TOPOGRAPHICAL SURVEY REPORT

Name of Project :-

TOPOGRAPHICAL SURVEY WORK AT PUNE JUNCTION RAILWAY STATION.

Prepared By

SD ENGINEERING

Written	Approved
SD Engineering	
	
Date and Signature	Date and Signature

Rev	Date	Author	Affected section	Changes
0	15/7/2024	SD Engineering		

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1 INTRODUCTION:

1.Pune Junction railway station (Co-odinates. 380966.6550 E, 2049084.2000 N) is the main railway junction of the city of Pune, India. It is one of the major railway junctions in Maharashtra. Pune Junction consists of 6 platforms. It also has a suburban train network.

2 .It has two accesses, from HH Aga Khan Road on the south and Raja Bahadur Mills Road from the north. It is controlled and regulated by the Pune Police and Central Reserve Police Force.

3 The first passenger train in India ran on 16 April 1853 on the track laid by the Great Indian Peninsula Railway from Chhatrapati Shivaji Maharaj Terminus in Mumbai to Thane. The GIPR line was extended to Kalyan in 1854, then on the south-east side to Khopoli via Palasdari railway station at the foot of the Western Ghats in 1856. While construction work was in progress across the Bhor Ghat, GIPR opened the Khandala–Pune track to the public in 1858. The Pune railway station opened in 1858. The Bhor Ghat incline connecting Palasdari to Khandala was completed in 1862, thereby connecting Mumbai and Pune. The present Pune railway station building was built in 1925.

4 The Pune–Raichur sector of the Mumbai–Chennai line was opened in stages: the portion from Pune to Barshi Road was opened in 1859, from Barshi Road to Mohol in 1860 and from Mohol to Solapur also in 1860. Work on the line from Solapur southwards began in 1865, and the line was extended to Raichur in 1871.

5 The Southern Mahratta Railway (SMR) completed the metre-gauge Vasco–Guntakal railway line along with the branch from Londa to Pune via Miraj in 1890. The Pune–Londa main section was converted from metre-gauge to 5 ft 6 in (1,676 mm) broad gauge in 1971

6 This station has three footbridges with a skywalk. Elevator service is available on the footbridge. Plans are being made to upgrade the station to greater standards.

7 As a protection against the coronavirus, Central Railway's Railway Protection Force has deployed a robot, 'Captain Arjun', to screen patients and enhance security surveillance at the station. Its electronic eyes are useful for screening passengers during boarding. The robot will help protect passengers and rail staff from infection in addition to performing security maintenance. The robot is equipped with motion sensors, one pan-tilt-zoom camera and a dome camera, which uses artificial intelligence to track suspicious or anti-social mischief makers in the station. Recently, Indian Railways has also launched its first food truck at the Railway station. It is maintained by the Quick Service Restaurant brand Jumboking. In addition to this, there are 14 food stalls which are currently functional at the Pune Railway station as per IRSDC. These are located at different parts of the station and platforms. Other amenities in the station include waiting halls, dormitories, retiring rooms, cloak rooms, book stalls, health kiosks, pay and use toilets, SBI credit card kiosks, ATMs, water vending machines, pay and park and many others for the convenience of passengers. Facility management at the station is facilitated by The Indian Railway Stations Development Corporation Limited (IRSDC)

8 As part of its modernisation and beautification of the station, IRSDC is taking various initiatives and measures to upgrade facilities in and around the railway station. Some of these are undertaken in collaboration with leading third-party vendors.

2.OBJECTIVE:

Consultancy Services for Preparation of Detailed Topographical Land Survey of the existing **Pune Junction Railway station** of Western Railways in connection with Preparation of Technical Feasibility Study and Master Plan for Development / Redevelopment of Pune junction Railway Station on the Indian Railway Network.

In pursuance of letter award issued by **CREATIVE GROUP LLP** to M/s. SD Engineering (herein after referred as Agency) vide its Work order No. CGLLP/WO-Survey/Pune/2023-24 /W01-, Dated 19.06.2024 “Consultancy services for carrying out Topographical survey of PUNE Railway Station”. This report is prepared and delivered to give an overview of the various aspects of the survey work.

3 RECONNAISSANCE SURVEY

Reconnaissance survey of the whole area was carried out so as to understand the complete stretch and the extent of the work involved. Routes to be followed and control on the survey/level lines were ascertained so as to fix the position of various BMs and TBMs/traverse stations as per site requirements.

4 METHODOLOGY

The methodology adopted for carrying out the topographical survey of the area comprises of the following activities:

- Reconnaissance survey of the complete area was carried out so as to understand the complete stretch and the extent of the work involved.
- By using DGPS, Main Control points were established whereas Sub control points were established by using Electronic Total station with least count of 1second.
- Boundary limits were identified & picked up.
- Detailed topographical survey on the scale of 1:1000 by picking up all natural and manmade topographical features was carried. The N, E and Z coordinates of all Travers Station/ offset points were developed using Total Station.(List of such points attached)
- Temporary control points were fixed during Traverse at suitable locations by embedding iron nail in hard surface (mostly on road) to carry out detailed topographical survey of the project area.

4.1 Establishment of Control Points and Data processing:

In order to achieve the "WHOLE TO PART" concept, 4 Nos of precision ground control points (GCPs) were be established using Survey grade GNSS/GPS receivers. The data was observed in static mode and processed in post processing software to obtain Co-ordinates in Cartesian frame (Easting, Northing). A closed traverse using high end Electronic Total Station (ETS) was run in 4 legs in the project area based on these GCPs. Height Control developed using ETS with value of BM as given and shown on ground by Railway Authorities. All Traverse stations were coordinated with height and used during detail ground survey.

- AUTOCAD
- CIVIL 3D
- SURPAD SOFTWARE FOR SURVEY

4.2 Planimetric Control:

DGPS Surveying Techniques:

The precise coordinates of the control points using GPS Equipment were provided. The coordinates were observed in WGS-84 geodetic reference system with UTM 45 Projection system. The total area covered was about 7 Acres. Four No's of such points were provided

well distributed over area of work, with one of them taken as a Base Station, continuously operating during the observation period. The field data was collected using two Geodetic GPS receivers, with one kept fixed as a base station and other one used as rover stations. The base station was observed continuously for approxim..Ately 4-6 hours for that set of observations. Whereas the minimum observation time on roving stations was kept 30 minutes. The logging interval was set as 10 seconds and elevation mask of 15 degrees, to avoid loss of data due to the presence of some tall trees/ buildings in the Area. In most of the cases, the GPS receiver have collected data simultaneously from more than 5 satellites, thus providing good quality data for processing. The data was collected at such a time when GDOP (Geographical Dilution of Precision) value is less than 5 to ensure high level accuracy of resection.

4.3 Data Processing and Results:

The processing of the GPS data, thus collected, was done using GPS Data processing software. The small values of the standard deviation obtained as a result of this data processing, of the order of 5-7 cm, which indicate the good precision of the results obtained. The UTM 45 Projection system was used to convert spherical coordinates in to Grid Co-ordinates.

Instruments used:

Dual frequency GPS with base line static accuracy of 5mm ± 0.5 ppm Antenna used having phase center repeatability of less than 1 mm. And having antenna status probability of 99.99 %

Accuracy Achieved was more than 1:50,000

Establishment of Secondary Control Points:

Based on the grid co-ordinates worked out for Primary GCPs, a close traverse was run in 4 legs to establish secondary control points using precise Electronic Total Station instrument (ETS). This traverse was run from one known point and closed on other known point. During this process numbers of secondary control points were established for detail and contour survey. All necessary care was taken to achieve maximum level of planimetric and elevation accuracy as per requirement.

INSTRUMENT USED:

Electronic Total Station having angle & distance least count of 0.1" & 0.1 mm respectively and angle and distance accuracy of 3" and 2 mm ± 2 ppm respectively.

Accuracy achieved more than 1: 20,000,

Accuracy achieved: 25mm x Sq root of K, where K is level distance in km.

5 DETAILED TOPOGRAPHICAL AND CONTOUR SURVEY OF THE AREA

Detailed topographical survey of all natural and manmade features was carried out by picking up their N, E and Z coordinates of each point using Total Stations with appropriate feature codes attached to each feature within the specified area.

In general, these include:

a. Structures (Slum area), Existing roads, tracks, foot paths, pavement edges, shoulders, toe lines and trees etc. within the required area.
b. All yard features like rail, platform, signals etc
c. Water bodies like drains, Water tanks, bore wells, hand pumps etc.
d. Structures, Foot over Bridges and culverts.
e. Water bodies like water tank, ponds, well and bore wells
f. Utilities - Overhead HT lines, Electric and Telephone lines, IGL and other
g. Features as visible on ground. Station Buildings and fences etc.
h. All trees along with the girth
i. Monuments, Cremation ground, places of worship.

All field data from the Total Stations, and other field records, was downloaded regularly on to computer and processed to form proper connectivity of linear features based on the feature code and sequence of points. Survey data collected in the form of N E Z coordinates was suitably processed. All the requisite features were stored in different layer of Auto CAD file on computer.

6 DATA PROCESSING:

The data from Total Station was downloaded regularly at our office (since the office was not faraway from the survey site) and checked for any connectivity of leaner features based on featurecode and sequence of points taken. The downloaded and corrected data was then processed andprepared a basic drawing in AutoCAD. The generated drawing was printed and the same was checked at site and field work found within desired accuracy of mapping scale.

7 FEATURE CODES:

Pre defined unique feature codes were used while picking up the features (x, y and Z) on the ground by Total Station.

7.1 PLATFORM DETAILS

This station has three footbridges with a skywalk. Elevator service is available on the footbridge. Plans are being made to upgrade the station to greater standards.

PLAFORM NO. 1 AND 2 AND OTHER 4

Such places typically include various amenities and facilities like toilets, food shops, waiting rooms for different classes (upper and lower), ticket counters, sleeper rooms, clock rooms (for baggage storage), and

1. Ladies Waiting Room: A designated area for women passengers to wait comfortably before boarding their trains.

2. AC Waiting Room: A waiting area equipped with air conditioning, typically offering a more comfortable environment for passengers willing to pay for this service.

3. General Waiting Room: A standard waiting area available to all passengers, regardless of class or ticket type.

4. Toilet: Restrooms for passengers.

5. Food Shop: A place where passengers can purchase food and beverages.

6.Waiting Room: A designated area where passengers can wait for their trains.

7. Ticket Counter: Where passengers can buy tickets or inquire about travel details.

8. Sleeper Room: Likely refers to a room or area where sleeper class passengers can wait or rest before boarding.

9. Clock Room: A facility for storing luggage temporarily, often with a clock indicating departure times.

10. Upper Class Waiting Room: A waiting area specifically for passengers traveling in higher clas.

11. Shops: Places where passengers can purchase various goods, snacks, and beverages.

12. Water Tap: Usually located for passengers to refill water bottles or access drinking water.

8 SURVEY EQUIPMENT IN USE ON THE PROJECT

The following state of the art equipment & technology were used to conduct the topographical survey of the project site (PUNE Junction):

Sl. No.	Equipment	Sl. No.	Accuracy
1	Sokkia DGPS GRX3	1495-10050	1sec
2	Sokkia Total Station	CS 55	5sec
3	Sokkia Total Station	CX 105	1sec

9 DETAILS OF THE MANPOWER:

Sl. No.	Designation	Experience/Qualification	Numbers
1	Project Co-ordinator	13 years	1 No.
2	Engineer	5 years	1 No.
3	Co-ordinator	3 years	1 No.
4	Surveyor	3 years	3 Nos.

10 QUALITY CONTROL:

Adequate quality assurance measures introduced in the methodology were followed at every stage. The designated senior surveyor assigned for project carried constant supervision of day-to-day survey activities and followed adequate survey procedures**.**

11 FINAL DRAWINGS:

The hard copy output of the plan survey drawing on suitable scale was taken to the ground for physical verification and incorporation of relevant ground information.

Drawing includes: 1) Topographical plan of site

12. EXISTING PLATFORM OFFICE AND STRUCTURE

PLATFORM NO.1	
BOOKING COUNTER OFFICE	STATION DIRECTOR OFFICE
UPPER CLASS WAITING ROOM	DY STATION MANAGER OFFICE
CLOCK ROOM	SLEEPER CLASS WAITING ROOM
SECOND CLASS WAITING HALL	AC WAITING ROOM
CHIEF HALTH INSPECTOR PUNE	WAITNG ROOM
ELECTRICA MAINTENAN OFFICE	DIVIONAL CHIEF TICKET CENTRAL
CHIEF HEALTH INSPECTOR PUNE	WAITNG ROOM LADIES
S.R SECTION ENG WORK PUNE	CENTRAL RAILWAY LABOURS OFFICE
HOTEL OM SAI	PARCEL P.F AREA
RAILWAY PLICE STATION	
FOORD TRACK PLAZA	
SIDDHI VINAYAK FOOD SCRVICES	
CABIN	

PLATFORM NO.2 AND 3	
TOILET	DUTY OFFICE
SHOP	WATER TAB
PLATFORM NO.4 AND 5	
TOILET	SHOP
WATER TAB	
PLATFORM NO.6	
TOILET	SHOP
WATER TAB	EPB AREA
STATION AREA BUILDING	
CENTRAL RAILWAY HOSPITAL PUNE	CITY BUS STOP
POLICE STATION	RAILWAY CONSUMER OFFICE
TEMPLE	


पुणे जंक्शन
पुणेजंक्शन PUNE JUNCTION


GPS Map Camera
पुणे,MH,भारत
Arjun Raivar Path, Pune Cantt Township, पुणे, 411001, MH, भारत
Lat 18.527345, Long 73.870976
07/01/2024 11:27 AM GMT+05:30
Note : Captured by GPS Map Camera


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PUNE JUNCTION


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SITE PHOTOGHRAPH

PHOTOGHRAPH OF PLATFORM


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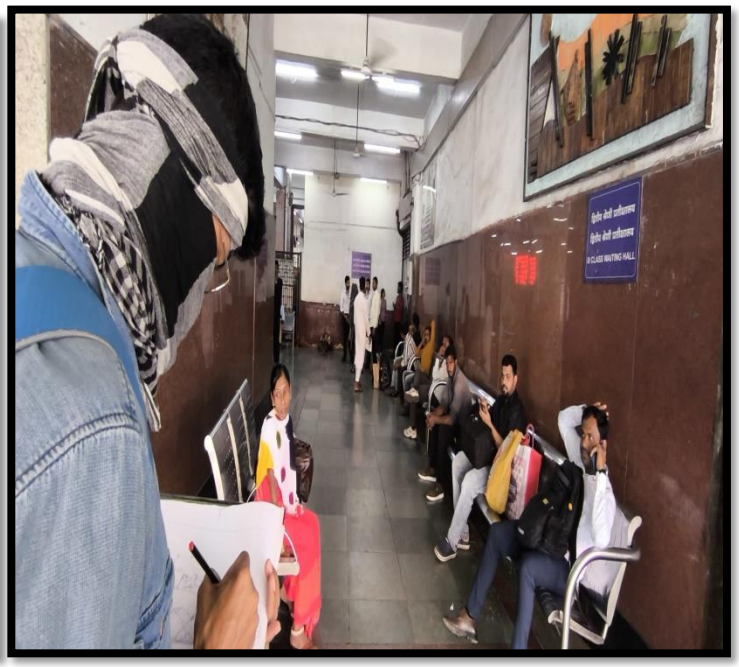
PUNE JUNCTION



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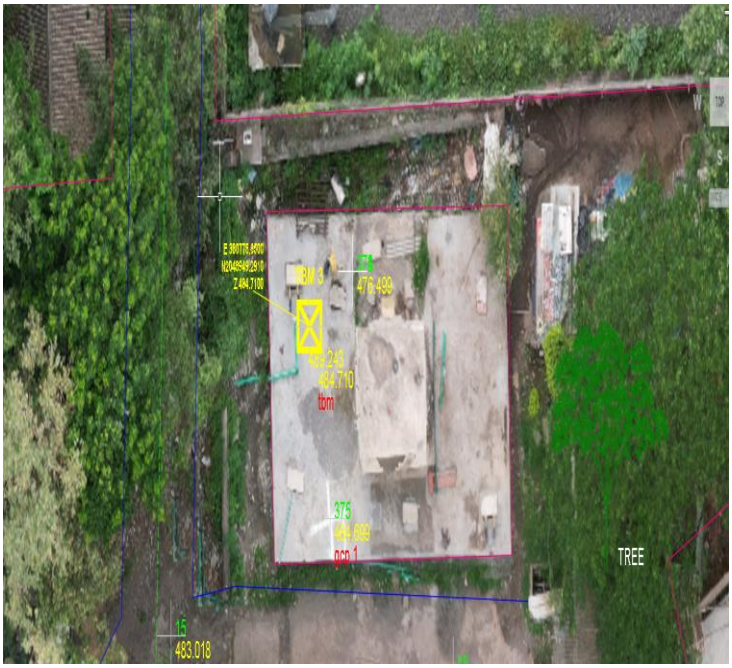
13.THE TABLE BELOW IS COMPILATION OF ALL THE POINT FROM TOPOGRAPHICAL PLAN

SR.NO.	EASTING	NORTHING	ELEVATION
TBM 1	2049123	380761.4	484.052
TBM 2	2049059	380818.1	483.585
TBM 3	2048949	380778.7	484.71

SR.NO.	CONFIRMATORY POINTS	EASTING	NORTHING	ELEVATION
1	ROAD LEVEL	380550.7750	2048752.4600	483.1030
2	ROAD LEVEL	380953.7860	2048930.9420	485.220
3	ROAD LEVEL	380902.1000	2048907.0920	485.286
4	ROAD LEVEL	381144.2562	2049012.5516	485.7650
5	ROAD LEVEL	381149.9509	2049033.9322	484.6540
6	PLATFORM 1	380966.6550	2049084.2000	484.2030
7	PLATFORM 2	381265.7640	2049121.3100	484.323
8	PLATFORM 3	381008.7640	2049148.2480	484.248
9	RAIL LEVEL	380767.0530	2049114.9590	483.281
10	RAIL LEVEL	380794.3640	2049093.5800	483.438

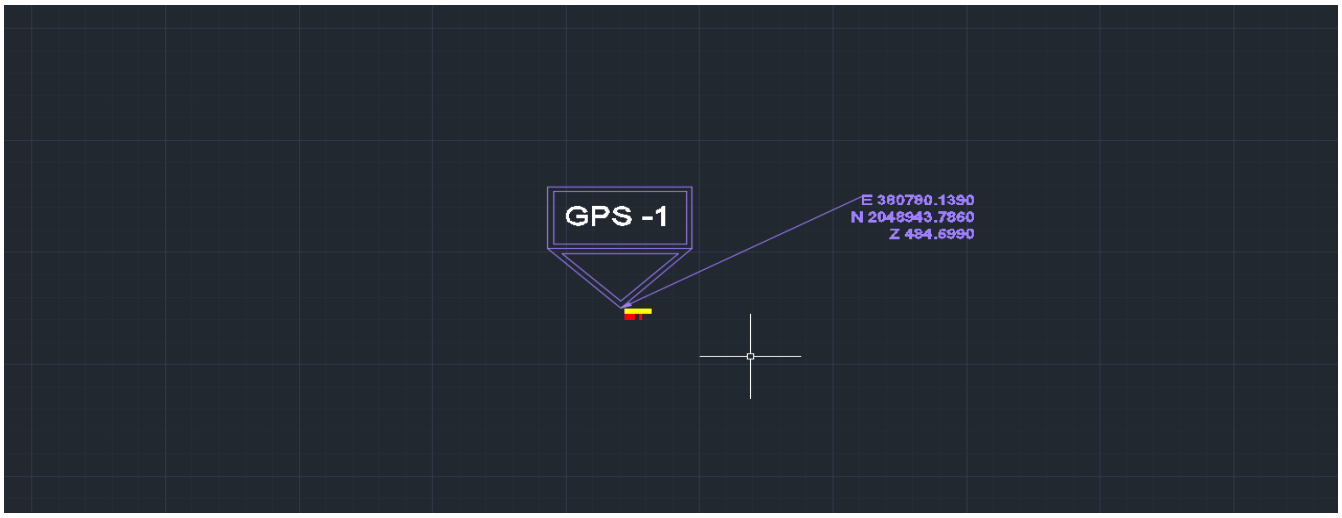

216
483.256
sn212
217
483.235
sn212
TBM1
218
484.060
ohe1136
353
4.052
tbm 1
210
483.065
sig
209
483.153
rl
208
483.164

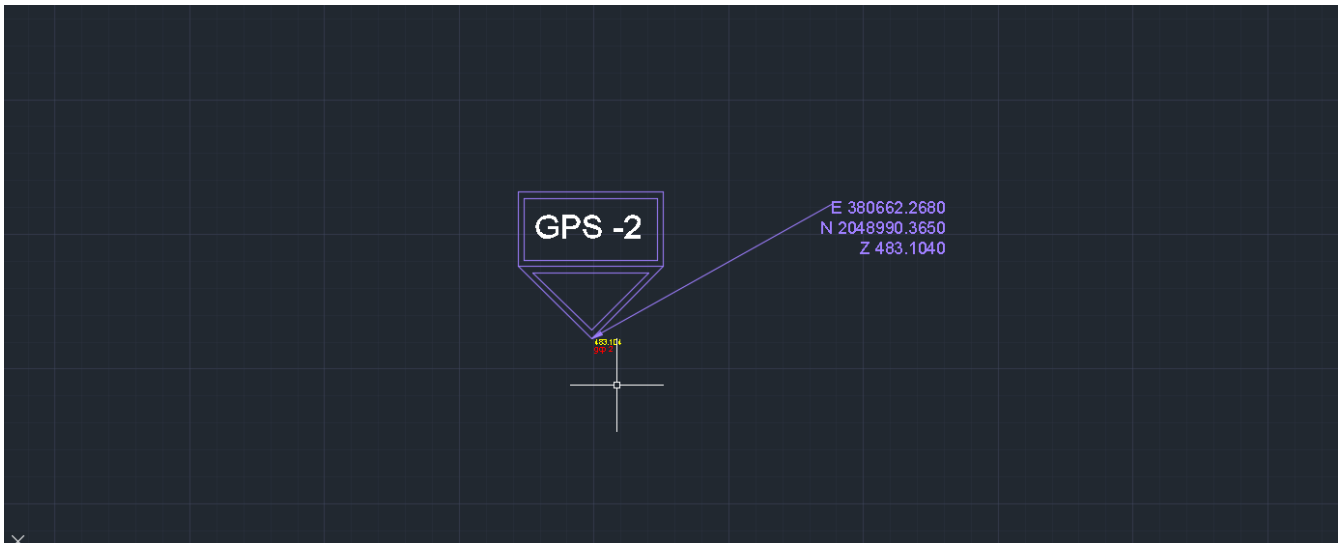

TBM2
213
483.672
rl
214
483.652
rl


TBM 3
476.498
tbm
375
TREE
15
483.018

14. GPS POINTS:

ID	Easting (Meter)	Northing (Meter)	Elevation (Meter)
GPS-1	380780.1390	2048943.7860	484.6990
GPS-2	380662.2680	2048990.1040	483.1040





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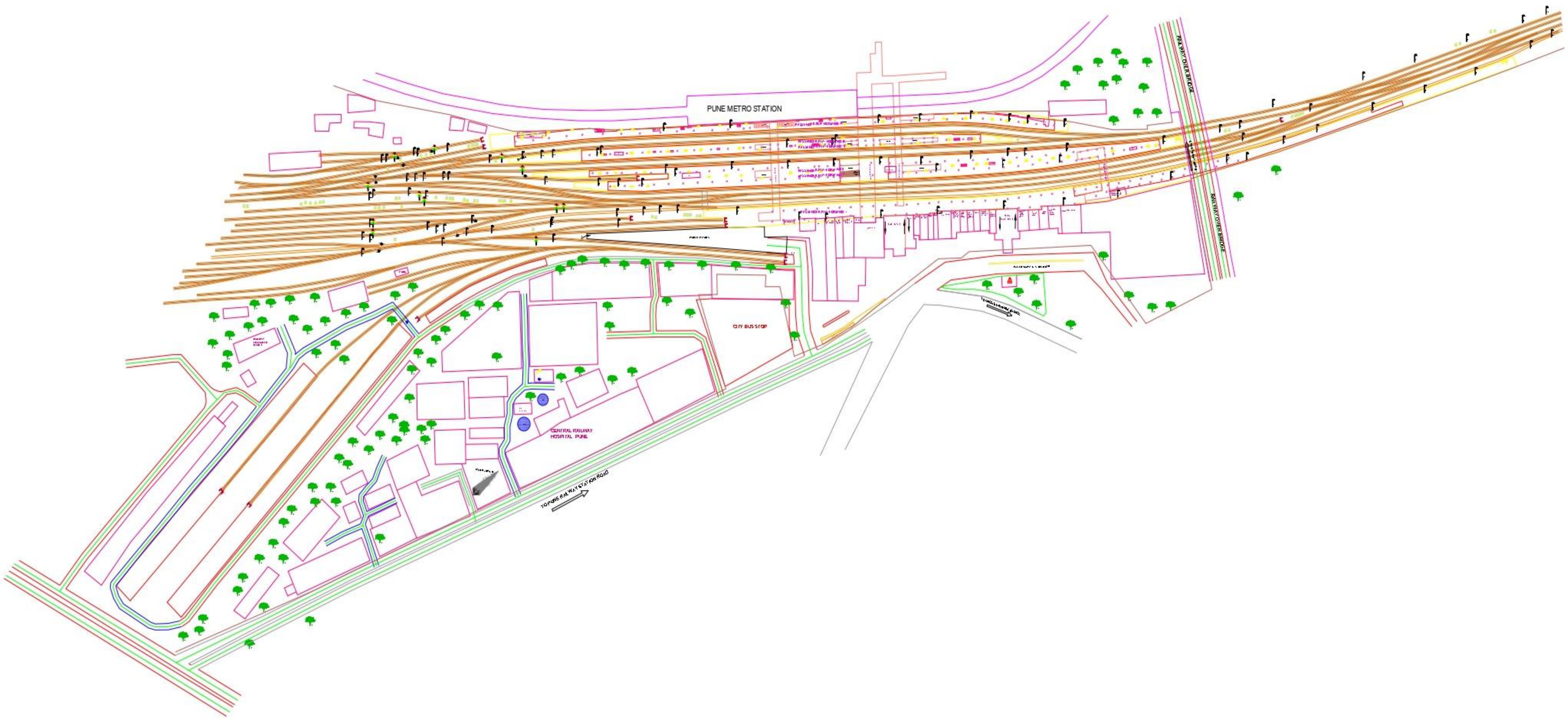
TOPOGHARPHICAL PLAN OF PUNE RAILWAY STATION

N



NO.	DESCRIPTION	SYMBOL
1	CC ROAD	
2	KATCHA ROAD	
3	SHADE	
4	BT ROAD	
5	ROAD CENTER	
6	DRAIN	
7	STRUCTURE	
8	RAILWAY LINE	
9	ELECTRIC PLOE / CHAIR	
10	COMPOUND WALL	
11	CHAIR	
12	PLATFORM	
13	TEXT	ABCD
14	O.H.E Pole	
15	JUNCTION BOARD	
16	STOCK RAIL JOINT	

NOTE :- ALL DIMENSION ARE IN METERS.

R00	[illegible]	ISSUED FOR CLIENT REVIEW	Ghulam Mohd Haque
REV NO	DATE	DESCRIPTION	VERIFIED BY

ISSUE RECORD

CLIENT: CREATIVE GROUP LLP

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PROJECT : TOPOGRAPHICAL SURVEY AT PUNE RAILWAY STATION

DWG. TITLE : TOPOGRAPHIC PLAN OF PUNE RAILWAY STATION

SCALE:	DRAWING NO.	REV.
DRAWN BY	MD.ALTMASH SHAIKH	R03