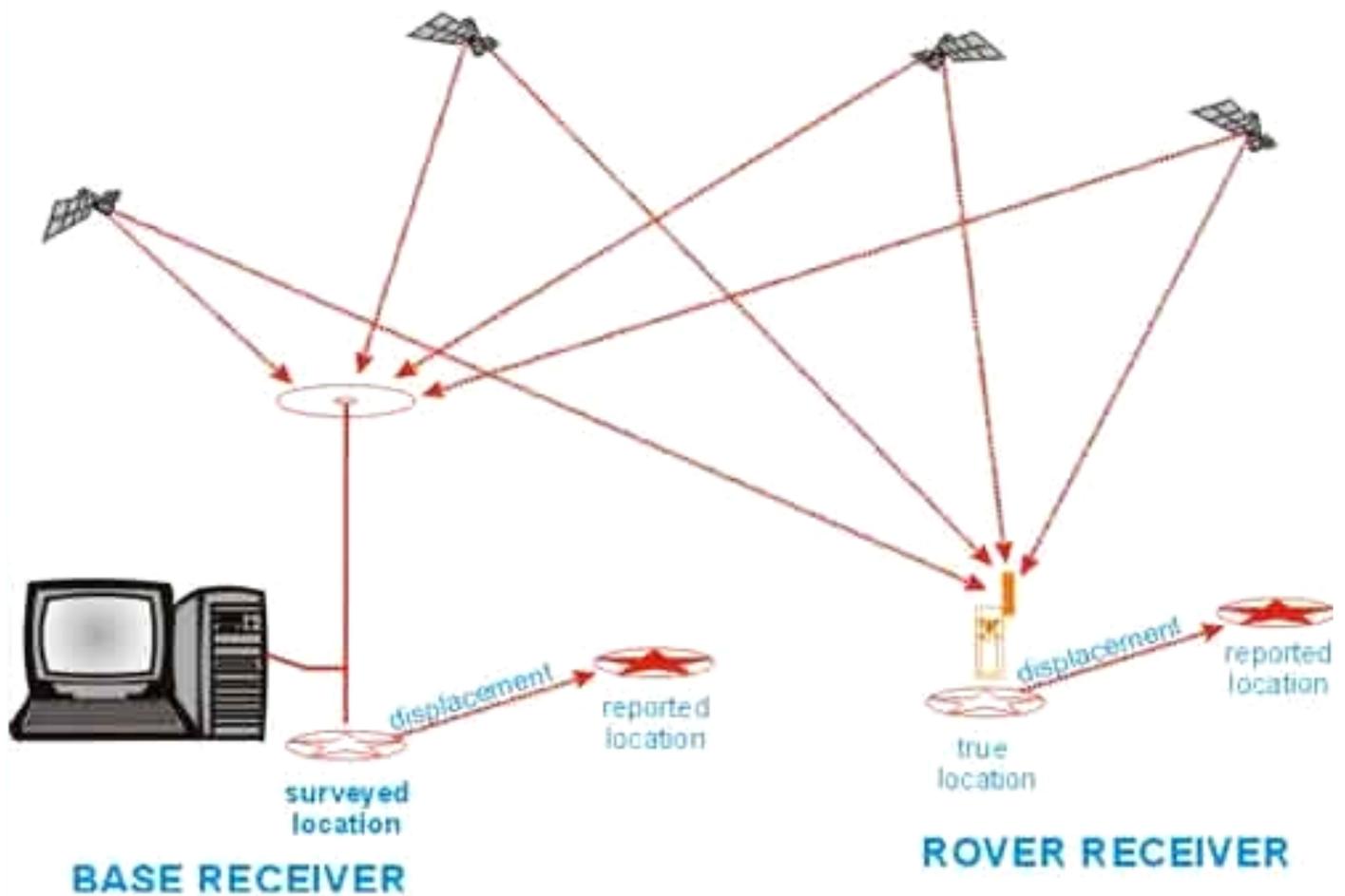# D.G.P.S. SURVEY REPORT OF
MALKA RENEWABLE ENERGY
FOREST DIVISION DHARAMJAIGARH
DISTRICT RAIGARH
CHHATTISGARH

Name of the Applicant:

Malka Renewable Energy Private Limited,
District - Raigarh,
Chhattisgarh.

INDEX

MAPS ON A3 SIZE PRINTOUT

DATA ENCLOSED IN SOFT COPY

1. ABOUT US

Computer Plus an **ISO 9001:2008 certified** organization working in the field of I.T. Consulting & Software Services. We are registered organization under **Directorate of Geology and Mining, Chhattisgarh**. We are serving since 1998 & head office in Raipur, (C.G.), with core competence in the areas of Integrated Business Solutions with Implementation and Support.

Our Team:

We're justifiably proud of the team we've assembled. Initially numbering just two programmers, **Computer Plus** has grown steadily and now has over 250 staff members. The **Computer Plus** team is made up of highly-qualified, talented and innovative IT and GIS professionals each with their own area of expertise. Their experience spans the full range of custom software development, from small entrepreneurial projects to complex systems for major corporations.

Our Mission:

Computer Plus's mission is to solve challenging technical problems in partnership with our clients.
How we achieve it:

- We understand the business needs of our clients, and how technology can be a tool to make modern businesses more profitable for both private and government sector.
- **Computer Plus** combines technical excellence with great customer service and value for money.
- We value creativity and collaboration; ideas are shared and everybody contributes on an individual basis toward the common goal.
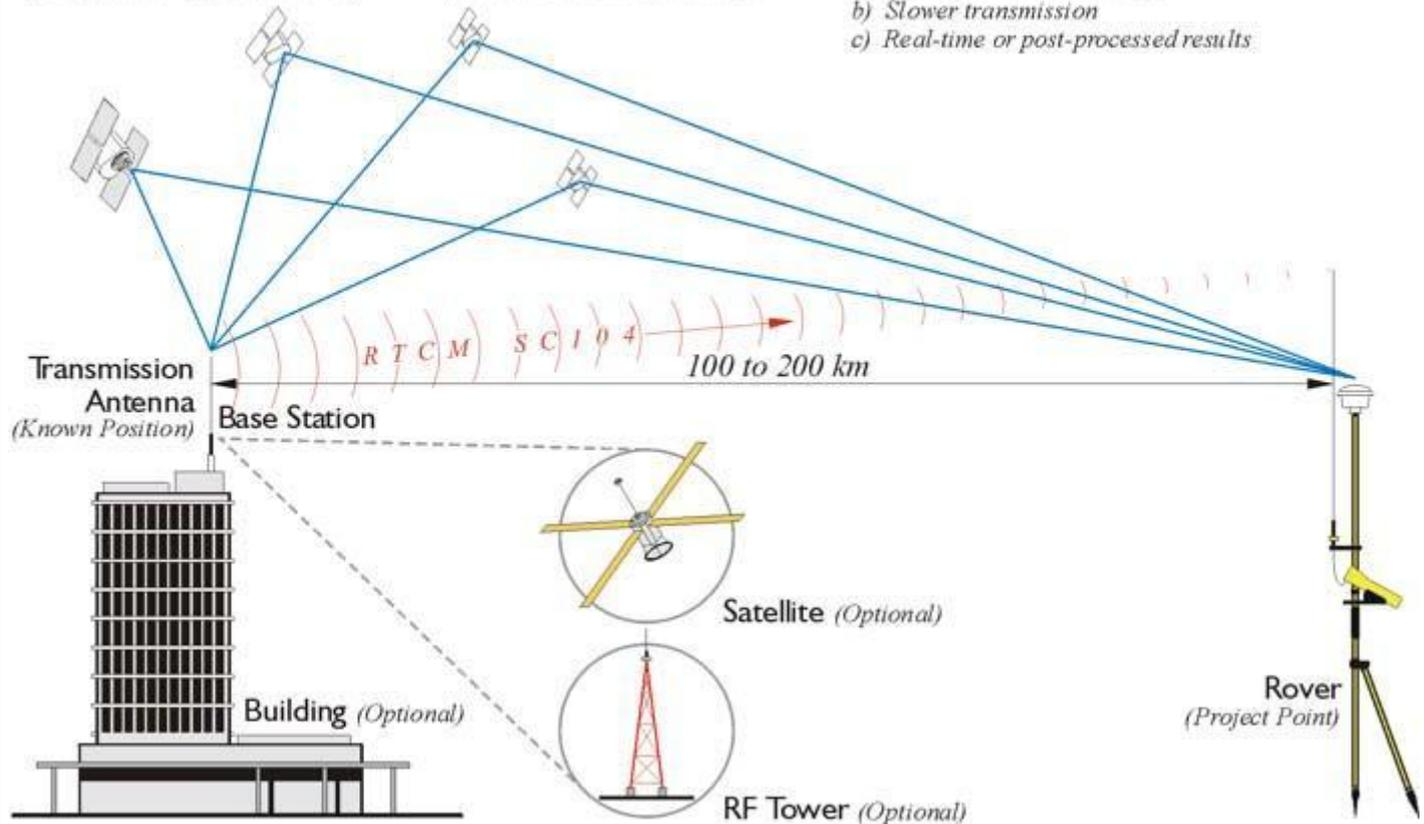
We create new teams for each project, ensuring the best possible combination of skills and experience to meet the client's needs and deliver high quality solutions.

2. INTRODUCTION TO DGPS

Differential GPS/DGPS
Positional Accuracy +/- 1 meter or so

- **Same Satellite Constellation**
  (Base Station - Rover/or Rovers)
- **Code Phase/Pseudorange**
  (Track 4 Satellites Minimum)
- **Radio Link**
  a) *Less information than RTK*
  b) *Slower transmission*
  c) *Real-time or post-processed results*

R T C M   S C 1 0 4   *100 to 200 km*

Transmission Antenna *(Known Position)*   **Base Station**

Satellite *(Optional)*

Building *(Optional)*
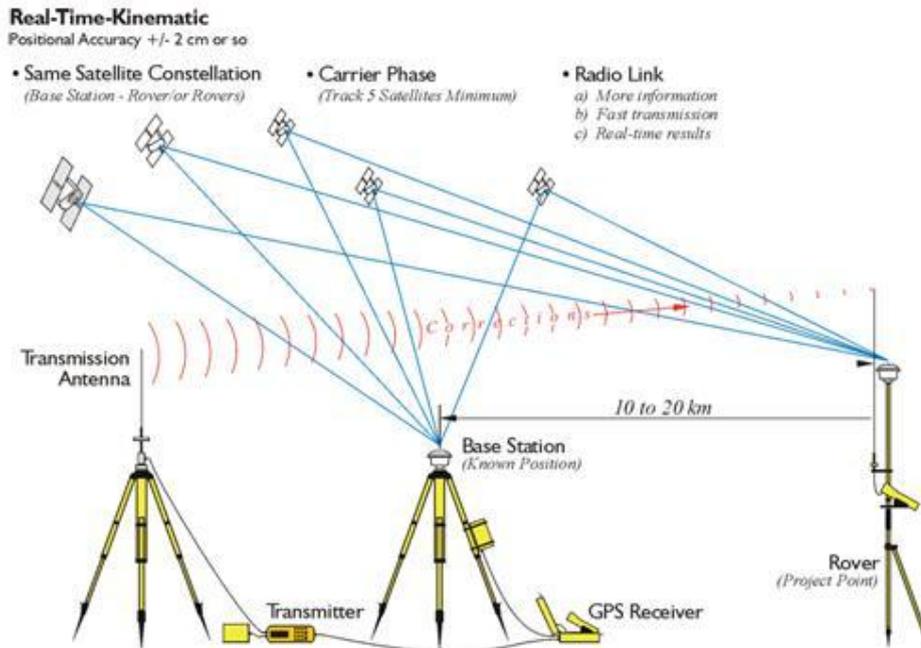
RF Tower *(Optional)*

Rover *(Project Point)*

The term DGPS is sometimes used to refer to differential GPS that is based on pseudoranges, aka code phase. Even though the accuracy of code phase applications was given a boost with the elimination of Selective Availability (SA) in May 2000 consistent accuracy better than the 2-5 meter range still requires reduction of the effect of correlated ephemeris and atmospheric errors by differential corrections. Though the corrections could be applied in post-processing services that supply these corrections, most often operate in real-time. In such an operation pseudorange based versions can offer meter- or even submeter results.

Usually, pseudorange corrections are broadcast from the base to the rover or rovers for each satellite in the visible constellation. Rovers with an appropriate input/output (I/O) port can receive the correction signal and calculate coordinates. The real-time signal comes to the receiver over a data link. It can originate at a project specific base station or it can come to the user through a service of which there are various categories. Some are open to all users and some are by subscription only. Coverage depends on the spacing of the beacons, aka transmitting base stations, their power, interference, and so forth. Some systems require two-way, some one-way, communication with the base stations. Radio systems, geostationary satellites, low-earth-orbiting.

SURVEY METHOD

1 RTK (Real Time Kinematic)
2 STATIC METHOD

1 Real-Time Kinematic

Real-Time-Kinematic
Positional Accuracy +/- 2 cm or so

- **Same Satellite Constellation**
  (Base Station - Rover or Rovers)
- **Carrier Phase**
  (Track 5 Satellites Minimum)
- **Radio Link**
  a) *More information*
  b) *Fast transmission*
  c) *Real-time results*

Transmission Antenna

Base Station
(Known Position)

10 to 20 km

Rover
(Project Point)

Transmitter

GPS Receiver

Most, not all, GPS surveying relies on the idea of differential positioning. The mode of a base or reference receiver at a known location logging data at the same time as a receiver at an unknown location together provide the fundamental information for the determination of accurate coordinates. While this basic approach remains today, the majority of GPS surveying is not done in the static post-processed mode. Post-processing is most often applied to control work. Now, the most commonly used methods utilize receivers on reference stations that provide correction signals to the end user via a data link sometimes over the Internet, radio signal, or cell phone and often in real-time.

In this category of GPS surveying work there is sometimes a distinction made between code- based and carrier based solutions. In fact, most systems use a combination of code and carrier measurements so the distinction is more a matter of emphasis rather than an absolute difference. Well that's a bit of discussion about static surveying, but as you know, a good deal of GPS these days is done not static. Much work is now done with DGPS or real-time kinematic, RTK.

Errors in satellite clocks, imperfect orbits, the trip through the layers of the atmosphere, and many other sources contribute inaccuracies to GPS signals by the time they reach a receiver.

These errors are variable, so the best to way to correct them is to monitor them as they happen. A good way to do this is to set up a GPS receiver on a

station whose position is known exactly, a base station. This base station receiver's computer can calculate its position from satellite data, compare that position with its actual known position, and find the difference. The resulting error corrections can be communicated from the base to the rover. It works well, but the errors are constantly changing so a base station has to monitor them all the time, at least all the time the rover receiver or receivers are working. While this is happening the rovers move from place to place collecting the points whose positions you want to know relative to the base station, which is the real objective after all. Then all you have to do is get those base station corrections and the rover's data together somehow. That combination can be done over a data link in real-time, or applied later in postprocessing.

Real-time positioning is built on the foundation of the idea that, with the important exceptions of multipath and receiver noise, GPS error sources are correlated. In other words, the closer the rover is to the base the more the errors at the ends of the baseline match. The shorter the baseline, the more the errors are correlated. The longer the baseline, the less the errors are correlated.

The base station is at a known point, whether it was on a building permanently or it's a tripod mounted base station. The fact that it is in a known position allows the base station to produce corrections. The constellation is telling the base station that it is in a slightly different place, so corrections can be created to sent to the rover at the unknown point. The corrections are applied in real time.
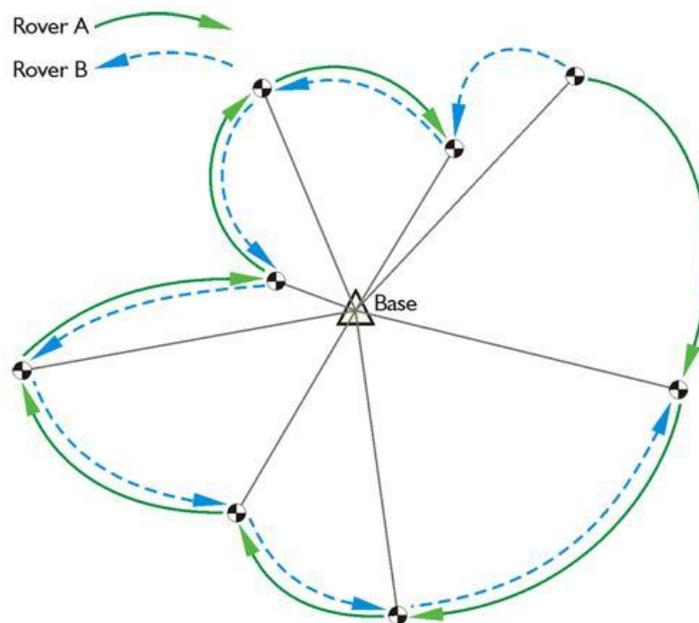
RADIAL GPS

Such real-time surveying is essentially radial. There are advantages to the approach. The advantage is a large number of positions can be established in a short amount of time with little or no planning. The disadvantage is that there is little or no redundancy in positions derived, each of the baselines originates from the same control station. Redundancy can be incorporated, but it requires repetition of the observations so each baseline is determined with more than one GPS constellation. One way to do it is to occupy the

project points, the unknown positions, successively with more than one rover. It is best if these successive occupations are separated by at least 4 hours and not more than 8 hours so the satellite constellation can reach a significantly different configuration.

RTK and DGPS are radial. You have a known point in the middle, the base, and then the unknown points around it. This provides little geometric solidity. If there's an error in one of these radial base lines, it would be tough to catch it because there's no real redundancy. The illustration shows a way around this difficulty. There are two receivers, A and B, and it's possible by double occupation, one receiver going one way and the other going the other, by double occupying the unknown points to get some redundancy and some checks against the positions from a base. Another way to do it is to use one receiver. That reciever would occupy each points twice with four to eight hours between the first occupation and the second occupation on the point. Another way is to move the base to another known point. Then if you have vectors from another base into these points, you have a check. This approach allows a solution to be available from two separate control stations. Obviously, this can be done with re-occupation of the project points after one base station has been moved to a new control point, or a two base stations can be up and running from the very outset and throughout of the work as would be the case using two CORS stations. It is best if there are both two occupations on each point and each of the two utilize different base stations.

A more convenient but less desirable approach is to do a second occupation almost immediately after the first. The roving receiver's antenna is blocked or tilted until the lock on the satellites is interrupted. It is then re-oriented on the unknown position a second time for the repeat solution. This does offer a second solution, but from virtually the same constellation.

More efficiency can be achieved by adding additional roving receivers. However, as the number of receivers rises, the logistics become more complicated, and a survey plan becomes necessary. Also, project points that are simultaneously near one another but far from the control station should be directly connected with a baseline to maintain the integrity of the survey. Finally, if the base receiver loses lock and it goes unnoticed, it will completely defeat the radial survey for the time it is down.

These are a few possibilities to consider when you are doing a real-time survey.

An advantage to continuously operating reference station network is that since those bases are operating simultaneously and all the time, it's possible to download the positions from more than one base and process your new position based on these continuously operating reference stations and have some redundancy.

2. STATIC METHOD

I. Rapid Static Method
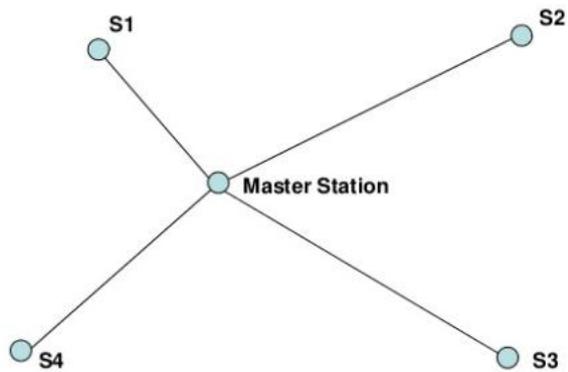
Schematic diagram of Rapid Static Method

II. Traverse Method

Schematic diagram of Traverse method

III. Trilateration Method

Trilateration method

3. INTRODUCTION TO SURVEY SITE

The surveyed area is located on **Village Damas,** which comes under **Block Dharamjaigarh, District Raigarh, and Chhattisgarh**. Raigarh longitude lattitude is **83°23'41.87"E 21°53'50.64"N.** Survey site is located **78.9** Km from **Raigarh**. Survey site comes under **Forest Division Dharamjaigarh**, **Tehsil Dharamjaigarh**, **Forest circle Bilaspur.**

AREA DETAILS & LAND CLASSIFICATION OF REVENUE FOREST

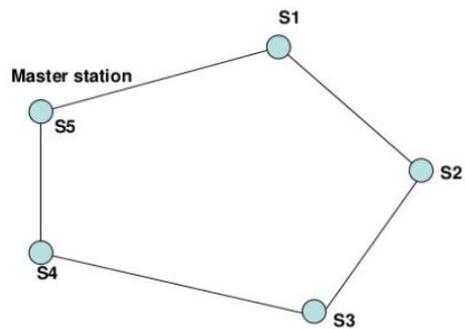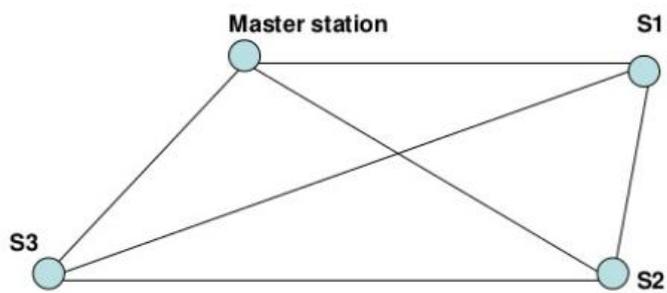| S.No	Division Name	District Name	Tehsil Name	Village Name	Khasra No.	Area In Hectare
01					1355/1K/1	0.700
02	Dharamjaigarh	Raigarh	Dharamjaigarh	Damas	1375/1K/1	2.451
03					1379/1K	1.539
TOTAL						**4.690**

AREA DETAILS & LAND CLASSIFICATION OF PROTECTED FOREST

S.No	Division Name	District Name	Tehsil Name	Village Name	Compartment No.	Area In Hectare
01	Dharamjaigarh	Raigarh	Dharamjaigarh	Damas	PF 385	2.000
TOTAL						**2.000**

AREA DETAILS & LAND CLASSIFICATION OF REVENUE PRIVATE LAND

S.No	Division Name	District Name	Tehsil Name	Village Name	Khasra No.	Area In Hectare
01					1355/3/K	0.154
02					1355/2	0.129
03	Dharamjaigarh	Raigarh	Dharamjaigarh	Damas	1359	0.121
04					1375/1/GH	0.089
05					1379/1/GH	0.243
TOTAL						**0.736**

LAND CLASSIFICATION SUMMARY

S.No	Division Name	District Name	Land Type	Area In Hectare
01	Dharamjaigarh	Raigarh	Revenue Forest	4.690
02			Protected Forest	2.000
TOTAL				**6.690**

4. METHODOLOGY USED

SURVEY METHODOLGY UNDER LINEAR PROJECT

UNDER LINEAR PROJECT TRIANGULATION METHOD WILL BE FOLOWED

USING THIS PBM AS A CORRECTION POINT WE HAVE TO COLLECT OTHER BOUNDARY POINTS

COLLECTED DATA HAVE TO BE SUPERIMPOSE ON TOPOSHEET MAP WHICH HAVE BEEN COLLECTED FROM SURVEY OF INDIA

COLLECTED DATA HAVE TO BE SUPERIMPOSE ON SATELLITE IMAGE WHICH HAVE BEEN COLLECTED FROM NRSC HYDERABAD

COLLECTED DATA HAVE TO BE SUPERIMPOSE ON CADASTRAL MAP WHICH HAVE BEEN COLLECTED FROM GOVERNMENT DEPARTMENT

REPORT PRFEPARATION & MAP PREPARED AS PER REQUIRED SCALE

5. CONTROL POINTS

PRIMARY CONTROL POINT (FIXING OF BASE STATION POINTS)

S.No.	P.C.P (Village Name)	LONGITUDE	LATTITUDE
1	Damas	83° 13' 36.714" E	22° 28' 9.752" N

SURVEYED GROUND CONTROL POINT

S.No.	PILLAR ID	LONGITUDE	LATTITUDE
1	TR1	83° 13' 26.651" E	22° 28' 8.734" N
2	TR2	83° 13' 27.609" E	22° 28' 9.190" N
3	TR3	83° 13' 27.764" E	22° 28' 8.921" N
4	TR4	83° 13' 27.990" E	22° 28' 8.892" N
5	TR5	83° 13' 28.174" E	22° 28' 8.748" N
6	TR6	83° 13' 28.919" E	22° 28' 8.248" N
7	TR7	83° 13' 28.738" E	22° 28' 8.019" N
8	TR8	83° 13' 27.885" E	22° 28' 7.528" N
9	TR9	83° 13' 27.318" E	22° 28' 8.208" N
10	SW1	83° 13' 30.120" E	22° 28' 8.226" N
11	SW2	83° 13' 29.161" E	22° 28' 9.258" N
12	SW3	83° 13' 31.557" E	22° 28' 9.362" N
13	SW4	83° 13' 32.420" E	22° 28' 10.627" N
14	SW5	83° 13' 34.466" E	22° 28' 10.204" N
15	SW6	83° 13' 34.412" E	22° 28' 9.142" N
16	SW7	83° 13' 33.992" E	22° 28' 8.152" N
17	PS1	83° 13' 36.115" E	22° 28' 9.323" N
18	PS2	83° 13' 36.062" E	22° 28' 8.351" N
19	FW2	83° 13' 38.395" E	22° 28' 8.317" N
20	C1	83° 13' 38.536" E	22° 28' 9.277" N
21	C2	83° 13' 40.418" E	22° 28' 8.436" N
22	C3	83° 13' 44.706" E	22° 28' 9.368" N
23	C4	83° 14' 20.484" E	22° 28' 17.740" N
24	L1	83° 13' 38.421" E	22° 28' 8.827" N
25	L2	83° 13' 38.694" E	22° 28' 8.752" N
26	L3	83° 13' 40.366" E	22° 28' 8.294" N
27	L4	83° 13' 41.120" E	22° 28' 8.088" N
28	L5	83° 13' 43.689" E	22° 28' 8.633" N
29	L6	83° 13' 44.468" E	22° 28' 8.844" N
30	L7	83° 13' 45.999" E	22° 28' 8.713" N
31	L8	83° 13' 48.901" E	22° 28' 8.614" N
32	L9	83° 13' 53.322" E	22° 28' 7.815" N
33	L10	83° 13' 57.226" E	22° 28' 8.595" N
34	L11	83° 14' 1.464" E	22° 28' 8.852" N

S.No.	PILLAR ID	LONGITUDE	LATTITUDE
35	L12	83° 14' 5.178" E	22° 28' 11.243" N
36	L13	83° 14' 7.489" E	22° 28' 11.598" N
37	L14	83° 14' 9.138" E	22° 28' 12.031" N
38	L15	83° 14' 11.322" E	22° 28' 14.057" N
39	L16	83° 14' 14.696" E	22° 28' 15.402" N
40	L17	83° 14' 17.448" E	22° 28' 16.480" N
41	L18	83° 14' 19.849" E	22° 28' 17.081" N
42	L19	83° 14' 20.160" E	22° 28' 17.202" N
43	L20	83° 14' 23.871" E	22° 28' 18.650" N
44	L21	83° 14' 26.081" E	22° 28' 20.043" N
45	L22	83° 14' 28.729" E	22° 28' 21.438" N
46	L23	83° 14' 31.316" E	22° 28' 22.802" N
47	L24	83° 14' 32.334" E	22° 28' 23.737" N
48	L25	83° 14' 33.006" E	22° 28' 24.394" N
49	L26	83° 14' 34.980" E	22° 28' 27.326" N
50	L27	83° 14' 37.729" E	22° 28' 29.171" N
51	L28	83° 14' 39.343" E	22° 28' 30.154" N
52	L29	83° 14' 40.937" E	22° 28' 29.280" N
53	L30	83° 14' 43.745" E	22° 28' 27.691" N
54	R1	83° 13' 38.446" E	22° 28' 9.608" N
55	R2	83° 13' 38.861" E	22° 28' 9.498" N
56	R3	83° 13' 40.234" E	22° 28' 9.135" N
57	R4	83° 13' 41.443" E	22° 28' 8.815" N
58	R5	83° 13' 43.947" E	22° 28' 9.382" N
59	R6	83° 13' 44.759" E	22° 28' 9.567" N
60	R7	83° 13' 45.938" E	22° 28' 9.484" N
61	R8	83° 13' 49.172" E	22° 28' 9.361" N
62	R9	83° 13' 53.351" E	22° 28' 8.594" N
63	R10	83° 13' 57.213" E	22° 28' 9.371" N
64	R11	83° 14' 1.100" E	22° 28' 9.564" N
65	R12	83° 14' 5.200" E	22° 28' 12.023" N
66	R13	83° 14' 7.571" E	22° 28' 12.372" N
67	R14	83° 14' 8.641" E	22° 28' 12.660" N
68	R15	83° 14' 10.663" E	22° 28' 14.548" N
69	R16	83° 14' 14.638" E	22° 28' 16.130" N
70	R17	83° 14' 17.532" E	22° 28' 17.257" N
71	R18	83° 14' 19.687" E	22° 28' 17.831" N
72	R19	83° 14' 20.964" E	22° 28' 18.353" N
73	R20	83° 14' 23.743" E	22° 28' 19.455" N
74	R21	83° 14' 25.836" E	22° 28' 20.851" N
75	R22	83° 14' 28.188" E	22° 28' 22.251" N
76	R23	83° 14' 30.640" E	22° 28' 23.709" N
77	R24	83° 14' 31.420" E	22° 28' 24.490" N
78	R25	83° 14' 32.155" E	22° 28' 25.193" N
79	R26	83° 14' 33.901" E	22° 28' 27.742" N
80	R27	83° 14' 35.448" E	22° 28' 29.041" N

S.No.	PILLAR ID	LONGITUDE	LATTITUDE
81	R28	83° 14' 36.360" E	22° 28' 30.974" N
82	R29	83° 14' 37.372" E	22° 28' 32.761" N
83	R30	83° 14' 40.353" E	22° 28' 31.102" N
84	R31	83° 14' 43.378" E	22° 28' 29.451" N
85	R32	83° 14' 44.510" E	22° 28' 28.791" N

6. SURVEY DATE & PHOTOGRAPHS

SURVEY DATE	SURVEY TIME	VILLAGE NAME
07-03-2017	11.00 AM To 05.00 AM	Damas
08-03-2017		

Weather was nice with clear sun light. Survey pillar marking has been done before itself so it was easy to get the location point. Survey has been done by the survey team members Mr. Rakesh Kumar Ratre, Mr. Surendra Pratap Koshle and Mr. Gulshan. The team was leaded by Mr. Surendra Pratap Koshle.

Base Station Photographs

Survey photographs with staff

Survey Pillar Photographs

DGPS SURVEY & REPORT PREPARED BY:

COMPUTER PLUS

Software Development & Consultancy

Plot No. 4 Sector-1, Devendra Nagar
Raipur (C.G.) 492001
Phone No: 0771 4031077 M : 7587113793
E-mail: info@cplus.in Website: www.cplus.in

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