VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELAGAVI – 590 018

INTERNSHIP REPORT

On

"CONSTRUCTION OF CHICKBALLAPURA URBAN DEVELPOPMENT AUTHORITY BUILDING"

Submitted in partial fulfillment of the Requirement for the Award of

BACHELOR OF ENGINEERING

in

CIVIL ENGINEERING

Submitted

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Internship carried out at:

PUBLIC WELFARE DEPARTMENT OFFICE

UNDER THE GUIDANCE OF

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DEPARTMENT OF CIVIL ENGINEERING

S J C INSTITUTE OF TECHNOLOGY

CHICKBALLAPUR – 562 101

2021-22

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CHICKBALLAPUR - 562 101, KARNATAKA

DEPARTMENT OF CIVIL ENGINEERING

CERTIFICATE

This is to certify that the Internship Work entitled **"CONSTRUCTION OF CHICKBALLAPURA URBAN DEVELOPMENT AUTHORITY BUILDING"** is a bonafide work carried out by GAGAN R (1SJ18CV034) is bonafide student of S J C Institute of Technology in partial fulfillment for the award of Bachelor of Engineering in Civil Engineering in Visvesvaraya Technological University, Belagavi during the academic year 2021-2022. It is certified that they have completed the Internship satisfactorily.

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ACKNOWLEDGMENT

With great pride I would like to express my gratitude to S J C Institute of Technology. Thetemple of learning for providing us the required platform for the fulfillment of the internship.

Remembering with reverence, I offer my pranamas at the lotus feet of Byravaikya Padmabhushana Paramapoojya Jagadguru Sri Sri Sri Dr. Balagangadharanatha Mahaswamiji.

Submitting devout pranamas and seeking the blessings of his holiness Paramapoojya Jagadguru Sri Sri Sri Dr. Nirmalanandanatha Mahaswamiji and poojya Sri Sri Mangalanatha Swamiji.

I express my sincere thanks to Dr. G T Raju, Principal of SJCIT, Chickballapur for providing us with excellent infrastructure to complete the internship.

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I thank my Internship Coordinator Mr. Kamath G M for his guidance, encouragement and valuable suggestion.

It is my privilege to thank my Guide Mr. RAKESH M R for his guidance, encouragement,support and valuable suggestion for completion of my internship.

And last but not the least, I would be very pleased to express my heartfelt thanks to Mr. Santhosh Kumar H N Assistant Engineer, for their guidance and support provided to complete the internship.

I also thank all those who extended their support and co-operation while bringing out this internship.

Finally, I would like to thank our family members and friends for their kind co-operation and motivation to proceed in my internship work.

GAGAN R (1SJ18CV034)

[ಲೋಕೋಪಯೋಗಿ ಇಲಾಖೆ]

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TO WHOM IT MAY CONCERN

This is certified that the following students of 7th sem/ 4th year in Civil Engineering of SJC Institute of Technology, Chikkaballapur had been under training at our construction site (KPWD Project, a building site, at Sitrus Meadows, Chikkaballapura City from 04/04/2022 to 30/04/2022.

Students completed their training on various jobs on civil constructions at above mentioned site. Their attendance and performance during training was found excellent.

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26.05.2022

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ABSTRACT

Internship training offered by public works department Chickballapur was fortunate opportunity for me during my fourth year of under graduation it helped me to apply my theoretical knowledge gained during the university academic programme into real world industrial based execution and experience professional construction process it helped me to enhance my skill and to enrich my industrial knowledge keeping me update with the latest technologies this opportunity has extremely helped me to expose into an environment where I could think as a civil engineer.

I had my training experience from 4th April to 30th April 2022 at P.W.D Chickballapur.

This report contains the knowledge and experience I have gained through my internship training at PWD Chickballapur.

LIST OF FIGURES

Figure No.	Title	PAGE NO
Figure 1.1	PWD OFFICE, CHICKABALLAPURA	6
Figure 1.2	ELEVATION OF BUILDING	8
Figure 1.3	GROUND FLOOR AND FIRST FLOOR PLAN	9
Figure 2.1	CONCRETE MIXER	10
Figure 2.2	PAN	11
Figure 2.3	NEEDLE VIBRATOR	12
Figure 2.4	PERSONAL PROTECTION EQUIPMENT	12
Figure 2.5	TOOLS USED AT CONSTRUCTION SITE	12
Figure 3.1	COMBINED AND INDIVIDUAL FOOTING	15
Figure 3.2	DETAIL OF FOOTING	16
Figure 4.1	KEY PLAN OF COLUMN CENTRE LINE	17
Figure 4.2	COLUMN STARTER	18
Figure 4.3	COLUMN SHUTTERING	19
Figure 4.4	COMPACTION BY MECHANICAL VIBRATOR	20
Figure 4.5	CURING	20
Figure 5.1	SIZE STONE MASONRY	23
Figure 6.1	SAND OR EARTH MATERIAL IN FILLING	24
Figure 6.2	FILLING IN FOUNDATION	25
Figure 6.3	RUBBLE SOLING	26
Figure 6.4	BACK FILLING	26
Figure 6.5	STEEL BARS IN PLINTH BEAM	27
Figure 6.6	FILLING IN PLINTH BEAM	28
Figure 6.7	FILLING IN FLOORING	28
Figure 6.8	CONSOLIDATION AFTER FILLING	29
Figure 7.1	LONGITUDINAL SECTION OF WATERTANK	33
Figure 7.2	PCC BED FILLING	34
Figure 7.3	PCC BED CURING	34
Figure 7.4	REINFORCEMENT IN WATR TANK	35
Figure 7.5	SLAB CONCRETING	35
Figure 7.6	SHUTTERING FOR CONCRETE FILLING	36
Figure 7.7	CURING OF WATER TANK	

CONTENTS

ACKNOWDLLEMENT		**I**
ABSTRACT		**II**
LIST OF FIGURES		**III**
Chapter No.	**Chapter Name**	**PAGE NO**
CHAPTER 01	**COMPANY PROFILE**	
	1.1. ABOUT COMPANY	6
	1.2. VISION	7
	1.3. MISSION	7
	1.4. OFFICE DETAILS	7
	1.5. PROJECT DETAILS	8
CHAPTER 02	**SAFETY MEASURES AT SITE**	
	2.1. CONSTRUCTION SITE SAFETY RULES	10
	2.2. EQUIPMENT USED FOR CONSTRUCTION	10
	2.2.1. CONCRETE MIXER	10
	2.2.2. TRANSPORTATION	11
	2.2.3. COMPACTORS	11
CHAPTER 03	**FOUNDATION**	
	3.1. FOUNDATION DEFINITION	13
	3.2. TYPES OF FOUNDATION	13
	3.2.1. SHALLOW FOUNDATIONS	13-14
	3.2.2. DEEP FOUNDATION	14
	3.3.DESIGN CONSIDERATIONS	15-16
CHAPTER 04	**COLUMN**	
	4.1. COLUMN DEFINITION	17
	4.2. COLUMN STARTER	17 18
	4.3. COLUMN REINFORCEMENT	
	4.3.1. CHECKING COLUMN REINFORCEMENT STEEL	18 19
	4.4. COLUMN SHUTTERING	
	4.5. COLUMN CONCRETING	19
	4.6. DESIGN CONSIDERATIONS	20

CHAPTER 05 STONE MASONRY

5.1SELECTION OF STONE 21
5.1. TYPES OF STONE MASONRY 21
5.1.1. RUBBLE MASONRY 21
5.1.2. ASHLAR MASONRY 21
5.2. GENERAL PRINCIPLES 22
5.3. MORTAR 22

CHAPTER 06 SOIL FILLING

6.1. DEFINITION 24
6.2. TYPES OF FILLING MATERIALS 24
6.2.1. SOIL OR EARTH AS A FILLINGMATERIAL 24
6.3. FILLING IN FOUNDATION 25
6.4. BACK FILLING 25
6.5. PLINTH BEAM 27
6.5.1. STEEL BARS USED FOR PLINTH BEAM 27
6.5.2. DETAILING OF PLINTH BEAM 27
6.6. FILLING IN PLINTH 27
6.7. FILLING IN FLOORING ANDCONSOLIDATION 28
6.7.1. CONSOLIDATION 28
6.7.2. CONSOLIDATION TYPES 29

CHAPTER 07 UNDERGROUND WATER TANK

7.1. DEFINITION 30
7.2. IMPORTANCE OF UNDERGROUND WATERTANK 30
7.3. TYPES 31
7.4. ADVANTAGES OF CONCRETE WATERTANK 31
7.5. DESIGN CONSIDERATION 32-36

CHAPTER 08 CONCLUSION 37

REFERENCE 39

CHAPTER 1

INTRODUCTION

1.1 ABOUT COMPANY

PWD: PUBLIC WORKS DEPARTMNET

The Public Works Department is the authority that looks into all kinds of public sectorworks in India.

Karnataka Public Works Department (also known as Karnataka Public Works, Ports and Inland Water Transport Department or KPWD) is the Karnataka government agency in charge of the public works in the state of Karnataka, India. It is entrusted with the responsibility of construction and maintenance of buildings for most of the Karnataka government departments and public undertakings and maintenance of road works including the National Highways, State Highways, and Major District roads.

FIG 1.1 PWD OFFICE, CHICKBALLAPUR

PWD under the ministry of Public Works Department is the pioneer in construction area in Karnataka. Over about four centuries, PWD could successfully set the trend and standard in the state's infrastructure development. It plays a pivotal role in implementation of government construction projects. It also undertakes projects for autonomous bodies as deposit works. Public works Department has highly qualified and experienced professionals forming a multidisciplinary team of civil, mechanical, and electrical engineers who work alongside architects from the department of architecture. With this strong base of standards and professionalism developed over the years, PWD is the respiratory of expertise and hence the first choice among discerning clients for any type of construction project in Karnataka. Besides being the construction agency of the government, it performs regulatory function in setting pace and managing projects for the country construction industry under the close supervision of the ministry of Housing and Public Works.

1.1 VISION

- Build world-class, Mega Organization which makes significant contribution to the society and have a positive effect on the economic and social life of our state.

1.2 MISSION

- Based on the innovative products and services that make a difference and excellence of its business operations.
- By providing the best quality and vast range of professional services with minimal costand on-time completion.
- Continual improvement in quality and cost through innovative technology and effective utilization of resources.
- By exceeding customer satisfaction.
- Survey, plan, design, estimate and execute various classes of road as well as government buildings and other infrastructure facilities all over the state.
- Work with the communities, other government department and the private sector to get thebest result.

1.4 OFFICE DETAILS AND ADDRESS

- **NAME** **:** Public Works Department.

- **OFFICE ADDRESS** **:** Office of Assistant Executive Engineer

Public Works Department
Chickballapura Sub-Division
Chickballapura

- **EMAIL** : aeepwdcbpur@gmail.com
- **WEBSITE** : www.kpwd.com
- **PHONE NUMBER** : 08156-274633

1.4 PROJECT DETAILS

- **NAME OF WORK** : Construction of Chickballapura Urban Development Building.
- **PROJECT COST** : 248 lakhs
- **PROJECT PERIOD** : 11 months
- **DATE OF COMMENCEMENT:** 3-2-2022
- **DUE DATE OF COMPLETION:** 1-1-2023
- **TOTAL BUILT UP AREA** : 600 sqm
- **NUMBER OF FLOORS** : G+1
- **TYPE OF STRUCTURE** : RCC

FIG 1.2 ELEVATION

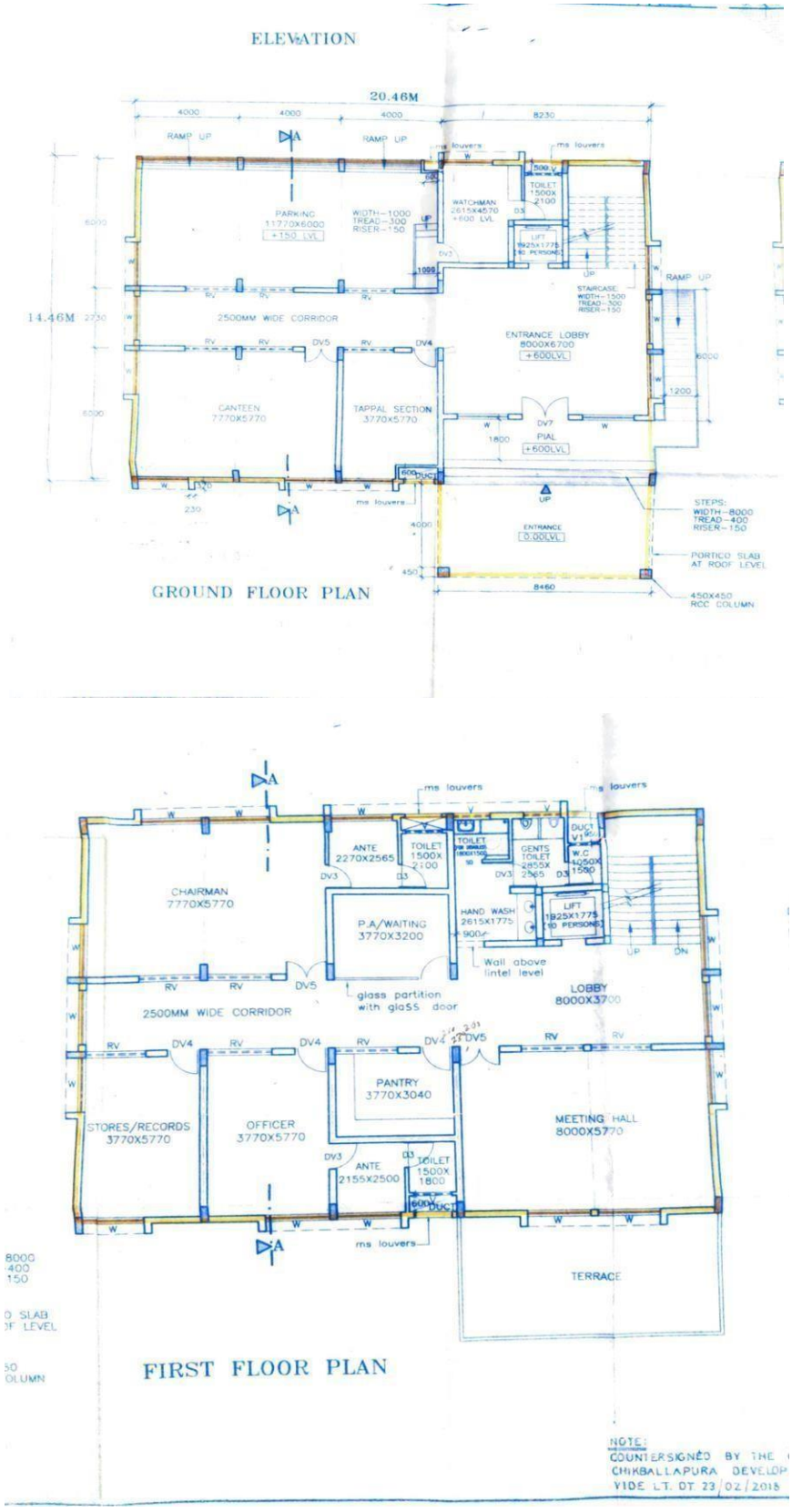


FIG 1.3 GROUND FLOOR AND FIRST FLOOR PLAN

CHAPTER 2

SAFETY MEASURES AT SITE

2.1 CONSTRUCTION SITE SAFETY RULES

- Wear the PPE at all the times.
- Do not start work without an induction.
- Keep a tidy site.
- Do not put yourself or others at risk.
- Follow safety signs and procedure.
- Never work in unsafe areas.
- Report defects.
- Never tamper with equipment.

2.2 EQUIPMENTS USED FOR CONSTRUCION

2.2.1 CONCRETE MIXER

This is a power mechanically operated machine which is used to mix the concrete. It consists a hollow cylindrical part with inner side wings, in which cement, sand aggregates and water is mixed properly.

FIG 2.1 CONCRETE MIXER

2.2.2 TRNASPORTATION

The process of carrying the concrete mix from the place of its mixing to final position of deposition is termed as transportation of concrete. There are various methods of transportation as mentioned below-

Transport of concrete by pans.

Transport of concrete by wheel barrows.

Transport of concrete by tipping Lorries.

Transport of concrete by pumps.

Transport of concrete by belt conveyers.

At this site concrete was transported by pans.

FIG 2.2 PAN

2.2.3 COMPACTORS

When the concrete has been placed, it shows a very loose structure. Hence, it must be compacted to remove air bubbles and voids so as to make it dense and solid concrete to obtain a high strength. There are two types methods of compaction.

1. Manual Compaction

2. Mechanical Compaction

There are four types of mechanical vibrators

1.Immersion or needle vibratory
2.Extended or shutter vibrator
3.Surface vibrator
4.Vibrating table

At our construction site needle type of vibrator was used for compaction of concrete.

FIG 2.3 NEEDLE VIBRATOR

FIG 2.4 PERSONAL PROTECTION EQUIPMENT USED AT SITE

FIG 2.5 TOOLS USED AT CONSTRUCTION SITE

CHAPTER 3

FOUNDATION

3.1 FOUNDATION DEFINITION

A foundation is the element of any structure which connects it to the ground and transfer loads from the structure to the ground. Foundations are generally considered either shallow or deep. Foundation is a load bearing structure which bears all the loads coming on the building or any structure. Foundation is generally of two types:

1. Shallow foundation
2. Deep foundation

3.2 TYPES OF FOUNDATION

3.2.1 SHALLOW FOUNDATION

Shallow foundations are also called spread footings or open footings. The open refers to the fact that the foundation made by first excavating all the earth till the bottom of the footing, and then constructing the footing. During the early stages of work, entire footing is visible to the eye, and therefore is called open foundation. The idea is that each footing takes the concentrated load of the column and spreads it over a large area, so that the actual weight on the soil does not exceed the safe bearing capacity of the soil.

Types of shallow foundations are:

3.2.1.1 STRIP FOOTING

The footing which supports long masonry or RCC wall is known as strip footing. In this type of footing the width of footing is twice the width of wall which is rested on it, sometimes even wider. It runs throughout the wall. If Bearing Capacity is more than width of footing is lesser.

Generally used in load bearing structures.

3.2.1.2 ISOLATED FOOTING

This type of footing supports individual column. If good soil is available then this type of footings is economical. This type of footings is used generally when Soil Bearing Capacity is high, loads on footings are less, columns of a building are not closely spaced.

This kind of footing is of three types:

1. Flat footing

2. Stepped footing
3. Sloped footing

3.2.1.3 COMBINED FOOTING

Footing that supports two or more columns is known as combined footing. When one column is closed to property line the center of gravity of column will not coincide with footing in such cases it is necessary to provide combined footing with that of internal column, the ultimate aim is to get uniform pressure distribution under entire area of footing.

Combined footings are further classified into following types based on there shapes:

1. Rectangular Combined footing
2. Trapezoidal combined footing
3. Strap beam combined footing

3.2.1.4 STRAP BEAM COMBINED FOOTING

Strap beam combined footing is used when one column is located on a property line, resulting in an eccentric load on a portion of footing. In this type of footing a beam is provided to the adjacent column footing to restrain the overturning effect.

3.2.1.5 RAFT FOOTING

It is also called as Mat footing. If loads transmitted by the columns in a structure are heavy and allowable soil pressure is small then footing requires more area, so in order to spread the load over the large area with less depth then footing area must be increased if Individual footing is used then footings will overlap with each other so to avoid this a common footing is provided which supports all columns such type of footing is called Raft footing. Raft footing is used to support storage equipment's, Silos, Chimneys, Towers, various industrial structures and buildings with basement where continuous water proofing is needed.

3.2.2 DEEP FOUNDATION

A deep foundation is a type of foundation which transfers building loads to the earth further down from the surface than a shallow foundation does, to a subsurface layer or a range of depths. This process is utilized when existing soil is not stable enough to handle a foundation.

Here the depth of foundation is greater than the width of the foundation.

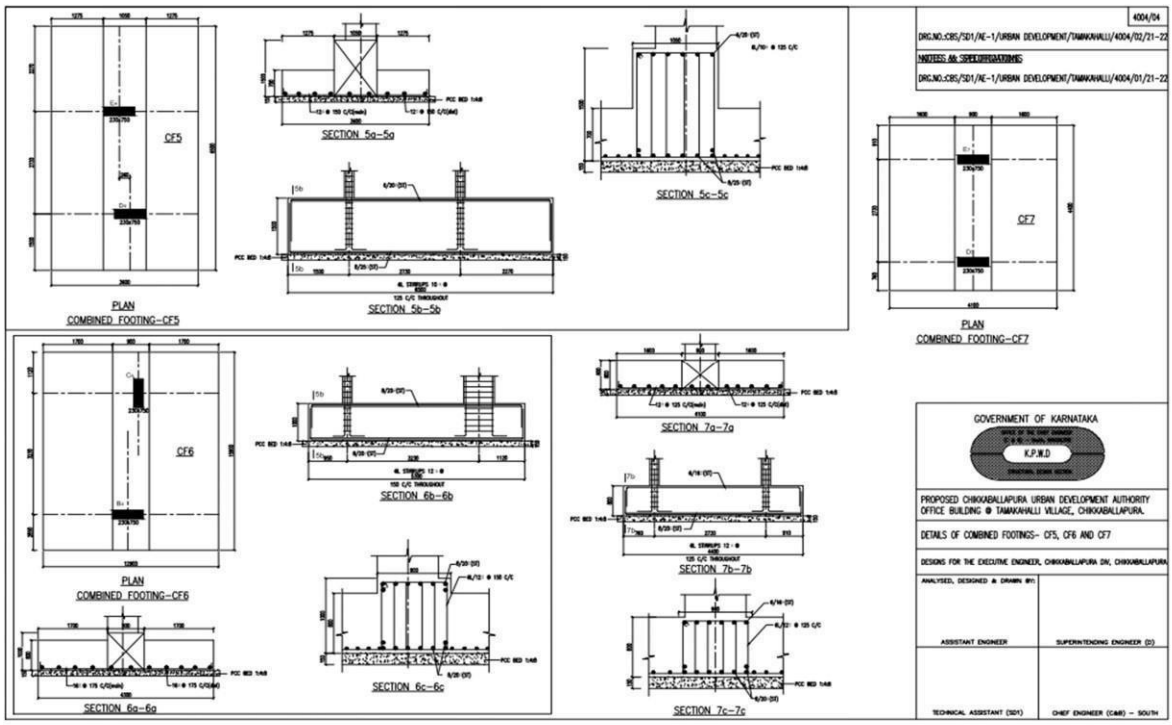
Types of Deep foundation

1. Pile foundation
2. Caisson foundation

3.3 DESIGN CONSIDERATIONS

1. S.B.C for foundation is 1.6 T/SQM @ 2.00m.
2. Foundation should be laid at the depth as recommended in the soil test report.
3. The foundation of the building is designed for GROUND FLOOR + 4 FLOORS.
4. PCC-M10 grade Concrete, 150mm thick.
5. Footing clear cover 50mm.
6. Footing concrete M25.
7. Type of Footing: Combined, Individual.

FIG 3.1 COMBINED FOOTING AND INDIVIDUAL FOOTING



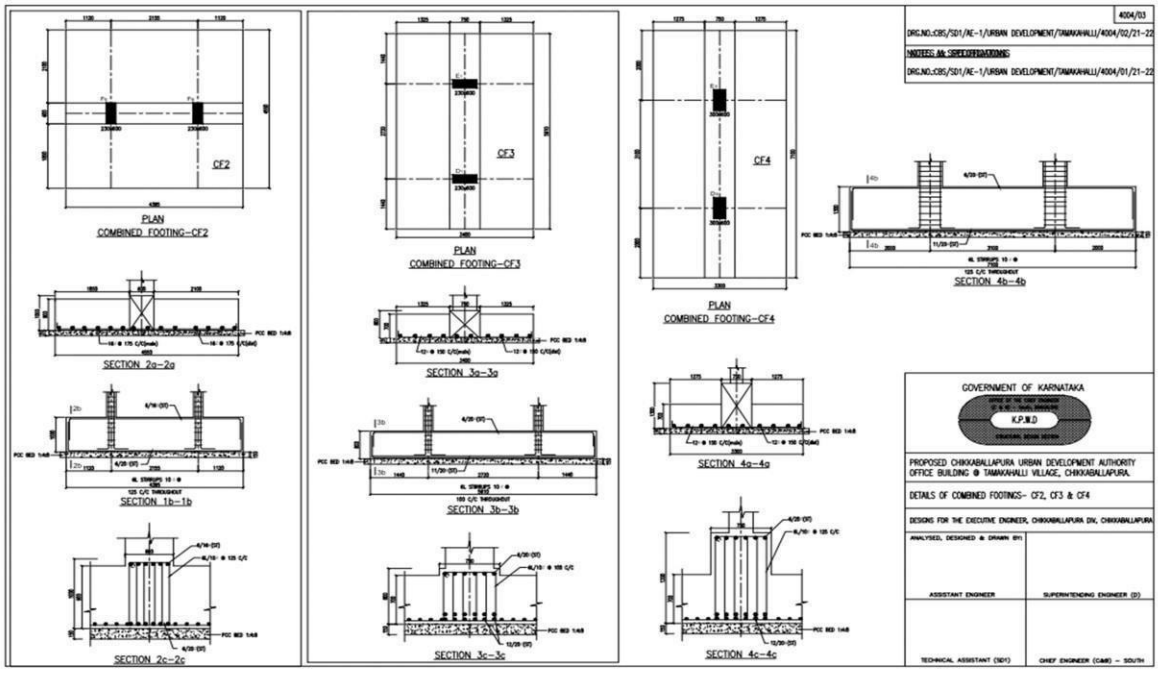


FIG 3.2 REINFORCEMENT DETAILS OF FOOTING

CHAPTER 4

COLUMN CONSTRUCTION

4.1 COLUMN DEFINITION

A column is a vertical structural member intended to transfer a compressive load to the ground through footings.

Columns are typically constructed from materials such as stone, brick, block, concrete, timber, steel, and so on which have good compressive strength.

4.2 COLUMN STARTER

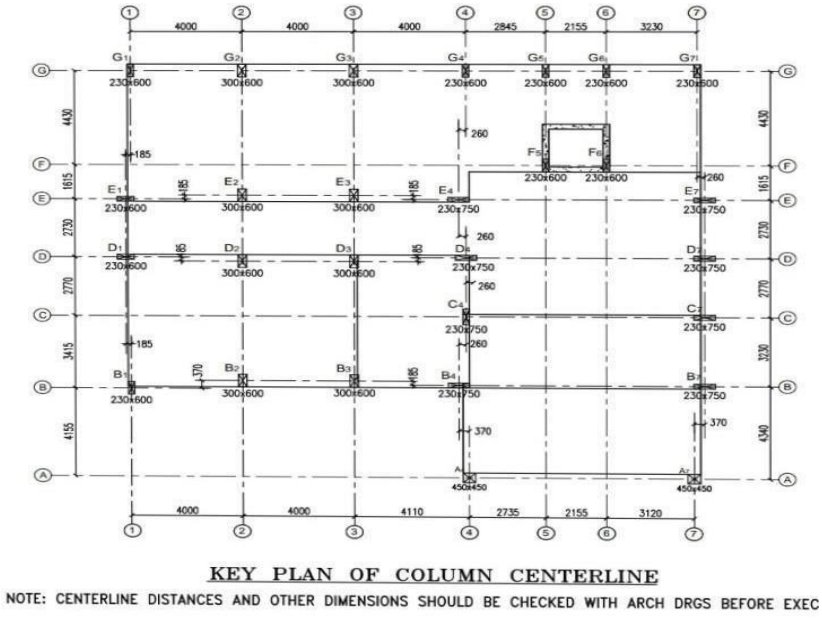


Fig 4.1: KEY PLAN OF COLUMN CENTRELINE

A well-reputed architect always provides the separate drawing which shows the center line or exact positions of each column at the site according to the reference dimensions.

Hence the drawings of the column layout need to be carefully studied and checked whether the location of the column starter is according to the reference dimensions shown in the drawing or not.

Starters are needed to cast the column in proper alignment. Column starter marking is the process of casting the first 50-100mm height of column for the alignment of rest of the column. To

construct the column starter, the shutters are made to the size of the column and height of shutter should be normally 75-100mm. The shutters are fixed at bottom of the column according to the center line. After the curing period is over, remove the formwork of the starter.

FIG 4.2 COLUMN STARTER

4.3 COLUMN REINFORCEMENT

Reinforcement is provided so that size of the column is not increased. It improves the ductility of the member to the structure gets the stability to withstand earthquake in a superior view. Once the column marking is done column reinforcement is carried out as per the structural drawing. Reinforcement bars of 12# 20mm Ø are provided. Ties are used to hold the longitudinal bars to provide to prevent it from buckling. Lateral ties or stirrups of 8mm Ø at 200mm center to center are provided. Maximum reinforcement ratio for columns is 0.08 times the gross area of the column. It brings economy to the design of the columns and prevent steel congestion, which otherwise hinders proper concrete placement.

4.3.1 CHECKING OF COLUMN REINFORCEMENT STEEL

Following checks for column reinforcement should be carried out before column casting. The reinforcement steel should be free of any loose scale, rust, mud, or oil. Main reinforcement and ring of column should be cut as per required length. The stirrups should be carefully cut in length as extra length will result in large size of stirrups/rings resulting in less cover to concrete, which is never advisable. In a reinforcement column, the area of longitudinal reinforcement shall not less than 0.8% or more than 6% of the gross- sectional area of the column as per IS code. A minimum of 4 bars shall be provided in a square or rectangular column.

The bars shall not be less than 12 mm in diameter and spacing of the bars along the periphery of the column shall not exceed 300mm. The diameter of the rings or ties shall not be less than one-

fourth of the diameter of the largest longitudinal bar and in no case less than 6mm. However, we recommended 8mm diameter bars. Main reinforcing bars and stirrups should be tied tightly to each other by using binding wire of proper gauge, preferably 16 gauge. Check the size of stirrups before tying. Hook angle in link or stirrups should be 135°. Lapping should be provided in the central half of the member length and lap length should be 45D (D is the diameter of the bar). Lapping should be in joggle if diameter of bar is more than 12mm. Spacing near support should be less than middle portion of the column. Before placing the concrete, check the reinforcement details with bar bending schedule and get an approval from structural consultant.

4.4 COLUMN SHUTTERING

This helps the structural member to gain sufficient strength to carry its self- load and load from other members. Shuttering of columns after column reinforcement is done by using MS sheets. Thin films of oil or grease should be applied to inner surface of the metal sheets to enable easy removal of the column after the concrete is hardened. Proper supports are provided using props so that it does not move. Diagonals of the shuttering are checked to ensure dimensional accuracy using plum bomb.

FIG 4.3 COLUMN SHUTTERING

4.5 COLUMN CONCRETING

Reinforced concrete column is a structural member designed to carry compressive loads, composed of concrete with an embedded steel frame to provide reinforcement.

Uniform concrete mix is prepared in the ratio of 1:1:2(cement: sand: coarse aggregates). If the quantity of concrete required is less than machine mix can be done whereas for large quantity RMC can be made use. When concrete mix is ready is poured into column boxes or shuttering that is fixed. It is poured in layers by giving vibrations using mechanical vibrators after each layer

to prevent the voids, so that proper compaction takes place. Excess vibration should be avoided as nit leads to separation. 2 minutes of vibration can be provided.

4.6 DESIGN CONSIDERATIONS

MIX ; 25 Concrete

Column sizes: 230*600mm

300*600mm

230*750mm

230*600mm

Clear cover : 40mm

Día of vertical bars: 25mm,20mm

Stirrups : 8#ties @ 200c/c

FIG 4.4 COMPACTION BY MECHANICAL VIBRATOR

FIG 4.5 CURING

CHAPTER 5

STONE MASONRY

The construction of stones bonded together with mortar is termed as stone masonry where the stones are available in an abundance in nature, on cutting and dressing to the proper shape, they provide an economical material for the construction of various building components such as walls, columns, footings, arches, lintels, beams etc.

5.1 SELECTION OF STONE FOR STONE MASONRY

1. Availability
2. Ease of working
3. Appearance
4. Strength and stability
5. Polishing characteristics
6. Economy
7. Durability

5.2 TYPES OF STONE MASONRY

Based on the arrangement of the stone in the construction and degree of refinement in the surface finish, the stone masonry can be classified broadly in the following two categories:

1. Rubble masonry
2. Ashlar masonry

5.2.1 RUBBLE MASONRY

1. Coursed rubble masonry
2. Un-coursed rubble masonry
3. Random rubble masonry
4. Polygonal rubble masonry
5. Flint rubble masonry
6. Dry rubble masonry

5.2.2 ASHLAR MASONRY

1. Ashlar fine masonry
2. Ashlar rough tooled

3. Rock (or) Quarry faced

4. Ashlar chamfered masonry

5. Ashlar block in course

5.3 GENERAL PRINCIPLES

The stones to be used for stone masonry should be hard, tough and durable.

The pressure acting on stones should be vertical.

The stones should be perfectly dressed as per the requirements.

The stone masonry section should always be designed to take compression and not the tensile stresses.

The masonry work should be properly cured after the completion of work, for a period of 2 to 3 weeks.

The mortar to be used should be good quality and in the specified faces.The

construction work of stone masonry should be raised uniformly.

5.4 MORTAR

It's a building material (such as a mixture of cement, lime, or gypsum plaster with sand and water) that hardens and is used in masonry or plastering.

Types of mortar as binding material:

Mortars are classified into the following five categories:

i. Cement mortar ii. Lime mortar iii. Surkhi mortar iv.

Gauged mortar v. Mud mortar

At work site cement mortar is used and 1:6 ratios are used to prepare cement mortar.

FIG 5.1 SIZE STONE MASORY

FIG 5.1 SIZE STONE MASONRY

CHAPTER 6

SOIL FILLING

6.1. DEFINITION

A filling refers to a quantity of earthen material such as murrum, soil, rock, aggregate, shingle, and sand that is placed and compacted in trenches, foundation, and under floors for the purpose of filling in a hole or depression.

6..2 TYPES OF FILLING MATERIALS

- •SOIL OR EARTH
- •MURRUM
- •SAND
- •SHINGLE

6.2.1 SOIL OR EARTH AS A FILLING MATERIAL

The soil used for the filling in a different type of works shall be free from salts, organic, or other harmful matter. Black cotton soil is not recommended for use unless so specified due to its property of high expansion and this is the material used for filling in this constructional soil filling.

FIG 6.1 SAND OR EARTH USED IN FILLING WORKS

6.3. FILLING IN FOUNDATION

•Once the work in the foundation has been completed the space around the foundation masonryin trenches shall be cleared of all debris, brickbats, etc.,

•The cleaned foundation trenches shall be filled with earth in layers not exceeding 250 mm, each layer being watered, rammed, and compacted before the succeeding one is laid.

•Earth shall be rammed with iron rammer where feasible and with the butt ends of crowbar where rammer cannot be used.

FIG 6.2 FILLING IN FOUNDATION.

6.4. BACKFILLING`

The entire space between the substructure i.e., foundation and side of excavation shall be filled back to the original surface level in layer not exceeding 250 mm in thickness. It shall be watered and well compacted by means the rammers to achieve maximum consolidation. For Plinth filling it shall start from the lowest level in the horizontal layer not exceeding 250 mm in depth. Each layer should be compacted by ramming with rammer of 7-10 Kg weight. Filling shall beadequately watered and ramped for achieving maximum compaction.

•Backfilling work shall not start until Site Engineer gives his approval to do so. Material used for backfilling shall be any one or combination of soil types mentioned

•Back filling shall be done in layers of thickness not exceeding 30 to 45cm depending on compaction equipment and method (loose soil before compaction). The soil layer shall then be watered adequately and compacted to minimum 90% to 95% of Standard Proctor Density for soil

other than sand and 85% in case of sand. Compaction shall be carried out at optimum moisture content (OMC). Soil after compaction shall be free from pockets underneath.

•After the compaction of final layer of soil, at least 3 cores shall be taken from the areas directed by Site Engineer and the soil shall be tested in laboratory for the degree of compaction achieved. Results shall be matched above (NOT CARRIED OUT)

•If the soil is excessively wet, it shall be allowed to dry sufficiently before compaction. (Approximately OMC should be maintained)

•Hand compaction shall be resorted to as directed by the Site Engineer. Overall compacted thickness of soil shall be as per drawing.

•Over the compacted ground, rubble soling shall be done. Stones shall be hand packed as close as possible and bedded firmly on broadest base. Void shall be filled with chips and small stones.

FIG 6.3 RUBBLE SOLING

FIG 6.4 BACK FILLING

6.5. PLINTH BEAM

6.5.1 STEEL BARS USED FOR PLINTH BEAM

The two bars with a minimum diameter of 12mm at the bottom of the beam should be provided and at the top of these beams two bars with a minimum diameter of 10mm shall be provided. By 25mm concrete cover reinforcement bars should be protected and stirrups of 6mm and 15cm of spacing are connected.

6.5.2. DETAILING OF PLINTH BEAM

Plinth beam : 230 * 300mm

Grade of concrete : M25 Grade

Steel bars : 12mm diameter

Bottom rods : 3 no. of rods

Top rods : 3 no. of rods

Filling depth from foundation level to plinth level: 275 mm (250-300mm standard)

FIG 6.5 STEEL BARS IN PLINTH BEAM

6.6. FILLING IN PLINTH

•The filling in plinth shall be started from the lowest level in regular horizontal layers, each not exceeding 250 mm in depth.

•Each layer of the filling shall be compacted by ramming with rammers of 7 to 10 kg weight.

•The filling shall be adequately watered for achieving maximum compaction.

•The top surface of the filling shall be neatly dressed level or to a slope or grade as desired.

FIG 6.6 FILLING IN PLINTH BEAM

6.7. FILLING IN FLOORING AND CONSOLIDATION

Generally, for filling in large floors, like factory floors, hangars, etc. compaction is carried out by mechanical means such as sheep-foot roller or by hand roller or by power roller to 90 to 95 per cent of standard Proctor's density under optimum moisture conditions. Here water consolidation method is used with hand ramming procedure

FIG 6.7 FILLING IN FLOORING

6.7.1. CONSOLIDATION

Soil mass is formed of tiny loose particles in which lots of voids are created in between. In such voids either air or water gets occupied unless external pressure or load for compaction is applied to it.

6.7.2. CONSOLIDATION TYPES

•Primary consolidation

•Secondary consolidation

Primary consolidation is carried out here, after the initial consolidation, a further decrease in volume occurs. This time it is due to the expulsion of water from voids. The phenomenon or mechanism is not much simple and faster than the earlier stage. after full saturation, the static steady load applied is now taken up by the water in form of pore water pressure. The question may arise 'Why not by soil particles and the answer for that is water is almost incompressible in comparison to soil. So even soil mass gets compressed water cannot and takes up all pressure. (This phenomenon is beautifully explained by the Terzaghi Spring analogy model). Now on excess pressure in the water, the hydraulic gradient is developed and thus water starts to flow forming capillaries and release out. The pressure is now transferred to soil and thus closes capillaryvoids resulting increase in effective stress and a decrease in volume. The rate and magnitude of decrease in volume depending upon the permeability of the soil. Thus, their rate is different for various types of soil i.e., in fine-grained soil (like clay) consolidation occurs for long time and coarse-grained soil (like sandy loam) it takes comparatively shorter time due to high permeability.The primary consolidation is simply known as "Consolidation" over a large scale.

FIG 6.8 CONSOLIDATION AFTER FILLING

CHAPTER 7

UNDERGROUND WATER TANK

7.1 UNDERGROUND WATER TANK

Underground water tanks are structures which act as a reservoir for small domestic or commercial buildings. Basic components of underground water tanks are base slab, side walls, and Roof slab. Tanks are very ductile, enabling to withstand seismic forces and varying water backfill, Tanks utilize materials efficiently – Steel in Tension, concrete in compression.

Underground Water tanks have low maintenance throughout the life as these are built with concrete, durable material that never corrodes and does not require coating when in contact with water or the environment. The main advantage of underground water tank is that the temperature is lower than the overhead tanks, which will reduce evaporation inside water tank.

Underground water tank faces different types of loads compared to other structures, they mainly face horizontal or lateral loads due to earth pressure and water pressure or any liquid pressure which is been stored in the tank. The side walls of the underground water tank will face greater load at the bottom and the load linearly decreases towards the top.

The underground water tank not only faces load inside the tank it also has to bear the surcharge above the ground level. So, the roof slab of the underground tank should have enough strength to with stand the surcharge.

7.2. IMPORTANCE OF UNDERGROUND WATER TANK

Seepage

It’s very important to store water and not to lose it. The tank should have a durable, watertight, opaque exterior and a clean, smooth interior. Below ground tanks must also be plastered well and correctly installed, otherwise they can collapse.

Evaporation

All storage tanks should have a roof made from locally available materials. A tight-fitting top cover prevents evaporation.

Safety

We should prevent mosquito breeding and keeps insects, rodents, birds and children out of the tank. A suitable overflow outlet(s) and access for cleaning are also important. **Storage of water**

It is very imperative for all tanks to store water because the main process of tank is to store water due to lack of running fresh water in all areas.

Emergency

Underground water tanks are used as reservoirs where water is pumped to overhead tanks. When water is not available it will help us to store and use water.

7.3 TYPE OF WATER TANK BASED ON MATERIAL:

CONCRETE TANK:

Concrete water storage tanks can be built above grade or mostly hidden from view.

They are built on site because of the material's weight. Concrete is a porous material and needs to be sealed to prevent minerals leaching in to water. With proper sealing and construction techniques, this is can be addressed. Mining production and delivery of concrete is energy intensive. The advantage is achieved by its long life and its ability to be simply recycled. Choosing a tank material choice is wonderful, but as you can see, there are advantages and disadvantages with each type of tank, particularly when it comes to environmental impacts – so it's really a matter of gagging your needs and budget and then choosing the lesser of the evils. In regards to the financial side the things, bear in mind not just the initial cost, but how many times the tank will need replacing over 10 years. This also plays a role in the concrete tanks have been used in rural areas for many years but are becoming more common in the city, particularly precast underground concrete tanks that can be placed under driveways or front and back yards. The advantage of underground concrete tanks is that they can collect large volumes of water in properties tight for space that could not otherwise accommodate above-ground tanks. Housing with small gardens still consume large volumes of water internally through laundries, toilets and showers and could benefit from using underground concrete tanks for 'whole of house' water supply

7.4 ADVANTAGES OF CONCRETE WATER TANK

7.4.1 COST:

The concrete tank its self is generally only slightly more expensive than some steel options, however it becomes more expensive per liter when placing concrete tanks underground as excavation, transport and crane hire (for larger tanks) can be quite expensive.

7.4.2 DETERIORATION / LIFE SPAN / DURABILITY:

Concrete tanks are extremely durable and most purpose – built concrete rainwater tanks have plasticizers added for strength and are poured into a seamless mould to prevent leaks. Most manufactures offer warranties of between 20 and 30 years, however a good quality concrete tank can last several decades. While not as easy to repair as steel or fiberglass tanks, leaking concrete tanks can be fixed with various sealants depending on the size of the crack and the position.

7.4.3 SIZE AND SHAPE:

There are more and more companies producing pre-cast concrete tanks in many shapes and sizes including rectangular ones that fit neatly under driveways. Underground concrete tanks can also be casted on site (in situ). Most concrete tanks, whether pre-cast or built on site, are designed to be load bearing and are therefore ideal for placing under driveways.

Water quality: Some older concrete tanks may leach lime, increasing the PH of water and affecting its taste. However, in most cases the water quality most concrete tanks are very good. Concrete tanks tend to keep the water cooler than most other tanks, reducing the likelihood of bacterial growth.

7.4.4 SITE PREPARATION:

Concrete tanks are extremely heavy and therefore some settling tends to occur once put in place The use of packing sand or cracker dust is recommended and it may be worth rolling or compacting the sand before installing the tank to reduce initial movement. It is advisable to allow the tank to settle for a number of weeks before connecting fixed plumbing of resources used.

7.4.5 DESIGN CONSIDERATION

Excavation of soil: 3.2 m

PCC: M10 grade, 0.15 m thickness

Clear cover: 30 mm

Inner – Inner: width = 2.5 m

Length = 4.5 m

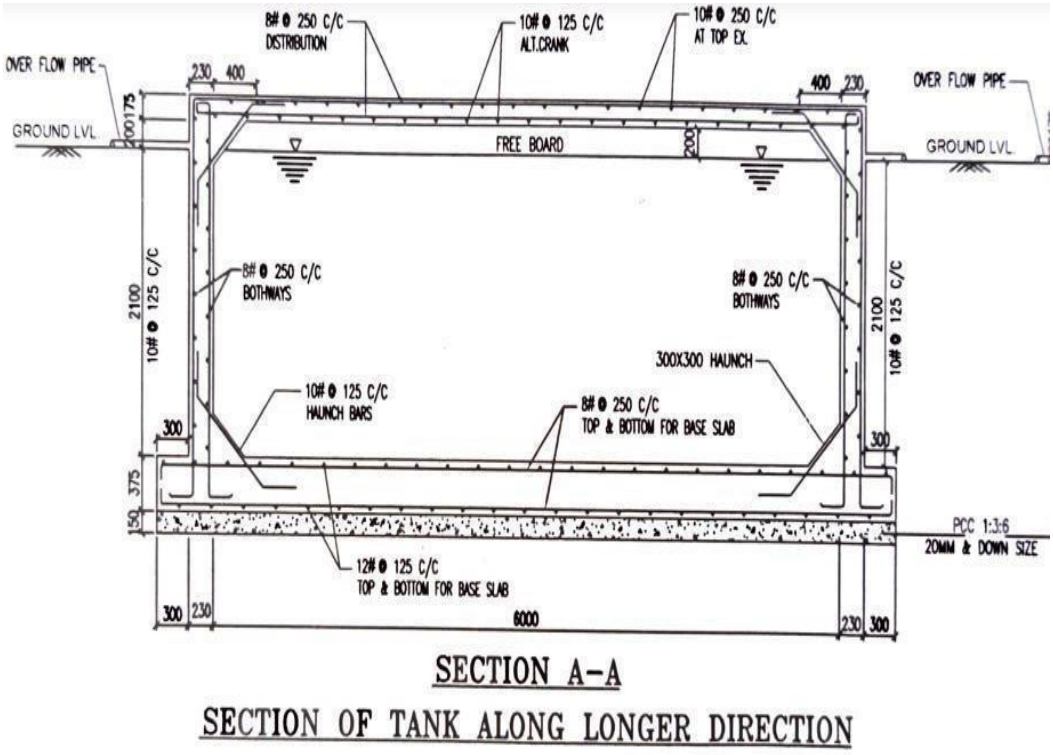


FIG 7.1 SECTION OF TANK ALONG LONGER DIRECTION

FIG 7.2 PCC BED FILLING

FIG 7.3 PCC BED CURING

FIG 7.4 REINFORCEMENT OF WATER TANK

FIG 7.5 SLAB CONCRETING

FIG. 7.6 SHUTTERING FOR CONCRETE FILLING

FIG. 7.7 CURING OF WATER TANK

CHAPTER 8

CONCLUSION

- The internship is a bridge between the theoretical knowledge and the practical or the reality work at the field of construction or civil engineering work.
- we all who take the internship class go the companies that already working either as a consultant or a contractor. This program played an important role to break the conventional thought that field works can be only implemented by students who hold a degree or people who have an experience in building construction.
- As an undergraduate, this training program was an excellent opportunity for me to get to the ground level and experience the things that I would have never gained through going straight intoa job. Internship was very great opportunity I got to apply the theories that I learnt with the real industry for real situations.
- Having exposed to situations I was able to obtain lot of experiences which will be definitely helpful to attain success in my future career as an engineer.
- Finally, I can say with a great pleasure that 30 days of internship was a helpful period of time for me to excel my skills.
- The experience I gained through this training program will be a strong foundation to my career.

PHOTO WITH SITE ENGINEER

REFRENCES

1. IS 456-2000
2. Hand book on construction practices
3. The high yield strength deformed bars of Fe500 conforming IS 1786-2008 were used.
4. Fabrication details of reinforcing bars such as laps, hooks, bends conforming to IS 456 and IS 2502 were used.
5. Drawing details provided by PWD office.