

PLUMBING AND



HEATING INDUSTRY OF DETROIT

14001 W. EIGHT MILE ROAD • DETROIT, MI 48226-1606 • (313) 241-7001

February 6, 1996

**P. H. I.**

Presents the

**"Supervisory Training Course"**

March 20 - May 15, 1996

Wednesdays -- 5:00 to 8:30 P.M.

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**About the Program:**

This Course is designed to improve Leadership, Communication, Supervisory and Decision-Making Skills of Job Supervisors.

The program is an exclusive eight week program to be conducted at the Plumbing and Heating Industry Fund Conference Center, located on West Eight Mile Road, in Detroit. In short, this "Supervisory Training Course" will help those in leadership positions to be more than an everyday supervisor. It will give you that extra insight into achieving success, and improving your day-to-day performance.

**Course Overview:**

- ➔ **Safety and the Supervisor** - What is the role and responsibility of the supervisor in preparing, implementing, supervising, and enforcing an effective safety program? Learn MIOSHA walkdown and reporting requirements. What impact does an effective safety program have on your company's ability to compete for new work?
- ➔ **Project Management, Planning and Scheduling** - (2 sessions) Learn the elements of effective construction project management. Methods and tools for planning and scheduling project work and determining manpower loading requirements will be covered. Application will be covered through the use of case studies.
- ➔ **Interpreting Behavioral Styles to Improve Communications** - Communicating effectively with others requires an understanding of behavioral styles and communication preferences. Learn how to recognize and interpret different behavioral styles and learn the communication techniques that are most effective for various styles.
- ➔ **The Supervisor and His Role in Project Startup and Execution** - Learn how the contractor supervisor organizes the job site, plans and assigns work, and maintains a smooth running job. Documentation requirements (Daily reports, Change Orders, etc.) will be covered. Discuss actions the supervisor can take to avoid problems before they happen.

Over....

- **The Responsibility of the Supervisor in Closing Out A Project** - What is the job of the supervisor in finishing the work and insuring that the proper training, punching out, collections, construction drawings, etc. have been properly processed and closed, and all necessary documentation is completed. How can the supervisor help to insure his/her company will receive timely final payment?
- **Conducting Successful Project Meetings** - Review types of meetings subcontractor supervisors might be involved in and what role he should play. Learn effective meeting planning techniques as well as effective communications for meetings.
- **Superintendent Panel Discussion** - Participate in a interactive discussion on expectations of supervision with you superintendents. What can the supervisor do to improve overall job performance?

Send your experienced foremen and/or other employees that are in supervisory positions.

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## R E G I S T R A T I O N   F O R M

### **SUPERVISORY TRAINING COURSE**

Return to: PHL, 14801 W. Eight Mile Road, Detroit, MI 48235

The \_\_\_\_\_ Company wishes to register the following  
persons for the Supervisory Training Course:

\_\_\_\_\_  
Name of Registrant

\_\_\_\_\_  
Name of Registrant

\_\_\_\_\_  
Registrant's Direct Supervisor

Dinner will be served at 5:00 P.M. -- Courses will begin at 5:30 P.M.

Our registration fee of \$65.00 per person is enclosed, and made payable to P.H.L.

**Major topic outline for PHI Supervisory Training Course - disk 535**

**I. Class #1 - Wednesday, April 17, 1996**

**A. Introduction - 8 minutes - 5:30 pm to 5:38 pm**

The PHI Supervisory Training course is designed to help those in leadership positions to be more than an everyday supervisor. It is tailored to give the attendee an insight into achieving success, and assist to improve his or her day-to-day performance.

1. Bob Lee, John Davis, or Tom Storey will introduce the program and rjs.
2. RJS section of the course is 2 sessions aimed at teaching the attendees the elements of effective project management. Methods and tools for planning and scheduling project work and for determining manpower loading requirements will be discussed and case studies will be used to illustrate the techniques presented.

**B. Section 1 - An Overview of Construction Project Management - 30 minutes - 5:38 pm to 6:08 pm**

**1. Elements and structure of the construction business - 12 minutes**

It is essential for the good construction project manager to understand what the business is built upon, its structure, and what constitutes success in construction as a business. The main elements and structure of the construction industry include:

- a) Thinking patterns (1) - 270
- b) Approach patterns (1) - 271
- c) The need for profit (1) - 282
- d) Factors that influence profit - (1) - 95
- e) Profit potential levels (1) - 283
- f) Picture of a project (1) - 155
- g) Macro matrix boundaries of design & construction (1) - 417
- h) Generic line of action (1) - 81
- i) Participants in designing & building (1) - 268
- j) Construction control documents (1) - 301
- k) Project costs committed (1) - 420
- l) Project costs committed and spent (1) - 350

**2. Management styles and types, and delivery systems used in the construction business - 10 minutes**

- a) Types of management in project oriented business (1) - 274
- b) Relation between functional and project management in evolution (1) - 364
- c) Traditional project delivery system characteristics (1) - 291
- d) Non traditional project delivery system characteristics (2) - 292
- e) Nine major steps to effective proj management (2) - 223

- f) Elements of effective project management (1) - 273
    - g) Qualities of a good project manager (1) - 285
  - 3. Measuring project success - 8 minutes
    - a) Elements of importance to success in design & construction - (3) - 341
    - b) Questions to be asked about your project (1) - 186
- C. **Section 2 - Setting Project Goals and Objectives - 42 minutes - 6:08 pm to 6:50 pm**
  - 1. Defining goals and objectives in the construction business - 12 minutes  
How intelligent and interactive planning and scheduling produce good goals and objectives and influence their achievement.
    - a) Graphic objectives (1) - 121
    - b) Goals & objectives definition summary (1) - 316
    - c) The dio/pdo/udo intersection (1) - 197
    - d) Setting goals & objectives (3) - 275
  - 2. Conflict - the good and bad - how competent construction project managers handle conflict. - 15 minutes  
Might use some material from partnering book - chapter on causes of conflict.
    - a) Destructive Conflict (1) - 382
    - b) Destructive conflict in today's technical world (2) - mspe talk
    - c) Seven actions to smooth and resolve potentially destructive conflict (1) - mspe talk
    - d) People (1) - 383
    - e) Positive Conflict (1) - 385
  - 3. Partnering an old-new method of getting along with each other - 15 minutes  
If you don't care who gets the credit you can accomplish anything.
    - a) What is partnering? - (2) - 429
    - b) The components of a partnering system (1) - 431
    - c) Problem mentions (2) - 454
    - d) Eight most frequently mentioned design and construction problems (1)
    - e) If you don't care who gets the credit you can accomplish anything (1)
- D. **Section 3 - Planning the Project - 51 minutes - 6:50 pm to 7:41 pm**
  - 1. The nature of planning - what it is and what it isn't - 8 minutes  
Stress the difference between planning and scheduling.
    - a) Job planning - what is it? (1) - 284
    - b) Advantages of good planning (1) - 281
    - c) Act from a plan (3) - 216
  - 2. Various planning methods and tools - 20 minutes  
Explain the history of network modeling, PERT, CPM, arrow diagramming (conventional and dummy separation), and precedence diagramming

(classical and modified).

- a) CPM exercise #1 (1) - 37
- b) Solution to exercise #1 - numbered nodes - (1) - 138
- c) Solution to exercise #1 - precedence - (1) - 139
- d) ES/LF calculations (1) - 293
- e) Working day calendar (4)
- 3. Case studies in planning - 10 minutes
  - a) CPM exercise #2 (1) - 38
  - b) CPM exercise #3 (1) - 39
  - c) CPM exercise #4 (1) - 89
  - d) Strax Company Meazzanine (1) - 207
  - e) Strax Company Action Plan (1) - 208
- 4. Supplementary planning information - 5 minutes
  - a) Levels of planning (1) - 135
  - b) Chicago area weather (1) - 136
- 5. Impacted work plans - 8 minutes
  - a) Clarion base network model (2) - 330
  - b) Clarion impacted network model (2) - 333
- E. Section 4 - Scheduling the Project - 55 minutes - 7:41 pm to 8:36 pm
  - 1. What is planning, what is scheduling and how do they work together to allocate resources? - 30 minutes  
Stress the need for planning to precede scheduling.
    - a) Translation definition (1) - 379
    - b) Schedule definition (1) - 378
    - c) Case of resource sensitive school proj (2) - 263
    - d) Single resource allocation plan (1) - 154
    - e) Full resource allocation plan (1) - 25
    - f) Resource allocation bar chart form (2) - 26
    - g) Calculated resource allocation network (1) - 244
    - h) Resource allocation ES/EF bar chart solution (1) - 245
    - i) Resource allocation leveled solution (1) - 246
  - 2. Other forms of translations from the plan to working tools - 25 minutes  
How do we get the most use out of the various planning techniques we use in construction?
    - a) Clarion base network data (1) - 380
    - b) Clarion base bar chart (1) - 381
    - c) Slant chart (1) - 79
    - d) Item processing chart (1) - 11
    - e) Procurement network model (1) - 300
    - f) Submittal turn around (1) - 239
    - g) Bulletin/change order record (1) - 198

- h) Equipment activity tabulation (1) - 200
- i) Money flow (1) - 147

## II. Class #2

### A. Section 5 - Construction Organization and Management

1. Basics of management in the construction business
2. 05.00 Nine Master keys of management (1) 195
3. 05.00 & 05.00 Notes on forerunner & conservatively managed companies (2) - 315
4. 05.00 The role of the manager (1) - 148
5. 05.00 Managerial leverage (1) - 210
6. 05.00 Critical transition point (1) - 183
7. 05.00 & 05.00 Span of management explanation (2) - 279
8. 05.00 Span of management graphics (1) - 122
9. 05.00 Decision to action time span graphics (1) - 149
10. 05.00 Decision to action explanation (1) - 278
11. 05.00 & 05.00 Creativity & how it is used in project management (2) - 225
12. 05.00 & 05.00 Apply situational thinking (2) - 229
13. 05.00 Ethics - questions to ask to guide ethical decision making (1) - 365
14. 05.00 & 05.00 PMI thinking (2) - 325
15. 05.00 to 05.00 Prepare for the probable (3) - 227
16. 05.00 & 05.00 Manage by exception (2) - 217
17. 05.00 to 05.00 How to spring the time trap (4) - 252
18. 05.00 to 05.00 Working well with people (5) - 231
19. 05.00 to 05.00 Employ the power of training (3) - 230
20. 05.00 4 i's improvement cycle (1) - 377
21. 05.00 & 05.00 Record types & their uses (2) - 375
22. 05.00 & 05.00 Claim prone job characteristics (2) - 125
23. 05.00 to 05.00 Common causes of contested claims (5) - 228

### B. Section 6 - Monitoring the Project

1. 06.00 Pareto's law (1) - 146
2. 06.00 Identify vital targets (1) - 233
3. 06.00 Management by exception graphics (1) - 150
4. 06.00 Manage by exception (2) - 217
5. 06.00 & 06.00 Clarion penthouse monitored network (2) - 332
6. 06.00 & 06.00 Control system techniques (2) - 63
7. 06.00 Color coding (1) - 91

### C. Section 7 - General Reference Material and Case Studies

1. 07.00 to 07.00 Glossary of terms (19) - 309
2. 07.00 to 07.00 Closing out a construction project (5) - 323

3. 07.00 to 07.00 Bibliography (4) - 287
4. 07.00 to 07.00 Retentions, collections & final payment (8) - 259
5. 07.00 & 07.00 Form content & design (2) - 294
6. 07.00 & 07.00 Preparing forms - case study for various disciplines (2) - 296
7. 07.00 & 07.00 Residential house planning case study (2) - 277
8. 07.00 & 07.00 Mind prober words (2) - 253
9. 07.00 Case study pointers (1) - 163

**HANDOUT LIST – PHI SUPERVISORY TRAINING COURSE - FALL 1989**  
**RALPH J. STEPHENSON, P.E.**

**SECTION 1 – AN OVERVIEW OF CONSTRUCTION PROJECT MANAGEMENT**

- 1.1 Thinking Patterns
- 1.2 Approach Patterns
- 1.3 The Need for Profit
- 1.4 Factors that Influence Profit
- 1.5 Profit Potential Levels
- 1.6 Picture of a Project
- 1.7 Elements of Effective Project Management
- 1.8 Line of Action
- 1.9 Participants in Designing & Building
- 1.10 Construction Control Documents
- 1.11 Qualities of a Good Project Manager
- 1.12 Nine Master Keys of Management
- 1.13-1.14 Nine Major Steps to Effective Project Management
- 1.15 Decision to Action Time Span Graphics
- 1.16 Decision to Action Explanation

**SECTION 2 – SETTING GOALS & OBJECTIVES**

- 2.1 Graphic Objectives
- 2.2 The DIG/DEG Intersection
- 2.3-2.4 Setting Goals & Objectives
- 2.5 Questions to be Asked

**SECTION 3 – PLANNING THE PROJECT**

- 3.1 Job Planning – What is it?
- 3.2 Advantages of Good Planning
- 3.3-3.5 Act from a Plan
- 3.6 Network Planning Minitext – Arrow
- 3.7 Rules for Numbering Nodes
- 3.8 CPM Exercise #1
- 3.9 ES/LF Calculations
- 3.10 Solution to Exer #1 – Arrow Diagram
- 3.11 Solution to Exer #1 – Precedence Diagram
- 3.12-3.13 2 Year Working Calendar
- 3.14-3.15 4 Year Working Calendar
- 3.16 Strax Mezzanine Floor Plan
- 3.17 Strax Mezzanine Network

**SECTION 4 – SCHEDULING THE PROJECT**

- 4.1-4.2 Case of the Resource Sensitive School Project
- 4.3 Single Resource Allocation Plan
- 4.4 Full Resource Allocation Plan
- 4.5 Resource Allocation Bar Chart
- 4.6 Resource Allocation Network Solution



## HANDOUT LIST – PHI SUPERVISORY TRAINING COURSE - FALL 1989

- 4.7 Resource Alloc ES/EF Bar Chart Solution
- 4.8 Resource Alloc Leveled Solutio
- 4.9 NECA Network of Ceiling Work
- 4.10-4.11 Prelim Project Schedule Forms
- 4.12-4.13 Porject Schedule Forms
- 4.14-4.15 Job Progress Report Forms
- 4.16 Slant Chart
- 4.17 Item Processing Chart
- 4.18 Submittal Turn Around
- 4.19 Bulletin/Change Order Record
- 4.20 Equipment Activity Tabulation
- 4.21 Money Flow

### **SECTION 5 – CONSTRUCTION ORGANIZATION & MANAGEMENT**

- 5.1 The Role of the Manager
- 5.2 Managerial Leverage
- 5.3 Span of Management Graphics
- 5.4-5.5 Span of Mgt Explanation
- 5.6-5.9 How to Spring the Time Trap
- 5.10 Traditional Organization Chart
- 5.11 Functioal Company Department Relations

### **SECTION 6 – CASE STUDIES & MISCELLANEOUS MATERIAL**

- 6.1 Paretos Law
- 6.2 Identify Vital Targets
- 6.3 Management by Exception Graphics
- 6.4-6.5 Manage by Exception
- 6.6-6.7 Claim Prone Job Characteristics
- 6.8-6.13 Common Causes of Contested Claims
- 6.14 Color Coding

### **SECTION 7 – CASE STUDIES & MISCELLANEOUS MATERIAL**

- 7.1-7.10 Glossary of Terms
- 7.11 Pointers for Case Studies
- 7.12-7.19 Luther Mechanical's Trillium Office
- 7.20-7.22 (No handouts with these nurnbers)
- 7.23-7.26 Network Models & Bar Charts for Luther
- 7.29-7.32 Network Models & Bar Charts for Luther
- 7.33 The Sneaky Boiler Contractor
- 7.34-7.36 Bibliography

**SECTION ONE**

**OVERVIEW OF CONSTRUCTION  
PROJECT MANAGEMENT**

**THINKING PATTERNS**

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

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

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

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

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

**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**

**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!**

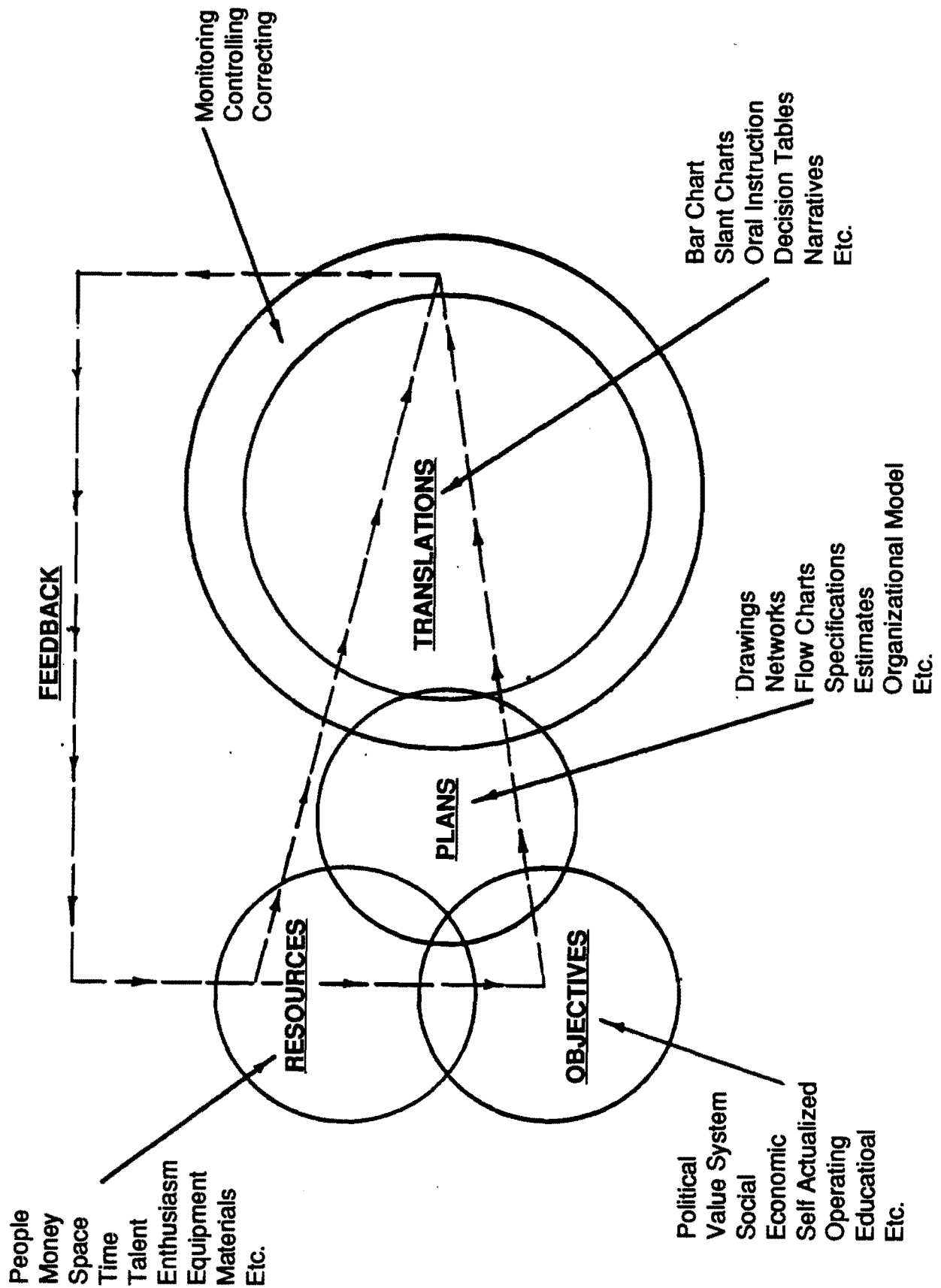
**WHAT FACTORS INFLUENCE PROFIT?**

Business Volume	Size of Project
Field Efficiency (Effectiveness)	Quality of Drwgs & Specs
Office Efficiency (Effectiveness)	Location
Executive Competence	Labor Relations
Executive Interest	Caliber of Field Managers
Diversity of Operation (Hedging)	Expediting Effectiveness
Types of Contracts	Project Planning
Quality of Estimating	Project Scheduling
Unit Costs	Withheld Amounts
Area Work Volume	Availability of Labor
Season of the Year	Billing Procedures
Local Economy	Inventory Practices
National Economy	Internal Education
Governmental Policies	Internal Training
Caliber of Participating Contractors	Type of Business
Caliber of Competing Contractors	Experience
Caliber of Suppliers	Reputation
Delivery Dates	Staff Honesty
Amount of Warranty Work	Caliber of Purchasing Skills
Caliber of Owner or Client	Profiling Procedures
Type of Project	Organizational Plans

**PROFIT POTENTIAL LEVELS**

- LEVEL 1 –** Include Everything
- LEVEL 2 –** Prepare a Good Work Plan
- LEVEL 3 –** Prepare a Good Schedule

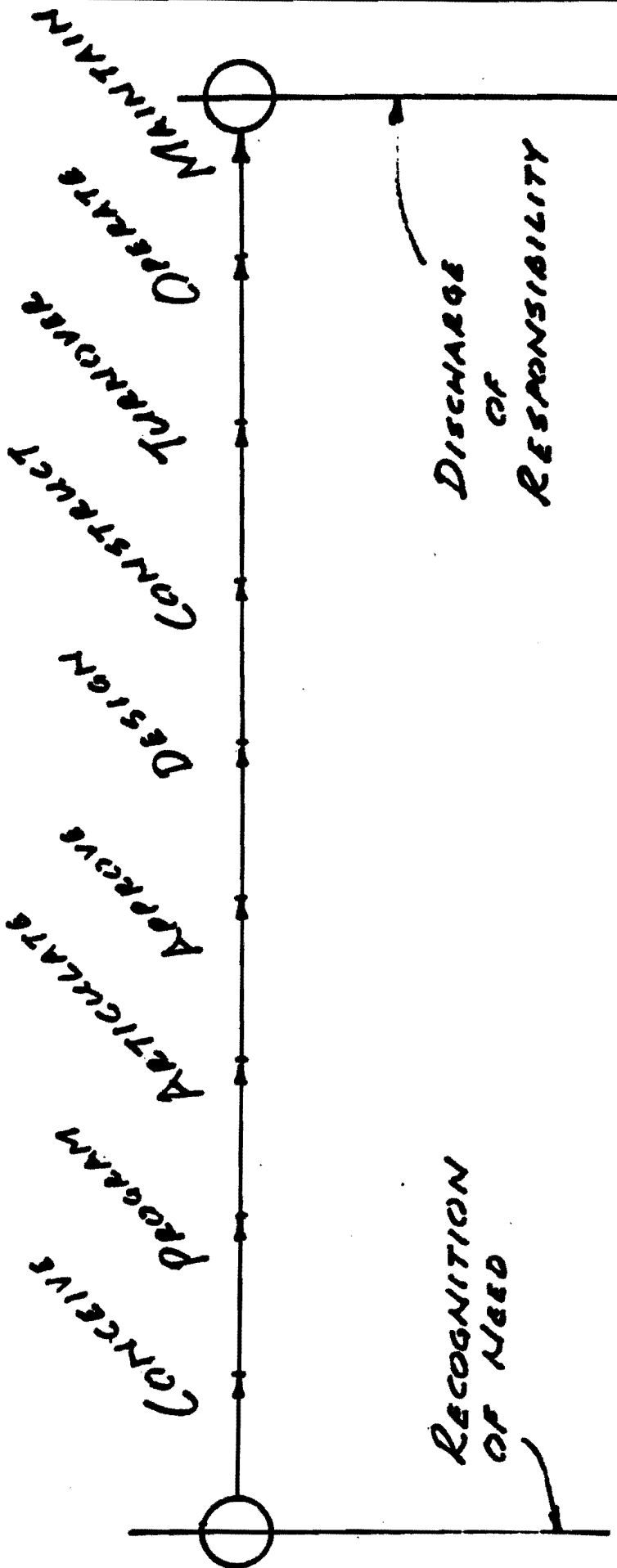
# PICTURE OF A PROJECT





**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



LINE OF ACTION

DA 2/4/72

**PARTICIPANTS IN DESIGNING & BUILDING ENVIRONMENTS**

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

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

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

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

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

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

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

**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.

**QUALITIES OF A GOOD PROJECT MANAGER**

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

## **SUMMARY OF THE NINE MASTER KEYS OF MANAGEMENT**

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

### **Three Requirements of the Good Manager**

- A. Acquire a discerning (unique) point of view
- B. Follow an effective mode of action
- C. Employ a sensitive touch in interpersonal relationships

#### **A Discerning Point of View**

Action #1 - Apply situational thinking

Result #1 - Your decisions will be more objective and less impulsive

Action #2 - Identify vital targets

Result #2 - You'll quickly recognize turning points in critical situations

Action #3 - Prepare for the probable

Result #3 - You'll be less flappable in difficult situations

#### **An Effective Mode of Action**

Action #4 - Focus on performance criteria

Result #4 - You'll better satisfy yourself and your superiors

Action #5 - Act from a Plan

Result #5 - You'll be able to get projects under way quickly and with certainty

Action #6 - Manage by Exception

Result #6 - You'll accomplish more work than you ever thought possible

#### **A Feeling for People**

Action #7 - Develop your confidence in others

Result #7 - You'll find that people cooperate more freely

Action #8 - Employ the power of training

Result #8 - You'll find that employee attitudes improve

Action #9 - Know your true self

Result #9 - When you truly comprehend your whole self you'll find people responding to your ideas more directly and often more favorably

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

## **NINE MAJOR STEPS TO EFFECTIVE PROJECT MANAGEMENT**

### **DEFINITIONS**

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

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

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

### **QUESTION AND ANSWERS ABOUT PROJECT MANAGEMENT**

- What is different about project organization compared to functional organization?
  1. Project organization is usually temporary.
  2. Project organization is usually based on a different rationale than is functional organization.
  3. Project authority positions tend to be vested first and earned later.
- How is a project effectively managed?

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

1. Goals and objectives for the project are clearly identified, and starting, intermediate and ending measuring points established early in the project life.
2. A suitable project delivery system is selected as the goals & objectives are defined.

(continued)

**NINE MAJOR STEPS TO EFFECTIVE PROJECT MANAGEMENT**

(continued)

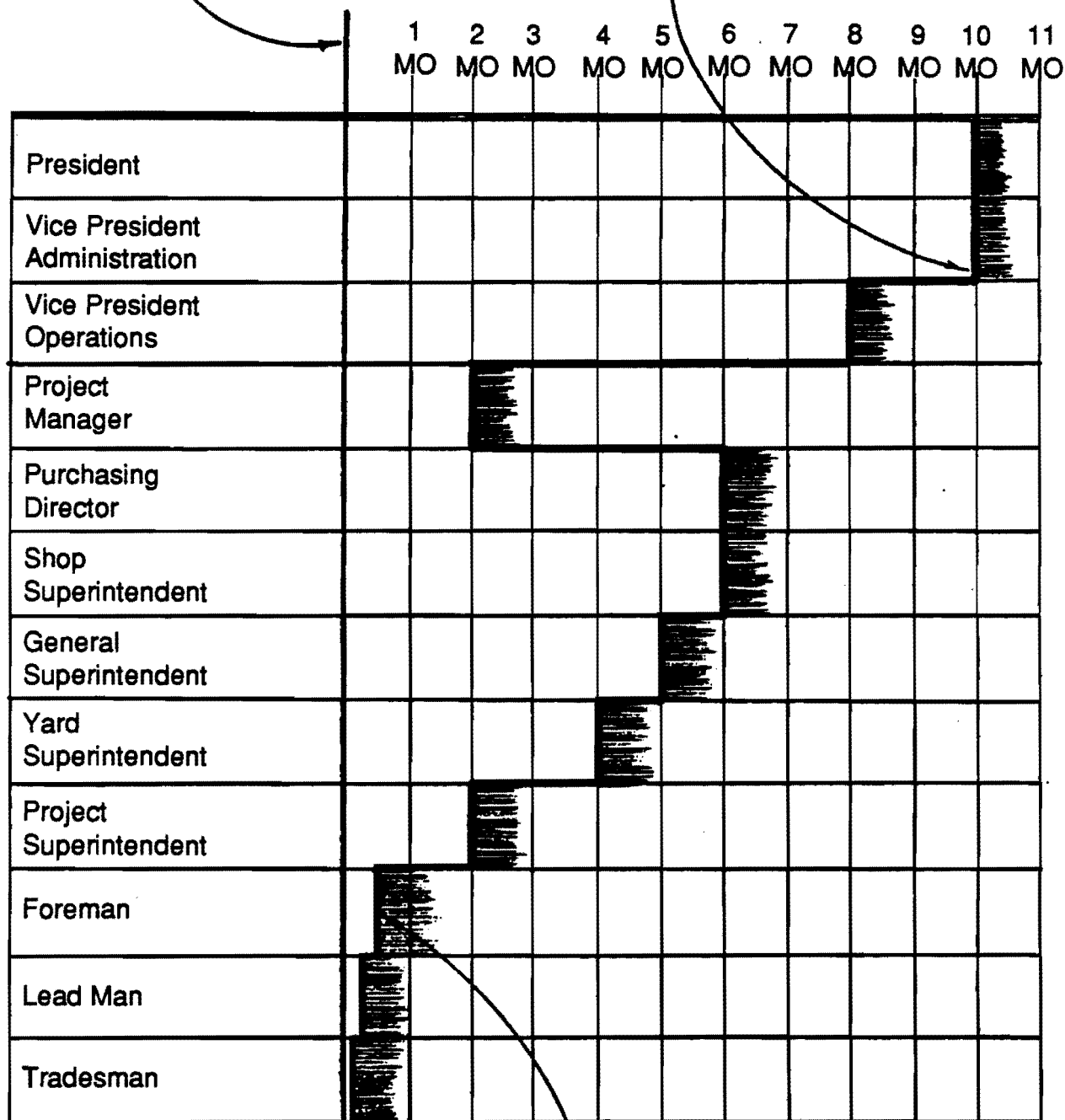
3. An action plan showing desired and necessary courses of action from beginning to end of the project is prepared.
4. The action plan is translated into schedules, and the resources needed are determined and balanced for most profitable performance.
5. A project organization is built under (not over) the resources required to give resource management quality, continuity, and monitorability.
6. A method of isolating, identifying and correcting deviations from desired performance standards is designed and put into action.
7. The needed resources are assembled and the project team gets to work.
8. Progress and performance of the team is measured and evaluated using management by exception.
9. The project is closed out promptly, cleanly, and totally as work draws to a close.



# DECISION TO ACTION TIME SPAN

Decision time line -- point  
in time where major  
decisions are made

Action time line -- point  
in time where major  
decisions are action upon



Action Time Line

Decision Time Line

### **DECISION TO ACTION TIME SPAN EXPLANATION**

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

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

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

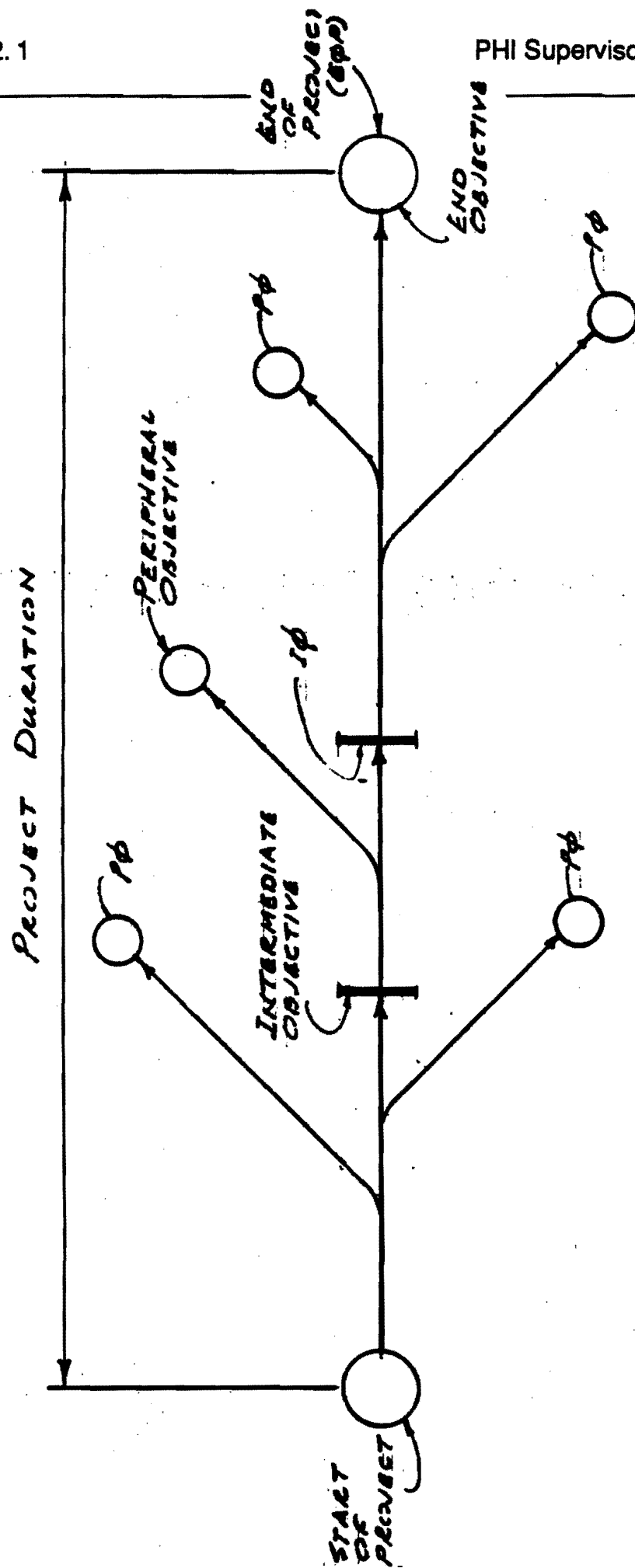
In summary the benefits of preparing a decision to action analysis for your firm are:

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

**SECTION TWO**

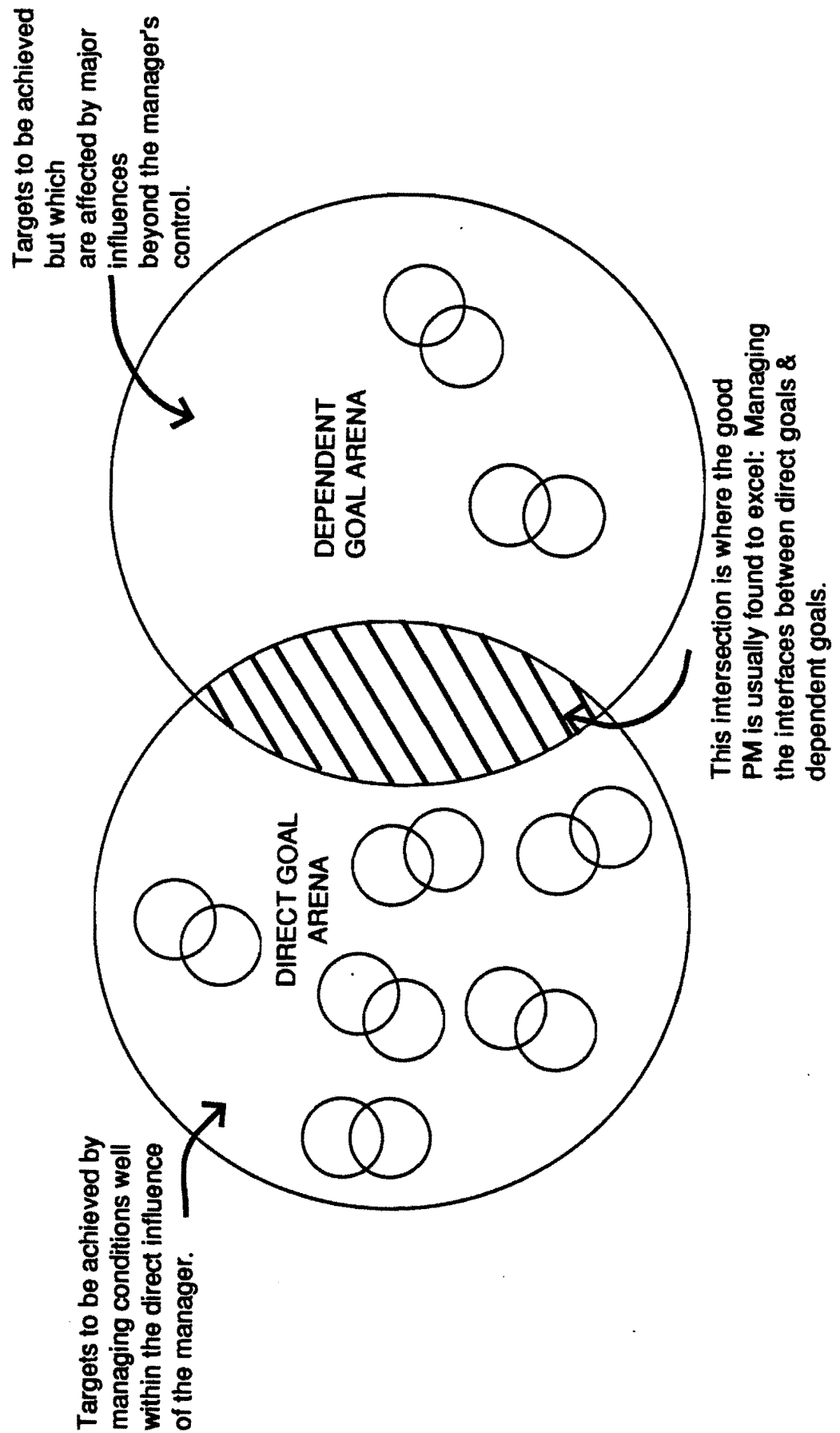
**OVERVIEW OF CONSTRUCTION  
PROJECT MANAGEMENT**





END, INTERMEDIATE & PERIPHERAL OBJECTIVES

## THE DIG / DEG INTERSECTION



### **SETTING GOALS AND OBJECTIVES**

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

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

#### **Step 1**

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

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

#### **Step 2**

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

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

#### **Step 3**

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

(continued)

**SETTING GOALS AND OBJECTIVES**

(continued)

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

**Step 4**

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

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

**Step 5**

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

**Step 6**

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

**Step 7**

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



**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? (UMD)

\_\_\_\_\_

**SECTION THREE**

**PLANNING THE PROJECT**



**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 !**

**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.

**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

(continued)

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**ACT FROM A PLAN** (Continued)

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

(Continued)



**ACT FROM A PLAN** (Continued)**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

### **NETWORK PLANNING MINITEXT**

#### **Symbols**

1.     Arrow or task →  
A single definable action (or a single grouping of a number of definable actions) requiring resources.
2.     Circle or node  
The starting or ending point of a task .... a momentary point in time.
3.     Dotted or dummy arrow - - ->  
A symbol representing the existence of a relationship between tasks. Dummies have no resources allocated.

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

#### **KEEP SYMBOLS SIMPLE !**

#### **Rules of Job Planning**

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

#### **Steps in Network Planning**

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

**RULES FOR NUMBERING NODES**

1. It is recommended the numbering sequence move down and to the right.
2. Normally, twenty numbers per hundred should be reserved for future use, and noted on diagram.
3. A node, having two or more arrows entering, or two or more arrows leaving, is numbered.
4. A node, having a single arrow entering, and a single arrow leaving, does not have to be numbered unless required by rule 5.
5. No more than one node in a sequence should be without a number.

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

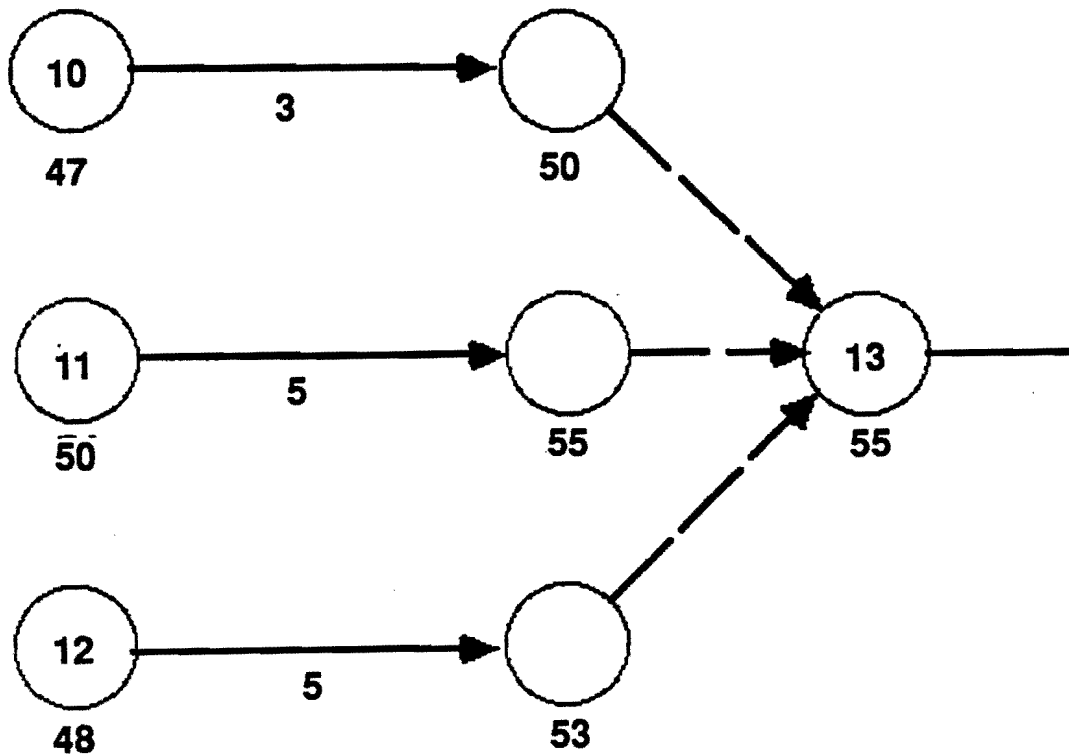
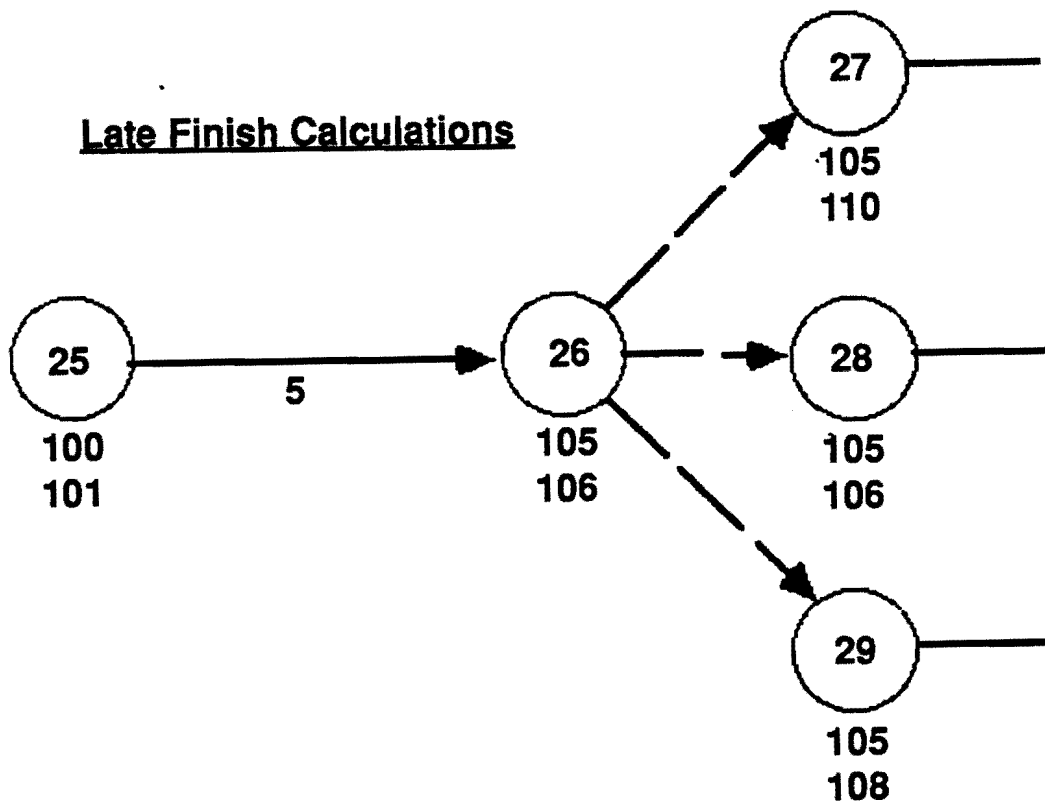
i is the initial node number designation.

j is the end node number designation.

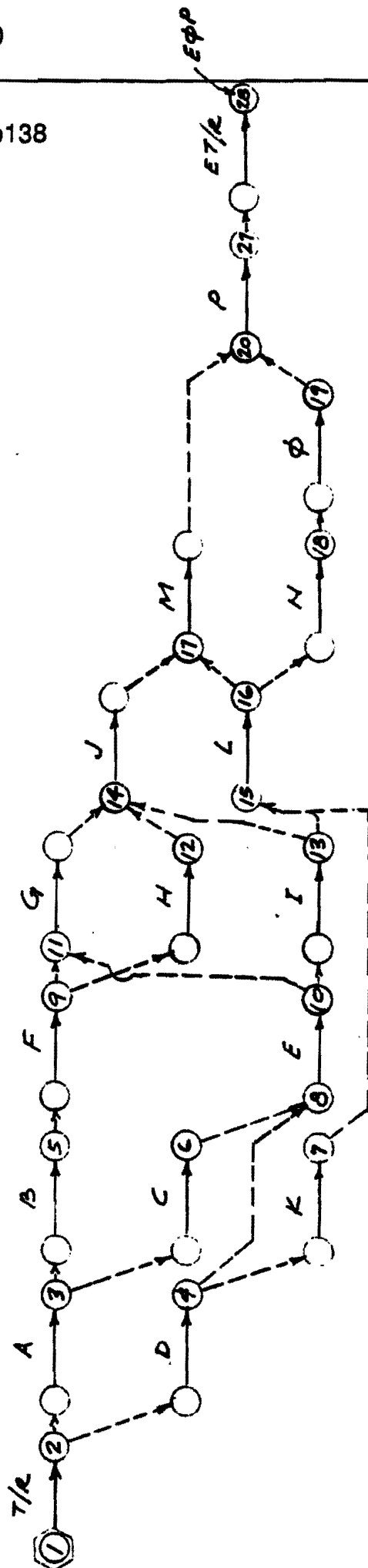
**CPM EXERCISE #1**

Project starts with task A.

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

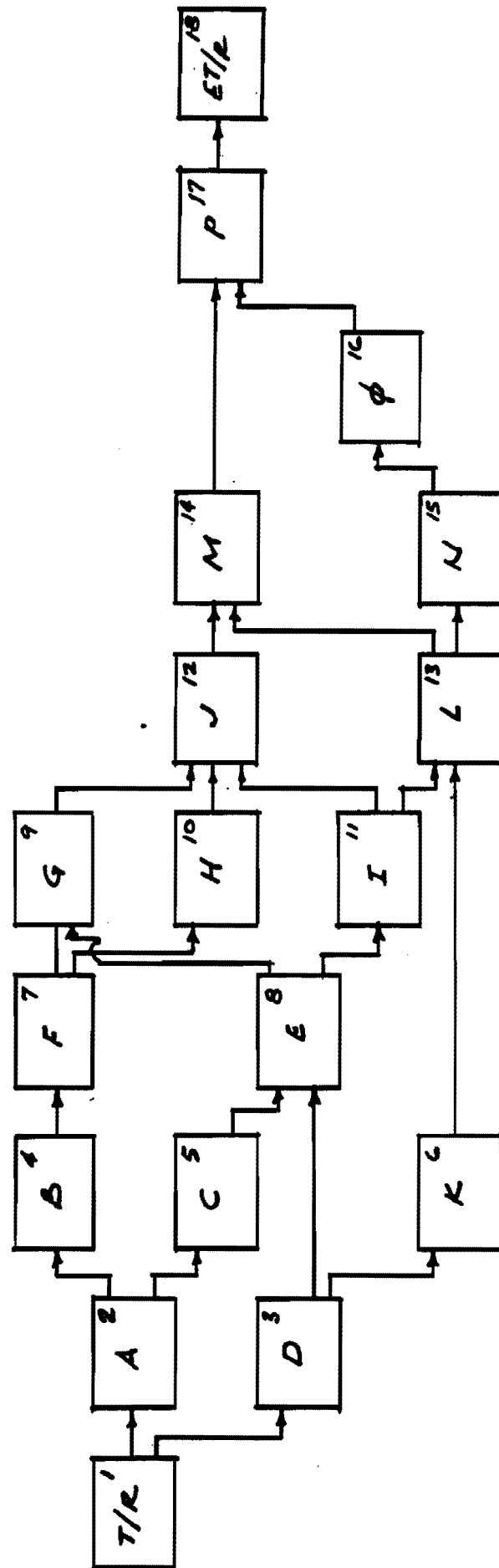
**Early Start Calculations****Late Finish Calculations**

h/o138

Reserved Node Nos.

21	24
22	25
23	26

SOLUTION TO EXERCISE # 1  
ARROW DIAGRAM



SOLUTION TO EXERCISE #1  
PRECEDENCE DIAGRAM

## 2-Yr. working calendar starting Jan. 4, 1989

Date W/D	Date W/D	Date W/D	Date W/D	Date W/D
JAN.. 1989				
03 01	15 52	25 103	07 153	18 204
04 02	16 53	26 104	08 154	19 205
05 03	17 54	30 105	09 155	20 206
06 04	20 55	31 106	10 156	23 207
09 05	21 56	JUNE	11 157	24 208
10 06	22 57	01 107	14 158	25 209
11 07	23 58	02 108	15 159	26 210
12 08	24 59	05 109	16 160	27 211
13 09	27 60	06 110	17 161	30 212
16 10	28 61	07 111	18 162	31 213
17 11	29 62	08 112	21 163	NOV
18 12	30 63	09 113	22 164	01 214
19 13	31 64	12 114	23 165	02 215
20 14	APR	13 115	24 166	03 216
23 15	03 65	14 116	25 167	06 217
24 16	04 66	15 117	28 168	07 218
25 17	05 67	16 118	29 169	08 219
26 18	06 68	19 119	30 170	09 220
27 19	07 69	20 120	31 171	10 221
30 20	10 70	21 121	SEPT	13 222
31 21	11 71	22 122	01 172	14 223
FEB	12 72	23 123	05 173	15 224
01 22	13 73	26 124	06 174	16 225
02 23	14 74	27 125	07 175	17 226
03 24	17 75	28 126	08 176	20 227
06 25	18 76	29 127	11 177	21 228
07 26	19 77	30 128	12 178	22 229
08 27	20 78	JULY	13 179	24 230
09 28	21 79	03 129	14 180	27 231
10 29	24 80	05 130	15 181	28 232
13 30	25 81	06 131	18 182	29 233
14 31	26 82	07 132	19 183	30 234
15 32	27 83	10 133	20 184	DEC
16 33	28 84	11 134	21 185	01 235
17 34	MAY	12 135	22 186	04 236
20 35	01 85	13 136	25 187	05 237
21 36	02 86	14 137	26 188	06 238
22 37	03 87	17 138	27 189	07 239
23 38	04 88	18 139	28 190	08 240
24 39	05 89	19 140	29 191	11 241
27 40	08 90	20 141	OCT	12 242
28 41	09 91	21 142	02 192	13 243
MAR	10 92	24 143	03 193	14 244
01 42	11 93	25 144	04 194	15 245
02 43	12 94	26 145	05 195	18 246
03 44	15 95	27 146	06 196	19 247
06 45	16 96	28 147	09 197	20 248
07 46	17 97	31 148	10 198	21 249
08 47	18 98	AUG	11 199	22 250
09 48	19 99	01 149	12 200	26 251
10 49	22 100	02 150	13 201	27 252
13 50	23 101	03 151	16 202	28 253
14 51	24 102	04 152	17 203	29 254



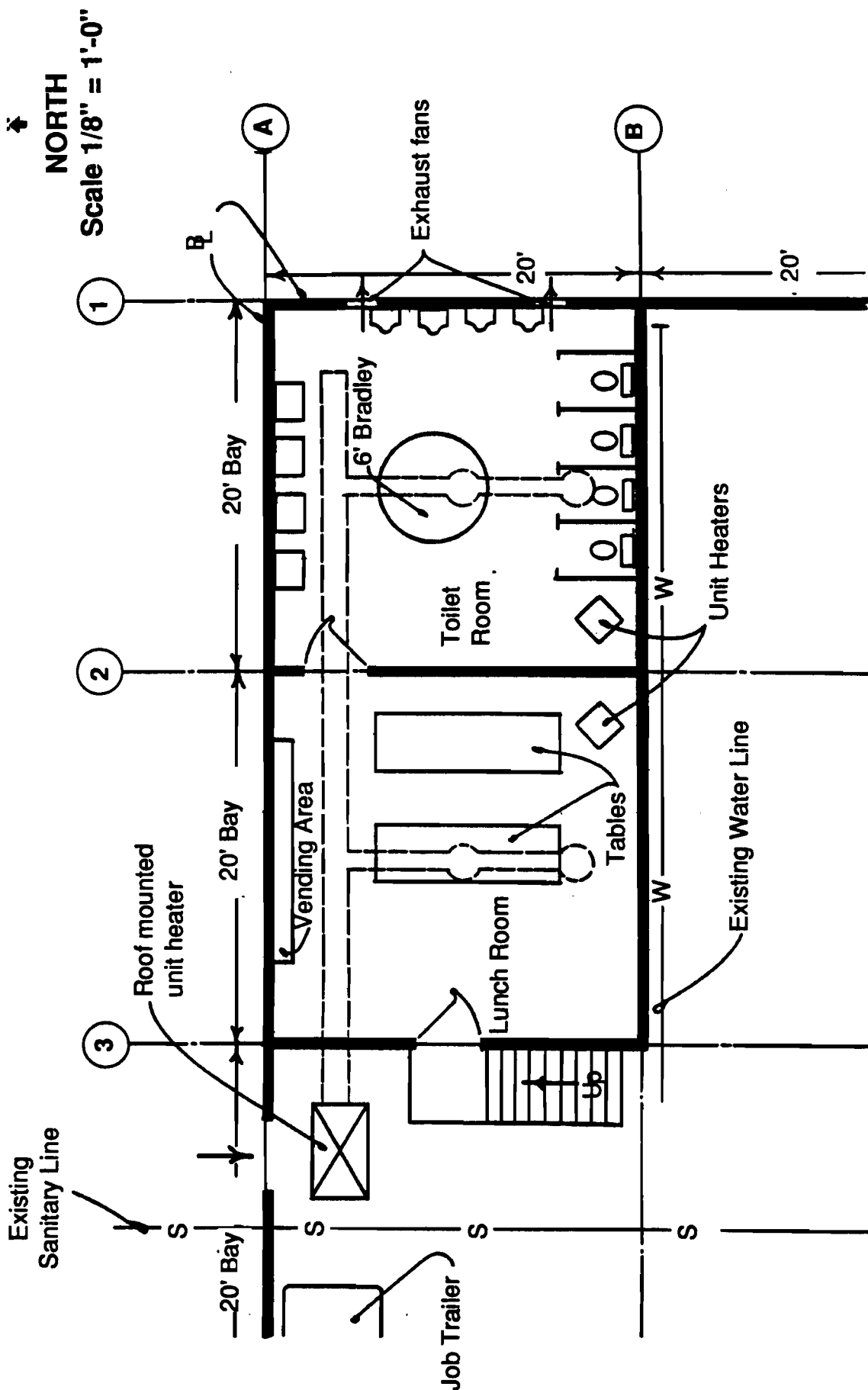
Date W/D	Date W/D	Date W/D	Date W/D	Date W/D
JAN.. 1990	14 306	25 358	08 409	22 461
02 255	15 307	29 359	09 410	23 462
03 256	16 308	30 360	10 411	24 463
04 257	19 309	31 361	13 412	25 464
05 258	20 310	JUNE	14 413	26 465
08 259	21 311	01 362	15 414	29 466
09 260	22 312	04 363	16 415	30 467
10 261	23 313	05 364	17 416	31 468
11 262	26 314	06 365	20 417	NOV
12 263	27 315	07 366	21 418	01 469
15 264	28 316	08 367	22 419	02 470
16 265	29 317	11 368	23 420	05 471
17 266	30 318	12 369	24 421	06 472
18 267	APR	13 370	27 422	07 473
19 268	02 319	14 371	28 423	08 474
22 269	03 320	15 372	29 424	09 475
23 270	04 321	18 373	30 425	12 476
24 271	05 322	19 374	31 426	13 477
25 272	06 323	20 375	SEPT	14 478
26 273	09 324	21 376	04 427	15 479
29 274	10 325	22 377	05 428	16 480
30 275	11 326	25 378	06 429	19 481
31 276	12 327	26 379	07 430	20 482
FEB	13 328	27 380	10 431	21 483
01 277	16 329	28 381	11 432	23 484
02 278	17 330	29 382	12 433	26 485
05 279	18 331	JULY	13 434	27 486
06 280	19 332	02 383	14 435	28 487
07 281	20 333	03 384	17 436	29 488
08 282	23 334	05 385	18 437	30 489
09 283	24 335	06 386	19 438	DEC
12 284	25 336	09 387	20 439	03 490
13 285	26 337	10 388	21 440	04 491
14 286	27 338	11 389	24 441	05 492
15 287	30 339	12 390	25 442	06 493
16 288	MAY	13 391	26 443	07 494
19 289	01 340	16 392	27 444	10 495
20 290	02 341	17 393	28 445	11 496
21 291	03 342	18 394	OCT	12 497
22 292	04 343	19 395	01 446	13 498
23 293	07 344	20 396	02 447	14 499
26 294	08 345	23 397	03 448	17 500
27 295	09 346	24 398	04 449	18 501
28 296	10 347	25 399	05 450	19 502
MAR	11 348	26 400	08 451	20 503
01 297	14 349	27 401	09 452	21 504
02 298	15 350	30 402	10 453	24 505
05 299	16 351	31 403	11 454	26 506
06 300	17 352	AUG	12 455	27 507
07 301	18 353	01 404	15 456	28 508
08 302	21 354	02 405	16 457	31 509
09 303	22 355	03 406	17 458	
12 304	23 356	06 407	18 459	
13 305	24 357	07 408	19 460	

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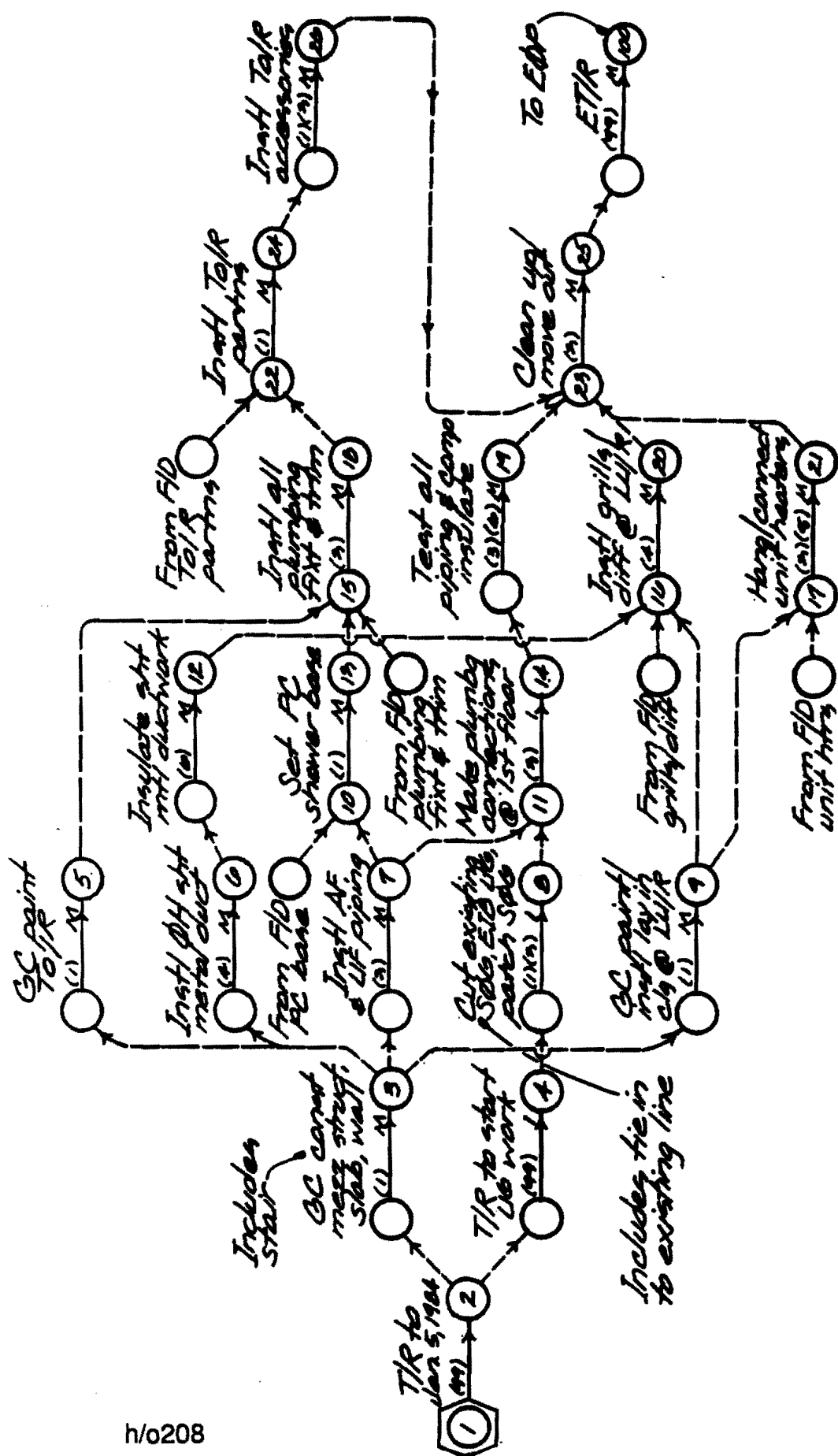
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h/o207

# STRAX COMPANY MEZZANINE LUNCH & TOILET ROOM ADDITION



H/O 207



h/o208

### Responsibility Codes

- 1 Strux Manufacturing
- 2 Harbor Contracting - G.C.
- 3 Arco Mechanical Piping
- 4 Sancy Sheet Metal
- 5 Bus Electric
- 6 Astro Insulators
- 99 Time restraints

### Abbreviations

T/R	Time restraint	EIB	Excavate, instl, backfill
GC	General contractor	SOG	Slab on grade
UG	Underground	PC	Pre cast
OH	Overhead	TOLR	Toilet room
AF	Above floor	LULR	Lunch room
UF	Under floor	I	1st floor
FID	Fabricate/deliver	M	Mezz floor



**SECTION FOUR**

**SCHEDULING THE PROJECT**





**THE CASE OF A 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 8 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 the equipment and your men, 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 we 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 we would man the job by tomorrow noon. If the cost and the schedule are in the ballpark you have a job.

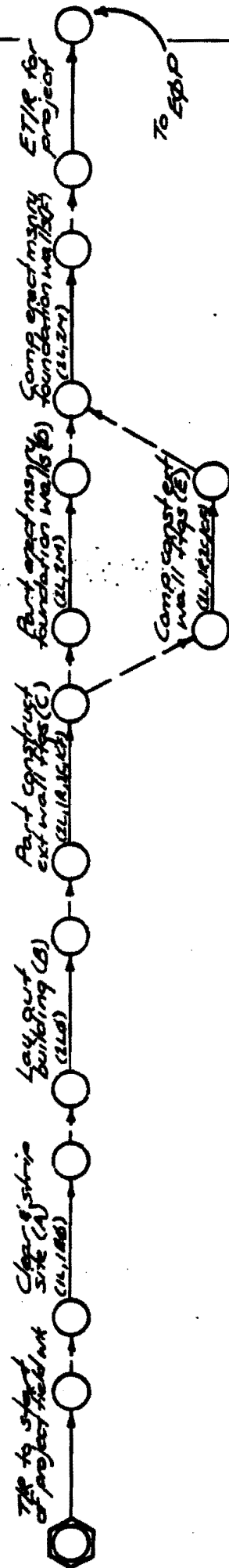
The business and management objectives you are thinking about as you consider how to plan the job include:

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 23 working days.
5. Balance tradesmen used 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 the school and for Rasmussen.

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

H/O154

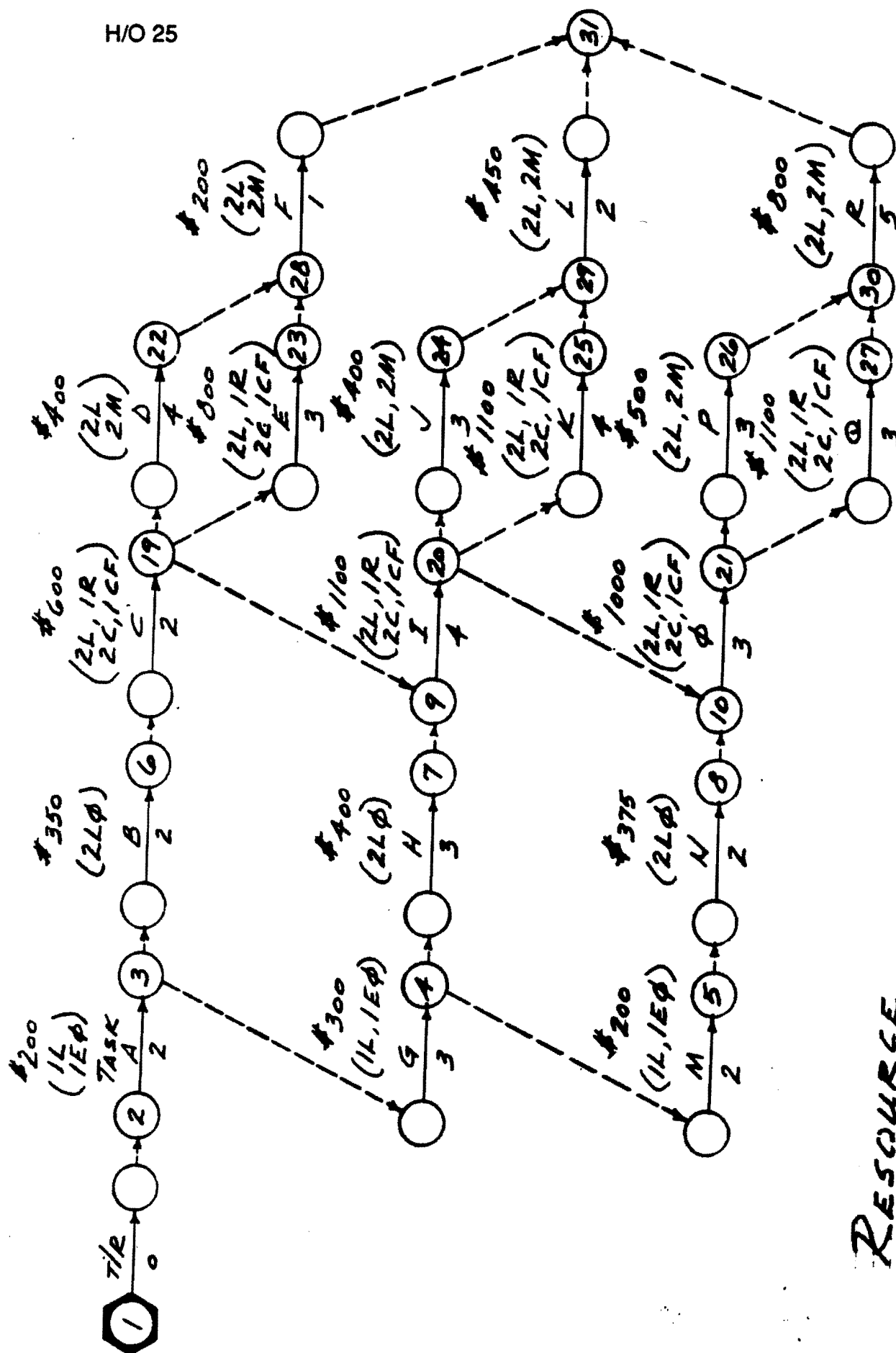


### Resource Code

L Labors  
 EEP Equipment operators  
 LP Layout engineers  
 R Reinforcing steel workers  
 C Carpenters  
 CF Cement finishers  
 M Masons

## RESOURCE ALLOCATION

H/O 25

RESOURCEALLOCATIONRESERVED CODE NOS.

11	15
12	16
13	17
14	18

RALPH J. STEPHENSON, P.E.

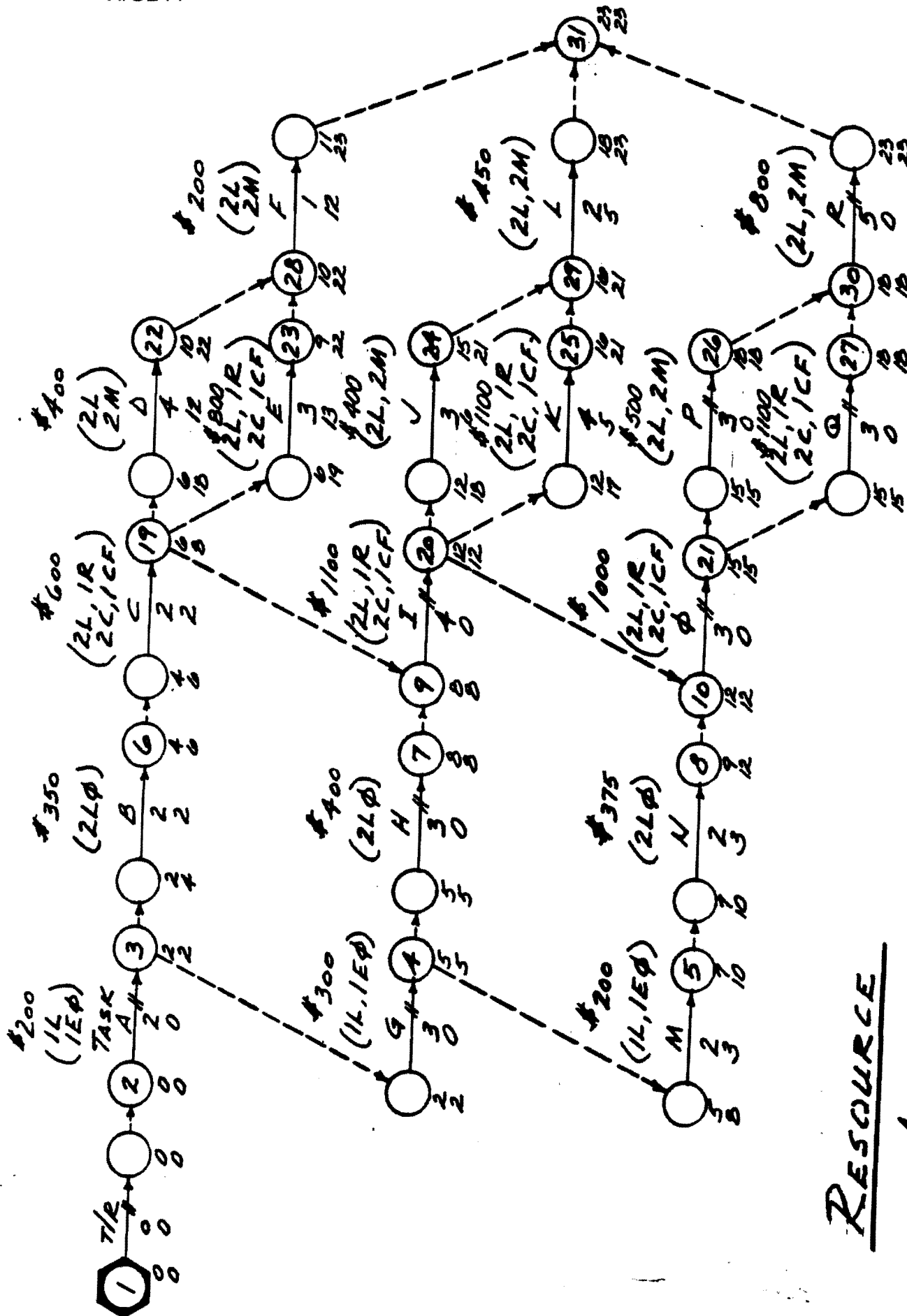
MAY 9, 1968

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

## RESOURCE ALLOCATION

*RALPH J. STEPHENSON, P.E.*

H/O244

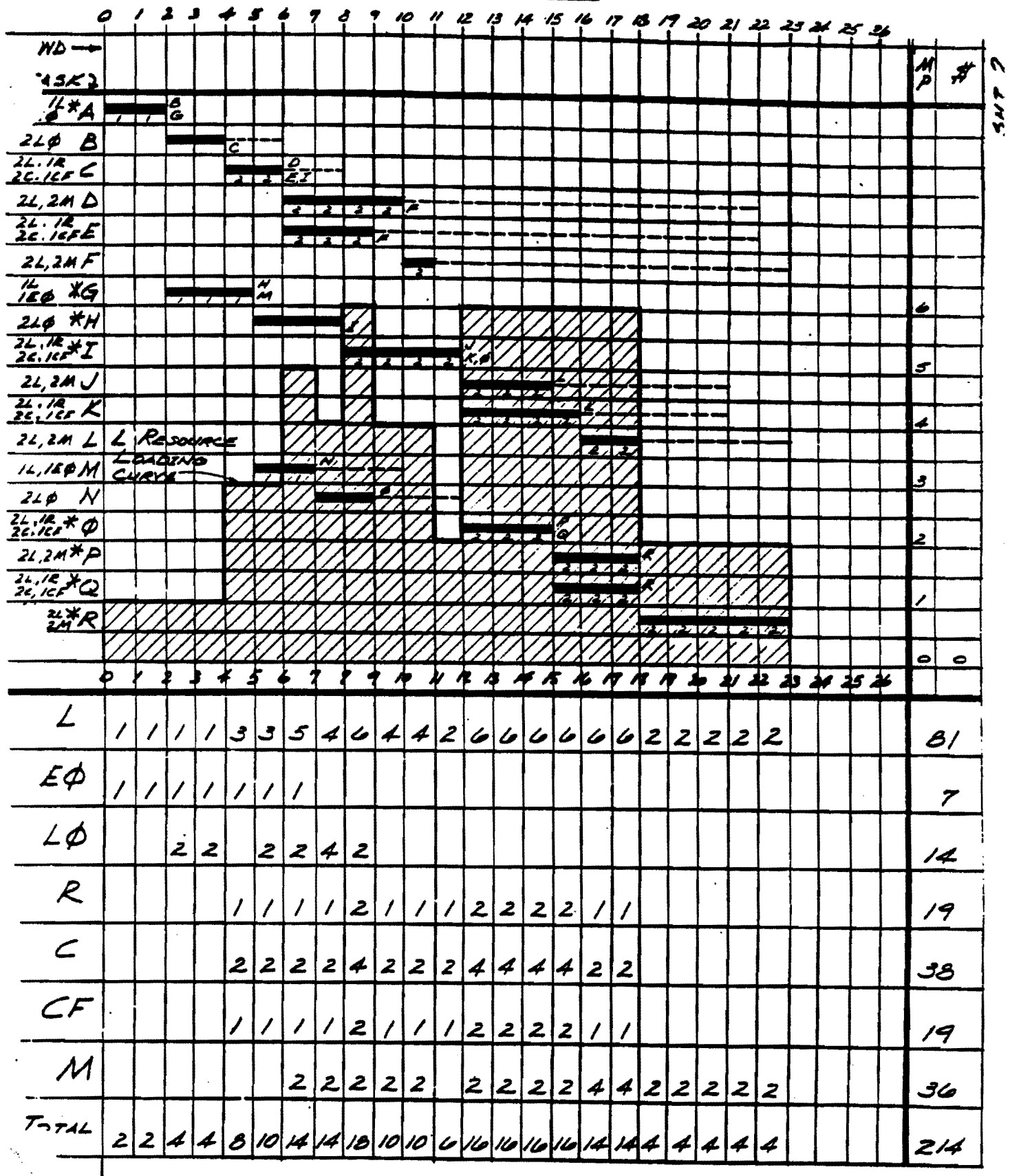


RESERVED CODE NOS.

11	15
12	16
13	17
14	18

RESOURCEALLOCATION

RALPH J. STEPHENSON, P.E.  
 MA 29, 1960

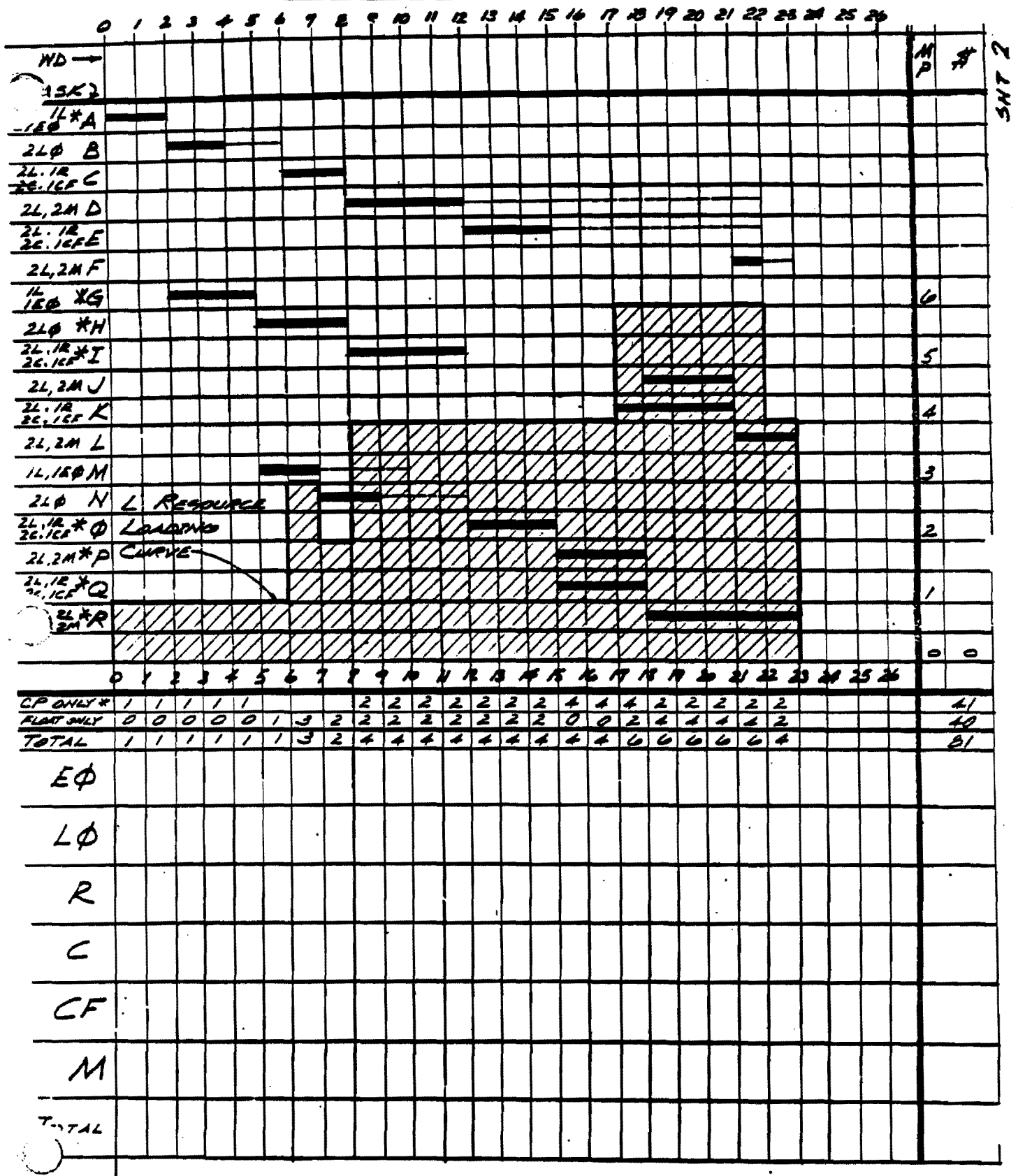
ES/EF SCHEDULERESOURCE ALLOCATION #1

HO 245

MAY 29, 1968

RALPH J. STEPHENSON, PE

H/O246

LEVELED SCHEDULERESOURCE ALLOCATION #2

MAY 29, 1968

RALPH J. STEPHENSON, P.E.



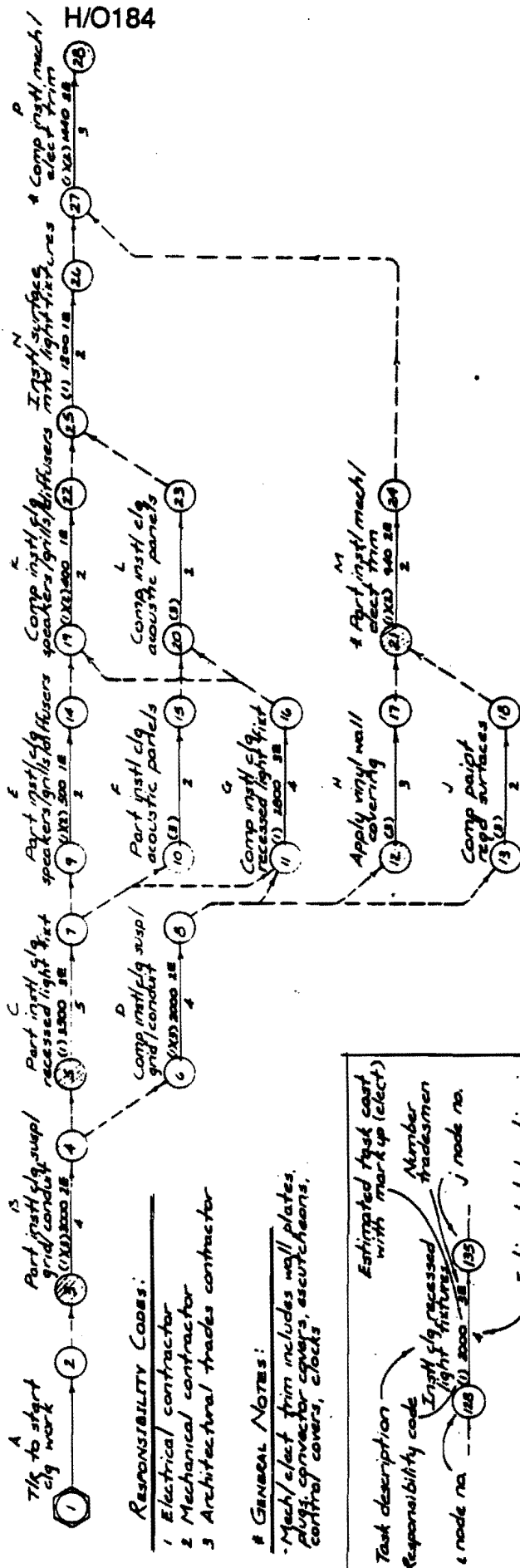


FIGURE #1 - NETWORK MODEL

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

Task description and codes	Month	Date	Wkg Day
1 3 4 4 Part instl c/g, susp/ recessed light fixt			
2 5 7 5 Part instl c/g, susp/ recessed light fixt			
3 6 8 4 Comp instl c/g, susp/ recessed light fixt			
4 7 14 2 Part instl c/g, susp/ recessed light fixt			
5 10 15 2 Part instl c/g, susp/ recessed light fixt			
6 11 16 4 Comp instl c/g, susp/ recessed light fixt			
7 12 17 3 Apply vinyl wall covering			
8 13 18 2 Comp paint reg'd surfaces			
9 19 22 2 Comp instl c/g, susp/ recessed light fixt			
10 20 23 1 Comp instl c/g, susp/ recessed light fixt			
11 21 24 2 Part instl c/g, susp/ recessed light fixt			
12 25 26 2 Part instl c/g, susp/ recessed light fixt			
13 27 28 3 Comp instl c/g, susp/ recessed light fixt			

FIGURE #2 BAR CHART

DATE **2-4-86**

W. R. J. G.

		CALENDAR PERIOD																								
		1986						1987																		
NO.	DESCRIPTION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	COMMENTS				
1.0	Foundations																					EXCL. FOUNDINGS & ETC.				
2.0	Substructure																									
2.0	Superstructure																									
	Columns & Beams																					EXCL. ABOVE				
	Floors, Walls & Stairs																					" "				
	Roof																					" "				
4.0	Interior Closure																									
	Site																					EXCL. ABOVE				
	Doors, Windows, Curtain Wall																					" "				
5.0	Roofing																									
6.0	Interior Construction																									
	Partitions																									
	Finishes																									
7.0	Conveying																									
8.0	Mechanical																									
8.0	Electrical																									
11.0	Equipment																					N.E.				
12.0	Site Work																									
	Date	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG					
	Year	1986												1987												





# PROJECT

**BY**

**CALENDAR PERIOD**[illegible]



## SHEET OF

**JOB NO.**

**YEARS**[illegible]

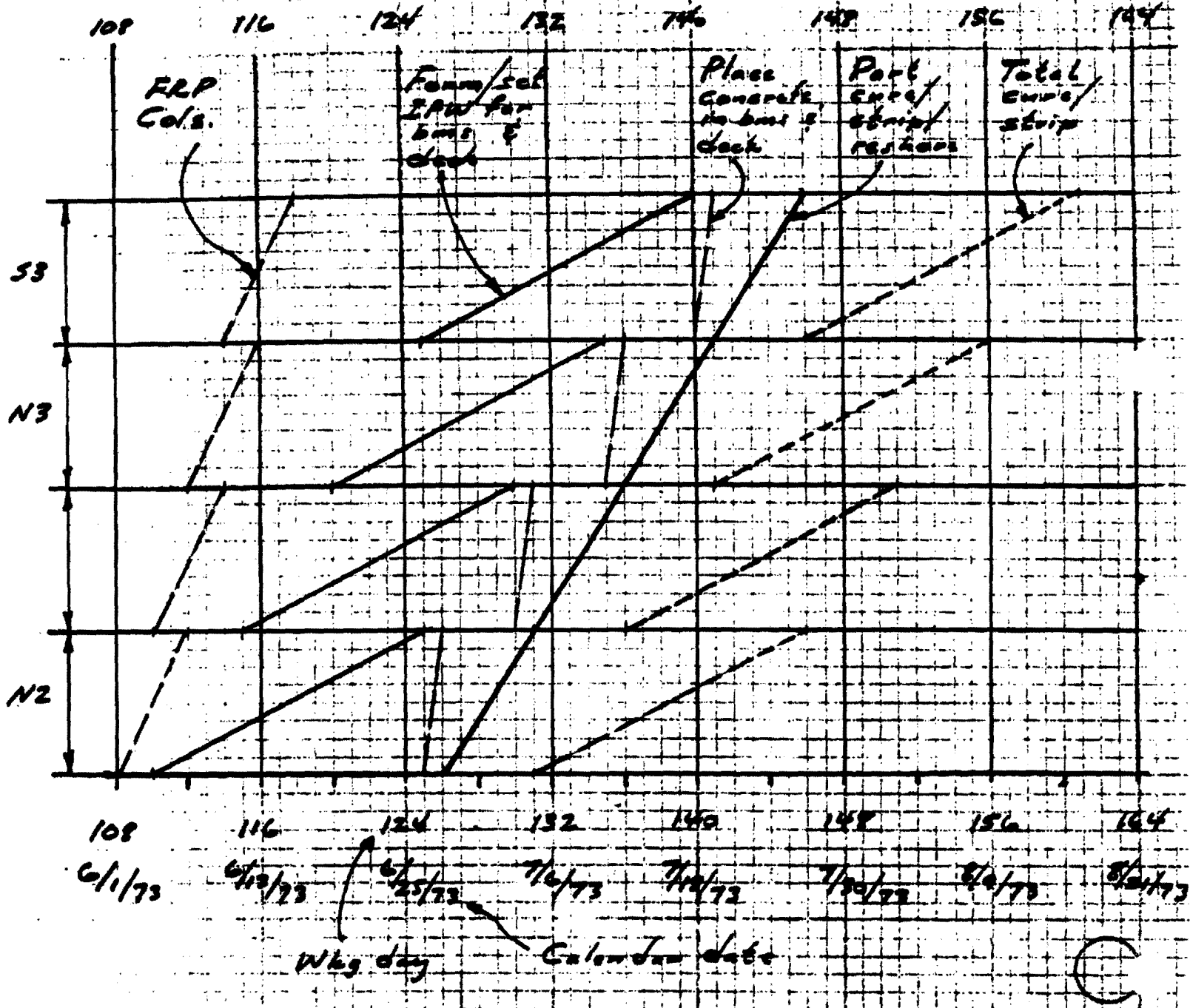
Subject \_\_\_\_\_

Slant Chart - Floor Pours

Date 3/1/73

N2, S2, N3, S3

Page ⑦

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



Date \_\_\_\_\_ **RALPH J. STEPHENSON**

### ITEM PROCESSING SCHEDULE

[illegible]

H/O239

## SUBMITTAL TURN AROUND TIMES

*TIME REQUIRED IN  
WORKING DAYS*

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

H/O198

BULLETIN #	170 9/5/82	180 7/5/82	190 9/29/82	200 10/19/82	210 10/27/82	220 11/10/82	230 11/24/82	240 12/4/82	250 12/23/82	260 1/10/83	270 1/24/83
11											
10											
9											
8											
7											
6											
5											
4											
3											
2											
1											

Bulletin  
quoting  
periodQuote  
evaluation  
period

BULLETIN/CHANGE ORDER RECORD

VOIDED, 11/4/82. (216) NOT QUOTED

CHANGE ORDER #

H/O200

① LINE #	② EQUIPMENT DESCRIPTION & WHO FURNISHES	③ PRESENT LOCATION OF EQUIP	④ FINAL LOCATION	⑤ ACTION TO BE TAKEN & BY WHOM	⑥ ACTION TO BE TAKEN & BY WHOM	⑦ OTHER EQUIP AFFECTED	⑧ 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	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 & Install	Telco Young	—	
5	2 new prefab shop offices 10'x15'x8' (Young)	New	1 in new bldg lab area 1 in existing bldg QA area	Erect Mech/Elect	Young Telco	In existing bldg after Telco clears space (watch!)	

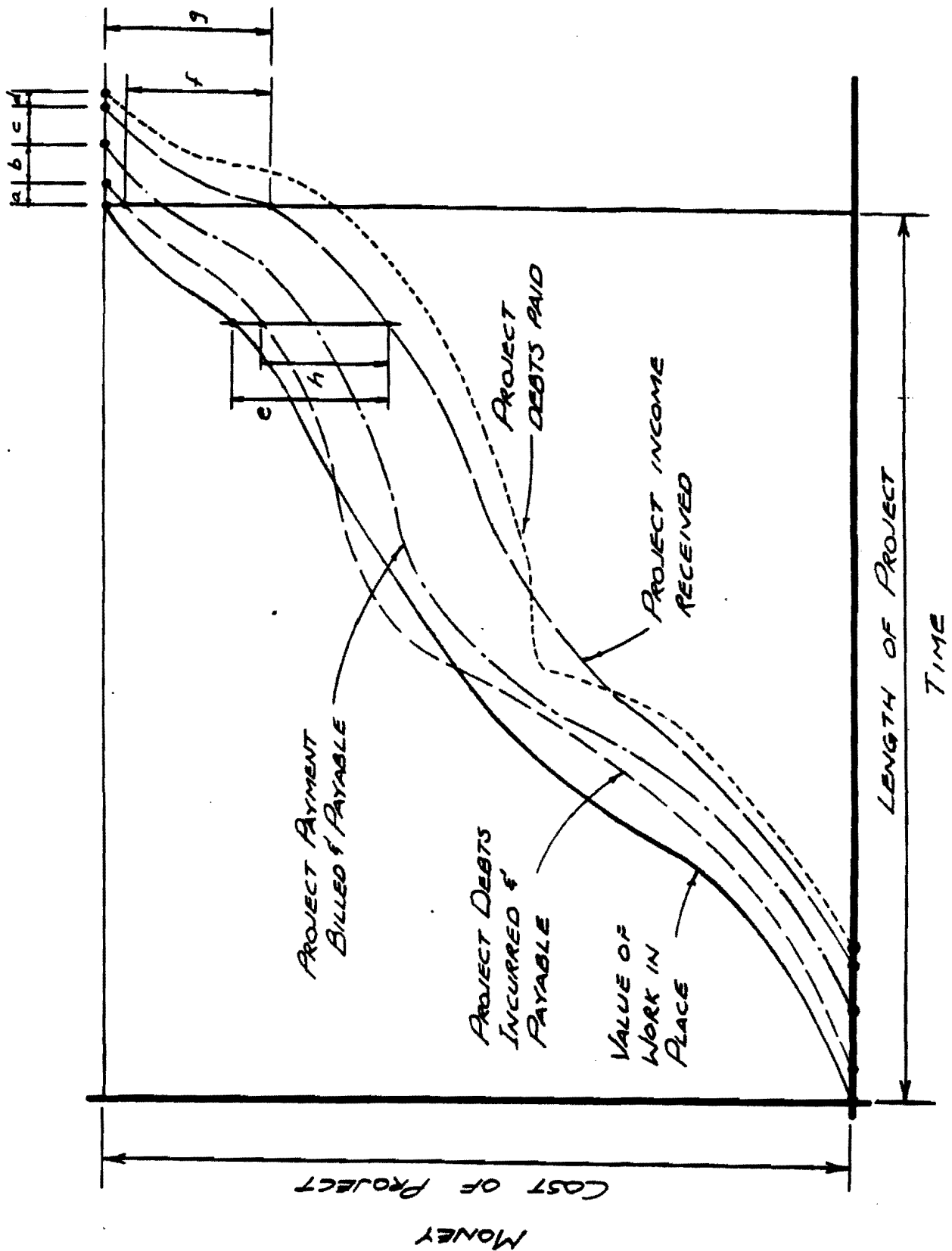
Abbreviations

NW Northwest

QA Quality Assurance

EQUIPMENT ACTIVITY TABULATION

H/O147



PROJECT MONEY FLOW



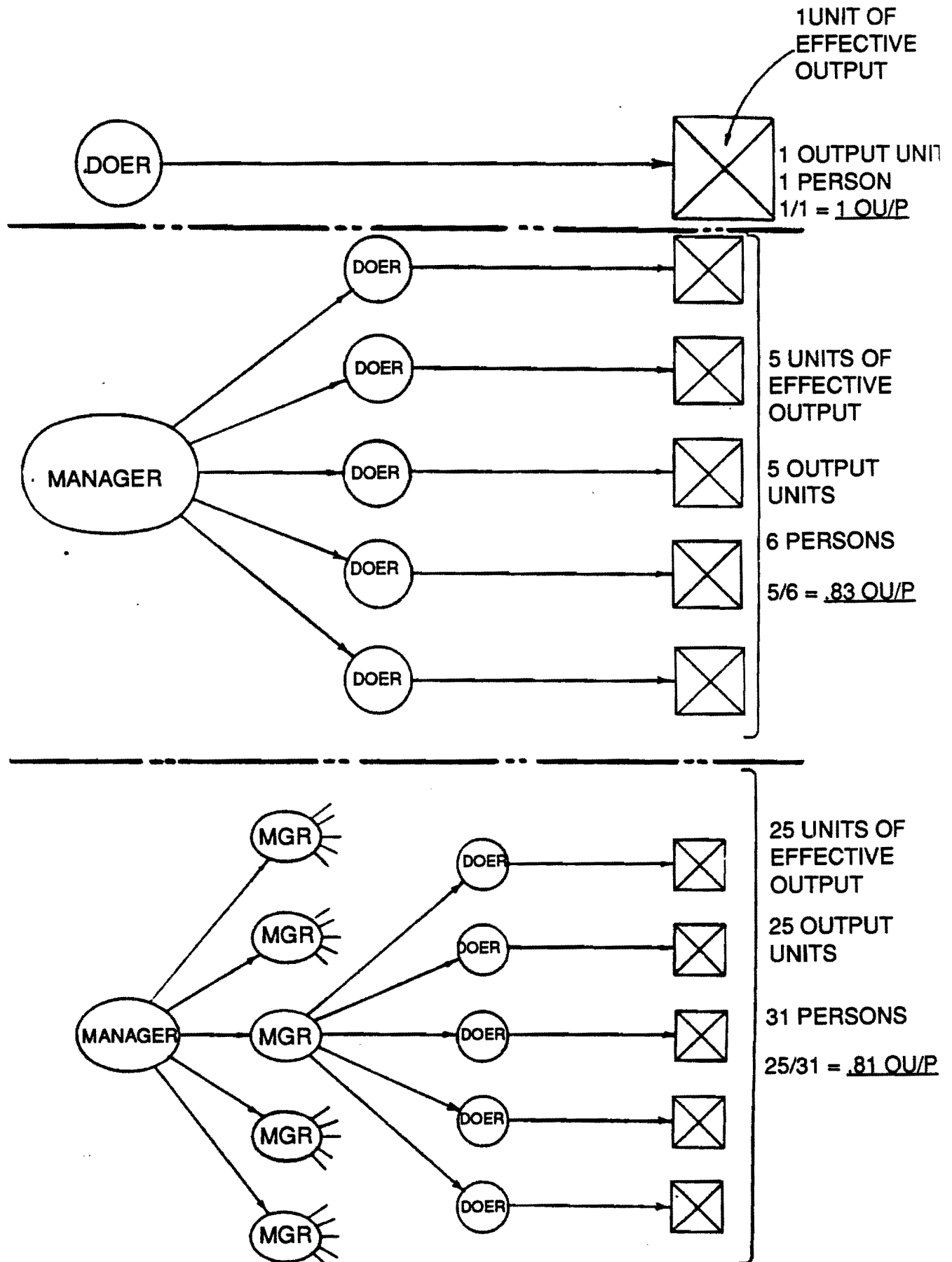
**SECTION FIVE**

**CONSTRUCTION ORGANIZATION  
& MANAGEMENT**

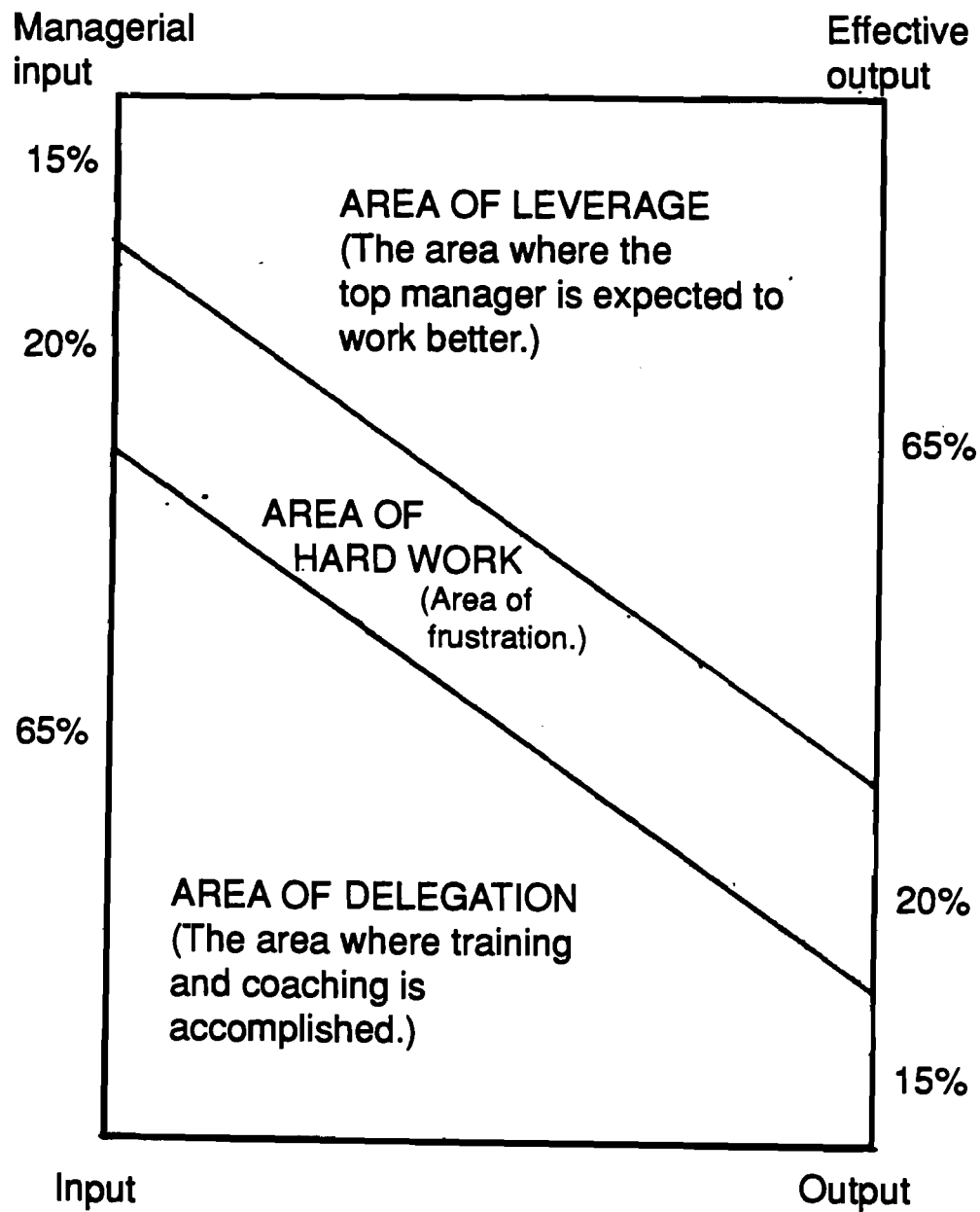




# THE ROLE OF THE MANAGER

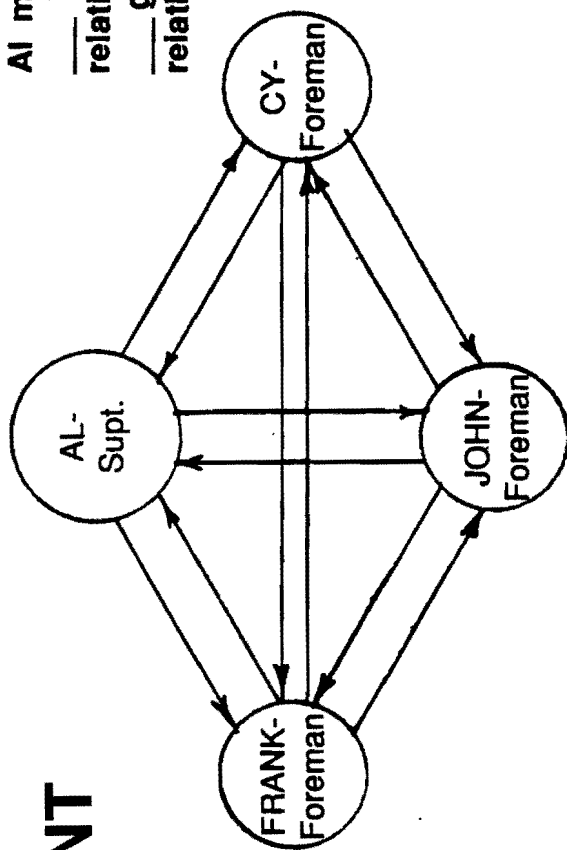


## MANAGERIAL LEVERAGE

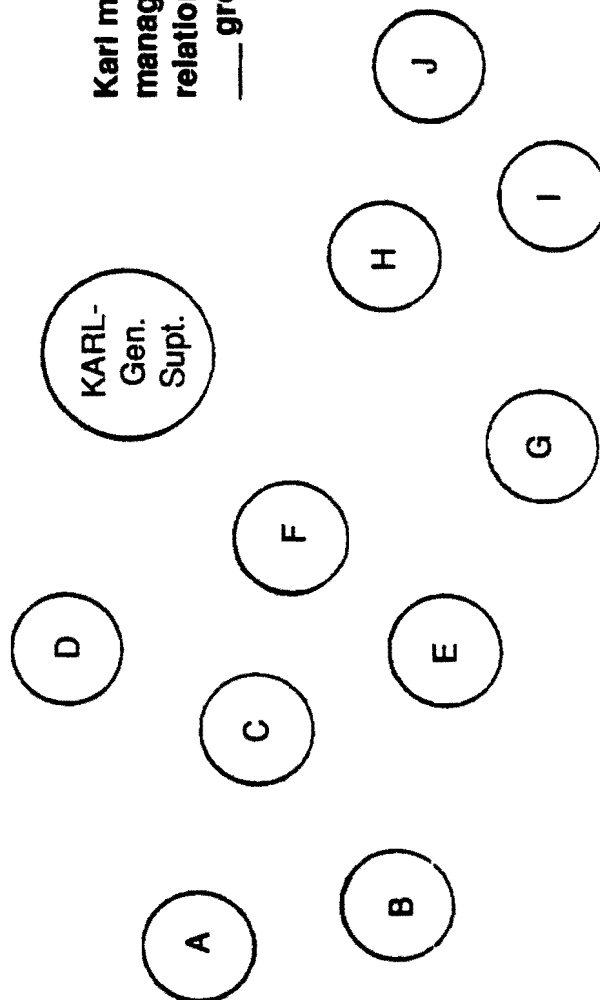


# SPAN OF MANAGEMENT PRINCIPLES

Al manages  
\_\_\_ Individual  
relationships &  
\_\_\_ group  
relationships



Karl may have to  
manage \_\_\_ Individual  
relationships &  
\_\_\_ group relationships



**SPAN OF MANAGEMENT EXPLANATION**

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

Main factors that influence an effective span of management are:

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

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

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

If 2 way links must be maintained among both you and your subordinates within a managerial span of control of four, you are now managing 20 paths.

Still not too many, provided any one link or set of links does not require excessive time.

(Continued)

**SPAN OF MANAGEMENT EXPLANATION**

(Continued)

As the number of participants increases it can be seen 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  $2 \times 21 = 42$ . 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  $20 \times 2 = 40$  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.

**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

(Continued)

**HOW TO SPRING THE TIME TRAP**

(Continued)

- 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

(Continued)

**HOW TO SPRING THE TIME TRAP**

(Continued)

**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

(Continued)

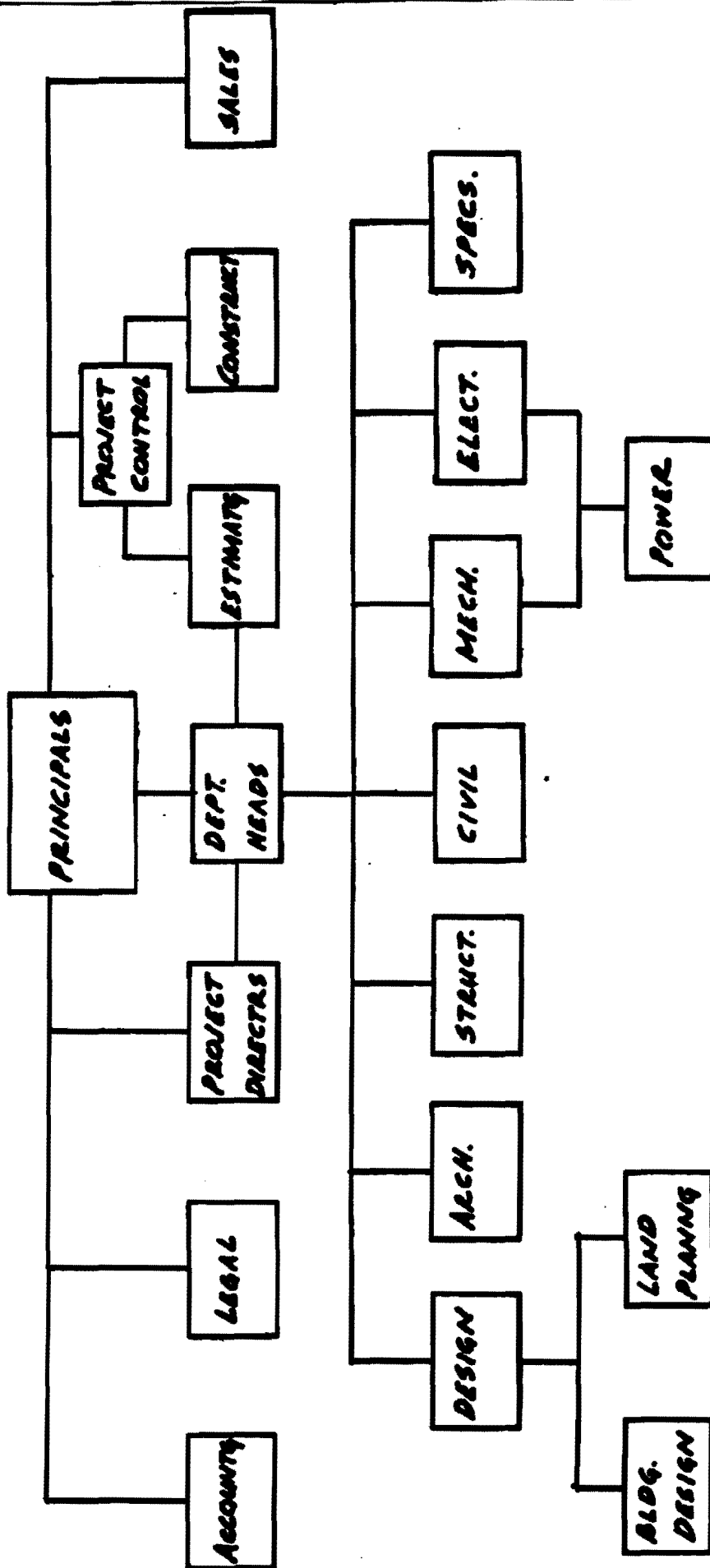


**HOW TO SPRING THE TIME TRAP**

(Continued)

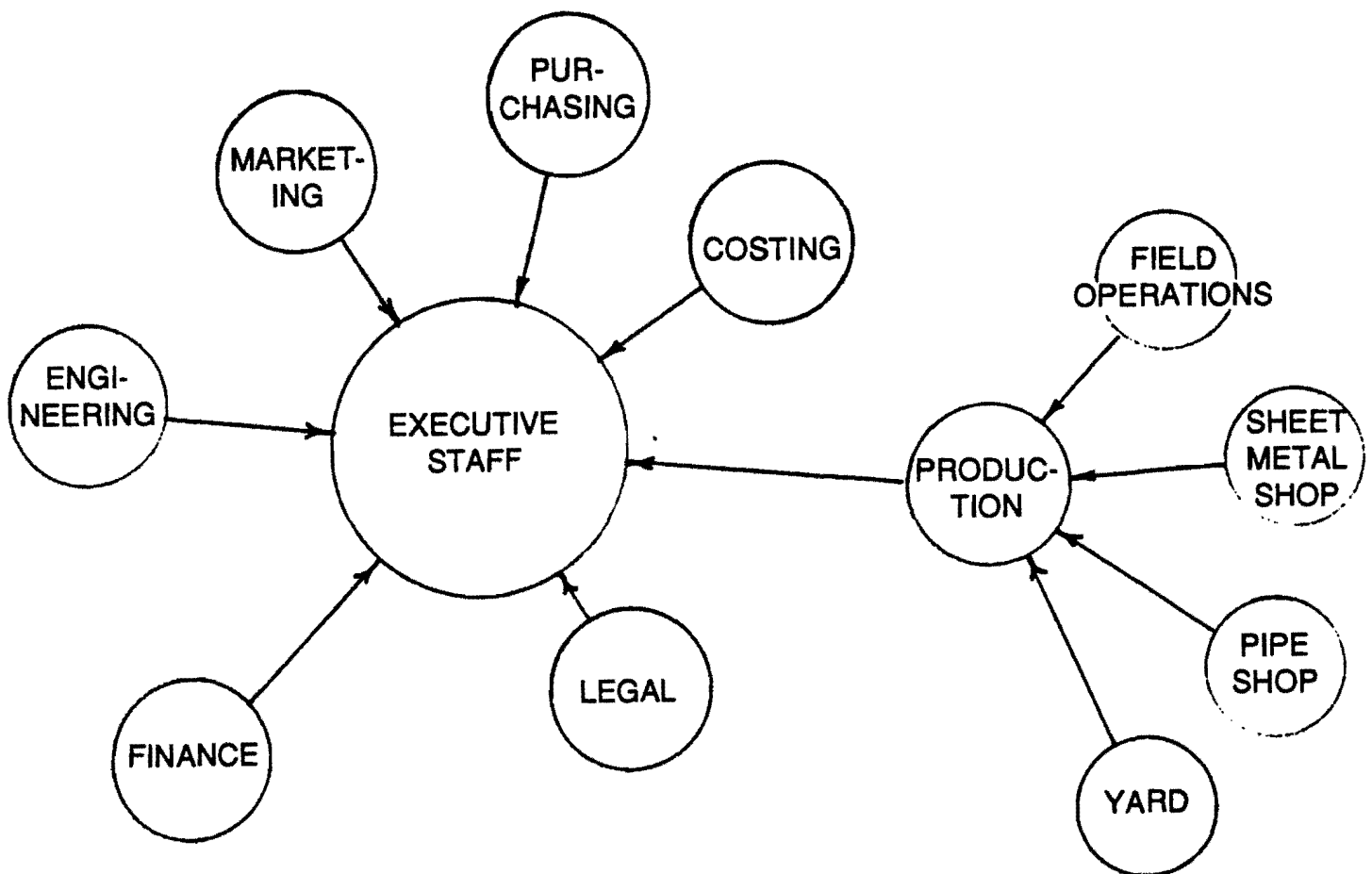
2. Insistence on all the facts - paralysis by analysis
    - a. Accept risks as inevitable
    - b. Decide without all the facts
  3. Fear of the consequences of a mistake
    - a. Delegate the right to be wrong
    - b. Use mistakes as a learning process
  4. Lack of a rational decision making process
    - 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

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



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## EXAMPLE OF BASIC FUNCTIONAL COMPANY RELATIONS (DEPARTMENTAL)





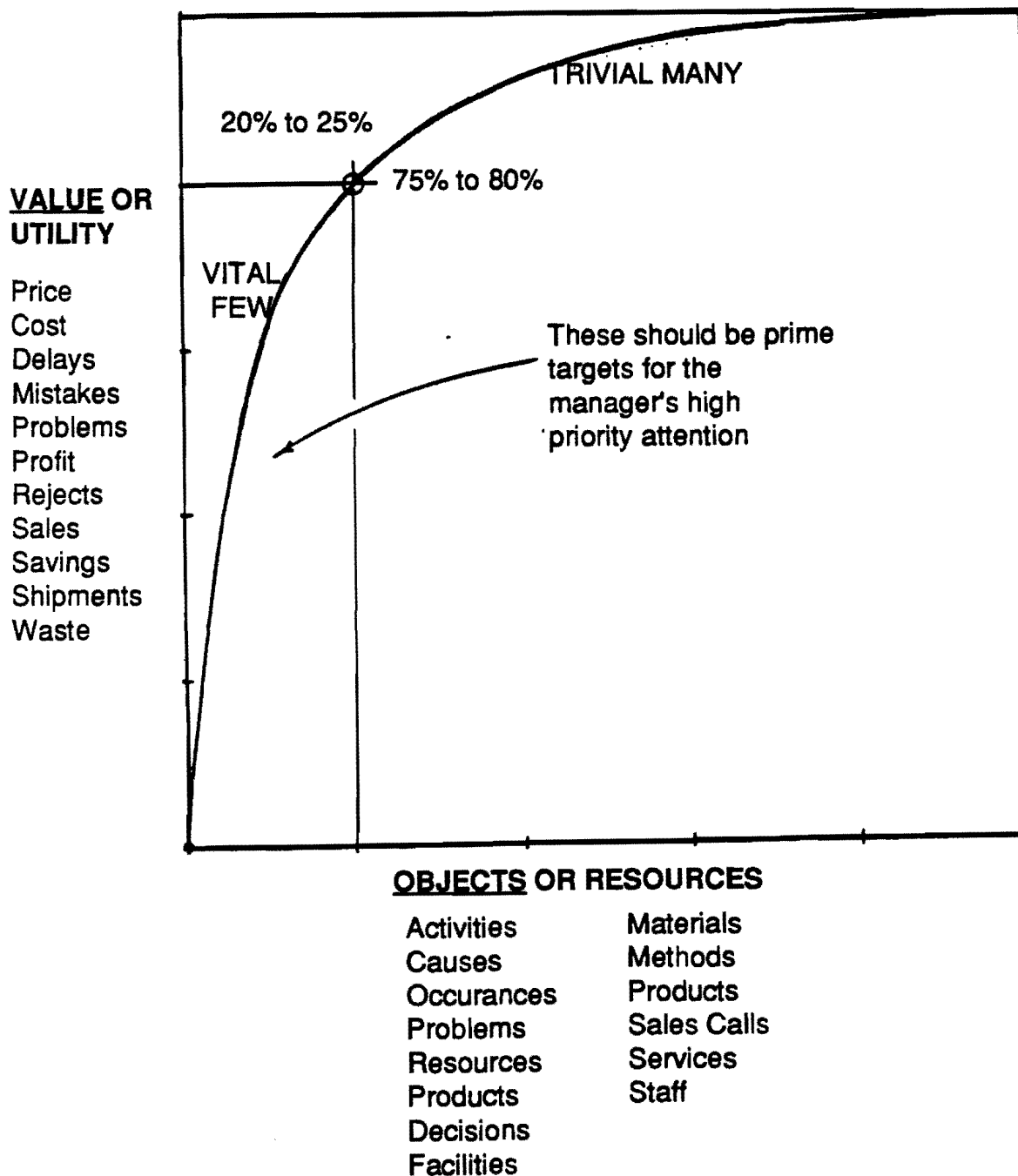
**SECTION SIX**

**MONITORING THE PROJECT**



# PARETOS LAW

In an object/value situation  
only a few of the objects account for  
the greatest part of the value.



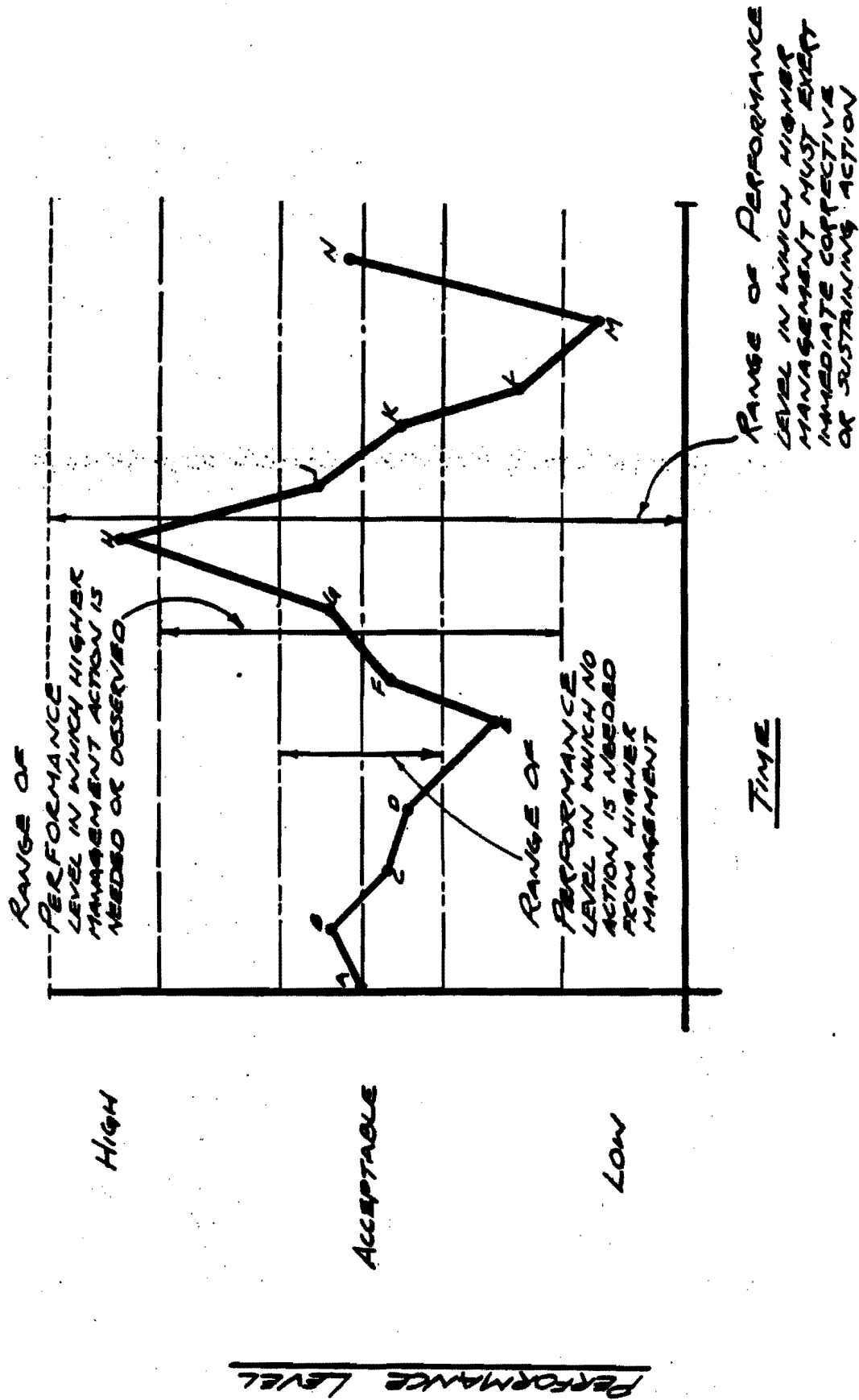
**IDENTIFY VITAL TARGETS**

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 mistakes 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



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MANAGEMENT BY EXCEPTION (MX) AND  
PERFORMANCE LEVEL ACTIONS

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**MANAGE BY EXCEPTION**

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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 paperwork
  - 4. If used incorrectly can give a false sense of security and well being
  - 5. Is silent only on items predetermined not to be critical. Conditions may change
- E. The big advantage of MX is that much of the decision making is done in advance (much like a trouble shooter's manual, a decision tree or a decision table).
- F. The manager must understand that once freed by a good MX system from the demands of routine work, he must fill his time with creative effort directed toward improving his plans, organization, staff and decisions.
- G. MX is invaluable in detecting trends – movements toward or away from objectives
- H. Beware of overreaction to an MX alert. Remember MX is a tool of the manager, not the manager.

- I. Four MX alert levels
  - 1. No unusual difficulties – everything OK
  - 2. Moderate deviations – the situation needs the manager's attention and analysis
  - 3. Above average deviations – the performance is unacceptable and needs corrective action, or is excellent and may be desirable to sustain
  - 4. Unusually large deviations – the performance is vitally disturbed or is so good as to demand investigation by the manager now
  
- J. Methods of reporting with MX
  - 1. Word of mouth
    - a. Fast
    - b. No record left
    - c. Listener may appear to comprehend, but may not
  - 2. Written
    - a. Permanent record available
    - b. Can be studied anytime
    - c. Easily systemized
    - d. Irregular reports may allow critical factors to go unnoticed
  - 3. Charted
    - a. Good for presentation to large numbers of people with limited amounts of time
    - b. Subject to scale misinterpretation
    - c. Requires special resources and talents to do well
  - 4. Electronically reported
    - a. Easily used on a selective basis
    - b. Data available quickly
    - c. High processing error potential

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**CLAIM PRONE JOB CHARACTERISTICS**

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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.

(Continued)

**CLAIM PRONE JOB CHARACTERISTICS**

(continued)

- H. Non-labile party involvement in responsible positionS,  
i. e. non-labile 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-labile 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.

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### **COMMON CAUSES OF CONTESTED CLAIMS**

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

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

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

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

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

#### **1. Directed Change - 48%**

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

##### **Examples**

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

##### **Advice**

- Required extensions of time should be stated in writing.
- Costs for extended general conditions should be agreed upon early.

(Continued)

**COMMON CAUSES OF CONTESTED CLAIMS**

(Continued)

- The client or owner is obligated to pay for the change, if there is a charge.
- Payment for the work should be explicitly agreed upon before starting.

**2. Constructive change - 42%**

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

**Examples**

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

**Advice**

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

**3. Defective or deficient contract documents - 41%**

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

**Examples**

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

(Continued)

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**COMMON CAUSES OF CONTESTED CLAIMS**

(Continued)

**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.

(Continued)



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**COMMON CAUSES OF CONTESTED CLAIMS**

(Continued)

**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**

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.

(Continued)

**COMMON CAUSES OF CONTESTED CLAIMS**

(Continued)

**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 precontract period, that affects construction on matters of importance.

(Continued)

**COMMON CAUSES OF CONTESTED CLAIMS**

(Continued)

**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.

h/o 91

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.

**SECTION SEVEN**

**CASE STUDIES &  
MISCELLANEOUS MATERIAL**



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**DEFINITIONS**

- **Acceleration**  
Contract work performed in a time period shorter than that originally contemplated by the contract, or contract work performed on time when the contractor is entitled to an extension of time for his performance.
- **Apparent Authority**  
A situation in which one person or organization acts on behalf of another person or organization without the other person's or organization's formal authority.
- **Arbitration**  
A method for settling disputes whereby an officially designated third party (usually one to three people) hears and considers arguments and determines an equitable settlement. Usually considered binding upon the parties.
- **Authority**  
The leverage, 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.
- **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.
- **Cardinal Change**  
A change that is outside the scope of the contract.
- **Change Order**  
An official notice that the changes specified in the change order are to be done. A properly executed change order is a revision to the scope of work and the contract documents.
- **Claim**  
A demand for something as due; an assertion of a right or an alleged right. In construction generally a demand for something as due, or in which the demand is disputed.
- **Claim Avoidance**  
A technique and procedure for generation of situations in which the demand for what is due as a result of a contract agreement is honored without formal dispute, or in which the dispute is settled by an administrative settlement.
- **Claim Potential**  
The measure of potential that any project has to encounter disputes during its implementation.
- **Closed 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.

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- **Construction Management**  
A system of attempting to better manage the construction process by providing expert construction knowledge and resources throughout all phases of the project. The goal of the process is to make available to the participants, information best provided by an expert skilled in construction practices, so that when the project moves into the field the managers can provide the owner with the highest potential for project success.
  - **Constructive Change**  
An owner's action or inaction that has the same effect as a written directive.
  - **Contract Documents**  
Usually considered to be the documents which provide the full definition of the scope of work for which the parties are legally responsible. Could include the agreement, the drawings, the specifications, instructions to bidders, addendum, and any other material included by mutual agreement and clearly identified as part of the contract.
  - **Control**  
Maintaining firm, competent managerial direction of any given situation. Controlling leads to achievement. It is usually accomplished by the invisible use of leverage.
  - **Critical Path Method**  
A mathematical modeling technique which allows the user to establish ranges within which resources can or must be used.
  - **Cuts**  
Excerpts from catalogs, drawings, or flyers that depict a configuration to be used in the construction process.
  - **Daily Reports**  
Daily technical reports about the project containing data on manpower, weather, major activities, equipment on job, and other job related statistical information. Usually the daily report form is preprinted and in loose leaf form.
  - **Decision-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.
  - **Development**  
A business operation in which the primary goal is to locate and produce profitable and marketable real estate assets.



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- **Diary**  
Similar to a log but dealing more with personal observations of the individual writing it relative to his feelings about the job and the people.
  - **Differing Site Conditions**  
Where actual site conditions differ materially from those indicated in the contract documents; or where unknown physical conditions at the site differ materially from those ordinarily expected to be encountered in work of the nature contemplated by the contract.
  - **Directed Change**  
A written or verbal change that falls within the scope of the contract. The owner has the responsibility of paying for the change.
  - **Document Control System**  
A method of receiving, classifying, marketing, storing, and retrieving documents received and sent on a project.
  - **Dysfunction - Organizational**  
An organizational problem that hinders or prevents achieving objectives. May be temporary or permanent.
  - **Early Finish (EF)**  
The earliest possible date by which a task can finish in a network model if it has been started at its early start date.
  - **Early Start (ES)**  
The earliest possible date at which a task can begin in a network model if all tasks immediately preceding it have been completed by their early finish dates.
  - **Education**  
The teaching and learning process by which the principles of doing things are conveyed to the learner.
  - **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.
  - **Executive**  
The executing arm of the organization closest to the flow of expense and income experienced in achieving the organization's prime objectives. Closely related to line operations.
  - **Feedback Loop**  
The loop of communication around a project through which information is conveyed to and through the various components of the project.
  - **Field Order**  
An official notice that the actions or changes described in the field order are to be done. The field order is usually issued only in emergency situations where the time between decision and action does not permit issuance of a bulletin followed by a change order. A method of payment is usually specified in the field order.
  - **General Conditions**  
The portion of the contract agreement that contains contractual-legal requirements for the work.

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- **General Requirements**

The portion of the contract agreement that contains overall technical support specifications governing work on the job.

- **Goals**

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

- **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**

A management system that emphasizes diversifying by expanding existing functions by classes. For instance a design office could accomplish horizontal integration through dividing their operations into various kinds of projects such as commercial, institutional and industrial. These all use the same or similar functional disciplines but the organization is divided into separate groups that concentrate mainly on one of the three main building types.

- **Hygiene**

The elements in an organizational situation that are acceptable to an individual but do not necessarily motivate him. These same elements, if unacceptable to the individual, may act as negative influences.

- **Interfaces**

Points at which different but related activities exert direct influences upon each other. Interfaces are often the points where direct objective activities contact dependent objective activities. Poor management of interface situations usually causes problems and dysfunctions.

- **Late Finish (LF)**

The latest allowable date by which a task can be completed in a network model without forcing those tasks that follow past their latest allowable start dates.

- **Late Start (LS)**

The latest allowable date by which a task can be started in a network model without forcing those tasks that follow past their latest allowable starting dates.

- **Leverage**

The effective use of vested and earned authority to solve problems and achieve goals and objectives.

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- Log

A permanently bound, dated, hand written record of job related events that have occurred on a project. The log is usually in ink, and is maintained by an individual in responsible charge of the work with which the record deals.

- Maladministration

The interference of the owner in the right of the contractor to develop and enjoy the benefits of least cost performance.

- Manage

To define, assemble and direct the application of resources.

- Management\*

The act and manner of managing.

- Management by Exception (MX)

A measuring and monitoring system that sounds an alarm to the manager when problems have appeared or are about to appear, and remains silent when there are no problems. The system identifies the problem area, thus permitting the effective manager to manage the exception while leaving the smoothly running operations to continue running smoothly.

- Money Flow

The flow of income and expense measured against time.

- Monitoring

Measurement of current project conditions and position against the standards of performance set for the job.

- Motivation

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

- Network

A system of interconnected, interacting components. Usually a part of an open system.

- Network Plan

A graphic statement of the action standard of performance to be used in achieving project objectives.

- Network Planning

A graphic technique of showing necessary and desired actions needed to achieve end, intermediate and peripheral objectives.

- Objectives

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

- Objectives - Dependent

Objectives to be achieved that are affected by major influences beyond the manager's direct control. The dependent goal may be predictable or unpredictable.

Dependent goals, while usually beyond the manager's control, may well be within the 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.

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- **Objectives - Direct**  
Objectives that can be achieved by managing conditions within the manager's direct influence.
  - **Objectives - End**  
Objectives realized from and upon total completion of the defined project work.
  - **Objectives- Intermediate**  
Objectives achieved at specific and identifiable stages of the project, i.e. partial occupancy of a building, turnover of a mechanical system for temporary heat, or completion and issuance of foundation plans for early start of construction.
  - **Objectives - Peripheral**  
Objectives realized on an ongoing basis through the life of the project and achieved as an indirect result of project activities. Peripheral objectives may be personal, professional, technical, financial or social. Peripheral objectives might include staff promotion, profitable subcontractor operations, specialized experience, or achievement of design excellence in a special field.
  - **Ongoing Organization**  
The arrangement and interrelationships of people charged with providing supportive action on an ongoing basis within the company. Examples of functions contained within the ongoing design or construction organization are estimating, administration, legal, marketing, sales, purchasing, and accounting.
  - **Open System**  
A system which exchanges energy, information and physical components with its environments.
  - **Organization**  
The arrangement of resources (talent, skill money, time, space, people, et al) that has evolved, or been selected, to accomplish the functions, activities, and management, and goals and achieve the objectives of a business or institution.
  - **Owner Furnished Items**  
Those items furnished by the owner according to the contract documents.
  - **Planning**  
Establishing and arranging necessary and desired actions leading to end, intermediate and peripheral objectives.
  - **Prime Contractor\***  
A contractor whose business agreement is directly with the organization providing primary financing for the project.
  - **Sub Contractor\***  
A contractor whose business agreement is directly with a prime contractor.
  - **Problem**  
A deviation from an accepted and/or approved standard of performance.

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- **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.
  - **Project**  
A set of work actions having identifiable objectives, and a beginning and an end.
  - **Project - as related to management**  
A specific management assignment to achieve a set of objectives by accomplishing a group of related, discrete operations which have a defined beginning and end.
  - **Project Delivery System**  
A method of assembling, grouping, organizing & managing project resources so as to best reach project goals & objectives.
  - **Project Director**  
The individual responsible for implementation of several projects upon which his company is engaged.
  - **Project 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. Contracts with functional operations.
  - **Project Organization**  
The arrangement and interrelations of people charged with actually achieving project objectives. (See organizational structure.)
  - **Project Superintendent**  
The manager involved in the actual construction process and most directly responsible for the expenditure of funds to carry out the project. Usually the superintendent is responsible for field execution of the work.

- **Question - Direct**  
Asked with strong indication as to who or whom should answer.
- **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.
- **Question - Closed\***  
Questions that can be answered with a yes or no, or with a simple statement of fact.
- **Question - Open\***  
Questions that cannot be answered with a yes or no, or a simple statement of fact.
- **Resources**  
The tools of the supportive and executive manager. Resources include time, talent, tools, equipment, time, money, experience, space, materials, as well as intangibles, such as enthusiasm, morale and leverage.
- **Responsibility**  
The assignment, spoken or understood, that a person in an organization has as his part in maintaining the organization's health and vitality.
- **Schedule**  
A graphic or written tabulation of project activities showing where the activities are to start and finish. The schedule is derived from the plan of action and the network model by locking the tasks and the resources they require into a specific time position.
- **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.
- **Span of Control**  
The number of organizationally related individuals a manager directly controls on a one to one basis.
- **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.
- **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.
- **Submittal**  
Any document submitted by contracting parties to the owner's agents for review for accuracy, responsibility of design, general

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- arrangement, and approval. Submittals are used by the fabricator and the installer to show adequate details so the intent of the contract documents can be achieved. There is a mild ongoing professional controversy as to whether approved submittals are contract documents. Generally they are not considered contract documents, but aids to better fabrication and installation procedures.
- **Superior Knowledge**  
The owner's withholding specific data on matters of substance not known to contracting parties during the pre contract period.
  - **Suspension**  
An owner's or owner's agent action of stopping all or a part of the work.
  - **System**  
An assemblage or combination of things or parts forming a complex or unitary whole.
  - **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.
  - **Time and Material Contract**  
An agreement in which payment for services and material is made only for those services and materials actually furnished. There may, or may not, be imposed a not-to-exceed amount on the total cost.
  - **Total Float (TF)**  
The amount of discretionary time available to a task. The total float is the difference between the early and late starts or finishes. Formally, it is defined as the duration of the task, subtracted from the difference between the late finish (LF) and the early start (ES):  
i.e.  $(LF-ES)-DURATION=TF$ .
  - **Training**  
The teaching and learning process by which specific, explicit methods and systems of doing something, usually by rote, are conveyed to the learner.
  - **Translation**  
Recasting standard of performance information and data into graphic, narrative, mental, oral or other forms, to insure optimum use by those involved.
  - **Turnaround Time**  
The amount of time required to process submittals.
  - **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.
  - **Upset Price**  
A guaranteed maximum price agreed to in a time and material contract. (See time and material contract.)
  - **Vertical Growth**  
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

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integration is incorporating real estate control, building design, financing, construction, leasing and asset management into a single development operation.

- **Vested Authority**

The endowing of privileges, strength and leverage from a superior, usually to a subordinate. Generally gained quickly, rather than being earned by long and proven service in a related field within the organization.

- **Working Drawings**

The set of contract drawings that pictorially show the intended appearance of a job when complete.



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**POINTERS FOR READING, ANALYZING AND  
SOLVING CASE STUDIES**

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

**Pointer 1**

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

**Pointer 2**

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

**Pointer 3**

Clearly identify your position in the case study. What is it you are supposed to be, and how are you supposed to act? This activity is called internal role playing and is a good simulation technique for solving problems from your standpoint.

**Pointer 4**

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

**Pointer 5**

Be certain to answer the problem questions as fully as time permits. Normally the minutes allocated to a case study will be few and it is important to focus quickly upon the essential elements of the problems presented.

**Pointer 6**

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

**TO: PHI Supervisor's Training students**

**FROM: Ralph J. Stephenson, Instructor**

Attached is a case study, handouts 7.16 through 7.22, that we will be using in the classes for October 25 and November 1, 1989. The material to be covered in the October 25, 1989 class is shown on pages 7.17 to 7.21 of the handout and includes the following:

- **Section #1**
- **Section #2**
- **Section #3**
- **Section #4**

Please read the material in sections #1, 2, 3 & 4 prior to the class on October 25, 1989. Be prepared to develop the two lists requested during classroom discussion.

Section #5 will be discussed in the November 1, 1989 class. We will review how it is to be approached during the October 25, 1989 session.

For definitions of underlined words in the case study, please see pages 7.01 through 7.14 in your class handout notebook. You will also find it of help to read page 7.15 entitled "Pointers for reading, analyzing and solving case studies."

Your careful study of the material will be greatly appreciated.

## **Luther Mechanical's Trillium Office Building**

### **Section #1**

You are a foreman for Luther Mechanical, a moderately large mechanical contracting firm, currently doing about \$15 million per year gross volume. Luther has, according to all you have heard from your fellow workers and from other contractors, good growth potential vertically and horizontally. Your own work record with Luther is good. You have consistently managed well, have exhibited good leadership internally and externally to the company, and have nearly always produced profitable jobs.

This morning, October 25, 1989, you have been called into the office of the president, Mrs. Mary Luther, who founded the company 10 years ago with her husband. She took total control of the firm about 6 years ago, when Mr. Luther started a new electrical design/build firm. According to the office grapevine Luther Electric will probably be joined to Luther Mechanical as a design/build mechanical and electrical firm sometime in the next two years.

When you walk into Mrs. Luther's office, you see your immediate boss, the vice president of operations, Ed Jenson, sitting with the president looking over the construction drawings and specifications for a new 9 story office building to be built in midtown Detroit.

You recognize the drawing because between jobs recently you were asked to help take off and estimate some of the plumbing, sprinkler and HVAC work on the job. However, you hadn't heard anything more about the job since then.

Mrs. Luther invites you to sit down, gets you a cup of coffee, and says, "Ed and I have just been told by the developer that we are going to be awarded this office project, The Trillium, as a prime contractor to the developer, Lambeau Properties. There will be some design required from Luther, and we will take the job on a time and material basis with a guaranteed maximum price (gmp). Since the job is a little larger and somewhat more complex than Luther's usual projects, Ed and I feel we should use a project manager/superintendent system to manage and build it.

Your work record for the company for the past nine years has been excellent. We know you are seriously considering going back to college to get your degree in electrical engineering, and that the major holdup at present is your workload, your family responsibilities – 3 children can be a handful – and the finances required.

All things considered, we both feel you might find this project to be a good challenge by which to accomplish some of the work and personal goals you and your family have set for yourselves. At 34, you are certainly mature enough to begin taking on some new job responsibilities, and we're offering you the job as project manager/superintendent for the Trillium Building."

**Section #2**

Mrs. Luther goes on to say, "In your work on the Trillium you will have the full responsibility and authority to \_\_\_\_\_."

Finish the above sentence by listing some of the work responsibilities and the corresponding authority you think Mrs. Luther should want you to have on the Trillium project.

1.

2.

3.

4.

5.

**Section #3**

Mrs. Luther then asks Ed Jensen if he has any comments on your appointment, or any assignments he would like to make at this time. Ed tells you he is pleased to welcome you to the middle management ranks and would like you to outline to him what you think should be done over the next few weeks. The job is now in final negotiations, the construction contracts are being written, and it is expected that your client, Lambeau Properties, will break ground for the Trillium in 4 weeks (20 working days).

Mr. Jensen says further that the remaining design of mechanical systems will be done with a reputable local engineer and that you will probably be called upon to help get the documents into final constructible form. However, you presently have adequate working drawings, specifications and direction to put the job into motion as soon as ground is broken. Meanwhile, you must close out the 60,000 square foot three-story Clarion office building upon which you are a lead mechanical foreman. You estimate it will take you about 3 to 4 weeks (15 to 20 working days) to complete the close out and turn over so you are totally able to work full time on the Trillium project.

Mr. Jensen adds that you are being assigned a 20 year old mechanical engineering student for the first three months of the Trillium job to do whatever leg work you need. This, he says, "is to free you up to do the critical activities that require experience and good judgment."

**Section #4**

Mr. Jenson then asks, "What questions do you have for Mrs. Luther and me?"  
(notice the use of the open question asked by Mr. Jenson.)

What are some of the most critical questions you want to and should ask of Mrs. Luther and Mr. Jenson? Remember, you probably won't see much of Mrs. Luther once the job starts in the field, so think hard and take advantage of this opportunity to find out what is important to you.

Write down at least 5 questions you would ask and to whom you would address them. Ask open questions (those that cannot be answered with a yes or no).

1.

2.

3.

4.

5.

**Section #5**

Mrs. Luther and Ed Jenson have answered your questions to the extent they can and the meeting is at an end. Mr. Jenson reminds you of his request for a list of actions you intend to take over the next 6 weeks. He said he would like to have the list and some idea of sequence and time by the end of the week.

List these actions at random on the Post-It Notes you were given in class. **Use one note per action.** Try to keep the scope of work for each activity entered on a note within a duration of from 10 to 15 working days. Don't try to prepare the note set in any given order. Think about the next 6 weeks at random. We'll see how to organize the notes later.

The list should take into account the **new work**, the **job you're closing out**, **assignments for the engineering student** you have at your disposal, and the **actions required by others**, not under your control but doing things that affect your work.

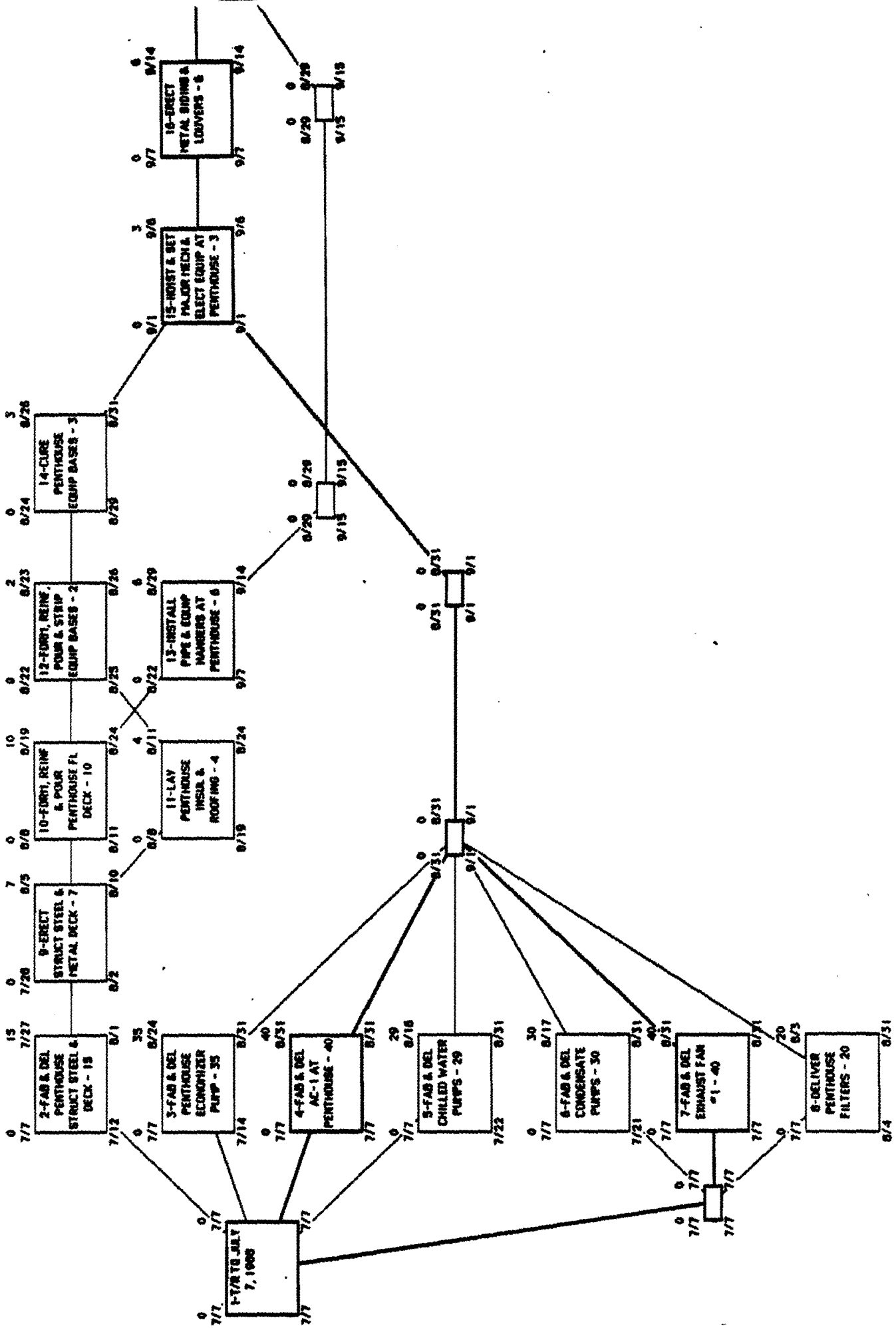
To get you started, here are a few activity suggestions. You provide the rest:

- Prepare list of possible long lead order and delivery items fro Trillium.
- Prepare list of mobilization actions for Trillium.
- Complete insulate sheet metal ductwork at Clarion penthouse.
- Make final electrical hookups to air handlers at Clarion penthouse.
- Complete close out procedures at Clarion.
- Check on permits required for Trillium.

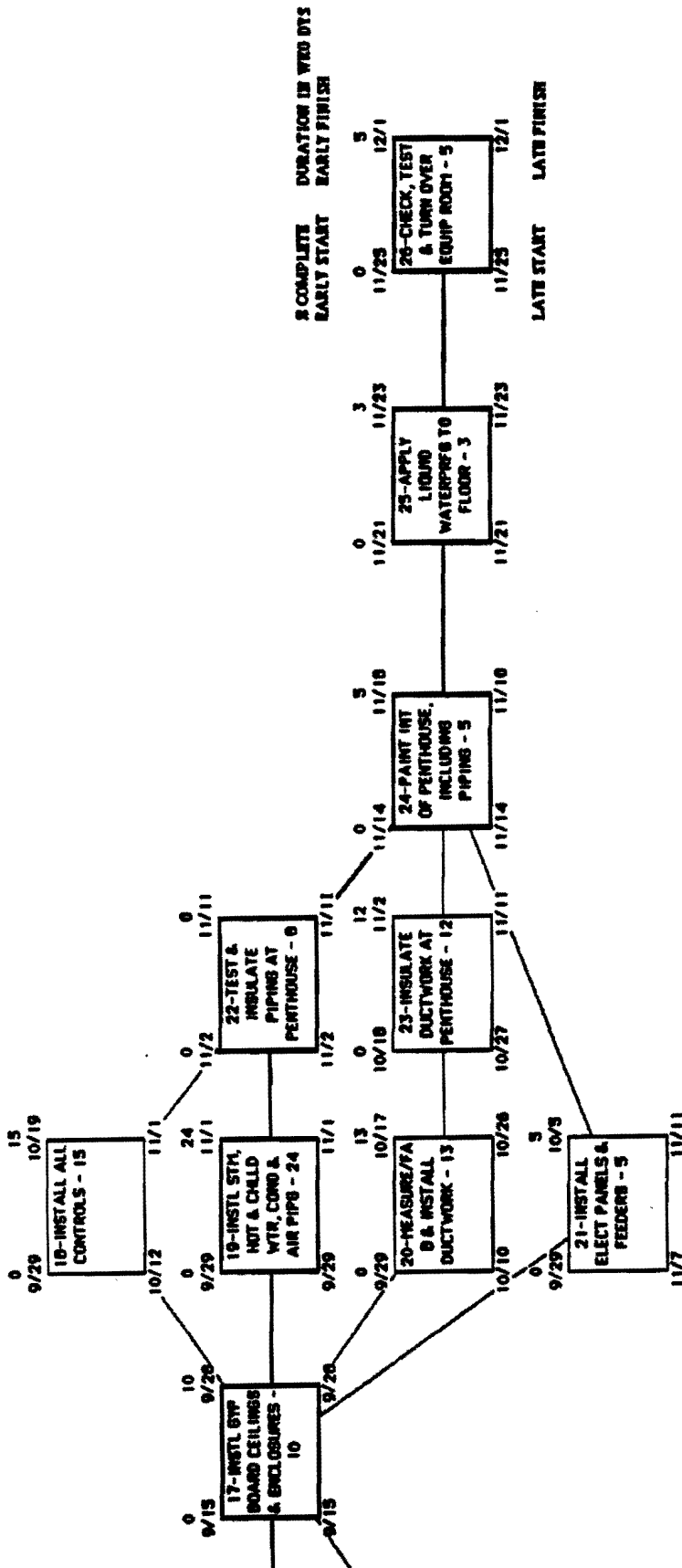
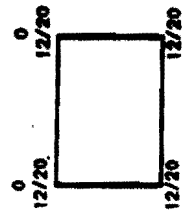
**Hint:**

For ideas on additional items see the Job Supervisor's manual, pages 82 through 86 for close out items, and pages 73 to 78 for mobilization items.

Be certain to bring your pack of Post-It Notes to class for the session on November 1, 1989.







Base Plan of Action

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

Issue #1 - July 7, 1988  
339 mech equip room - dist 162

Luther Mechanical Contractors  
Detroit, Michigan

724

sheet  
ph-1

1-T/R TO JULY 7, 1966  
 2-FAB & DEL PENTHOUSE STRUCT DECK - 15  
 3-FAB & DEL PENTHOUSE ECONOMIZER PUMP - 35  
 4-FAB & DEL AC-1 AT PENTHOUSE - 40  
 5-FAB & DEL CHILLED WATER PUMPS - 20  
 6-FAB & DEL CONDENSATE PUMPS - 30  
 7-FAB & DEL EXHAUST FAN #1 - 40  
 8-DELIVER PENTHOUSE FILTERS - 20  
 9-ERECT STR & METAL DECK - 7  
 10-FORM, REINF & PENTHOUSE FL DECK - 10  
 11-ROOFING - 4  
 12-POUR & STRIP EQUIP BASES - 2  
 13-INSTALL PENTHOUSE - 6  
 14-THOUSE EQUIP BASES - 3  
 15-HOIST & SET MAJOR MECH & ELECT EQUIP AT PENTHOUSE - 3  
 16-ERECT METAL SIDING & LOUVERS - 6  
 17-INSTALL GYP BOARD CEILINGS & ENCLOSURES - 10  
 18-INSTALL ALL CONTROLS - 15  
 19-INSTALL STM, HOT & CHLD WTR, COND & AIR PIPS - 24  
 20-MEASURE/FAB & INSTALL D  
 21-INST  
 23-INSULATE DUCTWORK

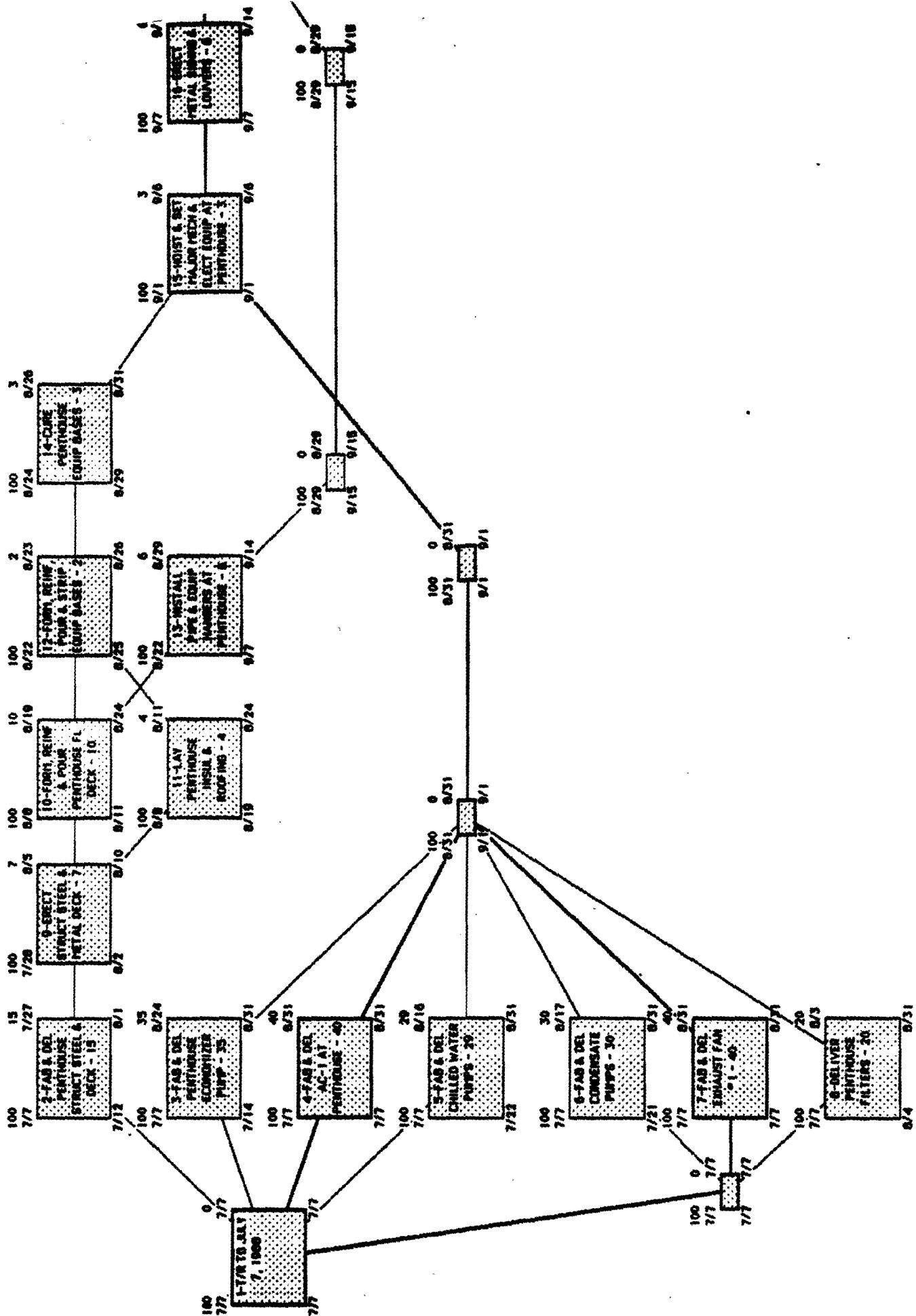


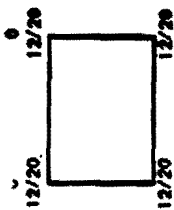
7/7	7/14	7/21	7/28	8/4	8/11	8/18	8/25	9/1	9/8	9/15	9/22	9/29	10/6	10/13	10/20	10/27
1-T/R TO JULY 7, 1966																
2-FAB & DEL PENTHOUSE STRUCT STEEL & DECK - 15																
3-FAB & DEL PENTHOUSE ECONOMIZER PUMP - 35																
4-FAB & DEL AC-1 AT PENTHOUSE - 40																
5-FAB & DEL CHILLED WATER PUMPS - 29																
6-FAB & DEL CONDENSATE PUMPS - 30																
7-FAB & DEL EXHAUST FAN #1 - 40																
8-DELIVER PENTHOUSE FILTERS - 20																
9-ERECT STRUCT STEEL & METAL DECK - 7																
10-FORM, REINF & POUR PENTHOUSE FL DECK - 10																
11-LAY PENTHOUSE INSUL & ROOFING - 4																
12-FORM, REINF, POUR & STRIP EQUIP BASES - 2																
13-INSTALL PIPE & EQUIP MANGERS AT PENTHOUSE - 9																
14-CURE PENTHOUSE EQUIP BASES - 3																
15-HOIST & SET MAJOR MECH & ELECT EQUIP AT PENTHOUSE - 3																
16-ERECT METAL SIDING & LOUVERS - 6																
17-INSTALL GYP BOARD CEILINGS & ENCLOSURES - 10																
18-INSTALL ALL CONTROLS - 15																
19-INSTALL STM, HOT & CHLD WTR, COND & AIR PIPE - 24																
20-MEASURE/FAB & INSTALL DUCTWORK - 13																
21-INSTALL ELECT PANELS & FEEDERS - 5																
23-INSULATE DUCTWORK																

Item #1 - July 7, 1966  
 30 mech equip room - dist 102

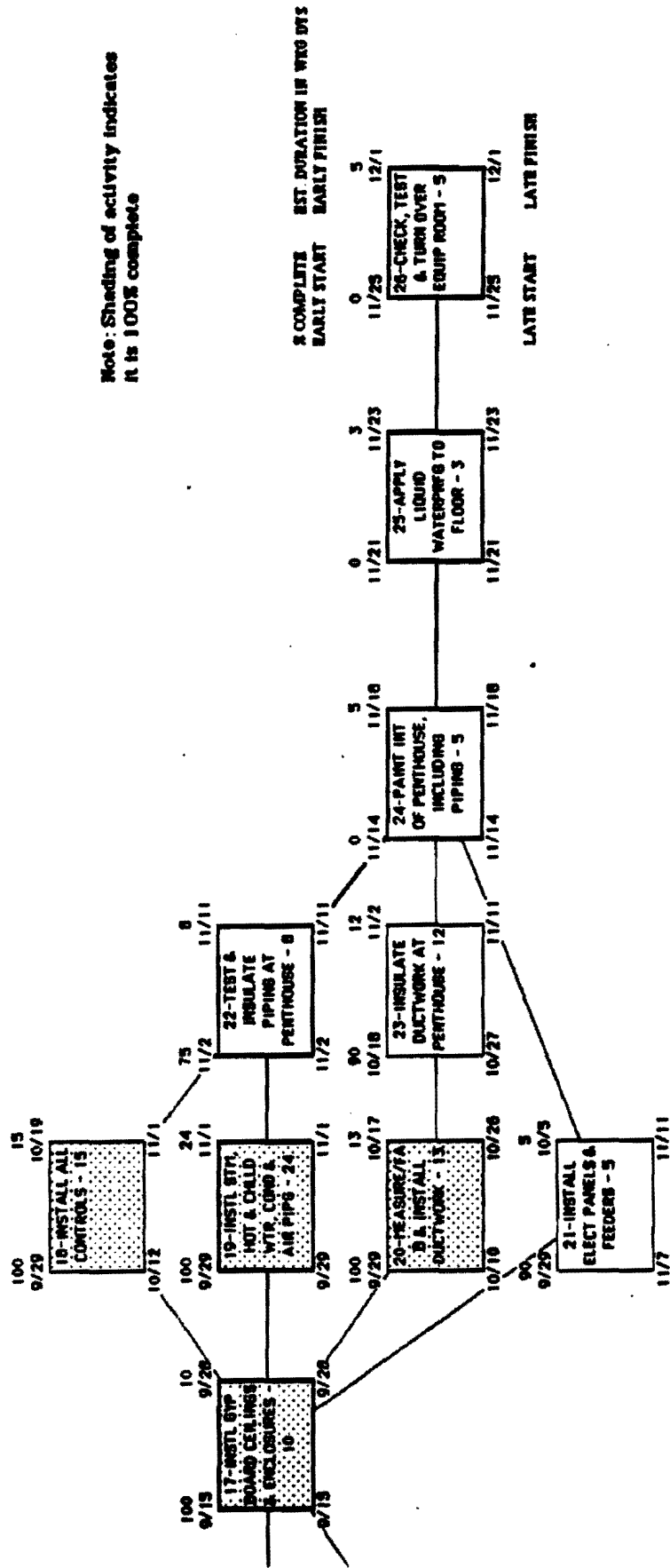
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Note: Shading of activity indicates  
it is 100% complete



Project Status as of November 3, 1966

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

Luther Mechanical Contractors  
Detroit, Michigan

Issue #1 - July 1, 1966  
Issue #2 - monitor 11/3/66  
332 item per month - check 162

730

sheet  
ph-1

7/7	7/14	7/21	7/28	8/4	8/11	8/18	8/25	9/1	9/8	9/15	9/22	9/29	10/6	10/13	10/20	10/27
1-T/R TO JULY 7, 1966																
2-FAB & DEL PENTHOUSE STRUCTURAL DECK - 15																
3-FAB & DEL PENTHOUSE ECONOMIZER PUMP - 35																
4-FAB & DEL AC-1 AT PENTHOUSE - 40																
5-FAB & DEL CHILLED WATER PUMPS - 20																
6-FAB & DEL CONDENSATE PUMPS - 30																
7-FAB & DEL EXHAUST FAN #1 - 40																
8-DELIVER PENTHOUSE FILTERS - 20																
9-ERECT STRUCTURAL & METAL DECK - 7																
10-FORM, REINF & CAST PENTHOUSE FL DECK - 10																
11-ERECT ROOFING - 4																
12-ERECT, REINF, POUR & STRIP EQUIP BASES - 2																
13-INSTALL PENTHOUSE EQUIP BASES - 3																
14-ERECT PENTHOUSE EQUIP BASES - 3																
15-HOIST & SET MAJOR MECH & ELECT EQUIP AT PENTHOUSE - 3																
16-ERECT METAL SIDING & LOUVERS - 6																
17-INSTALL GYP BOARD CEILINGS & ENCLOSURES - 10																
18-INSTALL ALL CONTROLS - 15																
19-INSTALL STM, HOT & CHLD WTR, COND & AIR PIPES - 24																
20-MEASURE/FAB & INSTALL DUCTWORK - 10																
21-INSTALL DUCTWORK - 10																
22-INSULATE DUCTWORK - 10																
23-INSULATE DUCTWORK - 10																

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3	11/10	11/17	11/24	12/1	12/8	12/15	12/22	12/29
<p><b>NETWORK MODEL FOR CLARION OFFICE BUILDING PENTHOUSE MECHANICAL EQUIPMENT ROOM #1</b></p> <p><b>Luther Mechanical Contractors Detroit, Michigan</b></p> <p><b>sheet ph-B1</b></p>								
<p>22-TEST &amp; INSULATE PIPING AT PENTHOUSE - 8</p> <p>24-PAINT INT OF PENTHOUSE, INCLUDING PIPING - 5</p> <p>25-APPLY LIQUID WATERPROOF TO FLOOR - 3</p> <p>26-CHECK, TEST &amp; TURN OVER EQUIP ROOM - 5</p> <p>7.32</p>								

**Case Study #5**  
**The Sneaky Boiler Contractor**

You have just completed and activated a sizable boiler house addition. The contract for boiler installation was a separate agreement with the owner, Carlton State College, with all other contracts direct with your firm, the Shoenite Construction Company, general contractors. As the job is being closed out, Jerry Biel, the physical plant director for the college comes to you confidentially and says the boiler contractor, Laguna, is claiming extra costs because Shoenite Construction interfered with his erection procedure by not providing a slab on grade from which to erect the tube systems and the boiler walls.

Actually Laguna, because of their separate contract with the owner, paid little or no attention to your requests as project manager to keep the area clear and early filled the slab on grade sector with material and equipment before you could possibly have built the slab.

Early in the job you prepared a detailed critical path diagram of all elements of the project including the boiler work. The boiler diagram was prepared in consultation with Laguna, and approved by their superintendent. The network clearly showed the slab on grade being built prior to loading the area with boiler equipment.

**Consider these questions:**

- 1) What potential problems exist here for you and Shoenite Construction Company?
- 2) What steps should you take immediately?
- 3) What is your own position in this matter? Why?
- 4) Describe the problem the owner has and how Shoenite Construction and you might help him resolve it.

**Suggested Bibliography of Management Related Books**

A starter list for the project manager's library

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

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

Lester Bittel
- **It All Depends**  
University of Alabama Press  
University of Alabama

Harvey Sherman
- **Management-Tasks, Responsibilities, Practices**  
Harper & Row, Publishers, Inc.  
10 East 53rd Street  
New York, New York 1002

Peter F. Drucker
- **The Managerial Grid**  
The Gulf Publishing Company  
Houston, Texas 77001

Blake & Mouton
- **Top Management Planning**  
The MacMillan Company  
866 Third Avenue  
New York, New York 10022

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

Lester R. Bittel
- **Critical Path Method**  
Cahners Publishing Company  
Boston, Massachusetts 02116

Radcliff, Kawal, Stephenson
- **Effective Psychology for Managers**  
Prentice Hall, Inc.  
Englewood Cliffs, New Jersey

Mortimer R. Feinberg

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|---|----------------------|
| <ul style="list-style-type: none"><li>• <b>The Time Trap</b><br/>Amacon<br/>135 W. 50th Street<br/>New York, New York 10020</li></ul>   | R. Alec MacKenzie    |
| <ul style="list-style-type: none"><li>• <b>Management - Theory and Practice</b><br/>McGraw-Hill Book Company<br/>330 West 42nd Street<br/>New York, New York 10036</li></ul>  | Ernest Dale          |
| <ul style="list-style-type: none"><li>• <b>An Introduction to Decision Logic Tables</b><br/>John Wiley &amp; Sons, Inc.<br/>605 Third Avenue<br/>New York, New York 10016</li></ul>                                   | Herman McDaniel      |
| <ul style="list-style-type: none"><li>• <b>Management by Objective</b><br/><br/>Pitman Publishing Company<br/>20 East 46th Street<br/>New York, New York 10017</li></ul>  | George S. Odiome     |
| <ul style="list-style-type: none"><li>• <b>How to Attract Good Luck</b><br/>Cornerstone Library<br/>Division of Pocket Books, Inc<br/>Rockerfeller Center<br/>670 Fifth Avenue<br/>New York, New York 10020</li></ul> | A.H.Z Carr           |
| <ul style="list-style-type: none"><li>• <b>Synectics</b><br/>Harper &amp; Row Publishers, Inc<br/>49 East 33rd Street<br/>New York, New York 10016</li></ul>  | William J. J. Gordon |
| <ul style="list-style-type: none"><li>• <b>The Speech Writing Guide</b><br/><br/>John Wiley &amp; Sons, Inc<br/>605 Third Avenue<br/>New York, New York 10016</li></ul>   | James J. Welsh       |
| <ul style="list-style-type: none"><li>• <b>The Executive Deskbook</b><br/>Van Nostrand Reinhold Company<br/>450 West 33rd Street<br/>New York, New York 10001</li></ul>   | Auren Uris           |
| <ul style="list-style-type: none"><li>• <b>Formal Organization - A Systems Approach</b><br/>Irwin - Dorsey Press<br/>Homewood, Illinois</li></ul>   | Carzo & Yanouzas     |

• **Managing Architectural Projects**  
The American Institute of Architects  
1735 New York Avenue NW  
Washington, DC 20006

David Haviland

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

• **A Professional Guide for Young Engineers**  
Engineers Council for Professional Development

William E. Wickenden

• **Legal Aspects of Architecture, Engineering and the Construction Process**  
West Publishing Company  
St. Paul, Minnesota

Justin Sweet

• **Managing in Turbulent Times**  
Harper & Row, Publishers, Inc.  
10 East 53rd Street  
New York, New York 10022

Peter F. Drucker

• **Effective Meetings for Busy People**  
McGraw Hill, Inc.  
New York, New York

William T. Carnes

• **Give & Take**  
Thomas Y. Crowell Company  
New York

Chester L. Karrass

• **Smart Questions**  
McGraw Hill Book Company  
New York, New York

Dorothy Leeds

• **Managing Organizational Conflict**  
Prentice Hall, Inc.  
Englewood Cliffs, New Jersey

Stephen P. Robbins

