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INSTITUTE FOR CONSTRUCTION MANAGEMENT - the educational division of the Construction Association of Michigan

CRITICAL PATH METHOD SEMINAR

Detroit, Michigan

January 29 & 30, 1992

Instructor - Ralph J. Stephenson, P. E.

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About Ralph J. Stephenson, P.E.

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

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

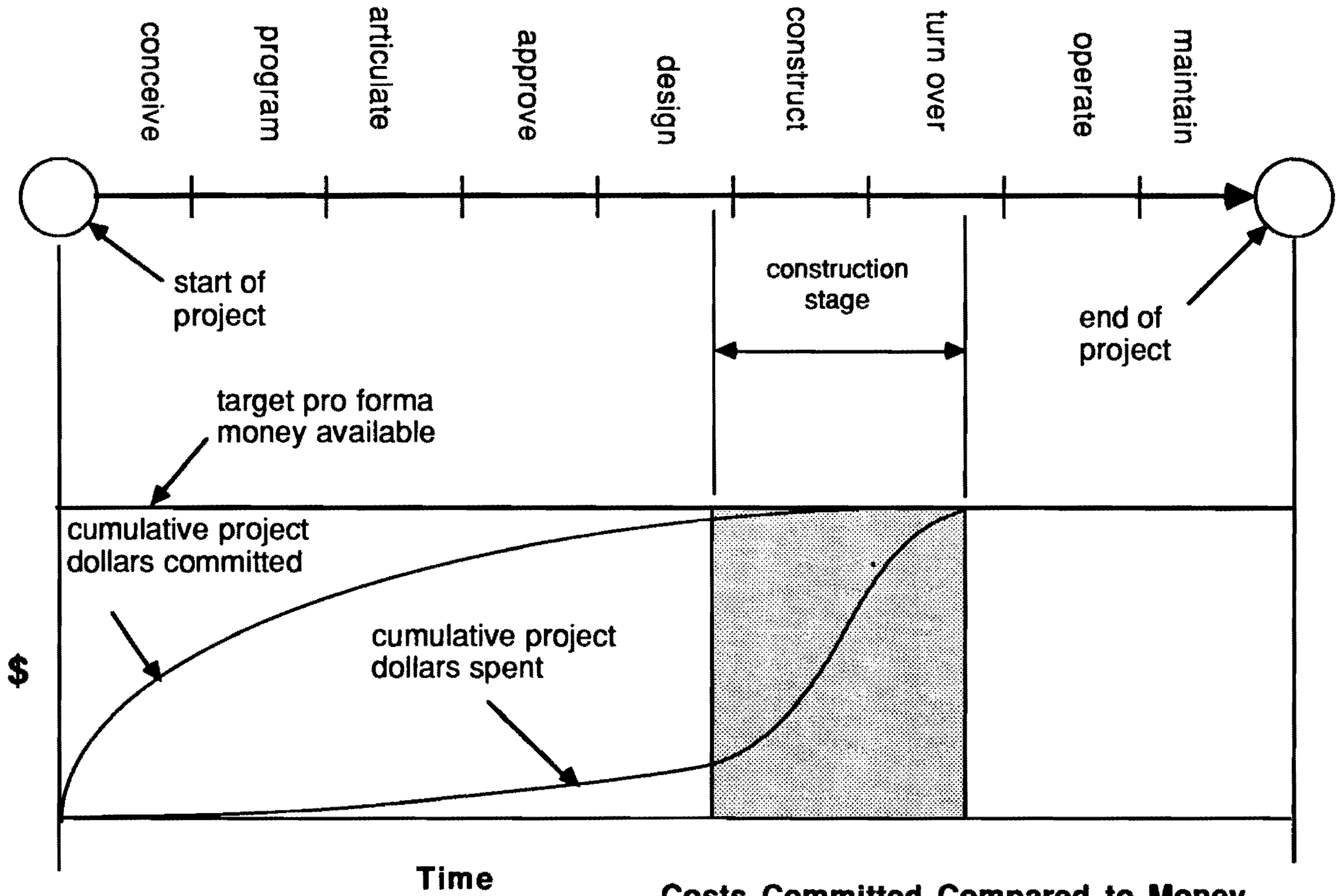
He is a registered professional engineer in Michigan, Wisconsin, Illinois, Indiana, Ohio, Pennsylvania, West Virginia, Virginia, Florida, and Minnesota. He is a member of the Engineering Society of Detroit, the Michigan and National Society of Professional Engineers, the American Planning Association,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

Since 1952 Mr. Stephenson has been involved at middle and upper management levels in the planning, programming, design, construction, and operation of several billion dollars worth of construction related projects. These include work on industrial, commercial, and institutional programs throughout North America. He has taught hundreds of technical and management seminars in the United States, Canada, and Europe and is the author of several magazine articles. He also is the co-author of a book on critical path method. His broad experience has given him an understanding of the nature of small, medium, and large size companies, and of the need to solve their management problems through creative, systematic, and workable approaches.

ICM cpm 92 seminar - Ralph J. Stephenson, P. E.

Master handout list

001	Project costs committed and spent
002	The need for profit
003	Profit potential levels
004 & 005	9 Steps to effective proj mgmt
006	Goals & objectives definition summary
007	The dio/pdo/udo intersection
008	Job planning - what is it?
009	Advantages of good planning
010 to 012	Act from a plan
013 & 014	Network planning minitext - arrow
015	Network planning minitext
016	CPM exercise #1
017	Solution to exercise #1 - unnumbered nodes
018	Solution to exercise #1 - numbered nodes
019	Solution to exercise #1 - precedence
020	ES/LF calculations
021 to 024	Working day calendar
025	CPM exercise #2
026	CPM exercise #3
027	CPM exercise #4
028 & 029	Pueblo pile test laundry list example
030	Pueblo pile test summary network
031 & 032	Pueblo pile test full network
033	Levels of planning
034	Factors to be considered when evaluating networks
035 & 036	Clarion base network model
037 & 038	Clarion impacted network model
039	Questions to be asked about your project
040 to 042	Abbreviations
043	Chicago area weather
044	Domino move case study - Bengst
045	Domino move floor plan - Bengst
046 & 047	Summary domino move network model, undated - Bengst
048 & 049	Laundry list example - Vyvyan a/e
050 to 057	Tulsa Rivers case study
058	Translation definition
059	Schedule definition
060 & 061	Case of resource sensitive school project
062	Single resource allocation plan
063	Full resource allocation plan
064 & 065	Resource allocation bar chart form
066	Calculated resource allocation network
067	Resource allocation ES/EF bar chart solution
068	Resource allocation leveled solution
069	Profit potential levels
070 & 071	Use of float time in project planning
072	Clarion base network data
073	Clarion base bar chart



Costs Committed Compared to Money Spent on Construction Projects

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THE NEED FOR PROFIT

A. KINDS OF PROFIT

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

B. ELEMENTS OF MULTI VALUE COMPETITION

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

C. HOW DO WE ACHIEVE PROFIT - TRUE PROFIT ?

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

& profits will be automatic!

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PROFIT POTENTIAL LEVELS

LEVEL 1 - INCLUDE EVERYTHING

LEVEL 2 - PREPARE A GOOD WORK PLAN

LEVEL 3 - PREPARE A GOOD SCHEDULE

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NINE MAJOR STEPS TO EFFECTIVE PROJECT MANAGEMENT

DEFINITIONS

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

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

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

QUESTION

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

1. Project organization is usually temporary.

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

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

STEPS TO GOOD PROJECT MANAGEMENT

• A good project seems to require 9 major steps, done well, to be successful.

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

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

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

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

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

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

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

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

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

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Goals & Objectives Definition

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

Definitions

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

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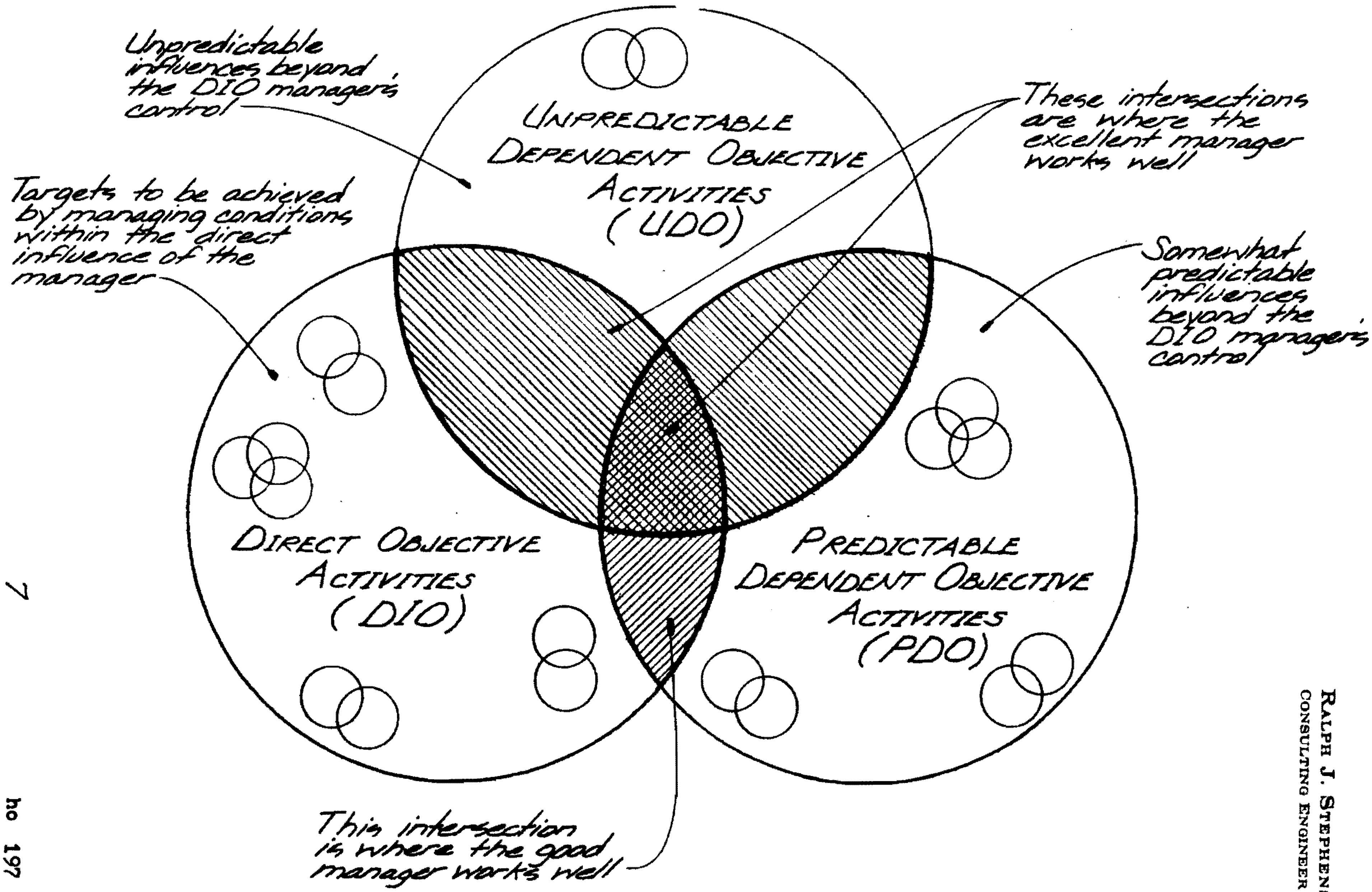

THE DIO/PDO/UDO INTERSECTION

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JOB PLANNING - WHAT IS IT ?

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

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

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

PLAN VISIBLY !

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ADVANTAGES OF GOOD PLANNING

1. Provides accurate simulation of the project.
2. Provides early statement of intent.
3. Encourages good communication on the project.
4. Provides management by exception potential.
5. Allows accurate tracking of project progress.
6. Allows accurate performance evaluation.
7. Provides accurate project history.

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Act From A Plan

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

A. Five essential planning questions for the manager to ask and have answered.
1. What?
2. Where?
3. When?
4. How?
5. Who?

B. Essential planning actions for the manager to take
1. Set goals, objectives, and a project delivery system
2. Prepare, approve and translate an action plan
3. Organize, assemble resources and set project systems
4. Do the job

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

D. Prepare, have approved and translate an action plan
1. May be mental, verbal, text written or graphic
2. May be strategic or tactical, summary or tactical
3. May be short, medium or long range (the manager must set the time scale)
    a. The shorter the time interval covered by the plan, the greater is the chance the plan will succeed. However, the shorter the time interval covered, the greater is the probability that longer range

needs, which truly measure the manager's effectiveness, will remain unmet

b. The higher you are in the management structure, the larger and longer are the planning scales you must use (the higher you are the further you are expected to see)

4. A good manager plans the work and then works the plan

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

1. Build plans based on optimum integration of management viewpoints
2. Define relationships through functional diagraming of interconnections
   a. Formal
   b. Informal
   c. Reporting
   d. Staff
   e. Temporary
3. Make clear cut assignments
   a. The manager should not assume a person will automatically know his full pattern of responsibilities.
   b. Don't leave definition of authority and responsibility to chance. Be specific.
4. Build a feedback system
   a. Organizational grapevines are often used for informal feedback
   b. Formal feedback systems should be built by specific assignment (must have a standard of project performance defined before a formal feedback system can be put in place)
5. Keep organization goal and objective oriented
   a. Keep organization lean - avoid unnecessary staffing
   b. Provide delegation and training opportunities
   c. Tend to build around objectives and needs rather than people (there are major exceptions to this - distinguish these early)
   d. Provide for proper grading of decision to action time spans

F. Common planning failures

1. Not touching all organizational and management bases - use the

what, where, when, how and who system

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

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NETWORK PLANNING MINITEXT

Symbols

1. Arrow or task ⟶

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

2. Circle or node ◯

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

3. Dotted or dummy arrow ---->

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

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

KEEP SYMBOLS SIMPLE !

Rules of Job Planning

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

Steps in Network Planning

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

Rules for Numbering Nodes

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

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

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

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

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

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

<u>i</u> is the initial node number designation.

<u>j</u> is the end node number designation.

NETWORK PLANNING MINITEXT

Symbols

1. a. Task - for arrow diagramming 

   b. Task - for precedence diagramming 

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

2. a. Circle or node - for arrow diagramming 

   b. No comparable symbol for precedence diagramming

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

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

   b. Solid relation arrow - for precedence diagramming 

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

KEEP SYMBOLS SIMPLE!

Rules of Job Planning

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

Steps in Network Planning

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

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

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

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

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CPM EXERCISE #1

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

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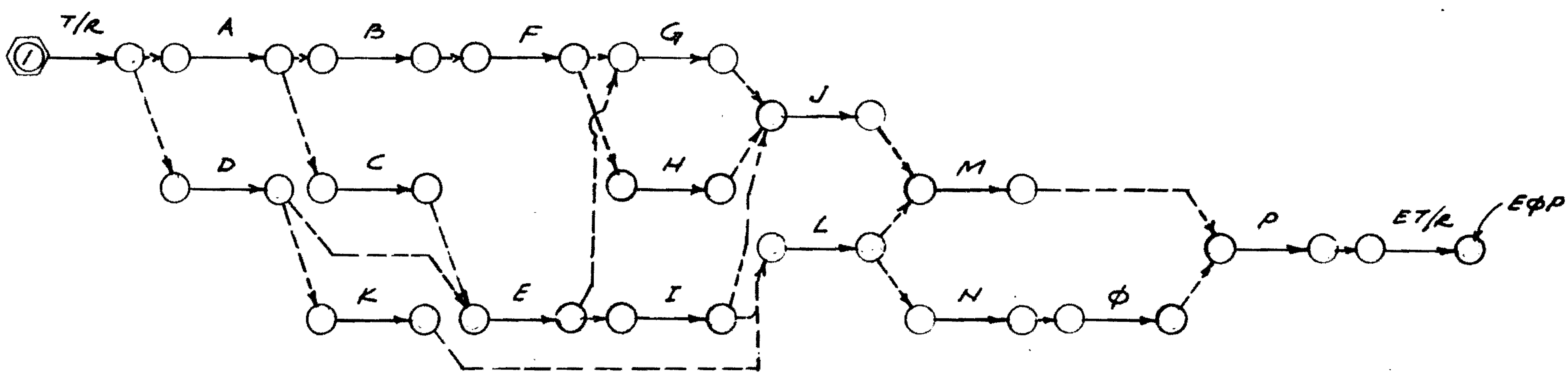

Reserved Node Nos.

SOLUTION TO EXERCISE #1
ARROW DIAGRAM

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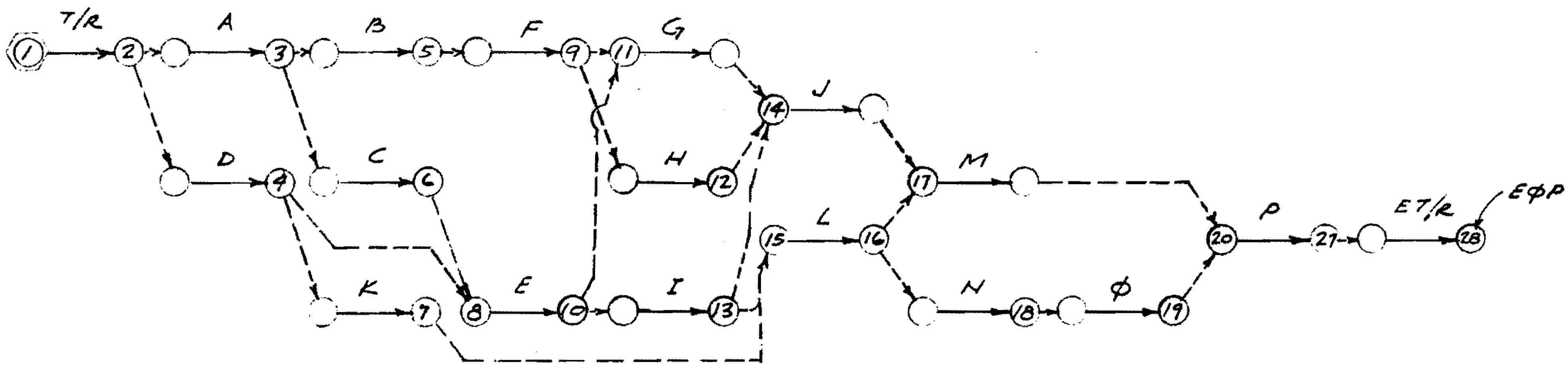

Reserved Node Nos.

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SOLUTION TO EXERCISE # 1
ARROW DIAGRAM

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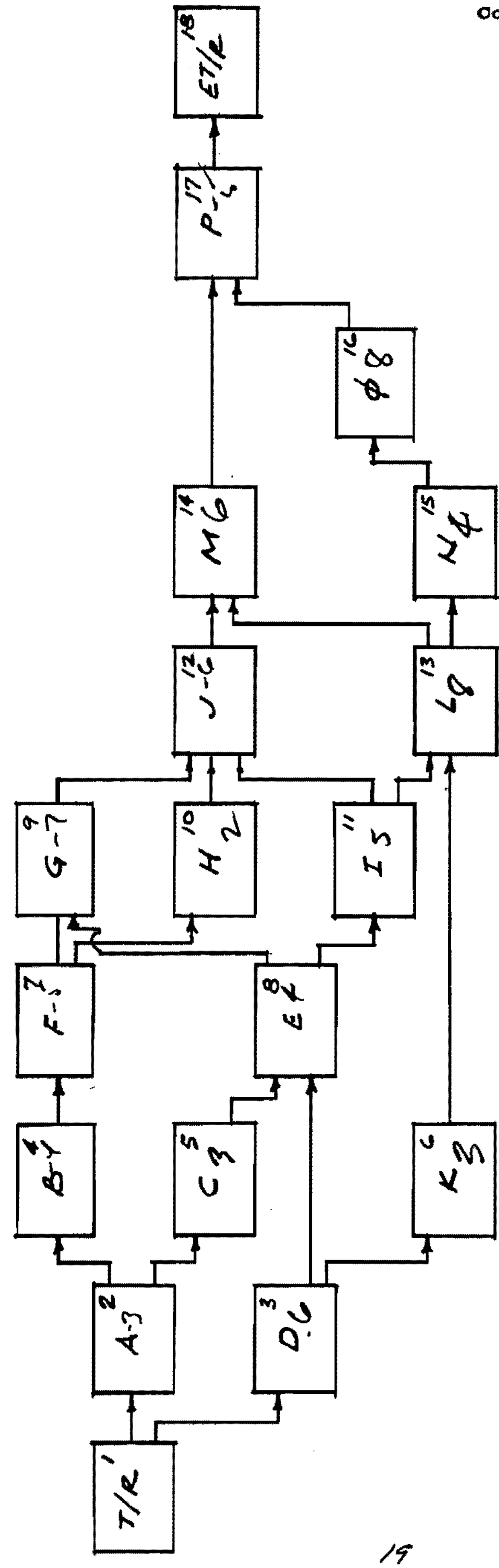
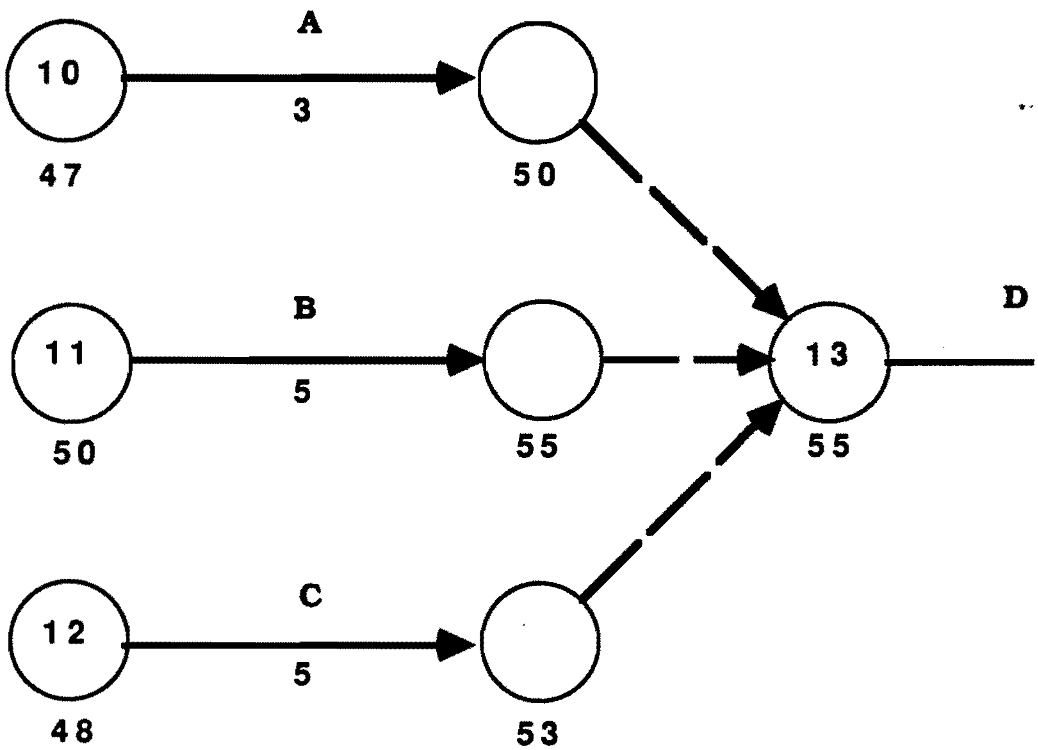
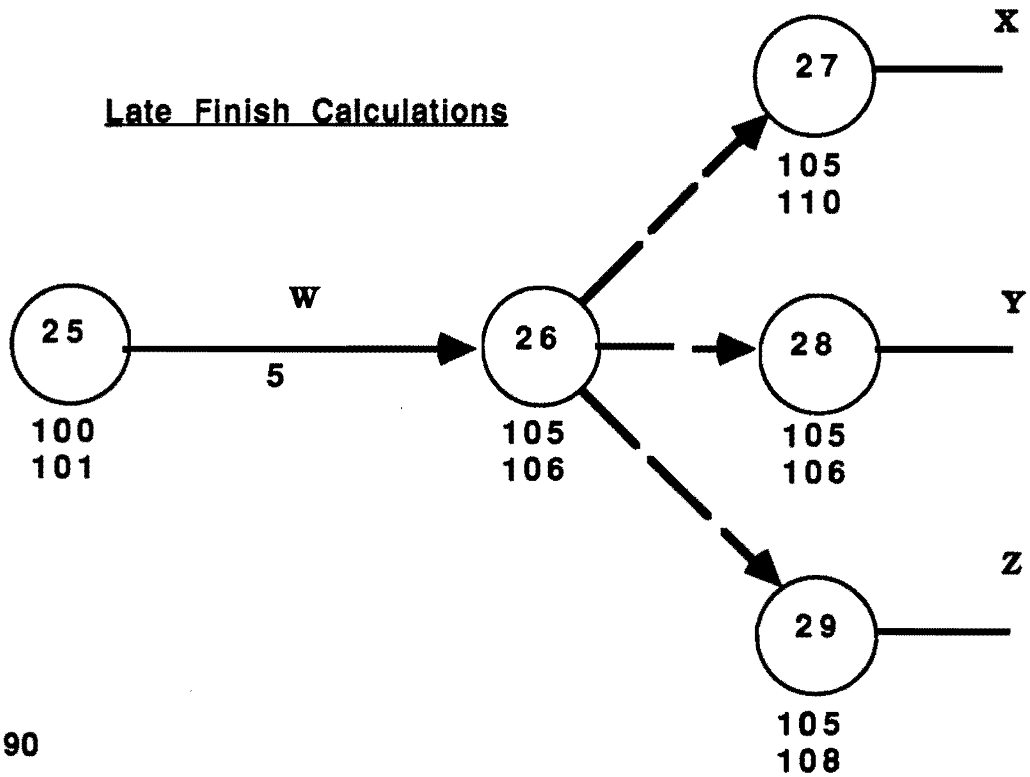


SOLUTION TO EXERCISE #1
PRECEDENCE DIAGRAM

Early Start Calculations



Late Finish Calculations



2 year working day calendar starting on January 2, 1991

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CPM EXERCISE #2

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

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

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EXERCISE #3

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

EXERCISE #4

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

Laundry list for pile test

<u>Pueblo Plant</u>
Nebraska Public Power Distribution District
Oaski, Nebraska
Introduction

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

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

Plan the entire test pile installation process.

Laundry list - at random unnumbered

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

Laundry list - at random numbered in rough action sequence

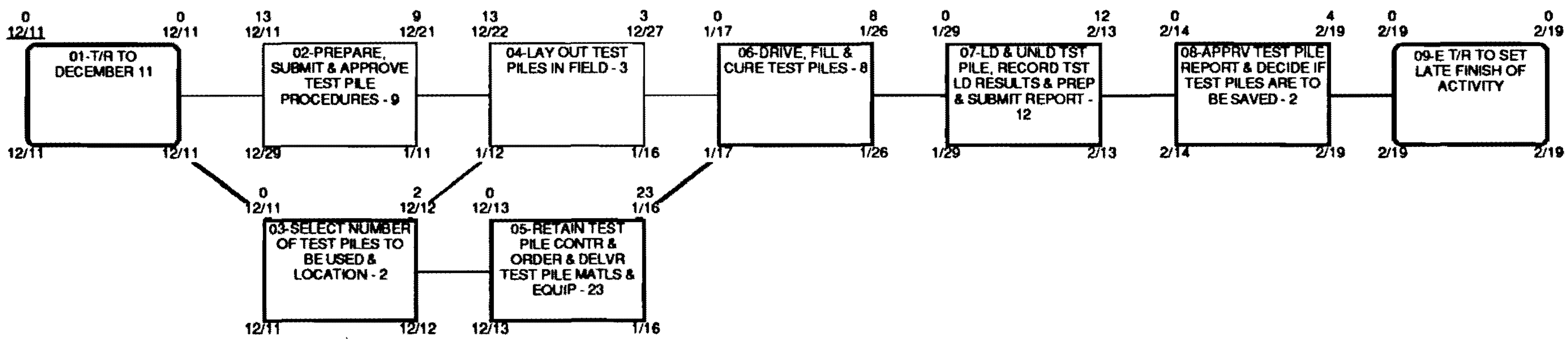
- 002 - Select test pile locations
- 010 - Record test load results
- 008 - Load piling
- 005 - Order testing equipment
- 011 - Decide whether test piles remain as permanent piles
- 001 - Select number of test piles
- 006 - Deliver test pile materials
- 004 - Retain test pile contractor
- 001 - Prepare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

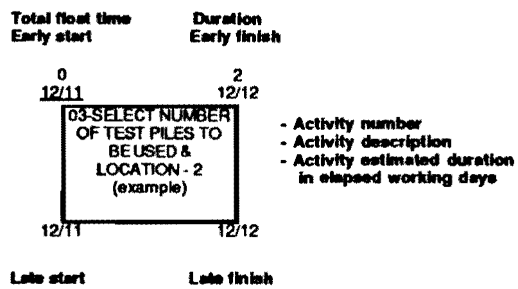
007 - Drive & fill test piles

Laundry list - numbered & ordered

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

HO 317 Dec 1990





ACTIVITY KEY

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

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

<u>**Reserved activity numbers**</u>

41	46
42	47
43	48
44	49
45	50

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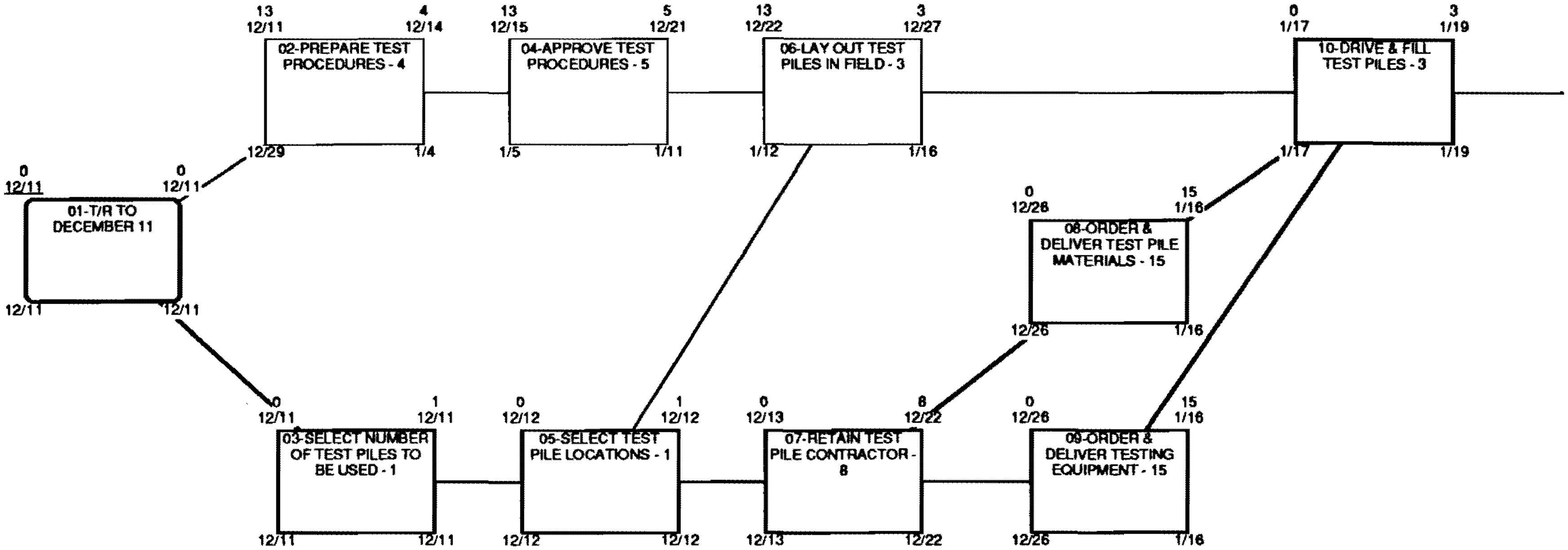
Mt. Pleasant, Michigan 48858
ph 517 772 2537

SHEET SM-1


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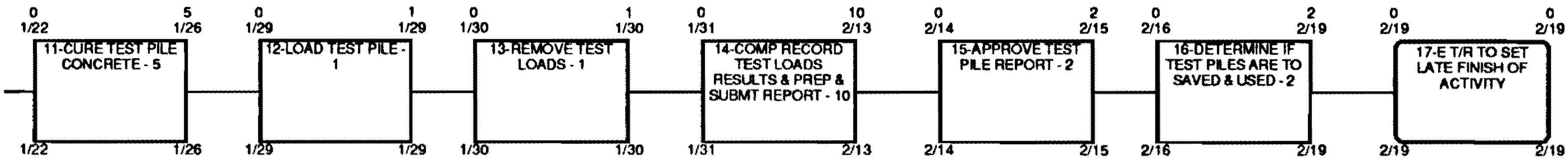

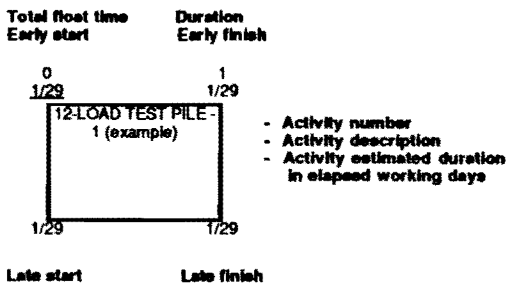

ACTIVITY DATA KEY

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

Reserved activity numbers

41	46
42	47
43	48
44	49
45	50

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

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SHEET #1

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FIRST LEVEL NETWORK - Summary Management Diagram

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

SECOND LEVEL NETWORK - Working Diagram

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

THIRD LEVEL NETWORK - Key Operation Sub Diagram

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

Factors in evaluating network models - ho 260

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

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

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

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

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

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

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

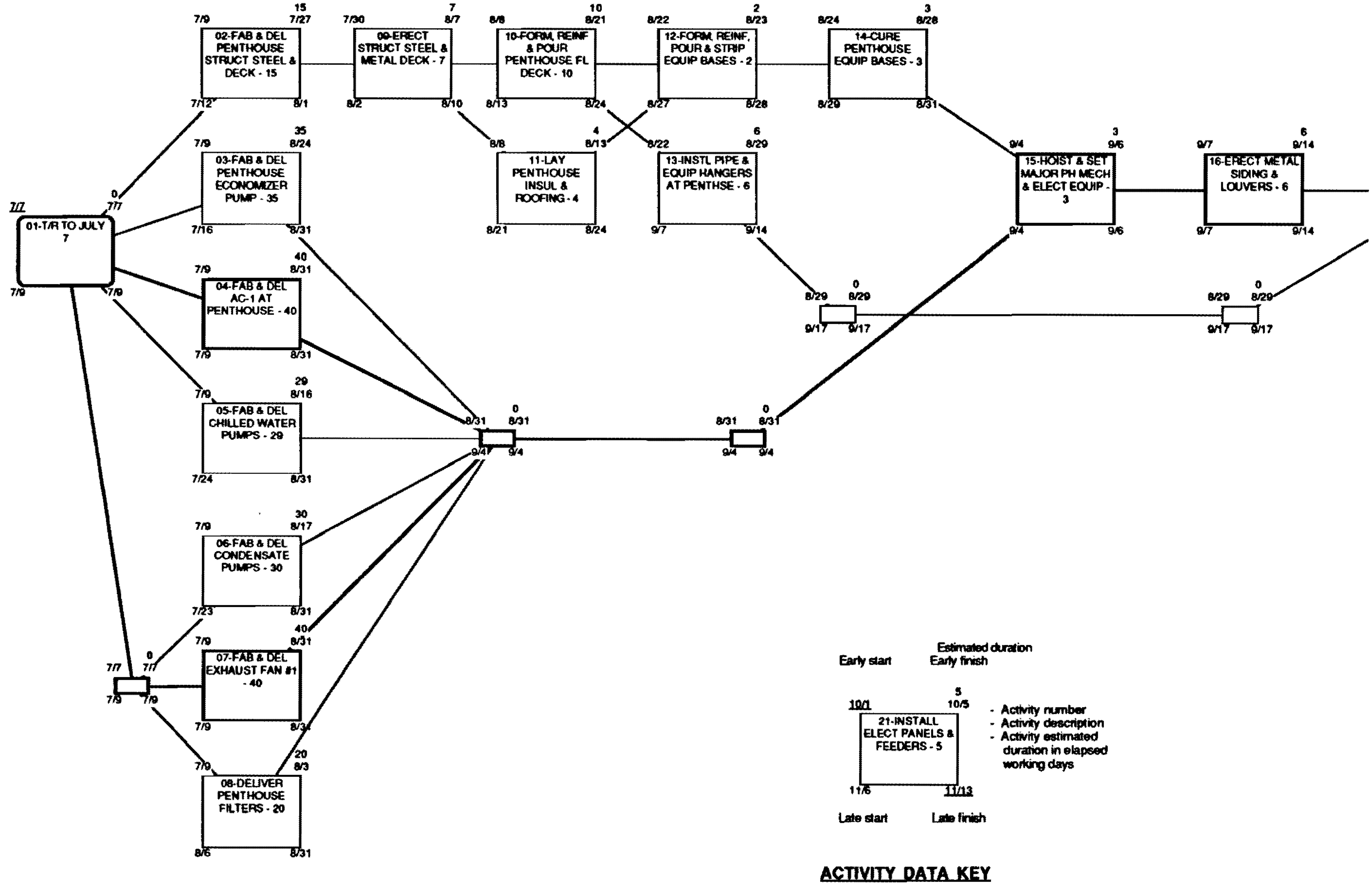
__7. Quality of network appearance
How well was the diagram presented? Could you understand what the job was all about from reading the network without explanation?

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

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

_____ Total
*****

_____ Average (total divided by 9)


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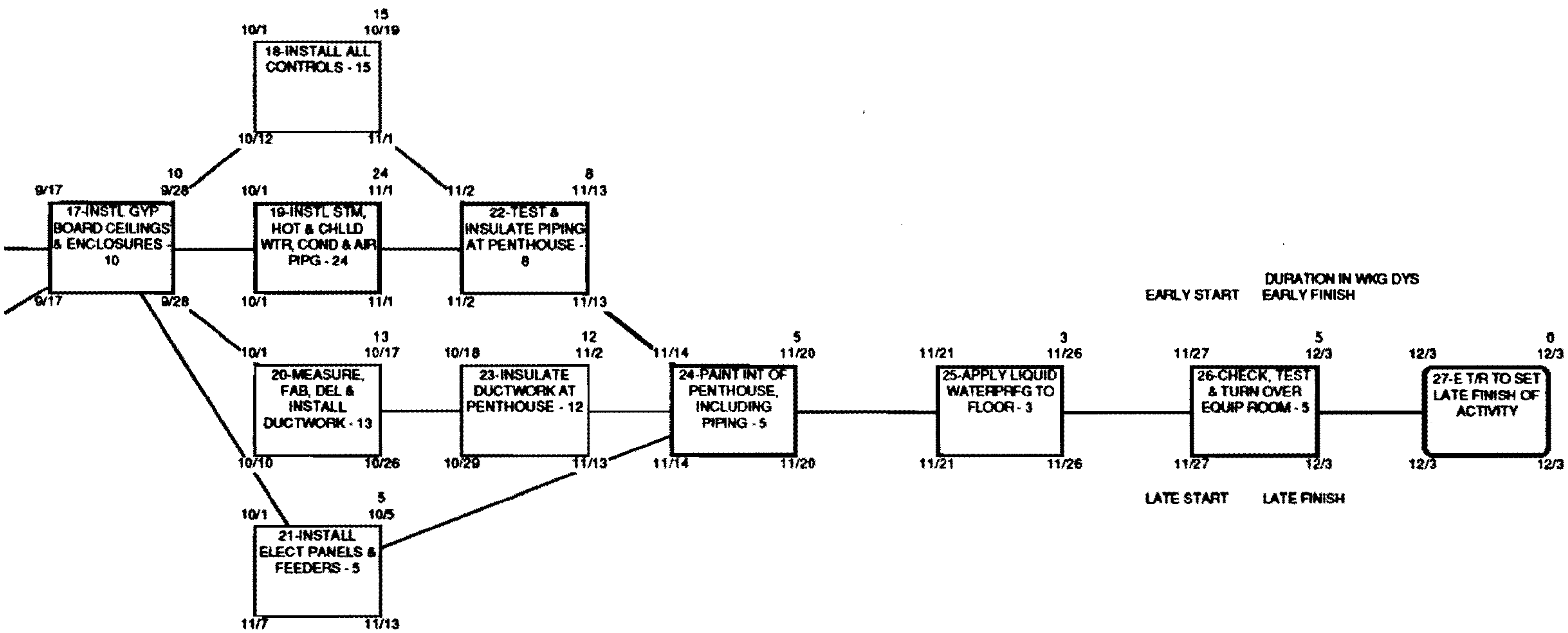
11/13
- Activity number
- Activity description
- Activity estimated duration in elapsed working days
Late start
Late finish
ACTIVITY DATA KEY

35



Base Plan of Action

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

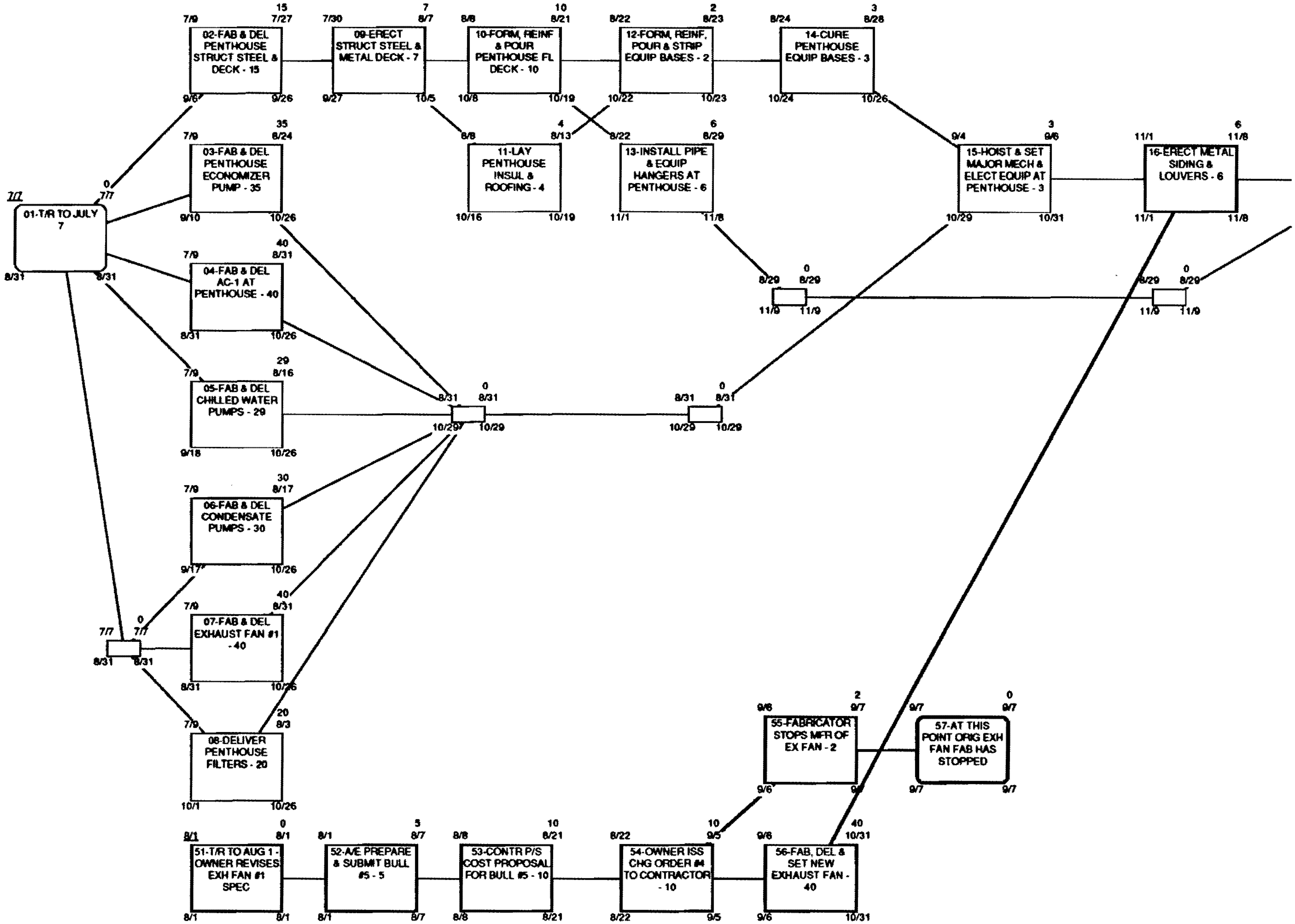
Issue #1 - July 7
330 clarion base plan
disk 162

Reserved Activity Numbers

041	046
042	047
043	048
044	049
045	050

Luther Mechanical Contractors
Washington D.C.

sheet ph-1


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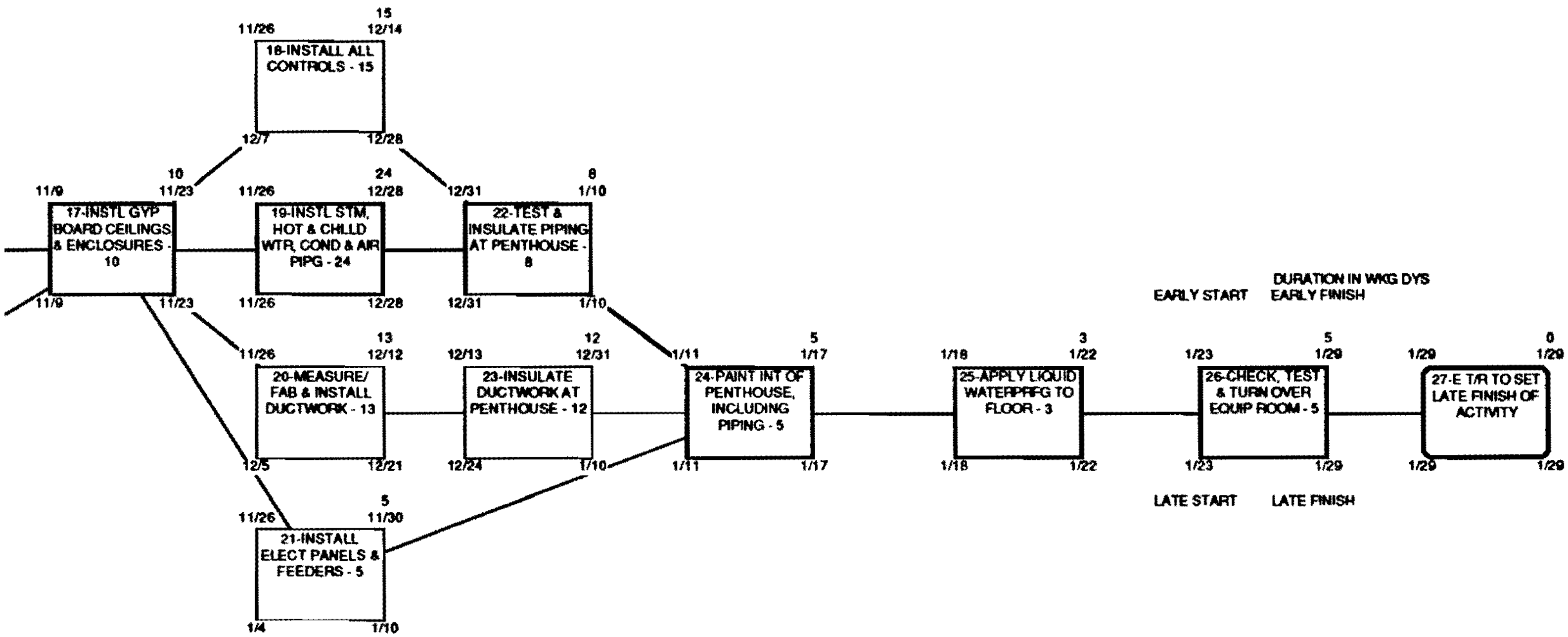
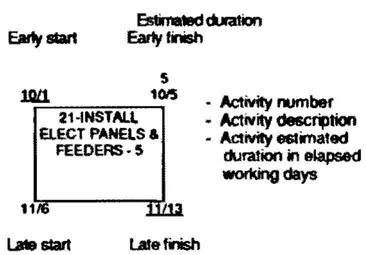
08-DELIVER PENTHOUSE FILTERS - 20
09-ERECT STRUCT STEEL & METAL DECK - 7
10-FORM, REINF & POUR PENTHOUSE FL DECK - 10
11-LAY PENTHOUSE INSUL & ROOFING - 4
12-FORM, REINF, POUR & STRIP EQUIP BASES - 2
13-INSTALL PIPE & EQUIP HANGERS AT PENTHOUSE - 6
14-CURE PENTHOUSE EQUIP BASES - 3
15-HOIST & SET MAJOR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



Change order impact on base plan of action



ACTIVITY DATA KEY

Issue #1 - July 9
Issue #2 - August 1
333 clarion chg order
disk 162

Reserved Activity Numbers

041	046
042	047
043	048
044	049
045	050

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

Luther Mechanical Contractors
Washington, D.C.

sheet
ph-1

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CONSULTING ENGINEER

QUESTIONS TO BE ASKED

1) <u>WHAT</u>? -- 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) <u>WHERE</u>? -- Where will the work take place?

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

4) <u>HOW</u>? -- 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) <u>WHO'S</u>? -- Who's responsible?
-- Who's in charge?
-- Who's doing the work?
-- Who's liable?
-- Who's in charge for my client?
-- Who's the ultimate decision maker? (UDM)

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NETWORK PLANNING ABBREVIATIONS

A	Area
ABV	Above
AC	Air condition
ACCESS	Accessories
ACOUST	Acoustic
ACT	Activate
AD	Approve, deliver
AFD	Approve, fabricate, deliver
AL	All
ALT	Alteration
ALUM	Aluminum
AP	Approve
ASMBLY	Assembly
ASP	Asphalt
/	And
⁄̶	At
BAL	Balance
BALC	Balcony
BD	Board
BKFL	Backfill
BKFLG	Backfilling
BLDG	Building
BLKG	Blocking
BLT	Bolt
BM	Beam
BRG	Bearing
BRK	Brick
BSE	Base
BSMT	Basement
CASD	Check and approve shop drawings
C/B	Columns and beams
CER	Ceramic
CL	Column line
CLG	Ceiling
CLKG	Calking
CNTL	Control
CO	Cutoff
COATG	Coating
COL	Column
COMP	Complete
CONC	Concrete
CONCT	Connect
COND	Conduit
CONN	Connection
CONST	Construct
CONT	Continue
COOLG	Cooling
CONVTR	Convector
CP	Cap
CP	Complete
CT	Ceramic tile
CVR	Cover
D	Dummy
D	Duration
DAFD	Detail, approve, fabricate, deliver
DEMOL	Demolish
DIFF	Diffuser
DK	Deck
DPPRF	Damp proof
DR	Door
DRINKG	Drinking
DRN	Drain
DUCTWK	Ductwork
DWG	Drawing
E	East
EF	Early finish
EFRP	Excavate, form, reinforce, pour
EIB	Excavate, install, backfill
ELEC	Electric
ELEV	Elevator
ENERG	Energize
EQUIP	Equipment
ERCT	Erect
ES	Early start
E T/R	End time restraint
EXC	Excavation
EXP	Exposed
EXT	Exterior
EXTG	Existing

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

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POURG	Pouring
PRES	Pressure
PRM	Primary
PROT	Protection
PRS	Piers
PVG	Paving
RAD	Radiant
RAILG	Railing
RD	Road
REINF	Reinforcing
REL	Relocate
REQD	Required
RESIL	Resilient
RESTL	Reinforcing steel
REMV	Remove
RFG	Roofing
RISR	Riser
RM	Room
RR	Railroad
RSC	Rolling steel curtain
RUBB	Rubber
RUFF	Rough
S	South
SBSTNTLY	Substantially
SDWK	Sidewalk
SETTG	Setting
SEWR	Sewer
SHT	Sheet
SIDG	Siding
SLB	Slab
SOG	Slab on grade
SPDRL	Spandrel
SPRNKLR	Sprinkler
SS	Structural steel
SS	Substation
ST	Start
ST	Street
STD	Stud
STL	Steel
STM	Steam
STR	Stair
STRP	Strip
STRUCT	Structural
SUPT	Support
SURF	Surface
SUSP	Suspension
SWTCHGR	Switchgear
SYS	System

TEMP	Temporary
TFT	Total float time
TK	Tank
TO/R	Toilet room
TPG	Topping
T/R	Time restraint
TR	Trim
TRANSFRMR	Transformer
TRD	Tread
TST	Test
TWR	Tower
UG	Underground
ULG	Unloading
UTIL	Utility
US	Underside
U T/R	Updating time restraint
VB	Vapor barrier
VENTILTR	Ventilator
VEST	Vestibule
W	West
WASHG	Washing
WK	Work
WLKWY	Walkway
WLL	Wall
WNDW	Window
WP	Waterproofing
WTR	Water
W T/R	Weather time restraint

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

Chicago Area Weather

Source: Jack Kolstadt

Week		Working Day	Total Working Days Worked	Loss in Working Days
Dec.	1	234	3½	1½
	2	239	3½	1½
	3	244	4	1
	4	249	3	2
Jan.	1	256	2-1/5	2-4/5
	2	261	2-1/5	2-4/5
	3	266	3½	1½
	4	271	3	2
Feb.	1	277	3	2
	2	282	3	2
	3	287	4	1
	4	292	3½	1½
Mar.	1	297	4½	½
	2	302	4½	½
	3	307	4	1
	4	312	3½	1½
Apr.	1	320	3½	1½
	2	325	4½	½
	3	330	4	1
	4	335		0

Ralph J. Stephenson PE PC
Consulting Engineer

The Domino Move Case Study

(An exercise in planning successive moves)

You are the project manager on a domino move realignment of space in a project adding a 2nd floor to the Bengst Corporation office in Tarry, Montana. The addition has been closed in and base building work is complete ready for tenant fit up.

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

Moves will require the following times

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

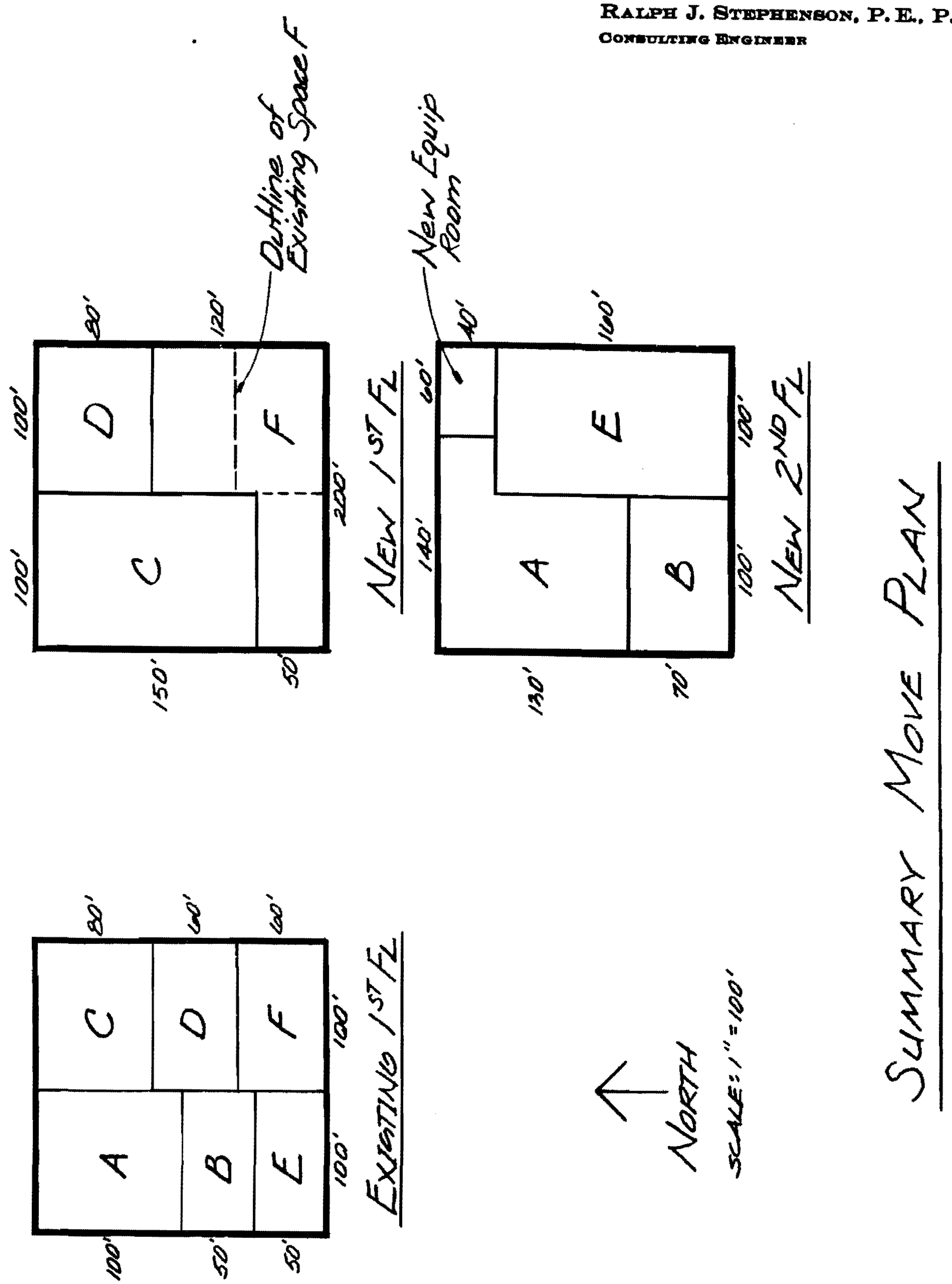
Remodeling will require the following times:

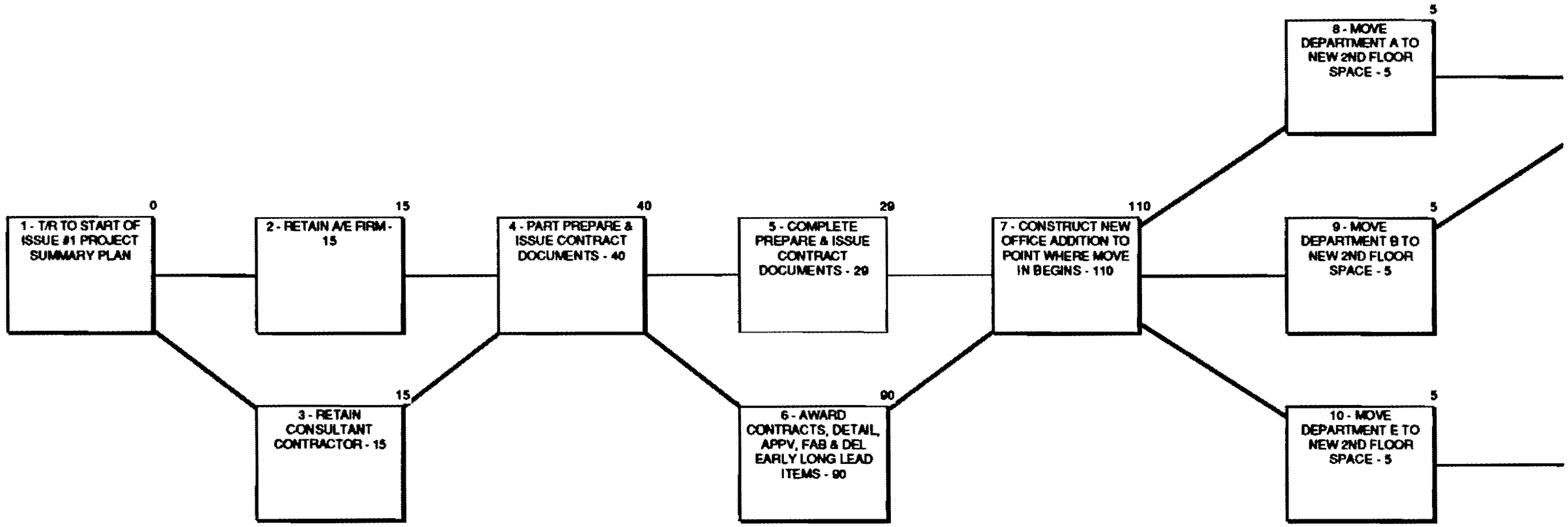
• Remodeling former A & B to new C	20 working days
• Remodeling former C to new D	15 working days
• Remodeling former E to new southwest F	10 working days
• Remodeling former D to new northeast F	12 working days

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

To do

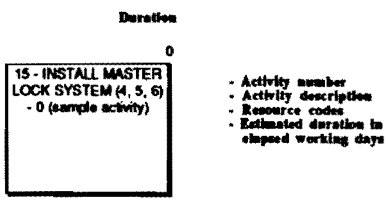
1. Prepare a network logic model for the move and remodeling sequence.
2. Quantify and calculate the logic model.
3. Analyze the move sequence and identify when you want to move E and remodel F.


SUMMARY MOVE PLAN
EXISTING 1ST FL
A
B
C
D
E
F
100'
50'
50'
80'
60'
60'
100'
100'
NEW 1ST FL
C
D
F
Outline of Existing Space F
100'
100'
150'
50'
80'
120'
200'
NEW 2ND FL
A
B
E
New Equip Room
140'
60'
130'
70'
40'
160'
100'
100'
NORTH
SCALE: 1"=100'



Reserved activity numbers

041	046
042	047
043	048
044	049
045	050



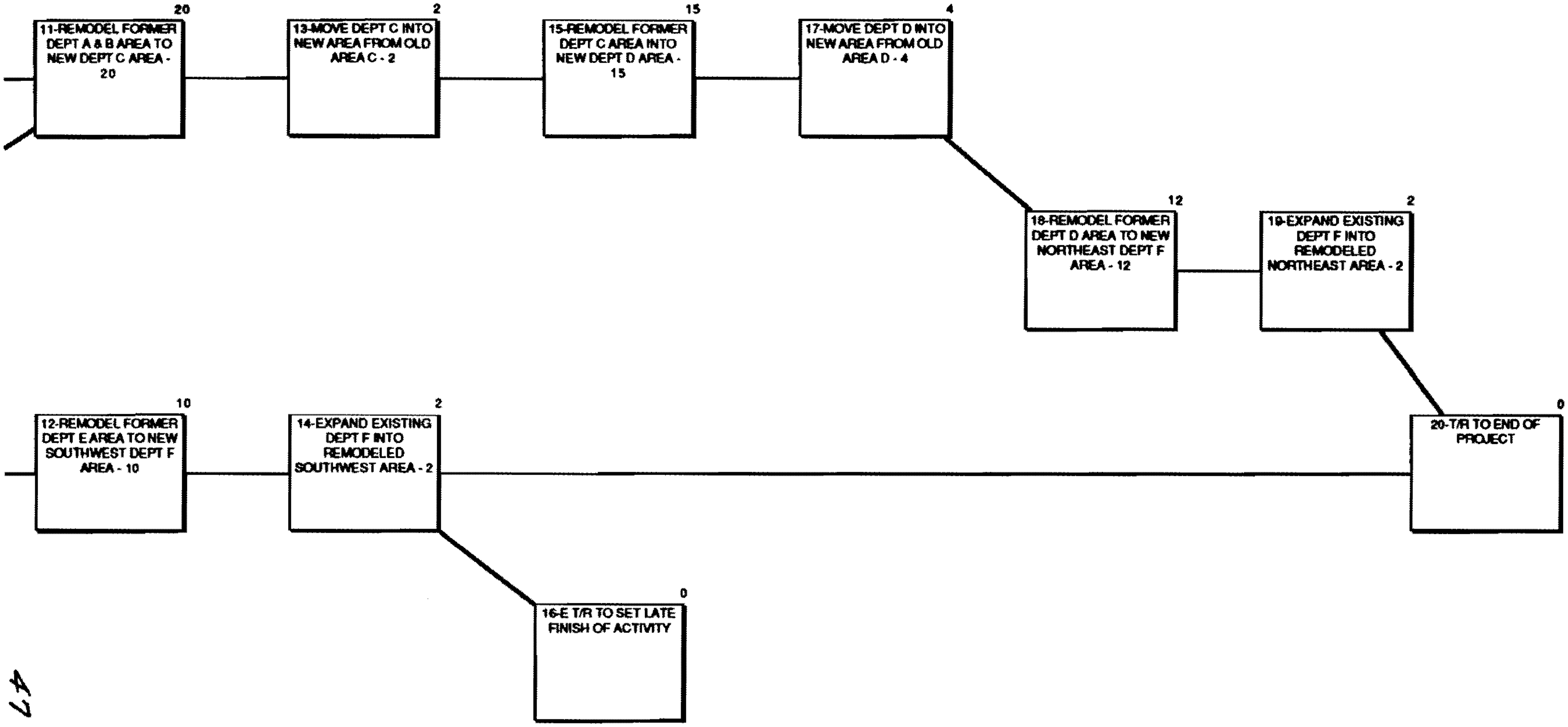
Activity Key

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

SUMMARY NETWORK MODEL - BENGST CORPORATION EXPANSION PLAN TARRY, MONTANA

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

SHEET #SM1



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

47

	CATEGORY	ACTION ITEM	RESP
1	AE	-ARCHITECT/ENGINEER	
2	CM	-C0NSTRUCTION MANAGER	
3	OW	-OWNER	
4	PM	-PROJECT MANAGER	
5	RE	-REGULATORY AGENCIES	
6	SU	-SURVEY ITEMS	
7	UT	-UTILITY ITEMS	
8	RE/SU	CHECK AND CLEAR EASEMENTS	
9	RE/SU	CHECK AND CLEAR ZONING	
10	RE	CHECK OUT WITH BUILDING DEPARTMENT	
11	UT/SU	CHECK OUT WITH CABLE TV COMPANY	
12	UT/SU	CHECK OUT WITH ELECTRICAL UTILITY	
13	UT/SU	CHECK OUT WITH GAS UTILITY	
14	RE/SU	CHECK OUT WITH PLANNING & ZONING	
15	UT/SU	CHECK OUT WITH TELEPHONE UTILITY	
16	UT/SU	CHECK OUT WITH WATER & SEWER DEPARTMENT	
17	RE	DECIDE ON HOW APPROVALS ARE TO BE PROVIDED	
18	OW/AE/PM/CM	DECIDE ON TOTAL ORGANIZATIONAL STRUCTURE	
19	AE	DEVELOP DESIGN CONCEPT & SCHEMATIC STUDIES	
20	OW/PM/AE/CM	ESTABLISH PRELIM TOTAL PROJECT MONEY FLOW EXPECTED	
21	OW/PM/AE/CM	ESTABLISH REPORTING SYSTEMS	
22	OW/PM/AE/CM	ESTABLISH WHO THE UDM'S ARE FOR EACH PARTY	
23	OW/PM/AE/CM	GET APPROVALS ON TOTAL ORGANIZATION	
24	AE	GET APPROVALS ON VYVYAN'S ORGANIZATION	
25	AE	HAVE HEART TO HEART TALK WITH OFFICE STAFF	
26	AW/RE	MAKE BUILDING CODE REVIEW	
27	SU/UT	OBTAIN ALL UTILITY LOCATIONS	
28	OW/AE/PM/CM	OBTAIN PRO FORM FROM OWNER	
29	SU/UT	OBTAIN PROPERTY SURVEY	
30	SU	OBTAIN SOIL BORINGS & SOILS ANALYSIS	
31	SU	OBTAIN TOPO SURVEY	
32	OW/PM/CM/AE	OWNER REVIEW AND APPROVE CONCEPT & SCHEMATIC STUDIES	
33	AE	PLAN DRAWING ISSUE PROCEDURES WITH DEPTS	
34	OW/AE/PM/CM	PREPARE & ISSUE PRELIM ORGANIZATION STRUCT	
35	OW/AE/PM/CM	PREPARE & ISSUE PROJECT DIRECTORY	
36	AE/CM/PM	PREPARE BASE LINE ITEM ESTIMATE	
37	OW/AE/CM/PM	PREPARE LIST OF RESPONSIBILITIES OF EACH PARTY	
38	OW/AE/CM/PM	PREPARE MATRIX OF PARTICIPANTS & RESPONSIBILITIES	
39	AE/PM	PREPARE PLAN OF ARCH/ENGR ACTION FOR 3 MONTHS AHEAD	

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

1. Planning & scheduling case study - ho258 - cpmcsty - d116

2. CPM case study

2.1. Project case study details

2.1.1. Name of project - The Tulsa Rivers
2.1.2. Location - Tulsa, Oklahoma
2.1.3. Owner & developer - Tulsa Pioneers Inc. - TIP
2.1.4. Designer - Goebel & Associates - Architects, Engineers & Planners
2.1.5. Contractor - Drucker Construction, Inc.
2.1.6. Type of building - speculative office building
2.1.7. Key dates
2.1.7.1. Current date - October 9, 1986 (working day 198)
2.1.7.2. Mobilize & move on site - October 20, 1986 (working day 205)
2.1.7.3. Completion dates

Landlord or base building work - May 9, 1988 (601)

Must be ready at this point to start tenant work at 1st occupied floor

All site work and parking areas complete
All elevators operable
All mechanical systems operable
All electrical systems operable
All core areas finished and ready for use
All landlord work forces off job

Total completion date - July 21, 1988 (working day 639)

All tenant work complete
All tenants moved in and satisfied
Total job cleaned up and turned over to TIP property management department

2.1.8. Characteristics of project
2.1.8.1. General information

Location - Tulsa, Oklahoma
Site size - Approximately 15 acres - expansion planned
6 stories plus basement
Finish floor to finish floor heights

Basement to first floor - 16' 0"
First floor to second floor - 12' 0"
Second through sixth each - 11 ' 0"
Sixth to high point of main roof - 12' 0"
Sixth to machine room floor - 16' 0"

Footprint = 150' x 150' = 22,500 sq ft per fl
Gross floor area in building = 7 x 22,500 = 157,500 sq ft
Parking spaces to be provided in phase 1 = 900

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

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

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

2.1.8.4. Procurement (pr)

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

Contracts already let for

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

All other contracts to be let as contract documents are issued

2.1.8.5. Substructure (sb)

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

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

Basement walls reinforced concrete on concrete strip footings

Subsoil sandy with some clay - no major water problems

2.1.8.6. Superstructure (ss)

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

Frame to be structural steel erected in 2 story tier sections

Decks to be light weight concrete slabs

Decks to be formed with metal deck - no shoring required

2.1.8.7. Exterior skin (sk)

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

Exterior walls

- From 2nd floor spandrel to roof spandrel - alum and glass curtain wall
  - Spandrel glass to be opaque
  - Floor glass to be glare and heat resistant
  - Aluminum frame to be anodized
  - Field measurements of aluminum may be necessary
- At 1st floor
  - Aluminum entries
  - Some storefront & glass at commercial tenant areas
  - Brick masonry at exterior service and non commercial areas
- All exterior glass and glazing to be calked
- No exterior field painting

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

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

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

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

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

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

2.2. Laundry lists

2.2.1. Procurement - early

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

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

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

2.2.1.2. Detail, approve, fabricate and deliver

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

2.2.2. Substructure work - at random - unnumbered

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

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

2.2.3. Substructure work - at random - numbered for sequencing

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

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

2.2.3.16. 11 - Fill and fine grade for basement slab on grade
2.2.3.17. 12 - Lay vapor barrier and set in floor work for basement slab on grade
2.2.3.18. 13 - Pour out basement slab on grade
2.2.3.19. 01 - Mobilize & move on site

2.2.4. Substructure work - in rough order - numbered

Estimated durations are given after the activity description in elapsed working days (student to provide durations).

2.2.4.1. 01 - Mobilize & move on site -
2.2.4.2. 02 - Layout building site -
2.2.4.3. 03 - Clear building site -
2.2.4.4. 04 - Mass excavate for building -
2.2.4.5. 05 - Excavate, form reinforce & pour interior column footings -
2.2.4.6. 05 - Excavate, form, reinforce & pour exterior wall & column footings -
2.2.4.7. 05 - Excavate, form, reinforce & pour interior wall footings -
2.2.4.8. 06 - Excavate, form, reinforce & pour elevator pit slab on grade -
2.2.4.9. 06 - Set anchor bolts at piers for structural steel -
2.2.4.10. 06 - Form, reinforce, pour and strip footing piers -
2.2.4.11. 06 - Form, reinforce, pour and strip perimeter basement walls -
2.2.4.12. 07 - Form, reinforce,pour and strip elevator pit walls -
2.2.4.13. 08 - Waterproof elevator pit walls -
2.2.4.14. 09 - Backfill interior of basement to rough grade -
2.2.4.15. 10 - Excavate, install and backfill underground electrical work -
2.2.4.16. 10 - Excavate, install and backfill underground mechanical work -
2.2.4.17. 11 - Fill and fine grade for basement slab on grade -
2.2.4.18. 12 - Lay vapor barrier and set in floor work for basement slab on grade -
2.2.4.19. 13 - Pour out basement slab on grade -

2.2.5. Superstructure work - at random - unnumbered

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

2.2.5.1. Erect structural steel - tier 1 - basement through 2nd floor
2.2.5.2. Erect structural steel - tier 2 - 2nd through 4th floor
2.2.5.3. Erect structural steel - tier 3 - 4th through 6th floor
2.2.5.4. Erect structural steel - tier 4 - 6th through roof levels
2.2.5.5. Detail & trim structural steel - tier 1 - basement through 2nd floor
2.2.5.6. Detail & trim structural steel - tier 2 - 2nd through 4th floor
2.2.5.7. Detail & trim structural steel - tier 3 - 4th through 6th floor
2.2.5.8. Detail & trim structural steel - tier 4 - 6th through roof levels
2.2.5.9. Erect metal deck - tier 1 - basement through 2nd floor
2.2.5.10. Erect metal deck - tier 2 - 2nd through 4th floor
2.2.5.11. Erect metal deck - tier 3 - 4th through 6th floor
2.2.5.12. Erect metal deck - tier 4 - 6th through roof levels

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

2.2.6. Front end work

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

2.2.7. Procurement - later

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

2.2.8. Exterior skin work - at random - numbered

All elements needed to close the building to weather.

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

2.2.9. Rough interior work - at random - numbered

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

2.2.10. Finish interior work - at random - numbered

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

2.2.11. Systems work

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

2.2.12. Site work

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

2.2.13. ho 258 - 87

TRANSLATE

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

Ralph J. Stephenson PE PC
Consulting Engineer

SCHEDULE

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

Ralph J. Stephenson PE PC
Consulting Engineer

The case of the resource sensitive school project

A project management case study in the allocation of resources

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

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

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

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

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

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

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

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

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

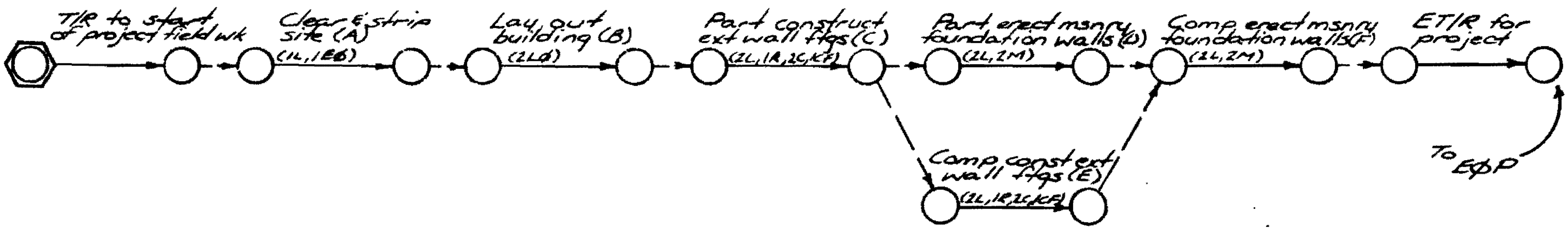
5. Balance tradesmen use on the job, particularly laborers, to maintain as constant level as possible.

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

7. Minimize the risk of lost profit potential.

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

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



62

RESOURCE CODE

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

RESOURCE ALLOCATION

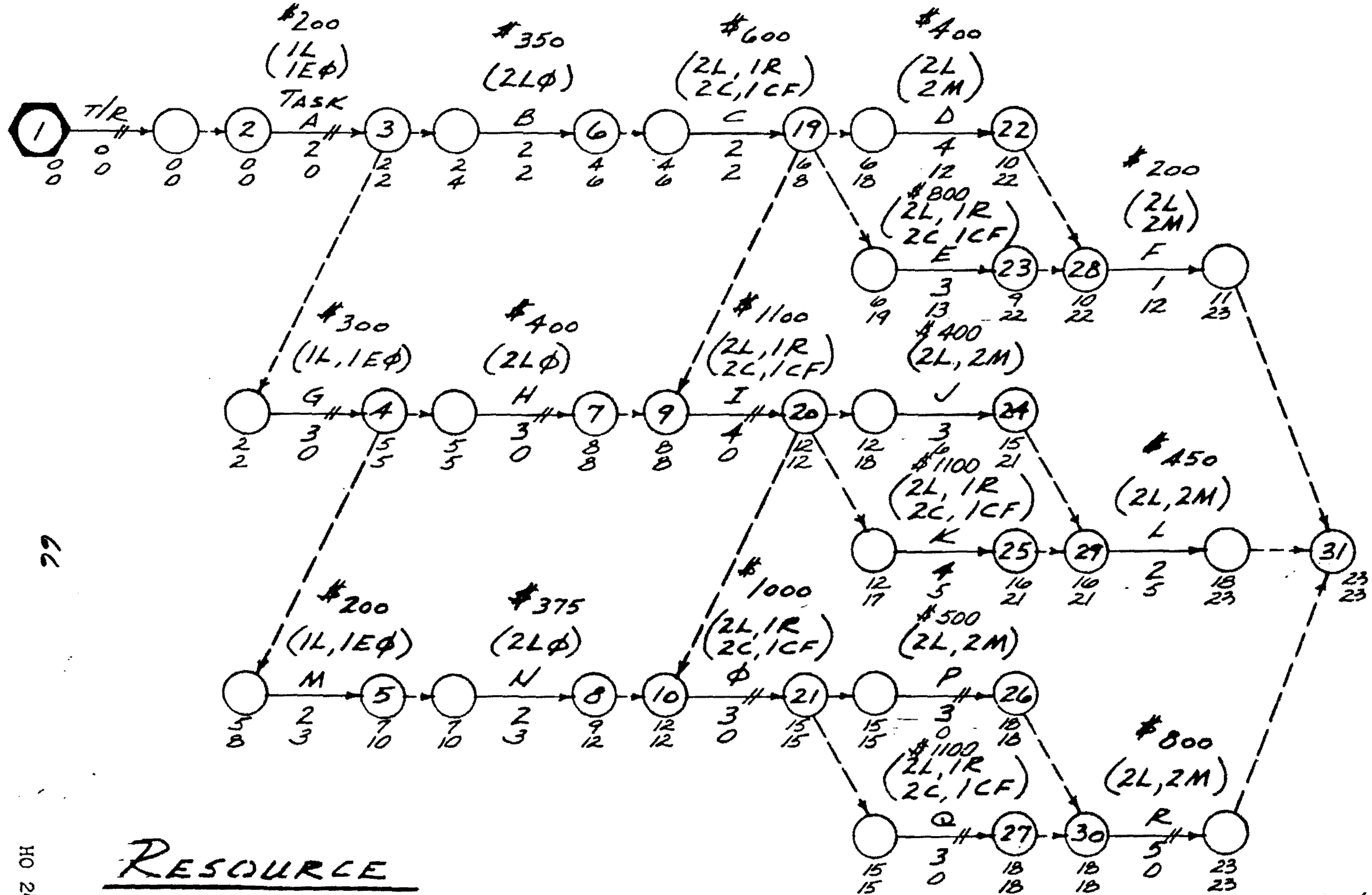
RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

SHT 2

WD → TASK ↓	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	MP	#
1L 1EØ *A																													
2LØ B																													
2L.1R 2C.1CF C																													
2L,2M D																													
2L.1R 2C.1CF E																													
2L,2M F																													
1L 1EØ *G																													
2LØ *H																													
2L.1R 2C.1CF *I																													
2L,2M J																													
2L.1R 2C,1CF K																													
2L,2M L																													
1L,1EØ M																													
2LØ N																													
2L,1R 2C.1CF *Ø																													
2L,2M *P																													
2L,1R 2C,1CF *Q																													
2L 2M *R																													
																												0	0

	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	
L																												
EØ																												
LØ																												
R																												
C																												
CF																												
M																												
TOTAL																												

RESOURCE ALLOCATION



Resource Allocation

Ralph J. Stephenson, P.E.

May 29, 1968

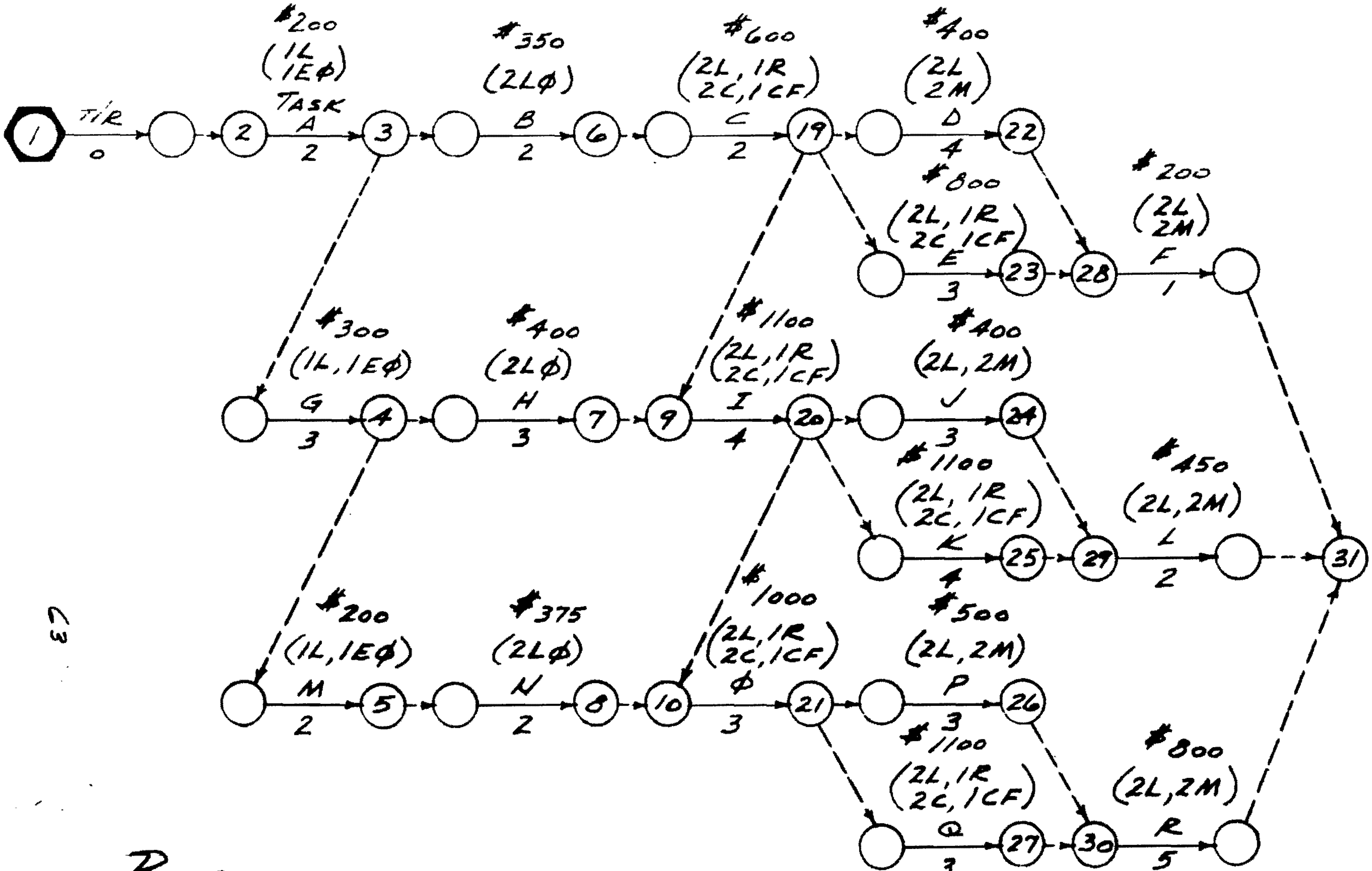
Reserved Node Nos.

11	15
12	16
13	17
14	18

HO 244

H/O

66



C3

Resource Allocation

Reserved Node Nos.

11	15
12	16
13	17
14	18

Ralph J. Stephenson, P.E.

May 29, 1968

H/O 25

SHT 2

WD →	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	MP	#
TASK																													
1L 1EΦ *A																													
2LΦ B																													
2L.1R 2C.1CF C																													
2L,2M D																													
2L.1R 2C.1CF E																													
2L,2M F																													
1L 1EΦ *G																													
2LΦ *H																													
2L.1R 2C.1CF *I																													
2L,2M J																													
2L.1R 2C,1CF K																													
2L,2M L																													
1L,1EΦ M																													
2LΦ N																													
2L.1R 2C.1CF *Φ																													
2L,2M *P																													
2L,1R 2C,1CF *Q																													
2L. 2M *R																													
																												o	o

	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		
L																													
EΦ																													
LΦ																													
R																													
C																													
CF																													
M																													
TOTAL																													

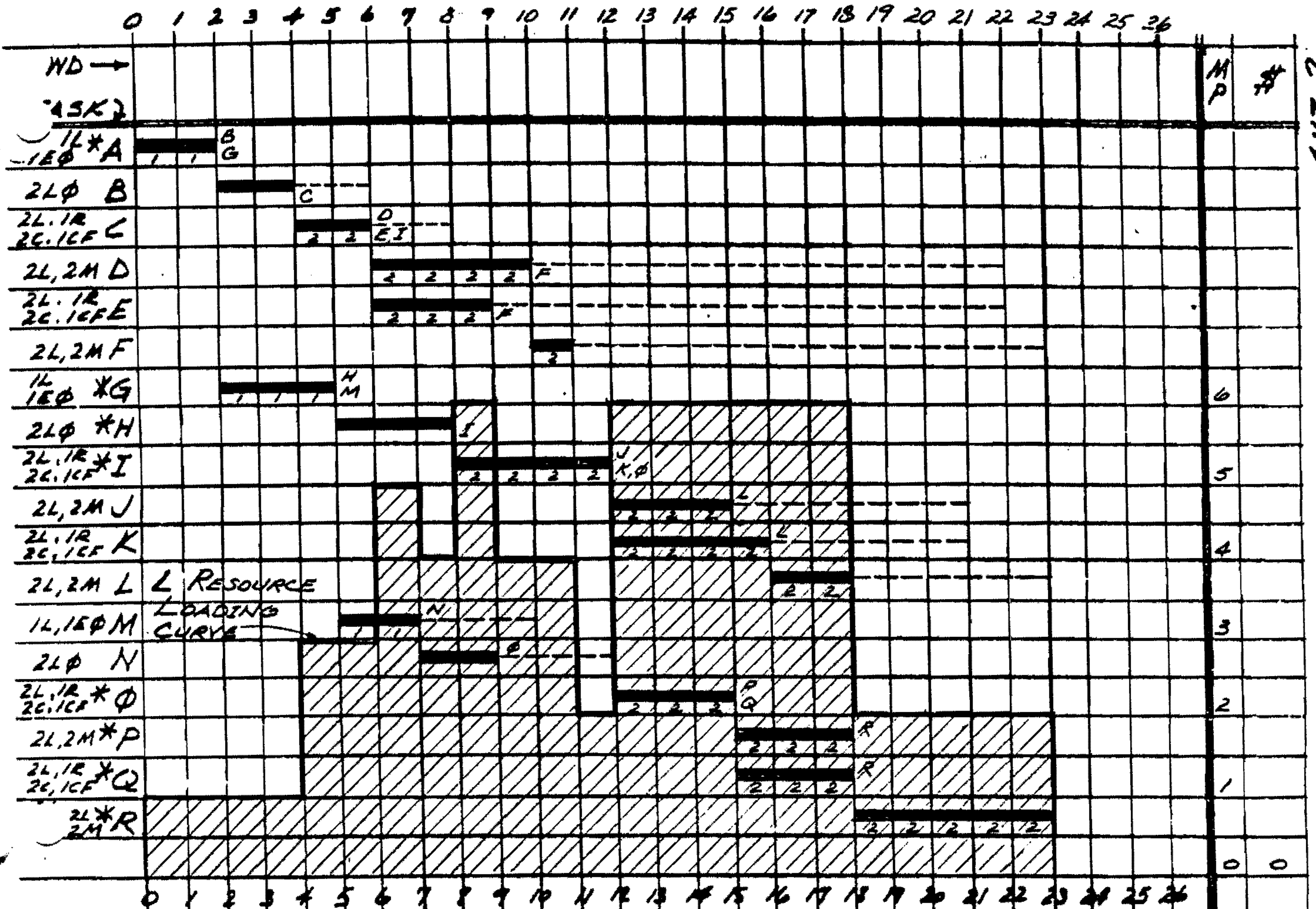
RESOURCE ALLOCATION

MAY 29, 1968

RALPH J. STEPHENSON, P.E.

HO 26

ES/EF Schedule



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

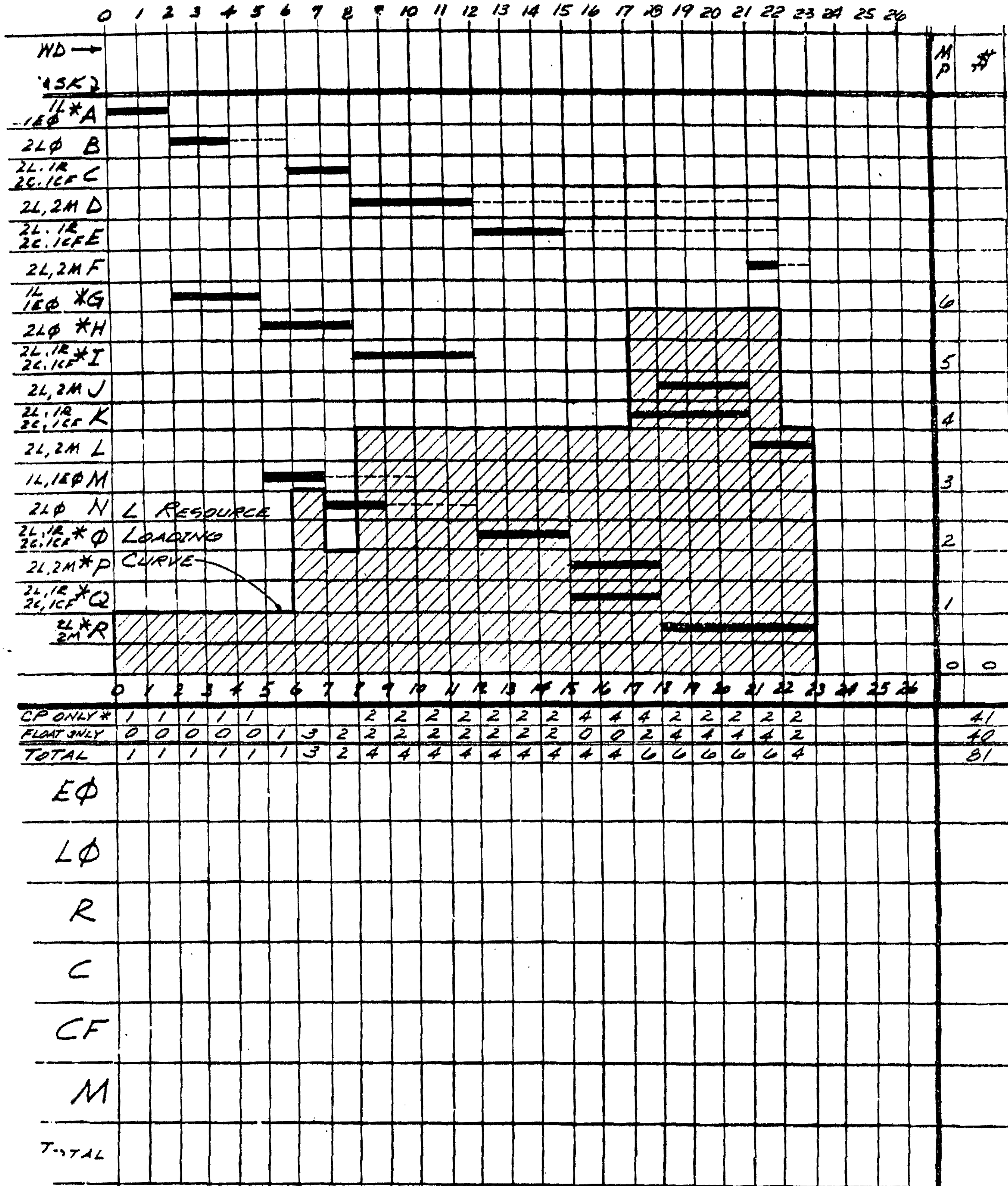
Resource Allocation #1

HO 245

May 29, 1968

Ralph J. Stephenson, P.E.

LEVELED SCHEDULE



	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	#
CP ONLY*	1	1	1	1	1				2	2	2	2	2	2	2	4	4	4	2	2	2	2	2					41
FLOAT ONLY	0	0	0	0	0	1	3	2	2	2	2	2	2	2	2	0	0	2	4	4	4	4	2					40
TOTAL	1	1	1	1	1	1	3	2	4	4	4	4	4	4	4	4	4	6	6	6	6	6	4					81

RESOURCE ALLOCATION #2

HO 246

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

PROFIT POTENTIAL LEVELS

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

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

A brief discussion of each is given below.

Level A Profit Potential

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

Level B Profit Potential

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

Level C Profit Potential

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

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

Ralph J. Stephenson PE PC
Consulting Engineer

Use of float time in project planning

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

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

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

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

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

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

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

3. On negotiated projects, where there may be a cost and time span to be mutually agreed on by the contracting parties as the project gets under way, ownership of float time is usually a matter to be worked out in advance as job conditions demand.

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

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

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

* * *

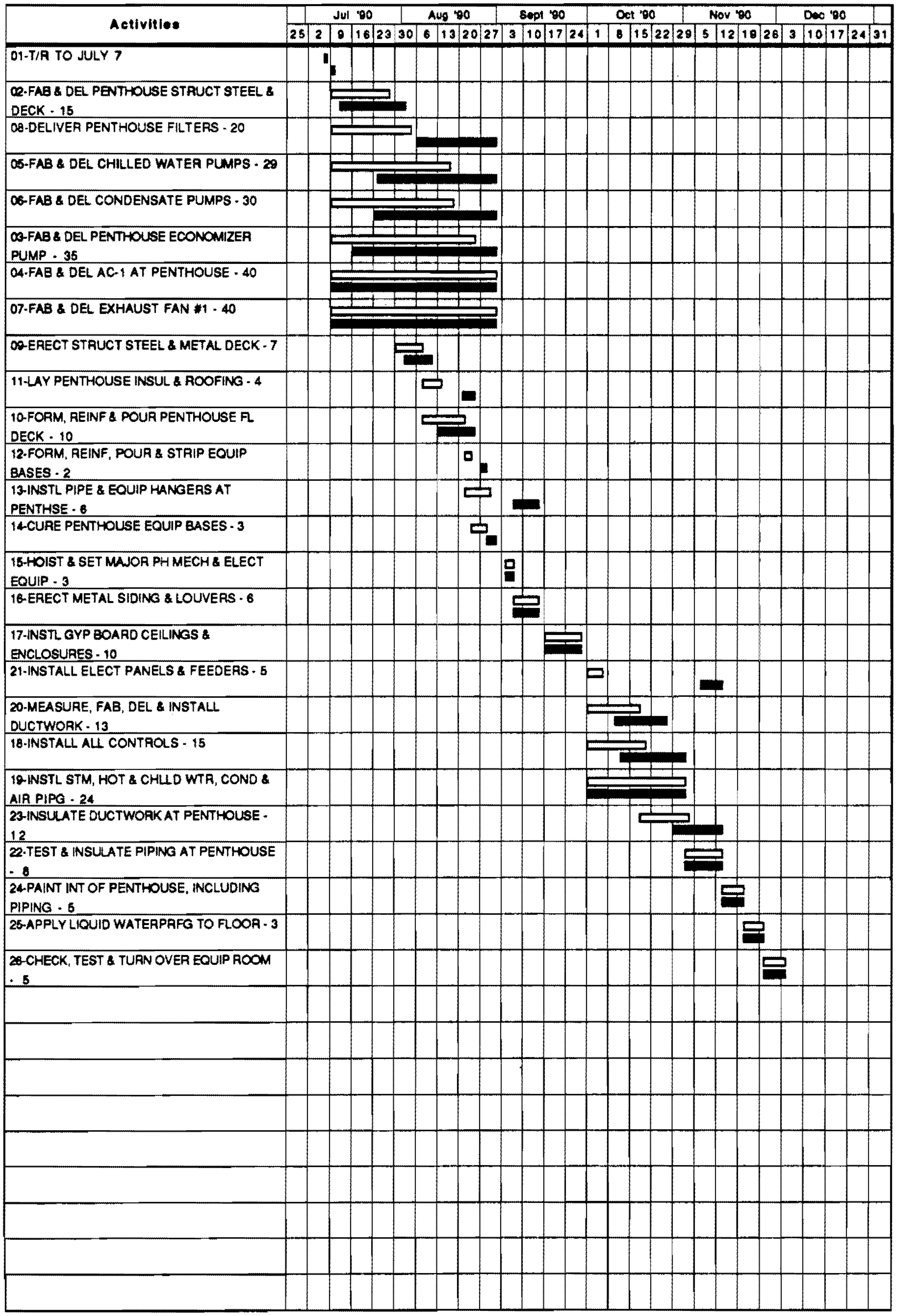
In general most problems with float occur where approval delays are encountered, where intermediate project dates are not specified but are desired and imposed, when poor performance pushes tasks beyond scheduled end dates, or where uncontrollable obstacles to meeting project contract obligations appear.

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

Listed in early start early finish order

Clarion Office Building
Equipment Room

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

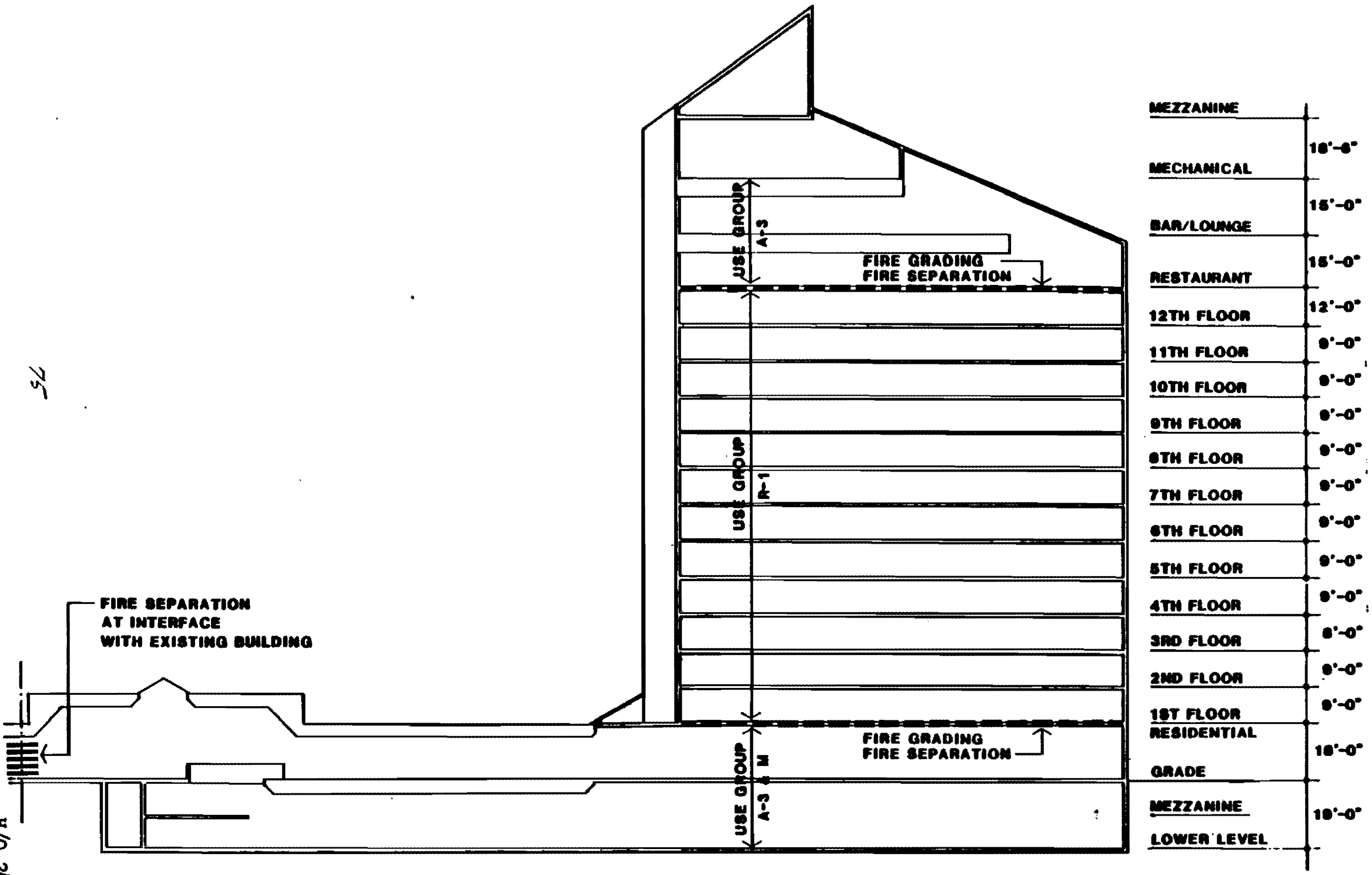


• Open bar shows early starts & finishes
• Solid bar shows late starts & finishes

Page 1 of 1
Sunday, December 15, 91

PAVILLION PROJECT DRAWING ISSUE PAGE 1
LISTED BY DATE OF ISSUE - DATE PRINTED: [illegible] 1983
RALPH J. STEPHENSON PE PC

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


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

75

H/O 240

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

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

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

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

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

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

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

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

Ralph J. Stephenson PE PC
Consulting Engineer

GUIDELINES TO PREPARING CONTRACT DOCUMENT & PROJECT LAUNDRY LIST MATRIXES

DEFINITIONS

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

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

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

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

PREPARING THE MATRIX

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

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

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

- Form, reinforce, pour & strip concrete wall footings

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

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

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

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

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

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

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

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

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

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

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

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

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

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

* * *

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

POSSIBLE FIELDS TO BE INCLUDED IN MATRIXES

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

5. Submittals required for action to be taken - sbm

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

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

Typical building components include:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

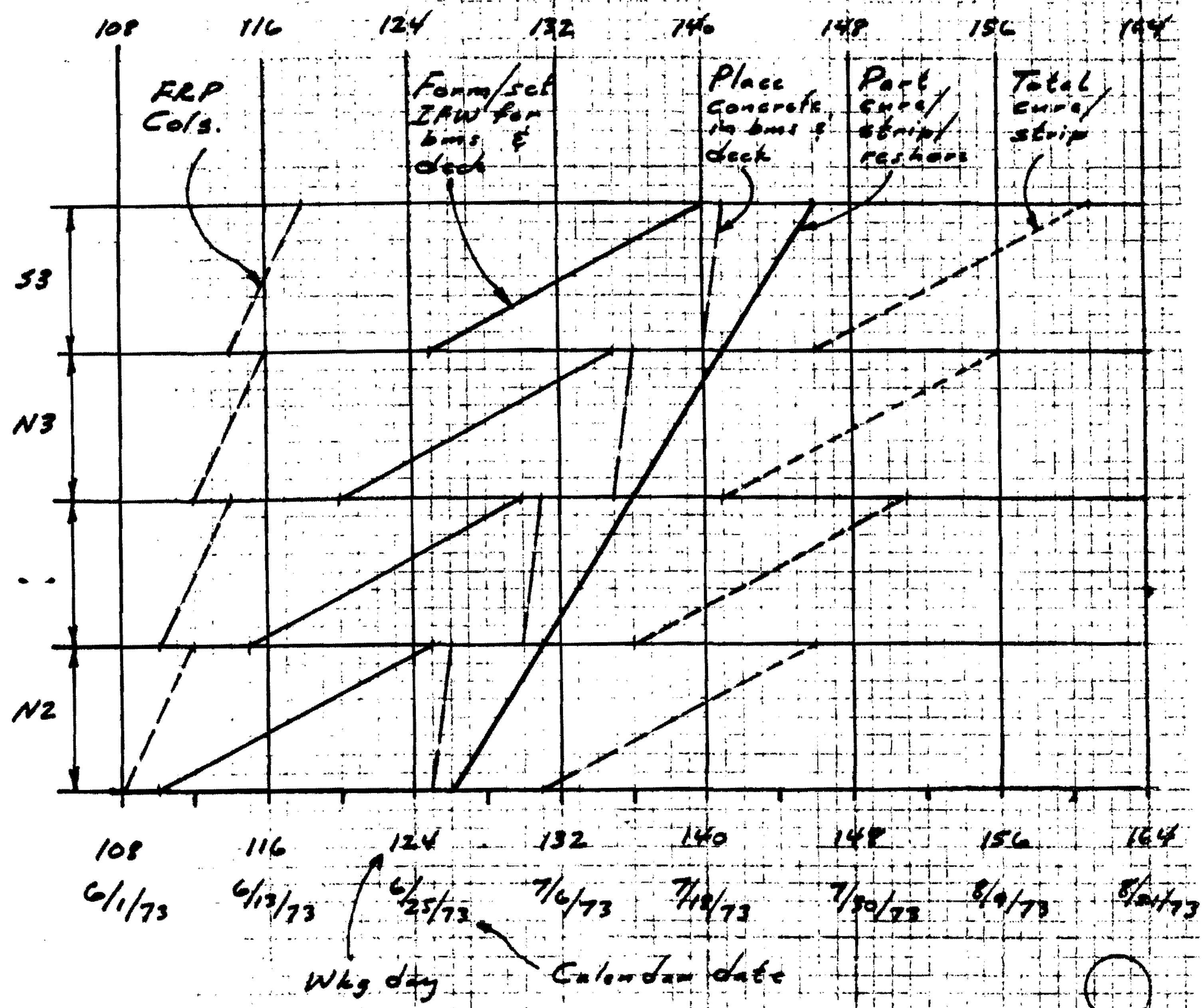
RALPH J. STEPHENSON CONSULTING ENGINEER 15064 WARWICK ROAD DETROIT 23, MICHIGAN PHONE 273-5025

Subject: Slant Chart - Floor Pours N2, S2, N3, S3

Date: 3/1/73

Page: (7)

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



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4/28/73

H/O 79

Project ______________ Date ______________ RALPH J. STEPHENSON
Sht ______________ CONSULTING ENGINEER

ITEM PROCESSING SCHEDULE

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

SOLICIT & RECEIVE CTL PROPOSALS (5, 6)	ANALYZE CTL PROPOSALS & SUBMIT RECOMM TO OWNER (5)	OWNER RECOMM CTL CONTRACTOR TO BE SELECTED (1, 2)	GC REVIEW, ACCEPT RECOMM AND AWARD CTL CONTRACT (5)	SUB CONTRACTOR PREPARE & SUBMIT CTL SHOP DWGS (6)	REV & APPV CTL SUBMITL & RETN TO SUBCONTR (5, 1, 2)	FAB & DEL CHALK, TACK & LIQUID MARKER BOARDS (6)	TO	***1. CHALK, TACK & LIQUID MARKER BOARDS (CTL)***
SOLICIT & RECEIVE AFL PROPOSALS (5, 6)	ANALYZE AFL PROPOSALS & SUBMIT RECOMM TO OWNER (5)	OWNER RECOMM AFL CONTRACTOR TO BE SELECTED (1, 2)	GC REVIEW, ACCEPT RECOMM AND AWARD AFL CONTRACT (5)	SUB CONTRACTOR PREPARE & SUBMIT ACL SHOP DWGS (6)	REV & APPV ACL SUBMITL & RETN TO SUBCONTR (5, 1, 2)	FAB & DEL ACCESS FLOORING (6)	TO	***2. ACCESS FLOORING (AFL)***
SOLICIT & RECEIVE FDP PROPOSALS (5, 6)	ANALYZE FDP PROPOSALS & SUBMIT RECOMM TO OWNER (5)	OWNER RECOMM FDP CONTRACTOR TO BE SELECTED (1, 2)	GC REVIEW, ACCEPT RECOMM AND AWARD FDP CONTRACT (5)	SUB CONTRACTOR PREPARE & SUBMIT FDP SHOP DWGS (6)	REV & APPV FDP SUBMITL & RETN TO SUBCONTR (5, 1, 2)	FAB & DEL FULL HEIGHT DEMOUNTABLE PARTITIONS (6)	TO	***3. FULL HEIGHT DEMOUNTBL PARTITIONS (FDP)***
SOLICIT & RECEIVE FPA PROPOSALS (5, 6)	ANALYZE FPA PROPOSALS & SUBMIT RECOMM TO OWNER (5)	OWNER RECOMM FPA CONTRACTOR TO BE SELECTED (1, 2)	GC REVIEW, ACCEPT RECOMM FPA AND AWARD CONTRACT (5)	SUB CONTRACTOR PREPARE & SUBMIT FPA SHOP DWGS (6)	REV & APPV FPA SUBMITL & RETN TO SUBCONTR (5, 1, 2)	FAB & DEL FOLDING PARTITIONS (6)	TO	***4. FOLDING PARTITIONS (FPA)***
SOLICIT & RECEIVE WWP PROPOSALS (5, 6)	ANALYZE WWP PROPOSALS & SUBMIT RECOMM TO OWNER (5)	OWNER RECOMM WWP CONTRACTOR TO BE SELECTED (1, 2)	GC REVIEW, ACCEPT RECOMM AND AWARD WWP CONTRACT (5)	SUB CONTRACTOR PREPARE & SUBMIT WWP SHOP DWGS (6)	REV & APPV WWP SUBMITL & RETN TO SUBCONTR (5, 1, 2)	FAB & DEL WOVEN WIRE PARTITIONS (6)	TO	***5. WOVEN WIRE PARTITIONS (WWP)***

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

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

DIVISION 10

ITEMS INCLUDED

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

Issue #1 - November 15
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ho 300 - Dec 90

SHEET
P10-01

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER

SUBMITTAL TURN AROUND TIMES

TIME REQUIRED IN WORKING DAYS

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

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

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

RALPH J. STEPHENSON, P.E.
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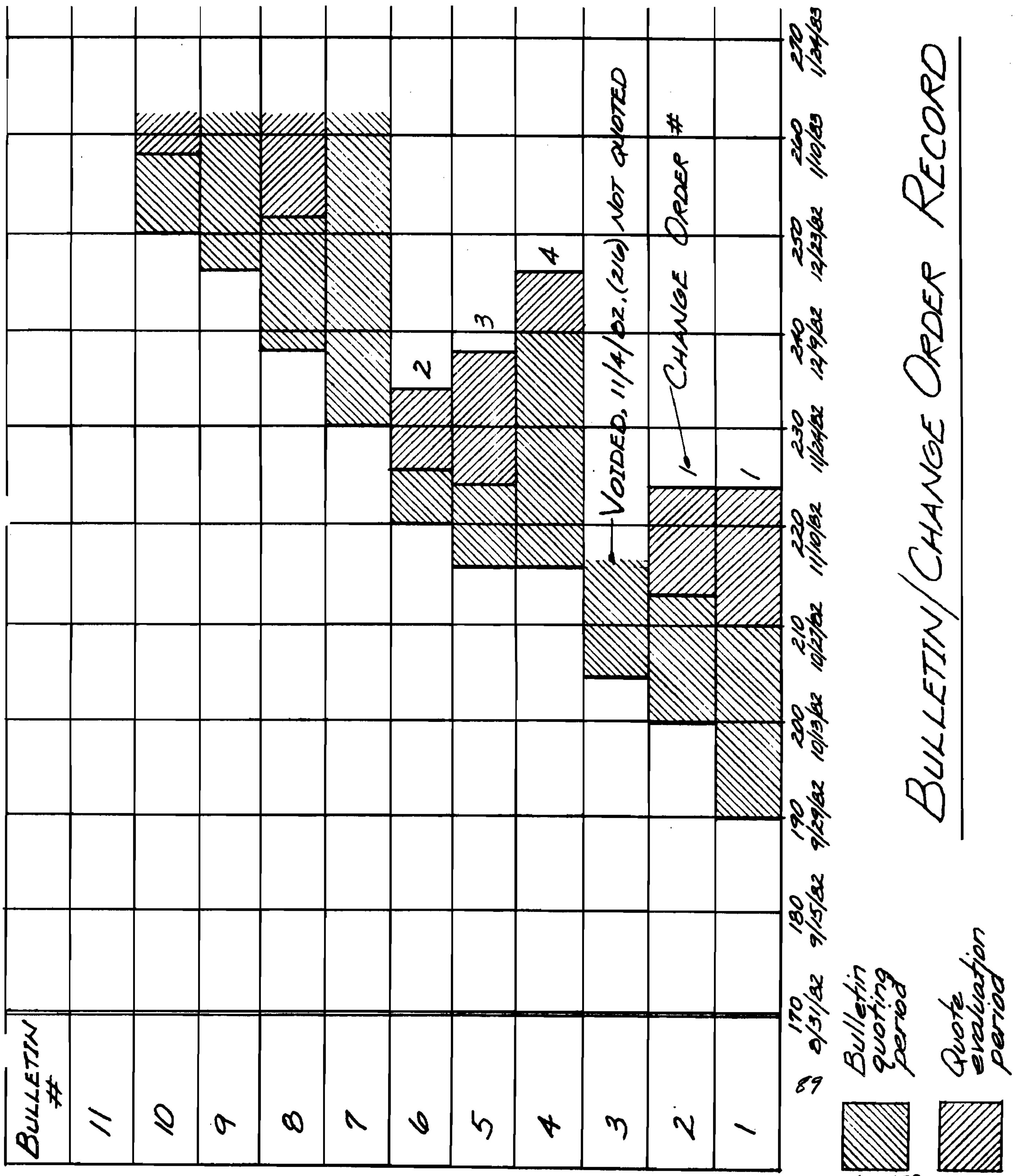


BULLETIN/CHANGE ORDER RECORD

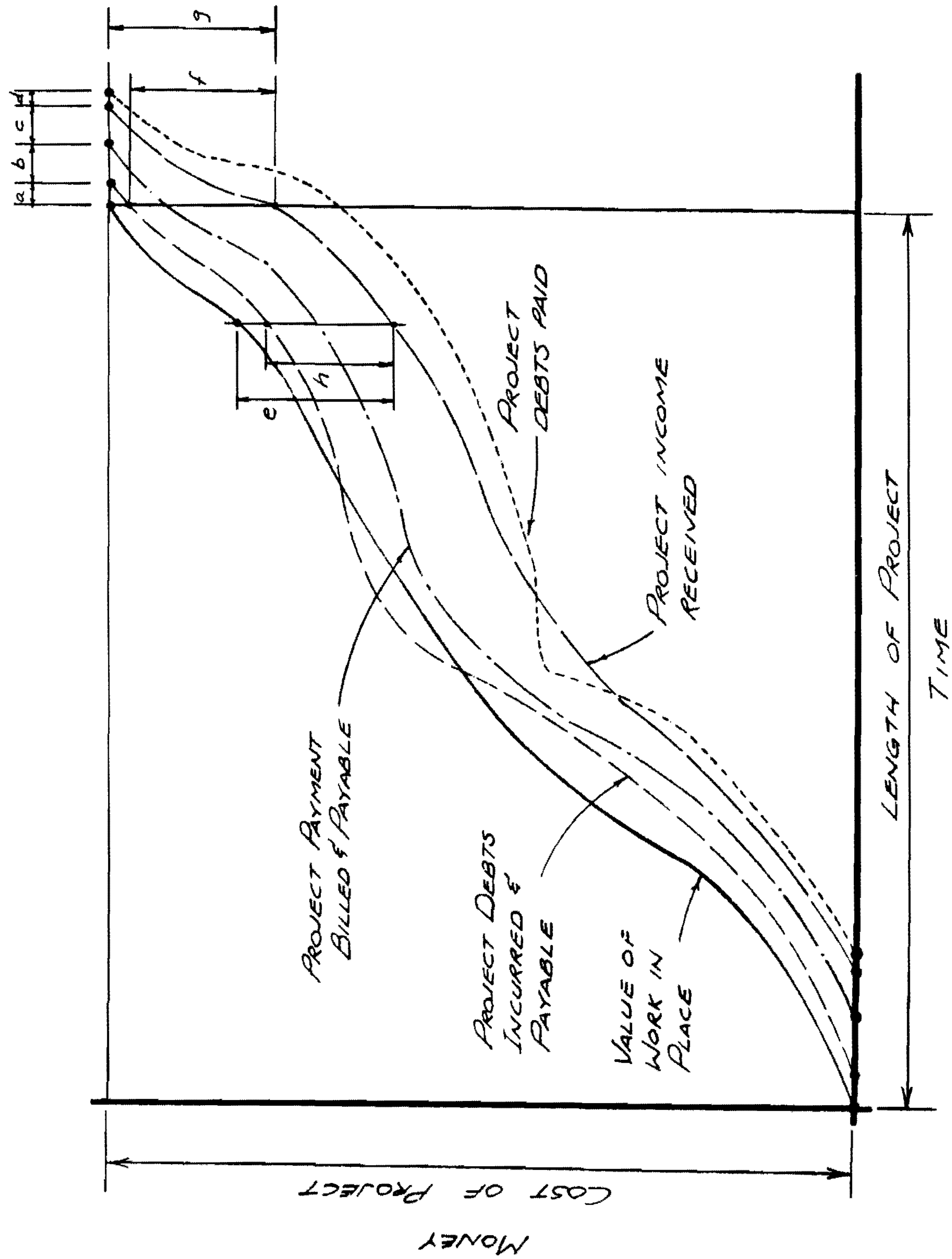
ho 198

① LINE #	② EQUIPMENT DESCRIPTION & WHO FURNISHES	③ PRESENT LOCATION OF EQUIP	④ FINAL LOCATION	⑤ 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	Falstaff	New compressors must be ready to run	
				Set	Young & Falstaff		
				Hook up	Falstaff		
2	3 existing paint spray booths (Telco)	NW corner existing building	New building paint dept	Move & Set	Young	—	
				Hook up	Telco		
3 90	2 new paint spray booths (Falstaff)	New	New building paint dept	Erect	Young	—	
				Hook up	Telco		
4	6 existing column mounted jib cranes (Telco)	Cols 6C 5D 7D 3F 4C 2F	New bldg Cols 10A 11A 10B 11B 10C 11C	Remove	Telco	—	
				Move & Instl	Young		
5	2 new prefab shop offices 10'x15'x8' (Young)	New	1 in new bldg lab area; 1 in existg bldg QA area	Erect	Young	In existg bldg after Telco clears space (watch!)	
				Mech/Elect	Telco		

Abbreviations:

NW Northwest
QA Quality Assurance

EQUIPMENT ACTIVITY TABULATION



PROJECT MONEY FLOW

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

Turnover Cycle (t) Example

Definitions:

x = completion date in working days (wd)

i = starting date in working days

d = duration in elapsed working days to complete one unit

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

n = number of units

Basic equations:

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

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

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

Examples:

For x unknown

i = 160

d = 7 wd

t = 4 wd

n = 11 units

For i unknown

x = 325

d = 10 wd

t = 6 wd

n = 21 floors

For t unknown

x = 352

i = 280

d = 9

n = 15 sectors

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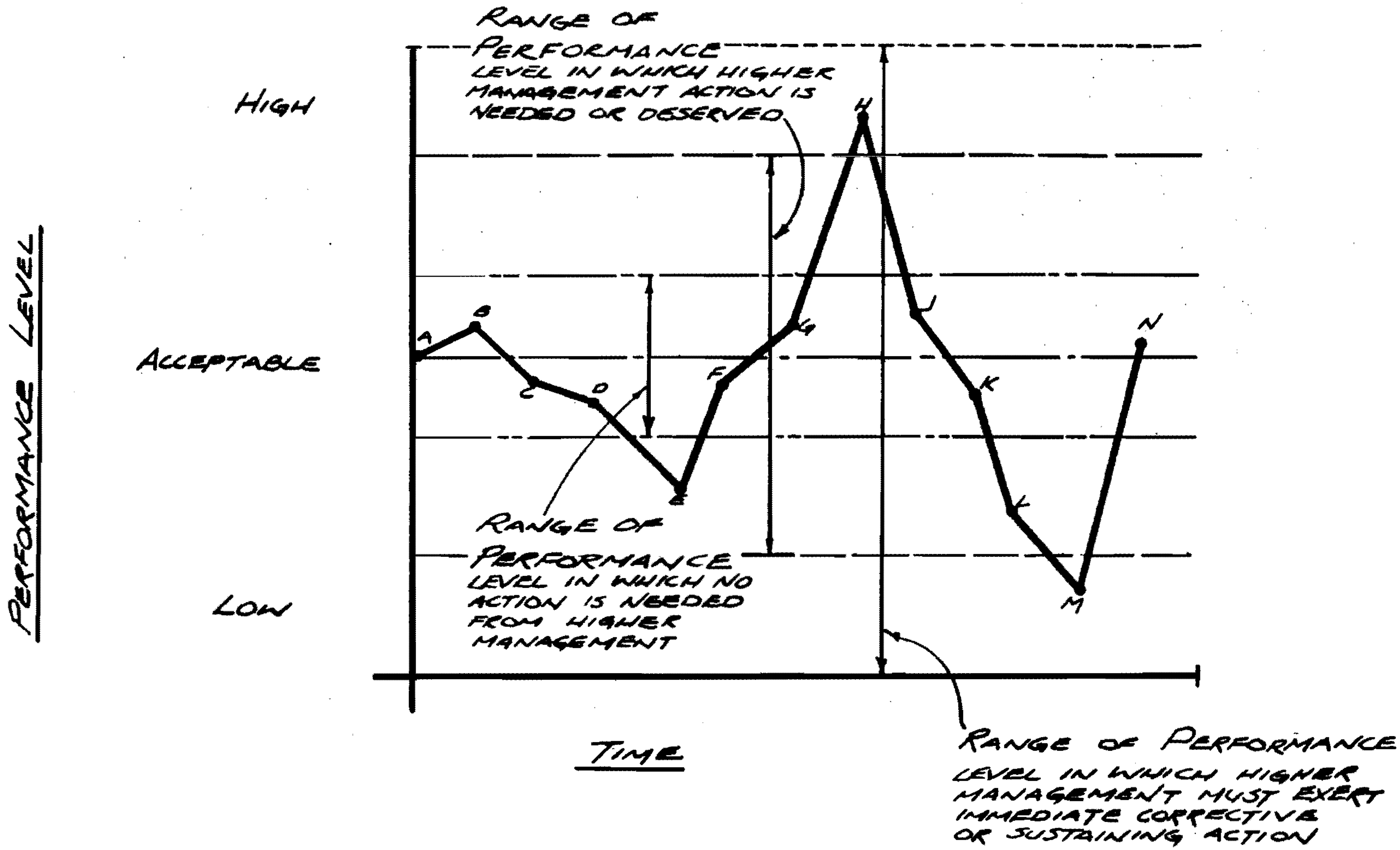
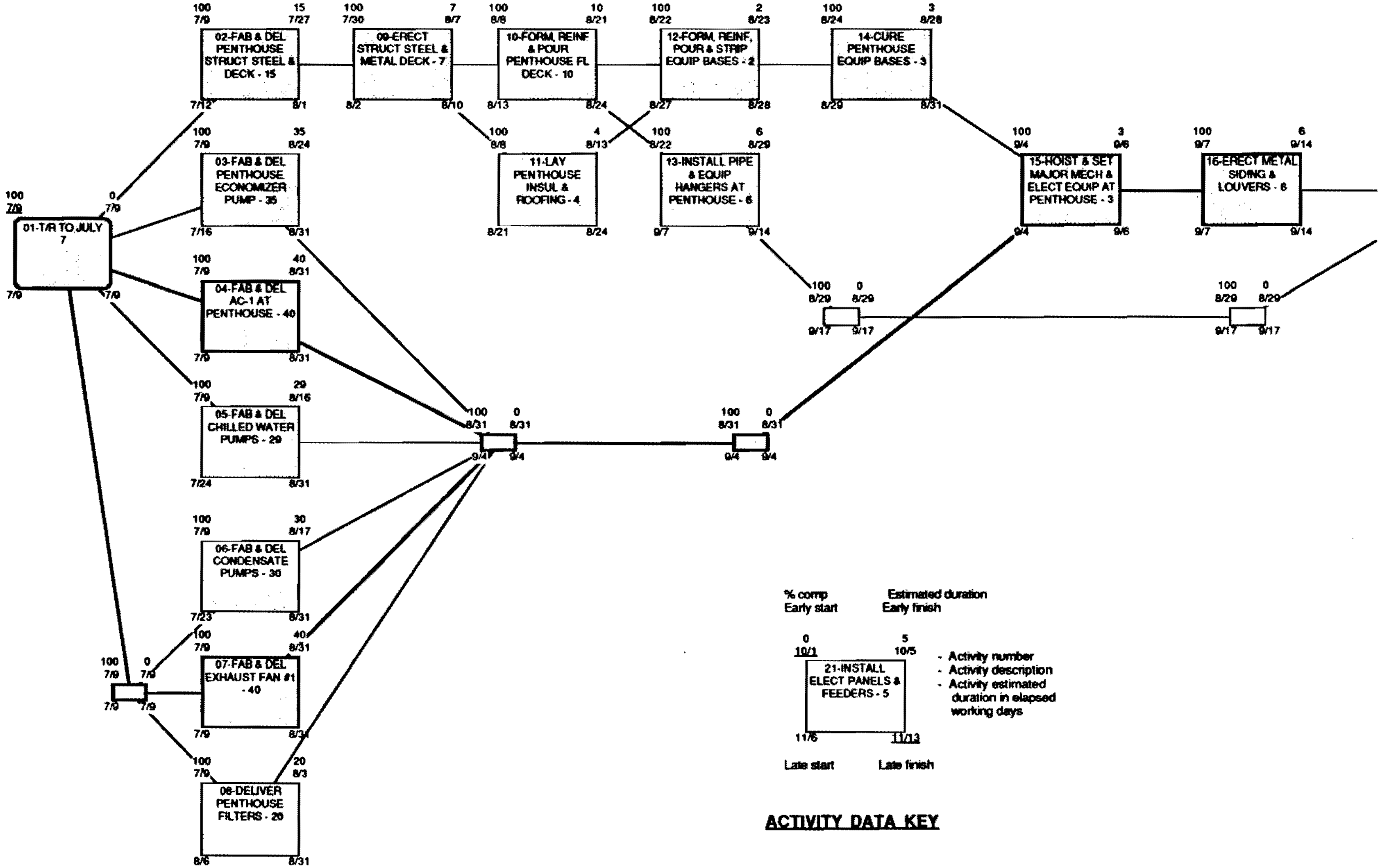
CONSULTING ENGINEER

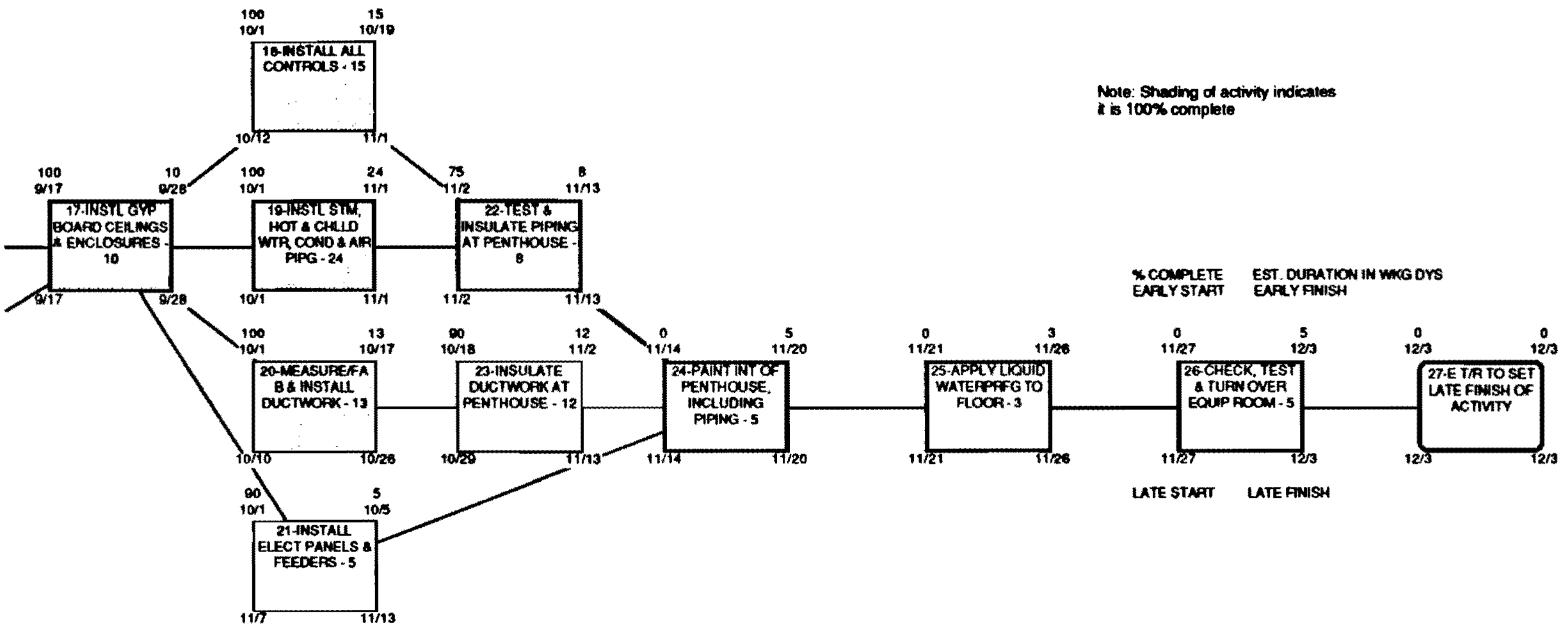


MANAGEMENT BY EXCEPTION (MX) AND PERFORMANCE LEVEL ACTIONS



ACTIVITY DATA KEY

94



Project Status as of November 5

Issue #1 - July 7
Issue #1 - monitor 11/5
332 11/5 mtr phl l1ahtph1
disk 162

Reserved Activity Numbers

041 046
042 047
043 048
044 049
045 050

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

Luther Mechanical Contractors
Washington, D.C.

sheet ph-1

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

CONTROL SYSTEM TECHNIQUES

Color Coding

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

Green

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

Orange

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

Blue

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

Yellow

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

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

Description of Various Listings

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

Node Sequence

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

CONTROL SYSTEM TECHNIQUES
(Page 2)

Node Sequence (continued)

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

Early Start (ES) Sequence

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

Late Start (LS) Sequence

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

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

Late Finish (LF) Sequence

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

Total Float (TF) Sequence

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

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

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COLOR CODING

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

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

<u>Green</u>

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

<u>Orange</u>

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

<u>Blue</u>

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

<u>Yellow</u>

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

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

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Monitoring #1

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

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

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

VICTORIA MECHANICAL COMPANY

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

RALPH J STEPHENSON P E - CONSULTANT

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

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

I	J	DAYS	RSP	LOC CD	Code	AND DESCRIPTION	COST	NODE SEQUENCE E/S	L/S	E/F	L/F	TF
109	134	0	0		D			9136	10196	9106	10186	26
110	117	5	1	1	C	INS HTG&CLNG PPG IN CLG	1200	9146	10126	9206	10186	20
110	135	0	0		D			9146	10196	9136	10186	25
110	135	0	0		D			9146	10196	9136	10186	25
111	113	0	0		D			9216	10066	9206	10056	11
111	136	0	0		D			9216	10126	9206	10116	15
111	136	0	0		D			9216	10126	9206	10116	15
112	113	0	0		D			9146	10066	9136	10056	16
112	119	3	3	1	C	INS RUFF ELEC CNDT&FDRS		9146	10146	9166	10186	22
112	137	0	0		D			9146	10186	9136	10156	24
112	137	0	0		D			9146	10186	9136	10156	24
113	118	6	4	1		ER INT MSNRY PARTNS		9216	10066	9286	10136	11
114	120	0	0		D			9236	10196	9226	10166	18
115	120	0	0		D			9306	10196	9296	10186	13
116	120	0	0		D			9166	10196	9156	10186	23
117	120	0	0		D			9216	10196	9206	10186	20
118	121	3	5	1	P	ER STUDS FOR DRY WALL		9296	10146	10016	10186	11
119	120	0	0		D			9176	10196	9166	10186	22
120	122	0	0		D			9306	10196	9296	10186	13
121	122	0	0		D			10046	10196	10016	10186	11
121	124	3	5	1	C	ER STUDS FOR DRY WALL		10046	10226	10066	10266	14
122	123	4	1	1	P	INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
122	123	4	3	1	P	INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
123	125	0	0		D			10086	10256	10076	10226	11
123	126	0	0		D			10086	10276	10076	10266	13
124	126	0	0		D			10076	10276	10066	10266	14
124	161	0	0		D			10076	10286	10066	10276	15
124	161	0	0		D			10076	10286	10066	10276	15
125	128	5	5	1	P	HANG DRY WALL		10256	10256	10296	10296	0
126	127	3	1	1	C	INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
126	127	3	3	1	C	INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
127	128	0	0		D			10136	11016	10126	10296	13
127	163	0	0		D			10136	11026	10126	11016	14
127	163	0	0		D			10136	11026	10126	11016	14
128	129	5	5	1		COMP HANG DRY WALL		11016	11016	11056	11056	0
129	130	0	0		D			11086	11086	11056	11056	0
129	166	0	0		D			11086	11086	11056	11056	0
129	166	0	0		D			11086	11086	11056	11056	0
130	131	4	1	1		INS FIN TUBE PIPING	960	11086	11086	11116	11116	0
131	400	12	0	1		ET/R		11126	11126	11306	11306	0
131	170	0	0		D			11126	11246	11116	11236	8
131	170	0	0		D			11126	11246	11116	11236	8
132	138	6	6	2	P	INS SPRINKLER PIPING	2880	9166	10146	9236	10216	20
133	139	8	2	2	P	INS SHT MTL DUCT FTTNGS	4800	9206	10116	9296	10206	15
134	140	3	1	2	P	INS DMSTC WTR PPG-CLG	720	9136	10196	9156	10216	26
135	151	3	1	2	P	INS HTG&CLNG PPG IN CLG	720	9146	10196	9166	10216	25
136	153	8	1	2		INS TO/R PLMG RISERS	1920	9216	10126	9306	10216	15
137	152	4	3	2	P	INS RUFF ELEC CNDT&FDRS		9146	10186	9176	10216	24
138	153	0	0		D			9246	10226	9236	10216	20
138	154	5	6	2	C	INS SPRINKLER PIPG	2400	9246	10266	9306	11016	22
139	153	0	0		D			9306	10226	9296	10216	16
139	155	8	2	2	C	INS SHT MTL DUCT&FTTNGS	4800	9306	10216	10116	11016	15
140	153	0	0		D			9166	10226	9156	10216	26
140	156	3	1	2	C	INS DMSTC WTR PPG-CLG	720	9166	10286	9206	11016	30

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	NODE SEQUENCE E/S	L/S	E/F	L/F	TF
151	153	0	0		D		9176	10226	9166	10216	25
151	157	2	1	2	C INS HTG&CLNG PPG IN CLG	480	9176	10296	9206	11016	30
152	153	0	0		D		9206	10226	9176	10216	24
152	159	3	3	2	C INS RUFF ELEC CNDT&FDRS		9206	10286	9226	11016	28
153	158	4	4	2	ER INT MSNRY PARTNS		10016	10226	10066	10276	15
154	160	0	0		D		10016	11026	9306	11016	22
155	160	0	0		D		10126	11026	10116	11016	15
156	160	0	0		D		9216	11026	9206	11016	30
157	160	0	0		D		9216	11026	9206	11016	30
158	161	0	0		D		10076	10286	10066	10276	15
159	160	0	0		D		9236	11026	9226	11016	28
160	163	0	0		D		10126	11026	10116	11016	15
161	162	3	5	2	P ER STUDS FOR DRY WALL		10076	10286	10116	11016	15
162	163	0	0		D		10126	11026	10116	11016	15
162	165	4	5	2	C ER STUDS FOR DRY WALL		10126	11046	10156	11096	17
163	164	4	1	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
163	164	4	3	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
164	166	0	0		D		10196	11086	10186	11056	14
164	167	0	0		D		10196	11106	10186	11096	16
165	167	0	0		D		10186	11106	10156	11096	17
166	168	6	5	2	P HANG DRY WALL		11086	11086	11156	11156	0
167	168	4	1	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
167	168	4	3	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
168	169	6	5	2	C HANG DRY WALL		11166	11166	11236	11236	0
169	170	0	0		D		11246	11246	11236	11236	0
170	171	4	1	2	INS FIN TUBE PIPG	960	11246	11246	11306	11306	0
171	400	0	0		ET/R		12016	12016	11306	11306	0
0	0	0					0	0	0	0	0

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

VICTORIA MECHANICAL COMPANY

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

RALPH J STEPHENSON P E - CONSULTANT

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

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	EARLY STRT SEQ E/S	L/S	E/F	L/F	TF
1	2	106	0		T/R TO START OF PROJECT		1026	1076	5316	5316	0
2	3	65	0	1	T/R POUR OUT 1ST FL SOG		6016	6226	8316	9226	15
2	4	69	0	2	T/R TO POUR OUT 2ND DECK		6016	6166	9076	9226	11
2	5	58	0	R	T/R TO C ER RF MTL DECK		6016	7206	8206	10086	34
2	6	70	0	R	T/R TO C LAY INSUL & RFG		6016	7166	9086	10226	32
2	7	102	0		T/R TO C EXT MSNRY&GLZNG		6016	6016	10226	10226	0
101	107	6	6	1	P INS SPRINKLER PIPG	2880	9086	9286	9156	10056	14
102	108	8	2	1	P INS SHT MTL DCT&FTTINGS	4800	9086	9246	9176	10056	12
103	109	3	1	1	P INS DMSTC WTR PPG-CLG	720	9086	10016	9106	10056	17
104	110	4	1	1	P INS HTG&CLNG PPG IN CLG	960	9086	10066	9136	10116	20
105	111	9	1	1	INS TO/R PLUMBG RISERS	2160	9086	9236	9206	10056	11
106	112	4	3	1	P INS RUFF ELEC CNDT&FDRS		9086	9306	9136	10056	16
109	116	3	1	1	C INS DMSTC WTR PPG-CLG	720	9136	10146	9156	10186	23
134	140	3	1	2	P INS DMSTC WTR PPG-CLG	720	9136	10196	9156	10216	26
110	117	5	1	1	C INS HTG&CLNG PPG IN CLG	1200	9146	10126	9206	10186	20
112	119	3	3	1	C INS RUFF ELEC CNDT&FDRS		9146	10146	9166	10186	22
135	151	3	1	2	P INS HTG&CLNG PPG IN CLG	720	9146	10196	9166	10216	25
137	152	4	3	2	P INS RUFF ELEC CNDT&FDRS		9146	10186	9176	10216	24
107	114	5	6	1	C INS SPRINKLER PIPG	2400	9166	10126	9226	10186	18
132	138	6	6	2	P INS SPRINKLER PIPING	2880	9166	10146	9236	10216	20
140	156	3	1	2	C INS DMSTC WTR PPG-CLG	720	9166	10286	9206	11016	30
151	157	2	1	2	C INS HTG&CLNG PPG IN CLG	480	9176	10296	9206	11016	30
108	115	8	2	1	C INS SHT MTL DUCT&FTTINGS	4800	9206	10076	9296	10186	13
133	139	8	2	2	P INS SHT MTL DUCT FTTINGS	4800	9206	10116	9296	10206	15
152	159	3	3	2	C INS RUFF ELEC CNDT&FDRS		9206	10286	9226	11016	28
113	118	6	4	1	ER INT MSNRY PARTNS		9216	10066	9286	10136	11
136	153	8	1	2	INS TO/R PLMG RISERS	1920	9216	10126	9306	10216	15
138	154	5	6	2	C INS SPRINKLER PIPG	2400	9246	10266	9306	11016	22
118	121	3	5	1	P ER STUDS FOR DRY WALL		9296	10146	10016	10186	11
139	155	8	2	2	C INS SHT MTL DUCT&FTTNGS	4800	9306	10216	10116	11016	15
153	158	4	4	2	ER INT MSNRY PARTNS		10016	10226	10066	10276	15
121	124	3	5	1	C ER STUDS FOR DRY WALL		10046	10226	10066	10266	14
122	123	4	1	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
122	123	4	3	1	P INS IN WLL MECH/ELEC WK	1920	10046	10196	10076	10226	11
161	162	3	5	2	P ER STUDS FOR DRY WALL		10076	10286	10116	11016	15
126	127	3	1	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
126	127	3	3	1	C INS IN WLL MECH/ELEC WK	1440	10086	10276	10126	10296	13
162	165	4	5	2	C ER STUDS FOR DRY WALL		10126	11046	10156	11096	17
163	164	4	1	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
163	164	4	3	2	P INS IN WLL MECH/ELEC WK	1920	10136	11026	10186	11056	14
167	168	4	1	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
167	168	4	3	2	C INS IN WLL MECH/ELEC WK	1920	10196	11106	10226	11156	16
125	128	5	5	1	P HANG DRY WALL		10256	10256	10296	10296	0

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

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

VICTORIA MECHANICAL COMPANY

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

RALPH J STEPHENSON P E - CONSULTANT

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

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

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

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

VICTORIA MECHANICAL COMPANY

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

RALPH J STEPHENSON P E - CONSULTANT

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

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

107

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

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

VICTORIA MECHANICAL COMPANY

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

RALPH J STEPHENSON P E - CONSULTANT

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

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

I	J	DAYS	RSP	LOC CD	AND DESCRIPTION	COST	TOTAL FLT E/S	L/S	SEQ E/F	L/F	TF
134	140	3	1	2	P INS DMSTC WTR PPG-CLG	720	9136	10196	9156	10216	26
152	159	3	3	2	C INS RUFF ELEC CNDT&FDRS		9206	10286	9226	11016	28
140	156	3	1	2	C INS DMSTC WTR PPG-CLG	720	9166	10286	9206	11016	30
151	157	2	1	2	C INS HTG&CLNG PPG IN CLG	480	9176	10296	9206	11016	30
2	6	70	0	R	T/R TO C LAY INSUL & RFG		6016	7166	9086	10226	32
2	5	58	0	R	T/R TO C ER RF MTL DECK		6016	7206	8206	10066	34

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

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

RALPH J STEPHENSON P E - CONSULTANT

LISTING IS IN LATE START SEQUENCE

ACTIVITIES FROM 9-24-76 TO 10-26-76

RETURN BY 10-19/76

I	J	-DEADLINE- START	FINISH	TOTAL DAYS	RESPONSIBILITY	COMMENT	DAYS LATE
TASK DESCRIPTION							
2	7	6 1 76	10 22 76	102	NOT ASSIGNED	SHOULD FINISH	
	T/R TO C EXT MSNRY&GLZNG						
2	6	7 16 76	10 22 76	70	NOT ASSIGNED	SHOULD FINISH	
R	T/R TO C LAY INSUL & RFG						
105	111	9 23 76	10 5 76	9	VICTORIA MECHNL	SHOULD FINISH	
1	INS TO/R PLUMBG RISERS			2160			
113	118	10 6 76	10 13 76	6	MASONRY CONTRCT	SHOULD START AND FINISH	
1	ER INT MSNRY PARTNS						
108	115	10 7 76	10 18 76	8	HVAC CONTRCTR	SHOULD FINISH	
1	C INS SHT MTL DUCT&FTTNGS			4800			
133	139	10 11 76	10 20 76	8	HVAC CONTRCTR	SHOULD FINISH	
2	P INS SHT MTL DUCT FTTNGS			4800			
110	117	10 12 76	10 18 76	5	VICTORIA MECHNL	SHOULD FINISH	
1	C INS HTG&CLNG PPG IN CLG			1200			
136	153	10 12 76	10 21 76	8	VICTORIA MECHNL	SHOULD START AND FINISH	
2	INS TO/R PLMG RISERS			1920			
109	116	10 14 76	10 18 76	3	VICTORIA MECHNL	SHOULD FINISH	
1	C INS DMSTC WTR PPG-CLG			720			
112	119	10 14 76	10 16 76	3	ELEC CONTRCTR	SHOULD FINISH	
1	C INS RUFF ELEC CNDT&FDRS						
118	121	10 14 76	10 16 76	3	DRY WALL CONTRC	SHOULD START AND FINISH	
1	P ER STUDS FOR DRY WALL						
132	135	10 14 76	10 21 76	6	SPRNKLR CONTRCT	SHOULD START AND FINISH	
2	P INS SPRINKLER PIPING			2880			
137	152	10 18 76	10 21 76	4	ELEC CONTRCTR	SHOULD START AND FINISH	
2	P INS RUFF ELEC CNDT&FDRS						
122	123	10 19 76	10 22 76	4	VICTORIA MECHNL	SHOULD START AND FINISH	
1	P INS IN WLL MECH/ELEC WK			1920			

PROJECT STATUS REPORT FOR NEW OFFICE FACILITY HIGHLAND AND MORAN

ACTIVITIES FROM 9-24-76 TO 10-26-76

RETURN BY 10-19/76

I J	-D E A D L I N E- START	FINISH	TOTAL DAYS	RESPONSIBILITY	COMMENT	DAYS LATE
TASK DESCRIPTION						
122 123	10 19 76	10 22 76	4	ELEC CONTRCTR	SHOULD START AND FINISH	
1 P INS IN WLL MECH/ELEC WK			1920			
139 155	10 21 76	11 1 76	8	HVAC CONTRCTR	SHOULD START AND CONTINUE	
2 C INS SHT MTL DUCT&FTTNGS			4800			
121 124	10 22 76	10 26 76	3	DRY WALL CONTRC	SHOULD START AND FINISH	
1 C ER STUDS FOR DRY WALL						
153 158	10 22 76	10 27 76	4	MASONRY CONTRCT	SHOULD START AND CONTINUE	
2 ER INT MSNRY PARTNS						
125 128	10 25 76	10 29 76	5	DRY WALL CONTRC	SHOULD START AND CONTINUE	
1 P HANG DRY WALL						
138 154	10 26 76	11 1 76	5	SPRNKLR CONTRCT	SHOULD START AND CONTINUE	
2 C INS SPRINKLER PIPG			2400			

RALPH J. STEPHENSON, P. E.
CONSULTING ENGINEER

November 1,

Subject: Monitoring Report #1

New Office Facility

Highland and Moran, Keith, Iowa

Victoria Mechanical Company

Project: 76:10

Monitored from Issue #1 dated April 26,

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

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

Actions taken:

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

General Summary

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

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

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

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

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

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

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

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

Ralph J. Stephenson, P.E.

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RALPH J. STEPHENSON, P. E.
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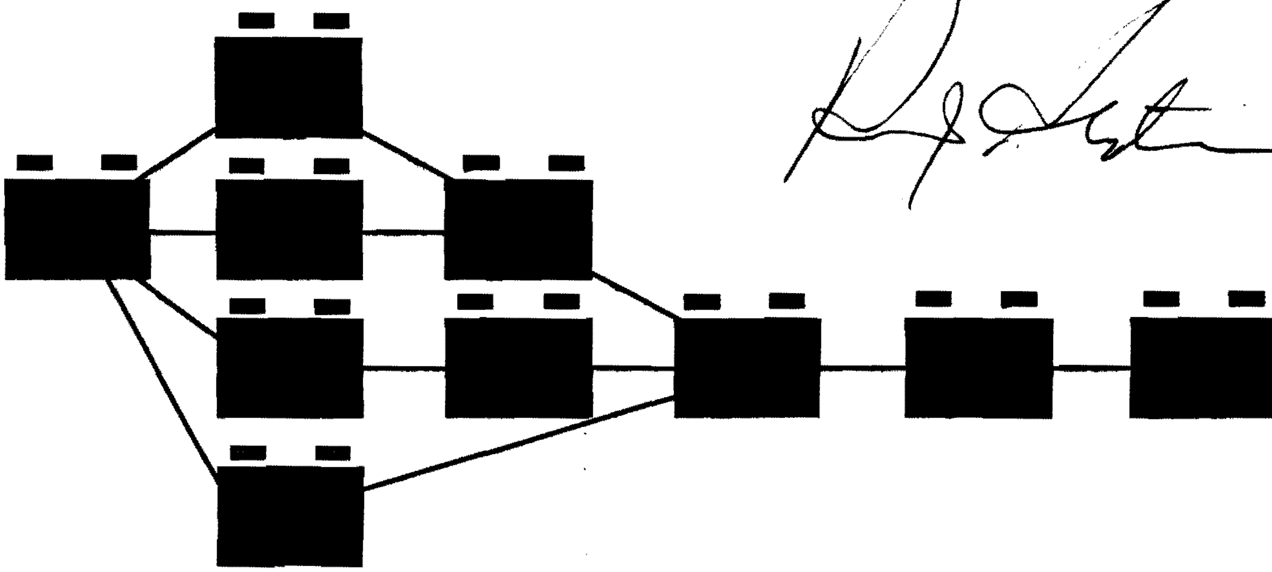
Monitoring #2

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

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



Critical Path Planning Seminar

January 29 & 30, 1992

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