments

A. Direct payment from the owner

1. Conventional method on self financed projects
2. Success of method depends on the integrity and competence of the owner

B. **Direct payment from another contractor**
   1. Evolved when general contractor did most of their own work
   2. The secondary payment process may be used as a club rather than a tool

C. **Direct payment from another party**
   1. Usually called the title company method
      a) Steps in the title company disbursement method
         (1) A. Monthly draw requests received from the contractors
         (2) B. Supporting documents reviewed by the appropriate tier of contractor
         (3) C. Job inspected by inspecting architect retained by payer
         (4) D. Payment made to the contractors directly
            (a) Sometimes direct to subs
            (b) Sometimes to general contractor for disbursement to subs
      b) Advantages
         (1) Insures prompt payment to contractors
         (2) Provides third party evaluation to gage performance
         (3) Gives financing source full control of the money flow
         (4) Tends to diminish tendency to front load or unbalance billings
      c) Disadvantages
         (1) Removes some of prime contractor's leverage to get work done
         (2) Creates excessive dependency on attitudes of financing source
         (3) Owner plays secondary role in motivating performance
         (4) Poorly qualified inspecting architect can create havoc
            (a) Bad attitude toward contractors
            (b) Jealousy between architect of record and inspecting architect

VI. **Final payment**

A. **Elements of record used in closing out the job**
   1. The punch list and the certificate of occupancy
      a) Usually these provide the rationale behind final payment being made
      b) You should decide early how the job is to be punched out
         (1) Who is to do it?
         (2) When is it to be done?
         (3) What standards of performance are to be used to measure acceptability
         (4) When is the contractor's punch list to be prepared?
         (5) When is the owner's punch list to be prepared?
   2. The operating and maintenance manuals
      a) Inadequate OMM submittals may be cause for non payment
      b) Get them done and get them submitted!

VII. **Where successful collections and payment start**

A. **The agreement**

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

1. Often contractors take jobs that specify impossible performance

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

Example: the withholding 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.

a) Infeasible schedules
b) Inadequate contract documents
c) Unworkable contract agreements
   (1) Multiple primes
   (2) Installation of unknown systems
   (3) Undefined responsibility patterns

B. **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.

1. Profiling a client should follows a basic pattern
2. What factors describe how a client will pay?
   a) Personal integrity
   b) Business integrity
   c) Past payment record with you
   d) Past payment record with others
   e) Current financial strength
   f) Nature of assembled project financing
   g) Process used for approving payment and releasing funds
   h) Attitudes of the architect/engineer toward you and paying
   i) Methods of closing out jobs

C. **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.

1. What factors describe a good pay project for you
   a) Your past experience in building such facilities
   b) The client's past experience in building such facilities
   c) Funding sources
      (1) Individuals
      (2) Syndicates
      (3) Trust funds
      (4) Pension funds
      (5) Political entities
   d) Payment method
      (1) Direct payment
      (2) Title company payment
      (3) Inspecting architect
      (4) Payment method specified to be used for sub contractors
      (5) Retention specified

D. **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.

1. A. Weigh each factor
   a) Weight each from one to ten as to its importance to you
      (1) One - totally unimportant to being paid
      (2) Ten - most critical to being paid

2. B. Assign values to the client and the project which you are proposing upon
   a) Values should be from one to ten
      (1) One - Client and project produce worst pay potential situation for factor
      (2) Ten - Client and project produce best pay potential situation for factor
3. C. Multiply the factor weight by the value to get a profile number
4. Example of profiling

   <u>How you might profile the payment potential of a new prospect.</u>

   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.

VIII. **Rules for getting paid promptly**
   A. **Be certain of your agreement and understand what it says**
   B. **Be honest in your dealings and your intent**
   C. **Fulfill your contract**
   D. **Avoid legal entanglements and threats**
   E. **Be willing to use the lubricating oil of small favors exchanged**

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

X. **ho 259 - March 1996**

8.44

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Master check list information - updated as of December 4, 1997

I. Overview

The project manager's master check list is designed for those involved with, or responsible for, directing, managing, planning, scheduling, expediting or closing out construction projects. It is also intended for the use of planning, programming and design professionals whose work results in the ultimate construction of a facility or the improvement of the physical environment.

As your comments are received, and as the check list sees use on actual projects I shall further elaborate on each of the five major generic work phases use presently. These are front end work (fen), programming (pgm), designing (des), constructing (con), and following up (fol).

Additions to the work phase list will be made as they are suggested and appear useful and appropriate for achieving the major uses of the check list.

II. Background

The pm master check list originated as a tabulation of construction activities that might be encountered in the network planning of a development, design, or construction project. As the list has been used by various practitioners items have been added, and the use of the list has been expanded. It can be used for making selective runs by:

- work phase
- csi codes
- general information
- responsibility codes
- submittal requirements
- who is responsible
- who is doing the work
- who is in charge
- who is liable
- target dates
- actual dates

III. Format for data runs - fields as of 12/04/97

A. Data type - describes the use of the record in relation to the management of the project of which it is a part.

1. abbreviations (abb)
   Key abbreviations used for descriptive purposes - limited where possible to three characters.
2. action (act)
   The basic name and description of what is being identified in the key fields.
3. participants (par)
   The individuals or organizations responsible for carrying out the activities on the project. Usually participants will be designated by a specific code number as they become part of the project team.

B. Sequence # - describes the work phase by number when the action, subject or meaning occurs or is used in the project line of action.

The sequence # identifies the places in the general sequence of work in which design and construction professionals often visualize actions occurring in an improvement program.

1. 01 - gen - general information about the project
   Usually used to classify data that does not fit into other work phases (fields). An example of an important general category is the list of abbreviations shown in the master check list.
2. 02 - fen - front end work
   Work which must or should occur very early in any given phase of the project and usually before the main operations of the work phase begin. For instance checking land ownership to determine if the project can be built on the site is usually a front end activity that must be done as or before detailed programming or design work starts.
3. 03 - pgm - program work
   The program writing phase defines a step in the design process where a narrative oriented statement is prepared describing 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 the program is called the brief.

   Often an action item normally encountered during the program phase will have to be deferred until the design phase because adequate information is not available at the earlier program phase. For instance reciprocal easements at a site may not be totally defined until some design and possibly construction begins.

4. 04 - des - design work
   The phase of work where detailed design studies and construction documents are prepared. The end product of the design work is a full set of contract documents from which the project can be built for the cost, within the time, and to the quality required by the proforma cost analysis and the project program.
   a) A further breakdown of the design work can be made as follows
      (1) 04.01 - sch - schematic design
      (2) 04.02 - ddv - design development
      (3) 04.03 - pcd - preliminary construction documents
      (4) 04.04 - fcd - final construction documents
      (5) 04.05 - caw - construction contract award
5. 05 - con - construction work
   The process of converting a concept and its related plans and specifications into an actual physical environment in accordance with the program and the design requirements.

   Usually the construction work phase can be broken in to several well defined parts of the building or environment. These might include the items listed below. Building parts are designated in the master pm check list as components and are defined in the component field or column (cmpt).
   a) 05.01 - caw - construction contract award
   b) 05.02 - gcr - general conditions
   c) 05.03 - siw - site work
   d) 05.04 - sbw - substructure work
   e) 05.05 - ssw - superstructure work
   f) 05.06 - esk - exterior skin work
   g) 05.07 - irw - interior rough work
   h) 05.08 - ifw - interior finish work
   i) 05.09 - usy - unit systems work
   j) 05.10 - clo - close out work
   k) 05.11 - war - warranty work

6. 06 - fol - follow up work
   A category of work that occurs as the project nears completion and occupancy, or following total completion of the project and during turnover, occupancy, and operation of the facility. This list of items is limited to very few items in the pm check list and most often are designated at close out items (clo) in the component (cmpt) column. No major list of follow up work is given in the present master check list.

C. **Action, subject or meaning - describes what major element is being defined by the codes within the line item description (record).**

D. **CSI code - describes the master spec. section in accordance with the generic spec. section to which the work is assigned by the CSI and most other major information providers.**

E. **Work phase - describes the work phase by alphabetic characters in place of numbers.**

Note: this is a redundant set of data and duplicates the data shown in the sequence # column described above.

01 - General (gen)
02 - Front end work (fen)
03 - Program (pgm)
04 - Design (des)
05 - Construction (con)
06 - Follow up (fol)

F. **Component of project (cmpt) - provides supplementary information about actions, subjects and meanings**

1. aba - abatement work
2. adm - administrative work
3. cde - code and ordinance work
4. clo - close out work
5. con - construction work
6. cos - cost & estimating work
7. cot - contracts work
8. cst - costing work
9. ctr - contract preparation & execution work
10. dem - demolition work
11. des - design work
12. eas - easement work
13. env - environmental work
14. esk - exterior skin work
15. fen - front end work
16. fin - finance work
17. frw - front end work
18. gcr - general conditions & requirements work
19. ifw - interior finish work
20. ins - insurance
21. irw - interior rough work
22. isp - inspection work
23. mgt - management work
24. mkt - marketing work
25. ofs - off site work

26. ons - on site work
27. pas - planning & scheduling work
28. per - permitting work
29. pgm - program work
30. pro - procurement work
31. reg - regulatory work
32. rep - reporting work
33. res - real estate work
34. sbw - substructure work
35. sit - site work
36. siw - site work
37. ssw - superstructure work
38. sub - submittal work
39. tes - testing work
40. trf - traffic related work
41. usy - unit systems work
42. utl - utility work
43. ven - value engineering
44. war - warranty work
45. zon - zoning work

G. **Responsibility code - Identifies individual or organization responsible for action**

Master Project Management Check List - d608 - listed by seq, data type & cmpt

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rec #	data type	seq	action, subject or meaning	csi code	wk phase	cmpt	resp code
1	abb	01/	- PAR - PARTY				
2	abb	01/	- ABB - ABBREVIATIONS		gen/	abb/	
3	abb	01/	- ACT - ACTION		gen/	abb/	
4	abb	01/	- RSP - RESPONSIBILITY CODES		gen/	rsp/	
5	par	01/	STEEL ERECTOR	005/	gen/	gen/rsp/	
6	par	01/	CAISSON CONTRACTOR	002/	gen/	gen/rsp/	
7	par	01/	PAINTING CONTRACTOR	009/	gen/	gen/rsp/	
8	par	01/	RESTEEL SUPPLIER	003/	gen/	gen/rsp/	
9	par	01/	DRYWALL CONTRACTOR	009/	gen/	gen/rsp/	
10	par	01/	STRUCTURAL STEEL CONTRACTOR	005/	gen/	gen/rsp/	
11	par	01/	STATE AGENCIES	001/	gen/	gen/rsp/	
12	par	01/	MUNICIPAL AGENCIES	001/	gen/	gen/rsp/	
13	par	01/	COUNTY AGENCIES	001/	gen/	gen/rsp/	
14	par	01/	ROLLING CURTAIN CONTRACTOR	008/	gen/	gen/rsp/	
15	par	01/	ROOF TOP UNIT FABRICATOR	015/	gen/	gen/rsp/	
16	par	01/	PAVING CONTRACTOR	003/	gen/	gen/rsp/	
17	par	01/	ACOUSTIC CONTRACTOR	009/	gen/	gen/rsp/	
18	par	01/	FIRE MARSHALL	001/	gen/	gen/rsp/	
19	par	01/	ROOFING CONTRACTOR	007/	gen/	gen/rsp/	
20	par	01/	CONCRETE CONTRACTOR	003/	gen/	gen/rsp/	
21	par	01/	HVAC CONTRACTOR	015/	gen/	gen/rsp/	
22	par	01/	ARCHITECT/ENGINEER	001/	gen/	gen/rsp/	
23	par	01/	OSR (ON SITE REPRESENTATIVE)	001/	gen/	gen/rsp/	
24	par	01/	HOLLOW METAL FABRICATOR	008/	gen/	gen/rsp/	
25	par	01/	SLIDING DOOR CONTRACTOR	008/	gen/	gen/rsp/	
26	par	01/	OVERHEAD DOOR CONTRACTOR	008/	gen/	gen/rsp/	
27	par	01/	GAS COMPANY	001/	gen/	gen/rsp/	
28	par	01/	PRECAST ERECTOR	003/	gen/	gen/rsp/	
29	par	01/	METAL DECK CONTRACTOR	005/	gen/	gen/rsp/	
30	par	01/	EXCAVATION CONTRACTOR	002/	gen/	gen/rsp/	
31	par	01/	GENERAL CONTRACTOR	001/	gen/	gen/rsp/	
32	par	01/	CARPENTRY CONTRACTOR	006/	gen/	gen/rsp/	
33	par	01/	MECHANICAL CONTRACTOR	015/	gen/	gen/rsp/	
34	par	01/	HARDWARE INSTALLER	008/	gen/	gen/rsp/	
35	par	01/	GLASS AND GLAZING CONTRACTOR	008/	gen/	gen/rsp/	

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rec #	data type	seq	action, subject or meaning	csi code	wk phase	cmpt	resp code
36	par	01/	MISCELLANEOUS IRON CONTRACTOR	005/	gen/	gen/rsp/	
37	par	01/	ELECTRICAL CONTRACTOR	016/	gen/	gen/rsp/	
38	par	01/	SPRINKLER CONTRACTOR	015/	gen/	gen/rsp/	
39	par	01/	RESILLIENT FLOOR TILE CONTRACTOR	009/	gen/	gen/rsp/	
40	par	01/	HARD TILE CONTRACTOR	009/	gen/	gen/rsp/	
41	par	01/	FOOD SERVICE EQUIPMENT CONTRACTOR	011/	gen/	gen/rsp/	
42	par	01/	TOILET PARTITION CONTRACTOR	010/	gen/	gen/rsp/	
43	par	01/	LANDSCAPE CONTRACTOR	002/	gen/	gen/rsp/	
44	par	01/	FOLDING PARTITION CONTRACTOR	010/	gen/	gen/rsp/	
45	par	01/	DOCK LEVELLER CONTRACTOR	011/	gen/	gen/rsp/	
46	par	01/	MILLWORK CONTRACTOR	006/	gen/	gen/rsp/	
47	par	01/	INSURANCE RATE SETTER	001/	gen/	gen/rsp/	
48	par	01/	SITE UTILITY CONTRACTOR	002/	gen/	gen/rsp/	
49	par	01/	IRRIGATION CONTRACTOR	002/	gen/	gen/rsp/	
50	par	01/	POWER COMPANY	001/	gen/	gen/rsp/	
51	par	01/	STRIPING CONTRACTOR	009/	gen/	gen/rsp/	
52	par	01/	DEPARTMENT OF PUBLIC WORKS	001/	gen/	gen/rsp/	
53	par	01/	DEPARTMENT OF TRANSPORTATION	001/	gen/	gen/rsp/	
54	par	01/	FIRE EXTINGUISHER CONTRACTOR	010/	gen/	gen/rsp/	
55	par	01/	FEDERAL AGENCIES	001/	gen/	gen/rsp/	
56	par	01/	SIGNAGE CONTRACTOR	010/	gen/	gen/rsp/	
57	par	01/	DATA PHONE SYSTEM	016/	gen/	gen/rsp/	
58	par	01/	TELEPHONE COMPANY	016/	gen/	gen/rsp/	
59	par	01/	- RSP - RESPONSIBILITY CODES		gen/	gen/rsp/	
60	abb	01/02/03/ 04/05/	- AGR - AGREEMENTS		gen/fen/ pgm/des/	agr/	
61	abb	01/02/03/ 04/05/	- BUS - BUSINESS NEGOTIATIONS		gen/fen/ pgm/des/	bus/	
62	abb	01/02/03/ 04/05/	- CDE - CODE & ORDINANCE WORK		gen/fen/ pgm/des/	cde/	
63	abb	01/02/03/ 04/05/	- CMPT - COMPONENT		gen/fen/ des/pgm/	cmpt/	
64	abb	01/02/03/ 04/05/	- COS - COST & ESTIMATING WORK		genfen/p gm/des/c	cos/	
65	abb	01/02/03/ 04/05/	- CTR - CONTRACT PREPARATION AND EXECUTION WORK		gen/fen/ pgm/des/	ctr/	
66	abb	01/02/03/ 04/05/	- EAS - EASEMENT WORK		gen/fen/ pgm/des/	eas/	
67	abb	01/02/03/ 04/05/	- FEN - FRONT END WORK		gen/fen/ pgm/des/	fen/	
68	abb	01/02/03/ 04/05/	- MKT - MARKET CONSIDERATIONS		gen/fen/ pgm/des/	mkt/	
69	abb	01/02/03/ 04/05/	- REG - REGULATORY WORK		gen/fen/ pgm/des/	reg/	
70	abb	01/02/03/ 04/05/	- RES - REAL ESTATE		gen/fen/ pgm/des/	res/	

rec #	data type	seq	action, subject or meaning	csi code	wk phase	cmpt	resp code
71	abb	01/02/03/04/05	- GEN - GENERAL CONSTRUCTION RELATED		gen/fen/pgm/des/	seq/	
72	abb	01/02/03/04/05/	- VAC - VACATION OF BUILDINGS OR LAND		gen/fen/pgm/con	vac/	
73	abb	01/02/03/04/05	- ZON - ZONING WORK		gen/fen/pgm/des/	zon/	
74	abb	01/03/04/	- PDE - PRELIMINARY DESIGN		gen/pgm/des/	pde/	
75	abb	01/03/04/05/	- ADM - ADMINISTRATION		gen/pgm/des/con/	adm/	
76	abb	01/03/04/05/	- APR - APPROVAL		gen/pgm/des/con/	apv/	
77	abb	01/03/04/05/	- COT - CONTRACTS		gen/pgm/des/con/	cot/	
78	abb	01/03/04/05/	- CST - COSTING		gen/pgm/des/con/	cst/	
79	abb	01/03/04/05/	- EAS - EASEMENTS		gen/pgm/des/con/	eas/	
80	abb	01/03/04/05/	- FIN - FINANCE		gen/pgm/des/con/	fin/	
81	abb	01/03/04/05/	- MGT - MANAGEMENT		gen/pgm/des/con/	mgt/	
82	abb	01/03/04/05/	- PAS - PLANNING & SCHEDULING		gen/pgm/des/con/	pas/	
83	abb	01/03/04/05/	- PER - PERMIT WORK		gen/pgm/des/con/	per/	
84	abb	01/04	- DDE - DESIGN DEVELOPMENT		gen/des/	dde/	
85	abb	01/04/	- DES - DESIGN WORK		gen/des/	des/	
86	abb	01/04/	- DES - DESIGN		gen/des/	des/	
87	abb	01/04/	- PRG - PROJECT DESIGN PROGRAM WORK		gen/des/	prg/	
88	abb	01/04/	- SDE - SCHEMATIC DESIGN		gem/des/	sde/	
89	abb	01/04/05/	- COD - CONTRACT DOCUMENTS		gen/des/con/	cod/	
90	abb	01/04/05/	- GCR - GENERAL CONDITIONS & REQUIREMENTS		gen/des/con/	gcr/	
91	abb	01/04/05/	- MKP - MOCK UP		gen/des/con/	mkp/	
92	abb	01/05/	- CCU - CURB CUT		gen/con/	ccu/	
93	abb	01/05/	- CLO - CLOSE OUT		gen/con/	clo/	
94	abb	01/05/	- CON - CONSTRUCTION		gen/con/	con/	
95	abb	01/05/	- CSQ - CONSTRUCTION SEQUENCE		gen/con/	csq/	
96	abb	01/05/	- DEM - DEMOLITION WORK		gen/con/	dem/	
97	abb	01/05/	- DEM - DEMOLITION WORK		gen/con/	dem/	
98	abb	01/05/	- ESK - EXTERIOR SKIN WORK		gen/con/	esk/	
99	abb	01/05/	- IFW - INTERIOR FINISH WORK		gen/con/	ifw/	
100	abb	01/05/	- IRW - INTERIOR ROUGH WORK		gen/con/	irw/	
101	abb	01/05/	- OFS - OFF SITE WORK		gen/con/	ofs/	
102	abb	01/05/	- ONS - ON SITE WORK		gen/con/	ons/	
103	abb	01/05/	- PRO - PROCUREMENT WORK		gen/con/	pro/	
104	abb	01/05/	- SBW - SUBSTRUCTURE WORK		gen/con/	sbw/	
105	abb	01/05/	- SIT - SITE WORK		gen/con/	siw/	

rec #	data type	seq	action, subject or meaning	csi code	wk phase	cmpt	resp code
106	abb	01/05/	- SIW - SITE WORK		gen/con/	siw/	
107	abb	01/05/	- SSW- SUPER STRUCTURE WORK		gen/con/	ssw/	
108	abb	01/05/	- USY - UNIT SYSTEMS WORK		gen/con/	usy/	
109	abb	02/	- PGM - PROGRAM		pgm/	seq/	
110	act	02/03//04/05/	OBTAIN PERMANENT & INTERIM FINANCING INFORMATION AS REQUIRED		fen/pgm/des/con/	fin/fen/pgm/des/con	
111	act	02/03/04/	PREPARE PRO FORMA COST ANALYSES		fen/pgm/des/	cos/fin/fen/pgm/des/	
112	act	02/03/04/	SELECT CONSTRUCTION ADVISORS OR CONSULTANTS AS REQUIRED		fen/pgm/des/	fen/des/pgm /	
113	act	02/03/04/	SELECT DESIGN ARCHITECT		fen/pgm/des/	fen/pgm/des/	
114	act	02/03/04/	SELECT TRAFFIC CONSULTANT		fen/pgm/des/	fen/pgm/des/	
115	act	02/03/04/	SELECT PRODUCTION ARCHITECT		fen/pgm/des	fen/pgm/des/	
116	act	02/03/04/	SELECT SITE ENGINEER		fen/pgm/des/	fen/pgm/des/	
117	act	02/03/04/	SELECT ELECTRICAL ENGINEER		fen/pgm/des/	fen/pgm/des/	
118	act	02/03/04/	SELECT MECHANICAL ENGINEER		fen/pgm/des/	fen/pgm/des/	
119	act	02/03/04/	SELECT STRUCTURAL ENGINEER		fen/pgm/des/	fen/pgm/des/	
120	act	02/03/04	PREPARE AND SUBMIT MARKET ABSORBTION RATE STUDIES		fen/pgm/des/	fen/pgm/des/fin/	
121	act	02/03/04/	REVIEW & APPROVE ENVIRONMENTAL IMPACT STATEMENTS	001	fen/pgm/des/	fen/pgm/des/reg/	
122	act	02/03/04/	RESOLVE PROPERTY USE RESTRICTIONS		fen/pgm/des/	fen/pgm/des/res/	
123	act	02/03/04/	REZONE PROPERTIES AS REQUIRED		fen/pgm/des/	fen/pgm/des/res/zon	
124	act	02/03/04/	PREPARE ALTA/ACSM LAND TITLE SURVEY		fen/pgm/des/	fen/res/des/pgm/	
125	act	02/03/04/	CHECK AND CLEAR ALL ASSESSMENTS AGAINST THE PROPERTY		fen/pgm/des/	fen/res/des/pgm/	
126	act	02/03/04/	LOCATE SITES		fen/pgm/des/	fen/res/pgm/des/	
127	act	02/03/04/	ACQUIRE CONTROL OF PROPERTY		fen/pgm/des/	fen/res/pgm/des/	
128	act	02/03/04/	PREPARE MARKET STUDIES		fen/pgm/des/	pgm/fen/des/	
129	act	02/03/04/	CHECK LAND OWNERSHIP TO DETERMINE IF PROJECT CAN BE BUILT ON SITE		fen/pgm/des/	res/pgm/fen/des/	
130	act	02/03/04/05/	PREPARE AND OBTAIN REQUIRED EASEMENTS		fen/pgm/des/con/	eas/fen/pgm/des/con	
131	act	02/03/04/05/	NEGOTIATE AND EXECUTE ALL PRIVATE EASEMENTS AT SITE		fen/pgm/des/con/	eas/fen/pgm/des/con	
132	act	02/03/04/05/	NEGOTIATE AND EXECUTE ALL RECIPROCAL ACCESS EASEMENTS AT SITE		fen/pgm/des/con/	eas/fen/pgm/des/con	
133	act	02/03/04/05/	NEGOTIATE AND EXECUTE ALL SEMI PUBLIC EASEMENTS AT SITE		fen/pgm/des/con/	eas/fen/pgm/des/con	
134	act	02/03/04/05/	DECIDE ON AND DESCRIBE ALL SEMI PUBLIC UTILITY EASEMENTS AT SITE		fen/pgm/des/con/	eas/fen/pgm/des/con	
135	act	02/03/04/05/	DECIDE ON AND DESCRIBE ALL RECIPROCAL ACCESS EASEMENTS AT SITE		fen/pgm/des/con/	eas/fen/pgm/des/con	
136	act	02/03/04/05/	DECIDE ON AND DESCRIBE ALL PUBLIC UTILITY EASEMENTS AT SITE		fen/pgm/des/con/	eas/fen/pgm/des/con	
137	act	02/03/04/05/	DECIDE ON AND DESCRIBE ALL PRIVATE EASEMENTS AT SITE		fen/pgm/des/con/	eas/fen/pgm/des/con	
138	act	02/03/04/05/	NEGOTIATE AND EXECUTE ALL PUBLIC UTILITY EASEMENTS AT SITE		fen/pgm/des/con/	eas/fen/pgm/des/con	
139	act	02/03/04/05/	PREPARE & OBTAIN ALL STREET RELOCATION EASEMENTS		fen/pgm/des/con/	eas/fen/pgm/des/con	
140	act	02/03/04/05/	SET PROJECT DELIVERY SYSTEM TO BE USED		fen/pgm/des/con/	fen/des/con/pgm	

rec #	data type	seq	action, subject or meaning	csi code	wk phase	cmpt	resp code
141	act	02/03/04/05/	PREPARE & SUBMIT ENVIRONMENTAL IMPACT STATEMENTS		fen/pgm/des/con/	fen/env/pgm/des/con	
142	act	02/03/04/05/	IDENTIFY PROJECT ULTIMATE DECISION MAKERS		fen/pgm/des/con/	fen/mgt/pgm/des/con	
143	act	02/03/04/05/	OBTAIN SITE TOPOGRAPHICS, BOUNDARY, BOUNDARY & UTILITY SURVEYS		fen/pgm/des/con/	fen/pgm/des/con/	
144	act	02/03/04/05/	APPLY FOR REGULATORY AGENCY APPROVALS		fen/pgm/des/con/	fen/pgm/des/con/	
145	act	02/03/04/05/	SELECT GEOTECHNICAL ENGINEER		fen/pgm/des/con/	fen/pgm/des/con/	
146	act	02/03/04/05/	INSURE INTERNAL STAFF WAGE AGREEMENTS ARE IN PLACE		fen/pgm/des/con/	fen/pgm/des/con/ad	
147	act	02/03/04/05	APPLY FOR & OBTAIN ENVIRONMENTAL PERMITS REQUIRED	001/	fen/pgm/des/con/	fen/pgm/des/con/env	
148	act	02/03/04/05/	IDENTIFY ULTIMATE DECISION MAKER		fen/pgm/des/con/	fen/pgm/des/con/mgt	
149	act	02/03/04/05/	IDENTIFY RELATIONS AMONG PARTIES		fen/pgm/des/con/	fen/pgm/des/con/mgt	
150	act	02/03/04/05/	SET PROJECT MISSION, GOALS & OBJECTIVES		fen/pgm/des/con/	fen/pgm/des/con/mgt	
151	act	02/03/04/05/	REVALIDATE YOUR FIRM'S ABILITY TO DO THE JOB		fen/pgm/des/con/	fen/pgm/des/con/mgt	
152	act	02/03/04/05/	DECIDE ON PROJECT DELIVERY SYSTEM TO BE USED		fen/pgm/des/con/	fen/pgm/des/con/mgt	
153	act	02/03/04/05/	APPLY FOR & OBTAIN WATERWAY WORK PERMITS		fen/pgm/des/con/	fen/pgm/des/con/per	
154	act	02/03/04/05	OBTAIN PERMITS FROM CORPS OF ENGINEERS AS REQUIRED		fen/pgm/des/con/	fen/pgm/des/con/per	
155	act	02/03/04/05/	OBTAIN TEMPORARY & PERMANENT FINANCING		fen/pgm/des/con/	fen/pgm/fin/des/con/	
156	act	02/03/04/05/	DETERMINE FINANCIAL SOUNDNESS OF CLIENT		fen/pgm/des/con/	fen/pgm/fin/des/con/	
157	act	02/03/04/05/	OBTAIN INTERIM FINANCING		fen/pgm/des/con/	fen/pgm/fin/des/con/	
158	act	02/03/04/05	PREPARE & SUBMIT ENVIRONMENTAL IMPACT STATEMENT	001/	fen/pgm/des/con/	fen/pgm/reg/env/des	
159	act	02/03/04/05	PREPARE AND SUBMIT TRAFFIC STUDIES OF SITE AREA		fen/pgm/des/con/	fen/pgm/trf/sit/des/co	
160	act	02/03/04/05/	OBTAIN OR PREPARE ALL EASEMENTS FOR STREET RELOCATION		fen/pgm/des/con/	fen/reg/eas/des/con/p	
161	act	02/03/04/05	REVIEW & APPROVE ENVIRONMENTAL IMPACT STATEMENT	001/	fen/pgm/des/con/	fen/reg/env/des/con/	
162	act	02/03/04/05/	CHECK ALL ASSESTS AND RESOLVE OUTSTANDING LIABILITY COMMITMENTS		fen/pgm/des/con/	fen/res/pgm/des/con	
163	utl	02/03/04/05/	- UTL - UTILITY WORK		fen/pgm/des/con/	cmpt	
164	act	02/04/	APPLY FOR AND OBTAIN SITE PLAN APPROVAL		fen/des/	fen/sit/des/	
165	act	02/04/05/	IDENTIFY EASEMENTS & RESTRICTIONS THAT IMPACT ON FIELD WORK		fen/des/con/	eas/fen/des/con/	
166	act	02/04/05/	OBTAIN NOTICE TO PROCEED IF APPROPRIATE	001/	fen/des/con/	fen/adm/des/con/	
167	act	02/04/05	REVIEW APPLICABLE LIEN LAWS & CONVEY INFORMATION TO THOSE CONCERNED	001/	fen/des/con/	fen/adm/des/con/	
168	act	02/04/05	OBTAIN HIGHWAY PERMITS FOR ROAD IMPROVEMENTS	001/	fen/des/con/	fen/con/per/des/	
169	act	02/04/05	EXECUTE CONSTRUCTION CONTRACTS WITH CLIENTS	001/	fen/des/con/	fen/ctr/des/con/	
170	act	02/04/05/	PREPARE LIST OF ALLOWANCES AND REVIEW WITH PROJECT STAFF	001/	fen/des/con/	fen/des/con/	
171	act	02/04/05/	MAKE FULL REVIEW OF CONSTRUCTION DRAWINGS		fen/des/con/	fen/des/con/	
172	act	02/04/05/	ESTABLISH AND TABULATE KEY PROJECT DATES, AND REVIEW WITH PROJECT TEAM	001/	fen/des/con/	fen/des/con/	
173	act	02/04/05	IDENTIFY NATURE OF LABOR FORCE FOR PROJECT		fen/des/con/	fen/des/con/	
174	act	02/04/05/	PREPARE & SUBMIT APPROVAL PROCEDURES TO BE USED		fen/des/con/	fen/des/con/	
175	act	02/04/05/	ESTABLISH PLAN ROOM PROCEDURES FOR PROJECT	001/	fen/des/con/	fen/des/con/	

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176	act	02/04/05	ARRANGE FOR AND MAKE VIDEO & SOUND RECORDS		fen/des/con/	fen/des/con/	
177	act	02/04/05/	MAKE VIDEO TAPE RECONASSAINCE OF SITE BEFORE STARTING DESIGN & CONSTRUCTION	001/	fen/des/con/	fen/des/con/gcr/	
178	act	02/04/05/	SET PROCEDURES FOR ALL JOB RELATED MEETINGS		fen/deslcon/	fen/des/con/mgt/	
179	act	02/04/05	OBTAIN SOIL BORINGS AND SUBSOIL ANALYSES	002/	fen/des/con/	fen/des/con/sbw/	
180	act	02/04/05	MAKE PRECONSTRUCTION SITE RECONNAISSANCE - PHONE, SOUND, TV	001/	fen/des/con/	fen/des/con/sit/	
181	act	02/04/05	APPLY FOR TEMPORARY UTILITY SERVICES	001/	fen/des/con/	fen/des/utl/con/	
182	act	02/04/05/	DETERMINE APPLICABLE UTILITY EASEMENTS & CONFIRM CLEARANCE TO START WORK	001/	fen/des/con/	fen/eas/des/con/	
183	act	02/04/05	DETERMINE SITE ACCESS REQUIREMENTS DURING CONSTRUCTION	001/	fen/des/con/	fen/gcr/si/des/con	
184	act	02/04/05/	VALIDATE YOUR FIRM'S ABILITY TO MEET INSURANCE REQUIREMENTS	001/	fen/des/con/	fen/ins/des/con/adm/	
185	act	02/04/05	IDENTIFY RELATIONS AMONG PARTIES DURING CONSTRUCTION		fen/des/con/	fen/mgt/des/con/	
186	act	02/04/05/	READ CONSTRUCTION SPECIFICATIONS AND CONTRACTS	001/	fen/des/con/	fen/mgt/des/con/	
187	act	02/04/05	APPLY FOR PERMANENT UTILITY SERVICES	001	fen/des/con/	fen/utl/des/con/	
188	act	02/05/	PREPARE BLANKET PURCHASE ORDER SYSTEM	001/	fen/con/	adm/fen/de/con/	
189	act	02/05/	PREPARE MASTER LABOR & MATERIAL BUDGETS	001/	fen/con/	con/fen/cos/	
190	act	02/05/	PREPARE & DISTRIBUTE BUY-OUT ESTIMATE AS REQUIRED	001/	fen/con/	con/fen/pro/	
191	act	02/05/	REVIEW BULLETIN, CHANGE ORDER & FIELD ORDER PROCEDURES WITH SUBCONTRACTORS	001/	fen/con/	fen/adm/con/	
192	act	02/05/	PREPARE SCHEDULE OF VALUES FOR PAYMENT REQUESTS	001/	fen/con/	fen/adm/con/	
193	act	02/05/	REVIEW EMPLOYEE SITE CONDUCT GUIDELINES WITH SUBCONTRACTORS	001/	fen/con/	fen/adm/con/	
194	act	02/05/	OBTAIN EMERGENCY PHONE NUMBERS FOR SUBCONTRACTORS	001/	fen/con/	fen/adm/con/	
195	act	02/05/	OBTAIN FIELD OFFICE PHONES AND DISTRIBUTE NUMBER	001/	fen/con/	fen/adm/con/	
196	act	02/05/	REVIEW BILLING PROCEDURES WITH SUBCONTRACTORS	001/	fen/con/	fen/adm/con/	
197	act	02/05/	DETERMINE SCOPE & NATURE OF LABOR AGREEMENTS & DISCUSS WITH PROJECT TEAM	001/	fen/con/	fen/adm/con/	
198	act	02/05/	NOTIFY FIELD STAFF AND OTHERS CONCERNED REGARDING ALTERNATES SELECTED	001/	fen/con/	fen/adm/con/	
199	act	02/05/	OBTAIN BUILDER'S RISK AND LIABILITY INSURANCE	001/	fen/con/	fen/adm/con/ins/	
200	act	02/05/	OBTAIN FIRE AND THEFT INSURANCE	001/	fen/con/	fen/adm/con/ins/	
201	act	02/05/	PROVIDE OWNER WITH INSURANCE CERTIFICATES AS REQUIRED	001/	fen/con/	fen/adm/con/ins/	
202	act	02/05/	OBTAIN SUBCONTRACTOR INSURANCE CERTIFICATES	001/	fen/con/	fen/adm/con/ins/	
203	act	02/05/	SET & IMPLEMENT SAFETY PROGRAM	001/	fen/con/	fen/adm/con/reg/	
204	act	02/05/	PREPARE & DISTRIBUTE CONSTRUCTION JOB SITE PLAN	001/	fen/con/	fen/adm/sit/gcr/con/	
205	act	02/05/	INSPECT JOB SITE BEFORE MOBILIZE & MOVE IN	002/	fen/con/	fen/con/	
206	act	02/05/	OBTAIN ALL SITE CLEARANCES NEEDED TO BEGIN AND MAINTAIN CONSTRUCTION WORK	002/	fen/con/	fen/con/	
207	act	02/05/	PROVIDE NOTICE OF START OF WORK AS REQUIRED	001/	fen/con/	fen/con/	
208	act	02/05/	PREPARE AND DISTRIBUTE SUBCONTRACTOR LIST	001/	fen/con/	fen/con/	
209	act	02/05/	SET & HOOK UP JOB SITE CLOTHES CHANGING FACILITIES FOR TRADES	001/	fen/con/	fen/con/	
210	act	02/05/	SET UP FIELD BANK ACCOUNTS AS NEEDED	001/	fen/con/	fen/con/adm/	

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211	act	02/05/	OBTAIN BONDS, INSURANCE & LICENSES AS REQUIRED	001/	fen/con/	fen/con/adm /	
212	act	02/05/	REVIEW EMPLOYEE SITE CONDUCT GUIDELINES WITH INTERNAL STAFF	001/	fen/con/	fen/con/adm /	
213	act	02/05/	ARRANGE FOR & TAKE ONGOING CONSTRUCTION PHOTOS	001	fen/con/	fen/con/adm /	
214	act	02/05/	SET & HOOK UP JOB SITE OFFICES	001/	fen/con/	fen/con/gcr /	
215	act	02/05/	SET & HOOK UP JOB SITE STORAGE FACILITIES	001/	fen/con/	fen/con/gcr /	
216	act	02/05/	IDENTIFY ALL GENERAL REQUIREMENTS & CONDITION ITEMS	001/	fen/con/	fen/con/gcr /	
217	act	02/05/	INSTALL JOB SITE PHONES	001/	fen/con/	fen/con/gcr /	
218	act	02/05/	REVIEW SITE PLAN AND SITE SPACE ALLOCATION WITH SUBCONTRCTORS	001/	fen/con/	fen/con/sit/gcr/	
219	act	02/05/	INSTALL JOB SITE TEMPORARY WATER	001/	fen/con/	fen/con/sit/gcr/	
220	act	02/05/	INSTALL JOB SITE TEMPORARY TOILETS	001/	fen/con/	fen/con/uti /	
221	act	02/05/	PROVIDE CONSTRUCTION SUPT WITH SUBCONTRACT PURCHASE ORDERS SHOWING WK SCOPE OF SUBCONTRACTS	001/	fen/con/	fen/cot/adm/con/	
222	act	02/05/	ASSEMBLE AND ORGANIZE PROJECT CONSTRUCTION TEAM		fen/con/	fen/mgt/con /	
223	abb	03/	- FEN - FRONT END WORK		fen/	seq/	
224	act	03/04/	CHECK PARKING REQUIREMENTS		pgm/des/	cde/pgm/des/	
225	act	03/04/	MAKE PRELIM CODE REVIEW OF EARLY DESIGN PACKAGES		pgm/des/	cde/pgm/des/	
226	act	03/04/	NEGOTIATE AND EXECUTE CONSTRUC- TION ADVISOR CONTRACTS AS REQUIRED		pgm/des/	ctr/pgm/des/	
227	act	03/04/	REVIEW PROJECT PROGRAM NEEDS AND DESIRE WITH OWNER		pgm/des/	pgm/des/	
228	act	03/04/	SELECT CONSTRUCTION DESIGN CHARACTERISTICS & SYSTEMS		pgm/des/	pgm/des/	
229	act	03/04/	WRITE FACILITY PROGRAM		pgm/des/	pgm/des/	
230	act	03/04/	REVIEW PROJECT PROGRAM NEEDS AND DESIRES WITH ARCHITECT/ENGINEER		pgm/des/	pgm/des/	
231	act	03/04/	DETERMINE SCOPE OF WORK FOR ALL OFF SITE CONSTRUCTION REQUIRED	002/	pgm/des/	pgm/des/	
232	act	03/04/	DETERMINE ELEVATOR REQUIREMENTS		pgm/des/	pgm/des/	
233	act	03/04/	PREPARE PROJECT PROGRAM		pgm/des/	pgm/des/	
234	act	03/04/	REVIEW AND APPROVE PROJECT PROGRAM		pgm/des/	pgm/des/	
235	act	03/04/	DETERMINE ELECTRICAL DEMAND LOADS	016/	pgm/des/	pgm/des/utl/	
236	act	03/04/	DETERMINE PHONE DEMAND LOADS	016/	pgm/des/	pgm/des/utl/	
237	act	03/04/	DETERMINE GAS DEMAND LOADS	015/	pgm/des/	pgm/des/utl/	
238	act	03/04/	OBTAIN VARIANCES TO LAND USE ORDINANCES AS REQUIRED		pgm/des/	res/reg/pgm/des/	
239	act	03/04/05/	REVIEW CLIENT CONTRACT	001	pgm/des/con/	adm/cot/des/con/pg	
240	act	03/04/05/	OBTAIN PERMANENT FINANCING		pgm/des/con/	fin/des/con/pgm/	
241	act	03/04/05/	REVIEW ALL EXOTIC MATERIALS TO BE USED WITH PROJECT STAFF		pgm/des/con/	pgm/des/con/	
242	act	03/04/05/	OBTAIN COPIES OF APPLICABLE CODES AND ORDINANCES		pgm/des/con/	pgm/des/con/	
243	act	03/04/05/	PREPARE AND DISTRIBUTE PROJECT ORGANIZATION CHART		pgm/des/con/	pgm/des/con/adm/	
244	act	03/04/05/	ESTABLISH SCOPE OF OFF-SITE WORK REQUIRED BY YOU AND BY OTHERS		pgm/des/con/	pgm/des/con/ofs/siw	
245	act	03/04/05/	IDENTIFY LONG LEAD OR HARD TO PROCURE ITEMS AND DISCUSS WITH PROJECT STAFF		pgm/des/con/	pgm/des/con/pro/	

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246	act	03/04/05/	PREPARE & SUBMIT VALUE ENGINEERING ANALYSIS	001/	pgm/des/con/	pgm/des/con/ven/	
247	act	03/04/05/	REMOVE CONTAMINANTS FROM SITE AS REQUIRED	001/	pgm/des/con/	reg/pgm/des/aba/con	
248	abb	04/	- DES - DESIGN		des/	seq/	
249	act	04/	APPLY FOR & OBTAIN PLAN CODE REVIEWS REQUIRED	001	des/	cde/des/	
250	act	04/	OBTAIN VARIANCES TO BUILDING CODES AS REQUIRED		des/	cde/des/	
251	act	04/	EXECUTE SITE ENGINEER CONTRACT		des/	ctr/des/	
252	act	04/	EXECUTE ELECT ENGINEER CONTRACT		des/	ctr/des/	
253	act	04/	EXECUTE DESIGN ARCHITECTURAL CONTRACT		des/	ctr/des/	
254	act	04/	EXECUTE PRODUCTION ARCHITECT CONTRACT		des/	ctr/des/	
255	act	04/	EXECUTE STRUCTURAL ENGINEER CONTRACT		des/	ctr/des/	
256	act	04/	EXECUTE MECHANICAL ENGINEER CONTRACT		des/	ctr/des/	
257	act	04/	EXECUTE TRAFFIC ENGINEER CONTRACT		des/	ctr/des/	
258	act	04/	CHECK DESIGN DEVELOPMENT PACKAGE FOR CONSTRUCTIBILITY		des/	des/	
259	act	04/	CHECK PRELIMINARY DESIGN PACKAGE FOR CONSTRUCTIBILITY		des/	des/	
260	act	04/	MAKE CODE SEARCHES FOR DOCUMENT COMPLIANCE		des/	des/	
261	act	04/	PREPARE DESIGN DEVELOPMENT PACKAGE		des/	des/	
262	act	04/	PREPARE PRELIMINARY DESIGN PACKAGE		des/	des/	
263	act	04/	PREPARE SCHEMATIC DESIGN PACKAGE		des/	des/	
264	act	04/	PREPARE FINAL CONSTRUCTION DOCUMENTS	001/	des/	des/	
265	act	04/	CHECK SCHEMATIC DESIGN PACKAGE FOR CONSTRUCTIBILITY		des/	des/	
266	act	04/	PREPARE & SUBMIT PERFORMANCE SPECS FOR LIFE SAFETY AND AUTOMATION SYSTEMS		des/	des/	
267	act	04/	PREPARE & ISSUE ELEVATOR ENTRANCE AND CAB DESIGN	014/	des/	des/	
268	act	04/	CERTIFY GROSS BUILDING AREAS	001	des/	des/	
269	act	04/	PREPARE & ISSUE DESIGN DEVELOPMENT PACKAGE		des/	des/	
270	act	04/	REVIEW & APPROVE DESIGN DEVELOPMENT PACKAGE		des/	des/	
271	act	04/	PREPARE & ISSUE SCHEMATIC DESIGN PACKAGE		des/	des/	
272	act	04/	REVIEW & APPROVE SCHEMATIC DESIGN PACKAGE		des/	des/	
273	act	04/	PREPARE & ISSUE PRELIMINARY DESIGN PACKAGE		des/	des/	
274	act	04/	REVIEW & APPROVE PRELIMINARY DESIGN PACKAGE		des/	des/	
275	act	04/	PREPARE & ISSUE CONTRACT DOCUMENT PACKAGE		des/	des/	
276	act	04/	REVIEW & APPROVE CONTRACT DOCUMENT PACKAGE	001	des/	des/	
277	act	04/	PREPARE AND SUBMIT EARLY DESIGN STUDIES TO CITY FOR COMMENT		des/	des/cde/	
278	act	04/	RETAIN WINDOW WASHING CONSULTANT		des	des/cot/	
279	act	04/	RETAIN ELEVATOR CONSULTANT		des/	des/cot/	
280	act	04/	RETAIN LIFE SAFETY & AUTOMATION CONSULTANT		des/	des/cot/	

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281	act	04/	CONFIRM OWNER OR END USER TIME TABLE FOR DESIGN	001	des/	des/pas	
282	act	04/	PREPARE AND SUBMIT EARLY DESIGN STUDIES TO XDOT		des/	des/sit/	
283	act	04/	DEVELOP SURROUNDING ROAD IMPROVEMENT PLANS WITH XDOT		des/	des/sit/	
284	act	04/	DEVELOP SURROUNDING ROAD IMPROVEMENT PLANS WITH CITY		des/	des/sit/	
285	act	04/05/	SET OFFICE PROJECT FILING SYSTEM	001/	des/con/	adm/con/des/	
286	act	04/05/	SET FIELD PROJECT FILING SYSTEM	001/	des/con/	adm/con/des/	
287	act	04/05/	SET UP REQURIED COURIER SERVICE FOR LOCAL DELIVERY OF CRITICAL MATERIAL	001/	des/con/	adm/con/des/	
288	act	04/05/	PROCESS CLIENT & SUB CONTRACTOR CHANGE ORDERS	001/	des/con/	adm/des/con/	
289	act	04/05/	PREPARE & DISTRIBUTE CODE OF ACCOUNTS	001/	des/con/	adm/des/con/	
290	act	04/05/	PREPARE & REVIEW REQUESTS FOR PAYMENT WITH CLIENT'S REPRESENTATIVE	001/	des/con/	adm/des/con/	
291	act	04/05/	SET & IMPLEMENT CLIENT REVIEW PROCEDURES	001/	des/con/	adm/des/con/	
292	act	04/05/	PREPARE & DISTRIBUTE PROJECT DIRECTORY	001/	des/con/	adm/des/con/	
293	act	04/05/	PROVIDE FIELD STAFF WITH UP TO DATE CONTRACT DRAWING SET	001/	des/con/	adm/des/con/	
294	act	04/05/	PROVIDE FIELD STAFF WITH JOB LOG BOOKS AND SET PROCEDURES FOR ENTRIES	001/	des/con/	adm/des/con/	
295	act	04/05/	INSURE THAT ALL DRAWING DEPOSITS ARE RETURNED	001/	des/con/	adm/des/con/	
296	act	04/05/	SET PROCEDURES FOR SUBMISSION OF DAILY, WEEKLY, AND MONTHLY REPORTS	001/	des/con/	adm/des/con/	
297	act	04/05/	FILE BID SET OF CONTRCT DOCUMENTS IN SAFE, PROTECTED LOCATION	001/	des/con/	adm/des/con/	
298	act	04/05/	ESTABLISH PROJECT DESIGN & CONSTRUCTION COST ACCTG SYSTEM AND ACCOUNT NUMBERS	001	des/con/	adm/des/con/	
299	act	04/05/	SET STORAGE & INSURANCE REQUIREMENTS FOR MATERIAL & EQUIPMENT FURNISHED BY OTHERS	001/	des/con/	adm/des/con/gcr/	
300	act	04/05/	PREPARE AND PUBLISH, AS APPROPRIATE, FULL PROJECT CRITIQUE & DEBRIEFING	001/	des/con/	clo/des/con/	
301	act	04/05/	IDENTIFY EQUIPMENT & MATERIAL FURNISHED BY OTHERS & REVIEW WITH PROJECT STAFF	001/	des/con/	con/pro/des/	
302	act	04/05/	CONFIRM OWNER'S BUDGET RELATIVE TO THE PROJECT DELIVERY SYSTEM SELECTED	001/	des/con/	cos/des/con/	
303	act	04/05/	ESTIMATE COSTS OF REVISIONS TO WORK	001/	des/con/	cos/des/con/	
304	act	04/05/	PREPARE BASE COST ESTIMATES TO CORRELATE WITH DESIGN PROGRAM	001/	des/con/	cos/des/con/	
305	act	04/05/	PREPARE & EXECUTE ALL LICENSE AGREEMENTS	001/	des/con/	ctr/des/con/	
306	act	04/05/	NEGOTIATE & EXECUTE AGREEMENT ON TRAFFIC SIGNALIZATION		des/con/	ctr/des/con/	
307	act	04/05/	EXECUTE GEOTECHNICAL ENGINEER CONTRACT		des/con/	ctr/des/con/	
308	act	04/05/	NEGOTIATE AND EXECUTE GUARANTEED MAXIMUM PRICES AS REQUIRED		des/con/	ctr/des/con/	
309	act	04/05/	NEGOTIATE AND EXECUTE DESIGN/BUILD CONTRACTS AS REQUIRED		des/con/	ctr/des/con/	
310	act	04/05/	ESTABLISH & PUBLISH OPERATING & MAINT MANUAL (OMM) SUBMITTAL PROCEDURES	001/	des/con/	des/clo/con/	
311	act	04/05/	DEFINE JOB CONDITIONS TO BE MET FOR SUBSTANTIAL COMPLETION	001/	des/con/	des/clo/con/	
312	act	04/05/	ESTABLISH AND PUBLISH WARRANTY PROCEDURES	001/	des/con/	des/clo/war/con/	
313	act	04/05/	PREPARE & SUBMIT DAILY REPORTS	001/	des/con/	des/con/	
314	act	04/05/	CHECK FINAL DESIGN PACKAGE FOR CONSTRUCTIBILITY	001/	des/con/	des/con/	
315	act	04/05/	PREPARE BIDDER'S LISTS	001/	des/con/	des/con/	

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316	act	04/05/	EXECUTE CLIENT LETTER OF INTENT IF APPROPRIATE		des/con/	des/con/	
317	act	04/05/	PREPARE AND SUBMIT CLIENT PROPOSALS		des/con/	des/con/	
318	act	04/05/	PREPARE SUBCONTRACTOR SELECTION	001/	des/con/	des/con/	
319	act	04/05/	EXECUTE CLIENT DESIGN CONTRACT		des/con/	des/con/	
320	act	04/05/	PACKAGE CONST. DOCUMENTS FOR SOLICITING SUB PROPOSALS		des/con/	des/con/	
321	act	04/05/	SET FORMAT FOR PROJECT DOCMENT FILES		des/con/	des/con/	
322	act	04/05/	TABULATE ACCEPTED ALTERNATES & INSURE APPLICABLE DRAWINGS ARE AVAILABLE		des/con/	des/con/	
323	act	04/05/	TABULATE ALL BID QUALIFICATIONS & REVIEW WITH PROJECT STAFF		des/con/	des/con/	
324	act	04/05/	ESTABLISH & PUBLISH SUBMITTAL PROCESSING PROCEDURES	001/	des/con/	des/con/	
325	act	04/05/	PREPARE CONTRACT AWARD TABLATION SHEET WHERE APPROPRIATE	001/	des/con/	des/con/	
326	act	04/05/	ESTABLISH PHOTO TAKING RESPONSIBILITIES AND PROCEDURES ON PROJECT	001/	des/con/	des/con/	
327	act	04/05/	PREPARE CONTRACT DOCUMENT MATRIX	001/	des/con/	des/con/	
328	act	04/05/	BIND EDGES OF FREQUENTLY USED SETS OF DRAWINGS		des/con/	des/con/	
329	act	04/05/	CONFIRM OWNER OR END USER TIME TABLE FOR CONSTRUCTION & OCCUPANCY	001/	des/con/	des/con/	
330	act	04/05/	LABEL & SAFELY STORE INTACT BID SET OF CONTRACT DOCUMENTS	001/	des/con/	des/con/	
331	act	04/05/	IDENTIFY ALL ALLOWANCE ITEMS & DISTRIBUTE LIST TO THOSE CONCERNED	001/	des/con/	des/con/	
332	act	04/05/	RETAIN ENGINEERING SURVEY SERVICES REQUIRED	001/	des/con/	des/con/	
333	act	04/05/	REVIEW & DISTRIBUTE ALL SUBSOIL REPORTS AS REQUIRED		des/con/	des/con/	
334	act	04/05/	ESTABLISH LEVEL OF DOCUMENTATION TO BE MAINTAINED ON PROJECT		des/con/	des/con/	
335	act	04/05/	SET JOB MEETING SCHEDULES	001/	des/con/	des/con/	
336	act	04/05/	ESTABLISH & IMPLEMENT PROCEDURES FOR KEEPING FIELD LOGS, DIARIES & REPORTS	001/	des/con/	des/con	
337	act	04/05/	DETERMINE RESTRICTED LOAD REQUIREMENTS ON SITE ACCESS ROADS	001/	des/con/	des/con/	
338	act	04/05/	ESTABLISH REQUEST FOR PAYMENT, APPROVAL & PAYMENT PROCEDURES	001/	des/con/	des/con/	
339	act	04/05/	ESTABLISH AND IMPLEMENT PROJECT MEETING NOTE PROCEDURE	001/	des/con/	des/con/	
340	act	04/05/	PREPARE & ISSUE ELEVATOR FIXTURE DESIGN, MATERIALS & COLORS	014/	des/con/	des/con/	
341	act	04/05/	DEFINE JOB CONDITIONS TO BE MET FOR OBTAINING CERTIFICATE OF OCCUPANCY	001/	des/con/	des/con/clo/	
342	act	04/05/	ESTABLISH AND PUBLISH PUNCH LIST PROCEDURES	001/	des/con/	des/con/clo/	
343	act	04/05/	ESTABLISH & PUBLISH CONSTRUCTION RECORD SET PREPARATION PROCEDURES	001/	des/con/	des/con/clo/	
344	act	04/05/	EXECUTE CLIENT DESIGN OR CONSTRUCTION CONTRACT	001/	des/con/	des/con/ctr/	
345	act	04/05/	APPLY FOR & OBTAIN EROSION CONTROL PERMITS	002/	des/con/	des/con/env/per/	
346	act	04/05/	DESIGN, FABRICATE AND ERECT SITE IDENTIFICATION SIGN	001/	des/con/	des/con/gcr/	
347	act	04/05/	DETERMINE LOCATION OF STORAGE, OFFICE, CONST ROADS, STOCKPILE, PARKING, TRAILERS, & FAB AREAS	002/	/des/con/	des/con/gcr/slt/	
348	act	04/05/	PREPARE & SUBMIT ELEVATOR STUDIES		des/con/	des/con/jpro/	
349	act	04/05/	OBTAIN REQUIRED APPROVALS OF WORK PLANS AND SCHEDULES	001/	des/con/	des/con/pas/	
350	act	04/05/	REVIEW WORK PLAN AND SCHEDULES WITH SUBCONTRACTORS	001/	des/con/	des/con/pas/	

rec #	data type	seq	action, subject or meaning	csi code	wk phase	cmpt	resp code
351	act	04/05/	PREPARE SUMMARY & DETAILED NETWORK MOBELS OF WORK TO BE DONE	001/	des/con/	des/con/pas/	
352	act	04/05/	FILE CONTRACT DOCUMENT BUILDING PERMIT SET IN SAFE, PROTECTED BUILDING	001/	des/con/	des/con/per/	
353	act	04/05/	LABEL & SAFELY STORE INTACT PERMIT SETS OF DRAWNINGS	001/	des/con/	des/con/per/	
354	act	04/05/	APPLY FOR & OBTAIN ELECTRICAL PERMITS	016/	des/con/	des/con/per/	
355	act	04/05/	APPLY FOR & OBTAIN DEMOLITION PERMITS	002/	des/con/	des/con/per/	
356	act	04/05/	APPLY FOR & OBTAIN MECHANICAL PERMITS	015/	des/con/	des/con/per/	
357	act	04/05/	APPLY FOR & OBTAIN STREET RESTRICTION PERMITS	001/	des/con/	des/con/per/	
358	act	04/05/	APPLY FOR & OBTAIN HEALTH DEPARTMENT PERMITS	001/	des/con/	des/con/per/	
359	act	04/05/	APPLY FOR & OBTAIN SITE WORK PERMITS	002/	des/con/	des/con/per/	
360	act	04/05/	APPLY FOR & OBTAIN FULL BUILDING PERMIT	001/	des/con/	des/con/per/	
361	act	04/05/	APPLY FOR & OBTAIN FOUNDATION PERMITS	001/	des/con/	des/con/per/	
362	act	04/05/	APPLY FOR & OBTAIN CURB CUT PERMITS	002/	des/con/	des/con/per/	
363	act	04/05/	APPLY FOR & OBTAIN FOOD SERVICE PERMITS	001/	des/con/	des/con/per/	
364	act	04/05/	APPLY FOR AND OBTAIN ALL SIGN PERMITS	001/	des/con/	des/con/per/	
365	act	04/05/	APPLY FOR & OBTAIN SITE UTILITY PERMIT	002/	des/con/	des/con/per/	
366	act	04/05/	APPLY FOR & OBTAIN SITE IMPROVEMENT PERMIT	001/	des/con/	des/con/per/	
367	act	04/05/	APPLY FOR & OBTAIN SOIL EROSION PERMITS	002/	des/con/	des/con/per/	
368	act	04/05/	OBTAIN FULL BUILDING PERMIT	001/	des/con/	des/con/per/	
369	act	04/05/	OBTAIN FOUNDATION PERMITS	001/	des/con/	des/con/per/	
370	act	04/05/	OBTAIN ELECTRICAL PERMIT	001/016/	des/con/	des/con/per/	
371	act	04/05/	OBTAIN PLUMBING PERMIT	001/015/	des/con/	des/con/per/	
372	act	04/05/	OBTAIN CURB CUT PERMITS	001/	des/con/	des/con/per/	
373	act	04/05/	APPLY FOR & OBTAIN HIGHWAY RIGHT OF WAY WORK PERMITS	001/	des/con/	des/con/per/	
374	act	04/05/	OBTAIN SITE WORK PERMITS	001/002/	des/con/	des/con/per/sit/	
375	act	04/05/	SET NORMAL, EXPEDITED AND SPECIAL SUBMITTAL TURNAROUND TIMES TO BE USED	001/	des/con/	des/con/pro/	
376	act	04/05/	IDENTIFY ALL OWNER FURNISHED EQUIPMENT ITEMS & DISTRIBUTE TO THOSE CONCERNED	001/	des/con/	des/con/pro/	
377	act	04/05/	OBTAIN & DISTRIBUTE APPROVED LONG LEAD ITEM COLOR & FINISH SCHEDULES	001/	des/con/	des/con/pro/	
378	act	04/05/	DETERMINE WAREHOUSING NEEDS AND OBTAIN SPACE	001/	des/con/	des/con/pro/	
379	act	04/05/	OBTAIN DELIVERY DATES FOR MATERIAL & EQUIPMENT FURNISHED BY OTHERS	001/	des/con/	des/con/pro/	
380	act	04/05/	ESTABLISH FORMAT AND CONTENT OF PROCUREMENT LOGS	001/	des/con/	des/con/pro/	
381	act	04/05/	DESIGN, SUBMIT AND APPROVE CONCRETE MIXES	003/	des/con/	des/con/pro/	
382	act	04/05/	PREPARE & ISSUE ELEVATOR PROPOSAL PACKAGE	014/	des/con/	des/con/pro/	
383	act	04/05/	EVALUATE ELEVATOR PROPOSALS AND AWARD CONTRACT	014/	des/con/	des/con/pro/cot/	
384	act	04/05/	DETERMINE MOCK UPS REQUIRED AND MAKE ARRANGEMENTS FOR THEIR DESIGN AND CONSTRUCTION	001/	des/con/	des/con/pro/mup/	
385	act	04/05/	FOLLOW UP AND RECEIVE TEMPORARY UTILITY SERVICES	001/	des/con/	des/con/pro/utl/	

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386	act	04/05/	REVIEW TESTING NEEDS AND OBTAIN TESTING SERVICES	001/	des/con/	des/con/tes /pro/	
387	act	04/05/	OBTAIN INFORMATION ON TRASH COMPACTOR	013/	des/con/	des/con/us y/	
388	act	04/05/	OBTAIN INFORMATION ON PALLETT STACKER	013/	des/con/	des/con/us y/	
389	act	04/05/	OBTAIN INFORMATION ON BALER	013/	des/con/	des/con/us y/	
390	act	04/05/	DETERMINE RECIPROCAL EASEMENTS & CONFIRM CLEARANCE TO START WORK		des/con/	eas/des/co n /	
391	act	04/05/	DETERMINE MAINTENANCE EASEMENTS AND CONFIRM CLEARANCE TO START WORK	001/	des/con/	eas/des/co n /	
392	act	04/05/	FOLLOW UP WITH PUBLIC RELATIONS CALL AFTER CONSTRUCTION	001/	des/con/	mkt/des/co n /	
393	act	04/05/	FOLLOW UP AND OBTAIN REGULATORY APPROVALS	001/	des/con/	reg/des/co n /	
394	act	04/05/	RETAIN CURTAIN WALL/TESTING CONSULTANT		des/con/	tes/des/con /pro/	
395	abb	05/	- CON - CONSTRUCTION		con/	seq	
396	act	05/	OBTAIN ALL WAIVERS OF LEINS	001/	con/	adm/con/	
397	act	05/	PROVIDE PROJECT STAFF WITH COPIES OF OFFICE FIELD PROCEDURE & POLICY MANUALS	001/	con/	adm/con/	
398	act	05/	PROVIDE SUBCONTRACTORS WITH ADEQUATE CONSTRUCTION DOCUMENTS	001/	con/	adm/con/	
399	act	05/	ESTABLISH REMOTE PROJECT BANK ACCOUNTS	001/	con/	adm/con/	
400	act	05/	OBTAIN AND DISTRIBUTE SITE ADDRESSES	001/	con/	adm/con/	
401	act	05/	SET UP FIELD PETTY CASH ACCOUNT & PROVIDE CASH TO FIELD STAFF	001/	con/	adm/con/	
402	act	05/	ESTABLISH PROJECT CONST COST ACCTG SYSTEM AND ACCOUNT NUMBERS	001/	con/	adm/con/	
403	act	05/	SET & IMPLEMENT SUB CONTRACT PAYMENT PROCEDURES	001/	con/	adm/con/g cr/	
404	act	05/	SET PROJECT CLOSE OUT PROCEDURES	001/	con/	clo/con/	
405	act	05/	TURN OVER PROJECT TO CLIENT	001/	con/	clo/con/	
406	act	05/	PUNCH OUT PROJECT	001/	con/	clo/con/	
407	act	05/	OBTAIN GUARANTEES	001/	con/	clo/con/	
408	act	05/	OBTAIN CERTIFICATE OF OCCUPANCY	001/	con/	clo/con	
409	act	05/	OBTAIN PROJECT OPERATING AND MAINTENANCE MANUALS	001/	con/	clo/con/	
410	act	05/	PREPARE AND SUBMIT CONST DOCUMENT RECORD SET (FORMERLY CALLED THE AS BUILT RECORD SET)	001/	con/	clo/con/	
411	act	05/	OBTAIN WARRANTIES	001/	con/	clo/con	
412	act	05/	REVIEW CONSENT OF SURETY REQUIREMENTS & DISTRIBUTE INFO AS APPROPRIATE	001/	con	clo/con/	
413	act	05/	ASSIST IN START UP PROCESS FOR EQUIPMENT (DEFINE CAREFULLY)	001/	con/	clo/con/	
414	act	05/	PLAN & IMPLEMENT SYSTEMS TRAINING PROGRAMS AS REQUIRED	001/	con/	clo/con/	
415	act	05/	OBTAIN CERTIFICATE OF SUBSTANTIAL COMPLETION	001/	con/	clo/con/	
416	act	05/	CLEAR FINAL PAYMENT ON PROJECT AND OBTAIN PROPER WAIVERS OF LIEN	001	con/	clo/con/	
417	act	05/	PROVIDE OWNER AND USER WITH AN UP-TO-DATE SET OF CONSTRUCTION DOCUMENTS FOR REFERENCE USE	001	con/	clo/con/	
418	act	05/	COLLECT, RECORD, AND STORE JOB LOGS, DIARIES, REPORTS, AND OTHER PROJECT DOCUMENTATION	001	con/	clo/con/	
419	act	05/	BRING ALL MEETING MINUTES AND RECORD FILES UP-TO-DATE	001	con/	clo/con/	
420	act	05/	COLLECT AND BIND ALL OFFICIAL AND UNOFFICIAL PROJECT PHOTOS	001	con/	clo/con/	

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421	act	05/	COLLECT AND RECORD ALL PROJECT NETWORK PLANS, SCHEDULES, AND BAR CHARTS	001/	con/	clo/con/	
422	act	05/	CLOSE OUT AND STORE CORRESPONDENCE AND OTHER RECORD FILES	001/	con/	clo/con/	
423	act	05/	ASSEMBLE AND PROPERLY STORE ALL SHOP DRAWINGS AND OTHER JOB RELATED SUBMITTALS	001/	con/	clo/con/	
424	act	05/	REQUEST ARCH/ENGR OF RECORD TO MAKE CERTIFICATE OF SUBSTANTIAL COMPLETION INSPECTION	001/	con/	clo/con/	
425	act	05/	PLAN AND IMPLEMENT GRAND OPENING OF PROJECT AS REQUIRED	001/	con/	clo/con/	
426	act	05/	CONDUCT INTERNAL PROJECT CRITIQUE AND MAKE RECOMMENDATIONS FOR IMPROVEMENTS	001/	con/	clo/con/	
427	act	05/	ACCOUNT FOR ALL CLIENT-OWNED TOOLS, SPARE PARTS, AND EXTRA STOCKS OF MATERIALS	001/	con/	clo/con/	
428	act	05/	PROVIDE OWNER COPIES OF ALL RELEASES THAT ALLOW BUILDING OCCUPANCY	001/	con/	clo/con/	
429	act	05/	LABEL ALL ELECT PANEL BOXES, PLMBG, VALVES AND EQUIP FOR PROPER OPERATION AND MAINTENANCE	015/016/	con/	clo/con/	
430	act	05/	PROVIDE ALL KEYS AND KEYING SCHEDULES	008/	con/	clo/con	
431	act	05/	SUBMIT FINAL STATEMENT OF ACCOUNTING AS REQUIRED, TO OWNER AND ARCHITECT/ENGINEER	001/	con/	clo/con	
432	act	05/	OBTAIN, PREPARE, OR ISSUE FINAL CHANGE ORDER REFLECTING ADJUSTMENTS TO CONTRACT AMOUNTS	001/	con/	clo/con/	
433	act	05/	SEND DESERVED THANK YOU LETTERS TO THE OWNER, DESIGNERS, AND CONTRACTORS INVOLVED	001/	con/	clo/con/	
434	act	05/	PROVIDE OWNER WITH COMPLETE LIST OF CONTRACTORS AND VENDORS ON JOB AND WHAT THEY DID	001/	con/	clo/con/	
435	act	05/	ARRANGE FOR SUCH OPEN HOUSE ACTIVITIES AS MIGHT BE DESIRES	001/	con/	clo/con/	
436	act	05/	INSURE THAT YOUR COMPANY IDENTIFICATION IS SHOWN SOMEWHERE IN THE BUILDING IF PERMITTED	001/	con/	clo/con/	
437	act	05/	INSURE THE BUILDING IS AS CLEAN OR CLEANER THAN SPECIFIED WHEN YOU MOVE OUT	001/	con/	clo/con/	
438	act	05/	PROPERY TRAIN AND TURN OVER THE FACILITY TO THE OWNER'S REPRESENTATIVES	001/	con/	clo/con/	
439	act	05/	ESTABLISH START OF ALL WARRANTY AND GUARANTEE PERIODS PRIOR TO OWNER MAKING JOB OPERATIVE	001/	con/	clo/con/	
440	act/	05/	PREPARE AND SUBMIT TO THE OWNER SPECIFIC WARRANTIES AS SPECIFIED	001/	con/	clo/con/	
441	act	05/	PREPARE AND SUBMIT TO THE OWNER WORKMANSHIP OR MAINTENANCE BONDS REQUIRED	001/	con/	clo/con/	
442	act	05/	PREPARE AND SUBMIT TO THE OWNER MAINTENANCE AGREEMENTS AS SPECIFIED	001/	con/	clo/con/	
443	act	05/	PREPARE AND SUBMIT TO THE OWNER DAMAGE AND SETTLEMENT SURVEYS OF THE SITE AND FACILITIES	001/	con/	clo/con/	
444	act	05/	PREPARE AND SUBMIT TO THE OWNER FINAL PROPERTY SURVEYS OF THE SITE	001/	con/	clo/con/	
445	act	05/	SUBMIT FINAL BILLING TO OWNER FOR ALL IMCOMPLETE ITEMS AND A PROPER COST ASSIGNED TO EACH	001/	con/	clo/con/	
446	act	05/	ADVISE OWNER OF ANY INSURANCE CHANGES OVER EXISTING OR PAST REQUIREMENTS OR DATES	001/	con/	clo/con/	
447	act	05/	SUBMIT FINAL UTILITY METER READINGS, AND RECORDS OF STORED FUEL AT TIME OF SUBSTANTIAL COMPLETION	001/	con/	clo/con/	
448	act	05/	SUBMIT TO OWNER CONSENT OF SURETY TO FINAL PAYMENT IF REQUIRED	001/	con/	clo/con/	
449	act	05/	RID JOB OF ALL RODENTS, INSECTS, AND OTHER PESTS BY AN EXPERIENCED EXTERMINATOR	001/	con/	clo/con/	
450	act	05/	CAREFULLY READ THE FULL CONTRACT DOCUMENT CLOSE OUT REQUIREMENTS	001/	con/	clo/con/	
451	act	05/	MAINTAIN INVENTORY OF TOOLS & EQUIPMENT	001/	con/	con/adm/	
452	act	05/	PREPARE EMPLOYEE SITE CONDUCT GUIDELINES	001/	con/	con/adm/	
453	act	05/	ASSIGN CONSTRUCTION JOB NUMBERS	001/	con/	con/adm/	
454	act	05/	NEGOTIATE CONSTRUCTION CONTRACTS WITH CLIENTS		con/	con/ctr/	
455	act	05/	APPLY CONCRETE FLOOR SEALER	003/	con/	con/ifw/	

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456	act	05/	APPLY CONCRETE FLOOR SEALER	003/	con/	con/ifw/	
457	act	05/	APPLY WALL COVERING	009/	con/	con/ifw/	
458	act	05/	INSTALL HARDWARE CLOTH WALLS	006/	con/	con/ifw/	
459	act	05/	INSTALL COMPACTOR AND BALER EQUIPMENT	011/	con/	con/ifw/	
460	act	05/	INSTALL MILLWORK & TRIM	006/	con/	con/ifw/	
461	act	05/	INSTALL DOCK LEVELERS	011/	con/	con/ifw/	
462	act	05/	INSTALL VINYL STRIP DOORS	010/	con/	con/ifw/	
463	act	05/	INSTALL FOLDING PARTITIONS	010/	con/	con/ifw/	
464	act	05/	INSTALL, GLAZE & CAULK INTERIOR WINDOWS	008/	con/	con/ifw/	
465	act	05/	INSTALL TRAFFIC DOORS	010/	con/	con/ifw/	
466	act	05/	INSTALL CERAMIC TILE WALLS AND FLOORS	009/	con/	con/ifw/	
467	act	05/	HOOK UP SNACK BAR EQUIPMENT	011/015/ 016/	con/	con/ifw/	
468	act	05/	INSTALL WINDOW BLINDS	012/	con/	con/ifw/	
469	act	05/	INSTALL AND ADJUST SPRINKLER HEADS	015/	con/	con/ifw/	
470	act	05/	INSTALL ACOUSTIC CEILIN SUSPENSION & GRID	009	con/	con/ifw/	
471	act	05/	INSTALL HANGERS & GRID FOR ACOUSTICAL CEILING	009/	con/	con/ifw/	
472	act	05/	SET FOOD SERVICE EQUIPMENT	011/	con/	con/ifw/	
473	act	05/	INSTALL INTERIOR HOLLOW METAL DOORS	008/	con/	con/ifw/	
474	act	05/	LAY RESILIENT FLOORING	009/	con/	con/ifw/	
475	act	05/	INSTALL IN RACK SPRINKLER PIPING AND HEADS	015/	con/	con/ifw/	
476	act	05/	INSTALL SIGNAGE	010/	con/	con/ifw/	
477	act	05/	INSTALL INT WOOD DOORS	008/	con/	con/ifw/	
478	act	05/	INSTALL SURFACE MOUNTED LIGHT FIXTURES	016/	con/	con/ifw/	
479	act	05/	INSTALL CARPET	009/	con/	con/ifw/	
480	act	05/	INSTALL QUARRY TILE FLOORS	009/	con/	con/ifw/	
481	act	05/	INSTALL PLUMBING FIXTURES	015/	con/	con/ifw/	
482	act	05/	INSTALL HOSE RACK STATIONS	015/	con/	con/ifw/	
483	act	05/	INSTALL CEILING GRILLS & DIFFUSERS	015/	con/	con/ifw/	
484	act	05/	TAPE & SAND WALL GYP BOARD	009/	con/	con/ifw/	
485	act	05/	HANG STUD WALL GYP BOARD	009/	con/	con/ifw/	
486	act	05/	TAPE & SAND CEILING DRY WALL	009/	con/	con/ifw/	
487	act	05/	INSTALL DOOR HARDWARE	008/	con/	con/ifw/	
488	act	05/	INSTALL LAY IN LIGHT FIXTURES	016/	con/	con/ifw/	
489	act	05/	INSTALL TOILET ROOM PARTITIONS	010/	con/	con/ifw/	
490	act	05/	INSTALL TOILET ROOM ACCESSORIES	010/	con/	con/ifw/	

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491	act	05/	PAINT REQUIRED INTERIOR SURFACES	009/	con/	con/ifw/	
492	act	05/	INSTALL VIEWPORTS	010/	con/	con/ifw/	
493	act	05/	HANG CEILING GYP BOARD	009/	con/	con/ifw/	
494	act	05/	COMPLETE HOOK UP ELEVATOR AND EQUIPMENT ROOM MACHINERY	014/	con/	con/ifw/	
495	act	05/	INSTALL FIRE EXTINGUISHERS	010/	con/	con/ifw/	
496	act	05/	DRY PLASTER SURFACES	009/	con/	con/ifw/	
497	act	05/	INSTALL WOOD HANDRAILS AND TRIM	008/	con/	con/ifw/	
498	act	05/	INSTALL ELEVATOR CAR FRAMES	014/	con/	con/ifw/	
499	act	05/	INSTALL CONVECTOR COVERS	015/	con/	con/ifw/	
500	act	05/	APPLY PLASTER SKIM COAT TO INTERIOR WALLS	009/	con/	con/ifw/	
501	act	05/	INSTALL RECESSED LIGHT FIXTURES	016/	con/	con/ifw/	
502	act	05/	INSTALL HOISTWAY WIRING	014/	con/	con/ifw/	
503	act	05/	SET ELEVATOR MACHINE BEAMS	014/	con/	con/ifw/	
504	act	05/	INSTALL MARBLE FOOOR AND WALL FINISHES	004/	con/	con/ifw/	
505	act	05/	HOOK UP FOOD SERVICE EQUIPMENT	011/015/ 016/	con/	con/ifw/	
506	act	05/	APPLY PLASTER FINISH COAT TO INTERIOR WALLS	009/	con/	con/ifw/	
507	act	05/	INSTALL DRAPERIES	012/	con/	con/ifw/	
508	act	05/	APPLY GYPSUM FLOOR TOPPING	003/	con/	con/ifw/	
509	act	05/	INSTALL ACOUSTIC CEILING PANELS	009//	con/	con/ifw/	
510	act	05/	INSTALL INTERIOR BUILDING PAVERS	009/	con/	con/ifw/	
511	act	05/	INSTALL ELEVATOR RAILS	014/	con/	con/ifw/	
512	act	05/	APPLY PLASTER BROWN AND SCRATCH COAT TO INTERIOR WALLS	009/	con/	con/ifw/	
513	act	05/	HOOK UP & TEST FIRE PROTECTION 3RD PARTY SUPERVISORY SYSTEM	015/016/	con/	con/ifw/	
514	act	05/	INSTALL ELEVATOR EQUIPMENT ROOM MACHINERY	013/	con/	con/ifw/	
515	act	05/	COMPLETE HOOK UP ELEVATOR AND EQUIPMENT ROOM MACHINERY	014/	con/	con/ifw/	
516	act	05/	INSTALL ELEVATOR RAIL BRACKETS & CAR & COUNTERWEIGHT RAILS	014/	con/	con/ifw/	
517	act	05/	INSTALL ELEVATOR PIT EQUIPMENT	014/	con/	con/ifw/	
518	act	05/	SPRAY ON FIREPROOFING AT INTERIOR STRUCT STEEL MEMBERS	007/	con/	con/ifw/	
519	act	05/	SPRAY ON FIREPROOFING AT PERIMITER STRUCT STEEL MEMBERS	007/	con/	con/ifw/	
520	act	05/	INSTALL INSULATION AT EXTEIOR WALL SPANDRELS	007/	con/	con/ifw/	
521	act	05/	SPRAY ON FIREPROOFING AT ELEVATOR HOISTWAY STRUCT STEEL FRAMING	007/	con/	con/ifw/	
522	act	05/	INSTALL ELEVATOR CAR ENCLOSURES	014/	con/	con/ifw/	
523	act	05/	MAKE ELEVATORS OPERATIVE	014/	con/	con/ifw/	
524	act	05/	INSTALL FIN TUBE PIPING	015/	con/	con/ifw/	
525	act	05/	HOOK UP ELEVATOR MACHINE ROOM EQUIPMENT	014/	con/	con/ifw/	

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526	act	05/	INSTALL ELEVATOR ENTRANCES (MINUS DOORS)	014/	con/	con/ifw/	
527	act	05/	INSTALL ELEVATOR DOORS AT FLOORS	014/	con/	con/ifw/	
528	act	05/	SET ELEVATOR MACHINE ROOM EQUIPMENT	014/	con/	con/ifw/	
529	act	05/	PROVIDE TEMPORARY PERMANENT POWER TO MACHINE ROOMS FOR ELEV INSTALLATION	016/	con/	con/ifw/	
530	act	05/	INSTALL DRAPERY TRACKS	012/	con/	con/ifw/	
531	act	05/	ERECT ELEV SHAFT STUDS, IN WALL WORK & DRY WALL TO PART ENCLOSE SHAFTS	009/015/ 016/	con/	con/ifw/	
532	act	05/	INSTALL ELECTRICAL POWER EQUIPMENT DISCONNECTS	016/	con/	con/ifw/	
533	act	05/	INSTALL IN-WALL WOOD BLOCKING	006/	con/	con/irw/	
534	act	05/	INSTALL DOCK LEVELERS (TO FORM LEVELER PIT)	011/	con/	con/irw/	
535	act	05/	ERECT MISC IRON LADDERS	005/	con/	con/irw/	
536	act	05/	ERECT MIS IRON STAIRS	005/	con/	con/irw/	
537	act	05/	ERECT MISC IRON HANDRAILS	005/	con/	con/irw/	
538	act	05/	INSTALL ABOVE CLG INTERIOR GAS PIPING	015/	con/	con/irw/	
539	act	05/	INSTALL ABOVE CLG INTERIOR ROOF DRAIN LEADER	015/	con/	con/irw/	
540	act	05/	INSTALL ABOVE CLG SHEET METAL DUCTWORK FOR HVAC	015/	con/	con/irw/	
541	act	05/	INSTALL AND TEST ABOVE FLOOR FIRE SPRINKLER RISERS	015/	con/	con/irw/	
542	act	05/	INSTALL ABOVE CLG ELECTRICAL DISTRIBUTION CONDUIT	016/	con/	con/irw/	
543	act	05/	INSTALL ELECTRICAL LIGHTING DISTRIBUTION PANELS	016/	con/	con/irw/	
544	act	05/	INSTALL PLUMBING STUB OUTS	015/	con/	con/irw/	
545	act	05/	INSTALL HOLLOW METAL DOOR FRAMES	008/	con/	con/irw/	
546	act	05/	INSTALL IN WALL ROUGH ELECT WORK	016/	con/	con/irw/	
547	act	05/	PULL ELECTRICAL DISTRIBUTION WIRE IN CONDUIT	016/	con/	con/irw/	
548	act	05/	INSTALL AND TEST ABOVE FLOOR FIRE SPRINKLER LATERALS AND DROPS	015/	con/	con/irw/	
549	act	05/	INSTALL ABOVE CLG INTERIOR DOMESTIC SEWER PIPING	015/	con/	con/irw/	
550	act	05/	INSTALL ABOVE CLG INTERIOR DOMESTIC WATER PIPING	015/	con/	con/irw/	
551	act	05/	INSTALL ELECTRICAL POWER DISTRIBUTION PANELS	016/	con/	con/irw/	
552	act	05/	INSTALL HARD CEILING SUSPENSION AND FRAMING	009/	con/	con/irw/	
553	act	05/	INSTALL BORROWED LIGHT HOLLOW METAL FRAMES	008/	con/	con/irw/	
554	act	05/	INSTALL ABOVE CLG SUPPORTS FOR FOLDING PARTITIONS	005/006/	con/	con/irw/	
555	act	05/	ERECT METAL WALL STUDS FOR DRY WALL PARTITIONS	009/	con/	con/irw/	
556	act	05/	INSTALL BELOW FLOOR ELECTRICAL ROUGH INTO ABOVE FLOOR EQUIPMENT	016/	con/	con/irw/	
557	act	05/	INSTALL IN WALL ROUGH DOMESTIC PLUMBING WORK	015/	con/	con/irw/	
558	act	05/	INSTALL IN WALL ROUGH HVAC WORK	015/	con/	con/irw/	
559	act	05/	INSTALL IN WALL ROUGH ELECTRICAL CONDUIT AND FEEDERS	016/	con/	con/irw/	
560	act	05/	INSTALL IN WALL ROUGH MEDICAL GAS PIPING	015/	con/	con/irw/	

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561	act	05/	INSTALL METAL STAIRS AND HANDRAILS	005/	con	con/irw/	
562	act	05/	INSTALL FIRE EXTINGUISHERS CABINETS	010/	con/	con/irw/	
563	act	05/	INSTALL TEMPORARY CLOSURES AT ELEVATOR SHAFTS TO PROTECT FROM WEATHER	001/	con/	con/irw/	
564	act	05/	INSTALL COILING DOORS & GRILLS	008/	con/	con/irw/	
565	act	05/	REQUEST AND IMPLEMENT SPECIAL INSPECTIONS OF PROJECT	001/	con/	con/isp/	
566	act	05/	PREPARE PROJECT CONSTRUCTION SCHEDULES	001/	con/	con/pas/	
567	act	05/	PREPARE PROJECT CONSTRUCTION NETWORK MODEL	001/	con/	con/pas/	
568	act	05/	APPLY FOR & OBTAIN TEMPORARY PARKING PERMITS	001/	con/	con/per/	
569	act	05/	PROCESS SUBMITTALS	001/	con/	con/pro/	
570	act	05/	REVIEW AND EVALUATE CONST SUB CONTRACT PROPOSALS	001/	con/	con/pro/	
571	act	05/	OBTAIN SUBCONTRACTOR INFOMATION	001/	con/	con/pro/	
572	act	05/	PREPARE SUBCONTRACTOR SELECTION LIST	001/	con/	con/pro/	
573	act	05/	PREPARE LIST OF VENDORS PROVIDING BIDDING INFORMATION	001/	con/	con/pro/	
574	act	05/	REVIEW PURCHASE ORDER CONDITIONS WITH SUBCONTRACTORS	001/	con/	con/pro/	
575	act	05/	ESTABLISH RENTAL EQUIPMENT NEEDS AND PROCURE EQUIPMENT		con/	con/pro/	
576	act	05/	ESTABLISH HOISTING NEEDS AND PROCURE HOISTING EQUIPMENT	001/	con/	con/pro/	
577	act	05/	PREPARE MATERIAL PROCUREMENT PURCHASE ORDERS	001/	con/	con/pro/	
578	act	05/	EXPEDITE ALL DELIVERIES	001/	con/	con/pro/	
579	act	05/	FAB & DELIVER ELEVATOR PLUNGER CASINGS	014/	con/	con/pro/	
580	act	05/	FAB & DELIVER ELEVATOR BRACKETS & RAILS	014/	con/	con/pro/	
581	act	05/	FAB & DELIVER ELEVATOR ENTRANCES	014/	con/	con/pro/	
582	act	05/	SOLICIT & RECEIVE ELEVATOR PROPOSALS	014/	con/	con/pro/	
583	act	05/	FAB & DELIVER ELEVATOR PIT EQUIPMENT	014/	con/	con/pro/	
584	act	05/	FAB & DELIVER ELEVATOR CAR FRAMES	014/	con/	con/pro/	
585	act	05/	FAB & DELIVER ELEVATOR CAB INTERIOR FINISHES	014/	con/	con/pro/	
586	act	05/	FAB & DELIVER ELEVATOR MACHINE ROOM EQUIPMENT	014/	con/	con/pro/	
587	act	05/	FAB & DELIVER ELEVATOR MACHINE ROOM EQUIPMENT ANCHOR BOLTS	014/	con/	con/pro/	
588	act	05/	FAB & DELIVER ELEVATOR PIT TIE DOWN STEEL & EMBEDS	014/	con/	con/pro/	
589	act	05/	SOLICIT & RECEIVE CONST SUB CONTRACT PROPOSALS	001/	con/	con/pro/cot/	
590	act	05/	PREP & ISSUE SUB CONTRACTOR CONSTRUCTION CONTRACTS & PO'S	001/	con/	con/pro/cot/	
591	act	05/	RECEIVE AND FILE ALL EXECUTED SUB CONSTRACTS	001/	con/	con/pro/cot/	
592	act	05/	PREPARE LIST OF EARLY SUBMITTALS NEEDED AND ASSIGN TO PROJECT STAFF FOR DOING	001/	con/	con/pro/sub/	
593	act	05/	REVIEW & APPROVE ELEVATOR PIT TIE DOWN STEEL & EMBEDS SHOP DRAWINGS	014/	con/	con/pro/sub/	
594	act	05/	PREPARE & SUBMIT ELEVATOR PIT TIE DOWN STEEL & EMBEDS SHOP DRAWINGS	014/	con/	con/pro/sub/	
595	act	05/	REVIEW & APPROVE CONTRACTOR DRAWINGS OF ELEVATOR DOORS, FRAMES & CABS	014/	con/	con/pro/sub/	

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596	act	05/	PREP & SUBMIT CONTRACTOR DWGS FOR ELEV FIXTURE DESIGN, MTLS & COLORS	014/	con/	con/pro/sub/	
597	act	05/	REVIEW & APPROVE CONTRACTOR DWGS FOR ELEV FIXTURES	014/	con/	con/pro/sub/	
598	act	05/	PREPARE & SUBMIT ELEVATOR MACHINE ROOM ANCHOR BOLT SHOP DRAWINGS	014/	con/	con/pro/sub/	
599	act	05/	PREPARE & SUBMIT CONTRACTOR DRAWNGS OF ELEVATOR DOORS, FRAMES & CABS	014/	con/	con/pro/sub/	
600	act	05/	REVIEW & APPROVE ELEVATOR MACHINE ROOM ANCHOR BOLT SHOP DRAWINGS	014/	con/	con/pro/sub/	
601	act	05/	PREPARE & SUBMIT ELEVATOR HOISTWAY, PIT & MACHINE ROOM SHOP DRAWINGS	014/	con/	con/pro/sub/	
602	act	05/	REVIEW & APPROVE ELEVATOR HOISTWAY, PIT & MACHINE ROOM SHOP DRAWINGS	014/	con/	con/pro/sub/	
603	act	05/	REVIEW & APPROVE CONTRACTOR DWGS FOR ELEVATOR ENTRANCES	014/	con/	con/pro/sub/	
604	act	05/	FOLLOW UP AND RECEIVE PERMANENT UTILITY SERVICES	001/	con/	con/pro/util/	
605	act	05/	EXCAVATE, FORM, REINFORCE, POUR & STRIP EXT WALL & COL FTGS	003/	con/	con/sbw/	
606	act	05/	EXCAVATE, FORM, REINFORCE, POUR & STRIP INTERIOR COL FOOTINGS	003/	con/	con/sbw/	
607	act	05/	SET EMBEDS IN SUBSTRUCTURE WALLS AS REQUIRED	003/015/016/	con/	con/sbw/	
608	act	05/	FORM, REINF, POUR & STRIP COL FOOTINGS PIERS	003/	con/	con/sbw/	
609	act	05/	SET EMBEDS IN EXT WALL FOOTINGS	005/	con/	con/sbw/	
610	act	05/	LAY OUT COLUMN LNES & INTERIOR ELEVATIONS	001/	con/	con/sbw/	
611	act	05/	EXCAVATE, FORM, REINFORCE, POUR & STRP EXT WALL & COL FTGS	003/	con/	con/sbw/	
612	act	05/	POISON SUBBASE	002/	con/	con/sbw/	
613	act	05/	BACKFILL INT COL FOOTINGS & PIERS	002/	con/	con/sbw/	
614	act	05/	DRILL AND FILL COLUMN CAISSONS	002/	con/	con/sbw/	
615	act	05/	FILLL & FINE GRADE FOR INTERIOR SLAB ON GRADE	003/	con/	con/sbw/	
616	act	05/	SET IN FLOOR WORK FOR INTERIOR SLAB ON GRADE	003/	con/	con/sbw/	
617	act	05/	POUR OUT INTERIOR SLAB ON GRADE	003/	con/	con/sbw/	
618	act	05/	CURE SLAB ON GRADE TO ALLOW CONSTRUCTION TRAFFIC	003/	con/	con/sbw/	
619	act	05/	SAW CUT SLAB ON GRADE	003/	con/	con/sbw/	
620	act	05/	SEAL SLAB ON GRADE SAW CUT JOINTS	003/	con/	con/sbw/	
621	act	05/	BACKFILL EXT COL & WALL FOOTINGS & PIERS	002/	con/	con/sbw/	
622	act	05/	DRIVE TEST PILING & LOAD	002/	con/	con/sbw/	
623	act	05/	DRIVE AND BRACE SOLDIER BEAMS AND INSTALL LAGGING	002/	con/	con/sbw/	
624	act	05/	RUB EXPOSED FOUNDATION CONCRETE	003/	con/	con/sbw/	
625	act	05/	DRIVE & FILL STEEL SHELL PILES	002/	con/	con/sbw/	
626	act	05/	DRIVE WOOD PILES	002/	con/	con/sbw/	
627	act	05/	SET SLEEVES IN SUBSTRUCTURE WALLS AS REQUIRED	015/016/	con/	con/sbw/	
628	act	05/	DRIVE STEEL H PILES	002/	con/	con/sbw/	
629	act	05/	CUT OFF PILING	002/	con/	con/sbw/	
630	act	05/	FORM, REINFORCE & POUR CAISSION CAPS	003/	con/	con/sbw/	

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631	act	05/	FORM, REINFORCE & POUR FILE CAPS	003/	con/	con/sbw/	
632	act	05/	SET PERIM INSULATION AT SUBSTRUCTURE WALLS	007/	con/	con/sbw/	
633	act	05/	LAY AND PART BACKFILL FOOTING DRAIN TILE	002/	con/	con/sbw/	
634	act	05/	BLAST ROCK AND REMOVE AS REQUIRED	002/	con/	con/sbw/	
635	act	05/	MOBILIZE AND MOVE DRIVING RIG ON SITE	002/	con/	con/sbw/	
636	act	05/	BACKFILL GRADE BEAMS	002/	con/	con/sbw/	
637	act	05/	BRACE BASEMENT WALLS FOR EARLY BACKFILLING AS REQUIRED	002/	con/	con/sbw/	
638	act	05/	MASS EXCAVATE FOR SUBSTRUCTURE WORK	002/	con/	con/sbw/	
639	act	05/	APPLY WATERPROOFING TO EXTERIOR FOUNDATION WALLS	007/	con/	con/sbw/	
640	act	05/	SET ANCHOR BOLTS IN FOOTINGS, PIERS AND WALLS	003/	con/	con/sbw/	
641	act	05/	INSTALL WATER STOPS IN SUBSTRUCTURE WALLS AS REQUIRED	003/	con/	con/sbw/	
642	act	05/	EXCAVATE, FORM, REINFORCE, POUR AND STRIP GRADE BEAMS	003/	con/	con/sbw/	
643	act	05/	STABILIZE SOIL	002/	con/	con/sbw/	
644	act	05/	INSTALL UNDERPINNING	002/	con/	con/sbw/	
645	act	05/	DRIVE PRESTRESSED CONCRETE PILES	002/	con/	con/sbw/	
646	act	05/	DRIVE SHEET PILING	002/	con/	con/sbw/	
647	act	05/	DRILL, INSTALL AND GROUT TIE BACKS	002/	con/	con/sbw/	
648	act	05/	BACKFILL AND COMPACT AT EXTERIOR OF SUBSTRUCTURE WALLS	002/	con/	con/sbw/	
649	act	05/	LAY VAPOR BARRIER FOR SLAB ON GRADE	007/	con/	con/sbw/	
650	act	05/	APPLY SEALER TO SLAB ON GRADE	003/	con/	con/sbw/if w/	
651	act	05/	EXCAVATE, INSTALL & BACKFILL UG ELECTRICAL CONDUIT	016/	con/	con/sbw/ut i/	
652	act	05/	EXCAVATE, INSTALL, TEST & BACKFILL UG BLDG ROOF STORM DRAIN LINES	015/	con/	con/sbw/ut l/	
653	act	05/	EXCAVATE, INSTALL, TEST & BACKFILL UG BLDG SANITARY SEWER	015/	con/	con/sbw/ut l/	
654	act	05/	EXCAVATE, INSTALL, TEST & BACKFILL UG FIRE PROTECTION LINES	015/	con/	con/sbw/ut l/	
655	act	05/	ENERGIZE PRIMARY TRANSFORMER	016/	con/	con/siw/	
656	act	05/	FORM, REINFORCE, POUR & FINISH CONCRETE TRUCK APRONS	002/	con/	con/siw/	
657	act	05/	FORM, REINFORCE, POUR & FINISH CONCRETE SIDEWALKS	002/	con/	con/siw/	
658	act	05/	LAY ASPHALT BASE COURSE	002/	con/	con/siw/	
659	act	05/	LAY ASPHALT WEARING COURSE	002/	con/	con/siw/	
660	act	05/	SET & EMBED VEHICLE GUARD POSTS	005/	con/	con/siw/	
661	act	05/	STRIPE PARKING AND ROADWAY AREAS	009/	con/	con/siw/	
662	act	05/	INSTALL LANDSCAPING	002/	con/	con/siw/	
663	act	05/	FORM, REINFORCE, POUR & FINISH CONCRETE CURBS & GUTTERS	002/	con/	con/siw/	
664	act	05/	CONSTRUCT EXTERIOR BUILDING PLANTERS	003/004/	con/	con/siw/	
665	act	05/	ROUGH GRADE SITE AREAS AS REQUIRED	002/	con/	con/siw/	

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666	act	05/	ERECT FLAGPOLE	010/	con/	con/siw/	
667	act	05/	INSTALL SITE PAVERS	002/	con/	con/siw/	
668	act	05/	INSTALL BIKE RACKS	006/	con/	con/siw/	
669	act	05/	CONSTRUCT SERVICE AREA ENCLOSURE	002/003/004/	con/	con/siw/	
670	act	05/	CLEAR & GRUB SITE	002/	con/	con/siw/	
671	act	05/	SEET HORIZ & VERTICAL CONTROLS	002/	con/	con/siw/	
672	act	05/	CUT & FILL MAIN BLDG AREA TO FINAL SUB GRADE ELEVATION	002/	con/	con/siw/	
673	act	05/	STOCKPILE EXCAVATED MATERIAL	002/	con/	con/siw/	
674	act	05/	CUT & FILL SITE AREAS OUTSIDE BLDG TO SUB GRADE ELEVATION	002/	con/	con/siw/	
675	act	05/	INSTALL TEMPORARY UTILITIES	002/	con/	con/siw/	
676	act	05/	LAY OUT BUILDING	001/	con/	con/siw/	
677	act	05/	BALANCE EXTERIOR SITE AREAS	002/	con/	con/siw/	
678	act	05/	BALANCE BUILDING AREAS	002/	con/	con/siw/	
679	act	05/	INSTALL CURB CUTS & APRONS	002/	con/	con/siw/	
680	act	05/	INSTALL ACCELERATION & DECELERATION LANES ON ADJOINING ROADS	002/	con/	con/siw/	
681	act	05/	INSTALL TRAFFIC SIGNALS & CONTROLLERS	016/	con/	con/siw/	
682	act	05/	INSTALL SITE DITCH DRAINS & CULVERTS	002/	con/	con/siw/	
683	act	05/	STRIPE VEHICLE & PEDESTRIAN AREAS	009/	con/	con/siw/	
684	act	05/	REMOVE EXISTING CONCRETE FOUNDATIONS	002/	con/	con/siw/	
685	act	05/	MASS EXCAV, INSTL UNDERGRD UTIL & GRADE FOR POOL SPRAYED CONC	002/	con/	con/siw/	
686	act	05/	APPLY SPRAYED CONCRETE FOR POOL BASIN	003/	con/	con/siw/	
687	act	05/	FILL & FINE GRADE FOR POOL PERIM DECK	002/	con/	con/siw/	
688	act	05/	POOR OUT POOL PERIM SLAB ON GRADE DECK	003/	con/	con/siw/	
689	act	05/	STRIP SITE	009/	con/	con/siw/	
690	act	05/	INSTALL FLAG POLE FOUNDATION	002/	con/	con/siw/	
691	act	05/	FORM, REINFORCE & POUR TRANSFORMER BASES	002/	con/	con/siw/	
692	act	05/	EXCAVATE, INSTALL & BACKFILL LIGHT POLE BASES	016/	con/	con/siw/	
693	act	05/	INSTL & LAMP SITE LIGHT FIXTURE	016/	con/	con/siw/	
694	act	05/	FINE GRADE SITE AREAS TO BOTTOM OF BASE PAVING COURSE	002/	con/	con/siw/	
695	act	05/	EXCAVATE, INSTALL, TEST & BACKFILL SITE UG GAS LINES	002/	con/	con/siw//utl/	
696	act	05/	REMOVE EXISTING BELOW GRADE CONCRETE AS REQUIRED	002/	con/	con/siw/dem /	
697	act	05/	INSTALL TELEPHONE CABLE TO BUILDING	016/	con/	con/siw/utl/	
698	act	05/	EXCAV, INSTL & BACKFILL SITE ELECT & TELEPHONE CONDUIT	016/	con/	con/siw/utl/	
699	act	05/	EXCAVATE, INSTALL, TEST & BACKFILL SITE UG STORM SEWER LINES	002/	con/	con/siw/utl/	
700	act	05/	EXCAVATE, INSTALL, TEST & BACKFILL SITE UG FIRE PROECTION LINES	002/	con/	con/siw/utl/	

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701	act	05/	EXCAVATE, INSTALL, TEST & BACKFILL SITE UG SANITARY SEWER LINES	002/	con/	con/siw/ut 1/	
702	act	05/	EXCAVATE, INSTALL, TEST & BACKFILL SITE US DOMESTIC WATER LINES	002/	con/	con/siw/ut 1/	
703	act	05/	EXCAVATE, INSTALL & BACKFILL SITE LIGHTING CONDUIT	016/	con/	con/siw/ut 1/	
704	act	05/	SET TRANSFORMERS ON BASE	016/	con/	con/siw/ut 1/	
705	act	05/	PULL PRIMARY CABLE AND CONNECT TRANSFORMER	016/	con/	con/siw/ut 1/	
706	act	05/	FORM, POUR & STRIP EXTERIOR COLUMNS	003/	con/	con/ssw/	
707	act	05/	CURE & STRIP CONCRETE CORE WALLS	003/	con/	con/ssw/	
708	act	05/	ERECT STRUCT STEEL AND JOISTS	005/	con/	con/ssw/	
709	act	05/	PLUMB, BOLT & DETAIL STRUCTURAL STEEL & JOISTS	005/	con/	con/ssw/	
710	act	05/	ERECT METAL FLOOR & ROOF DECK	005/	con/	con/ssw/	
711	act	05/	FORM, REINFORCE & SET IN FL WORK FOR SUPPORTED CONCRETE DECKS	003/	con/	con/ssw/	
712	act	05/	GROUT BASE PLATES	003/	con/	con/ssw/	
713	act	05/	POUR CONC SLABS AND CURBS ON METAL DECK	003/	con/	con/ssw/	
714	act	05/	GROUT EXTERIOR PRECASE PANELS	003/	con/	con/ssw/	
715	act	05/	ALIGN & WELD EXTERIOR PRECAST PANELS	003/005/	con/	con/ssw/	
716	act	05/	INSTALL ROOF EQUIPMENT CURBS	006/007/	con/	con/ssw/	
717	act	05/	STRIP & RESHORE SUPPORTED CONCRETE DECK	003/	con/	con/ssw/	
718	act	05/	INSTALL SHEAR STUDS	005/	con/	con/ssw/	
719	act	05/	POUR OUT SUPPORTED CONCRETE DECKS	003/	con/	con/ssw/	
720	act	05/	ROUGH WOOD FRAME WALLS AND FLOOR SYSTEM	006/	con/	con/ssw/	
721	act	05/	FORM, REINFORCE, POUR & STRIP CONCRETE SHAFT & SHEAR WALLS TO FLOOR DECK ABOVE	003/	con/	con/ssw/	
722	act	05/	CURE SUPPORTED CONCRETE DECK TO POST TENSION	003/	con/	con/ssw/	
723	act	05/	STRIP CONCRETE COLUMNS	003/	con/	con/ssw/	
724	act	05/	FORM, REINFORCE & POUR CONCRETE COLUMNS	003/	con/	con/ssw/	
725	act	05/	FORM & SET IN FLOOR WORK FOR SUPPORTED CONCRETE DECK	003/	con/	con/ssw/	
726	act	05/	CURE SUPPORTED CONCRETE DECK TO STRIP & RESHORE	003/	con/	con/ssw/	
727	act	05/	TOTAL STRIP SUPPORTED CONCRETE DECK	003/	con/	con/ssw/	
728	act	05/	FORM, REINFORCE AND POUR CONCRETE CORE WALLS	003/	con/	con/ssw/	
729	act	05/	ERECT LIGHT GAUGE STEEL WALLS AND SUPPORTED DECKS	005/	con/	con/ssw/	
730	act	05/	FORM, REINFORCE, POUR & STRIP COLS TO FLOOR DECK ABOVE	003/	con/	con/ssw/	
731	act	05/	FORM, REINFORCE, POUR & STRIP CONCRETE SUPPORTED DECKS ON WOOD FORMS	003/	con/	con/ssw/	
732	act	05/	RUB EXPOSED CONCRETE SURFACES ON SUPPORTING STRUCTURES	003/	con/	con/ssw/	
733	act	05/	SET EMBEDS IN SUPPORTED CONCRETE DECK	003/	con/	con/ssw/	
734	act	05/	INSTALL EMERGENCY GENERATOR	016/	con/	con/usy/	
735	act	05/	TEST & BALANCE AIR SYSTEMS	015/	con/	con/usy/	

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736	act	05/	INSTALL ELEVATOR FIRE COMMAND ROOM	016/	con/	con/usy/	
737	act	05/	INSTALL DATA PHONE SYSTEM	016/	con/	con/usy/	
738	act	05/	RUN IN FOOD SERVICE EQUIPMENT	011/	con/	con/usy/	
739	act	05/	INSTALL ELEVATOR LIFE SAFETY SYSTEMS	014/016/	con/	con/usy/	
740	act	05/	INSTALL & WIRE GUARD STATION PANEL & EQUIPMENT	016/	con/	con/usy/	
741	act	05/	TRAIN STAFF ON FOOD SERVICE EQUIPMENT USE AND MAINTENANCE	011/	con/	con/usy/	
742	act	05/	INSTALL ELEVATOR CONTROL SYSTEMS	014/	con/	con/usy/	
743	act	05/	ORDER, DETAIL, APPROVE, FAB & DELIVER ELEVATOR	014/	con/	con/usy/pr o/	
744	act	05/	ORDER, DETAIL, APPROVE, FAB & DELIVER EMERGENCY GENERATOR	016/	con/	con/usy/pr o/	
745	act	05/	INSTALL JOB SITE TEMPORARY POWER	016/	con/	con/utl/sit /	
746	act	05/	INSTALL JOB SITE TEMPORARY PERMANENT POWER	016/	con/	con/utl/sit /	
747	act	05/	PROVIDE FIELD WITH FIELD BUDGETS	001/	con/	cos/con/	
748	act	05/	PREPARE FIELD COST, HOUR, QUANTITY BUDGET TARGETS	001/	con/	cos/con/	
749	act	05/	PREPARE AND MAINTAIN PAST & CURRENT FIELD LABOR ANALYSES	001/	con/	cos/con/	
750	act	05/	PREPARE & MAINTAIN PAST & CURRENT ADMINISTRAIVE LABOR ANALYSES	001/	con/	cos/con/	
751	act	05/	PREPARE & MAINTAIN GENERAL CONDITIONS MATERIAL ANALYSES	001/	con/	cos/con/	
752	act	05/	PREPARE OVER/UNDER ANALYSIS OF PROPOSALS AND BUY OUT	001/	con/	cos/con/pr o/	
753	act	05/	DEMOLISH & REMOVE ALL EXISTING ABOVE GRADE OBSTRUCTIONS AS REQUIRED	002/	con/	dem/con/s it/	
754	act	05/	DEMOLISH AND REMOVE ALL BELOW GRADE OBSTRUCTIONS AS REQUIRED	002/	con/	dem/con/s it/	
755	act	05/	LOCATE, REMOVE, RELOCATE, CAP ALL EXISTING SPECIAL USE UTILITIES AS REQUIRED	002/	con/	dem/con/s it/utl/	
756	act	05/	LOCATE, REMOVE, RELOCATE ALL EXISTING ELECTRICAL LINES AS REQURIED	002/	con/	dem/con/s it/utl/	
757	act	05/	LOCATE, REMOVE, RELOCATE, CAP ALL EXISTING WATER LINES AS REQUIRED	002/	con/	dem/con/s it/utl/	
758	act	05/	LOCATE, REMOVE, RELOCATE ALL EXISTING CABLE TV LINES AS REQUIRED	002/	con/	dem/con/s it/utl/	
759	act	05/	LOCATE, REMOVE, RELOCATE ALL EXISTING PHONE LINES AS REQUIRED	002/	con/	dem/con/s it/utl/	
760	act	05/	LOCATE, REMOVE, RELOCATE OR CAP ALL EXISTING GAS LINES AS REQUIRED	002/	con/	dem/con/s it/utl/	
761	act	05/	LOCATE, REMOVE, RELOCATE, CAP ALL EXISTING STORM LINES AS REQUIRED	002/	con/	dem/con/s it/utl/	
762	act	05/	LOCATE, REMOVE, RELOCATE, CAP ALL EXISTING SANITARY LINES AS REQUIRED	002/	con/	dem/con/s it/utl/	
763	act	05/	DEMOLISH EXISTING STRUCTURES AS REQUIRED	002/	con/	dem/sit/co n/	
764	act	05/	INSTALL SLIDING METAL FIRE DOORS	008/	con/	esk/con/	
765	act	05/	CAULK EXTERIOR PRECAST PANELS	007/	con/	esk/con/	
766	act	05/	INSTALL ROOF DRAINS AND OVERFLOW DRAINS	015/007/	con/	esk/con/	
767	act	05/	INSTALL SHEET METAL CURBS	015/007/	con/	esk/con/	
768	act	05/	PAINT REQUIRED EXTERIOR SURFACES	009/	con/	esk/con/	
769	act	05/	LAY ROOF INSULATION	007/	con/	esk/con/	
770	act	05/	INSTALL EXPANSION JOINT ASSEMBLIES AT ROOF AS REQUIRED	007/	con/	esk/con/	

rec #	data type	seq	action, subject or meaning	csi code	wk phase	cmpt	resp code
771	act	05/	LAY SINGLE PLY ROOF MEMBRANE	007/	con/	esk/con/	
772	act	05/	INSTALL ROOF MOUNTED MECHANICAL EQUIPMENT	015/	con/	esk/con/	
773	act	05/	INSTALL SHEET METAL ROOF FLASHINGS AND TRIM	007/	con/	esk/con/	
774	act	05/	INSTALL ROOF SCUPPERS AND DOWNSPOUTS	015/007/	con/	esk/con/	
775	act	05/	INSTALL EXTERIOR GLASS IN STOREFRONT & ENTRIES	008/	con/	esk/con/	
776	act	05/	CAULK STOREFRONTS AND ENTRIES	008/	con/	esk/con/	
777	act	05/	INSTALL STOREFRONT & ENTRY ALUM FRAMING	008/	con/	esk/con/	
778	act	05/	INSTALL EXTERIOR DOOR HARDWARE	008/	con/	esk/con/	
779	act	05/	INSTALL WOOD OVERHEAD DOORS	008/	con/	esk/con/	
780	act	05/	INSTALL BUILDING MOUNTED SECURITY CAMERAS	016/	con/	esk/con/	
781	act	05/	INSTALL EXTERIOR MAN DOORS	008/	con/	esk/con/	
782	act	05/	INSTALL LOUVERS IN EXTERIOR WALLS	010/	con/	esk/con/	
783	act	05/	INSTALL DOCK SEALS AND BUMPERS	011/	con/	esk/con/	
784	act	05/	INSTALL BUILDING MOUNTED SECURITY LIGHTING	016/	con/	esk/con/	
785	act	05/	APPLY PLASTER TO EXTERIOR SURFACES	009/	con/	esk/con/	
786	act	05/	CAULK EXTERIOR DOORS	007/	con/	esk/con/	
787	act	05/	SET, ALIGN, & SECURE EXTERIOR PRECAST PANELS	003/005/	con/	esk/con/	
788	act	05/	INSTALL EXTEROR HARD CEILING SOFFIT FRAMING	009/	con/	esk/con/	
789	act	05/	ERECT EXTERIOR MASONRY	004/	con/	esk/con/	
790	act	05/	LAY INSULATION & BUILT UP ROOFING	007/	con/	esk/con/	
791	act	05/	INSTALL ROOF FLASHINGS & TRIM	007/	con/	esk/con/	
792	act	05/	INSTALL ROOF SHINGLES	007/	con/	esk/con/	
793	act	05/	CLEAN EXTERIOR MASONRY	004/	con/	esk/con/	
794	act	05/	INSTALL MISCELLANEOUS IRON FOR EXTERIOR SKIN WORK	005/	con/	esk/con/	
795	act	05/	APPLY EXTERIOR INSULATION AND FINISH SYSTEMS (DRYVIT AND OTHERS)	007/	con/	esk/con/	
796	act	05/	CAULK EXTERIOR SASH	008/	con/	esk/con/	
797	act	05/	CAULK EXTERIOR MASONRY	007/	con/	esk/con/	
798	act	05/	ERECT EXTERIOR GRANITE	004/	con/	esk/con/	
799	act	05/	INSTALL STANDING SEAM METAL ROOF DECK	005/	con/	esk/con/	
800	act	05/	INSTALL TEMPORARY UTILITIES	001/	con/	gcr/con/utl/	
801	act	05/	FILE NOTICE OF PROJECT START	001/	con/	reg/con/	
802	act	05/	OBTAIN CERTIFICATE OF OCCUPANCY	001/	con/	reg/con/	
803	act	05/	INSPECT & APPROVE ELEVATOR CAR OPERATION	014/	con/	reg/con/usy/	
804	act	05/	PREPARE & SUBMIT SUMMARY CONSTRUCTION REPORTS	001/	con/	rep/con/	
805	act	05/	REVIEW SUBMITTAL PROCESSES WITH SUBCONTRACTOR & OBTAIN THEIR AGREEMENT	001/	con/	sub/con/	

rec #	data type	seq	action, subject or meaning	csi code	wk phase	cmpt	resp code
806	fol	05/	- FOL - FOLLOW UP		con/	cmpt/	
807	war	05/	- WAR - WARRANTY WORK		con/	cmpt/	
808	act	05/06/	PUT OWNER ON MARKETING AND MAILING LISTS AND OTHER ACTION TICKLER LISTS AS APPROPRIATE	001/	con/fol/	clo/con/fol /mkt/	
809	act	05/06/	FOLLOW UP ON CORRECTIVE WORK REQUIRED DURING WARRANTY PERIOD	001/	con/fol/	con/clo/wa r/fol/	

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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 I - 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.

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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

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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 - Electrical 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 distribution 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 improvements
      (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 Street, 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 - catalog 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 remodeling 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 - December 1997**

RJS

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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. FAX number
- 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.

Ralph J. Stephenson, P.E.
Consulting Engineer

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.

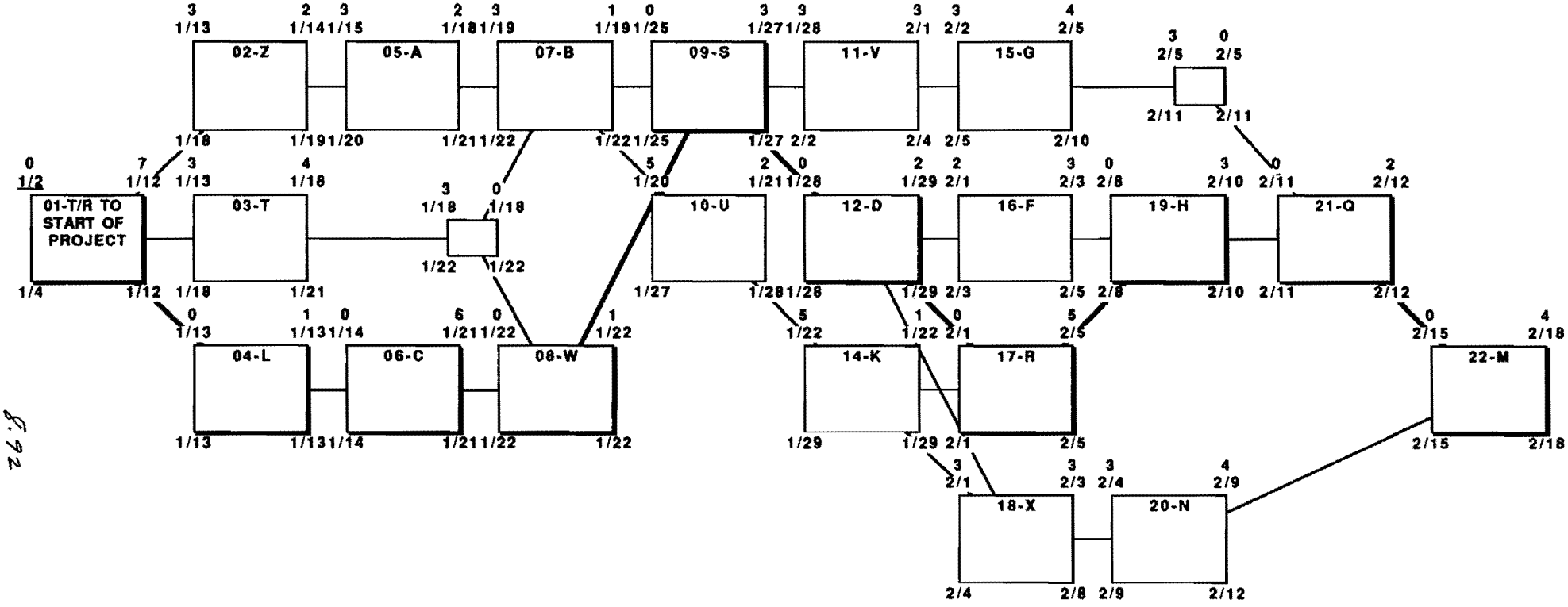
The houses are fully landscaped and ready for owner move in upon completion.

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?



Reserved activity numbers

41	46
42	47
43	48
44	49
45	50

lan 01
han 22

Slack
Earliest Start
Duration
Earliest Finish

Latest Start
Latest Finish

ACTIVITY LEGEND

Issue #1 - January 13, 1998

exercise #2

NETWORK MODEL FOR EXERCISE #2

WEX PM 99 Project Team

Ralph J. Stephenson P.E.
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Note:
Float time shown in this network model is for the sole use of the WEX PM 99 project team. Use of float time by others is to be only by written permission of the WEX PM 99 team management.

ho #527

MIND PROBER

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

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

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

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 shelte
		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

Construction University
Essays published to date
Introduction andTable of Contents

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December 6, 2000

Introduction To The Construction University

Dear Planning, Design and Construction Professional:

I am experimenting with sending an occasional essay or article on planning, design, construction, and facilities maintenance to interested professionals. There is no cost to for these essays, and I hope we may even get some Paper contributions from you for the Construction University to send out as a starting point for the e-mail university (we take the classroom to the student).

This sampler consists, first of a short essay on "Use of Float Time in Project Planning", followed by a series of 11 other essays on various planning, design and construction subjects. The hope is that you or any of your professional associates or friends will use this material for the benefit our respective professions -- but I request users to please give the authors credit.

Of course, I'm always happy to hear from you, so please don't hesitate to drop an e-line. Cordially and sincerely, with hope that you'll respond

Ralph J. Stephenson, P.E.

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Table of Contents

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December 6, 2000

Use of Float Time in Project Planning
CU essay #001

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December 31, 1999

Dear Friends:

Happy Millennium! (For men it starts this year; for women, next).

I am experimenting with a construction mailing list to be used to distribute an occasional essay or article on planning, design, construction, and facilities maintenance. You are on my test list to see who is actually interested. There is obviously no cost to you and I hope we may even get some paper contributions (from you) to send out as a starting point for the on-line university (we take the classroom to the site of the student). There exists the possibility that we may post a web site for those in the construction professions so that we might make available a wide variety of topics from which anyone might choose...a glossary of terms, case studies, practices and protocol. What do you think?

I'm offering a small sample of what I'm thinking about with a short essay on "Use of Float Time in Project Planning." The idea is that anyone may use this material for any reason so long as it benefits our professions but I would like users to give the authors credit, please.

Of course, I'm always happy to hear from you, so please don't hesitate to drop me an e-line. Cordially and sincerely (with hope that you'll respond)

Ralph J. Stephenson, P.E.

Use of Float Time in Project Planning

by Ralph J. Stephenson, P.E.

-- 487 words
-- Reading time approximately 4 minutes

December 30, 1999

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

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December 31, 1999

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

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December 31, 1999

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.

Ralph J. Stephenson, P.E.
Consulting Engineer
January 7, 2000

Dear Construction University faculty:

Below is our second offering (CU #002) in the Construction University curriculum. In this essay we're examining just how many people you can directly manage.

Control of the span of management is one of the largest and most serious problems encountered by the emerging manager. He or she so often feels able to manage the world, but, in truth and practice, these individuals are delegating that operation to those within their span of management who they can influence most effectively. That span of management can be anywhere between six and thirty, depending totally on the amount of interaction expected among those being managed.

Let me know what you think about this...write me if you've experienced it yourself. Those other Construction University students (an elite group) receiving these essays might well like to hear your story. Send it to me and we'll see what happens. ...After all Construction University is the locus of common sense !

Cordially and sincerely,

Ralph J. Stephenson, P.E.

Span of Management

-- 1299 words
-- Reading time approximately 6 minutes

December 30, 1999

Carrie is a very bright lady, a university graduate with writing, publishing and management skills and aspirations. A year ago Carrie accepted a very responsible position with Xeno Development. Xeno is an international urban planning, design and construction firm specializing in the development and ownership of integrated commercial enterprises and related sports facilities.

Her immediate superior, Helen Ralon, vice president of staff operations, immediately spotted Carrie's talents and gave her a clearly defined departmental management assignment including responsibility for publishing the monthly Xeno newsletter for commercial and sports facility owners. Current staff of the department in addition to

Ralph J. Stephenson, P.E.
Consulting Engineer
January 7, 2000

Carrie was two full-time writers, one proof reader/graphic designer and one computer operator.

Carrie quickly assembled this group into a effective team whose performance was good enough to lead Helen to add another supervisory task to Carrie's assignments -- preparing all proposal letters for presentation to prospective clients. Carrie was delighted by the challenge, and soon hired, with Helen's support, two additional engineering and architectural professionals to provide technical strength to the operation.

About seven months into the dual newsletter/proposal management assignment, Helen noticed some signs of weariness in Carrie but still no lack of enthusiasm for her job. Carrie was also beginning to do a great job of public relations of the firm. The marketing manager asked Helen if he could temporarily borrow Carrie to spearhead the upcoming negotiations for a very large five year development.
Carrie's new assignment involved responsibility for seeing that the work of two estimators, one architectural designer, and one more cad operator were properly meshed into the negotiation timetable and presentations.

Helen soon noticed that Carrie was spending more overtime, was looking tired and harassed; she also was losing her normal good natured rapport with others. Most seriously, her work quality and management abilities were visibly deteriorating.

After some serious thinking, Helen decided Carrie's problems might stem from a too-rapid and too-large expansion of her span of control. This very common ailment affects many managers today, and the failure of them and their superiors to recognize the problem is often the cause for promising careers ending up in frustration and failure. Continued later. As to the details - read on!

Span of management can be defined as the number of people whose activities you are able to manage and supervise by 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.

The 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

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Consulting Engineer

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 four to six persons. Where there is little or no intercommunication among those under your direct management, you may be able to manage 20 to 30 people. Such a number is not arbitrary: many years ago social scientists studied Sear's stores' middle management. The Sear's researchers 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 structure. If you have four subordinates reporting directly to you and there are no links between or among the subordinates, the number of two-way communication channels in the system is four, one for each of your subordinates to and from you. This requires management of 4 x 2 = 8 relations -- well within the capabilities of even an inexperienced manager.

If two-way links must be maintained among you and among 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 two-way communication links rises rapidly. For a manager and six subordinates who are totally linked the number of two-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 linkage among 20 subordinates you will find yourself trying to keep in touch with so many communication channels that you never can gain permanent 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. 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.

Ralph J. Stephenson, P.E.
Consulting Engineer
January 7, 2000

Military management for thousands of years has proven that careful attention must be paid the span of control to maintain safety and effectiveness of troops being managed.

Today's managers in all fields of construction (for example Helen and Carrie in our case study) 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 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, both the managed and the manager.

* * *

Now for one and a half solutions out of many -

By all means, Helen--an experienced manager--certainly realizes what's happened to Carrie. She sits down and explains it to her--Carrie, as a new manager, has seen all the warning signs of impending trouble but interpreted them as her own failing; in response, she was taking on more and more of the responsibility and had begun to micro manage. Helen shows her how things started to come unraveled and then they set about together to fix the problems.

Carrie needs to groom one or more of her subordinates to manage some of Xeno's operations, allowing Carrie to be most effective on the heavy-hitting projects while permitting her to keep her hard-won authority (and responsibility).

In the span of two months--through mentoring and informal meetings--Carrie's span of control is well balanced, there's a new manager in the company (under Carrie, and the light and heavy work is getting done more effectively. At their most recent meeting, Helen told Carrie how very proud she was to be working with her. They both got nice bonuses at year end and Carrie is looking at management as an ongoing career possibility.

Ralph J. Stephenson, P.E.
Consulting Engineer
January 19, 2000

Dear member of the Construction University:

The following essay is the result of my participation in a seminar by the Michigan and Detroit chapters of the Associated General Contractors, entitled AGC Student/Contractor Awareness Night (SCAN) in October of 1999. My friend Dick Brunvand of the Michigan Chapter of the AGC asked me to expand on my panel comments. This brief essay is the answer to his request.

As always, the materials from the Construction University are for your use as long as that use is intended to benefit the professions. It would be nice, too, if you give the various authors credit as you reuse these materials.

Ralph J. Stephenson, P.E.

Ethics in the Design and Construction Industry

by Ralph J. Stephenson, P.E.

1405 words
approximate reading time = 10 minutes

Are you ethical? -- Am I ethical? -- Are they ethical (and who are they, anyway)? The professional designer and constructor face these questions and dozens of others related to behavior day in and day out. We'll assume you are ethical and let's assume I am, too. But do we mean the same thing? Will we use the same criteria in an ethical situation that involves both of us? Can you see the need for both of us to share a definition?

Confucius said it very well:

"If language is not correct, what is said is not what is meant: What ought to be done remains undone: Morals deteriorate: Justice will go astray: And the people will stand about in hopeless confusion."

Civilizations and their disciplines of good, evil, moral duty and standards of conduct, commonly called ethics, are faced ultimately with hard decisions about what they believe in and what they wish for the future. Similarly, the design and construction

professions face the need to transfer into words and deeds what is healthy to believe in and what is healthy to do. A very simple anecdote illustrates the principles of proper behavior in a startlingly clear mode as presented in the world of words. Let us call this story the "Case of the Invisible Sprinkler Lines."

A young journeyman sprinkler fitter named Fred, just 22 years old, is working on a medium-sized school job in Lansing, Michigan. Fred's approved shop drawings show a sprinkler main running above the ceiling from the riser to the branch line in a small, enclosed storage area on the first floor. Two sprinkler heads are to be located in the storage room.

Fred has found sheet metal ductwork and water piping that interfere with this line, making it difficult to install without redesigning the sprinkler distribution system. Fred flags down George, his supervisor, and asks him what to do. George, a seasoned tradesman and field manager with almost 30 years experience looks over the situation and tells Fred -- 'forget the runs and just install dummy heads in the storage area after the ceiling is in. Nobody will notice it or check it anyway. Arguments with the owner, the architect and the engineer about who's going to pay for correcting the interferences aren't worth the trouble it'll take to resolve the problem.'

Fred disagrees but does not have time to voice his feelings because George is already on his way to another job.

The president of Fred's company, Tom Halstead, happens to be at the project for a job meeting. Fred sees him some distance away as he is told by George to ignore the interference. George has left the area without seeing Mr. Halstead, and the president is walking toward Fred, obviously with the intent of saying hello and seeing how things are going.

Many thoughts are flying through Fred's mind:

What should I say, if anything, to Mr. Halstead about the sprinkler heads?
How can I justify any course of action to George?
What will the guys on my fitter crew think of me?
What will my family think of me?
What will be my opinion later about my action today?
Am I in the right business?

This, in miniature, is what many of us encounter as we try to make ethical, moral, and civilized decisions about the problems and temptations facing us in our personal and

on-the-job lives.
There are some easily applied systems that can help you arrive at quick but sound ethical decisions. For instance, the three-question technique proposed by Kenneth Blanchard and Norman Vincent Peale in their book *The Power of Ethical Thinking* suggests you answer three questions:

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? (In a sum-zero situation there is a winner and loser with the winner taking everything the loser loses.)

3. How will my decision make me feel about myself?
• Will it make me feel proud?
• Will I feel good if it is published in the local newspaper?
• Will I feel good if my family finds out about my decision?

In Fred's situation the legal answer is apparent. Doing what his superior, George, suggests is clearly a violation of the law and probably of company policy. Further, a decision to install the dummy heads is a disservice and a danger to those who must occupy the completed school.

Installing the dummies creates an automatic adversarial situation in which there are losers: those using the building and depending on the life-safety systems. There are dubious winners: the contractors on the job. There is another loser, Fred. He will probably lose his job unless he can think of a way to a winning solution, one in which all parties win.

The third consideration is more complex and personal but is probably the easiest to answer. Your feelings are best known to yourself, and your answer will mirror your ethical capacity to exist in a working group that values a high trust of others in that group.

We have seen in the sprinkler story an example of the formal ethic where Fred's refusal to install the dummy sprinkler heads is readily recognized as ethical by the law and by well-accepted standards of good conduct.

Blanchard and Peale are superb as far as they go, but for those of us in the construction

professions there is yet another form of ethic: paramount respect for public health, safety, and welfare. As an illustration consider a situation where life safety is at stake and you must make decision in which only the end result is the measurement of ethical performance. For instance, suppose that you, as a project manager on a busy highway job, must suddenly shut down a critical interchange at morning rush hour due to an unexpected gas leak. The end result -- a safe journey for the users -- will be the final criterion of ethical action, rather than the shut down and its delay to motorists at the start of the work day.

In our second example above situational ethics determine what rules of law and behavior can be safely broken to arrive at course of action that at its completion is considered ethical. Here is where professional designers and constructors must be at their best. Perhaps the most reliable and straightforward ethical guidelines I have received were those given to me many years ago by Clement Freund, Dean of Engineering at the University of Detroit. I had asked for his guidance in considering a structural design revision that in my opinion could be safely done, but would possibly violate a required code. He told me about a simple test of ethical priorities, and how to apply it to actions that must be taken as we make ethical decisions. "Your actions", Dean Freund said, "should be given the following order of consideration:

- Your first priority is -- to protect the health, welfare and safety of the public.
- Your second priority is -- to protect the interests of your client or employer.
- Your third priority is -- to protect the interests of your peers.

Although there may be no single acid test of ethical, moral, and civilized behavior, the considerations outlined above certainly contain the essence of generally accepted civil and professional action to achieve such behavior. Their incorporation into your thinking and reasoning in design and construction matters will give you added confidence in the validity of your design and construction choices.

Ralph J. Stephenson, P.E.

Ralph J. Stephenson, P.E.
Consulting Engineer
February 4, 2000

To Construction University faculty

CU#4 is an introduction to a management skill needed by professional planners, designers, and constructors. As usual, we welcome your comments and suggestions.

Regards,

Ralph J. Stephenson, P.E.

USING INTELLIGENT QUESTIONING

by Ralph J. Stephenson, P.E.

-- 1,623 words
-- Approximate reading time - 8 minutes

(Every man and woman is satisfied that there is such a thing as truth or they would not ask any questions - paraphrased from Charles Sanders Peirce)

Over the years I have been impressed by the amount and quality of information some professionals in the design and construction business are able to acquire in a very short time. After much watching, listening, reading and thinking I have concluded that this information is a direct result of their use of a talent...the talent of intelligent questioning. Part of this talent grows out of a sincere interest in what others think; the other part is learned.

The sincere interest portion of questioning must be acquired by a belief that what others know can add value to your professional responsibilities to society, your clients and your peers.

The learned part of acquiring quality information requires an understanding of the power of various kinds of questions. An actual example might illustrate how important it is to know the types of questions you can ask and how they are

used.

The Case of the Closed Question

This event happened several years ago on the construction of a large discount store in Chicago upon which I was engaged as a consultant. My responsibility was to regularly inspect, evaluate, and report on construction progress of the job to the owner.

The general contractor's field superintendent on the job, Linton (not his real name), was originally a farmer, and a good one. He had earned an architectural degree from an excellent Midwest university and had received his professional architectural registration. Linton had learned, as do many farmers, to keep his mouth shut except when he added value by opening it.

I came to the job about nine o'clock in the morning and checked in at the field office. Linton was occupied but told me to go ahead and tour the job and he would catch up later.

Site grading was in work for a major share of the parking areas and the foundations for the building were substantially complete. I noticed that building work and site grading were meeting planned dates between early and late starts and finishes. However, several trenched utility excavations were standing open and empty.

It was not a serious schedule problem at the time, but with wet, cold weather in the forecast, the open excavations might force a site-work cost overrun for my client.

Linton caught up with me just as I was heading back to the shanty to review job progress with him. On our way I asked--"Linton, do you have all your building permits," knowing that Linton, an honest person, would quickly explain why he wasn't installing site utilities in the open trenches. However, Linton responded with a terse one-word answer: "yes."

This puzzled me because normally our superintendents, including Linton, worked very hard this time of the year to get their site underground work completed as quickly as possible.

I was disconcerted at what I thought was less-than-honest answer and it showed in my face. Linton, both a perceptive and conscientious man, was concerned at my lack of acceptance of his explanation and clammed up until we arrived at the trailer. Once in a warm and relatively comfortable work place, I said to Linton, "If you have all your permits...and knowing from my inspection that you have the underground pipe and conduit on the job...why aren't you installing the parking lot utilities in those open trenches?"

Linton told me quickly and impatiently that I had asked him if he had all his building permits--not all of his construction permits. He said he did have a full building permit, but that his site work permit was still pending and would be available later that day.

So, Linton felt that he would have been lying--and rightly so--if he had told me he didn't have the building permit.

The lesson learned: Don't ask the Lintons of this world a yes or no question unless you are totally satisfied that a yes or no will provide you with all the correct information you need. Linton had given me a right answer to a wrong question.

Questions stimulate the mind. Most active, interested people love to answer a question because it gives them a chance to think constructively about situations. To use questioning as an intelligence tool we, as design and construction professionals, must understand that although there are fifteen or twenty kinds of questions in common use, most of these are either open or closed. This two-part division gives us a basis for effectively formulating almost any question we choose to ask.

Let us begin our discussion with a few fundamental definitions.

A question is a brief sentence in an interrogatory form addressed to someone, and is designed to elicit information.

*A closed question is one that can be answered with a yes or no, or with a simple statement of fact:
- Are you going to the committee meeting tonight?
- Is the structure concrete or steel?
- I hear a large crowd is expected at the basketball game. Is this true?

The closed question is valuable in opening a line of inquiry. It can be used to narrow down a group to those individuals who probably know something about a particular subject.

* An open question is one that cannot be answered with a yes or no, nor with a simple statement of fact:
- What is the best approach to inspecting and monitoring the project?
- How do you open this word processor?
- Why do you want to bring the utilities in from the south?

The open question is best used to encourage those responding to a closed question to further elaborate on their knowledge. It is a valuable tool with which to build a meaningful discussion base and to zero in quickly on the details of a topic.

The Soccer Program

Fred Thompson, the program manager for a sports-facility developer, is meeting with a working group of fifteen people from various architectural and engineering disciplines. They are about to begin discussions of the project-delivery systems available for a proposed soccer complex. Fred wants to quickly locate those in the meeting who know something about writing narrative programs about sport facilities. He asks a closed question: "Who in the room has experience in writing narrative design programs for sports facilities?"

Notice the question is devoid of specific details. Instead, Fred has allowed the audience members to provide their ideas about what he is asking. This stimulates the group to supply their own interpretation about what Fred wants and to give answers that will help direct the discussion into more specific channels.

Lisa raises her hand, answers "yes" to Fred's closed question, and begins to converge the discussion by asking Fred another closed question: "Are you looking for experience with interior design narrative programs for facility support areas?"

Others who answered Fred's opening question are now also asking both closed and open questions to further narrow down what it is that Fred is really trying to find from the group. At the same time, Fred is gathering information about the people who will probably prove valuable as he makes design-team

management assignments.

When formulating questions we should distinguish clearly between various types of closed and open questions. To set the stage for further discussions of intelligent questioning, I have defined below some sub definitions that may be formatted either as closed or open inquiries.

a. **Ambiguous** - questions possible to interpret in different ways:
* Do you like this job?
* What are your career objectives?
* How many sections do you use in your specification format?
* Who owns small tools at the end of the job?
* Where is this specified?

b. **Closing** - questions that cut off or freeze the discussion temporarily or permanently:
* Is that your best price?
* Their proposal includes several options we want but you have excluded - can you match the options?
* Take it or leave it--ok?

c. **Direct** - questions with a strong indication who should answer:
* What does the group think about design/build? Tony, how about you?
* Here's a question that probably should be answered by a safety expert. What do you think, Hal?
* Is this a code problem, a design problem, or a construction problem?
* How do our clients feel about chemical environmental issues?

d. **Directive** - specific questions about specific issues:
* What quality of graphics do you want to use in this presentation--high, medium, or sketch level?
* What do you mean when you say we should start our cost estimates by figuring the "must" items first?
* Are you aware of the business risks you are taking with our client by using iterative costing with a guaranteed maximum price?
* When did you first realize how good that glass system really was?

e. **Indirect or overhead** - asked of a group without indication who is to answer:
* How do you approach the problem of governmental restrictions on the type of project delivery system your division can use?

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* How has the use of commissioning improved your project costs?
* What type of management organization has proven successful in your respective offices?
* How do you prorate equipment rental costs?

This is by no means an exhaustive list of the types of questions that are out there and there will be more to follow in the next Construction University paper.

As always, your input and questions are welcomed! I'd especially like to hear about any times when your questions led to...hmmm...interesting answers. Remember to change the names of all the parties.

Here are some references I suggest if you want to know more about questions and questioning:

Smart Questions by Dorothy Leeds - McGraw-Hill Book Company

The Nine Master Keys of Management by Lester R. Bittel - McGraw Hill Book Company

Give and Take by Chester L. Karrass - Thomas Y. Crowell Company.

The Gap
CU Essay #005
Written by Phil Bennett
Edited by David Schock , PhD

Ralph J. Stephenson, P.E.
Consulting Engineer
February 26, 2000

Dear Construction University Faculty:

Here is CU #005--The Gap, written by Phil Bennett of the University of Wisconsin. Some of you are familiar with Phil through classes you have attended there and others of you may recognize the name through the many flyers you get from WEX. Phil is an outstanding educator in the design and construction disciplines and probably has conducted more successful and meaningful seminars for design and construction professionals than anybody else I know.

He and I have been looking at the makeup of our classes at the U. of W. for many years and we agreed about four years ago that Phil should write a paper with his views of a peculiar phenomenon--the existence of a hole in the age spectrum that had certain characteristics, and, within some groups, had produced a vacuum in information transfer. You can read all about it below.

The essay is long and meaningful, meant to be read at your leisure. And, naturally, we hope you will send your comments.

This essay is the fifth in the Construction University series. If for any reason you did not receive and want any of the earlier mailings, just let me know. Here's what we've sent so far: Float Time (CU #001), Span of Control (CU #002), Ethics (CU #003); and Using Intelligent Questioning (CU #004). As well, if you would like to address an essay to this audience of dedicated professionals, drop me a line.

Cordially,

Ralph J. Stephenson, P.E.

The Gap - Are We Educationally and Experientially Preparing the Construction Industry for the 21st Century?

by Philip M. Bennett

Architect and Professor
Department of Engineering Professional Development
University of Wisconsin

-5,338 words
-Approximate reading time = 25 minutes

The construction industry is presently undergoing a change in the experiential backgrounds of many of the members of its professional work force. U.S. demographics and insurance studies show that as we neared the year 2000 approximately 60 percent of the experienced work force in America would be retiring.

The legendary construction professionals who had many years of technical skills are now retired or retiring. The magnitude of the knowledge base being lost to retirement has yet to be realized. Many individuals who are retiring after 40 or 50 years of experience will take with them several critical areas of information necessary to maintain continuity and the integrity of the departments that they leave.

Their leaving has created a void...a gap. Somebody--many somebodies, actually-- have to fill it, but how can we remedy the lack of preparation that accompanies new members of our fields? Even more serious, there is now a lack of people in the 35-45 year-old age range...a time, traditionally, when many construction professionals were moving into middle management. It is these people who would have been training new entrants to the professions and these same people, historically, would be getting

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ready to take over the upper management tier.

A host of issues--the high costs of construction, limited time for training, and larger construction demands--have opened this gap and it's up to us--those of us who are not yet retired (even some who are but remain active in the professions) and who can see the problem--to address the issue. My hope is that everyone in the construction industry will reevaluate organizational and individual deficiencies and then direct training efforts toward improving industry performance.

The Problem

The gap hasn't happened all at once. We've been watching during the past twenty-five years as economic and time constraints have pushed many organizations and companies to place less emphasis on training and mentoring to replace a growing number of retirees. Add to all that, with the onset of downsizing, rightsizing, and company buy-outs, many individuals have been forced into alternate career paths that have limited the depth of experience they might have gained by staying in just one position. This fragmentation in training has produced large numbers of individuals who have limited skills in the specialty and general areas needed to satisfy the needs of the construction industry.

Major changes in construction and related manufacturing sectors in the 1980s have further reduced the number of midrange-age individuals in the work force. As a result, middle management has been decimated. We now are feeling the effects of limited leadership to take over many organizational programs. There is little discernible leadership continuity in the overall work force coming from the Gap Group -- and that's something we desperately need.

Let's start by taking a closer look at the reasons we face this problem:

Abandoning Training Programs

Day-to-day training, education, and experiential opportunities are essential to keeping and maintaining a high level of performance in our nation's work force. Over the past several years, specialty programs like construction specifications writing, preparing high-quality working drawings, and other technical skill areas required to produce usable construction documents have been dropped from the training curriculum.

Seemingly, organizations are no longer willing to train individuals in the basic skill areas required for success of their projects.

As we've seen a downturn in training numbers, we have also seen an increase in the number of construction problems and deficiencies resulting from poorly organized and inadequately written legal documents. Basic technical skills are still required to successfully solve construction industry problems.

Automation Technology

During the mid-1970s and through the 1980s, automation technology was implemented in a number of organizations and companies across the U.S. As the automation world developed, more and more companies became proficient in many applications associated with their production activities. The automation world became a part of everyone's life and proficiency and production has increasingly affected the overall structure of the work force.

As a result, individuals working in management down through the production staff have been affected by the increased capabilities needed to deal with larger scale projects and production demands. The overall size of the work force began to change in profile and numbers causing impacts on middle management.

Economics

During the past 15 years, many organizations and companies have been faced with cutting overall production and operational costs. The need to reduce costs has greatly affected the work force and many individuals in upper and middle management. Realigning staff to meet production needs while cutting costs has tended to decrease the number of individuals in the middle-age range of the work force.

Company Downsizing and Rightsizing

In an effort to reduce production costs and realign with public needs, many companies have been downsizing in an effort to cut costs in addition to realigning their staff to meet overall demands.

For some organizations, this has been termed as a process of rightsizing the production staff to meet the goals of the organization while serving the overall marketplace. These

company actions caused many organizations to reduce middle management and, in some cases, upper management, which resulted in a lack of continuity of age range within the work force.

Company Acquisitions and Mergers

To face the world of competition, many organizations have moved into merger and acquisition positions in order to absorb the competition and reduce production costs. These kinds of moves have cost jobs in many different disciplines found in both the private and public sector. When one organization absorbs another it tends to reduce the work force in the middle management and middle-aged range, and may take out the continuity of experiential development within an organization. As a result, we have few people in the age range from 35 to 45, and a pressing need to hire many young people.

Specialization

As our world has become more complex, many disciplines have become more specialized. Larger projects, more sophisticated automation technology, construction technology change, and the overall demands for production have created a demand for individuals who specialize in their educational and experiential development. An individual no longer comes into an organization and works through a whole series of areas before reaching a high level within the company. It is now difficult to find individuals who understand a process from beginning to end; that's a radical departure from past practice.

Worker Mobility

During the past 15 years, many changing job opportunities and downsizing have caused the work force to become more mobile, thus producing fragmentation of learning experiences. One now finds very few individuals who have had a long-term continuity of learning within one organization. Individuals tend to spend only a few years in a particular learning experience before moving on to some entirely different job. Such mobility amplifies the fragmentation of experience. The gap in educational and experiential backgrounds is increasing at a rapid rate because of mobility and limited job tenure opportunities for continuity in the organizational structure.

Temporary Attitudes

We no longer find organizations that have a family-type work force of long standing. Tenure on a job tended to strengthen the quality of production--the overall attitudes being positive and the final product one that pleased the public. Many individuals have acquired an attitude that "I'm only here for a short time, so my experiences will be limited by my exposure to the company or organization." These attitudes tend to decrease the valuable experiential gain from exposure to limited processes within the organization.

As a result, the depth of knowledge on an overall process or production activity will be very limited and not well understood. This process tends to result in a "Who cares?" attitude and, therefore, we find many companies with a work force that is not strongly aligned with the overall goals and objectives of the organization.

Limited Time to Apprentice or for Mentoring

With organizational goals focusing on reducing costs, reducing time, and reducing staff, one finds no real concentration on mentoring or having individuals apprentice under an experienced professional. Efforts to cut costs have also reduced the emphasis placed on training people properly within the organization. Combined with the "Who cares?" attitude, we have individuals who are in and out of organizations with no real alignment or goals that produce stability. In many cases, companies have the attitude that "Once we train the individuals or invest money in their educational background they will leave and move on to other opportunities."

As a result, we find many companies and organizations that are constantly dealing with new people to train who have limited backgrounds and understanding of overall organizational goals. When the individuals in the work force reach a certain point, they decide to quit and move on to another organizational structure thus causing major gaps within the continuity of the work force. Production goes down while the quality of the product also goes down. The customer ends up the loser.

Organizations Changing from Long-range Planning to Short-range Planning

During the past 10 or so years, many organizations have altered their planning process from long-range to very short-range, and, in many cases, day-to-day.

This shift results in reduced training, reduced employee allegiance to the organization, and undermines the good features of longevity. Many individuals know from the

outset that their jobs will only last as long as the projects are funded. With many organizations working on a project-by-project basis, it tends to cause a fragmentation of the learning process and produces a sense of insecurity on the part of the worker.

Changing from a Corporate Attitude to Self- or Individual Fulfillment

As we go back in history, we find many organizations with employees who had a strong corporate attitude and feeling toward their company. The Gap attitude is often one purely of survival and focused on one's self rather than the corporation.

In a survival-work environment, there is little thought given to training and experiential development since there is a major lack of security. The survival attitude in today's work force has helped to cause many gaps in the experiential and learning environment that is so critical in developing strong organizations. As a result, we find many people having to spend time filling in the gaps and covering for individuals who lack the experience or the backgrounds necessary to fulfill their job requirements.

No Continuity in Age or Experience

In surveys taken informally at recent professional development courses, participants have verified that their organizations and others like them have a dwindling number of managers and workers in the middle age range of 35 to 45. As a result, companies are faced with a lack of continuity in experience and production capabilities. Many companies are forced to hire younger, inexperienced people to help cover for the many individuals who are retiring or who have already retired from the work force. The limited time for training causes a limited number of the work force to cover for those who have left with all the experience. The end result is production that lacks quality control.

Lower-Quality Leadership and Decision Making

Many organizations are starting to see the impact of their inabilities to respond to the level of decision-making and leadership necessary to maintain a successful operation. Both private and governmental organizations are beginning to face the same difficulties because the trend toward lower-quality leadership and decision making is increasing at a rapid rate. As a result, production costs and project development mismanagement are causing many projects to get out of hand early in the development stages.

Reduction in Historic Information Database with Less Emphasis Being Placed on Historic Experience

Lack of continuity in the work force, a loss in the experiential base through retirement, and the mobility of the work force have caused many organizations to place little emphasis on the historic database necessary to make improvements and refinements to their overall production process. The expected results can be more trial-and-error decision-making activities, greater risk to the owner-clients, and repetition of many mistakes. The end result will be higher costs, lower quality, and reduced fulfillment of user needs.

Surveys have shown that few organizations are taking advantage of their history...that is, using their historic data as a basis for decision making. Lacking a strong information database will create major gaps in training and experiential backgrounds of their employees (especially new employees). The weakness in limited informational databases of historic data will result in higher cost decision-making while at the same time increasing and magnifying the risk of poor decisions being made.

Segmental Learning and Experience Due to Frequent Job Changes and Limited Exposure to an Entire Process

Long-term benefits can be gained by providing solid career-path training opportunities that expose individuals to many dimensions of an organization's operations. As identified earlier, many individuals are managing specialized projects, tasks, and activities that limit their overall exposure to a process or an entire project, and keep them from fully developing their career potentials. With fewer training and mentoring opportunities, many individuals are left to develop skills on their own and with inadequate guidance.

As a result, many companies face more down time in bringing new people on board and in bringing them up to speed in their job performance. Therefore, it is becoming very important to develop career-path training and good exposure to field mentoring in an effort to reduce training costs while improving the future production from the employee.

Fewer Educational Programs

To complicate things further, many colleges and universities have either dropped or

altered their career development programs that were considered basic and essential in maintaining skill levels. With a lack of continuity in training, hiring and developing career-path programs, the nation will be faced with increasing cost to achieve the quality expected by the general public. Random surveys in professional development programs indicate the gap in age range and experience hinders continuity in expertise.

Informal class surveys of professionals in many fields and representing many different industries have indicated a major gap in the age range of their employees and also in the experience base for future leadership. Fellow workers and employees agree that the United States is facing a major problem in developing strong continuity in leadership and decision making because we do not have good continuity of training within most organizations.

How Do We Recognize the Problem?

How do you know if your construction-related firm is in the Gap Squeeze? There are three main areas you should examine.

Experiential Deficiencies

Are your projects getting out of hand? Are there to few people who know what needs to be done to bring the project in profitably? Are bad decisions being routinely made without being recognized?

Presently, we have fewer individuals in the marketplace experientially capable of picking up where many of the retirees have left off. Most organizations over the next few years will be faced with trying to recover experience by shifting personnel and bringing in younger people to be trained to close the gap presently being encountered across the nation.

With older generations retiring, the experiential level within an organization declines rapidly. This decline leaves many deficiencies in the potential for management, procedural activity, and overall technical experience to effectively solve critical problems. With a major gap in the middle-aged range and experience level, companies must search for younger people to pick up the slack, and in many cases, to bring back retired individuals as consultants. If not filled, the educational and experiential gap will cause the overall quality of decision making and leadership to decline rapidly.

Limited experience in the project management field has already caused many projects to get out of hand with very high cost overruns and major losses to owner-clients. We can attribute this to the decline in leadership and judgment that has accompanied the replacement of experienced project managers with those who are much less experienced. As a result of the lack of quality education and good experiential backgrounds, one finds the leadership and decision-making in question.

Deficiencies in Documents and Reports

Are your documents adequate to accomplish the jobs for which they were designed?

Surveys taken over the last several years in a professional development program focusing on contract documents shows a steady decline in the quality of these documents. The number of errors, deficiencies, and overall problems associated with many construction projects tends to be increasing rather than decreasing. Also, fewer people are able to judge whether documents and reports are sufficient; they just don't know! Our surveys have shown that this decline is continuing to grow at a more rapid pace as we move into the 21st century.

It is interesting to note that there appears to be a corollary in the ability of training in particular skill areas such as specifications writing and the quality control of working drawing development in the construction industry. Professional development programs on these subjects were presented for decades until there was a drop in demand in the late 1980s.

As these programs were dropped, there was an increase in the number of problems associated with development of construction documents the actual project construction in the field.

Profile of Age Ranges in Organizations and Departments

What does your work force look like on paper?

To better recognize the problem graphically, departments, organizations, and companies should profile the age range of their employees in addition to their experiential backgrounds. The information gathered through these surveys will provide a working base for determining the potential problems and gaps to be faced in quality leadership and decision making in their near future.

For those organizations that have already recognized the problem, they will have the advantage of an early recovery, which will allow them to still select from a greater resource pool of skilled individuals. Those organizations that have not recognized the problem and are hoping everything somehow will be resolved will face greater problems in the future because they will have fewer people to select from to create strong production and administrative programs.

What Can We Do about The Problem? How Can We Prepare?

We in the construction industry must become more active and creative in devising ways to minimize the impact of this wave of retirement among our experienced colleagues. As more and more individuals reach retirement age we need to place more emphasis on internal training as well as external training of those proposing to enter the professions. We need to focus educational activities on many different levels of technical training as well as building professional career programs that have been based on the experience of knowledge-rich retirees. Filling the gap and reducing the educational and experiential loss should be a high priority goal of all organizations.

We must undertake an all-out effort to improve training programs, mentoring activities, and co-op programs to provide educational opportunities. On-the-job training combined with excellent educational opportunities will help bring our nation's work force into a new alignment for the challenges we face in the twenty-first century. We must encourage a resurgence of interest and desire on the part of young professionals to become better educated and trained in how to do quality work.

Improve Hiring Practices to Encourage More Continuity in Age Range and Experience

To build stability back into our organizations, divisions, departments, and companies, we need to update hiring practices and organizational thinking to focus on developing an employee base that maintains continuity in age range and experience. Past hiring practices have focused on economics, downsizing, and rightsizing with little emphasis on age range or experience. It has been expedient in the past to simply hire staff on a project-by-project basis with no concern for longevity in career development. As a

result, many organizations suffer from discontinuity in age range and shallow experiential depth.

Improve Professional Development for Employees

With the creation and continuing existence of a gap in age ranges and experiential backgrounds for many company employees, it will become critical to use effective professional development training programs for extending and enhancing career path programs. Both in-house training programs and off-site training endeavors should be looked upon as effective methods to compensate for major losses in experiential skills from retirees and changing work flow patterns. Professional development programs can project younger employees into decision-making situations where they will be able to do a more effective job in a relatively short period of time.

Surveys have shown that an employee can be advanced three to five years ahead of his or her underdeveloped capabilities for problem solving simply by attending continuing education programs. Sharpening skills through both formal and informal training can add great value to an organization's experiential base. Professional development attendees have indicated that some programs can give them educational insights to help them solve problems that would have been far more costly to resolve if they had not attended a continuing education program. Personal discussions with employees and informal surveys have shown that companies active in internal and external training programs have generally operated with a higher level of success and have produced more quality projects than those who have not encouraged employee career development.

Improve Mentoring

With an increase in the number of retirees, it becomes critical to develop effective mentoring programs as early as possible to avoid damaging declines in the experiential base of a department or organization. Good mentoring programs can work effectively by teaming experienced individuals with less experienced individuals who have greater automation skills. This combination not only enhances the learning experience, but also saves training costs and improves quality production.

Careful planning and staff organization can create mentoring programs that do not reduce overall production or alter decision making, but, instead, enhance the end product through more effective working relationships. Teaming up a younger person with an older, experienced staff member can bring many benefits to the organization. It

allows the more experienced person to take advantage of the younger person's fresh technical skills and incorporate them into the problem-solving process. At the same time, this can better integrate the experienced individual's knowledge of the process and the overall goals established by the organizational structure. The exchange of ideas, the application of technology, and the extension of the younger generation's experience provides an overall successful learning environment that produces better problem solving, and saves time and money in the delivery process.

Improve In-house Training

In the future, more internal training will help organizations fill the educational gap and overcome many of the problems that come from potentially fragmented training off-site.

As a result of the current situation, some organizations are beginning to request in-plant or in-house training programs to bring staff members into a position where they can perform more effectively in a limited time frame. These special programs focus on critical task performance requirements and critical company demands. Benefits from in-house training appear to far outweigh the limited training of a few individuals being sent to off-site training centers. In particular, in-house training programs give rise to organizational representatives who become more effective team players as well as focus on the thinking process necessary to streamline many organizational structures.

The continuity of in-house training and employee participation in planning the program helps generate strong organizational goals and mission assignments. Several recent in-plant programs have demonstrated greater unity in carrying out work assignments to meet public demands through employee participation. This type of training has also often been accomplished at a lower cost to the organizations and departments involved in internal professional development.

Nor does all the in-house training have to come from outside: in many organizations, there are very talented people who have not been given an opportunity to conduct or present seminars or in-house training programs for the benefit of less-experienced individuals. Great opportunities exist for developing ongoing in-house training programs that build on experienced individuals' knowledge obtained through years of experience as well as from attending outside professional development programs.

It is also important to encourage those individuals given an opportunity to attend outside professional development programs to help build in-house training programs

based on their learning experience.

Team Up Experienced Staff with Younger, Inexperienced Staff

Complex demands of many of our design and construction projects require that heavy emphasis be placed on team interaction and decision making in an effort to maintain quality control. Organizations are beginning to recognize that the complexity of technology and the demands of current projects are requiring more and more specialists working in a team setting to solve complex technical problems. Organizations can exploit this situation by teaming up younger, inexperienced individuals with older more experienced specialists who can share good technical knowledge. This is not necessarily a mentoring arrangement, but it may well lead to one. Teaming also provides the opportunity for younger people who are more proficient and skilled in automation areas to pass on their learning experiences and knowledge to the less-skilled older generations.

Improve Teamwork Concepts which Share Experiences and Take Advantage of Specialists

It is important to realize when and where teamwork and specialization linked to effective training programs can enhance the quality and outcome of the project development process. Organizations need to evaluate their work and production environments to determine how they can most effectively share experiences and create mentoring settings. In many organizations, the internal competition becomes so great that it may destroy the potential for interchange or effective mentoring programs. In those situations, it is important for the organizational development program leaders to recognize when and where they can build in internal training and have it count toward the output or product of the individual responsible for mentoring in-house personnel. More programs need to put an emphasis on building strong training programs and in-house mentoring efforts that can be evaluated in performance measurements for employees.

Improve Cross-Training Skills

Cross-training programs allow individuals to develop skills in more than one specialty area. Individuals who take part in cross training are generally able to enhance their career opportunities as well as improve their earning power by becoming more

valuable to their employer. Cross training also allows individuals to cover for each other during vacations and employment declines as well as handling peak loads where multiple talents are required. By creating cross-training programs, organizations can reduce the impact of losses through retirees and provide cover for individuals who are absent from the middle-age range of experiential backgrounds.

Develop Training and Operational Manuals

With a rapidly declining experiential base, it is becoming more critical to develop effective training manuals and operational manuals to allow younger employees to better understand the process and the requirements to achieve high levels of success when fulfilling public demands. In many organizations, continuity of procedures and standard operational guidelines must be adhered to in order to accomplish the task.

Surveys of most successful organizations indicate that they have developed organizational missions and objectives that are a starting point for effective procedural and training manuals, which, in turn encourage uniformity and continuity in delivering their services.

The development of effective operational and training manuals can be the beginning of a strong educational development process. Good manuals and procedures will enable younger employees to better understand the company or organizational program as well as the standardization required to maintain specific levels of production and quality. Training manuals are especially important where projects rely on critical decision making through a series of problems whereby experience can be captured and transferred to younger team members. Case studies, good examples, things-that-work manuals, and quality decisions for specific problems can enhance the training potential for new employees.

Develop Databases with Useful Historic Information

Automation technology can now provide a more-effective framework for storing historic project information. Valuable information collected from case studies, successful projects, and good problem solving situations can be captured and stored for easy retrieval. To build consistency and good decision making in future projects, organizations and departments need to place greater emphasis on reusing historic information for planning and implementing projects. With major gaps in experiential backgrounds and continuity of employment, it has now become imperative to rely on good historic information collected prior to individual retirements. Historic databases

can provide valuable information for project start-ups, thereby reducing costs, time, and labor resources while maintaining quality decision making.

Use Former Employees as Training Consultants to Improve Quality of Decisions and Project Review

As we move into the 21st century, departments and organizations need to consider the avenues available for training, project review, and effective leadership for decision making. One route is to use former employees as trainers or training consultants to maintain professional development within an organization. In many cases, lower-cost mentoring or education can take place by rehiring a former employee to watch over and guide younger individuals in their career paths

It is important to consider the use of consultants or former employees for project reviews and construction-document reviews in an effort to reduce potential problem areas. Outside consultants and specialists can help to reduce the impact of the gap or loss in experiential information due to retirements.

Develop Review Teams to Check Projects and Quality Control

An effective means for quality review checking can be developed by selecting skilled individuals to work as a team in monitoring production and final checking of project execution. Most organizations have key people who can add great value to the project by incorporating their knowledge base in establishing project delivery methods. This form of review can be the most cost-effective method by which to add value to the employee's contribution to the organization. The benefits derived from properly using skilled individuals can be realized in the checking process through the reduction of risks.

Phil Bennett, 2000 --

Philip M. Bennett is a registered Architect and a Program Director in the Department of Engineering Professional Development at the University of Wisconsin in Madison, Wisconsin. He has worked in all phases of engineering education and training at the University since 1967. During this period he has developed and maintained more than

400 continuing education programs and research projects.

Under his direction, annual continuing education programs have been developed and presented on working drawing production, CADD management, specification writing, construction contracts, construction inspection and field administration, project and construction management, housing and building inspection, planning and zoning for community land use management, effective zoning administration, integrated mining and land reclamation, and design of functional research and development laboratories.

Ralph J. Stephenson, P.E.
Consulting Engineer

March 28, 2000

Dear Construction University Faculty:

Our newest Construction University essay entitled "Closing Out A Construction Project", is presented below for your use and most particularly for your comments. For several years I have been collecting design and construction project and program close out items from experts like yourselves in the planning, programming, design and construction professions. I would like to take advantage of your knowledge and experience as a generic construction practitioner to sharpen up the list in the essay below and to add to it the new terms now used in our vocabulary, in our classrooms, in the field and in the drafting rooms of our design offices.

Please take some time as it becomes available and give me your comments, revisions and additions on the list below. I will, in turn, try to incorporate your suggestions in future Construction University materials.

Look for the next CU essay in the near future.

Regards and good luck (with a dash of skill) in closing out your next project.

Sincerely yours,

Ralph

Closing Out A Construction Project

A random summary of close out guidelines for owners, architects, engineers and contractors

By Ralph J. Stephenson, P.E.

-- 1,372 words - approximate reading time = 9 minutes

The process of closing out a construction project has emerged as one of the most important sequence 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 items are added)

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.

Ralph J. Stephenson, P.E.
Consulting Engineer

April 12, 2000

Dear Construction University Faculty:

A few years ago I was asked by a structural steel fabricator in Grand Rapids, Michigan to summarize some informal remarks I had made about why the planning, design and construction profession is so significant.

At first I thought it would be a difficult request to fill. How wrong I was! The summary was easy to write and it stimulated some ideas that had been rattling around in my mind for a long time. The essay is no intellectual masterpiece and was written from memory about the off-the-cuff remarks I had made at the evening program on which I had appeared.

In reading the essay the other day it seemed to me that the content of the paper might be of value to today's construction professional. Perhaps you will agree.

Comments and essays about our business and profession are always welcome. Please write and send them along.

Regards,

Ralph

Five Ingredients of Significance

by Ralph J. Stephenson, P.E.

-- 1074 words
-- approximate reading time - 5 minutes

Five ingredients are critical to good thinking and effective management in design and construction.

- Importance!
- Responsibility!
- Excitement!
- Contribution!
- Methodology!

Properly proportioned, blended, and applied, they bring important rewards to skilled practitioners who plan, design, construct, and operate our society's buildings and facilities.

Ralph J. Stephenson, P.E.
Consulting Engineer

These rewards enrich professional life, and are won as we become aware of how the five act in our daily work.

First, let's examine - *Importance*.

1. Importance!

The design and construction professional contributes greatly to the quality of our total environment. This contribution of knowledge, skill, ingenuity, ethical behavior, and sound moral outlook makes the generic construction practitioner a front line battler for good. It identifies the professional as being an important individual. It makes the organization within which he or she works a significant vehicle for societal good.

We in the construction industry must think of our efforts as contributing to society's benefit without our worrying overmuch about who gets the credit or recognition for what is accomplished. Doing this makes you important to others.

The second point of consideration is - *Responsibility*.

2. Responsibility!

Responsibility for our actions as professionals is an integral part of our duties. We cannot always be 100% right. We can however, improve the probability of being accurate and correct to a degree where the public, our employers, our clients, and our peers may safely place high confidence in our judgment.

This confidence should generate a shared understanding that we will take responsibility for our actions and their results.

In the work place, some may have a flawed perception of what constitutes a mistake by the skilled professional. This is a risk all professionals, credentialed or not, must take. We cannot transfer that risk to others who are not so fortunate or knowledgeable, nor as able to carry the burden of such risk.

Your decisions as to how to carry responsibility are part of your professional thinking. They are developed by your upbringing, your work, your training, your education, and your experiences. The true professional must accept the risk of responsible action by being honestly responsible.

Feeling responsible for a job is often as great a reward as is feeling you have contributed to that job's success

Taking the risk of being responsible generates the next reward element of our business life - *Excitement*.

Ralph J. Stephenson, P.E.
Consulting Engineer

3. Excitement!

To chase truth in things technical is a natural instinct of the true generic construction professional. Excitement is one of the most sought after rewards of good construction - a business where the product is of critical importance, and its design and manufacture is in your hands.

Excitement is the process of experiencing the ups and downs that accompany any contribution to society's well being. It is the barometer that measures the pressure, or lack of, to do well.

The reward of excitement is frequently found in both the action and the result. When we are about to accomplish something significant, excitement mounts. When we have accomplished something significant, excitement is heightened by what the accomplishment means to those for whom we took the action.

Excitement must be one of the driving forces for a professional who desires excellence. However, the project must be worthy of that excitement and the participants must be willing to join in. This leads to our next significant ingredient - *Contribution*.

4. Contribution!

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

Believing this brings into view a vast array of rewards and benefits to the professional practitioner. Credit is a tool to encourage improvement and learning. If you are a real pro at what you do, and you want the results of your work to bring about truly constructive change, then by contributing and transferring credit you can often gain rewards far beyond a direct credit benefit to yourself!

When you contribute what you can without concern for being given credit, you gain benefits that encourage you and those being given the credit, to become even better.

Interestingly, a direct gain for another by your efforts, usually results in a gain for you, often from unidentifiable sources. Many times this unexpected bonus comes from those who have been credited and their supporters.

Even if the rewards of giving don't result in a credit to you, don't worry - your store of gifts for others won't ever run out. Giving encourages giving.

The rewards of accomplishing important things, accepting responsibility, experiencing excitement, and making a contribution of talents without expectation of credit, bring into view a fifth ingredient of significance - *Methodology*.

Ralph J. Stephenson, P.E.
Consulting Engineer

5. Methodology!

Often the secret of doing something well is first doing it poorly -- knowing some degree of failure. We must all experience failure to understand what success means. Patterns of success seen through the traps of failure help us develop better methods of doing things.

These are then merged into habits and processes that encourage the elements of successful action to be continually duplicated and evaluated, and when necessary, changed or discarded.

Every exceptional professional has built a variety of procedures that serve well and hold failure at bay. The reward of using these procedures is the gift of success.

When you have learned to use good procedures well, when not to use them, and when to adapt them to a different situation, you will have built a dependable professional methodology.

Successful practitioners must use good methods to guide them in matters of significance.

(The basis of a talk to the Grand Rapids, Michigan
chapter of the American Society of Professional Estimators)

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

To the faculty of the Construction University:

Many times the design and construction professional encounters a decision making dilemma in which ratings, rankings, and listings must be applied to a set of factors, weights, and attributes to determine what the best combination of all of these is for a specific situation requiring a decision, a prediction or an evaluation to be made.

The various theories of probability can be of help in resolving many of the problem situations encountered in our business of generic construction. However we may not always have the technical knowledge to work comfortably with formal statistical or probability methods. Therefore I offer the following essay, the eighth in the series of Construction University papers to help the practitioner make good, and justifiable, decisions. In CU #008 I will introduce a relatively simple method of ranking choices when several factors may influence the decision as to which are the best.

I call the system weights and values as a decision making tool.

Please let me know of your own experiences with decision making tool and with your permission we will pass them along to others in the construction industry.

Ralph J. Stephenson, P.E.

Construction University

Weights and values as a decision making tool

April 24, 2000

--712 words
--reading time approx 5 minutes

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 staff. Upper management is then responsible for adjusting the objective decisions of the project manager to a decision in line with what the upper management staff feel personally, politically, professionally, subjectively, and technically is the appropriate selection.

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

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? I recommend 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. <u>One</u> means the factor is of minimum importance in the evaluation. <u>Ten</u> indicates the factor is crucial to the evaluation. A definition of the gradation steps is often of assistance in improving the sensitivity of the process.

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 <u>ranking</u> the factors, you are <u>weighing</u> 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 1.) an award of a hard money contract from a full set of contract documents; 2.) retention of a non liable construction manager to run the project; or 3.) the use of a liable general contractor involved early as a construction consultant and providing iterative estimating leading to submission and acceptance of a guaranteed maximum price.

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

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 stff needs	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.

Comments, observations, ideas?

Ralph

Ralph J. Stephenson, P.E.
Consulting Engineer

May 15, 2000

Dear Construction Faculty:

CU #009 below is one of the more complex views of the project and program management systems that we have included in the CU series. The process described below is designed to help both new and experienced managers get a firm handle on what it is that he or she is expected to manage. The process likewise can help show those on the project or program team what role they are to play in achieving the vision and mission of the entire action effort.

As usual, comments, rebuttals and new ideas are welcome, along with your permission to include them in future Construction University essays. Let us hear from you!

We will soon be collecting comments received so far and will incorporate them into a future CU.

Keep in touch!

Regards,

Ralph J. Stephenson

VISIONS, MISSIONS, GOALS, OBJECTIVES & MANAGEMENT - CU 009

By Ralph J. Stephenson, P.E.

-- 1271 words
-- Approximate reading time - 10 minutes

Since the start of the American Industrial Revolution in the late 1700s and continuing through the 19th, 20th and into the 21st centuries, entrepreneurs have wrestled with defining what they do, what they would like their future to be, and how they could reach a desired goal through effective management of their organizations.

You, who practice management for a livelihood, have probably wondered if there is

a pattern for success in the application of philosophies that have seemingly driven business planning over the past 200 or more years.

I believe "yes" is the answer!

While recently reviewing various concepts of words and their meanings I came to a somewhat fuzzy, inconclusive conclusion that there are five words that have permanent significance in defining how a business or enterprise becomes and stays successful. The five might be incorporated into a single sentence entitled "How to be Successful." -- but more about that shortly.

We live in two worlds, the world-of-words and the world of non-words. The world-of-words is that in which we live by simulating actions through words and other symbols that describe events that could or actually do happen. Let me give you an example.

When I am preparing a plan and schedule of a construction project I am working in a world-of-words. The plan is made up of words and symbols that describe actions, of arrows and boxes that represent the relation of an action to other actions, and of a defined duration of the action that is used to calculate the time line characteristics of the project model.

The world of non-words is that in which we live and cause things to happen by our actual presence and physical actions. A world-of-words model such as described above is only a guide to the physical construction of the project. We build the actual project in the world of non-words.

By this brief essay I shall attempt to show how the manager can start building a sound action plan in a world-of-words using key descriptive elements that are critical to the plan. Then we can relate this plan model to the world of non-words showing how the manager can simulate various alternatives while translating his or her model into a real set of actions.

Suppose we want to design and build a new library and remodel an adjoining existing library. The process of planning to build can be described in seven steps:

1. First determine what our grand plan of action will require. We will need --

• **A Vision** - The application of competence in discernment or perception; intelligent foresight: the manner in which one sees or conceives of something.

• **A Mission** - A statement of the most important result to be achieved by our project or program successfully matching our vision.

• **Goals** - The unquantified desires of an organization or individual expressed without time or other resources assigned.

• **Objectives** - Quantified targets derived from established goals. Commonly used resources in converting goals to objectives are money, time, human abilities, actions, equipment, and space.

• **Management** - The act and manner of defining, assembling and directing the application of resources to achieve our mission and specific goals and objectives.

2. Next we arrange the essential components in a rough array or model showing a possible sequence in which they might occur in relation to each other.

VISION MISSION GOALS OBJECTIVES MANAGEMENT

Now we subtract the components one by one from our model and evaluate what happens when that component is removed.

3. Action - subtract the VISION.

MISSION GOALS OBJECTIVES MANAGEMENT

- Result - CONFUSION ABOUT WHERE WE ARE HEADING.

By removing vision from the model we blur the meaning of the project or program, and raise serious questions about why we ever embarked on this course of action anyway: the removal produces action paralysis and confusion about desired results.

4. Action - Put back the VISION and subtract the MISSION.

VISION GOALS OBJECTIVES MANAGEMENT

- Result - LOSS OF MANAGEMENT DIRECTION.

We have now removed a vital link between the foresight to visualize and the

definition of specific goals needed to achieve managerial success. Mission definition is required to keep us from losing the path to our vision.

5. Action - Put back the MISSION and subtract the GOALS.

VISION MISSION OBJECTIVES MANAGEMENT

- Result - POOR TIMING IN OUR DECISION MAKING.

Now, we have either extended or reduced the time from stating our mission to defining our objectives to a degree where we may lose the action time sense needed to proceed in a realistic manner.

6. Action - Put back the GOALS and subtract the OBJECTIVES.

VISION MISSION GOALS MANAGEMENT

- Result - DRIFTING MANAGEMENT.

We end up having to manage elements of the model without having clearly defined time frames.

7. Put back the OBJECTIVES and subtract the MANAGEMENT.

VISION MISSION GOALS OBJECTIVES

- Result - INABILITY TO ACHIEVE OUR OBJECTIVES, GOALS AND MISSION.

We now have no engine or rudder left on our ship by which we can achieve our vision through the use of the model objectives, goals, and mission.

* * *

The above model and the brief analysis-by-subtraction shows how critical the major components of our model are: how they help us to reach our vision while fulfilling our mission. We can summarize this essay in a single sentence entitled "How to be Successful"

"You improve your chances of success in any endeavor by applying a vision (what you see in your future), understanding your mission (the primary achievements

you must reach), setting your goals (targets, not yet quantified, but at which you are aiming), incorporating your goals into a set of objectives (quantified targets), all designed so you can provide a solid business plan, molded by whatever management form you feel best fits your abilities."

* * *

CU #009 glossary of terms

• **Business** - One's occupation, profession or trade.

• **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.

• **Efficient** - Doing things right

• **Effective** - Doing the right things.

• **Enterprise** - A project that is of above average importance and requires boldness , readiness and risk-taking in its doing.

• **Entrepreneur** - An employer of productive labor. A person who organizes, operates, and assumes the risk for a business venture.

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

• **Management** - The act and manner of defining, assembling and directing the application of resources to achieve specific goals and objectives.

• **Mission** - A statement of the most important result to be achieved by a project or a program being successfully completed.

• **Objective** - Quantified targets derived from established goals (see goal). Commonly used resources in converting goals to objectives are money, time, human abilities, human actions, equipment, and space.

• **Profit** - The return in resources obtained by investing other resources in a business or an enterprise. Usually the returned resource has a greater value to the investor

than does the invested resource.

• **Subtractive analysis** - A means of reaching conclusions by subtracting various components of a model, and then evaluating what effect the subtraction has on the model.

• **Successful** - The favorable or profitable termination of attempts or endeavors: having obtained something desired or intended.

• **Vision** - The application of competence in discernment or perception; intelligent foresight. The manner in which one sees or conceives of something.

• **World-of-words** - The world in which we live by simulating actions through words and other symbols describing events that do or could happen in the world of non-words.

• **World of non-words** - The world in which we live and cause things to happen by our actual presence and physical actions.

"Be efficient about being effective."

Ralph J. Stephenson P.E., P.C.
Consulting Engineer
June 11, 2000

To: The Construction University Management Faculty:
From: Ralph J. Stephenson

When you work with other organizations, their management and their staff, you can gain much business-useful knowledge by observing critical elements of that organization's operations. Those that may contribute to the success, or lack of success, in people, management, and marketing relations include:

- How the organization functions,
- How successful the organization is as measured by your standards,
- What techniques the various departments and divisions use to maintain their organizational and management effectiveness,
- What they do, or don't do, that lowers or improves their potential for succeeding,
- What styles of management work or don't work as used by their various operations and staff management,
- ..... and on and on.

From several years of amateur and professional experience I can recommend a few characteristics that may reveal some of the most telling elements of similarities between your beliefs and the organizational characteristics that you might observe. These characteristics may accurately indicate if you and the place you are observing or benchmarking are headed in similar directions and have congruent visions, goals, objectives and operating modes that fit well with each other.

One of the most important of these elements is the nature of the organization as defined by the words "**conservative**" and "**forerunner**" (not to be intermingled with the meanings of politically oriented conservative and liberal). The following **benchmarking** essay may help you discover how the match between you and a work place plays a vital role in your future, particularly in the planning, design and construction profession.

* * * * *

Notes on Forerunner & Conservatively Managed Organizations

By Ralph J. Stephenson, P.E.

Total length - 1,169 words
Approximate reading time - 6 minutes

What are alternative names to **forerunner** and **conservatively** managed organizations? Proactive & reactive, positive & negative, front & back, do & wait, high risk & low risk, maximum & minimum, go & no-go, try & no-try, run & walk, hard money & negotiated, ...?

(For definitions of words in bold, underlined type see the glossary of terms at the end of this essay).

Let us start by testing a few of the characteristics that influence what kind of organization these words seem to describe.

• The **forerunner** organization tries to optimize the probability of being right.

• The **conservatively** organization tries to minimize the probability of being wrong.

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

• Some characteristics of the **forerunner** organization:

- Aggressive in their field of work,
- Young in mind and spirit,
- High risk takers,
- Are good at **leveraging** resources,
- Have good morale,
- Work well within the general absence of a dominant management structure,
- Healthy cooperation among lower management,
- Strong competitive drive at all levels of management,
- Strong sensing of (not necessarily knowing about) total purpose in respect to:
  Financial return on investment (see also **value-added**),
  Social obligation,
  Professional integrity,
  Technical excellence,
  Ethical behavior,
- Provision of **project sense of worth**,
- Sensing of true **value-added** 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,
- Learn well from mistakes they make.

• Some characteristics of the **conservative** organization:

- Usually very well managed from top down,
- Moderately well managed from bottom up,
- Tend toward **paternalistic management,**
- Major decision making centered in top management,
- Good financial strength, if the organization is mature,
- Dependable,
- Predictable,
- **Secretive** at upper management levels,
- Closely controlled employee training,
- Modest salary structure,
- Standard and well protected employee **financial benefits,**
- Usually stress **hygiene** as opposed to **motivation,**
- High levels of employee **loyalty** in those who like the system,
- High **employee security,**
- Heavy use of pretested decisions at executive management levels,
- Long **tenure** of service among senior management,
- Intolerant of actions that pose threats to a **conservative** management style.

Case study for your consideration:

To illustrate the determination of **congruence** in management and behavioral characteristics let us look at Adam Jay, a 25 year old, well-educated civil engineer and project manager. Adam is registered as a professional engineer in several states and has good credentials in his professional field of construction operations. He is already being considered for a junior officer position in his company.

He has a strong drive to take good care of his family and to insure that they benefit from his short and long term professional efforts.

Adam likes the internal and external competitive aspects of general contracting. He couples this drive to a strong sense of the importance of caring for the public health, welfare and safety of his community.

The organizational structure of his employer's firm, Johnston and Sons, P.C. is rather rigid and in Adam's opinion a tad too highly regimented. However he appreciates the need for a relatively predictable structure to allow for a feeling of comfort and security that will allow planning properly for the future of both the company and the employees.

The need to express individually selected courses of action and decision making is strong in Adam's makeup, and he often feels he needs more excitement in his career work.

You are a trusted friend of Adams and considered by him as a coach and mentor. He has just asked you in a social setting what kind of organizations

he should plan to be with during the various stages of his career. He has phrased the query as an open question, and is obviously interested in what you have to say. You judge that he will listen, but might be inclined to tailor his opinions and decision to fit what words he wants you to use.

What career paths would you recommend Adam Jay follow over the next 10 years?

Glossary for CU #010 - Notes on Forerunner & Conservatively Managed Companies

• Benchmarking - The continuous process of measuring the products, services, and practices you employ against your toughest competitors, and against those companies and organizations recognized as industry and practice leaders.

• Congruence - Correspondence, agreement, harmony, or conformity.

• Conservative - Favoring moderate traditional views and values; restrained in style.

• Employee security - That benefit gained by one who works for another and enjoys freedom from risk, danger, doubt, anxiety, or fear.

• Financial benefits - The benefits obtained by practicing the science of effectively managing money and other assets.

• Flux - Constant or frequent fluctuation or change.

• Forerunner - One who, or that which, precedes as in time or ideas or abilities; one that runs in front of.

• 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.

• Leveraging - The effective use of vested and earned authority and resources to solve problems and achieve goals and objectives.

• Liberal - Generally favoring proposals for reform, open to new ideas for progress, and tolerant of the ideas and behavior of others; broad-minded.

• Loyalty - Faithfulness to a person, ideal, organization, or custom.

• Motivation - The elements of a given situation that encourage, and make effective, successful and meaningful, the activities of those engaged in the situation.

• Positive change - Change that is managed so its control and use raises the potential for individuals or organizations to succeed at being excellent.

• Paternalistic management - A policy or practice of treating or governing people in a fatherly manner, especially by providing for their needs without giving them responsibility.

• Politically conservative - Of, pertaining to, or dealing with the structure or affairs of government in the private, public or volunteer sectors of our society and favoring moderate traditional views and values; restrained in style.

• Politically liberal - Of, pertaining to, or dealing with the structure or affairs of government in the private, public or volunteer sectors of our society, and not limited to or by traditional, orthodox, or authoritarian attitudes or dogmas. Generally favoring proposals for reform, open to new ideas for progress, and tolerant of the ideas and behavior of others; broad-minded.

• Project sense-of-worth - In project management, the quality that renders something desirable, useful, or valuable.

• Secretive - Not given to openness, as of purpose or action.

• Tenure - Permanence of position, often granted an employee after a specified number of years.

• Value-added - The return in resources obtained by investing other resources in a business or an enterprise. Usually the returned resource has a greater value to the investor than does the invested resource.

* * * * *

Ralph J. Stephenson, P.E.

Ralph J. Stephenson, P.E.
Consulting Engineer
June 30, 2000

Subject : CU #011 - Close out list for Community Medical Center Tenant Improvements
June 30, 2000

To: The Construction University Faculty:
From: Ralph J. Stephenson, P.E.

In response to CU #006 "Closing Out A Construction Project", Mr. Mike Breunig at Collins Project Management -- <mbreunig@collinspm.com> -- in Norcross, Georgia, sent the Construction University a close out list tailored to the construction of tenant improvements for a Community Medical Center tenant space. We have only a few specialized close out lists such as this and I asked Mr. Mike Breunig if we could send it along to the members of the CU faculty. His answer was a quick, short note

"Feel free to use the close out check list for any training programs for CU e-mails. Please give credit to:

Collins Project Management
5996 Peachtree Parkway
Norcross, Georgia 30092
Phone: 770-263-3733"

-- so, his check list constitutes CU #011, this addition to our ongoing close out essays.

Please let me know if you are still receiving the CU series of essays and please feel free to submit any material you would like to see in print to me for potential inclusion in future CU's.
Keep in touch!

Regards

Ralph

Ralph J. Stephenson, P.E.
Consulting Engineer
June 30, 2000

Community Medical Center Tenant Improvements - Close out check list

Courtesy of

Collins Project Management
5996 Peachtree Parkway
Norcross, Georgia 30092
Phone: 770-263-3733

--834 words
--approximate reading time - 5 minutes

A. RULES OF THE SITE

1. Final cleaning operations
2. Check all work area light fixtures
3. Respond to all Field Inspections and Punchlists - Tenant MEP Engineers
4. Certified Air Balance Report
5. O&M Manuals for all MEP Equipment
6. "As-built" MEP Drawings
7. Final Lien Waivers 01010-22.
8. Certificate stating that no hazardous materials have been utilized in the construction.
9. Certificate of Occupancy
10. All keys to building Standard locksets and custom locksets

B. SUBSTANTIAL COMPLETION PROCEDURES

1. Delivery of maintenance materials and tools
2. Removal of temporary facilities
3. Changeover to permanent locking systems
4. Final cleaning

5. Owner informed of necessary procedures for changing over insurance coverages
6. Owner informed of procedures for changing over operation, maintenance, security, etc.
7. Owner received occupancy and operating permits from authorities having jurisdiction.
8. List of incomplete work
9. Startup reports
10. Final testing, adjusting, and balancing reports
11. Demonstration of equipment and systems to the Architect and Owner and demonstration reports
12. Instruction of owner's personnel and instruction reports
13. Contractor's Warranties
14. Subcontractor's Warranties
15. Operation and maintenance data
16. Keying Records
17. Certificate of Substantial Completion

C. APPLICATION FOR PAYMENT FOLLOWING SUBSTANTIAL COMPLETION
1. Final Change Order
2. Contractor's affidavit of release of liens
3. Release of Liens - Subcontractors
4. Request for reduction or release of retainage
5. Consent of surety to reduction in or partial release of retainage
6. Final list of incomplete work

D. FINAL COMPLETION PROCEDURES
1. Completion of all work
2. Maintenance agreements
3. Project record documents
4. Request for final inspection from contractor to architect with previous inspection lists attached
5. Final completion inspection by Architect (punchlist)
6. State Health Planning Agency (SHPA) approval of work and consent to occupancy
7. Completion of all items on punchlist or inspection reports
8. Updated final statement, accounting for final changes to the contract sum
9. Consent of surety to final payment
10. Certification that financial obligations to governing authorities and public

utilities have been fulfill
11. Description of unsettled claims
12. Certificates of insurance for all coverages specified to commence at final completion

E. CONSTRUCTION CHANGE DIRECTIVES
1. Account for unused materials that have been paid for by the owner

F. TEMPORARY FACILITIES AND SERVICES
1. Permanent Facilities Used during Construction: Clean; replace parts that are worn in excess of that expected during normal usage
2. Restore all areas of the existing facility damaged by construction activities to their existing condition

G. PROJECT RECORD DOCUMENTS
1. Record Drawings
2. Project Manual (Specifications)
3. Record Submittals with Shop Drawings, Product Data and Samples
4. Operation & Maintenance Data
5. Warranties
6. Schedule of Products
7. Controls Diagrams
8. Firestopping and Smokestopping final inspection reports
9. Project Record Drawings showing location of all fire and smoke barriers, sealing of penetrations, references to maintenance data
10. Joint Sealers - 1 year warranty
11. Solid core plastic laminate-faced interior doors - warranty for life of original installation
12. Lead lined wood doors - x-ray protection test
13. Specialized tools as needed for adjustment, maintenance, removal and replacement of builders hardware
14. Keys - furnish 2 change keys for each lock
15. Lead lined gypsum board - x-ray protection testing at joints and penetrations
16. Glazed Pavers & Wall Tile - furnish at least 5 percent of total product installed maintenance stock
17. Acoustical ceiling lay-in panels - furnish at least 5 percent of total product installed maintenance stock
18. Exposed ceiling suspension members - furnish at least 2 percent of total product installed for maintenance stock

19. Resilient tile flooring - furnish at least 10 percent of each variety installed for maintenance stock
20. Resilient base - furnish at least 10 percent of each variety installed for maintenance stock
21. Resilient sheet flooring - furnish at least 10 percent of each variety installed, in full roll width, for maintenance stock
22. Paint Maintenance Stock - furnish not less than one labeled and sealed 1-gallon can of each type of finish coat and color
23. Wall Coverings Maintenance Stock - Vinyl - 2 percent of the number of rolls installed
24. Wall Coverings Maintenance Stock - Wallpaper - 2 percent of the number of rolls installed
25. Plastic Laminate Lockers - turn keys over to the owner
26. Accordion Folding Partitions - 2 year warranty
27. Accordion Folding Partitions - maintenance materials
28. Accordion Folding Partitions - demonstrate operation procedures
29. Medical Equipment - demonstrations, warranty cards and instruction booklets
30. Medical Equipment - check for operating condition
31. Mechanical Equipment - Record (As-Built) Drawings
32. Mechanical Equipment - Operating and Maintenance Manuals and instruction
33. Mechanical Equipment - Test and balance and report
34. Mechanical Equipment - Minimum 1 year warranty required on all division 15 work and equipment
35. Plumbing Systems - disinfection certification
36. Sprinkler Heads - provide a minimum of 2 spare heads of each type
37. Packaged Air-Cooled Chillers - startup report
38. Automatic Controls and Energy Management System - startup report
39. Automatic Controls and Energy Management System - installation, operation, maintenance service manuals and parts brochures
40. Automatic Controls and Energy Management System - graphics
41. Electrical As-Built Drawings
42. Electrical Equipment - maintenance and instruction manuals
43. Electrical - tests, demonstration and instructions
44. Electrical system warranty
45. Electrical - spare fuses and storage cabinet
46. Electrical Service and Distribution - typewritten directory for all panelboards
47. Nurse/Patient Communications Network - one year warranty including

guaranteed emergency and routine service response times
48. Nurse/Patient Communications Network - provide spare parts and maintenance contract
49. Nurse/Patient Communications Network - train all staff receiving the new equipment
50. Nurse/Patient Communications Network - as built drawings of all network components and associated wiring
51. Motor Controls and Wiring - test all overload relay control circuits

Ralph J. Stephenson, P.E.
Consulting Engineer

July 21, 2000

What is Happening to the Use of Technology in Construction Operations?

By Ralph J. Stephenson, P.E.

-- 1530 words - reading time approximately 10 minutes

Some construction professionals sense that their use of conventional operating techniques is out of synch with much of the new construction technology now being produced and marketed by electronic equipment and software suppliers.

At the beginning of the design and construction electronics age in the mid 1950's contractors' technical needs were filled at a pace that allowed even the most cautious professionals to see the resulting benefits and to gradually fold the systems into their daily operations. Examples of this early embracing of technology could be seen in the widespread use of estimating systems using computers and spreadsheets (1960), and critical path planning using early CAD systems and computational systems (1955).

Today, the pace of new entries into the electronic design and construction market make it almost impossible for any but a few users of these systems to keep up with new developments and new products. The result is often chaos in and among firms, and within the industry disciplines. New professional graduates are bringing academically learned, cutting-edge programs to the field where they are promptly put at odds, and often invidiously compared, with other operational systems...both old and new.

Let's face it: not every professional can know every program and every platform...nor does he or she want to!

There is an even more fundamental acceptance and learning problem. It deals with our assessment of just what it is that we seem to need to effectively and profitably design, engineer, and construct.

To help bring into focus what this means to the professional constructor let's first examine four factors that determine how well we will be doing business and constructing facilities during the current booming technological expansion.

These four include:

Factor #1. Operational needs of the successful contractor.

Factor #2. Basic technological systems that are used to meet these needs.

Factor #3. Problems resulting from failure to match the tools available to meet these needs.

Factor #4. Solving the problems caused by not meeting operational needs.

Once we have a clear understanding of these four factors, and how they affect our organization and our profession we can apply the results to planning how we can best use the evolving technology to achieve success. Let's first prepare a check list of the factors in a specific program of improvement...for instance gaining excellence in the preparation of useful project plans and schedules.

Factor #1 - Some of the operational needs of a successful construction contractor who want to plan and schedule well.

- Knowing how to manually prepare network plans & critical path diagrams.
- Understanding the difference between planning and scheduling.
- Properly using workable expediting systems.
- Knowing the yardsticks by which to measure project success.
- Understanding the concept of program management.
- Understanding and properly using project delivery systems.
- Knowing how to keeping accurate records.
- Preparing and using check lists of design and construction actions to be taken.
- Knowing how to, and, then, properly processing revisions.
- Implementing principles of good field inspection for the project team.
- Knowing how to manage a project or a program.

- Understanding how to evaluate various impacts on project progress.
- Knowing the common causes of contested claims.
- Being able to accurately identify the problem job.
- Understanding how to properly close out the project.

Factor #2 - Some of the basic technological devices currently being used by successful construction contractors.

- Office based computers and operating software.
  Lap tops,
  Desk-based PC's,
  Main frames,
  Computer-aided drafting and computational hardware and software,
- Hand-held computers and operating software.
- Hand-held cell phones.
- Communication systems to link job sites with home office and other project personnel.
  Written,
  Verbal,
  Pictorial and graphic,
  Computational,
- Hand-held TV devices.
- Internet and other similar information carriers that import and send data.

Factor #3 - Types of problems often resulting from failure to match the tools available to the needs to be satisfied.

- Poor job management.
- Inability to communicate with others.
- Poor staff morale and attitudes.
- Low personnel quality and people difficulties.
- Not being a good on-site neighbor.
- Inability to take timely action.
- Inability to properly plan and schedule the project or program work
- Failure to properly organize, exert authority, and take responsibility.
- Dirty, poorly planned, or dangerous work-site conditions.
- Slow and/or biased performance in revision processing.
- Poor construction document quality.
- Slow or incompetent submittal processing.

- Inadequate user group interaction needed to properly build the job.
- Inadequate or inaccurate documents and documentation.
- Slow, improper, and untimely decision making.
- Slow, inadequate, or improper procurement of materials and equipment.
- Sloppy, slow, and untimely closing out of the project.
- Slow or inaccurate payment processing. (Prompt payment is the life blood of a successful job.)
- Slow, delayed, or biased approval processes.
- Time growth which extends the project without corresponding relief.
- Inadequate staffing and manpower provided on job.
- Disproportionate cost growth of the project that damages expected cash flow.
- Late, excessive, or unfair substitutions and alternates.
- Failure to maintain regular project evaluations.
- Flawed constructibility usually caused by faulty programs and construction documents.
- Legal matters that interfere with job progress and create artificial problems.
- Extreme weather conditions that interrupt job continuity and increase costs.

Factor #4 - Learning systems good contractors can use to effectively meet operational needs.

- Mentoring
- Coaching
- Training
- Education
- Orientation
- Cooperation with training institutions
- Cooperation with educational institutions
- Tightening certification requirements

The assignment immediately in front of me as I write this article is to comment on the ways modern technology is affecting planning and scheduling and the ways we deliver successful construction projects today. With the above four factors fresh in our minds let us start the critique.

• • •

My comments may seem terse, but this is where I think we need to start --

Comment #1 - We are not following evaluation systems that provide rational and objective arguments for adopting, rejecting or revising the bewildering array of

systems we are asked to consider in our professional work today.

Comment #2 - We are wasting enormous amounts of time that could be best spent in becoming better builders on substitution of eye-catching graphics for understandable explanations of the new technological systems. ("If it's pretty it must be right, accurate and sufficient.")

Comment #3 - We are not being discerning enough in selecting technological systems that actually contribute to cost effective practices.

Comment #4 - In our rush for volume (too often at a sacrifice of quality and profit) we do not take adequate time to fully understand the actual operational techniques needed to build properly.

Many planners, designers, architects, engineers, contractors and facilities managers no longer spend enough time tracking jobs in the field. They don't know how long design and construction operations really take, how much they cost, whether or not they will work properly -- simply because they're not monitoring their projects, and they are not talking with, and watching, the skilled trades and managers who actually build the work on the site.

Comment #5 - We too often substitute electronic processing for mentally derived logic, analysis and decision making by those individuals actually responsible for doing and for managing the work.

Comment #6 - We are too complaisant, too accepting, too trusting that technological systems will automatically solve all our problems. We need to challenge doubtful assertions, and to ask again and again...does this technological system--really help us achieve our goals and objectives?

Comment #7 - We must better train and educate technical professionals in the definitions and use of words used to describe construction operations. When we all assume we know what a given word means...and then find out it means different things to different people... we're headed for problems. For instance I hear many professionals use the words "planning" and "scheduling" in the sense that they mean the same thing. Not true!

> Planning is to define project actions and their relations with each other in a sequence that will most effectively achieve goals and objectives.

Ralph J. Stephenson, P.E.
Consulting Engineer

Scheduling is to show by a graphic or written tabulation of project activities where the planned activities are to actually start and finish. The schedule is derived from the plan of action by locking the tasks and their resources into specific time positions.

Comment #8 - We don't see what it is that makes problems for others on the project team. We are frequently so concerned with ourselves and our jobs that we exclude any attempt to understand what's going on around us. The result is that we needlessly cause problems for others.

Comment #9 - We fail to understand the ramification of problems created from not knowing how electronic systems differ from human systems. This practice tends to shift the responsibility for designing and using the system from the user to the electrons... all you have to do is type it in and the machine does the rest!

Comment #10 - We often resist learning how to use new systems because they seem to pose a threat to our career by putting us at a disadvantage with the younger, more knowledgeable practitioners. Therefore we fight the new techniques, the new systems; we fail to be effective construction professionals... and, we fail to help others do what we actually believe is needed to improve our industry.

In sum, I would assess our situation this way: Technology is not bad -- we merely use it poorly. We can do better.

Comments?

Regards,

Ralph