

THE CHOICE OF PREFABRICATION OVER CONVENTIONAL METHOD FOR LONG SPAN ROOFING

A Thesis

Submitted in partial fulfillment of the requirements for the award of
Master of Architecture degree in Building Management

by

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**DEPARTMENT OF ARCHITECTURE
SCHOOL OF BUILDING AND ENVIRONMENT**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade "A" by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

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BONAFIDE CERTIFICATE

This is to certify that this Report is the bonafide work of **JAGADEESH PANDIAN (39840008)** who carried out the Thesis entitled “THE CHOICE OF PREFABRICATION OVER CONVENTIONAL METHOD FOR LONG SPAN” under our supervision from January 2021 to May 2021.

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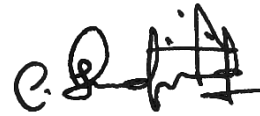
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DECLARATION

I **JAGADEESH PANDIAN.C** hereby declare that the Thesis Report entitled “THE CHOICE OF PREFABRICATION OVER CONVENTIONAL METHOD FOR LONG SPAN ROOFING THE CHOICE OF PREFABRICATED STRUCTURAL CONCEPT AND MATERIAL FOR LONG SPAN ROOFING” done by me under the guidance of **Ar. PRIYADHARSHINI** (Internal) and **Ar SARATH C. KANTH**, Principal Architect, Designtech (External) at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Master of Architecture degree in Building Management.



DATE:

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SIGNATURE OF THE CANDIDATE

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ABSTRACT

The long span roofing in the factors including time, cost, and quality. Long span roof are today widely applied for sport, social, industrial, ecological and other activities.

Construction industry is considered as one of the most important industries in India. It is well known that most construction projects are done through conventional technique but prefabrication technique is a new one for the construction industry. The aim of the project is to study the present situation of the precast construction industry in India. Suggestions for improvement of the industry and study on cost effectiveness of precast concrete construction for single and multi-storey residential buildings are to be given. A literature survey was carried out in order to obtain the comparison between the conventional buildings with precast concrete buildings in India and some field visits are conducted to collect data to investigate the current situation regarding precast industry in India.

The roof has to be efficiently designed to satisfy certain functional requirements as follows

- Strength and stability, which is vital to the performance of the structure as a whole.
- Weather resistance including prevention and discharge of rain, snow and condensation.
- Thermal resistance involving regulating internal environments by solar heat loss balance, air temperatures, energy conservation and ventilation.
- Fire resistance including fire safety measures and/or precautions to keep distribution of fire from source at a minimum and provision of adequate lighting.
- Sound insulation involving maintaining adequate noise levels.

KEYWORDS: long span roofing; prefabrication technique; cost effectiveness; conventional buildings.

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CHAPTER 1

1. INTRODUCTION

1.1 INTRODUCTION

The construction field in India is at a quick rate of development. It gives wide opportunities in India to prefabricated division. Currently precast solid structures are the propelled development systems accessible around the world. With wide acceptability, the precast solid structure frameworks are turning into a famous decision for development. Precast concrete are accessible in many shape, sizes, including basic components and unreinforced pieces. The prefabricated business is the spine for the improvement of new thoughts in development business of any nation; Factory structures, private structures and the mechanical township are required for all intents and purposes by every one of the divisions, either to help the assembling or administrations of any industry.

The material has inherent properties of thermal idleness (permitting a more consistent temperature both in icy and hot locales) and acoustic protection. Everyone realizes that concrete does not burn. It is adequately solid to oppose effects, impacts and natural calamities like earthquakes, tornadoes and floods. The precast solid industry can source an extensive variety of aggregates locally and offer a colossal assortment of hues and visual impacts.

Construction is the creation of housing or housing units utilizing manufacturing plant motorization. The industrial facility setting improves reasonableness through a mix of mass buy of materials, large scale manufacturing get together procedures and the utilization of less talented work. Construction can take one of three structures: pre-assembled parts, secluded housing. The construction of lodging segments, for example, windows, entryways, and cupboards, has for quite some time been a backbone of the development business, minimizing expenses by lessening nearby, high-cost work. Proceeding with advancement in this feature of construction gives a developing scope of development items that may additionally decrease development costs. Particular lodging includes the construction of areas of lodging that are then amassed nearby in this way decreasing nearby work costs. Measured lodging depends on pre-assembled, manufacturing plant delivered, simple to-transport particular units, which limit the cost of generation. Last structures are planned from the back to front utilizing a progression of standard "modules of utilization" and homes made out of these modules can possibly be configured in an assortment of routes, as per the specific prerequisite of the site or customer.

1.2 AIM

To study the choice of prefabricated structural concept and material for long span roofing based on time, cost and quality.

1.3 SCOPE

The equally outlined strategies, a good understanding of the structural behaviour of long span structures and careful implementation, will reduce the incidence of collapse of long span structures as well as eliminate some of the concomitant problems of erection of long span structures. This study provides an understanding on various types and purpose of long span roofing used in construction industry and keep a track on time taken .

1.4 OBJECTIVES

- To study the various possible ways involved in long span roofing system.
- Major project personnel and their roles and responsibilities should be identified at the start of the project in order to determine the correct chain of command and reporting hierarchy
- To ensure that proper project management procedures are applied to prevent friction amongst parties concerned, eliminate budget overruns and ensure that project delivery timelines are met.
- To enable the team adequately familiarize themselves with certain construction requirements, specifications and details which have been prepared in line with the codes of practice at design stage.
- Proper planning has to be made for saving overall cost on the structure from materials used in the construction without compromising the quality.
- To decide on the proper prefabricated structure that saves cost and time through proper study.

1.5 METHODOLOGY

- Understanding the possibilities of long span roofing systems . And also knowing the importance of applying the most appropriate system through literature study.
- Selection criteria - Adequate environmental studies should be conducted and results of these should be employed in the estimation of the wind and snow load on the structure.
- Analyzing the effective and possible ways of long span roofing through case study.
- Which is best? Time - Cost – Quality

CHAPTER 2 : LITERATURE

2.1 AIRBUS INDUSTRIAL HALL IN TOULOUSE, FRANCE

2.1.1 INTRODUCTION:

Client: EADS

Architect: ADPI

Design office: Cooperation: ADPI & Jaillet-Rouby

Contractor: URSSA (Spain), CIMOLAI (Italy),

CASTEL et FROMAGET, JOSEPH PARIS,

RICHARD DUCROS (France), BUYCK (Belgium)

Control Office: SOCOTEC and VERITAS



***Fig 1 Internal view
of the building
during construction***

Prefab is related to prefabricated construction. The word "Prefab" is not an industry term like modular homes, manufactured homes, panelized home, or site-built home. The term is an amalgamation of panelized and modular building systems which is well planned & designed before the initiation of construction and placement of structure as per detailed design at work site. In industry these are called Pre Engineered Building (PEB). Prefabricated homes and modular homes are dwellings manufactured in a factory in advance, usually in sections that can be easily transported to the site and integrated. Prefabs are made of composite materials which are manufactured by combination of materials containing different properties such as plastics, concrete and steel. These are specifically designed for longer period of applications or usage.

- Two parallel industrial rolling cranes, 50 m span, 22 tones capacity for lifting of the wings.
- Two parallel industrial rolling cranes, 35 m span, 30 tones capacity for fuselage transportation.
- Two dual loads 2 x 4 suspended cranes for normal service.

The wing-lifting cranes roll on rails suspended on the truss of the frame of the roof. Sliding doors provide a 117 x 32 m² opening. They are supported by their own structural frame. This huge structure was designed and installed economically using fabricated sections and a trussed upper beam.

Application Benefits:

- Fast track construction
- Efficient use of steel components
- Flexibility of space organization
- Sustainable design approach

- High crane facilities

2.1.2 CONSTRUCTION DETAILS

Roof and roof trusses

The roof trusses span 117 m. The height of the trusses varies from 8 m at the supports up to 13.5 m at mid span. The main roof elements are composed of two parallel truss frames of 33 m span along the building and made of rectangular hollow steel sections. Each roof element comprises a pair of front and rear trusses, roof structure, roof service equipments, fire safety network, etc., and when completed at ground level is lifted and positioned at the top of the columns in one piece.

Columns are rigidly fixed to the ground and have equal slenderness ratio in each direction to avoid any horizontal buckling phenomenon during lifting operations.

Assembly of the trusses at ground level has the advantage of achieving safe construction, limited use of scaffolding, a simple operation and fast construction process. The joints between the truss elements and the top of the columns are pinned.



Fig 2 Roof and roof trusses



Fig 3 Roof and roof trusses

This simple method provides the following advantages:

- Rapid connection operations in a critical erection phase.
- No welding operation during assembly.

- The truss upper flange element is connected and simply sits on a short span beam on top of the column.

The vertical deflection of the trusses was limited to $\text{span}/2000$ due to crane operation requirements. The elements of the main truss spanning across the building were I shape fabricated sections and bolted on joints. Each column was made of two separate fabricated sections jointed by a continuous truss web.



Fig 4

2.2 CACTUS SHOPPING CENTRE IN ESCH/ALZETTE

2.2.1 INTRODUCTION:

Client: Cactus S.A.

Architect: Paczowski Fritsch Associés

Structural Engineer: Schroeder & Associés S.A.

Contractor: MABILUX S.A.

Fire Engineering: ArcelorMittal



Fig 5 Cactus shopping centre

This medium size supermarket is situated in the city centre of Esch/Alzette and it replaces an older structure. The owner wanted to have a modern bright shopping centre and opted for an open space with huge glazed surface for two of the façades. It was a requirement that the steel structure, with its long span curved cellular beams, should be visible.

Due to the location of the supermarket in a city centre, the local authorities required a fire resistance of 90 minutes for the steel structure supporting the roof.

The Natural Fire Safety Concept was applied to calculate the development of the fire in the supermarket. Using this concept, the opportunity for a building with a fully glazed façade and visible steel structure has been retained.

APPLICATION BENEFITS:

- Column-free internal space provides maximum flexibility
- Attractive appearance due to use of curved cellular beams
- Unprotected steel justified by a fire engineering approach

2.2.2 CONSTRUCTION DETAILS

Structure

The structure comprises a series of portal frames using steel columns and curved cellular beams. The frames are interconnected by means of steel roof purlins and a bracing system. The frame has a single 20 m span. The column height is 7.5 m and the maximum height in the middle of the curved beam is 9.1 m. The distance between adjacent main frames is 7.5 m.

Frames are connected by continuous purlins (IPE200). The roofing is made with a steel decking (HOESCH TR44A), insulation and waterproofing. The beams are ArcelorMittal Cellular Beams® made from HEB450 in S235 steel. The height of the beam is 590 mm, the diameter of the openings is 400 mm and the distance between the openings is 600 mm.

Natural fire safety concept

ArcelorMittal was asked to perform the fire engineering of the structure and the authorities accepted the application of the Natural Fire Safety Concept. The fire design was based on the prescriptions of EN 1991-1-2 (Characteristic fire load for office building 730 MJ/m²) and took into account active fire fighting measures (automatic alarm & transmission to the fire brigade, smoke exhaust systems, etc.).

No sprinklers were required due to the small size of the building. The fire temperature was calculated using the 2-zone software Ozone and localised temperatures were calculated using the Hasemi methodology. A set of simulations was performed to analyse the breaking of the glazed walls (front and back façades are completely glazed).

As the maximum resulting steel temperatures in the columns were 880°C, a 3-D finite element analysis was performed, taking into account the whole structure of the building at this temperature. One complete model of the building in 3 dimensions was analysed. All the simulations were made using the FE software SAFIR. The result of this fire engineering approach was the decision that the steel structure did not require any passive fire protection.

CHAPTER 3 : ANALYSIS - PREFABRICATED STRUCTURES VS CONVENTIONAL STRUCTURES

3.1 PREFABRICATED STRUCTURES

3.1.1 INTRODUCTION:

Prefab is related to prefabricated construction. The word "Prefab" is not an industry term like modular homes, manufactured homes, panelized home, or site-built home. The term is an amalgamation of panelized and modular building systems which is well planned & designed before the initiation of construction and placement of structure as per detailed design at work site. In industry these are called Pre Engineered Building (PEB). Prefabs are made of composite materials which are manufactured by combination of materials containing different properties such as plastics, concrete and steel. These are specifically designed for longer period of applications or usage.

ADVANTAGES OF PREFABRICATION	DISADVANTAGES OF PREFABRICATION
Self-supporting ready-made components are used, so the need for formwork, shuttering and scaffolding is greatly reduced.	Leaks can form at joints in prefabricated components.
Construction time is reduced and buildings are completed sooner, allowing an earlier return of the capital invested.	Transportation costs may be higher for voluminous prefabricated sections.
On-site construction and congestion of site is minimized.	Large prefabricated sections require heavy-duty cranes and precision measurement from handling to place in position
Better quality control can be achieved in a factory assembly line setting than at the construction site.	Larger groups of buildings from the same type of prefabricated elements tend to look drab and monotonous.
Prefabrication site can be located where skilled labour is more readily available and the costs of labour, power, materials, space and overheads are reduced.	Local jobs may be lost, if the work done to fabricate the components being located in a place far away from the place of construction. This means that there are less locals working on any construction project at any time, because fabrication is outsourced.
Time spent due to bad weather or hazardous environments at the construction site is minimized	
Less wastage of construction material.	
Advanced materials such as sandwich-structured composite etc. can be easily used, improving thermal and sound insulation and air tightness	

3.2 CONVENTIONAL STRUCTURES

3.2.1 INTRODUCTION:

Conventional steel buildings are constructed by rolled steel sections which are designed individually and fabricated at site using welding and cutting, offering the ability to design a unique building. It's highly durable – conventional steel structures won't bend or break because of heavy loads. Conventional construction is a method of ordinary or standard construction. It commonly involves the utility of traditional materials, and remains within a particular set of parameters. Most conventional structure buildings are based upon plans of moderate and simple measurements, as well as regular floor plans.

ADVANTAGES OF CONVENTIONAL STRUCTURES	DISADVANTAGES OF CONVENTIONAL STRUCTURES
It embraces various building shapes.	Needs high labour numbers and plant on site.
It can be assumed to be more or less monolithic	Erection of formwork is time consuming.
Connections are homogeneous with rest of the frame	The quality control is difficult.
It is easily used for two way structural systems	Once the concrete has been cast it is too difficult to do any modifications
It is not necessary to pay for crane on site	Weather can create problems for curing, and for construction itself.
Construction can proceed independently of weather conditions	Erecting and interconnecting them to form the final structure.
Better working conditions for the building operatives	Concrete must cure before it is loaded.
	Quality control of finish surfaces is not assured.

3.3 PREFAB VS CONVENTIONAL STRUCTURES

- Prefab structures are designed lighter section in comparison to conventional structure.
- Prefab structures are fabricated in workshop which reduces the required construction time. However, in case of conventional structure there is no precise control over construction time.
- In prefab structure there is more accuracy in construction as the fabrication of the structure is done in workshop by the skilled worker as per approved quality assurance plan (QAP).

However in case of conventional building, there is not much control over accuracy as the same is done by skilled/ semi skilled workers at site.

- In case of prefab structures, cost is analyzed at the stage of design itself and therefore chances of fluctuation of cost are very less. However the construction cost of conventional structure depends upon time and market fluctuations.
- In the PEBs, ready-made components are used, so the need for formwork, shuttering and scaffolding is greatly reduced. However in conventional construction, building components constructed at site requiring formwork, shuttering and scaffolding. There is minimal effect of climatic or weather conditions in case of PEBs while in conventional construction, time spent due to bad weather or hazardous environments at the construction site increases the construction cost and project completion time.
- In the PEBs, fabrication unit can be located where skilled labour is readily available and costs of labour, power, materials, space and overheads are lower. However in conventional construction, construction cost depends upon location, zone, climatic condition & availability of material & man power.

3.4 METHODOLOGY

- **Plan Preparation** : Plan preparation is done for the G+7 building to estimate the quantities of conventional and precast constructions.

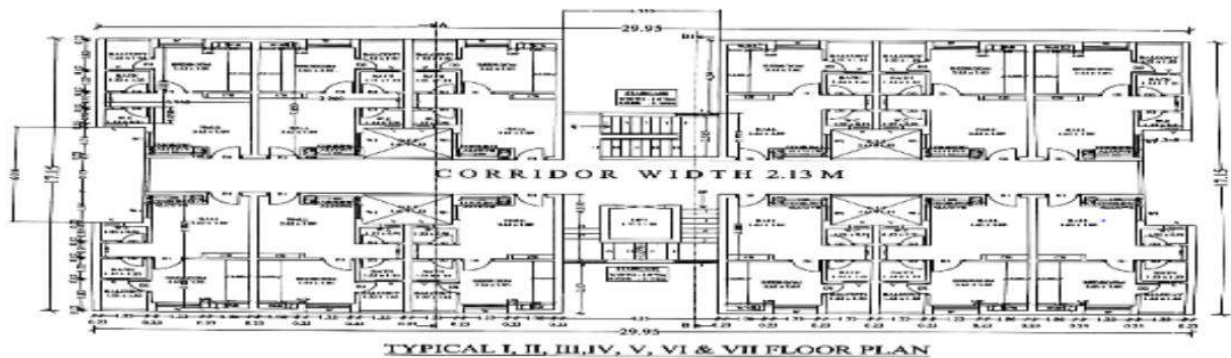


Fig 6 floor plan

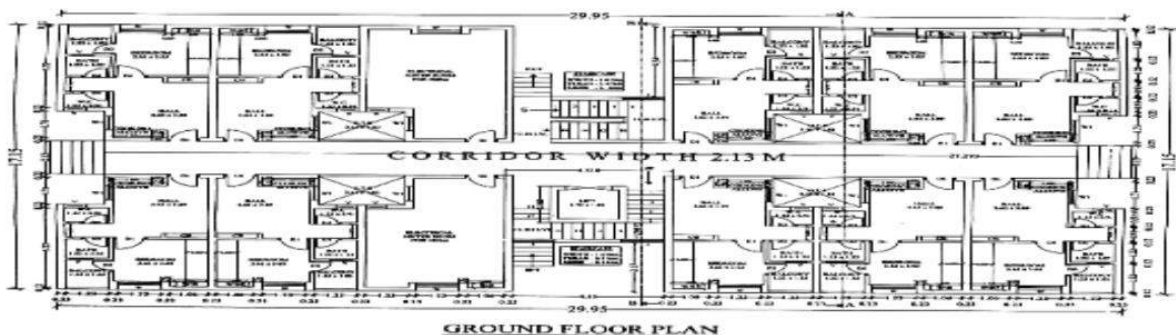


Fig 7 floor plan

- **Estimation of Quantities:** Estimation is used to find out the requirement of the materials for both the constructions. The details of the materials which are used in the construction from the companies were collected. By getting these details we can estimate the quantities of the materials.
- **Project Duration:** Project duration of the each construction was collected from the site offices and compares the time of completion period by using Critical Path method gives the project duration of precast and conventional construction of the building.
- **Cost Analysis:** This is the main factor which is considered in the project is to find out the comparison of cost analysis of building for the prefab construction and conventional construction. In this analysis we want to consider the resources of labor, material and machineries.
- **Data Collection:** In the data collection we can also know the procedures of the construction work and also find out the difficulties of the work. This collection is helpful to find out cost of the project for the both constructions. We also find the project duration of the construction by using these enquiries
- **Estimated Cost of the Conventional and Prefabricated Structures:** The cost of the traditional development was computed through the information gathered from ordinary development site, which help to discover the cost of the aggregate task .The sub structure cost is relatively equivalent in the two strategies, the superstructure cost is more in regular than in pre-assembled structure. Completions is likewise somewhat higher in customary. Add up to cost of the working for ordinary development is 5cr and for prefab is 4.7cr.

ESTIMATED COST OF THE CONVENTIONAL AND PREFABRICATED STRUCTURES:

Table 1 Conventional Building

S.NO	DESCRIPTION	COST
1	Sub Structure - (Site cleaning, Earthwork, Foundation, Basement, Soil filling& Consolidation)	1.75cr
2	Super Structure – (Wall panels framing and Roofing slabs.)	2.25cr
3	Finishing Works – (Electrical, Plumbing Painting, Tiling, and Windows, Extra items)	1 r
	Total cost	5 r

Table 2 Prefabricated Building

S.NO	DESCRIPTION	COST
1	Sub Structure - (Site cleaning, Earthwork, Foundation, Basement, Soil filling& Consolidation)	1.64cr
2	Super Structure – (Wall panels framing and Roofing slabs.)	2.11cr
3	Finishing Works – (Electrical, Plumbing Painting, Tiling, and Windows, Extra items)	0.94cr
	Total cost	4.7cr

RESULTS AND DISCUSSION:

In this Study, I have compared the cost and time taken for convention as well as prefabricated construction show them through graphical representation and network diagram.

Comparison Graphs of Cost and Time for Conventional and Prefabricated Structures

Cost for substructure is lesser in prefabricated structures. The cost for superstructure is almost equal in both cases. Finishes shows a difference of about 6 lakhs lesser in prefabricated. The time for the sub structure is almost equal in both prefab and conventional construction. The superstructure in the conventional methods takes 241 days more than prefabricated structure, which helps to reduce the total duration in prefabrication by large extent. Finishes in conventional takes 114 more days than prefabricated structure.

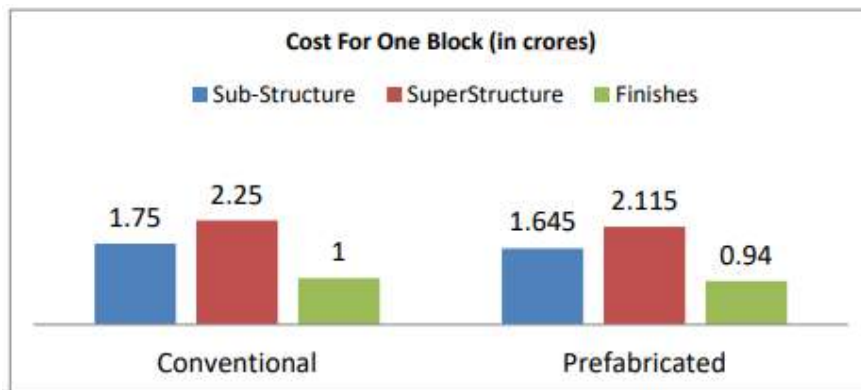


Fig 8 Comparison graph for cost

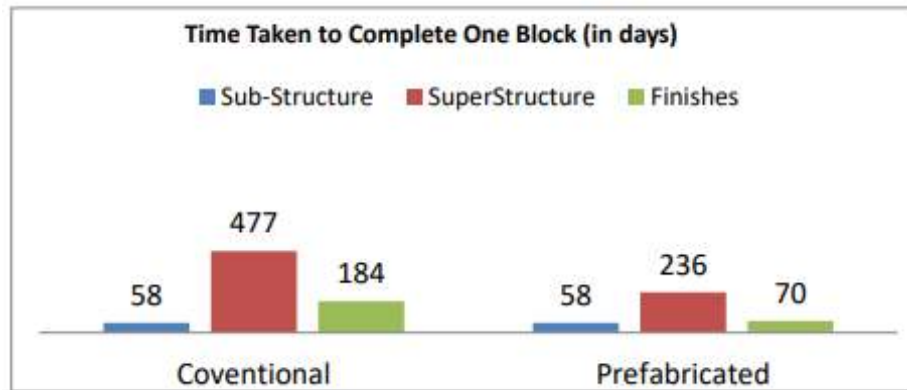


Fig 9 Comparison graph for time

Comparison Graphs of Total Cost and Time for Conventional and Prefabricated Structures

The total project cost were calculated for both the constructions and shown in the graph. It represents the cost of the prefabrication construction is lower than the conventional construction by a small fraction. The difference in cost of the project difference is around 6% between the prefabrication and conventional construction. This means that the prefabricated structure proved to be economical.

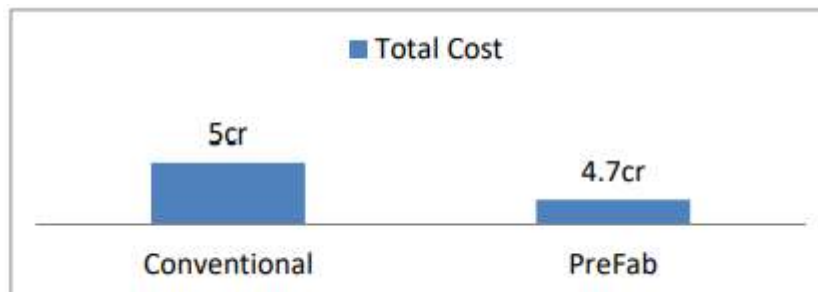


Fig 10 Total cost comparison graph

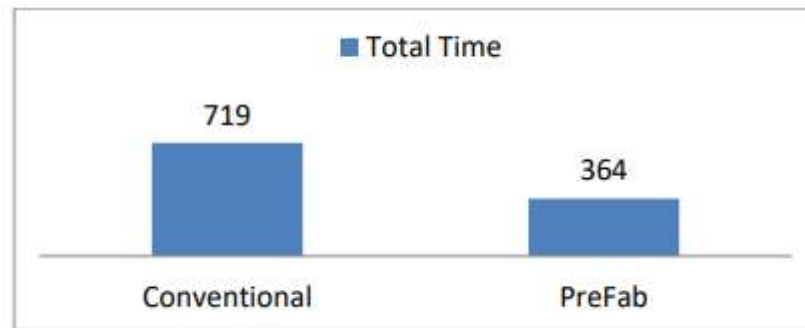


Fig 11 Total time comparison graph

The total project duration were calculated for both construction and shown in the graph. It represents the duration of the prefabrication construction is lower than the conventional construction. The time duration of the project difference is 355 days between the prefabrication and conventional construction. This contains very low time duration compared to the conventional method for the structure

- **Pert Analysis:** The program evaluation and review technique, commonly abbreviated PERT, is a statistical tool, used in project management, which was designed to analyze and represent the tasks involved in completing a given project.
- **Network Diagrams:** Network diagram helps to represent the activities in a sequential form and shows a distribution in time. Theoretical path method (CPM), or critical path analysis (CPA), is an algorithm for scheduling a set of project activities. It is commonly used in conjunction with the program evaluation and review technique

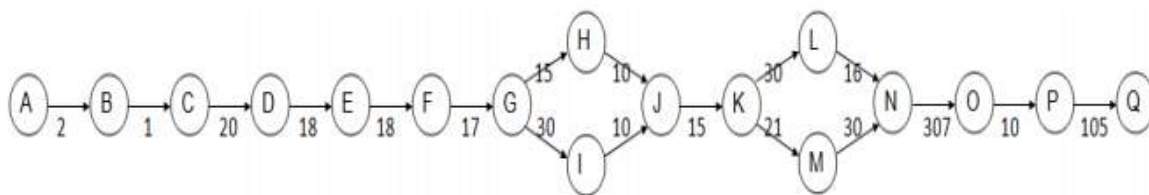


Fig 12 Network Diagram for Prefabricated Building CRITICAL PATH –ABCDEFGHIKMOPQ (553)

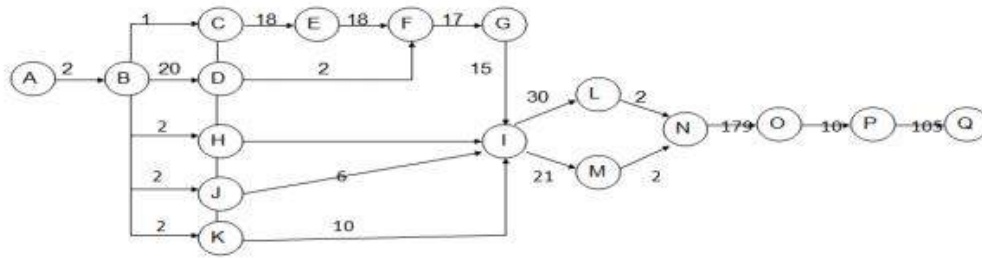


Fig 13 Network Diagram for Prefabricated Building CRITICAL PATH –ABCEFGILNOPQ (397)

From these figures we can determine the various sequence and order in which the construction activities occurred and also the duration of each activities. The various sequence and paths are taken and the duration of each path possible is found to determine the critical path for both the network diagrams

CONCLUSIONS

The fundamental objectives of the work have been accomplished. The aggregate cost and length have been resolved for both prefab and ordinary development .And additionally we had thought about the focal points and detriments of both construction and traditional development by the overview directed. The examination shows there isn't a colossal cost contrast between the techniques (6%), prefab being more temperate in tall structures when contrasted with regular. In the meantime the prefab development diminishes the undertaking length, lessened by 335 days when contrasted with the ordinary. Because of overview we had realized that the prefab development have more points of interest and obtainment in industrialized, substantial frameworks. Materials that have turned out to be profoundly particular, with specialist vacillations in cost and accessibility, can be accumulated at construction shops or processing plants. Moreover, the institutionalization of building segments makes it workable for development to occur where the crude material is minimum costly.

To decide if construction is a decent choice you have to consider.

- Proper cost analysis and planning can help to achieve at an economical estimate for prefab construction. Educating student's trainers and even labourers more about prefabrication in depth will help provide more trained and educated work force for prefabrication.
- It can also change the conventional mindset of people and accept to try modern construction methods. Use of standardized elements from companies that have variety of options to choose from can help make structure unique.
- One time investment in good quality lifting machines and proper maintenance can help in further savings.

CHAPTER 4 : LIVE CASE STUDY

4.1 ISHA YOGA CENTRE COIMBATORE

4.1.1 INTRODUCTION:



Fig 14 Contruction of Isha yoga centre



Fig 16 Isha yoga centre



Fig 15

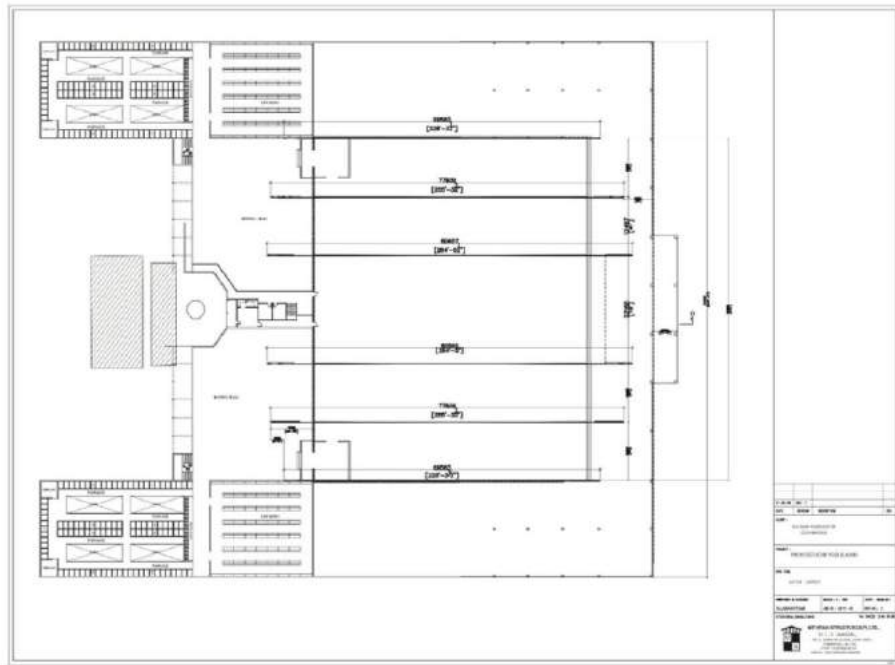


Fig 17 Plan



Fig 20



Fig 19



Fig 18

4.1.2 ANALYSIS:

Design type : Two hinged arch

Time taken for construction : 83 days

Cost : 4.7 cr

Number of cranes used : 2 nos (special cranes has been used)

- Two hinged arch with maximum span of 80m un-supported and the roof purlin with the span of 24m.
 - The arch is anchored on the natural stone which acts as a foundation and pedestal.
 - Maximum height achieved is 15m.
 - Purlin 1 height 10 m clear height.
 - Purlin 2 height 12 m clear height.
 - Purlin 3 height 15 m which is in center.
- Each purlin height is 1.8 m with 150 mm box section as structural member.
- Galvalume sheet (metal sheet) is used for roofing.

4.1.3 PRE FABRICATION

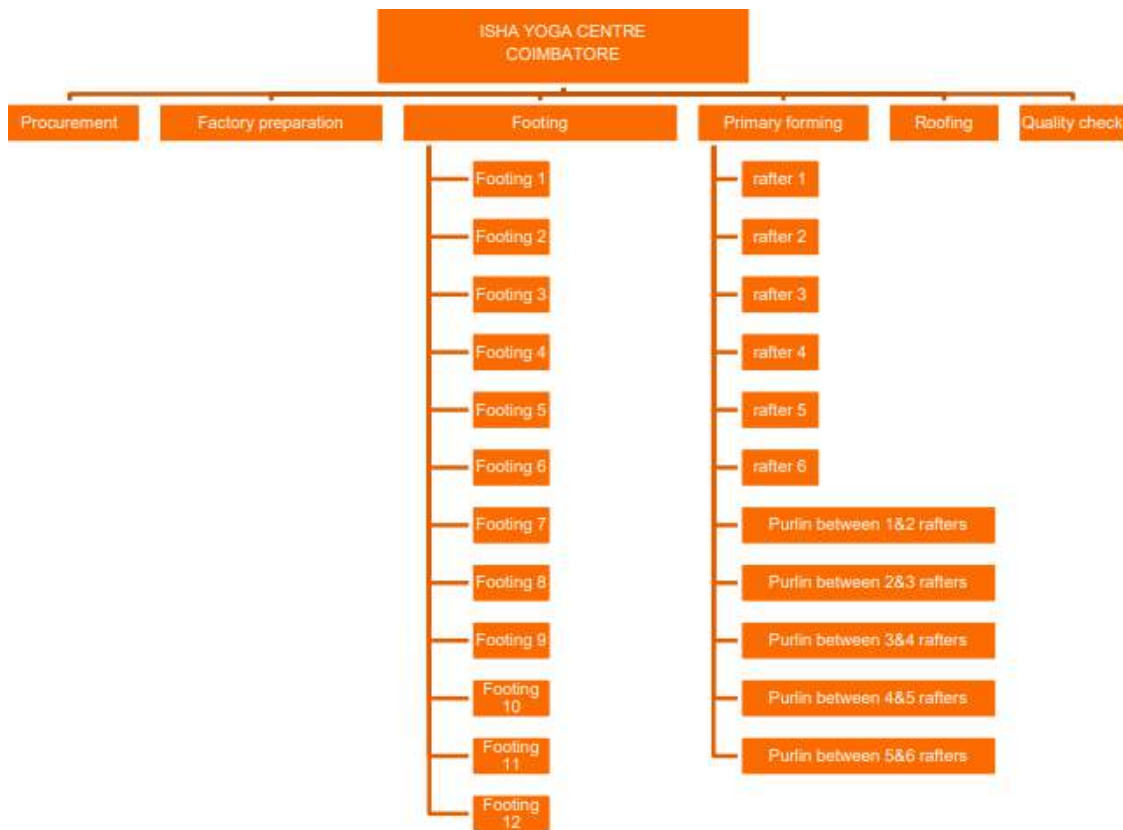


Fig 24 Pre Fab method

Table 3 Prefabrication

ISHA YOGA CENTRE COIMBATORE		Classic Schedule Layout				01-May-21 23:13	
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float
YOGA CENTRE ISHA YOGA CENTRE COIMBATORE		83	83	0%	20-Jun-11	12-Sep-11	0
YOGA CENTRE.PROCURE Procurement		7	7	0%	20-Jun-11	26-Jun-11	0
PROC001	Procurement list preparation	2	2	0%	20-Jun-11	21-Jun-11	0
PROC002	Ordering materials and waiting period	4	4	0%	22-Jun-11	25-Jun-11	0
PROC003	Storing	1	1	0%	26-Jun-11	26-Jun-11	0
YOGA CENTRE.FACTORY Factory preparation		26	26	0%	27-Jun-11	23-Jul-11	0
FAC0001	Surface clearing	2	2	0%	27-Jun-11	28-Jun-11	0
FAC0002	Cutting and machining	3	3	0%	29-Jun-11	01-Jul-11	0
FAC0003	Punching and drilling	3	3	0%	02-Jul-11	05-Jul-11	0
FAC0004	Straghtening, bending and rolling	4	4	0%	06-Jul-11	09-Jul-11	0
FAC0005	Lifting and placing the member and temporarily holding in place	2	2	0%	10-Jul-11	11-Jul-11	0
FAC0006	Temporarily bracing the system to ensure stability during erection	1	1	0%	12-Jul-11	12-Jul-11	0
FAC0007	Aligning and permanently connecting the members by bolting or welding	2	2	0%	13-Jul-11	14-Jul-11	0
FAC0008	Application of a final coat of painting and fire proof coating	4	4	0%	15-Jul-11	18-Jul-11	0
FAC0009	Quality check	2	2	0%	19-Jul-11	20-Jul-11	0
FAC0010	Surface treatment	2	2	0%	21-Jul-11	22-Jul-11	0
FAC0011	Transportation (Max length 20000mm)	1	1	0%	23-Jul-11	23-Jul-11	0
YOGA CENTRE.FOOTING Preparation for footing		15	15	0%	24-Jul-11	07-Aug-11	0
FOT0001	Cleaning the site	1	1	0%	24-Jul-11	24-Jul-11	0
FOT0003	Cross checking strength	1	1	0%	07-Aug-11	07-Aug-11	0
FOT0002	Center line marking for all the footing	1	1	0%	25-Jul-11	25-Jul-11	0
YOGA CENTRE.FOOTING.F1 Footing 1		1	1	0%	26-Jul-11	26-Jul-11	0
F10001	Marking for anchoring bolts and plate	1	1	0%	26-Jul-11	26-Jul-11	0
F10002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	26-Jul-11	26-Jul-11	0
F10003	Placing base plate of size 3500mm x 800mm	1	1	0%	26-Jul-11	26-Jul-11	0
F10004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	26-Jul-11	26-Jul-11	0
F10005	Curing for key lock set	1	1	0%	26-Jul-11	26-Jul-11	0
F10006	Cross checking strength	1	1	0%	26-Jul-11	26-Jul-11	0
F10007	Fixing the bolts	1	1	0%	26-Jul-11	26-Jul-11	0
YOGA CENTRE.FOOTING.F2 Footing 2		1	1	0%	27-Jul-11	27-Jul-11	0
F20001	Marking for anchoring bolts and plate	1	1	0%	27-Jul-11	27-Jul-11	0
F20002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	27-Jul-11	27-Jul-11	0
F20003	Placing base plate of size 3500mm x 800mm	1	1	0%	27-Jul-11	27-Jul-11	0
F20004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	27-Jul-11	27-Jul-11	0
F20005	Curing for key lock set	1	1	0%	27-Jul-11	27-Jul-11	0
F20006	Cross checking strength	1	1	0%	27-Jul-11	27-Jul-11	0
F20007	Fixing the bolts	1	1	0%	27-Jul-11	27-Jul-11	0
YOGA CENTRE.FOOTING.F3 Footing 3		1	1	0%	28-Jul-11	28-Jul-11	0
F30001	Marking for anchoring bolts and plate	1	1	0%	28-Jul-11	28-Jul-11	0
Page 1 of 10		TASK filter: All Activities			© Oracle Corporation		

Table 4 Prefabrication

ISHA YOGA CENTRE COIMBATORE		Classic Schedule Layout				01-May-21 23:13		
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float	
F30002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	28-Jul-11	28-Jul-11	0	
F30003	Placing base plate of size 3500mm x 800mm	1	1	0%	28-Jul-11	28-Jul-11	0	
F30004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	28-Jul-11	28-Jul-11	0	
F30005	Curing for key lock set	1	1	0%	28-Jul-11	28-Jul-11	0	
F30006	Cross checking strength	1	1	0%	28-Jul-11	28-Jul-11	0	
F30007	Fixing the bolts	1	1	0%	28-Jul-11	28-Jul-11	0	
YOGA CENTRE FOOTING.F4 Footing 4		1	1	0%	29-Jul-11	29-Jul-11	0	
F40001	Making for anchoring bolts and plate	1	1	0%	29-Jul-11	29-Jul-11	0	
F40002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	29-Jul-11	29-Jul-11	0	
F40003	Placing base plate of size 3500mm x 800mm	1	1	0%	29-Jul-11	29-Jul-11	0	
F40004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	29-Jul-11	29-Jul-11	0	
F40005	Curing for key lock set	1	1	0%	29-Jul-11	29-Jul-11	0	
F40006	Cross checking strength	1	1	0%	29-Jul-11	29-Jul-11	0	
F40007	Fixing the bolts	1	1	0%	29-Jul-11	29-Jul-11	0	
YOGA CENTRE FOOTING.F5 Footing 5		1	1	0%	30-Jul-11	30-Jul-11	0	
F50001	Making for anchoring bolts and plate	1	1	0%	30-Jul-11	30-Jul-11	0	
F50002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	30-Jul-11	30-Jul-11	0	
F50003	Placing base plate of size 3500mm x 800mm	1	1	0%	30-Jul-11	30-Jul-11	0	
F50004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	30-Jul-11	30-Jul-11	0	
F50005	Curing for key lock set	1	1	0%	30-Jul-11	30-Jul-11	0	
F50006	Cross checking strength	1	1	0%	30-Jul-11	30-Jul-11	0	
F50007	Fixing the bolts	1	1	0%	30-Jul-11	30-Jul-11	0	
YOGA CENTRE FOOTING.F6 Footing 6		1	1	0%	31-Jul-11	31-Jul-11	0	
F60001	Making for anchoring bolts and plate	1	1	0%	31-Jul-11	31-Jul-11	0	
F60002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	31-Jul-11	31-Jul-11	0	
F60003	Placing base plate of size 3500mm x 800mm	1	1	0%	31-Jul-11	31-Jul-11	0	
F60004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	31-Jul-11	31-Jul-11	0	
F60005	Curing for key lock set	1	1	0%	31-Jul-11	31-Jul-11	0	
F60006	Cross checking strength	1	1	0%	31-Jul-11	31-Jul-11	0	
F60007	Fixing the bolts	1	1	0%	31-Jul-11	31-Jul-11	0	
YOGA CENTRE FOOTING.F7 Footing 7		1	1	0%	01-Aug-11	01-Aug-11	0	
F70001	Making for anchoring bolts and plate	1	1	0%	01-Aug-11	01-Aug-11	0	
F70002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	01-Aug-11	01-Aug-11	0	
F70003	Placing base plate of size 3500mm x 800mm	1	1	0%	01-Aug-11	01-Aug-11	0	
F70004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	01-Aug-11	01-Aug-11	0	
F70005	Curing for key lock set	1	1	0%	01-Aug-11	01-Aug-11	0	
F70006	Cross checking strength	1	1	0%	01-Aug-11	01-Aug-11	0	
F70007	Fixing the bolts	1	1	0%	01-Aug-11	01-Aug-11	0	
YOGA CENTRE FOOTING.F8 Footing 8		1	1	0%	02-Aug-11	02-Aug-11	0	
F80001	Making for anchoring bolts and plate	1	1	0%	02-Aug-11	02-Aug-11	0	
Page 3 of 10		TASK filter: All Activities		© Oracle Corporation				

Table 5 Prefabrication

ISHA YOGA CENTRE COIMBATORE		Classic Schedule Layout			01-May-21 23:13		
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float
F80002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	02-Aug-11	02-Aug-11	0
F80003	Placing base plate of size 3500mm x 800mm	1	1	0%	02-Aug-11	02-Aug-11	0
F80004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	02-Aug-11	02-Aug-11	0
F80005	Curing for key lock set	1	1	0%	02-Aug-11	02-Aug-11	0
F80006	Cross checking strength	1	1	0%	02-Aug-11	02-Aug-11	0
F80007	Fixing the bolts	1	1	0%	02-Aug-11	02-Aug-11	0
YOGA CENTRE.FOOTING.F9 Footing 9		1	1	0%	03-Aug-11	03-Aug-11	0
F90001	Marking for anchoring bolts and plate	1	1	0%	03-Aug-11	03-Aug-11	0
F90002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	03-Aug-11	03-Aug-11	0
F90003	Placing base plate of size 3500mm x 800mm	1	1	0%	03-Aug-11	03-Aug-11	0
F90004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	03-Aug-11	03-Aug-11	0
F90005	Curing for key lock set	1	1	0%	03-Aug-11	03-Aug-11	0
F90006	Cross checking strength	1	1	0%	03-Aug-11	03-Aug-11	0
F90007	Fixing the bolts	1	1	0%	03-Aug-11	03-Aug-11	0
YOGA CENTRE.FOOTING.F10 Footing 10		1	1	0%	04-Aug-11	04-Aug-11	0
FX0001	Marking for anchoring bolts and plate	1	1	0%	04-Aug-11	04-Aug-11	0
FX0002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	04-Aug-11	04-Aug-11	0
FX0003	Placing base plate of size 3500mm x 800mm	1	1	0%	04-Aug-11	04-Aug-11	0
FX0004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	04-Aug-11	04-Aug-11	0
FX0005	Curing for key lock set	1	1	0%	04-Aug-11	04-Aug-11	0
FX0006	Cross checking strength	1	1	0%	04-Aug-11	04-Aug-11	0
FX0007	Fixing the bolts	1	1	0%	04-Aug-11	04-Aug-11	0
YOGA CENTRE.FOOTING.F11 Footing 11		1	1	0%	05-Aug-11	05-Aug-11	0
FX0001	Marking for anchoring bolts and plate	1	1	0%	05-Aug-11	05-Aug-11	0
FX0002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	05-Aug-11	05-Aug-11	0
FX0003	Placing base plate of size 3500mm x 800mm	1	1	0%	05-Aug-11	05-Aug-11	0
FX0004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	05-Aug-11	05-Aug-11	0
FX0005	Curing for key lock set	1	1	0%	05-Aug-11	05-Aug-11	0
FX0006	Cross checking strength	1	1	0%	05-Aug-11	05-Aug-11	0
FX0007	Fixing the bolts	1	1	0%	05-Aug-11	05-Aug-11	0
YOGA CENTRE.FOOTING.F12 Footing 12		1	1	0%	06-Aug-11	06-Aug-11	0
FX0001	Marking for anchoring bolts and plate	1	1	0%	06-Aug-11	06-Aug-11	0
FX0002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	06-Aug-11	06-Aug-11	0
FX0003	Placing base plate of size 3500mm x 800mm	1	1	0%	06-Aug-11	06-Aug-11	0
FX0004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	06-Aug-11	06-Aug-11	0
FX0005	Curing for key lock set	1	1	0%	06-Aug-11	06-Aug-11	0
FX0006	Cross checking strength	1	1	0%	06-Aug-11	06-Aug-11	0
FX0007	Fixing the bolts	1	1	0%	06-Aug-11	06-Aug-11	0
YOGA CENTRE.PRIMARY Primary forming		18	18	0%	08-Aug-11	25-Aug-11	0
YOGA CENTRE.PRIMARY/RAFTER Erection rafters		12	12	0%	08-Aug-11	19-Aug-11	0
		Page 5 of 10			TASK filter: All Activities		© Oracle Corporation

Table 6 Prefabrication

ISHA YOGA CENTRE COIMBATORE		Classic Schedule Layout			01-May-21 23:13		
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float
	YOGA CENTRE.PRIMARY.RAFTER.RF2 Erecting rafter 2	2	2	0%	10-Aug-11	11-Aug-11	0
RF20001	Joining 3 different portion of rafters at site	1	1	0%	10-Aug-11	10-Aug-11	0
RF20002	Placing rafters at position using cranes	1	1	0%	10-Aug-11	10-Aug-11	0
RF20003	Fixing both the ends of rafters on footing	1	1	0%	11-Aug-11	11-Aug-11	0
RF20004	Allignment check	1	1	0%	11-Aug-11	11-Aug-11	0
RF20005	Cross checking strength	1	1	0%	11-Aug-11	11-Aug-11	0
	YOGA CENTRE.PRIMARY.RAFTER.RF1 Erecting rafter 1	2	2	0%	08-Aug-11	09-Aug-11	0
RF10001	Joining 3 different portion of rafters at site	1	1	0%	08-Aug-11	08-Aug-11	0
RF10002	Placing rafters at position using cranes	1	1	0%	08-Aug-11	08-Aug-11	0
RF10003	Fixing both the ends of rafters on footing	1	1	0%	09-Aug-11	09-Aug-11	0
RF10004	Allignment check	1	1	0%	09-Aug-11	09-Aug-11	0
RF10005	Cross checking strength	1	1	0%	09-Aug-11	09-Aug-11	0
	YOGA CENTRE.PRIMARY.RAFTER.RF3 Erecting rafter 3	2	2	0%	12-Aug-11	13-Aug-11	0
RF30001	Joining 3 different portion of rafters at site	1	1	0%	12-Aug-11	12-Aug-11	0
RF30002	Placing rafters at position using cranes	1	1	0%	12-Aug-11	12-Aug-11	0
RF30003	Fixing both the ends of rafters on footing	1	1	0%	13-Aug-11	13-Aug-11	0
RF30004	Allignment check	1	1	0%	13-Aug-11	13-Aug-11	0
RF30005	Cross checking strength	1	1	0%	13-Aug-11	13-Aug-11	0
	YOGA CENTRE.PRIMARY.RAFTER.RF4 Erecting rafter 4	2	2	0%	14-Aug-11	15-Aug-11	0
RF40001	Joining 3 different portion of rafters at site	1	1	0%	14-Aug-11	14-Aug-11	0
RF40002	Placing rafters at position using cranes	1	1	0%	14-Aug-11	14-Aug-11	0
RF40003	Fixing both the ends of rafters on footing	1	1	0%	15-Aug-11	15-Aug-11	0
RF40004	Allignment check	1	1	0%	15-Aug-11	15-Aug-11	0
RF40005	Cross checking strength	1	1	0%	15-Aug-11	15-Aug-11	0
	YOGA CENTRE.PRIMARY.RAFTER.RF5 Erecting rafter 5	2	2	0%	16-Aug-11	17-Aug-11	0
RF50001	Joining 3 different portion of rafters at site	1	1	0%	16-Aug-11	16-Aug-11	0
RF50002	Placing rafters at position using cranes	1	1	0%	16-Aug-11	16-Aug-11	0
RF50003	Fixing both the ends of rafters on footing	1	1	0%	17-Aug-11	17-Aug-11	0
RF50004	Allignment check	1	1	0%	17-Aug-11	17-Aug-11	0
RF50005	Cross checking strength	1	1	0%	17-Aug-11	17-Aug-11	0
	YOGA CENTRE.PRIMARY.RAFTER.RF6 Erecting rafter 6	2	2	0%	18-Aug-11	19-Aug-11	0
RF60001	Joining 3 different portion of rafters at site	1	1	0%	18-Aug-11	18-Aug-11	0
RF60002	Placing rafters at position using cranes	1	1	0%	18-Aug-11	18-Aug-11	0
RF60003	Fixing both the ends of rafters on footing	1	1	0%	19-Aug-11	19-Aug-11	0
RF60004	Allignment check	1	1	0%	19-Aug-11	19-Aug-11	0
RF60005	Cross checking strength	1	1	0%	19-Aug-11	19-Aug-11	0
	YOGA CENTRE.PRIMARY.PURLIN Erecting Purlins	6	6	0%	20-Aug-11	25-Aug-11	0
	YOGA CENTRE.PRIMARY.PURLIN.PUR1 Purlin between 1&2 rafters	2	2	0%	20-Aug-11	21-Aug-11	0
PUR10001	Cross checking purlins on site after fixing rafters (40 nos)	1	1	0%	20-Aug-11	20-Aug-11	0
PUR10002	Fixing purlins (40nos) by welding the joints	2	2	0%	20-Aug-11	21-Aug-11	0
PUR10003	Cross checking strength	1	1	0%	20-Aug-11	20-Aug-11	0
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Table 7 Prefabrication

ISHA YOGA CENTRE COIMBATORE		Classic Schedule Layout				01-May-21 23:13		
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float	
YOGA CENTRE.PRIMARY.PURLIN.PUR2&3	Purlin between 2&3 rafters	2	2	0%	21-Aug-11	22-Aug-11	0	
PUR20001	Cross checking purlins on site after fixing rafters (40 nos)	1	1	0%	21-Aug-11	21-Aug-11	0	
PUR20002	Fixing purlins (40nos) by welding the joints	2	2	0%	21-Aug-11	22-Aug-11	0	
PUR20003	Cross checking strength	1	1	0%	21-Aug-11	21-Aug-11	0	
YOGA CENTRE.PRIMARY.PURLIN.PUR3&4	Purlin between 3&4 rafters	2	2	0%	22-Aug-11	23-Aug-11	0	
PUR30001	Cross checking purlins on site after fixing rafters (40 nos)	1	1	0%	22-Aug-11	22-Aug-11	0	
PUR30002	Fixing purlins (40nos) by welding the joints	2	2	0%	22-Aug-11	23-Aug-11	0	
PUR30003	Cross checking strength	1	1	0%	22-Aug-11	22-Aug-11	0	
YOGA CENTRE.PRIMARY.PURLIN.PUR4&5	Purlin between 4&5 rafters	2	2	0%	23-Aug-11	24-Aug-11	0	
PUR40001	Cross checking purlins on site after fixing rafters (40 nos)	1	1	0%	23-Aug-11	23-Aug-11	0	
PUR40002	Fixing purlins (40nos) by welding the joints	2	2	0%	23-Aug-11	24-Aug-11	0	
PUR40003	Cross checking strength	1	1	0%	23-Aug-11	23-Aug-11	0	
YOGA CENTRE.PRIMARY.PURLIN.PUR5&6	Purlin between 5&6 rafters	2	2	0%	24-Aug-11	25-Aug-11	0	
PUR50001	Cross checking purlins on site after fixing rafters (40 nos)	1	1	0%	24-Aug-11	24-Aug-11	0	
PUR50002	Fixing purlins (40nos) by welding the joints	2	2	0%	24-Aug-11	25-Aug-11	0	
PUR50003	Cross checking strength	1	1	0%	24-Aug-11	24-Aug-11	0	
YOGA CENTRE.ROOFING	Roofing and sheeting work	16	16	0%	25-Aug-11	10-Sep-11	0	
ROF0001	Checking completion before covering	2	2	0%	25-Aug-11	26-Aug-11	0	
ROF0002	Cross checking leakages	2	2	0%	09-Sep-11	10-Sep-11	0	
YOGA CENTRE.ROOFING.ROOF	Erect covering	12	12	0%	27-Aug-11	08-Sep-11	0	
COV0001	Placing roof sheets	12	12	0%	27-Aug-11	08-Sep-11	0	
COV0002	Joining them using screws	12	12	0%	27-Aug-11	08-Sep-11	0	
COV0003	Sealing the joints to avoid leakages (silicon)	12	12	0%	27-Aug-11	08-Sep-11	0	
YOGA CENTRE.CHECK	Quality check	2	2	0%	11-Sep-11	12-Sep-11	0	
QCK0001	Checking all the structural members and roof sheet	2	2	0%	11-Sep-11	12-Sep-11	0	

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TASK filter: All Activities

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Table 8 Prefabrication

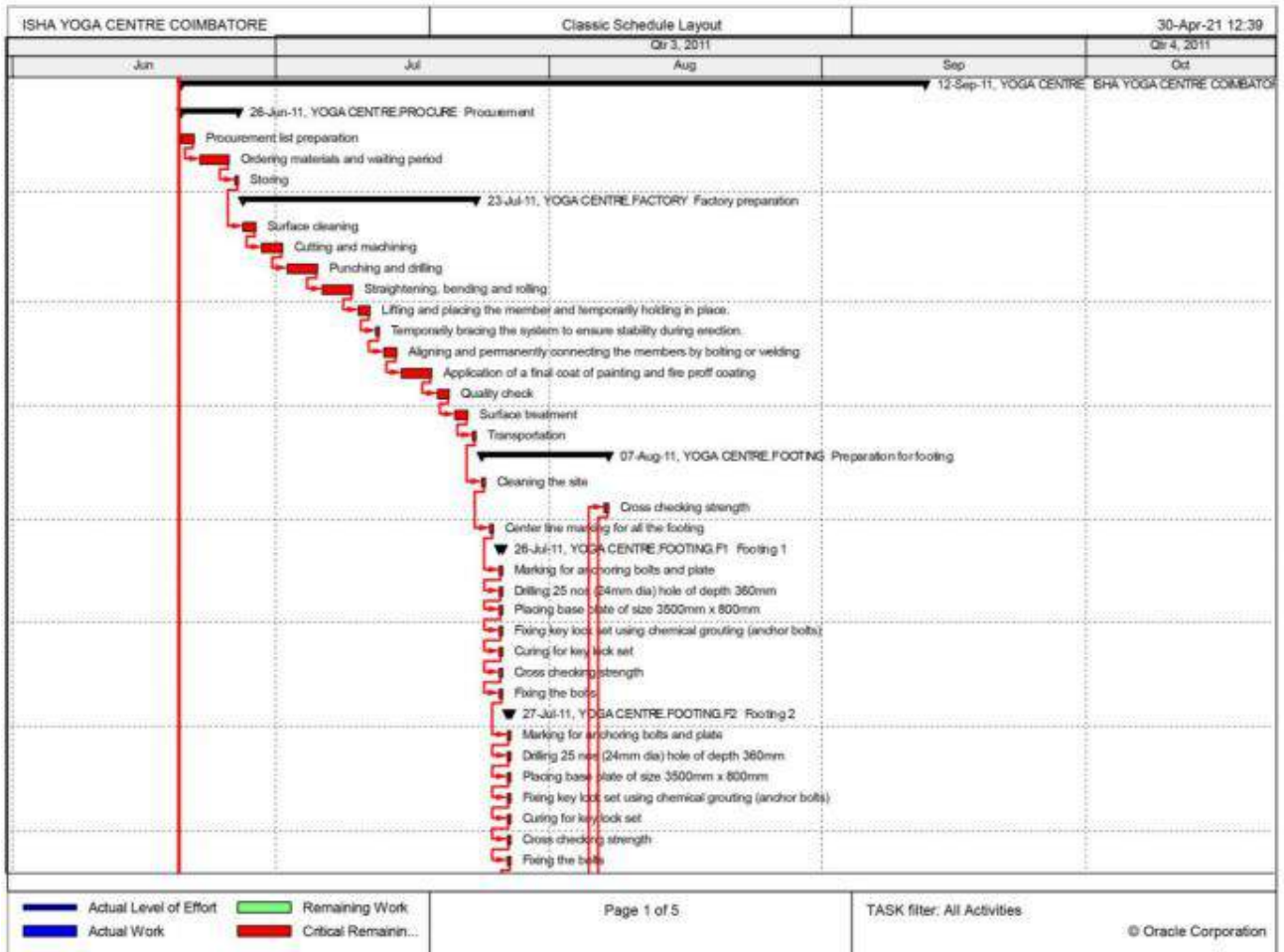


Table 9 Prefabrication

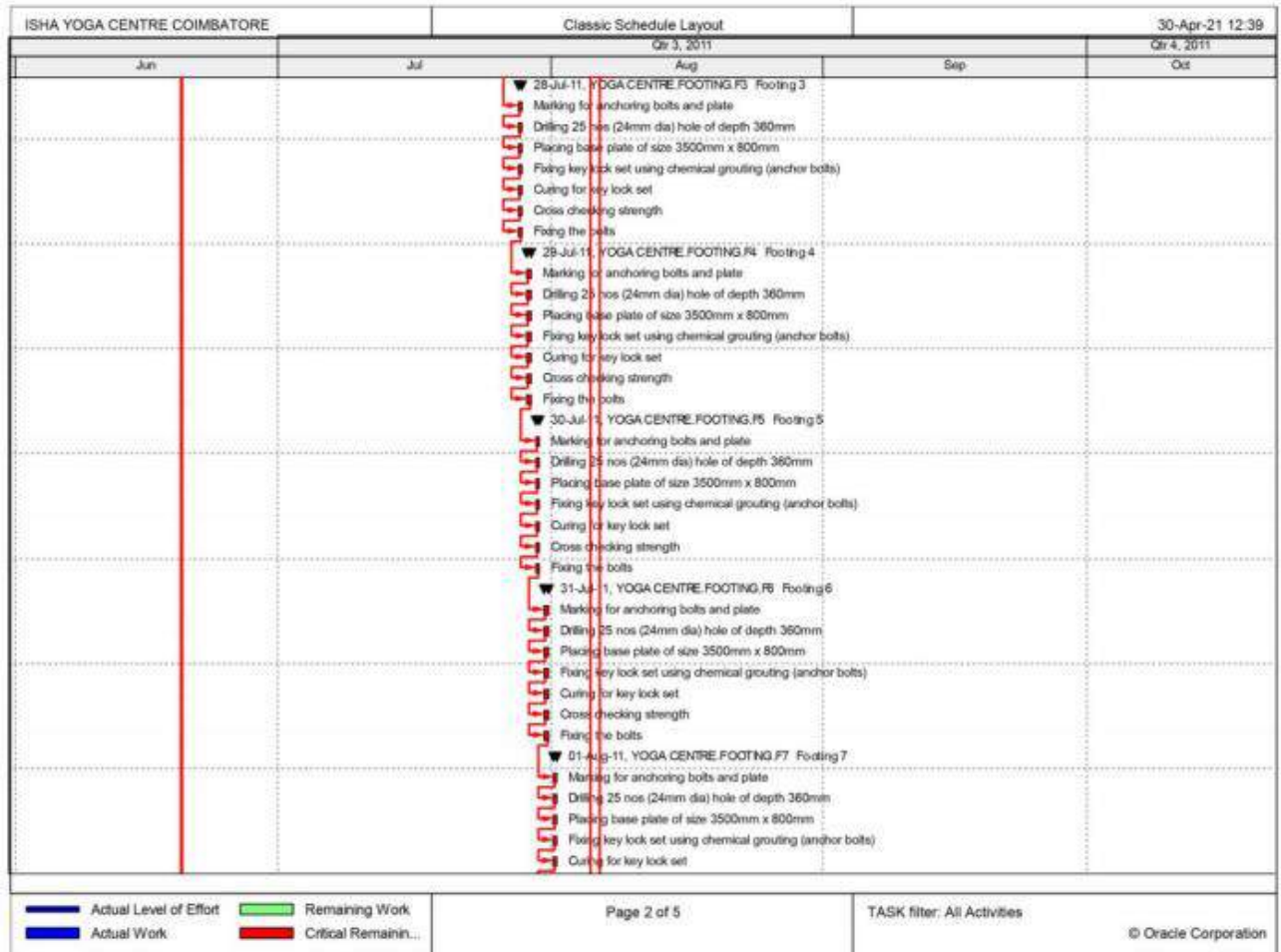


Table 10 Prefabrication

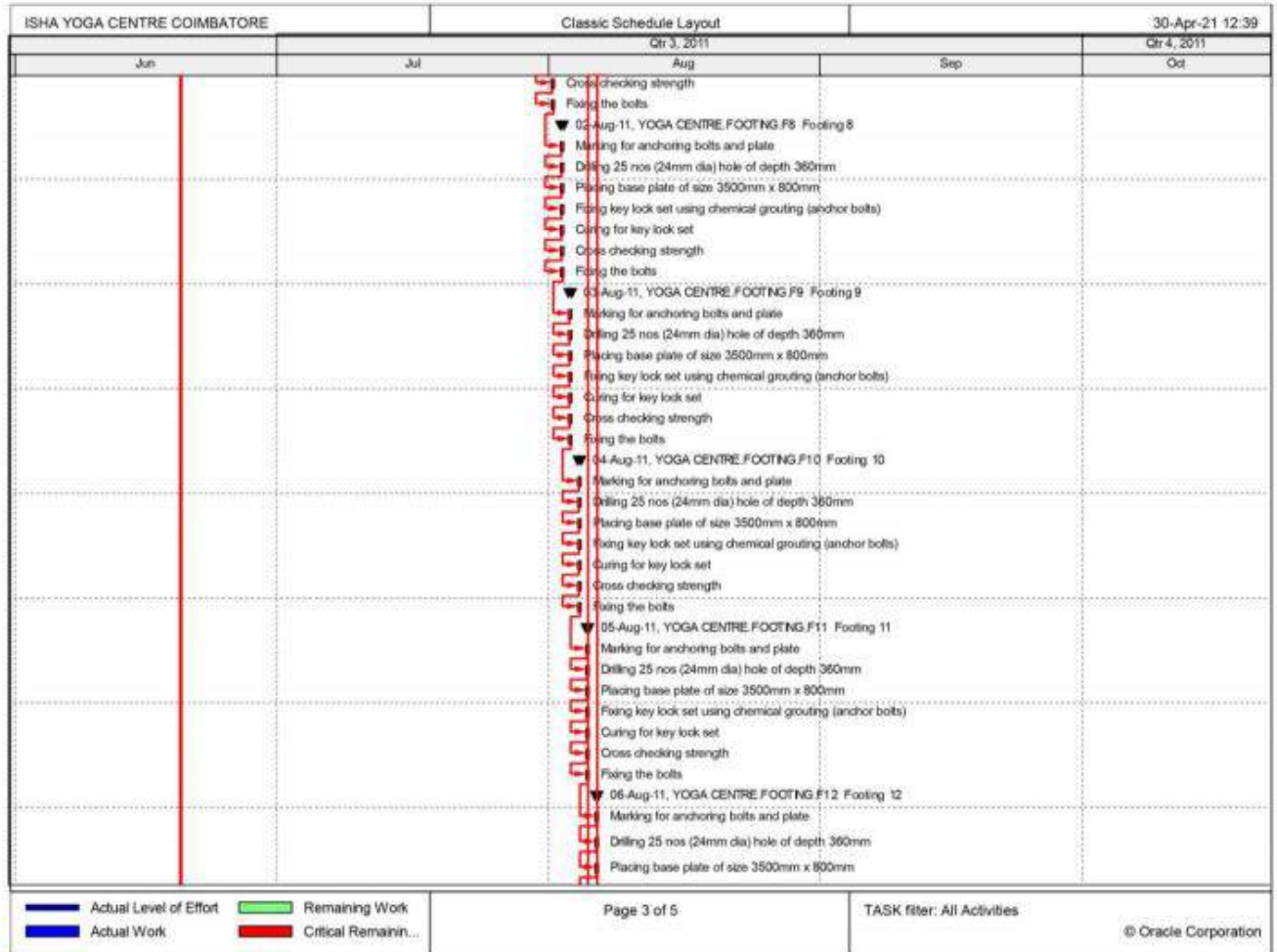


Table 11 Prefabrication

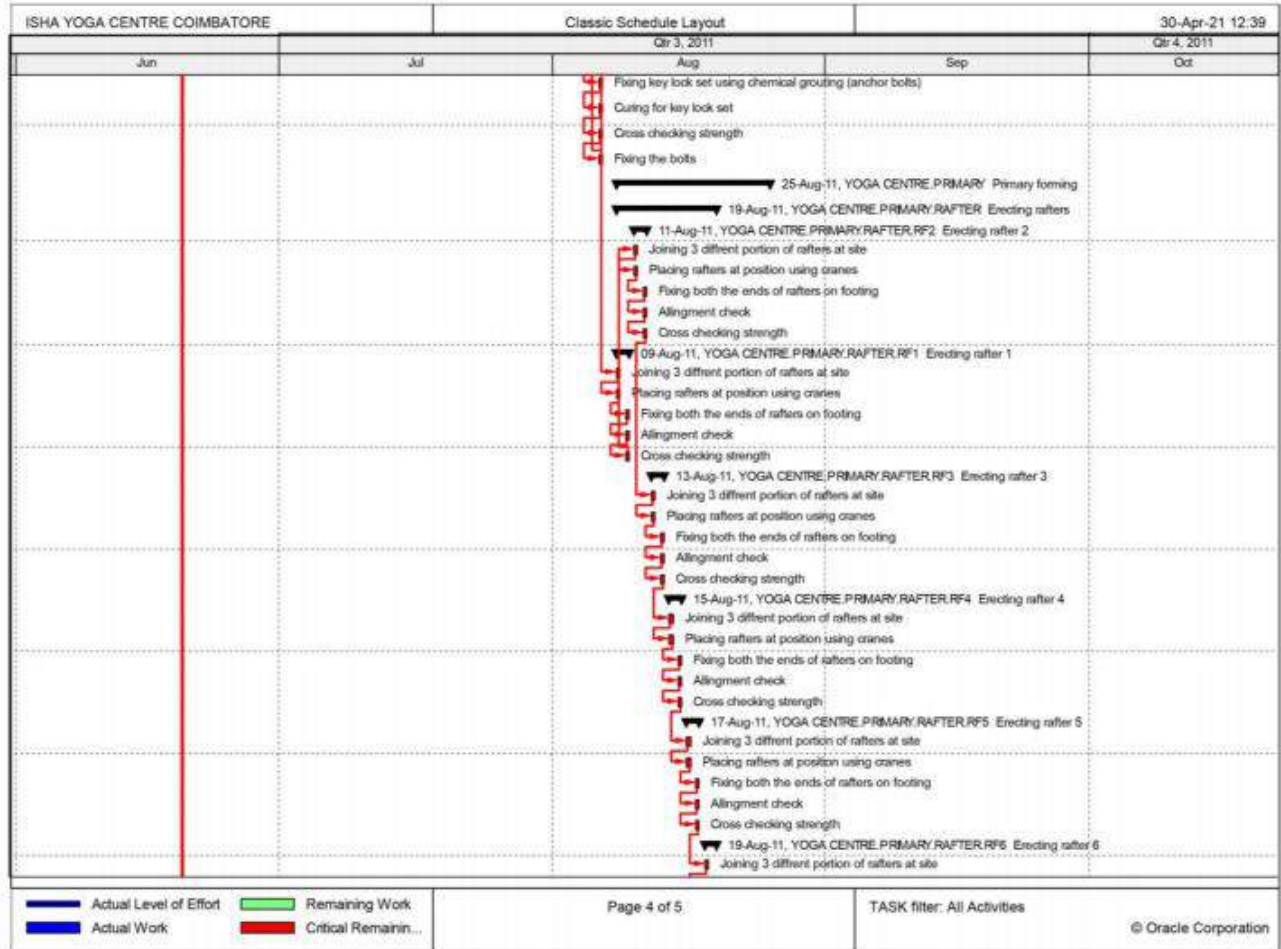
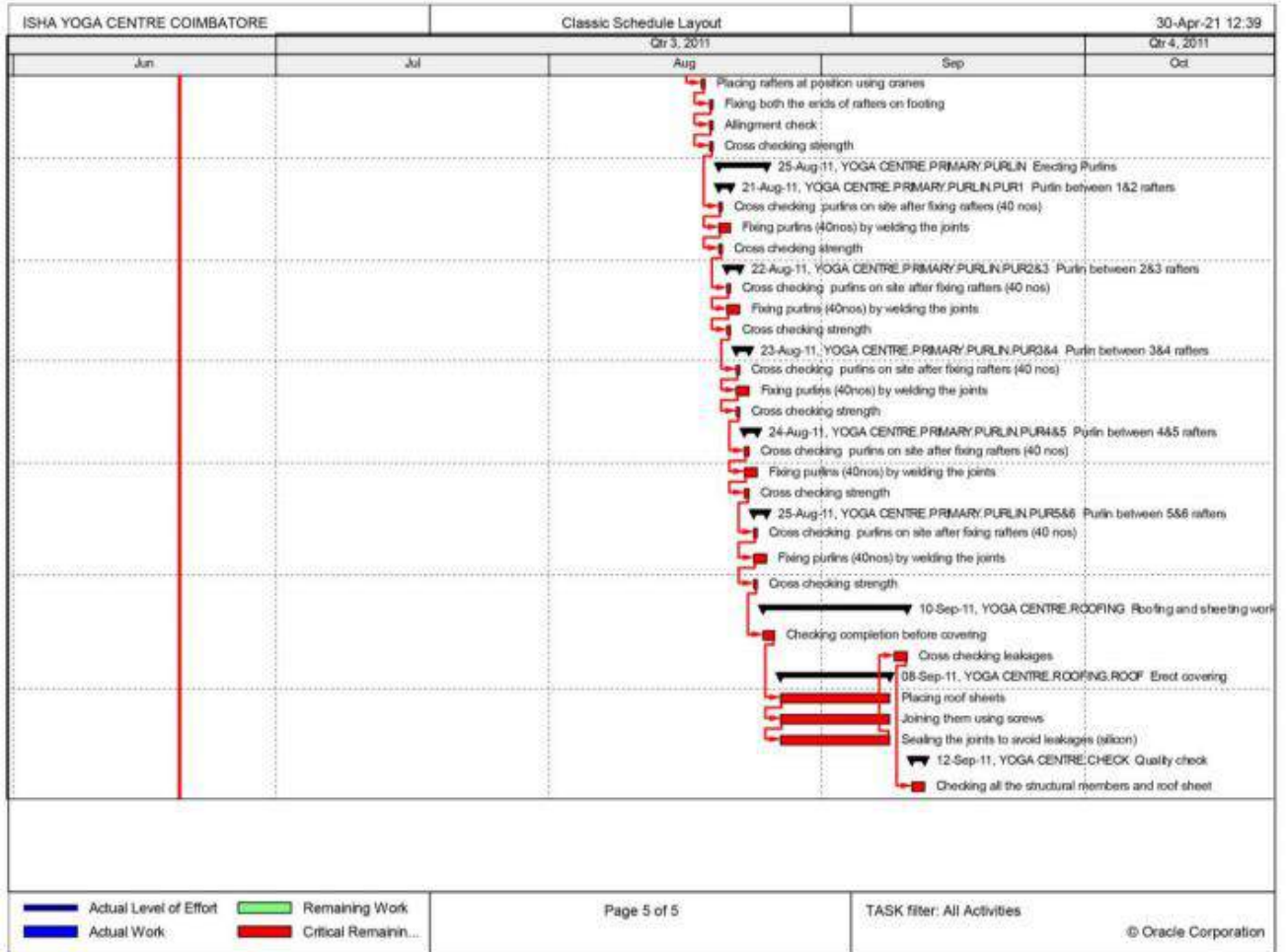


Table 12 Prefabrication



4.1.4 CONVENTIONAL METHOD

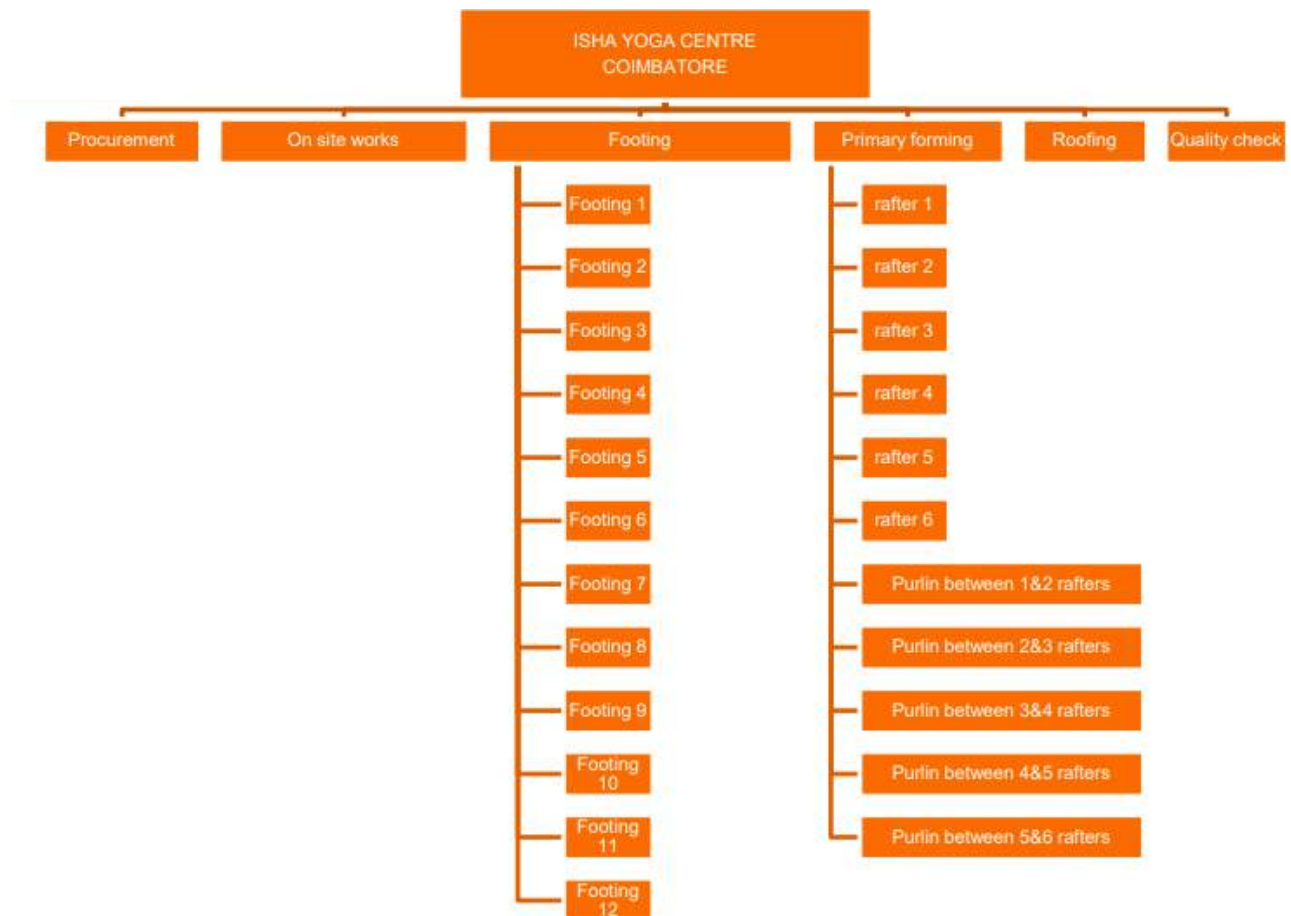


Fig 25 Conventional Method

Table 13 Conventional method

Isha yoga centre (conventional method)		Classic Schedule Layout			01-May-21 23:04		
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float
YOGA CENTRE (CON) Isha yoga centre (conventional method)		116	116	0%	20-Jun-11	15-Oct-11	0
YOGA CENTRE (CON).PROCURE Procurement		7	7	0%	20-Jun-11	26-Jun-11	0
PR00001	Procurement list preparation	2	2	0%	20-Jun-11	21-Jun-11	0
PR00002	Ordering materials and waiting period	4	4	0%	22-Jun-11	25-Jun-11	0
PR00003	Storing at site	1	1	0%	26-Jun-11	26-Jun-11	0
YOGA CENTRE (CON).ON SITE On site work for rafters and purlins		12	12	0%	27-Jun-11	09-Jul-11	0
FAC0001	Surface cleaning	2	2	0%	27-Jun-11	28-Jun-11	0
FAC0002	Cutting and machining	3	3	0%	29-Jun-11	01-Jul-11	0
FAC0003	Punching and drilling	2	2	0%	02-Jul-11	03-Jul-11	0
FAC0004	Straightening, bending and rolling	2	2	0%	05-Jul-11	06-Jul-11	0
FAC0005	Application of a 1st coat of painting	2	2	0%	07-Jul-11	08-Jul-11	0
FAC0006	Quality check	1	1	0%	09-Jul-11	09-Jul-11	0
YOGA CENTRE (CON).FOOTING Preparation for footing		13	13	0%	27-Jun-11	10-Jul-11	96
FOT0001	Clearing the site	1	1	0%	27-Jun-11	27-Jun-11	96
FOT0002	Center line marking for all the footing	1	1	0%	27-Jun-11	27-Jun-11	96
YOGA CENTRE (CON).FOOTING.F1 Footing 1		1	1	0%	28-Jun-11	28-Jun-11	96
F10001	Marking for anchoring bolts and plate	1	1	0%	28-Jun-11	28-Jun-11	96
F10002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	28-Jun-11	28-Jun-11	96
F10003	Placing base plate of size 3500mm x 800mm	1	1	0%	28-Jun-11	28-Jun-11	96
F10004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	28-Jun-11	28-Jun-11	96
F10005	Curing for key lock set	1	1	0%	28-Jun-11	28-Jun-11	96
F10006	Cross checking strength	1	1	0%	28-Jun-11	28-Jun-11	96
F10007	Fixing the bolts	1	1	0%	28-Jun-11	28-Jun-11	96
YOGA CENTRE (CON).FOOTING.F2 Footing 2		1	1	0%	29-Jun-11	29-Jun-11	96
F20001	Marking for anchoring bolts and plate	1	1	0%	29-Jun-11	29-Jun-11	96
F20002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	29-Jun-11	29-Jun-11	96
F20003	Placing base plate of size 3500mm x 800mm	1	1	0%	29-Jun-11	29-Jun-11	96
F20004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	29-Jun-11	29-Jun-11	96
F20005	Curing for key lock set	1	1	0%	29-Jun-11	29-Jun-11	96
F20006	Cross checking strength	1	1	0%	29-Jun-11	29-Jun-11	96
F20007	Fixing the bolts	1	1	0%	29-Jun-11	29-Jun-11	96
YOGA CENTRE (CON).FOOTING.F3 Footing 3		1	1	0%	30-Jun-11	30-Jun-11	96
F30001	Marking for anchoring bolts and plate	1	1	0%	30-Jun-11	30-Jun-11	96
F30002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	30-Jun-11	30-Jun-11	96
F30003	Placing base plate of size 3500mm x 800mm	1	1	0%	30-Jun-11	30-Jun-11	96
F30004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	30-Jun-11	30-Jun-11	96
F30005	Curing for key lock set	1	1	0%	30-Jun-11	30-Jun-11	96
F30006	Cross checking strength	1	1	0%	30-Jun-11	30-Jun-11	96
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Table 14 Conventional method

Isha yoga centre (conventional method)		Classic Schedule Layout				01-May-21 23:04		
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float	
F30007	Fixing the bolts	1	1	0%	30-Jun-11	30-Jun-11	96	
YOGA CENTRE (CON).FOOTING.F4 Footing 4		1	1	0%	01-Jul-11	01-Jul-11	96	
F40001	Marking for anchoring bolts and plate	1	1	0%	01-Jul-11	01-Jul-11	96	
F40002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	01-Jul-11	01-Jul-11	96	
F40003	Placing base plate of size 3500mm x 800mm	1	1	0%	01-Jul-11	01-Jul-11	96	
F40004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	01-Jul-11	01-Jul-11	96	
F40005	Curing for key lock set	1	1	0%	01-Jul-11	01-Jul-11	96	
F40006	Cross checking strength	1	1	0%	01-Jul-11	01-Jul-11	96	
F40007	Fixing the bolts	1	1	0%	01-Jul-11	01-Jul-11	96	
YOGA CENTRE (CON).FOOTING.F5 Footing 5		1	1	0%	02-Jul-11	02-Jul-11	96	
F50001	Marking for anchoring bolts and plate	1	1	0%	02-Jul-11	02-Jul-11	96	
F50002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	02-Jul-11	02-Jul-11	96	
F50003	Placing base plate of size 3500mm x 800mm	1	1	0%	02-Jul-11	02-Jul-11	96	
F50004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	02-Jul-11	02-Jul-11	96	
F50005	Curing for key lock set	1	1	0%	02-Jul-11	02-Jul-11	96	
F50006	Cross checking strength	1	1	0%	02-Jul-11	02-Jul-11	96	
F50007	Fixing the bolts	1	1	0%	02-Jul-11	02-Jul-11	96	
YOGA CENTRE (CON).FOOTING.F6 Footing 6		1	1	0%	03-Jul-11	03-Jul-11	96	
F60001	Marking for anchoring bolts and plate	1	1	0%	03-Jul-11	03-Jul-11	96	
F60002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	03-Jul-11	03-Jul-11	96	
F60003	Placing base plate of size 3500mm x 800mm	1	1	0%	03-Jul-11	03-Jul-11	96	
F60004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	03-Jul-11	03-Jul-11	96	
F60005	Curing for key lock set	1	1	0%	03-Jul-11	03-Jul-11	96	
F60006	Cross checking strength	1	1	0%	03-Jul-11	03-Jul-11	96	
F60007	Fixing the bolts	1	1	0%	03-Jul-11	03-Jul-11	96	
YOGA CENTRE (CON).FOOTING.F7 Footing 7		1	1	0%	05-Jul-11	05-Jul-11	96	
F70001	Marking for anchoring bolts and plate	1	1	0%	05-Jul-11	05-Jul-11	96	
F70002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	05-Jul-11	05-Jul-11	96	
F70003	Placing base plate of size 3500mm x 800mm	1	1	0%	05-Jul-11	05-Jul-11	96	
F70004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	05-Jul-11	05-Jul-11	96	
F70005	Curing for key lock set	1	1	0%	05-Jul-11	05-Jul-11	96	
F70006	Cross checking strength	1	1	0%	05-Jul-11	05-Jul-11	96	
F70007	Fixing the bolts	1	1	0%	05-Jul-11	05-Jul-11	96	
YOGA CENTRE (CON).FOOTING.F8 Footing 8		1	1	0%	06-Jul-11	06-Jul-11	96	
F80001	Marking for anchoring bolts and plate	1	1	0%	06-Jul-11	06-Jul-11	96	
F80002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	06-Jul-11	06-Jul-11	96	
F80003	Placing base plate of size 3500mm x 800mm	1	1	0%	06-Jul-11	06-Jul-11	96	
F80004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	06-Jul-11	06-Jul-11	96	
F80005	Curing for key lock set	1	1	0%	06-Jul-11	06-Jul-11	96	
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Table 15 Conventional method

Isha yoga centre (conventional method)		Classic Schedule Layout			01-May-21 23:04		
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float
F80006	Cross checking strength	1	1	0%	06-Jul-11	06-Jul-11	96
F80007	Fixing the bolts	1	1	0%	06-Jul-11	06-Jul-11	96
YOGA CENTRE (CON).FOOTING.F9 Footing 9		1	1	0%	07-Jul-11	07-Jul-11	96
F90001	Marking for anchoring bolts and plate	1	1	0%	07-Jul-11	07-Jul-11	96
F90002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	07-Jul-11	07-Jul-11	96
F90003	Placing base plate of size 3500mm x 800mm	1	1	0%	07-Jul-11	07-Jul-11	96
F90004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	07-Jul-11	07-Jul-11	96
F90005	Curing for key lock set	1	1	0%	07-Jul-11	07-Jul-11	96
F90006	Cross checking strength	1	1	0%	07-Jul-11	07-Jul-11	96
F90007	Fixing the bolts	1	1	0%	07-Jul-11	07-Jul-11	96
YOGA CENTRE (CON).FOOTING.F10 Footing 10		1	1	0%	08-Jul-11	08-Jul-11	96
FX0001	Marking for anchoring bolts and plate	1	1	0%	08-Jul-11	08-Jul-11	96
FX0002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	08-Jul-11	08-Jul-11	96
FX0003	Placing base plate of size 3500mm x 800mm	1	1	0%	08-Jul-11	08-Jul-11	96
FX0004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	08-Jul-11	08-Jul-11	96
FX0005	Curing for key lock set	1	1	0%	08-Jul-11	08-Jul-11	96
FX0006	Cross checking strength	1	1	0%	08-Jul-11	08-Jul-11	96
FX0007	Fixing the bolts	1	1	0%	08-Jul-11	08-Jul-11	96
YOGA CENTRE (CON).FOOTING.F11 Footing 11		1	1	0%	09-Jul-11	09-Jul-11	96
FX0001	Marking for anchoring bolts and plate	1	1	0%	09-Jul-11	09-Jul-11	96
FX0002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	09-Jul-11	09-Jul-11	96
FX0003	Placing base plate of size 3500mm x 800mm	1	1	0%	09-Jul-11	09-Jul-11	96
FX0004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	09-Jul-11	09-Jul-11	96
FX0005	Curing for key lock set	1	1	0%	09-Jul-11	09-Jul-11	96
FX0006	Cross checking strength	1	1	0%	09-Jul-11	09-Jul-11	96
FX0007	Fixing the bolts	1	1	0%	09-Jul-11	09-Jul-11	96
YOGA CENTRE (CON).FOOTING.F12 Footing 12		1	1	0%	10-Jul-11	10-Jul-11	96
FX0001	Marking for anchoring bolts and plate	1	1	0%	10-Jul-11	10-Jul-11	96
FX0002	Drilling 25 nos (24mm dia) hole of depth 360mm	1	1	0%	10-Jul-11	10-Jul-11	96
FX0003	Placing base plate of size 3500mm x 800mm	1	1	0%	10-Jul-11	10-Jul-11	96
FX0004	Fixing key lock set using chemical grouting (anchor bolts)	1	1	0%	10-Jul-11	10-Jul-11	96
FX0005	Curing for key lock set	1	1	0%	10-Jul-11	10-Jul-11	96
FX0006	Cross checking strength	1	1	0%	10-Jul-11	10-Jul-11	96
FX0007	Fixing the bolts	1	1	0%	10-Jul-11	10-Jul-11	96
YOGA CENTRE (CON).PRIMARY Primary forming		80	80	0%	10-Jul-11	28-Sep-11	0
PF0001	Scaffolding	2	2	0%	10-Jul-11	11-Jul-11	0
YOGA CENTRE (CON).PRIMARY.RAFTER Erecting rafters		72	72	0%	12-Jul-11	22-Sep-11	0
YOGA CENTRE (CON).PRIMARY.RAFTER.RF2 Erecting rafter 1		12	12	0%	12-Jul-11	23-Jul-11	0
RF20001	Lifting and placing the member and temporarily holding in place using cranes	1	1	0%	12-Jul-11	12-Jul-11	0
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Table 16 Conventional method

Isha yoga centre (conventional method)		Classic Schedule Layout			01-May-21 23:04		
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float
RF20002	Temporarily bracing the system to ensure stability	1	1	0%	13-Jul-11	13-Jul-11	0
RF20003	Aligning and temporarily connecting the members by bolting or welding	1	1	0%	14-Jul-11	14-Jul-11	0
RF20004	Alignment check	1	1	0%	14-Jul-11	14-Jul-11	0
RF20005	Fixing both the ends of rafters on footing	1	1	0%	15-Jul-11	15-Jul-11	0
RF20006	Permanently connecting the frames and supporting members by bolting or welding	2	2	0%	16-Jul-11	17-Jul-11	0
RF20007	Final alignment & strength check	1	1	0%	18-Jul-11	18-Jul-11	0
RF20008	Application of a final coat of painting and fire proof coating	4	4	0%	19-Jul-11	22-Jul-11	0
RF20009	Quality check	1	1	0%	23-Jul-11	23-Jul-11	0
YOGA CENTRE (CON) PRIMARY RAFTER RF1 Erecting rafter 2		12	12	0%	24-Jul-11	04-Aug-11	0
RF10001	Lifting and placing the member and temporarily holding in place using cranes	1	1	0%	24-Jul-11	24-Jul-11	0
RF10002	Temporarily bracing the system to ensure stability	1	1	0%	25-Jul-11	25-Jul-11	0
RF10003	Aligning and temporarily connecting the members by bolting or welding	1	1	0%	26-Jul-11	26-Jul-11	0
RF10004	Alignment check	1	1	0%	26-Jul-11	26-Jul-11	0
RF10005	Fixing both the ends of rafters on footing	1	1	0%	27-Jul-11	27-Jul-11	0
RF10006	Permanently connecting the frames and supporting members by bolting or welding	2	2	0%	28-Jul-11	29-Jul-11	0
RF10007	Final alignment & strength check	1	1	0%	30-Jul-11	30-Jul-11	0
RF10008	Application of a final coat of painting and fire proof coating	4	4	0%	31-Jul-11	03-Aug-11	0
RF10009	Quality check	1	1	0%	04-Aug-11	04-Aug-11	0
YOGA CENTRE (CON) PRIMARY RAFTER RF3 Erecting rafter 3		12	12	0%	05-Aug-11	16-Aug-11	0
RF30001	Lifting and placing the member and temporarily holding in place using cranes	1	1	0%	05-Aug-11	05-Aug-11	0
RF30002	Temporarily bracing the system to ensure stability	1	1	0%	06-Aug-11	06-Aug-11	0
RF30003	Aligning and temporarily connecting the members by bolting or welding	1	1	0%	07-Aug-11	07-Aug-11	0
RF30004	Alignment check	1	1	0%	07-Aug-11	07-Aug-11	0
RF30005	Fixing both the ends of rafters on footing	1	1	0%	08-Aug-11	08-Aug-11	0
RF30006	Permanently connecting the frames and supporting members by bolting or welding	2	2	0%	09-Aug-11	10-Aug-11	0
RF30007	Final alignment & strength check	1	1	0%	11-Aug-11	11-Aug-11	0
RF30008	Application of a final coat of painting and fire proof coating	4	4	0%	12-Aug-11	15-Aug-11	0
RF30009	Quality check	1	1	0%	16-Aug-11	16-Aug-11	0
YOGA CENTRE (CON) PRIMARY RAFTER RF4 Erecting rafter 4		12	12	0%	17-Aug-11	28-Aug-11	0
RF40001	Lifting and placing the member and temporarily holding in place using cranes	1	1	0%	17-Aug-11	17-Aug-11	0
RF40002	Temporarily bracing the system to ensure stability	1	1	0%	18-Aug-11	18-Aug-11	0
RF40003	Aligning and temporarily connecting the members by bolting or welding	1	1	0%	19-Aug-11	19-Aug-11	0
RF40004	Alignment check	1	1	0%	19-Aug-11	19-Aug-11	0
RF40005	Fixing both the ends of rafters on footing	1	1	0%	20-Aug-11	20-Aug-11	0
RF40006	Permanently connecting the frames and supporting members by bolting or welding	2	2	0%	21-Aug-11	22-Aug-11	0
RF40007	Final alignment & strength check	1	1	0%	23-Aug-11	23-Aug-11	0
RF40008	Application of a final coat of painting and fire proof coating	4	4	0%	24-Aug-11	27-Aug-11	0
RF40009	Quality check	1	1	0%	28-Aug-11	28-Aug-11	0
YOGA CENTRE (CON) PRIMARY RAFTER RF5 Erecting rafter 5		12	12	0%	29-Aug-11	10-Sep-11	0
RF50001	Lifting and placing the member and temporarily holding in place using cranes	1	1	0%	29-Aug-11	29-Aug-11	0
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Table 17 Conventional method

Isha yoga centre (conventional method)		Classic Schedule Layout				01-May-21 23:04		
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float	
	 RF50002 Temporarily bracing the system to ensure stability	1	1	0%	30-Aug-11	30-Aug-11	0	
	 RF50003 Aligning and temporarily connecting the members by bolting or welding	1	1	0%	31-Aug-11	31-Aug-11	0	
	 RF50004 Alignment check	1	1	0%	31-Aug-11	31-Aug-11	0	
	 RF50005 Fixing both the ends of rafters on footing	1	1	0%	01-Sep-11	01-Sep-11	0	
	 RF50006 Permanently connecting the frames and supporting members by bolting or welding	2	2	0%	02-Sep-11	03-Sep-11	0	
	 RF50007 Final alignment & strength check	1	1	0%	04-Sep-11	04-Sep-11	0	
	 RF50008 Application of a final coat of painting and fire proof coating	4	4	0%	06-Sep-11	09-Sep-11	0	
	 RF50009 Quality check	1	1	0%	10-Sep-11	10-Sep-11	0	
	 YOGA CENTRE (CON).PRIMARY.RAFTER.RF6 Erecting rafter 6	12	12	0%	11-Sep-11	22-Sep-11	0	
	 RF60001 Lifting and placing the member and temporarily holding in place using cranes	1	1	0%	11-Sep-11	11-Sep-11	0	
	 RF60002 Temporarily bracing the system to ensure stability	1	1	0%	12-Sep-11	12-Sep-11	0	
	 RF60003 Aligning and temporarily connecting the members by bolting or welding	1	1	0%	13-Sep-11	13-Sep-11	0	
	 RF60004 Alignment check	1	1	0%	13-Sep-11	13-Sep-11	0	
	 RF60005 Fixing both the ends of rafters on footing	1	1	0%	14-Sep-11	14-Sep-11	0	
	 RF60006 Permanently connecting the frames and supporting members by bolting or welding	2	2	0%	15-Sep-11	16-Sep-11	0	
	 RF60007 Final alignment & strength check	1	1	0%	17-Sep-11	17-Sep-11	0	
	 RF60008 Application of a final coat of painting and fire proof coating	4	4	0%	18-Sep-11	21-Sep-11	0	
	 RF60009 Quality check	1	1	0%	22-Sep-11	22-Sep-11	0	
	 YOGA CENTRE (CON).PRIMARY.PURLIN Erecting Purlins	6	6	0%	23-Sep-11	28-Sep-11	0	
	 YOGA CENTRE (CON).PRIMARY.PURLIN.PUR1 Purlin between 1&2 rafters	2	2	0%	23-Sep-11	24-Sep-11	0	
	 PUR10001 Cross checking purlins on site after fixing rafters (40 nos)	1	1	0%	23-Sep-11	23-Sep-11	0	
	 PUR10002 Fixing purlins (40nos) by welding the joints	2	2	0%	23-Sep-11	24-Sep-11	0	
	 PUR10003 Cross checking strength	1	1	0%	23-Sep-11	23-Sep-11	0	
	 YOGA CENTRE (CON).PRIMARY.PURLIN.PUR2&3 Purlin between 2&3 rafters	2	2	0%	24-Sep-11	25-Sep-11	0	
	 PUR20001 Cross checking purlins on site after fixing rafters (40 nos)	1	1	0%	24-Sep-11	24-Sep-11	0	
	 PUR20002 Fixing purlins (40nos) by welding the joints	2	2	0%	24-Sep-11	25-Sep-11	0	
	 PUR20003 Cross checking strength	1	1	0%	24-Sep-11	24-Sep-11	0	
	 YOGA CENTRE (CON).PRIMARY.PURLIN.PUR3&4 Purlin between 3&4 rafters	2	2	0%	25-Sep-11	26-Sep-11	0	
	 PUR30001 Cross checking purlins on site after fixing rafters (40 nos)	1	1	0%	25-Sep-11	25-Sep-11	0	
	 PUR30002 Fixing purlins (40nos) by welding the joints	2	2	0%	25-Sep-11	26-Sep-11	0	
	 PUR30003 Cross checking strength	1	1	0%	25-Sep-11	25-Sep-11	0	
	 YOGA CENTRE (CON).PRIMARY.PURLIN.PUR4&5 Purlin between 4&5 rafters	2	2	0%	26-Sep-11	27-Sep-11	0	
	 PUR40001 Cross checking purlins on site after fixing rafters (40 nos)	1	1	0%	26-Sep-11	26-Sep-11	0	
	 PUR40002 Fixing purlins (40nos) by welding the joints	2	2	0%	26-Sep-11	27-Sep-11	0	
	 PUR40003 Cross checking strength	1	1	0%	26-Sep-11	26-Sep-11	0	
	 YOGA CENTRE (CON).PRIMARY.PURLIN.PUR5&6 Purlin between 5&6 rafters	2	2	0%	27-Sep-11	28-Sep-11	0	
	 PUR50001 Cross checking purlins on site after fixing rafters (40 nos)	1	1	0%	27-Sep-11	27-Sep-11	0	
	 PUR50002 Fixing purlins (40nos) by welding the joints	2	2	0%	27-Sep-11	28-Sep-11	0	
	 PUR50003 Cross checking strength	1	1	0%	27-Sep-11	27-Sep-11	0	
	 YOGA CENTRE (CON).ROOFING Roofing and sheeting work	16	16	0%	28-Sep-11	13-Oct-11	0	
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Table 18 Conventional method

Isha yoga centre (conventional method)		Classic Schedule Layout			01-May-21 23:04		
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float
ROF0001	Checking completion before covering	2	2	0%	28-Sep-11	29-Sep-11	0
ROF0002	Cross checking leakages	2	2	0%	12-Oct-11	13-Oct-11	0
YOGA CENTRE (CON).ROOFING.ROOF	Erect covering	12	12	0%	30-Sep-11	11-Oct-11	0
COV0001	Placing roof sheets	12	12	0%	30-Sep-11	11-Oct-11	0
COV0002	Joining them using screws	12	12	0%	30-Sep-11	11-Oct-11	0
COV0003	Sealing the joints to avoid leakages (silicon)	12	12	0%	30-Sep-11	11-Oct-11	0
YOGA CENTRE (CON).CHECK	Quality check	2	2	0%	14-Oct-11	15-Oct-11	0
QCK0001	Checking all the structural members and roof sheet	2	2	0%	14-Oct-11	15-Oct-11	0

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Table 19 Conventional method

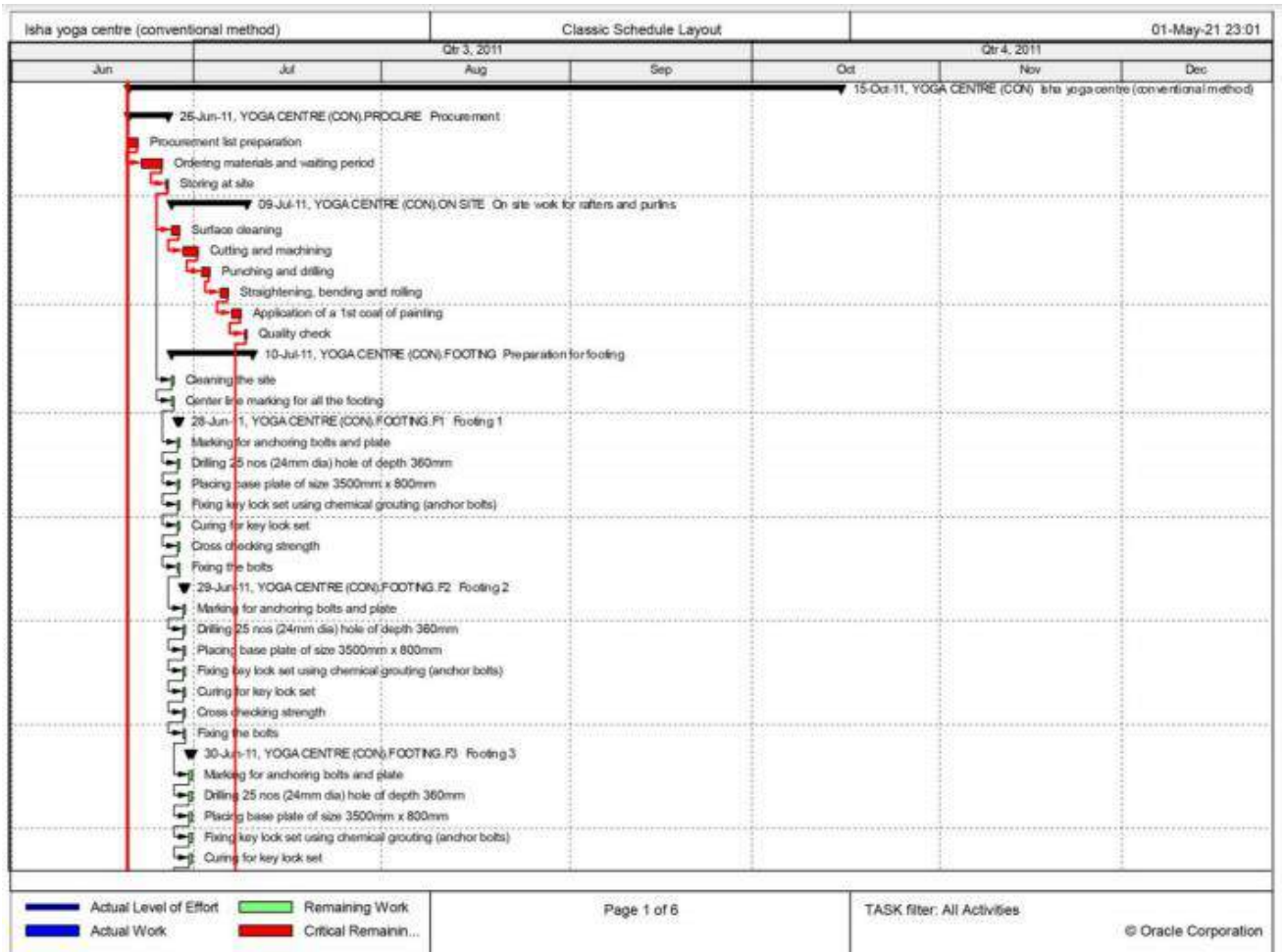


Table 20 Conventional method



Table 21 Conventional method



Table 22 Conventional method

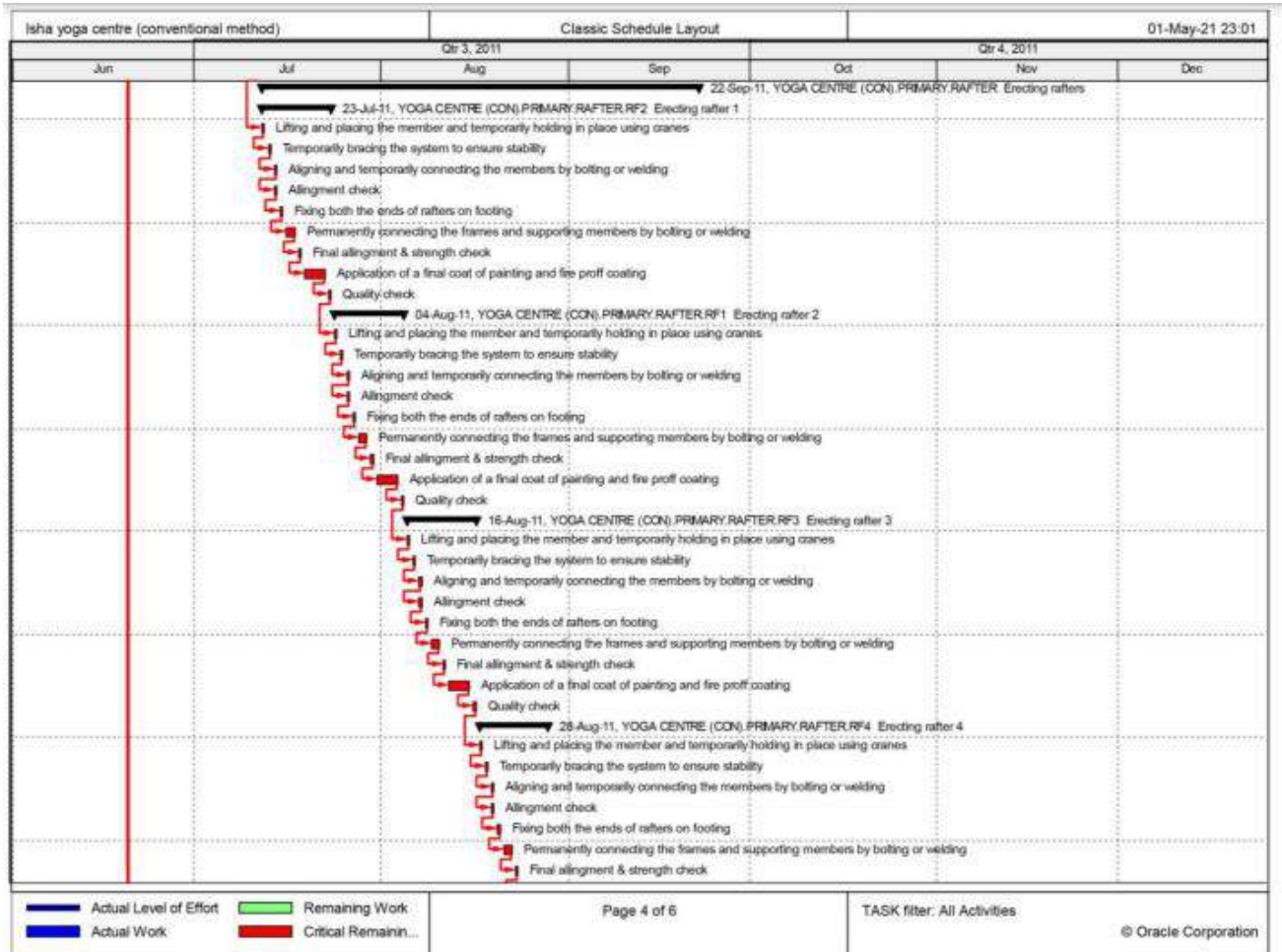


Table 23 Conventional method

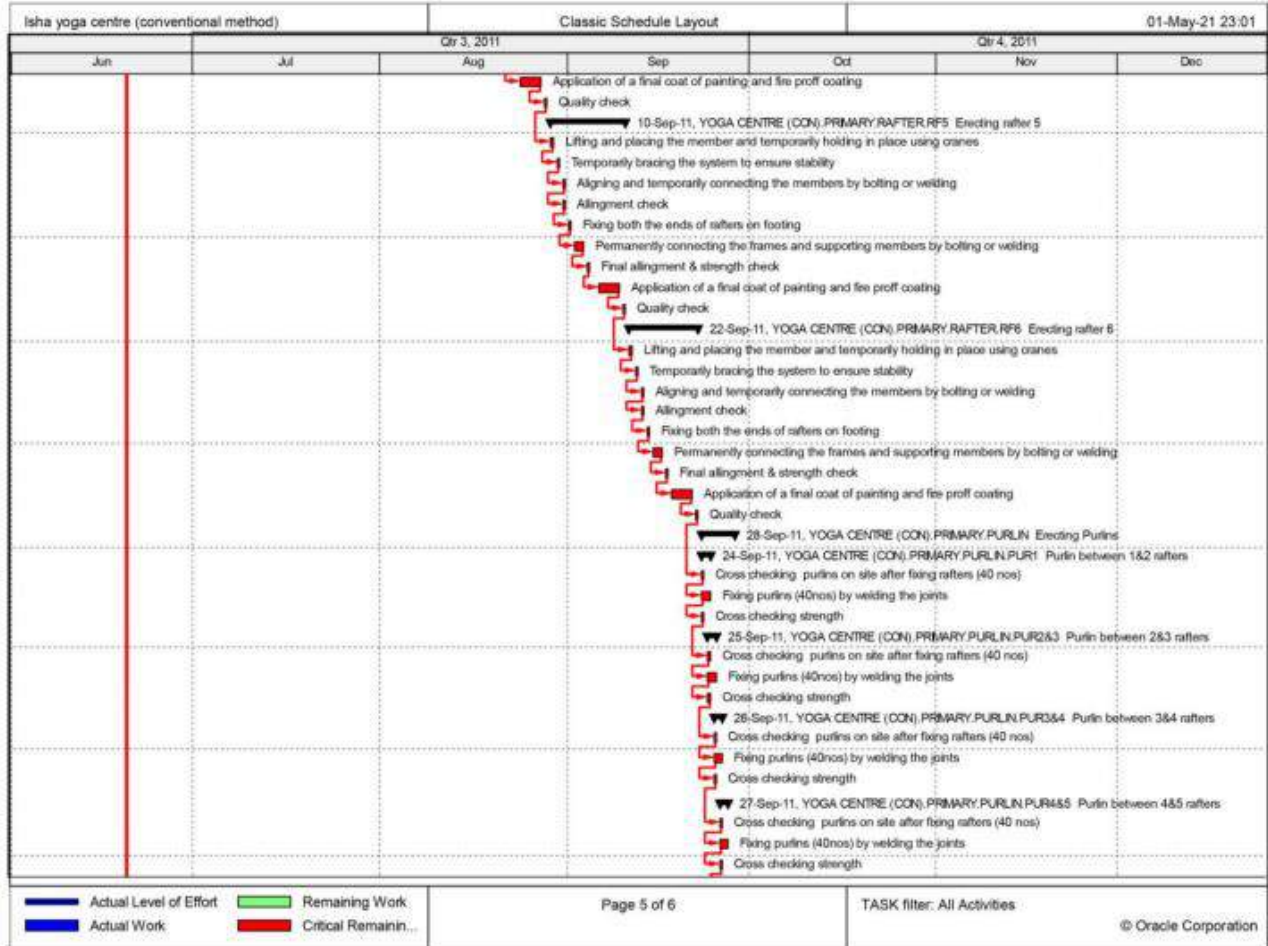
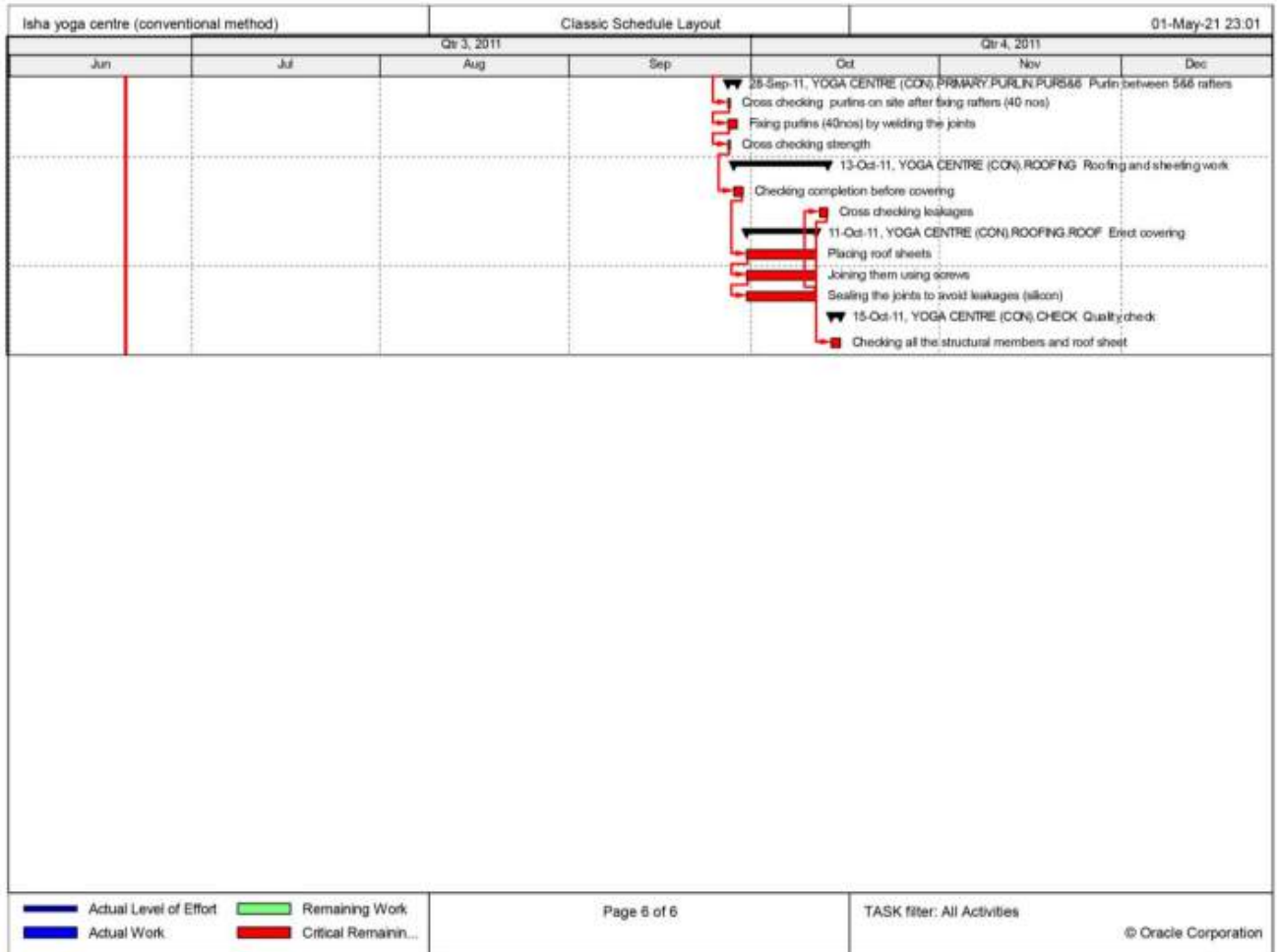


Table 24 Conventional method



4.1.5 COST ANALYSIS

Estimated Cost of the Conventional and Prefabricated Structures:

Table 25 Prefabricated

S.NO	DESCRIPTION	COST
1.	Factory works (Procuring materials, preparing all the members, transportation and labor.)	750 per sqft
2.	Erection – (Temporarily creating covered site working yard, scaffolding, cranes, Footing, Rafters, purlins, sheeting, insulation and Labor etc.)	
3.	Finishing Works – (Painting includes fire protection coating, whether proof and labor etc.)	
	Total cost	4.7 cr

Table 26 Conventional

S.NO	DESCRIPTION	COST
1.	On site work (Procuring materials, storing, temporarily creating covered site working yard, preparing all the members at site yard, scaffolding, cranes and labor works)	780 per sqft
2.	Erection – (Footing, Rafters, purlins, sheeting, insulation and Labor etc.)	
3.	Finishing Works – (Painting includes fire protection coating, whether proof and labor etc.)	
	Total cost	4.9 cr

STEEL CALCULATION

ISMC 150 Box Section

$$W=150\text{MM}-8-8-8-8-8 = 118\text{mm} = 0.118\text{m}$$

$$L=1\text{m}$$

$$\text{Size}= 150*8\text{m}$$

$$=150/1000*8/1000$$

$$= 1.5*0.008\text{m}$$

$$\text{Density} = 7850 \text{ kg/m}$$

$$\text{Weight} = \text{Density}*\text{volume}$$

$$\text{Volume} = L*W*T = 1\text{m} * 0.118 * 0.008 * 4 = 0.003776\text{m}$$

$$\text{Weight} = \text{Density} * \text{volume}$$

$$= 7850\text{kg/m} * 0.003776 \text{ m}$$

$$= 29.6416 \text{ kg/ m}$$

ISMC 450 Box

$$w = 450\text{mm} - 16 - 16\text{mm} = 418\text{mm} = 0.418\text{m}$$

$$L = 1\text{m}$$

$$\text{Size} = 450 * 16\text{mm} = 450/1000 * 16/1000 = 0.45 * 0.01\text{m}$$

$$\text{Density} = 7850 \text{ kg/m}$$

$$\text{Weight} = \text{Density} * \text{Volume}$$

$$w = 350 - 16 - 16\text{mm} = 318\text{mm} = 0.318\text{m}$$

[V1]

$$\text{Volume} = L * W * t$$

$$= 1\text{m} * 0.418\text{m} * 0.016 * 2$$

$$= 0.013376 \text{ m}$$

[V2]

$$\text{Volume} = L * w * t$$

$$= 1\text{m} * 0.318 * 0.016 * 2$$

$$= 0.010176\text{m}$$

$$\text{Total Volume} = V1 + V2$$

$$= 0.013376\text{m} + 0.010176\text{m}$$

$$= 0.023552\text{m}$$

$$\text{Weight} = \text{Density} * \text{Volume}$$

$$= 7850 \text{ kg/m} * 0.023552\text{m}$$

$$= 184.88 \text{ Kg/m}$$

$$\text{ISMC-150} = 29.64\text{Kg/m}$$

$$\text{ISMC -450*350} = 184.88\text{kg/m}$$

Supporting members**Frame 1**

$$\text{Length} = 1.83$$

$$\text{Nos} = 80$$

$$\text{Total length} = 146.4\text{m}$$

Frame 2

$$\text{Length} = 1.83$$

$$\text{Nos} = 88$$

$$\text{Total length} = 161\text{m}$$

Frame 3

Length = 1.83

Nos = 96

Total length = 175.6m

Total = 146.4 + 161 + 175.6

= 483 * 2 (other side)

= 966 [1000]

Main member**Frame 1**

Length = 70m * 2

= 140

Frame 2

Length = 78m * 2

=156

Frame 3

Length = 81m * 2

= 162

Total = 140+156+162

= 458m

= 500m

PURLINS**Purlins 1 to 2**

Width =12.5, Length = 70m

Nos = 70/6 = 11.6 =12

= 38* 12.5m = 475 * 2

= 950m

Purlin 2 to 3

Width =12.5, Length =78m

Nos = 78/6 = 13

= 43* 12.5m

= 538 * 2

= 1076m

Purlin 3to 4

Width =23.1,

Length = 264/81m

$$= 23.1 \times 44$$

$$= 1.016\text{m} \times 2$$

Total = 950 + 1076 + 2032

$$= 4.058\text{m}$$

Weight calculation:**ISMC –150 [Supporting members & purlins]**

Sup members = 1000m

Purlins = 4.058m

Total = 5058m

Weight (kg) = 5058 * 29.64

$$= 149919 \text{ Kg}$$

$$= \mathbf{165.25 \text{ ton}}$$

ISMC - 450*350*16 (main members)

$$= 500\text{m} \times 184.88 \text{ kg/m}$$

Weight (kg) = 92440kg

$$= \mathbf{101.89 \text{ ton}}$$

Cost :

1ton = 45000/ton

ISMC–150

$$= 165.25 \text{ ton}$$

$$= 165.25 \times 45000$$

$$= \mathbf{7436250}$$

ISMC–450

$$= 101.89 \times 45000$$

$$= \mathbf{4585050}$$

Table 27

		(Kg/m)		
Supporting member & purlins	ISMC-150	29.64Kg/m	149919 Kg / 165.25 ton	74,36,250
Truss	ISMC -450*350	184.88kg/m	92440kg / 102 ton	45,85,050
TOTAL				1,21,84,900

CRANE:

10 Hours per day rent = 12000

Cost for Prefab

Days = 18 + 6+ 16

= 40

= 40*12000

= 480000

Cost for Conventional

Days = 80 + 6 + 16

= 102

= 102 * 12000

= 1224000

ROOFING SHEET :

Material & Installation cost = 63,600 * 350

= 22,260,000

PREFABRICATION

MATERIAL = 7436250 + 4585050
= 12,184,900

CRANE
= 4, 80,000

FACTORY
= 63600 * 40 = 2,544,000

LABOUR
= 63600 * 60 = 38, 16,000

SHEET
= 22,260,000 + 3180,000 + 19, 08,000
= 27,348,000

OTHERS [scaffolding]
= 1, 20,000

Total = 12,021,300 + 63,6000 + 4,80,000 + 25,44,000 + 38,16,000 + 27,348,00 + 1, 20,000
= 46,965,300.

CONVENTIONAL

MATERIAL
= 1,33,56,000
= 1,33,56,000 [including wastage and supporting material]

CRANE
= 12, 24,000

SHEET
= 27348000 [including weatherproof installation,gutters]

SCAFOLDING
= 63600 * 5 = 318000

LABOUR
= 63,600*80
=50, 88,000

PAINTING & FIRE PROTECTION WORK
= 63,600 * 30 = 19, 08,000

Total = 1,33,56,000 + 1224000 + 27348000 + 318000 + 5088000 + 1908000
= 4,92,90,000

Table 28

	PREFABRICATION	Per sq ft	CONVENTIONAL	Per sq ft
MATERIAL	1,21,84,900	195	1,33,56,000	210
CRANE	4, 80,000	8	12, 24,000	20
FACTORY (including painting and fire proof)	25,44,000	40	-	
SHEET & SEALENT	2,73,48,000	430	2,73,48,000	430
LABOUR	38, 16,000	60	50, 88,000	80
OTHERS [scaffolding]	1, 20,000	2	3,18,000	5
PAINTING & FIRE PROFF WORK	-		19, 08,000	30
TOTAL	46,965,300.	735	4,92,90,000	775

4.1.6 COMPARATIVE ANALYSIS

Comparison Graphs of Total Cost, Time and Quality for Conventional and Prefabricated Structures

The total project cost were calculated for both the Methods shown in the graph. It represents the cost of the prefabrication construction is lower than the conventional construction by a small fraction. The difference in cost of the project difference is around 20 lakh between the prefabrication and conventional construction. This means that the prefabricated structure proved

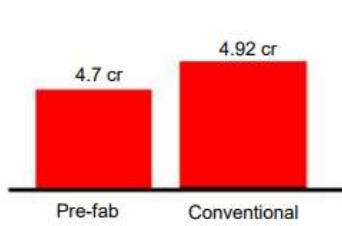


Fig 28 Total cost comparison graph

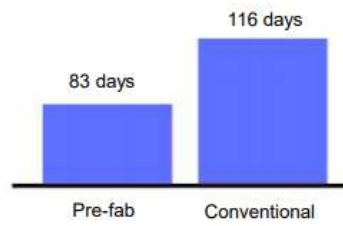


Fig 27 Total time comparison graph

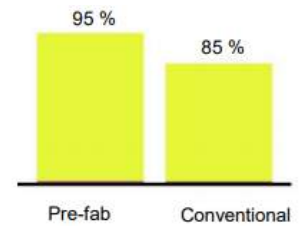


Fig 26 Quality comparison graph

The total project duration were calculated for both construction and shown in the graph. It represents the duration of the prefabrication construction is lower than the conventional construction. The time duration of the project difference is 33 days between the prefabrication and conventional construction. This contains very low time duration compared to the conventional method for the structure.

The total Quality were calculated for both construction and shown in the graph. It represents the quality of the prefabrication construction is higher than the conventional construction. The quality of the project difference is 10% between the prefabrication and conventional construction. This contains very High quality when compared to the conventional method for the structure.

4.2 CONCLUSION

The fundamental objectives of the work have been accomplished .The examination shows there isn't a colossal cost contrast between the techniques (23,24,700 lakhs (5%)), prefab being more temperate in long span structures when contrasted with regular. In the meantime the prefab development diminishes the undertaking length, lessened by 33 days (40%) when contrasted with the Conventional. Because of overview we had realized that the prefab development have more points of interest and obtainment in industrialized, substantial frameworks. Quality of the product is maintained in pre fab method when comparing to conventional method and that's plays major role construction. Even though it has its own disadvantage but when comes to time ,cost and quality it is comparatively lesser than conventional method.

To decide if construction is a decent choice you have to consider.

- Proper cost analysis and planning can help to achieve at an economical estimate for prefab construction. Educating student's trainers and even labourers more about prefabrication in depth will help provide more trained and educated work force for prefabrication.
- It can also change the conventional mindset of people and accept to try modern construction methods. Use of standardized elements from companies that have variety of options to choose from can help make structure unique.
- One time investment in good quality lifting machines and proper maintenance can help in further savings.

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