Construction Management And Scheduling Of Residential Building Using Primavera

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ABSTRACT

Although the long-introduced Industrialized Building System (IBS) has promised to solve and improve the current construction method and scenario in our country, but the IBS method has not gained enough popularity. One of the reasons is due to lack of research works done to quantifying the benefit of IBS especially in construction time saving. In lieu with such scenario, this study conducted to quantify evidence of time saving in IBS application. Primavera P6 is amazing software, which is used not just by planners, but also managers, engineers, schedulers, and anyone else involved in planning, management, reporting of a project. Primavera P6 has benefited every industry from aerospace to manufacturing, electronics to IT, Telecom to Civil, any more. Primavera is an amazing project management software tool which is not just used by project managers. Designed to make managing large or complex projects a piece of cake, Primavera is the ideal tool for anyone who is involved in planning, monitoring and reporting on the progress of any big task, development or venture. The project management software tool of choice in industries such as construction, engineering, aerospace, transport and security, as well as in many other industry sectors. Primavera allows for top level planning as well as being ideal for managing the intricate details. This enables project managers, planners, planning controllers and other associated professionals to have instant access to all the project information they require at the touch of a button. Also from this study shown not all IBS components can improved to the overall construction duration, however by adopting IBS components can improve and expedite the construction of 18 stories residential building from the point of departure of the project throughout of the whole of project's with a total 405 days or 42% the time saving.

Keywords: Construction Management, Scheduling, Residential Building, Using, Primavera

1 INTRODUCTION

Single-storey buildings have become an essential part of today's architects due to the growing population and limited space available. Natural calamities are also a matter of great concern for building designs and materials used in building two-storey buildings. Every time a seismic event occurs somewhere around the globe, Nature reminds us that there are still many things to be done by practicing engineers to reach the goal of saving lives and property during these extreme events. However utility projects have their own features. The application of LOB and Linear scheduling techniques in utility projects are questioned by industrial professionals. For the underground utility project, the layouts of several utility lines are diverged. But on some locations, these utility lines intersect with each other, one over another. The construction of each utility line must be sequenced in this situation to avoid workspace conflicts, or lines with higher elevation are constructed ahead of the ones with lower elevation, and to provide work continuity for crews or resources.

This study will focus on the comparison of construction scheduling technique application in utility projects, such as Gantt chart, CPM, and LOB, and indicate advantages and disadvantages of each technique. It develops the modified LOB method which uses a group of linear equations to identify the construction interference locations of utility lines, estimate the interference time based on the historical production rate, and adjust the construction schedule to satisfy the construction constraints. It helps to avoid the construction interruption, keep the continuity of crew work, and avoid the delay of construction and cost overruns. Primavera Project Management is a flexible scheduling software package with many capabilities. The software is easy to learn and has a user interface similar to many other windows based programs. Primavera software is available in enterprise and stand alone versions which make it versatile for use by single or multiple users. Primavera uses Dynamic Data Exchange (DDE) and Object Linking and Embedding (OLE) to allow users to insert data, graphs, tables, and figures from other applications. It will also allow users to create project templates, which can be stored and used for future projects. The program can also be used to group and view multiple projects at the same time.

Primavera provides the ability to view the project in Gantt or PERT format. When viewing a Gantt chart, it will allow the user to roll up project activities to an appropriate level of detail, and filters can be applied to show only specific types of activities. Primavera also allows the user to customize colors and text to highlight pertinent information. Time, cost, quality target and participation satisfaction have been identified as the main criteria for measuring the overall

success of construction projects Of these, cost and time tend to be the most important and visible, always considered as very critical because of their direct economic implications if they are unnecessarily exceeded. This study to compare time performance of the conventional method of construction for highrise residential and Industrial Building System (IBS) method by formulate benchmark measures of industry norms for overall construction period using 'scheduling simulation modelling' Such model development necessitated the enumeration of a group of significant variables affecting construction times by adopting IBS of public housing projects. Actual project schedule and project information from 15 case studies of conventional and IBS method of construction were collected from the client organization and their registered building contractors to develop the prediction model by using mean analysis.

2. RISK AND ISSUES

2.1 Status Related Risks

This is not only a problem caused by the exclusive urban system. It is also related to the fact that workers from rural areas tend to move back and forth between the city and the village. They go back to the countryside when they cannot continue in cities. The lack of identification with the urban society among rural-urban migrants can potentially generate a major problem for the extension of formal social security: A low participation rate in the urban welfare system and continued reliance on rural social security, which is still largely distinctive from the urban system.

3.PROJECT MANAGEMENT

Primavera Systems, Inc was a private company providing Project Portfolio Management (PPM) software to help project-intensive organizations identify, prioritize, and select project investments and plan, manage, and control projects and project portfolios of all sizes. On January 1, 2009 Oracle Corporation took legal ownership of Primavera. Primavera Systems, Inc. was founded on May 1, 1983 by Joel Koppelman and Dick Faris. It traded as a private company based in Pennsylvania (USA), developing software for the Project Portfolio Management market. To help expand its product capabilities, Primavera acquired Eagle Ray Software Systems in 1999, Evolve Technologies (a professional services automation vendor) in 2003, Pro Sight (an IT portfolio management software vendor) in 2006, and, in the same year, Pert master (a project risk management software vendor).

3.1 Planning, Controlling, And Managing Projects

Before implementing Primavera to schedule projects, team members and other project participants should understand the processes involved in project management and the associated recommendations that help smooth the Primavera implementation that supports your corporate mission. If you were driving to a place you had never seen, would you get in the car without directions or a map Probably not. More than likely you'd take the time to plan your trip, consider alternate routes, and estimate your time of arrival. Planning the drive before you even left would help your trip be more successful. And, along the way, should you encounter road blocks or traffic delays, you would have already identified alternate ways to reach your destination.

3.2 Attributes Of A Project Management Plan

The project team has to select a set of processes that would be implemented in order to complete the project. There are a total of 44 project management processes that are organised in 9 knowledge areas. Some important project management processes are

- Develop Project Charter
- Develop Preliminary Project Scope Statement
- Develop Project Management Plan
- Scope Planning
- Risk Analysis etc.
- For Complete list of all project management processes refer to my post "Project Management Process and relationship with project management knowledge area

3.3 Inputs Required For Project Management Plan

3.3.1 Preliminary Project Scope Statement

The preliminary project scope statement documents the characteristics and boundaries of the project, and its associated products and services, as well as methods of acceptance and scope control.

3.3.2 Enterprise Factors

Government and Industry standards, Quality Standards, existing facilities, existing human resource, stakeholder risk tolerances, costing estimates, industry risk databases, existing information system etc.

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3.3.3 Organisational Processes

Health and safety policies, Quality checklists, process audit and improvement targets, standardized work breakdown structure templates, risk templates, standard guidelines for performance measurement criteria, Communication guidelines, financial guidelines, record retention and information security system guidelines, vendor management policy, change control procedures and guidelines, document creation, approval, control and retention guidelines, project closure guidelines.

3.4The Basic Elements Of Project Management

Most projects can be divided up into five basic stages and processes. Terms that are commonly used for these are: initiation ('kick-off' or start), planning and development, production and implementation (sometimes known as execution), monitoring and controlling and closing. All projects will use these basic elements but at a level appropriate to the size and complexity of the project.

3.5 The Basic Mechanism Of Project Management

3.5.1 Defining Your Scope

The scope of a project is everything that the project (team) will change, deliver and is responsible for. The processes of delivering the project scope should be factored into a project plan. The scope is usually clearly defined by the planning and development phase of any project.

3.5.2 Creating A Project Plan

A project plan is a detailed proposal for doing or achieving the objectives and goals of a project. A project plan should detail the 'what, when, how and by whom' of any project and is a key resource to successfully managing work. Project plan templates can vary depending on what you are trying to achieve, but there are many examples available for free or from professional bodies. You can also use a software program to compile a project plan although this is probably best suited to large or complex projects. A simple tool such as a year planner or calendar can be effective for working out the timeline and showing the various dependencies for a smaller project.

3.5.3 Identifying And Logging Risks And Issues

Risk and/or issue registers are common tools for identifying, analysing and managing risks (something which has not yet occurred) and issues (something which has already occurred).Using these registers, project teams can estimate and adjust their planned activities, taking into account risks and issues, thereby managing their impact.

3.6 SWOT Analysis

A strengths, weaknesses, opportunities and threats (SWOT) analysis is a commonly used strategic tool to evaluate a project or a business. In relation to a project, the analysis can be defined as:

- strengths - factors within the project or organisation that are helpful to achieving objectives
- weaknesses - factors or constraints to the project or organisation that are harmful to achieving objectives
- opportunities - external conditions that are helpful to achieving objective
- threats - external conditions which could hinder achieving objectives

3.7 Creating A Project Library
- Depending on the complexity, length, and number of people and parties involved in a project, keeping track of and allowing access to the relevant documentation can be vital to ensuring a project is successful.
- Without a proper, centralised system of logging and storing of information about a project, important data can become lost or inaccessible very quickly, with a risk of poor version control meaning that there may be both a duplication of effort and conflicting iterations of project documents in circulation.
- It is therefore worth considering creating a project library so that each individual or party has easy access via a single point to the most up-to-date information about the project. You should make sure that these documents will be accessible in the future - eg in a shared file rather than on an individual's computer.

3.8 Closing A Project

At the end of a project it's always worth carrying out a 'lessons learned' exercise. This isn't just to record what went wrong or to congratulate yourselves about what went well. It should provide a valuable reminder of things that worked efficiently, what was less effective and why, and what this teaches you so that you are better equipped to undertake another project in the future. It's worth asking the opinion of everyone on the project team under a set of headings.

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3.9 Analysis

Study conducted to analyse how long does it takes to assemble the components at the site to produce the entire conceptual building of the high rise residential building. It is important also to determine whether it takes the same speed and time to install the Industrialised Building System (IBS) components compared to conventional cast-in-situ method. Scheduling of IBS components at site can also help to further determine the work duration of the entire project implementing IBS components, as compared to conventional methods. The assembly and erection of the conceptual high rise residential building have been modelled and analysed using computer software. More emphasize given on how the scheduling on assembly time is carried out efficiently at a site using IBS components for the high rise residential building.
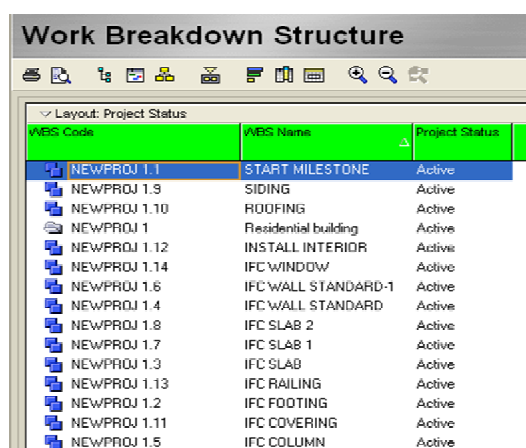
4. TOOLS OF PRIMAVERA

4.1 Enterprise Project Structure

Assume a company "NGC" i.e. Naz Group of Contractors. And we assume that NGC has categorized its projects in three categories/programs1. Each Category/Program is called an independent EPS Node and are Training, Infrastructure and Pipe Line Projects. Each Node is further divided into sub-nodes. Under Training EPS node, there are two sub-nodes i.e. P3 and P6. Similarly, under Infrastructure Projects EPS Node, there are two sub-nodes i.e. Buildings and Roads. The third EPS node which is Pipe Line Projects also has two sub-nodes that classify projects based on location i.e. projects in Dubai and in Qatar. The objective of this example is to comprehend the procedure of grouping the projects based on any required parameter.

4.2 Work Breakdown Structure

One of the first steps in planning a project is to break down the project into its major deliverables i.e. major product or service components. This is known as the Work Breakdown Structure (WBS) shown in Figure.4.1. After you have created the WBS, you can then create the activities required to achieve those deliverables. This article discusses the WBS, and demonstrates how to create a simple WBS in Primavera P6.Unlike some scheduling software programs that are somewhat of a bottom up approach, Primavera P6 encourages you to create a work breakdown structure (WBS) at the beginning of the project. This is known as a top down approach. Primavera P6 recognizes the importance of the project management team keeping their "eye on the ball" throughout the project life cycle. This means that you maintain a focus on the end product or service, which is the whole purpose of the project. The WBS helps you maintain this focus on the product. At its heart the WBS is a deliverable-oriented decomposition of the project into smaller components. So the WBS focuses on the deliverables, and it is simply a breakdown of all the components making up the product in a hierarchical fashion. Primavera P6 has you create the WBS first, so that the activities on the project schedule flow from the WBS in a top down method, and not the other way around.

A project schedule must have just the right amount of detail to show critical work but not so much that it inhibits the construction engineer or contractor in maintaining and updating the schedule.(Figure.4.2)

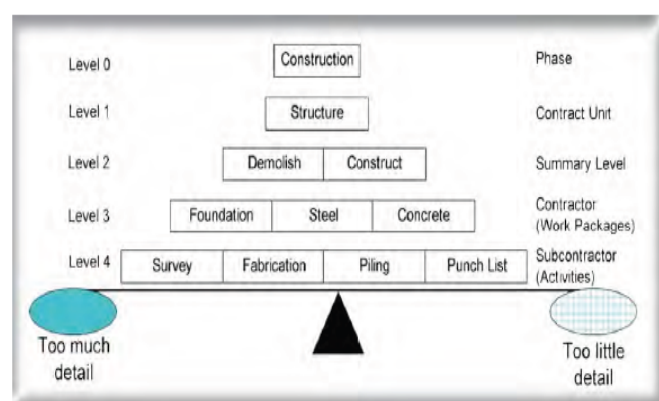**Figure. 4.1** WBS Window   **Figure.4.2** WBS Level of Detail

4.3 GANTT Chart Scheduling Method

The bar chart was originally developed by Henry L. Gantt in 1917 and is called a Gantt chart. A bar chart is —a graphic representation of project activities which are shown in a time-scaled bar line with no links shown between activities. It quickly became popular in construction industry because of its ability to graphically represent a project's activities on a time scale. A bar chart has become a vehicle for representing many pieces of a project's information. A

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project must be broken into smaller, usually homogeneous components, each of which is called an activity or task. Bar charts basically use the x-axis to depict time, and the y-axis is used to represent individual activities.

4.3.1 Advantage of Bar Chart

Bar charts have gained wide acceptance and popularity mainly because of their simplicity of and ease of preparation and understanding. No ―theory or complicated calculations are involved. Anyone can understand them. Bar charts particularly appeal to persons who do not have a technical background. For example, some clients and upper-level managers may better understand the plan for carrying out a construction project by looking at a bar chart than by looking at a schematic of logic network. The advent of the critical path method (CPM) and the evolution of powerful computers, bar chart did not perish or lose importance. Instead, they evolved to a different supporting role that made them more valuable and popular.

Bar charts are time scaled, the length of the activity bar represents the time duration of the activity). Both the node, in the node networks, and the arrow, in the arrow networks, are not time-scaled.

- Bar chart are simple to prepare.
- Bar chart are easy to understand.
- Bar chart are acceptable for presentation, especially for field   people and people who are unfamiliar with the CPM.
- Bar charts can be loaded with more information, such as cash-flow diagrams and man-hours.

4.4 Network Scheduling Method

One of the major network scheduling methods which have been used in the construction industry is CPM (critical path method). This method involves the use of a geometric representation of flow chart which depicts the precedence between activities. The critical path method (CPM) is a duration-driven technique in which the basic inputs are project activities, their durations, and dependence relationships. Activity durations are functions of the resources required (rather than available) to complete each activity. The CPM formulation assumes that resources are not restricted in any sense . The use of network techniques and CPM by construction companies has reached a steady level after the enthusiastic boom of the early 1960‘s. Computer programmes eliminate the need to prepare a network, but the network notation provides an easily understood output format for management personnel.

4.4.1 Advantages of Network Scheduling Method

When comparing bar charts with networks, three advantages over bar charts:

- Network show logic, the relationships among the activities. Bar charts do not
- Networks can better represent large and complicated projects.
- Networks can estimate, or predict, the completion date of the project, or other dates, on the basis of mathematical calculations of the CPM.

4.4.2 Limitation of Network Scheduling Method

Comparing to bar charts, network scheduling is not time scaled. It requires practitioners to be trained to understand the CPM. From the authors‘ experiences, the presentation of CPM is not as acceptable for field people as bar chart. And resource information cannot be loaded in CPM. Some scheduling software vendors tried to take the advantage of time-scaled feature of bar chart and impose it on network which some persons called time-scaled logic diagrams. On the other hand, there is evidence that contractors do not use networks in highly repetitive jobs because of their belief that high repletion would reduce the chances of successful scheduling and control by networks. This may cause difficulties in communication among the members of the construction management team. The second problem is that the CPM algorithm is designed primarily for optimizing project duration rather than dealing adequately with the special resource constraints of repetitive projects. The CPM algorithm has no capability that would ensure a smooth procession of crews from unit to unit with no conflict and no idle time for workers and equipment. This leads to hiring and procurement problems in the flow of labor and material during construction.

4.5 Line Of Balance (LOB)

The line of balance (LOB) method was originated by the Goodyear Company in the early 1940s and was developed by the US Navy during the Second World War for the programming and control of both repetitive and non-repetitive projects. A common characteristic of LOB techniques is the typical unit network. Representative construction projects that fit into this category are a repetitive housing project or a high-rise building. Linear construction projects often consist of repetitive processes which have different production rates. This phenomenon of production rate imbalance has the potential for negatively impacting project performance by causing work stoppages, inefficient utilization of allocated resources, and excessive costs. Production rate imbalance occurs when the production curves of leading

processes intersect the curves of following process because of different production rates and insufficient lag between start times of processes.

The LOB can determine at any time:

- Shortage of delivered materials which may impact production;
- Materials which are being delivered in excess which may cause additional material handling or require additional storage space;
- The jobs or processes which are falling behind and the required rate of acceleration to satisfy the required LOB quantities;
- The jobs or processes which are ahead of schedule which may b e placing heavier demands on operating capital than necessary, and
- A forecast of partially completed production units by job, work station, or process to support the delivery schedule of finished units.

4.6 Activity

The capability to setup and assign Activity Codes to activities in your projects. Activity Codes are used to classify, categorize, and organize activities based on your organization's reporting needs. Activity Codes are usually created and assigned at the beginning of the project. For example, if you subcontract the majority of your project activities, you may want to setup an activity code entitled "Subcontractor". You can then establish the set of all Subcontractors that might be used (ie. activity code values). The Activity Codes can be assigned to activities and used to categorize, organize, group and sort, and filter activities to support your reporting needs.

4.6.1 Activity Codes Can Be Used For The Following:

- Group and sort activities into specific categories in the activity table & layouts
- View summary bars on the Gantt Chart based on activity code values
- View and roll up activities in the activity table
- Summarize activities
- Filter activities
- Build reports in the wizard or editor
- Examples of activity codes include Phase, Location, Responsibility, Subcontractor.

4.6.2 Activity codes can be setup at three levels:

- **Global** – Users can create an unlimited number of global activity codes, which are available to all activities in your P6 database. This level enables you to organize activities within a single project or across the entire enterprise project structure (EPS).

- **EPS** – These codes are available to activities within an EPS node. Users are able to create an unlimited number of EPS level codes. Activities can be organized within a single project or across all projects sharing a common EPS node.

- **Project** – Codes are available to activities in the project in which the codes are created. Users can create up to 500 project-level activity codes. Project codes allow you to organize and filter activities based on unique project reporting requirements. (Figure.4.3)
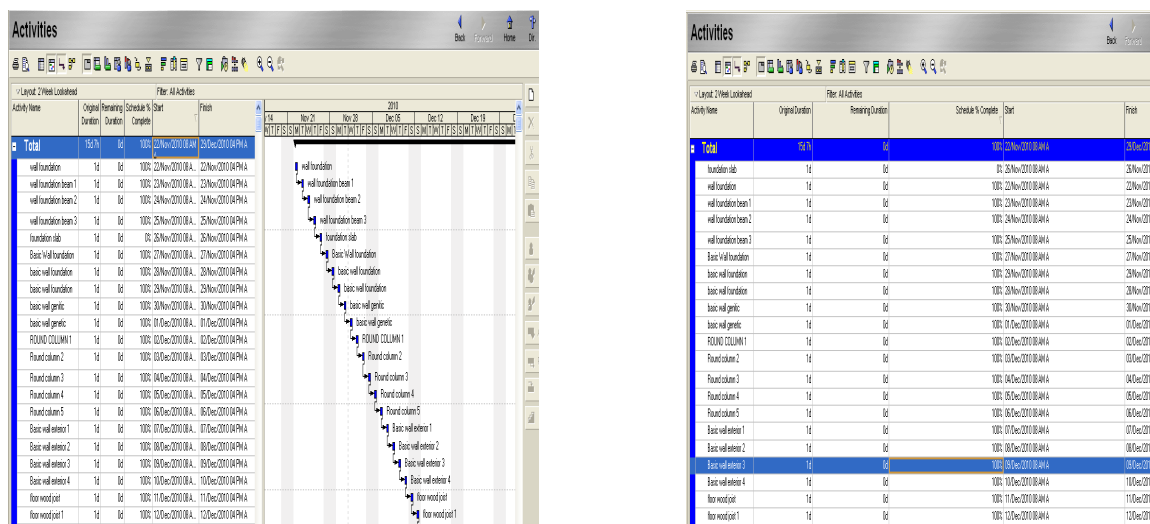

Figure. 4.3 Activity Before Assessing The Issues And Risk Factors

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4.7 Network In Primavera

Use the Activity Network View to display a visual diagram of your project's activities and activity relationships according to the work breakdown structure (WBS). The Activity Network View depicts the sequencing of activities within a project using boxes that represent groups, work breakdown structures, milestones, and activities, and arrows that represent relationships between activities. An Activity Network is a graphical display of activities and their logical relationships according to the WBS. You can use an Activity Network to view activity relationship paths and the flow of work through a project(Figure.4.4). Activity Networks also allow you to examine and edit an activity and its predecessors and successors. One of many attributes for an activity, the Activity Type determines how the activity is scheduled according to various scheduling scenarios:

Task Dependent: This type of activity indicates that assigned resources should be scheduled based on the activity's calendar, rather than the calendars of the resources.
Resource Dependent: This type of activity indicates that resources should be scheduled based on their assigned calendars. Use this type when the activity duration may be affected by resource availability.
Level of Effort: This type of activity indicates that it is ongoing with a duration determined by its dependent activities. The duration is calculated based on the schedule dates of its predecessors and successors. Administrative activities are typically designated as Level of Effort.
Start Milestone: This type of activity indicates the beginning of a major project phase. Activities of this type have a duration of zero (0) with no resource assignments.
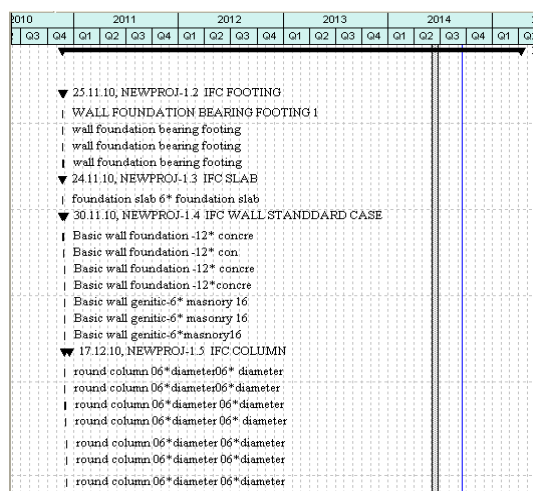

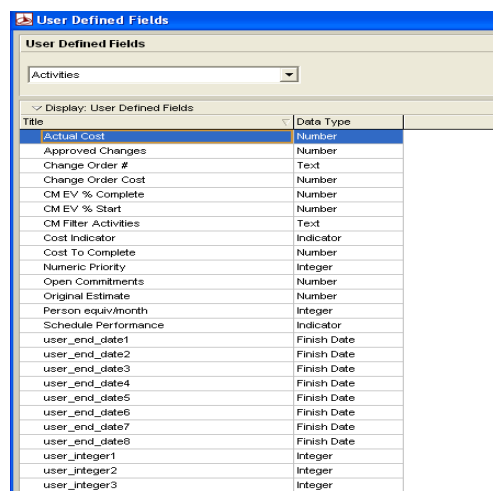**Figure. 4.4** Network Diagram for represents in primavera   **Figure.4.5** User Defined Field

4.8 User Defined Fields

User defined fields allow you to create and maintain data specific to your organization. For example, you can track additional activity data, such as delivery dates and purchase order numbers. You can also track additional resource data or project cost-related data, such as profit, variances, and revised budgets. User defined fields are global, so they can be used across all projects in your organization. You can also create project user defined fields. Project user defined fields track information specific to projects. For example, your organization might require a custom field to track project profit. Project user defined fields are unique in that you can define a formula or statement to automatically calculate field values, and identify graphical indicators to display for a field, based on its value (Figure.4.5)

4.8.1 Risk UDFs

Create risk user-defined fields (UDFs) to store additional project risk data on the Risks page that is pertinent to your project or business and is not available from the default fields. For example, you might need to include a location field to identify where the risk might occur, or a ranking field to determine the order in which the risks will be handled. UDFs can be of many types: text, start date, finish date, cost, number, integer, or indicator. Data from UDFs is not used in scoring calculations.

4.8.2 Indicators For User Defined Fields

Define indicators for user defined fields (UDFs) that will display based on criteria set for field values. For example, you can choose a graphical indicator to display when the value of the field equals a certain number, or when the value of the field falls between a certain range of dates. You must create a project user defined field before defining an indicator.

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4.9 Constraints

Constraints are recognized real-world restrictions that affect project performance. Any factor that potentially delays when an activity can be scheduled is a constraint (Figure.4.6). The most typical constraints are date restrictions. Constraints can apply to the entire project or only to individual activities and can even reflect external project requirements that cannot be built into the network logic. Some examples of constraints are: must finish by (project-level constraint) and start on or after (activity-level constraint). Constraints are used to build a schedule that more accurately reflects the real-world aspects of the project, provide added control to the project, and impose a restriction on the entire project or an individual activity. Typically, only contractual constraints such as the contract completion date will be allowed in the original baseline schedule. The EIC needs to identify and approve any constraints used in the schedule. Upon approval by the EIC, the contractor may add constraints in monthly progress schedule to reflect situations such as dates provided for in a Utility Relocations Agreement, etc. Many times when Contractor's state they need a constraint for an activity where a date needs to be met in the contract, instead these dates just need to be monitored to assure that they are not exceeded.

4.9.1 Activity Constraint Dates

The Contractor shall not have any constrained activities, with the exception of contractual dates, unless the Engineer accepts such constraints in writing. Milestone activities shall be included for the Contract Award which shall have a primary constraint of "Finish On" and the date of contract signature by the State Comptroller, and for the Contract Completion which shall have a primary constraint of "Finish on or before" and the contract completion date indicated in the contract documents. Only contractual/owner-designated constraints are allowed unless specifically authorized by this specification or the Engineer.
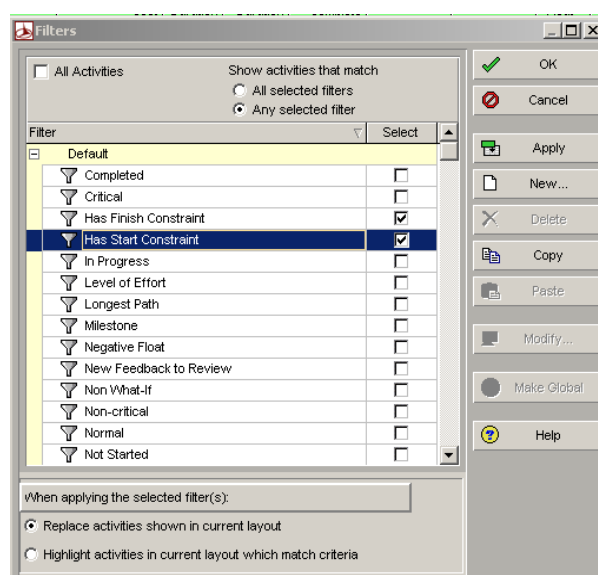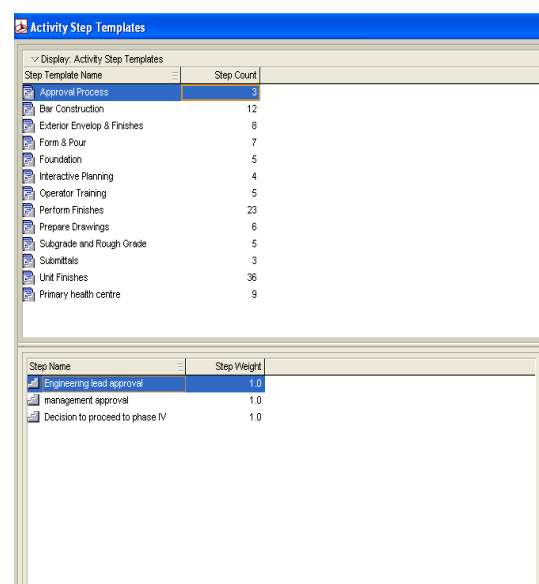

Figure. 4.6 Constraint Window   **Figure.4.7** Activity Step Templates

4.10 Steps

Steps make it possible to describe and report progress for activity work at a granular level by breaking an activity into its component parts. Steps can have a step weight that quantifies the portion of an activity's total work that each step represents. On a project per project basis, you can use step weights to calculate Activity Percent Complete. For example, three steps are assigned to an activity; the first step has a weight of 2, and the second and third steps each have a weight of 1.When mark the first step (weight of 2) as complete, the percent complete is 50. When you mark the first and second steps complete, the percent complete is 75. When all three steps are marked complete, the percent complete is 100. Activity steps make it possible to describe and report progress for activity work at a more granular level of detail. If you have privileges to edit activities, you can add individual steps to activities, or you can add predefined groups of steps based on templates that have been defined for your organization. You can specify a weight for each step to show how much work for the activity is contained in a step.

4.10.1 Activity Step Templates

Step templates enable an organization to define groups of steps that can be shared by many projects. By creating templates for groups of activity steps that are relevant in many projects, an organization can streamline data entry and ensure that work is identified consistently throughout the organization. In P6, when adding steps to an activity, you can

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choose from a list of available templates. You can use more than one template, but you can add steps from only one template at a time. If you use a template to add steps to an activity, you can edit the step details but not the step name.

4.10.2 Weighted Activity Steps

To indicate the portion of activity work that a single step represents, you can assign it a numerical value, or weight. Once work for a step is underway, Primavera can use the step weight and the reported progress of step work (Step Percent Complete) to calculate the percentage of total work that has been completed for the activity. Step templates enable you to define a group of steps common to multiple activities, and then assign the template to different activities. By creating templates for groups of activity steps that are relevant in many projects, an organization can streamline data entry and ensure that work is identified consistently throughout the organization.

4.11 Trace Logic

Trace logic provides a graphical display of dependency relationships for an activity. You can step forward or backward through a sequence of activities to focus on predecessor and successor relationships. This alternative viewing format enables you to examine a path of relationships while still viewing the entire project. Trace logic provides visual cues to help you read the diagram. The selected activity is highlighted in blue. Activity boxes with a red border represent critical activities. Activity boxes to the left of the selected activity are predecessors. Activity boxes to the right are successors. Solid lines represent driving relationships, while dashed lines represent non-driving relationships. You can manage activity relationships using the detail windows or Gantt chart on the Activities page. When multiple projects are open, you can even add relationships between activities in different projects. You can view activity relationships in the Trace Logic detail window on the Activities page.

4.12 Cost Accounts

Cost accounts enable you to monitor project expenses, activity costs, and earned value throughout the project life cycle. Costs are attached to activities and resources so you can track the amount of work accomplished against the amount of money spent. You can assign default or created cost accounts to any project. Cost accounts are established in a hierarchy. For example, if you created a cost account for a project component such as hardware, you would create other cost accounts beneath this component to show its parts such as coding and installation.

4.13 Baselines

A baseline is a copy, or snapshot, of project data at a given time. Because a baseline is a static representation of a project plan, it can be used as a benchmark against which to measure performance as a project progresses. You can create multiple baselines to establish metrics throughout the project life cycle. Typically, you would want to create an initial baseline once the project plan is approved, then you would create additional baselines according to your organization's requirements. For example, you could create new baselines at specific reporting intervals. Although many baselines can be created for a project, only two baselines can be used at any given time to display and compare data. These are known as the Project Baseline and User's Primary Baseline. The current project can also be used as the baseline, for example, in situations where no other baseline yet exists. The Project Baseline is a single metric for comparison that enables all members of a team to have a shared and consistent set of data against which to evaluate project progress. There is only one Project Baseline at any time. All pages that display summarized data compare and display data against the Project Baseline. The User's Primary Baseline is an optional personal baseline that is used to evaluate project progress.

4.13.1 Baseline Progress Schedule

i) Defining Project details and defaults – Within the Dates tab, the "Planned Start" shall be either the Letting Date or the contract Award Date, the "Data Date" shall be the date of Contract Award, the "Must Finish By" date shall be the contract Completion Date. Within the Settings tab, define the Critical Activities as the "Longest Path". The Project Scheduler role does not have security privileges to change this data in the project Details tab, so requests for changes to this data needs to be forwarded to the CPMSchedulingSection@dot.state.ny.us; include in your request the contract Dnumber and the ProjectID.

ii) Sufficient activities shall be included to assure that there is adequate planning for the entire project. The appropriate number of activities will be largely dependent upon the nature, size, and complexity of the project. In addition to all site construction activities, network activities shall include: activities necessary to depict the procurement/submittal process including shop drawings and sample submittals; the fabrication and delivery of key and long-lead procurement elements; testing of materials, plants, and equipment; settlement or surcharge periods activities; sampling and testing period activities; cure periods; activities related to temporary structures or systems; activities assigned to subcontractors, fabricators, or suppliers; erection and removal of falsework and shoring; major traffic stage switches; activities assigned to the Department and other involved State agencies and authorities, including final inspection; activities to perform

punch list work; and activities assigned to other entities such as utilities, municipalities, County government/agencies, and other adjacent contractors. The schedule shall indicate intended submittal dates, and depict the review and approval periods as defined in the Contract Documents for Department review.

4.13.2 BASELINE MANAGEMENT AND TARGETING

Previous editions of Primavera scheduling software target one version of a schedule to another. In other words, an updated schedule could be targeted to that schedule's baseline schedule, in order for the scheduler to examine how activities progressed compared to the plan. P6 has changed the targeting process and now uses the P6 baseline process. The P6 baseline is a copy of a project, intended to be a snapshot of a previous version of a project. P6 allows these P6 baseline schedules to be saved within another schedule, and use that P6 baseline as the basis of comparison. Once a P6 baseline is saved within a schedule, the current project's progress can be compared to the predicted progress. It is important to understand that, after a schedule is saved as a P6 baseline, it disappears from view in the Project window, and it can no longer be independently opened. A schedule can be restored into the Project window; however, for the time that it is a P6 baseline, access to that schedule is not available. It is important to understand that, after a schedule is saved as a P6 baseline, it disappears from view in the Project window, and it can no longer be independently opened. A schedule can be restored into the Project window; however, for the time that it is a P6 baseline, access to that schedule is not available. When a contractor submits a new update schedule, it is typical to save last period's update as a P6 baseline, so that the two schedules can be compared. P6 allows an unlimited number of P6 baselines to be saved per project, though only four (one project baseline and three user baselines) can be displayed in the Gantt Chart at one time.

- The application automatically assigns the baseline a name based on the selected project. For example, if you select Project A, the application will name the newly created baseline A - B1.
- Specify the default Project Baseline and User's Primary Baseline by selecting from the list of available baselines for each project in the table on the Baselines dialog box.
- Click Convert a Project to Baseline and select a project to convert a project into a baseline.
- Select a baseline and click Restore a Baseline to remove the baseline and make it a project.

5. CONCLUSION

This study compared time performance of the conventional method of construction for high- rise residential and Industrial Building System (IBS) method by formulate benchmark measures of industry norms for overall construction period using scheduling simulation modeling. The positive changes include creating a healthy working environment among those involved directly in the construction industry. Better Efficiency in Delivering Services: Project management provides a "roadmap" that is easily followed and leads to project completion. Once you know where to avoid the bumps and potholes, it stands to reason that you're going to be working smarter and not harder and longer. Improved Customer Satisfaction Whenever you get a project done on time and under budget, the client walks away happy. And a happy client is one you'll see again. Smart project management provides the tools that enable this client/manager relationship to continue. Enhanced Effectiveness in Delivering Services The same strategies that allowed you to successfully complete one project will serve you many times over And also Reduced risk and cost of schedule overrun. It helps easily plan and manage project activities, It optimizes management of all resources, It gives clear visibility of what's going on in the project, It allows quick and easy forecasting of WBS's, activities or projects.

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