A REPORT

ON

MOBILE TOWER CONSTRUCTION BSNL

BY

NAME OF THE STUDENT ID No.

VIKAS V 2022A3PS1338H

AT

HCIN NETWORKS PRIVATE LIMITED- BENGALURU

A Practice School Station of

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI

(JUNE 2024)

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VIKAS V	2022A3PS1338H	EEE

Prepared in partial fulfillment of the Practice School-I Course Nos.

BITS F225

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Firstly, I am grateful to BITS PILANI University for providing me with the opportunity to work with HCIN Networks Private Limited, enabling me to gain invaluable industry experience.

I extend my heartfelt thanks to our faculty-in-charge for their organized events, seamless coordination with mentors, and ensuring a smooth workflow throughout.

Lastly, I express my sincere appreciation to Mr. Manjunath, Chief Projects Officer at HCIN Networks Private Limited, for his comprehensive guidance throughout the project. His detailed explanations, regular task assignments, and unwavering support were instrumental in successfully completing our tasks.

ABSTRACT SHEET

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE PILANI (RAJASTHAN)

Practice School Division

Station: HCIN NETWORKS PRIVATE LIMITED **Centre:** Bengaluru

Duration: 8 Weeks **Date of Start:** 28 May 2024

Date of Submission: 25 June 2024

ID no./Name/Discipline: 2022A3PS1338H/VIKAS V/EEE

Name and Designation of the Expert: Manjunath, Chief Projects Officer

Name of the PS Faculty: Ramesha Rao

Keywords: Telecommunications, BSNL, Network Coverage, Tower Construction, Signal Optimization, Connectivity Improvement, Structural Design, Infrastructure, Data Traffic, Communication Services, Improving Time and Cost Effeciency

Project Areas: Site Selection, Network Planning, Installing Proper Earthing System, Installing Solar panels, Fencing, Project Management

Abstract: The "Tower Construction Project for BSNL Networks" aims to enhance coverage and connectivity by building new telecommunications towers in underserved regions. This involves site selection, structural design, and erection of durable, reliable towers adhering to industry standards and safety regulations. The project will optimize signal reach, address coverage gaps, and support increased data demands, ultimately improving network performance and service quality for BSNL customers across India.

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INTRODUCTION

HCIN Networks, backed by over 15 years of experience is a telecommunications company focused on providing advanced networking solutions tailored to meet the needs of modern businesses. Specializing in network infrastructure, HCIN Networks offers a range of services including network design, implementation, and management. With a commitment to reliability, scalability, and security, HCIN Networks strives to enhance connectivity and optimize network performance for its clients. Through innovative technologies and personalized service, HCIN Networks aims to empower businesses with robust and efficient networking solutions that support their growth and operational goals.

The "Tower Construction Project for BSNL Networks" is an initiative designed to bolster Bharat Sanchar Nigam Limited's (BSNL) telecommunication infrastructure by constructing new towers in areas with insufficient coverage. This project addresses the critical need for enhanced connectivity and improved network performance in underserved regions. By implementing state-of-the-art structural design and adhering to rigorous safety standards, the project aims to provide robust and reliable communication services. The initiative will support increased data traffic, optimize signal reach, and ensure high-quality service for BSNL customers, aligning with the company's mission to deliver accessible and efficient telecommunications across India

EARTHING (Conventional)

Total Earth Pits required: 4(including one test pit)

Earth Pit 1:

- Tower grid earthing for tower body
- Tower LA

Earth Pit 2:

- Solar Panel
- Alternate Current Distribution Box (ACDB)
- SMPS/CCU
- Batery Bank

Earth Pit 3:

- EB neutral and DG earthing using GI pipe

Total GI plates in one earth pit needed = 4

From plate no.2 one GI strip is connected for Earthing tower body and another GI strip is connected for earthing LA

From plate no.1 one GI strip is connected to Power Room

4 GI strips are required for connecting 4 GI plates in the pit

Total GI strips required for one Earth Pit = 6

Dimension of GI plate = 400x600x6.5mm

Dimensions of each GI strip = 50x3 mm

Depth of Earth pit=3m

Dimensions of Earth pit= 2x2x3mm

Standard Earth Resistance= 0.5 Ohm

Earth Pit Dimension: 2x2x3m

Test Pit Dimension: 0.3x0.3x0.45m

Tower Dimension: 4.5x4.5x40m

Earthing Process

Methods:

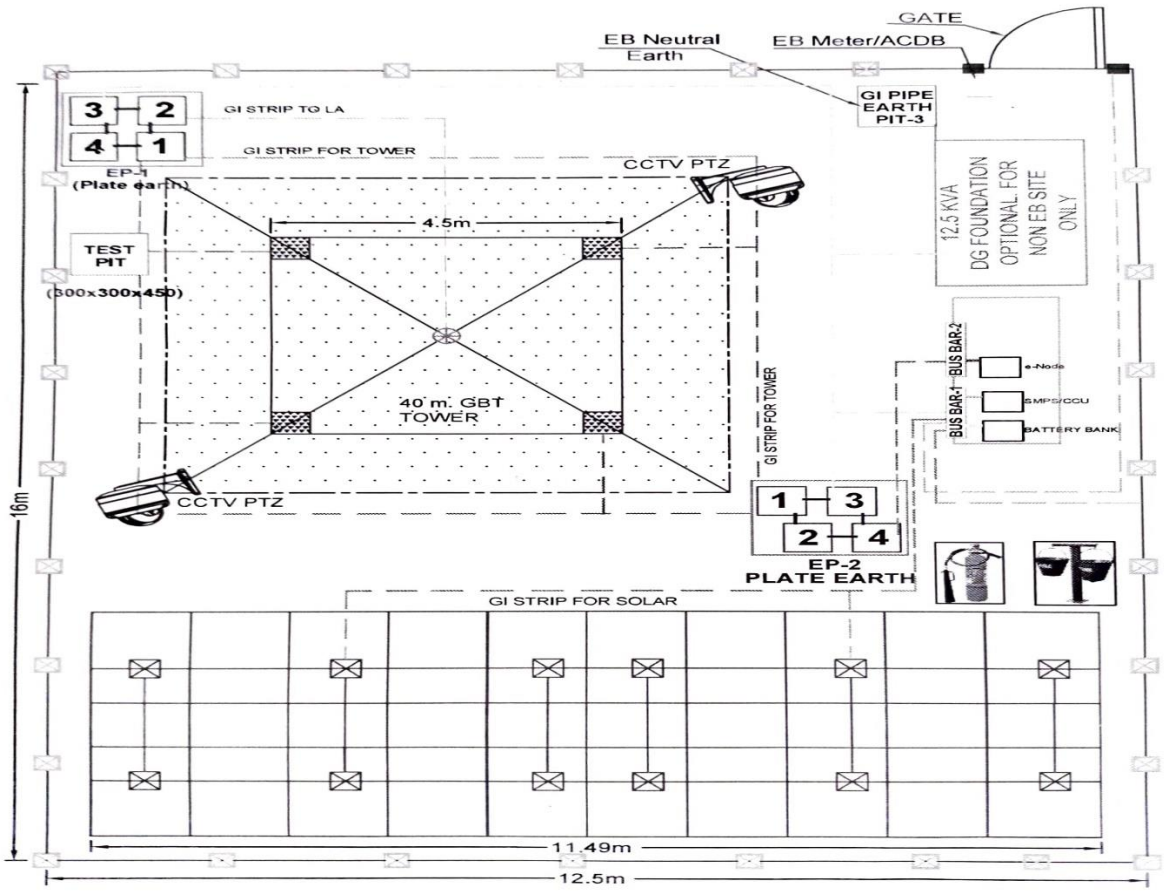
- **Plate type (using Cast Iron plate, Galvanised Iron plate, Copper Plate)**
- **Pipe type (using GI pipe of 75mm, 10ft, 6 holes for connection of earth wires and inserted in ground)**

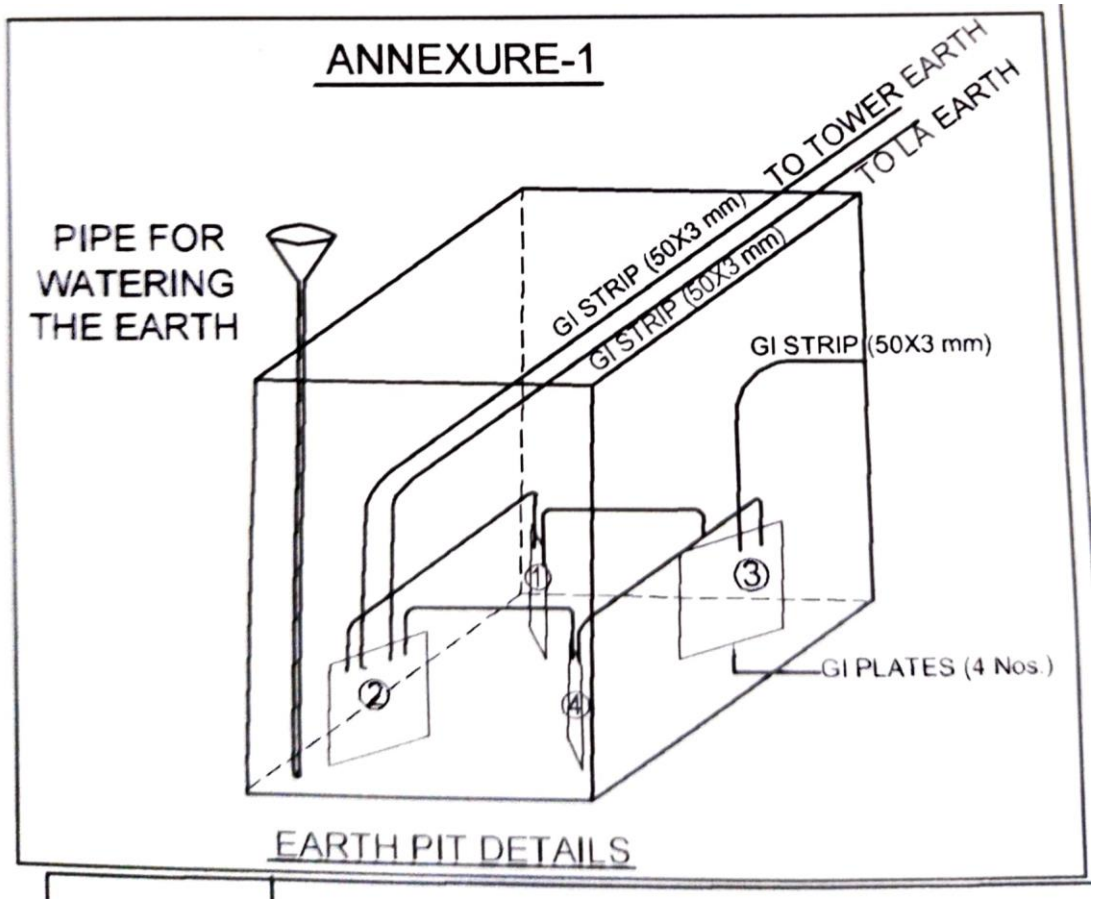
Method For Construction of Earth Pit:

- Excavation (2x2x3m)
- Placing GI plates (400x600x6.5mm) for more contact of earth and reduce earth resistance
- Fill the pits with mixture of wood coal powder salt and sand in equal part
- Wood coal powder good conductor of electricity, anti corrosive, longer plate life
- Coal and salt to keep soil wet permanently
- Use GI strip to connect GI plate to earthing system
- Cover the GI strip with GI pipe(2.5” diameter) with flange
- Cover top of GI pipe with T joint to avoid jamming of pipe with dust and water
- Use GI pipe to water the bottom of earth plates

Factors affecting earth resistivity: (Standard Earth Resistance=0.5 ohm)

- Physical Composition of Soil (depends on soil variety)
- Moisture present in soil
- Dissolved salts (small quantity of dissolved salts can reduce resistivity upto 80%)
- No. of plates
- Area Available(Distance between electrodes must be equal to driven depth to avoid overlapping of resistance area of influence)
- Current magnitude(More Current ->More drying of soil->More resistance)


GATE
EB Neutral
Earth
EB Meter/ACDB
GI PIPE
EARTH
PIT-3
3
2
4
1
GI STRIP TO LA
GI STRIP FOR TOWER
EP-1
(Plate earth)
CCTV PTZ
4.5m
TEST
PIT
(300x300x450)
12.5 KVA
DG FOUNDATION
OPTIONAL FOR
NON EB SITE
ONLY
40 m. GBT
TOWER
BUS BAR-2
BUS BAR-1
e-Node
SMPS/CCU
BATTERY BANK
GI STRIP FOR TOWER
CCTV PTZ
1
3
2
4
EP-2
PLATE EARTH
GI STRIP FOR SOLAR
16m
11.49m
12.5m


ANNEXURE-1
PIPE FOR
WATERING
THE EARTH
TO TOWER EARTH
TO LA EARTH
GI STRIP (50X3 mm)
GI STRIP (50X3 mm)
GI STRIP (50X3 mm)
GI PLATES (4 Nos.)
1
2
3
4
EARTH PIT DETAILS

Resistance of plate electrode to earth

R=r/A * sqrt(pi/A)

r=resistivity of soil

A=area of earthing plate

Chemical Earthing

- **Filler:** Advanced form of conventional earthing where silica associated back fill along with bentonite is used in place of charcoal and salt
- **Electrodes used:** Pure copper earthing electrodes, copper bonded earthing electrodes, GI earthing electrodes in place of pure copper earthing plates.
- **Life:** 12-15 years in comparison to conventional earthing 3-4 years
- Relatively cheaper in comparison to conventional earthing in terms of service life

Method of Earthing(Hybrid):

- 6 Earth Pits in total (1 Test Pit, 2 Chemical Earth Pit, 3 Conventional Earth Pit)
- Earth Pit 1: Tower Earthing
- Earth Pit 2: For LA
- Chemical Pit 1: Solar, SMPS/CCU, Battery Bank, ACDB
- Chemical Pit 2: BTS, Media Equipment
- Earth Pit 3: EB/DG neutral for GI pipe earthing

All the other details are same as the Conventional Earthing

SOLAR PANEL

2 solar panels of 5kW each = 10kW (Total Power Of Solar panel)

Gap between legs of Solar panel = 1187 mm

Dimensions

1st 4 columns: 1464x2304 mm

2nd 4 columns: 1800x2304mm

3rd 4 columns: 1300x2304mm

Gap between fence and solar panel= 619 and 520 mm

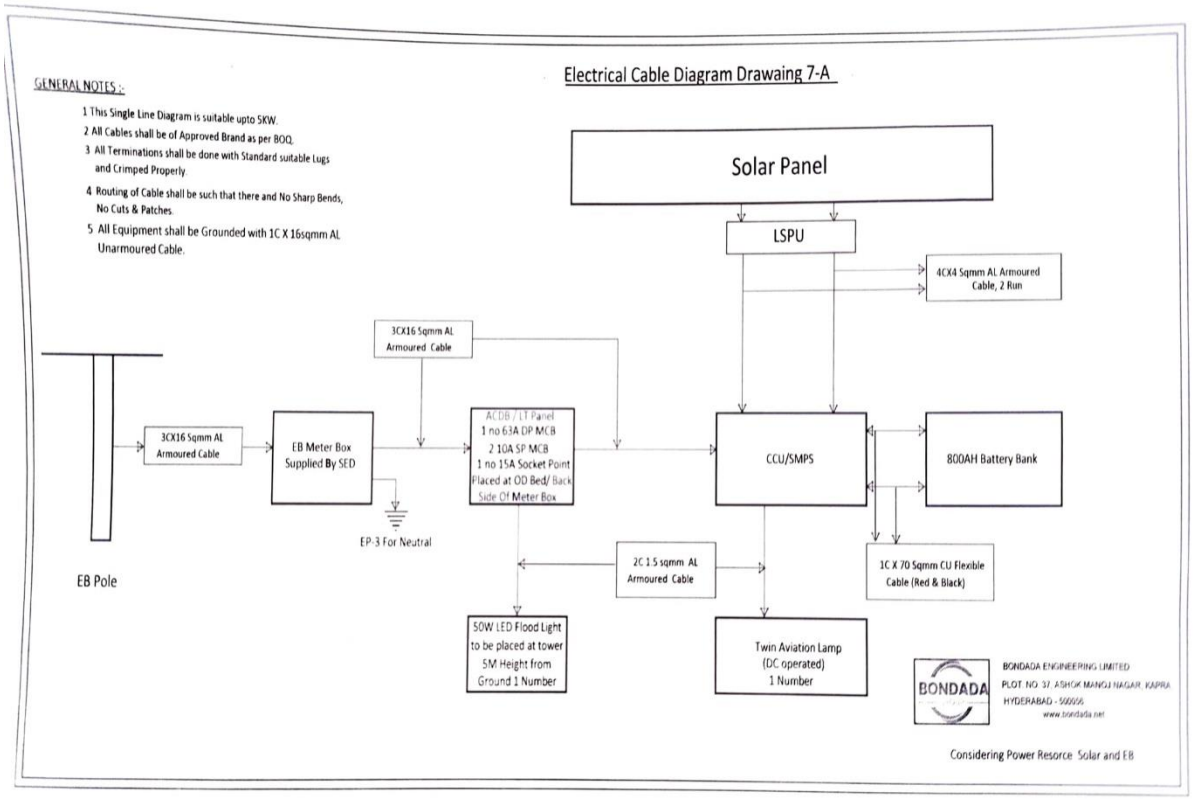
Fencing dimensions: 12.5mx16m

Solar Foundation length=11.49m

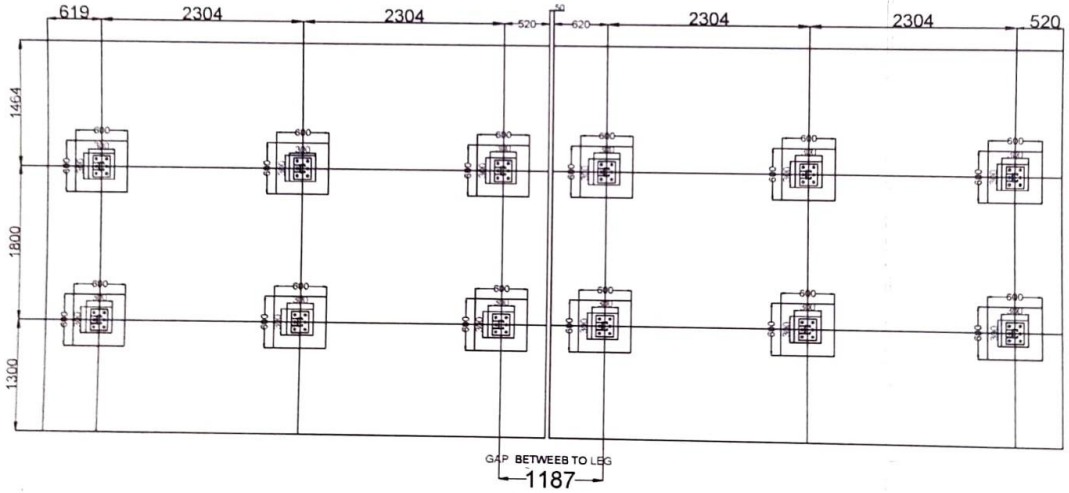
Increasing Effeciency of Solar Panel using:

1. Charge Controller: A charge controller is a device in solar power systems that regulates the voltage and current from solar panels to batteries. It prevents overcharging, over-discharging, and ensures the batteries receive the proper voltage, enhancing their lifespan and efficiency.

2. MPPTs (Maximum Power Point Trackers) are advanced charge controllers used in solar power systems. They optimize the power output from solar panels by continuously adjusting the electrical operating point to ensure the panels produce their maximum power, especially in varying sunlight conditions. This increases the efficiency and energy harvest of the system.



SOLAR FONDATION DRAWING



PLAN FOR 12 COLUMNS (2x5=10 kw)

BOQ

ITEM	DIMENSIONS	QUANTITY	PRICE/m	Sub Total/m
EB pole installation		1	20000	20000
3CX16 sqmm cable (armoured)	16 sqmm	3	50	150
4CX4 sqmm cable (armoured)	4 sqmm	2	73	146
2CX1.5 sqmm cable (armoured)	1.5 sqmm	1	52	52
1CX70 sqmm cable (armoured)	70 sqmm	1	475	475
1CX16 sqmm cable (unarmoured)	16 sqmm	10	32	320
EB Meter Box		1	5000	5000
ACDB Panel		1	3900	3900
50W LED Flood light		1	1200	1200
Consumer Control Unit		1	4259	4259
SMPS		1	570	570
Twin Aviation Lamp		1	5500	5500
800AH battery bank		1	8500	8500
Solar panel (5kW)		2	275000	550000
63A Double Pole MCB		1	795	795
10A Single Pole MCB		2	362	724
15A Socket Point		1	300	300
DG Set (12.5kVA)		1	150000	150000
AMF/ATS panel		1	10000	10000
CCTVs		2	4000	8000
GI strips	50x3mm	28 (7 for each pit)	338	9464
GI plates	400x600x6.5mm	16 (4 for each pit)	85	1360
Bus Bars		2	700	1400
Salt and Charcoal		8 kgs	47	1504
				Total Cost
				783619

CONCLUSION

The Rough Time Estimation for the project based on above data is as follows

1. **Site Assessment and Preparation:**

   Duration: 1-2 days

2. **Design and Planning:**

   Duration: 2-3days

3. **Procurement of Materials:**

   Duration: 6-9 days (overlaps with design and planning)

4. **Installation of Mounting Structures and Earthing Preparation:**

   Duration: 1-2 days

5. **Installation of Solar Panels and Earthing System:**

   Duration: 2-3days

6. **Electrical Connections and Inverter Setup:**

   Duration: 1-2 days

7. **System Testing, Earthing Verification, and Commissioning:**

   Duration: 1-2 days

Total Estimated Duration: 18-25 days

The rough cost estimation for the project is as follows

1. **Solar Panel System: Cost Range: ₹11,25,000 - ₹13,50,000+**
2. **Earthing System: Cost Range: ₹75,000 - ₹1,00,000+**
3. **Total Estimated Cost (Combined):Range: ₹12,00,000 - ₹14,00,000+**