D.G.P.S. SURVEY REPORT

AREA DEMARCATION AND BOUNDARY FIXATION OF FOREST

LAND COVERED IN LOHARA-RENGADABRI-JUNNAPANI-CHOUKI ROAD FOREST

COMPARTMENT NO. RF-173,194,193,191 AND PF-307,312,313,

FOREST DIVISION – BALOD, RANGE – DOUNDI-LOHARA

DISTRICT – BALOD (C.G.)

APPLICANT

GENERAL MANAGER

CHHATTISGARH ROAD DEVELOPMENT CORPORATION Ltd.

RAIPUR, (C.G.)

CERTIFICATE

This is to certify that the work of D.G.P.S. Survey of the area proposed for ***LOHARA-RENGADABRI–JUNAPANI-CHOWKI ROAD*** *construction in BALOD District over an area of 5.53 Hectare., forest compartment no. RF- 173,194,193,191 and PF- 307,312,313, forest division BALOD in District – BALOD. Ordered by* ***The Office of the General Manager, CGRDC, Raipur (C.G.).***

The D.G.P.S. Survey work done by L.N.MALVIYA INFRA PROJECT Pvt. Ltd. BHOPAL (M.P.)

The work done is as followed:-

As per the work order the Coordinates of Boundary pillars & Surveyed area are corrected and we have successfully completed the work, which is correct in our knowledge.

Date: - 26/09/2019

Place: - Tehsil- Doundi-lohara (C.G.)

L.N. MALVIYA INFRA PROJECTS PVT. LTD.

Project Manager
Chhattisgarh Road Development Corporation Limited
Raipur (C.G.)

Authorized Seal & Signature

CONTENTS

INTRODUCTION OF THE PROJECT

The Office of the General Manager, CGRDC, Raipur (C.G.) is the nodal agency for construction of ***LOHARA-RENGADABRI–JUNAPANI-CHOWKI ROAD*** (Pkg-04) in District - Balod over an area of 5.53 hectare, in forest compartment no. RF- 173,194,193,191 and PF- 307,312,313, of Balod forest division in, District – Balod. D.G.P.S. survey work has been done by ***L.N.MALVIYA INFRA PROJECT Pvt. Ltd. BHOPAL (M.P.).*** The D.G.P.S. survey was done successfully and accurately from 26/09/2019 to 30/09/2019 in the presence of CGRDC and FOREST Dept. officials.

PROJECT DESCRIPTION

The project road starts from Lohara at Km. 0.000 (20°45'40.69"N Latitude), (80°57'1.78"E Longitude) and ends at Chouki on km 42.010 (20°45'30.69"N Latitude), (80°44'39.82"E Longitude). The Project Road Lohara-Rengadabri-Junnapani-Chouki is situated in central part of Chhattisgarh State having a total existing length 42.010 Km. and design length 41.983 Km.

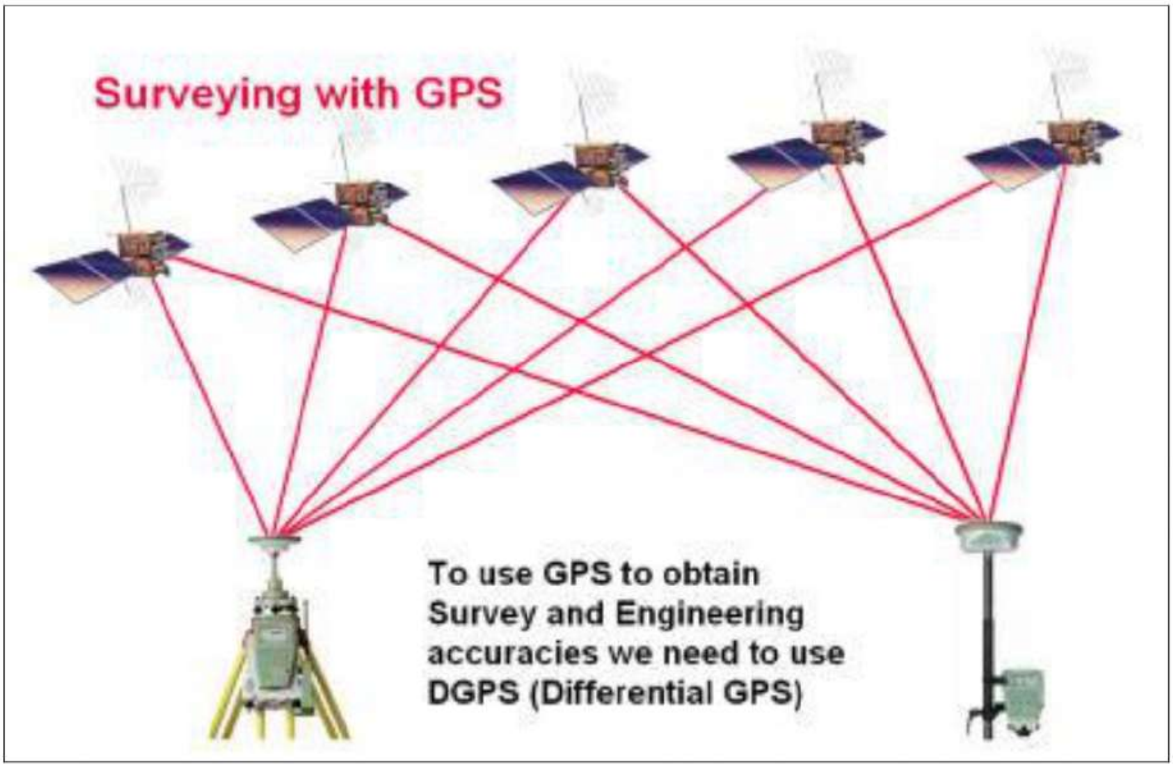
The survey area comes under Govt. Forest land, compartment no. RF-173,194,193,191 and PF- 173,307,312,313 of forest division Balod, district-Balod in Chhattisgarh. The total surveyed area 5.53 hectare. The surveyed area is on LOHARA-RENGADABRI-JUNAPANI-CHOUKI ROAD (Pkg.-04).

FEATURES & METHODOLOGY OF DGPS SURVEY

Differential Global Positioning System (DGPS) is an enhancement to Global Positioning System that uses a network of fixed, ground-based reference station to broadcast the difference between the position indicated by the satellite system and the known fixed positions. These positions broadcast the difference between the measured satellite pseudo ranges and actual (internally computed) pseudo ranges and receiver station may correct their pseudo ranges by the same amount.

Differential Positioning

Surveying with GPS



INTRODUCTION OF DGPS

WHAT IS DGPS AND WHY USE IT?

• **Differential Global Positioning System (DGPS)** is an enhancement to Global Positioning System that provides improved location accuracy, from the 15-meter nominal GPS accuracy to about 10 cm in case of the best implementations. • DGPS refers to using a combination of receivers and satellites to reduce/eliminate common receiver based and satellite based errors reduce orbit errors reduce ionospheric and tropospheric errors reduce effects of SA eliminate satellite and receiver clock errors • improve accuracy significantly 100's of metres to metres to centimetres to millimetres 1. DGPS uses one or several (network) fixed ground based reference stations (in known locations). 2. The base station compares its own known location, to that computed from a GPS receiver. 3. Any difference is then broadcast as a correction to the user. Correction signals can be broadcast either from ground stations, or via additional satellites. These services are privately owned and usually require a user subscription.

Examples: • Satellite Based Augmentation System (SBAS), • Wide Area Augmentation System (WAAS), • Local Area Augmentation System (LAAS), • European Geostationary Navigation Overlay Service (EGNOS), • Omni STAR • Coast guard beacon service.

Why do we Need Differential GPS?

By using DGPS we can improve our positional accuracy from around 1.5m with standard GPS to around 40cm with DGPS, without the need for post processing. In the case of the road survey van (top right), users can measure the amount of road wear and judge whether the road should be resurfaced just by driving over it. Just one day's driving can replace a month's manual work using traditional methods. There are many other applications like this. The labour saving is immense but at the same time, previously impossible tasks are made possible such as the prediction of earthquakes before they occur.

DGPS Summary

• Term refers to simple C/A code differential

• Available on GPS receivers from low cost to high cost

• Produces accuracies from sub-metre to metres

• Many real-time DGPS correction providers - Coast guard, EGNOS, OmniSTAR

• Used for many different applications including marine navigation, precision farming and vehicle testing applications.

What is RTK?

Real Time Kinematic is an advanced form of DGPS which uses the satellites carrier wave to compare 2 observations from different receivers within the system, to fine tune the satellite and receiver clock errors, thus improving positional accuracy. **Real Time Kinematic (RTK).**

The GPS signal is made up of 3 distinct components: • Carrier wave • GPS Code • Navigation message Typical GPS receivers will use the GPS navigation message to calculate its position. RTK uses the carrier wave of the GPS signal, which is 19.02cm long. By counting the number of cycles (and phase of the carrier), the travel time and distance can be measured more accurately.

RTK Summary • Similar technique as DGPS that uses the carrier phase to provide more accurate positioning • Cost is higher compared to DGPS receivers • Produces accuracies from 20 cm to sub-centimetres • RTK corrections provided via a local base station or by a private correction provider - OmniSTAR, Leica, Trimble • Used for many different applications including machine control (construction, container ports, farming), vehicle testing applications, surveying (land, marine, hydrographic, aerial)

RINEX FILE

The first proposal for the ***Receiver Independent Exchange Format RINEX*** was developed by the Astronomical Institute of the University of Berne for the easy exchange of the Global. Positioning System (GPS) data to be collected during the first large European GPS campaign EUREF 89, which involved more than 60 GPS receivers of 4 different manufacturers. The governing aspect during the development was the following fact: Most geodetic processing software for GPS data use a well-defined set of observables: • The carrier-phase measurement at one or both carriers (actually being a measurement on the beat frequency between the received carrier of the satellite signal and a receivergenerated reference frequency). • The pseudorange (code) measurement, equivalent to the difference of the time of reception (expressed in the time frame of the receiver) and the time of transmission (expressed in the time frame of the satellite) of a distinct satellite signal.

• The observation time being the reading of the receiver clock at the instant of validity of the carrier-phase and/or the code measurements. Usually the software assumes that the observation time is valid for both the phase **and** the code measurements, **and** for all satellites observed. Consequently all these programs do not need most of the information that is usually stored by the receivers: They need phase, code, and time in the above mentioned definitions, and some stationrelated information like station name, antenna height, etc. Up till now two major format versions have been developed and published: • The original RINEX Version 1 presented at and accepted by the 5th International Geodetic Symposium on Satellite Positioning in Las Cruces, 1989. [Gurtner et al. 1989],[Evans 1989] • RINEX Version 2 presented at and accepted by the Second International Symposium of Precise Positioning with the Global Positioning system in Ottawa, 1990, mainly adding the possibility to include tracking data from different satellite systems (GLONASS, SBAS). [Gurtner and Mader 1990a, 1990b], [Gurtner 1994]. Several subversions of RINEX Version 2 have been defined: • Version 2.10: Among other minor changes allowing for sampling rates other than integer seconds and including raw signal strengths as new observables. [Gurtner 2002] • Version 2.11: Includes the definition of a two-character observation code for L2C pseudoranges and some modifications in the GEO NAV MESS files [Gurtner and Estey 2005] • Version 2.20: Unofficial version used for the exchange of tracking data from spaceborne receivers within the IGS LEO pilot project [Gurtner and Estey 2002]. As spin-offs of this idea of a receiver-independent GPS exchange format other RINEX-like exchange file formats have been defined, mainly used by the International GNSS Service IGS: • Exchange format for **satellite and receiver clock offsets** determined by processing data of a GNSS tracking network [Ray and Gurtner 1999].

• Exchange format for the complete **broadcast data of spacebased augmentation systems** SBAS. [Suard et al. 2004] • IONEX: Exchange format for **ionosphere models** determined by processing data of a GNSS tracking network [Schaer et al. 1998] • ANTEX: Exchange format for **phase center variations** of geodetic GNSS antennae [Rothacher and Schmid 2005]. The upcoming European Navigation Satellite System Galileo and the enhanced GPS with new frequencies and observation types, especially the possibility to track frequencies on different channels, ask for a more flexible and more detailed definition of the observation codes. To improve the handling of the data files in case of "mixed" files, i.e. files containing tracking data of more than one satellite system, each one with different observation types, the record structure of the data record has been modified significantly and, following several requests, the limitation to 80 characters length has been removed. As the changes are quite significant, they lead to a new RINEX Version 3. The new version also includes the unofficial Version 2.20 definitions for space-borne receivers. The major change asking for a version 3.01 was the requirement to generate consistent phase observations across different tracking modes or channels, i.e. to apply ¼-cycle shifts prior to RINEX file generation, if necessary, to facilitate the processing of such data. The RINEX version 3.00 format consists of three ASCII file types: 1. Observation data File 2. Navigation message File 3. Meteorological data File Each file type consists of a header section and a data section.

The header section contains global information for the entire file and is placed at the beginning of the file. The header section contains **header labels in columns 61-80** for each line contained in the header section. These labels are mandatory and must appear exactly as given in these descriptions and examples. The format has been optimized for minimum space requirements independent from the number of different observation types of a specific receiver or satellite system by indicating in the header the types of observations to be stored for this receiver and the satellite systems having been observed. In computer systems allowing variable record lengths the observation records may be kept as short as possible. Trailing blanks can be removed from the records. There is no maximum record length limitation for the observation records. Each Observation file and each Meteorological Data file basically contain the data from one site and one session. Starting with Version 2 RINEX also allows including observation data from more than one site subsequently occupied by a roving receiver in rapid static or kinematic applications. Although Version 2 and higher allow to insert header records into the data section it is not recommended to concatenate data of more than one receiver (or antenna) into the same file, even if the data do not overlap in time. If data from more than one receiver have to be exchanged, it would not be economical to include the identical satellite navigation messages collected by the different receivers several times.

Therefore the navigation message file from one receiver may be exchanged or a composite navigation message file created containing non-redundant information from several receivers in order to make the most complete file. The format of the data records of the RINEX Version 1 navigation message file was identical to the former NGS exchange format. RINEX version 3 navigation message files may contain navigation messages of more than one satellite system (GPS, GLONASS, Galileo, Quasi Zenith Satellite System (QZSS), BeiDou System (BDS) and SBAS). The actual format descriptions as well as examples are given in the Appendix Tables at the end of the document. BASIC DEFINITIONS Time: The time of the measurement is the receiver time of the received signals. It is identical for the phase and range measurements and is identical for all satellites observed at that epoch. For single-system data files it is by default expressed in the time system of the respective satellite system. Otherwise the actual time can (for mixed files must) be indicated in the Start Time header record. Pseudo-Range: The pseudo-range (PR) is the distance from the receiver antenna to the satellite antenna including receiver and satellite clock offsets (and other biases, such as atmospheric delays): PR = distance + c * (receiver clock offset –satellite clock offset + other biases) so that the pseudo-range reflects the actual behaviour of the receiver and satellite clocks. The pseudo-range is stored in units of meters. Phase: The phase is the carrier-phase measured in whole cycles. The half-cycles measured by squaring type receivers must be converted to whole cycles and flagged by the respective observation code. The phase changes in the same sense as the range (negative doppler). The phase observations between epochs must be connected by including the integer number of cycles. The observables are not corrected for external effects like atmospheric refraction, satellite clock offsets, etc. If necessary phase observations are corrected for phase shifts needed to guarantee consistency between phases of the same frequency and satellite system based on different signal channels.

If the receiver or the converter software adjusts the measurements using the real-time-derived receiver clock offsets dT(r), the consistency of the 3 quantities phase / pseudo-range / epoch must be maintained, i.e. the receiver clock correction should be applied to all 3 observables: 1 Time (corr) = Time(r) - dT(r) 2 PR (corr) = PR (r) - dT(r)*c 3 phase (corr) = phase (r) - dT(r)*freq Doppler: The sign of the doppler shift as additional observable is defined as usual: Positive for approaching satellites. Satellite numbers: Starting with RINEX Version 2 the former two-digit satellite numbers nn are preceded by a one-character system identifier s. The same satellite system identifiers are also used in all header records when appropriate. THE EXCHANGE OF RINEX FILES: The original RINEX file naming convention was implemented in the MS-DOS era when file names were restricted to 8.3 characters. Modern operating systems typically support 255 character file names. The goal of the new file naming convention is to be more: descriptive, flexible and extensible than the RINEX 2.11 file naming convention. All elements are fixed length and are separated by an underscore "_" except for the: file type and compression fields that uses a period "." separator. Fields must be padded with zeros to fill the field width. The file compression field is optional. In order to further reduce the size of observation files Yuki Hatanaka developed a compression scheme that takes advantage of the structure of the RINEX observation data by forming higher order differences in time between observations of the same type and satellite. This compressed file is also an ASCII file that is subsequently compressed again using the above mentioned standard compression programs.

LIST OF MAPS

S.No.	PARTICULARS
1	SURVEY OF INDIA TOPOSHEET 1:50000
2	GEO-REFERENCE MAP 1:75000 (SURVEYED AREA SUPER IMPOSED ON FOREST COMPARTMENT)
3	INDEX MAP 1:15000
4	GOOGLE KML FIL IN PDF FORMET

SUMMARY OF AREA

NAME OF PROJECT – LOHARA-RENGADABRI-JUNAPANI-CHOWKI ROAD

DISTRICT- BALOD

FOREST DIVISION – BALOD

RANGE – LOHARA

S.NO.	VILLAGE	COMP NO.	AREA (IN Ha.)
1	GURAMI	173	0.10
2	GURAMI	194	2.01
3	RAYGARH	193	1.11
4	MAATRI	191	1.22
5	MAATRI	307	0.17
6	PUNARKASHA	312	0.44
7	NANGUTOLA	313	0.48
TOTAL AREA :-			**5.53**

AFFECTED ROAD AREA IN FOREST – 5.53 ha (Incl. Existing Road)

EXISTING ROAD AREA –45.48 ha.

EXISTING ROAD LENGTH – 42.983 Km.

EXISTING ROAD LENGTH IN FOREST – 3.950 Km.

EXISTING ROAD WIDTH – 3.75 m BT with 7.50 m paved Shoulder

PROPOSED ROAD ROW – 14 m

DATA SHEET

All pillars and point in DEGREE DECIMAL Format

S. NO.	LONGITUDE	LATTITUDE	UTM ZONE
1	81.02946	20.75331	44N
2	81.02949	20.75326	
3	81.02932	20.75317	
4	81.02928	20.75322	
5	81.02918	20.75313	
6	81.02922	20.75308	
7	81.02384	20.74858	
8	81.02389	20.74853	
9	81.02394	20.74846	
10	81.02324	20.7481	
11	81.02321	20.74816	
12	81.02328	20.74805	
13	81.0199	20.74823	
14	81.01991	20.74829	
15	81.0199	20.74816	
16	81.01671	20.74855	
17	81.01672	20.74861	
18	81.01514	20.74876	
19	81.01515	20.74882	
20	81.01419	20.74884	
21	81.01418	20.7489	
22	81.01419	20.74877	
23	81.01272	20.74839	
24	81.01268	20.74851	
25	81.01169	20.74817	
26	81.0117	20.74824	
27	81.00446	20.74771	
28	81.00449	20.74766	
29	81.00443	20.74777	
30	80.99953	20.74632	
31	80.99962	20.74622	
32	80.99948	20.74637	
33	80.99642	20.74574	

34	80.99644	20.74568	44N
35	80.99639	20.74579	
36	80.99461	20.74253	
37	80.99457	20.7426	
38	80.99465	20.74247	
39	80.99274	20.73933	
40	80.99285	20.7394	
41	80.99261	20.73926	
42	80.99195	20.73811	
43	80.992	20.73807	
44	80.99205	20.73803	
45	80.98794	20.73116	
46	80.9879	20.73122	
47	80.98786	20.73129	
48	80.98492	20.73119	
49	80.98492	20.73125	
50	80.98492	20.73131	
51	80.98405	20.73101	
52	80.98398	20.73104	
53	80.98392	20.73108	
54	80.98269	20.72993	
55	80.98261	20.72996	
56	80.98275	20.7299	
57	80.98236	20.72965	
58	80.98177	20.72939	
59	80.98172	20.72949	
60	80.98232	20.72976	
61	80.97617	20.72699	
62	80.97607	20.72702	
63	80.97597	20.72704	
64	80.97524	20.72615	
65	80.97524	20.72626	
66	80.92479	20.76733	
67	80.92477	20.76727	
68	80.97525	20.72638	
69	80.92144	20.76764	
70	80.92143	20.76758	
71	80.87797	20.77063	

72	80.92142	20.76751	
73	80.878	20.77058	
74	80.87794	20.77069	
75	80.87734	20.77019	
76	80.92475	20.76721	
77	80.8773	20.77024	44N
78	80.87597	20.76989	
79	80.87598	20.76977	
80	80.87737	20.77014	
81	80.87525	20.77004	
82	80.87522	20.76999	
83	80.8752	20.76992	

सहायक परिक्षेत्र अधिकारी
माटरी

परिक्षेत्र अधिकारी
ंगचुवा

परिक्षेत्र अधिकारी
डौण्डीलोहारा

सहायक वन परिक्षेत्र अधिकारी
रेंगाडबरी

परिक्षेत्र अधिकारी

उप वनमण्डलाधिकारी
उप वनमण्डल दल्ली
वनमण्डल बालोद (छ.ग.)

L.N. MALVIYA INFRA PROJECTS PVT. LTD.

Project Manager
Chhattisgarh Road Development
Corporation Limited
Raipur (C.G.)

Divisional Forest Officer
Balod Division, Balod

VILLAGE LIST

1. Gurami
2. Raigarh
3. Matri
4. Punarkasa
5. Nangutola

DGPS SURVEY PHOTO GRAPHS