

PLANNING & SCHEDULING OF EPC BUILDING WORKS USING PRIMVERA P6

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PROGRAM: MS (PROJECT
MANAGEMENT)



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LAHORE CAMPUS**

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SUBMISSION DATE:

11-Jun-2017

CERTIFICATE

This witness statement is issued to the applicants for the fulfillment of their MS (Project Management) program requirements being carried out at Bahria University Lahore Campus (BULC).

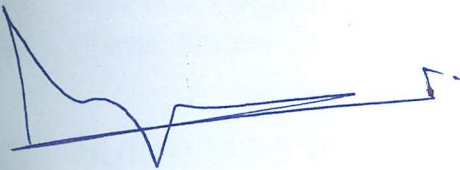
It is witnessed that **Mr. Abubakar Saddique** Enrollment: **03-298152-013** and **Mr. Moaz Tariq** Enrollment: **03-298152-012** Class: **MSPM-III** Semester: **SPRING 2017** has contacted / visited / frequently utilized our premises / participated in our real-time projects for implementing project management skills using EPM as a leading software tool.

They have contributed fully / partially in the following highlighted fields of project management

1. Planning
2. Scheduling
3. Monitoring & control

We found them skillful in applying EPM Primavera in the above highlighted fields

Additionally, It is noteworthy to mention that both above mentioned students have demonstrated good ethical practices, enthusiastic approach to work, task convergence capabilities and professionalism while in association with this organization.



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TIMELINE
CONSULTANTS
Project Management Group

EPC Building Works by Moaz Tariq

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PRIMARY SOURCES

1	Smigic, M., and G. Zivadinovic. "Application of primavera enterprise in electric power distribution of Belgrade", 18th International Conference and Exhibition on Electricity Distribution (CIRED 2005), 2005. Publication	1 %
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Abbreviations

EPS	Enterprises project structure
OBS	Organizational Breakdown Structure
WBS	Work Breakdown structure
EVM	Earned value management
CV	Cost variance
SV	Schedule variance
PV	Planned value
CPI	Cost performance index
CPM	Critical Path Method
SPI	Schedule performance index
BAC	Budget at completion
ACWP	Actual cost of work performed
BCWS	Budgeted cost for work scheduled
BCWP	Budgeted cost for work performed
EAC	Estimate at completion
VAC	Variance at completion
PMO	Project Management office
P6	Primavera P6

ACKNOWLEDGMENT

Up and above anything else, all gratitude and praises are due to ALMIGHTY ALLAH alone, the most Gracious, Merciful and Compassionate, the Creator of the universe, who enabled us to complete this report successfully. It is a matter of great pleasure and honour for us to express our deep sense of gratitude for the time devoted to us by **Mr. Afzal Ali Khokhar** Resident Engineer *Timeline Consultants*. Who facilitated us by enabling us to gather the data required for our project and helping us anyway he could along the way.

We are also thankful to everyone who contributed towards the completion of our report including special thanks for **Mr. Faisal Shehzad** (Course Supervisor) who helped us immensely during the most difficult phase of our report. Finally, we extend our cordial gratitude and our special regards to our most respectful affectionate and loving parents, who have always prayed for our success and betterment.

Abstract

Our project is to carry out Planning and Scheduling of EPS Building schedule using Primavera P6, a modern world tool to implement the best Project Management Practices dictated by PMI. Primavera is enterprise project portfolio management software. It includes project management, product management, collaboration and control capabilities and integrates with other enterprise software such as Oracle and SAP's ERP systems. Report includes the brief history of the Organization that undertook the said project, context in which project was carried and most importantly it discusses how Planning & Scheduling of the said project was carried how using Primavera P6. Report also includes necessary supporting the literature, the conclusions and recommendations being rendered after having the work on Primavera and the understanding/issues/familiarity with new features (CBT Log) that was perceived/ realized during working on Primavera.

In this report we have used different earn value techniques and What If analysis details are attached in report.

Declaration of Authentication

We, MSPM, Student in the Department of Management Sciences, Bahria University, Lahore Campus, certify that the work presented in this report is to the best of our knowledge.

All sources used and any help received in the preparation of this dissertation have been acknowledged.

Copyright

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1 CHAPTER-1: Introduction

1.1 The Company

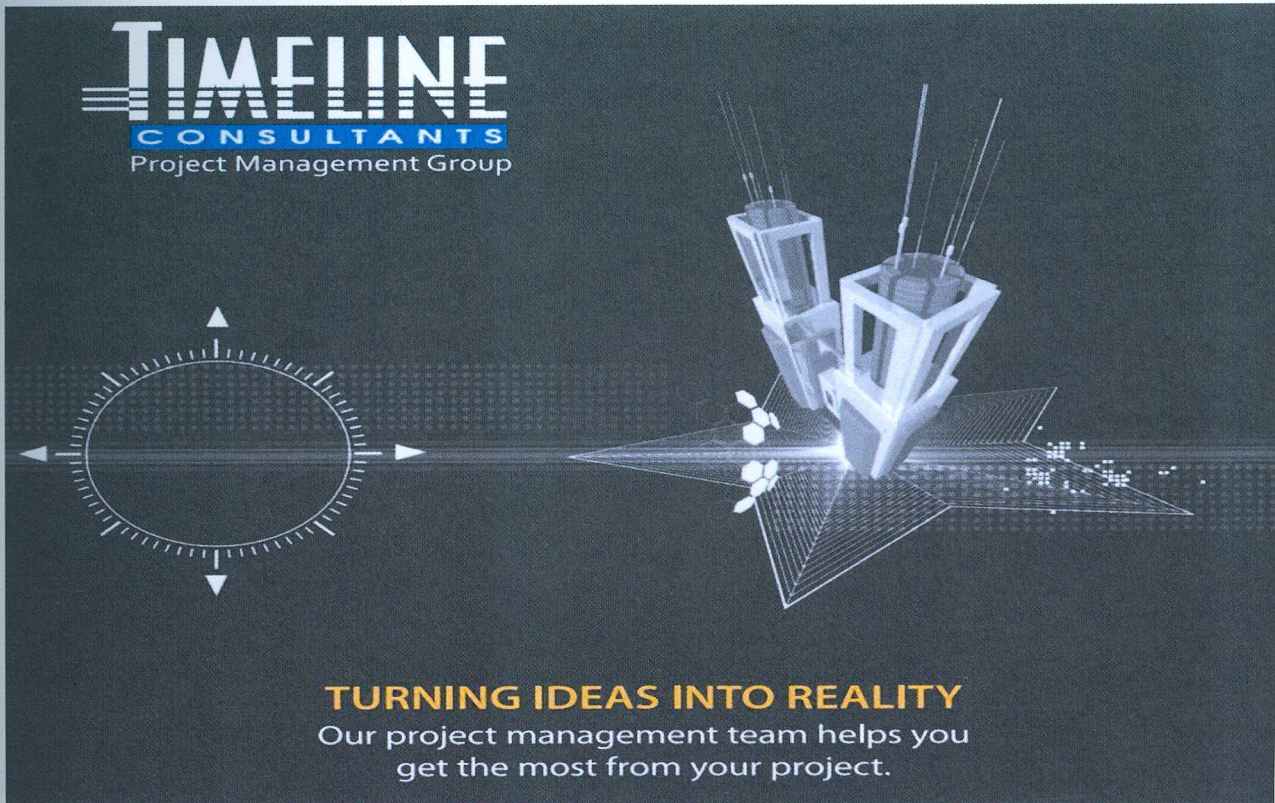


Figure 1 Timeline Logo

Timeline Consultants was setup by Mr. Qazi Mohammad Mohsin after a 25 year career as a Project Manager in spanning construction projects all over Pakistan and abroad. Timeline Consultants was formed in 2005 from a team of high capability individuals having well proficient experience in construction industry.

Due to the growing demand in project management field; Timeline specializes in providing affordable, innovative and practical engineering, project management solutions aimed at saving the client's time and money. With team of premier professionals, Timeline is determined to produce high-quality, clear and accurate plans that enable projects to be completed with certainty, efficiency, minimizing the cost on-site delays and contract.

1.2 Vision

“We are dedicated to move forward as one of the leading project management company of Pakistan that not only support our clients dream to become reality, but also promote growth and development for our community that consistently meet the international standards.”

1.3 Mission

“To provide our clients with innovative, affordable and practical solutions for their investment objectives, through a dedicated team who ensures high quality standard of work is delivered within the given finances and on time”.

1.4 Corporate Strategy

“As a business partner Timeline will provide the engineering expertise and dedication to build your project from inception to completion. Timeline forte is quality. The work is ensured according to international standards and compliance is ensured through quality assurance systems. Through careful planning and detailed project execution, our pool of experience and qualified professionals ensure to provide customized solutions as per client’s requirement.

As a professional project management consultant our main objective is to keep the owner well informed and advise them to make the best decisions possible. We accumulate a professional team of people whose job is to maximize the productivity of work and minimize its cost effect where possible. Our capability to calculate accurate budgets, creating realistic schedules, obtaining agency entitlements and coordination between the project team has helped save our clients substantial amount of capital.

With a professional understanding of design, construction, legal obligations and attention to details, our goal is to provide satisfaction to our clients with in the given budget and time, but above their expectation.’

1.5 Project Management

A project is one of a kind in that it is not a normal operation, but rather a particular arrangement of operations intended to fulfill a solitary objective.

Project Management, then, is the utilization of information, aptitudes, instruments, and strategies to venture exercises to meet the undertaking prerequisites.

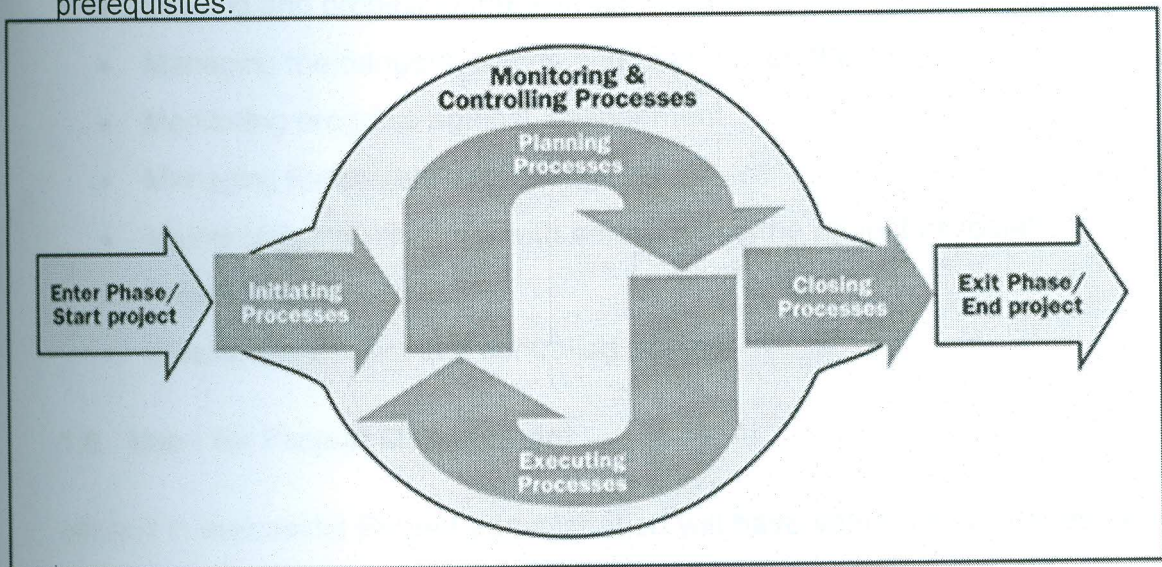


Figure 3-1. Project Management Process Groups

A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition. ©2008 Project Management Institute, Inc. All Rights Reserved.

Figure 2 Project Management Process Group

Project management processes are subdivided into five groups:

- Initiating
- Planning
- Executing
- Monitoring and Controlling
- Closing

The main components of project management are enlisted below

- Defining the motivation behind why a venture is important; Capturing Project prerequisites, indicating nature of the deliverables, assessing assets and timescales;
- Preparing a business case to legitimize the speculation
- Securing corporate understanding and subsidizing
- Developing and executing an administration arrangement for the task
- Leading and propelling the task conveyance group
- Managing the dangers, issues and changes on the venture
- Monitoring progress against arrangement
- Managing the project's spending plan
- Maintaining interchanges with partners and the project association
- Provider Administration
- Closing the Project in a controlled manner

1.6 Need for Project Management

Interest in successful Project administration will have various advantages to both the host association and the general population required in conveying the undertaking. It will:

- ✓ Provide a more prominent probability of accomplishing the fancied result
- ✓ Ensure effective and best esteem utilization of assets
- ✓ Satisfy the varying needs of the undertaking's partner

1.7 Product Portfolio

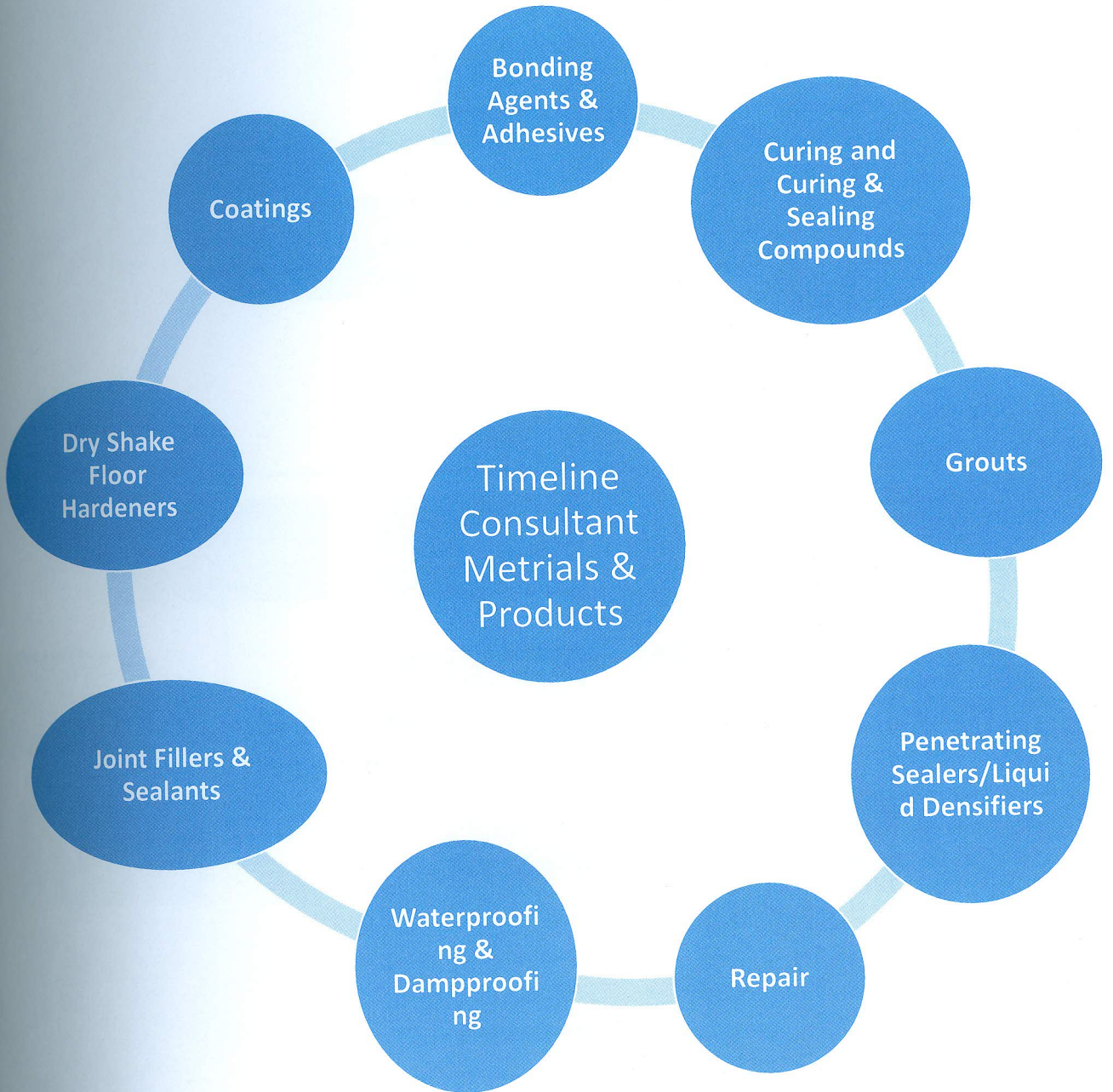


Figure 3 Portfolio

1.8 Organizational Chart

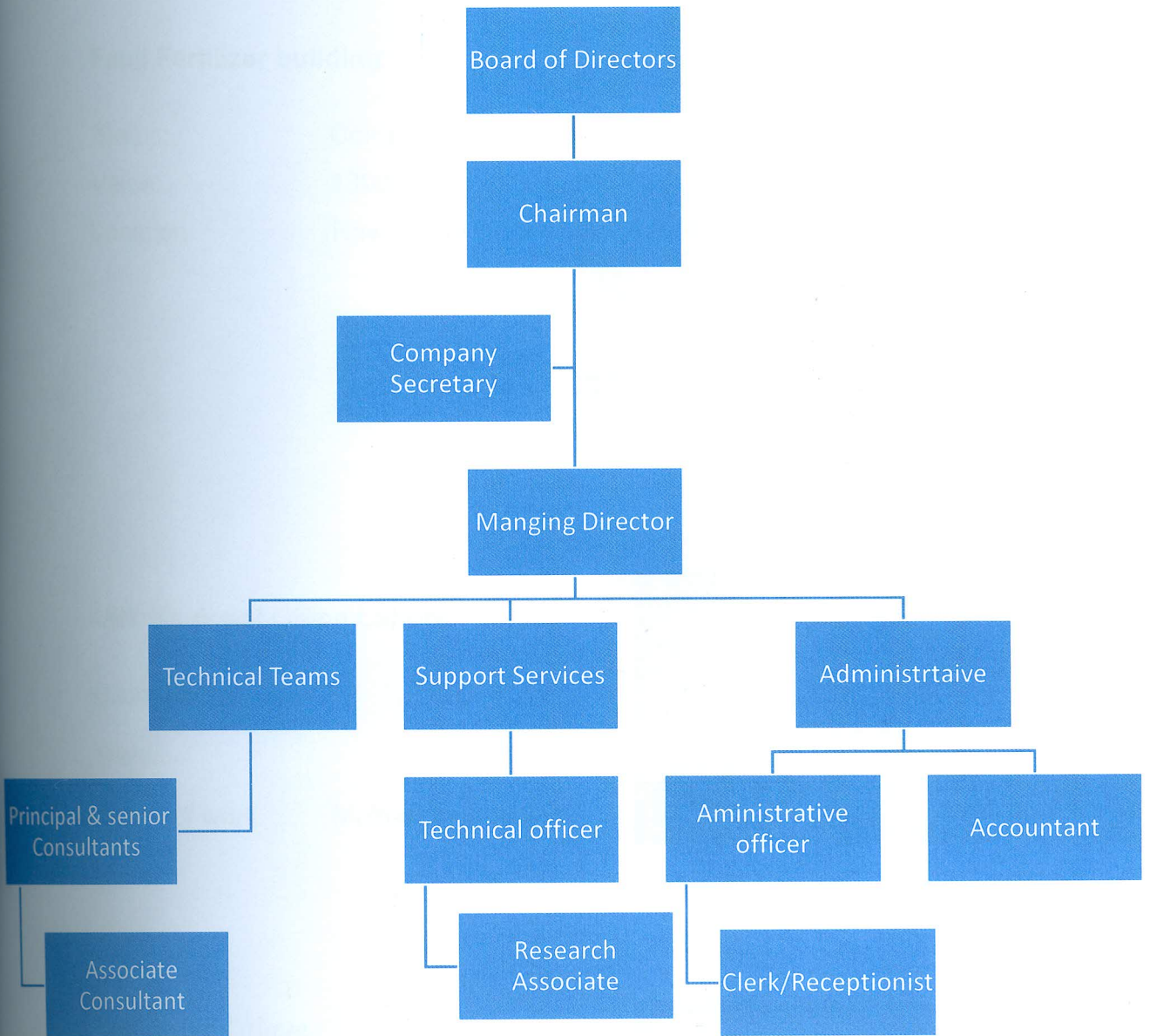


Figure 4 Organogram

1.9 TimeLine Consultancy Projects:

Fauji Fertilizer building

Status: Completed
Value: 1300
Location: Rawalpindi



Figure 5 TLC Projects 1

UBL Regional Office Lahore:

Client Name: UBL
Status: In progress
Scope of work: Multi-story building



Figure 6 TLC Projects 2

CBL Head Office:

Location: Zafar Ali rd Lahore
Covered Area: 18530 sqft
Cost: 100M



Figure 7 TLC Projects 3

AMANAH MALL:

Location: Lahore
Covered area: appx 300,000 sft



Figure 8 TLC Projects 4

MARGALA HOTEL:

Location: Islamabad
Land Area: 50,000 sqft



Figure 9 TLC Projects 5

101 TOWER:

Location: Gujranwala
Covered area: approx. 80,000 Sft,



Figure 10 TLC Projects 6

Chapter 2 Primavera P6

STAR MALL & AVARI HOTEL:

Location: Gujranwala
Covered area: 350,000 sqft



Figure 11 TLC Projects 7

F-8 Villa

Location: Islamabad
Covered area: 15000 sqft



Figure 12 TLC Projects 8

With a professional understanding of design, construction, legal obligations and attention to details, our goal is to provide satisfaction to our clients with in the given budget and time, but above their expectation.

2 Chapter 2 Primavera P6

2.1 Introduction

Primavera Oracle P6 is a planning tool and integrated project portfolio management. Primavera contains a standalone windows interface, server oracle and Microsoft server database. Primavera P6 provide multi features to tackle the needs of project planners and schedulers. Primavera is basically a project management software which helps the users to track and analyze performance of a project. It is a multi-feature and multi user system which provides ease for planning in a best way. This software is perfect for stakeholders management who need to deal with different activities and need access over a division or the whole organization's projects. It supports an enterprise project structure (EPS). Primavera provides unlimited number of tasks, activities, baselines, resources, work breakdown structures (WBS), Organization breakdown structures (OBS), and Critical path method (CPM) budget and resource levelling.

Large scale usage for mega business wide project portfolio management require Oracle or SQL Server as the project database. For little usage standalone SQL Server can be utilized. The PM module likewise gives incorporated resource management. In expansion, the module gives coordinated risk management, issue tracking, and management.

Primavera provide detail reports to client and users some reports are for actual works, some are for budgeted and some are future/remaining works. These reports contain activities, resources and for cost. The Report Wizard makes accurate reports that concentrate particular information from its database. Moreover, primavera includes the following features.

- ✓ Work breakdown structures, user defined fields, codes, resources levelling support by a primavera.
- ✓ Same project can be access concurrently by multiple users

- ✓ One of the major features is tracking of issues in a project
- ✓ Threshold can be used for a management purpose
- ✓ Schedule, earned value and cross project rollups of cost are enables form tracking feature
- ✓ Providing opportunity to assign work products and documents to activities and managed them centrally
- ✓ By the help of visualize time based Gantt and Time scale logic diagram can be created
- ✓ Resource management become easy for a planner and project manager
- ✓ Different types of reports can be obtained from software for better understanding

2.2 Benefits of Primavera

There are many advantages for working with primavera. It is Oracle based programming which gives many advantages to an organizer and project supervisor. Some the advantages of primavera are as taking after.

2.2.1 Clear Visibility

It gives straightforward view that one ready to perceive what is new with a project at various time.

2.2.2 Forecasting

Anticipating can be enhanced with an entry of time as up-date data gives to see where there is to use asset progressively or not.

2.2.3 Instant Access

Advance can be track with a section of time and distinctive angles like asset, cost data can be acquired at whatever point required.

2.2.4 Monitoring

Checking can be better as it give data about the project through following and reports on advance.

2.2.5 Project Management

Less demanding project administration particularly in expansive scale and complex tasks.

2.2.6 Diminished risk

It not only prominent risk but also cost attached with schedule overhead.

2.2.7 Controlling

One can control project from alternate aspects of project.

2.2.8 Optimization of Resource

Asset can be used and administration all the more effectively and over allotment of asset can be asses through this device

2.2.9 Better communication

Communication among stakeholder and project members becomes more efficient and good.

2.2.10 Breakdown of project

It gives mechanism to easy breakdown projects with activities structure.

2.2.11 Collaboration

It provides easy collaboration in all users assigned to a specific project.

2.3 Organization breakdown structure

The Organizational breakdown structure is an overall levels of divisions that addresses the administrators accountable for the implementation in projects. The OBS for the most part mirrors the organization structure of your relationship, from top-level workforce down through the diverse levels constituting your business. You can relate the tried and true boss with their scopes of the EPS (Enterprise Project Structure) — either centre points or stand alone project. When you relate a project with an EPS , It become the part of OBS.

2.3.1 How to create Organizational Breakdown Structure

- ✓ click to Enterprise >> OBS
- ✓ In the pop up window click on display >> Filter by >> choose All OBS Elements
- ✓ Select Add and create a new OBS entry

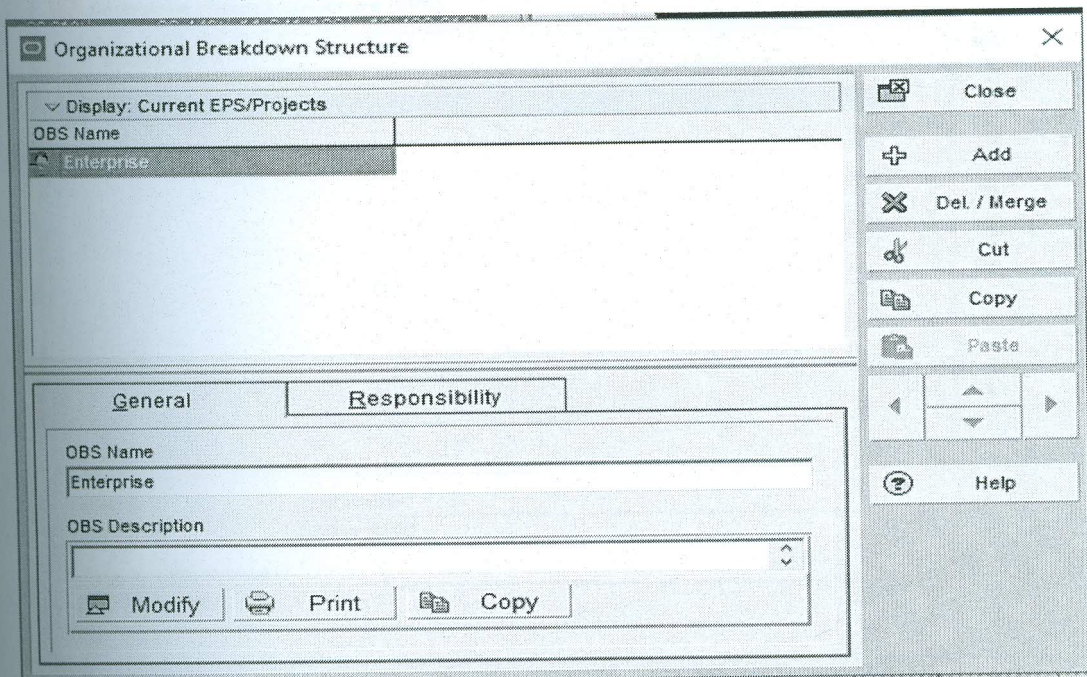


Figure 13 OBS

2.4 Enterprise Project Structure

The structure show and compresses all projects of an association inside the characterized project progressively for top down planning, cost and resource estimation. It likewise empowers one to deal with numerous activities from the top level of the association to the single level that performs specific project assignments. Besides, it used to characterize extend highlights like dates, spending plans, codes and assets.

2.4.1 How to Create Enterprise Project Structure

- ✓ Select enterprise form the top menu
- ✓ Click Enterprise project structure
- ✓ Move the arrow key to place the new element at the required position
- ✓ The respective responsible manager selected which was created in the OBS

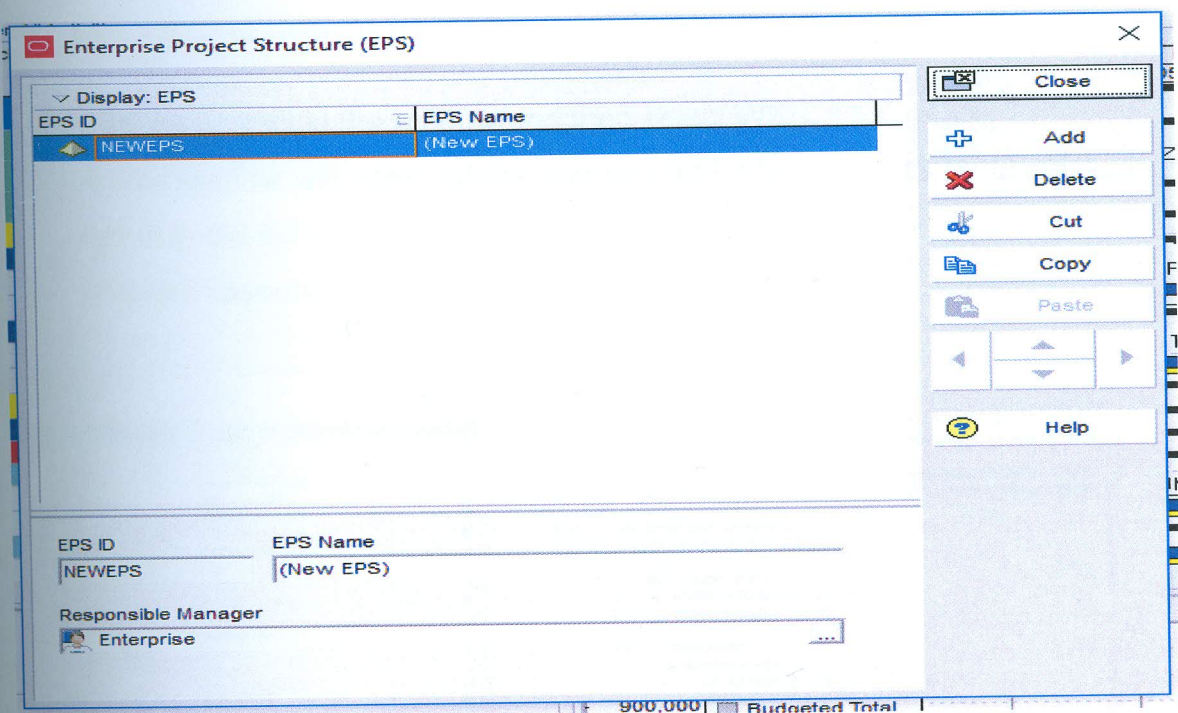


Figure 14 EPS

2.5 Work Break down Structure

WBS is the lowest level of a Project. This is again a hierarchal structure representing different relative and relevant activities and their relationships. This reflects an organized order that activities related to each other are all under the same level. Activities can be added to a specific WBS through “+” sign on the left top of the window hence activities can be added to respective

2.5.1 WBS levels.

This structured network gives us a framework for budgeting, scheduling, measuring and reporting a project status and its performance. It is important in a way that Project Manager is aware of all high and low levels of WBS and aware which area needs more attention to control the Project. The WBS provides a roadmap to plan the Project. A WBS also guides us a summary level check list to the activities that must be completed.

2.5.2 How to create WBS

- ✓ Click on Project in the window and then select WBS.
- ✓ A new window will open, where you can add different WBS by using Add option in the left up side of the window.
- ✓ Different Layouts can be obtained by using display options.

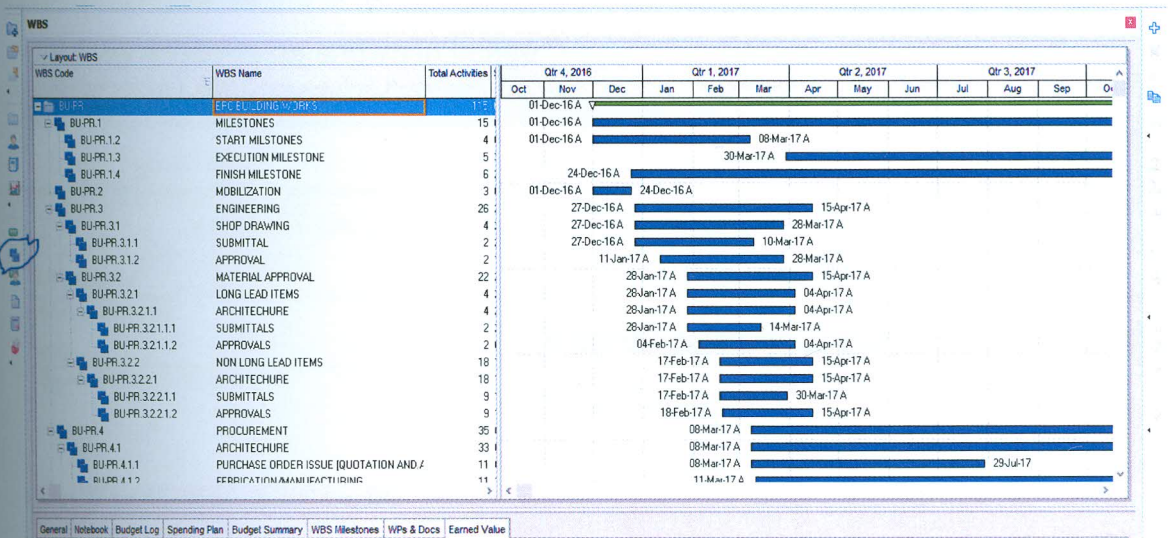


Figure 15 WBS View

2.6 WBS Summary

This Activity duration is assigned to the overall length of the WBS which is actually depending on the Starting date of the first activity of the WBS and the Finish date of the last activity of the same WBS. Hence its duration is overall time, the activities take in a WBS.

2.7 Resource break down Structure

Resource breakdown structure is same as different structures. It isolates the progressive system of resources as indicated by their cost. It is additionally the wellspring of resource sent out to project like labor, material and nonlabor. Resource estimation is vital for the accomplishment of a project as overloaded resources must be recorded at the highest point of the usage. Through resource breakdown structure stakeholders can comprehend about all resources and their management in the project deliverables alongside the aggregate costs happens in consumption of project.

2.8 Activity types in Primavera

There are different activity types in primavera, Activity types are selected at project level for all the project activities and also can be selected for each activity at activity windows as shown in image.

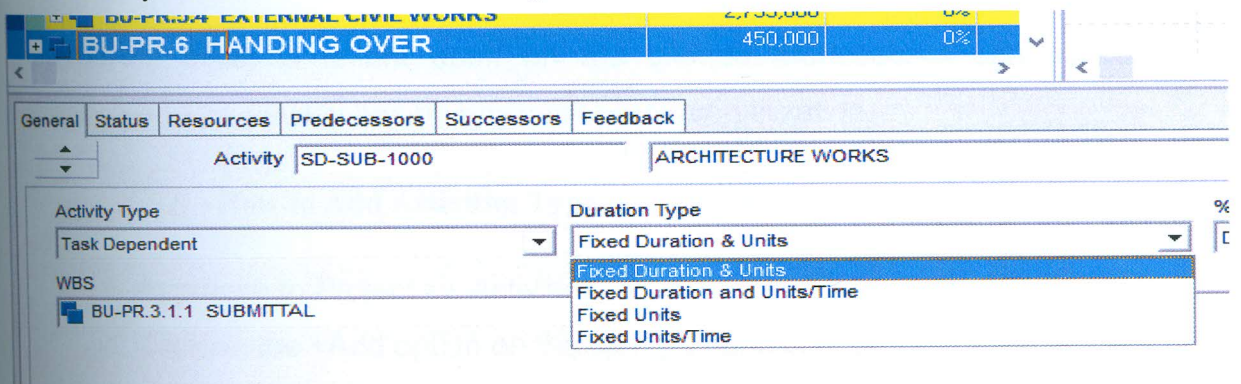


Figure 16 Activity Percentage Complete

2.8.1 Start and Finish Milestone

An activity addresses a point in time (event) when a predecessor task is started or achieved, for instance a task which has some centrality is either started or is done. For example, Start/Finish of a Project, Commencing execution works, Completion of a Phase etc. A Milestone will demonstrate only a solitary date in the Start/Finish Date areas. A Start Milestone will have only a start date and no total date. So likewise, a Finish Milestone will have only a total date. This is in light of the fact that by definition, a Milestone is just the portrayal of a point in time; it has no traverse of its own. That is the reason Milestones have "zero" days as traverse. Also, Milestones don't eat up any advantages.

2.8.2 Resource Dependent

Resource dependent activities are those which have any resource constraint to execute.

2.8.3 Task dependent

This Activity Type is used as a piece of circumstances where the allocated number of resources has no impact on the activity completion.

2.8.4 Level of Effort

Level of effort is reliant upon on the allotted predecessor and successor activities. This usually has no any such resource utilization.

2.8.5 How to Add Activities Type

- ✓ Approach to Project >> Activities
- ✓ Click on the +Add option on the tip right hand side of the display
- ✓ Select activity ID and Activity name > Next
- ✓ Select appropriate WBS to place activity where to place > Next

- ✓ Activity type choose form the drop down menu > Next
- ✓ Assigning of resources will be done later so for now leave this part > Next
- ✓ Specify duration type > Next
- ✓ Specify the effort need to complete the activity > Next
- ✓ In next step configure relationships between activities but can be done late so choose 'the no continue option' > Next
- ✓ More information will be added about activities choose 'no thanks option' > Next Finish

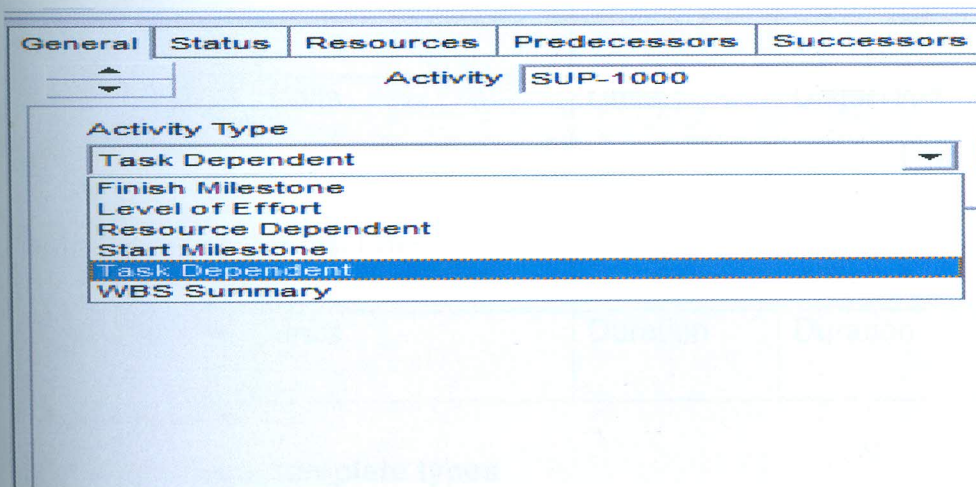


Figure 17 Activity Types

2.9 Activity Duration Type in Primavera

There are 4 options to compute duration.

- Fixed duration and units
- Fixed duration and units/time
- Fixed units
- Fixed units/time

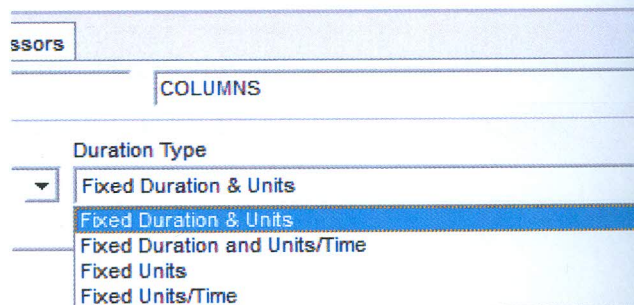


Figure 18 Duration Type

Duration Type	If duration change then what changes?	If units/time change then what changes?	If unit change then what changes?	If add resource what changes?
Fixed Duration and Units	Units/Time	Units	Units/Time	Units/Time
Fixed duration and units/time	Units	Units	Units/Time	Units
Fixed Units	Units/Time	Duration	Duration	Duration
Fixed units/time	Units	Duration	Duration	Duration

Table 1 Duration Type

2.10 Percentage complete types

2.10.1 Activity Percent Complete

Activity percent complete gives us the earned value cost by using the details of how much an activity has been completed. It is further divided into three options.

2.10.2 Duration Percent Complete

This type in earn value is used when the progress of project is tracked by using the remaining duration i.e. $(\text{Original Duration} - \text{Remaining Duration} / \text{Original duration}) * 100$

2.10.3 Units Percent Complete

This type is used when we track the progress of project by using actual work performed and remaining units to complete i.e. $(\text{Actual Units} / \text{At Completion Units}) * 100$

2.10.4 Physical Percent Complete

Personal experience and judgment is required if you want to avail this option.

2.10.5 WBS Milestone Percent Complete

Milestones are defined at each WBS level and we give each of them a worth or value. With the passage of time, when you see that some progress has taken place and then you check those as complete and hence the performance at WBS milestone on all WBS is calculated.

2.10.6 0/100 Percent Complete

Earned value is only calculated 100 % once the whole activity has been completed. You have to wait for completion of an activity to track performance.

2.10.7 50/50 Percent Complete

When you choose the earned value type as 50/50 percent complete, as soon as the activity starts, it is marked as 50 % complete. When the activity finishes, only then earned value changes to 100 %. Implementation of Primavera P6 on Dasu Hydropower Transmission Line Project

2.10.8 Custom Percent Complete

This earned value type is used when a user himself defines some percentage as soon as the activity starts. Its earned value is also taken as 100 % when activity finishes.

General	Notebook	Budget Log	Spending Plan	Budget Summary	WBS Milestones	WPs & Docs	Earned Value
Technique for computing performance percent complete				Technique for computing Estimate to Complete (ETC)			
<input checked="" type="radio"/> Activity percent complete <input type="checkbox"/> Use resource curves / future period buckets <input type="radio"/> WBS Milestones percent complete <input type="radio"/> 0/100 <input type="radio"/> 50/50 <input type="radio"/> Custom percent complete <input type="text" value="6"/>				<input checked="" type="radio"/> ETC = remaining cost for activity or ETC = PF * (Budget at Completion - Earned Value), where: <input type="radio"/> PF = 1 <input type="radio"/> PF = 1 / Cost Performance Index <input type="radio"/> PF = 1 / (Cost Performance Index * Schedule Performance Index) <input type="radio"/> PF = <input type="text" value="0.88"/>			

Figure 19 Percentage complete types

2.11 Stacked Histogram

Stacked histogram is fundamentally a most ideal approach to see all resources assignment/utilization with time.

Advantages of Stacked Histogram

- It gives data about usage of resource.
- Present relative significance for every resource.
- Different shading coding can be used to highlight resource assignment

2.11.1 How to develop in Primavera

- ✓ Select a project
- ✓ Click resource usage profile
- ✓ At the left side of the bottom in display filter resources to current projects resources

- ✓ Select Stacked Histogram from the right bottom Display option
- ✓ Again select resource usage profile option from the same right bottom display
- ✓ Select Add option
- ✓ Now where option is appear
- ✓ Select type of thing you want to implement like resource, calendar etc.
- ✓ Suppose resource id is selected
- ✓ Then open the option of value appears in the same option
- ✓ Add resource
- ✓ Write the same name display in filter name
- ✓ Click in ok you can start to see how we build out that histogram.
- ✓ If one want to display every resource, you do need to go in add the filter for each resource

2.12 Baselines

A baseline acts as a bench marking tool to track the performance of the Project against Project plan and taking actions to get it back on track if deviated. Primavera gives us the flexibility to use multiple baselines at different time intervals. If you have not created any baseline for a project, the current data may serve as baseline. First a baseline is created and then it is assigned to the project to track the progress.

2.12.1 To Add a Baseline

- ✓ Click to project and select Maintain Baselines.
- ✓ A new window opens where you can click on “Add” option to add a baseline.
- ✓ Click on “save a copy of the current project as a new baseline” and then select “OK”.

✓ Baseline has been created.

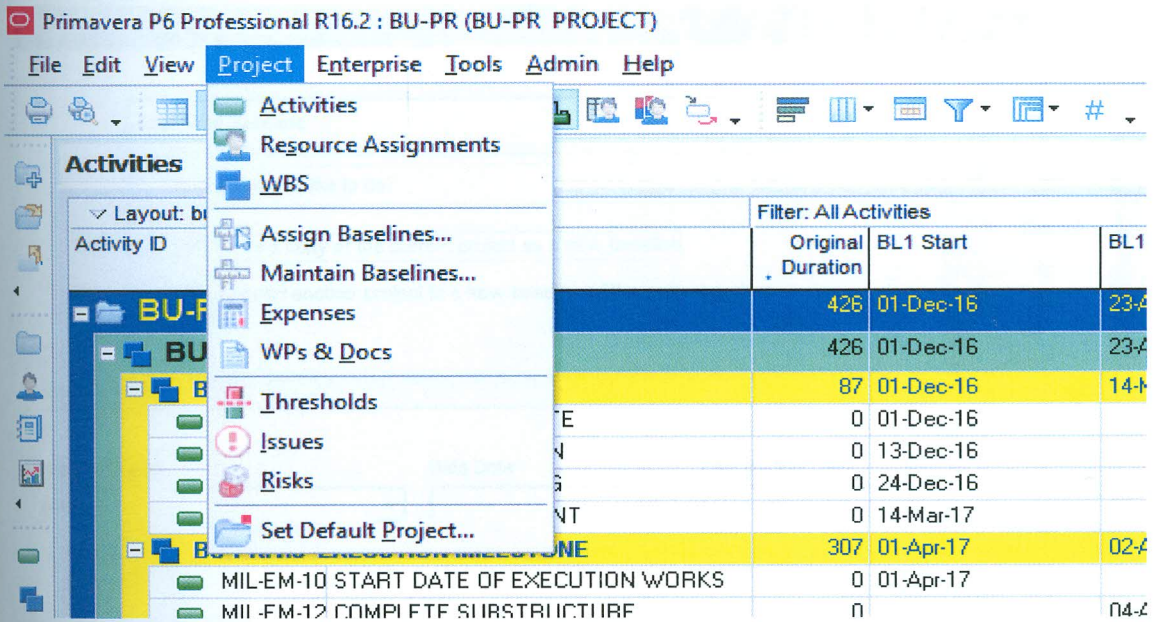


Figure 20 Add Baseline

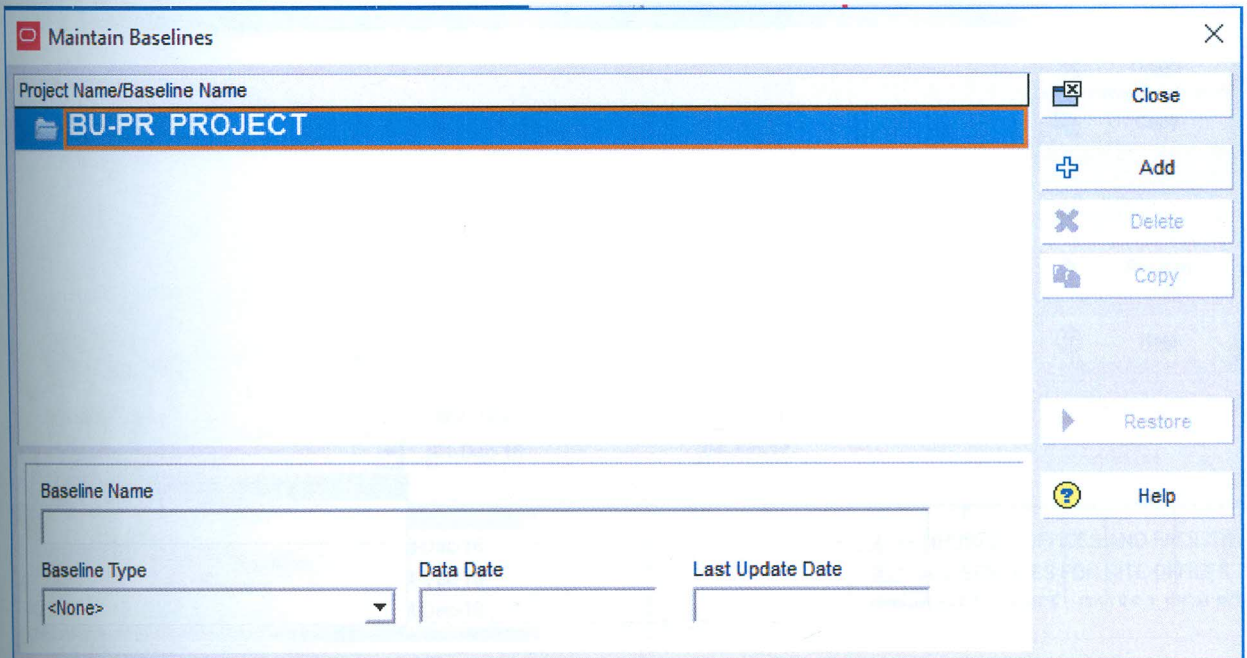


Figure 21 Add Baseline Window

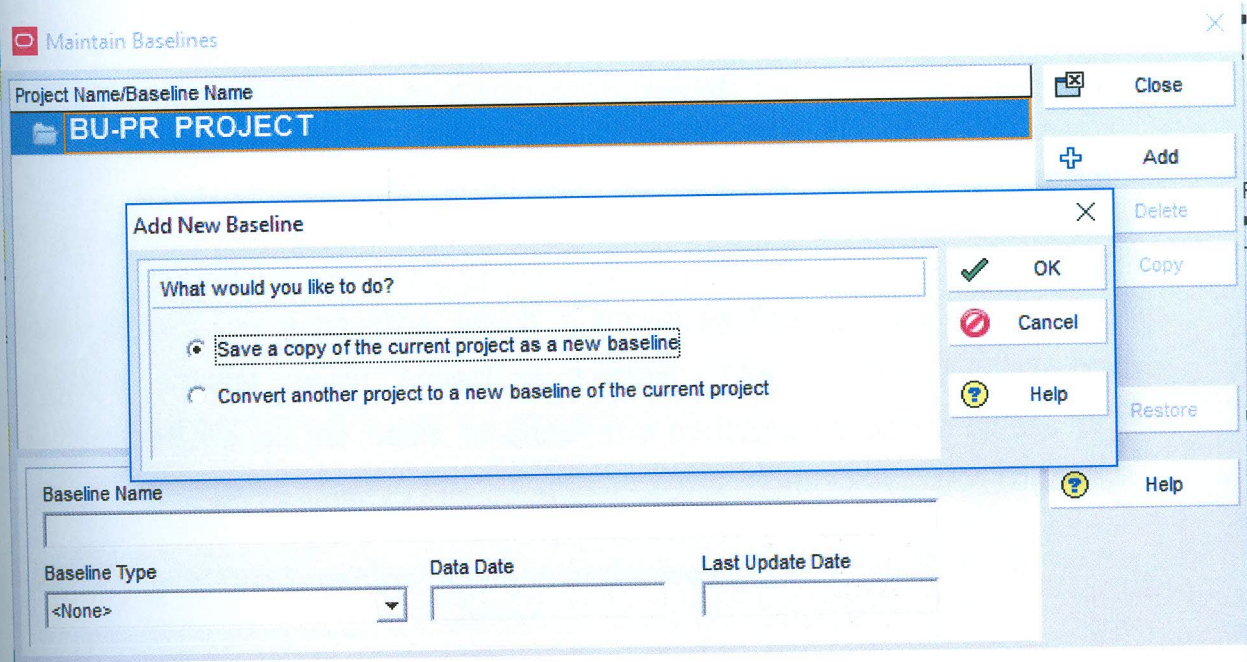


Figure 22 Select Baseline

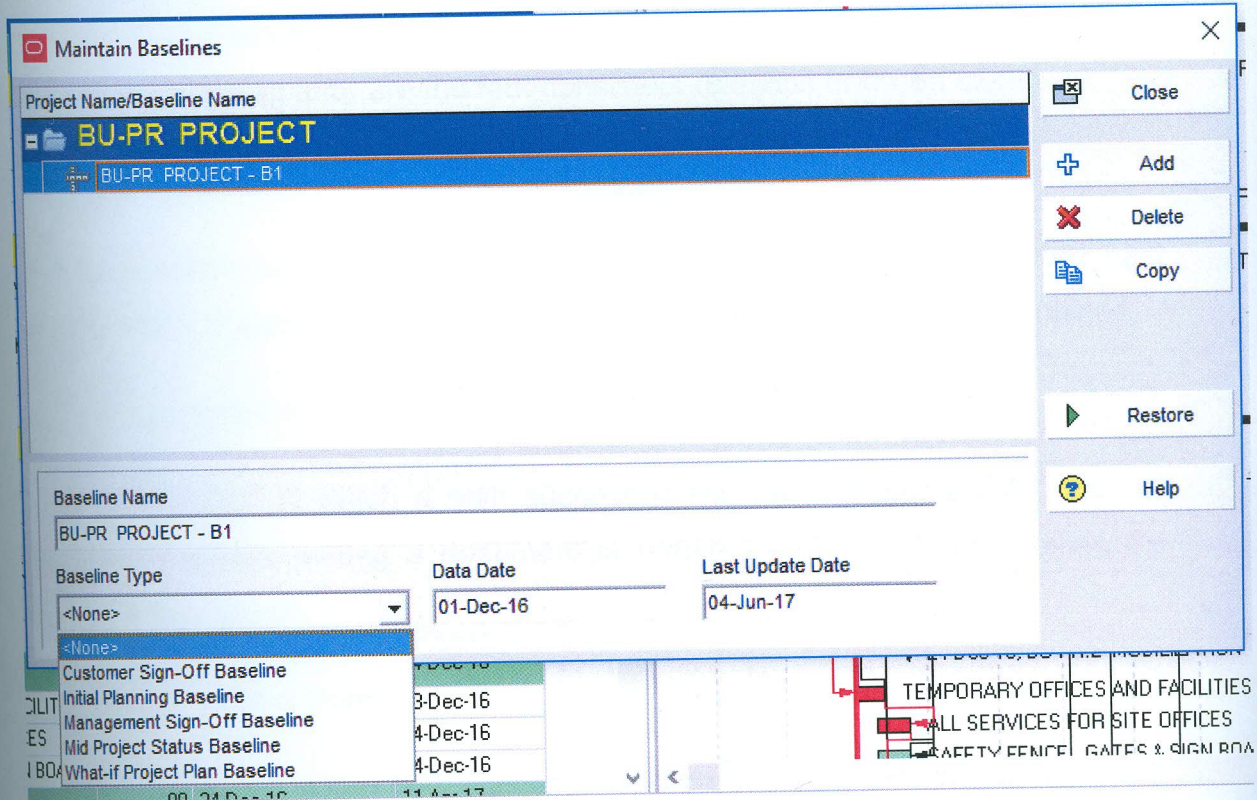


Figure 23 Baseline Type

2.12.2 Assigning A Baseline

Click on Project and then select the Assign baseline option.

A new window opens with Project baseline and User baselines.

Every project has a baseline, which is known as Project baseline. This is the baseline against which project is tracked. This creates a collaborative environment for all the users to check the performance and progress of the project at any given time.

2.13 Logical relationships between activities

There are four sorts of sensible relations. A past action is an action that coherently precedes a reliant action in a timetable of a venture. Henceforth, successor movement is a needy action that comes after another action in a project plan. Taking after are the four consistent relations between exercises.

2.13.1 Finish to Start

A logical relationship in which firstly previous activity has to finish then next activity starts. Example the prize distribution cannot start until race has finished.

2.13.2 Finish to Finish

A logical relation in which a both successor and predecessor activity finished together. Example writing a document is required to finish before editing the document can finish.

2.13.3 Start to Start

A logical relation in which both successor and predecessor activity start together. Example of level concrete and pour foundation.

2.13.4 Start to Finish

A logical relation in which a successor activity cannot finish until a predecessor activity has start. Example the first shift of security guard cannot finish until unless the second security guard shift starts.

2.14 Assigning Resource to activities

Assigning of resource is an important task in a primavera because it also estimate about the actual cost incur for completing that particular activity. Following are the steps to follow for assigning resources to different activities.

- ✓ Choose activities of project
- ✓ Select the activity that wants to assign a resource
- ✓ In activity display click the resource tab
- ✓ Then click add resource
- ✓ Different resources are given select the resource wants to assign
- ✓ Click the assign button and close button for completing assigning

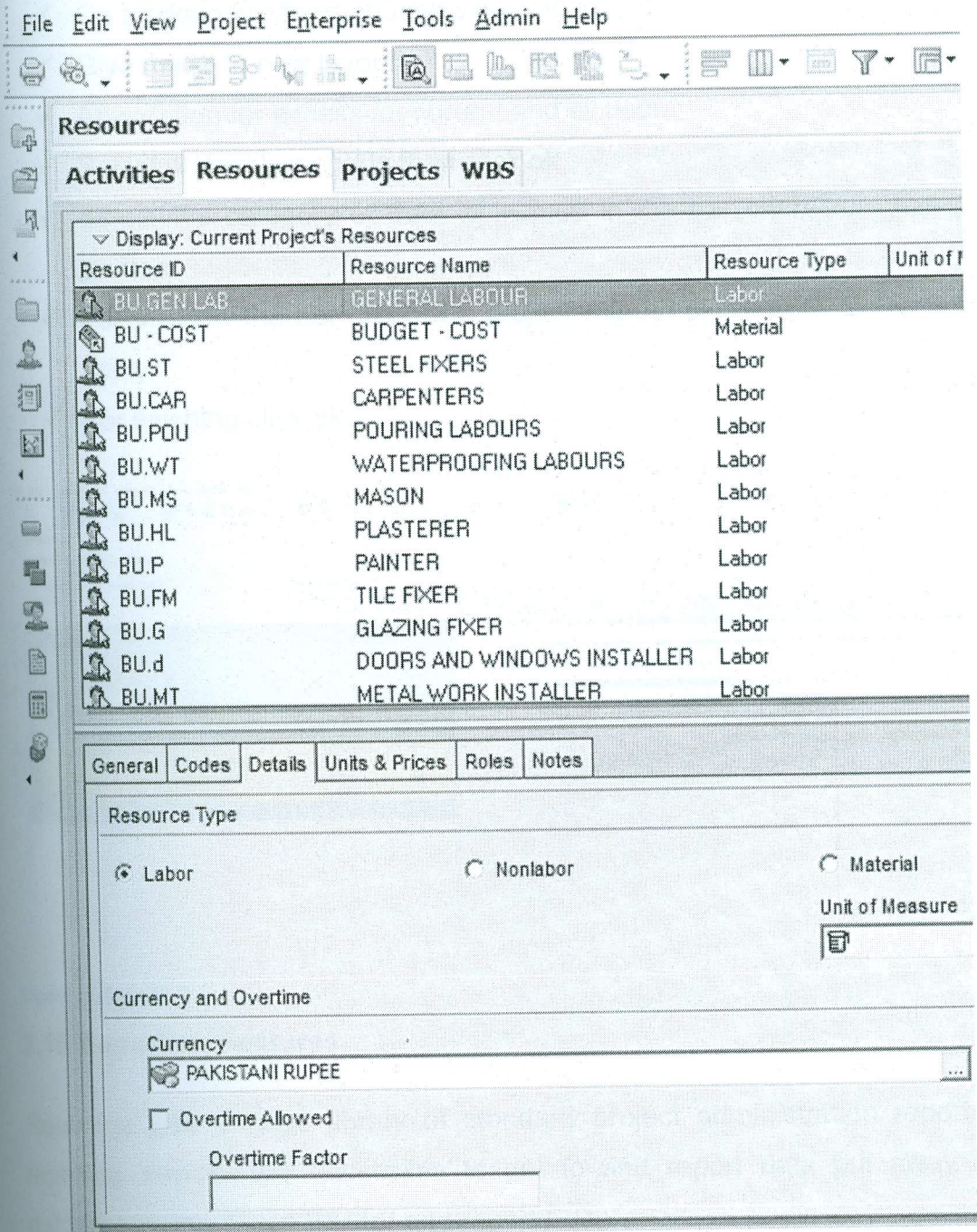


Figure 24 Resource Window

2.14.1 How to create project bar charts in Primavera

Project bar charts are a representation of a project data in different graphical shapes. Bar charts in Primavera can be created by following steps.

- ✓ On tracking windows choose view and layout
- ✓ Give name to new layout
- ✓ Able option for access for current and all users
- ✓ Select project bar charts then click ok
- ✓ Select the category of data to include in the bar chart from the display section
- ✓ For preview the bar chart of a project without closing the dialog box click apply
- ✓ For finishing click ok

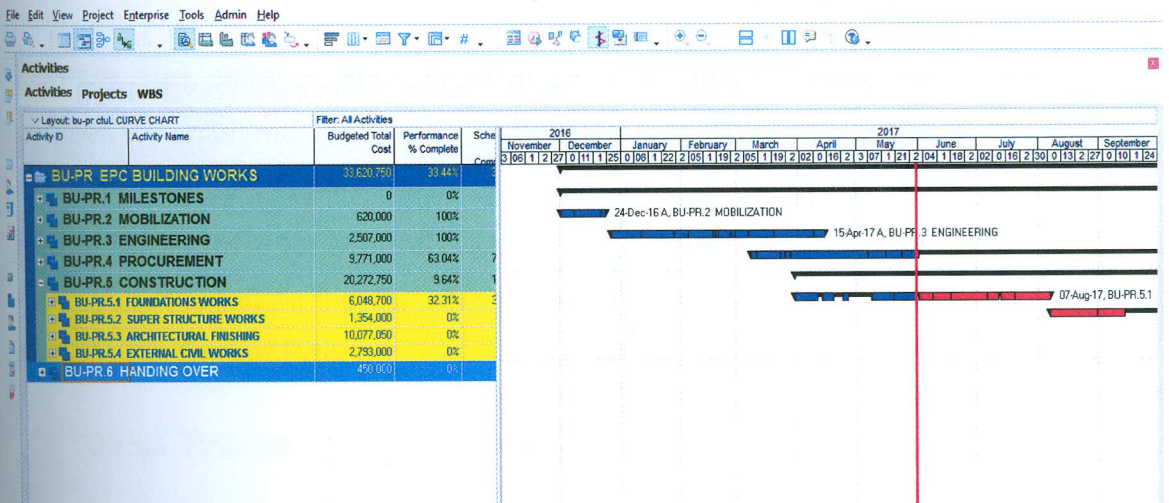


Figure 25 Bar chart

2.15 Reporting Features

Reporting give a huge library of standard project administration reports, two reporting devices are accessible to get to and report data put away in the database by the report Wizard and report Editor.

2.15.1 Report Wizard

One can use the Report Wizard to easily make a wide collection of altered reports. The wizard steps you through the route toward making new reports, enabling you to pick the arrangement of information and specific data fields to

fuse. You can assemble, sort, and channel augment information and join time-passed on data for units and costs. When you make a report with the Report Wizard, you can later use the wizard or the Report Editor to change the report, if imperative

2.15.2 Report Editor

The Report Editor is a successful gadget that enables you to make reports that are exceedingly revamped. Despite the way that you can make changed reports with the Report Wizard, the Report Editor gives the capacity to tailor a report more about to your specific necessities. The Report Editor enables you to get-together, sort, channel, and climb wander information. You can demonstrate time courses for units and costs and join outlines and HTML interfaces in your reports. You can use the Report Editor to moreover adjust reports you make with the Report Wizard. Regardless, if you modify a wizard report in the Report Editor, when you resuscitate the report in the wizard, you lose most of the progressions made in the Report Editor.

2.15.3 Printing and sparing reports

One can audit and print reports and you can save reports as substance or HTML archives. In case you save a response to a record, you can import the data to a spread sheet program, email the report, disperse the give a record of a Web site page, or possibly document the report. You can similarly arrange a report and make a WP and Docs record for the report. Right when P6 Professional is related with a P6 EPPM database, reports can moreover be gotten to from the Project Documents entryway and the Projects, Documents page in P6.

2.16 Earned Value management

Earned value is a management technique to analyses the work done with planned values.

2.16.1 EVM provide information about following

- ✓ Budgeted cost for work scheduled (BCWS) which the planned value for a project
- ✓ Earned value or Budget cost for Work performed (BCWP)
- ✓ Actual cost of work performed (ACWP) in a project
- ✓ Budget at completion (BAC)
- ✓ Estimate to completion (EAC) it is basically the cumulative to cost of work performed and the estimate to complete the remaining work of a project
- ✓ Cost Variance (CV) it tells about cost related matters whether project is under cost or over cost
- ✓ Schedule Variance (SV) it tells about schedule of a project whether project is above schedule or behind schedule
- ✓ Variance at completion it tells about total variance at the completion of project

2.16.2 How to calculate EVM in Primavera

- ✓ Define activities
- ✓ Assign resources to activities
- ✓ Go to project option > Maintain Baseline
- ✓ Click on Add and click ok to create a baseline
- ✓ Go to project > Assign Baseline click on project baseline to select baseline
- ✓ Then right click on activity table > in column choose earned value management column group to add different values of earned value management.

WBS Milestones	WPs & Docs	Earned Value
Technique for computing Estimate to Complete (ETC)		
<input checked="" type="radio"/> ETC = remaining cost for activity or ETC = PF * (Budget at Completion - Earned Value), where:		
<input type="radio"/> PF = 1		
<input type="radio"/> PF = 1 / Cost Performance Index		
<input type="radio"/> PF = 1 / (Cost Performance Index * Schedule Performance Index)		
<input type="radio"/> PF = <input type="text" value="0.88"/>		

Figure 26 ETC Types

2.17 Calculating performance percent complete

In primavera there are five options for selecting performance percent complete. These options are select at the WBS level and to all activities within the WBS. These techniques are selected and calculated on the following basis.

2.17.1 Activity percent complete

Activity percent complete technique is used to calculate earned value cost which is based on the activity percent complete. For this primavera provides three different options for setting activity percent complete which are listed below.

2.17.2 Duration percent complete

It is used when progress is reported based on remaining duration. The formula to calculate it $(\text{original duration} - \text{remaining duration}) / (\text{original duration}) * 100$

2.17.3 Unit percent complete

It is used to reported progress on the actual work performed and units to complete remaining. It is calculated as $(\text{Actual cost} / \text{at completion units}) * 100$

2.17.4 Physical percent complete

This technique is utilized on the basis of personal judgment as project manager assume that this particular work can be done or will be done in this period of time.

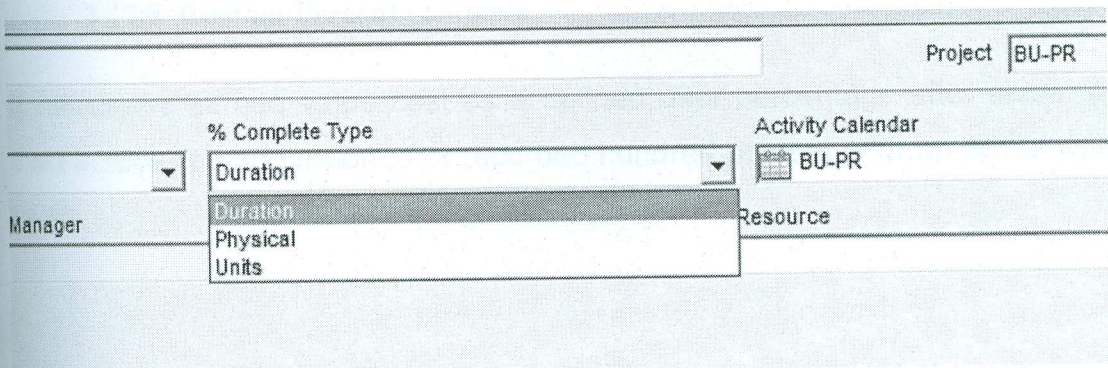


Figure 27 Percentage Complete Type

2.17.5 WBS Milestone Percent complete

This option is selected from the WBS and it is calculated on the basis of completion of the WBS elements weighted milestones.

2.17.6 How to select in Primavera

- ✓ Select project WBS

- ✓ Then choose WBS value that want to give weighted milestones and click the earned value tab
- ✓ For computing performance percent complete click the WBS milestones percent complete option

2.17.7 0/100 Milestone complete

It calculated earned value cost as zero percent after an actual start date recorded and hundred percent after the actual finish is recorded.

2.17.8 50/50

It calculated earned value cost as fifty percent as when the actual start date is reported and reported hundred percent on the actual finish.

2.17.9 Custom Percent complete

It calculates earned value cost as a defined user percentage after actual work start is reported and reported or recorded hundred percent after an actual work is finish.

Technique for computing performance percent complete

Activity percent complete

Use resource curves / future period buckets

WBS Milestones percent complete

0/100

50/50

Custom percent complete

Figure 28 Technique for computing performance Percentage Complete

2.18 S Curve

S- Curve is a way to show cost, man hour, units against time in the form of a plot. Its shape is like alphabetic "S" as in the start of the project, let's say cost is very high and then in the middle stage, with the passage of time, you start controlling constraints in favour. At completion time of a project, again it starts increasing due to some unavoidable circumstances. Its significance can be realized with the fact that being the Project manager of a team you need quick review of the activities going around and whether some remedial action is required or not. S-Curve can be created in activities window, by going to resource usage profile options. Types of S-Curve in Primavera are as follow:

- Man Hours versus Time S-Curve
- Costs versus Time S-Curve
- Baseline S-Curve
- Actual S-Curve
- Target S-Curve
- Value and Percentage S-Curves

2.18.1 Man Hours versus Time S-Curve

This S-curve is suitable for the projects where high labor rate is involved. Here it gives us the idea that how much man hours are working for project. In other words, it gives us the idea that how much man hours are resulting what accomplishments. They are helpful to keep the project on track by allocating more man hours in urgency.

2.18.2 Costs versus Time S-Curve

Cost versus Time S-curve is used when there is a distinction between labor and non-labour activities. Some might be allocated resources while others might need to outsource for on time completion of project. Hence you can calculate the cost incurred over a period of time.

2.18.3 Baseline S-Curve

Before start of any project, a prototype is made. A plan is originated and then this plan is taken into different phases of the project. This may be called as Baseline of the project. Similarly, baseline S-curve is made against project baseline and hence it assists us to monitor the progress of the project so far. Baseline may need to revise if you are making changes in proposed plan and resources.

2.18.4 Actual S-Curve

When you revise a schedule with time, you get the % completion of each task. This information helps to generate an Actual S-curve. Its use is preferred with baseline S-curve and target S-curve, which make it easier for you to get the exact information and then take action accordingly as per requirement. This actual S-curve, at the completion of the project, meets target S-curve to indicate that you have achieved the target set by you.

2.18.5 Target S-Curve

This S-curve is used where you want to compare your actual progress of the project with that of what you have revised over time, different from baseline schedule. It gives a real picture how to achieve your target by keeping in mind the constraints.

2.18.6 Value and Percentage S-Curve

This S-curve is helpful when you want to know how much man hours have been used so far and how much cost has been incurred, and how much still need to be invested. This is done by Value S-curve. Percentage S-curve indicated the percentage of actual work been done against baseline S-curve and target S-curve.

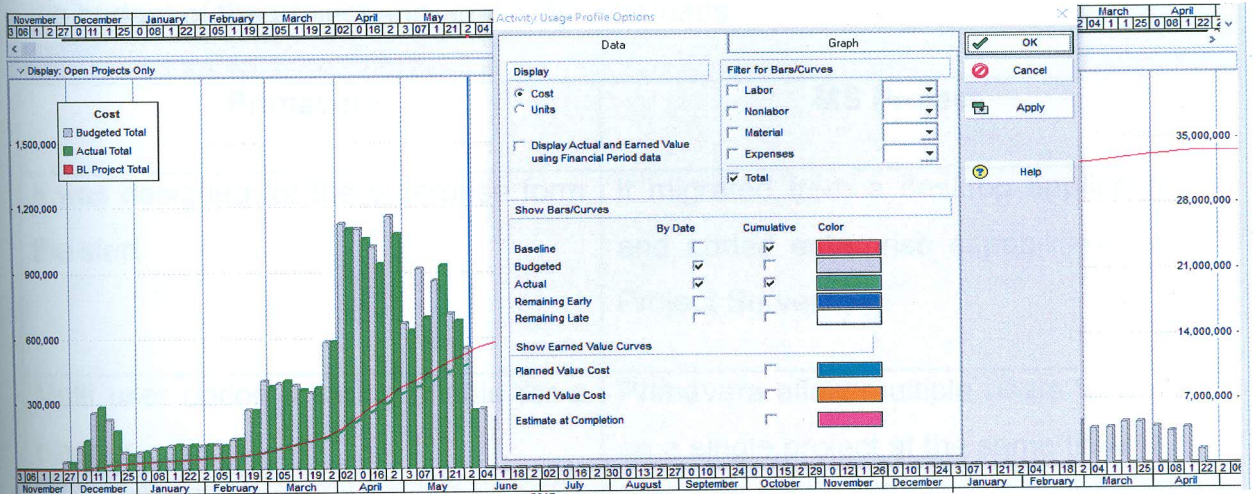


Figure 29 EVM

2.19 Printing S-Curve

After complete creation of S-Curve if want to take print of it then go to the print preview dialog to select options tab. Here uncheck the activity table and Gantt chart options. So select the profile option. The S-curve will appear on the printing page and one can give print command.

2.20 Difference between Primavera and MS project

2.20.1 Primavera

The perceived standard for elite project administration Primavera P6 Professional Project Management, handles huge scale, exceedingly complex and multifaceted projects. Sort out activities of up to 100,000 exercises with unlimited number of resources.

2.20.2 MS Project

Microsoft project is a tool which helps in a management of a project. It is developed and sold by Microsoft to assist project managers of different domains in developing a plan, assigning resources to tasks, tracking progress, managing the budget of the project and analysing workloads.

Primavera	MS Project
It was designed for the enterprise form the start	It migrated from a desktop application and added enterprise capabilities with Project Server
Multi user option is not available for a planner	Primavera allow multiple users to work on a single project at the same time
Number of baseline are primary, secondary and tertiary	Unlimited baselines can be created
One of the feature is of Progress Spotlight which highlights activity table row in yellow if they are due any status in the next period	In Microsoft project requires the development of filters to allow for the selection of activities requiring status

activities as in WBS activities are defined at each level	them look like WBS.
---	---------------------

Table 2 Primavera VS Ms Project

2.21 What if Analysis through project reflection.

What if is important feature of project planning and controlling. Primavera provides a tool to perform different IF analysis and provide What results of the analysis.

Steps to perform what if analysis are as below

2.21.1 Create Reflection

Right click on original project , the tab will show option of “create reflection” by clicking it primavera will create a reflection of original project keeping a link to reinsert option as later stages we can re insert/merge the analysed or approved changes in original project.

BU-PR	EPC BUILDING WORKS	115	500
BU-PR-1	EPC BUILDING WORKS LF1	0	500
BU-PR-2	EPC BUILDING WORKS LF 2	115	500
? BU-PR-3	EPC BUILDING WORKS LF 2 Reflection	115	500

Figure 30 Project Reflection

Reflected project will be shown with a yellow question mark as shown in above image.

Open this project and do changes like change resource, change duration add any activity.

2.21.2 IF analysis

Activity ARF-1040 have original duration of 30 days what will happen if we change it to 50 days?

To perform this change the duration in reflected project.

Activities Projects

Layout: bu-pr ctuL CURVE CHART		Filter: All Activities	
Activity ID	Activity Name	Original Duration	Finish
BU-PR-3	EPC BUILDING WORKS LF 2 Reflectio	428	25-Apr-18
+ BU-PR-3.1	MILESTONES	428	25-Apr-18
+ BU-PR-3.2	MOBILIZATION	20	24-Dec-16 A
+ BU-PR-3.3	ENGINEERING	90	15-Apr-17 A
+ BU-PR-3.4	PROCUREMENT	220	25-Nov-17
- BU-PR-3.5	CONSTRUCTION	311	04-Apr-18
+ BU-PR-3.5.1	FOUNDATIONS WORKS	109	07-Aug-17
+ BU-PR-3.5.2	SUPER STRUCTURE WORKS	52	07-Oct-17
- BU-PR-3.5.3	ARCHITECTURAL FINISHING	150	04-Apr-18
ARF-1000	MASONRY WORKS	15	26-Oct-17
ARF-1010	PLASTER WORKS	10	07-Nov-17
ARF-1020	WATERPROOFING WET AREAS	8	02-Nov-17
ARF-1030	WALL TILING	20	25-Nov-17
ARF-1040	CEILING WORKS	30	25-Dec-17
ARF-1050	TILE FLOORING FINISHING	40	12-Jan-18
ARF-1060	MARBLE FLOORING FINISHING	25	23-Jan-18

Figure 31 Duration and start days before change

As per above image project have total duration of 426 days and finish date is 25th April 2017. Now let perform the change in activity ARF-1040 results are in below image

Activities Projects

Layout: bu-pr ctuL CURVE CHART		Filter: All Activities	
Activity ID	Activity Name	Original Duration	Finish
BU-PR-3	EPC BUILDING WORKS LF 2 Reflectio	438	07-May-18
+ BU-PR-3.1	MILESTONES	438	07-May-18
+ BU-PR-3.2	MOBILIZATION	20	24-Dec-16 A
+ BU-PR-3.3	ENGINEERING	90	15-Apr-17 A
+ BU-PR-3.4	PROCUREMENT	220	25-Nov-17
- BU-PR-3.5	CONSTRUCTION	321	17-Apr-18
+ BU-PR-3.5.1	FOUNDATIONS WORKS	109	07-Aug-17
+ BU-PR-3.5.2	SUPER STRUCTURE WORKS	52	07-Oct-17
- BU-PR-3.5.3	ARCHITECTURAL FINISHING	160	17-Apr-18
ARF-1000	MASONRY WORKS	15	26-Oct-17
ARF-1010	PLASTER WORKS	10	07-Nov-17
ARF-1020	WATERPROOFING WET AREAS	8	02-Nov-17
ARF-1030	WALL TILING	20	25-Nov-17
ARF-1040	CEILING WORKS	40	05-Jan-18
ARF-1050	TILE FLOORING FINISHING	40	17-Jan-18
ARF-1060	MARBLE FLOORING FINISHING	25	03-Feb-18

Figure 32 Project status after IF analysis

As shown in above image IF we change duration of ARF-1040 the project overall duration and finish date will be disturbed.

This What results are need approval before merging it in original schedule.

2.21.3 Merge the Reflected schedule in original schedule

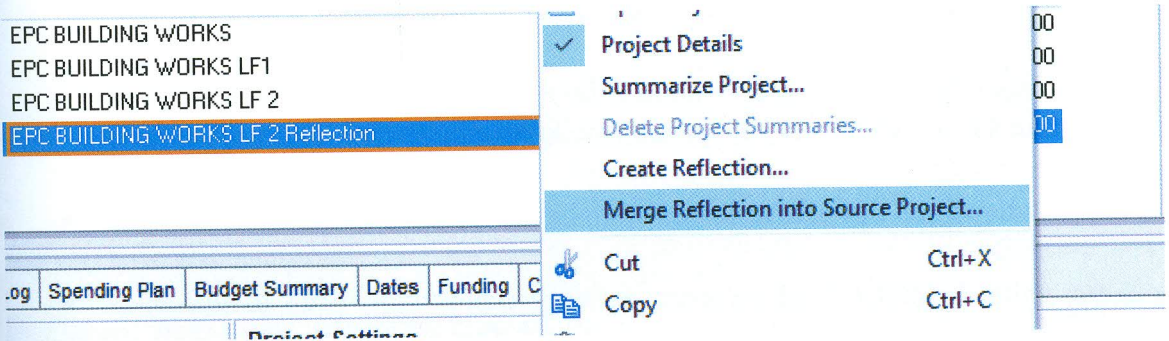


Figure 33 Merge the reflected schedule

Left click on reflection and window will show option of merge as shown in above image.

2.21.4 Accept the What If analysis

By clicking on merge reflection option. A new window will be open which will show the changes and impact and also will show different option as to keep the reflection or delete. Details are shown in below image. We can accept/ commit few changes are are desirable and few can be discarded.

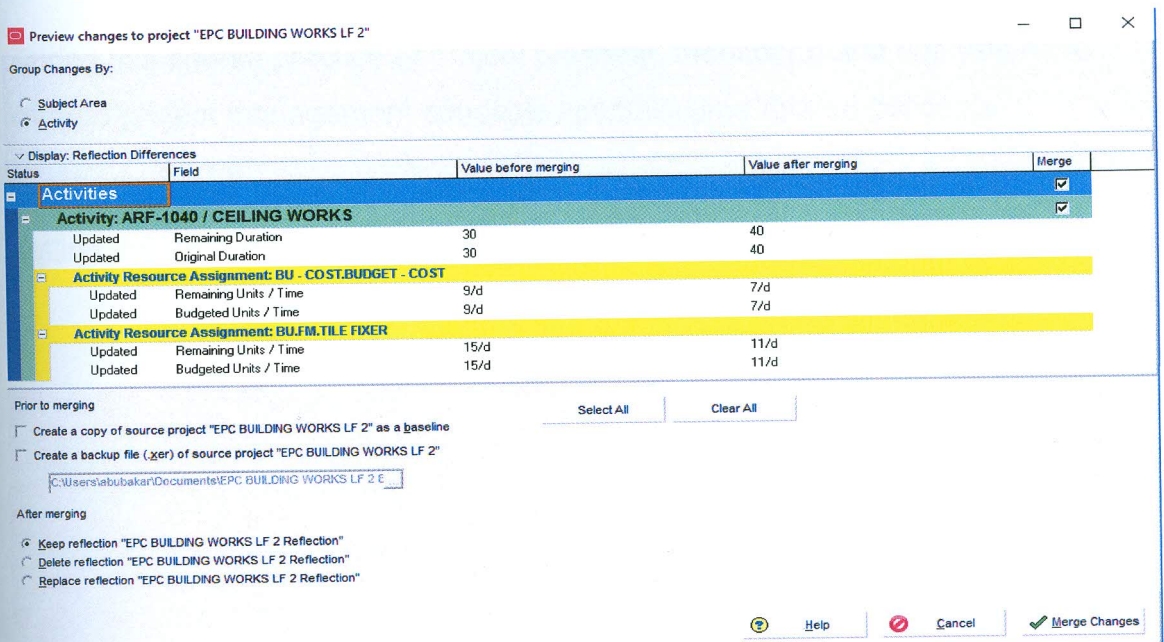


Figure 34 Accept Changes of WHAT IF ANALYSIS

2.22 Recommendations

- P6 is a project management tool it should be taught in 2nd semester instead of 3rd semester so that students can do more practice and have good grip on its application
- Its applications can be discussed in other courses such as in cost management class we can discuss how to control cost through P6 and same for risk and other courses.
- Risk management through Primavera could be discussed in class as primavera have risk analyzer.
- Extension of Time options and types are important for practical planning this can be discussed in class for next batch..

2.23 Conclusion

EPC contracts are mostly done where client have no expertise for that scope of works. In Pakistan mostly building contracts are delayed due to delay in procurement. Practicing integrated EPC schedule has gave good experience about EPC schedule.

During this course practice of project planning, monitoring and analysis have cleared project management concepts specially time related concepts.

Different Earned Value techniques used in reports, Project setting and ETC setting are also shown in reports.

3 Chapter 3 Project

3.1 Charter

3.1.1 Project Brief

Our project is to carry out Planning and Scheduling of a building project where all engineering, procurement and construction has to be done by subject company by using Primavera P6, a modern world tool to implement the best Project Management Practices dictated by PMI.

Report includes the brief history of the Organization that undertook the said project, context in which project was carried and most importantly it discusses how Planning & Scheduling of the said project was carried how using Primavera P6. Report also includes necessary supporting the literature, the conclusions and recommendations being rendered after having the work on Primavera and the understanding/issues/familiarity with new features (CBT Log) that was perceived/realized during working on Primavera.

3.1.2 Project Objective

The objective of this project is to provide all facilities i.e. engineering, procurement and construction under one umbrella as per contract and high degree of quality.

3.1.3 Critical Success Factors

Following are Critical success factors of the selected project:

- Approval of Engineering Design
- Completion as per Scope
- Timely procurement
- Completion within Budget
- Completion within time

3.1.4 Version History

Version #	Prepared by	Revision Date	Approved by	Approval Date
00	Moaz Tariq	15 Oct 2016	PMO	20- Oct 2016

Table 3 Version #

3.1.5 Estimated Duration

After getting approval, 426 day to deliver all the deliverables of project.

3.1.6 High Level Risks

- Delay in approval of engineering design by regulatory authority
- Delay in procurement of long lead items
- Material unavailability

3.1.7 Project Milestones/ scope statement

Mile stone	Start	Finish	Budget
Mobilization	13 Dec 2016	24 Dec 2016	620000/
Engineering	24 Dec 2016	11 Apr 2017	2507000/
Procurement	17 Mar 2017	26 Oct 2017	9771000/
Substructure	01 Apr 2017	04 Aug 2017	6048700/
Superstructure	04 Aug 2017	05 Oct 2017	1354000/
Finishes	05 Oct 2017	2 Apr 2018	10077050/

Table 4 Project Milestone

3.1.8 Stakeholders

Sr.#	Stakeholder	Power	Interest	Action Strategy
1	Client	High	High	Manage Close
2	Consultant	High	High	Manage Close
3	Contractor	High	High	Manage Close
4	Architect	High	Low	Communicate

Table 5 Stakeholders

3.1.9 Project Budget Estimates

Summary of Major Deliverable cost is as follow.

- Mobilization 620000/-
- Engineering 2507000/-
- Procurement 977100/-
- Substructure 6048700/-
- Superstructure 1354000/-
- Finishes 10077050/-

3.1.10 Project Organization

This section describes the key roles supporting the project

Muhammad Waqas	Manager Engineering
Saqib ali	Manager Procurements
Afzal Ali	Manager Construction
Rehan Butt	Project Monitoring & Control

Table 6 Project Organization

3.1.11 Project Charter Approval

Name	Role	Signature

Table 7 Charter Approval

3.2 Project Setting

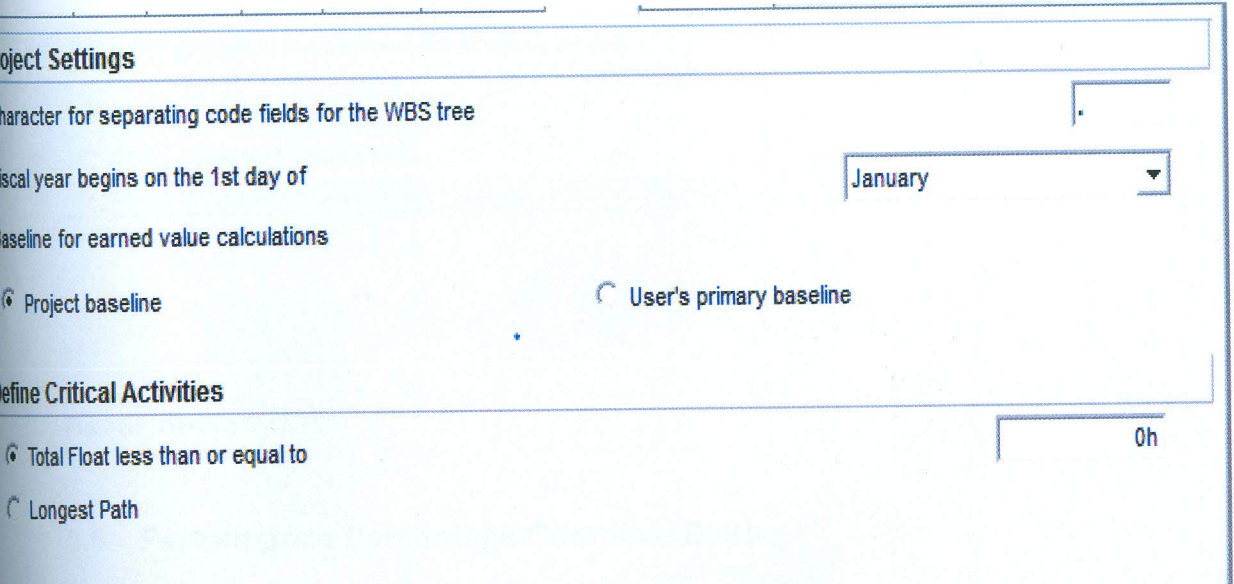


Figure 35 Project Setting

3.3 Earn Value Setting

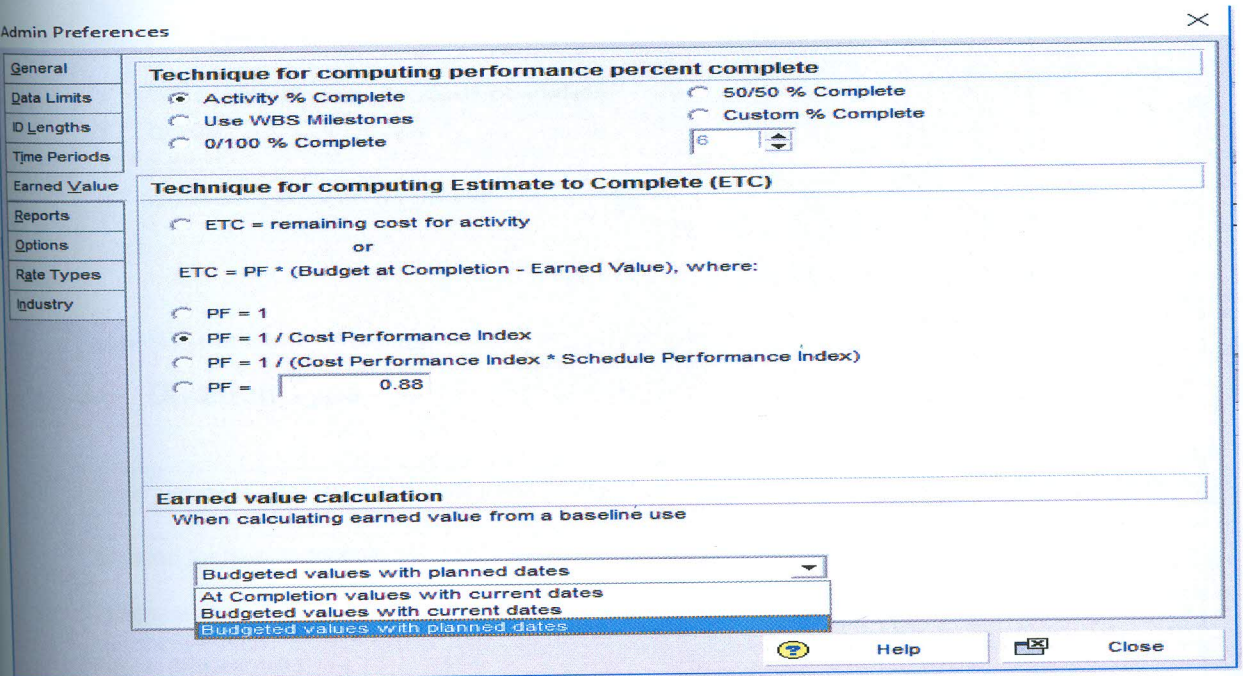


Figure 36 Earned Value Setting

3.4 Setting for ETC computing

Technique for computing Estimate to Complete (ETC)

- ETC = remaining cost for activity
or
- ETC = PF * (Budget at Completion - Earned Value), where:
- PF = 1
- PF = 1 / Cost Performance Index
- PF = 1 / (Cost Performance Index * Schedule Performance Index)
- PF =

Figure 37 Setting for ETC

3.5 Performance Percentage Complete Setting

Technique for computing performance percent complete

- Activity percent complete
 - Use resource curves / future period buckets
- WBS Milestones percent complete
- 0/100
- 50/50
- Custom percent complete

Figure 38 Performance Percentage setting

3.6 Duration Type

General	Notebook	Budget Log	Spending Plan	Budget Summary	Dates	Funding	Codes	Defaults	Resources	Si
Defaults for New Activities										
Duration Type					<input type="text" value="Fixed Duration & Units"/>					
Percent Complete Type					<input type="text" value="Physical"/>					
Activity Type					<input type="text" value="Task Dependent"/>					

Figure 39 Setting for Activity and Duration Type

3.7 Resource Curve

Following type of curves are used in this project

- Liner,
- Trapezoidal
- Front Loaded
- Back Loaded
- customize curves

3.8 Baseline Type

Initial Customer sign off Baseline Type is used.

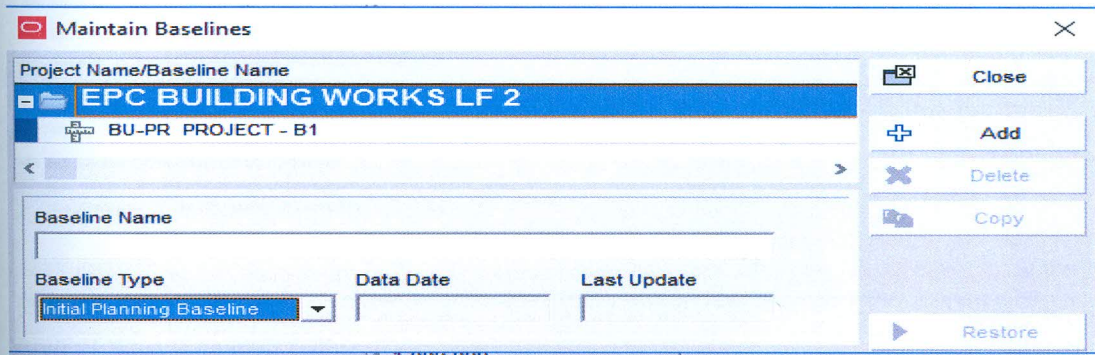
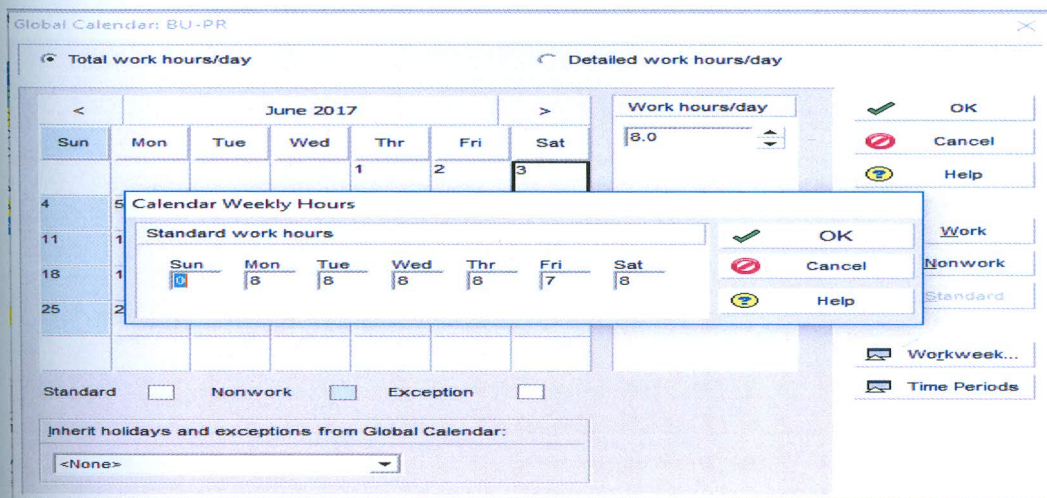


Figure 40 Baseline Type

3.9 Calendar setting

Customize Calendar is used for this project



3.10 What If Analysis Setting

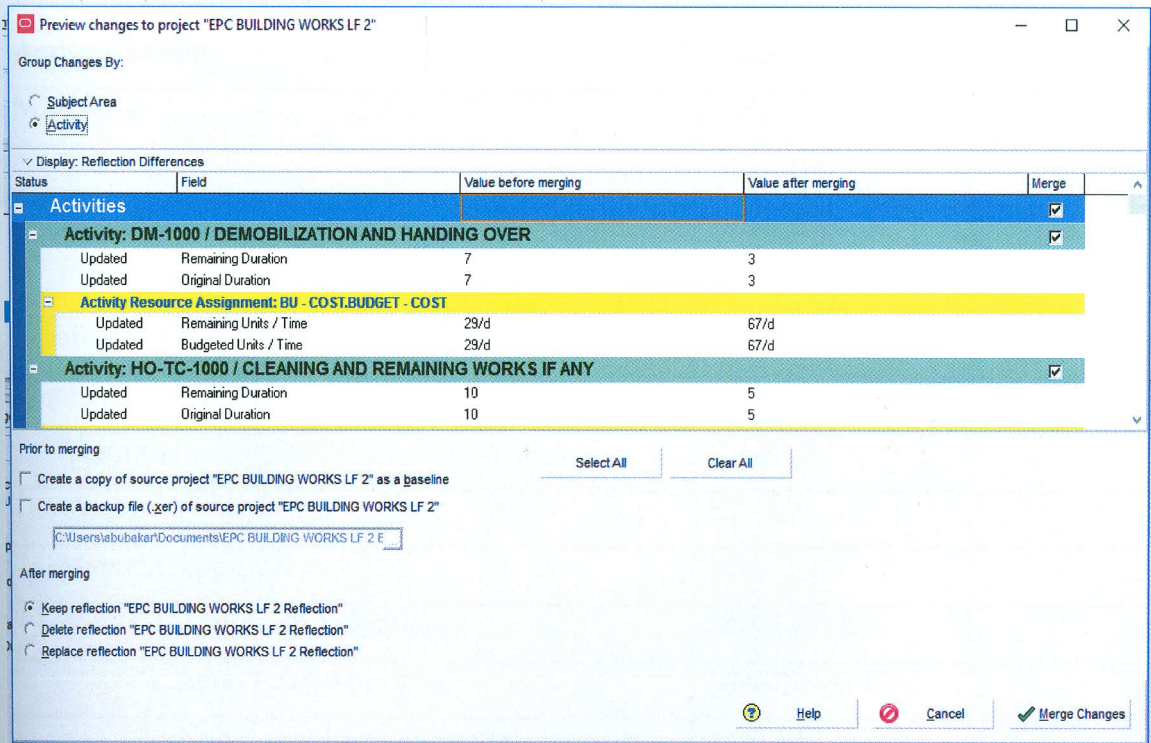


Figure 41 What If Analysis Setting

3.11 Activity Codes

In Baseline project all activities ID are assigned as per a pattern. Relating Scope of Work with WBS and nature of Works. Activity ID Coding detail is as under:

Activity Scope	Code
Milestone	MIL
Start Milestone	MIL-SM
Execution Milestone	MIL- EX
Finish Milestone	MIL-FM
Mobilization	M
Engineering	
Submittal	SD-SUB
Approval	SD-AP
Material Approval	MA
Long Lead Submittal	MA-LL-SUB
Long Lead Approval	MA-LL-APP
Non Long Lead Submittal	MA-NLL-SUB
Non Long Lead Approval	MA-NLL-APP
Procurement	P
Purchase Order Architecture	P.O-ARCH
Fabrication Architecture	FEB-ARCH
Deliver to Site Architecture	DTS-ARCH
Deliver to Site Civil	DEL. C
Construction	
Substructure Works	SUB
Superstructure Works	SUP
Architecture Finishes	ARF
External Civil Works	ECW
Handing Over Testing & Commission	HO-TC
Demobilization	DM

Table 8 Activity Codes

4 ANNEXURE I – CBT LOG

Serial no	Problem	Solution	Source	Remarks
1	Opening giant chart	Click view from Toolbar then select check giant chart form the show on top	Teacher	Closed
2	Assigning Baseline for the project	Click Project then assign baseline whether primary, secondary and tertiary	Teacher	Closed
3	Making relationships in between activities	By defining predecessors and successors by clicking on the activities	Internet	Closed
4	Defining resources	Clicking enterprises and open resources option then use add for defining resources with their wages	Teacher	Closed
5	Assigning Resource to each activity	Click on activity then select resource to open add resource option for assigning resources for the activity	Friend	Closed
6	Difference in techniques for computing performance percentage	By going to project then WBS option for selecting desirable technique	Teacher	Closed
7	Selecting industry after installation of P6	Go to admin then admin preferences go to industry option to select as your industry or requirement	Friend	Closed
8	In making S-Curve	Click Activity usage profile then select form the right bottom activity usage profile option to mark the values needs to show on graph	Teacher	Closed
9	How can group and sort activities	Accessed by Clicking Group and Sort option form the menu bar	Teacher	Closed
10	WBS option	Go to 'Display Options bar', choose 'Show on Top, WBS Table. To list and sort WBS elements.'	Class mate	Closed

11	Filtering	Open a Project and to view only those projects with a specific status; go to "View, Filter By, Status, then choose the status we want to use. We can also choose View, Filter By, Customize. In the Filters dialog box, mark the applicable check boxes" for the statuses of the projects we want to have look on.	Class mate	Closed
12	Resource Levelling	Open the projects that contain the resources we want to level. Click on the Tools and then Level Resources.	Class mate	Closed
13	Defining Activity /Resource codes	By selecting 'enterprise' to select resource and activity codes to add codes for each domain	Class mate	Closed
14	How can group and sort activities	Accessed by Clicking Group and Sort option form the menu bar	Teacher	Closed
15	WBS option	Go to 'Display Options bar', choose 'Show on Top, WBS Table. To list and sort WBS elements.'	Class mate	Closed
16	Filtering	Open a Project and to view only those projects with a specific status; go to "View, Filter By, Status, then choose the status we want to use. We can also choose View, Filter By, Customize. In the Filters dialog box, mark the applicable check boxes" for the statuses of the projects we want to have look on.	Class mate	Closed

5 References

1. <http://www.timelineconsultants.net/>
2. <http://www.businessdictionary.com/definition/project.html>
3. <https://www.pmi.org/about/learn-about-pmi/what-is-project-management>
4. <http://searchcio.techtarget.com/definition/project-management>
5. <https://rapidbi.com/criticalsuccessfactors/>
<http://www.3deducators.com/Managementtraining/ProjectManagement/Primavera atraining.asp>
7. <https://www.safaribooksonline.com/library/view/oracle-primavera-p6/9781849684682/ch03s03.html>
8. <http://smallbusiness.chron.com/organizational-breakdown-structure-obs-72523.html>

6 List of Reports

Following Reports are attached.

- 6.1 Project Schedule Log**
- 6.2 Project WBS**
- 6.3 Project Milestone Report**
- 6.4 Project Baseline Table and Gantt Chart as per PERT**
- 6.5 Critical Activities**
- 6.6 Critical Path**
- 6.7 Cost Distribution Curve**
- 6.8 Resource Assignment Month Wise**
- 6.9 Progress Report After 3 Months With EV option PF=1**
- 6.10 Progress Report After 3 Months With EV Option PF=10(SPI X CPI)**
- 6.11 Progress Curve after 3 Months**
- 6.12 Progress Report After 6 Months**
- 6.13 Progress Curve After 6 Month**
- 6.14 What If Analysis Change Report**
- 6.15 What IF analysis Revised Schedule**

Project schedule log

Scheduling/Levelling Report - 2017-06-09 15:01:32 - PM.exe



Default Project.....BU-PR

Projects:

BU-PR.....EPC BUILDING WORKS

Scheduling/Levelling Settings:-----

General

SchedulingYes

LevellingNo

Ignore relationships to and from other projectsNo

Make open-ended activities criticalNo

Use Expected Finish DatesYes

Schedule automatically when a change affects datesNo

Level resources during schedulingNo

Recalculate assignment costs after schedulingNo

When scheduling progressed activities useRetained Logic

Calculate start-to-start lag fromEarly Start

Define critical activities as Total Float less than or equal to .0

Compute Total Float AsFinish Float

Calculate float based on finish date ofEach project

Calendar for scheduling Relationship LagPredecessor Activity

Calendar

Advanced

Calculate multiple float paths.....No

Statistics:

Projects.....1
 # Activities.....115
 # Not Started.....44
 # In Progress.....12
 # Completed.....59
 # Relationships.....146
 # Activities with Constraint.....0

Errors: -----

Warnings:-----

Activities without predecessors.....1

Project:	BU-PRActivity:	MIL-SM-100	PROJECT START
----------	----------------	------------	---------------

DATE

Activities without successors.....14 Milestones

Milestone Activities with invalid relationships.....0

Finish milestone and predecessors have different calendars.....0

Scheduling/Levelling Results:-----

Projects Scheduled/Leveled.....1

Activities Scheduled/Leveled.....115

Relationships with other projects.....0

Data Date.....31-May-17

Earliest Early Start Date.....31-May-17

Latest Early Finish Date.....25-Apr-18

Exceptions: -----

Critical Activities.....22

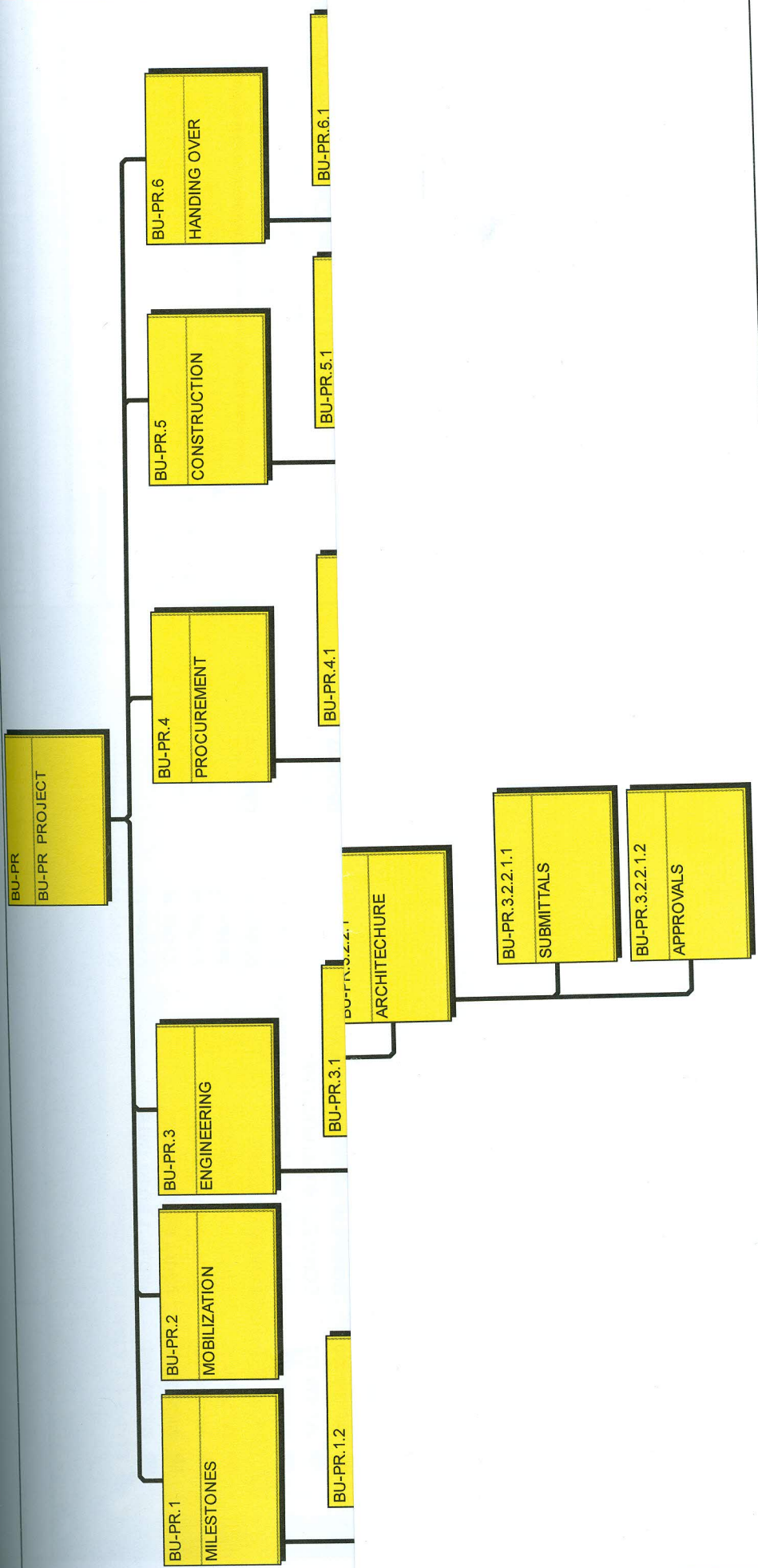
Project:	BU-PRActivity:	ARF-1000	MASONRY WORKS
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Project:	BU-PRActivity:	ARF-1010	PLASTER WORKS
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Project:	BU-PRActivity:	ARF-1020	WATERPROOFING
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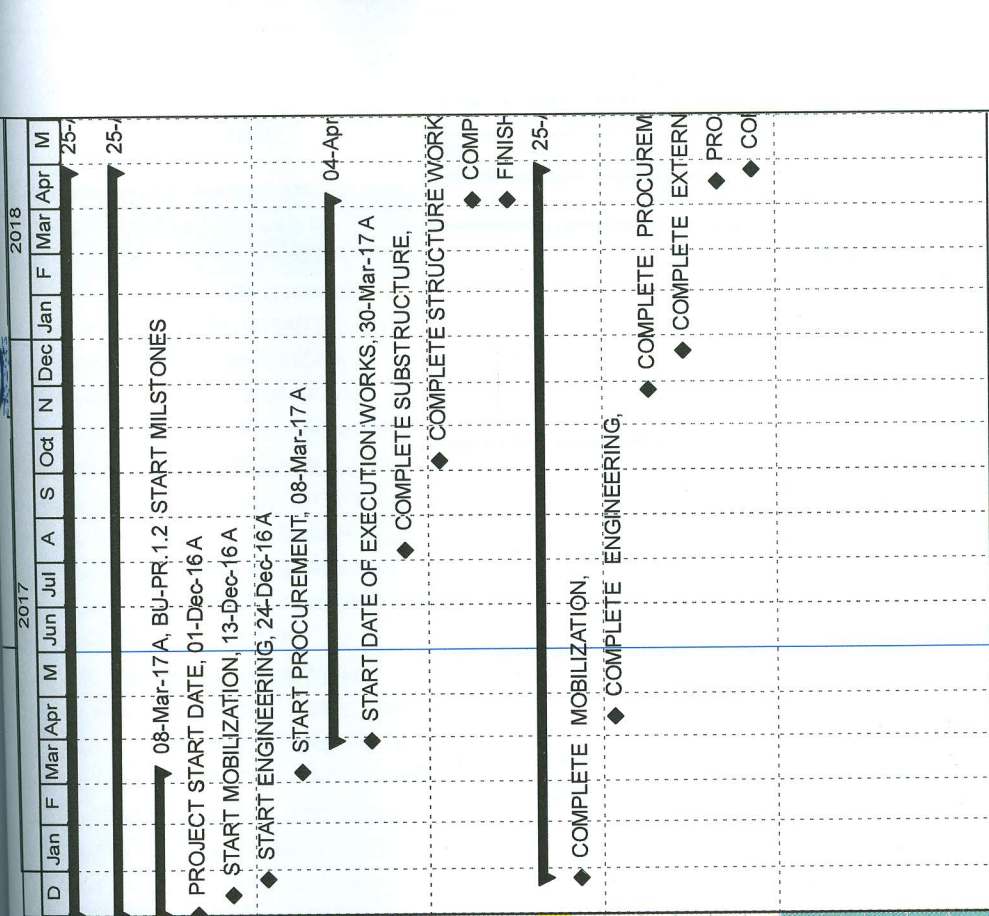
WET AREAS

	Project:	BU-PRActivity:	ARF-1030	WALL TILING
	Project:	BU-PRActivity:	ARF-1040	CEILING WORKS
FINISHING	Project:	BU-PRActivity:	ARF-1080	TOILET FLOORING
	Project:	BU-PRActivity:	ARF-1090	PAINTING 1ST FIX
	Project:	BU-PRActivity:	ARF-1120	INSTALL DOORS
	Project:	BU-PRActivity:	ARF-1150	PAINTING 2ND FIX
ACCESSORIES ,MIRRORS & GLASS PARTIOTION	Project:	BU-PRActivity:	ARF-1160	INSTALL TOILET
AND HANDING OVER	Project:	BU-PRActivity:	DM-1000	DEMOBILIZATION
MOISTURE PROTECTION	Project:	BU-PRActivity:	DTS-ARCH1010	THERMAL &
REMAINING WORKS IF ANY	Project:	BU-PRActivity:	HO-TC-1000	CLEANING AND
DEMOBILIZATION	Project:	BU-PRActivity:	MIL-FM-150	COMPLETE
FOUNDATION WORKS	Project:	BU-PRActivity:	SUB-1040	RAFT
WALLS AND COLUMN	Project:	BU-PRActivity:	SUB-1050	RETAINING
OF RETAINING WALLS	Project:	BU-PRActivity:	SUB-1060	MASONRY WORKS
	Project:	BU-PRActivity:	SUB-1070	WATERPROOFING
	Project:	BU-PRActivity:	SUB-1080	BACKFILLING
	Project:	BU-PRActivity:	SUB-1090	SLAB ON GRADE
	Project:	BU-PRActivity:	SUP-1000	COLUMNS
	Project:	BU-PRActivity:	SUP-1010	ROOF SLAB
Activities with unsatisfied constraints.....0				
Activities with unsatisfied relationships.....0				
Activities with external dates.....0				



WBS CHART VIEW

WBS Code	
WBS Name	



Activity ID	Activity Name	BL Project Start	BL Project Finish
BU-PR EPC BUILDING WORKS			
BU-PR.1 MILESTONES			
BU-PR.1.2 START MILSTONES			
MIL-SM-100	PROJECT START DATE	01-Dec-16	23-Apr-18
MIL-SM-110	START MOBILIZATION	01-Dec-16	23-Apr-18
MIL-SM-120	START ENGINEERING	01-Dec-16	14-Mar-17
MIL-SM-130	START PROCUREMENT	13-Dec-16	
		24-Dec-16	
		14-Mar-17	
BU-PR.1.3 EXECUTION MILESTONE			
MIL-EM-100	START DATE OF EXECUTION WORKS	01-Apr-17	02-Apr-18
MIL-EM-120	COMPLETE SUBSTRUCTURE	01-Apr-17	04-Aug-17
MIL-EM-130	COMPLETE STRUCTURE WORKS		05-Oct-17
MIL-EM-140	COMPLETE FINISHING WORKS		02-Apr-18
MIL-EM-160	FINISH DATE		02-Apr-18
BU-PR.1.4 FINISH MILESTONE			
MIL-FM-100	COMPLETE MOBILIZATION	24-Dec-16	23-Apr-18
MIL-FM-110	COMPLETE ENGINEERING		24-Dec-16
MIL-FM-120	COMPLETE PROCUREMENT		11-Apr-17
MIL-FM-130	COMPLETE EXTERNAL WORKS		26-Oct-17
MIL-FM-140	PROJECT FINISH DATE		18-Dec-17
MIL-FM-150	COMPLETE DEMOBILIZATION		13-Apr-18
			23-Apr-18
BU-PR.2 MOBILIZATION			
BU-PR.3 ENGINEERING			
BU-PR.4 PROCUREMENT			
BU-PR.5 CONSTRUCTION			
BU-PR.6 HANDING OVER			

MILESTONE LIST
Page 1 of 1

Actual Level of Effort █ Remaining Work

Primary Baseline █ Critical Remaining Work

Actual Work █ Milestone ◆

Date	Revision	Check... A...



2018

Activity Name

Nov Dec Jan Feb Mar Apr May

23-Apr-18

23-Apr-18

02-Apr-18, BU-P

23-Apr-18

23-Apr-18

23-Apr-18

BU-PR BU-PR PROJECT

BU-PR.1 MILESTONES

BU-PR.1.2 START MILSTONES

- MIL-SM-' PROJECT START DATE
- MIL-SM-' START MOBILIZATION
- MIL-SM-' START ENGINEERING
- MIL-SM-' START PROCUREMENT

BU-PR.1.3 EXECUTION MILESTONE

- MIL-EM-' START DATE OF EXECUTION
- MIL-EM-' COMPLETE SUBSTRUCTURE,
- MIL-EM-' COMPLETE STRUCTURE WORKS,
- MIL-EM-' COMPLETE FINISHING WORKS,
- MIL-EM-' FINISH DATE

BU-PR.1.4 FINISH MILESTONE

- MIL-FM-' COMPLETE MOBILIZATION
- MIL-FM-' COMPLETE ENGINEERING
- MIL-FM-' COMPLETE PROCUREMENT,
- MIL-FM-' COMPLETE EXTERNAL WORKS,
- MIL-FM-' PROJECT FINISH DATE
- MIL-FM-' COMPLETE DEMOBILIZATION

BU-PR.2 MOBILIZATION

- M-100 TEMPORARY OFFICES AND
- M-110 ALL SERVICES FOR SITE
- M-120 SAFETY FENCE, GATES &

BU-PR.3 ENGINEERING

BU-PR.3.1 SHOP DRAWING

- BU-PR.3.1.1 SUBMITTAL**
 - SD-SL ARCHITECTURE WORKS
 - SD-SL CIVIL WORKS
- BU-PR.3.1.2 APPROVAL**
 - SD-AF ARCHITECTURE WORKS
 - SD-AF CIVIL WORKS

BU-PR.3.2 MATERIAL APPROVAL

- BU-PR.3.2.1 LONG LEAD ITEMS**
 - BU-PR.3.2.1.1 ARCHITECTURE**
 - BU-PR.3.2.1.1.1 SUBMITTALS**
 - ALUMINUM WINDOWS
 - KITCHEN CABINETS
 - BU-PR.3.2.1.1.2 APPROVALS**
 - ALUMINUM WINDOWS
 - KITCHEN CABINETS
 - BU-PR.3.2.2 NON LONG LEAD ITEMS**
 - BU-PR.3.2.2.1 ARCHITECTURE**
 - BU-PR.3.2.2.1.1 SUBMITTALS**
 - ACCESSORIES
 - THERMAL & MOISTURE INSULATION
 - GYPSUM BOARD CEILING
 - CEMENT BOARD CEILING
 - MARBLE FLOOR TILES
 - PAINTING
 - GRANITE VANITY TOP

Revision

Checked

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- Remaining Work
- Critical Remaining Work
- ◆ Milestone



2018

Activity Name

Nov Dec Jan Feb Mar Apr May

- METAL WORKS
- TOILET FLOOR

BU-PR.3.2.2.1.2 APPROVALS

- ACCESSORIES
- THERMAL & MOISTURE PROTECTION
- GYPSUM BOARD CEILING
- CEMENT BOARD CEILING
- MARBLE FLOOR TILES
- PAINTING
- GRANITE VANITY TOP
- METAL WORKS
- TOILET FLOOR

6-Oct-17, BU-PR.4 PROCUREMENT

BU-PR.4 PROCUREMENT

6-Oct-17, BU-PR.4.1 ARCHITECTURE

BU-PR.4.1 ARCHITECTURE

6-Oct-17, BU-PR.4.1 ARCHITECTURE

BU-PR.4.1.1 PURCHASE ORDER ISSUANCE

6-Oct-17, BU-PR.4.1 ARCHITECTURE

6-Oct-17, BU-PR.4.1 ARCHITECTURE

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6-Oct-17, BU-PR.4.1 ARCHITECTURE

Revision

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Remaining Work

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Critical Remaining Work

Milestone



2018

Activity Name

Nov Dec Jan Feb Mar Apr May

BU-PR.4.2.1 DELIVERY TO SITE

- DEL-C CONCRETE
- DEL-C STEEL

BU-PR.5 CONSTRUCTION

BU-PR.5.1 FOUNDATIONS WORKS

- SUB-1000 EXCAVATION WORKS
- SUB-1010 BACKFILLING BEFORE RAFT
- SUB-1020 TERMITE TREATMENT AND
- SUB-1030 WATERPROOFING UNDER
- SUB-1040 RAFT FOUNDATION WORK
- SUB-1050 RETAINING WALLS AND CO
- SUB-1060 MASONRY WORKS
- SUB-1070 WATERPROOFING OF RET
- SUB-1080 BACKFILLING
- SUB-1090 SLAB ON GRADE

FOUNDATIONS WORKS:

BU-PR.5.2 SUPER STRUCTURE WORKS

- SUP-1000 COLUMNS
- SUP-1010 ROOF SLAB
- SUP-1020 PARAPET WALL

7, BU-PR.5.2 SUPER STRUCTURE WORKS:

BU-PR.5.3 ARCHITECTURAL FINISH

- ARF-1000 MASONRY WORKS
- ARF-1010 PLASTER WORKS
- ARF-1020 WATERPROOFING WET A
- ARF-1030 WALL TILING
- ARF-1040 CEILING WORKS
- ARF-1050 TILE FLOORING FINISHING
- ARF-1060 MARBLE FLOORING FINIS
- ARF-1070 STAIRS FLOORING FINISH
- ARF-1080 TOILET FLOORING FINISH
- ARF-1090 PAINTING 1ST FIX
- ARF-1100 INSTALL METAL WORKS
- ARF-1110 INSTALL KITCHEN CABINETS
- ARF-1120 INSTALL DOORS
- ARF-1130 INSTALL WINDOWS
- ARF-1140 INSTALL CURTAIN WALLS
- ARF-1150 PAINTING 2ND FIX
- ARF-1160 INSTALL TOILET ACCESS

MASONRY WORKS:

PLASTER WORKS:

WATERPROOFING WET AREAS

WALL TILING

CEILING WORKS

TILE FLOORING FINISHING

MARBLE FLOORING FINISHING

STAIRS FLOORING FINISHING

TOILET FLOORING FINISHING

PAINTING 1ST FIX

INSTALL METAL WORKS

INSTALL KITCHEN CABINETS

INSTALL DOORS

INSTALL WINDOWS

INSTALL CURTAIN WALLS

PAINTING 2ND FIX

INSTALL TOILET

BU-PR.5.4 EXTERNAL CIVIL WORKS

- ECW-100 CONSTRUCTION OF UNDERGROUND SEPTIC TANKS
- ECW-101 HARDSCAPING AND ROADS FINISHING
- ECW-102 LANDSCAPING
- ECW-103 CONSTRUCTION OF UNDERGROUND WATER TANK

CONSTRUCTION OF UNDERGROUND SEPTIC TANKS

HARDSCAPING AND ROADS FINISHING

LANDSCAPING

CONSTRUCTION OF UNDERGROUND WATER TANK

BU-PR.6 HANDING OVER

BU-PR.6.1 TESTING AND COMMISSIONING

- HO-TC-1 CLEANING AND REMAINING

BU-PR.6.2 DEMOBILIZATION

- DM-1000 DEMOBILIZATION AND HANDING OVER

02-Apr-18, BU-P

02-Apr-18, BU-P

18-Dec-17, BU-PR.5.4 EXTERNAL CIVIL WORKS

23-Apr-18

13-Apr-18, BU-P

CLEANING AND REMAINING

23-Apr-18

DEMOBILIZATION

Revision

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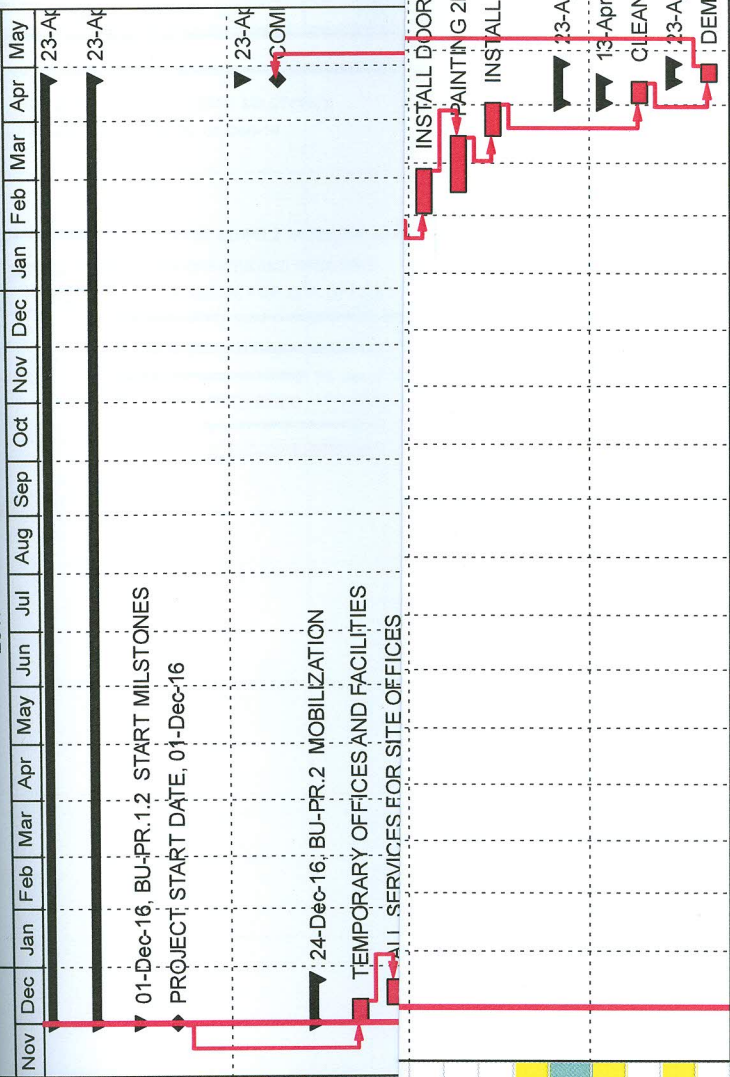
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Critical Remaining Work

Milestone

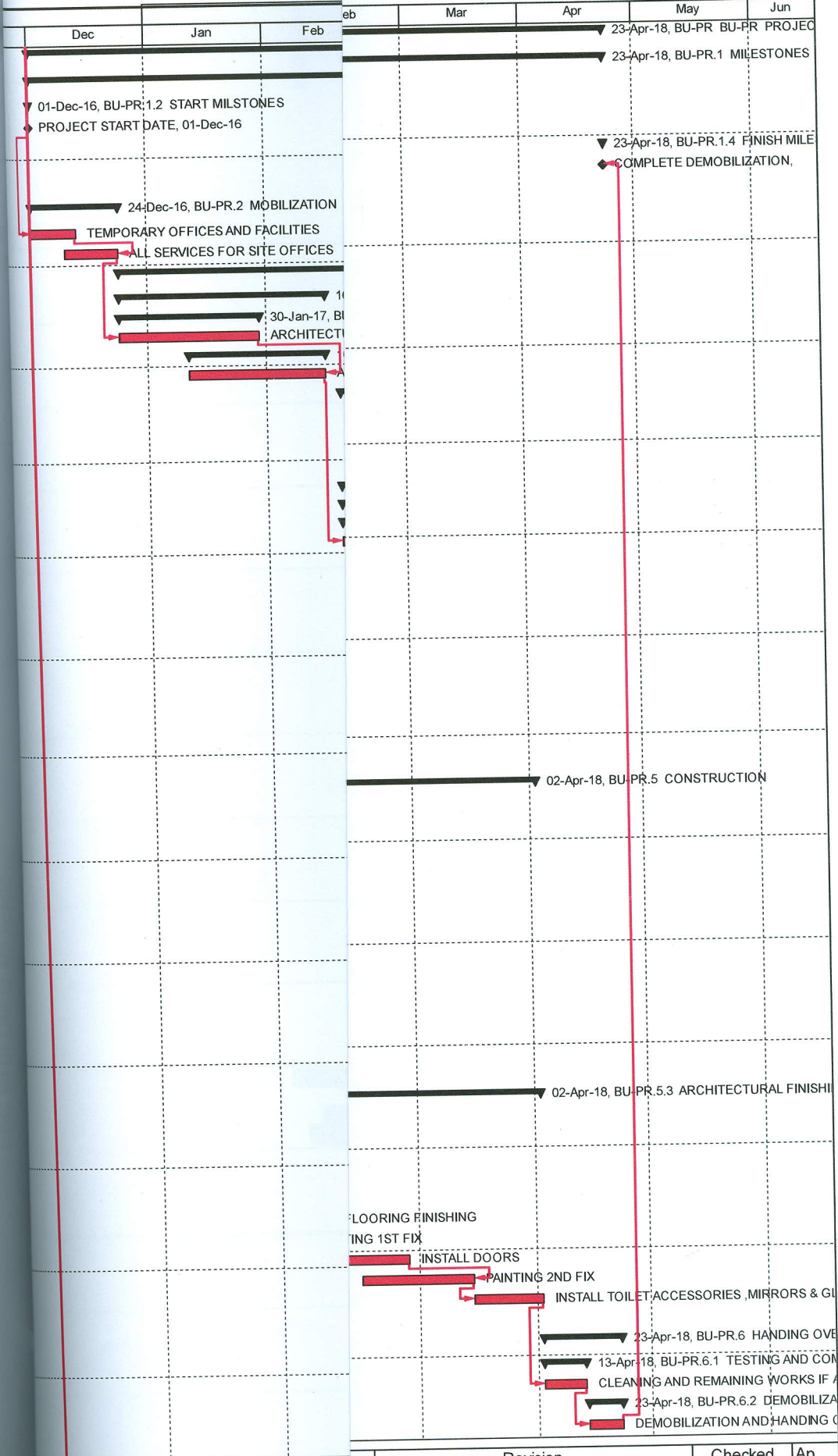


Activity Name	BL1 Start	BL1 Finish
BU-PR.1 MILESTONES	01-Dec-16	23-Apr-18
BU-PR.1.2 START MILESTONES	01-Dec-16	23-Apr-18
PROJECT START DATE	01-Dec-16	01-Dec-16
BU-PR.1.3 EXECUTION MILESTONE	23-Apr-18	23-Apr-18
BU-PR.1.4 FINISH MILESTONE	23-Apr-18	23-Apr-18
COMPLETE DEMOBILIZATION	01-Dec-16	24-Dec-16
BU-PR.2 MOBILIZATION	01-Dec-16	24-Dec-16
TEMPORARY OFFICES AND FACILITIES	01-Dec-16	13-Dec-16
INSTALL DOORS	01-Feb-18	26-Feb-18
PAINTING 2ND FIX	13-Feb-18	15-Mar-18
INSTALL TOILET ACCESSORIES, MIRRORS &	15-Mar-18	02-Apr-18
BU-PR.5.4 EXTERNAL CIVIL WORKS	02-Apr-18	23-Apr-18
BU-PR.6 HANDING OVER	02-Apr-18	13-Apr-18
BU-PR.6.1 TESTING AND COMMISSIONING	02-Apr-18	13-Apr-18
CLEANING AND REMAINING WORKS IF ANY	02-Apr-18	13-Apr-18
BU-PR.6.2 DEMOBILIZATION	14-Apr-18	23-Apr-18
DEMOBILIZATION AND HANDING OVER	14-Apr-18	23-Apr-18

CRITICAL ACTIVITIES		Date	Revision	Check... A...
Remaining Work	summary			
Critical Remaining Work				
Milestone				

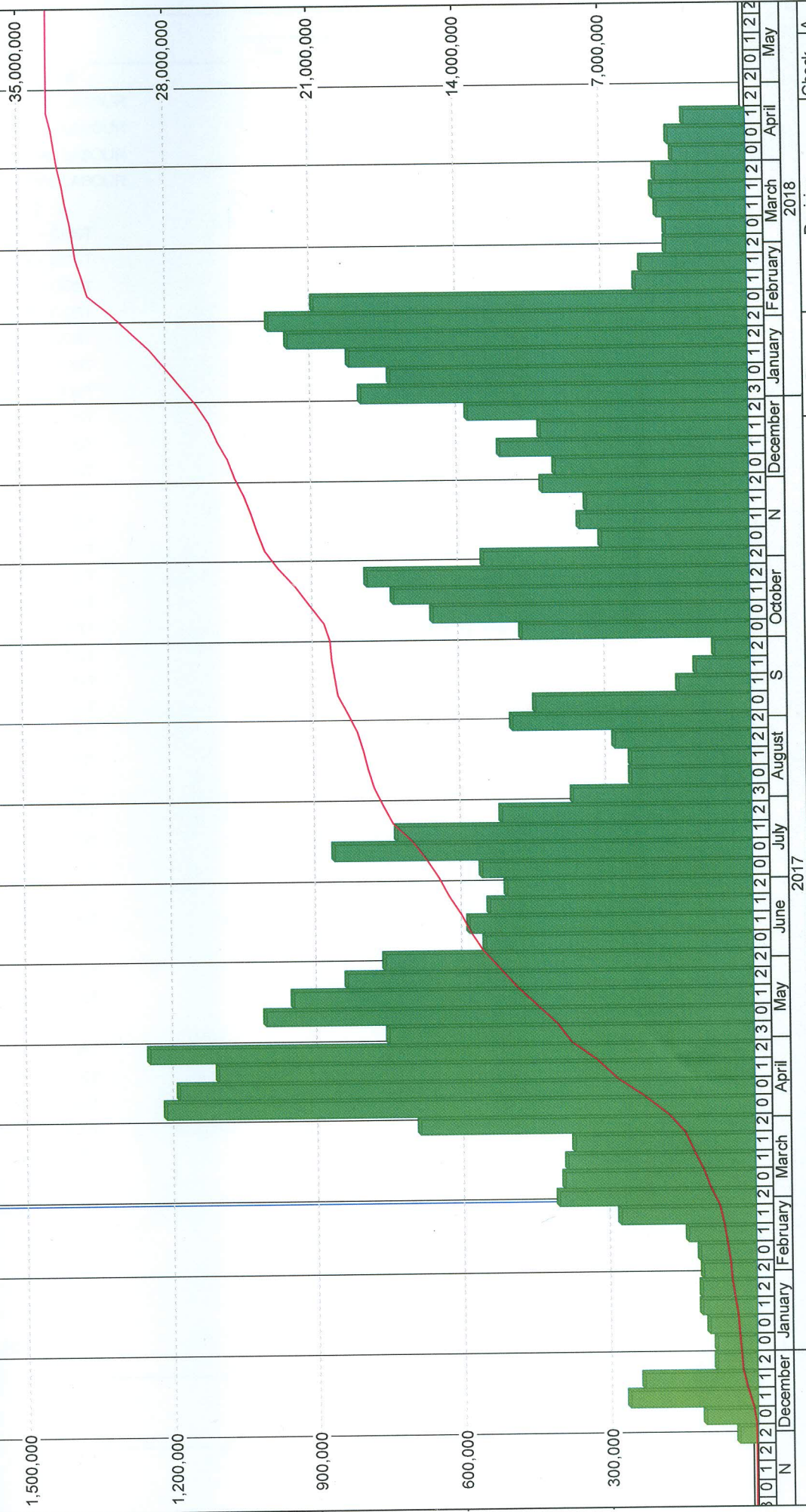


2018



- █ Remaining Work
- █ Critical Remaining Work
- ◆ Milestone

Revision	Checked	Ap...

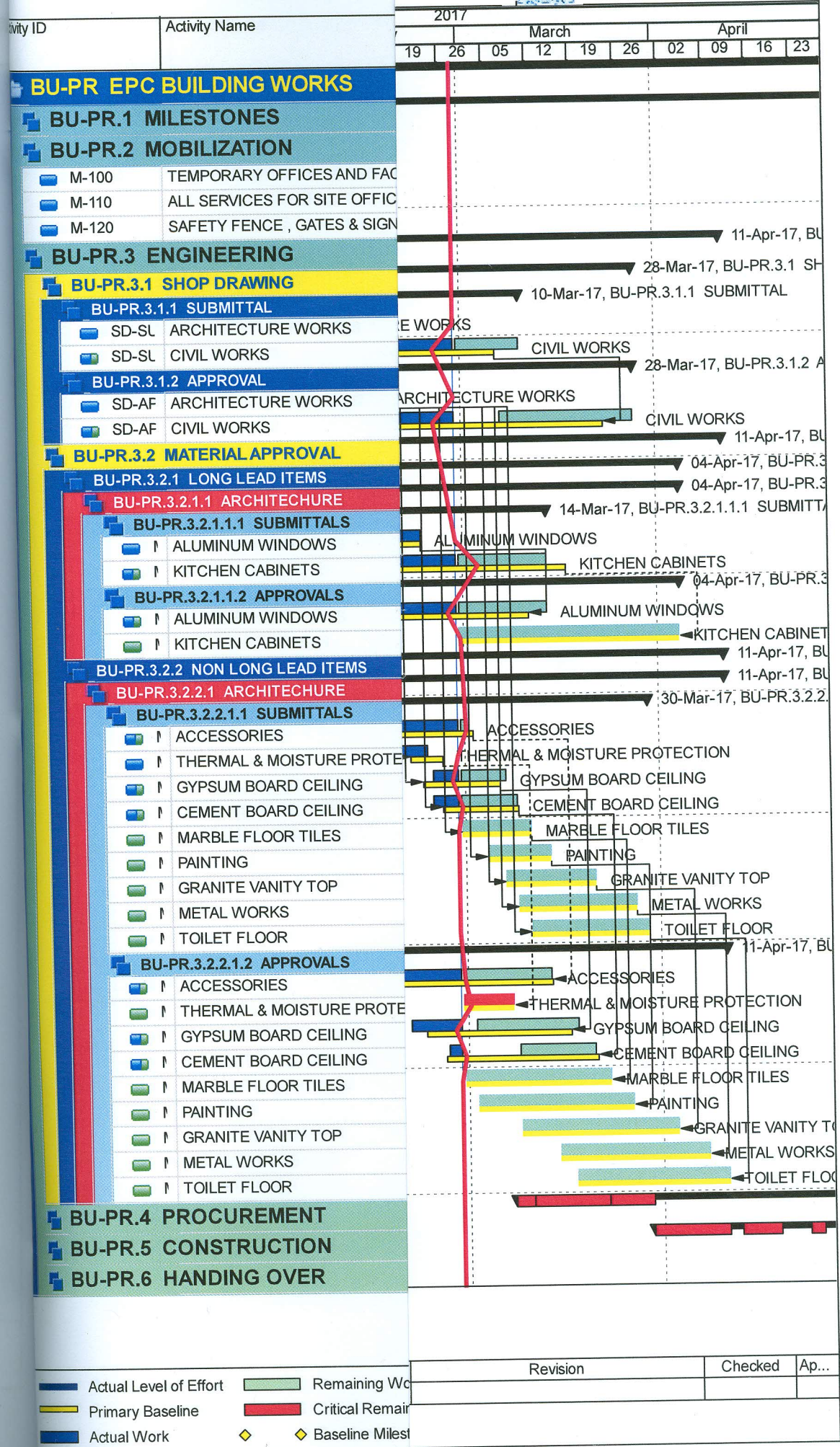


COST DISTRIBUTION CURVE

Cost

- Budgeted Total
- BL Project Total

Date	Revision	Check... A...



█ Actual Level of Effort █ Remaining Work
█ Primary Baseline █ Critical Remainder
█ Actual Work ◆ Baseline Milest

Revision	Checked	Ap...



Activity ID	Activity Name	2017									
		March					April				
		19	26	05	12	19	26	02	09	16	23

BU-PR EPC BUILDING WORKS

BU-PR.1 MILESTONES

BU-PR.2 MOBILIZATION

M-100	TEMPORARY OFFICES AND FAC
M-110	ALL SERVICES FOR SITE OFFICE
M-120	SAFETY FENCE , GATES & SIGN

BU-PR.3 ENGINEERING

BU-PR.3.1 SHOP DRAWING

BU-PR.3.1.1 SUBMITTAL

SD-SL	ARCHITECTURE WORKS
SD-SL	CIVIL WORKS

BU-PR.3.1.2 APPROVAL

SD-AF	ARCHITECTURE WORKS
SD-AF	CIVIL WORKS

BU-PR.3.2 MATERIAL APPROVAL

BU-PR.3.2.1 LONG LEAD ITEMS

BU-PR.3.2.1.1 ARCHITECTURE

BU-PR.3.2.1.1.1 SUBMITTALS

ALUMINUM WINDOWS
KITCHEN CABINETS

BU-PR.3.2.1.1.2 APPROVALS

ALUMINUM WINDOWS
KITCHEN CABINETS

BU-PR.3.2.2 NON LONG LEAD ITEMS

BU-PR.3.2.2.1 ARCHITECTURE

BU-PR.3.2.2.1.1 SUBMITTALS

ACCESSORIES
THERMAL & MOISTURE PROTECTION
GYPSUM BOARD CEILING
CEMENT BOARD CEILING
MARBLE FLOOR TILES
PAINTING
GRANITE VANITY TOP
METAL WORKS
TOILET FLOOR

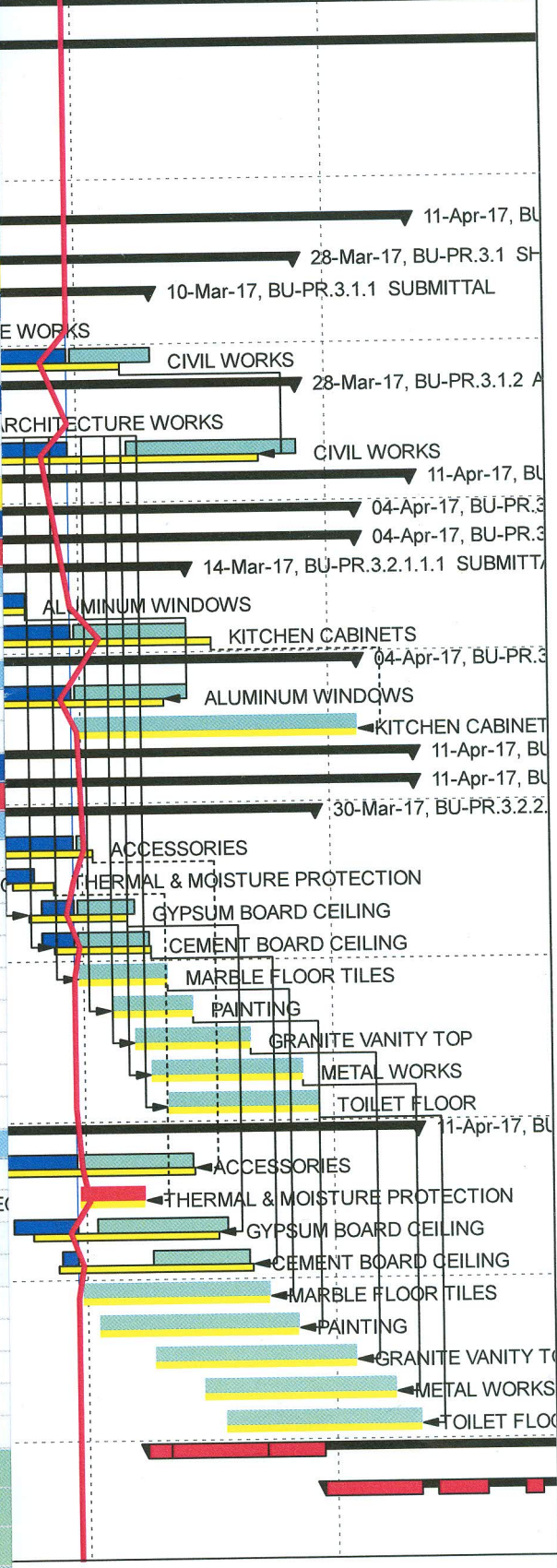
BU-PR.3.2.2.1.2 APPROVALS

ACCESSORIES
THERMAL & MOISTURE PROTECTION
GYPSUM BOARD CEILING
CEMENT BOARD CEILING
MARBLE FLOOR TILES
PAINTING
GRANITE VANITY TOP
METAL WORKS
TOILET FLOOR

BU-PR.4 PROCUREMENT

BU-PR.5 CONSTRUCTION

BU-PR.6 HANDING OVER



Actual Level of Effort	Remaining Work
Primary Baseline	Critical Remaining
Actual Work	Baseline Milestone

Revision	Checked	Ap...
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Activity ID	Activity Name	2017												
		April				May				June				
		9	26	02	09	16	23	30	07	14	21	28	04	11

BU-PR EPC BUILDING WORKS

BU-PR.1 MILESTONES

BU-PR.2 MOBILIZATION

BU-PR.3 ENGINEERING

BU-PR.3.1 SHOP DRAWING

BU-PR.3.1.1 SUBMITTAL

SD-SL ARCHITECTURE WORKS

SD-SL CIVIL WORKS

BU-PR.3.1.2 APPROVAL

SD-AF ARCHITECTURE WORKS

SD-AF CIVIL WORKS

BU-PR.3.2 MATERIAL APPROVAL

BU-PR.3.2.1 LONG LEAD ITEMS

BU-PR.3.2.1.1 ARCHITECTURE

BU-PR.3.2.1.1.1 SUBMITTALS

ALUMINUM WINDOWS

KITCHEN CABINETS

BU-PR.3.2.1.1.2 APPROVALS

ALUMINUM WINDOWS

KITCHEN CABINETS

BU-PR.3.2.2 NON LONG LEAD ITEMS

BU-PR.3.2.2.1 ARCHITECTURE

BU-PR.3.2.2.1.1 SUBMITTALS

ACCESSORIES

THERMAL & MOISTURE PROTECTION

GYPSON BOARD CEILING

CEMENT BOARD CEILING

MARBLE FLOOR TILES

PAINTING

GRANITE VANITY TOP

METAL WORKS

TOILET FLOOR

BU-PR.3.2.2.1.2 APPROVALS

ACCESSORIES

THERMAL & MOISTURE PROTECTION

GYPSON BOARD CEILING

CEMENT BOARD CEILING

MARBLE FLOOR TILES

PAINTING

GRANITE VANITY TOP

METAL WORKS

TOILET FLOOR

BU-PR.4 PROCUREMENT

BU-PR.4.1 ARCHITECTURE

BU-PR.4.1.1 PURCHASE ORDER ISSUE

P.O-AF ACCESSORIES

P.O-AF THERMAL & MOISTURE PROTECTION

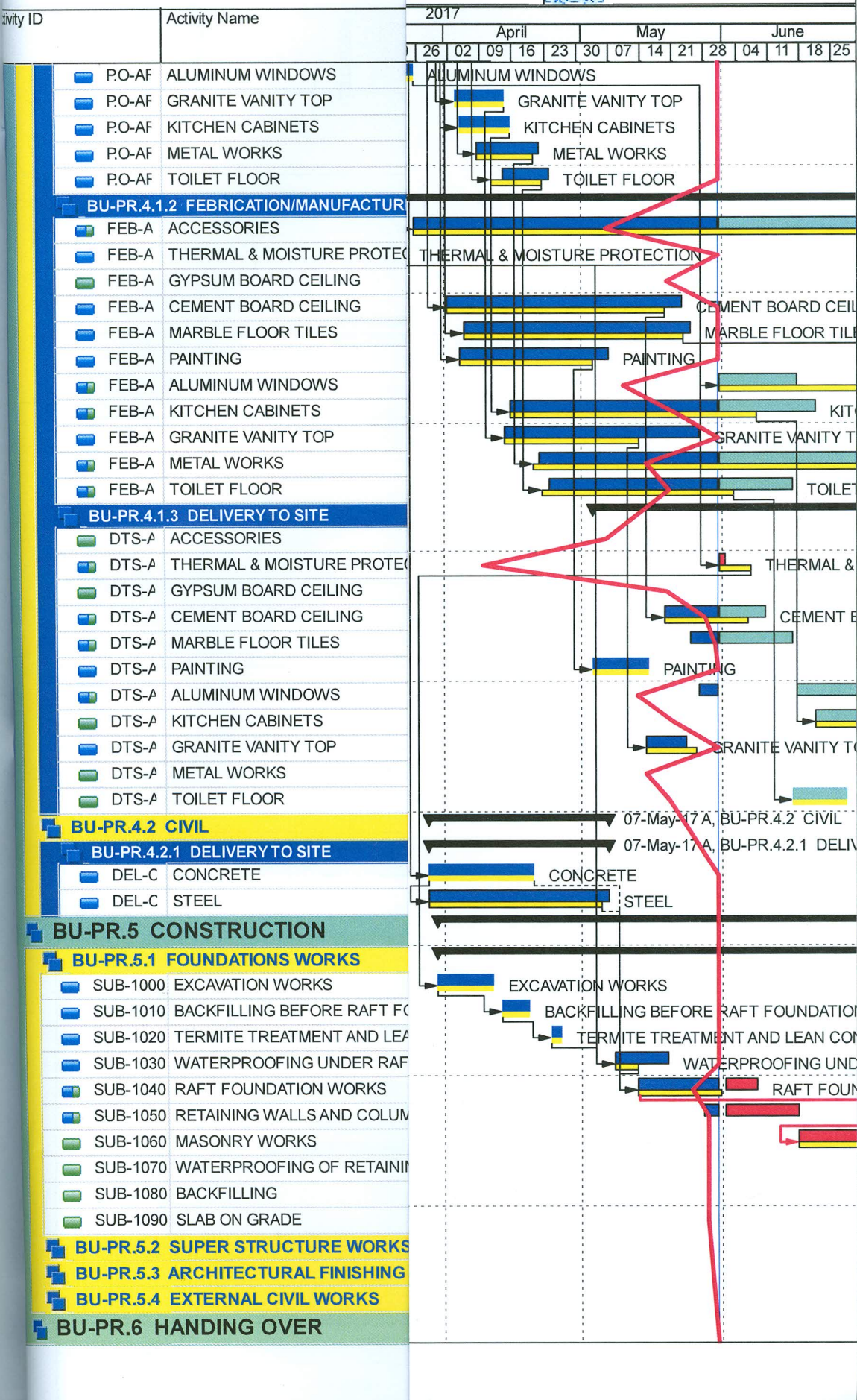
P.O-AF GYPSON BOARD CEILING

P.O-AF CEMENT BOARD CEILING

P.O-AF MARBLE FLOOR TILES

P.O-AF PAINTING

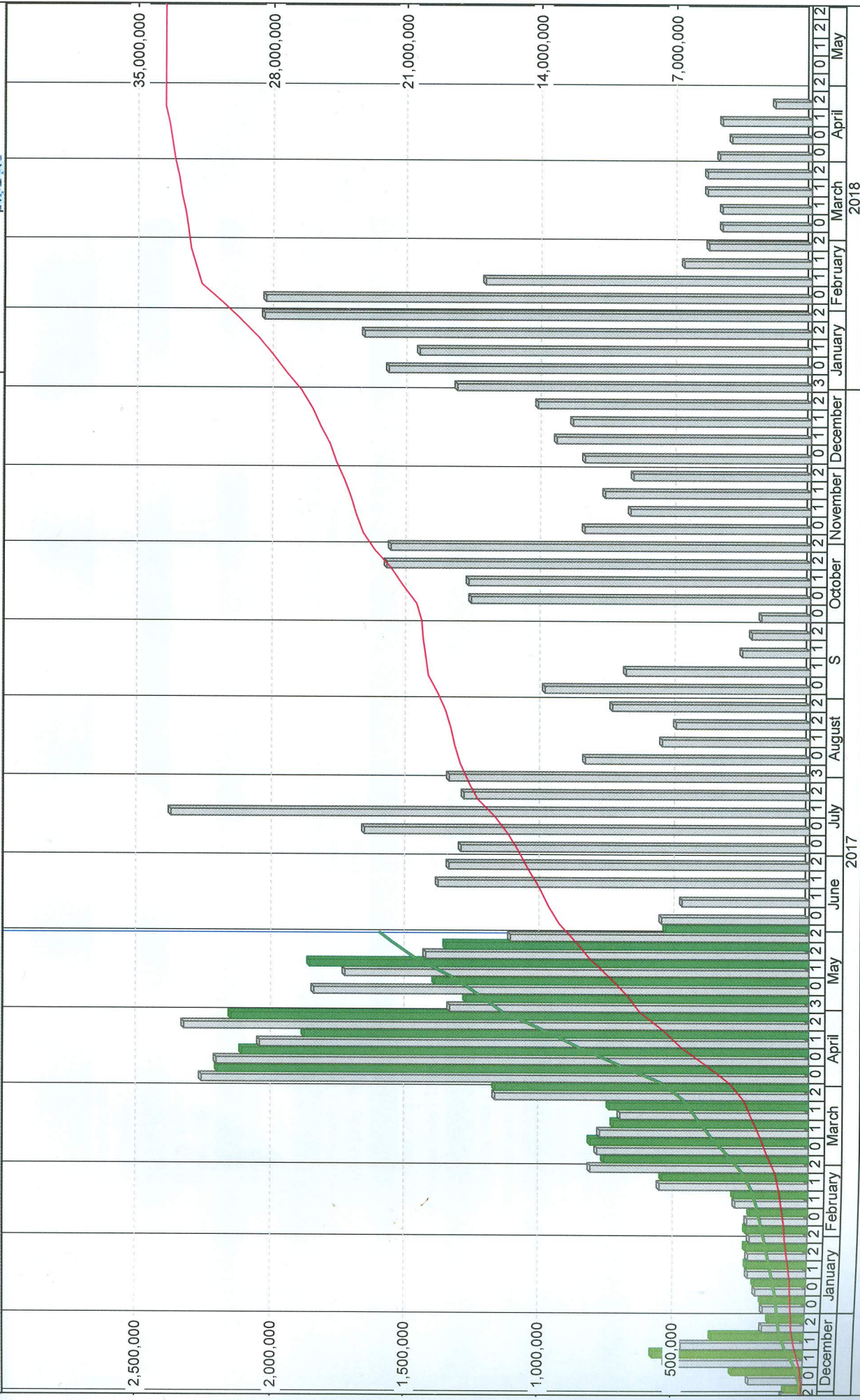
	Actual Level of Effort		Remaining Work	Revision	Checked	Ap...
	Primary Baseline		Critical Remainder			
	Actual Work		Baseline Milestones			



Revision	Checked	Ap...
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PF = 1 / CPI X SPI

Actual Total



ACTUAL VS BUDGETED COST CHART LF-2

DATA DATE 31ST MAY-17
PF = 1 / CPI X SPI

Cost

- Budgeted Total
- Actual Total
- BL Project Total

Date	Revision	Check...
		A...

2018

May

April

March

February

January

December

November

October

September

August

July

June

May

April

March

February

January

December



Status	Field	Value before merging	Value after merging
Activities			
ARF-1040 / CEILING WORKS			
Updated	Remaining Duration	30	20
Updated	Original Duration	30	20
ARF-1090 / PAINTING 1ST FIX			
Updated	Remaining Duration	30	20
Updated	Original Duration	30	20
ARF-1120 / INSTALL DOORS			
Updated	Remaining Duration	20	13
Updated	Original Duration	20	13
ARF-1150 / PAINTING 2ND FIX			
Updated	Remaining Units / Time	124/d	309/d
Updated	Budgeted Units / Time	124/d	309/d
DM-1000 / BU - COST.BUDGET - COST			
Updated	Remaining Units / Time	29/d	67/d
Updated	Budgeted Units / Time	29/d	67/d
HO-TC-1000 / BU - COST.BUDGET - COST			
Updated	Remaining Units / Time	25/d	50/d
Updated	Budgeted Units / Time	25/d	50/d
SUP-1000 / BU - COST.BUDGET - COST			
Updated	Remaining Units / Time	22/d	29/d
Updated	Budgeted Units / Time	22/d	29/d
SUP-1010 / BU - COST.BUDGET - COST			
Updated	Remaining Units / Time	63/d	95/d
Updated	Budgeted Units / Time	63/d	95/d

**What IF Analysis
Reflection Changes**



Activity Name	Original Duration	2017												2018				
		D	Jan	F	M	Apr	M	Jun	Jul	A	S	Oct	N	D	Jan	F	M	Apr
BU-PR-3 EPC BUILDING WORKS LF 2 Reflection	386	01-Dec-16																23-Apr-18
BU-PR-3.1 MILESTONES	386	01-Dec-16																23-Apr-18
BU-PR-3.1.2 START MILSTONES	152	01-Dec-16																14-Mar-17
BU-PR-3.1.3 EXECUTION MILESTONE	225	01-Apr-17																02-Apr-18
BU-PR-3.1.4 FINISH MILESTONE	366	24-Dec-16																23-Apr-18
BU-PR-3.2 MOBILIZATION	20	01-Dec-16																24-Dec-16
BU-PR-3.3 ENGINEERING	90	24-Dec-16																11-Apr-17
BU-PR-3.3.1 SHOP DRAWING	75	24-Dec-16																23-Mar-17
BU-PR-3.3.2 MATERIAL APPROVAL	60	30-Jan-17																11-Apr-17
BU-PR-3.4 PROCUREMENT	220	09-Mar-17																26-Oct-17
BU-PR-3.4.1 ARCHITECTURE	220	09-Mar-17																26-Oct-17
BU-PR-3.4.2 CIVIL	32	24-Mar-17																01-May-17
BU-PR-3.5 CONSTRUCTION	278	01-Apr-17																02-Apr-18
BU-PR-3.5.1 FOUNDATIONS WORKS	109	01-Apr-17																04-Aug-17
BU-PR-3.5.2 SUPER STRUCTURE WORKS	43	04-Aug-17																05-Oct-17
BU-PR-3.5.3 ARCHITECTURAL FINISHING	126	05-Oct-17																02-Apr-18
BU-PR-3.5.4 EXTERNAL CIVIL WORKS	62	05-Oct-17																18-Dec-17
BU-PR-3.6 HANDING OVER	8	02-Apr-18																23-Apr-18
BU-PR-3.6.1 TESTING AND COMMISSIONING	5	02-Apr-18																13-Apr-18
BU-PR-3.6.2 DEMOBILIZATION	3	14-Apr-18																23-Apr-18



REVISED SCHEDULE AFTER WHAT IF ANALYSIS