PLANNING AND SCHEDULING OF A TWO STOREY BUILDING USING PRIMAVERA P6

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Abstract— Planning and scheduling is very important in construction projects because of the increasing complexities in this domain. Construction Planning is the necessary forerunner to Scheduling and includes defining work tasks, determining general sequence, construction methods and assigning responsibilities. Improper planning can lead to major delays in the project work. Projects nowadays huge amount of paperwork, which makes the management very cumbersome. These problems can be solved using a project planning software which helps to give a structured approach to planning. In this study, a case of a two storey research lab has been taken to depict how proper planning and scheduling is done using Primavera software.
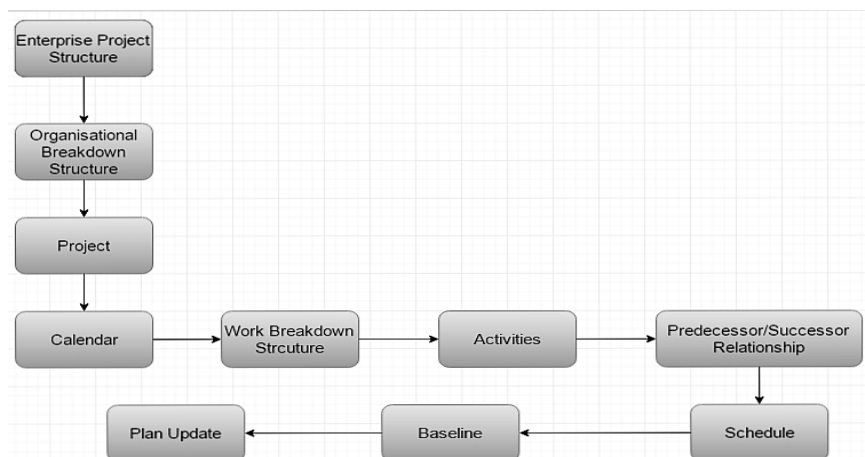
Keywords— Planning, Scheduling, Project Planning Software, Primavera.

I. INTRODUCTION

The task of finishing off a construction site with an estimated time is the most crucial concern amongst the project managers. Inevitable delays and cost in the project might occur due to improper coordination and communication among the experts. These constraints make project management a complex task. Several approaches and techniques have been established for an effective management and control of the project. However it is necessary to have a good understanding of the project for improving the productivity and enhancing the quality of work. Planning involves the choice of technology, the definition of work tasks, the estimation of the required resources and durations for individual tasks. On the other hand scheduling involves time order and the relationship between the activities of a construction project. In this project a case study on a two storeyed building and also an effective time management has been done using CPM method. CPM is suited for a project involving numerous activities interlinked in a complex manner. The schedule is developed based on the project site and the resource capacity and material requirements in the project planning software Primavera P6. An efficient planning and scheduling on primavera helps to control and monitor the progress of the work by reviewing and reprogramming under some changes so that the work goes hand in hand with the projected time.

Primavera P6 Enterprise Project Portfolio Management is the most powerful, robust and easy-to-use solution for globally prioritizing, planning, managing and executing projects, programs and portfolios. In this project we have carried out the management following the flow chart:

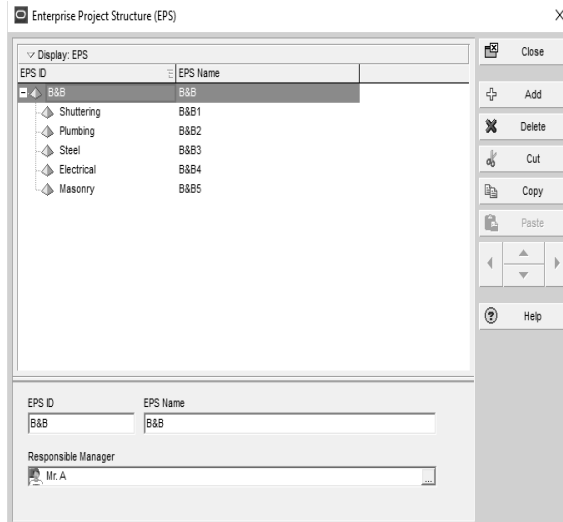All the steps have been properly explained with the help of the case taken.

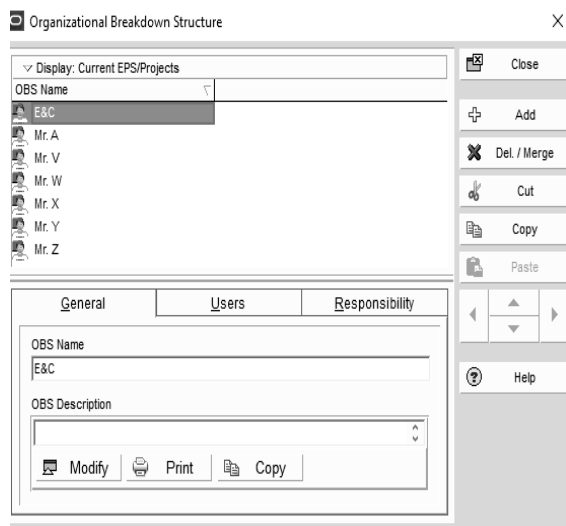## II. OBJECTIVE

The objectives of this study are:
1. Find the construction sequence for a residential building construction.
2. Calculate the practical durations required to carry out the activities.
3. Identify the scheduling technique.
4. Develop scheduling using Primavera project planner's software.

III. RESEARCH METHODOLOGY

Enterprise Project Structure is a hierarchical structure that identifies the company wide projects and enables organization and management of those projects and enables organization and management of those projects by means of subdivisions or levels.

Organizational Breakdown Structure is a hierarchical arrangement of an organization's management structure. OBS is defined at a global level and relates and relates with the EPS to control user access to project information.
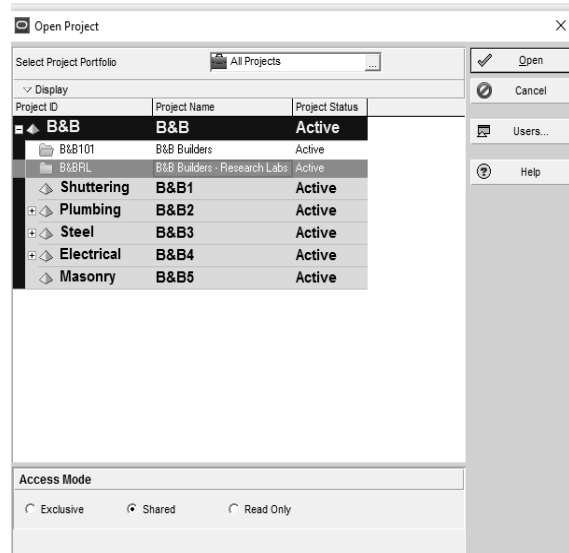

Project is a temporary endeavour undertaken to create a unique product, service or result. A project contains a set of activities performed in a coordinated arrangement in order to create a product, service, or measurable business result. Projects must have a definite beginning and end dates; else it is not a project. A project is concluded when its objectives have been reached or when the project is terminated. There are three Access Modes:

Shared Mode: Anyone who has access may also open the project, calculate and display with their user preferences, and report different data from the same project at the same time.

Exclusive Mode: In order to open the projects exclusively, that means the respective users alone can edit the projects information's, other users cannot be editable.

Read-only Mode: In read-only mode the project information is displayed for all users but the information is not edit by any of the user. It is just for viewing purpose only. In this project we have made a project with the following specifications:

1) An EPS node, OBS node to assign a responsible manager.
2) Project ID: B&B
   Project Name: B&BRL
3) The Project Start date: 19 February 2016.
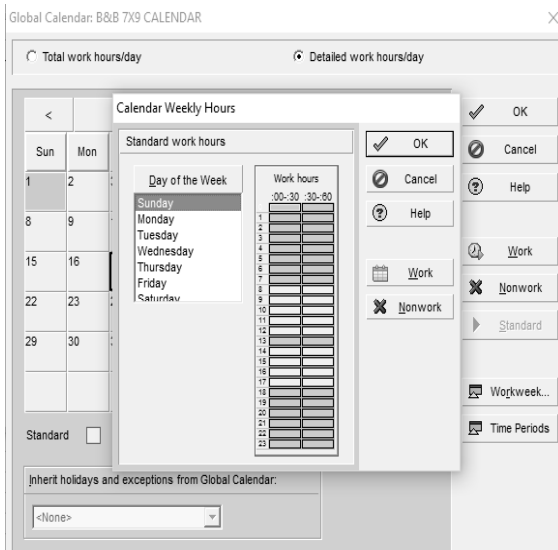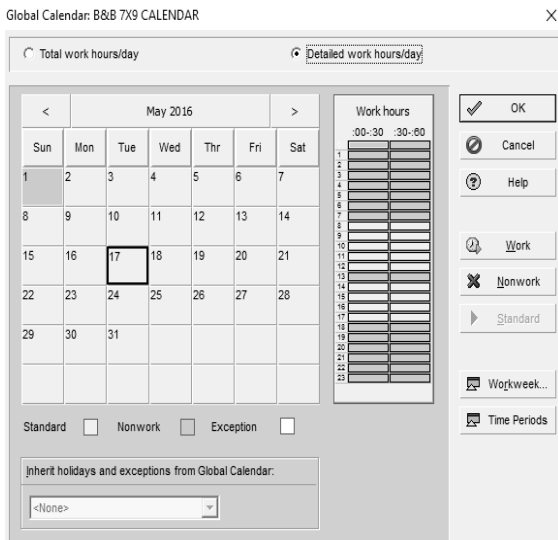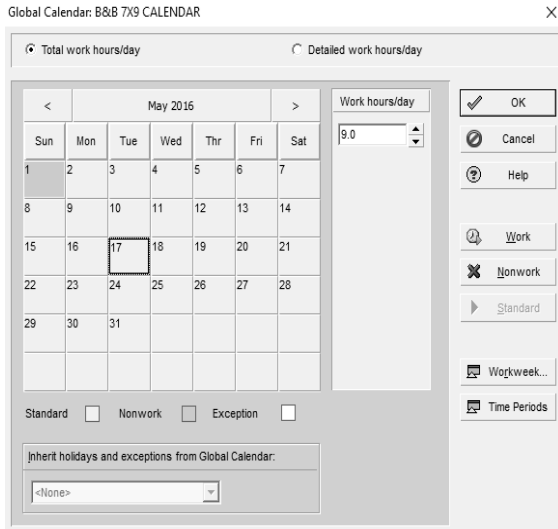4) Access Mode: Shared Mode

Calendars are used to set in a project and its resources' working times to accurately reflect resource availability information. The application uses your calendar assignments for levelling resources, scheduling, and tracking activities. Calendar will display the working and non-working time of an organization. Calendar will also represent the working days and working hours in a day. Besides, national holidays, specified days, and project-specific work/non workdays can also be declared. There are three types of calendars:

- Global Calendar: It contains calendars that apply to all projects.
- Project Calendar: It is a separate pool of calendars for each project.
- Resource Calendar: It can be defined and applied to each individual resource.

In this project we have used 7X9 Global Calendar and given holidays for:

24th March 2016: Holi & 1st May 2016: Labour Day

represents a hierarchical breakdown of a project into elements. It relates the elements of work to be accomplished to each other and to the end product. WBS is also called as an organized method of dividing a product into sub products at lower levels of detail. In a project, the WBS is developed by starting with the end objective and successively starting with the end objective and successively subdividing it into manageable components in terms of size, duration, and responsibility which include all steps to achieve the objective. It will provide an easy way to summarize data along with a better understanding. Primavera Project Management allows just one hierarchical WBS structure.

WBS is a hierarchical structure to which activities are attached.

Figure 8: Work Breakdown Structures

Activities are the fundamental work elements of project. They are the lowest level of a Work Breakdown Structure. Activities must have certain durations, costs, and resources or role requirements. In Gantt chart it shows a graphical indicator of the project.

List of Activities involved for the construction:

Work Breakdown Structure is used to define and organize the project elements so as to clearly identify the deliverables, report and summarize schedule and cost data at different levels in detail. A WBS

Activities

Layout: Classic Schedule Layout | Filter: All Activities

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Schedule % Complete
A1140	Roof Shuttering	10	10	05-Apr-16	14-Apr-16	10%
A1150	Roof Barbending	8	8	10-Apr-16	17-Apr-16	0%
A1160	Roof Concrete	3	3	20-Apr-16	22-Apr-16	0%
A1170	Deshuttering	8	8	05-May-16	11-May-16	0%
A1180	Ceiling plastering	11	11	10-May-16	19-May-16	0%
A1190	Brick work upto lintel level	13	13	13-May-16	24-May-16	0%
A1200	Lintel & Sunshade shuttering wok	8	8	14-May-16	20-May-16	0%
A1210	Lintel & Sunshade barbending work	6	6	16-May-16	20-May-16	0%
A1220	Lintel & Sunshade Concrete	6	6	21-May-16	25-May-16	0%
A1230	Brickwork upto roof level	6	6	25-May-16	29-May-16	0%
A1240	Door and window frame fixing work	3	3	26-May-16	28-May-16	0%
A1250	Wall Plastering	17	17	26-May-16	09-Jun-16	0%
A1260	Painting Work	13	13	02-Jun-16	13-Jun-16	0%
A1270	Floor tile laying	11	11	06-Jun-16	15-Jun-16	0%
A1280	Door and window shutter fixing work	3	3	10-Jun-16	12-Jun-16	0%
A1890	Cleaning and handing over	3	3	12-Jun-16	14-Jun-16	0%
B&BRL.First Floor B&B3		80	80	23-Apr-16	12-Jul-16	0%
A1290	Column raising upto roof level	9	9	23-Apr-16	30-Apr-16	0%
A1300	Staircase shuttering	2	2	28-Apr-16	29-Apr-16	0%
A1310	Staircase barbending	2	2	01-May-16	02-May-16	0%
A1320	Staircase waist slab concrete	2	2	03-May-16	04-May-16	0%

Activities

Layout: Classic Schedule Layout | Filter: All Activities

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Schedule % Complete
A1320	Staircase waist slab concrete	2	2	03-May-16	04-May-16	0%
A1330	Roof Shuttering	11	11	30-May-16	09-May-16	0%
A1340	Roof Barbending	9	9	07-May-16	14-May-16	0%
A1350	Roof Concrete	3	3	17-May-16	19-May-16	0%
A1360	Deshuttering	8	8	01-Jun-16	07-Jun-16	0%
A1370	Ceiling plastering	11	11	11-Jun-16	20-Jun-16	0%
A1380	Brick work upto lintel level	11	11	14-Jun-16	23-Jun-16	0%
A1390	Lintel & Sunshade shuttering work	8	8	10-Jun-16	16-Jun-16	0%
A1400	Lintel & Sunshade barbending work	8	8	12-Jun-16	18-Jun-16	0%
A1410	Lintel & Sunshade concrete	6	6	17-Jun-16	21-Jun-16	0%
A1420	Brick work roof level	8	8	19-Jun-16	25-Jun-16	0%
A1430	Door and window frame fixing work	3	3	20-Jun-16	22-Jun-16	0%
A1440	Wall Plastering	17	17	20-Jun-16	04-Jul-16	0%
A1450	Painting work	12	12	27-Jun-16	08-Jul-16	0%
A1460	Floor tile laying	10	10	03-Jul-16	12-Jul-16	0%
A1470	Door and window shutter fixing work	3	3	07-Jul-16	09-Jul-16	0%
A1480	Cleaning and handing over	3	3	09-Jul-16	11-Jul-16	0%
B&BRL.Second Floor B&B4		81	81	20-May-16	08-Aug-16	0%
A1490	Column raising upto roof level	9	9	20-May-16	27-May-16	0%
A1500	Staircase shuttering	2	2	25-May-16	26-May-16	0%
A1510	Staircase barbending	2	2	28-May-16	29-May-16	0%

Activities

Layout: Classic Schedule Layout | Filter: All Activities

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Schedule % Complete
A1520	Staircase waist slab concrete	2	2	30-May-16	31-May-16	0%
A1530	Roof Shuttering	11	11	27-May-16	05-Jun-16	0%
A1540	Roof barbeding	9	9	03-Jun-16	10-Jun-16	0%
A1550	Roof concrete	3	3	13-Jun-16	15-Jun-16	0%
A1560	Deshuttering	8	8	28-Jun-16	04-Jul-16	0%
A1570	Ceiling plastering	10	10	10-Jul-16	19-Jul-16	0%
A1580	Brick work upto lintel level	10	10	04-Jul-16	13-Jul-16	0%
A1590	Lintel & Sunshade shuttering work	7	7	07-Jul-16	13-Jul-16	0%
A1600	Lintel & Sunshade barbending work	8	8	09-Jul-16	15-Jul-16	0%
A1610	Lintel & Sunshade Concrete	6	6	14-Jul-16	19-Jul-16	0%
A1620	Brick work upto roof level	8	8	16-Jul-16	24-Jul-16	0%
A1630	Door and window frame fixing work	3	3	17-Jul-16	19-Jul-16	0%
A1640	Wall Plastering	17	17	17-Jul-16	31-Jul-16	0%
A1900	Painting Work	13	13	24-Jul-16	04-Aug-16	0%
A1910	Floor tile laying	11	11	30-Jul-16	08-Aug-16	0%
A1920	Door and window shutter fixing work	3	3	03-Aug-16	05-Aug-16	0%
A1930	Cleaning and handing over	3	3	05-Aug-16	07-Aug-16	0%
B&BRL.Head Room B&B5		39	39	15-Jun-16	22-Jul-16	0%
A1650	Column barbending	2	2	15-Jun-16	16-Jun-16	0%
A1660	Column concrete	2	2	17-Jun-16	18-Jun-16	0%
A1670	Head Room Roof Shuttering	3	3	19-Jun-16	21-Jun-16	0%

Activities

Layout: Classic Schedule Layout | Filter: All Activities

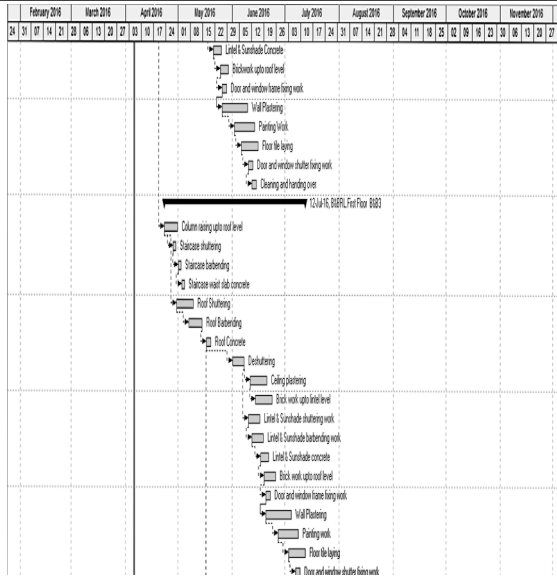| Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Schedule % Complete
A1680	Roof barbending & concreting	1	1	21-Jun-16	21-Jun-16	0%
A1690	Roof deshutering	2	2	28-Jun-16	29-Jun-16	0%
A1700	Ceiling plastering	2	2	30-Jun-16	01-Jul-16	0%
A1710	Brick work upto lintel level	3	3	30-Jun-16	02-Jul-16	0%
A1720	Lintel & sunshade concrete	1	1	02-Jul-16	02-Jul-16	0%
A1730	Brick work upto roof level	1	1	04-Jul-16	04-Jul-16	0%
A1740	Inner wall plastering	3	3	06-Jul-16	08-Jul-16	0%
A1750	Wall painting	3	3	10-Jul-16	12-Jul-16	0%
A1760	Floor tiling	2	2	13-Jul-16	14-Jul-16	0%
A1770	Cleaning & Handing over	2	2	21-Jul-16	22-Jul-16	0%
B&BRL.External Finishes B&B6		39	39	01-Jul-16	08-Aug-16	0%
A1780	RCC parapet wall concrete	5	5	01-Jul-16	05-Jul-16	0%
A1790	Parapet wall plastering	5	5	06-Jul-16	10-Jul-16	0%
A1800	Weathering coarse	15	15	11-Jul-16	25-Jul-16	0%
A1810	Pressed tiles	15	15	16-Jul-16	30-Jul-16	0%
A1820	Outer Wall Plastering	25	25	11-Jul-16	04-Aug-16	0%
A1830	External Plumbing & Sanitary work	10	10	16-Jul-16	25-Jul-16	0%
A1840	External Painting	18	18	20-Jul-16	06-Aug-16	0%
A1850	Site Cleaning & Handing Over	4	4	05-Aug-16	08-Aug-16	0%
A1860	End of Project	0	0		08-Aug-16	0%

Predecessor/Successor Relationships defines how an activity relates to the start or finish of another activity. These relationships are used together with activity durations to determine schedule dates. Relationship lines graphically illustrate the links between activities in Gantt Charts and Activity Networks. Predecessor is an activity that controls the start or finish of another activity or successor activity. Successor is an activity whose start or finish depends on the start or finish of another activity or predecessor's activity.

Types of Relationships:
1. Finish to Start (FS) Relationship
   The successor activity cannot start until its predecessor finishes.
2. Start to Start (SS) Relationship
   The successor activity cannot start until its predecessor starts.
3. Finish to Finish (FF) Relationship
   The finish date of the predecessor task determines the finish date of the successor task.
4. Start to Finish (SF) Relationship
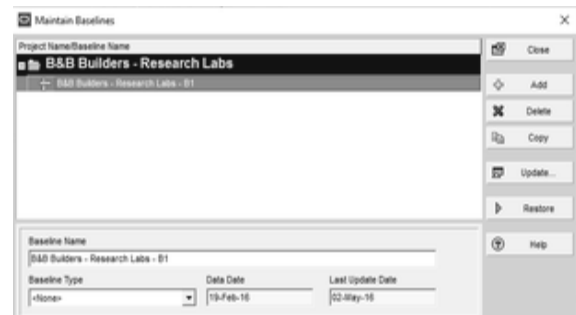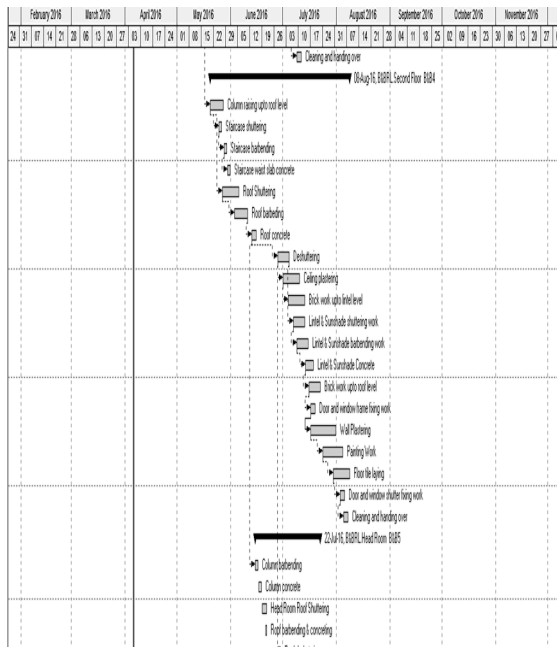   The successor activity cannot finish until its predecessor starts.

Gantt chart

Primavera Project Management starts **Scheduling** at the beginning of the project and continues till the end to calculate the early start and finish dates for each activity.

The Critical Path Method is a mathematically based algorithm for scheduling a set of project activities. Critical path is the sequence of activities which adds up to the longest overall duration. It is the shortest time possible to complete the project.

After the scheduling, using the critical path method we come to know the shortest time possible to complete the project is 109 days.

Baseline is a copy or snapshot of project data at a given time. Since baseline is a statistic representative of a project plan, it can be used in compare against measure performance as the project progresses. In this case, we have taken a baseline B&B Builders – Research Labs – B1.
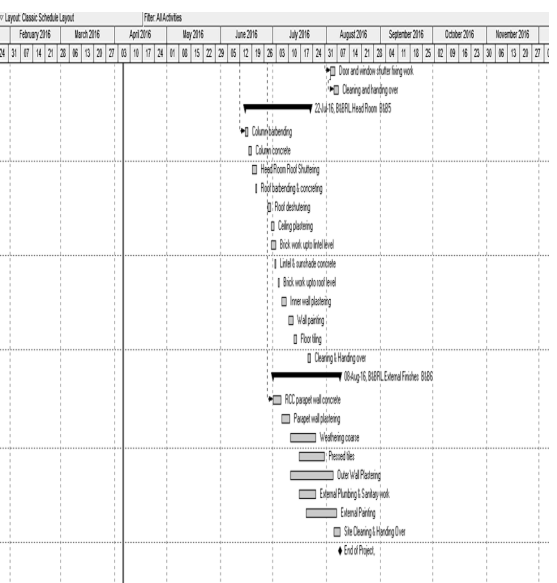

It is followed by **Plan Update** to automatically update the selected baseline.

ACKNOWLEDGEMENT

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