Research Report
KTC-01-09/SPR-195-99-IF

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KENTUCKY CONTRACT TIME DETERMINATION SYSTEM

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KENTUCKY CONTRACT TIME DETERMINATION SYSTEM

KTC-01-09/SPR-195-99-1F

KY-CTDS
Kentucky Contract Time Determination System
(KYSPR-99-195)

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In cooperation with the Kentucky Transportation Cabinet

May 4, 2001

Commonwealth of Kentucky
Transportation Cabinet
Department of Highways
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J.M. Yowell
State Highway Engineer

James C. Codell, III
Secretary of Transportation

E. Jeffrey Mosley
Deputy Secretary

Paul E. Patton
Governor

May 24, 2001

Mr. Jose M. Sepulveda
Division Administrator
Federal Highway Administration
330 West Broadway
Frankfort, Kentucky 40601

Subject: Implementation Statement for Final Report entitled
"KY-CTDS, Kentucky Contract Time Determination System"
Study Number: KYSPR 99-195-1F

Dear Mr. Sepulveda:

The goal of this study was to provide the Kentucky Transportation Cabinet with a quick and accurate system for conceptually determining a reasonable project duration for its highway construction projects at Bid Letting. This was accomplished by working closely with an experienced advisory committee of Cabinet Construction and Design personnel.

The pc-based system utilizes a combination of standard software packages and six pre-determined project templates. The system allows the Cabinet Construction Engineer to quickly determine the total project duration. The system further provides for modification of the computed contract time and for documentation of the results.

This KY-CTDS system has been in use in the Central Office with support from the University of Kentucky developers.

Sincerely,

J. M. Yowell, P.E.
State Highway Engineer

JMY/JLC/WM

c: John Carr
Paul Toussaint
Dexter Newman
Cliff Linkes
Willie McCann

Technical Report Documentation Page

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16. Abstract

This paper reports on the results of research that was funded by the Kentucky Transportation Cabinet (KyTC) to develop a new method for determining construction contract time for its highway construction contracts. The current and other DOT systems were analyzed to determine how a new system could provide better estimated durations. It was pre-determined that a pc computer based system was best suited. The development of the system input was developed from KyTC engineers with construction experience. The study advisory committee worked with Kentucky Transportation Center research engineers to develop the basis for the new contract time determination system, called KY-CTDS.

The KY-CTDS program provides a conceptual estimating tool for predicting construction contract time for the Kentucky Department of Highways. It uses the pre-determined project classifications with only the major activities that control the project duration. Production rates and activity relationships were determined and are included in the program. Final adjustments in the project can be easily made by KyTC engineers. This system utilizes Microsoft Project® 98 and Microsoft Excel® Version 7.0 software operating on a personal computer. System outputs include a graphical bar chart schedule for estimating the contract time for bidding purposes. System output may also help in resolving construction disputes. The program is not suitable for detailed scheduling of construction operations.

17. Key Words	18. Distribution Statement
Contract Time, Project Duration, Project Template, Planning, Time Estimating, Conceptual Time Estimating Tool	Unlimited with approval of Kentucky Transportation Cabinet

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1. INTRODUCTION

This research project was to update the KyTC's planning tool used for the determination of contract time allotted for contractors to complete highway construction projects in the Commonwealth of Kentucky. Although this issue was initially raised by the Transportation Cabinet, the FHWA has also expressed a desire to have all states use an organized rationale for determining and documenting their determination of allotted contract time for their highway construction projects. Additionally, this project was timely in that its implementation could help provide support and assistance to the district design engineers new responsibility for making these contract time determinations for projects performed in their districts.

2. THE PREVIOUS CONTRACT TIME SYSTEM

Until recently, experienced home office design engineers would normally have determined all of the contract times allotted for highway construction projects for all twelve Department of Highway Districts. Along with considerable experience, the home office design engineers had a tool at their disposal, a software program that had been developed and been in use for quite some time. The program was originally written as a mainframe application and had been used as such up to the advent of the personal computer. It was then converted to a pc-based application; however, the dated program core logic was not upgraded and remained the same mainframe machine structured logic. At that time, the home office design engineers also keep the responsibility for contract time determination for highway construction projects.

The previous contract system used one single highway construction type project template model for all highway construction projects. The single generic model consisted of fourteen major controlling activities, some would pertain and others would not, but the one single template model was used for all cases. This model logic linked each project activity to the start of the project and each activity was assigned a predetermined amount of lag duration from the start of the project to the activity start. The project's contract time was then determined by the activity with the latest completion, having the greatest time sum of activity duration and its predetermined lag duration.

With this single generic template model, the activity duration is calculated by the productivity rates for each particular activity multiplied by the design quantities that were input from the engineer's estimate. These activity productivity rates were variable by quantity and locale where construction operations were to occur. This afforded the design engineer user a considerable amount of activity duration adjustment. The productivity rates were generated from historical productivity data for previous projects, but the researchers were unable to document their exact source, and thought they would be difficult to update, now and in the future.

Home office design engineers that had performed this function had a considerable amount of working experience with the template model and the contract time process.

With this experience, the design engineer's quantity estimate, the project's key activities, the productivity rates and ranges, and a simplified calendar calculation by the program, an experienced design engineer could easily arrive at a reasonable project contract time. The districts then used this contract time for the bid letting and in the preparation of contract documents.

The contract time determination program performed the time arithmetic and even printed out a simple bar chart graphical representation of the project for documentation. From experience, the home office engineers could manipulate the program to provide whatever contract completion they thought reasonable. This became the contract time allotted for a highway construction project in the Commonwealth of Kentucky. For a long time there had been few challenges of this system by contractors, for it routinely allotted more than ample time to complete their work.

The districts construction personnel and other Transportation Cabinet personnel did occasionally question excessive amounts of contract time allowed. Although the system had served well for quite some time, it required enhancement and updating to be more in line with Department of Highways thoughts on contract time allotment. An updated contract time determination system with proper support and assistance would also give new district design personnel users confidence to perform this contract time determination function, and to provide them support documentation to withstand future challenges.

3. RESEARCH OBJECTIVES

In August of 1998, a proposal for research study was submitted and approved. The research objectives were to:

1. Review the highway contract time determination systems currently used by other DOTS.

2. Determine the conceptual activities controlling contract time for each classification of highway construction project currently undertaken by the KyTC.

3. Develop a computerized system, KY-CTDS: Kentucky Contract Time Determination System, for KyTC personnel to use when estimating contract time for all classes of highway construction projects.

4. Develop a KY-CTDS Users Manual and train KyTC personnel to use the system

The proposed KY-CTDS was to:

1. Provide a rational system for establishing project completion times for highway contracts

2. Provide a basis for better planning of KyTC resources for its construction projects
3. Provide a stronger defense in contract time disputes
4. Allow younger engineers to learn how to estimate project completion times.

The research work plan included the following tasks:

1. Review of Contract Time Determination Systems Utilized by Other DOTs
2. Develop a Conceptual Project Planning System for KyTC Projects
3. Develop a Computerized System for Contract Time Determination
4. Develop a KY-CTDS Users Manual and Training Program for KyTC Personnel
5. Prepare Final Report for Project
6. Conduct Training Sessions for KyTC Personnel

4. OTHER DOT'S CONTRACT TIME SYSTEMS

The researchers' first step was to investigate how other state DOTs were determining contract time for their highway construction projects. The researchers looked at both the computerized and the manual based systems in current use by other state DOTs. The researchers found that most states used a manual contract time determination system, as opposed to an integrated computerized contract time determination system.

The representative examples of the other states' contract time systems are described below.

In Florida, after an experienced project performs a detailed review of the drawings, specifications, and contract documents, he would fill in a contract time determination worksheet form by hand for a planned highway construction project in the state of Florida. The experienced engineer would select the required project activities for each phase of the project and compile an activity list on the preformatted contract duration worksheet form. These selected activities would those considered by the project engineer to be on the critical path of the project. The design quantities for the engineer's estimate for the selected activities are then listed in the next column. The activity production rates are next listed in the next column of the worksheet form. The activity duration is then manually calculated by the multiplying the design quantity by the production rate, and it is recorded in the nest column of the worksheet form. The project engineer can use an activity duration calculator chart developed for

the Florida DOT for easy conversion of activity design quantity to workdays. The Project engineer then uses the Florida calendar day conversion factor of 1.46 to convert workdays into calendar days. The project engineer may adjust this calendar day conversion factor depending on the type of project. For example, a conversion factor of 1.0 or less would be used for an Incentive/ Disincentive type project.

The Florida project engineer then manually prepares project bar chart showing all of the controlling activities with their computed calendar day durations. Activity predecessors and successors are listed along with any assigned activity lag time. A nominal 15-day contingency is then added to the total project duration, to account for any unforeseen event that may have been overlooked. Florida uses the same contract duration worksheet system and form for all highway construction projects even if a scheduling software package were to be used for the project schedule (1).

Indiana also uses an experienced project engineer to determine contract time, but in this case from Indiana. Their system is similar hand-written procedure that uses a contract determination worksheet form to establish contract time for their highway construction projects. Indiana does use predetermined English and metric production rates categorized by an Indiana project type that have been developed for all construction work activities performed in the state. The project engineer develops the project activities, the project activity logic, the relationship between these activities, and which of these are the project duration controlling activities. The project duration, or contract time is the resultant of this contract time determination procedure. Workdays are also converted into calendar days. The project engineer then makes adjustments for any other factor that merits consideration, such as, holidays, permit restrictions, delivery time of materials, and any specific time that a ramp, bridge, or road is needed to be put back in service (2).

The Texas DOT contract time determination system is also a formalized procedure performed by experienced engineers that can do it by hand or by computer. The computerized application uses commercially software packages, Lotus 1-2-3, Flash-Up, and SuperProject for the functioning components of their computerized system. Lotus 1-2-3 is used to calculate activity durations. Flash-Up is used as the communication utility to link Lotus 1-2-3 to SuperProject scheduling software that generates the bar chart schedule. The Texas system uses a number of narrowly defined project models to determine contract for their highway construction projects. Thirteen separate predetermined project template models were developed for their system to describe their typical highway construction projects. A fourteenth template model was added to model any other project that does not fit one of the first thirteen.

The Texas project template models contain predetermined project duration controlling activities for that specific type of given project. These activities were generated by a taskforce of their DOT's more experienced engineers. In their project template models, all controlling activities are listed along with the corresponding units and the ranges of their production rates. The Texas DOT contract time determination system then uses five sensitivity factors to adjust project duration, and

resulting the contract time. These sensitivity factors are: Location, Traffic Conditions, Complexity, Soil Conditions, and Quantity of Work. They allow the user to adjust for differing project characteristics. Each of the Texas DOT district offices also uses their own unique set of production rates that they have adjusted for their particular local. Controlling activity link logic is predetermined and programmed in their software system. Only experienced users are allowed to modify the controlling activity relationship logic. From the engineer's estimate, the design quantities and units are input in the predetermined format. District default production rates are then used to calculate the corresponding controlling activity durations. These default production rates may also be adjusted for a specific project. The controlling activities and their calculated durations are then transferred to SuperProject to generate a project bar chart schedule (3).

The Louisiana DOT contract time determination system is also a computerized system that utilizes project template models and is based on the work by the Texas DOT. The system uses Lotus 1-2-3 for Windows template files for a model's separate unique set of controlling activities, production rates, and phasing implementation plan for the project. From the engineer's estimate, the design quantities for the project controlling activities are input into a user selected project template model. The project duration, or contract time is then calculated from the predetermined controlling activity logic and default production rates (4).

The contract time determination system of the Texas and the Louisiana DOTs were implemented in the early 1990s. In the research that was done by the Louisiana DOT, a personal computer based system that used specific project template models based upon project classifications, productivity rates, and for generation of a bar chart schedule would yield more consistent and accurate contract time (4).

5. DEVELOPMENT OF A CONCEPTUAL PROJECT PLANNING SYSTEM FOR KYTC PROJECTS

The principal investigator has had considerable hands-on experience in developing contract time determination systems, namely for the Indiana DOT and for the Texas DOT. A research work plan was established to take advantage of the previous work done. The work plan was to make the deliverable end product refined for, unique to and specifically for the highway construction project of the Commonwealth of Kentucky. As a state, Kentucky is large and diverse, requiring unique specialization of a contract time determination system to meet its requirements and its system would necessarily be different than any other state's system.

In 1997, Sion Tesone, of the University of Kentucky developed an MS Visual Basic computer program using a combination of macros in MS Excel and in MS Project commercially available software packages. His independent study project was intended to mimic the existing contract time determination system in use by KyTC. This was an initial and preliminary investigation of the existing KyTC system in anticipation of submitting the research study proposal. This effort resulted in the

development of a single template model system similar to those in the Texas DOT contract time determination system. From the engineer's estimate, design quantities could be input into the project template model. Controlling activity durations were then calculated automatically with the execution of a MS Visual Basic programming macro. Input and calculation resultant data are then transferred to a MS Project template for schedule preparation via MS Windows Clipboard. The preformatted controlling activity relationship logic was also transferred to the MS Project template via this data transfer. MS Project then was able to perform calendar date arithmetic and generate a bar chart schedule for the project. Although this effort was limited to the sole project type model in use by the KyTC, it was a good initial effort to gain familiarity with the logic and the procedures of the current KyTC contract time determination system. It also gave an indication of how the standard commercially available Microsoft software products could be used in the contract time determination system. Also, an incompatibility in communication between Microsoft standard software products and Primavera scheduling software was discovered.

In August of 1998, the proposal for this research study with the current research objectives was submitted and accepted by the KyTC. An advisory committee was appointed to provide guidance and direction for the research team effort at the appropriate milestone points during the course of the research study.

The Study Advisory Committee was comprised of:

TABLE 1: KY-CTDS Advisory Committee

STUDY ADVISORY COMMITTEE		
John Sacksteder	KTC, Design	Chairman
Glenn Dockery	KTC Design	
Dexter Newman	KTC Construction	Co-Chairman
Vibert Forsythe	KTC Construction	
W. T. Chambers, Jr.	D-2 Construction	
John Cornett	D-11 Construction	
Daniel Jewell	D-11 Preconstruction	
Gary Raymer	D-4 Construction	
Charles Briggs	KYTC Operations	
Richard Guidi	D-6 Design	***Working Committee***
Doug Brookman	KTC Design	***Working Committee***
Ken Overturf	D-7 Design	***Working Committee***
Frank Bush, Jr.	D-7 Design	***Working Committee***
Wayne Moseley	D-7 Construction	***Working Committee***
Donn Hancher	UK-CEM	***Working Committee***
Ray Werkmeister	UK-CEM	***Working Committee***
Becky Luscher	UK-CEM	***Working Committee***

In addition to the Study Advisory Committee's important oversight function, a smaller working committee was selected from advisory committee members that had significant construction experience and time available to participate in the hands-on detail work and decisions required in developing a new KyTC contract time determination system. They are noted above on Table 1.

The smaller working committee met routinely every two to three weeks for about nine months at the District 7 DOH office. These working meetings generally lasted for about three hours at a time. Outside assignments were routinely made and the findings were presented to the working committee. Members embraced this project and were very conscientious in their attendance and their active participation. The amount of the member's construction experience and knowledge was impressive. Differences in design quantity units, approaches to planning and best practices were observed to vary from district to district. The working committee did work through these differences and did arrive at consensus agreement on all major issues, with all viewpoints presented and discussed.

The tasks performed by the Working Committee were as follow:

1. The first task of the working committee was to consider what and how many project templates would be needed to accurately describe the highway construction projects for the Commonwealth of Kentucky. The previous contract time determination system uses a single template model for all highway construction projects, although the current KyTC's Project Authorization System contains twenty project classifications. The working committee quickly elected to select six typical project classification types for new highway construction.

   Maintenance type projects were excluded from incorporation into the contract time determination system, because the contract time for these maintenance types of projects is determined differently than the new work construction projects. Inclusion would also greatly increase the complexity of the system.

   Six project classification models were selected to depict the KyTC's new construction project types. These project classification models are: Reconstruction Limited Access, Reconstruction Open Access, New Route, Relocation, Bridge Rehabilitation, and Bridge Replacement.

   The first four project classification models are to be used for road construction projects and the latter two are to be used for bridge construction projects. A brief description of the various models is listed in Table 2.

TABLE 2: Kentucky Department of Highway Project Templates

Project Template	*Project Description*
Reconstruction Limited Access	This is a project that utilizes the existing alignment but may revise the profile grade for an overlay.
Reconstruction Open Access	This is a project where a road is being rebuilt that has either "Access by Permit" or "Partial Control" while utilizing the existing right-of-way.
New Route	This is a project being built from point "A" to point "B".
Relocation	This is a project that a section of road is being rebuilt on new alignment and grade.
Bridge Rehabilitation	This is a project that a lane on a bridge would be closed for reconstructing or widening the deck part width.
Bridge Replacement	This project's main focus would be to build a new bridge.

2. The second task of the working committee was to determine the template of project controlling activities for each of these project classification models. The project controlling activities of the Texas DOT model were used as the starting point, but was quickly set aside and replaced with a more innovative, uniquely Kentucky best practices way of doing highway construction. Only those activities that would be considered to be on the critical path, or could ever possibly become part of the critical path and control the project's total duration were selected. It was difficult to set aside all of the project activities and keep focus on just these project duration controlling activities.

   Standard English units of measure were selected for each of the project controlling activities. Again, this was not a simple task because there exist hundreds of different units of measure in the current KyTC database and project designers specify design quantities in the engineer's estimate in many different forms and units. Conversion of project templates to allow metric units was investigated and rejected due to KTC's standardization on English units.

3. The next task was to determine the activity relationship logic between each of the controlling activities for each of the six project classification models. This was a laborious process that required intense concentration, selling, persuading and discussing to arrive at a consensus agreement. MS Project's software limitation of using only one relationship between activities was also a controlling factor in logic development. Since most of the project controlling activities have overlapping relationships, the relationship logic had to be defined as a percent of completion of the predecessor activity. The considerable construction experience and knowledge of the group was heavily relied upon to arrive at consensus in the definition method and the amount of overlap that could be considered reasonable. The six project templates with their project controlling activities and their relationship logic were fully defined.

In Table 3, the "Reconstruction Limited Access" project classification template is shown with the project controlling activities and the predecessor relationship logic. Under "Preceding Activities and Relationships", the activities with 100% in parentheses indicate "Finish to Start" relationships. All other relationships are "Start to Start" with a lag of a percent of its predecessor's completion. All six templates with relationship logic can be found in Appendix I C.

The largest of the project templates is the Limited Access Template that has thirty-eight project controlling activities. New Route and Relocation Templates both have thirty-three activities each since they do not consider demolition of existing structures. In the Commonwealth of Kentucky, demolition of existing structures is typically handled ahead of time by another contract. Bridge Rehabilitation and Bridge Replacement Templates have only fifteen controlling activities since they are used only for bridge construction projects and do not include paving considerations. Typical bridge operations activities are included in other templates in the case where these activities control project duration. Also, it can be pointed out that Reconstruction Limited Access and Reconstruction Open Access Templates have the same number of exact project controlling activities and relationships. They do differ by the default production rates used. Differing production rates are also found with New Route and Relocation Templates, and with Bridge Rehabilitation and Bridge Replacement Templates.

4. The next task to be considered was how to incorporate the impact of phasing on the project templates. Phasing has a significant impact on construction planning and the project duration, and on a contract time determination system. Other DOT's models reviewed dealt with phasing by replicating the project controlling activities for each phase. This would necessarily required breaking down the engineer's estimate design quantities for each phase. This would require a considerable amount of additional work on the user's part and introduce a highly likely possibility of error into the contract time determination system. Design consultants currently do not break down their engineer's estimate by phases.

   Since a contract time determination system is intended to be strictly a conceptual planning and time estimating tool, the working committee arrived at an innovative approach to the phasing planning. Their solution was to provide for project phasing by adding a phasing allowance to the total project duration. The phasing allowance would be based upon the number of required phases and an estimate of the time in days required per phase. This phasing allowance has bee incorporated into each project template, which adds an appropriate amount of time for phasing. See Table 3.

   This approach to phasing greatly speeds up and simplifies planning considerations required for the contract time determination process, without sacrificing accuracy.

TABLE 3: Reconstruction Limited Access Template

ID	*Major Work Items*	*Preceding Activities & Relationships (% complete of predecessor)*
1	Initial Traffic Control	
2	Clearing & Grubbing	1(100%)
3	Diversion (By-pass Detour)	1(100%)
4	Roadway Excavation	2(75%), 3(25%)
5	Embankment in Place	2(75%), 3(25%)
6	Drainage Pipe	4(10%), 5(10%)
7	Box Culverts, Class A Concrete	2(50%)
8	Erect Temporary Bridge	1(100%)
9	Remove Existing Structures	3(100%), 8(100%)
10	Cofferdams	9(100%)
11	Structure Excavation	9(100%), 10(100%)
12	Piling	10(100%), 11(50%)
13	Sub-Structure, Class A Concrete	12(50%)
14	Concrete Beams	13(100%)
15	Steel Beams	13(100%)
16	Super-Structure, Class AA Concrete	14(100%), 15(100%)
17	Remove Temporary Bridge	16(100%)
18	Major Retaining Walls	4(100%), 5(100%)
19	Sub-grade Stabilization	4(100%), 5(100%), 6(75%), 7(75%)
20	Stone Base	19(100%)
21	Drainage Blanket	19(100%)
22	Asphalt Base, Leveling, & Wedging	20(100%), 21(100%)
23	Curb & Gutter	20(100%), 22(75%)
24	Entrance Pavement	20(100%), 22(75%)
25	Barrier Walls, Slip Form	22(90%)
26	Asphalt Repair	22(90%)
27	Concrete Repair	20(100%)
28	Concrete Paving	20(100%),21(100%)23(95%),24(50%), 27(100%)
29	Asphalt Surface	22(90%), 23(95%), 24(50%), 25(100%), 26(100%), 27(100%)
30	Sheet Signs	28(100%), 29(100%)
31	Panel Signs	28(100%), 29(100%)
32	Major Traffic Signals	28(100%), 29(100%)
33	Lighting, Total Installation Luminaries	28(100%), 29(100%)
34	Guardrail	28(100%), 29(100%)
35	Finish Seeding	28(100%), 29(100%)
36	Pavement Marking	28(100%), 29(100%)
37	Final Clean-Up	17(100%), 18(100%), 28(100%), 29(100%), 30(100%), 31(100%), 32(100%), 33(100%), 34(100%), 35(100%), 36(100%)
38	Phasing Allowance	37(100%)

5. The next task for the working committee to address was the selection of the default production rates to be used with each project controlling activity. Although difficult for the members to agree to what could be considered a reasonable daily average production rate, variations in topography and other characteristics of the Commonwealth of Kentucky were considered in arriving at a reasonable daily production rate for each of the project controlling activities. The previous contract time determination system had used production rates for the each of its fourteen standard activities based on dated historical data. These production rates were analyzed and used as the starting point for deliberations of the working committee.

   With much debate and discussion of what could be considered reasonable, a compromise evolved which reinforced the idea that each district can adjust, increase and decrease, the default production rates and ranges to reflect the working conditions or the reasonable construction productivity possible in their local districts. The Commonwealth of Kentucky topography encompasses broad flat expanses, rolling hills, rugged mountainous terrain, all of which require unique evaluation and adjustment of production rates.

   There are a total of forty different controlling activities in the combination all six of the project templates. The new experienced based production rates of the working committee were compared to the old production rate algorithms of the previous contract time determination system and the old algorithms were set aside as being too generous in granting contractor time. The new production rates were then tested with several recently completed highway construction projects and found that they would have been challenging to the contractor but still reasonable. The working committee also verified the new production rates on several of their current active projects, with the same results.

   These new experience based rates may then be selected to be the default production rates, and are initial suggested values that will ultimately need adjustment to reflect local district conditions. These production default rates were presented and explained in detail to the full advisory committee in this context and they were approved. Some of the controlling activities' durations are dealt with in terms of a lump sum, and therefore, a predefined default fixed amount of time is specified for these activities, versus a production rate. They do, however, have a specified range as all of the other rate specifications.

6. The working group then developed reasonable ranges for the production rates, taking into consideration the size and location of the project, the type of soil conditions and topography, and complexity of the job. The default production rates, Upper, Average and Lower, and the fixed time for project controlling activities for Reconstruction Limited Access project template are listed Table 4.

   With the above tasks satisfactorily completed, most of the work of the working committee was accomplished.

In summary, the working group's deliverables to the project included:

- The six project classifications templates
- The project controlling activities for each template
- The relationship logic for each project controlling activity
- Default production rates for each project controlling activity
- Range of production rates for each project controlling activity

TABLE 4: Productivity Rates for Reconstruction Limited Access Template

ACTIVITY	*UNITS*	*LOWER LIMIT*	*AVERAGE VALUE*	*UPPER LIMIT*
Initial Traffic Control	Days	1	2	4
Clearing & Grubbing	Acres	1	3	6
Diversion (By-pass Detour)	Days	3	6	12
Roadway Excavation	CY	1,000	5,000	10,000
Embankment in Place	CY	800	4,000	8,000
Drainage Pipe	LF	100	200	300
Box Culverts, Class A Concrete	CY	10	30	50
Erect Temporary Bridge	Days	5	8	10
Remove Existing Structures	Days	1	3	5
Cofferdams	Days	5	15	30
Structure Excavation	CY	100	300	500
Piling	LF	200	300	600
Sub-Structure, Class A Concrete	CY	10	40	80
Concrete Beams	LF	200	600	800
Steel Beams	Lb	5,000	20,000	40,000
Super-Structure, Class AA Concrete	CY	10	20	40
Remove Temporary Bridge	Days	2	4	8
Major Retaining Walls	SF	500	1,000	1,500
Sub-grade Stabilization	SY	4,000	8,000	12,000
Stone Base	Tons	500	1,500	4,000
Drainage Blanket	Tons	500	1,200	2,000
Asphalt Base, Leveling, & Wedging	Tons	500	1,200	2,000
Curb & Gutter	LF	300	500	1,000
Entrance Pavement	SY	50	100	150
Barrier Walls, Slip Form	LF	300	500	800
Asphalt Repair	Tons	20	50	80
Concrete Repair	SY	10	30	50
Concrete Paving	SY	1,000	4,000	8,000
Asphalt Surface	Tons	400	1,000	1,500
Sheet Signs	Each	20	30	40
Panel Signs	Each	1	2	3
Major Traffic Signals	Days/ Intersect	10	15	20
Lighting, Total Installation Luminaries	Each	1	2	3
Guardrail	LF	1,000	1,500	2,000
Finish Seeding	SY	2,000	4,000	7,000
Pavement Marking	LF	5,000	10,000	20,000
Final Clean-Up	Days	5	10	15
Phasing Allowance	Days/ Phase	1	3	5

6. USE OF SOFTWARE TO DEVELOP THE CONCEPTUAL PROJECT PLANNING SYSTEM FOR KYTC PROJECTS

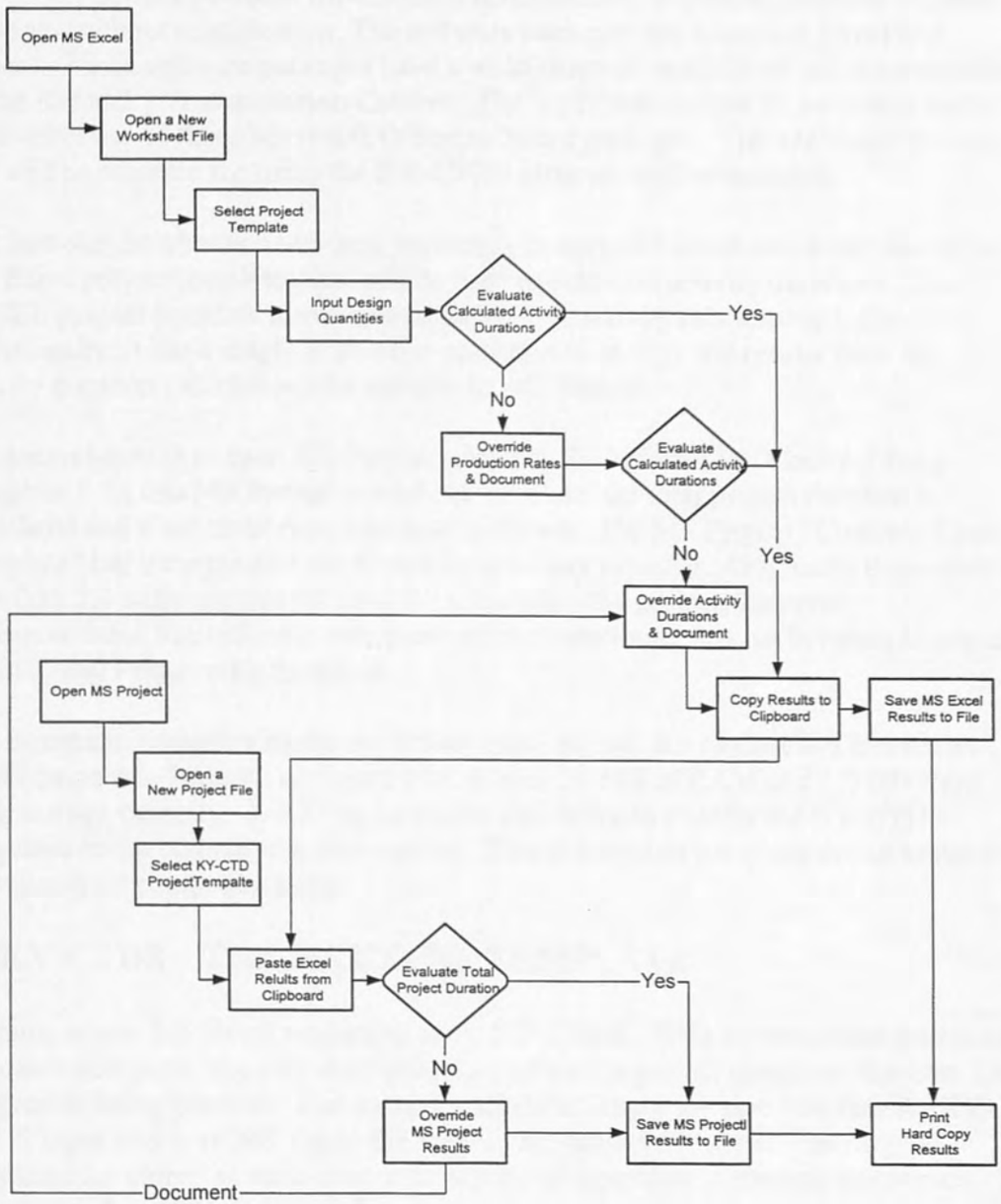
In 1998, Rebecca L. Luscher, a graduate research assistant, expanded Sion Tesone's original programming work in the MS Visual Basic computer program using the working committee's decisions and input: the use of six project classification models and the default production rates for the Commonwealth of Kentucky. Ms. Luscher tested this new program version of the contract time determination system on several current highway projects and found it to yield consistent and realistic contract times. With an attempt to make the contract time determination system rugged, dependable, and usable by a broad range of experience users, the programming complexity increased.

Additionally programming to make the project templates incorruptible further increased the programming complexity. This complexity would create internal programming conflicts under various situations and with different users. The program software would blow up without the user able to get control and correct the problem. This was merely a software programming problem, and it did not diminish the success of the working committee's contract time determination system that was proved repeatable and verifiable. The problem was in programming, not in system logic.

The research team revisited the characteristics needed for the contract time determination system software programming. It should be simple, easily understood by the intended user, adaptable for the projects intended, and the project templates should be protected from user corruption. Additionally, the software programming should be written as standard MS EXCEL and MS Project software applications, and not require extraordinary computer support for the users. These characteristics were needed to solve the software difficulties.

Additional software expertise was added to the research team, and with additional developmental work a much simplified software programming evolved, with the same successful results. User-friendliness and user-interface robustness was also achieved. The project templates were refined to take the most advantage of internal Microsoft software capabilities. The use of Microsoft commercially available software packages is an original project requirement, since the Kentucky State Government had selected Microsoft as their exclusive office software provider. Additionally, with the use of the Microsoft products, no additional software training would be required for implementation in the district offices. A schematic of this latest version of the KY-CTDS program is shown in Figure 1.

FIGURE 1 KY-CTDS Process Flowchart



This version of KY-CTDS was again tested with several current highway projects and was again found to yield realistic results with a number of inexperienced users.

7. COMPUTER SOFTWARE AND HARDWARE FOR KY-CTDS

KY-CTDS utilizes pc-based off-the-shelf commercially available computer software packages without modification. The software packages are Microsoft Excel and Project. These software packages have a wide range of capabilities and are accessible by the Kentucky Transportation Cabinet. The KyTC has trained its personnel in the basic-level use of these Microsoft Office software packages. The additional training that will be required for using the KY-CTDS program will be minimal.

The first-step in what is a two-step process is to open MS Excel and select one of six MS Excel project templates that will be used to calculate activity durations. The EXCEL project template also contains the project activity relationship logic. Additionally, it has a single macro that can be used to copy the results from the activity duration calculations for transfer to MS Project.

The second-step is to open MS Project selecting the MS Project "Contract Time Template." In this MS Project worksheet template, the total project duration is calculated and a bar chart representation is shown. The MS Project "Contract Time Template" has incorporated the Kentucky workday calendar. Originally Primavera's SureTrak 2.0 software was selected for scheduling the project; however, insurmountable limitations in communications were found to exist between Microsoft EXCEL and Primavera's SureTrak.

The minimum computer hardware system requirements are modest and include an IBM compatible Pentium equipped with at least 16 MB of RAM and 1.0 GB Hard Disk storage capacity. A 3.5" high-density disk drive to transfer the KY-CTDS templates to the computer is also needed. This is a modest computer set up in light of most personal computers today.

8. KY-CTDS ~ THE MS EXCEL TEMPLATE

Opening a new MS Excel worksheet starts KY-CTDS. With the templates loaded on the user's computer, the user may select one of the six project templates that best fits the project being planned. The opened worksheet is now the user interface for KY-CTDS input and is an MS-Excel file copy of the project template. The original templates are stored as write-protected MS Excel templates to prevent inadvertent user corruption of the template file.

The open worksheet contains three levels or tabs. They are: the *Template*, the *Default Values*, and the *Logic*. The *Template* Level is the user input and interface worksheet form. It also serves as the summary of the user input, overrides and comments the user may wish to make. The *Default Values* Level lists the Default Productivity Rate Data along with an Upper and Lower Rate range. The *Logic* Level lists the calculated duration results from the user input on the *Template* Level and the Activity Relationship Logic. The three worksheet levels for the Reconstruction Limited Access Template are depicted in Tables 2.1, 2.2, and 2.3.

FIGURE 2.1: Reconstruction Limited Access Template in KY-CTDS

Template Level

Microsoft Excel - 04 Limited Access1

File Edit View Insert Format Tools Data Window Help KY-Contract Time

B3 = Initial Traffic Control

	LIMITED ACCESS						
Item No	Activity	Unit	Input Design Quantity	Default Production Rate, Unit/Day	Default Activity Duration, Days	Production Rate Override, Unit/Day	Activity Duration Override, Days
1	Initial Traffic Control	Days		1	2		
2	Clearing & Grubbing	Acres		3	0	3	
3	Diversion (By-Pass Detour)	Days		1	6		
4	Roadway Excavation	CY		5,000	0	5,000	
5	Embankment in Place	CY		4,000	0	4,000	
6	Drainage Pipe	LF		200	0	200	
7	Box Culverts, Class A Concrete	CY		30	0	30	
8	Erect Temporary Bridge	Days		1	8		
9	Remove Existing Structures	Days		1	3		
10	Cofferdams	Days		1	15		
11	Structure Excavation	CY		300	0	300	
12	Piling	LF		300	0	300	
13	Sub-Structure, Class A Concrete	CY		40	0	40	
14	Concrete Beams	LF		600	0	600	
15	Steel Beams	Lb.		20,000	0	20,000	

Template | Default Values | Logic

Ready

FIGURE 2.2: Reconstruction Limited Access Template in KY-CTDS

Default Values Level

Microsoft Excel - 04 Limited Access1

File Edit View Insert Format Tools Data Window Help | KY-Contract Time

B2 = Initial Traffic Control

Item No	Activity	Current Rate	Current Duration	Unit	Lower Limit	Average	Upper Limit
1	Initial Traffic Control	1	2	Days	1	2	4
2	Clearing & Grubbing	3		Acres	1	3	6
3	Diversion (By-pass Detour)	1	6	Days	3	6	12
4	Roadway Excavation	5,000		CY	1,000	5,000	10,000
5	Embankment in Place	4,000		CY	800	4,000	8,000
6	Drainage Pipe	200		LF	100	200	300
7	Box Culverts,Class A Concrete	30		CY	10	30	50
8	Erect Temporary Bridge	1	8	Days	5	8	10
9	Remove Existing Structures	1	3	Days	1	3	5
10	Cofferdams	1	15	Days	5	15	30
11	Structure Excavation	300		CY	100	300	500
12	Piling	300		LF	200	300	600
13	Sub-Structure,Class A Concrete	40		CY	10	40	80
14	Concrete Beams	600		LF	200	600	800
15	Steel Beams	20,000		Lb	5,000	20,000	40,000
16	Super-Structure,Class AA Concrete	20		CY	10	20	40
17	Remove Temporary Bridge	1	4	Days	2	4	8
18	Major Retaining Walls	1,000		SF	500	1,000	1,500
19	Sub-grade Stabilization	8,000		SY	4,000	8,000	12,000
20	Stone Base	1,500		Tons	500	1,500	4,000

Template | Default Values | Logic

Ready NUM

FIGURE 2.3: Reconstruction Limited Access Template in KY-CTDS

Logic Level

Microsoft Excel - 04 Limited Access1

File Edit View Insert Format Tools Data Window Help | KY-Contract Time

F42 =

Iten No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	0	1
3	Diversion (By-Pass Detour)	6	1
4	Roadway Excavation	0	3SS+2,2SS+0
5	Embankment in Place	0	3SS+2,2SS+0
6	Drainage Pipe	0	4SS+0,5SS+0
7	Box Culverts, Class A Concrete	0	2SS+0
8	Erect Temporary Bridge	8	1
9	Remove Existing Structures	3	3,8
10	Cofferdams	15	9
11	Structure Excavation	0	9,10
12	Piling	0	10,11SS+0
13	Sub-Structure, Class A Concrete	0	12SS+0
14	Concrete Beams	0	13
15	Steel Beams	0	13
16	Super-Structure, Class AA Concrete	0	14,15SS+0
17	Remove Temporary Bridge	4	16
18	Major Retaining Walls	0	4,5
19	Sub-grade Stabilization	0	4,5,6SS+0,7SS+0
20	Stone Base	0	19

Template | Default Values | Logic

Ready

On the *Template* Level worksheet the user inputs the design quantities normally supplied by the design consultant on the engineer's estimate. The activity duration is automatically calculated in the *Calculated Activity Duration* column of this worksheet and automatically copied to the *Logic* Level data location.

If the user is dissatisfied with this result, the user may override the production rate by inputting a desired Production Rate in the *Production Rate Override* Column. This will automatically override the production rate used on the *Template* Level worksheet and record the results in the *Calculated Activity Duration* Column and the *Logic* Level data location.

If the user is still dissatisfied with this result, the user may directly input a desired duration in the Column indicated as *Activity Duration Override* and it will automatically override the resultant *Calculated Activity Duration* and automatically copy this result to the *Logic* Level data location. A *Comment* Column is provided for the user to document assumptions and decisions.

After evaluation of all project-controlling activities on the Template Level worksheet, the worksheet file may be "*saved as...*" and printed as any MS Excel worksheet. Both hard copy and electronic file copy functions are available and may be used.

The MS Project required input data reside on the *Logic* Level of the project template. It has been preformatted in the format required for MS Project. An Excel macro is programmed into the EXCEL project template to copy the data needed. Or the activity name column, the duration column, and the relationship logic column may be selected and copied into the MS Window Clipboard for transfer to MS Project directly by the user.

9. KY-CTDS ~ The MS Project Template

A MS Project template has been developed for use by KY-CTDS, Kycontract.mpp. The MS Project template is write-protected to protect it from inadvertently being corrupted (Figure 3). When the MS Project template is accessed, a copy is loaded into MS project for KY-CTDS use. Input data from the Excel worksheet is transferred to the MS Project template by means of the MS Windows Clipboard. By pasting MS Excel results into the MS Project template prepared worksheet all project controlling activities with their durations and relationship logic appear in bar chart form (Figure 3). At this time, it is advised that the user "save as" so that the information cannot be inadvertently lost.

The MS Project worksheet created for KyTC uses some specialized functions. The default MS Project calendar has been modified to be the KyTC working-day calendar with all holidays and non-workdays. The KyTC construction season is from April 1st to the end of November. MS Project displays non-workdays with a gray background on the bar chart schedule. The "Project Duration Summary", which gives the total amount of workdays allotted for the project is situated at the top of the activity listing.

A standard feature of MS Project allows the user to select the actual project start date of the project. Several different format views are available for the user's choice. Additional or new activities may be added. Modification to activity relationship logic is possible but strongly discouraged. File save as and print options are also among the standard MS Project menu options. The user may always return to Excel worksheets, make modifications, re-copy results into the Clipboard, return to MS Project and paste revisions. Both Excel and Project worksheet files should be routinely saved to protect your work.

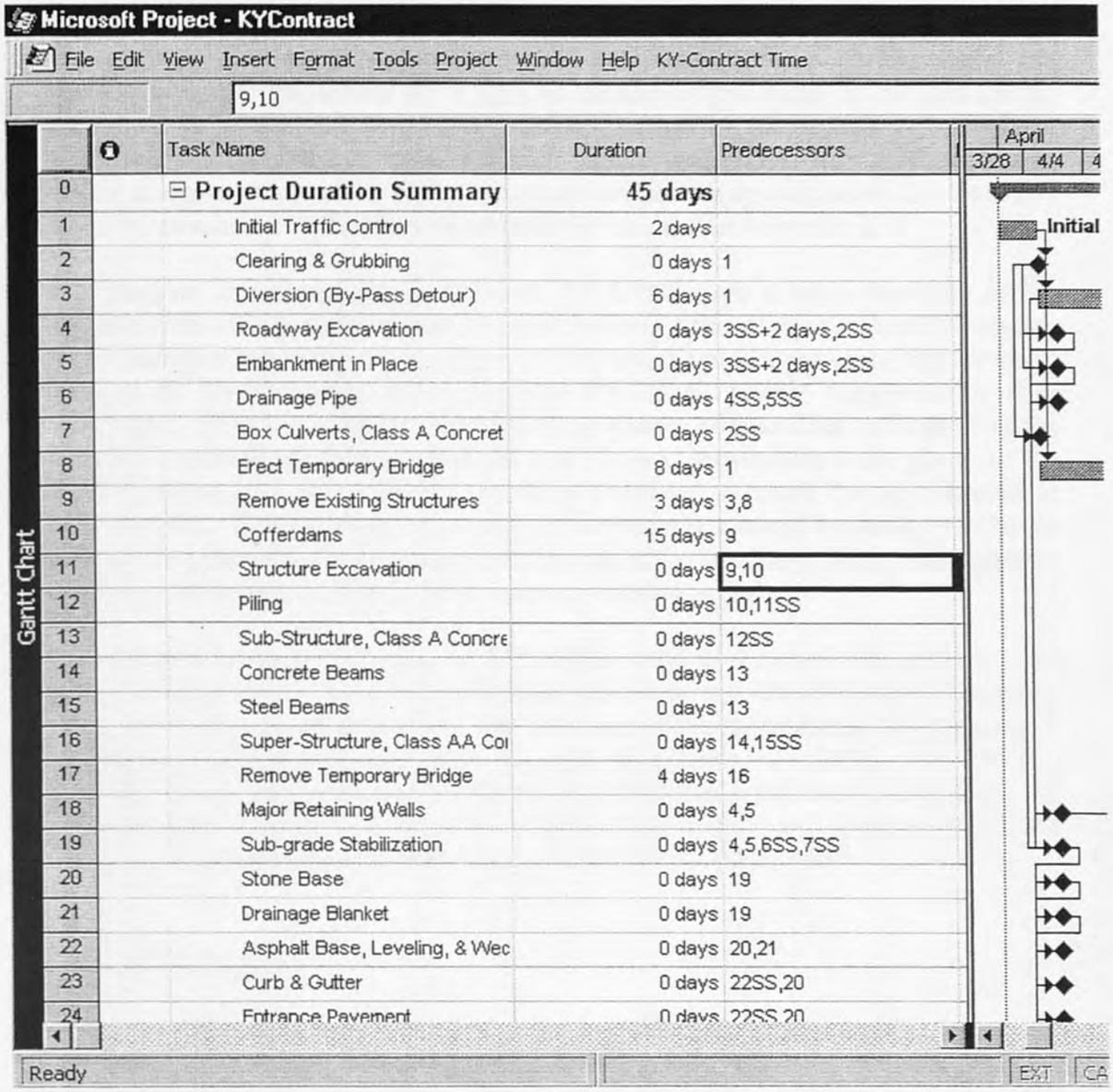
10. EXITING THE KT-CTDS PROGRAM

When the user has created the desired contract time results, the Excel and the Project worksheets should be "saved as ..." with a distinguishing filename related to the highway construction project. This filename can, and should be the same for each, since the Excel worksheet will have a ".xls" extension and the Project worksheet will have a ".mpp" extension. After saving the worksheets electronically, a hard copy print out should be generated for the project file. An attached note with author and date would be useful for future use.

Exiting Excel and Project exits from the KY-CTDS. This can be done with the standard drop down menu item method for Excel and Project.

It is strongly suggested that worksheet files be saved with a distinguishing filename related to the project to help find the files at a later time.

FIGURE 3: Schedule of Activities from Template in KY-CTDS Program



	Task Name	Duration	Predecessors
0	**Project Duration Summary**	**45 days**	
1	Initial Traffic Control	2 days	
2	Clearing & Grubbing	0 days	1
3	Diversion (By-Pass Detour)	6 days	1
4	Roadway Excavation	0 days	3SS+2 days,2SS
5	Embankment in Place	0 days	3SS+2 days,2SS
6	Drainage Pipe	0 days	4SS,5SS
7	Box Culverts, Class A Concret	0 days	2SS
8	Erect Temporary Bridge	8 days	1
9	Remove Existing Structures	3 days	3,8
10	Cofferdams	15 days	9
11	Structure Excavation	0 days	9,10
12	Piling	0 days	10,11SS
13	Sub-Structure, Class A Concre	0 days	12SS
14	Concrete Beams	0 days	13
15	Steel Beams	0 days	13
16	Super-Structure, Class AA Co	0 days	14,15SS
17	Remove Temporary Bridge	4 days	16
18	Major Retaining Walls	0 days	4,5
19	Sub-grade Stabilization	0 days	4,5,6SS,7SS
20	Stone Base	0 days	19
21	Drainage Blanket	0 days	19
22	Asphalt Base, Leveling, & Wec	0 days	20,21
23	Curb & Gutter	0 days	22SS,20
24	Entrance Pavement	0 days	22SS,20

11. KY-CTDS IMPLEMENTATION

On February 9, 2000, the research team hosted a conference on KY-CTDS at Y. T. Young Library on the University of Kentucky Lexington Campus. The purpose of the conference was to implement KY-CTDS as the tool of preference to be used for the determination of contract time for district bid lettings. A design and a construction engineer from each district were invited to attend, and all but one engineer with a family emergency attended. There also were several design engineers for the home office in attendance. A ListServ of attendees is included in Appendix II B.

The program introduced the participants KY-CTDS with a brief overview of the research team effects in developing the new system. After a brief break and relocation to the computer lab in the lower level of the library, the participants received hands-on instructions for installing and using the KY-CTDS project templates on their computers. With the hands-on participants familiarity with loading and operating the software templates in Microsoft Excel and Project, instructions were given to the participants on how to modify the templates as needed to match the requirements of their districts. It was stressed that the production rates could be easily overridden without the necessity of a permanent rate change in the template. If logic change were needed, much care would be needed to ensure a correct solution.

To support the implementation of KY-CTDS, each participant was given a 3½", 1.44Mb diskette with the six Excel Project templates and the MS Project Template. They were also given a copy of the Operating Manual included in Appendix I. Additionally, the participants were directed to use the KY-CTDS web site that contains all the information of the Operating Manual and any template updates, and information of interest to users of KY-CTDS. The support also included Email and Telephone support by the research team through the December 2000.

12. SUMMARY

The KY-CTDS is the new method to be used for determination of contract for highway construction projects for the Commonwealth of Kentucky. It utilizes standard office software package, MS Excel and MS Project 98 to add structure to the process, perform calculations, and produce tabular and graphical documentation for the planning process. The system is simple, robust and user-friendly. Because using the project templates is easy and transparent for the user, it is powerful working tool in the planning process.

The heart of the system is the six predetermined project models that were used to create project templates in MS Excel with default daily production rates. The user may easily override the default production rate project template calculation by inputting a user defined daily production rate. The project template will then automatically recalculate the activity duration. If the user is still dissatisfied with the resultant automatic calculated activity duration by a daily production rate, the user

may override and input a desired activity duration to be used. A Comment column provided to document any user decisions made.

When the user is satisfied with the activity durations, the input worksheet file is saved with a unique file name to identify it with the project. The worksheet file can then become a part of the electronic and hard copy documentation for the project.

The activity names, the resultant activity durations and the activity relationship logic of MS Excel project worksheet are then transferred via the clipboard to MS Project Template. Inserting the clipboard contents into the MS Project template yields the user a graphical presentation of the project and a calculation of the total working days of the project. With the setting of the project start date by the user, the date arithmetic is automatically performed using DOH calendar. The MS Project worksheet file is saved with the same unique file name used with MS Excel to identify it with the project and it becomes part of the electronic and hard copy documentation for the project on how the contract time was determined.

KY-CTDS is hands-on, user-friendly planning tool to be used by highway engineers of all experience levels for all new highway construction applications.

13. CONCLUSIONS AND RECOMMENDATIONS

The new KY-CTDS system is a benefit the Kentucky Transportation Cabinet. The work of the sub-group engineers made a valuable contribution to the research and should be modeled on future research projects. Their participation brought valuable and realistic field experience to the development process that shortened the research effort. Their input in developing project classification templates, project controlling activities, the relationship logic, and productivity rates was a tremendous value in developing KY-CTDS. Their suggestion on using a phasing allowance made the Project templates much simpler to understand, use, and maintain. The new KY-CTDS allows for better conceptual estimating of project duration by using realistic project controlling activities. It is more flexible to use than its predecessor. Hard copy and electronic file copy documentation is an additional benefit.

The use of existing Microsoft software packages available to KyTC eliminated the need for purchase of new software that would further require additional funding and training. KY-CTDS can be used on any KyTC personal computer throughout the Commonwealth of Kentucky equipped with MS Excel and MS Project. The two software packages effectively communicate with each other.

KY-CTDS must be limited to conceptual estimating only. Output can be shared electronically, and should be kept as documentation for possible future use. Additional future research is needed to more accurately define the range in productivity rates for the district offices throughout the Commonwealth. This may be accomplished with KyTC personnel with modest support from the researchers. These

production rate values can be grouped as regional default values to better suit each region. In addition, productivity rates for the similar project classification templates could be refined to better reflect differences in projects. Constructive input from contractors and other KyTC engineers would also be helpful for future enhancement of the KY-CTDS system.

14. REFERENCES

1. Herbsman, Zohar J. and Ralph Ellis, "Determination of Contract Time for Highway Construction Projects," NCHRP Synthesis Report 215, Transportation Research Board, Washington, D.C., 1995: pgs. 31-34.

2. Bertram, Timothy D., "Guidelines for Setting Contract Time," Indiana Department of Transportation, Operations Support Division, Indianapolis, Indiana, Memorandum 97-27, 10 Dec. 1997.

3. Hancher, Donn E., William F. McFarland, and Rifat T. Alabay, "Construction Contract Time Determination," Texas Transportation Institute, Texas A&M University System Research Report 1262-1F, Nov. 1992.

4. McCrary, Steven W., Melvin R. Corley, David A. Leslie, and Sripathae Aparajithan, "Evaluation of Contract Time estimation and Contracting Procedures for Louisiana Department of Transportation and Development Construction Projects," Louisiana Transportation Research Center Report 296, 11 Sep. 1995.

KY-CTDS

Contract Time Determination System
Wednesday
February 9, 2000
Gallery Room & 118A Computer Lab
Y. T. Young Library
University of Kentucky
Lexington, KY

Time	Topic	Location
8:00 -8:30 am	Refreshments, Gathering and Sign-In	Gallery Room
8:30 -9:30 am	Overview and Deliverable Results	Gallery Room
9:30 –9:45 am	Break	
9:45 –11:00 am	Program Hands On	Room 108A
11:00 am	General training Complete	
11:00 –11:30 am	Key District Person Training	Room 108A
11:30 am	Key Person Training Compete	
	All Depart	

KY-CTDS
(Contract Time Determination System)

OPERATING MANUAL

FOR THE USER

Developed for the
Kentucky Transportation Cabinet

By
Raymond F. Werkmeister, Jr., P.E.
Rebecca L. Luscher, EIT
Donn E. Hancher, Ph.D., P.E.

And the
Construction Engineering Section
Kentucky Transportation Center
University of Kentucky

January 27, 2000

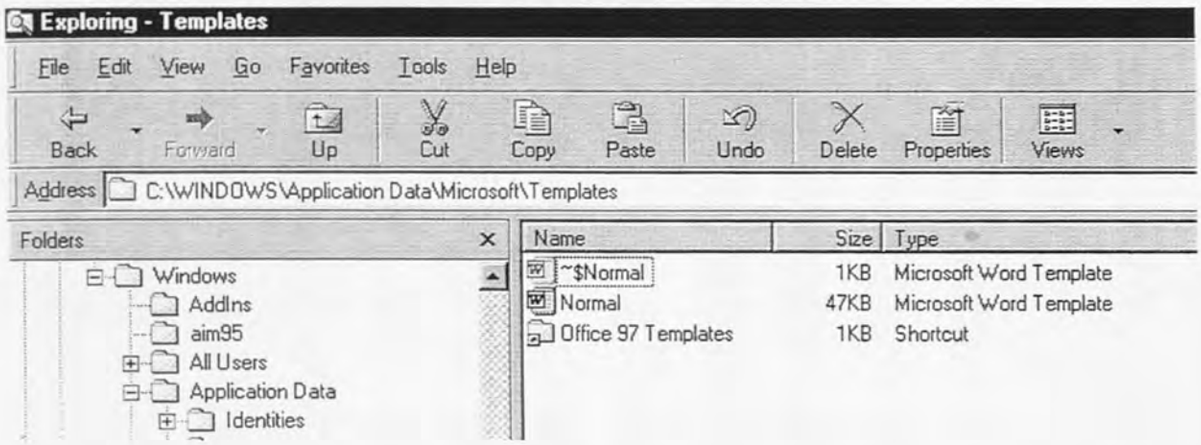
SECTION 1: Installing KY-CTDS Templates

This Section covers the initial installation of KY-CTDS Templates. If you are using the KY-CTDS Templates from the installation disk, or have already installed the KY-CTDS Templates on your computer's hard disk drive, proceed to the next section.

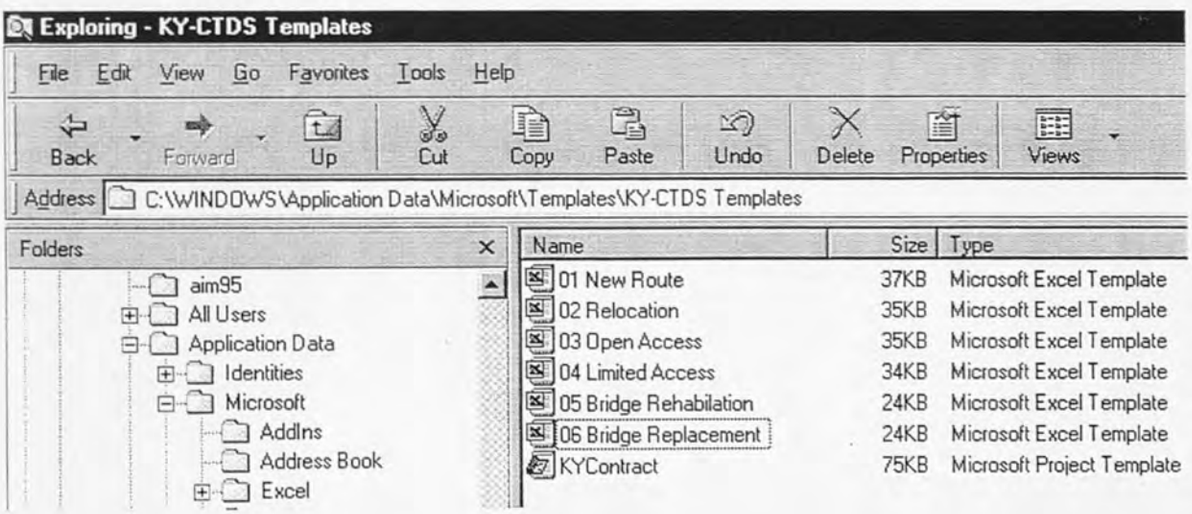
The procedure for installing the KY-CTDS Templates to your hard disk drive is very similar for Excel^{97} and for Excel^{2000}, the only difference is where the Excel Templates are to be saved. Excel^{97} Templates are normally saved in your Program Files/Microsoft Office/Software Solutions/Templates directory. Excel^{2000} Templates are normally saved in your Windows/Application Data/Microsoft/Templates directory. To install KY-CTDS Templates on your hard disk drive, copy the KY-CTDS Template Folder from the 3½" KY-CTDS Installation Disk to the appropriate location on your hard disk depending on whether you have Excel^{97} or Excel^{2000}.

Installation Procedure: (Excel^{2000})

1. Find where Excel Templates are stored on your computer's hard drive.

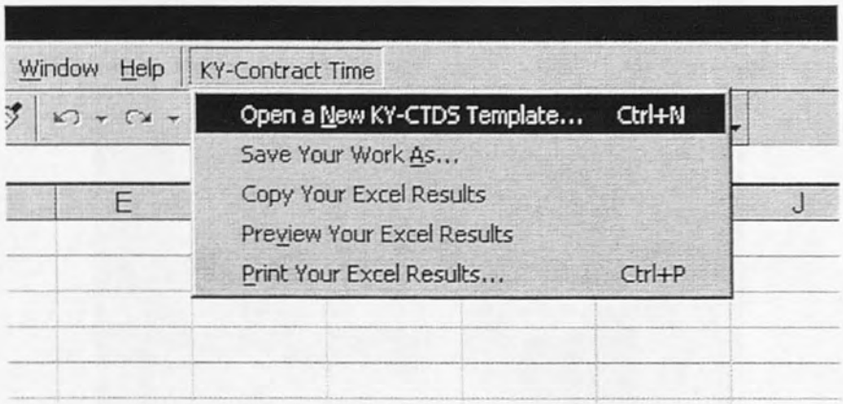


2. Copy the KY-CTDS Templates File Folder from the 3½" KY-CTDS Installation Disk to your hard disk drive to this location. This File Folder includes (6) Excel Templates and (1) MS Project Template to be use with KY-CTDS.



3. (Optional) Your Excel Menu may be modified to provide a KY-CTDS Menu Item, which may prove useful for the frequent use of KY-CTDS. Suggested items for the KY-CTDS Menu may include, but are not limited to:

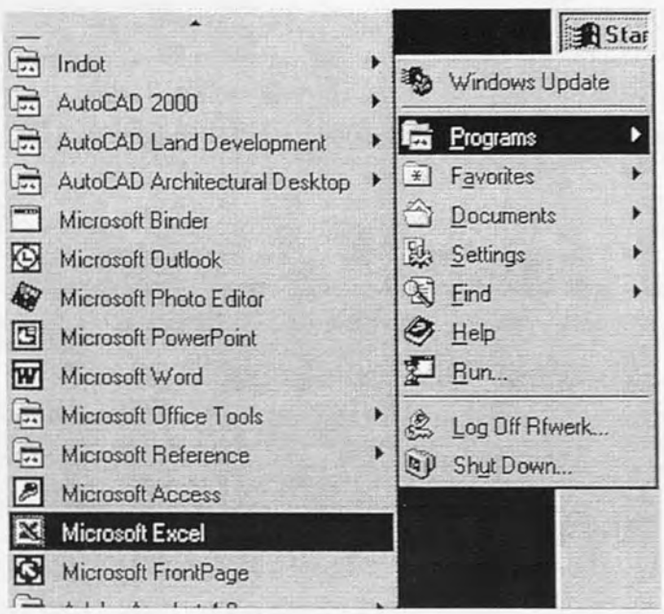
    1. Open a New KY-CTDS Template
    2. Save Your Excel Data As…
    3. Copy Your Excel Results (assign "Results" Macro)
    4. Print Preview Your Excel Results
    5. Print Your Excel Results



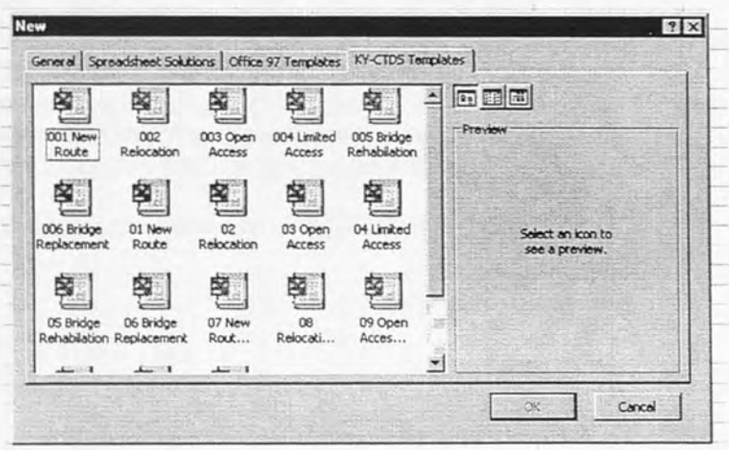
4. You are now ready to use KY-CTDS.

SECTION 2: Loading an Excel Project Template File

1. Open Excel 7.0, or higher version.
   Select ***Start, Programs, Microsoft Excel.***



2. Open the KY-CTDS Template File Folder.
   a. Select ***File*** on the Menu at top of screen. A drop down menu will appear.
   b. Select ***New***. A template screen will appear.
   c. Select the ***KY-CTS Templates*** File Folder. This was previously copied to your computer's hard drive with the instruction in Section 1.



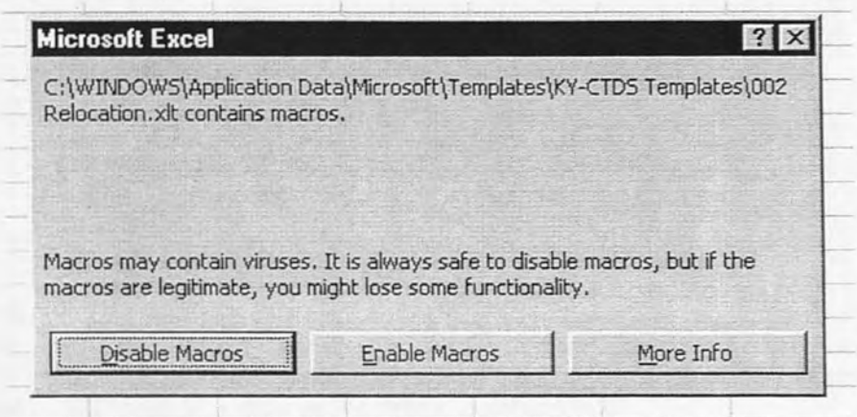
3. If you have selected an alternate location to the store KY-CTDS Templates, select this alternate location, ***File, Open...*** It may also be loaded from the KY-CTDS Installation Disk. **Care should be taken as to not corrupt the KY-CTDS Templates.**

4. Select the KY-CTDS Template file that matches your project. The KY-CTDS Template choices are:
    1. New Route (English or Metric)
    2. Relocation (English or Metric)
    3. Open Access (English or Metric)
    4. Limited Access (English or Metric)
    5. Bridge Rehabilitation (English or Metric)
    6. Bridge Replacement (English or Metric)

    a. The template may be selected by a left mouse click on the template icon, and the selection of ***OK***.

    b. Or the template may be selected directly by a double left mouse click on the template icon.

4. You may receive a "***Macro Alert***", depending on the Security Level Setting of your computer. This is not abnormal, and is the reaction to macros embedded in KY-CTDS Templates. Select ***Enable Macros*** to proceed.



5. Your selected template will now be loaded as the current Excel Worksheet with the given filename of the Template Name with the addition of "1", for example, "***New Route1***." The addition of "1" is to prevent the unintentional corruption of the original KY-CTDS Template. You may use "***Save As...*** " at any time to save the Excel Worksheet File with your unique project file name. The next time you select New Route Template, it will be the original template.

6. You are now ready to input data the into KY-CTDS Excel Worksheet.

SECTION 3: KY-CTDS Template Details

1. The KY-CTDS Template worksheet (equipped with the optional KY-Contract Time Menu Item) is similar to the one shown here depending upon the Display Properties Setting on your computer:

Microsoft Excel - 002 Relocation1

File Edit View Insert Format Tools Data Window Help KY-Contract Time

RELOCATION			Input Design Quantity	Default Production Rate, Unit/Day	Default Activity Duration, Days	Production Rate Override, Unit/Day	Activity Duration Override, Days	Calculated Activity Duration, Days
Item No	Activity	Unit						
1	Initial Traffic Control	Days		1	2			2
2	Clearing & Grubbing	Acres		3	0	3		0
3	Diversion (By-Pass Detour)	Days		1	6			6
4	Roadway Excavation	CY		5,000	0	5,000		0
5	Embankment in Place	CY		4,000	0	4,000		0
6	Drainage Pipe	LF		200	0	200		0
7	Box Culverts, Class A Concrete	CY		30	0	30		0
8	Cofferdams	Days		1	15			15
9	Structure Excavation	CY		300	0	300		0
10	Piling	LF		300	0	300		0
11	Sub-Structure, Class A Concrete	CY		40	0	40		0
12	Concrete Beams	LF		600	0	600		0
13	Steel Beams	Lb.		20,000	0	20,000		0
14	Super-Structure, Class AA Concrete	CY		20	0	20		0
15	Major Retaining Walls	SF		1,000	0	1,000		0
16	Sub-grade Stabilization	SY		8,000	0	8,000		0
17	Stone Base	Ton		1,500	0	1,500		0
18	Drainage Blanket	Ton		1,200	0	1,200		0
19	Asphalt Base, Leveling, & Wedging	Ton		1,200	0	1,200		0
20	Curb & Gutter	LF		500	0	500		0
21	Entrance Pavement	SY		100	0	100		0
22	Barrier Walls, Slip Form	LF		500	0	500		0

Template / Default Values / Logic /

2. Each KY-CTDS Template worksheet consists of (3) levels or Tabs, "***Template***", "***Default Values***", and "***Logic***". Worksheet cells are protected for User Input where required. "***Default Values***" and "***Logic***" Worksheets are totally protected, change is allowed only by the KY-CTDS designated administrator. Cell range protection on "***Template***" is defined below.

3. The columns headers and cell protection of the ***Template*** Worksheet are:

	Column Header	Protection Provided
1	Item No	Cell Range Column is Protected
2	Activity	Cell Range Column is Protected
3	Unit	Cell Range Column is Protected
4	Input Design Quantity	User input of designer supplied information
5	Default Production Rate, Unit/Day	Cell Range Column is Protected.
6	Default Activity Duration, Day ~	Cell Range Column is Protected
7	Production Rate Override, Unit/Day	User may input an override of default value.
8	Activity Duration Override, Days	User may input an override of the Calculated Activity Duration
9	Calculated Activity Duration, Days	Cell Range Column is Protected
10	Comment	User may document selections with comment

4. The ***Template*** Worksheet is the summary of your KY-CTDS Excel work. It documents all User Input Quantities, User Overrides, User Comments, and the resultant Calculated Activity Duration. It also documents all default values used or overridden.

5. The ***Default Values*** Worksheet contains the Default Production Rates, the Default Activity Duration, and Low, Average and High Production Rates per Activity suggested by KY-CTDS. Note, these values are suggested and may be overridden by the user.

Microsoft Excel - 002 Relocation1

File Edit View Insert Format Tools Data Window Help | KY-Contract Time

Item No	ACTIVITY	Current Rate	Current Duration	UNITS	Lower Limit	Average	Upper Limit
1	Initial Traffic Control	1	2	Days	1	2	4
2	Clearing & Grubbing	3		Acres	1	3	6
3	Diversion (By-pass Detour)	1	6	Days	3	6	12
4	Roadway Excavation	5,000		CY	1,000	5,000	10,000
5	Embankment in Place	4,000		CY	800	4,000	8,000
6	Drainage Pipe	200		LF	100	200	300

6. The ***Default Values*** Worksheet is protected from user input. Modifications for unique District situations and updated information is allowed by the designated KY-CTDS administer.

7. The ***Logic*** Worksheet contains the calculated/override activity durations, and the Diagram Logic of the selected project type. Modifications for unique District situations and updated information is allowed by the designated KY-CTDS administer.

Microsoft Excel - 002 Relocation1

File Edit View Insert Format Tools Data Window Help | KY-Contract Time

Item No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	0	1
3	Diversion (By-Pass Detour)	6	1
4	Roadway Excavation	0	3SS+2,2SS+0
5	Embankment in Place	0	3SS+2,2SS+0
6	Drainage Pipe	0	4SS+0,5SS+0
7	Box Culverts, Class A Concrete	0	2SS+0

8. The ***Logic*** Worksheet contains the information to be copied into the Clipboard and transferred into MS Project. Selecting ***Copy Your Excel Results*** of the KY-Contract Time Menu Item may do this.

Microsoft Excel - 002 Relocation1

File Edit View Insert Format Tools Data Window Help | KY-Contract Time

Item No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	0	
3	Diversion (By-Pass Detour)	6	
4	Roadway Excavation	0	3SS+2,2SS+0

KY-Contract Time menu:
- Open a New KY-CTDS Template... Ctrl+N
- Save Your Work As...
- Copy Your Excel Results
- Preview Your Excel Results
- Print Your Excel Results... Ctrl+P

9. Or, this may be done by selecting and copying the appropriate range to the Clipboard. The data needed for transfer is the Columns "***Activity***", "***Calc. Duration***" and "***Precedence,***

Microsoft Excel - 002 Relocation1

File Edit View Insert Format Tools Data Window Help | KY-Contract Time

Item No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	0	1
3	Diversion (By-Pass Detour)	6	1
4	Roadway Excavation	0	3SS+2,2SS+0
5	Embankment in Place	0	3SS+2,2SS+0
6	Drainage Pipe	0	4SS+0,5SS+0
7	Box Culverts, Class A Concrete	0	2SS+0
8	Cofferdams	15	1
9	Structure Excavation	0	3,8
10	Piling	0	8,9
11	Sub-Structure, Class A Concrete	0	10
12	Concrete Beams	0	11SS+0
13	Steel Beams	0	11SS+0
14	Super-Structure, Class AA Concrete	0	12,13SS+0
15	Major Retaining Walls	0	4,5
16	Sub-grade Stabilization	0	4,5,6SS+0,7SS+0
17	Stone Base	0	16
18	Drainage Blanket	0	16
19	Asphalt Base, Leveling, & Wedging	0	17,18
20	Curb & Gutter	0	19SS+0,17
21	Entrance Pavement	0	19SS+0,17
22	Barrier Walls, Slip Form	0	19SS+0,23
23	Concrete Paving	0	17,18,20SS+0,21SS+0
24	Asphalt Surface	0	19SS+0,20SS+0,21SS+0,22

Template / Default Values / Logic

Note, the copied range does not include Item No. Column, nor Column Headers.

SECTION 4: The KY-CTDS Templates

There are six Excel templates:

a. ***New Route*** is a new road being built from point "A" to "B".

b. ***Relocation*** is a section of road is being rebuilt on new alignment and grade.

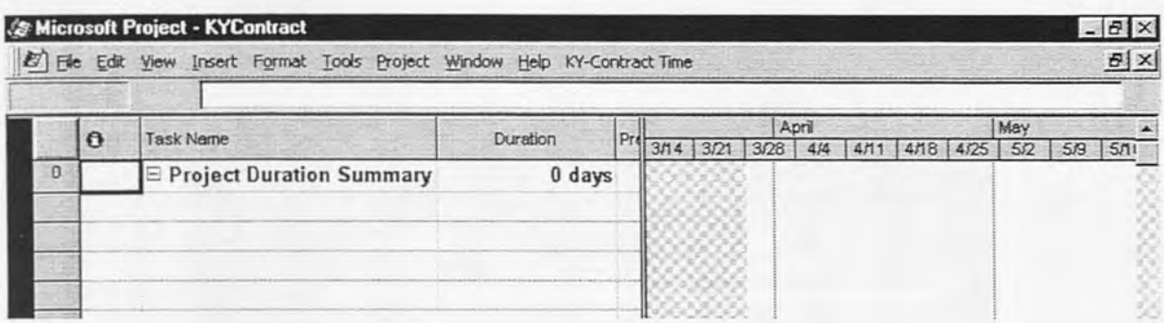
c. ***Reconstruction Limited Access*** is a project that utilizes the existing alignment but may revise the profile grade with an overlay.

d. ***Reconstruction Open Access*** is a project road being rebuilt that has Access by Permit or Partially Controlled while utilizing the existing right-of-way.

e. ***Bridge Rehabilitation*** is a lane on a bridge that would be closed for reconstructing or widening the deck width.

f. ***Bridge Replacement*** is a new bridge, or replacement of an old bridge.

There is also a MS Project Template. ***KY-Contract*** incorporates the KY-DOH Calendar and working days per month. It contains a macro that will compute the Project Duration Summary, as shown at the top of the chart.



Brief review of the steps covered so far.

1) ***Select*** the KY-CTDS Template that best fits your project.

2) ***Save*** the Excel Worksheet file with the appropriate project ***File Name*** that you select.

3) ***Input*** the Design Quantities supplied by the design data sheet. Take a look at the resultant Calculated Activity Durations. If dissatisfied with any of the automatic Calculated Activity Durations, adjust them by using either of the Overrides.

- Use the ***Production Rate Override*** to change the Production Rate to what you feel is more appropriate.
- Or, use the ***Activity Duration Override*** to change the Activity Duration to what is more appropriate.

4) Add ***Comments*** to document selections.

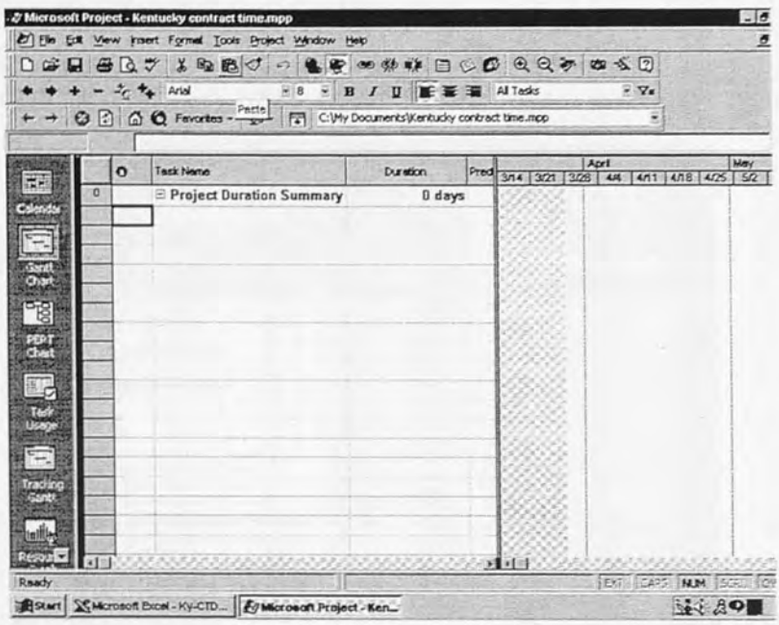
5) On the Logic Worksheet, ***Select*** and ***Copy*** the "***Activity***", "***Calc. Duration***", and "***Predecessors***" Data Ranges without headers into the Clipboard.

6) ***Resave*** your Excel Worksheet File at this time.

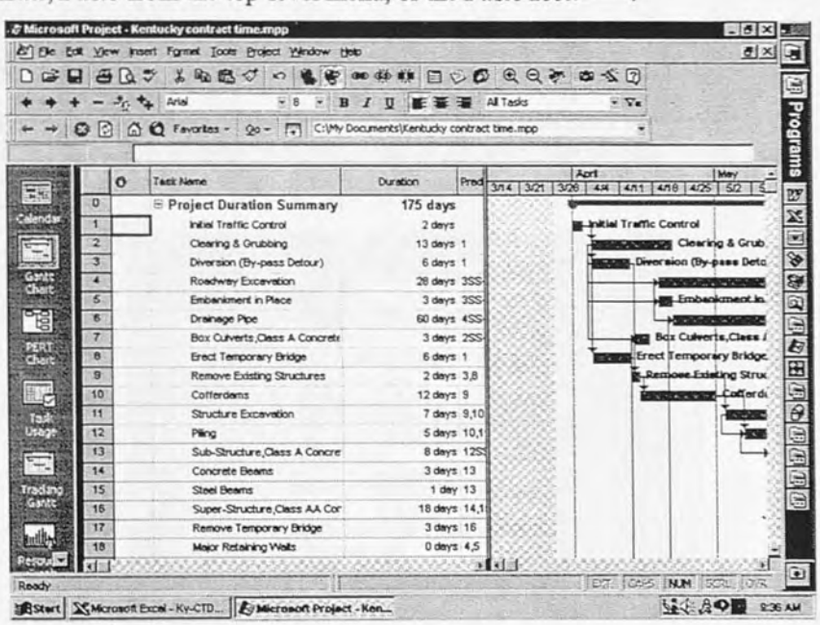
I. Now you are ready for MS Project

SECTION 5: MS Project

1. ***Open*** MS Project by selecting the ***KY-Contract*** template file. MS Project will open loaded with the appropriate KY-DOH Calendar.



2. Select ***Edit***, ***Paste*** from the top-level menu, or the ***Paste Icon***  .

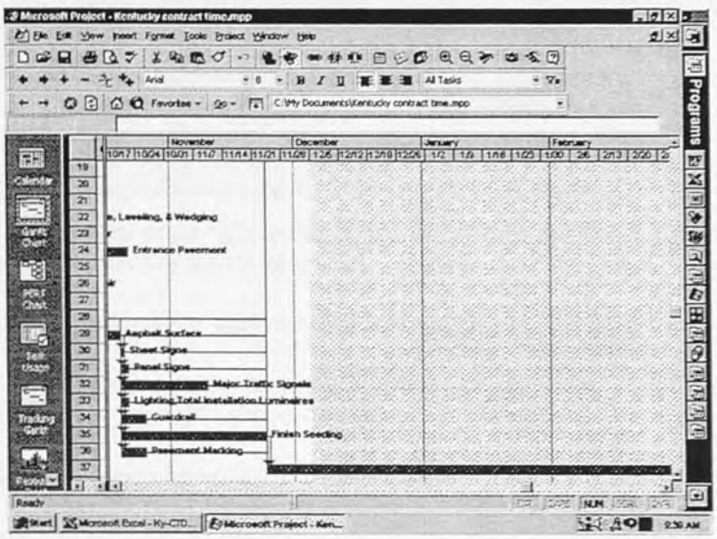


3. ***Save*** the MS Project File with the appropriate project ***File Name*** you select. Each KY-CTDS project will have two files, an Excel .xls file and a MS Project .mpp file. The filename may be the same. The file extensions will however be different.

Some MS Project Features:

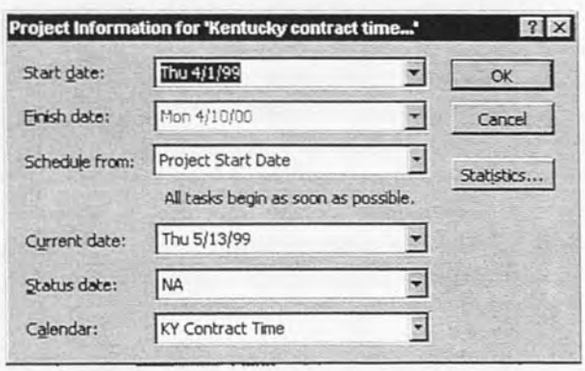
Project Summary Duration at the top of the chart shows the total workdays for the project. The KY-DOH calendar is used to consider workdays. The calendar also takes into consideration holidays and workdays limitation from the first of April through the end of November.

Non-working time is shown with a shaded background on the chart. For the period from the first of December to the end of March, the chart will have a shaded background to show non-working days.



Changing Project Start Date:

1. MS Project selects ***Time Now*** as a default ***Start Date*** when you enter the program. To change the ***Start Date*** of the project, select ***Project*** from the menu at the top of the screen. Select ***Project Information*** from the scroll down menu. A menu box will appear.



2. Select the down arrow to the right of the "***Start date***". A calendar will appear for you to choose the date when you desire the project to start.

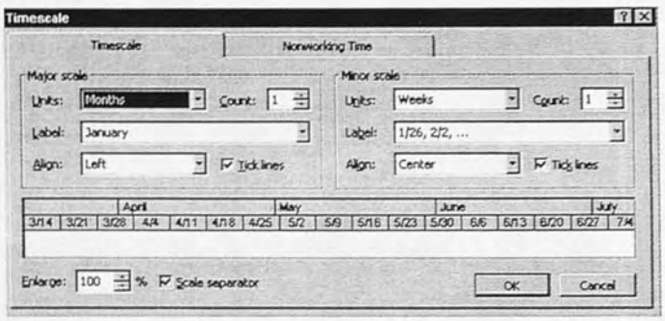
3. Scroll through the calendar by using the right and left navigation arrows displayed. Find the project start date and select it with the right mouse button. The "***Start date***" will be changed to this new start date.

4. Select ***OK*** to save the changes.

Changing the Timescale:

1. The default timescale has major scale units in months and minor scale units in weeks.

2. Select ***Format*** from the main menu and ***Timescale*** from the scroll down menu. A ***Timescale*** menu box screen will appear.



3. By selecting the down arrow at the right of ***Units***, you can change the ***Units of Major scale*** *or* ***Minor scale***. MS Project will not allow the major scale to be smaller than the minor scale.

4. By selecting the down arrow at the right of ***Label***, you can change scale labels on the chart.

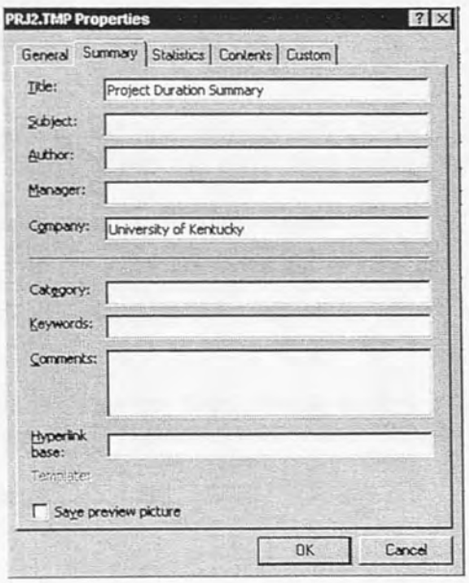
5. The ***Enlarge (%)*** will change how the timescale is spread out. As example, you may change wish to fit more months on a page when printing out the chart.

6. When complete with all timescale changes, select ***OK*** to save.

To Change the Title of the Project:

1. Select ***File*** from the top menu.

2. Select ***Properties*** from the scroll down menu. The menu box screen will appear.



3. Select the ***Summary*** tab.

4. You may change ***Project name*** in the ***Title*** box. This will change the ***Project name*** for printed schedule sheets and summary reports.

5. You may change ***Company name.***

6. Also you may input your name in the ***Author position.*** This will document who entered the information for this project.

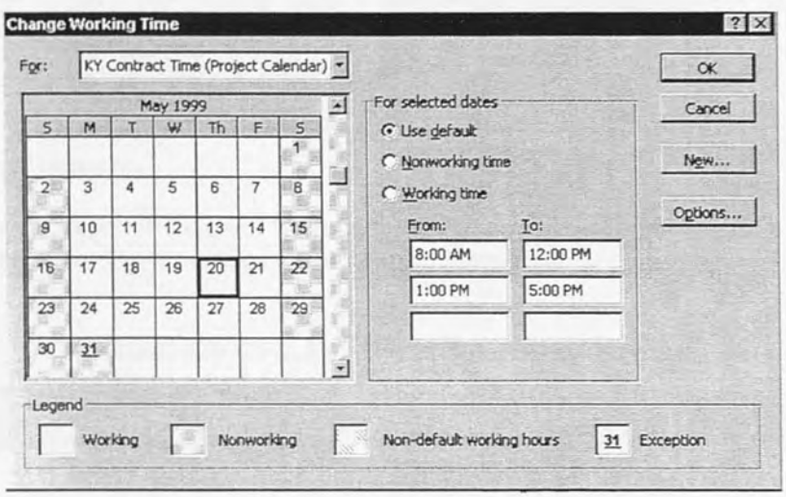
7. When complete with all changes, select ***OK*** to save.

To Add or Change a Holiday

1. Select ***Tools*** from the main menu at the top of the screen.

2. Select ***Change Working Time...*** from the scroll down menu.

3. A ***Change Working Time...*** menu box with a calendar will appear.



Note: Shaded boxes are designated as Nonworking Days.
The underlined calendar day, 31 has also been designated as a Nonworking Day.

4. To add a holiday: Select the month and year using the vertical scroll bar at the right of the calendar. Select the day of the month for the holiday and select ***Nonworking time*** menu item at the right.

5. To change work hours: Type in ***From:*** & ***To:*** times desired.

6. To change a nonworking time to working time: Select the day, or if consecutive, all the days to be changed in the calendar. Select the ***Working Time*** menu item. The day/days have been changed to ***Working Time.***

7. To change working day to nonworking day: Select the day or days to be changed in the calendar. Select ***Nonworking time*** menu item. The day/days have been changed to ***Nonworking time.***

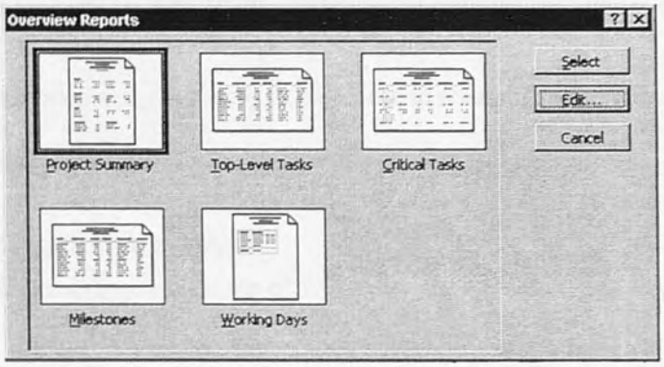
8. When complete with all changes, select ***OK*** to save.

To Show a Summary Report of the Starting Date, Finish Date, and Project Duration:

1. Select *View* from the main menu at the top of the screen.

2. Select ***Reports*** from the scroll down menu.

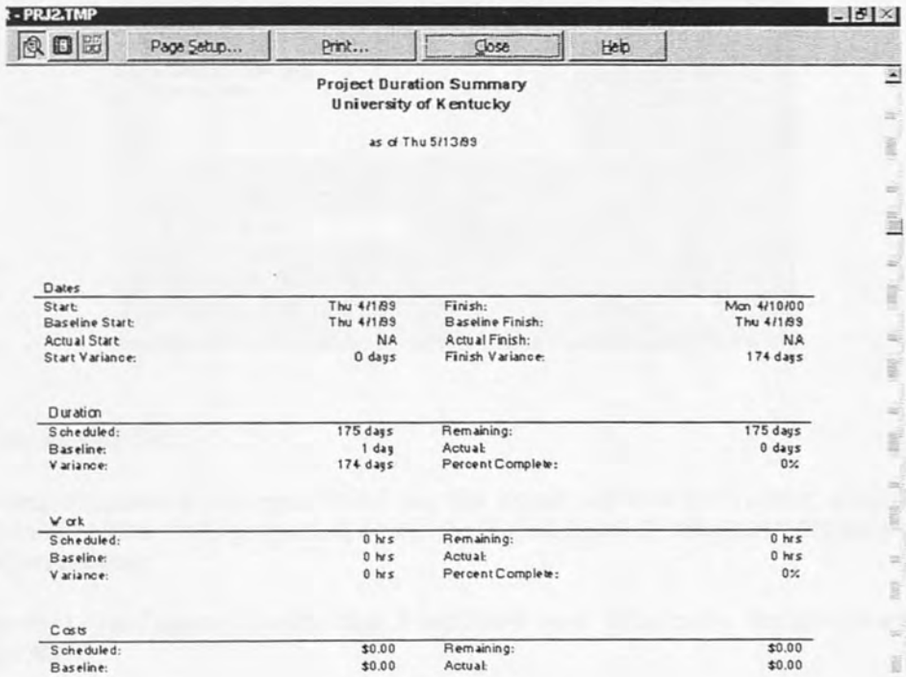
3. Select ***Overview*** (the menu box edges selection will be highlighted). Then ***Select***. A menu box screen will appear like the one below.



4. Select ***Project Summary***.

5. A Preview of the Report will appear. Click once anywhere on the page for the picture to zoom in to readable screen size. The top portion of the report is shown here.

Example of a Project Summary Report



6. The top of the page will list the ***Title of the Project*** , the ***Company name*** , and the ***date of the report.*** (Changing title and company name was described above)

7. The ***Dates section*** shows the Start and the Finish Date for the project based on the calendar's working and non-working days.

8. The ***Duration section*** depicts the total duration, referred to as the ***Scheduled Duration***. The ***Remaining duration*** is the same as the ***Scheduled Duration*** until the project is updated. The ***Remaining duration*** would differ if work progress data were entered.

9. MS Project is being used to calculate project durations. Other information for this sheet has not been entered and is not necessary for KY-CTDS. MS Project has unused capabilities of incorporating costs, resources, and work progress for a project.

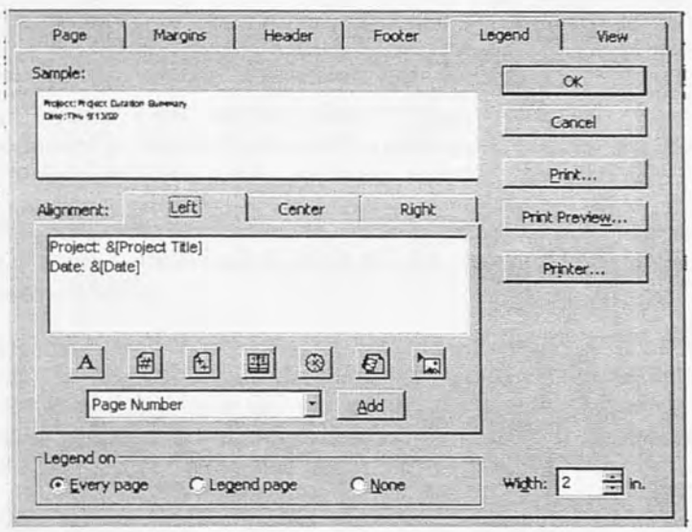
10. Select ***Print*** from the main menu at the top of the screen to print out of the summary report.

11. Select ***Close*** to return to the schedule.

To add a Legend to the Project before Printing:

1. Select ***View*** from the main menu at the top of the screen. Select ***Header and Footer*** from the scroll down menu.

2. The ***Header and Footer*** menu box will appear on the screen like the one below.



3. Select the ***Legend*** Tab.

4. The default alignment for the legend is left tab. The legend may have a left, center, or right alignment. By **"&(Project Title)"** MS project will type in the **Project Title**. By **"&(Date)"** MS project will type in the **Current Date**.

5. To have the Legend appear on every Page, Select ***Every page***. Other menu item options are: ***Legend page***, or ***None***.

6. Select ***Preview*** to view the schedule report on the screen.

7. When complete with all changes, select ***OK*** to save.

To Print a Bar Chart Schedule:

Note: A plotter will be needed to print out the bar chart schedule on one continuous sheet. There is too much information to scale down and remain readable on an 8" X 11" sheet of paper.

1. Select ***File*** from the main menu at the top of the screen.

2. Select ***Print Preview*** from the scroll down menu to see the bar chart print out on the screen.

3. Select ***Page setup*** from the scroll down menu to select the amount of material to be on one page and the orientation of the print (Portrait, the default, or Landscape).

4. Getting a satisfactory print result is a trial and error process. It depends on the amount of information to be printed. Compressing the ***Timescale*** can help to get a satisfactory result. This will go better with experience.

5. The user may elect to limit print out to the first page, which will show and document the ***total project duration***. The remainder of the bar chart only serves as a graphical presentation on how the project time is allocated. The Excel Worksheet already documents calculated activity durations and precedence logic.

6. To ***Print***, close ***Print Preview***, select ***File***, and select ***Print*** from the scroll down menu.

Appendix A: Description of KY-CTDS Templates

1. New Route: This is a project being built from point "A" to point "B". There would not be an existing route therefore no current traffic; but there would be some traffic involvement at termini and at crossroads. This project could be a bypass, connector, or industrial access road.

2. Relocation: This is a project that a section of road is being rebuilt on new alignment and grade. The existing road could be crossed at several locations thus having a significant amount of phase construction to maintain traffic.

3. Reconstruction Limited Access: This is a project that utilizes the existing alignment but may revise the profile grade for an overlay. This includes Interstate type facilities where the design may add a lane and barrier wall in the median, provide full safety, and rehabilitate the pavements. This work could include reworking ramp terminals to meet current criteria, a reconstruction of grade separations. Pavement rehabilitation could be either asphalt or concrete, overlay or inlay.

4. Reconstruction Open Access: This is a project where a road is being rebuilt that has Access by Permit or Partially Controlled while utilizing the existing right-of-way. This could be widening the road, converting a rural section to an urban section, or adding turn lanes. This would not be making a significant change to the horizontal or vertical alignment. Usually, this would be utilizing the existing pavement, widening it, and providing an asphalt overlay or constructing an inlay.

5. Bridge Rehabilitation: This is a project that a lane on a bridge would be closed for reconstruction or widening the deck part width. This would involve phase construction and the ability to work on only part of the bridge at a time.

6. Bridge Replacement: This project's main focus would be to build a new bridge. Either a diversion would have to be constructed prior to building the new bridge in the existing bridge location or the new bridge would be built on a new alignment. Either way there would be some roadway construction that would not occur concurrently with the bridge construction.

Appendix B: Description of Template Work Items

	Activity	Description
1	Initial Traffic Control	Setup time for traffic control system prior to start of construction.
2	Clearing & Grubbing	Site clearance of all obstacles prior to start of construction.
3	Diversion (By-pass Detour)	All activities required providing a diversion for traffic from the construction site.
4	Roadway Excavation	Includes the excavation and movement of all earth and rock on the construction site.
5	Embankment in Place	Includes the placement and compaction of all earth and rock fill on the project.
6	Drainage Pipe	Excavation, installation and backfill for drainage pipe on the project.
7	Box Culverts, Class A Concrete	Includes all activities involved in the construction of box culverts on the project.
8	Erect Temporary Bridge	All activities required to erect a temporary bridge for a project.
9	Remove Existing Structures	All activities required to remove any existing structures due to bridge construction from a project.
10	Cofferdams	All activities required to construct cofferdams on a project.
11	Structure Excavation	All excavation, rock and earth, required for bridge construction on a project.
12	Piling	All activities required for piling for a bridge on a project.
13	Sub-Structure, Class A Concrete	Forming, pouring, and curing foundations and piers for a bridge on a project.
14	Concrete Beams	All activities required to install concrete beams for a bridge on a project.
15	Steel Beams	All activities required to install steel beams for a bridge on a project.
16	Super-Structure, Class AA Concrete	Forming, pouring, and curing bridge deck and side-walls on a project.
17	Remove Temporary Bridge	All activities required to remove a temporary bridge from the project site.
18	Major Retaining Walls	All activities required to construct retaining walls for a project.
19	Sub-Grade Stabilization	All activities required to stabilize the sub-grade.
20	Stone Base	Placement and compaction of stone on a project.
21	Drainage Blanket	All activities required to install a drainage blanket on a project.
22	Asphalt Base, Leveling, & Wedging	All activities required to lay the asphalt base then level and wedge for a new or existing road on a project.

23	Curb & Gutter	All activities required to construct curbs and gutters on a project.
24	Entrance Pavement	Includes demolition, patching plus construction of new pavement for entrances to adjoining properties.
25	Barrier Walls, Slip Form	All activities required to construct barrier walls on a project. This includes forming, pouring, and curing.
26	Asphalt Repair	All activities required to patch asphalt surface on a roadway prior to paving for a project.
27	Concrete Repair	All activities required to patch concrete pavement on a roadway prior to paving for a project.
28	Concrete Paving	All activities required to concrete pave the new or existing road on a project.
29	Asphalt Surface:	All activities required to lay asphalt surface on a new or existing road for a project.
30	Sheet Signs:	All activities required to install sheet signs for a project.
31	Panel Signs:	All activities required to install panel signs for a project.
32	Major Traffic Signals	All activities required to install a traffic signal intersection on a project. This will include electrical work, poles, concrete bases, etc…
33	Lighting, Total Installation Luminaries	All activities required to install luminaries on a project.
34	Guardrail	All activities required to install guardrail on a project.
35	Finish Seeding	All activities required to place final 25% of seeding on a project.
36	Pavement Marking	All activities required to mark the new or existing pavement on a project.
37	Finish Approaches Work	Includes demolition, patching plus construction of approaches to adjoining properties.
38	Seeding & Landscaping	All activities required to seed and do landscaping on a project.
40	Final Clean-Up	All work required to complete all activities of the project.
41	Phasing Allowance	Number of days allocated to allow the project to be completed in phases.

Project Templates ~ Template, Default Values, and Logic Levels

Reconstruction Limited Access

LIMITED ACCESS			Input Design Quantity	Default Production Rate, Unit/Day	Default Activity Duration, Days	Production Rate Override, Unit/Day	Activity Duration Override, Days	Calculated Activity Duration, Days	Comments
Item No	Activity	Unit							
1	Initial Traffic Control	Days		1	2			2	
2	Clearing & Grubbing	Acres		3	0	3		0	
3	Diversion (By-Pass Detour)	Days		1	6			6	
4	Roadway Excavation	CY		5,000	0	5,000		0	
5	Embankment in Place	CY		4,000	0	4,000		0	
6	Drainage Pipe	LF		200	0	200		0	
7	Box Culverts, Class A Concrete	CY		30	0	30		0	
8	Erect Temporary Bridge	Days		1	8			8	
9	Remove Existing Structures	Days		1	3			3	
10	Cofferdams	Days		1	15			15	
11	Structure Excavation	CY		300	0	300		0	
12	Piling	LF		300	0	300		0	
13	Sub-Structure, Class A Concrete	CY		40	0	40		0	
14	Concrete Beams	LF		600	0	600		0	
15	Steel Beams	Lb.		20,000	0	20,000		0	
16	Super-Structure, Class AA Concrete	CY		20	0	20		0	
17	Remove Temporary Bridge	Days		1	4			4	
18	Major Retaining Walls	SF		1,000	0	1,000		0	
19	Sub-grade Stabilization	SY		8,000	0	8,000		0	
20	Stone Base	Ton		1,500	0	1,500		0	
21	Drainage Blanket	Ton		1,200	0	1,200		0	
22	Asphalt Base, Leveling, & Wedging	Ton		1,200	0	1,200		0	
23	Curb & Gutter	LF		500	0	500		0	
24	Entrance Pavement	SY		100	0	100		0	
25	Barrier Walls, Slip Form	LF		500	0	500		0	
26	Asphalt Repair	Ton		50	0	50		0	
27	Concrete Repair	SY		30	0	30		0	
28	Concrete Paving	SY		4,000	0	4,000		0	

29	Asphalt Surface	Ton		1,000	0	1,000		0	
30	Sheet Signs	Ea		30	0	30		0	
31	Panel Signs	Ea		1	0	1		0	
32	Major Traffic Signals	No of Intersection		15	15			15	
33	Lighting,Total Installation Luminaires	Ea		2	0	2		0	
34	Guardrail	LF		1,500	0	1,500		0	
35	Finish Seeding	SY		4,000	0	4,000		0	
36	Pavement Marking	LF		10,000	0	10,000		0	
37	Final Clean-Up	Days		1	10			10	
38	Phasing Allowance	No of Phase		1	3			3	

Item No	Activity	Current Rate	Current Duration	Unit	Lower Limit	Average	Upper Limit
1	Initial Traffic Control	1	2	Days	1	2	4
2	Clearing & Grubbing	3		Acres	1	3	6
3	Diversion (By-pass Detour)	1	6	Days	3	6	12
4	Roadway Excavation	5,000		CY	1,000	5,000	10,000
5	Embankment in Place	4,000		CY	800	4,000	8,000
6	Drainage Pipe	200		LF	100	200	300
7	Box Culverts,Class A Concrete	30		CY	10	30	50
8	Erect Temporary Bridge	1	8	Days	5	8	10
9	Remove Existing Structures	1	3	Days	1	3	5
10	Cofferdams	1	15	Days	5	15	30
11	Structure Excavation	300		CY	100	300	500
12	Piling	300		LF	200	300	600
13	Sub-Structure,Class A Concrete	40		CY	10	40	80
14	Concrete Beams	600		LF	200	600	800
15	Steel Beams	20,000		Lb	5,000	20,000	40,000
16	Super-Structure,Class AA Concrete	20		CY	10	20	40
17	Remove Temporary Bridge	1	4	Days	2	4	8
18	Major Retaining Walls	1,000		SF	500	1,000	1,500
19	Sub-grade Stabilization	8,000		SY	4,000	8,000	12,000
20	Stone Base	1,500		Tons	500	1,500	4,000
21	Drainage Blanket	1,200		Tons	500	1,200	2,000
22	Asphalt Base, Leveling, & Wedging	1,200		Tons	500	1,200	2,000
23	Curb & Gutter	500		LF	300	500	1,000
24	Entrance Pavement	100		SY	50	100	150
25	Barrier Walls, Slip Form	500		LF	300	500	800
26	Asphalt Repair	50		Tons	20	50	80
27	Concrete Repair	30		SY	10	30	50
28	Concrete Paving	4,000		SY	1,000	4,000	8,000
29	Asphalt Surface	1,000		Tons	400	1,000	1,500
30	Sheet Signs	30		Each	20	30	40
31	Panel Signs	1		Each	1	1	2
32	Major Traffic Signals	15	15	Days/ Intersection	10	15	20
33	Lighting,Total Installation Luminaires	2		Each	1	2	3
34	Guardrail	1,500		LF	1,000	1,500	2,000
35	Finish Seeding	4,000		SY	2,000	4,000	7,000
36	Pavement Marking	10,000		LF	5,000	10,000	20,000
37	Final Clean-Up	1	10	Days	5	10	15
38	Phasing Allowance	1	3	Days/ Phase	1	3	5

Iten No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	0	1
3	Diversion (By-Pass Detour)	6	1
4	Roadway Excavation	0	3SS+2,2SS+0
5	Embankment in Place	0	3SS+2,2SS+0
6	Drainage Pipe	0	4SS+0,5SS+0
7	Box Culverts, Class A Concrete	0	2SS+0
8	Erect Temporary Bridge	8	1
9	Remove Existing Structures	3	3,8
10	Cofferdams	15	9
11	Structure Excavation	0	9,10
12	Piling	0	10,11SS+0
13	Sub-Structure, Class A Concrete	0	12SS+0
14	Concrete Beams	0	13
15	Steel Beams	0	13
16	Super-Structure, Class AA Concrete	0	14,15SS+0
17	Remove Temporary Bridge	4	16
18	Major Retaining Walls	0	4,5
19	Sub-grade Stabilization	0	4,5,6SS+0,7SS+0
20	Stone Base	0	19
21	Drainage Blanket	0	19
22	Asphalt Base, Leveling, & Wedging	0	20,21
23	Curb & Gutter	0	22SS+0,20
24	Entrance Pavement	0	22SS+0,20
25	Barrier Walls, Slip Form	0	22SS+0
26	Asphalt Repair	0	22SS+0
27	Concrete Repair	0	20
28	Concrete Paving	0	20,21,23SS+0,24SS+0,27
29	Asphalt Surface	0	22FF+0,23SS+0,24SS+0,25,26,27
30	Sheet Signs	0	28,29
31	Panel Signs	0	28,29
32	Major Traffic Signals	15	28,29
33	Lighting,Total Installation Luminaires	0	28,29
34	Guardrail	0	28,29
35	Finish Seeding	0	28,29
36	Pavement Marking	0	28,29
37	Final Clean-Up	10	17,18,28,29,30,31,32,33,34,35,36
38	Phasing Allowance	3	37

Project Templates ~ Template, Default Values, and Logic Levels

Reconstruction Open Access

OPEN ACCESS			Input Design Quantity	Default Production Rate, Unit/Day	Default Activity Duration, Days	Production Rate Override, Unit/Day	Activity Duration Override, Days	Calculated Activity Duration, Days	Comments
Item No	Activity	Unit							
1	Initial Traffic Control	Days		1	2			2	
2	Clearing & Grubbing	Acres		3	0	3		0	
3	Diversion (By-Pass Detour)	Days		1	6			6	
4	Roadway Excavation	CY		5,000	0	5,000		0	
5	Embankment in Place	CY		4,000	0	4,000		0	
6	Drainage Pipe	LF		200	0	200		0	
7	Box Culverts, Class A Concrete	CY		30	0	30		0	
8	Erect Temporary Bridge	Days		1	8			8	
9	Remove Existing Structures	Days		1	3			3	
10	Cofferdams	Days		1	15			15	
11	Structure Excavation	CY		300	0	300		0	
12	Piling	LF		300	0	300		0	
13	Sub-Structure, Class A Concrete	CY		40	0	40		0	
14	Concrete Beams	LF		600	0	600		0	
15	Steel Beams	Lb.		20,000	0	20,000		0	
16	Super-Structure, Class AA Concrete	CY		20	0	20		0	
17	Remove Temporary Bridge	Days		1	4			4	
18	Major Retaining Walls	SF		1,000	0	1,000		0	
19	Sub-grade Stabilization	SY		8,000	0	8,000		0	
20	Stone Base	Ton		1,500	0	1,500		0	
21	Drainage Blanket	Ton		1,200	0	1,200		0	
22	Asphalt Base, Leveling, & Wedging	Ton		1,200	0	1,200		0	
23	Curb & Gutter	LF		500	0	500		0	
24	Entrance Pavement	SY		100	0	100		0	
25	Barrier Walls, Slip Form	LF		500	0	500		0	
26	Asphalt Repair	Ton		50	0	50		0	
27	Concrete Repair	SY		30	0	30		0	
28	Concrete Paving	SY		4,000	0	4,000		0	
29	Asphalt Surface	Ton		1,000	0	1,000		0	
30	Sheet Signs	Ea		30	0	30		0	

31	Panel Signs	Ea		1	0	1		0	
32	Major Traffic Signals	No of Intersection		15	15			15	
33	Lighting,Total Installation Luminaires	Ea		2	0	2		0	
34	Guardrail	LF		1,500	0	1,500		0	
35	Finish Seeding	SY		4,000	0	4,000		0	
36	Pavement Marking	LF		10,000	0	10,000		0	
37	Final Clean-Up	Days		1	10			10	
38	Phasing Allowance	No of Phase		1	3			3	

Item No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	0	1
3	Diversion (By-Pass Detour)	6	1
4	Roadway Excavation	0	3SS+2,2SS+0
5	Embankment in Place	0	3SS+2,2SS+0
6	Drainage Pipe	0	4SS+0,5SS+0
7	Box Culverts, Class A Concrete	0	2SS+0
8	Erect Temporary Bridge	8	1
9	Remove Existing Structures	3	3,8
10	Cofferdams	15	9
11	Structure Excavation	0	9,10
12	Piling	0	10,11SS+0
13	Sub-Structure, Class A Concrete	0	12SS+0
14	Concrete Beams	0	13
15	Steel Beams	0	13
16	Super-Structure, Class AA Concrete	0	14,15SS+0
17	Remove Temporary Bridge	4	16
18	Major Retaining Walls	0	4,5
19	Sub-grade Stabilization	0	4,5,6SS+0,7SS+0
20	Stone Base	0	19
21	Drainage Blanket	0	19
22	Asphalt Base, Leveling, & Wedging	0	20,21
23	Curb & Gutter	0	22SS+0,20
24	Entrance Pavement	0	22SS+0,20
25	Barrier Walls, Slip Form	0	22SS+0
26	Asphalt Repair	0	22SS+0
27	Concrete Repair	0	20
28	Concrete Paving	0	20,21,23SS+0,24SS+0,27
29	Asphalt Surface	0	22FF+0,23SS+0,24SS+0,25,26,27
30	Sheet Signs	0	28,29
31	Panel Signs	0	28,29
32	Major Traffic Signals	15	28,29
33	Lighting,Total Installation Luminaires	0	28,29
34	Guardrail	0	28,29
35	Finish Seeding	0	28,29
36	Pavement Marking	0	28,29
37	Final Clean-Up	10	17,18,28,29,30,31,32,33,34,35,36
38	Phasing Allowance	3	37

Project Templates ~ Template, Default Values, and Logic Levels

New Route

NEW ROUTE			Input Design Quantity	Default Production Rate, Unit/Day	Default Activity Duration, Days	Production Rate Override, Unit/Day	Activity Duration Override, Days	Calculated Activity Duration, Days	Comments
Item No	Activity	Unit							
1	Initial Traffic Control	Days		1	2			2	
2	Clearing & Grubbing	Acres		3	0	3		0	
3	Diversion (By-Pass Detour)	Days		1	6			6	
4	Roadway Excavation	CY		5,000	0	5,000		0	
5	Embankment in Place	CY		4,000	0	4,000		0	
6	Drainage Pipe	LF		200	0	200		0	
7	Box Culverts, Class A Concrete	CY		30	0	30		0	
8	Erect Temporary Bridge	Days		1	8			8	
9	Remove Existing Structures	Days		1	3			3	
10	Cofferdams	Days		1	15			15	
11	Structure Excavation	CY		300	0	300		0	
12	Piling	LF		300	0	300		0	
13	Sub-Structure, Class A Concrete	CY		40	0	40		0	
14	Concrete Beams	LF		600	0	600		0	
15	Steel Beams	Lb.		20,000	0	20,000		0	
16	Super-Structure, Class AA Concrete	CY		20	0	20		0	
17	Remove Temporary Bridge	Days		1	4			4	
18	Major Retaining Walls	SF		1,000	0	1,000		0	
19	Sub-grade Stabilization	SY		8,000	0	8,000		0	
20	Stone Base	Ton		1,500	0	1,500		0	
21	Drainage Blanket	Ton		1,200	0	1,200		0	
22	Asphalt Base, Leveling, & Wedging	Ton		1,200	0	1,200		0	
23	Curb & Gutter	LF		500	0	500		0	

24	Entrance Pavement	SY		100	0	100		0	
25	Barrier Walls, Slip Form	LF		500	0	500		0	
26	Asphalt Repair	Ton		50	0	50		0	
27	Concrete Repair	SY		30	0	30		0	
28	Concrete Paving	SY		4,000	0	4,000		0	
29	Asphalt Surface	Ton		1,000	0	1,000		0	
30	Sheet Signs	Ea		30	0	30		0	
31	Panel Signs	Ea		1	0	1		0	
32	Major Traffic Signals	No of Intersection		15	15			15	
33	Lighting,Total Installation Luminaires	Ea		2	0	2		0	
34	Guardrail	LF		1,500	0	1,500		0	
35	Finish Seeding	SY		4,000	0	4,000		0	
36	Pavement Marking	LF		10,000	0	10,000		0	
37	Final Clean-Up	Days		1	10			10	
38	Phasing Allowance	No of Phase		1	3			3	

Item No	Activity	Current Rate	Current Duration	UNITS	Lower Limit	Average	Upper Limit
1	Initial Traffic Control	1	2	Days	1	2	4
2	Clearing & Grubbing	3		Acres	1	3	6
3	Diversion (By-pass Detour)	1	6	Days	3	6	12
4	Roadway Excavation	5,000		CY	1,000	5,000	10,000
5	Embankment in Place	4,000		CY	800	4,000	8,000
6	Drainage Pipe	200		LF	100	200	300
7	Box Culverts,Class A Concrete	30		CY	10	30	50
8	Erect Temporary Bridge	1	8	Days	5	8	10
9	Remove Existing Structures	1	3	Days	1	3	5
10	Cofferdams	1	15	Days	5	15	30
11	Structure Excavation	300		CY	100	300	500
12	Piling	300		LF	200	300	600
13	Sub-Structure,Class A Concrete	40		CY	10	40	80
14	Concrete Beams	600		LF	200	600	800
15	Steel Beams	20,000		Lb	5,000	20,000	40,000
16	Super-Structure,Class AA Concrete	20		CY	10	20	40
17	Remove Temporary Bridge	1	4	Days	2	4	8
18	Major Retaining Walls	1,000		SF	500	1,000	1,500
19	Sub-grade Stabilization	8,000		SY	4,000	8,000	12,000
20	Stone Base	1,500		Tons	500	1,500	4,000
21	Drainage Blanket	1,200		Tons	500	1,200	2,000
22	Asphalt Base, Leveling, & Wedging	1,200		Tons	500	1,200	2,000
23	Curb & Gutter	500		LF	300	500	1,000
24	Entrance Pavement	100		SY	50	100	150
25	Barrier Walls, Slip Form	500		LF	300	500	800
26	Asphalt Repair	50		Tons	20	50	80
27	Concrete Repair	30		SY	10	30	50
28	Concrete Paving	4,000		SY	1,000	4,000	8,000
29	Asphalt Surface	1,000		Tons	400	1,000	1,500
30	Sheet Signs	30		Each	20	30	40
31	Panel Signs	1		Each	1	1	2
32	Major Traffic Signals	15	15	Days/Intersection	10	15	20
33	Lighting,Total Installation Luminaires	2		Each	1	2	3
34	Guardrail	1,500		LF	1,000	1,500	2,000
35	Finish Seeding	4,000		SY	2,000	4,000	7,000
36	Pavement Marking	10,000		LF	5,000	10,000	20,000
37	Final Clean-Up	1	10	Days	5	10	15
38	Phasing Allowance	1	3	Days/Phase	1	3	5

Project Templates ~ Template, Default Values, and Logic Levels

Relocation

RELOCATION									
Item No	Activity	Unit	Input Design Quantity	Default Production Rate, Unit/Day	Default Activity Duration, Days	Production Rate Override, Unit/Day	Activity Duration Override, Days	Calculated Activity Duration, Days	Comments
1	Initial Traffic Control	Days		1	2			2	
2	Clearing & Grubbing	Acres		3	0	3		0	
3	Diversion (By-Pass Detour)	Days		1	6			6	
4	Roadway Excavation	CY		5,000	0	5,000		0	
5	Embankment in Place	CY		4,000	0	4,000		0	
6	Drainage Pipe	LF		200	0	200		0	
7	Box Culverts, Class A Concrete	CY		30	0	30		0	
8	Cofferdams	Days		1	15			15	
9	Structure Excavation	CY		300	0	300		0	
10	Piling	LF		300	0	300		0	
11	Sub-Structure, Class A Concrete	CY		40	0	40		0	
12	Concrete Beams	LF		600	0	600		0	
13	Steel Beams	Lb.		20,000	0	20,000		0	
14	Super-Structure, Class AA Concrete	CY		20	0	20		0	
15	Major Retaining Walls	SF		1,000	0	1,000		0	
16	Sub-grade Stabilization	SY		8,000	0	8,000		0	
17	Stone Base	Ton		1,500	0	1,500		0	
18	Drainage Blanket	Ton		1,200	0	1,200		0	
19	Asphalt Base, Leveling, & Wedging	Ton		1,200	0	1,200		0	
20	Curb & Gutter	LF		500	0	500		0	
21	Entrance Pavement	SY		100	0	100		0	
22	Barrier Walls, Slip Form	LF		500	0	500		0	
23	Concrete Paving	SY		4,000	0	4,000		0	
24	Asphalt Surface	Ton		1,000	0	1,000		0	
25	Sheet Signs	Ea		30	0	30		0	
26	Panel Signs	Ea		1	0	1		0	
27	Major Traffic Signals	No of Intersection		15	15			15	
28	Lighting,Total Installation Luminaires	Ea		2	0	2		0	
29	Guardrail	LF		1,500	0	1,500		0	

30	Finish Seeding	SY		4,000	0	4,000		0	
31	Pavement Marking	LF		10,000	0	10,000		0	
32	Final Clean-Up	Days		1	10			10	
33	Phasing Allowance	No of Phase		1	3			3	

Item No	ACTIVITY	Current Rate	Current Duration	UNITS	Lower Limit	Average	Upper Limit
1	Initial Traffic Control	1	2	Days	1	2	4
2	Clearing & Grubbing	3		Acres	1	3	6
3	Diversion (By-pass Detour)	1	6	Days	3	6	12
4	Roadway Excavation	5,000		CY	1,000	5,000	10,000
5	Embankment in Place	4,000		CY	800	4,000	8,000
6	Drainage Pipe	200		LF	100	200	300
7	Box Culverts,Class A Concrete	30		CY	10	30	50
8	Cofferdams	1	15	Days	5	15	30
9	Structure Excavation	300		CY	100	300	500
10	Piling	300		LF	200	300	600
11	Sub-Structure,Class A Concrete	40		CY	10	40	80
12	Concrete Beams	600		LF	200	600	800
13	Steel Beams	20,000		Lb	5,000	20,000	40,000
14	Super-Structure,Class AA Concrete	20		CY	10	20	40
15	Major Retaining Walls	1,000		SF	500	1,000	1,500
16	Sub-grade Stabilization	8,000		SY	4,000	8,000	12,000
17	Stone Base	1,500		Tons	500	1,500	4,000
18	Drainage Blanket	1,200		Tons	500	1,200	2,000
19	Asphalt Base, Leveling, & Wedging	1,200		Tons	500	1,200	2,000
20	Curb & Gutter	500		LF	300	500	1,000
21	Entrance Pavement	100		SY	50	100	150
22	Barrier Walls, Slip Form	500		LF	300	500	800
23	Concrete Paving	4,000		SY	1,000	4,000	8,000
24	Asphalt Surface	1,000		Tons	400	1,000	1,500
25	Sheet Signs	30		Each	20	30	40
26	Panel Signs	1		Each	1	1	2
27	Major Traffic Signals	15	15	Days/Intersection	10	15	20
28	Lighting,Total Installation Luminaires	2		Each	1	2	3
29	Guardrail	1,500		LF	1,000	1,500	2,000
30	Finish Seeding	4,000		SY	2,000	4,000	7,000
31	Pavement Marking	10,000		LF	5,000	10,000	20,000
32	Final Clean-Up	1	10	Days	5	10	15
33	Phasing Allowance	1	3	Days/Phase	1	3	5

Item No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	0	1
3	Diversion (By-Pass Detour)	6	1
4	Roadway Excavation	0	3SS+2,2SS+0
5	Embankment in Place	0	3SS+2,2SS+0
6	Drainage Pipe	0	4SS+0,5SS+0
7	Box Culverts, Class A Concrete	0	2SS+0
8	Cofferdams	15	1
9	Structure Excavation	0	3,8
10	Piling	0	8,9
11	Sub-Structure, Class A Concrete	0	10
12	Concrete Beams	0	11SS+0
13	Steel Beams	0	11SS+0
14	Super-Structure, Class AA Concrete	0	12,13SS+0
15	Major Retaining Walls	0	4,5
16	Sub-grade Stabilization	0	4,5,6SS+0,7SS+0
17	Stone Base	0	16
18	Drainage Blanket	0	16
19	Asphalt Base, Leveling, & Wedging	0	17,18
20	Curb & Gutter	0	19SS+0,17
21	Entrance Pavement	0	19SS+0,17
22	Barrier Walls, Slip Form	0	19SS+0,23
23	Concrete Paving	0	17,18,20SS+0,21SS+0
24	Asphalt Surface	0	19FF+0,20SS+0,21SS+0,22
25	Sheet Signs	0	23,24
26	Panel Signs	0	23,24
27	Major Traffic Signals	15	23,24
28	Lighting,Total Installation Luminaires	0	23,24
29	Guardrail	0	23,24
30	Finish Seeding	0	23,24
31	Pavement Marking	0	23,24
32	Final Clean-Up	10	14,15,23,24,25,26,27,28,29.30,31
33	Phasing Allowance	3	32

Project Templates ~ Template, Default Values, and Logic Levels

Bridge Rehabilitation

BRIDGE REHABILATION									
Item No	Activity	Unit	Input Design Quantity	Default Production Rate, Unit/Day	Default Activity Duration, Days	Production Rate Override, Unit/Day	Activity Duration Override, Days	Calculated Activity Duration, Days	Comments
1	Initial Traffic Control	Days		1	2	1		2	
2	Clearing & Grubbing	Acres		3	0	3		0	
3	Erect Temporary Bridge	Days		1	8	1		8	
4	Remove Existing Structures	Days		1	3	1		3	
5	Cofferdams	Days		1	15	1		15	
6	Piling	LF		300	0	300		0	
7	Sub-Structure, Class A Concrete	CY		40	0	40		0	
8	Concrete Beams	LF		600	0	600		0	
9	Steel Beams	Lb.		20,000	0	20,000		0	
10	Super-Structure, Class AA Concrete	CY		20	0	20		0	
11	Finish Approach Work	Days		2	0	2		0	
12	Remove Temporary Bridge	Days		1	4	1		4	
13	Finish Seeding	SY		4,000	0	4,000		0	
14	Final Clean-Up	Days		1	10	1		10	
15	Phasing Allowance	No of Phase		1	3	1		3	

Item No	Activity	Current Rate	Current Duration	Unit	Lower Limit	Average	Upper Limit
1	Initial Traffic Control	1	2	Days	1	2	4
2	Clearing & Grubbing	3		Acres	1	3	6
3	Erect Temporary Bridge	1	8	Days	5	8	10
4	Remove Existing Structures	1	3	Days	1	3	5
5	Cofferdams	1	15	Days	5	15	30
6	Piling	300		LF	200	300	600
7	Sub-Structure,Class A Concrete	40		CY	10	40	80
8	Concrete Beams	600		LF	200	600	800
9	Steel Beams	20,000		Lb	5,000	20,000	40,000
10	Super-Structure,Class AA Concrete	20		CY	10	20	40
11	Finish Approach Work	2		Days	1	2	3
12	Remove Temporary Bridge	1	4	Days	2	4	8
13	Finish Seeding	4,000		SY	2,000	4,000	7,000
14	Final Clean-Up	1	10	Days	5	10	15
15	Phasing Allowance	1	3	Days/ Phase	1	3	5

Item No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	0	1
3	Erect Temporary Bridge	8	2
4	Remove Existing Structures	3	3
5	Cofferdams	15	4
6	Piling	0	5
7	Sub-Structure, Class A Concrete	0	6
8	Concrete Beams	0	7
9	Steel Beams	0	7
10	Super-Structure, Class AA Concrete	0	8,9SS+0
11	Finish Approach Work	0	10
12	Remove Temporary Bridge	4	11
13	Finish Seeding	0	12SS+2
14	Final Clean-Up	10	12,13
15	Phasing Allowance	3	14

Project Templates ~ Template, Default Values, and Logic Levels

Bridge Replacement

BRIDGE REPLACEMENT			Input Design Quantity	Default Production Rate, Unit/Day	Default Activity Duration, Days	Production Rate Override, Unit/Day	Activity Duration Override, Days	Calculated Activity Duration, Days	Comments
Item No	Activity	Unit							
1	Initial Traffic Control	Days		1	2	1		2	
2	Clearing & Grubbing	Acres		3	0	3		0	
3	Erect Temporary Bridge	Days		1	8	1		8	
4	Remove Existing Structures	Days		1	3	1		3	
5	Cofferdams	Days		1	15	1		15	
6	Piling	LF		300	0	300		0	
7	Sub-Structure, Class A Concrete	CY		40	0	40		0	
8	Concrete Beams	LF		600	0	600		0	
9	Steel Beams	Lb.		20,000	0	20,000		0	
10	Super-Structure, Class AA Concrete	CY		20	0	20		0	
11	Finish Approach Work	Days		2	0	2		0	
12	Remove Temporary Bridge	Days		1	4	1		4	
13	Finish Seeding	SY		4,000	0	4,000		0	
14	Final Clean-Up	Days		1	10	1		10	
15	Phasing Allowance	No of Phase		1	3	1		3	

Item No	Activity	Current Rate	Current Duration	Unit	Lower Limit	Average	Upper Limit
1	Initial Traffic Control	1	2	Days	1	2	4
2	Clearing & Grubbing	3		Acres	1	3	6
3	Erect Temporary Bridge	1	8	Days	5	8	10
4	Remove Existing Structures	1	3	Days	1	3	5
5	Cofferdams	1	15	Days	5	15	30
6	Piling	300		LF	200	300	600
7	Sub-Structure,Class A Concrete	40		CY	10	40	80
8	Concrete Beams	600		LF	200	600	800
9	Steel Beams	20,000		Lb	5,000	20,000	40,000
10	Super-Structure,Class AA Concrete	20		CY	10	20	40
11	Finish Approach Work	2		Days	1	2	3
12	Remove Temporary Bridge	1	4	Days	2	4	8
13	Finish Seeding	4,000		SY	2,000	4,000	7,000
14	Final Clean-Up	1	10	Days	5	10	15
15	Phasing Allowance	1	3	Days/ Phase	1	3	5

Item No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	0	1
3	Erect Temporary Bridge	8	2
4	Remove Existing Structures	3	3
5	Cofferdams	15	4
6	Piling	0	5
7	Sub-Structure, Class A Concrete	0	6
8	Concrete Beams	0	7
9	Steel Beams	0	7
10	Super-Structure, Class AA Concrete	0	8,9SS+0
11	Finish Approach Work	0	10
12	Remove Temporary Bridge	4	11
13	Finish Seeding	0	12SS+2
14	Final Clean-Up	10	12,13
15	Phasing Allowance	3	14

Presentation: Donn E. Hancher

Presentation on the Kentucky Contract Time Determination System

Dr. Donn E. Hancher, P.E.
Civil Engineering Department
University of Kentucky

Project Research Team

- Kentucky Transportation Cabinet
- Kentucky Transportation Center
- UK Civil Engineering Department
- CEM Research Staff:
  - Sion Tesone
  - Becky Luscher
  - Ray Werkmeister
  - Donn Hancher

KY-CTDS Objectives

- Estimates Construction Contract Time for KyTC Construction Projects
- Used by District Personnel for Bids
- User Friendly PC Application
- Based on Off-the-Shelf Software
  - Microsoft Office and MS-Project 98

Conceptual Planning Tool

- Planning Tool, not for Detailed Scheduling
- Limited to Project Controlling Activities
- Answers the Question:
  - "How much time should be reasonably given to the contractor to do the work?"
- Document Logic for Future Use
- Help Less Experienced Engineers

Development Process

- Overview by KyTC Advisory Committee
- Major Input by Working Group of Experienced KyTC Engineers
  - Established Typical Project Categories
  - Determined Controlling Project Activities
  - Set Production Rates for Controlling Activities
  - Established Method for Handling Phasing

Six KyTC Project Templates

Reconstruction Limited Access	This is a project that utilizes the existing alignment but may revise the profile grade for an overlay.
Reconstruction Open Access	This is a project where a road is being rebuilt that has either "Access by Permit" or "Partial Control" while utilizing the existing right-of-way.
New Route	This is a project being built from point "A" to point "B".
Relocation	This is a project that a section of road is being rebuilt on new alignment and grade.
Bridge Rehabilitation	This is a project that a lane on a bridge would be closed for reconstructing or widening the deck part width.
Bridge Replacement	This project's main focus would be to build a new bridge.

Productivity Rate Data

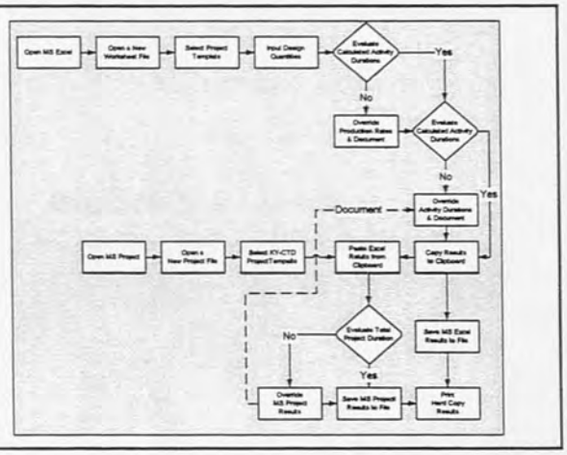
ACTIVITY	UNITS	LOWER LIMIT	AVERAGE VALUE	UPPER LIMIT
Initial Traffic Control	Days	1	2	4
Clearing & Grubbing	Acres	1	3	6
Diversion (By-pass Detour)	Days	3	6	12
Roadway Excavation	CY	1,000	5,000	10,000
Embankment in Place	CY	800	4,000	8,000
Drainage Pipe	LF	100	200	300
Box Culverts, Class A Concrete	CY	10	30	50
Erect Temporary Bridge	Days	5	8	10
Remove Existing Structures	Days	1	3	5
Cofferdams	Days	5	15	30

Activity Precedence Logic

Act ID	Major Work Items	Preceding Activities & Relationships (% complete of predecessor)
1	Initial Traffic Control	
2	Clearing & Grubbing	1(100%)
3	Diversion (By-pass Detour)	1(100%)
4	Roadway Excavation	2(75%), 3(25%)
5	Embankment in Place	2(75%), 3(25%)
6	Drainage Pipe	4(10%), 5(10%)
7	Box Culverts, Class A Concrete	2(50%)
8	Erect Temporary Bridge	1(100%)
9	Remove Existing Structures	3(100%),8(100%)
10	Cofferdams	9(100%)
11	Structure Excavation	9(100%),10(100%)
12	Piling	10(100%),11(50%)
13	Sub-Structure, Class A Concrete	12(50%)

How KY-CTDS Works

- Select One of Six Excel Project Templates
  - Reconstruction Limited Access
  - Reconstruction Unlimited Access
  - New Route
  - Relocation
  - Bridge Rehabilitation
  - Bridge Replacement
- Select MS Project 98 Template
  - Total Contract Time Duration

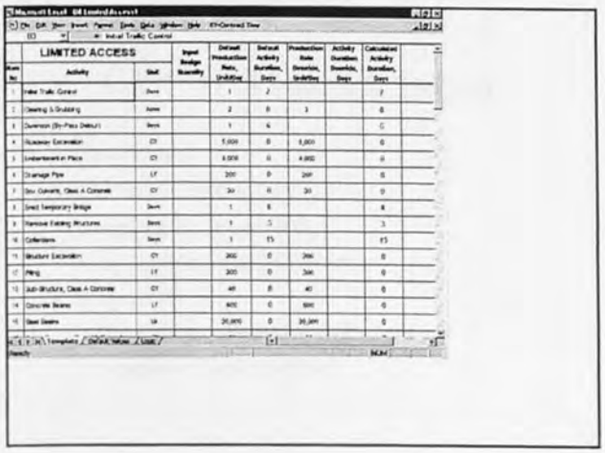


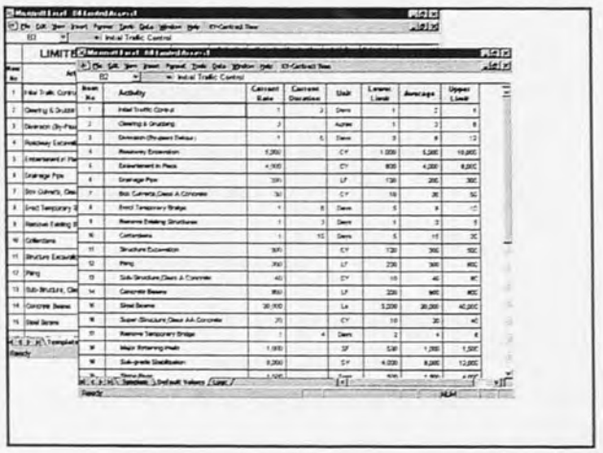
MS-Excel Operations

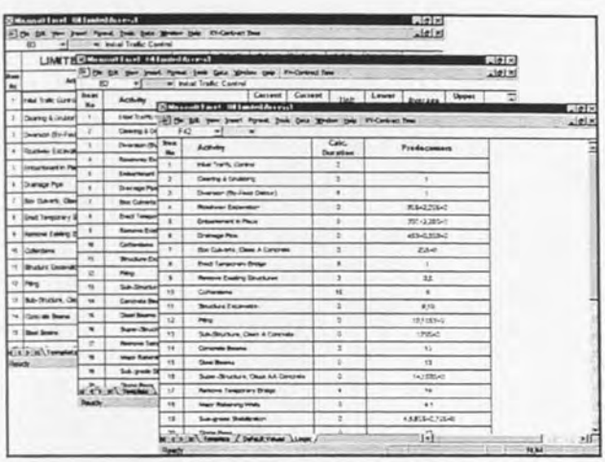
- Input the Design Quantities
- Auto Computation of Activity Durations
- User Can Override:
  - Default Productivity Rates
  - The Activity Duration
- Save Excel File
- Copy Final Activity Data to MS-Clipboard

Saved Excel File – 3 Levels

- 1st Level - Input/Summary Sheet
  - Controlling Activities Predetermined
  - Input of Design Quantities
  - Override for Default Productivity Rates
  - Override for Activity Duration
  - Input Column for Comment & Documentation
- 2nd Level – Default Activity Productivity
- 3rd Level – Automatic Calculations & Default Logic





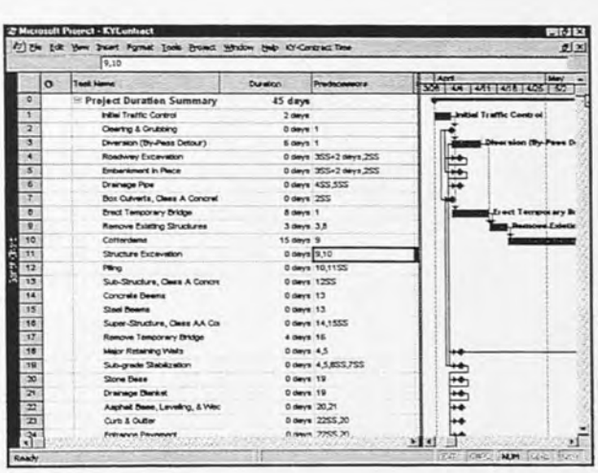


Clipboard Data

- Controlling Project Activities
- Controlling Activity Durations
- Controlling Activity Logic Relationships

MS-Project 98 Operations

- Switch to the MS-Project Template
  - DOH Calendar – 1 April to 30 November
- Paste Data from Clipboard
- Automatically Calculates the Overall Project Duration
- Graphical Representation of Project
- Can be Saved as Electronic or Hard Copy
- Can be Printed Out or Emailed



KY-CTDS Documentation

- Hard Copy
- Electronic File Copy
- Excel Spreadsheet File
  - all User Input and Overrides.
- Project 98
  - Total Project Duration Calculations
  - Graphical Representation

KY-CTDS Summary

- Must be Customized for Specific State
- Requirements are:
  - Project Templates
  - Controlling Activities
  - Production Rates
  - Construction Working Calendar for State
- Conceptual Planning Tool Only
- Provides Strong Documentation Database

Presentation: KY-CTDS, Raymond F. Werkmeister, Jr.

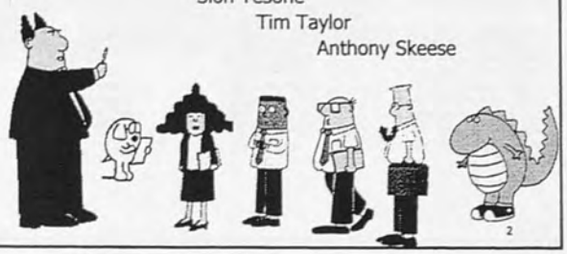
UNIVERSITY OF KENTUCKY

KY-CTDS

Contract Time Determination System

Research Project Staff

Donn Hancher
Ray Werkmeister
Becky Luscher
Sion Tesone
Tim Taylor
Anthony Skeese



2

Goals of KY-CTDS

- Easy to Use
- Flexible
- Reliable
- Microsoft Products
  - Excel
  - Project 88

3

Today's Topics

- Access to the KY-CTDS templates
  - From the 3½" KY-CTDS Disk
  - From your computer hard disk drive
- Input design quantities
- User Overrides
  - Productivity Rate Override
  - Calculated Duration Activity Override
- Determine KY-Contract Time.

4

Administrator's Topics

- Password Access
- Change Default
  - Productivity Rates
  - Activity Durations
- Difficult, but can be changed:
  - Activities – Addition or Deletion
  - Logic Changes

5

Your Resources

- KY-CTDS Operating Manual
- Template File Folder (3½" Diskette)
  - (6) Excel project templates
  - (1) Project 98 template
  - An Real Example
- KY-CTDS Web Page

www.uky.edu/~rfwerk0/KY-CTDS/default.html

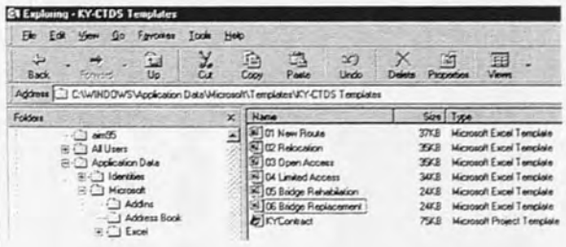
6

Loading KY-CTDS Templates

- Copy ***"KY-CTDS Template File Folder"*** from the ***3½" KY-CTDS Disk*** to the template location on your computer's hard disk.
  - Excel[97] - Microsoft templates are saved in the directory ***"Program Files/Microsoft Office/Software Solutions/Templates"***
  - Excel[2000] - Microsoft templates are saved in the directory ***"Windows/ApplicationData/ Microsoft/Templates"***
  - Or, the simplest method is to copy the file folder to your desktop.

7

Loading KY-CTDS Templates: Excel[2000]



8

KY-CTD Excel Menu

- Excel[2000]

  Your Standard Excel Menu may be modified to provide a ***KY-CTDS Menu*** which may be useful for frequent use of KY-CTDS.
- Suggested items may include:
  1. ***Open*** a New KY-CTDS Template
  2. ***Save*** Your Excel Data As...
  3. ***Copy*** Your Excel Results (assign "Results" Macro)
  4. ***Print Preview*** Your Excel Results
  5. ***Print*** Your Excel Results

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KY-CTD Excel Menu

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KY-CTDS

Ready to use a KY-CTDS Excel template?

Open Excel

Select ***Start***, ***Programs***, ***Microsoft Excel***.

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Open a KY-CTDS Template

Excel[2000]

1. Select ***File*** on the Menu at top of screen. A drop down menu will appear.
2. Select ***New***. A template screen will appear.
3. Select the ***KY-CTDS Templates*** File Folder.

The templates were previously loaded.

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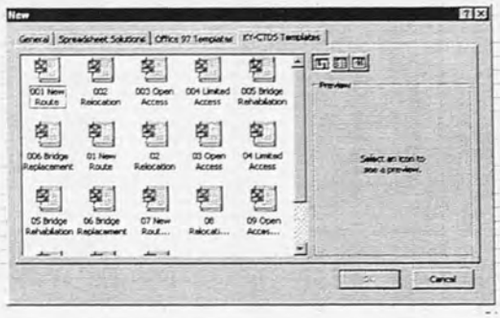
Open a KY-CTDS Template



Open a KY-CTDS Template

- If your templates have been saved at an alternate location, select ***File, Open...*** "*your alternate location*"
- You may also select from your Desktop Folder, or from the KY-CTDS Installation Disk.

Take care not to corrupt your original copy of the KY-CTDS Templates !!!

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Open a KY-CTDS Template

- Select the template that best matches your project.
- Your choices are:

New Route	Relocation
Open Access	Limited Access
Bridge Rehabilitation	Bridge Replacement

- Click the right mouse button on the template icon, and next select ***OK***.
- Or double click the left mouse click on your selected template icon.

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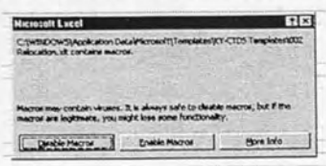
Open a KY-CTDS Template

- You may receive a "***Macro Alert***", depending on your computer's Security Setting.
- This is not abnormal, and is a result of the embedded macro in the KY-CTDS Templates.
- To proceed, select ***Enable Macros***.



17

Open a KY-CTDS Template

Your selected template will now be loaded

- The temporary filename will be the original Template Name with the addition of a "1".
- For example, ***"New Route1"***
- This is to prevent the unintentional corruption of your original KY-CTDS Template.
- Use ***"Save As..."*** at this, or at any time to save the Excel Worksheet File with your project name.

The next time you select New Route Template, it will be the original template.

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KY-CTDS

Ready to input design quantities?

KY-CTDS Template Details

Microsoft Excel - 002 Relocation1

File Edit View Insert Format Tools Data Window Help KY-Contract Time

RELOCATION			Input Design Quantity	Default Production Rate, Unit/Day	Default Activity Duration, Days	Production Rate Override, Unit/Day	Activity Duration Override, Days	Calculated Activity Duration, Days
Item No	Activity	Unit						
1	Initial Traffic Control	Days		1	2			2
2	Clearing & Grubbing	Acres		3	8	3		8
3	Diversion (By-Pass Detour)	Days		1	6			6
4	Roadway Excavation	CY		5,000	0	5,000		0
5	Embankment in Place	CY		4,000	0	4,000		0
6	Drainage Pipe	LF		200	0	200		0
7	Box Culverts, Class A Concrete	CY		30	0	30		0
8	Cofferdams	Days		1	15			15
9	Structure Excavation	CY		300	0	300		0
10	Piling	LF		300	0	300		0
11	Sub-Structure, Class A Concrete	CY		40	0	40		0
12	Concrete Beams	LF		600	0	600		0
13	Steel Beams	Lb.		20,000	0	20,000		0

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KY-CTDS Template Details

- KY-CTDS Templates contain 3 levels/Tabs,
- "***Template***", "***Default Values***", and "***Logic***".
- All of the cells of ***Default Values*** and "***Logic***" Worksheets are password protected.
- Change may be done by your KY-CTDS designated administrator only.

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KY-CTDS Template Details

- Some of the cell ranges of "***Template***" are also password protected.
- The protected columns are ***RED***
- The user input columns are ***BLUE***

Item No
Activity
Unit
Input Design Quantity
Default Production Rate
Default Activity Duration
Production Rate Override
Activity Duration Override
Calculated Activity Duration
Comment

22

Template Level

The Template Level serves as the **summary** of all your KY-CTDS Excel work.

- It documents **User Input Quantities**, **User Overrides**, **User Comments**, and the resultant **Calculated Activity Duration**.
- It also documents the **default productivity rates** and any **overrides used**.

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Default Values Level

Default Values Level contains:

- ***Default Production Rates***,
- ***Default Activity Duration***,
- ***Production Rates:***
  Lower Limit, ***Average*** & ***Upper Limit***

Microsoft Excel - 002 Relocation1

File Edit View Insert Format Tools Data Window Help KY-Contract Time

Item No	ACTIVITY	Current Rate	Current Duration	UNITS	Lower Limit	Average	Upper Limit
1	Initial Traffic Control	1	2	Days	1	2	4
2	Clearing & Grubbing	3		Acres	1	3	8
3	Diversion (By-pass Detour)	1	6	Days	3	6	12
4	Roadway Excavation	5,000		CY	1,000	5,000	10,000
5	Embankment in Place	4,000		CY	800	4,000	8,000
6	Drainage Pipe	200		LF	100	200	300

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Default Values Level

The listed default production rates and ranges are:

- suggested by KY-CTDS
- may be user overridden on the Template Level.

All of the cells of the ***Default Values*** Level are password protected.

Changes for unique district conditions may be done by the designated KY-CTDS administrators.

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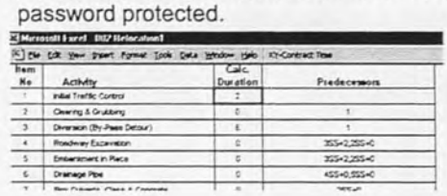
Logic Level

The ***Logic*** Level contains:

- the calculated duration or the override
- the Diagram Logic for the project.

All of the cells of the ***Default Values*** Level are password protected.



Item No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	0	1
3	Diversion (By-Pass Detour)	6	1
4	Roadway Excavation	0	3SS+2,2SS+0
5	Embankment in Place	0	3SS+2,2SS+0
6	Drainage Pipe	0	4SS+0,5SS+0

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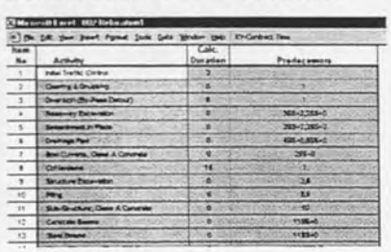
Logic Level

The data needed are the Columns "***Activity***", "***Calc. Duration***" and "***Precedence***"



Item No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	0	1
3	Diversion (By-Pass Detour)	6	1
4	Roadway Excavation	0	3SS+2,2SS+0
5	Embankment in Place	0	3SS+2,2SS+0
6	Drainage Pipe	0	4SS+0,5SS+0
7	Box Culverts, Class A Concrete	0	2FS-0
8	Cofferdams	14	1
9	Structure Excavation	0	2,6
10	Piling	0	2,9
11	Slab Structure, Class A Concrete	0	10
12	Concrete Beams	0	11SS+0
13	Steel Beams	0	11SS+0

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Review

1) ***Select*** the KY-CTDS Excel template that best fits your project.
2) ***Save*** that Worksheet file with the ***File Name*** that you select for your project.
3) ***Input*** the Design Quantities supplied by the design data sheet.
   - *Check out the Calculated Durations.*
   - *If you are dissatisfied, adjust by using the Production Rate or Activity Duration Override.*

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Review

- The ***Production Rate Override*** can be used to change the Default Production Rate.
- The ***Activity Duration Override*** can be used to change the Activity Duration to what you think is more appropriate.

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Review

4) Add ***Comments*** to document your changes or selections.
5) On the Logic Worksheet, ***Select*** and ***Copy*** the "***Activity***", "***Calc. Duration***", and "***Predecessors***" Data Ranges (without headers) into the Clipboard.
6) ***Resave*** your work often when changes are made.

30

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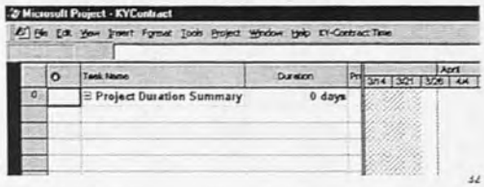
KY-CTDS

Ready to go to MS-Project?

KYContract Template

Open Project template file ***KYContract***.

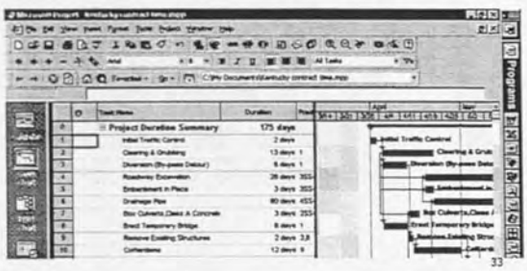
The ***KYContract*** template has the Kentucky Department of Highways Calendar already embedded in the template logic.



32

KYContract Template

Select ***Edit***, ***Paste***, or the ***Paste Icon***.



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KYContract Template

- ***Save*** the MS Project File with the project File Name you select.
- Each KY-CTDS project will have two files, an Excel **.xls** file and a MS Project **.mpp** file.
- The project filename you select may be the same for both files, but the file extensions will be different.

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KYContract Features

- ***Project Summary Duration*** shows the total workdays for the project.
- The KY-DOH calendar is used to determine all workdays and also considers holidays and workdays limitation from the first of April through the end of November.
- From the first of December to the end of March, the chart will show a shaded background to indicate non-working days.

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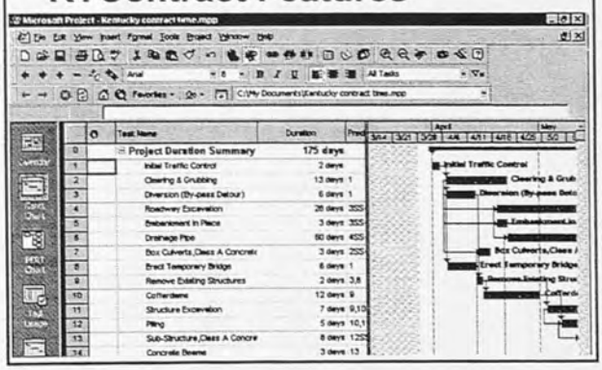
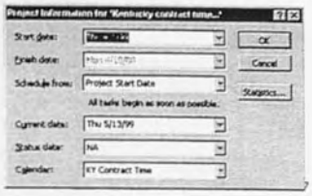
KYContract Features



Project Start Date

- Project selects ***Time Now*** as default ***Start Date***.
- To change, select ***Project*** from the menu at the top of the screen.
- Select ***Project Information*** from the scroll down menu.
- A menu box will appear.



Project Start Date

- Select the down arrow to the right of the "***Start date***". A calendar will appear for you to choose the date when you desire the project to start.
- Scroll through the calendar by using the right and left navigation arrows displayed. Find the project start date and select it with the right mouse button. The "***Start date***" will be changed to this new start date.
- Select ***OK*** to save the changes.

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Other KYContract Features

- Changing the Timescale
- Changing the Title of the Project
- Add or Change a Holiday
- Summary Reports
- Adding a Project Legend
- Printing a Bar Chart Schedule

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Construction Engineering & Management

KY-CTDS Example Problem

NEW ROUTE			Input Design Quantity	Default Production Rate, Unit/Day	Default Activity Duration, Days	Production Rate Override, Unit/Day	Activity Duration Override, Days	Calculated Activity Duration, Days	Comments
Item No	Activity	Unit							
1	Initial Traffic Control	Days		1	2			2	
2	Clearing & Grubbing	Acres	300	3	0	3		100	
3	Diversion (By-Pass Detour)	Days		1	6			6	
4	Roadway Excavation	CY	4,520,000	5,000	0	5,000	270	270	
5	Embankment in Place	CY		4,000	0	4,000		0	
6	Drainage Pipe	LF	10,600	200	0	200		53	
7	Box Culverts, Class A Concrete	CY		30	0	30		0	
8	Erect Temporary Bridge	Days	0	1	8			0	
9	Remove Existing Structures	Days	0	1	3			0	
10	Cofferdams	Days	0	1	15			0	
11	Structure Excavation	CY	450	300	0	300		2	
12	Piling	LF	2,300	300	0	300		8	
13	Sub-Structure, Class A Concrete	CY	250	40	0	40		7	
14	Concrete Beams	LF	1,400	600	0	600		3	
15	Steel Beams	Lb.		20,000	0	20,000		0	
16	Super-Structure, Class AA Concrete	CY	480	20	0	20		24	
17	Remove Temporary Bridge	Days		1	4			4	
18	Major Retaining Walls	SF		1,000	0	1,000		0	
19	Sub-grade Stabilization	SY		8,000	0	8,000		0	
20	Stone Base	Ton	111,000	1,500	0	1,500		74	
21	Drainage Blanket	Ton	22,000	1,200	0	1,200		19	
22	Asphalt Base, Leveling, & Wedging	Ton	63,000	1,200	0	1,200		53	

NEW ROUTE			Input Design Quantity	Default Production Rate, Unit/Day	Default Activity Duration, Days	Production Rate Override, Unit/Day	Activity Duration Override, Days	Calculated Activity Duration, Days	Comments
Item No	Activity	Unit							
23	Curb & Gutter	LF		500	0	500		0	
24	Entrance Pavement	SY		100	0	100		0	
25	Barrier Walls, Slip Form	LF		500	0	500		0	
26	Asphalt Repair	Ton		50	0	50		0	
27	Concrete Repair	SY		30	0	30		0	
28	Concrete Paving	SY		4,000	0	4,000		0	
29	Asphalt Surface	Ton	76,000	1,000	0	1,000		76	
30	Sheet Signs	Ea		30	0	30		0	
31	Panel Signs	Ea		1	0	1		0	
32	Major Traffic Signals	No of Intersection		15	15			15	
33	Lighting,Total Installation Luminaires	Ea		2	0	2		0	
34	Guardrail	LF	10,400	1,500	0	1,500		7	
35	Finish Seeding	SY	250,000	4,000	0	4,000		63	
36	Pavement Marking	LF	10,500	10,000	0	10,000		2	
37	Final Clean-Up	Days		1	10			10	
38	Phasing Allowance	No of Phase	3	1	3			3	

Item No	Activity	Current Rate	Current Duration	UNITS	Lower Limit	Average	Upper Limit
1	Initial Traffic Control	1	2	Days	1	2	4
2	Clearing & Grubbing	3		Acres	1	3	6
3	Diversion (By-pass Detour)	1	6	Days	3	6	12
4	Roadway Excavation	5,000		CY	1,000	5,000	10,000
5	Embankment in Place	4,000		CY	800	4,000	8,000
6	Drainage Pipe	200		LF	100	200	300
7	Box Culverts,Class A Concrete	30		CY	10	30	50
8	Erect Temporary Bridge	1	8	Days	5	8	10
9	Remove Existing Structures	1	3	Days	1	3	5
10	Cofferdams	1	15	Days	5	15	30
11	Structure Excavation	300		CY	100	300	500
12	Piling	300		LF	200	300	600
13	Sub-Structure,Class A Concrete	40		CY	10	40	80
14	Concrete Beams	600		LF	200	600	800
15	Steel Beams	20,000		Lb	5,000	20,000	40,000
16	Super-Structure,Class AA Concrete	20		CY	10	20	40
17	Remove Temporary Bridge	1	4	Days	2	4	8
18	Major Retaining Walls	1,000		SF	500	1,000	1,500
19	Sub-grade Stabilization	8,000		SY	4,000	8,000	12,000
20	Stone Base	1,500		Tons	500	1,500	4,000
21	Drainage Blanket	1,200		Tons	500	1,200	2,000
22	Asphalt Base, Leveling, & Wedging	1,200		Tons	500	1,200	2,000
23	Curb & Gutter	500		LF	300	500	1,000
24	Entrance Pavement	100		SY	50	100	150
25	Barrier Walls, Slip Form	500		LF	300	500	800
26	Asphalt Repair	50		Tons	20	50	80
27	Concrete Repair	30		SY	10	30	50
28	Concrete Paving	4,000		SY	1,000	4,000	8,000
29	Asphalt Surface	1,000		Tons	400	1,000	1,500
30	Sheet Signs	30		Each	20	30	40
31	Panel Signs	1		Each	1	1	2
32	Major Traffic Signals	15	15	ays/Intersecti	10	15	20
33	Lighting,Total Installation Luminaires	2		Each	1	2	3
34	Guardrail	1,500		LF	1,000	1,500	2,000
35	Finish Seeding	4,000		SY	2,000	4,000	7,000
36	Pavement Marking	10,000		LF	5,000	10,000	20,000
37	Final Clean-Up	1	10	Days	5	10	15
38	Phasing Allowance	1	3	Days/Phase	1	3	5

Item No	Activity	Calc. Duration	Predecessors
1	Initial Traffic Control	2	
2	Clearing & Grubbing	100	1
3	Diversion (By-Pass Detour)	6	1
4	Roadway Excavation	270	3SS+2,2SS+0
5	Embankment in Place	0	3SS+2,2SS+0
6	Drainage Pipe	53	4SS+0,5SS+0
7	Box Culverts, Class A Concrete	0	2SS+0
8	Erect Temporary Bridge	0	1
9	Remove Existing Structures	0	3,8
10	Cofferdams	0	9
11	Structure Excavation	2	9,10
12	Piling	8	10,11SS+0
13	Sub-Structure, Class A Concrete	7	12SS+0
14	Concrete Beams	3	13
15	Steel Beams	0	13
16	Super-Structure, Class AA Concrete	24	14,15SS+0
17	Remove Temporary Bridge	4	16
18	Major Retaining Walls	0	4,5
19	Sub-grade Stabilization	0	4,5,6SS+0,7SS+0
20	Stone Base	74	19
21	Drainage Blanket	19	19
22	Asphalt Base, Leveling, & Wedging	53	20,21
23	Curb & Gutter	0	22SS+0,20
24	Entrance Pavement	0	22SS+0,20
25	Barrier Walls, Slip Form	0	22SS+0
26	Asphalt Repair	0	22SS+0
27	Concrete Repair	0	20
28	Concrete Paving	0	20,21,23SS+0,24SS+0,27
29	Asphalt Surface	76	22SS+0,23SS+0,24SS+0,25,26,27
30	Sheet Signs	0	28,29
31	Panel Signs	0	28,29
32	Major Traffic Signals	15	28,29
33	Lighting,Total Installation Luminaires	0	28,29
34	Guardrail	7	28,29
35	Finish Seeding	63	28,29
36	Pavement Marking	2	28,29
37	Final Clean-Up	10	17,18,28,29,30,31,32,33,34,35,36
38	Phasing Allowance	3	37

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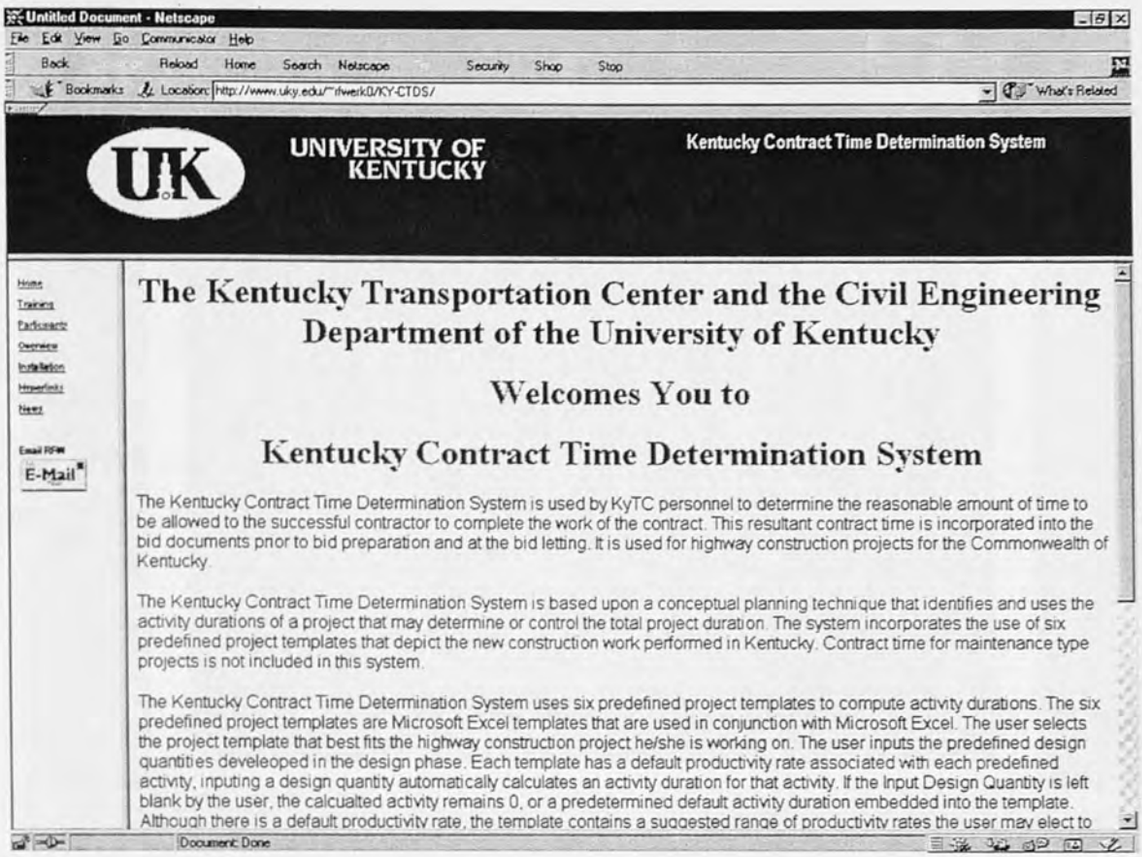
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The Kentucky Transportation Center and the Civil Engineering Department of the University of Kentucky
Welcomes You to
Kentucky Contract Time Determination System
The Kentucky Contract Time Determination System is used by KyTC personnel to determine the reasonable amount of time to be allowed to the successful contractor to complete the work of the contract. This resultant contract time is incorporated into the bid documents prior to bid preparation and at the bid letting. It is used for highway construction projects for the Commonwealth of Kentucky.
The Kentucky Contract Time Determination System is based upon a conceptual planning technique that identifies and uses the activity durations of a project that may determine or control the total project duration. The system incorporates the use of six predefined project templates that depict the new construction work performed in Kentucky. Contract time for maintenance type projects is not included in this system.
The Kentucky Contract Time Determination System uses six predefined project templates to compute activity durations. The six predefined project templates are Microsoft Excel templates that are used in conjunction with Microsoft Excel. The user selects the project template that best fits the highway construction project he/she is working on. The user inputs the predefined design quantities develeoped in the design phase. Each template has a default productivity rate associated with each predefined activity, inputing a design quantity automatically calculates an activity duration for that activity. If the Input Design Quantity is left blank by the user, the calcualted activity remains 0, or a predetermined default activity duration embedded into the template. Although there is a default productivity rate, the template contains a suggested range of productivity rates the user may elect to
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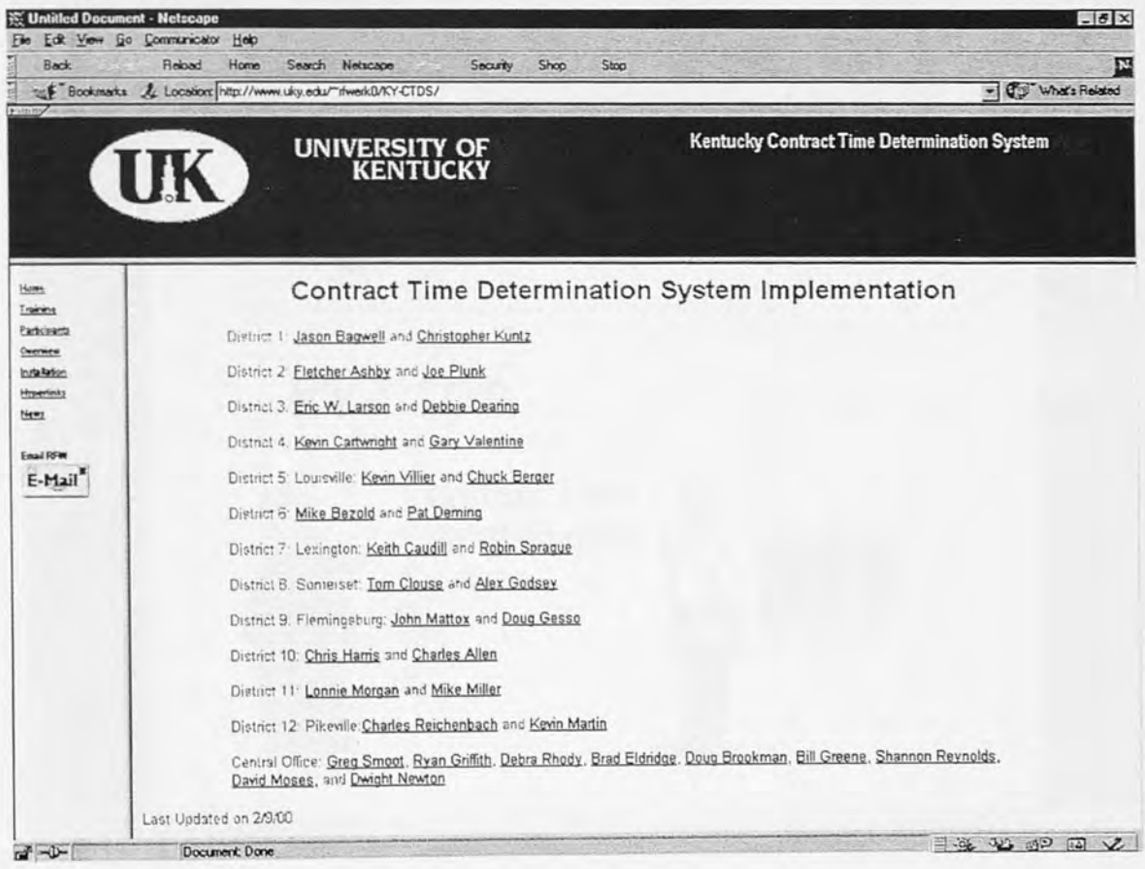
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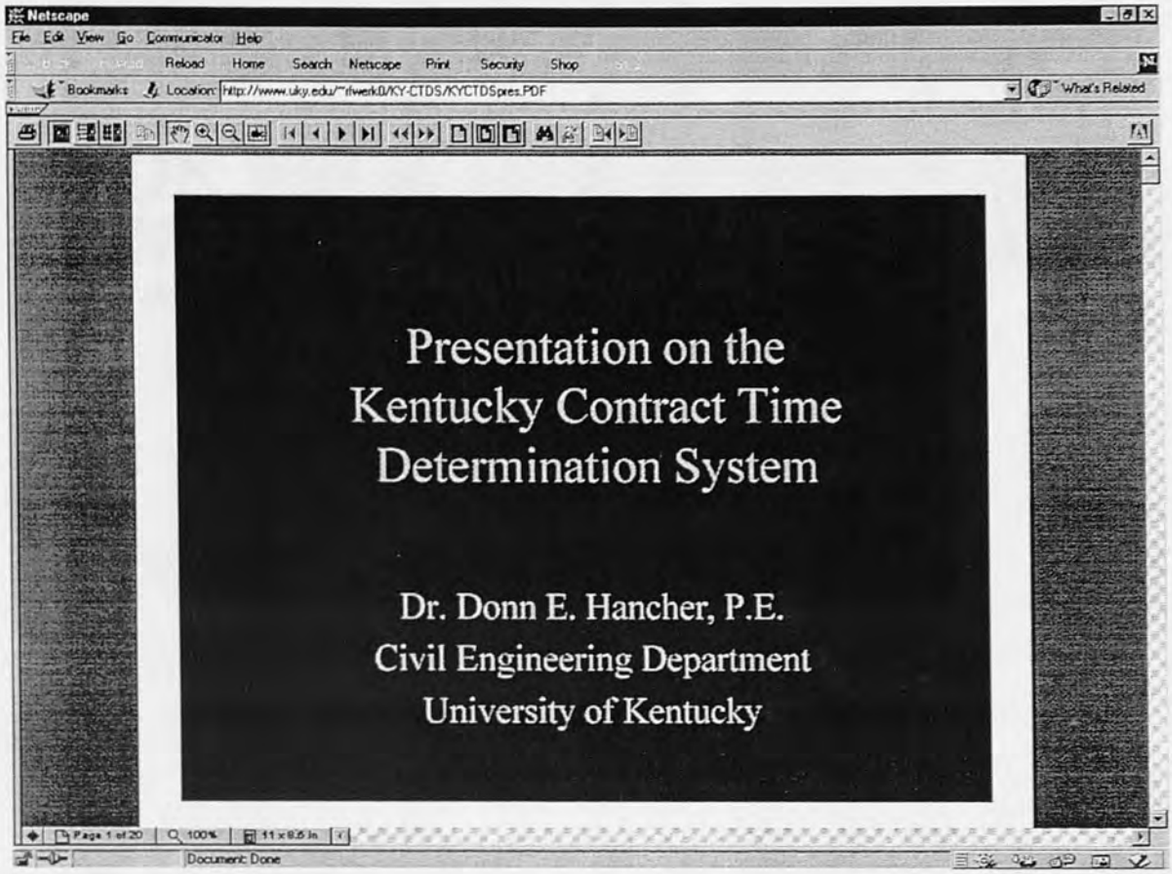
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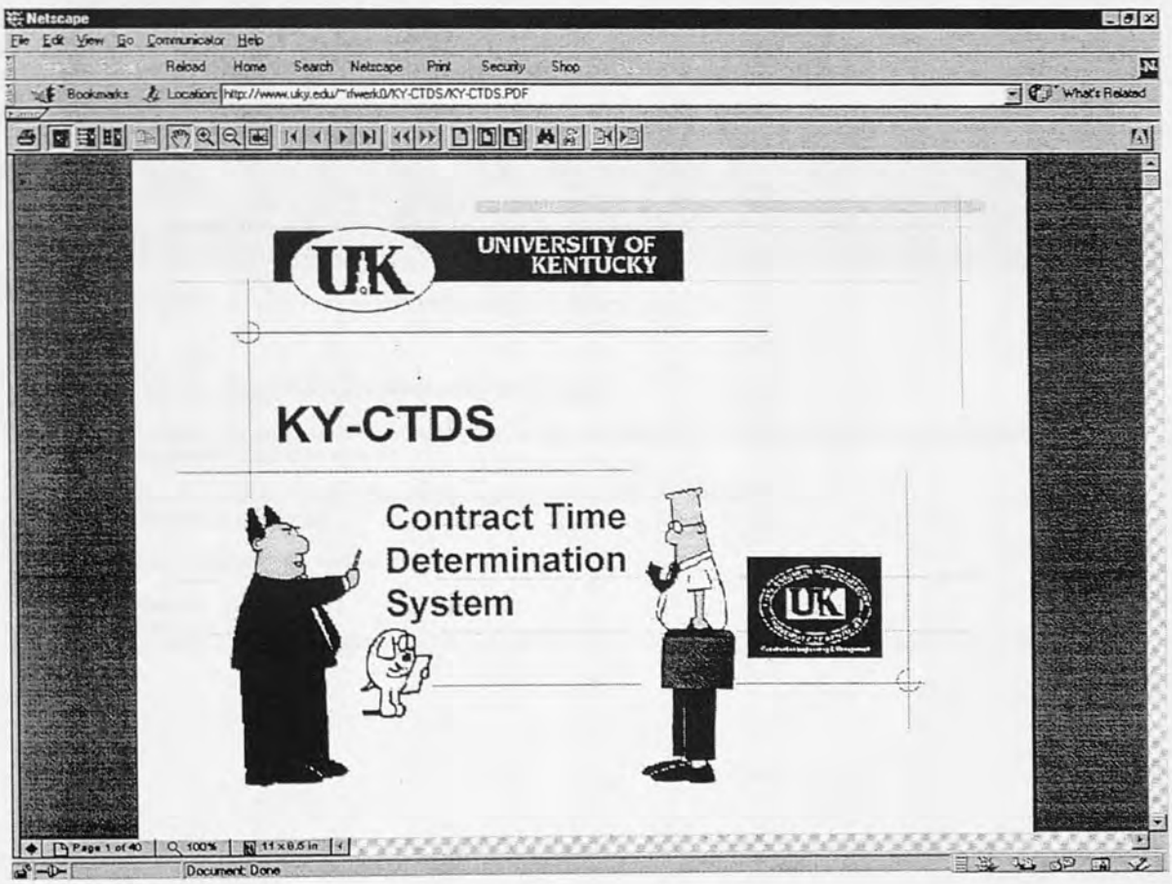
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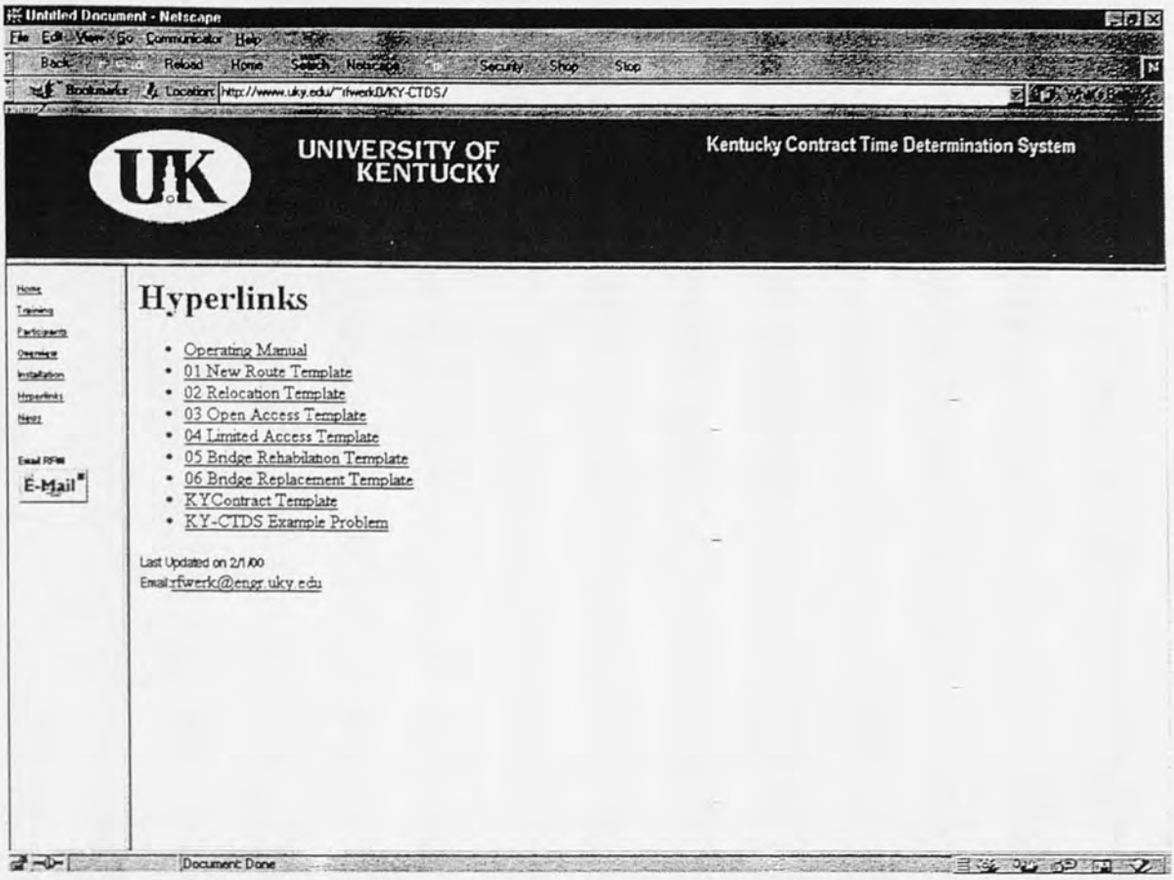
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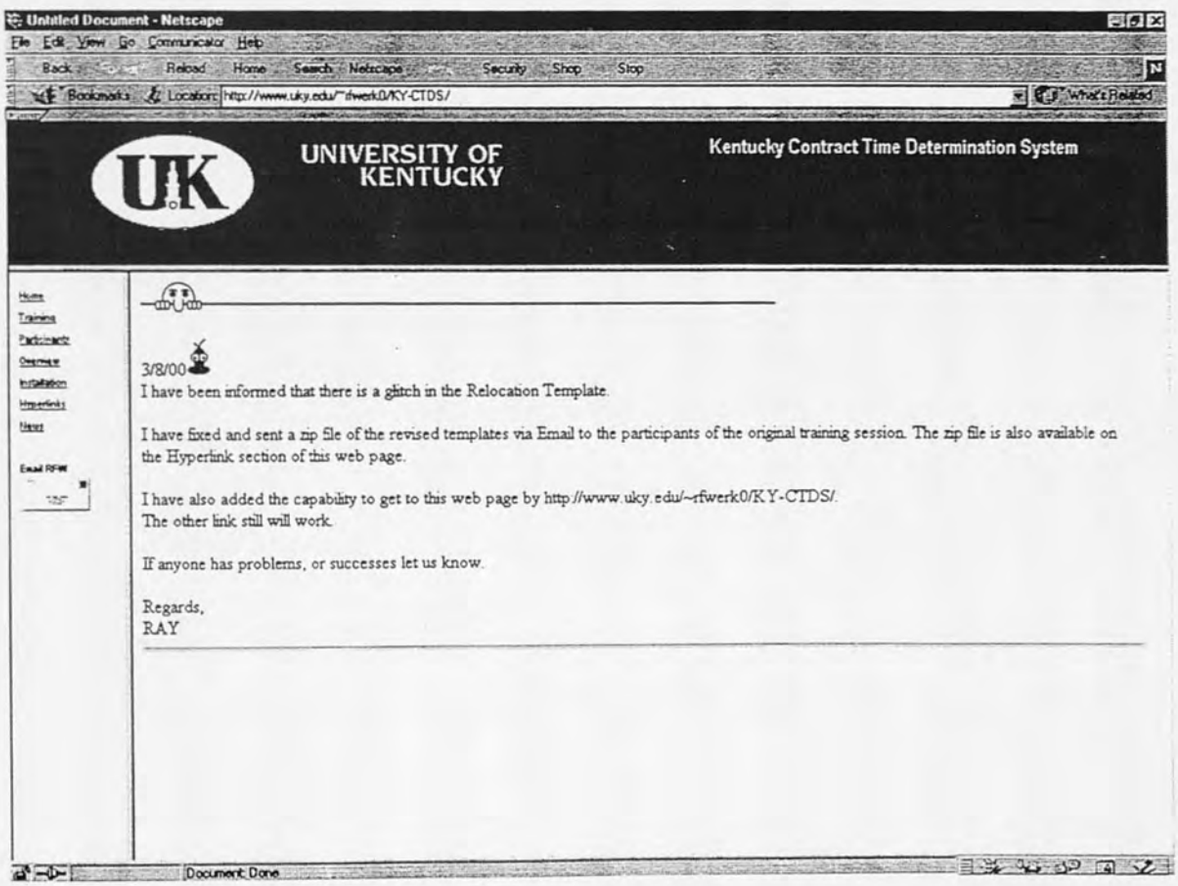
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I have also added the capability to get to this web page by http://www.uky.edu/~rfwerk0/KY-CTDS/.
The other link still will work.
If anyone has problems, or successes let us know.
Regards,
RAY
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