# INDUSTRIAL TRAINING REPORT

**ON**

# "CONSTRUCTION OF ROAD"

Submitted in partial fulfillment of the requirement for degree of

**B.Tech** in **CIVIL ENGINEERING**

at

**ARKA JAIN UNIVERSITY, Jharkhand**


**Submitted By**

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**SCHOOL OF ENGINEERING & I.T,ARKA JAIN UNIVERSITY, JAMSHEDPUR**

**2018-2021**

MADHUCON

MADHUCON

PROJECTS LIMITED

ISO 9001:2008 COMPANY

DATE:-28/08/21

**TO WHOME IT MAY CONCERN**

This is to certify that Mr.Tapan Kumar Gope S/O-Mr.Balaram Gope, A student of B.Tech (civil) at ARKA JAIN UNIVERSITY, JAMSHDPUR,JHARKHAND has successfully completed two month (from 25/06/21 to 25/08/21) long internship programme at this company. During the period of his internship programme with us,He was found punctual ,Hard working and inquisitive.

We wish him every success in life .

For,

**MADHUCON PROJECT LTD**

V. Raman.

**Authorized Signature**

MADHUCON PROJECTS LIMITED * Authorised Signatory

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# ACKNOWLEDGEMENT

I would like to express my utmost gratitude to the AJU for providing an opportunity to pursue the engineering training as partial fulfillment of the requirement for the degree of B.tech in CIVIL Engineering. The internship opportunity I had with was a great chance for learning and professional development. Therefore, I consider myself as a very lucky individual as I was provided with an opportunity to be a part of it. I am also grateful for having a chance to meet so many wonderful people and professionals who led me through this internship period.

Bearing in mind previous I am using this opportunity to express my deepest gratitude and special thanks to the **Mr.MUKESH KUMAR SINGH, H.R, MADHUCON PROJECT LIMITED (JAMSHEDPUR)** who in spite of being extraordinarily busy with his duties, took time out to hear, guide and keep me on the correct path and allowing me to carry out my project at their esteemed organization and extending during the training.

I express my deepest thanks to **Mr VENKAT RAMAN, Assistant Engineer, MADHUCON PROJECT LIMITED, JAMSHEDPUR** for taking part in useful decision & giving necessary advice and guidance and arranged all facilities to make life easier. I choose this moment to acknowledge his contribution gratefully.

I express my deepest thanks to all staffs and employees of COMPANY for taking part in useful decision & giving necessary advice and guidance and arranged all facilities to make life easier. I choose this moment to acknowledge their contribution gratefully. I perceive as this opportunity as a big milestone in my career development. I will strive to use gained skills and knowledge in the best possible way, and I will continue to work on their improvement, in order to attain desired career objectives. Hope to continue cooperation with all of you in the future.

# ABSTRACT

*SAMPLE:* The aim of this training is to get exposed to the Structural & Foundation Engineering. Learning about Beams and Column, Footings, Bar Bending Schedule, Concrete Mix Design and Construction Management.

I joined the company as trainee for one month training. In this report, I have highlighted the challenges that I encountered and the actions taken or solutions to problems during training in GDCL, Dwarka (Gujarat).

It was a rewarding opportunity for me to learn the work culture of PWD as; how the organization work for the entire project, was structured, its hierarchy, how various departments work in coordination with one another inside the system to achieve a common target and predetermined goals, how the superior officers interact with the clients and contractors, how the information is being delivered from the top to the bottom level employees etc.

CONTENTS

# EXECUTIVE SUMMARY

Construction planning and execution is a fundamental and challenging activity in the management of construction projects. It involves the choice of technology, the definition of work tasks, the estimation of the required resources and durations for individual tasks, and the identification of any interactions among the different work tasks. A good construction plan is the basis for developing the budget and the schedule for work. Developing the construction plan is a critical task in the manage ment of construction, even if the plan is not written or otherwise formally recorded. In addition to these technical aspects of construction plan ning, it may also be necessary to make organ izational decisions about the relation sh ips between project participants and even which organizations to include in a project. For example, the extent to which sub-contractors will be used on a project is often determined during construction planning.

Construction time performance (CTP) and flexibility in approaches to project time planning have been shown to be significantly associated. This raises interesting questions about how effective planning and control to fiacilitate flexibility in overcoming unexpected problems may be achieved. Various tols and techniques such as Gantt chart, activity diagram and Work Breakdown Structure (WBS) have aided the road construction projects in an effective manner.

## OBJECTIVE:

Complete the project in the specified time horizon and allocated cost.
Deliver value to the customers by providing excellent customer support.
Roads are an integral part of the transport system. A country's road network should be efticient in order to maximize economic and social benefits. They play a significant role in achieving national development and contributing to the overall perfomance and social function ing of the community. It is acknowledged that roads enhance mobility, taking people out of isolati on and there fore poverty. In China for instance, the govemment has popularized this belief by emphasizing that for any economy to develop, transport must start off first which will later stimulate other sectors to develop in an orderly fashion The most important factors which are needed in the developing country are economics, political and military. Each of them play great role in the respective part but they cannot perform an excellence job without proper commun icat ion and transportati on. There are three main kinds of transportation, they are by air, land and water There are two main transportations on land, they are trains and cars but roads are necessary for both of them. Cars can be driven without roads but it is difficult and very dangerous. Trains cannot travel with railroads. It is very hard to travel in tropical country such as Myanmar in raining season without a road. There are muds everywhere and they always cause trouble for cars and trains. Thus our govern ment is building roads and railroads around the country for the safety of the citizens. The basic of economic is trading and when people trade, the transportat ion will be needed. The country economic will develop when people travel to different the places and do businesses.When the politic ants travel around the country to meet the public, they will also need a road. When the military officers receive an order to check an area for the safety of the citizens, they will need roads to get there as soon as possible. By that way people can stay at their houses safe and sound. So people will love the their leader and obey the laws of our country.

## ROAD CONSTRUCTION

Road construction in India is about rs.150 billion. The contracting industry consist of large scale contractors (Rs.500 million and above) about 20 arge contractors accounting 40% of construction acti vities, medium scale contractors (Rs.100-500 million) is involved about 20% of construction activities and small scale contractors (Rs.5-100 million) is involved in remaining 40%.

## CONSTRUCTION MATERIAL

Embankment
Subgrade
Pavement structure base course
Surface course
Special materi als for drainage
Maintenance

## ROAD CONSTRUCTION EQUIPMENT

Govt. Bodies are the main buyers of the road construction equipment, market is limited During 1980s, transformation took place. Project became much larger size -external agency funding -mandatory to use appropriate equipment Pre-qualification criteria: based on ownership of equipment for selection of contractors.

In large projects 10 % advance were given, as a result contractors began purchasing their own equipment. Half of Indian manu factu res producing equipment in India have tie-up with foreign partners to improve their products.

FLY ASHFOR ROAD EMBANKMENT

1. lde ally suited as back fill material
2. Higher she ar strength leads to greater stability
3. Design by conventional method
4. Intermediate soil layers to provide confinement

Guidelines approved by company

USE OF GEOTEXTILES FOR CONSTRUCTION OF EMBANKMENT WITH STEEP SLOPE

**LAYING OF GEOTEXTILE OVER SO1L SUBGRADE (AS SEPARATOR)**

**MATERIALS FOR ROAD PAVEMENTS**

**1. Sub gradeup gradation (stabilisation)**

**Improvement in CBR and reduction in pavement thickness by stabilisation (use of foamed bitumen-cement, enzymes, resins etc.)**

**2. Sub-buse/base courses**

**Use of waste materials like fly ash, Blast furnace slag, Aircooled slags, municipal wastes, etc**

**3. Wearing courses**

**Modified bitumens, multigrade bitumens and improved emulsions**

## USE OF PROCESSED MUNICIPAL WASTES

**1. Construction of stabilised base/sub-base courses(PMW-lime-1y ash, PMW soil-cement)**

**2. Construction of test track using municipal wastes**

## CRITERIA FOR SELECTION OF MODIFIERS and Raw Materials

**1. Traffic**

**2. Climate**

**3. Cost-effectiveness**

**4. Performance reports**

**5. Constructability**

# MATERIALS FOR RIGID PAVEMENTS

Roller compacted concrete (RCCP)

1. Faster and economical
2. Can be used for base course and for wearing course
3. Saving of cement by using fly ash and GBFS

## Construction of roller compacted concrete

Use of waste materials like Marble slury dust, Slag. Fly ash, etc1.Use of waste materials to replace aggregates (DLC)
2.Use of pozzolanic waste materials to replace part of cement (CC and RCCpavements)
Magnesium oxychloride cement

*As a substitute to OPC in CC pavements
*Used for stabilisation of sand

FUNDAMENTALS OF ROAD CONSTRUCTION CONSISTS OF FIVE

TOPICS:

Topic 1: Construction Management Overview
Topic 2: Preliminary Investig at ions
Topic 3: Setting Out
Topic 4: Earthworks
Topic 5: Roadsides

BRIEF:

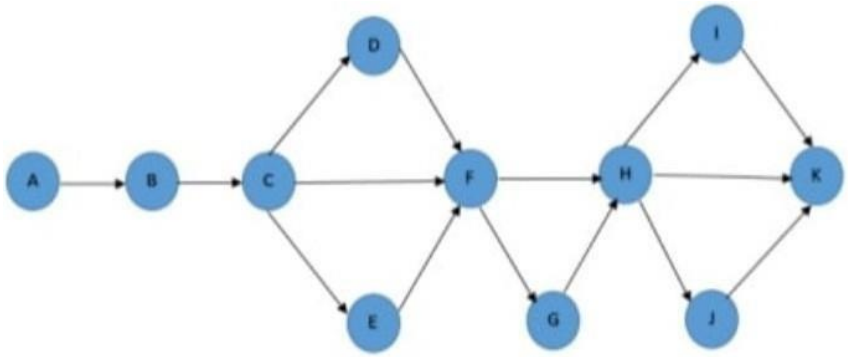
Construction Management Overview the critical issues in construction management including scheduling techniques, plant and equipment, human resources, mater ials, project man age ment, works program, safety and traffie management, quality systems and en vironmental management. Preliminary Investigations the phases of road investigation includ ing land acquisition, environmental issues, relocation of services and cultural and indi genous heritage management. Setting Out -covers vertical and horizontal alignments, preparation for earthworks andtrimming sub grades.
Earthworks-includes specifications, defin ition of earthworks terms, hold points, witness points and milestones, earthworks planning, plant and equipment, earthmoving operations and compliance testing and measurement. Drainageurban drainage. geo-textiles, surface erosion protection, moisture, pemeability, road drainage systems, construction methods and selection of materials.

Roadsides items at the roadside including furniture/signs, batter slopes, landscaping.

guardrails, crash barriers and noise fences/barriers

## 3.2 Activity Diagram:

1. Activity diagrams are graphical representations of workflows of stepwiseactivities and actions
2. with support for choice, iteration and concurrency. In the Unified ModelingLanguage, activity
3. diagramsare intended to model both computation al and organisationalprocesses (i.e.work flows).
4 Activity diagrams show the overall flow of control.
5.Activity diagr ams are constructed from a limited number of shapes, connectedwith arrows.
6 Themost impor tant shape types:
rounded rectangles represent actions;diamonds
represent decisions;
bars represent the start (split) or end (join) of concurrent activitiesa black circle
represents the start (initial state) of the workflow; an encircled black circle represents
the end (final state).
Arrows run from the start towards the end and represent the order in whichactivities happen.
Hence they can be regarded as a form of flowchart. Typical flowchart techniqueslack constructsfor expressing concurency



# KNOWLEDGE AREA

## 4.1 PROJECT SCOPE MANAGEMENT

The project is first conceptualized for a specific segment of customers. The market is understood and the needs of the segment are analyzed. The location and the en vironmental factors of the project are decided based on the previous analysis higher class of people are selected and the need of status is identified. The project will be located in a residential area which is well connected to the centrally to the city. The design of the project, selection of contractors and architects, approval of local municipal laws etc. are decided and made available. The role of each stakeholder is decided and the cost requ irement (Budget) for completion of the project is determined. This can be done quickly based on the previous experience of the other similar projects. The risks are identified and the steps are taken tosubdue the risks in order to avoid scope creep.

## 4.2 PROJECT COST MANAGEMENT

The contracting industry consist of large scale contractors (Rs.500 million and above) about20 large

contractors accounting 40% of construction activities, medium scale contractors

(Rs. 100-500 million) is involved about 20% of construction activities and small scalecontractors

(Rs5-100 million) is involved in remaining 40%. This project basically deal with the smallscale contractors.

## 4.3 PROJECT INTEGRATION MANAGEMNT

This is the stage where the actual work on the plan starts, t is not an easy task for anyone to convert the plan on paper into reality. This requires expertise in the specific area such as electrical, plumbing, civil, structural etc. Each task is assigned team to complete the job. These tasks are sometimes dependent and sometimes overlapping (independent). A proper coordination between teams is required to avoid any communication gap which can lead to cost overruns and scope creep. Any team will consist of a project manager who manages and controls the overallproject. Under him the task managers/supervisors are assigned who looks after the progress ofthe particular task. Contractors, architects, structural engineers and civil engineers are assig need for each task and works closely with the task manager/supervisor

The implementation/construction can be divided into phases depending on the bookings by customers and the avai lability of materials and labor. The problem comes with the material quality and delivery, Iabor issues, Safety issues, Compliance, Coordination etc. which ultimately results in the scope creep, cost over uns and hinders customer delivery and satisfaction. Thus in order to achieve the target, a project manager has to closely monitor theprogress and avid

botlenecks.

## 4.4 PROJECT HUMAN RESOURCE MANAGEMENT

## 4.5 PROJECT PROCUREMENT MANAGEMENT

In this stage the procurement of the necess ary materials are done. This is done through tendering where various contractors are invited from the qualified contractors. At first the BOQand tender specifications are decided by the tenderer. These details are then used for the compilation of the tender. These tenders are then sent to the selected number of contractors for different tasks and the filled tenders are received in the time spedfied by the tenderer. These tenders are then verified and the selection of the contractor is done. Negotiation takes place and finally the tender is awarded to the successful contractor.

This stage is one of the most crucial stages of a project. The root cause of any project not completing in time is majorly due to defaults in this stage. A tenderer has to be very careful about wrong information fling, faulty tender specificatio ns and BOQ. This causes increase the ordering cost, change in contractors, increase in project completion time, complexities etc. which actualy increases the scope ofthe project.

## 4.6 PROJECT TIME MANAGEMENT

Scheđuling of the project is done in order to micro manage the projeat and monitor the progress of the project. This helps in un derstanding the variatio ns from the actual plan and a manager can decide how fast the work has to be done and whether there will be a scope creep. This can be done by preparingGantt chart where the start, completion and progress of a project are mentioned.