PLANNING &SCHEDULING, VALUE ENGINEERING, HEALTH & SAFETY AND RISK MANAGEMNET

(D-TYPE APARTMENTS RISALPUR CANTT)

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NATIONAL UNIVERSITY OF SCIENCES AND TECHNOLOGY

MILITARY COLLEGE OF ENGINEERING

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It is to certify that the

Final Year Project Title

PLANNING &SCHEDULING, VALUE ENGINEERING, HEALTH & SAFETY AND RISK MANAGEMNET

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Submitted by

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Has been accepted towards the partial fulfillment

Of the requirements

For

Bachelors in Civil Engineering

LEC SHAHNILA GUL

MILITARY COLLEGE OF ENGINEERING, RISALPUR

DEDICATION

Dedicated to our beloved parents whose prayers, best wishes and support is

Always with us during the course of this project.

AND

Our respectable, sincere and dedicated instructors who were always willing

To put in their best to guide us throughout the tenure of the studies.

ACKNOWLEDGEMENT

We are thankful to Almighty ALLAH for giving us strength and courage to complete this project.

We would like to express our sincere gratitude to our Directing Staff LEC ENGR SHAHNILA GUL for supporting and encouraging us in our project. His suggestions and advices were pivotal in successful completion of this project.

We are also honored to have had the renowned instructor Colonel Naseem Baig as our Chief Instructor. His ceaseless support and valuable guidance always shown through like an invigorating ray of sunlight. Our profound gratitude also goes to Lt Col. Dr Hassan Farooq (MCE) for his innovative insights, from the perspective of Value Engineering that was critical for the success of this project. Madam Shahnila (MCE) also helped us a lot in Primavera software.

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CHAPTER # 1

LITERATURE REVIEW
PROJECT MANAGEMENT & PLANNING

This chapter introduces basic terminologies of the project. It introduces the project initiation and project management, benefits of project management, project management cycle & project planning and its different aspects.

1.1 Definition of project:

"A project is a temporary endeavor undertaken to create a unique product, service or result. The temporary nature of projects indicates a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists." (PMBOK 4th Ed)

A project could have a single person, an organization unit or organizational units.

A project can produce:

- A product that can be a part of another item or an item itself,

  Or

- A ability to accomplish a service

Some Examples of projects are as follows:

- Making a innovative product or service,
- Introducing a change in the structure,
- Developing a new information system,
- Constructing a building or an infrastructure, or
- Implementing a new business technique.

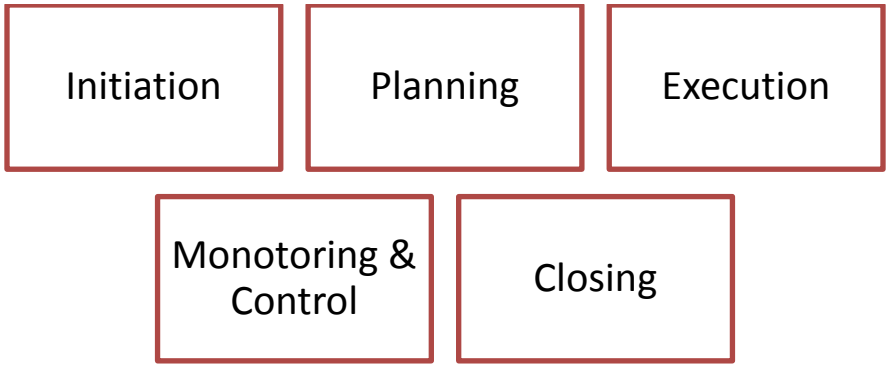
1.2 The Project Life Cycle:

The project life cycle might be controlled by the exceptional parts of the association. Each project has an unequivocal begin and a positive end, particular exercises that happen amidst will shift with the task. The life cycle gives the essential skeleton to dealing with the task.

Ventures fluctuate in size and intricacy. Regardless of how huge or little, straightforward or perplexing, all tasks might be mapped to the accompanying life cycle structure:

1.3 Project Management:

Project management is the application of knowledge, abilities, tools, and techniques to project activities to encounter the project desires. Project management is accomplished through the suitable application and integration of logically grouped project management processes comprising the 5 process groups. These process groups are:



Dealing a project typically includes:

- Identifying necessities,
- Addressing the requirements of the shareholders as the project is planned and carried out,
- Balancing the challenging project restraints including, But not limited to

The relationship among these elements is such that if any one element changes, no less than one other variable is liable to be influenced. For instance, if the timetable is abbreviated, frequently the financial backing needs to be expanded to add extra assets to finish the same measure of work in less time. On the off chance that a financial plan build is not conceivable, the degree or quality may be diminished to convey an item in less time for the same plan. The undertaking group must have the capacity to survey the circumstances and parity the requests with a specific end goal to convey an effective venture.

1.4 Project Planning:

"The planning process consists of those processes performed to establish the total scope of the effort, define and refine the objectives, and develop the course of action required to attain those objectives". (PMBOK 4th Ed)

1.4.1PROJECT Planning Process:

Following are the progressive steps for planning a construction project or any project:

1.4.1.1 Developing Project Management Plan:

Developing project management plan is the procedure of reporting the activities important to characterize, plan, coordinate, and facilitate all auxiliary arrangements. The venture administration arrangement will turn into the essential wellspring of data for how the undertaking will be arranged, executed, observed and controlled, and shut.

1.4.1.2 Creating WBS:

Work Breakdown Structure is the process of segmenting project works and project work into smaller, more controllable components.

1.4.1.3 Defining Activities:

Defining Activities is the method of identifying the definite actions to be performed to yield the project deliverables.

1.4.1.4 Sequence Activities:

Sequence Activities is the course of identifying and documenting relations among the project activities

1.4.1.5 Estimating activity resources:

Estimating activity resources is the process of estimating the type and quantities of material, people, equipment or supplies required to accomplish each activity.

1.4.1.6 Estimating activity durations:

Estimating activity durations is the procedure of approximating the number of work days required to complete individual activities with estimated resources.

1.4.1.7 Developing schedule:

Developing schedule is the practice of analyzing activity arrangements, durations, resource desires, and schedule limitations to create the project schedule.

1.4.1.8 Estimating costs:

Estimating costs is the process of developing an estimate of the financial resources needed to complete project activities.

1.4.1.9 Develop human resource plan:

Developing HR plan is the process of pinpointing and documenting project roles, responsibilities, and required skills, reporting relationships, and creating a staffing management plan.

1.4.1.10 Plan risk management:

Plan risk management is the method of defining how to carry out risk management activities for a project.

1.4.1.11 Identify risks:

Identifying risks is the course of defining which risks may affect the project and documenting their features.

1.4.1.12 Perform qualitative risk analysis:

Performing qualitative risk analysis is the method of prioritizing risks for supplementary analysis or action by measuring and combining their probability of occurrence and impact.

1.4.1.13 Perform quantitative risk analysis:

Perform quantitative risk analysis is the practice of statistically analyzing the effect of identified risks on overall project purposes.

1.4.1.14 Plan risk responses:

Planning risk responses is the procedure of developing options and actions to improve opportunities and to reduce threats to project purposes.

Chapter# 2

PLANNING AND SHEDULING

2.1 Introduction:

Planning is the fundamental however greatly essential capacity which needs cautious consideration of the organizer. The whole extend must be seen from starting till end including the valuable life of the undertaking. Throughout arranging, one must consider the targets of the task, assets accessible to embrace the venture, time and subsidizing demands, quality issues and other related viewpoints. Principle reason for arranging is to detail a movement plan for undertaking and organizing different exercises by using accessible assets in an offered time to attain the particular goals. Great arranging is the premise of creating a sound venture plan. The arrangement expounds how the undertaking is to be regulated and executed to accomplish the appointed objectives. The arrangement is a guide of particular customized exercises which highlight the visualized blueprint, in view of examinations and choices made on the current information and estimation of future patterns.

Shortsighted meaning of arranging is "settling on choices with the target of affecting the future" i.e.,

- What undertakings will be performed?
- How undertakings will be performed?
- In what succession the undertakings will be performed?
- Who will perform the undue?

2.2 Benefits of Planning

Planning provides the wide-ranging basis to the successful completion of a venture. Benefits of planning might be as follows

a. Clearly identifies goals and aims of the project.

b. Delivers a workable plan to move ahead for attainment of project objectives.

c. Make sure wise and optimum use of available resources.

d. Provides a basis to measure progress.

e. Brings every member of the team on the same level of understanding for ensuring well-orchestrated and coordinated effort for effective and efficient completion of the project.

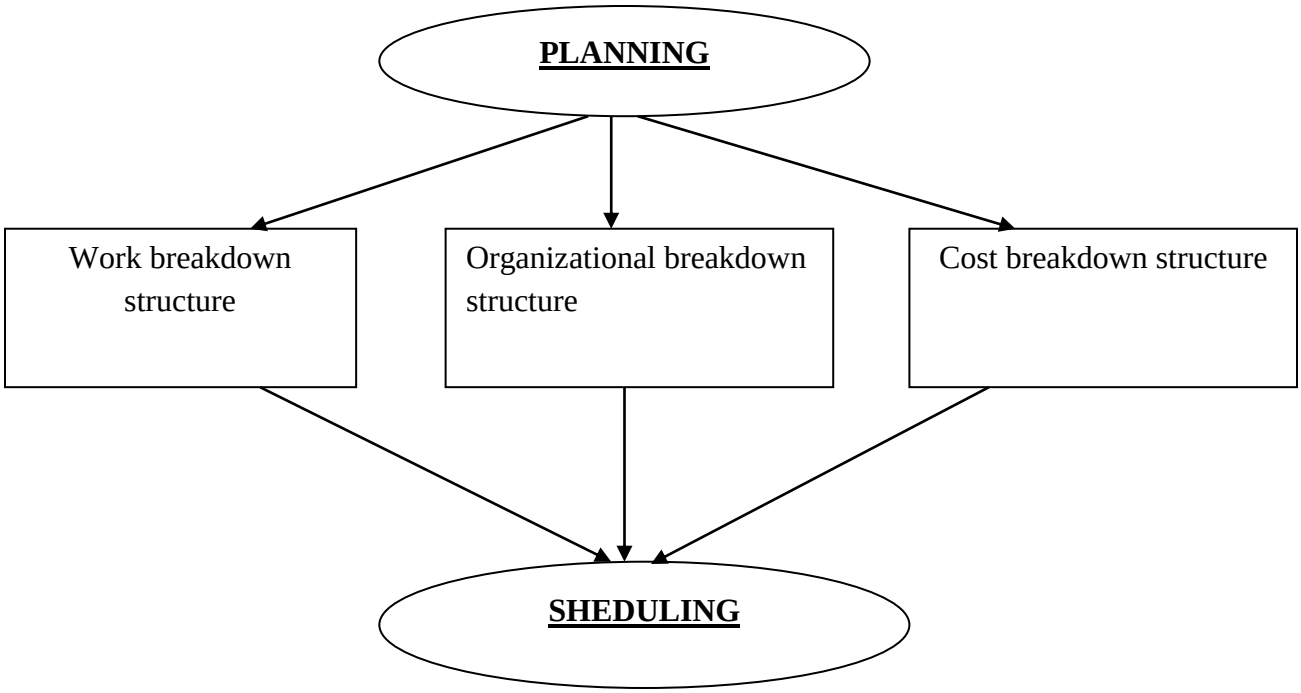
2.3 Approaches to Planning:

Construction planning include a lot of activities. It is a method of determining "What" is going to be done, "How" things are going to be done, "Who" will be doing activities and "How much" activities will cost. In this sense planning does not cover scheduling, which addresses the "When", but once planning is complete scheduling can be done very conveniently. Following are the main / basic approaches to planning:-

a. Work Breakdown Structure.

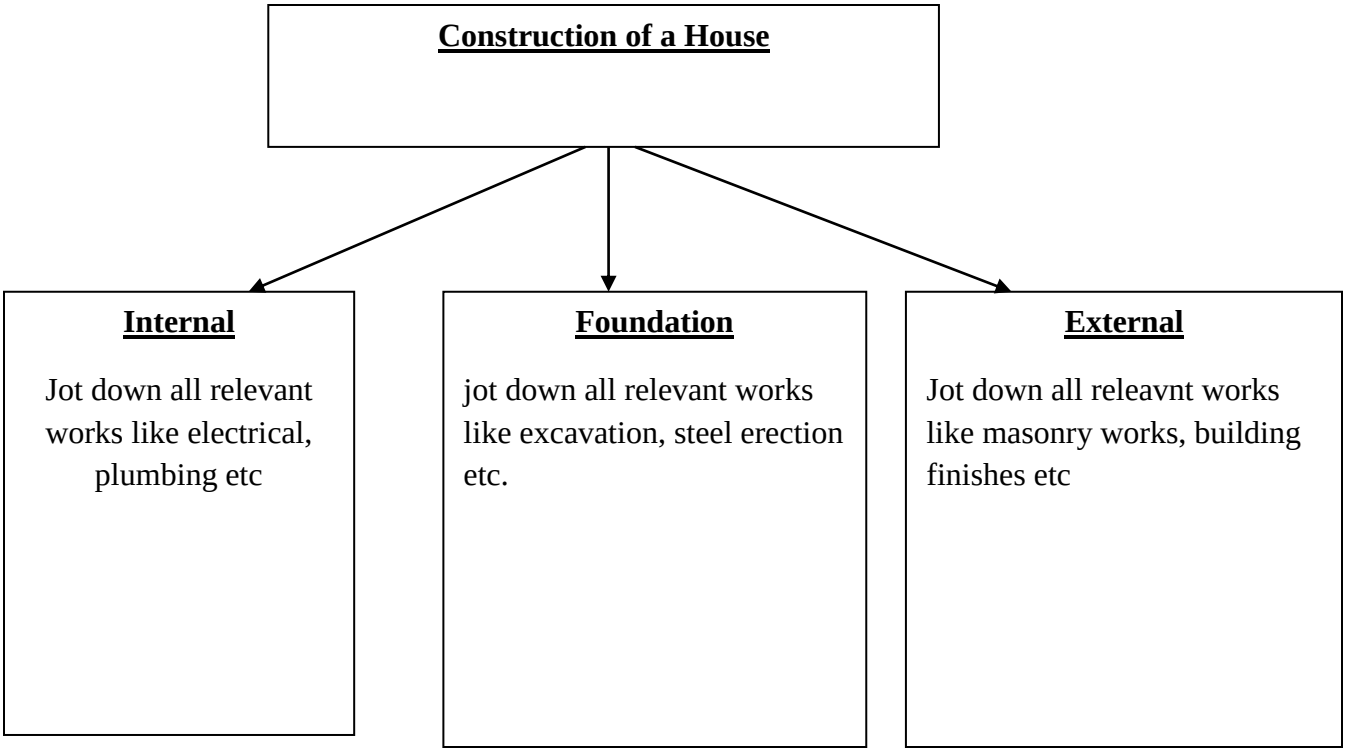
b. Organizational Breakdown Structure.

c. Cost Breakdown Structure



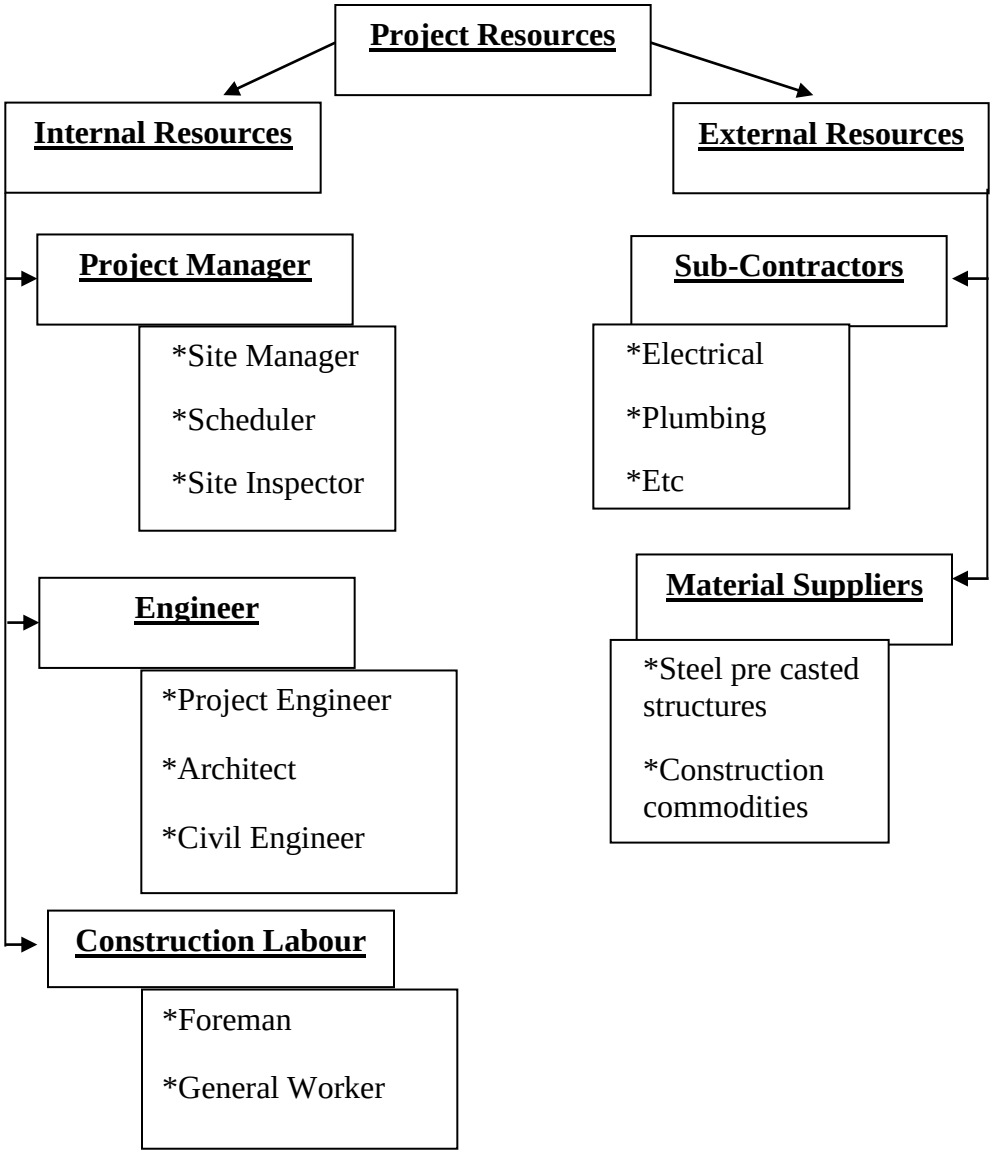
2.4 Work Breakdown Structure(WBS)

As obvious from the name, all the works required to be done are identified and listed. First of all identify the major components of the work and then identify different minor works and tasks to be performed under each major component. For smaller projects only one individual can be in idea of everything to be done but for projects involving many people the work has to be broken down into easily recognizable sub categories for easiness of execution. While breaking down the work it must be kept in mind that each minor work should be listed under the category / head it belongs to otherwise there are likely chances of missing out an essential work or may be its duplicated because in bigger projects the duplication or absence of a smaller component of work may not be easily noticed. WBS is illustrated through following diagram:-



2.5 Organizational Breakdown Structure:

After identifying different tasks to be performed, the organizational layout needs to be identified for performance of these tasks. Every project would require a different sort of human resource equipped with specific set of expertise. Contingent on objectives and goals of the undertaking, the obliged human assets will be sorted out into different divisions according to practical ranges. In short, The Organization Breakdown Structure is a pragmatic system to decay the pool of human assets required to execute the greater part of the errands into distinctive capability regions and after that into venture parts, freely of the amount of people that will be relegated the pointed out part. It is essentially the "individuals" related part of the asset breakdown structure. Its fundamental purpose is to correspond how those tasked with conveying the venture will be sorted out and organized as a Project Team. It need to performs an incredible part in illustrating the progression of the task group and characterizes unmistakably the reporting lines of a venture.



2 .6Cost Breakdown Structure

Purpose of Cost Breakdown Structure is to establish the cost of the project. Everything is going to cost for undertaking the project; the human resources, the material resources, technology and whole lot of effort in any form. The cost calculation is to be carried out after determining what is to be done and by whom it is to be done. For the purpose of cost calculation, the project has to be again broken down into some main and their sub components so as to ensure that every work and

task to be done is accounted for and their costs calculated. Determining the cost is done through the Cost Breakdown Structure which is a system for dividing a project into hardware elements and sub elements, functions and sub functions and cost categories. It is a hierarchical structure that classifies resources into cost accounts, typically labor, materials, and other direct costs. In addition it represents the economic breakdown of the project into budgets per work package. This will allow the project manager to track project progress and expenditure according to planning breakdown of activities and responsibilities.

CHAPTER # 3

PROJECT SCHEDULING ON PRIMAVERA P6

3.1 Work Breakdown Structure:

The work breakdown structure (WBS) is used to provide the framework for organizing & managing the work. A work breakdown structure is a results-oriented family tree that captures all the works of a project in an organized way. Large, complex projects are organized and comprehended by breaking them into progressively smaller pieces until they are a collection of defined “work packages" that may include a number of tasks. For good planning, break the project into pieces; organize the pieces in a logical way using a WBS. The WBS helps break thousands of tasks into chunks that we can understand & assimilate.WBS is also used to track costs related to various activities.

3.2 Scheduling:

- Schedule is a output of overall plan. Not merely a mechanical process, It is an art and a fairly systematic and scientific process. Process of Scheduling may uncover flaws in project plan which will lead to revisions.
- Determination of the timing and sequence of operations in the project and their assembly to give the overall completion time.
- Schedules are used to track progress. Other Uses can be dispute resolution, claims, change orders.

- Understanding how various materials, trades and subs effects project schedule
- Schedule Reliability Depends Largely on the Quality of Judgments Made.

3.3 Type of Project Schedules

1. Gantt Charts
2. Network Scheduling
3. PERT Network Scheduling

3.3.1 Gantt Charts

A Gantt chart is a horizontal bar or line chart which will commonly include the following features:

- Activities identified on the left hand side;
- Time scale is drawn on the top (or bottom) of the chart;
- A horizontal open or a line is drawn against each activity indicating estimated duration;
- Dependencies between activities are shown;
- At a review point the lines are shaded to represent the actual time spent

- Two Main Types of CPM Schedules

    - Activity of Arrow Method (AOA)
    - Precedence Diagramming Method (PDM)
    - Activity on Node (AON)

3.4 Activity:

An activity is a single work step that has a recognizable beginning and end. Activities are the elements into which a construction project can be sub-divided. Activities are time consuming tasks. Activities are defined within a hierarchical system which sub-divides larger elements of the project. This system is commonly referred as Work Breakdown Structure. Activity may be coded to include attributes of the activity.

3.5 Float:

Float is a measure of how much an activity can be delayed without delaying the project completion date. It is possible that only start of an activity or finish of an activity may be critical Activities with different early start and late start timings are flexible. The flexibility is a measure of the ability of a given activity to have its performance time extended and is called float. Such activities do not have to begin or end with the early start and early finish timings. The more float the less critical activity will be.

3.5.1 Types of float:

1. Total Float
2. Free Float

3.5.1.1 Total Float:

Total float is calculated either by subtracting the early finish time from the late finish time or by subtracting the early start time from late start time.

TF= LF-EF

TF= LS-ES

An activity that has zero total float is a critical activity. An activity's start may be critical even though an activity itself may not be critical. Total float of an activity indicates the amount of time by which an activity may be delayed without affecting the project's scheduled completion date. Activities share total float with other activities on the same path Individual activities in the path with total float do not own it.

3.5.1.2 Free Float:

Free float is the difference between an activity's early finish time and early start time for any succeeding activity.

FF= EF-ES (next activity)

The free float of an activity is an amount by which that activity can be delayed without delaying the early start of any following activity or any other activity in the network.

3.6 Project Planning Soft wares:

A number of soft wares are available in market which professionals & engineers use to manage project and plan the project. These soft wares use a variety of paths to determine the critical path of the project. These allow professional users and engineers to control the overall cost & budget of the project. Most commonly used soft ware for project planning is Primavera P6.

3.7 Primavera Project Planner P6:

Primavera is a versatile project management software tool which is not just used by project managers. It is designed to make or manage large or complex projects. Primavera is the ideal tool for anyone who is involved in planning, monitoring and reporting on the progress of any big task or development.

Primavera allows for top level planning as well as being ideal for managing the complex details. This enables project managers, planners, planning controllers and other professionals to have instant access to all the project information they require. It also means that all parties can be kept updated within one system, reducing duplicate information and keeping everyone at same grid.

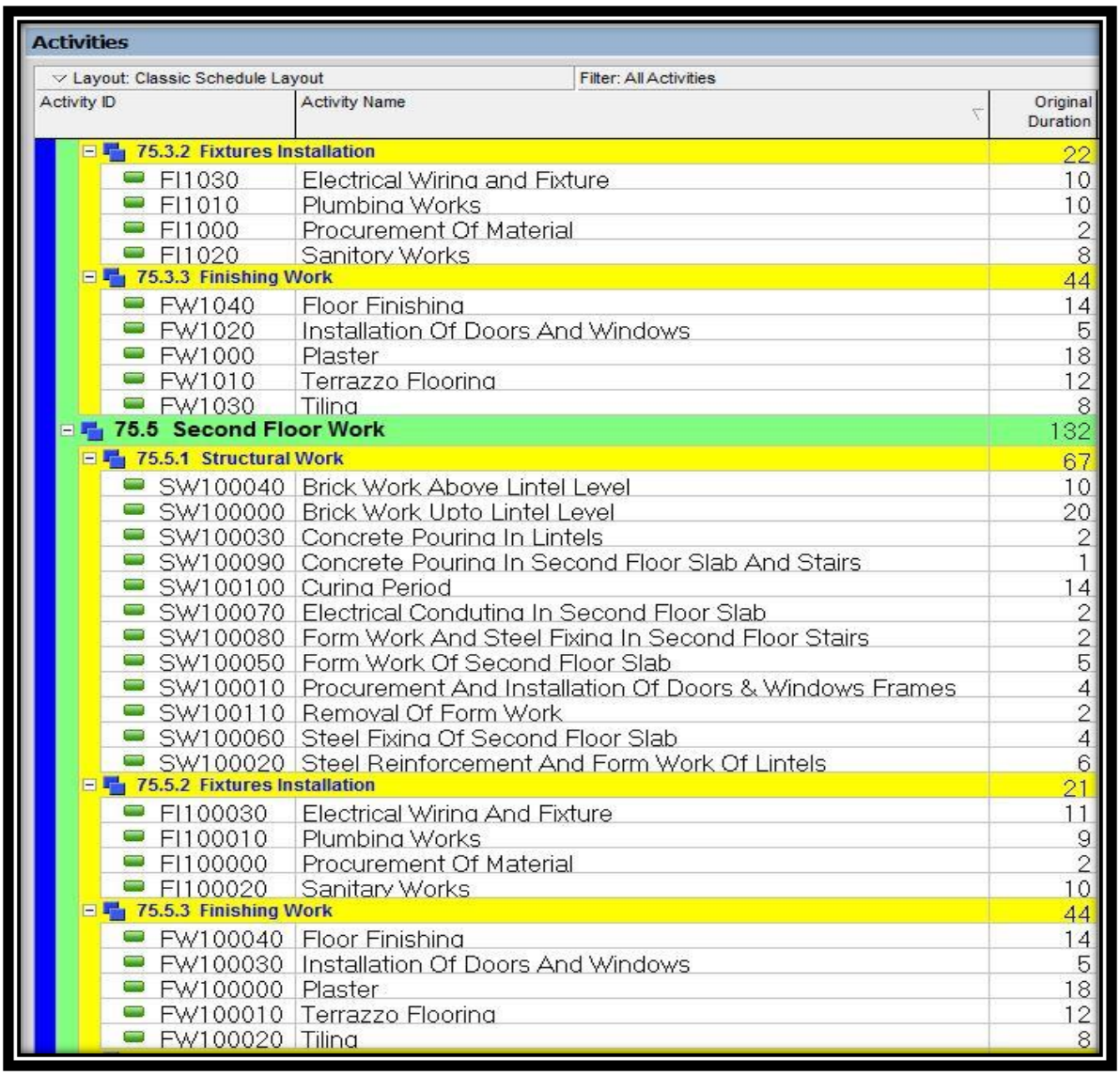
3.8 SCHEDULING ON PRIMAVERA P6

LIST OF ACTIVITIES

Activities

Layout: Classic Schedule Layout | Filter: All Activities

Activity ID	Activity Name	Original Duration
75 D-TYPE		407
D1040	Construction Of Under Ground Water Tank	7
D1010	Contract Finalization	1
D1050	Installation Of Electric Motor	1
D1020	Mobilization Of Equipment	4
D1030	Procurement Of material	3
D1000	Start Of project	0
75.1 Earthwork		24
E1010	Clearing And Grubbing	1
E1060	End of Earth Work	0
E1030	Excavation	7
E1020	Layout	1
E1040	Rolling And Compaction	3
E1000	Start Of Earth Work	0
E1050	Termite Proofing	1
75.2 Foundation Work		21
FN1080	Backfilling And Compaction	2
FN1060	Brick Work In foundation	5
FN1040	Concrete Pouring in Foundation	2
FN1050	Curing period	7
FN1070	DPC	1
FN1030	Form Work In Foundation	2
FN1010	Lean Concrete	2
FN1000	Start Of Foundation Work	0
FN1020	Steel Fixing in Foundation	3
75.3 Ground Floor Work		140
75.3.1 Structural Work		74
SW1050	Brick Work Above Lintel Level	6
SW1000	Brick Work Upto Lintel Level	18
SW1100	Concrete Pouring In Ground Floor Slab And Stair	1
SW1040	Concrete Pouring In RCC Lintels And Porch Columns	1
SW1130	Curing Of lintels & Walls	24
SW1110	Curing Period	10
SW1080	Electrical Conducting in Ground Floor Slab	2
SW1090	Form Work And Steel Fixing In Ground Floor Stairs	2
SW1060	Form Work Of ground Floor Slab	4
SW1020	Procurement And Installation Of Door And Windows Frames	3
SW1120	Removal Of Form Work	2
SW1070	Steel Fixing Of Ground Floor Slab	2
SW1030	Steel Reinforcement And Form Work Of Lintel	4
SW1010	Steel Reinforcement And Form Work Of Porch Column	2

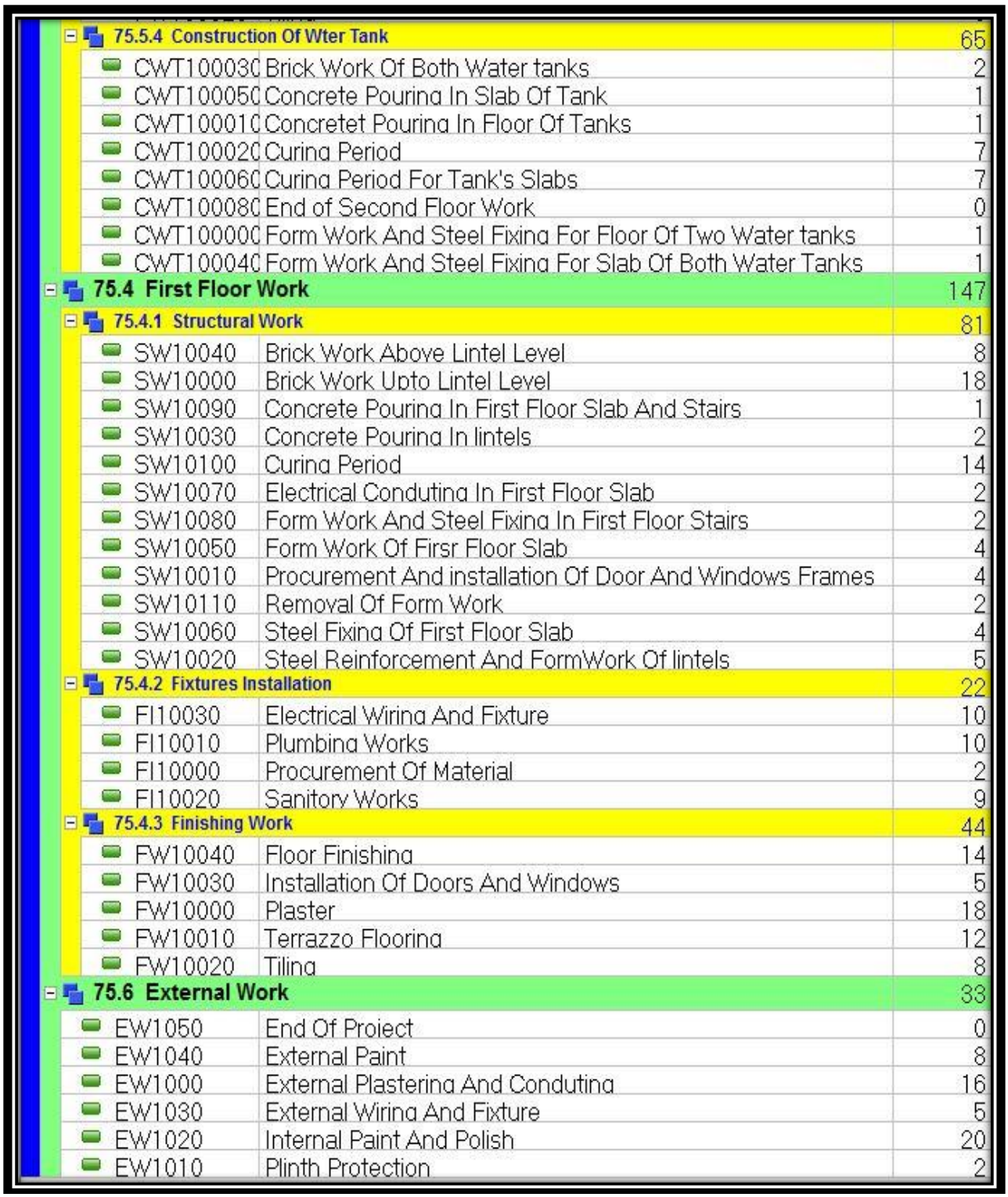


Activities

Layout: Classic Schedule Layout | Filter: All Activities

Activity ID	Activity Name	Original Duration
75.3.2 Fixtures Installation		22
FI1030	Electrical Wiring and Fixture	10
FI1010	Plumbing Works	10
FI1000	Procurement Of Material	2
FI1020	Sanitory Works	8
75.3.3 Finishing Work		44
FW1040	Floor Finishing	14
FW1020	Installation Of Doors And Windows	5
FW1000	Plaster	18
FW1010	Terrazzo Flooring	12
FW1030	Tiling	8
75.5 Second Floor Work		132
75.5.1 Structural Work		67
SW100040	Brick Work Above Lintel Level	10
SW100000	Brick Work Upto Lintel Level	20
SW100030	Concrete Pouring In Lintels	2
SW100090	Concrete Pouring In Second Floor Slab And Stairs	1
SW100100	Curing Period	14
SW100070	Electrical Conduting In Second Floor Slab	2
SW100080	Form Work And Steel Fixing In Second Floor Stairs	2
SW100050	Form Work Of Second Floor Slab	5
SW100010	Procurement And Installation Of Doors & Windows Frames	4
SW100110	Removal Of Form Work	2
SW100060	Steel Fixing Of Second Floor Slab	4
SW100020	Steel Reinforcement And Form Work Of Lintels	6
75.5.2 Fixtures Installation		21
FI100030	Electrical Wiring And Fixture	11
FI100010	Plumbing Works	9
FI100000	Procurement Of Material	2
FI100020	Sanitary Works	10
75.5.3 Finishing Work		44
FW100040	Floor Finishing	14
FW100030	Installation Of Doors And Windows	5
FW100000	Plaster	18
FW100010	Terrazzo Flooring	12
FW100020	Tiling	8

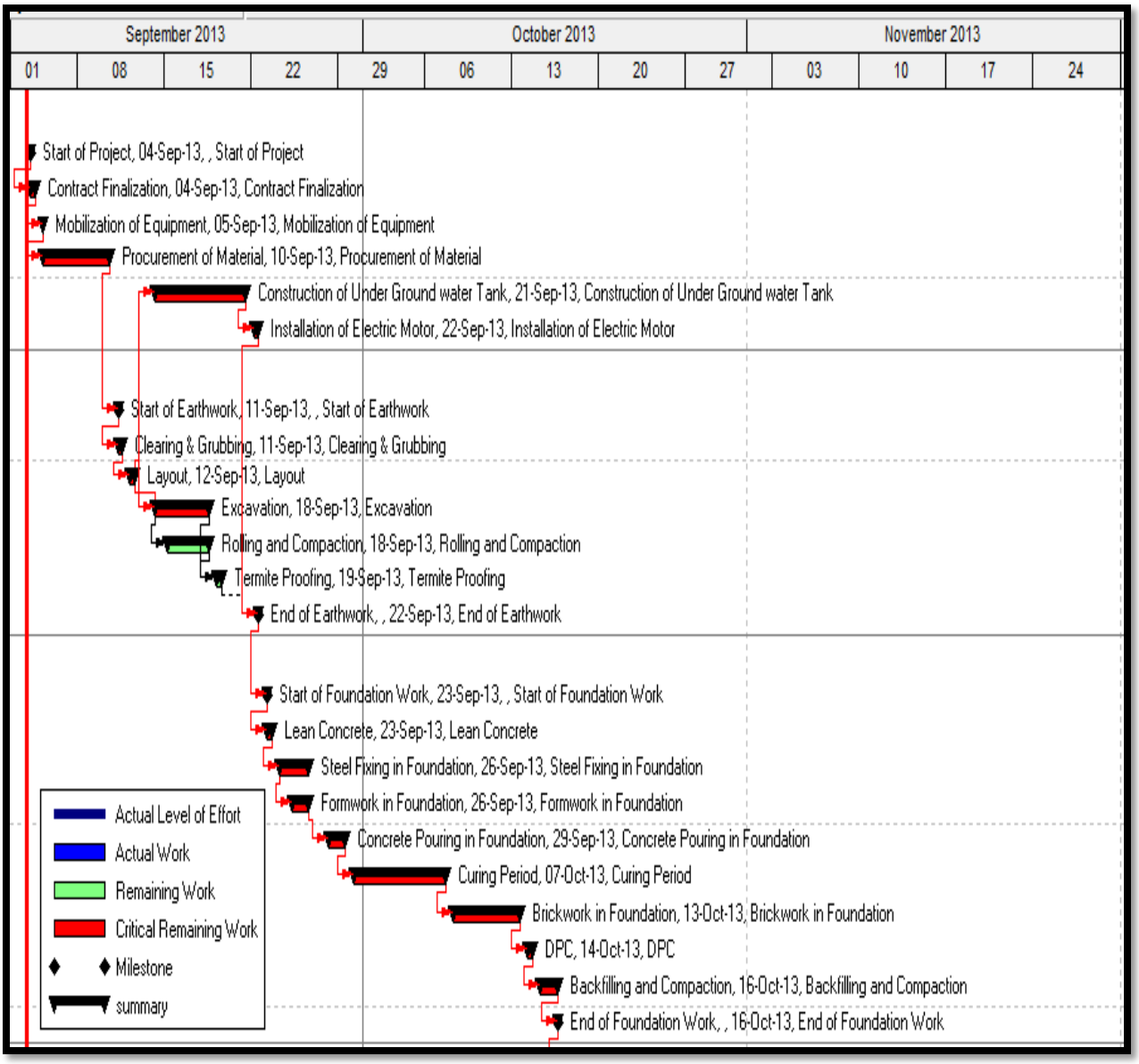
LIST OF ACTIVITIES



75.5.4 Construction Of Wter Tank		65
CWT10003C	Brick Work Of Both Water tanks	2
CWT10005C	Concrete Pouring In Slab Of Tank	1
CWT10001C	Concretet Pouring In Floor Of Tanks	1
CWT10002C	Curing Period	7
CWT10006C	Curing Period For Tank's Slabs	7
CWT10008C	End of Second Floor Work	0
CWT10000C	Form Work And Steel Fixing For Floor Of Two Water tanks	1
CWT10004C	Form Work And Steel Fixing For Slab Of Both Water Tanks	1
75.4 First Floor Work		147
75.4.1 Structural Work		81
SW10040	Brick Work Above Lintel Level	8
SW10000	Brick Work Upto Lintel Level	18
SW10090	Concrete Pouring In First Floor Slab And Stairs	1
SW10030	Concrete Pouring In lintels	2
SW10100	Curing Period	14
SW10070	Electrical Condutina In First Floor Slab	2
SW10080	Form Work And Steel Fixing In First Floor Stairs	2
SW10050	Form Work Of Firsr Floor Slab	4
SW10010	Procurement And installation Of Door And Windows Frames	4
SW10110	Removal Of Form Work	2
SW10060	Steel Fixing Of First Floor Slab	4
SW10020	Steel Reinforcement And FormWork Of lintels	5
75.4.2 Fixtures Installation		22
FI10030	Electrical Wiring And Fixture	10
FI10010	Plumbing Works	10
FI10000	Procurement Of Material	2
FI10020	Sanitory Works	9
75.4.3 Finishing Work		44
FW10040	Floor Finishing	14
FW10030	Installation Of Doors And Windows	5
FW10000	Plaster	18
FW10010	Terrazzo Flooring	12
FW10020	Tiling	8
75.6 External Work		33
EW1050	End Of Project	0
EW1040	External Paint	8
EW1000	External Plastering And Condutina	16
EW1030	External Wiring And Fixture	5
EW1020	Internal Paint And Polish	20
EW1010	Plinth Protection	2

LIST OF ACTIVITIES:

GANTT CHART:



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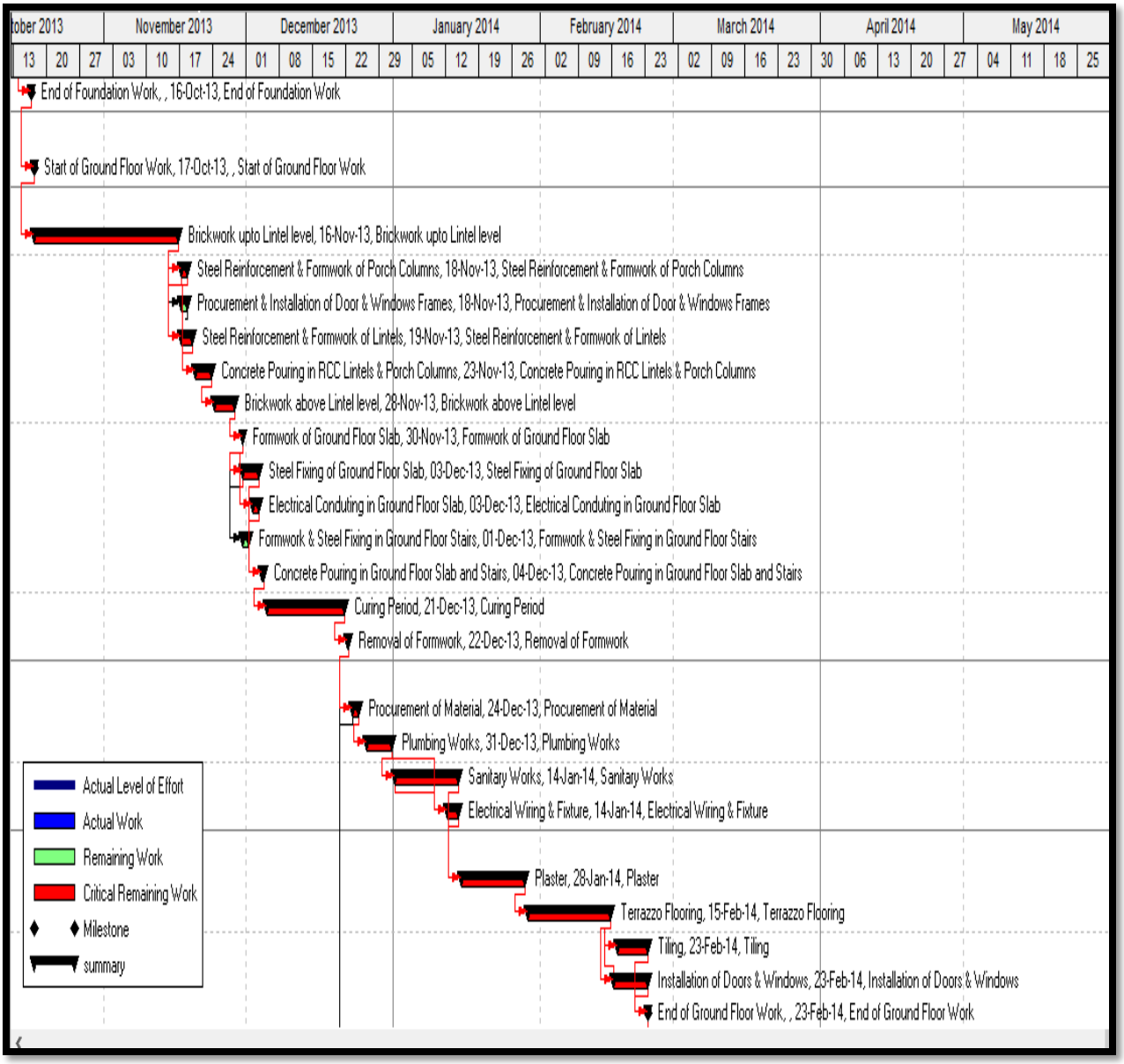
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Tiling, 23-Feb-14, Tiling
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Actual Work
Remaining Work
Critical Remaining Work
Milestone
summary

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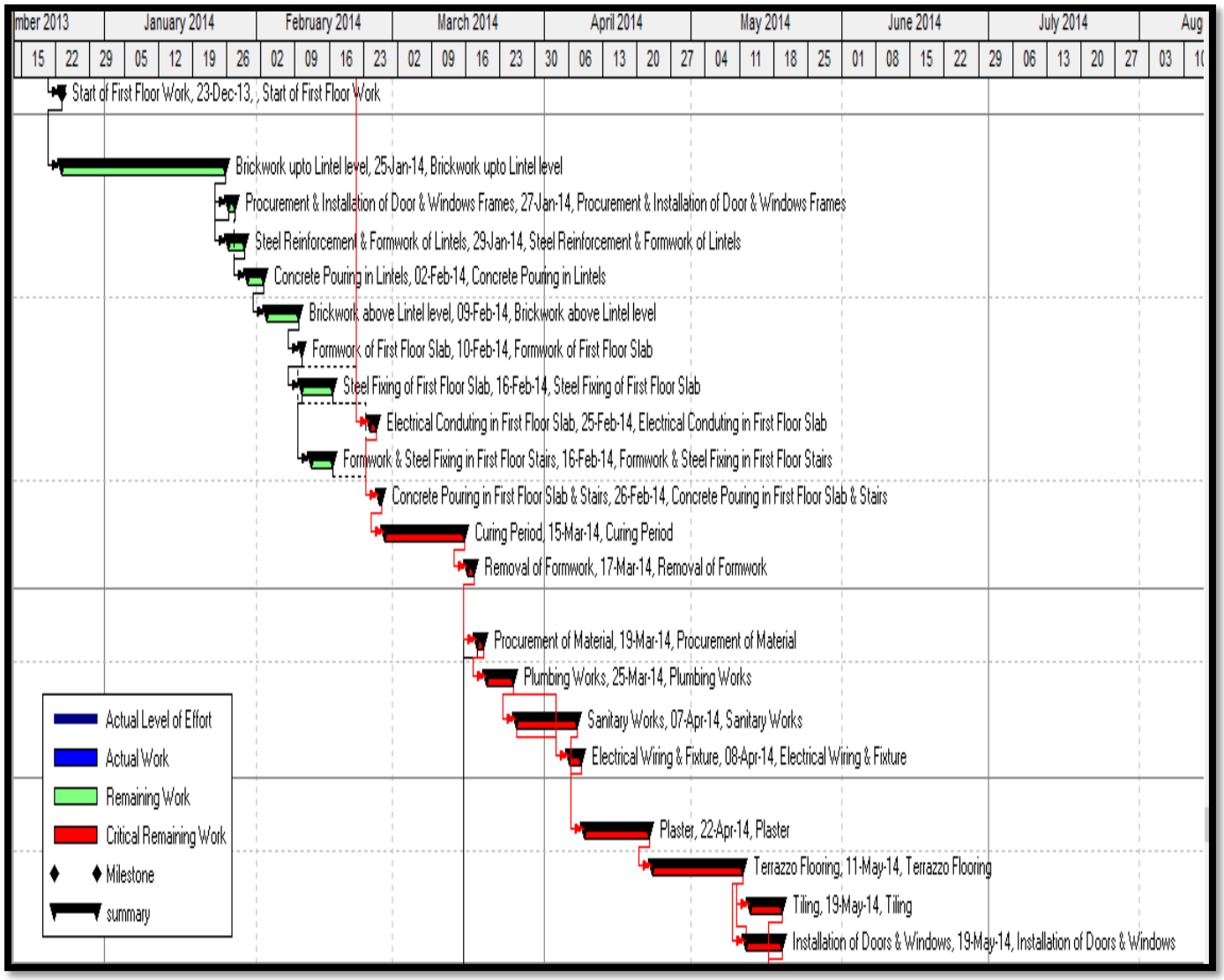
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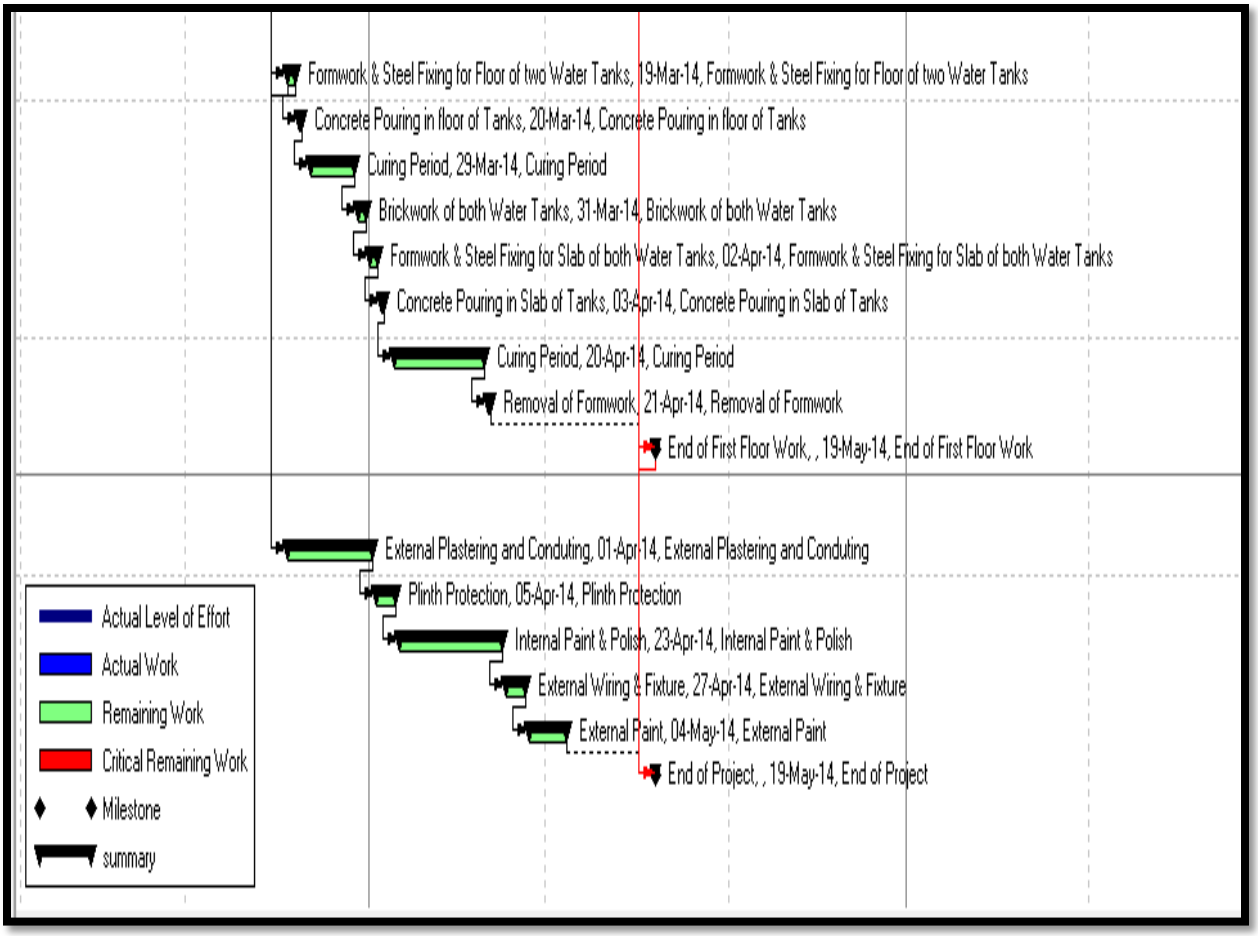
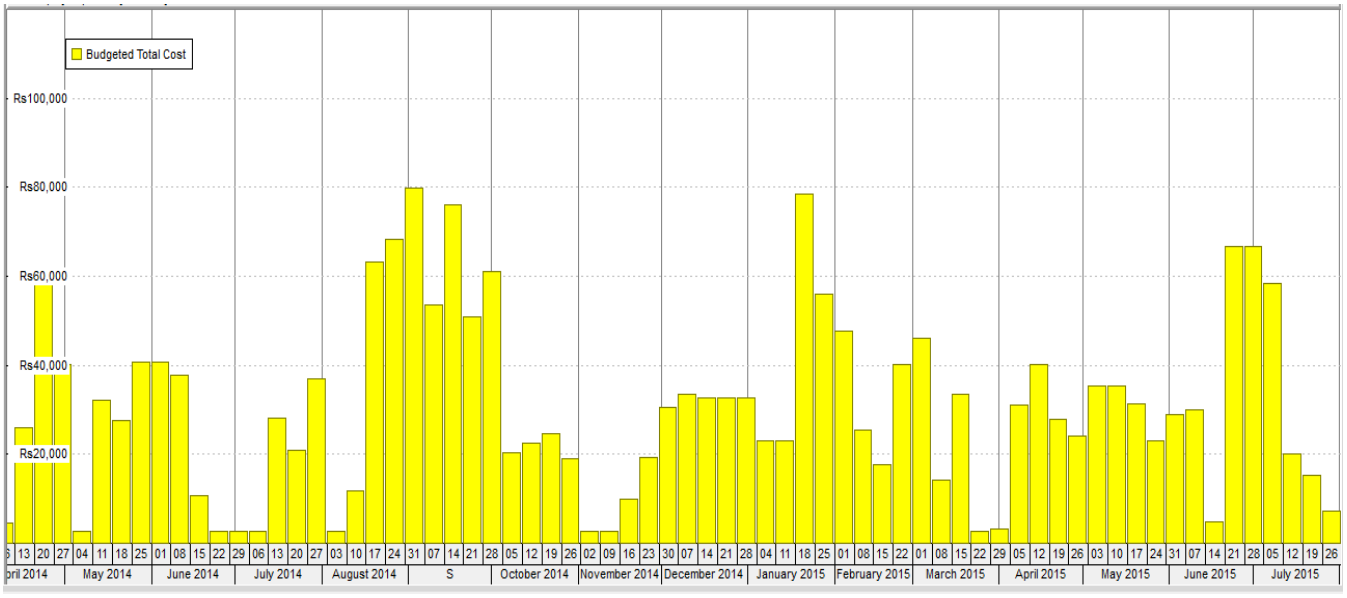
Plumbing Works, 25-Mar-14, Plumbing Works
Sanitary Works, 07-Apr-14, Sanitary Works
Electrical Wiring & Fixture, 08-Apr-14, Electrical Wiring & Fixture
Plaster, 22-Apr-14, Plaster
Terrazzo Flooring, 11-May-14, Terrazzo Flooring
Tiling, 19-May-14, Tiling
Installation of Doors & Windows, 19-May-14, Installation of Doors & Windows
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone
summary

GANTT CHART:


Formwork & Steel Fixing for Floor of two Water Tanks, 19-Mar-14, Formwork & Steel Fixing for Floor of two Water Tanks
Concrete Pouring in floor of Tanks, 20-Mar-14, Concrete Pouring in floor of Tanks
Curing Period, 29-Mar-14, Curing Period
Brickwork of both Water Tanks, 31-Mar-14, Brickwork of both Water Tanks
Formwork & Steel Fixing for Slab of both Water Tanks, 02-Apr-14, Formwork & Steel Fixing for Slab of both Water Tanks
Concrete Pouring in Slab of Tanks, 03-Apr-14, Concrete Pouring in Slab of Tanks
Curing Period, 20-Apr-14, Curing Period
Removal of Formwork, 21-Apr-14, Removal of Formwork
End of First Floor Work, , 19-May-14, End of First Floor Work
External Plastering and Conduting, 01-Apr-14, External Plastering and Conduting
Plinth Protection, 05-Apr-14, Plinth Protection
Internal Paint & Polish, 23-Apr-14, Internal Paint & Polish
External Wiring & Fixture, 27-Apr-14, External Wiring & Fixture
External Paint, 04-May-14, External Paint
End of Project, , 19-May-14, End of Project
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone
summary


Budgeted Total Cost
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Rs80,000
Rs60,000
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April 2014
May 2014
June 2014
July 2014
August 2014
October 2014
November 2014
December 2014
January 2015
February 2015
March 2015
April 2015
May 2015
June 2015
July 2015

CHAPTER # 4 VALUE ENGINEERING

4.1 History

It has been in use in other industries since the 2nd World War. In keeping with many management techniques Value Engineering started life in the USA. L.D.Miles one of the expert in the subject introduced VE into GEC in the 1940s. In the mid 1950s the USA Department of the Navy start routinely to include incentive clauses in procurement contracts. VE start as a method of overcoming shortages during and just after the 2^{nd} World War and involved widespread substitution of goods and chattels**.**

4.2 What is VE?

Value Engg includes:

- A systematic approach
- An attention on value & not cost
- The deduction of unnecessary cost without compromising upon value

The main aim is to improve the value of the end product, or service whereby the clients obtains extra for their money. This could be well-defined as, an organised approach to the identification and exclusion of excessive cost without harm of function. Excessive cost means, the cost which delivers neither use nor life nor quality nor look nor customer features.

4.3 What it isn't VE?

Value Engineering is none of the following

- An attack on the quality or appearance of the project.
- A cost cutting implementation
- A condemnation of the design professionals
- A assessment of the constructability of the project

There are all too much examples of techniques hidden as VE involving a hatchet task with the sole purpose of minimizing cost. Functions must remain integral for true Value Engg.

4.4 Pareto Chart

A simple technique for beginning the VE practice is by use of a Pareto chart. This sets out the construction cost data in chart form, with the most costly items at the top and the economical at the bottom. Pareto's law states that 80 % of the costs will be found in 20 % of the items. VE should focus on the high value items.

4.5 VE Team

VE has to be done by a experienced team leader so as not to create ill feeling. The procedure has to be undertaken with a great amount of sensitivity and diplomacy. It is the custom in the UK for VE to be undertaken by a team with expertise which cover design, constructability, budget & time. It would be normal for the team, to take in representatives from the Architect or Engineer, contractor's construction & buying units, quantity surveying and input from professional sectors of the construction process which may be affected. It is also often vital to have input from the user of the capacity.

The responsibilities undertaken by the team encompass:

- Gathering data about the present configuration deciding the needs, necessities and imperatives of the managers/clients/stakeholders
- Stablishing configuration criteria
- Eveloping an expense model, breaking down the undertaking into capacities and performing an utilitarian examine.

4.6 Five Phases of VE

VE should be carried out in 5 phases

- 1- Information Phase
- 2- Thought Phase
- 3- Assessment Phase
- 4- Development Phase
- 5- Presentation Stage

1. Information Phase

The introductory errand for the VE group throughout this stage is to recognize the components of the task which can profit most from the methodology. Brief inquiries might be helpful in giving a structure to this procedure

- What would it say it is?
- What does it do?
- What else does it do?
- What does it cost?
- What would it say it?

2. Thought Phase

In this phase the object is to generate alternative design ideas. It is essential that any ideas to be considered are creative.

3. Assesment Phase

Once the ideas have been identified and choosed they need to be fully evaluated and either acknowledged or rejected. The benefits and drawbacks of each idea will be properly well-thought-out. A standard against which each idea is to be judged is established at the start of this phase. Each design alternative can be evaluated against each of the performance criteria in order to produce an inclusive point score. At the end of this phase there should be a list of feasible

options which should be listed in order of merit with the option gaining the highest score at the top.

4. Development Phase

The alternative chose in the Evaluation Phase is then all the more completely created including taking a toll. Full life-cycle taking a toll together with vitality utilization ought to be utilized the extent that this would be possible. A choice is then made as to the alternatives which are to be prescribed.

5. Presentation Stage

The objective of this stage is to convince the original design team and the client of the value of the chosen options.

4.7 Unnecessary Cost($)

VE the Search for Unnecessary Cost provides five examples of pointless cost

1. Cost of an unnecessary element

An example of this type of unnecessary cost, is specifying a covering to a drainage pipe which is thicker than is required. Covering to reinforcement, can be a topic of contention and engineers are often respondent of being over vigilant when designing concrete cover.

2. Cost of unnecessary materials

This happens where an expensive material is specified when a inexpensive one would do the job just as well

3. Excessive cost of build-ability

Frequently the fashioner does not consider the way in which the work is to be developed. This can bring about exorbitant plant being utilized for more periods than is truly vital or work expense being admirably in abundance of what would be acquired if more thought were given to the assemble capability of the venture.

4. Unnecessary opportunity costs

An illustration of this sort of expense is a retail shopping center where because of wasteful configuration the net lettable region is not exactly could be attained with a more productive methodology. This could influence the customer's rental salary and the estimation of the building.

5. Unnecessary life cycle cost

At the point when thinking about outline elective it is getting normal to incorporate an activity identifying with the life-cycle execution of the option. Because of the vulnerabilities of future levels of investment and swelling the examination could be diverting. However in the event that suitable the significance of life cycle fetching might be reflected in the scoring framework

4.8 Team Objectives & Goals

The team work together to develop the VE practice to accomplish the following:

1-Provide in detail the substitutes with the greatest possible worth

2-Establish costs and backup credentials required to discretely convey the Alternative solutions.

The Team will typically present a written report to the management together with a verbal presentation. It is usually advisable when making a presentation to use power point or something similar. This will often act as a healing in bringing out questions to which solutions can be given. This process usually results in more promptly decisions being made.

4.9 Essentials of Value Engineering

The fundamentals of VE may be potted as follows:

- The general targets of the task and execution models must be plainly characterized and prioritized and saw by all stakeholders as ahead of schedule as would be prudent in the venture improvement process.
- It is crucial that assessment criteria for considering every thought are made at the start. Assessment criteria will vary for each one undertaking relying on the customer's corporate/venture goals. A school for instance would have altogether different VE assessment criteria than that of a concoction plant. It is typically great practice to connection the assessment criteria to the Strategic Brief which holds the targets for the undertaking.
- Sufficient vitality, time and innovativeness is used in creating an extent of results.
- The reach of potential results is legitimately and impartially assessed to impact last decision of the favored result

- Chosen results are accepted at suitable interims both throughout and after undertaking advancement
- All of the ramifications of favored results (costs , dangers and different duties) have been legitimately viewed as and are comprehended, acknowledged and concurred by all stakeholders
- Preferred results are effectively actualized at least cost without inconvenience to obliged quality and execution measures
- It is typical for a configuration stop to be set on new thoughts at some stage simultaneously, as late outline changes have a tendency to cause deferrals

4.10 Timing of Value Engineering

It is by and large acknowledged that the prior the VE procedure is attempted the more powerful it is prone to be. The later in the development methodology progressions are made the more costly they will get to be which thus makes them less viable. There are however varying perspectives on this matter. The ENR magazine distributed in the USA in its March 1990 release states:

"The effect of a VE mull over on the configuration is regularly most obvious when embraced after the begin of development. For instance a choice to change the initially detailed square segments to less costly adjust sections at Chicago's Boulevard Tower South building spared $250,000"

Worth Engineering the Search for Unnecessary Cost prescribes that esteem building studies are not attempted after 50-60 for every penny of the configuration has been finished.

Others will frequently contend that the VE methodology is progressing and it ought not stop until the work has been finished.

4.11 Projects Which Are Best Expected to Benefit from VE

Those Projects which are:

- Expensive
- Intricate
- Monotonous
- Exclusive with few precedents
- Highly perceptible and subject to external inspection.

4.12 Client Types

When undertaking Value Engineering, it is essential to have a in-depth understanding of the client's intentions. Clients fall into different classifications which include the following:

- The well-informed business client who undertakes construction projects regularly and has a virtuous understanding of how the construction industry works.
- The inexperienced business client who infrequently acquires construction projects
- Private clients who are often inexperienced and simple.

4.13 Client's Priorities

Clients have unpredictable explanations for undertaking construction work which includes:

- For venture
- To carry out their corporate
- To meet social wants such as roads and colleges
- To make a statement and establish confidence such as a company HQs
- For private career

4.13.1 Clients have contrary priorities in relation to the following:

- Occupation and performance of the facility
- Cost & TIme
- Quality and sustain ability
- Flexibility
- Hazard

It is important that the Value Engineering team is fully attentive of all these issues which should be taken into account when undertaking the Value Engineering course.

4.14 VALUE ENGINEERING TECHNIQUES CAN BE USED FOR 6 x D-TYPE APARTMENTS IN RISALPUR:

For D-Type Apartments, we can suggest following alternatives for existing materials and equipment which has been used in our project. It will result in saving of following important and key factors in construction industry

- Cost
    - Material
    - Labour
    - Equipment
- Scope

- Time

4.15 Alternatives & Techniques

1. Type of structure
2. Batching Plants
3. Supply Of Material
4. Concrete Blocks instead of Bricks
5. Steel shattering instead of Wood
6. Pre-Fabricated Members
7. Plastering By Using Pump
8. Reduce Shattering Period
9. Delay Due TO Payment problem
10. Delay due to supply of materials
11. Reduce digging time

1-Type of structure

Using Frame structure instead of Masonry structure. It will result in increased speed of work. Also in masonry structures, all the walls are load bearing walls constructed by using burnt brick & for partitioning, we use burnt bricks. But by introducing frame structure, we can replace the partition walls made of bricks by separation panels which will result in savings in terms of time and cost.

2. Batching Plants

As in Risalpur, a lot of construction work is under progress, therefore we can introducing a batching plant. It will result in increase production rate and will reduce material wastage. Also it proportionate the ingredients properly and enhances strength of concrete.

3. Supply Of Material

The supply of the material should be made on time by MES & Suppliers so that it save our time and budget.

4. Concrete Blocks instead of Burnt Bricks

As in case of frame structures, load comes on beams and columns and then transfer to footing. So we can use PCC blocks instead of Burnt Bricks. It results in 2-ways

- Minimizes Heat transfer
- Reduce Sound Problems

But I costs a little bit more than that of BB. But above mentioned benefits compensate this factor.

5. Steel shattering instead of Wood:

By using steel formwork, finishing of concrete will comes out smooth surface. It makes easier plastering and also provides us uniform thickness.

6. Pre-Fabricated Members

By using pre-fabricated members like columns and girders, we can save our time for construction.

7. Plastering by using Pump

By using pump

- It enhances production rate
- Reduces the times which ultimately results in cost saving
- Reduces wastage of material

8. Early Removal of Shattering & Curing Period

By using accelerators it will increase hydration process of concrete and we can remove shattering before 14 days, So that we can start plastering.

9. Delay due to Payment

If we ensure that running payment to contractor be made on time, so that delay in construction should not occur.

10. Using Excavator For Excavation

Instead of manual excavation, we should use excavator. It will save time, the labour force and will result in saving project duration.

CHAPTER N0 -5

INDUSTRY HEALTH AND SAFETY IN CONSTRUCION

5.1 INTRODUCTION

Health and safety are important aspects of construction industry. They ensure efficient and effective working of labours. If correct methods of health and safety are not applied, it can cause accidents. With effective laws on safety, labour's efficiency can be increased. The ratio of incidents in construction industry is more than any other industry as compared number of persons working in it. Similarly, number of deaths in construction industry is higher due to lack of knowledge on importance of health and safety. The hazards of incidents are not only reduced to people working on sites but sometimes people around the sites often get involved in an incident.

5.2 ACCIDENTS

Due to lack of proper knowledge on health and safety, accidents in construction industry are common. Some of the accidents are death, falling from height, fire incidents and collapse etc.

5.3 FALLING

People working on high rise buildings have not enough arrangements to make them safe on working at heights. Therefore it important to provide proper guard rails on higher stories. Fall from little height can cause serious injuries or even death.

5.3.1 PROTECTION FROM FALLING

1. Personal fall arrest system
2. Guardrails
3. Safety Net

1. PERSONAL FALL ARREST SYSTEM

These protections should be in place before the start of the work. The things which include in the personal fall arrest system are harness, anchorage and line. The employee must ensure that the employer has provided these things and training to use these things.

2. GUARDRAILS

Guardrails should be proper and strong. It should have enough height to prevent people from falling over.

3. SAFETY NET

Safety net should be provided as close as possible from the worker. Safety net should not be provided below 30 feet from the place where employees work.

5.3.2 PLACES WHERE FALL PROTECTION IS NEEDED

- Scaffolds
- Elevations
- Where work is done at height
- When excavating ground
- During brick is laid
- On top of building
- Construction of residences

5.3.3 WEAR A HELMET

Wearing a helmet is an important thing to remember as it saves a worker during falling or other serious accidents from critical hea.d injuries.

5.4 MOBILE PLANT

Construction plant are heavy and its movement on muddy and uneven ground can be difficult where driver has difficulty in visibility. People on the site are get injured or killed by the moving objects especially during reversing. Similarly, drivers and operators, are injured or killed, when a vehicle or plant is overturned.

5.5 FALLING MATERIAL AND COLLAPSES

In construction industry, people get injured by falling material from loads, that are lifted and material that is rolled off work platforms. Similarly, people get injured by falling objects when excavations, buildings and structures collapses. Collapses of structure can vary from walls, that fall due to their foundations are disturbed by nearby excavations, to buildings, that collapse

during alteration works because of the weakened or overloaded structure. Structure can also fall by nearby demolition of buildings, if proper of instability is not prevented. If ties are forgotten or removed early, scaffolds collapses can occur or when it becomes overloaded. Steel structures can also collapse, if proper bracing is not done.

5.6 ELECTRICAL ACCIDENTS

Due to unsafe use of equipment, people can suffer electric shocks and burns due to contact of overhead power lines and buried cables.

5.6.1 DANGERS OF ELECTRICITY

Electrical shocks are very dangerous for muscle tissues and are responsible for mascular spasms, due to which someone can fall and result in injuries or fractures. Electricity when passed through body can be responsible for imbalances or shaking of the heart resulting in fibrillation that can cause respiratory failure or a heart attack.High voltage electrical arcs due to short-circuits can destroy equipment.Low voltage electrical arcs are responsible for fires and explosions in atmospheres.Electrical arcs can also cause eye injuries intense ultraviolet radiations.

5.6.2 ELECTRICAL BURNS

Different injuries related to electricity are electrical burns, which can be at both entry or exit points. The damage of electricity enters through muscles and bones and leaves through exit point.

TYPES OF BURNS

Electricity can cause different types of burns

1. ELECTRICAL BURNS

When electrical current pass through body it generates heat and causes electrical burns. The electricity can burn skin, muscle, bone and bone marrow.

2. ELECTRICAL ARC BURNS

Explosion can be caused by electrical arc. Due to electrical arc, the temperature can be reached upto 3000 C and burning anyone standing nearby.

3. CONTACT BURNS

Sometimes accidental contacts with electrical equipment and conductors can cause burns. Clothes can be burned.

PROTECTION FROM ELECTRICAL HAZARDS

- Always make sure that all aerial cables are energized at fatal voltages.
- Be safe in touching live wire, even if it is not in use or seems isolated.
- Never touch a fallen electric wire.

TRIPS

One of the most important causes of injuries are trips on construction sites with over 1000 major injuries every year. By efficient management of access routes such as corridors, stairwells and foothpaths, most of these accidents can be avoided.

5.7 ILL HEALTH

In construction industry, workers suffer from bad health. Due to working in both difficult conditions and dangerous substances, construction workers get ill. Ill health can be due to

- **ASBESTOS**

When construction workers are exposed to asbestos, it can cause dangerous respiratory problems such as asbestosis and cancer.

- **MANUAL HANDLING**

Back injuries can be caused to people working in construction industry by lifting heavy and awkward loads. Single lift can cause injury, but as a result of repetitive lifting, long term injury develops due to repeated minor injury.

- **NOISE AND VIBRATION**

Hearing loss can be caused due to high level of noise and hand-arm vibration syndrome can be caused due to repeated use of vibrating tools.

- **CHEMICALS**

Chemicals can also be dangerous to construction workers as exposure to cement and solvents can cause skin problems such as dermatitis.

5.8 LAW FOR HEALTH AND SAFETY

The law provides different health and safety rules for the workers. It has made workers more comfortable with the work, which also has increased the effectiveness and efficiency of workers. This is one of the most important part of construction industry and it explains how health and safety can be increased at work.

- **PLANNING FOR HEALTH AND SAFETY**

Planning for health and safety is an important part of construction industry. It requires the health and safety problems are planned, organized, controlled, monitored and reviewed. Everyone working on the site has responsibility for health and safety issues. It should be checked that working conditions before the start of the work should be healthy and safe and ensuring that planning and organization is done so that proposed work is not going to put others at risk.

5.9 WORK SITE INSPECTIONS

Work site inspections are done based on following priorities

- Danger which cannot be prevented
- Serious injuries
- Complaints of workers
- Inspections made without any prior notice
- Inspection made after notice

INSPECTIONS

Inspections are done without any prior notice to employers or employees, regardless it is done after a complaint or programmed inspection.

5.10 ROOFING

If working on roof more than 6 feet from ground than you must have protection against falling.

PROTECTIONS FROM FALLING FROM ROOF

- Roof Jacks
- Planks
- These things should be checked and provided while working on roof.

5.11 LADDERS

Ladders are important tool for construction workers because of their excessive use in civil engineering works, while at the same time their care should also be done properly. They should be strong enough to bear the load of the workers and should not fall by slipping when a worker climbs up or down the ladder.

5.12 SCAFFOLD

A scaffold is an elevated, temporary work platform. It is used to work on greater heights .

THREATS WHILE USING SCAFFOLD

1.FALLS FROM ELEVATION

Workers can from elevation if proper care is not taken. The falls can be due to slipping, unsafe access and the lack of fall protection.

2 .STRUCK BY OBJECT

Strucking by objects includes got hit by falling tools or debris.

3. ELECTROCUTION

This can also happen if proper care against overhead power lines is not taken.

4 . SCAFFOLD COLLAPSE

Scaffold can collapse if it is not strong enough for taking the load of the worker or due to instability or overloading of the scaffold.

5. BAD PLANKING

If planking is not done carefully it can cause accidents.

5.13 PROTECTION FROM ACCIDENTS

FALLS FROM ELEVATION

- If a worker is working on heights greater than 10 feet, than he should be protected from falling by providing guardrails on the site or personal fall arrest system.
- Do not work on ice or snow covered platforms or during storms or high winds.

STRUCK BY OBJECTS

- Always wear hardhats for protection from falling objects.
- Build a net below the scaffold that will contain or deflect falling objects.

ELECTROCUTION

The danger of electrocution is a serious possibility when working near high voltage power lines. Check the clearance distance for protection from overhead power lines.

SCAFFOLD COLLAPSE

- Scaffold can be collapsed due to instability or overloading.
- Scaffold can be prevented from collapse by providing strong supports.
- There should be no bad planking.

TRAINING TO CONTROL THE HAZARDS

- Form of electrical, fall and falling hazards.
- Dealing with electrical hazards and fall protection systems
- Scaffold should be properly used
- Load capacities of scaffold

5.14 PROTECTION FROM SCAFFOLD HAZARDS

1. FALLING OBJECTS

- Stack material to prevent material from sliding, falling or collapse.
- Use protective measures such as toeboards and debris net.
- Wear hardhats.

2 . WHEN PERFORMING OVERHEAD WORK

- The equipment should not fall on people below.
- Secure hazard area make warning signs.

- Use toeboards, screens or guardrails on scaffolds to prevent materials from falling below.
- Avoid working when loads are moving.

3. WHEN USING POWER TOOLS, MACHINES, ETC

- Use eye protection when a machine causes flying particles.
- Ensure that tools are in good conditions.
- You should be efficient in power actuated tools.

5.15 MACHINE AND POWER TOOL HAZARDS

- Workers which use hand and power tools may be exposed to these threats.
- Flying materials can cause eye injuries.
- Hazardous materials.
- Electrical current, when improper grounding is done.

1. BASIC MACHINE SAFETY

- Machines should be regularly checked.
- Use right person for the job.
- Machines should be in working condition.
- Use it according to manual.
- Use efficient protective equipment.
- Be aware that equipment such as masks or work suits can increase heat stress.

5.16 HEAT-RELATED ILLNESSES

The following illnesses are caused by over-exposure to heat:

- HEAT CRAMPS
- HEAT EXHAUSTION
- HEAT STROKE

It is imperative to realize what causes these sicknesses, how you can secure yourself and what safeguards your business ought to take to ensure you.

1. HEAT CRAMPS:

These are muscle fits that are brought about when laborers sweat without supplanting the salt they have lost through sweating.

2. HEAT EXHAUSTION:

This results from delayed sweating. Side effects include:

Headache, queasiness or swooning

Shortcoming and an icy sweat

Aggravation or disarray

Thirst, queasiness or regurgitation

3. HEAT STROKE:

This is the most genuine wellbeing issue. A portion of the components that can prompt a heat stroke include:

- High temperatures and moistness
- Low levels of water utilization
- Substantial work
- Water confirmation attire
- Never being laid open to high temperature working environments

HEAT STROKE SYMPTOMS:

- Feeling of perplexity, powerlessness to think unmistakably, blacking out, breakdown or shakings.
- You could totally quit sweating.
- If not treated legitimately, the specialist can go into a state of extreme lethargy.

WHAT CAN YOUR EMPLOYER DO TO PREVENT HEAT-RELATED ILLNESSESS?

- Provide training on the risks due to heat stress and how to prevent it.
- Provide plenty of fresh water for workers close to their places of work.
- Allow workers to take breaks as needed. Provide shaded areas for worker breaks.

5.17 VEHICLE HAZARDS

Workers are more likely to get injured in vehicle accidents than in any other work-related accidents. Sometimes careless behavior of workers can cause serious accidents.

5.18 BEST AND PREFERRED WORK ZONES

Work is done quickly when load to be carried is in the best or preferred work zones. Working outside the best or preferred work zones can increase the risk of injuries. While lifting heavy loads, it is always preferred that the load should be in best work zone.

BEST WORK ZONE

Best work zone is at the chest region. While lifting heavy loads, the loads should be in best work zone.

PREFERRED WORK ZONE

Preferred work zone is above and below the chest region. While lifting normal loads, the loads should be in preferred work zone.

5.19 SAFE LIFTING TECHNIQUES

- Be close to the thing which you are lifting.
- Have firm grip on the object.
- Be calm and do not rush in lifting the object.
- During turning, do not twist tour back but turn with your feet.

5.20 PREVENTING BACK INJURIES

The items which are heavy and frequently-used keep them in the ―Best‖ or ―Preferred‖ Zone between your waist and shoulders. Prepare different storage areas in this way to reduce heavy lifting, carrying, or awkward positions. This minimizes the stress on the body due to bending or reaching overhead.

- Use Equipment's when reaching difficult areas.
- If you are confused, ask for help.
- Avoid twisting your back to reach difficult positions.
- Do different tasks, so that your muscles can relax.
- During break, stretch your body.

5.21 CONTROLLING WORKPLACE HAZARDS

5.21.1 ELIMINATION

Elimination is the best form of controlling the hazard. It should be done as early as possible. By eliminating a hazard, a worker can perform his task efficiently and effectively.

5.21.2 SUBSTITUTION

When there is no chance of eliminating a hazard, it should be substituted. The purpose is to replace chemicals, equipment, or hazardous materials with ones that are less hazardous.

5.21.3 ENGINEERING CONTROLS

Engineering controls are different ways , so that the technology can be used to make different the work environment, a machine, or some equipment in order to reduce the hazard.

5.21.4 ADMINISTRATIVE CONTROLS

Administrative Controls or changing labor practices means changing the behavior of how work is done. This is done to ensure that the best possible way of working is maintained.

5.21.5 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) can include face masks, and protection for the eyes, ears, and face, gloves, and protective rope. PPE is the least effective way for protection of workers because it does not get rid of the hazardous situation. If equipment fails, workers are still exposed to the risk.

CHAPTER NO-6

RISK ASSESSMENT IN CONSTRUCTION INDUSTRY

6.1 INTRODUCTION

In construction industry, risk assessment is an important factor which cannot be ignored. Risk assessment starts with the project and remains there until the project ends. Without proper risk assessment, it can increase cost and time to finish the project. It is also important because until we do not assess what kind of risk present in a project we cannot make a plan to mitigate it.

6.2 RISK MANAGEMENT IN CONSTRUCTION INDUSTRY

As construction industry is slow in accepting changes because of the contractors who do not want to change their traditional methods of construction due to which industry is suffering heavily in terms of risk which can make a project difficult complete.

6.3 RISK

Risk is an event in the project life which could have a positive or negative outcome. Risk is generally associated with a negative outcome but that is not the case every time, as it also can have a positive outcome.

6.4 RISK MANAGEMENT

Risk management is a technique by which we can minimize the risk in a project. Risk management is the most important and difficult process of project management. A project manager must be able to access all the risks, which are likely to occur and then make an effective plan to mitigate them. Furthermore, risk management in a construction project is comprehensive and systematic way of identifying, analyzing and responding to risks to achieve to project objectives.

6.4.1 COMPONENTS OF RISK MANAGEMENT PLANNING

6.4.1.1 RISK PLANNING

Any development task obliges watchful danger administration arranging so the venture ought to be finished on time and without extra cost. It is need of the undertaking on the grounds that it spares cost and time by making holders, developers and fashioners to express their needs and goals throughout theoretical stage, while course amendments are still generally minor and cheap. As opposed to utilizing more ill-disposed procedures like "danger moving" to dispose of danger for people, the gatherings included have an opportunity to assess hazard together and at times, to assign it better.

6.4.1.2 SCHEDULING

Scheduling is a vital stage in risk administration arranging. When acquirement of materials and development starts, altering mistakes gets all the more unreasonable. The calendar should exactly reflect all the works that needs to be carried out, including different components, for example, allowing and outline survey gatherings. It should likewise demonstrate real time spans for the culmination of meets expectations.

6.4.1.3 PARTNERING

Cooperating might be critical some piece of risk administration arranging. It helps in making great interdisciplinary correspondences , by giving answers for issues before they rise and make misconception. The interchanges between diverse controls ought to be expanded. Inquiries and noting oppurtunities get all the more because of collaborating and issues could be elucidated while working with substantial individuals.

6.4.1.4 STRATEGIC RISK PLANNING

Key risk arranging gives vital steps to the fruition of the task. Collaborating can additionally be critical measure diverse objectives and targets with particular yearly targets.

6.5 TYPICAL RISKS ON A CONSTRUCTION PROJECT

- Occurance of physical injury to workers on site.
- Failure to complete project on time.
- Failure to properly plan the project.
- Un expected conditions delaying the project..
- Unforeseen rises in the cost of labour and materials.
- Force majeure.
- Failure to complete the project in the budget the client has given.
- Contractor loss due to late production.
- Failure to keep within estimated costs.
- Failure to keep within the stipulated costs.
- Failure to maintain the quality of the project.

6.6 RISK AND UNCERTAINTY

Risk is an uncertain event which can have positive or negative effect. Risk is characterized as the occasion which can have positive or negative conclusion. Risk is likewise an unverifiable occasion, on the grounds that one can anticipate it yet nobody knows when it will happen and with what extent. Hazard additionally might be characterized as a normal for a circumstance, activity, or occasion in which various conclusions are conceivable, the specific one that will happen is unverifiable, and no less than one of the potential outcomes is undesirable (Yoe, 2000). Zayed and Chang (2002) characterized hazard as the vicinity of potential alternately real requirements that could obstruct venture execution, creating fractional or complete

disappointment either throughout development or at time of utilization. Greene (2001) expressed that there is no all including meaning of risk and gave his translation of what danger constituents:

Risk = Hazard × Exposure [1]

He characterized risk as the path in which an occasion can result in damage and presentation as the degree

6.7 DYNAMIC AND STATIC RISKS

Element risk is concerned with making open doors; for example it may concern creating another and creative item. Element risk implies that there will be potential picks up and misfortunes. Element risk is taking a chance with the misfortune of something sure for addition of something questionable (Flanagan & Norman, 1993) and (NAO, 2001).

Static risk related just to potential misfortunes where individuals are concerned with minimizing misfortunes by risk repugnance (Flanagan & Norman, 1993). The unsystematic and discretionary administration of risk can imperil the achievement of the venture since most dangers are exceptionally progressive all through the undertaking lifetime (Baloi & Price, 2003).

6.8 CAUSES OF RISK AS THREATS

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- industry exceptionally delicate to budgetary cycles.
- fierce rivalry as consequence of an over-capacitated business sector.
- relative simplicity of entrance.
- management issues.
- trading including:
- Competitive citing.
- Outsize activities.

- High outfitting.

6.9 RISK IDENTIFICATION TECHNIQUES

BRAINSTORMING

A brainstorming is an event which is used to create large number of ideas. In this technique there is a group of 5 to 10 individuals . (i) thought era stage, in which member create as more plans as could be expected under the circumstances (ii) thought determination stage, the thoughts are separated, staying just those endorsed by the whole gathering. (Morano et al. 2006).

DELPHI TECHNIQUE

Delphi is a method to acquire a notion accord about future occasions from a gathering of masters. It is underpinned by organized information, experience and innovativeness from a master board (Wright and Giovinazzo as refered to by Morano et al.,200

INTERVIEW/ EXPERT JUDGMENT

Unstructured, semi organized or organized talks with separately or by and large led with a set of accomplished task parts, master or undertaking stakeholder (Morano et al.,2006)

CHECKLIST

It comprises of an arrangement of thing that are stamped as yes or no , could be utilized by an individual undertaking colleagues, a gathering or in a meeting. (Morano et al.,2006)

INFLUENCE DIAGRAM

It is a graphical representation holding hubs speaking to the choice variables of an issue. A customary impact chart is shaped by three sorts of hubs: utility, choice and enlightening. The causal relationship happens between utility and chance hubs and speaks to a probabilistic reliance.

FLOWCHART

Graphical device that shows the steps of a methodology. This procedure is requested a superior cognizance of the dangers or the components interrelation (Morano et al.,200

CAUSE-AND-EFFECT DIAGRAMS

These are additionally called Ishikawa outlines or fishbone chart, show how different element may be interfaced to potential issues or effects(pmbok – PMI, 2008). The graph is outlined by posting the impact on the right sides and the reasons on the left sides. There are ordered for each one impact, and the fundamental driver must be assembled as indicated by these classifications.

6.10 RISK AND THE PROJECT LIFE CYCLE

Understanding the relationship between risk administration and venture stages for capital ventures could be a troublesome undertaking. Worldwide undertakings are regularly first- or one-time deliberations where venture advancement and staging choices could be disengaged from risk administration. For most universal activities, diverse members are in charge of and control the different periods of a venture's life cycle. By and large, the undertaking manager is generally in charge of system examination, an outsider is regularly employed to oversee and control outline and building to meet the starting imperatives set by the holder, and a builder is procured to develop the task, who turns the results over to the manager for operations or creation. Organizing tasks with different stages and obligations can build hazard by separating the task members in such a way, to the point that insignificant consideration is given to all-encompassing undertaking concerns. Individual task members get concerned with just their venture risks and either readily or unwillingly attempt to exchange these risks to other undertaking members (Kim and Bajaj 2000). Relieving hazard by decreasing their effect is a discriminating segment of risk administration. Actualized effectively, a fruitful risk relief method ought to lessen unfriendly effects. Generally a decently arranged and legitimately controlled risk relief methodology is a substitution of unverifiable and unpredictable occasions with a more foreseeable or controlled reaction (Chapman and Ward 2002).

6.11 RISK MITIGATION STRATIGIES

AVOIDANCE

In risk avoidance stratigies, the risk is not accepted and other lower risk options are considered from several alternatives. This is the best solution for risk mitigation.

ACCEPTANCE

Risk can be accepted by knowing its consequences and preparing to deal with the situation. If risk cannot be eliminated than it must be accepted.

REDUCTION

Risks can be reduced when it is continually monitored and controlled. This process involves the risk reduction plan and than tracking the plan. The risk is reduced when it cannot be accepted.

DEFLECTION

Risk can be deflected when it is shared with others. Different forms of risk sharing includes contractual shifting, performance incentives, insurance, warranties, bonds etc. This is the last step to mitigate the risk and is done when risk cannot be reduced.

6.12 FOCUSED EFFORTS

Fruitful undertaking administration requires the recognizable proof of the variables affecting task scope definition, expense, calendar, contracting methodology and work execution plan. However

a great part of the examination identified with risk recognizable proof, appraisal and administration for built offices is centered around specifics, for example, area, classes of risks angles, or sorts of activities. For instance arrangements of applicable development task dangers have been produced (Kangari 1995, RAMP 1998, Smith 1999, Hastak and Shaked 2000, Han and Diekmann 2001) and also political risk are accessible (Ashley and Bonner 1987, Howell 2001).

The estimation of orderly hazard administration of undertaking action is not completely perceived by the development industry (Walewski, Gibson, and Vines 2002). Since no normal perspective of risk exists, holders, speculators, planners, and constructors have varying targets and unfriendly connections between the gatherings are normal. Endeavors at arranging danger investigation administration between the greater part of the task members have not been formalized and this is particularly genuine between foremen and holders.

Worldwide undertaking risks are off and on again neglected or evaluated indiscriminately. Such risks incorporate war, civil war, terrorism, confiscation, failure to exchange cash crosswise over fringes, and exchange credit defaults by outside or household clients (Wells and Gleason 1995, Hastings 1999).

Despite the fact that risks, for example, common agitation and investment security are normally outside the extent of ordinary business, understanding and managing these dangers are discriminating for organizations living up to expectations globally. A 2001 study by Aon Trade Credit uncovered that, in the Fortune 1000, just something like 26 percent of organizations had

set up methodical and steady approachs to evaluate political dangers (AON 2003). Working in a global setting frequently obliges a much more extensive perspective of the venture's setting than with provincial tasks (Miller and Lessard, 2000; Mawhinney 2001).

For worldwide development, the reason for danger administration is to moderate dangers by anticipating components that might be impeding to extend destinations and deliverables. In spite of the fact that hazard administration is a generally known and honed procedure, few associations have vanquished its fruitful usage. Much of what is rehearsed is focused around instinct, individual judgment. The need to oversee risks is critical to all task stakeholders and basic for venture achievement.

6.13 RISK ALLOCATION ISSUES

In spite of the fact that agreement are the system to distribute liabilities and obligations of undertaking members in development, contract dialect alone is deficient to define and name all the risks (ACEC/AGC, 1992, Rahman and Kumaraswamy 2002). A perfect procedure would address the individual needs of every association and each one venture (Chapman and Ward 1997).

The dissemination of risk between the customer and builder has a tendency to dominate successful administration procedures and examinations indicate that contactors and managers give insignificant attention to dangers outside the domain of their own worries (Kim and Bajaj 2000, ENR 2002).

Despite the fact that the holders venture group must relate to the business mission of the organization, there are regularly detaches. CII research has demonstrated the disappointment to adjust business objectives and particular venture objectives because of poor preproject arranging is a significant industry challenge (CII 1997).

Determination of risk obligations and proprietorship is discriminating yet might be troublesome to focus for universal activities. The Fédération Internationale des Ingénieurs Conseils (the Universal Federation of Consulting Engineers, FIDIC) and the International European Development Federation (FIEC) distribute two well-known and broadly acknowledged types of states of agreement for universal development ventures (the Red and Yellow Books) that incorporate procurements on the reasonable and fair hazard offering between the holder and the foreman and additionally chance obligations, liabilities, repayment, and protection. A discourse on risk offering is incorporated in a dissection of the FIDIC Red Book (Bunni 1997) that incorporates an arrangement of stream charts of the risks in development, and their following obligations, liabilities and how these are managed by the Red Book (Conditions of Contract for work of Civil Engineering Development.

6.14 PATH FORWARD FOR RISK MANAGEMENT

In light of the work finished to date, the accompanying perceptions will control the activities of experts and the examination group to adequately create and actualize the danger dissection and administration apparatus:

- Hazard dissection and administration is best when conveyed early.
- Risk recognizable proof, examination, and relief methodology can direct the risks connected with worldwide development ventures.
- Hazard appraisal and administration is not a substitute for sufficient preproject arranging, task controls, or other administration and specialized prerequisites. The best hazard administration methodology is facilitated with all parts of task improvement and administration.
- Conventional connections between managers, moguls, and builders working in worldwide settings make it troublesome to evaluate and oversee dangers.
- Ventures with specific aspects (new engineering, different members, flimsy political circumstance, and so forth.) will probably be laid open to expanded levels of danger.

- The risk administration procedure ought to catch usable information and be kept as basic as conceivable.
- Documentation is basic, and appropriately recording the recognizable proof, investigation, and risk moderation plans and results for each one danger component considers lessons to be taken in, and moves to be made if important.

6.15 RISK MANAGEMENTS IN PROJECTS

Recognizing, distributing, and overseeing dangers at the front end of the task arranging methodology can enhance venture execution. Worldwide task hazard evaluation arranging is a transform that aids all undertaking members to handle hazards before they get critical issues.

Despite the fact that a venture could be separated into various separate stages and the dangers evaluated furthermore oversaw all things considered, there is a need to oversee hazards as a continuum over the undertaking life cycle.

Amplifying the methodology of evaluating and overseeing venture risks obliges introductory distinguishment consolidated with a systemic system for checking changes and effects about whether.

Risks and their effects have a more amazing inclination to fluctuate over the life cycle of universal capital activities. A few risks stay steady while other emerge and decrease as undertakings advancement. Enhancements in task execution might be attained by perceiving which risks happen over the whole extend life cycle and providing for them due thought. Inside the undertaking life cycle, ideal risk recognizable proof and appraisal systems and timing, and additionally the ID of the most positive choice focuses need to be sketched out. Few managers and builders have created a procedure to enhance the arrangement of venture dangers over the whole extend life cycle. Therefore, current appraisals of worldwide hazard regularly neglect to give satisfactory thought to how they may change about whether.

6.16 IPRA DEVELOPMENT

A methodology to recognize and evaluate dangers particular to global ventures utilizing standard wording.

- An arrangement of danger components particular to worldwide activities.
- An organized methodology to help distinguish, measure, and track dangers from an early phase of venture improvement however operation of the office.

The IPRA has been customized to address the particular issues regularly experienced by those working in a global setting. The device concentrates on the worldwide viewpoints and does not location issues considered to be fundamental task administraion.

6.17 Why Projects Get Off Track

Any absence of tolerance among specialized specialists on a venture might, and frequently does, help imperfect correspondence by creating the specialists to respond protectively to open concerns. Other specialists expect excessively in their endeavors to convey thoughts. They expect, for instance, that everybody has an essential level of learning that to them is underestimated. Others included in the venture group, who have equivalent or more excellent abilities in different controls, may have no clue what is constantly said on the grounds that they fail to offer the precise fundamentals that have been accepted.

Individuals who work with the specialized parts of dangers have a tendency to have a more finish understanding of the controls and frequently completely reject the concerns of others as silly or

misled. More awful, some specialized masters respect the apprehensions of non-specialized persons (at times the manager) as so nonsensical that the specialists don't endeavor to clarify the dangers and their evaluation process. This is risky conduct on the grounds that the manager and open need to see, as well as be included in, the strategies that create from dialog of these issues.

Examination shows that cooperation on discernments can enhance the methodology of comprehension. In workgroups among undertaking members, the members can—and ought to be—tested to characterize and clarify their observations with a specific end goal to make more stupendous understanding of varying perspectives. A point to consider: Although driving an auto is a much more terrific wellbeing danger from just about any viewpoint, a lot of people in the overall population see the utilization of pesticides as a far more stupendous danger. This is on account of laypeople utilize an alternate set of criteria than do masters when assessing dangers.

6.18 USE OF RISK ASSESSMENT PLANNING

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6.19 METHODS TO RESOLVE DISPUTES

Debate might be perilous for the tasks as they can build the expenses, postpones because of numerous inadmissible choices from the utilization of numerous inflexible existing settlements conditions, for example, ligitation or tying intervention, the business is moving to the utilization of voluntary and nonbinding systems. These strategies are

- Counseling conclusions

- Intercession
- Standing neutrals
- Minitrials
- Collaborating
- Emergency administration programs
- Process duration decrease plans
- Life-cycle-investigation models
- Ecological effect articulations
- Enhanced evaluative systems
- Question survey board (DRB)

Joining different ADR strategies as a major aspect of a bigger RAP methodology to maintain a strategic distance from expensive postponements and expenses connected with settlement of

debate at the end of a task through joint interdisciplinary outline appears to hold the best guarantee.

Once more, the consistent idea among all ADR systems is that they are voluntary. Actually tying assertion (when an unbiased outsider settles on a choice for the gatherings) relies on earlier composed understanding of all gatherings that the choice of the judge will tie the gatherings.

ADR ought to be considered by all gatherings to contracts as the to begin with, and maybe the best, system for anticipating question and of dealing with the determination of cases when and on the off chance that they happen. As there is no run of the mill undertaking or customer, no single ADR technique blankets each circumstance. The presence of the different voluntary and nonbinding methodology ought to be perceived and examined by contracting gatherings at the time of agreement start and transaction.

As a viable matter an ADR proviso, for example, a procurement for intercession or the utilization of a standing unbiased, ought to be incorporated in the agreement. (The American Arbitration Association, available on the World Wide Web at www.adr.org, can give model dialect and in addition extra data on the above methodologies.) Whether included or not, nonetheless, ADR's usage continuously requires the simultaneousness of all gatherings. The key is that there is distinguish that successful plan B to the customary methodologies of determining differences and cases are accessible.

In view of the disappointment of the customary antagonistic prosecution approach, which is in substantial part due to the time needed to explore through stuffed civil courts, ADR ought to be seen as an basic connection in the bind of steps taken to resolution a case. ADR does not so much supplant the outsider choice making methodology, however it ought to go before any such activity and will probably minimize the time needed. In most ADR methods, settlement arrangements are not essentially turned over to "pariahs." As a consequence of parties' proceeded contribution in the settlement process ,relationships are better saved.

The methodology proposed in this, which we feel is a best practice, has evident profits. Cost benefit investigation weighs vigorously on the profit side. Early mindfulness and eagerness of the own to use somewhat more cash in advance will pay more terrific profits later in the task.

The Building Futures Council solidly accepts the venture manager is the essential beneficiary of a better sorted out, question free extend where all members know and comprehend their parts and excitedly perform them, and where all members designers, engineers, foremen, subcontractors, sureties, and their direction will experience the pride of cooperation in an effective venture.

6.20 RISK MANAGEMENT OF D-TYPE APARTMENTS

6.20.1 EXTERNAL RISKS

- Involvement of owners and designer in construction
- Deliveries can be delayed
- Claims taking longer time to settle

- Delay due to late handing-over of site
- Increase in labour cost
- Objections by local communities
- Increase in price of construction material

6.20.2 ENVIRONMENTAL RISKS

- Strength of concrete
- Severity of weather
- Heavy rain
- Act of God
- Un forecasted issues of air quality
- Noise impact on others

6.20.3 CONSTRUCTION RISKS

- Health and safety
- Fire
- Water leaking problems
- Foundation collapses
- Poor work quality
- Low quality of materials

6.20.4 DESIGN RISKS

- Incomplete ang inaccurate design
- Unforeseen geotechnical issues
- In sufficient design analysis
- Incomplete surveys
- Design not up to standardIn accurate assumptions on technical issues

6.20.5 PROJECT MANAGEMENT RISKS

- In sufficient time to deliver project
- Water problems
- Energy problems
- Work stopped
- Delay in solving problems
- Inadequate performance
- Delay in tasks cause delay in other tasks
- Inadequate project scope
- Contractor delays
- Estimating and scheduling errors
- Waste of materials
- Placement of materials

6.20.6 ORGANIZATIONAL RISKS

- In efficient labour
- Change of priorities on existing programs
- Conflicts of resources with other projects
- Large number of projects
- Loss of important staff at important time of project
- Un foreseen work load on project manager
- Communication break down with project team
- In efficiency of contractor
- Lack of support of upper management
- Contractor un availability

6.21 RISK PRIORITIZATION

- Water problem
- Energy problem
- Foundation collapses
- Severity of weather
- Health and safety
- Increase in price of construction materials
- Poor work quality
- Increase in labour costs

- Low quality of materials
- Conflicts of resources with other projects

6.22 RISK RESPONSE AND RESPONSIBLE PERSON

- Arrange a generator(Manager)
- Provide water through water containers(Site Engineer)
- Avoid water and foundation contact(Geotechnical Engineer)
- Use additives to gain strength of concrete(Contractor)
- Labour costs should be maintained(Contractor)
- Materials should be procured from reliable source(Contractor)
- Resources should be completed on time(manager)
- Health and safety rules should be followed(Contractor)

Conclusion:

The project construction and management over the years have developed as a single entity to control the overall cost and duration of mega construction projects. A large number of soft ware's project managers use to do scheduling of the construction projects. We used Primavera Project Planner for scheduling P6 which is most widely used software in construction industry. Primavera is a huge tool for project managers & for construction firms to efficiently manage projects.

Planning is the first part of any construction project. It defines the scope of overall project. The success of whole project is dependent upon planning process. It lot depends upon the project manager, how he manages the whole project. By careful planning, we can finish the project in due time and agreed upon cost.

Scheduling is the process of breaking the project in different parts, so that different parts can be assigned to different team members due to which they can perform their work efficiently. In scheduling the work is breakdown in different smaller paths and the most critical path is selected.

Value engineering is the process of achieving high quality at low cost. We have adopted different methods in our building to improve value engineering. Value engineering manages the project effectively and efficiently.

Health and safety is an important aspect of construction industry. In our building, there are many things where health and safety aspects can be applied, but there is not much scope of it. There are different tools and methods which can be applied.

Risk management is a technique by which we manage risks and use different methods to reduce them. There are different risks in our project which can cause trouble but by effective risk management, we can reduce them.

RECOMMENDATIONS

- Planning is an essential part of any project, so it must be done in an effective way.
- By efficient planning, the time and cost of project can be saved.
- Scheduling helps perform of work easier.
- Scheduling determines the fastest path to completion of work.
- Value engineering seeks high value at low costs.

- Different methods of value engineering can be adopted to enhance project.
- Health and safety methods can improve the performance of labour.
- Health and safety methods should be ensured by employer.
- Risk planning should be done properly.
- Risk management, if done in an effective way can reduce time and cost of project.

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