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16. Abstract

The Pre-Construction Management System is a system to aid managers in planning and controlling schedules and manpower requirements for the Design phase of highway projects. The major objectives of this development include the following: (1) to provide projections of the month-by-month demand for design personnel needed to complete a Letting Program, and to gauge how that demand is altered by changes in the Schedule of Lettings; (2) to efficiently schedule projects in parallel, such that each project can be completed as early as possible, with a given limited number of personnel; and (3) to provide up-to-date information on the status of projects, manpower needs, and scheduled milestone dates, for management decision-making. The basis for the System includes the following: (1) Critical Path Method, which breaks a project into a set of manageable tasks, and links them in a logical sequence (networks); (2) fourteen networks of design activities, one for each class of project, with activity durations and manpower values defaulted to the average case; (3) modification of default activity durations and manpower requirements; and (4) modification of planning values by an experienced manager as a project becomes better defined and more information becomes available.

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PRE-CONSTRUCTION MANAGEMENT SYSTEM: PROCEDURES MANUAL

by

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Fred Hugo

Research Report Number 922-1F

Implementation of a Highway Pre-Construction Project Management System

Research Project 3-8-89/9-922

conducted for

Texas State Department of Highways and Public Transportation

by the

CENTER FOR TRANSPORTATION RESEARCH

Bureau of Engineering Research
THE UNIVERSITY OF TEXAS AT AUSTIN

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PREFACE

There is a pressing need within the Districts for a method of assessing manpower requirements, and for improving the forecasting of completion dates for projects. While the system must address information needs for project management, it should not introduce additional complexity.

ABSTRACT

The Pre-Construction Management System is a system to aid managers in planning and controlling schedules and manpower requirements for the Design phase of highway projects. The major objectives of this development include the following: (1) to provide projections of the month-by-month demand for design personnel needed to complete a Letting Program, and to gauge how that demand is altered by changes in the Schedule of Lettings; (2) to efficiently schedule projects in parallel, such that each project can be completed as early as possible, with a given limited number of personnel; and (3) to provide up-to-date information on the status of projects, manpower needs, and scheduled milestone dates, for management decision-making. The basis for the System includes the following: (1) Critical Path Method, which breaks a project into a set of manageable tasks, and links them in a logical sequence (networks); (2) fourteen networks of design activities, one for each class of project, with activity durations and manpower values defaulted to the average case; (3) modification of default activity durations and manpower requirements; and (4) modification of planning values by an experienced manager as a project becomes better defined and more information becomes available.

SUMMARY

The busier a manager finds himself, the more he needs to plan his work. This system is intended to relieve busy managers from the more mechanical aspects of planning, scheduling, and reporting, allowing them to fully concentrate on managing their projects. Successful implementation of the System will lead to the following results: (1) advance notice of manpower needs, allowing time for corrective measures; (2) formal analysis of the manpower required to handle additional work, and the effect of changed priorities or limited manpower on project completions; (3) improved forecasts of completion times for design projects, based on systematic evaluation of work required; (4) enhanced communication and coordination by directing attention to critical activities/functions, resulting in tighter tracking and control; (5) more efficient management of District manpower, by smoothing the spikes in demand, and the consequent need for overtime; and (6) simplified preparation of status reports, relieving project managers from manually collating and reporting data.

IMPLEMENTATION STATEMENT

The adoption of a new system of planning and controlling work requires commitment and support from the highest levels of the organization. Implementation of the Pre-Construction Management System is currently underway under leadership within the Design Division of the Department. Initial implementation efforts will involve Districts 11 (Lufkin), 12 (Houston, 13 (Yoakum), 14 (Austin), and 21 (Pharr). Each District should set up an Implementation Committee for the purpose of overseeing the implementation of the system. The suggested Committee makeup and responsibilities are detailed in this report.

PRE-CONSTRUCTION MANAGEMENT SYSTEM
PROCEDURES MANUAL

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CHAPTER 1

INTRODUCTION

Introduction

This Chapter presents the following:

- Overview of the System
- The System Modules
- Implementation Procedure

Overview of the System

The Pre-Construction Management System is a system to aid managers in planning and controlling Schedules and Manpower requirements for the Design phase of highway projects.

Major Objectives

- To provide Projections of the month-by-month Demand for Design Personnel needed to complete a Letting Program, and to gauge how that demand is altered by changes in the Schedule of Lettings.
- To efficiently schedule projects in parallel, such that each project can be completed as early as possible, with a given limited number of personnel.
- To provide up-to-date Information on the Status of projects, Manpower needs, and scheduled Milestone Dates, for management decision-making.

Major Benefits

• Advance notice of manpower needs- allowing adequate time for policy formulation, including identification of the need for Consultants to handle temporary peaks.

• Formal analysis of the manpower required to handle additional work, and the effect of changed priorities or limited manpower on project completions.

• Better forecasts of completion times for design projects, based on systematic evaluation of the work required, and followed up with qualitative analysis of progress.

• Enhanced communication and co-ordination by directing attention to critical activities/functions - resulting in tighter tracking and control of pre-construction activities.

• More efficient management of District manpower, by smoothing the spikes in demand, and the consequent need for overtime.

• Simplified preparation of status reports, relieving Project Managers from manual work in collating data and reporting- freeing them to plan and manage their projects.

System Basis

• The Critical Path Method (CPM), which breaks a project into a set of manageable tasks, and links them in a logical sequence (network).

• Fourteen networks of design activities, one for each class of project (eg, New-Location Freeway, etc.) with activity durations and manpower values defaulted to the average case.

• Modification of default activity durations and manpower requirements, as functions of Construction Cost.

• Modification of planning values by an experienced manager as a project becomes better-defined and more information becomes available.

System Environment

• Micro-computer, instead of a mainframe, allowing managers to be closer to the inputs and outputs of the System. Requires minimal learning time.

• Freedom to successively alter input values until the output is satisfactory: thus, alternative 'what-if' strategies can be simulated, for contingency planning.

• Requires an IBM-compatible personal computer, Super-Project-Expert (project management software), and Lotus 123 (spreadsheet software). Automation of repetitive procedures using Flash-Up (macro-maker software) is optional.

The System Modules

The System comprises three modules:

• Advance Planning Module (APM) for analysis of long-term manpower demands of the District Letting Schedule.

• Scheduling Module (SM) for scheduling design activities within the constraints of available manpower.

• Monitoring and Control Module (MCM) for analyzing the impacts of actual progress on future schedules.

Advance Planning Module (APM)

• Is a planning tool, to be applied to the Five-Year PDP.

• Allows for three alternative approaches.

Alternative A

• Provides an initial estimate of District Manpower Requirement in each function from projected average annual District Letting Volume.

Alternative B

• Provides a second estimate of District Manpower Requirement in each function from average annual number of projects of each type in the District, and their respective dollar volumes.

Alternative C

• Provides a profile of the month-by-month demand for each design discipline over the Five-Year Program for the District.

• Requires the classification type of each project, eg Widen Non-Freeway, Estimated Construction Cost, and the planned Letting Date.

Compatibility

• Since each alternative is based on different formulas, the results will differ. In order, each alternative requires more input than the previous, and commensurately provides more accurate estimates.

Scheduling Module (SM)

• Develops schedules for all the current projects assigned to a Design Group.

• Requires the classification type of each project, its Construction Cost, and its Letting Date.

• Outputs the target dates for project phases and individual activities, and the manpower required to meet those dates.

• Alternatively, if manpower is limited, the expected delays are calculated.

• Analyses should be carried out whenever new projects are assigned to the Group.

• The Design Group Supervisor should be responsible for this module.

Monitoring and Control Module (MCM)

• Analyzes the active projects in the Design Group, on a monthly basis.

• Requires the dates when activities were started and finished, best tracked by the Project Manager.

• Outputs are status reports to various levels of detail.

• Highlights current and potential delays for managerial action.

• Serves as a record of actual project performance.

Implementation Procedure

The adoption of a new system of planning and controlling work requires commitment and support from the highest levels of the organization.

Mandate

- A pressing need in the District for a method of assessing manpower requirements, and for improving the forecasting of completion dates for projects.
- System must address information needs for project management, but not introduce additional complexity.

Implementation Committee

The District should set up an Implementation Committee for the purpose of overseeing the implementation of the system.

Committee Makeup:

- Headed by the District Engineer.
- Includes the District Design Engineer.
- At least two Design Supervisors.
- One representative from the Right-of-Way Section.
- One representative from the Schematics/ Environmental Section.
- One member designated Implementation Co-ordinator.

Committee Responsibilities

The Committee should meet at least monthly, possibly as a follow-on to a regular district monthly meeting. The Committee should:

• Set up a schedule for implementation of the system in the District.

• Review the basic networks, and modify if absolutely necessary, to match District needs.

• Establish reporting formats for adoption throughout the District.

• Designate personnel for training and subsequent operation of the system.

• Monitor the implementation of the respective modules in individual Design Groups, assist with problems, and review outputs.

• Explore additional uses of the system, and enhancements.

• Forward recommendations to D-8 For updating the planning models and this manual.

This System should be a topic at the annual State-wide Engineers conference, where experiences can be exchanged.

Initiation

The schedule for the implementation process should be continually evaluated. (See Chapter 3 for detailed Procedures). The sequence should be:

• Review and approve the fourteen networks.

• Load all the projects in the Five-Year PDP into the APM. This may take anywhere from six weeks to 3 months. The Projects in the One-Year PDP need not be included, since the objective is the long-term outlook.

• At the same time, designated Design Supervisors should start loading their active projects into the Scheduling Module. The Implementation Co-ordinator can assist in this exercise. It is easier to start with projects to be let further in the future. Thus, by the time immediate projects are loaded, the system will be better understood, and actual status will be easier to assess. This process will take 1 to 2 months, at most.

• By then, too, the Monitoring and Control Module will, with no extra effort, be active for those Supervisors- the system will be operational.

Continuation

• Other Design Groups should be trained and brought on stream as soon as resources permit.

• As each Group plans its projects, the files should be forwarded to the APM, which would thus be refined.

• The schedules developed at the Design Group level would eventually replace the initial files in the APM, providing a more accurate outlook at the district level.

Utility

• Reports generated by the system can be customized for individual needs. However, for the system to be effective, reports to higher management ought to be summary and consistent.

• The system reports should be used to actually manage projects. Managers who ignore this tool may find themselves left behind while others pre-empt the resources needed to complete their projects on schedule.

Conclusion

The busier a manager finds himself, the more he needs to plan his work. This System is intended to relieve busy managers of the more mechanical aspects of planning, scheduling and reporting, allowing them to fully concentrate on managing their projects.

CHAPTER 2

SYSTEM ENVIRONMENT

Introduction

This chapter discusses the basis of the Pre-Construction Management System design. The system was developed through input and feedback from experienced managers of the Texas Highway Department, in order to match the unique project management needs of the organization.

Organizational Environment

Figure 2.1 illustrates how projects are programmed for Letting in the Highway Department.

- projects typically progress through the hierarchy, though not in queue.
- occasionally, a project may leapfrog if deemed essential.
- the major milestones in the life of a pre-construction project are:
    1. Design Studies Authorized
    2. ROW Acquisition Authorized
    3. PS&E Authorized
    4. Contract Let for Construction.

Figure 2.2 illustrates in outline the structure of the Highway Department Organization as it relates to the management of pre-construction activities.

- each level needs project information in order to make decisions.
- information is developed at intermediate levels and must flow up and down.

STRATEGIC MOBILITY PLAN (SMP) : LONG-TERM (20 YR)

*Identified Needs
*Revised every 2 years

TEN-YEAR PROGRAM (PDP)

*Based on Funding Projections and Highway System Reqmts
*CSJ Numbers Assigned
*Projects Assigned to Des.Supvr.
*Design Studies Authorized
*Advance Letting Schedule
*Revised every 2 years

FIVE-YEAR PROGRAM

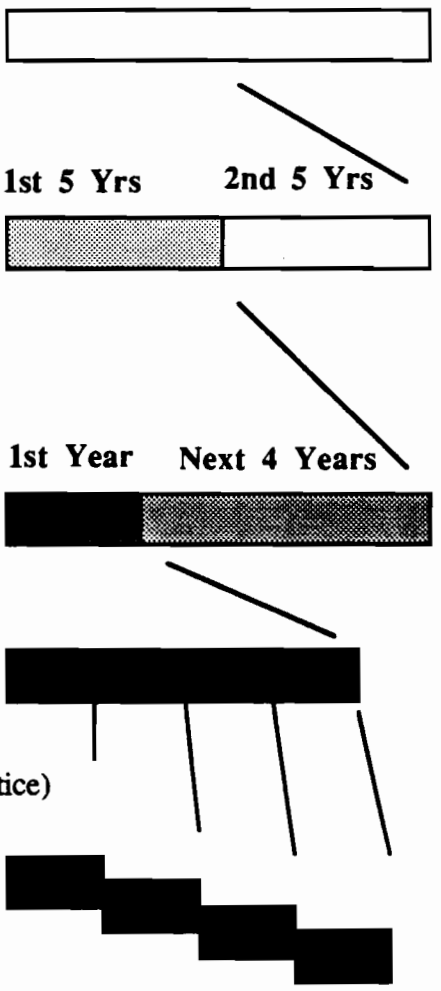
*Highway System Priorities
*ROW Acquisition Authorized
*Planned Letting Dates (Month/Year)
*Revised every 2 years

ONE-YEAR PROGRAM

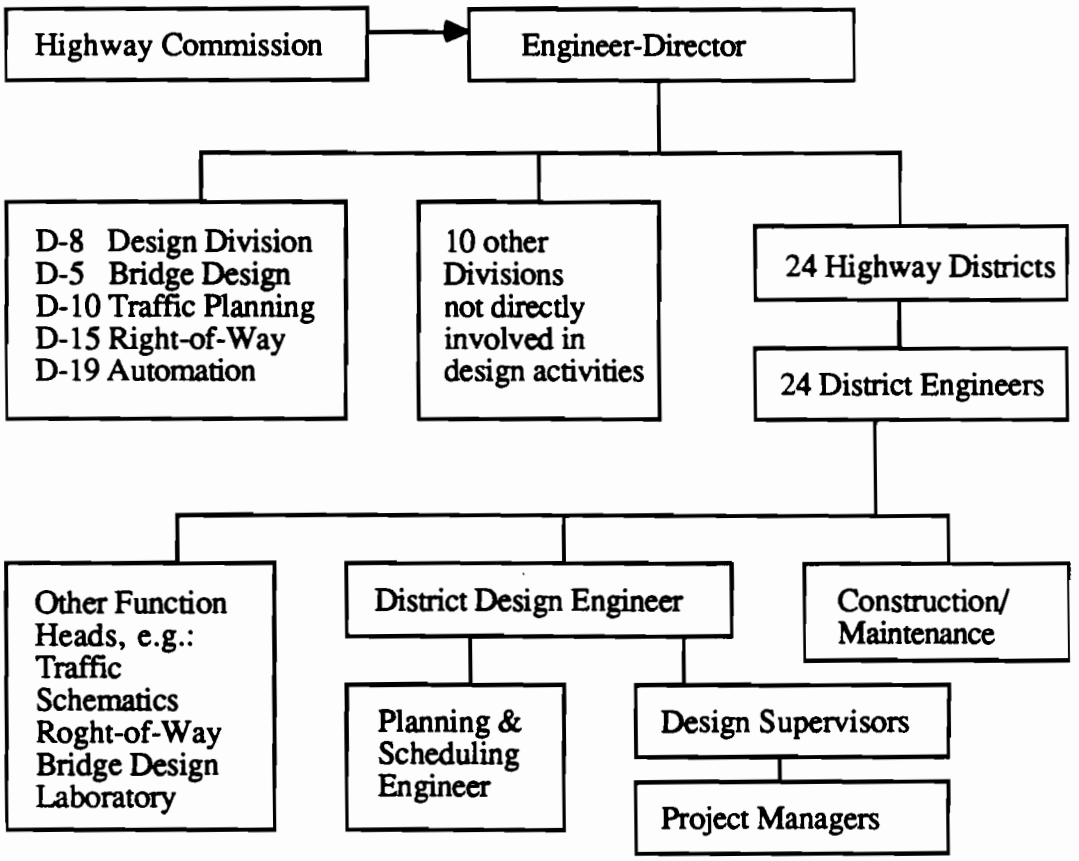
*Letting Authorized
*Funding Assigned
*Updated Monthly (4-month Advance Notice)
*Scheduled Letting Dates

MONTHLY LETTINGS

*Published by D-8
*Funding Committed
*Updated Monthly



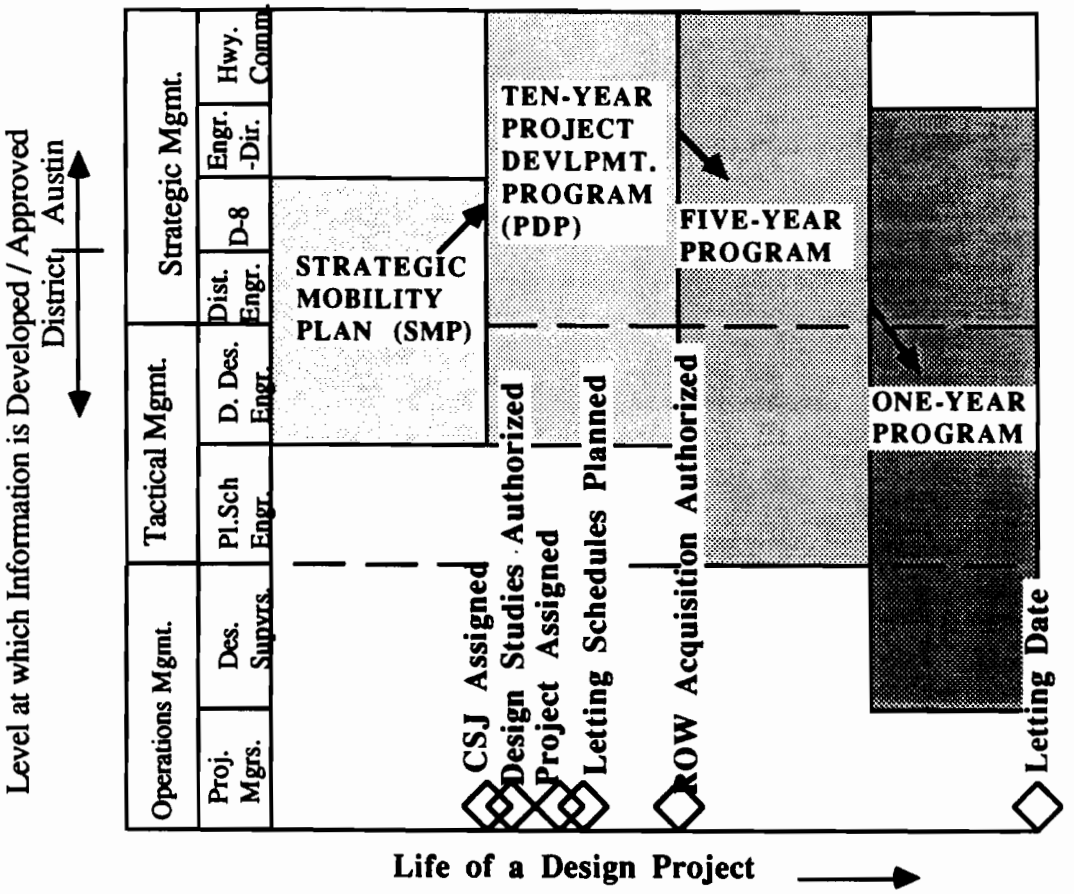
PROGRAMMING OF PROJECTS FOR LETTING
Figure 2.1



HIGHWAY DEPARTMENT ORGANIZATION STRUCTURE

Figure 2.2

Figure 2.3 integrates Figures 2.1 and 2.2 to illustrate the levels at which project management information is developed and approved, and at what stage in the life of a project. For example, the Ten-Year PDP is developed at the District Design Engineer's level, and approved by the Highway Commission.



PROGRAM EXECUTION IN THE ORGANIZATION

Figure 2.3

This identifies the levels at which project decisions are made, and the timing when these decisions are required. In this way, the information required for decision-making was determined, and the system was designed to satisfy those needs.

Operation of the Three Modules

Figure 2.4 superimposes the three modules of the system on Figure 2.3, illustrating how they span the levels of the organization and the life of a project. Their overlapping indicates that a project is tracked simultaneously in the three modules, and that project data is shared and exchanged.

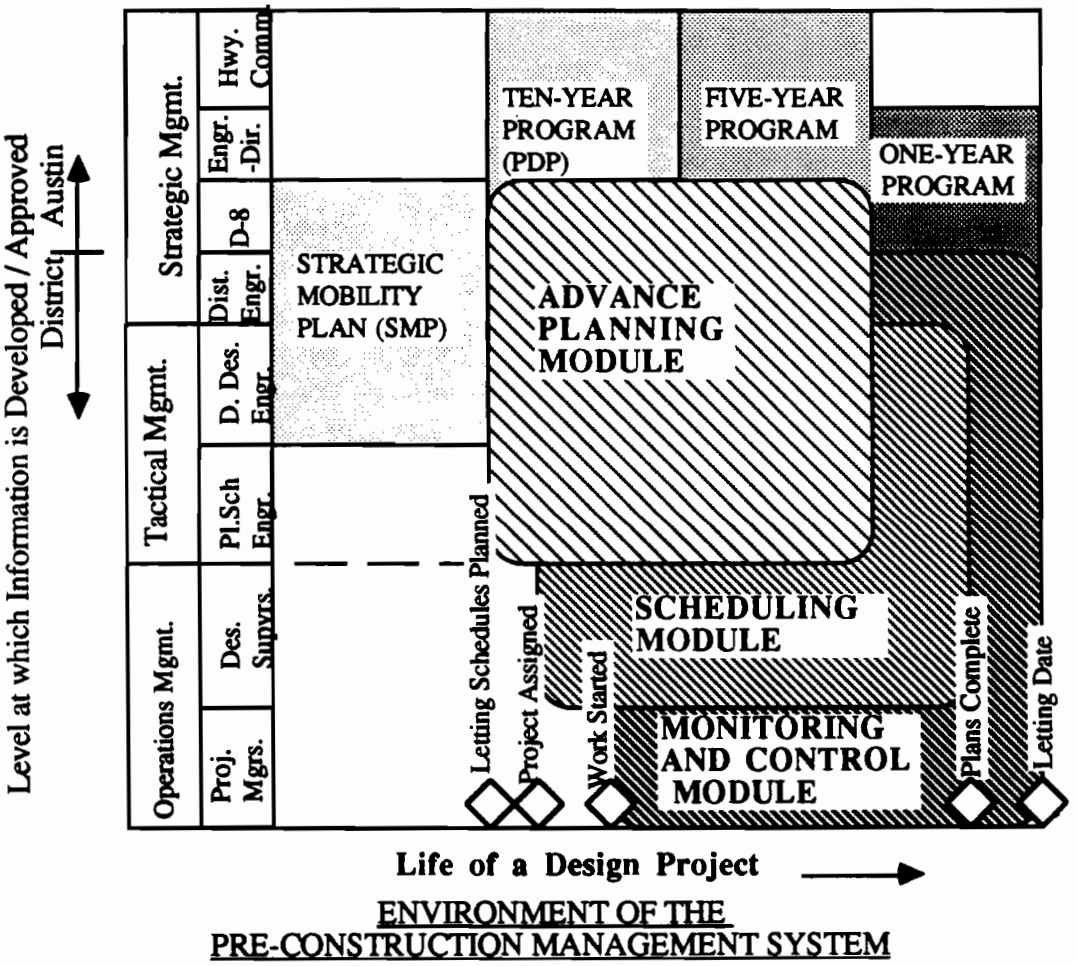


Figure 2.4

The Advance Planning Module

• would start tracking a project when it enters the Ten-Year PDP.

• manpower and schedule requirements for the Five-Year PDP would be developed by the Planning and Scheduling Engineer for review and approval by the District Design Engineer and the District Engineer.

• the data would be updated quarterly based on actual progress in each project.

• projects would be tracked in this Module until they enter the One-Year Program. At that stage, it is unlikely that decisions on resource re-allocation will materially affect the progress of that project.

The Scheduling Module

• would track projects when they are assigned to Design Supervisors.

• the impact of the new assignments on current work schedules, and the revised demand for resources would be determined by the Design Supervisor.

• the ability to achieve Planned Letting Dates would also be analyzed.

• analyses would be performed whenever new projects are assigned to his Design Group, and in any event, at least quarterly.

• outputs would feed up to the District Design Engineer's level for approval.

• files would be copied quarterly to the Advance Planning Module.

• projects would stay in this Module until PS&E are complete and forwarded to Austin. Thereafter, a project's resource demand is negligible, and there is no need to keep on analyzing it.

The Monitoring and Control Module

• would commence tracking when work starts on a project, any time after it enters the Scheduling Module. In fact, these two modules would utilize the same files, even the same machine.

• individual Project Managers would be responsible for updating their projects monthly, and the Design Supervisor would review input before recalculating the schedules.

• files would be copied quarterly to the Advance Planning Module.

• output reports would go all the way up to the District Engineer.

• projects would be dropped from this Module when they are let.

Hardware

Minimum hardware requirements for operating the system are:

• IBM-compatible Personal Computer with at least 512K of RAM (random access memory). A faster machine with math co-processor would be desirable.

• Two double-density (or one double-density and one high-density) $5^1/2$ " diskette drives. A hard-disk with at least 20 Mb of space is recommended.

• An 80-column monitor, either color or monochrome.

• An 80 character-per-line printer for regular-quality printouts. A plotter is suggested for higher quality outputs.

• Operating system, DOS, version 2.0 or higher. (Accessible memory is 640K, which restricts the number of projects simultaneously analyzed to 15 to 20.) A

computer which can be expanded to take advantage of OS/2, such IBM PS/2 Model 70, is suggested.

Software

The following software are required for operation of the system:

• SuperProject Expert (SPJ) project management software, by Computer Associates of San Jose, California.

Selected for its compatibility with the Department's project management needs:

- ease of learning and adequate graphic capabilities
- alternative ways of inputting data
- ability to exchange selected data with other software
- an OS/2-compatible edition
- the Vendor's continuing upscaling of the program's capabilities

• Lotus 123 spreadsheet software to combine and display data on the large number of projects in the PDP (because of the DOS limitation on the number of projects that can be analyzed simultaneously in SPJ).

SPJ exports project data to Lotus files, allowing Resource Histograms from hundreds of projects to be cumulated and analyzed. The combined histograms cannot be leveled in the sense that SPJ levels demand, but the display is more detailed, and the projects causing over-demand are clearly identifiable.

Considerations in the choice of Lotus 123 are:

- compatibility with SPJ for data exchange

- can combine data files and produce graphs
- sends text to a word-processing program for production of reports
- many Highway Department personnel are familiar with its use.

Library of Skeletal Networks

Development of the Networks

The key building block of the System is the Library of Skeletal Networks. For each of the fourteen types of highway projects identified by the Design Task Force in 1987 (Table 2.1), the major project phases were defined, then the activities within each phase, then the sequence in which the activities should logically proceed.

TABLE 2.1

THE FOURTEEN CLASSES OF HIGHWAY PROJECTS

1.	SC	Seal Coat
2.	OV	Overlay
3.	RER	Rehabilitate Existing Road
4.	CNF	Convert Non-Freeway to Freeway
5.	WF	Widen Freeway
6.	WNF	Widen Non-Freeway
7.	NLF	New-Location Freeway
8.	NNF	New-Location Non-Freeway
9.	INC	Interchange
10.	BWR	Bridge Widening/Rehab
11.	BR	Bridge Replacement
12.	UPG	Upgrade Freeway to Standards
13.	UGN	Upgrade Non-Freeway to Standards
14.	MSC	Miscellaneous Construction

Starting with New Location Freeways (chosen because it is the most comprehensive project type), managers from 5 volunteer districts identified the major phases, and detailed the constituent activities and sequences. It was found that the major phases corresponded to the accounting Function Codes, to which manhours are charged as a project develops.

Design Activities

Appendix A lists the activities which were identified as constituting the design of a New-Location Freeway, and the detailed scope of work under each activity. The list is organized according to the function code under which charges would be made, in order to retain compatibility with the FIMS database.

The Networks

The activities were organized into a network to capture the essential sequences. The criterion for linkage was: what must be accomplished before an activity can start? Another consideration was: what must be finished before an activity can finish?

After several reviews and iterations, an acceptable Network was arrived at - the Skeletal Network for New-Location Freeways and New-Location Non-Freeways. This comprised 43 activities. Then, for each project type, activities which were not required were eliminated, and those which were minor were combined. Thus, it was found that four basic networks could be used to model the fourteen project types:

Version	Projects	Activities
1.	NLF	43
2.	NNF WF WNF CNF INC	41
3.	BR BWR UPG UGN RER MSC	30
4.	SC OV	11

The major differences among the project types were found to be in the relative importance of each phase, as reflected in the extent of work or number of manhours for each activity, and the durations of the activities. But the significant finding was that all design projects could be modeled by the same basic sequence of activities.

The System comes with fourteen Skeletal Networks, one for each class of project. Appendix B contains the four types. The general flow is from left to right, but the actual position of activity boxes is not time-scaled.

The important thing to note is the relationships among the activities. If activity #2 can only start after activity #1 is finished, #1 is linked FS (Finish-Start) to #2. If activity #4 can start once #3 is started, #3 is linked SS (Start-Start) to #4. If activity #6 cannot be finished until #5 is finished, #5 is linked FF (Finish-Finish) to #6. Linking the start of a precedent activity to the finish of a subsequent activity is not allowed. Lag times were deliberately avoided by building them into the activities themselves.

Each activity has a duration in working days, and resources (persons of a specific discipline, Table 2.2) allocated to it for a percentage of their time over the

entire duration. This permits a resource to be allocated to several activities or projects simultaneously, allowing for the start-stop nature of many design activities.

Resources

A resource is a person or group with unique capabilities. Each person performing design is a resource. But it is not feasible to track each person's assignments. The design discipline in which skills are unique is a more logical tracking unit, since managers typically want to know, for example, how many Traffic Designers or how many Bridge Designers are required.

Thus six design disciplines were identified for tracking. This number was deliberately limited, because each additional resource makes analysis more computationally complex. However, since there varying levels of skill in these disciplines, a further subdivision identifying Engineers (=Designers) and Technicians (=Assistants) was made.

TABLE 2.2

DESIGN RESOURCES TO BE TRACKED

1. Planning	Engineer	Technician
2. Environmental	Engineer	Technician
3. General Design	Engineer	Technician
4. Traffic	Engineer	Technician
5. Bridge	Engineer	Technician
6. Right-of-Way	Engineer	Technician

The Formula Files

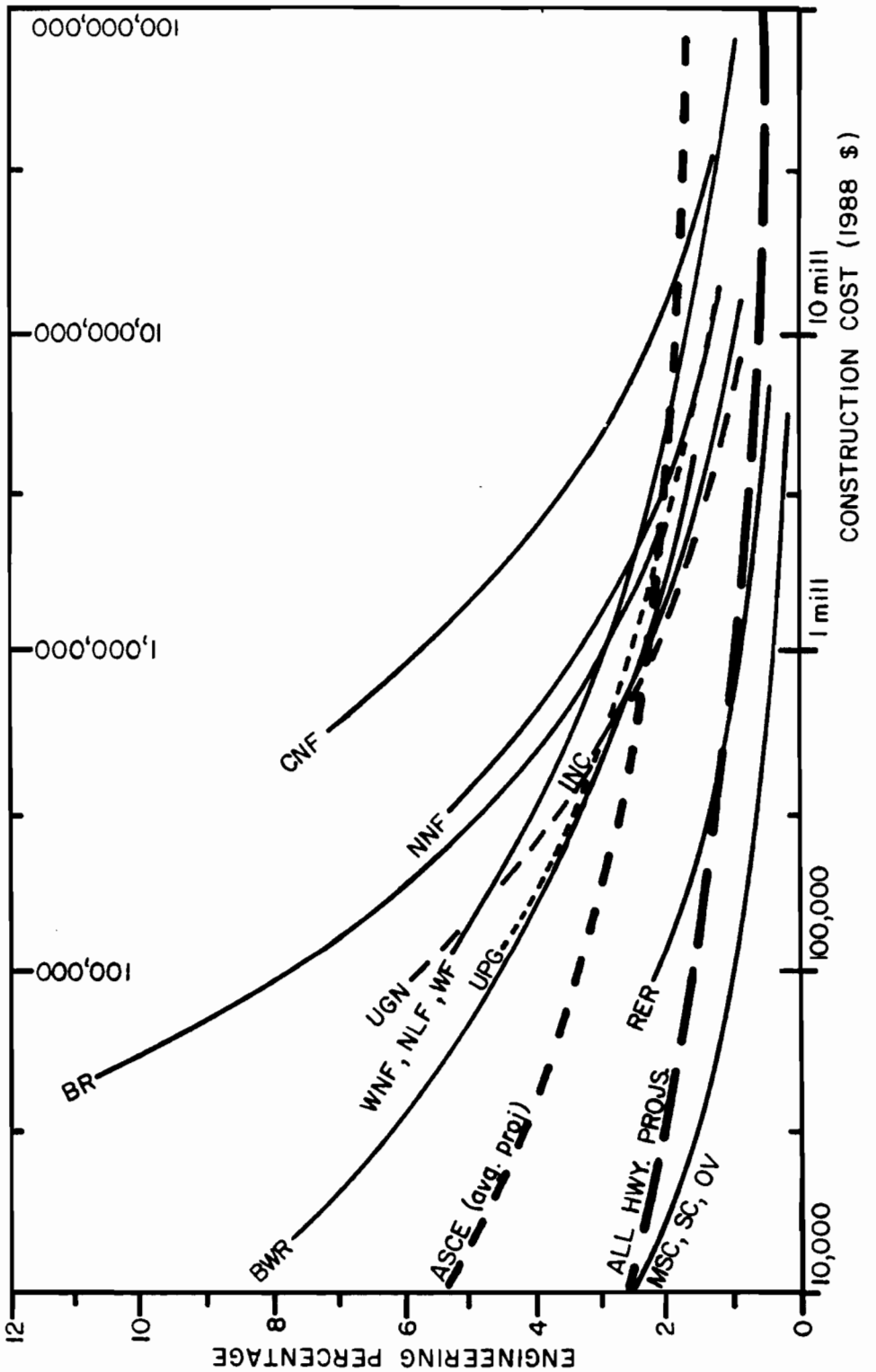
Concept

In order to produce a resource-schedule for a project the Network requires the duration in working days of each activity, the number of resources of each type working on the activity, and the percentage of their time they will spend on the activity over its duration: in effect, the resource-hours of each type consumed by the activity.

The Formula Files are Lotus-123 files, one for each project type, with built-in formulas which calculate activity durations and manhours, and resource requirements and allocations, when the estimated Construction Cost is entered. This is the only entry the planner has to make.

Manhours

It was found that the total engineering manhours for a project are a function of the Construction Cost. The relationships were transformed into Engineering Cost as a Percentage of Construction Cost, and are shown in Figure 2.5. From these, the Percentage Engineering is calculated from project cost. This is converted to dollars and hence manhours.



ENGINEERING COST AS A PERCENTAGE OF CONSTRUCTION COST

Figure 2.5

When total pre-construction manhours are calculated, a percentage (fixed for that project type) is allocated to each of Function Codes 110 to 180. Then the Manhours in each function code are further broken among the activities under that function code, each activity receiving a fixed percentage. Further, the activity manhours are split between Engineers and Technicians according to a fixed ratio for that activity.

The resulting resource hours are distributed evenly over the activity duration. For example, if the duration is 15 days and the Technician-hours is 60, that amounts to 4 Tech-hours per day or 50% of 1 person's time.

For each activity, there is a default number of resource-persons allocated. If the calculation results in that number working more than 100% of their time on the activity, the number of persons is increased one at a time until that allocation falls below 99%.

Durations

It was found that the total pre-construction duration of a project is highly variable. Project cost, number of manhours, project priority and number of staff assigned all seem to be influential. However, the durations of some activities appear to be related to project cost, while some appear to have fixed values.

The relationships between activity durations and Construction Cost used in the formula Files were developed from limited data on 13 projects, and thus the estimates may have considerable error. The resulting total project durations are greater

than the pattern of historical durations as obtained in the DCIS data, but by being conservative, they allow a manager sufficient room to accelerate his project if needed.

Default Values

All of the fixed percentages used in the Formula Files to estimate how the manhours in a project are distributed among activities and resources were derived from a Questionnaire sent to the 24 districts in July 1988. 20 districts responded in time for their data to be used.

The manager was asked to think of an average project of each type, and provide his best estimate of the average value, for each activity, of the following:

- the activity duration in working days.
- the percentage of the manhours in that function code typically charged to each activity
- the typical split in those manhours between Engineer (Designer) time and Technician (Non-designer) time, eg 40%-60%.

Means and Standard Deviations were computed to assess the distribution of the estimates. As expected, there was wide disparity. The number which seemed to reflect the majority opinion was used where possible. In other cases the mean or median was used.

Thus, the manhours and durations for each activity are calculated according to default formulas, as functions of the project construction cost. For each project type, the median construction cost was determined. Activity data corresponding to this cost were computed and entered into the Network for that project type, becoming default

values for that project type. Appendix C gives the default values for each of the fourteen networks.

Assumptions

It is important to understand that the default values are based on numerous assumptions. The major one is that averages are applicable to any individual project in any district. No significant differences were found in the performances of the 24 districts. However, construction cost is only one predictor of engineering manhours. It appears that an unquantifiable element often referred to as 'complexity' also plays a role.

The breakdown of manhours into the function codes using fixed percentages is also a major assumption. There is evidence that some of the function code manhours are in fact independent of project cost, and thus constitute 'project complexity'. These assumptions are made to initiate the system. As data is developed on actual projects, the default values would be revised accordingly.

Conclusion

The basis behind the system design has been presented. This establishes the soundness of the approach, while identifying the simplifications made to get a workable system started. As managers use this system, possible improvements would be seen. Feedback and exchange of ideas would serve to help make this a viable management tool.

CHAPTER 3

PROCEDURES

Introduction

This chapter provides the detailed procedures for using the System. The three Modules are described in detail. The objective and inputs for each module are first listed, then the keyboard inputs (**in bold**) and screen responses are given. Some special procedures are detailed. Most of these procedures can be automated by recording keyboard macros, using the program Flashup. Some likely error responses and trouble-shooting suggestions are offered at the end of the chapter.

Initial Set-up

Super-Project Expert

1. In the C drive, make a sub-directory called SPJ. **MD SPJ *Enter***
2. Enter that sub-directory. **CD SPJ *Enter***
3. Put the first SPJ diskette into the A drive, and copy all the files to the SPJ sub-directory. **COPY A:*.* *Enter***
4. Copy each SPJ diskette in the same way.
5. Load the program. **SPJ *Enter Enter***
6. View the Set-up Preferences. **/VS**
7. Set the mode to Expert. **/EE**
8. Modify the preferences as follows (highlight each choice using the arrow keys, then press ***Enter***):

Auto Recalculation	= No	Resource Leveling	= No
Confirm Quit	= Yes	Feedback Actuals	= Yes
Confirm Delete	= Yes	Level Using Priority	= No
Auto Putaway	= No	Show Link Type	= Yes
Auto Positioning	= No	Show Extended Report	= Yes
Auto Create Resources	= No	Show Subprojects	= Yes
Sound	= Yes	Show Duration Deviation	= No
Blink Conflict	= Yes	Show Hour of Day	= No
Date Entry on PERT/WBS	= Yes	Show Time of Day	= No
Evaluation Diagnostics	= Yes	Show Costing	= Yes
Auto Arrange on PERT	= No	Show Actuals	= Yes
Time Format	= 12hr	Show Early/Late	= Yes
2nd Gantt Line	= Actual	Show Planned	= Yes
Screen = select your monitor type		Show WBS	= Yes
Project Suffix	= pj	Show Workday	= Yes
Gantt Hrs per day	= 9	Show FinDelay	= Yes
Mark Tasks Critical with Float To: 1		Show WBS Number	= Yes
Current Date = your input			

9. Save this as the default. **/ES C:\SPJ\SYSPREF.SPJ *Enter***

10. View Details of Project. **/VD**

11. Using the arrow keys, go to Directory on second line and type in: **C:\NTWKS** ***Enter*** (You will create this sub-directory later).

12. Save this as the default. **/ES C:\SPJ\SYSPREF.SPJ *Enter***

13. Exit SPJ. **/VQ Y *Enter* CD\ *Enter***

System Files

1. In the C drive, make a sub-directory called NTWKS. **MD NTWKS *Enter***

2. Enter that sub-directory. **CD NTWKS *Enter***

3. Put the diskette containing the 14 Networks into the A drive, and copy all the files to the NTWKS sub-directory. **COPY A:*.PJ *Enter***

4. Return to the root directory. **CD\ *Enter***

5. Make a sub-directory called FMLAS. **MD FMLAS *Enter***

6. Enter that sub-directory. **CD FMLAS *Enter***

7. Put the diskette containing the Formula Files into the A drive, and copy all the files to the FMLAS sub-directory. **COPY A:*.WK1 *Enter***

8. Return to the root directory. **CD\ *Enter***

Flash-Up

1. Make a sub-directory called FLASH. **MD FLASH *Enter***

2. Enter that sub-directory. **CD FLASH *Enter***

3. Put the diskette containing the Flash-up program into the A drive, and copy all the files to the FLASH sub-directory. **COPY A:*.* *Enter***

4. Load the program. **FLASHUP *Enter***

5. Activate the Menu-bar (Use the numeric keypad Home-key). **Alt-Home**

6. Move over to Load & Save, and choose Load Library from disk. Load the file containing the macros provided. **A: PMS.WIN *Enter***

7. You should be able to run all the macros in this file now:

Alt-P activates the Advance Planning Module- Alternative A.

Alt-Z activates the Scheduling Module.

Alt-X activates the Crashing Option.

Alt-D activates the Reporting Module.

Whenever the message "To End Input Mode, Press {Enter}" appears at top right, you either input a value, make a choice, or simply press Enter. If nothing seems to be happening, wait a few seconds before pressing Enter again.

Detailed Procedures

The following gives the detailed steps in developing the outputs of each module. Some are already recorded in the Flash-up macros provided. You can record any sequence you like and create your own macros.

Advance Planning Module

Alternative A (**Alt-P** in Flash-up)

Objective: To estimate the manpower required to let a particular dollar amount annually.

Required Inputs:

1. A Lotus 123 file called PLANN-A.WK1, provided in the Sub-directory FMLAS.

2. An estimate of the average annual letting volume planned for the next 5 years, i.e. the Five-Year Program divided by 5.

Procedures:

1. Enter Lotus 123 and load the PLANN-A file. **CD\123 *Enter* 123 *Enter* /FD C:\FMLAS *Enter* /FR PLANN-A *Enter***

2. Follow the instruction to enter your average annual district Letting Volume at the cursor. Then go to cell A21. **(Function key) {F5} A21 *Enter***

3. Move down to cell A24 and enter the average cost per manhour for engineers in your district, including fringe benefits. Move over to cell C24 and enter the comparable cost for technicians. Then go to cell A41. **{F5} A41 *Enter***

4. Move down to cell B47 and type in the approximate percentage of the staff in Planning (Function Code 110) who should be engineers. Move down and repeat for each function. Accept the defaults if you are not sure.

5. Go to cell I21. **{F5} I21 *Enter***

6. Move over to cell O23 and enter the percentage of district design personnel manhours that are charged directly to engineering. Below you will see the required staff in each function calculated. Print the output if you would like a hard copy. **/PPR OUTPUT *Enter* AGQ**

7. Exit Lotus. **/QY *Enter* CD\ *Enter***

Alternative B

Objective: To estimate the manpower required to let the total dollar amounts of each type of project in the Five-Year PDP.

Required Inputs:

1. A Lotus 123 file called PLANN-B.WK1, provided in the Sub-directory FMLAS.

2. An estimate of the number of projects of each type, and their respective total dollar volumes in the Five-Year PDP.

Procedures:

1. Enter Lotus 123 and load the PLANN-B file. **CD\123 *Enter* 123 *Enter* /FD C:\FMLAS *Enter* /FR PLANN-B *Enter***

2. Follow the instructions to enter the number of projects of each type, and the dollar volume of each type in the Five-Year PDP. Then go to cell A21 and continue as from step 3 above. **{F5} A21 *Enter*** etc.

Alternative C

Figure 3.1 is the flowchart of the inputs, models, decisions and outputs for Alternative C, a more complex approach which builds data project by project.

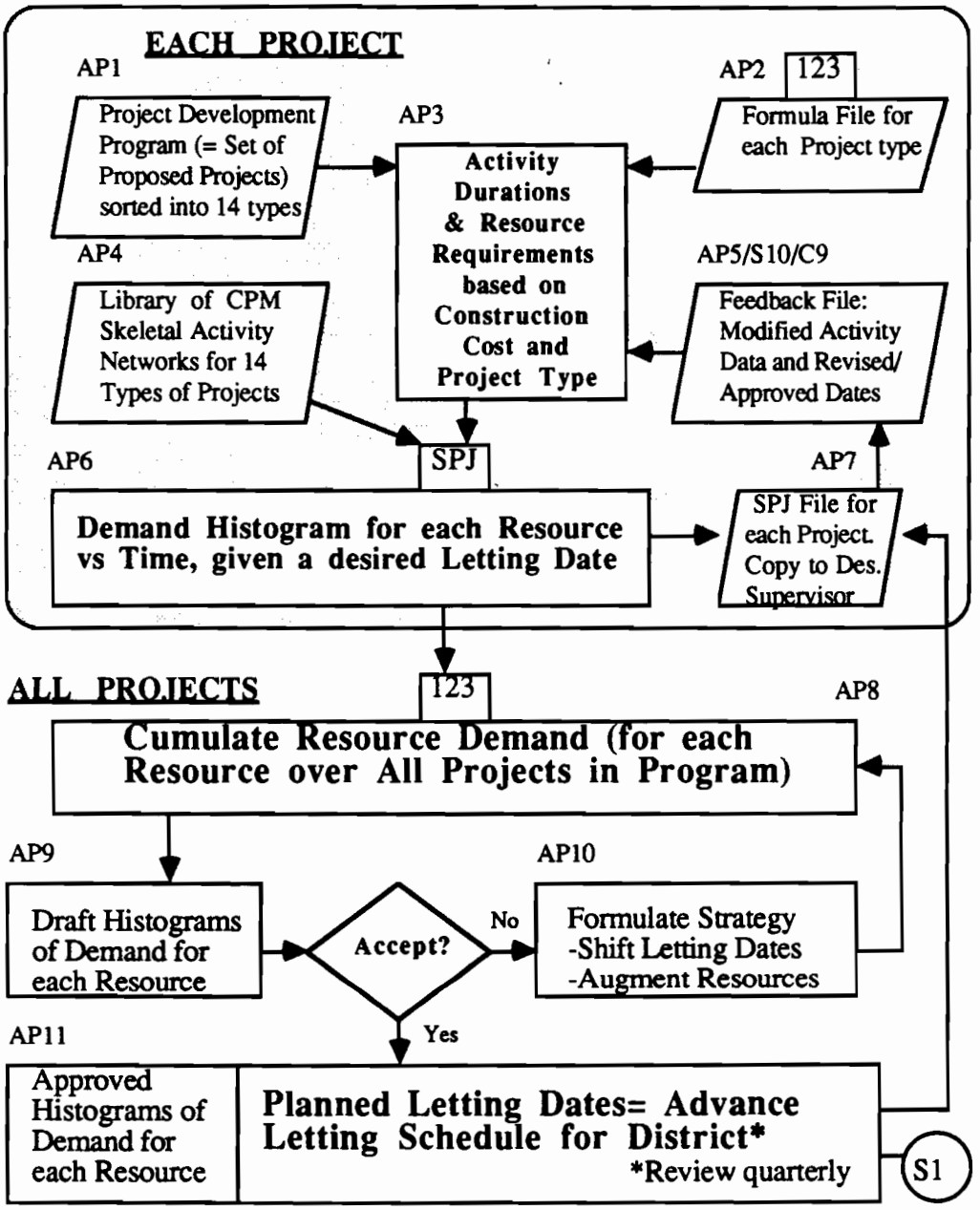
Objective:

• To produce a profile of the month-by-month demand for design personnel needed to accomplish the Five-Year Letting Schedule for the District.

Required inputs:

• AP1. The list of projects on the District's Five-Year PDP, sorted by class of project, with each project having a tentative letting date, in a Lotus 123 file.

• AP2. The library of Formula files for the 14 project types, for calculating activity durations and manpower requirements from project construction cost (C:\FMLAS).



ADVANCE PLANNING MODULE

Figure 3.1

• AP4. The Library of 14 standard networks, one for each class of project, with each activity in each network having a default duration and default resource requirements (C:\NTWKS).

• AP5. Feedback from the other two Modules on a quarterly basis, to revise the Planned Letting Dates and update the personnel demand profiles.

PROCEDURES:

Creating a File for each CSJ (**Alt-Z** in Flashup):

1. Enter Lotus 123 and set the file directory to FMLAS. **CD\123** ***Enter*** **123*Enter*** **/FD C:\FMLAS** ***Enter***

2. For the first project in the PDP (let's say its a Bridge Replacement), open the formula file. **/FR BRREPLC.WK1** ***Enter***

3. Enter the cost of the project. Activity durations and resource assignments are automatically calculated. **11111111** ***Enter***

4. Extract a workfile with all the durations. **/FXV ZWORKFL1.WK1*Enter*** **TASKS** ***Enter*** **R**

5. Extract another workfile with all the resource assignments. **/FXV ZWORKFL2.WK1*Enter* ASSGS *Enter* R**

6. Quit Lotus without saving./**QY*Enter***

7. Enter SPJ and load the network for the same project type just calculated. **CD\SPJ *Enter* SPJ *Enter Enter* /FL *(Choose the same project type, eg BRREPLC) Enter***

8. Go to the Project Details screen. **/VD** First enter a filename using 8 digits of the project CSJ, eg 12345678. Then enter a brief description of the project. Rename any other fields if you wish, then at the Project Finish Date, enter your tentative letting date.

9. Go to the Outline View and Unselect All Criteria. **/VO/SU**

10. Import the file previously extracted with the activity durations. **/FE *(Import)* TASKIMP*(Tasks)(123)(Yes)* C:\FMLAS\ZWORKFL1.WK1 *(F10)***

11. Import the file with the resource assignments. **/FE *(Import)* ASSIMPT*(Assignments)(123)(Yes)* C:\FMLAS\ZWORKFL2.WK1 *(F10)***

12. Note that both the durations and the allocations are changed. (Some may remain at the default value). Calculate the project schedule.***Shift*** **!**

13. Save the file, confirming the destination sub-directory, and exit SPJ. **/FS** ***(Confirm)*** **/VQY*Enter*** The saved file is the Planning File for that particular CSJ (AP7). Create a file for each CSJ by repeating this procedure for each project.

Exporting SPJ Histograms Into Lotus

1. In SPJ, load your project file. **/FL *Filename***

View Resource Details screens. **/VR**

View a desired resource.***Tab Key*** for Paging

If no response, unfreeze: **/SU** then ***Tab***

2. The pre-set Criteria Screen, named HISTEXPT will select the HISTograms of all the resources for EXPorT. **/SR**

Engage that Criteria. ***F7*** (Function key)

3. Go to Output Reports screen. **/OR**

For Report Type, choose RESOURCE SUMMARY ; ***(Enter)***

Matrix Format: MONTH ; First Column: TOTAL HOURS ;

Second Column: NONE ; Select Criteria: **HISTEXPT *Enter***

Report Format: "1-2-3".

For Filename, type your destination Subdirectory and filename, eg: **C:\123\BRxxx.WK1**

Proceed with the transfer. "Transferring" appears. ***F10*** (function key)
If "Overwrite Existing File?" appears, rename your file or accept.

4. After the transfer, save your file. Exit SuperProject. **/FS Y *Enter*** **/VQ**
A confirmation message should appear. Accept it. **Y *Enter Enter***

Viewing the Resource Histogram in Lotus 123:

1. Enter Lotus and load the file you created. **/FR *Filename***

You see the data exported from SPJ. The first column lists the resources, the second shows their total manhours for the project, and the third onwards shows the breakdown of manhours in each month. The dates are formatted as Day-Month. Put your cursor on the first date (cell C4), and re-format as Month-Year. **/RFD3 *..End Right Enter***

The last row is the Total Manhours per month. In the next row, divide that total by the average number of hours personnel charge to design in a month. (170?) **(*Above* /170) *Enter* /C*Enter Right..EndRight Enter***

This gives the number of persons required each month.

2. Create a Histogram. **/GTS X *Enter***

The X-axis is the Dates on Row4. **C4..*End Right Enter***

The "A" axis is the Number of Persons per month. (You can create a histogram for each simply by selecting the row of data for that resource). **A *Enter* C*?..End Right***

View the histogram. ***Enter*** **V**

Label the histogram. **/OTF**

Top label : **PROJECT BRxxxx /OTS**

Second label: **Personnel Reqd per Month *Enter* X**

X-axis label: **Project Duration *Enter* Y**

Y-axis label: **Total Personnel Reqd*Enter***

Clean up the X-axis. **/OSS6 *Enter***

View the histogram. **QQV**

Save it. **NC *(Name)***

Save the graph for printing. **/S *Filename***

Return to the Spreadsheet. **Q**

Save it. **/FS *Enter* R**

Exit Lotus 123. **/QY**

Printing the Histogram:

1. Enter Lotus Print Graph mode. **CD\123 *Enter* PGRAPH *Enter***

Change the Settings to the Sub-directory where your Graph is stored. **S H G *Subdir***

Set Image Preferences. **Q I S *Preferences***

List the graphs in the Subdirectory. **Q Q I I**

Choose your graph, using the Arrowkeys. ***Filename*.PIC**

Start Printing. The graph is printed. ***Enter* AG**

Exit Print Graph mode. **EY**

Aggregating Resource Histograms in Lotus 123 :

1. For each residency or design group, link all the projects assigned to them. Start by placing all the project files for that group into a single sub-directory, then load the file for the first project into SPJ. Go to the Details of Project screen and view linked projects. **/VD Ctrl-V**

Link the project files one at a time. **Ctrl-L *Choose***

If you exceed the amount of DOS memory available for linking projects, you will get an error message. Calculate the linked projects, put away that file, and link the rest separately. In OS/2 you can link a very large number of projects and calculate the resource demands.

2. For each file of linked projects, export the resource histograms to Lotus. Note the Lotus filenames, and the subdirectory you saved them under.

3. Enter Lotus 123. Load the histogram file exported from SPJ. Convert the last row, which is the total manhours required per month, from a formula to values. **/RV *B?.. End Right Enter***

In the A column of that row, enter: **AllResources**

The following applies if you have several residency files which were too large for SPJ to link. If the file you exported was created in OS/2 and had all district's projects, you need not continue. You can now create a histogram for each resource as above, and print it.

4. For each project class, split the Lotus file into 14, one for each of the resources, and one for the sums. To split the file, extract the data for each resource into a separate Lotus file **/FX *Filename*** (eg, RES1GENG.WK1) ***Extract Range***

(This should be **A1..A7 *End Right*,** ie, the range from the top left corner to row7- which includes the first resource - and all the way across). Then, delete row7- the first resource. **/WDR A7 *Enter***

The second resource moves to row7. Repeat the Extraction for each resource. With the final row left, save as, eg, RES1ALL. WK1).

5. Open a copy of the Lotus file of the Five-Year PDP (P1). This file should be set up as follows: first four rows: headings

first column: the CSJ numbers

second column: reserved for the project start date(this will be known later)

third column: the Letting date

fourth column: the project type

fifth column: the total manhours for the project (this will be known later)

subsequent columns: the third row should show the date for each month of the next five years, eg Jan-90, Feb-90....Dec-94.

Save the file as the name of the resource whose profile is desired (say ALLRSC.WK1, to start with). Make several copies.

6. Starting with the first group (RES1, say), bring the RES1ALL.WK1 file into your ALLRSC file. With the cursor at F5: **/FCCE BR1ALLRE.WK1**

The entire file is pasted at that location.

7. Match the Dates in the RES1ALL file with those on row3 (i.e., the time frames must be the same). **/M..*End Right EndDown Enter*** *Destination*

Erase the RES1ALL dates, etc, leaving only the row of manhour numbers at the correct row and time frame columns. The first number-column is the start date for the project.

8. On the next row, bring in RES2ALL numbers, and move into the correct time frame. Repeat for all the linked data files.

9. This is the data for the Five-Year Demand for all resources. On the row after all the projects, sum the manhour numbers in each column (month) for all the projects. (P7). These are the total manhours required each month. **@SUM(A4..*End Down*** **)** ***Enter*** **/C *Enter Right..*** *LastColumn.**Enter***

10. In the next row, divide that sum by the average number of hours a person charges to design design function codes per month, (170 ?). This gives the number of

persons required for each month. (***Above*** **/150)** ***Enter*** **/C** ***Enter Right.***. *Last Col.* ***Enter***

A plot of these numbers vs the time scale gives the Resource Demand profile (P8), ie the number of persons needed month by month in order to accomplish the Letting Schedule. **/GTSX** ***F3..End Right Enter*** **A** *LastRow..***End Right** ***Enter*** **V**

Use Options to clean up the horizontal axis and place axis titles, etc: **/OSS6** ***Enter*** **/OTY Personnel Reqd per Month**

11. Print out the Resource Demand profile, and circulate to management. If the peak demands are unacceptable, it is because too many projects are scheduled for that period. Examine the profiles to determine which projects are causing the peaks, and the time valleys to which peaks can be shifted. Then get a decision on which projects can be shifted (P9).

12. Go to the ALLRSC file, shift the relevant projects to their new time frames, and produce new profiles for review. Repeat this process until the resource profile is acceptable. The final Start and Letting dates can now be combined with other data on the projects to produce the Planned Letting Schedule (P10).

13. Open a copy of the final ALLRSC file. Save it under the name of the single resource of greatest interest (say GENENGS). Bring the RES1GENG file to the row corresponding to RES1. Superimpose the new numbers on the correct time frame as

before. Repeat the above process for each file as before. The end result is the demand for General Design Engineers month by month over the next five years.

14. Do this for any of the resource types, as desired.

Scheduling Module

Figure 3.2 is the flowchart of inputs, models, decisions and outputs for this Module.

Objective:

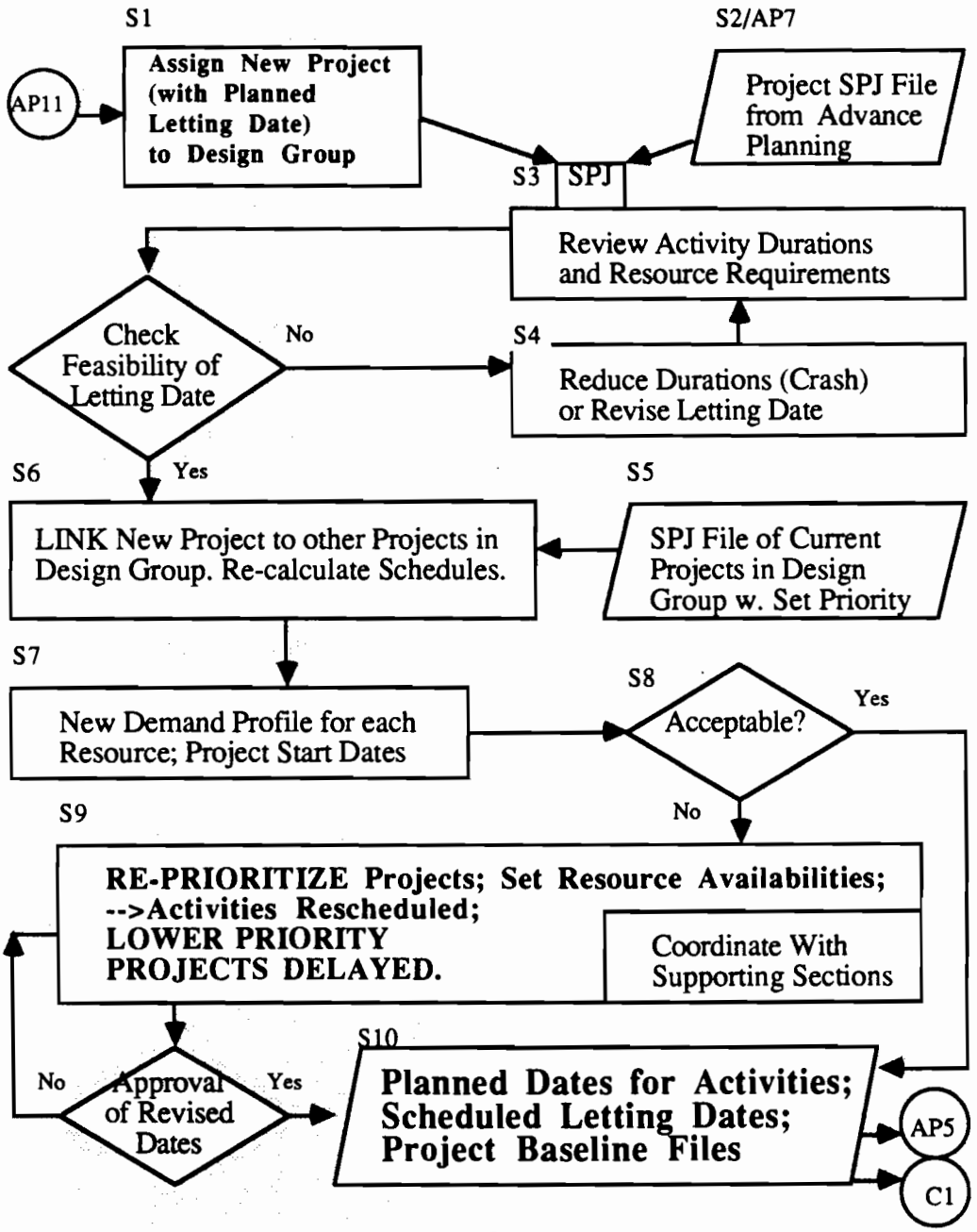
A schedule of activities for a Design Group, showing the interim deadline dates required to meet the Planned Letting Dates for all active projects.

Required inputs:

S1. The list of projects assigned to a Design Supervisor.

S2. The SPJ Planning Files on new projects from APM, with the Planned Letting Dates.

S5. The SPJ files of current projects in the Design Group.



SCHEDULING MODULE

Figure 3.2

PROCEDURES:

Planning a new project

1. Enter SPJ. Load the file from APM of the new project. (You will need to specify the subdirectory where the project file is located). The network for the project comes up. Check the Project Details screen. Change outdated information. **/VD**

2. Go to the Outline screen. **/VO**

Review and adjust the durations and resource requirements according to current information (S3). Changing a duration causes the associated resource manhours to be changed commensurately. If you only want to change the manhours, change the %Allocation figure. Recalculate the schedule. ***Shift*** **!**

3. Check whether, given that letting date, the Planned Start Date is feasible. If not, you need to reduce the durations of critical activities and commensurately increase the manpower allocations until the project fits (See below - crashing a project); alternatively, get approval to shift the Letting Date (S4). Save the file to the Subdirectory which contains the other active projects in the Design Group. **/FS *Subdir \CSJname***

Crashing a Project (Alt-X in Flash-Up)

1. In SPJ, load the file for the project to be crashed. Go to the Outline view. Look at the Scheduled Start and Finish dates and the Total Duration. Determine what start date you would like and what total duration would thus be required. Figure the ratio of the desired duration to the curent figure as a percentage (the scaling factor), and make a note of it.

2. Export a Lotus file with the current durations. **/FE** ***{Export}*** **TASKIMP*{Tasks}{123}{Yes}*** **C:\FMLAS\ZWORKFL1.WK1** ***{F10}***

3. Export a Lotus file with the current manpower allocations. **/FE** ***{Export}*** **ASSIMPT*{Assignments}{123}{Yes}*** **C:\FMLAS\ZWORKFL2.WK1** ***{F10}***

4. Exit SPJ and enter Lotus 123. Load the file called CRASHING.WK1. At the cursor, enter the percentage figure noted above. New durations and allocations are calculated.

5. Extract a file with the new durations. **/FXV C:\FMLAS\ZWORKFL1.WK1** ***Enter*** **R TASKS** ***Enter***

6. Extract a file with the new allocations. **/FXV C:\FMLAS\ZWORKFL2.WK1** ***Enter*** **R ASSGS** ***Enter***

7. Quit Lotus without saving and return to SPJ. Load the same file you wanted to crash. Go to the Details of Project screen and rename the file if you want to retain the original data, or else all will be overwritten. You can also revise the letting date and other data if you wish.

8. Go to the Outline screen. Import the new durations. **/FE** ***{Import}*** **TASKIMP***{Tasks}{123}{Yes}* **C:\FMLAS\ZWORKFL1.WK1** ***{F10}***

9. Import the new allocations. **/FE** ***{Import}*** **ASSIMPT** ***{Assignments}{123}{Yes}*** **C:\FMLAS\ZWORKFL2.WK1** ***{F10}***

10. Recalculate the file. Note that the total duration has been scaled down by the percentage you input. The total manhours are slightly different from the original figure due to some rounding. Review the new durations and change any that are now unrealistic. Recalculate, make any further adjustments you desire, and save the new file.

Viewing Resource Demands of all Active Projects

1. Load any active Project and go to the Project Details screen. View linked projects. **/VD** ***Ctrl*** **V**

Link the new CSJ's to the current projects in the Design Group, one at a time. (Available memory in DOS limits this to about 10 large files, or about 15-20 of a mix of large and small). Note that you can only link the projects stored in a single Sub-Directory. **Ctrl-L** ***Arrowkeys***

Recalculate. (This may take some time.)***Shift*** **!**

2. Look at the demands for each resource. **/VH** and ***Tab***

(These graphics screens are slow in coming up). The vertical axis is the total manhours required per symbol period, eg 5 days - see top left corner. The horizontal axis gives the total manhours required for each 7-symbol period. A white line shows the level where an extra person (unit) is needed. Most likely the maximum demands exceed availabilities of some resources. These profiles show when and where the workload is excessive.

Alternatively, you can export the resource histograms to Lotus as described before, and view them there. The results are much more well-defined.

Save your files to a diskette as backup. **/FS A:** ***Filename***

Limiting/Leveling Resource Demands, and the Effect on Schedules

1. In SPJ, load the file with all the linked projects you wish to level. View the Resource Details screen, and set the resource availabilities to realistic expected values, by entering the expected number of Full-Time Equivalent (FTE) persons of each type. (You can only use integers.) **/VR** No. of Units (fourth line): **? *Tab***

Go to the Set-up Preferences screen, and re-set SPJ to level resources according to project priority (at top right). **/VS** Resource Leveling: **Yes**; Level Using Priority First: **Yes**

Go to the Advanced Scheduling Options and set the assignment priority. **/EA** Highest Assignment Priority: **1**

For each project, you must assign a priority number. The project with highest priority will be assigned number 1, and so on.

2. In the Details of Project view, place your cursor on the filename, and tab among the linked projects. **/VD *Tab***

For the first project, go the Task Details screen. Give all the activities in that project a priority number 1 (below Finish). **/VT *Tab***

Return to the Details of Project screen and anchor the scheduled Start Date. An arrow appears next to that date. **/VD** Project Start Date ***Retype and Enter***

Prioritize each project in this way.

3. Recalculate (S7).(This will take a long time- do it overnight!) Save this leveled version of your file to a diskette ***Shift*** **! /FS** ***Filename***

4. Look at the schedule for each project. **/VD** and ***Tab***

Note that, because resources were limited, the finish dates of lower priority projects have been delayed. Seek approval of the revised letting dates. If not, the options are to re-prioritize your projects and re-level, or obtain the additional resources.

Your final version should present resource demands and activity dates you can commit to for all projects in the Design Group, with Approved Letting Dates (S9). Transfer these dates to the baseline schedule, or the planned schedule for the projects. **/VO /ET**

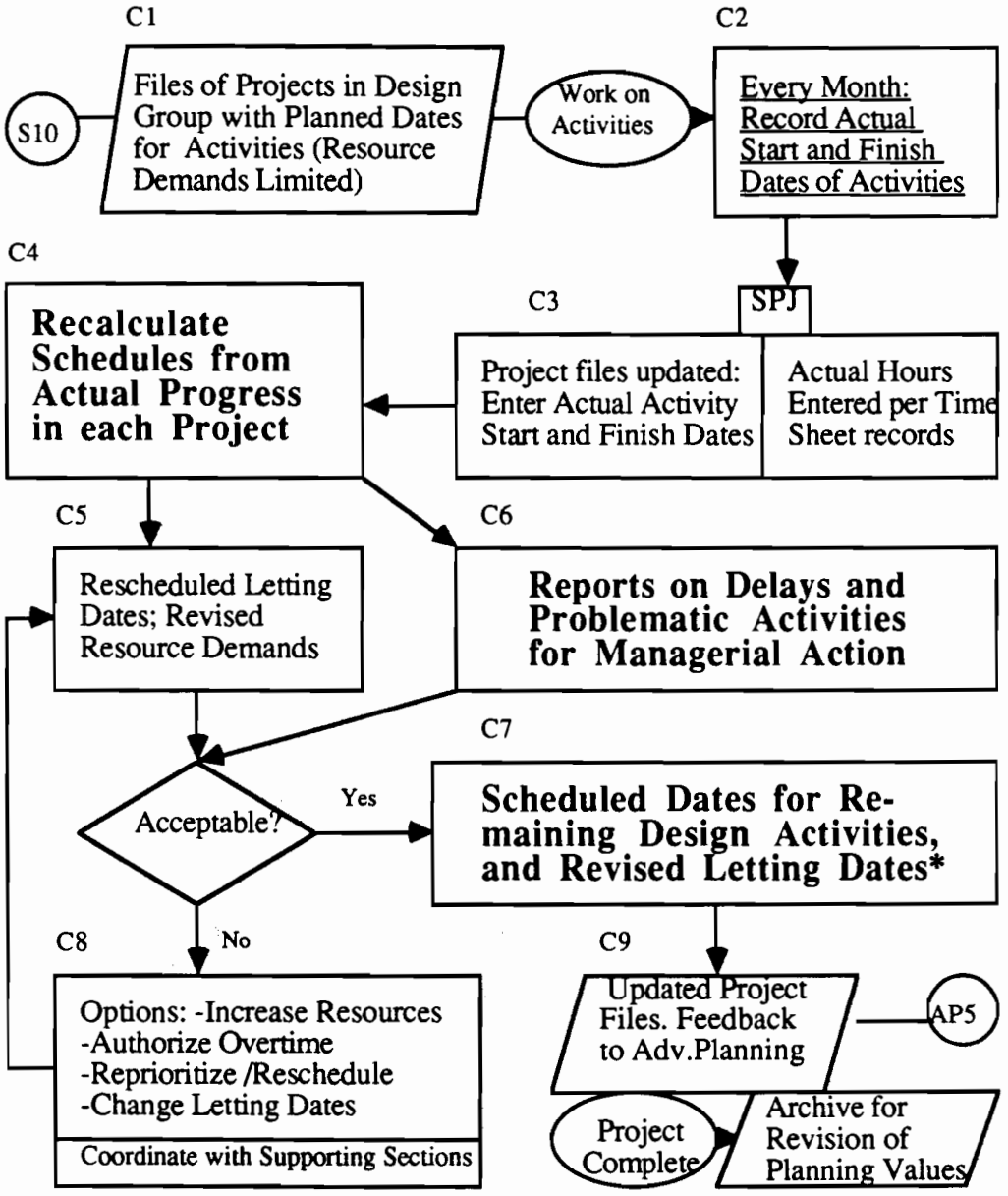
The file of all the projects in the Design Group should be copied quarterly to the APM to update the overall District outlook.

Monitoring and Control Module

Figure 3.3 is the flowchart of inputs, models, decisions and outputs for this module.

Objective:

The Status of each project in the Design Group, and Scheduled Dates for incomplete and future activities.



MONITORING AND CONTROL MODULE

Figure 3.3

Required inputs:

C1. The planned dates for all design activities in the Design Group (the final files from the SM).

C2. The actual start and finish dates for activities in the last month.

3. The SLD Printout of Manhours actually charged to each function code in each project.

PROCEDURES:

Updating Project Files:

1. In SPJ, load the SPJ file on the active projects in the Design Group. **/FL** ***Filename***

Go to the outline screen and select the pre-set updating screen. **/VO /ST** ***Tab*** to"UPDATING" ***F7*** (function key)

In the columns for Actual Start and Actual Finish Dates, enter the relevant activity dates. Enter estimated Actual Resource Hours spent on activities, so that total Function Code Hours match SLD charges (C3). Do the same for each project in turn. (Tab among linked projects by using the ***Tab key*** with the cursor on the filename in the Project Details view).

Unlink completed projects from the file and save to an archive file, thus recording actual performance for future revision of the default planning values. **/EU** ***Filename***

2. Check that Resource Leveling is set to No. **/VS** top right

Recalculate the schedules for your projects (C4). ***Shift !***

Several RED diagnostic boxes come up, saying that the Actual Dates differ from the original schedule. Press ***Enter*** each time to accept these. After recalculation, save the files to a diskette. **/FS A:*Filename***

3. Go to the Project Details screen. **/VD**

Check the Project Finish Dates. Quite likely, some will have slipped, while some may be ahead. You need to decide whether the ones ahead can spare resources (and be slowed up) to allow the delayed ones to make up time. In that case, go to the Outline screen, increase the durations of the remaining activities and reduce the resource allocations, until they are just within schedule. Several recalculations will be necessary.

In any case, for the delayed ones, reduce the durations of the remaining critical activities and increase the resource allocations until they are on schedule (or until they cannot be crashed any further). Save the files to a diskette.

4. Look at the resource histograms (C5). **/VH** and ***Tab***

Level the resource demands, if any resource is badly over-extended (follow the steps given in the Scheduling Module).

Produce reports on Current Project Status and Problematic Activities, and draft reports on Proposed New Schedules, Proposed Letting Dates, etc (C6-C9).

5. Cycle all reports for information, action and approval. Obtain feedback and approvals on draft reports of proposed strategies to cope with changes to schedules. Produce final reports on Revised Target Dates.

Feedback copies of current files with approved Revised Letting Dates to APM.

Special Procedures

Setting up a Formula File (This procedure takes about 2 hours)

1. Put a formatted disk in the A: drive. Enter SPJ and load the network for the relevant project type, say WNF.

2. Go to the Outline View.

3. Do a File Export of the Task durations. The Select Criteria is TASKIMP, the filetype is 1-2-3, and use A:WNFTASKS.WK1 as the filename.

4. Do a File Export of the Task assignments. The Select Criteria is ASSIMPT, the filetype is 1-2-3, and use A:WNFASSGS.WK1 as the filename.

5. Exit SPJ and enter Lotus 123. Open the formula file provided for Widening Non-Freeways (WIDNONFW.WK1). Put the cursor on cell D1. Bring in the file A:WNFTASKS.WK1.

6. Check that the tasknames in column A match those in column D. If not, move the data in columns A, B and C (up or down) one at a time to match column D.

This is critical, because the numbers in columns B and C will calculate the activity durations.

7. At cell F2, enter the following formula:

@ROUND(@EXP(B2+(C2*@LN(M1))),0)

If the result is ERR, move the cell displaying the project construction cost to cell M1, and edit the formula at F2 to be the above. Copy this down for all the tasks. For some of the tasks you will see a large number displayed (eg, 1+E12). Change each such to the number at column B for that task (that activity has a constant duration).

8. Go to the end of your task list, and move down a few rows. You will see another set of task data. These are the Assignments. Place your cursor at the cell displaying "Task ID", (let's say that is cell G50) and bring in the file A:WNFASSGS.WK1. Copy the fourth column of that data set to column A50. Update the formulas in columns C50 and E50.

9. Move over to the third to last column (say O50) "Duration". From O51 down, enter the cell address of the task duration calculated above in column F. For example, at O51, enter (F2). The duration for the first task from above should display. If there are 2 resources for the first task, you enter (F2) at O52. Do the same for each Task-Resource in your list. Consult the tasknames regularly to ensure that you are entering the correct number for each task. The last 2 Task-Resources should have durations of 65. (This is critical to ensure that if the project cost changes, the task-resource durations match the task durations).

10. In the fourth-to-last column ("Total Hours"), enter a formula to give that task-resource its share of the project total manhours calculated at cell N10. This total

is split among the Function Codes at cells N12..N18. FnCode 110 has about 10 activities among which the total at N12 must be shared. Let's say that activity 1 has 10%. Now that must be split between the resources assigned to activity1. Let's say the split is 60-40. Then for the first resource, enter (0.1*N12*0.6). For the second resource, enter (0.1*N12*0.4). Proceed down the list in this way, checking that the total for a function code matches the totals at N12..N18. (Nobody said this was simple!)

11. Go to cell B51. You will see a formula calculating allocations. It should look like (100*N51)/(8*O51*A51). N51 refers to the Activity-resource's Total Hours, and O51 to the corresponding duration. Correct the formula if necessary. Similarly, correct columns D51 and F51. The latter should read:

@ROUND((100*N51)/(8*O51*E51),0).

Finally, correct column J51 to read @IF(F51<2,2,F51).

12. Name the Task duration range TASKS and the Assignments ASSGS. Go to cell I1. Move the cursor to cell M1 (the cell for entering Construction Cost). The formula file has now been created. Save the file.

Errors and Trouble-shooting

The following lists possible error messages or input errors which could result in failure to achieve the intended objective, with suggestions for over-coming them. More often than not, the solution can be found in the relevant software manual, so this list is not to be considered exhaustive.

1. When SPJ file is loaded, nothing shows on screen. ***Home*** brings the PERT chart on screen.

2. The PERT chart looks like spaghetti. ***Ctrl*** **V** cleans up the screen. Reduce the view with ***Ctrl*** **R** several times. You lose some clarity.

3. In the PERT Chart, the cursor gets stuck on a particular activity. Try a different ***Arrowkey***

4. The Outline Screen has limited data. Try **/SU** to unfreeze the view, or alter it with several ***Ctrl*** **V**'s

5. The Program recalculates everything whenever you change any input. Check your Set-up Preferences. **/VS**

Switch Auto Recalculation to No, then save that Set-up. **/ES** ***Enter***

6. The Histogram Screen does not come up when requested. Have patience, this view takes about 20 seconds to paint, longer depending on your machine speed, and on how many projects are in memory.

Conclusion

The detailed procedures for operating the system have been given. For each module, a flowchart was presented, and the steps in producing each output were

described. Output reports must be customized to fit district management needs. Chapter 4 offers some sample reports and their usage.

CHAPTER 4

OUTPUTS AND USAGE

Introduction

This chapter describes some of the numerous reports that can be produced by the System. These outputs are to be used by managers for planning, scheduling and controlling their projects, so their usage is described, and the alternatives for acting on them are mentioned.

Management Information

Information Base

The Pre-Construction Management System was designed to supply management with the information needed to make scheduling decisions. The fact is, all managers do some form of planning for their projects, some more formally than others. This System is intended to provide a framework for formal planning. All planning of schedules will now have a common basis, using the same methods to arrive at solutions. The information to justify strategies and to support conclusions will now be available. Better information means better decisions.

System Outputs

The System's outputs will include:

- The Five-Year demand for selected personnel resources, in relation to the Proposed Letting Program.

• Detailed activity schedules for each Design Group, with resource demands constrained by availability.

• Revised schedules based on actual progress, and reports on deviations requiring managerial action.

• Automated and selective status reporting to any level of detail.

Users

Planning and Scheduling Manager

In every District, an individual working with the District Design Engineer is charged with the responsibility for preparing the Letting Schedule, updating it, and preparing Status Reports. That person is referred to here as the Planning and Scheduling Manager.

He/she will use the Advance Planning Module to :

• analyze the Five-Year PDP for approval by the District Design Engineer and the District Engineer.

• determine the manpower demand associated with the Letting Schedule, using tentative letting dates.

• project the demand for each type of resource of interest, and highlight the periods when that demand is likely to exceed supply.

• point out the projects which are causing that over-demand.

• propose alternatives for managing the overflow.

He/she must:

• have a clear understanding of the project development process, and the difference in durations and manpower requirements among the fourteen types of projects.

• understand the concepts behind the Networks, and the techniques of resource analysis.

• understand the assumptions behind the default durations and manpower loadings for each type of project, and whether they are applicable to his district, since he is responsible for the quality of the input.

• be familiar with the operations of the computer, and the software. This will be especially important for customizing reports and exploring additional uses of the system.

Design Supervisor

An individual who is responsible for the simultaneous design of a number of projects by a fixed group of Engineers and Technicians, usually working at a single office, is referred to as a Design Supervisor. The group working under him/her is called a Design Group.

He/she is assigned work by the District Design Engineer, usually a batch of projects at a time, each with a Planned Letting Date. He will use the Scheduling Module to:

• estimate activity durations and resource requirements for new projects, and fit them into his existing schedule.

• determine whether the Planned Letting Date is feasible, and what priority will be given to each project in the event of conflicts for scarce resources.

• assess the manpower requirements of his set of projects, and when and where shortages will affect schedules.

• schedule the individual activities in projects in co-ordination with Functional Sections such as Right-of-Way.

He/she must :

• understand the concepts of Critical Path scheduling and multi-project analysis.

• grasp the details of resource demand and supply as used in that analysis.

• particularly understand the Networks, the activity relationships, and the implications of altering them, since he is responsible for the quality of the input.

• be aware of techniques for crashing a project.

To do all of this requires familiarity with the computer and the software. Fortunately, this can be easily acquired, given Super-Project Expert's user-friendliness. Considering that he is wrestling with all kinds of project management decisions in his mind on a daily basis, this system can only make the Design Supervisor's work easier.

Project Manager

Each project has a senior designer in charge. He/she determines what activities will be done when, and who will do it. He is referred to here as the Project Manager.

He will use the Monitoring and Control Module to :

• keep track of the on-going activities in his project, to report progress, and to determine future schedules.

• on a monthly basis, he will update the file on his project as to the status of each activity. The Design Supervisor will review that update, and re-calculate the schedule in relation to other projects sharing the same resources.

• produce Status reports for all levels, selecting the information relevant for decisions and action at each level.

He must :

• have some understanding of the Network with its relationships, durations and resource requirements, for his project.

• provide suggestions to the Design Supervisor on how the schedule can be optimized.

• maintain a manual record of activity dates and manhours charged, in order to update his schedule.

• be able to input that information into the file on his project, and understand how the schedule is revised.

This should simplify the reporting process, and provide a systematic method of assessing progress and percentage complete.

Reports

The reporting capabilities of the system are versatile, and reports can be adapted to suit the needs of each district and each manager.

Production of Reports

SPJ stores all data in a database form similar to a spreadsheet. The Outline view shows the amount of data available (some 61 columns).

In addition, SPJ allows data to be summarized to various levels. In the networks, a project is divided into the function codes, so reports can be summarized to the function code level. Placing the cursor on a heading and hitting the **Minus** key (numeric keypad) collapses all the data under that heading. The **Plus** key reveals everything again.

Data is selected for reporting through the Select Criteria. /S Three alternative ways of looking at data are available: Task data, Resource data, and Assignments data. The "Column Order" column allows the data to be arranged in the order specified, e.g., you can set up the report so that the first column shows the Total Hours, the second the Scheduled Start, the third the Actual Start, etc.

The "Sort" column specifies the sorting hierarchy, e.g., activity data can be sorted by start dates, by finish dates, by duration, by WBS code, etc. To get the output in the order desired, you must be in the non-heading Outline view. **Ctrl-V** until all headings disappear.

The "Select From" and "Select to" columns allow you to slice a particular segment of the data, e.g., you can specify that you only want data on activities whose Start Dates are between January 90 and June 90, or whose Total Hours are between 50 and 500.

Several Select Criteria are built into the Default Networks:

TASKIMP is designed to import and export Activity Durations.

PLANDATES is for reporting the final schedule of a project.

UPDATING is a pre-set form for updating the Status of a project.

STATUSREPT is for reporting the status of a project after updating.

HISTEXPT is for exporting resource data to produce demand profiles in Lotus.

ASSIMPT is designed to import and export Manpower Requirements.

You can create more if needed, but **do not change TASKIMP, HISTEXPT or ASSIMPT. If you do, neither Alt-Z for project scheduling, nor Alt-X for project crashing, will work.**

There are several ways of producing hardcopy outputs from SPJ. Under Output, you can print just the Screen, or everything within the scrolling region (View). When you are in the Gantt chart view, the PERT chart, the Histogram view, or the WBS view, you can produce a plot, provided you have installed a plotter (or installed your printer as a plotter).

You can also produce pre-defined Reports, as described in the SPJ manual. However, you will probably find that you want to customize your own reports using the Select Criteria.

Basic Reports

Each Module produces a set of reports relevant to that stage of the project.

Advance Planning:

1. Projection of District Manpower Requirements from Expected Annual Letting Volume.

2. Projection of Variation in Demand for each Discipline over the Five-Year Program.

Scheduling:

1. Planned Dates for Project Phases and Activities (List and Gantt Chart)

    Any Selection of Activities or Phases

2. Planned Demand for Resources.

3. Planned Assignments.

Monitoring and Control:

1. Scheduled Dates for Remaining Phases and Activities (List and Gantt Chart)

    Revised Letting Date

2. Status of Phases and Activities (List and Gantt Chart)

    Any Selection of Activities of interest

Samples

The following illustrates samples of the various types of reports that can be produced.

Network for Bridge Replacement - Average Project
Task Gantt

Project: 12345678.PJ
10-27-89

40 Days Per Symbol Heading/Task Resource	Task ID	Dur	Schd Start		Schd Finish	Float
12345678.PJ	BRG	445	07-03-89	<	04-15-91	0
+FN CODE 110	032	34	07-03-89		08-18-89	1
+FN CODE 120	033	108	08-21-89		01-25-90	1
+FN CODE 130	034	411	08-22-89		04-15-91	0
+FN CODE 150	035	34	08-22-89		10-06-89	1
+FN CODE 160	036	219	08-16-89		07-05-90	115
+FN CODE 170	037	174	10-09-89		08-20-90	125
+FN CODE 180	038	195	07-05-90		04-15-91	0

Jul 89 01 | Apr 90 07 | Jan 91 12 | Oct 19

Critical / Non Critical | Assigned / Milestone | Unassigned / Float/Delay | Finish Delay / Free Float | Planned / Actual

SAMPLE REPORT 1

This is a summary schedule for a project. suitable for the District Engineer and the District Design Engineer.

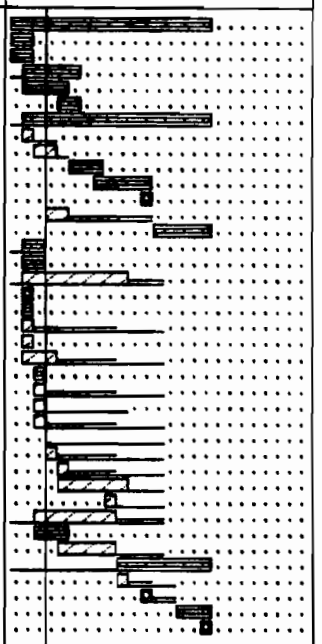
It shows the major phases of the project, the estimated duration (in working days) of each phase, when they are scheduled to start and finish, and the amount of float time available for each phase.

A barchart is also shown, with the critical phases clearly identified.

Network for Bridge Replacement – Average Project
Task Gantt

Project: 12345678.PJ
10-27-89

40 Days Per Symbol Heading/Task	Task ID	Dur	Schd Start		Schd Finish	Float
12345678.PJ	BRG	445	07-03-89	<	04-15-91	0
FN CODE 110	032	34	07-03-89		08-18-89	1
± PRELIM. ENGNRING	001	30	07-03-89		08-18-89	1
FN CODE 120	033	108	08-23-89		01-25-90	1
± ENV ASSMT	002	79	08-23-89		12-19-89	1
± FONSI(NO IMPACT)	003	25	12-19-89		01-25-90	1
FN CODE 130	034	411	08-22-89		04-15-91	0
± ROW OWNRSHP DATA	004	5	08-22-89		09-01-89	75
± ROW MAP,PLANS	005	18	10-09-89		11-02-89	58
± APPRAISL & NEGOT	006	80	01-25-90		04-25-90	1
± ROW ACQ & RELOC	007	115	04-25-90		10-15-90	1
ROW ACQUIRED	008	0	10-15-90		10-15-90	1
± UTIL RELOC PLANS	009	44	11-02-89		01-09-90	192
± RELOC UTILITIES	010	125	10-15-90		04-15-91	0
FN CODE 150	035	34	08-22-89		10-09-89	1
± DESIGN SURVEYING	011	33	08-22-89		10-09-89	1
FN CODE 160	036	219	08-18-89		07-05-90	115
AUTHRZN- P S & E	012	0	08-18-89		08-18-89	1
± PSE DESIGN CONF	013	2	08-18-89		08-22-89	1
± TRAFF.CONTRL PLN	014	6	08-22-89		08-30-89	325
± STREAM CROSS.HYD	015	8	08-22-89		09-05-89	25
± PERMITS & AGRMTS	016	80	08-22-89		11-17-89	269
± ALGN,PRFL,SCHEM.	017	7	09-28-89		10-09-89	1
± ILLUMINATION	018	2	10-09-89		10-11-89	298
± EARTHWORK	019	9	10-09-89		10-20-89	201
± SGN STRP SIGNALS	020	7	10-09-89		10-16-89	291
± RDWY HYDRAULICS	021	5	10-20-89		10-27-89	275
± DRAINAGE DETAILS	022	8	10-27-89		11-08-89	275
± RET WAL,MISC DET	023	6	12-19-89		12-28-89	243
± RAILROAD AGREE	024	120	01-04-90		07-05-90	115
± PLN PRF RDWY DET	025	18	08-25-90		08-20-90	125
FN CODE 170	037	174	10-09-89		08-20-90	125
± BRIDGE LAYOUTS	026	50	10-09-89		12-19-89	1
± BRIDGE DETAILS	027	125	12-19-89		08-20-90	125
FN CODE 180	038	195	07-05-90		04-15-91	0
± PS&E ASSY,D.REVW	028	12	07-05-90		07-23-90	115
P S & E COMPLETE	029	0	10-15-90		10-15-90	57
± AUSTIN REVW,BIDS	030	65	01-08-91		04-15-91	0
LETTING DATE	031	0	04-15-91		04-15-91	0



SAMPLE REPORT 2

This is a more detailed schedule for a project, suitable for the Design Supervisor and the Project Manager.

It gives the scheduled date for each activity, and the float times. The Project Manager can thus coordinate activities in each functional area.

Network for Bridge Replacement - Average Project
Task Gantt

Project: 12345678.PJ
10-27-89

40 Days Per Symbol Task Name	Task ID	Dur	Schd Start	Schd Finish	Float
ROW OWNRSHP DATA	004	5	08-22-89	09-01-89	75
ROW MAP PLANS	005	18	10-09-89	11-02-89	56
APPRAISL & NEGOT	006	60	01-25-90	04-25-90	1
ROW ACQ & RELOC	007	115	04-25-90	10-15-90	1
ROW ACQUIRED	008	0	10-15-90	10-15-90	1
RELOC UTILITIES	010	125	10-15-90	04-15-91	0

Jul 89 01 | Apr 90 07 | Jan 91 12 | Oct 19 | Jul 92 25

SAMPLE REPORT 3

This is a partial schedule report, suitable for forwarding to the Right-of-Way section.

Each section can thus be informed in advance of proposed schedules.

Resource Details — Project: 12345678.PJ
10-27-89 7:49a — Revision: 0

Network for Bridge Replacement - Average Project

Rsrc Name: GenDesEng	General Design Engineer												
								Defaults			Totals		
Work Code:		Accrue:		Prorate			Hours:		40	Var:		4812.86	
Total Overscheduled:		0	Rate Mult:	1.00			Fixed:		0.00	Fix:		0.00	
Calendar Variance:		0	No. Units:	4			Rate:		13.72	Tot:		4812.86	
Workday:	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Standard Day:		8	Act:		0.00
Start: 8:00a	0	8	8	8	8	8	0	Allocation:		8x	Hrs:	214	

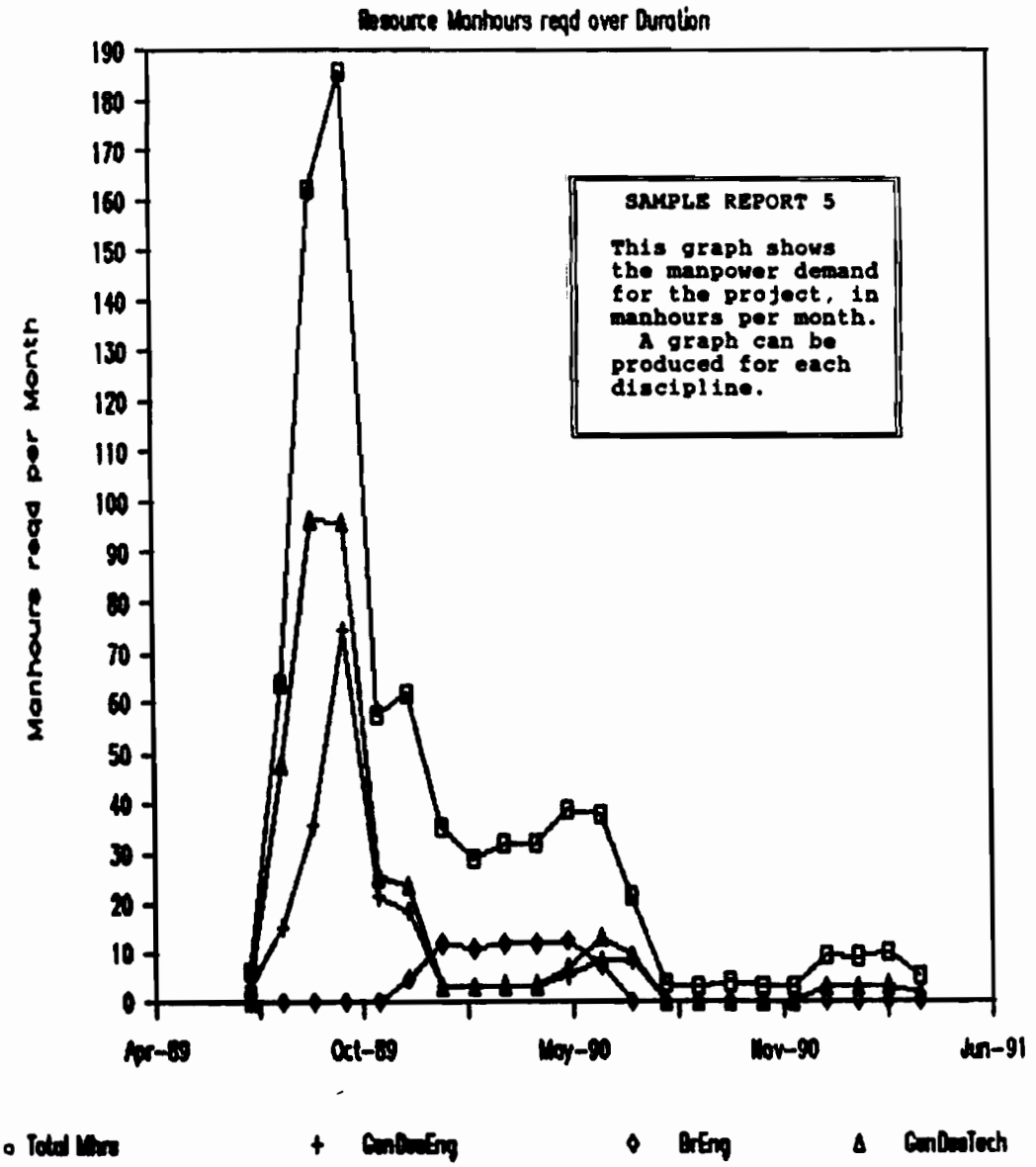
ID	Task	Dur	Hrs	Allc	Un	Ovr	Actl	Pr	Start	Finish
005	ROW MAP,PLANS	18	3	2%x	1	0	0	50	10-09-89	11-02-89
004	ROW OWNRSHP DATA	5	2	3%x	1	0	0	50	08-22-89	09-01-89
017	ALGN,PRFL,SCHEM.	7	14	25%x	1	0	0	50	09-28-89	10-09-89
026	BRIDGE LAYOUTS	50	32	8%x	1	0	0	50	10-09-89	12-19-89
019	EARTHWORK	9	26	35%x	1	0	0	50	10-09-89	10-20-89
024	RAILROAD AGREE	120	20	2%x	1	0	0	50	01-04-90	07-05-90
016	PERMITS & AGRMTS	60	10	2%x	1	0	0	50	08-22-89	11-17-89
028	PS&E ASSY,D.REVW	12	8	8%x	1	0	0	50	07-05-90	07-23-90
022	DRAINAGE DETAILS	8	8	11%x	1	0	0	50	10-27-89	11-09-89
030	AUSTIN REVW,BIDS	65	11	2%x	1	0	0	50	01-08-91	04-15-91
015	STREAM CROSS.HYD	8	8	11%x	1	0	0	50	08-22-89	09-05-89
011	DESIGN SURVEYING	33	27	10%x	1	0	0	50	08-22-89	10-09-89
025	PLN PRF RDWY DET	16	7	5%x	1	0	0	50	05-25-90	06-20-90
018	ILLUMINATION	2	4	19%x	1	0	0	50	10-09-89	10-11-89
013	PSE DESIGN CONF	2	8	11%x	4	0	0	50	08-18-89	08-22-89
023	RET WAL,MISC DET	6	10	20%x	1	0	0	50	12-19-89	12-28-89
021	RDWY HYDRAULICS	5	8	18%x	1	0	0	50	10-20-89	10-27-89
001	PRELIM. ENGNRING	30	8	3%x	1	0	0	50	07-03-89	08-18-89

SAMPLE REPORT 4

This report shows the activities on which a particular discipline (General Design Engineer) is scheduled to work, suitable for the Project Manager.

It gives the time period when the activities are scheduled, the total manhours required, and the percentage of their time the personnel will need to spend, on average, on those activities.

Sample Report- Manpower Demand



Outline
10-26-89 2:36p

Project: 12345678.PJ
Revision: 0

Network for Bridge Replacement - Average Project

Heading/Task	Schd Start	Schd Finish	Actual Start	Actual Finish	Pct Comp	Actl Hours
12345678.PJ	07-03-89<	04-15-91	07-15-89		44	0
FN CODE 110	07-03-89	08-18-89	07-15-89	08-15-89	100	0
± PRELIM. ENGNRING	07-03-89	08-18-89	07-15-89	08-15-89	100	0
FN CODE 120	08-23-89	01-25-90	08-15-89		34	0
± ENV ASSMT	08-23-89	12-19-89	08-15-89		50	0
± FONSI(NO IMPACT)	12-19-89	01-25-90			0	0
FN CODE 130	08-22-89	04-15-91	08-15-89		20	0
± ROW OWNRSHP DATA	08-22-89	09-01-89	08-15-89	08-25-89	100	0
± ROW MAP,PLANS	10-09-89	11-02-89	10-01-89		80	0
± APPRAISL & NEGOT	01-25-90	04-25-90			0	0
± ROW ACQ & RELOC	04-25-90	10-15-90			0	0
ROW ACQUIRED	10-15-90	10-15-90			0	0
± UTIL RELOC PLANS	11-02-89	01-09-90			0	0
± RELOC UTILITIES	10-15-90	04-15-91			0	0
FN CODE 150	08-22-89	10-09-89	08-15-89	10-15-89	100	0
± DESIGN SURVEYING	08-22-89	10-09-89	08-15-89	10-15-89	100	0
FN CODE 160	08-18-89	07-05-90	09-01-89		55	0
AUTHRZN- P S & E	08-18-89	08-18-89	09-01-89	09-01-89	100	0
± PSE DESIGN CONF	08-18-89	08-22-89	09-01-89	09-02-89	100	0
± TRAFF.CONTRL PLN	08-22-89	08-30-89	09-05-89	09-15-89	100	0
± STREAM CROSS.HYD	08-22-89	09-05-89	09-01-89	09-15-89	100	0
± PERMITS & AGRMTS	08-22-89	11-17-89	09-01-89		60	0
± ALGN,PRFL,SCHEM.	09-28-89	10-09-89	10-01-89	10-15-89	100	0
± ILLUMINATION	10-09-89	10-11-89	10-15-89	10-16-89	100	0
± EARTHWORK	10-09-89	10-20-89	10-17-89		80	0
± SGN STRP SIGNALS	10-09-89	10-18-89	10-20-89		90	0
± RDWY HYDRAULICS	10-20-89	10-27-89			0	0
± DRAINAGE DETAILS	10-27-89	11-09-89			0	0
± RET WAL,MISC DET	12-19-89	12-28-89			0	0
± RAILROAD AGREE	01-04-90	07-05-90			0	0
± PLN PRF RDWY DET	05-25-90	06-20-90			0	0
FN CODE 170	10-09-89	06-20-90			0	0
± BRIDGE LAYOUTS	10-09-89	12-19-89			0	0
± BRIDGE DETAILS	12-19-89	06-20-90			0	0
FN CODE 180	07-05-90	04-15-91			0	0
± PS&E ASSY,D.REVW	07-05-90	07-23-90			0	0
P S & E COMPLETE	10-15-90	10-15-90			0	0
± AUSTIN REVW,BIDS	01-08-91	04-15-91			0	0
LETTING DATE	04-15-91	04-15-91			0	0

SAMPLE REPORT 6

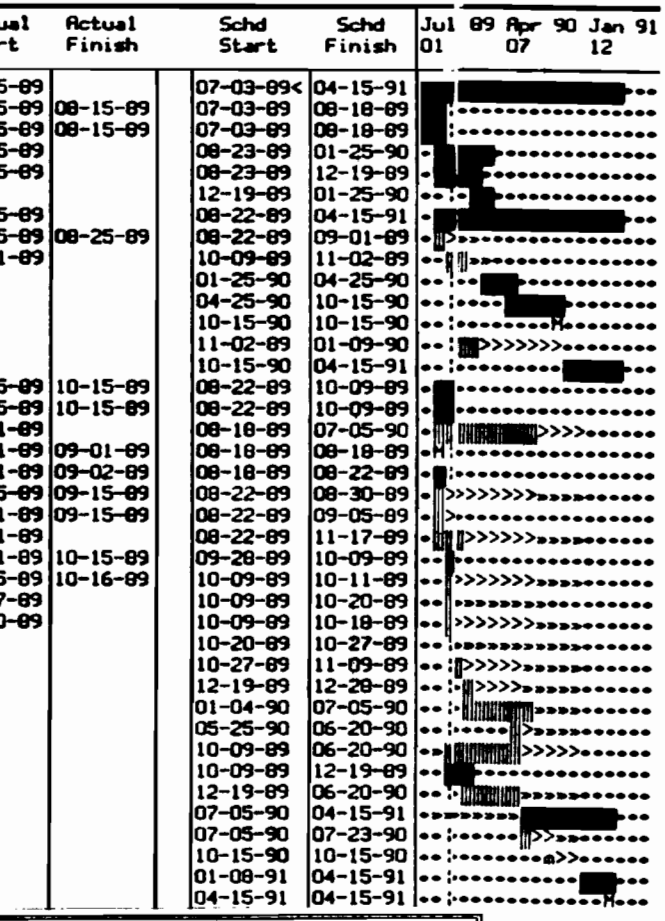
This is the form on which the Project Manager will update project status every month. For each activity, simply enter the date on which it was started, and if not finished, percent complete.

The actual manhours expended on completed activities should be entered from Time Sheet records.

Task Gantt
10-27-89 8:18a

Network for Bridge Replacement - Average Project

40 Days Per Symbol Heading/Task	Task ID	Dur	Status	Pct Comp	Actual Start	Actual Finish	Schd Start	Schd Finish
12345678.PJ	000	445		44	07-15-89		07-03-89<	04-15-91
FN CODE 110	032	34	Late Start/Crit.	100	07-15-89	08-15-89	07-03-89	08-18-89
± PRELIM. ENGNRING	001	30	Late Start/Crit.	100	07-15-89	08-15-89	07-03-89	08-18-89
FN CODE 120	033	106	Late Start/Crit.	34	08-15-89		08-23-89	01-25-90
± ENV ASSMT	002	78	Late Start/Crit.	50	08-15-89		08-23-89	12-19-89
± FONSI(NO IMPACT)	003	25	Scheduled/Crit.	0			12-19-89	01-25-90
FN CODE 130	034	411	Scheduled/Crit.	20	08-15-89		08-22-89	04-15-91
± ROW OWNRSHP DATA	004	5	Scheduled	100	08-15-89	08-25-89	08-22-89	09-01-89
± ROW MAP,PLANS	005	18	Scheduled	80	10-01-89		10-09-89	11-02-89
± APPRAISL & NEGOT	006	60	Scheduled/Crit.	0			01-25-90	04-25-90
± ROW ACQ & RELOC	007	115	Scheduled/Crit.	0			04-25-90	10-15-90
ROW ACQUIRED	008	0	Scheduled/Crit.	0			10-15-90	10-15-90
± UTIL RELOC PLANS	009	44	Scheduled	0			11-02-89	01-09-90
± RELOC UTILITIES	010	125	Scheduled/Crit.	0			10-15-90	04-15-91
FN CODE 150	035	34	Late Start/Crit.	100	08-15-89	10-15-89	08-22-89	10-09-89
± DESIGN SURVEYING	011	33	Late Start/Crit.	100	08-15-89	10-15-89	08-22-89	10-09-89
FN CODE 160	036	219	Late Start	55	09-01-89		08-18-89	07-05-90
AUTHRZN- P S & E	012	0	Late Start/Crit.	100	09-01-89	09-01-89	08-18-89	08-18-89
± PSE DESIGN CONF	013	2	Late Start/Crit.	100	09-01-89	09-02-89	08-18-89	08-22-89
± TRAFF.CONTRL PLN	014	6	Scheduled	100	09-05-89	09-15-89	08-22-89	08-30-89
± STREAM CROSS.HYD	015	8	Late Start	100	09-01-89	09-15-89	08-22-89	09-05-89
± PERMITS & AGRMTS	016	60	Scheduled	60	09-01-89		08-22-89	11-17-89
± ALGN,PRFL,SCHEM.	017	7	Late Start/Crit.	100	10-01-89	10-15-89	09-28-89	10-09-89
± ILLUMINATION	018	2	Scheduled	100	10-15-89	10-16-89	10-09-89	10-11-89
± EARTHWORK	019	9	Scheduled	80	10-17-89		10-09-89	10-20-89
± SGN STRP SIGNALS	020	7	Scheduled	90	10-20-89		10-09-89	10-18-89
± ROWY HYDRAULICS	021	5	Scheduled	0			10-20-89	10-27-89
± DRAINAGE DETAILS	022	8	Scheduled	0			10-27-89	11-09-89
± RET WAL,MISC DET	023	6	Scheduled	0			12-19-89	12-28-89
± RAILROAD AGREE	024	120	Scheduled	0			01-04-90	07-05-90
± PLN PRF ROWY DET	025	16	Scheduled	0			05-25-90	06-20-90
FN CODE 170	037	174	Late Start	0			10-09-89	06-20-90
± BRIDGE LAYOUTS	026	50	Late Start/Crit.	0			10-09-89	12-19-89
± BRIDGE DETAILS	027	125	Scheduled	0			12-19-89	06-20-90
FN CODE 180	038	195	Scheduled/Crit.	0			07-05-90	04-15-91
± PS&E ASSY,O.REVW	028	12	Scheduled	0			07-05-90	07-23-90
P S & E COMPLETE	029	0	Scheduled	0			10-15-90	10-15-90
± AUSTIN REVW,BIDS	030	65	Scheduled/Crit.	0			01-08-91	04-15-91
LETTING DATE	031	0	Scheduled/Crit.	0			04-15-91	04-15-91



SAMPLE REPORT 7

This is a detailed status report on a project after updating, suitable for the Design Supervisor and the Project Manager.

The current status of each activity and phase, and the percentage complete in each phase, and in the overall project, are given. The latest estimated letting date is also given.

Task Gantt
10-27-89 8:04a

Network for Bridge Replacement - Average Project

40 Days Per Symbol Heading/Task	Task ID	Dur	Status	Pct Comp	Actual Start	Actual Finish	Schd Start	Schd Finish
12345678.PJ	BRO	445		44	07-15-89		07-03-89<	04-15-91
+FN CODE 110	032	34	Late Start/Crit.	100	07-15-89	08-15-89	07-03-89	08-18-89
+FN CODE 120	033	106	Late Start/Crit.	34	08-15-89		08-23-89	01-25-90
+FN CODE 130	034	411	Scheduled/Crit.	20	08-15-89		08-22-89	04-15-91
+FN CODE 150	035	34	Late Start/Crit.	100	08-15-89	10-15-89	08-22-89	10-09-89
+FN CODE 160	036	219	Late Start	55	09-01-89		08-18-89	07-05-90
+FN CODE 170	037	174	Late Start	0			10-09-89	06-20-90
+FN CODE 180	038	195	Scheduled/Crit.	0			07-05-90	04-15-91

Jul 89 Apr 90 Jan 91
01 07 12

SAMPLE REPORT 8

This is a summary status report for the District Engineer and the District Design Engineer.

The status of each phase, and of the overall project, are given. The estimated letting date is also given.

DISTRICT xx

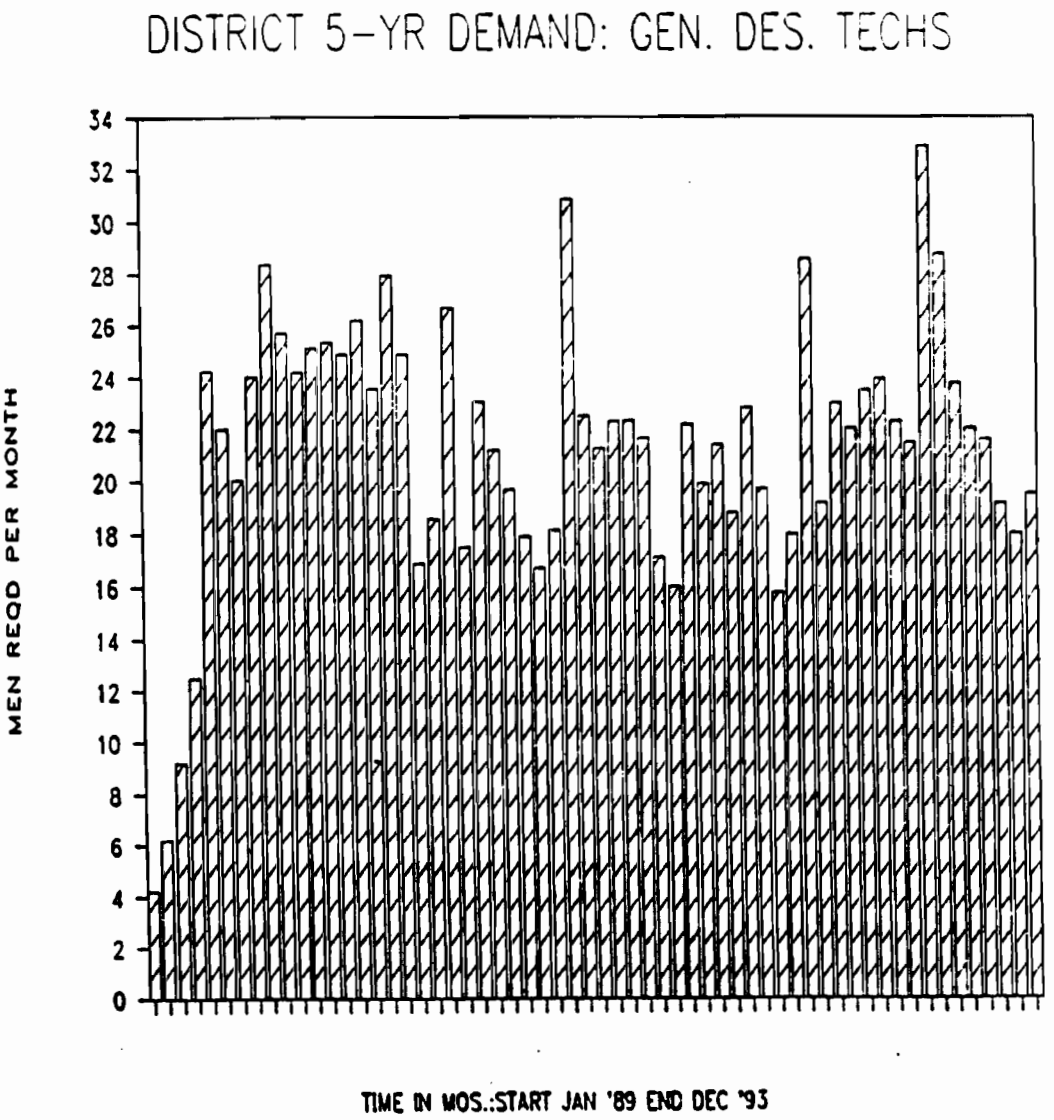
Expected AVERAGE ANNUAL Letting Volume for the next 3 years, in Millions of $ (eg 50 for $50m.) 50

	Total	95% Range	Engrs	Techs
Reqd Planning Staff	3	+/- 1	1	2
Reqd Environmental Staff	1	+/- 0	0	1
Reqd Right-of-Way Staff	2	+/- 1	2	0
Reqd Surveying Staff	10	+/- 2	4	6
Reqd Designing Staff	27	+/- 3	18	9
Reqd Bridge Design Staff	7	+/- 1	4	4
Reqd Reviewing Staff	3	+/- 0	1	3
Reqd Total Staff	54	+/- 8	30	24

SAMPLE REPORT 9

This is the output from Alternative A of the Advance Planning Module, suitable for the District Engineer and the District Design Engineer.

It provides an estimate of the manpower required to deliver an average annual letting volume.



SAMPLE REPORT 10

This is the output of Alternative C of the Advance Planning Module, suitable for the District Engineer and the District Design Engineer.

It provides a look at the variation in demand for each type of design personnel over a Five-Year Program, given a particular Letting Schedule.

APPENDIX A

SCOPE OF WORK IN HIGHWAY DESIGN ACTIVITIES

SCOPE OF WORK IN DESIGN ACTIVITIES

(The first three digits of the activity number are the function code, and the fourth is the numerical sequence).

1101. **PROJECT CONCEPT CONFERENCE.**

Scope of project outlined and agreed upon.

1102. **PLANIMETRICS.**

Route location studies.

Aerial photography.

Uncontrolled mosaic.

1103. **TRAFFIC EVALUATION AND PROJECTIONS.**

Data obtained from District Planning Administrator.

1104. **PRELIMINARY ESTIMATES.**

First estimates of alternatives to compare to authorized funding.

1105. **PRELIMINARY GEOMETRICS AND RIGHT-OF-WAY REQMTS.**

Typical sections.

Preliminary layouts.

Profile grades.

Prelim. ROW requirements.

Prelim. signing plan and traffic control concept.

1106. **SELECT PREFERRED ALTERNATIVE.**

Decision after public meetings, to prepare design schematics.

1107. **SCHEMATICS.**

Revised geometrics and drainage.

Revised traffic control plan.

Revised ROW requirements.

1108. **SOIL SURVEY.**

Sampling for slope stability and pavement design parameters.

Core drilling for foundation design parameters.

Laboratory testing.

1109. **PAVEMENT DESIGN.**

Pavement based on traffic projections and soils information.

Review by D-8 and FHWA.

1201. **ENVIRONMENTAL ASSESSMENT & PUBLIC MEETINGS.**

Determination of categorical exclusion.

Prelim. hydrological and ecological investigations.

Historical & archeological property (cultural resources)=4f evaluation.

Noise and air-quality analyses.

Socio-economic impacts.

Need for Approvals.{C.of Engrs., Coast Guard, FEMA (Floodplains), etc.}

Prepare and present the following at Public Meeting:

Feasible alternatives)

Typical details) = Prelim. geo. & ROW (1105)

General configuration)

Major design features.

Cost estimates (1104).

1202. **DRAFT ENVIRONMENTAL IMPACT STATEMENT.**

Prepare document and submit to D-8 and FHWA.

Co-ordinate with approving agencies.

1203. **PUBLIC HEARINGS & FINAL ENVIRONMENTAL IMPACT STATEMENT/ Finding Of No Significant Impact (FONSI).**

Present the following:

Detailed schematics (1108).

ROW ownership data (1301).

Then: FHWA input received.

Public input received.

Includes "Control of Temp. Traffic" (addressed at 1107 & 1108)

Approval by D-8 and FHWA.

Record of Decision/Finding of No Significant Impact(FONSI).

1301. **RIGHT-OF-WAY OWNERSHIP DATA.**

ROW Requirements (from 1601).

County records of boundaries and owners.

Donations, Hardship buying, etc., identified.

1302. **RIGHT-OF-WAY MAPPING AND PLANS.**

Staking of ROW and Field notes.

Property Ties and Boundary surveys.

Deed preparation.

Relocation plan.

Approval by D-15.

1303. **APPRAISAL AND NEGOTIATION.**

Valuation of parcels to be acquired.

First offer and negotiations.

Final offer.

1304. **ROW ACQUISITION AND RELOCATION.**

Purchase of parcels.

Condemnations.

Relocation assistance.

1305. **CERTIFICATION OF ADJUSTMENT OF UTILITIES.**

Utilities relocated, or-

Agreements formalized to adjust utilities during construction.

Proposed adjustments included in plans.

Certificates by ROW Section attached to plans.

1501. **FIELD SURVEY.**

Control lines and benchmarks.

Topographical map, profiles, cross-sections.

Survey of utilities.

Submit to Utility Cos. for verification.

1502. **DESIGN SURVEYING.**

Field measurements during Detailed Design.

1601. **DESIGN CRITERIA CONFERENCE.**

Design criteria and Standards.

Typical sections.

Prelim. traffic control plan.

Width of R-O-W.

Geometrics.

No. of lanes.

Bridge alignments.

1602. **ALIGNMENT AND TYPICAL SECTIONS**

Revise Design if required after approval of DCC by District Design Engineer.

Horizontal and vertical alignments.(from 1108).

Submission to D-19 for cross-sections.

Typical sections to D-8 for approval.

1603. **RAILROAD AGREEMENTS.**

Layouts of crossings to D-5.

D-5 to Railroad for approval.

1604. **PERMITS AND AGREEMENTS.**

All governmental permits and Third-Party agreements.

1605. **EARTHWORKS.**

Final horiz. alignment.

Road and ditch profiles.

Final vertical alignment---->Drainage Design (1606)

Intersection layouts and grade separations.

Ramp details---->Bridge Layouts (1701).

Final typical sections incl. pavement.

Retaining wall layouts.

Earthworks.

Planimetric sheets.

Detour layouts during constr.= Traffic control plan.

Grading Summary Sheets.

1606. **DRAINAGE DESIGN.**

Stream Crossing Hydraulics

Drainage area map.

Storm sewer hydraulic calcs.

Calcs. for cross- and parallel culverts.

Roadway Hydraulics

Calcs. for side road ditches.

Hyd. calcs. for bridges---->Bridge Layouts (1701).

Outfall channel hydraulics.

Drainage Details

Culvert profiles, layout & details/contours.

Storm sewer details.

Documentation.

1607. **RET. WALLS & MISCELLANEOUS STRUCTURES.**

Retaining Walls and Misc. Structures.

1608. **TRAFFIC CONTROL PLAN.**

Sequence of Construction.

Layout/sections during each phase of construction.

Detour layouts/ lane closure schedules.

Temp. signing & signal revision.

Co-ord. with adj. construction.

1609. **MISCELLANEOUS DETAILS.**

Illumination.

Landscaping/erosion control/pumphouses.

Noise abatement.

Modification of standard details for special situations.

Roadside parks/rest stations/weighstations.

Third Party requirements/pedestrian overpasses.

Curb & gutter/ access driveways/ sidewalks.

1610. **UTILITY LAYOUTS AND DETAILS.**

Existing and proposed locations of utilities (after 1500).

Sewers, water, gas, oil, power, telephone, storm sewers.

1611. **PERMANENT TRAFFIC MANAGEMENT & SAFETY REVIEW.**

Signing, Signalization, Striping

Pavement Markings/ railroad crossings.

Ramp metering.

Changeable message signs; Surveillance.

Review of temporary traffic control plan.

Review of permanent traffic control plan.

Revisions to plans.

1701. **BRIDGE LAYOUTS.**

Horiz. alignment.

Road profile.

Soil data.

High water marks---->Bridge Details(1702).

Riprap/slope protection.

Approach/end transition.

Bridge retaining wall layouts.

D-5 approval.

1702. **BRIDGE DETAILS.**

Interior & abutment bents.

Columns, footings & piling details.

Beams, slab & diaphragms.

Expansion jts.

Beam protection plates.

Illumination/ guard railings.

1801.**ASSEMBLY OF PS&E AND SUPPORTING DOCUMENTS & DISTRICT REVIEW.**

Project general notes.

Set of plans.

List of specifications.

Detailed Engineer's estimate.

P S & E submission data sheet.

Construction speed zone.

Permits and agreements.

Review by District Design Engineer.

Constructability review.

Final revisions made to plans.

Documents printed and bound.

Submit to D-8.

1802. **AUSTIN REVIEW, ADS & BIDDING PERIOD.**

Review and processing of documents by D-8.

DCIS updated.

Funds available/ added to tentative letting schedule.

FHWA authorizes release of ads.

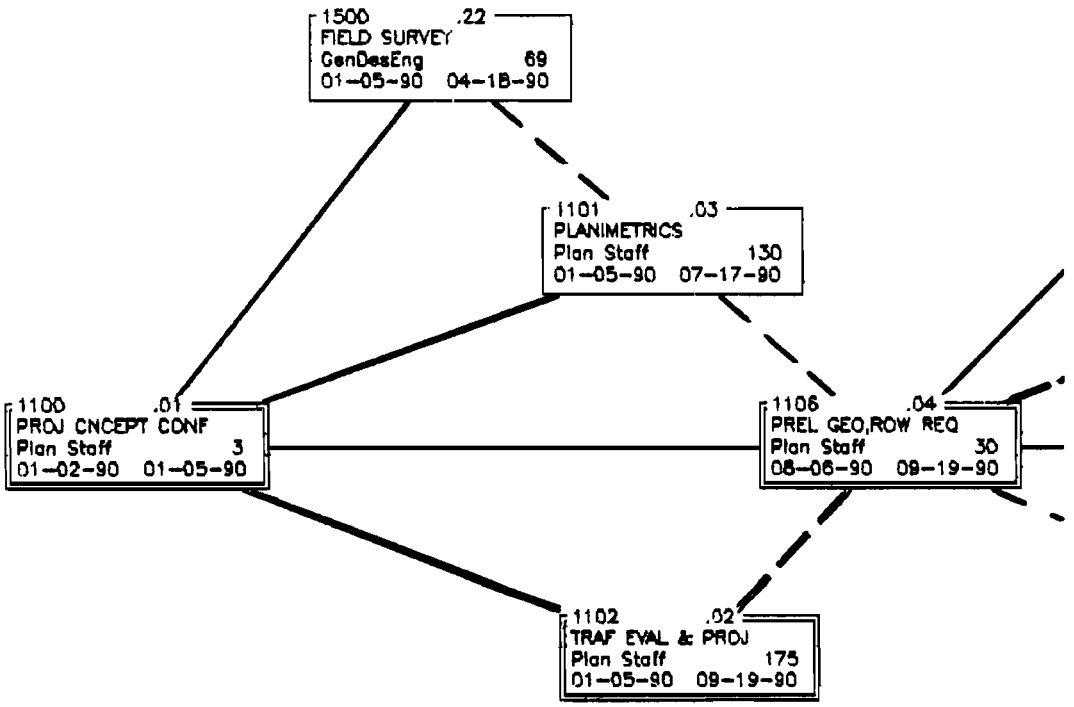
First ad published.

Bidding period.

Bids opened.

NETWORK 1

NEW LOCATION FREEWAYS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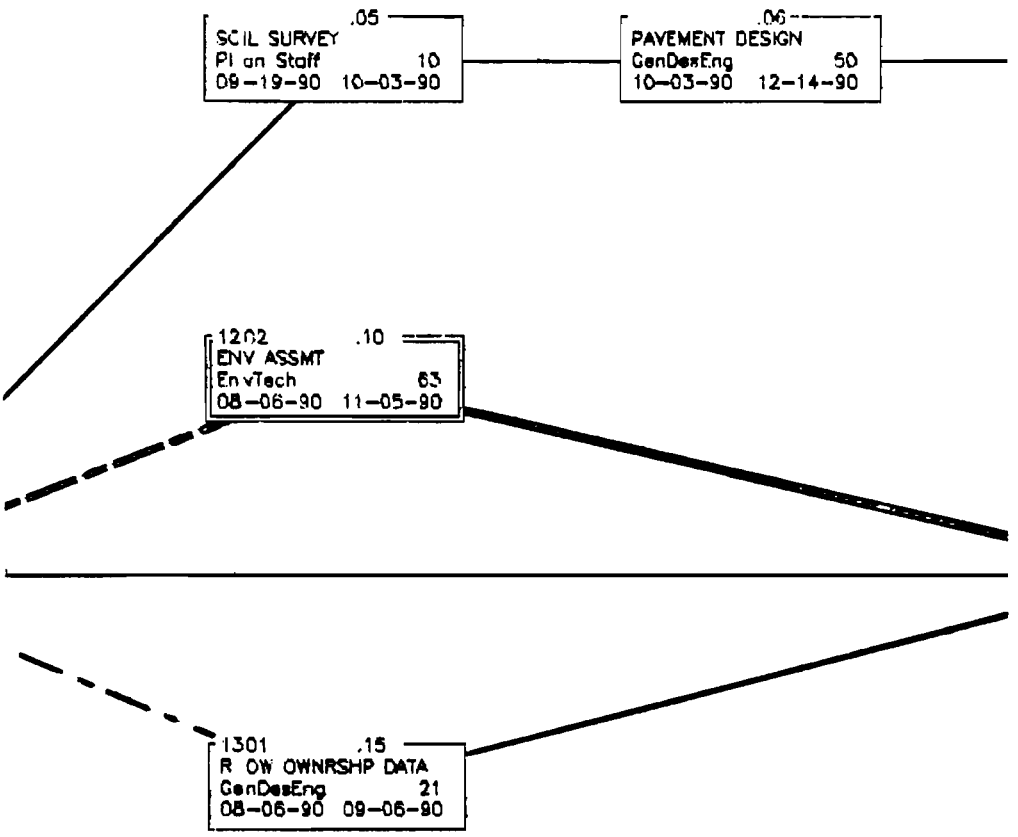
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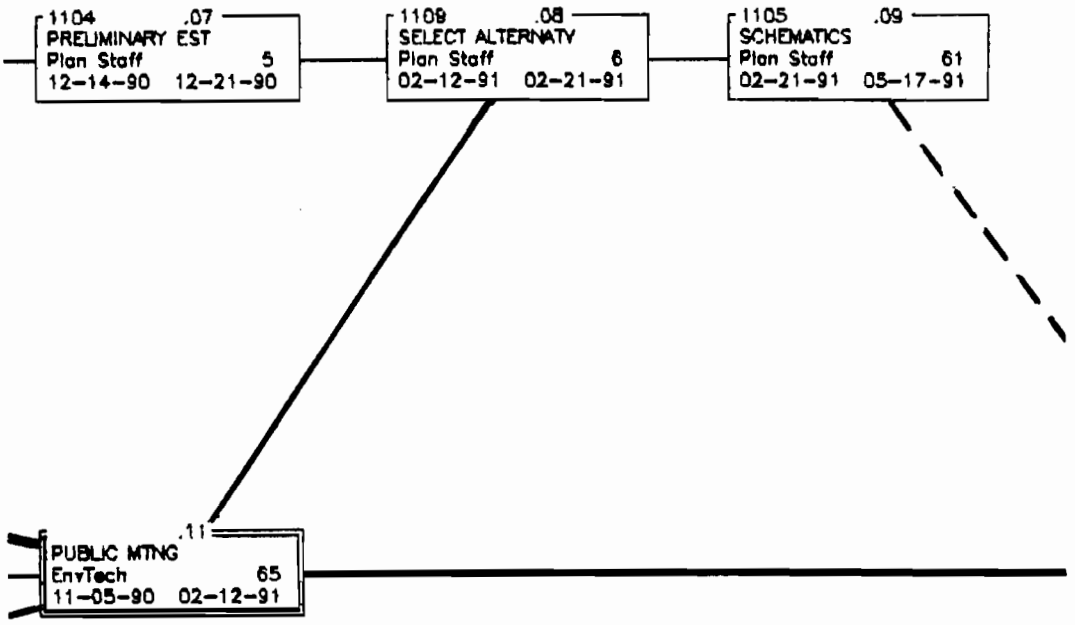
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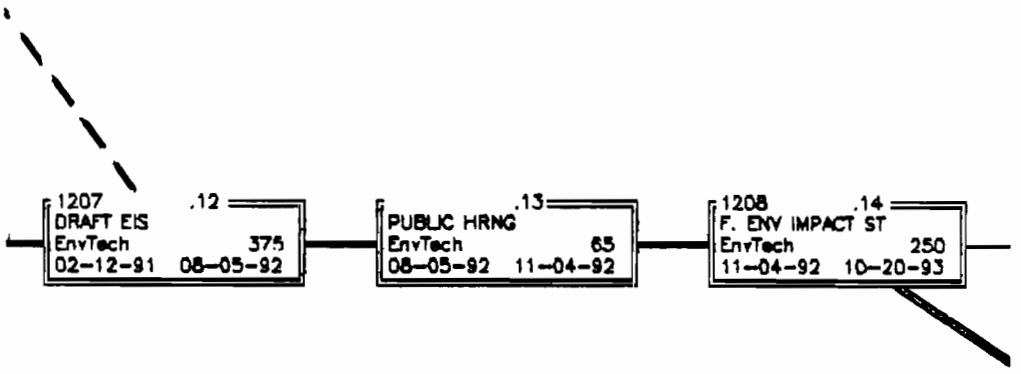
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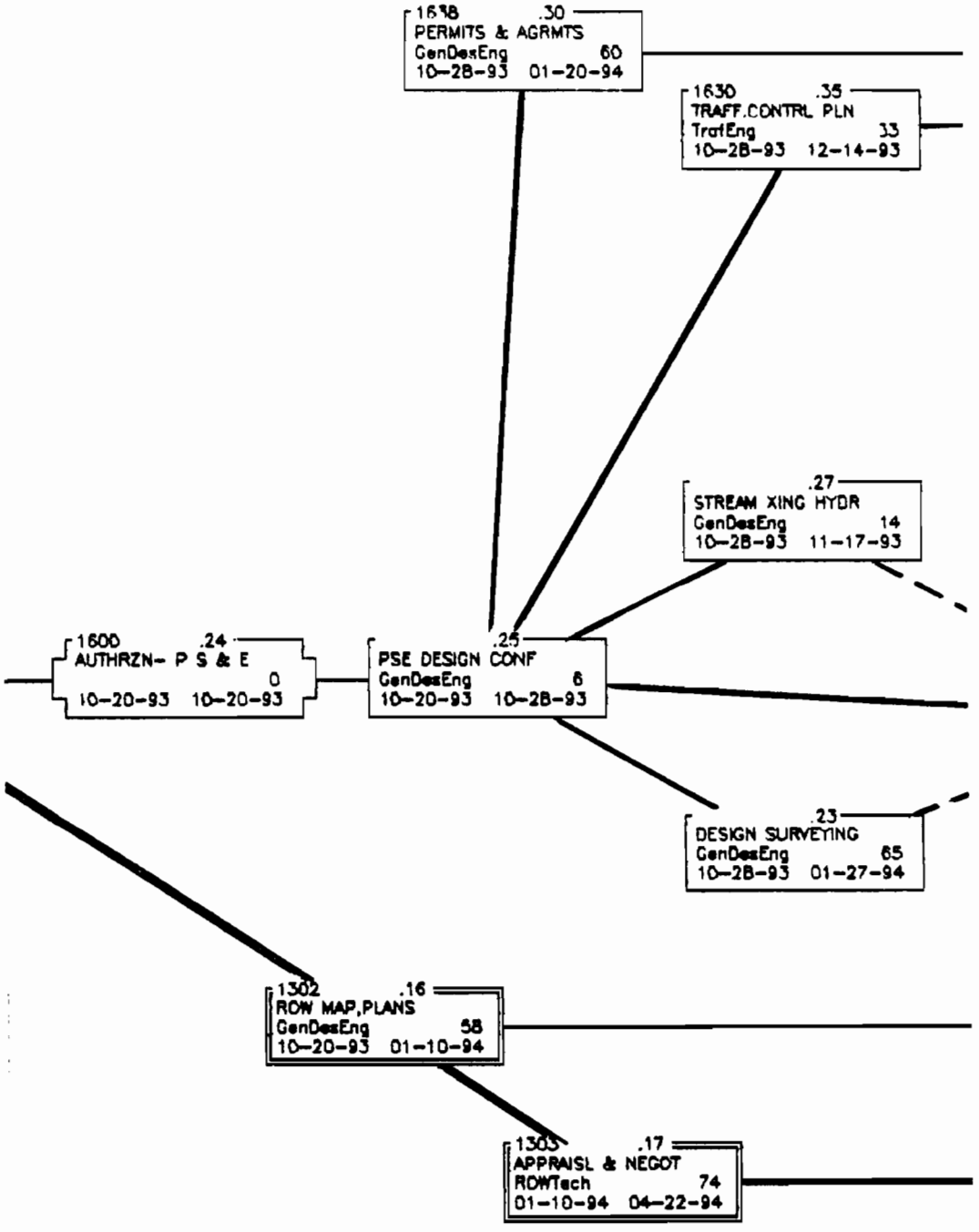
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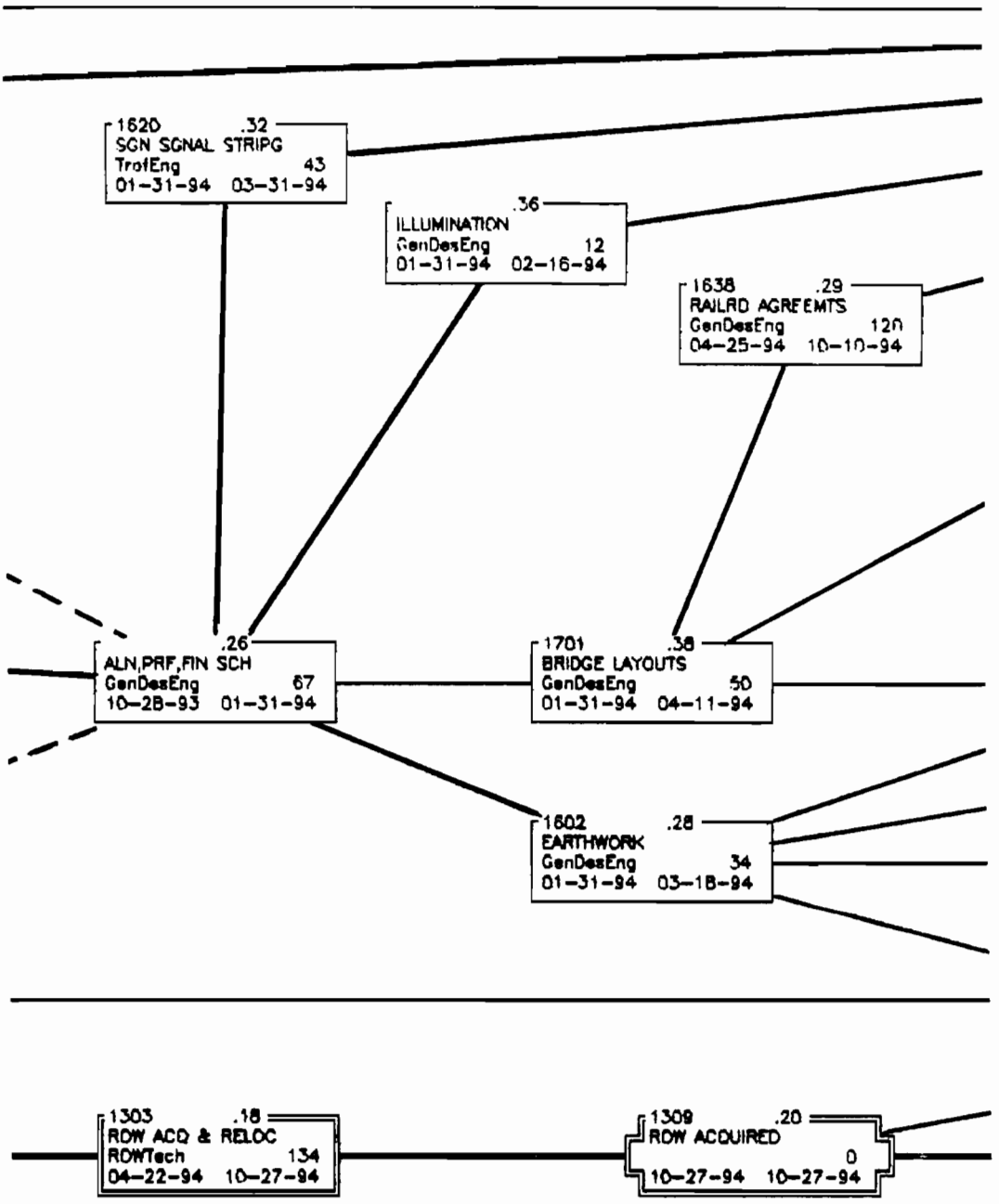
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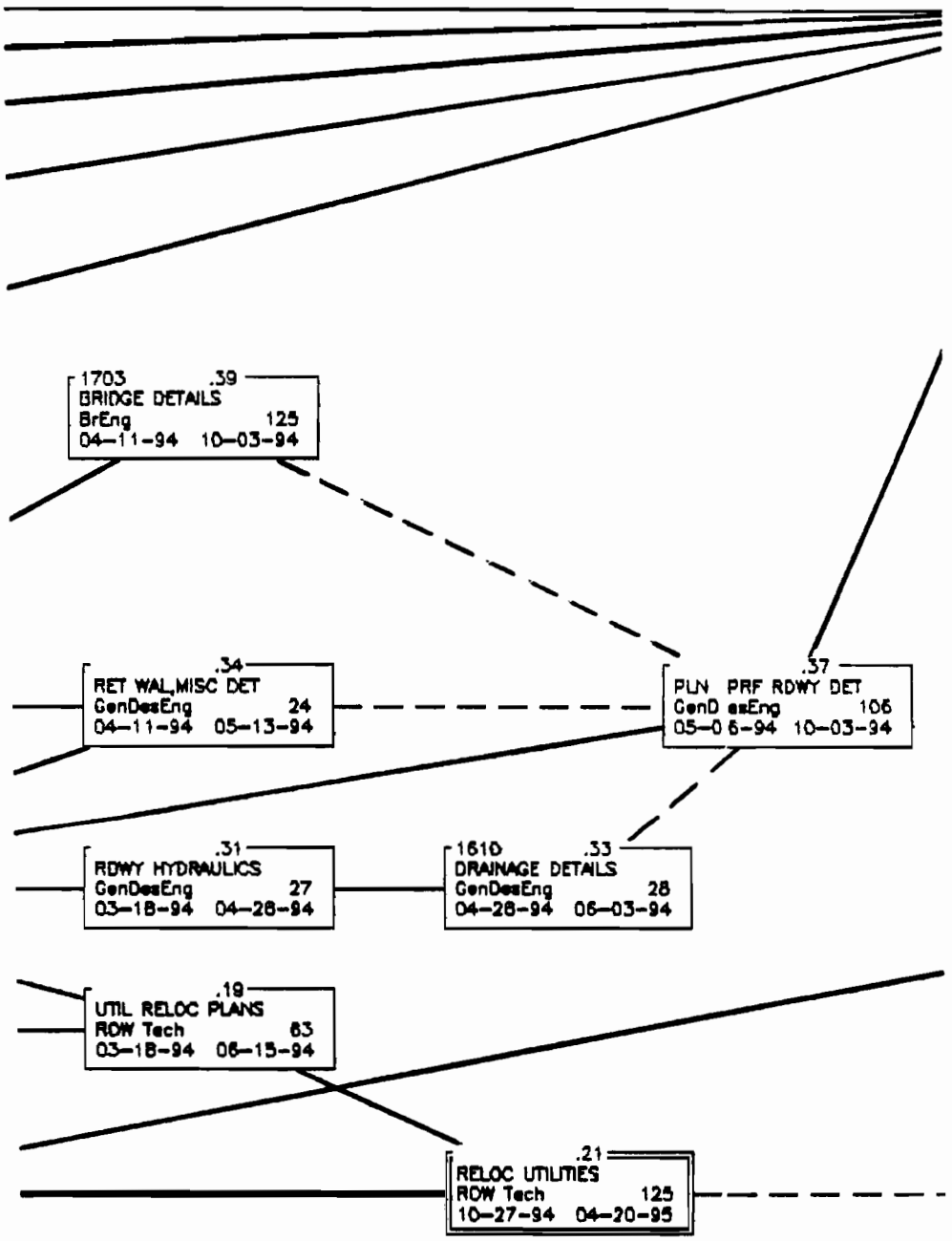
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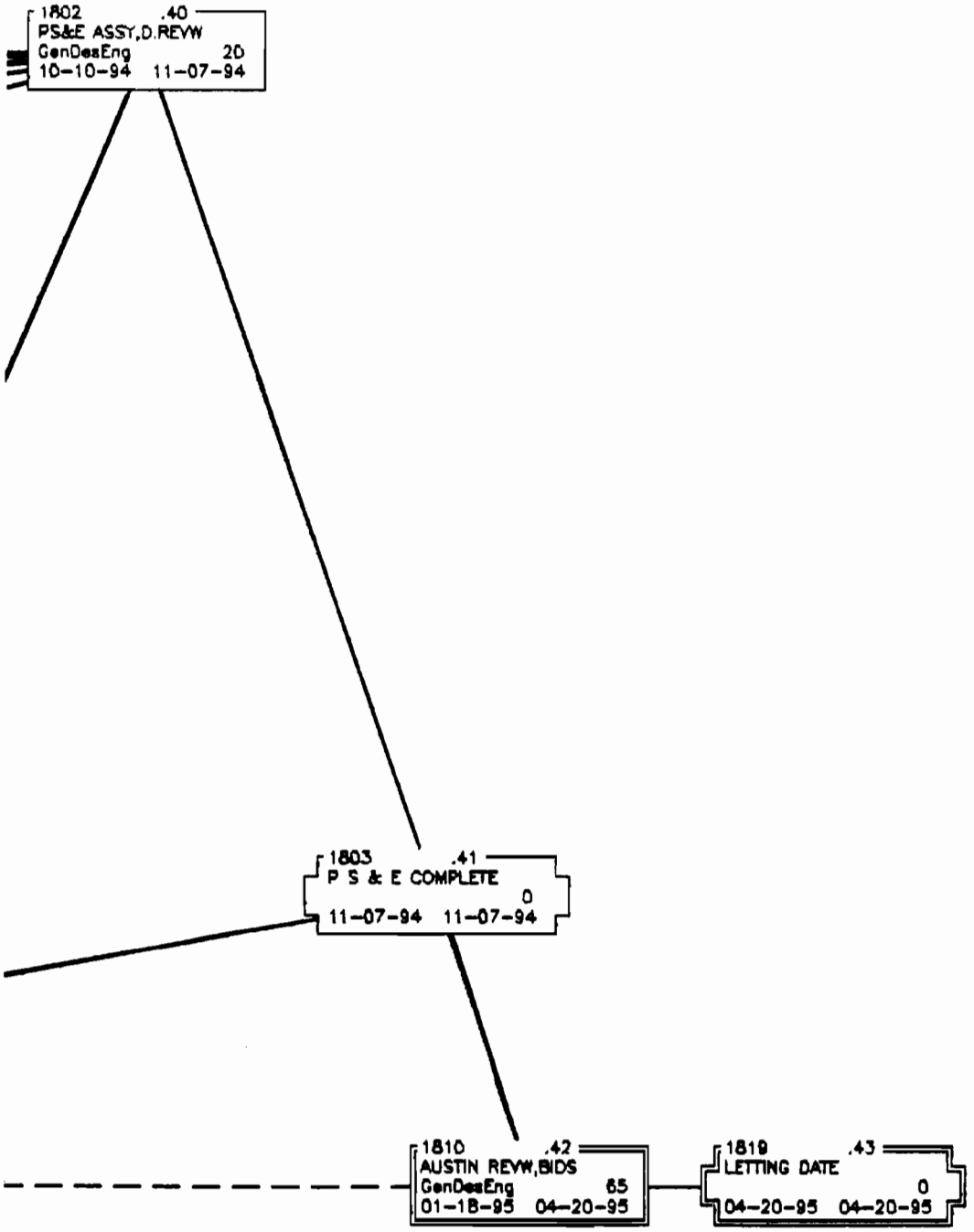
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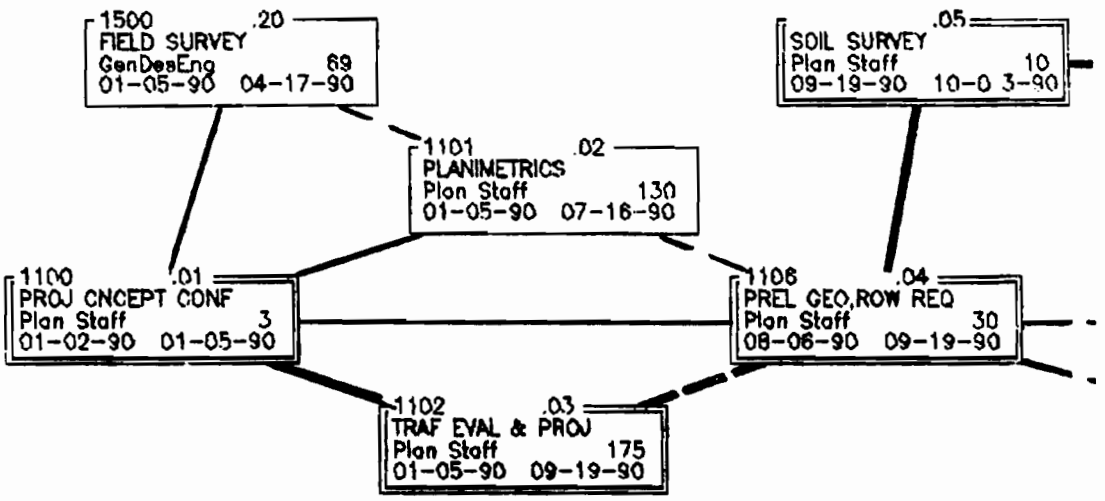
4. CONVERT NON-FREEWAY TO FREEWAY.
5. INTERCHANGE.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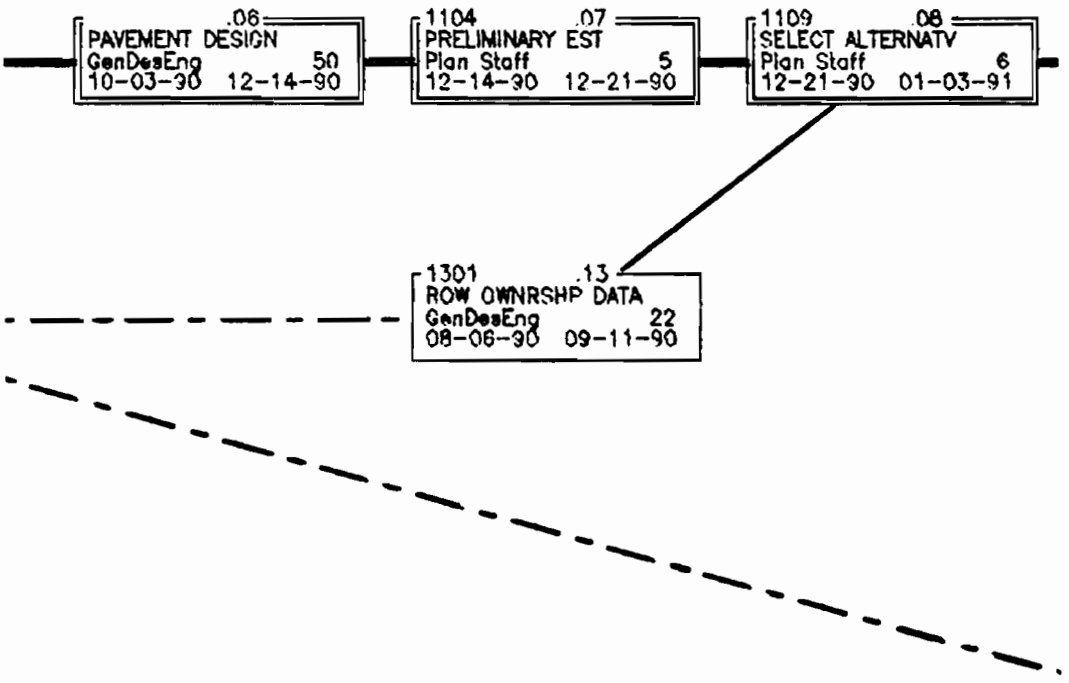
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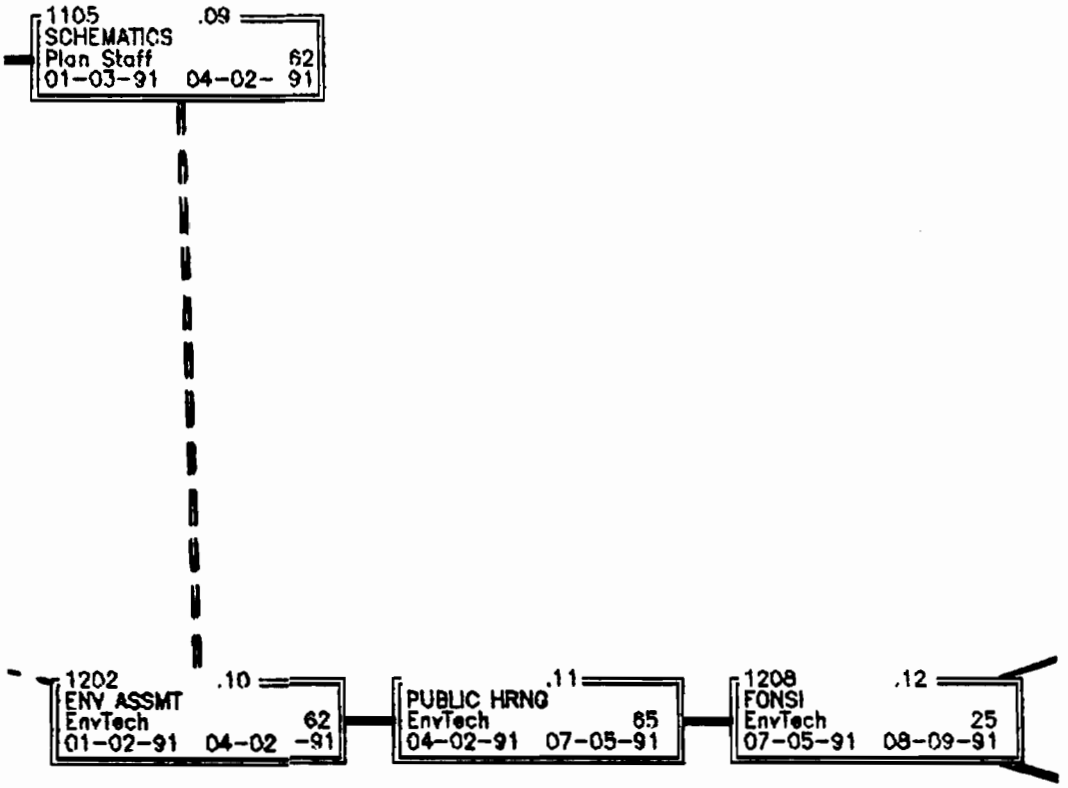
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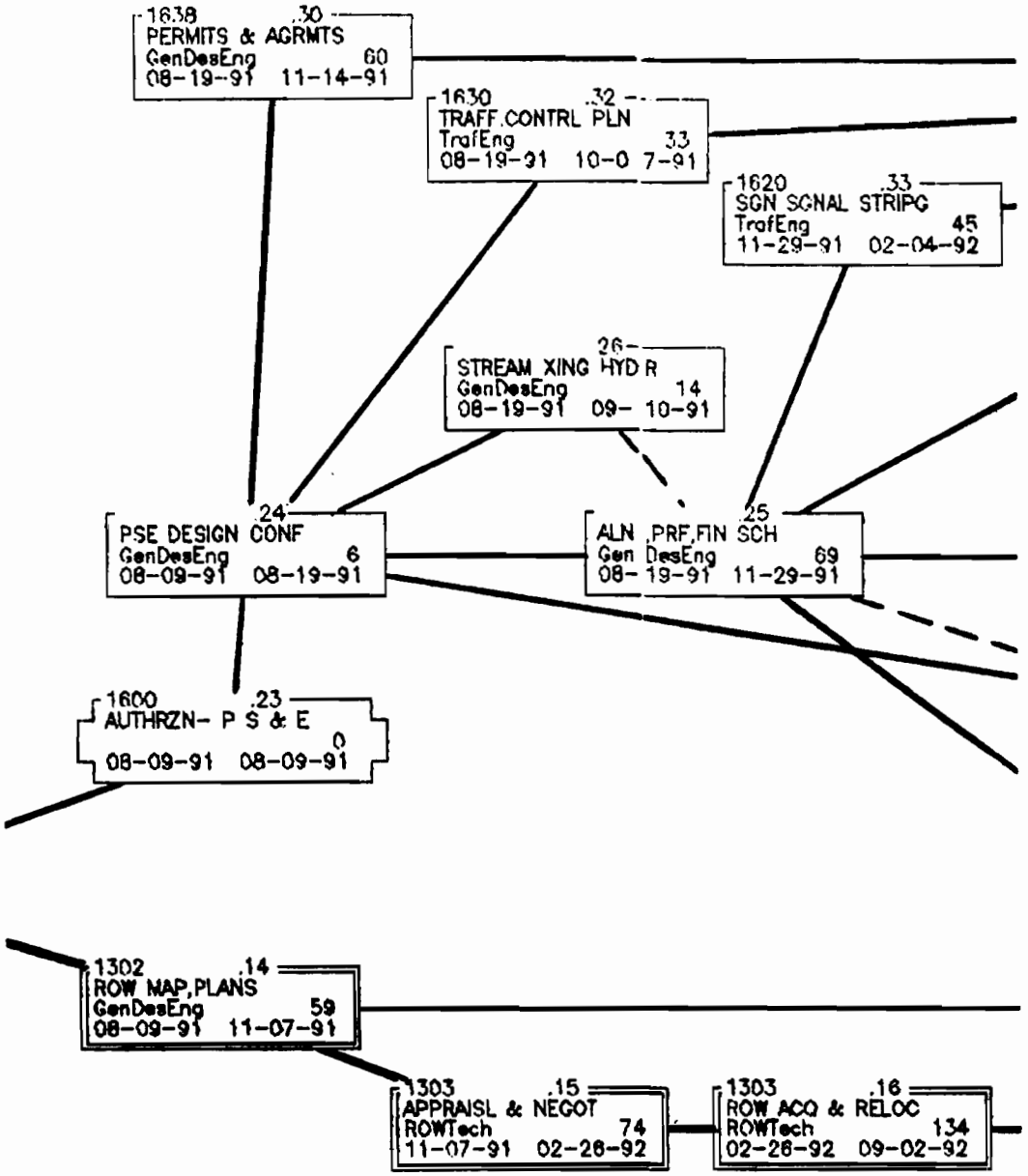
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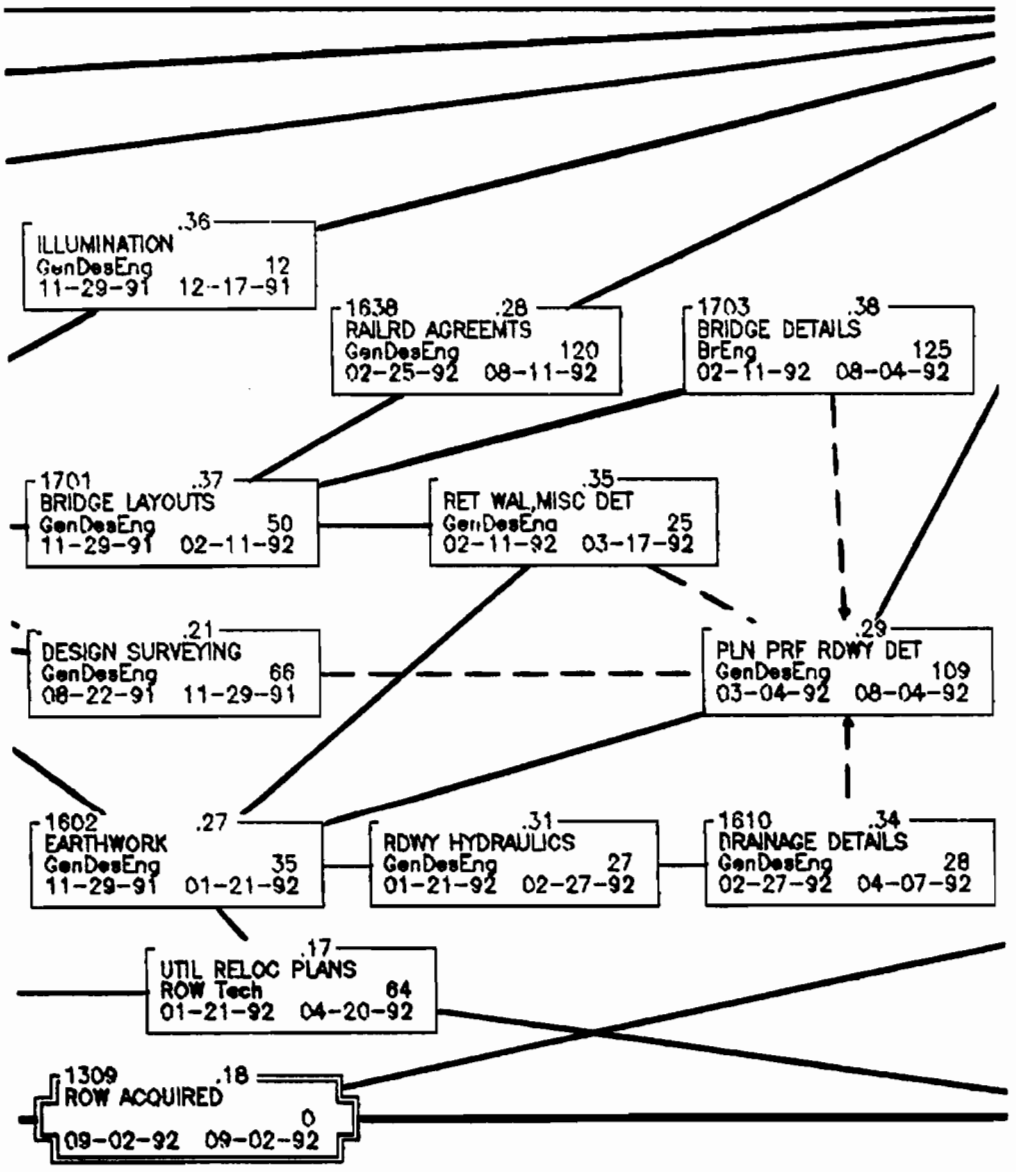
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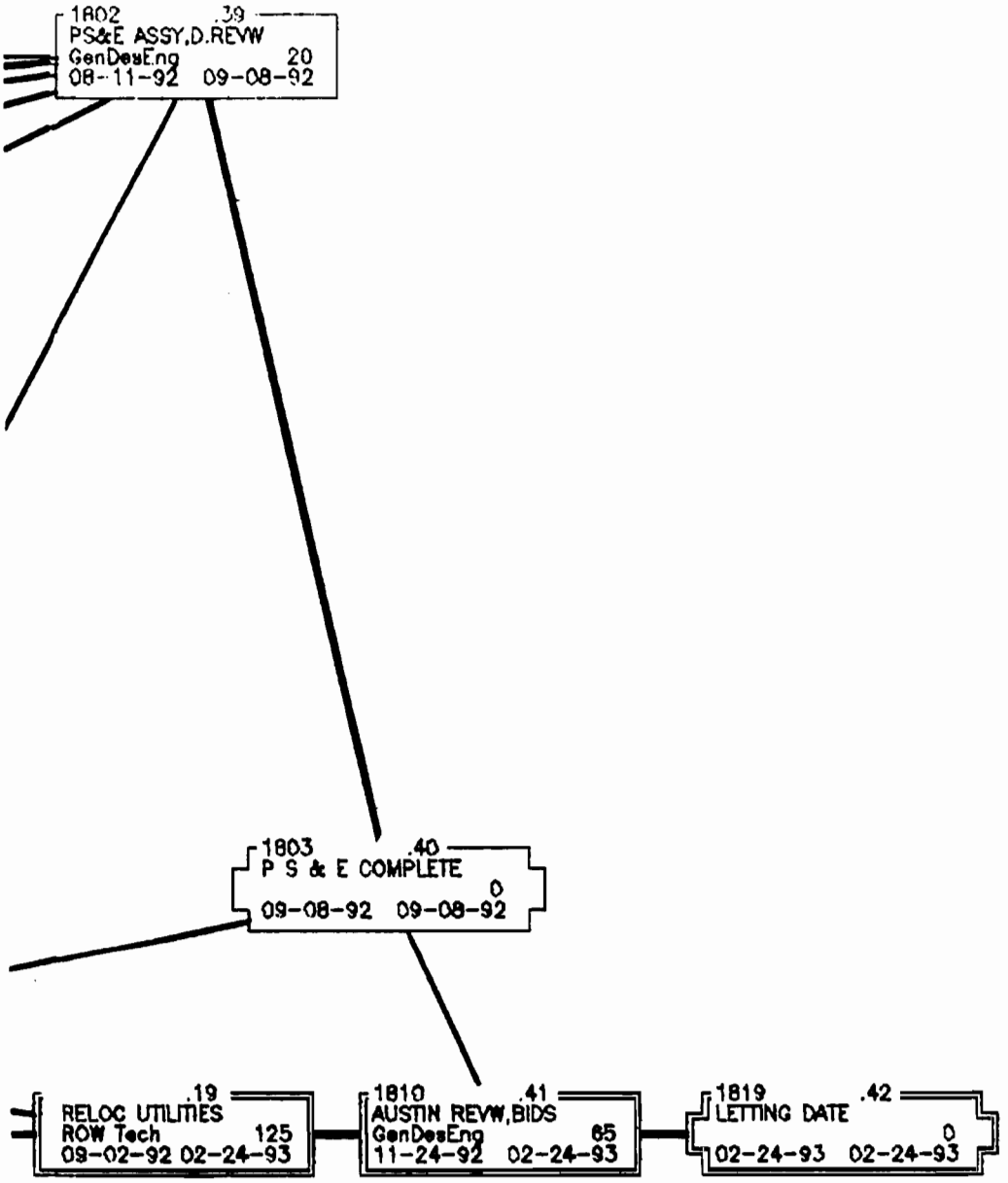
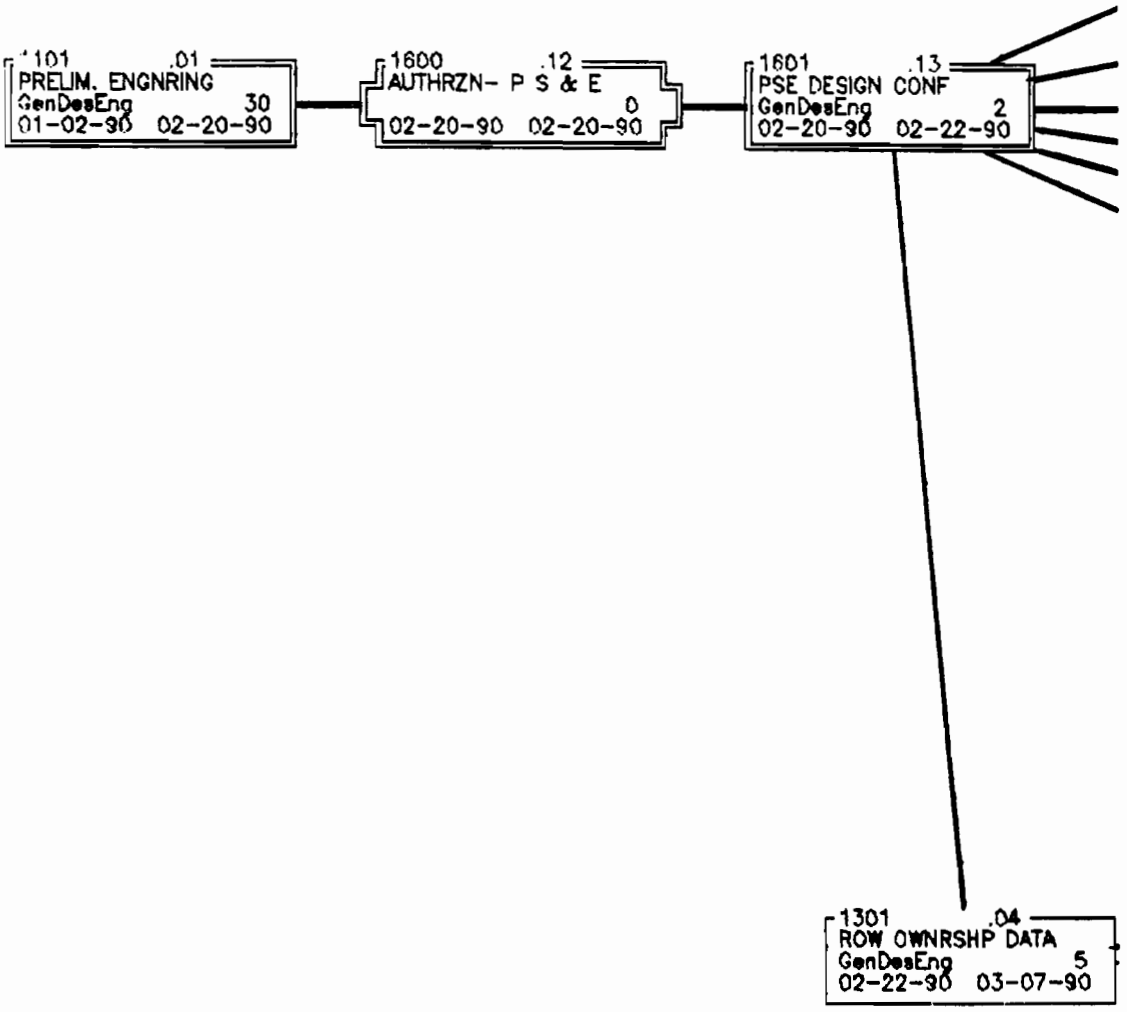
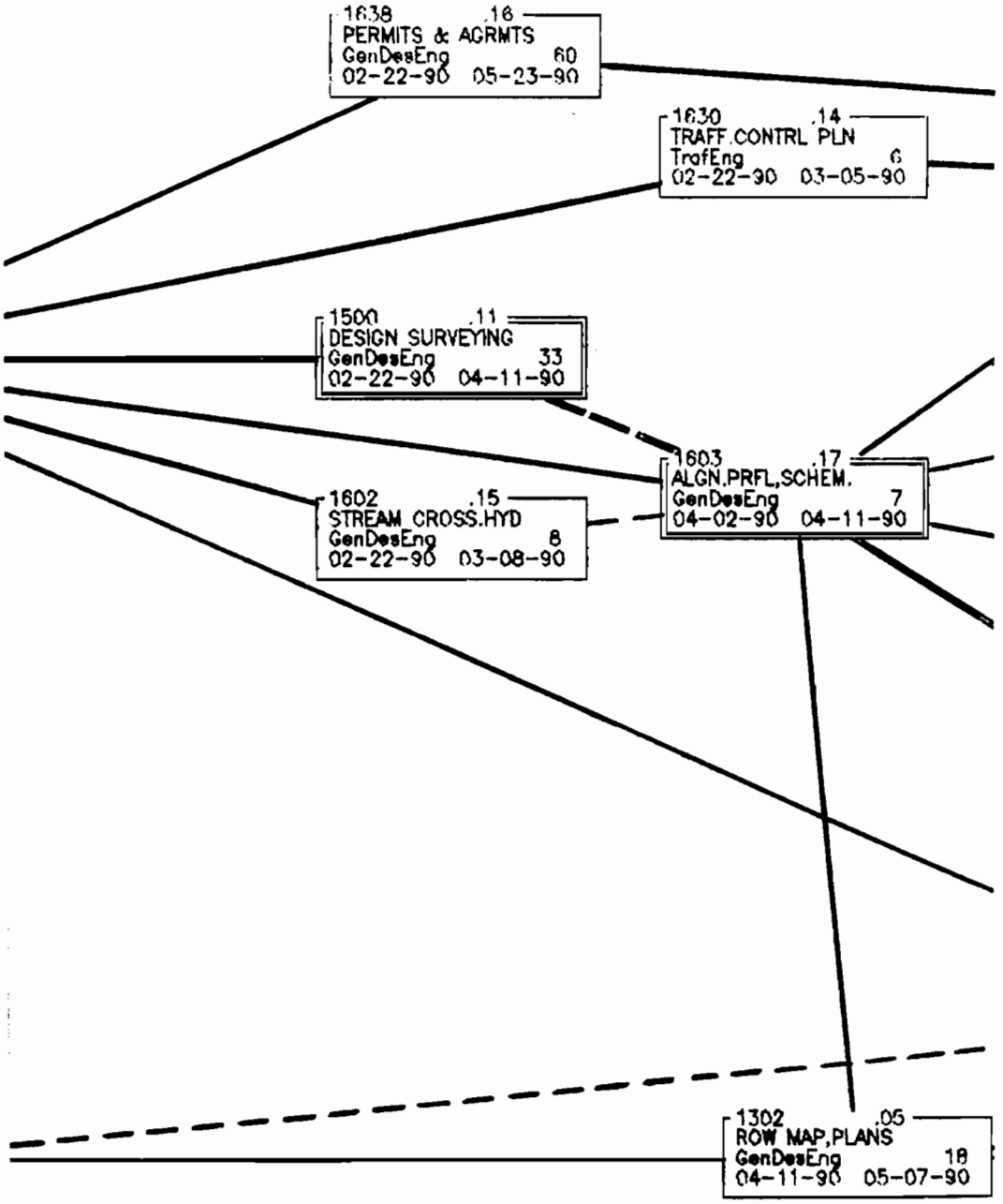
PLN PRF RDWY DET
GenDesEng 109
03-04-92 08-04-92
1602 .27
EARTHWORK
GenDesEng 35
11-29-91 01-21-92
.31
RDWY HYDRAULICS
GenDesEng 27
01-21-92 02-27-92
1610 .34
DRAINAGE DETAILS
GenDesEng 28
02-27-92 04-07-92
.17
UTIL RELOC PLANS
ROW Tech 64
01-21-92 04-20-92
1309 .18
ROW ACQUIRED
0
09-02-92 09-02-92

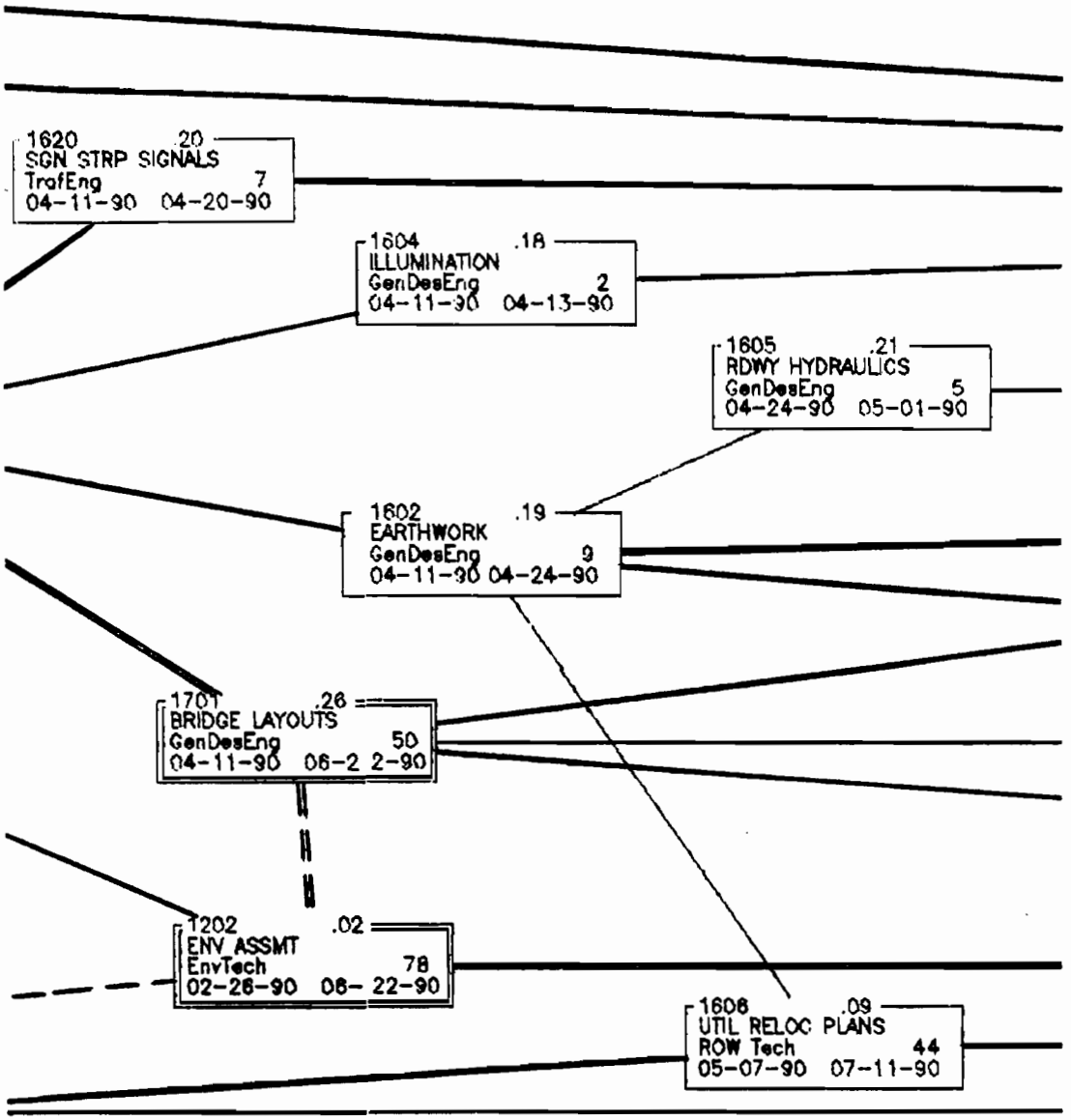

1802 .39
PS&E ASSY,D.REVW
GenDesEng 20
08-11-92 09-08-92
1803 .40
P S & E COMPLETE
0
09-08-92 09-08-92
.19
RELOC UTILITIES
ROW Tech 125
09-02-92 02-24-93
1810 .41
AUSTIN REVW,BIDS
GenDesEng 65
11-24-92 02-24-93
1819 .42
LETTING DATE
0
02-24-93 02-24-93

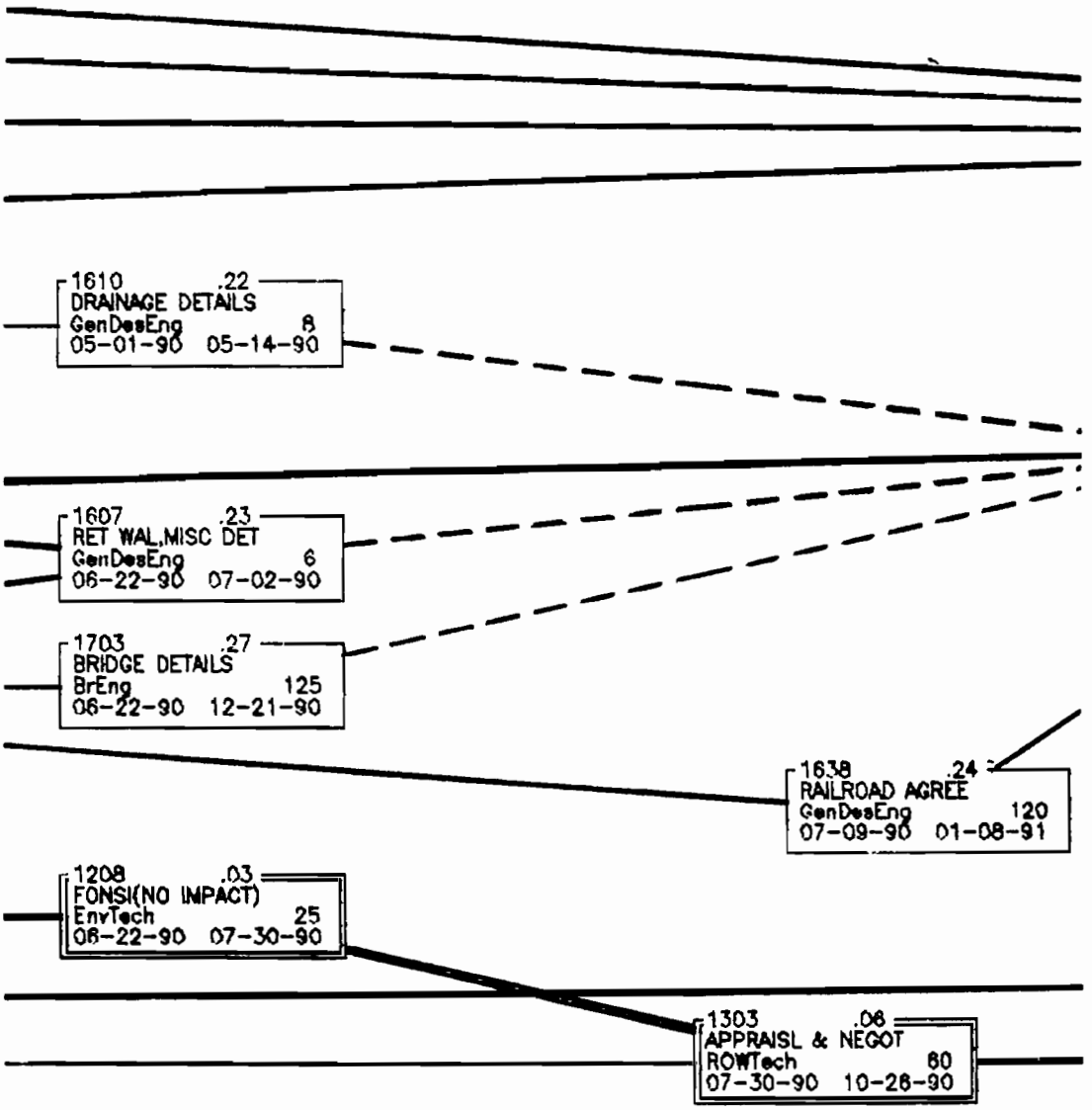
NETWORK 3

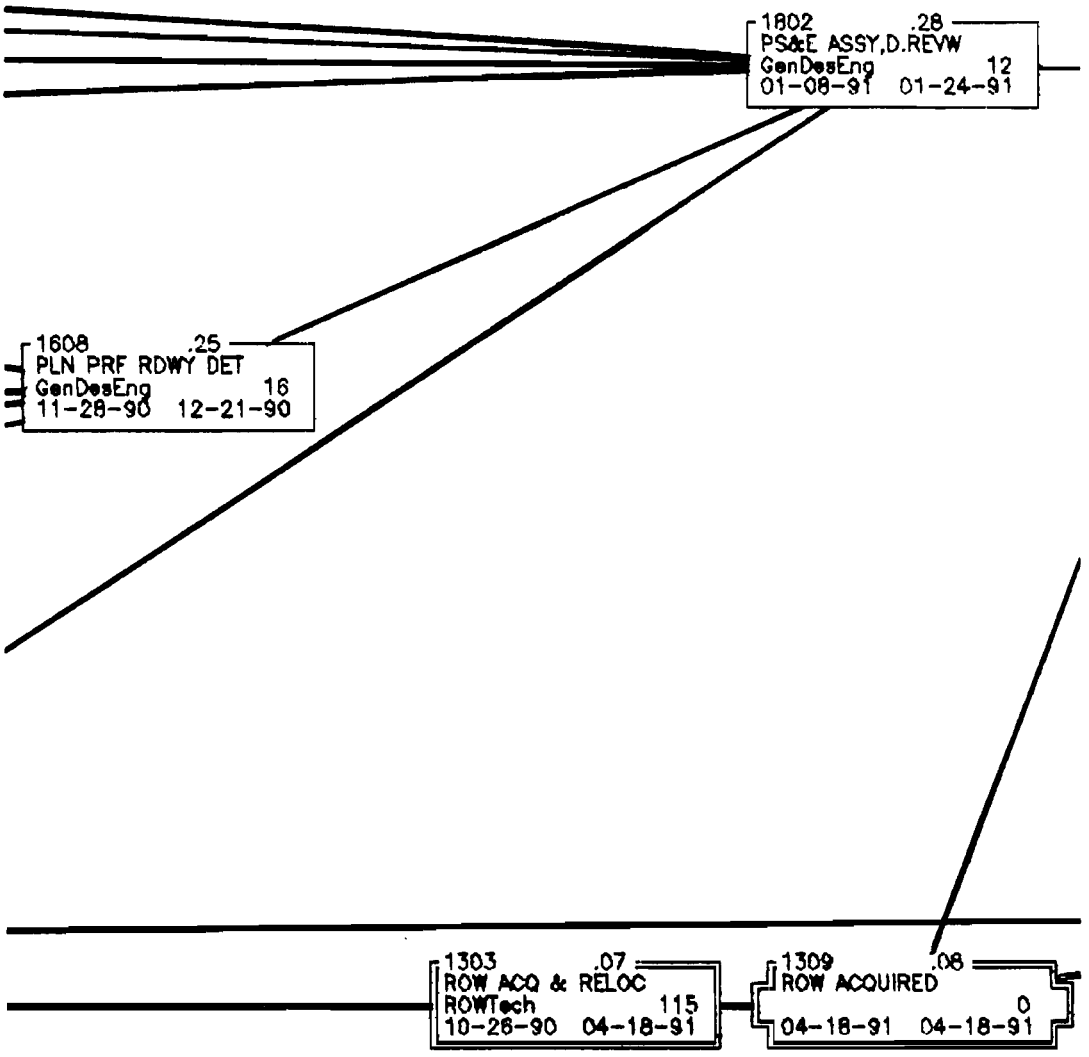
1. BRIDGE REPLACEMENT.
2. BRIDGE WIDENING/ REHAB.
3. UPGRADE FREEWAY TO STANDARDS.
4. UPGRADE NON-FREEWAY TO STANDARDS.
5. REHABILITATE EXISTING ROAD.
6. MISCELLANEOUS CONSTRUCTION.

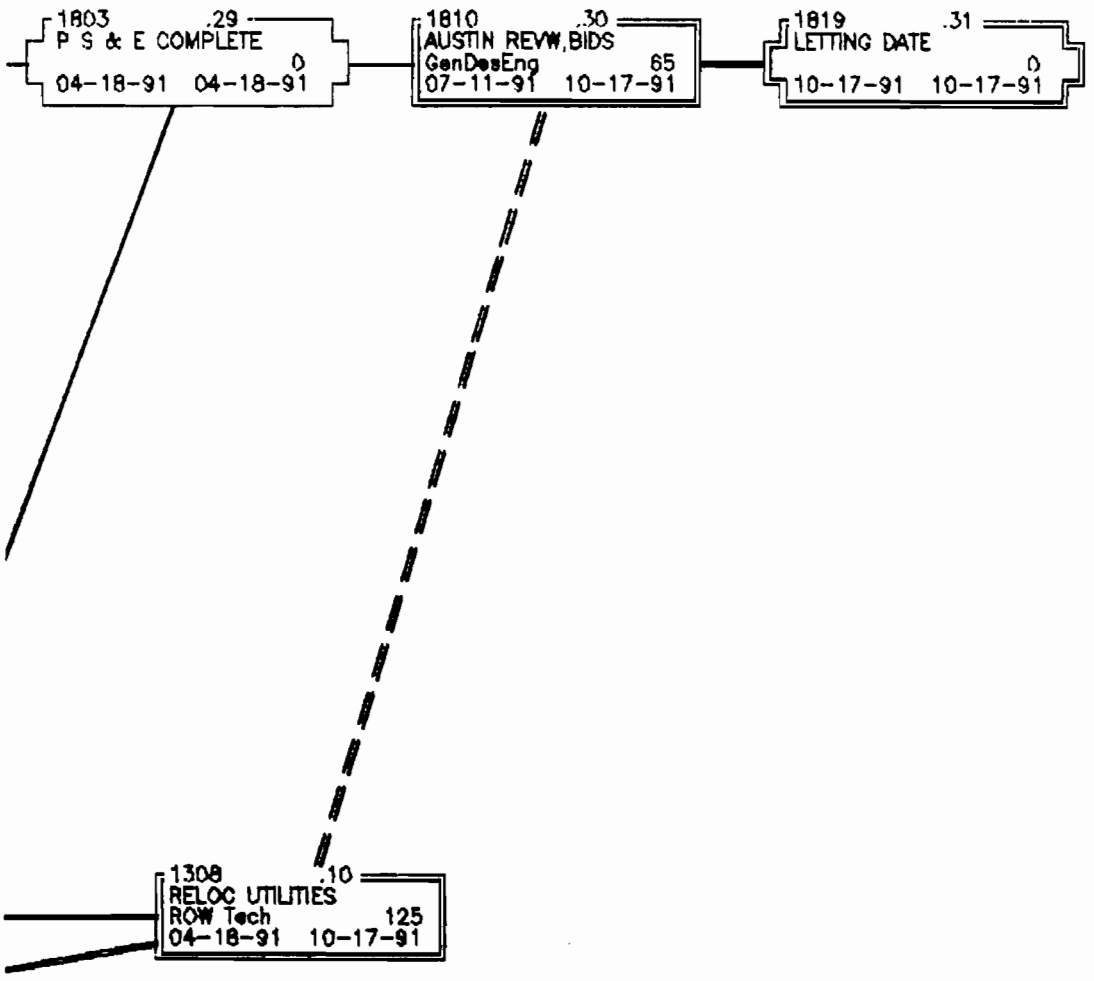

1101 .01
PRELIM. ENGNRING
GenDesEng 30
01-02-90 02-20-90
1600 .12
AUTHRZN- P S & E
0
02-20-90 02-20-90
1601 .13
PSE DESIGN CONF
GenDesEng 2
02-20-90 02-22-90
1301 .04
ROW OWNRSHP DATA
GenDesEng 5
02-22-90 03-07-90


1638 .16
PERMITS & AGRMTS
GenDesEng 60
02-22-90 05-23-90
1630 .14
TRAFF.CONTRL PLN
TrafEng 6
02-22-90 03-05-90
1500 .11
DESIGN SURVEYING
GenDesEng 33
02-22-90 04-11-90
1603 .17
ALGN,PRFL,SCHEM.
GenDesEng 7
04-02-90 04-11-90
1602 .15
STREAM CROSS.HYD
GenDesEng 8
02-22-90 03-08-90
1302 .05
ROW MAP,PLANS
GenDesEng 18
04-11-90 05-07-90


1620 .20
SGN STRP SIGNALS
TrafEng 7
04-11-90 04-20-90
1604 .18
ILLUMINATION
GenDesEng 2
04-11-90 04-13-90
1605 .21
RDWY HYDRAULICS
GenDesEng 5
04-24-90 05-01-90
1602 .19
EARTHWORK
GenDesEng 9
04-11-90 04-24-90
1701 .26
BRIDGE LAYOUTS
GenDesEng 50
04-11-90 06-2 2-90
1202 .02
ENV ASSMT
EnvTech 78
02-26-90 06- 22-90
1606 .09
UTIL RELOC PLANS
ROW Tech 44
05-07-90 07-11-90

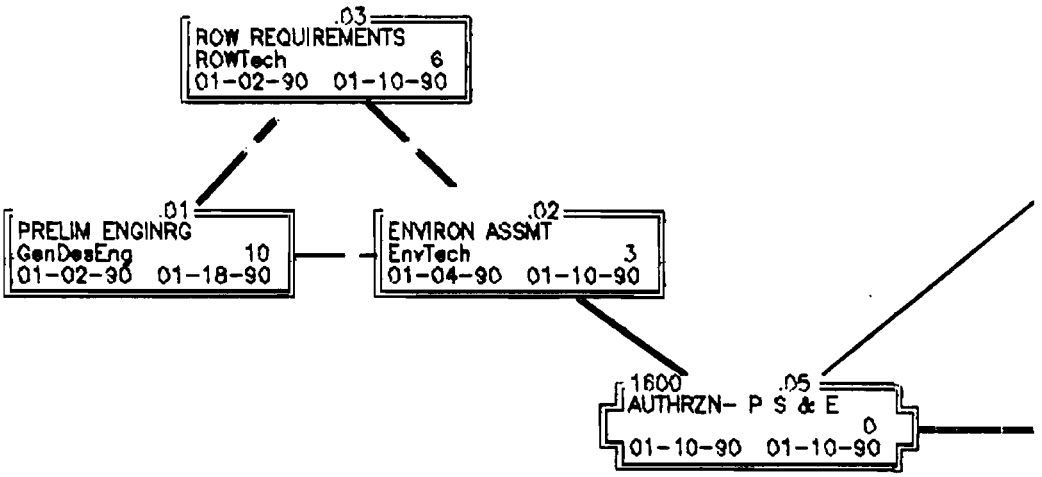

1610 .22
DRAINAGE DETAILS
GenDesEng 8
05-01-90 05-14-90
1607 .23
RET WAL,MISC DET
GenDesEng 6
06-22-90 07-02-90
1703 .27
BRIDGE DETAILS
BrEng 125
06-22-90 12-21-90
1638 .24
RAILROAD AGREE
GenDesEng 120
07-09-90 01-08-91
1208 .03
FONSI(NO IMPACT)
EnvTech 25
06-22-90 07-30-90
1303 .06
APPRAISL & NEGOT
ROWTech 60
07-30-90 10-26-90

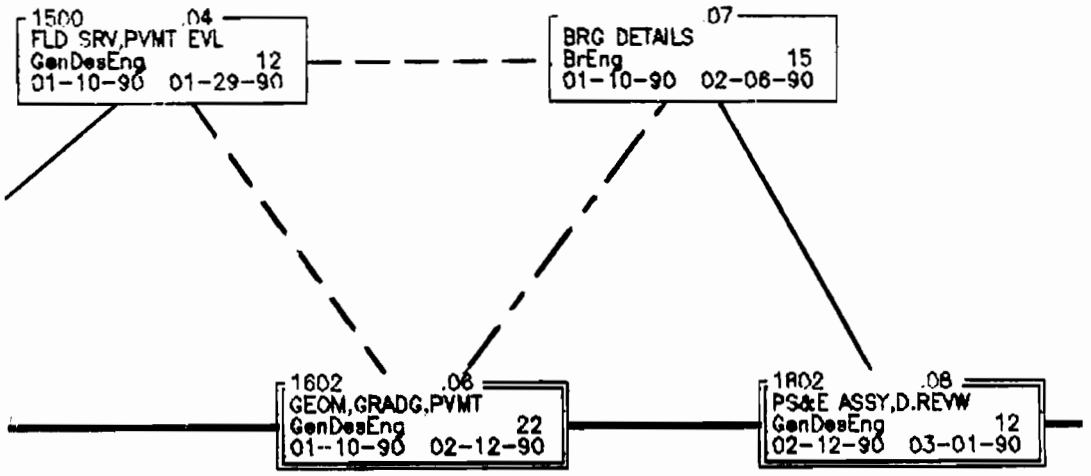

1802 .28
PS&E ASSY,D.REVW
GenDesEng 12
01-08-91 01-24-91
1608 .25
PLN PRF RDWY DET
GenDesEng 16
11-28-90 12-21-90
1303 .07
ROW ACQ & RELOC
ROWTech 115
10-26-90 04-18-91
1309 .08
ROW ACQUIRED
0
04-18-91 04-18-91

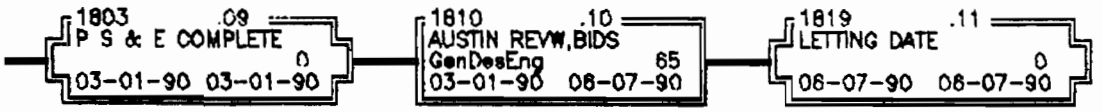

1803 .29
P S & E COMPLETE
0
04-18-91 04-18-91
1810 .30
AUSTIN REVW,BIDS
GenDesEng 65
07-11-91 10-17-91
1819 .31
LETTING DATE
0
10-17-91 10-17-91
1308 .10
RELOC UTILITIES
ROW Tech 125
04-18-91 10-17-91

NETWORK 4

1. SEALCOATS.
2. OVERLAYS.


.03
ROW REQUIREMENTS
ROWTech 6
01-02-90 01-10-90
.01
PRELIM ENGINRG
GenDesEng 10
01-02-90 01-18-90
.02
ENVIRON ASSMT
EnvTech 3
01-04-90 01-10-90
1600 .05
AUTHRZN- P S & E
0
01-10-90 01-10-90


1500 .04
FLD SRV,PVMT EVL
GenDesEng 12
01-10-90 01-29-90
.07
BRG DETAILS
BrEng 15
01-10-90 02-06-90
1602 .06
GEOM,GRADG,PVMT
GenDesEng 22
01--10-90 02-12-90
1802 .08
PS&E ASSY,D.REVW
GenDesEng 12
02-12-90 03-01-90


1803 .09
P S & E COMPLETE
0
03-01-90 03-01-90
1810 .10
AUSTIN REVW,BIDS
GenDesEng 65
03-01-90 06-07-90
1819 .11
LETTING DATE
0
06-07-90 06-07-90

DEFAULT VALUES IN NETWORKS

Outline
09-08-89 3:50p

Project: BRGREPLC.PJ
Revision: 5

Network for Bridge Replacement - Average Project

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
BRGREPLC.PJ		BRO	448			814	0	
FN CODE 110		032	34			16	1	
PRELIM. ENGNRING		001	30			16	1	
	GenDesEng	001	30	3%x	1	8		
	GenDesTech	001	30	3%x	1	8		
FN CODE 120		033	107			19	1	
ENV ASSMT		002	78			13	1	
	EnvTech	002	78	2%x	1	13		
FONSI(NO IMPACT)		003	25			6	1	
	EnvTech	003	25	3%x	1	6		
FN CODE 130		034	414			85	0	
ROW OWNRSHP DATA		004	5			12	76	
	GenDesEng	004	5	3%x	1	2		
	GenDesTech	004	5	24%x	1	10		
ROW MAP,PLANS		005	18			6	58	
	GenDesEng	005	18	2%x	1	3		
	GenDesTech	005	18	2%x	1	3		
APPRAISL & NEGOT		006	60			10	1	
	ROWTech	006	60	2%x	1	10		
ROW ACQ & RELOC		007	115			19	0	
	ROWTech	007	115	2%x	1	19		
ROW ACQUIRED		008	0			0	0	
UTIL RELOC PLANS		009	44			18	194	
	ROW Tech	009	44	5%x	1	18		
RELOC UTILITIES		010	125			20	0	
	ROW Tech	010	125	2%x	1	20		
FN CODE 150		035	34			154	1	
DESIGN SURVEYING		011	33			154	1	
	GenDesEng	011	33	10%x	1	27		
	GenDesTech	011	33	12%x	4	127		
FN CODE 160		036	220			295	117	
AUTHRZN- P S & E		012	0			0	1	
PSE DESIGN CONF		013	2			17	1	
	GenDesEng	013	2	11%x	4	8		
	GenDesTech	013	2	14%x	4	9		
TRAFF.CONTRL PLN		014	6			27	328	

Outline
09-08-89 3:54p

Across: 1 Down: 2
Project: BRGREPLC.PJ
Revision: 5

Network for Bridge Replacement - Average Project

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
	TrafEng	014	6	28%x	1	14		
	TrafTech	014	6	27%x	1	13		
STREAM CROSS.HYD		015	8			15	25	
	GenDesEng	015	8	11%x	1	8		
	GenDesTech	015	8	10%x	1	7		
PERMITS & AGRMTS		016	60			20	272	
	GenDesEng	016	60	2%x	1	10		
	GenDesTech	016	60	2%x	1	10		
ALGN,PRFL,SCHEM.		017	7			30	1	
	GenDesEng	017	7	25%x	1	14		
	GenDesTech	017	7	28%x	1	16		
ILLUMINATION		018	2			7	299	
	GenDesEng	018	2	19%x	1	4		
	GenDesTech	018	2	14%x	1	3		
EARTHWORK		019	9			55	202	
	GenDesEng	019	9	35%x	1	26		
	GenDesTech	019	9	39%x	1	29		
SGN STRP SIGNALS		020	7			12	294	
	TrafEng	020	7	11%x	1	7		
	TrafTech	020	7	8%x	1	5		
RDWY HYDRAULICS		021	5			15	278	
	GenDesEng	021	5	18%x	1	8		
	GenDesTech	021	5	16%x	1	7		
DRAINAGE DETAILS		022	8			15	278	
	GenDesEng	022	8	11%x	1	8		
	GenDesTech	022	8	10%x	1	7		
RET WAL,MISC DET		023	6			22	245	
	GenDesEng	023	6	20%x	1	10		
	GenDesTech	023	6	25%x	1	12		
RAILROAD AGREE		024	120			40	117	
	GenDesEng	024	120	2%x	1	20		
	GenDesTech	024	120	2%x	1	20		
PLN PRF RDWY DET		025	16			20	126	
	GenDesEng	025	16	5%x	1	7		
	GenDesTech	025	16	10%x	1	13		
FN CODE 170		037	176			206	126	

Across: 1 Down: 3
Outline
Project: BRGREPLC.PJ
09-08-89 3:50p
Revision: 5

Network for Bridge Replacement - Average Project

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
BRIDGE LAYOUTS		026	50			76	1	
	GenDesEng	026	50	8%x	1	32		
	GenDesTech	026	50	11%x	1	44		
BRIDGE DETAILS		027	125			130	126	
	BrEng	027	125	7%x	1	70		
	BrTech	027	125	6%x	1	60		
FN CODE 180		038	197			39	0	
PS&E ASSY,D.REVW		028	12			17	117	
	GenDesEng	028	12	8%x	1	8		
	GenDesTech	028	12	9%x	1	9		
P S & E COMPLETE		029	0			0	58	
AUSTIN REVW,BIDS		030	65			22	0	
	GenDesEng	030	65	2%x	1	11		
	GenDesTech	030	65	2%x	1	11		
LETTING DATE		031	0			0	0	

Outline Project: BRGWIDEN.PJ
09-08-89 4:00p Revision: 1
Network for bridge Widen/Rehab - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
BRGWIDEN.PJ	BWO	446			626	0	
FN CODE 110	032	32			10	1	
PRELIM. ENGNRING	001	30			10	1	
GenDesEng	001	30	2%x	1	5		
GenDesTech	001	30	2%x	1	5		
FN CODE 120	033	107			17	1	
ENV ASSMT	002	79			13	1	
EnvTech	002	79	2%x	1	13		
FONSI(NO IMPACT)	003	25			4	1	
EnvTech	003	25	2%x	1	4		
FN CODE 130	034	414			68	0	
ROW OWNRSHP DATA	004	4			2	78	
GenDesEng	004	4	2%x	1	1		
GenDesTech	004	4	2%x	1	1		
ROW MAP,PLANS	005	16			6	58	
GenDesEng	005	16	2%x	1	3		
GenDesTech	005	16	2%x	1	3		
APPRAISL & NEGOT	006	59			10	1	
ROWTech	006	59	2%x	1	10		
ROW ACQ & RELOC	007	113			19	0	
ROWTech	007	113	2%x	1	19		
ROW ACQUIRED	008	0			0	0	
UTIL RELOC PLANS	009	42			11	193	
ROW Tech	009	42	3%x	1	11		
RELOC UTILITIES	010	125			20	0	
ROW Tech	010	125	2%x	1	20		
FN CODE 150	035	34			47	1	
DESIGN SURVEYING	011	30			47	1	
GenDesEng	011	30	3%x	1	8		
GenDesTech	011	30	4%x	4	39		
FN CODE 160	036	220			191	117	
AUTHRZN- P S & E	012	0			0	1	
PSE DESIGN CONF	013	2			10	1	
GenDesEng	013	2	6%x	4	4		
GenDesTech	013	2	8%x	4	6		
TRAFF.CONTRL PLN	014	5			16	329	

Across: 1 Down: 2
Outline
Project: BRGWIDEN.PJ
09-08-89 4:00p
Revision: 1
Network for Bridge Widen/Rehab - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
	TrafEng	014	5	19%x	1	8		
	TrafTech	014	5	18%x	1	8		
STREAM CROSS.HYD		015	7			8	26	
	GenDesEng	015	7	7%x	1	4		
	GenDesTech	015	7	6%x	1	4		
PERMITS & AGRMTS		016	60			20	272	
	GenDesEng	016	60	2%x	1	10		
	GenDesTech	016	60	2%x	1	10		
ALGN,PRFL,SCHEM.		017	6			17	1	
	GenDesEng	017	6	16%x	1	8		
	GenDesTech	017	6	18%x	1	9		
ILLUMINATION		018	3			4	297	
	GenDesEng	018	3	7%x	1	2		
	GenDesTech	018	3	5%x	1	2		
EARTHWORK		019	8			30	202	
	GenDesEng	019	8	21%x	1	14		
	GenDesTech	019	8	24%x	1	16		
SGN STRP SIGNALS		020	6			7	294	
	TrafEng	020	6	7%x	1	4		
	TrafTech	020	6	5%x	1	3		
RDWY HYDRAULICS		021	4			8	282	
	GenDesEng	021	4	12%x	1	4		
	GenDesTech	021	4	11%x	1	4		
DRAINAGE DETAILS		022	7			6	282	
	GenDesEng	022	7	5%x	1	3		
	GenDesTech	022	7	5%x	1	3		
RET WAL,MISC DET		023	5			15	246	
	GenDesEng	023	5	11%x	1	5		
	GenDesTech	023	5	25%x	1	10		
RAILROAD AGREE		024	120			40	117	
	GenDesEng	024	120	2%x	1	20		
	GenDesTech	024	120	2%x	1	20		
PLN PRF RDWY DET		025	12			10	126	
	GenDesEng	025	12	3%x	1	3		
	GenDesTech	025	12	7%x	1	7		
FN CODE 170		037	176			262	126	

Across: 1 Down: 3
Outline
Project: BRGWIDEN.PJ
09-08-89 4:00p
Revision: 1

Network for Bridge Widen/Rehab - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
BRIDGE LAYOUTS		026	50			92	1	
	GenDesEng	026	50	10%x	1	40		
	GenDesTech	026	50	13%x	1	52		
BRIDGE DETAILS		027	125			170	126	
	BrEng	027	125	9%x	1	90		
	BrTech	027	125	8%x	1	80		
FN CODE 180		038	197			31	0	
PS&E ASSY,D.REVW		028	11			9	117	
	GenDesEng	028	11	4%x	1	4		
	GenDesTech	028	11	5%x	1	5		
P S & E COMPLETE		029	0			0	58	
AUSTIN REVW,BIDS		030	65			22	0	
	GenDesEng	030	65	2%x	1	11		
	GenDesTech	030	65	2%x	1	11		
LETTING DATE		031	0			0	0	

Across: 1 Down: 3
Outline
Project: CNVTNNFY.PJ
09-08-89 4:24p
Revision: 4
Network for Convert NonFreeway - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float
	GenDesEng	030	16	56%x	1	72	
	GenDesTech	030	16	44%x	1	57	
TRAFF.CONTRL PLN		031	20			204	265
	TrafEng	031	20	60%x	1	96	
	TrafTech	031	20	67%x	1	108	
SGN SGNAL STRIPG		032	25			76	227
	TrafEng	032	25	25%x	1	50	
	TrafTech	032	25	13%x	1	26	
DRAINAGE DETAILS		033	19			153	194
	GenDesEng	033	19	56%x	1	86	
	GenDesTech	033	19	44%x	1	67	
RET WAL,MISC DET		034	16			230	186
	GenDesEng	034	16	97%x	1	125	
	GenDesTech	034	16	82%x	1	105	
ILLUMINATION		035	7			52	245
	GenDesEng	035	7	59%x	1	34	
	GenDesTech	035	7	32%x	1	18	
FN CODE 170		047	176			1276	77
BRIDGE LAYOUTS		036	50			436	71
	GenDesEng	036	50	47%x	1	188	
	GenDesTech	036	50	62%x	1	248	
BRIDGE DETAILS		037	125			840	77
	BrEng	037	125	24%x	2	480	
	BrTech	037	125	18%x	2	360	
FN CODE 180		048	154			116	0
PS&E ASSY,D.REVW		038	17			64	72
	GenDesEng	038	17	22%x	1	30	
	GenDesTech	038	17	25%x	1	34	
P S & E COMPLETE		039	0			0	61
AUSTIN REVW,BIDS		040	65			52	0
	GenDesEng	040	65	5%x	1	26	
	GenDesTech	040	65	5%x	1	26	
LETTING DATE		041	0			0	0

Outline
09-08-89 4:24p

Project: CNVTNNFY.PJ
Revision: 4

Network for Convert NonFreeway - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float
CNVTNNFY.PJ	CN0	767			4521	0
FN CODE 110	042	302			408	1
PROJ CNCEPT CONF	001	3			7	1
Plan Staff	001	3	7%x	4	7	
TRAF EVAL & PROJ	002	175			56	1
Plan Staff	002	175	2%x	2	56	
PLANIMETRICS	003	130			42	45
Plan Staff	003	130	2%x	2	42	
PREL GEO,ROW REQ	004	30			39	1
Plan Staff	004	30	8%x	2	39	
SOIL SURVEY	005	10			12	1
Plan Staff	005	10	3%x	1	3	
GenDesTech	005	10	11%x	1	9	
PAVEMENT DESIGN	006	50			204	1
GenDesEng	006	50	32%x	1	128	
GenDesTech	006	50	19%x	1	76	
PRELIMINARY EST	007	5			9	1
Plan Staff	007	5	11%x	2	9	
SELECT ALTERNATV	008	6			7	1
Plan Staff	008	6	7%x	2	7	
SCHEMATICS	009	50			32	1
Plan Staff	009	50	4%x	2	32	
FN CODE 120	043	162			26	1
ENV ASSMT	010	67			11	1
EnvTech	010	67	2%x	1	11	
PUBLIC HRNG	011	65			11	1
EnvTech	011	65	2%x	1	11	
FONSI	012	25			4	1
EnvTech	012	25	2%x	1	4	
FN CODE 130	044	621			203	0
ROW OWNRSHP DATA	013	14			8	81
GenDesEng	013	14	2%x	1	3	
GenDesTech	013	14	4%x	1	5	
ROW MAP,PLANS	014	40			14	1
GenDesEng	014	40	2%x	1	7	
GenDesTech	014	40	2%x	1	7	
APPRAISL & NEGOT	015	69			12	1
ROWTech	015	69	2%x	1	12	

Across: 1 Down: 2
Outline
Project: CNVTNNFY.PJ
09-08-89 4:24p
Revision: 4
Network for Convert NonFreeway - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
ROW ACQ & RELOC		016	128			21	0	
	ROWTech	016	128	2%x	1	21		
UTIL RELOC PLANS		017	57			128	130	
	ROW Tech	017	57	28%x	1	128		
ROW ACQUIRED		018	0			0	0	
RELOC UTILITIES		019	125			20	0	
	ROW Tech	019	125	2%x	1	20		
FN CODE 150		045	450			258	233	
FIELD SURVEY		020	60			49	114	
	GenDesEng	020	60	2%x	1	10		
	GenDesTech	020	60	2%x	4	39		
DESIGN SURVEYING		021	52			209	233	
	GenDesEng	021	52	10%x	1	42		
	GenDesTech	021	52	10%x	4	167		
FN CODE 160		046	221			2234	71	
AUTHRZN- P S & E		022	0			0	71	
PSE DESIGN CONF		023	4			9	71	
	GenDesEng	023	4	19%x	1	7		
	GenDesTech	023	4	4%x	1	2		
ALN,PRF,FIN SCH		024	33			204	71	
	GenDesEng	024	33	37%x	1	98		
	GenDesTech	024	33	40%x	1	106		
STREAM XING HYDR		025	12			128	92	
	GenDesEng	025	12	74%x	1	72		
	GenDesTech	025	12	58%x	1	56		
EARTHWORK		026	23			229	129	
	GenDesEng	026	23	67%x	1	124		
	GenDesTech	026	23	57%x	1	105		
RAILRD AGREEMTS		027	120			155	71	
	GenDesEng	027	120	7%x	1	68		
	GenDesTech	027	120	9%x	1	87		
PLN PRF RDWY DET		028	59			510	77	
	GenDesEng	028	59	40%x	1	189		
	GenDesTech	028	59	68%x	1	321		
PERMITS & AGRMTS		029	60			155	225	
	GenDesEng	029	60	14%x	1	68		
	GenDesTech	029	60	18%x	1	87		
RDWY HYDRAULICS		030	16			129	194	

Outline
09-08-89 4:33p

Project: INTRCHNG.PJ
Revision: 3

Network for Interchanges - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
INTRCHNG.PJ	IN0	742			1879	0	
FN CODE 110	042	299			262	1	
PROJ CNCEPT CONF	001	3			4	1	
Plan Staff	001	3	4%x	4	4		
TRAF EVAL & PROJ	002	175			56	1	
Plan Staff	002	175	2%x	2	56		
PLANIMETRICS	003	130			42	45	
Plan Staff	003	130	2%x	2	42		
PREL GEO,ROW REQ	004	30			24	1	
Plan Staff	004	30	5%x	2	24		
SOIL SURVEY	005	10			9	1	
Plan Staff	005	10	2%x	2	4		
GenDesTech	005	10	6%x	1	5		
PAVEMENT DESIGN	006	50			92	1	
GenDesEng	006	50	13%x	1	52		
GenDesTech	006	50	10%x	1	40		
PRELIMINARY EST	007	5			6	1	
Plan Staff	007	5	7%x	2	6		
SELECT ALTERNATV	008	6			6	1	
Plan Staff	008	6	6%x	2	6		
SCHEMATICS	009	46			23	1	
Plan Staff	009	46	3%x	2	23		
FN CODE 120	043	161			80	1	
ENV ASSMT	010	69			39	1	
EnvTech	010	69	7%x	1	39		
PUBLIC MTNG	011	65			21	1	
EnvTech	011	65	4%x	1	21		
FONSI	012	25			20	1	
EnvTech	012	25	10%x	1	20		
FN CODE 130	044	595			156	0	
ROW OWNRSHP DATA	013	11			11	86	
GenDesEng	013	11	2%x	1	2		
GenDesTech	013	11	10%x	1	9		
ROW MAP,PLANS	014	34			20	1	
GenDesEng	014	34	2%x	1	6		
GenDesTech	014	34	5%x	1	14		
APPRAISL & NEGOT	015	67			27	0	
ROWTech	015	67	5%x	1	27		

Across: 1 Down: 2
Outline
Project: INTRCHNG.PJ
09-08-89 4:33p
Revision: 3

Network for Interchanges - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
ROW ACQ & RELOC	016	125			30	0	
ROWTech	016	125	3%x	1	30		
UTIL RELOC PLANS	017	54			48	128	
ROW Tech	017	54	11%x	1	48		
ROW ACQUIRED	018	0			0	0	
RELOC UTILITIES	019	125			20	0	
ROW Tech	019	125	2%x	1	20		
FN CODE 150	045	440			247	217	
FIELD SURVEY	020	57			65	114	
GenDesEng	020	57	2%x	1	10		
GenDesTech	020	57	3%x	4	55		
DESIGN SURVEYING	021	47			182	217	
GenDesEng	021	47	8%x	1	31		
GenDesTech	021	47	10%x	4	151		
FN CODE 160	046	211			816	61	
AUTHRZN- P S & E	022	0			0	61	
PSE DESIGN CONF	023	4			9	61	
GenDesEng	023	4	20%x	1	7		
GenDesTech	023	4	4%x	1	2		
ALN,PRF,FIN SCH	024	23			47	61	
GenDesEng	024	23	12%x	1	23		
GenDesTech	024	23	13%x	1	24		
STREAM XING HYDR	025	11			48	73	
GenDesEng	025	11	28%x	1	25		
GenDesTech	025	11	26%x	1	23		
EARTHWORK	026	19			77	127	
GenDesEng	026	19	27%x	1	42		
GenDesTech	026	19	23%x	1	35		
RAILROAD AGREE	027	120			68	61	
GenDesEng	027	120	4%x	1	39		
GenDesTech	027	120	3%x	1	29		
PERMITS & AGRMTS	028	60			48	205	
GenDesEng	028	60	5%x	1	24		
GenDesTech	028	60	5%x	1	24		
RDWY HYDRAULICS	029	12			47	196	
GenDesEng	029	12	25%x	1	24		
GenDesTech	029	12	23%x	1	23		
PLN PRF RDWY DET	030	44			177	67	

Across: 1 Down: 3
Outline
Project: INTRCHNG.PJ
09-08-89 4:33p
Revision: 3

Network for Interchanges - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float
	GenDesEng	030	44	17%x	1	60	
	GenDesTech	030	44	33%x	1	117	
TRAFF.CONTRL	PLN	031	15			66	250
	TrafEng	031	15	28%x	1	34	
	TrafTech	031	15	26%x	1	32	
SGN SGNAL STRIPG		032	19			39	223
	TrafEng	032	19	15%x	1	23	
	TrafTech	032	19	10%x	1	16	
DRAINAGE DETAILS		033	15			56	196
	GenDesEng	033	15	24%x	1	29	
	GenDesTech	033	15	22%x	1	27	
RET WAL,MISC DET		034	13			114	179
	GenDesEng	034	13	56%x	1	59	
	GenDesTech	034	13	52%x	1	55	
ILLUMINATION		035	5			20	237
	GenDesEng	035	5	28%x	1	12	
	GenDesTech	035	5	19%x	1	8	
FN CODE 170		047	176			264	67
BRIDGE LAYOUTS		036	50			84	61
	GenDesEng	036	50	10%x	1	40	
	GenDesTech	036	50	11%x	1	44	
BRIDGE DETAILS		037	125			180	67
	BrEng	037	125	5%x	2	100	
	BrTech	037	125	4%x	2	80	
FN CODE 180		048	145			54	1
PS&E ASSY,D.REVW		038	16			32	61
	GenDesEng	038	16	12%x	1	16	
	GenDesTech	038	16	12%x	1	16	
P S & E COMPLETE		039	0			0	58
AUSTIN REVW,BIDS		040	65			22	1
	GenDesEng	040	65	2%x	1	11	
	GenDesTech	040	65	2%x	1	11	
LETTING DATE		041	0			0	1

Outline
09-08-89 4:40p

Project: MISCELLN.PJ
Revision: 3

Network for Miscellaneous Projects - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
MISCELLN.PJ	MS0	420			319	0	
FN CODE 110	031	25			8	1	
PRELIM ENGINRG.	001	25			8	1	
GenDesEng	001	25	2%x	1	4		
GenDesTech	001	25	2%x	1	4		
FN CODE 120	032	88			14	1	
ENVIRON. ASSMT.	002	84			14	1	
EnvEng	002	84	2%x	1	14		
FN CODE 130	033	331			60	0	
ROW OWNRSHP DATA	003	3			2	20	
GenDesEng	003	3	2%x	1	1		
GenDesTech	003	3	2%x	1	1		
ROW MAP,PLANS	004	11			4	1	
GenDesEng	004	11	2%x	1	2		
GenDesTech	004	11	2%x	1	2		
APPRAISL & NEGOT	005	56			9	1	
ROWTech	005	56	2%x	1	9		
ROW ACQ & RELOC	006	108			18	0	
ROWTech	006	108	2%x	1	18		
UTIL RELOC PLANS	007	38			7	126	
ROW Tech	007	38	2%x	1	7		
ROW ACQUIRED	008	0			0	0	
RELOC UTILITIES	009	125			20	0	
ROW Tech	009	125	2%x	1	20		
FN CODE 150	034	26			20	1	
DESIGN SURVEYING	010	25			20	1	
GenDesEng	010	25	2%x	1	4		
GenDesTech	010	25	2%x	4	16		
FN CODE 160	035	213			95	41	
AUTHRZN- P S & E	011	0			0	1	
PSE DESIGN CONF	012	2			4	1	
GenDesEng	012	2	2%x	4	2		
GenDesTech	012	2	2%x	4	2		
ALN,PRF,FIN SCH	013	4			3	1	
GenDesEng	013	4	3%x	1	1		
GenDesTech	013	4	6%x	1	2		
STRM CRSNG HYD	014	6			2	20	
GenDesEng	014	6	2%x	1	1		

Across: 1 Down: 2
Outline
Project: MISCELLN.PJ
09-08-89 4:40p
Revision: 3

Network for Miscellaneous Projects - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
	GenDesTech	014	6	2%x	1	1		
RAILROAD AGREE		015	120			40	41	
	GenDesEng	015	120	2%x	1	20		
	GenDesTech	015	120	2%x	1	20		
EARTHWORK		016	5			5	129	
	GenDesEng	016	5	3%x	1	2		
	GenDesTech	016	5	6%x	1	3		
PERMITS & AGRMTS		017	60			20	188	
	GenDesEng	017	60	2%x	1	10		
	GenDesTech	017	60	2%x	1	10		
SIG SGN STRPING		018	5			2	219	
	TrafEng	018	5	2%x	1	1		
	TrafTech	018	5	2%x	1	1		
RDWY HYDRAULICS		019	3			2	203	
	GenDesEng	019	3	3%x	1	1		
	GenDesTech	019	3	2%x	1	1		
PLN PRF RDWY DET		020	7			5	50	
	GenDesEng	020	7	2%x	1	2		
	GenDesTech	020	7	4%x	1	3		
TRAFF.CONTRL PLN		021	9			4	238	
	TrafEng	021	9	2%x	1	2		
	TrafTech	021	9	2%x	1	2		
DRAINAGE DETAILS		022	5			3	203	
	GenDesEng	022	5	3%x	1	2		
	GenDesTech	022	5	2%x	1	1		
RET WAL,MISC DET		023	3			3	171	
	GenDesEng	023	3	6%x	1	2		
	GenDesTech	023	3	4%x	1	1		
ILLUMINATION		024	2			2	219	
	GenDesEng	024	2	2%x	1	1		
	GenDesTech	024	2	2%x	1	1		
FN CODE 170		036	176			96	50	
BRIDGE LAYOUTS		025	50			16	41	
	GenDesEng	025	50	2%x	1	8		
	GenDesTech	025	50	2%x	1	8		
BRIDGE DETAILS		026	125			80	50	
	BrEng	026	125	2%x	2	40		
	BrTech	026	125	2%x	2	40		

Across: 1 Down: 3
Outline
Project: MISCELLN.PJ
09-08-89 4:40p
Revision: 3

Network for Miscellaneous Projects - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
FN CODE 180	037	122			26	0	
PS&E ASSY,D.REVW	027	9			4	41	
GenDesEng	027	9	2%x	1	2		
GenDesTech	027	9	2%x	1	2		
P S & E COMPLETE	028	0			0	41	
AUSTIN REVW,BIDS	029	65			22	0	
GenDesEng	029	65	2%x	1	11		
GenDesTech	029	65	2%x	1	11		
LETTING DATE	030	0			0	0	

Outline
09-08-89 4:45p

Project: NEWLOCFW.PJ
Revision: 2

Network for New Location Frwy - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float
NEWLOCFW.PJ	NL0	1358			8235	0
FN CODE 110	044	345			618	309
PROJ CNCEPT CONF	001	3			17	1
Plan Staff	001	3	17%x	4	17	
TRAF EVAL & PROJ	002	175			56	1
Plan Staff	002	175	2%x	2	56	
PLANIMETRICS	003	130			42	45
Plan Staff	003	130	2%x	2	42	
PREL GEO,ROW REQ	004	30			77	1
Plan Staff	004	30	16%x	2	77	
SOIL SURVEY	005	10			30	342
Plan Staff	005	10	8%x	1	7	
GenDesTech	005	10	28%x	1	23	
PAVEMENT DESIGN	006	50			284	342
GenDesEng	006	50	44%x	1	176	
GenDesTech	006	50	27%x	1	108	
PRELIMINARY EST	007	5			20	342
Plan Staff	007	5	48%x	1	20	
SELECT ALTERNATV	008	6			23	308
Plan Staff	008	6	46%x	1	23	
SCHEMATICS	009	61			69	309
Plan Staff	009	61	14%x	1	69	
FN CODE 120	045	820			208	1
ENV ASSMT	010	63			51	1
EnvTech	010	63	10%x	1	51	
PUBLIC MTNG	011	65			16	1
EnvTech	011	65	3%x	1	16	
DRAFT EIS	012	375			60	1
EnvTech	012	375	2%x	1	60	
PUBLIC HRNG	013	65			21	1
EnvTech	013	65	4%x	1	21	
F. ENV IMPACT ST	014	250			60	1
EnvTech	014	250	3%x	1	60	
FN CODE 130	046	1211			590	0
ROW OWNRSHP DATA	015	21			38	43
GenDesEng	015	21	4%x	1	7	
GenDesTech	015	21	18%x	1	31	
ROW MAP,PLANS	016	58			61	0

Across: 1 Down: 2
Outline
Project: NEWLOCFW.PJ
09-08-89 4:45p
Revision: 2

Network for New Location Frwy - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
	GenDesEng	016	58	3%x	1	14		
	GenDesTech	016	58	10%x	1	47		
APPRAISL & NEGOT		017	74			77	0	
	ROWTech	017	74	13%x	1	77		
ROW ACQ & RELOC		018	134			86	0	
	ROWTech	018	134	8%x	1	86		
UTIL RELOC PLANS		019	63			288	97	
	ROW Tech	019	63	57%x	1	288		
ROW ACQUIRED		020	0			0	0	
RELOC UTILITIES		021	125			40	0	
	ROW Tech	021	125	4%x	1	40		
FN CODE 150		047	1036			231	55	
FIELD SURVEY		022	69			106	106	
	GenDesEng	022	69	3%x	1	17		
	GenDesTech	022	69	4%x	4	89		
DESIGN SURVEYING		023	65			125	55	
	GenDesEng	023	65	4%x	1	21		
	GenDesTech	023	65	5%x	4	104		
FN CODE 160		048	254			5186	53	
AUTHRZN- P S & E		024	0			0	53	
PSE DESIGN CONF		025	6			16	53	
	GenDesEng	025	6	6%x	4	12		
	GenDesTech	025	6	4%x	2	4		
ALN,PRF,FIN SCH		026	67			575	53	
	GenDesEng	026	67	64%x	1	344		
	GenDesTech	026	67	43%x	1	231		
STREAM XING HYDR		027	14			173	106	
	GenDesEng	027	14	86%x	1	97		
	GenDesTech	027	14	67%x	1	76		
EARTHWORK		028	34			861	93	
	GenDesEng	028	34	87%x	2	474		
	GenDesTech	028	34	71%x	2	387		
RAILRD AGREEMTS		029	120			346	53	
	GenDesEng	029	120	20%x	1	192		
	GenDesTech	029	120	16%x	1	154		
PERMITS & AGRMTS		030	60			288	240	
	GenDesEng	030	60	30%x	1	144		
	GenDesTech	030	60	30%x	1	144		

Across: 1 Down: 3
Outline
Project: NEWLOCFW.PJ
09-08-89 4:45p
Revision: 2

Network for New Location Frwy - Default Values

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Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float
RDWY HYDRAULICS		031	27			403	144
	GenDesEng	031	27	52%x	2	225	
	GenDesTech	031	27	82%x	1	178	
SGN SGNAL STRIPG		032	43			231	190
	TrafEng	032	43	43%x	1	148	
	TrafTech	032	43	24%x	1	83	
DRAINAGE DETAILS		033	28			516	144
	GenDesEng	033	28	64%x	2	287	
	GenDesTech	033	28	51%x	2	229	
RET WAL,MISC DET		034	24			458	159
	GenDesEng	034	24	63%x	2	242	
	GenDesTech	034	24	56%x	2	21	
TRAFF.CONTRL PLN		035	33			344	267
	TrafEng	035	33	60%x	1	159	
	TrafTech	035	33	70%x	1	185	
ILLUMINATION		036	12			58	221
	GenDesEng	036	12	38%x	1	37	
	GenDesTech	036	12	21%x	1	21	
PLN PRF RDWY DET		037	106			917	58
	GenDesEng	037	106	39%x	1	331	
	GenDesTech	037	106	69%x	1	586	
FN CODE 170		049	176			1300	58
BRIDGE LAYOUTS		038	50			400	53
	GenDesEng	038	50	46%x	1	184	
	GenDesTech	038	50	54%x	1	216	
BRIDGE DETAILS		039	125			900	58
	BrEng	039	125	27%x	2	540	
	BrTech	039	125	18%x	2	360	
FN CODE 180		050	139			102	1
PS&E ASSY,D.REVW		040	20			60	53
	GenDesEng	040	20	17%x	1	28	
	GenDesTech	040	20	20%x	1	32	
P S & E COMPLETE		041	0			0	53
AUSTIN REVW,BIDS		042	65			42	1
	GenDesEng	042	65	5%x	1	26	
	GenDesTech	042	65	3%x	1	16	
LETTING DATE		043	0			0	1

Outline
09-08-89 4:51p

Project: NEWNONFW.PJ
Revision: 4

Network for New Location NonFreeway - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
NEWNONFW.PJ	NNO	736			1832	0	
FN CODE 110	043	296			329	1	
PROJ CNCEPT CONF	001	3			11	1	
Plan Staff	001	3	11%x	4	11		
PLANIMETRICS	002	130			42	45	
Plan Staff	002	130	2%x	2	42		
TRAF EVAL & PROJ	003	175			56	1	
Plan Staff	003	175	2%x	2	56		
PREL GEO,ROW REQ	004	30			48	1	
Plan Staff	004	30	10%x	2	48		
SOIL SURVEY	005	10			18	1	
Plan Staff	005	10	4%x	1	4		
GenDesTech	005	10	17%x	1	14		
PAVEMENT DESIGN	006	50			72	1	
GenDesEng	006	50	11%x	1	44		
GenDesTech	006	50	7%x	1	28		
PRELIMINARY EST	007	5			17	1	
Plan Staff	007	5	21%x	2	17		
SELECT ALTERNATV	008	6			15	1	
Plan Staff	008	6	15%x	2	15		
SCHEMATICS	009	44			50	1	
Plan Staff	009	44	7%x	2	50		
FN CODE 120	044	164			40	1	
ENV ASSMT	010	70			17	1	
EnvTech	010	70	3%x	1	17		
PUBLIC HRNG	011	65			11	1	
EnvTech	011	65	2%x	1	11		
FONSI	012	25			12	1	
EnvTech	012	25	6%x	1	12		
FN CODE 130	045	589			183	0	
ROW OWNRSHP DATA	013	10			19	86	
GenDesEng	013	10	4%x	1	4		
GenDesTech	013	10	18%x	1	15		
ROW MAP,PLANS	014	31			33	1	
GenDesEng	014	31	3%x	1	8		
GenDesTech	014	31	10%x	1	25		
APPRAISL & NEGOT	015	66			37	1	
ROWTech	015	66	7%x	1	37		

Across: 1 Down: 2
Outline
Project: NEWNONFW.PJ
09-08-89 4:51p
Revision: 4

Network for New Location NonFreeway - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
ROW ACQ & RELOC	016	123			40	0	
ROWTech	016	123	4%x	1	40		
UTIL RELOC PLANS	017	52			34	131	
ROW Tech	017	52	8%x	1	34		
ROW ACQUIRED	018	0			0	0	
RELOC UTILITIES	019	125			20	0	
ROW Tech	019	125	2%x	1	20		
FN CODE 150	046	434			432	218	
FIELD SURVEY	020	55			172	121	
GenDesEng	020	55	7%x	1	31		
GenDesTech	020	55	8%x	4	141		
DESIGN SURVEYING	021	45			260	218	
GenDesEng	021	45	12%x	1	44		
GenDesTech	021	45	15%x	4	216		
FN CODE 160	047	208			584	59	
AUTHRZN- P S & E	023	0			0	59	
PSE DESIGN CONF	024	3			20	59	
GenDesEng	024	3	15%x	4	15		
GenDesTech	024	3	9%x	2	5		
ALN,PRF,FIN SCH	025	20			46	59	
GenDesEng	025	20	11%x	1	18		
GenDesTech	025	20	17%x	1	28		
STREAM XING HYDR	026	10			32	69	
GenDesEng	026	10	20%x	1	16		
GenDesTech	026	10	20%x	1	16		
EARTHWORK	027	17			98	131	
GenDesEng	027	17	36%x	1	49		
GenDesTech	027	17	36%x	1	49		
RAILRD AGREEMTS	028	120			40	59	
GenDesEng	028	120	2%x	1	20		
GenDesTech	028	120	2%x	1	20		
PLN PRF RDWY DET	029	38			104	68	
GenDesEng	029	38	10%x	1	31		
GenDesTech	029	38	24%x	1	73		
PERMITS & AGRMTS	030	60			35	201	
GenDesEng	030	60	3%x	1	15		
GenDesTech	030	60	4%x	1	20		
RDWY HYDRAULICS	031	11			34	201	

Across: 1 Down: 3
Outline
Project: NEWNONFW.PJ
09-08-89 4:51p
Revision: 4

Network for New Location NonFreeway - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
	GenDesEng	031	11	19%x	1	17		
	GenDesTech	031	11	19%x	1	17		
TRAFF.CONTRL	PLN	032	14			40	249	
	TrafEng	032	14	15%x	1	17		
	TrafTech	032	14	20%x	1	23		
SGN SGNAL STRIPG		033	17			33	226	
	TrafEng	033	17	13%x	1	18		
	TrafTech	033	17	11%x	1	15		
DRAINAGE DETAILS		034	14			42	201	
	GenDesEng	034	14	18%x	1	21		
	GenDesTech	034	14	18%x	1	21		
RET WAL,MISC DET		035	11			53	182	
	GenDesEng	035	11	25%x	1	22		
	GenDesTech	035	11	35%x	1	31		
ILLUMINATION		036	5			7	238	
	GenDesEng	036	5	9%x	1	4		
	GenDesTech	036	5	7%x	1	3		
FN CODE 170		048	176			196	68	
BRIDGE LAYOUTS		037	50			76	59	
	GenDesEng	037	50	8%x	1	32		
	GenDesTech	037	50	11%x	1	44		
BRIDGE DETAILS		038	125			120	68	
	BrEng	038	125	3%x	2	60		
	BrTech	038	125	3%x	2	60		
FN CODE 180		049	142			68	1	
PS&E ASSY,D.REVW		039	15			46	59	
	GenDesEng	039	15	18%x	1	22		
	GenDesTech	039	15	20%x	1	24		
P S & E COMPLETE		040	0			0	58	
AUSTIN REVW,BIDS		041	65			22	1	
	GenDesEng	041	65	2%x	1	11		
	GenDesTech	041	65	2%x	1	11		
LETTING DATE		042	0			0	1	

Outline
09-08-89 4:55p

Project: OVERLAYS.PJ
Revision: 1

Network for Overlays - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
OVERLAYS.PJ		OVO	108			153	0	
FN CODE 110		012	13			4	0	
PRELIM ENGINRG		001	10			4	0	
	GenDesEng	001	10	2%x	1	2		
	GenDesTech	001	10	2%x	1	2		
FN CODE 120		013	5			1	1	
ENVIRON ASSMT		002	3			1	1	
	EnvTech	002	3	3%x	1	1		
FN CODE 130		014	7			1	1	
ROW REQUIREMENTS		003	6			1	1	
	ROWTech	003	6	2%x	1	1		
FN CODE 150		015	13			32	11	
FLD SRV,PVMT EVL		004	12			32	11	
	GenDesEng	004	12	12%x	1	12		
	GenDesTech	004	12	10%x	2	20		
FN CODE 160		016	23			57	1	
AUTHRZN- P S & E		005	0			0	1	
GEOM,GRADG,PVMT		006	22			57	1	
	GenDesEng	006	22	13%x	1	23		
	GenDesTech	006	22	19%x	1	34		
FN CODE 170		017	19			32	5	
BRG DETAILS		007	15			32	5	
	BrEng	007	15	2%x	1	3		
	BrTech	007	15	12%x	2	29		
FN CODE 180		018	81			26	0	
PS&E ASSY,D.REVW		008	12			4	1	
	GenDesEng	008	12	2%x	1	2		
	GenDesTech	008	12	2%x	1	2		
P S & E COMPLETE		009	0			0	1	
AUSTIN REVW,BIDS		010	65			22	0	
	GenDesEng	U10	65	2%x	1	11		
	GenDesTech	010	65	2%x	1	11		
LETTING DATE		011	0			0	0	

Outline
09-08-89 4:57p

Project: REHABEXG.PJ
Revision: 1

Network - Rehab Existing Road - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
REHABEXG.PJ	RE0	458			593	0	
FN CODE 110	031	38			12	1	
PRELIM ENGINRG	001	37			12	1	
GenDesEng	001	37	2%x	1	6		
GenDesTech	001	37	2%x	1	6		
FN CODE 120	032	75			12	1	
ENVIRON ASSMT	002	74			12	1	
EnvTech	002	74	2%x	1	12		
FN CODE 130	033	381			75	0	
ROW OWNRSHP DATA	003	7			4	28	
GenDesEng	003	7	2%x	1	2		
GenDesTech	003	7	2%x	1	2		
ROW MAP,PLANS	004	23			8	1	
GenDesEng	004	23	2%x	1	4		
GenDesTech	004	23	2%x	1	4		
APPRAISL & NEGOT	005	63			11	1	
ROWTech	005	63	2%x	1	11		
ROW ACQ & RELOC	006	119			20	0	
ROWTech	006	119	2%x	1	20		
UTIL RELOC PLANS	007	48			12	144	
ROW Tech	007	48	3%x	1	12		
ROW ACQUIRED	008	0			0	0	
RELOC UTILITIES	009	125			20	0	
ROW Tech	009	125	2%x	1	20		
FN CODE 150	034	40			80	1	
DESIGN SURVEYING	010	38			80	1	
GenDesEng	010	38	6%x	1	19		
GenDesTech	010	38	5%x	4	61		
FN CODE 160	035	228			285	75	
AUTHRZN- P S & E	011	1			0	1	
PSE DESIGN CONF	012	3			4	1	
GenDesEng	012	3	2%x	4	2		
GenDesTech	012	3	2%x	4	2		
ALN,PRF,FIN SCH	013	11			54	1	
GenDesEng	013	11	26%x	1	23		
GenDesTech	013	11	35%x	1	31		
STREAM XING HYDR	014	9			12	30	
GenDesEng	014	9	7%x	1	6		

Across: 1 Down: 2
Outline Project: REHABEXG.PJ
09-08-89 4:57p Revision: 1

Network - Rehab Existing Road - Default Values

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Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
	GenDesTech	014	9	7%x	1	6		
EARTHWORK		015	12			30	155	
	GenDesEng	015	12	15%x	1	15		
	GenDesTech	015	12	15%x	1	15		
RAILRD AGREEMTS		016	120			40	75	
	GenDesEng	016	120	2%x	1	20		
	GenDesTech	016	120	2%x	1	20		
PERMITS & AGRMTS		017	60			20	236	
	GenDesEng	017	60	2%x	1	10		
	GenDesTech	017	60	2%x	1	10		
PLN PRF RDWY DET		018	24			37	84	
	GenDesEng	018	24	6%x	1	12		
	GenDesTech	018	24	13%x	1	25		
SGN SGNAL STRIPG		019	11			13	247	
	TrafEng	019	11	7%x	1	7		
	TrafTech	019	11	6%x	1	6		
TRAFF.CONTRL PLN		020	9			20	289	
	TrafEng	020	9	12%x	1	9		
	TrafTech	020	9	15%x	1	11		
RET WAL,MISC DET		021	8			20	201	
	GenDesEng	021	8	13%x	1	9		
	GenDesTech	021	8	17%x	1	11		
RDWY HYDRAULICS		022	7			13	229	
	GenDesEng	022	7	10%x	1	6		
	GenDesTech	022	7	11%x	1	7		
ILLUMINATION		023	3			6	255	
	GenDesEng	023	3	11%x	1	3		
	GenDesTech	023	3	9%x	1	3		
DRAINAGE DETAILS		024	10			16	229	
	GenDesEng	024	10	9%x	1	8		
	GenDesTech	024	10	9%x	1	8		
FN CODE 170		036	176			96	84	
BRIDGE LAYOUTS		025	50			16	75	
	GenDesEng	025	50	2%x	1	8		
	GenDesTech	025	50	2%x	1	8		
BRIDGE DETAILS		026	125			80	84	
	BrEng	026	125	2%x	2	40		
	BrTech	026	125	2%x	2	40		

Across: 1 Down: 3

Outline
Project: REHABEXG.PJ
09-08-89 4:58p
Revision: 1

Network - Rehab Existing Road - Default Values

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Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
FN CODE 180	037	158			33	0	
PS&E ASSY,D.REVW	027	13			11	75	
GenDesEng	027	13	4%x	1	5		
GenDesTech	027	13	5%x	1	6		
P S & E COMPLETE	028	0			0	58	
AUSTIN REVW,BIDS	029	65			22	0	
GenDesEng	029	65	2%x	1	11		
GenDesTech	029	65	2%x	1	11		
LETTING DATE	030	0			0	0	

Outline
09-08-89 5:02p

Project: SEALCOAT.PJ
Revision: 1

Network for Seal Coats - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float
SEALCOAT.PJ		SC0	102			67	0
FN CODE 110		010	13			4	1
PRELIM ENGINRG		001	7			4	1
	GenDesEng	001	7	2%x	1	2	
	GenDesTech	001	7	3%x	1	2	
FN CODE 150		011	11			24	1
FLD SRV,PVMT EVL		002	10			24	1
	GenDesEng	002	10	11%x	1	9	
	GenDesTech	002	10	9%x	2	15	
FN CODE 160		012	11			9	1
AUTHRZN- P S & E		003	0			0	1
GEOM,GRADG,PVMT		004	7			9	1
	GenDesEng	004	7	3%x	2	4	
	GenDesTech	004	7	8%x	1	5	
FN CODE 170		013	7			4	1
BRG DETAILS		005	5			4	1
	BrEng	005	5	2%x	1	1	
	BrTech	005	5	7%x	1	3	
FN CODE 180		014	81			26	0
PS&E ASSY,D.REVW		006	9			4	1
	GenDesEng	006	9	2%x	1	2	
	GenDesTech	006	9	2%x	1	2	
P S & E COMPLETE		007	0			0	1
AUSTIN REVW,BIDS		008	65			22	0
	GenDesEng	008	65	2%x	1	11	
	GenDesTech	008	65	2%x	1	11	
LETTING DATE		009	0			0	0

Outline
09-08-89 5:04p

Project: UGNONFY.PJ
Revision: 1

Network - Upgrade Non-Freeways- Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
UGNONFY.PJ	UNO	457			956	0	
FN CODE 110	031	38			66	2	
PRELIM ENGINRG	001	37			66	2	
GenDesEng	001	37	9%x	1	27		
GenDesTech	001	37	13%x	1	39		
FN CODE 120	032	75			12	1	
ENVIRON ASSMT	002	74			12	1	
EnvTech	002	74	2%x	1	12		
FN CODE 130	033	380			93	0	
ROW OWNRSHP DATA	003	7			6	27	
GenDesEng	003	7	2%x	1	2		
GenDesTech	003	7	7%x	1	4		
ROW MAP,PLANS	004	23			10	1	
GenDesEng	004	23	2%x	1	4		
GenDesTech	004	23	3%x	1	6		
APPRAISL & NEGOT	005	63			11	1	
ROWTech	005	63	2%x	1	11		
ROW ACQ & RELOC	006	119			20	0	
ROWTech	006	119	2%x	1	20		
UTIL RELOC PLANS	007	48			16	144	
ROW Tech	007	48	4%x	1	16		
ROW ACQUIRED	008	0			0	0	
RELOC UTILITIES	009	125			30	0	
ROW Tech	009	125	3%x	1	30		
FN CODE 150	034	39			341	1	
DESIGN SURVEYING	010	38			341	1	
GenDesEng	010	38	20%x	1	61		
GenDesTech	010	38	23%x	4	280		
FN CODE 160	035	227			313	76	
AUTHRZN- P S & E	011	1			0	1	
PSE DESIGN CONF	012	3			7	1	
GenDesEng	012	3	5%x	4	5		
GenDesTech	012	3	2%x	4	2		
ALN,PRF,FIN SCH	013	11			60	1	
GenDesEng	013	11	29%x	1	26		
GenDesTech	013	11	38%x	1	34		
STREAM XING HYDR	014	9			12	29	
GenDesEng	014	9	7%x	1	6		

Across: 1 Down: 2
Outline
Project: UGNONFY.PJ
09-08-89 5:04p
Revision: 1

Network - Upgrade Non-Freeways- Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
	GenDesTech	014	9	7%x	1	6		
EARTHWORK		015	12			34	155	
	GenDesEng	015	12	17%x	1	17		
	GenDesTech	015	12	17%x	1	17		
RAILRD AGREEMTS		016	120			40	76	
	GenDesEng	016	120	2%x	1	20		
	GenDesTech	016	120	2%x	1	20		
PERMITS & AGRMTS		017	60			20	236	
	GenDesEng	017	60	2%x	1	10		
	GenDesTech	017	60	2%x	1	10		
PLN PRF RDWY DET		018	24			41	85	
	GenDesEng	018	24	6%x	1	12		
	GenDesTech	018	24	15%x	1	29		
SGN SGNAL STRIPG		019	11			15	248	
	TrafEng	019	11	8%x	1	8		
	TrafTech	019	11	7%x	1	7		
TRAFF.CONTRL PLN		020	9			23	289	
	TrafEng	020	9	14%x	1	11		
	TrafTech	020	9	16%x	1	12		
RET WAL,MISC DET		021	8			23	202	
	GenDesEng	021	8	15%x	1	10		
	GenDesTech	021	8	19%x	1	13		
RDWY HYDRAULICS		022	7			15	231	
	GenDesEng	022	7	12%x	1	7		
	GenDesTech	022	7	13%x	1	8		
ILLUMINATION		023	3			6	257	
	GenDesEng	023	3	12%x	1	3		
	GenDesTech	023	3	10%x	1	3		
DRAINAGE DETAILS		024	10			17	231	
	GenDesEng	024	10	10%x	1	8		
	GenDesTech	024	10	11%x	1	9		
FN CODE 170		036	176			96	85	
BRIDGE LAYOUTS		025	50			16	76	
	GenDesEng	025	50	2%x	1	8		
	GenDesTech	025	50	2%x	1	8		
BRIDGE DETAILS		026	125			80	85	
	BrEng	026	125	2%x	2	40		
	BrTech	026	125	2%x	2	40		

Across: 1 Down: 3
Outline
Project: UGNONFY.PJ
09-08-89 5:04p
Revision: 1

Network - Upgrade Non-Freeways- Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
FN CODE 180	037	158			35	0	
PS&E ASSY,D.REVW	027	13			13	76	
GenDesEng	027	13	5%x	1	6		
GenDesTech	027	13	6%x	1	7		
P S & E COMPLETE	028	0			0	58	
AUSTIN REVW,BIDS	029	65			22	0	
GenDesEng	029	65	2%x	1	11		
GenDesTech	029	65	2%x	1	11		
LETTING DATE	030	0			0	0	

Outline
09-08-89 5:08p

Project: UPGRDFWY.PJ
Revision: 1

Network - Upgrade Freeways - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
UPGRDFWY.PJ	UP0	468			1349	0	
FN CODE 110	031	43			44	2	
PRELIM ENGINRG	001	41			44	2	
GenDesEng	001	41	5%x	1	17		
GenDesTech	001	41	8%x	1	27		
FN CODE 120	032	75			12	1	
ENVIRON ASSMT	002	72			12	1	
EnvTech	002	72	2%x	1	12		
FN CODE 130	033	391			103	0	
ROW OWNRSHP DATA	003	9			5	31	
GenDesEng	003	9	2%x	1	2		
GenDesTech	003	9	4%x	1	3		
ROW MAP,PLANS	004	28			10	1	
GenDesEng	004	28	2%x	1	5		
GenDesTech	004	28	2%x	1	5		
APPRAISL & NEGOT	005	65			11	1	
ROWTech	005	65	2%x	1	11		
ROW ACQ & RELOC	006	121			20	0	
ROWTech	006	121	2%x	1	20		
UTIL RELOC PLANS	007	51			37	142	
ROW Tech	007	51	9%x	1	37		
ROW ACQUIRED	008	0			0	0	
RELOC UTILITIES	009	125			20	0	
ROW Tech	009	125	2%x	1	20		
FN CODE 150	034	43			212	1	
DESIGN SURVEYING	010	42			212	1	
GenDesEng	010	42	11%x	1	37		
GenDesTech	010	42	13%x	4	175		
FN CODE 160	035	231			734	83	
AUTHRZN- P S & E	011	1			0	1	
PSE DESIGN CONF	012	3			7	1	
GenDesEng	012	3	5%x	4	5		
GenDesTech	012	3	2%x	4	2		
ALN,PRF,FIN SCH	013	16			169	1	
GenDesEng	013	16	57%x	1	73		
GenDesTech	013	16	75%x	1	96		
STREAM XING HYDR	014	10			30	33	
GenDesEng	014	10	20%x	1	16		

Across: 1 Down: 2
Outline
Project: UPGRDFWY.PJ
09-08-89 5:08p
Revision: 1

Network - Upgrade Freeways - Default Values

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Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
	GenDesTech	014	10	17%x	1	14		
EARTHWORK		015	15			89	157	
	GenDesEng	015	15	40%x	1	48		
	GenDesTech	015	15	34%x	1	41		
RAILRD AGREEMTS		016	120			40	83	
	GenDesEng	016	120	2%x	1	20		
	GenDesTech	016	120	2%x	1	20		
PERMITS & AGRMTS		017	60			25	247	
	GenDesEng	017	60	2%x	1	10		
	GenDesTech	017	60	3%x	1	15		
PLN PRF RDWY DET		018	32			111	92	
	GenDesEng	018	32	14%x	1	36		
	GenDesTech	018	32	29%x	1	75		
SGN SGNAL STRIPG		019	14			38	253	
	TrafEng	019	14	20%x	1	23		
	TrafTech	019	14	13%x	1	15		
TRAFF.CONTRL PLN		020	12			59	297	
	TrafEng	020	12	28%x	1	27		
	TrafTech	020	12	33%x	1	32		
RET WAL,MISC DET		021	10			75	207	
	GenDesEng	021	10	44%x	1	36		
	GenDesTech	021	10	48%x	1	39		
RDWY HYDRAULICS		022	9			38	231	
	GenDesEng	022	9	28%x	1	21		
	GenDesTech	022	9	23%x	1	17		
ILLUMINATION		023	4			15	263	
	GenDesEng	023	4	28%x	1	9		
	GenDesTech	023	4	18%x	1	6		
DRAINAGE DETAILS		024	12			38	231	
	GenDesEng	024	12	21%x	1	21		
	GenDesTech	024	12	17%x	1	17		
FN CODE 170		036	176			204	92	
BRIDGE LAYOUTS		025	50			64	83	
	GenDesEng	025	50	7%x	1	28		
	GenDesTech	025	50	9%x	1	36		
BRIDGE DETAILS		026	125			140	92	
	BrEng	026	125	4%x	2	80		
	BrTech	026	125	3%x	2	60		

Across: 1 Down: 3
Outline
Project: UPGRDFWY.PJ
09-08-89 5:08p
Revision: 1

Network - Upgrade Freeways - Default Values

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Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
FN CODE 180	037	165			40	0	
PS&E ASSY,D.REVW	027	14			18	83	
GenDesEng	027	14	8%x	1	9		
GenDesTech	027	14	8%x	1	9		
P S & E COMPLETE	028	0			0	58	
AUSTIN REVW,BIDS	029	65			22	0	
GenDesEng	029	65	2%x	1	11		
GenDesTech	029	65	2%x	1	11		
LETTING DATE	030	0			0	0	

Outline
09-08-89 5:12p

Project: WIDENFWY.PJ
Revision: 3

Network for Widening Freeway - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
WIDENFWY.PJ	WF0	797			10284	0	
FN CODE 110	043	312			951	1	
PROJ CNCEPT CONF	001	3			25	1	
Plan Staff	001	3	26%x	4	25		
PLANIMETRICS	002	130			104	46	
Plan Staff	002	130	5%x	2	104		
TRAF EVAL & PROJ	003	175			56	1	
Plan Staff	003	175	2%x	2	56		
PREL GEO,ROW REQ	004	30			144	1	
Plan Staff	004	30	30%x	2	144		
SOIL SURVEY	005	10			45	1	
Plan Staff	005	10	12%x	1	10		
GenDesTech	005	10	43%x	1	35		
PAVEMENT DESIGN	006	50			352	1	
GenDesEng	006	50	54%x	1	216		
GenDesTech	006	50	34%x	1	136		
PRELIMINARY EST	007	5			38	1	
Plan Staff	007	5	47%x	2	38		
SELECT ALTERNATV	008	6			38	1	
Plan Staff	008	6	39%x	2	38		
SCHEMATICS	009	62			149	1	
Plan Staff	009	62	15%x	2	149		
FN CODE 120	044	154			176	1	
ENV ASSMT	010	62			90	1	
EnvTech	010	62	18%x	1	90		
PUBLIC HRNG	011	65			42	1	
EnvTech	011	65	8%x	1	42		
PONSI	012	25			44	1	
EnvTech	012	25	22%x	1	44		
FN CODE 130	045	650			440	0	
ROW OWNRSHP DATA	013	22			26	72	
GenDesEng	013	22	2%x	1	4		
GenDesTech	013	22	12%x	1	22		
ROW MAP,PLANS	014	59			44	1	
GenDesEng	014	59	2%x	1	10		
GenDesTech	014	59	7%x	1	34		
APPRAISL & NEGOT	015	74			60	1	
ROWTech	015	74	10%x	1	60		

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Network for Widening Freeway - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
ROW ACQ & RELOC	016	134			65	0	
ROWTech	016	134	6%x	1	65		
UTIL RELOC PLANS	017	64			195	98	
ROW Tech	017	64	38%x	1	195		
ROW ACQUIRED	018	0			0	0	
RELOC UTILITIES	019	125			50	0	
ROW Tech	019	125	5%x	1	50		
FN CODE 150	046	474			1264	236	
FIELD SURVEY	020	69			503	107	
GenDesEng	020	69	15%x	1	83		
GenDesTech	020	69	19%x	4	420		
DESIGN SURVEYING	021	66			761	236	
GenDesEng	021	66	24%x	1	127		
GenDesTech	021	66	30%x	4	634		
FN CODE 160	047	256			3415	56	
AUTHRZN- P S & E	023	0			0	56	
PSE DESIGN CONF	024	6			31	56	
GenDesEng	024	6	13%x	4	25		
GenDesTech	024	6	3%x	4	6		
ALN,PRF,FIN SCH	025	69			470	56	
GenDesEng	025	69	39%x	1	216		
GenDesTech	025	69	46%x	1	254		
STREAM XING HYDR	026	14			158	111	
GenDesEng	026	14	77%x	1	87		
GenDesTech	026	14	63%x	1	71		
EARTHWORK	027	35			275	92	
GenDesEng	027	35	55%x	1	154		
GenDesTech	027	35	43%x	1	121		
RAILRD AGREEMTS	028	120			193	56	
GenDesEng	028	120	8%x	1	77		
GenDesTech	028	120	12%x	1	116		
PLN PRF RDWY DET	029	109			707	61	
GenDesEng	029	109	29%x	1	253		
GenDesTech	029	109	52%x	1	454		
PERMITS & AGRMTS	030	60			197	245	
GenDesEng	030	60	16%x	1	77		
GenDesTech	030	60	25%x	1	120		
RDWY HYDRAULICS	031	27			236	146	

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Network for Widening Freeway - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
	GenDesEng	031	27	60%x	1	130		
	GenDesTech	031	27	49%x	1	106		
TRAFF.CONTRL PLN		032	33			318	272	
	TrafEng	032	33	60%x	1	159		
	TrafTech	032	33	60%x	1	159		
SGN SGNAL STRIPG		033	45			159	191	
	TrafEng	033	45	28%x	1	101		
	TrafTech	033	45	16%x	1	58		
DRAINAGE DETAILS		034	28			277	146	
	GenDesEng	034	28	68%x	1	153		
	GenDesTech	034	28	55%x	1	124		
RET WAL,MISC DET		035	25			354	161	
	GenDesEng	035	25	97%x	1	194		
	GenDesTech	035	25	80%x	1	160		
ILLUMINATION		036	12			40	224	
	GenDesEng	036	12	15%x	1	15		
	GenDesTech	036	12	26%x	1	25		
FN CODE 170		048	176			3772	61	
BRIDGE LAYOUTS		037	50			1132	56	
	GenDesEng	037	50	62%x	2	496		
	GenDesTech	037	50	53%x	3	636		
BRIDGE DETAILS		038	125			2640	61	
	BrEng	038	125	52%x	3	1560		
	BrTech	038	125	54%x	2	1080		
FN CODE 180		049	142			266	0	
PS&E ASSY,D.REVW		039	20			161	56	
	GenDesEng	039	20	51%x	1	82		
	GenDesTech	039	20	49%x	1	79		
P S & E COMPLETE		040	0			0	56	
AUSTIN REVW,BIDS		041	65			105	0	
	GenDesEng	041	65	12%x	1	63		
	GenDesTech	041	65	8%x	1	42		
LETTING DATE		042	0			0	0	

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Network for Widening NonFreeway - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
WIDNONFY.PJ	WN0	733			1559	0	
FN CODE 110	043	296			285	1	
PROJ CNCEPT CONF	001	3			9	1	
Plan Staff	001	3	9%x	4	9		
PLANIMETRICS	002	130			42	45	
Plan Staff	002	130	2%x	2	42		
TRAF EVAL & PROJ	003	175			56	1	
Plan Staff	003	175	2%x	2	56		
PREL GEO,ROW REQ	004	30			34	1	
Plan Staff	004	30	7%x	2	34		
SOIL SURVEY	005	10			13	1	
Plan Staff	005	10	3%x	1	3		
GenDesTech	005	10	12%x	1	10		
PAVEMENT DESIGN	006	50			68	1	
GenDesEng	006	50	10%x	1	40		
GenDesTech	006	50	7%x	1	28		
PRELIMINARY EST	007	7			13	1	
Plan Staff	007	7	11%x	2	13		
SELECT ALTERNATV	008	6			9	1	
Plan Staff	008	6	9%x	2	9		
SCHEMATICS	009	42			41	1	
Plan Staff	009	42	6%x	2	41		
FN CODE 120	044	168			37	1	
ENV ASSMT	010	71			18	1	
EnvTech	010	71	3%x	1	18		
PUBLIC HRNG	011	65			11	1	
EnvTech	011	65	2%x	1	11		
FONSI	012	25			8	1	
EnvTech	012	25	4%x	1	8		
FN CODE 130	045	587			144	0	
ROW OWNRSHP DATA	013	9			13	88	
GenDesEng	013	9	3%x	1	3		
GenDesTech	013	9	13%x	1	10		
ROW MAP,PLANS	014	28			23	1	
GenDesEng	014	28	2%x	1	5		
GenDesTech	014	28	8%x	1	18		
APPRAISL & NEGOT	015	65			21	1	
ROWTech	015	65	4%x	1	21		

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Network for Widening NonFreeway - Default Values

Heading/Task Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
ROW ACQ & RELOC	016	122			30	0	
ROWTech	016	122	3%x	1	30		
UTIL RELOC PLANS	017	51			37	135	
ROW Tech	017	51	9%x	1	37		
ROW ACQUIRED	018	0			0	0	
RELOC UTILITIES	019	125			20	0	
ROW Tech	019	125	2%x	1	20		
FN CODE 150	046	432			262	217	
FIELD SURVEY	020	53			107	122	
GenDesEng	020	53	5%x	1	22		
GenDesTech	020	53	5%x	4	85		
DESIGN SURVEYING	021	43			155	217	
GenDesEng	021	43	9%x	1	31		
GenDesTech	021	43	9%x	4	124		
FN CODE 160	047	205			677	59	
AUTHRZN- P S & E	023	0			0	59	
PSE DESIGN CONF	024	3			14	59	
GenDesEng	024	3	11%x	4	11		
GenDesTech	024	3	6%x	2	3		
ALN,PRF,FIN SCH	025	17			92	59	
GenDesEng	025	17	31%x	1	43		
GenDesTech	025	17	36%x	1	49		
STREAM XING HYDR	026	10			31	66	
GenDesEng	026	10	18%x	1	15		
GenDesTech	026	10	20%x	1	16		
EARTHWORK	027	15			77	134	
GenDesEng	027	15	32%x	1	39		
GenDesTech	027	15	31%x	1	38		
RAILRD AGREEMTS	028	120			40	59	
GenDesEng	028	120	2%x	1	20		
GenDesTech	028	120	2%x	1	20		
PLN PRF RDWY DET	029	33			115	68	
GenDesEng	029	33	13%x	1	35		
GenDesTech	029	33	30%x	1	80		
PERMITS & AGRMTS	030	60			40	198	
GenDesEng	030	60	4%x	1	20		
GenDesTech	030	60	4%x	1	20		
RDWY HYDRAULICS	031	9			38	206	

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Network for Widening NonFreeway - Default Values

Heading/Task	Resource	Task ID	Dur	Allc	Un	Total Hours	Float	
	GenDesEng	031	9	25%x	1	18		
	GenDesTech	031	9	27%x	1	20		
TRAFF.CONTRL	PLN	032	12			53	248	
	TrafEng	032	12	25%x	1	24		
	TrafTech	032	12	30%x	1	29		
SGN SGNAL STRIPG		033	15			39	228	
	TrafEng	033	15	19%x	1	23		
	TrafTech	033	15	13%x	1	16		
DRAINAGE DETAILS		034	13			53	206	
	GenDesEng	034	13	24%x	1	25		
	GenDesTech	034	13	26%x	1	28		
RET WAL,MISC DET		035	10			76	183	
	GenDesEng	035	10	45%x	1	36		
	GenDesTech	035	10	49%x	1	40		
ILLUMINATION		036	4			9	238	
	GenDesEng	036	4	7%x	1	3		
	GenDesTech	036	4	17%x	1	6		
FN CODE 170		048	176			112	68	
BRIDGE LAYOUTS		037	50			32	59	
	GenDesEng	037	50	3%x	1	12		
	GenDesTech	037	50	5%x	1	20		
BRIDGE DETAILS		038	125			80	68	
	BrEng	038	125	2%x	2	40		
	BrTech	038	125	2%x	2	40		
FN CODE 180		049	142			42	1	
PS&E ASSY,D.REVW		039	14			20	59	
	GenDesEng	039	14	8%x	1	9		
	GenDesTech	039	14	9%x	1	11		
P S & E COMPLETE		040	0			0	58	
AUSTIN REVW,BIDS		041	65			22	1	
	GenDesEng	041	65	2%x	1	11		
	GenDesTech	041	65	2%x	1	11		
LETTING DATE		042	0			0	1	