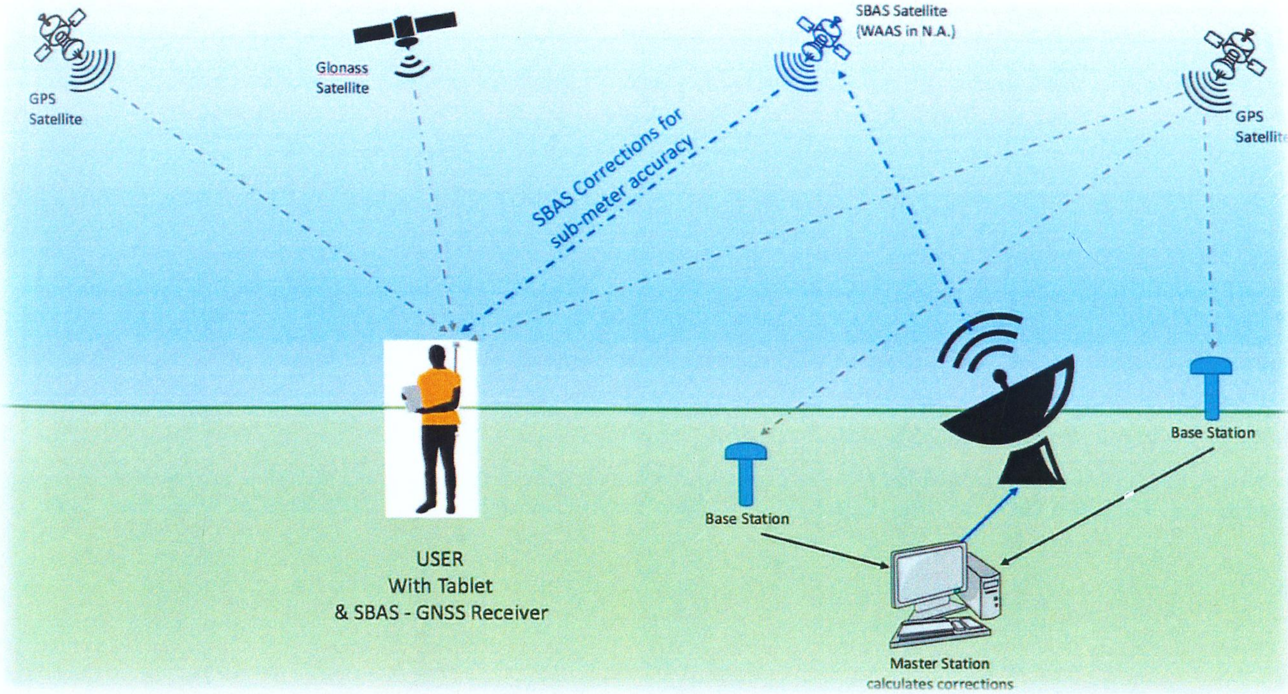
DGPS SURVEY REPORT FOR CONSTRUCTION OF ITI, POLYTECHNIC, SCHOOL & OTHER ASSOCIATED INFRASTRUCTURE OF NMDC IRON AND STEEL PLANT LOCATED AT VILLAGE - CHOKAWADA, TEHSIL – JAGDALPUR FOREST DIVISION BASTAR DISTRICT BASTAR CHHATTISGARH



Name of the Applicant:
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Executive Director NMDC Iron and Steel Plant, Nagarnaar, Jagdalpur, District - Bastar, Chhattisgarh.
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Surveyed By:
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Software Development & Consultancy,
Devendra Nagar, Raipur, Chhattisgarh.

Computer Plus Raipur (C.G.)

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MAPS ON A3 & A0 SIZE PRINTOUT

DATA ENCLOSED IN SOFT COPY

1. ABOUT US

Computer Plus an **ISO 9001:2015 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.

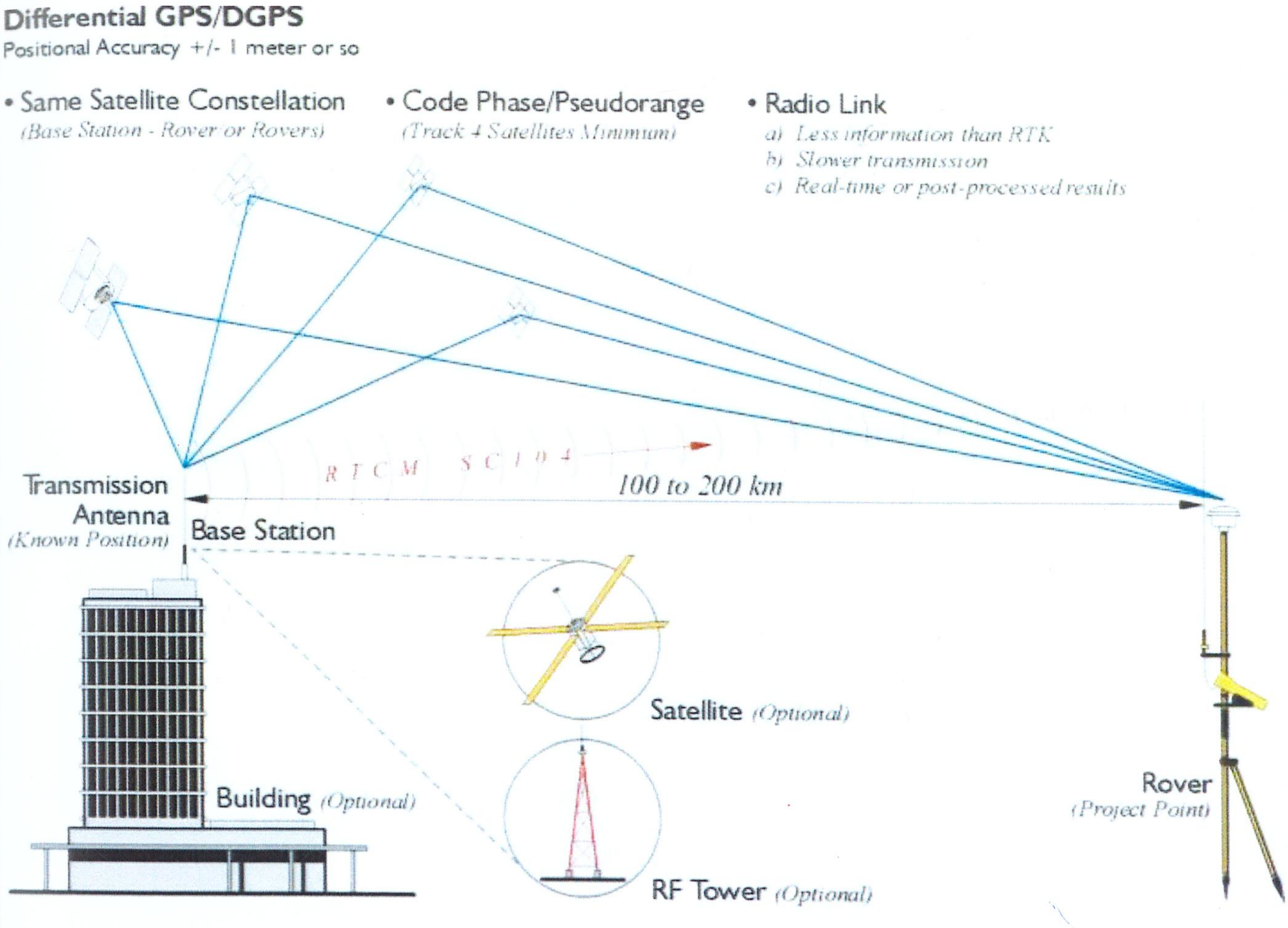
Our Mission:

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



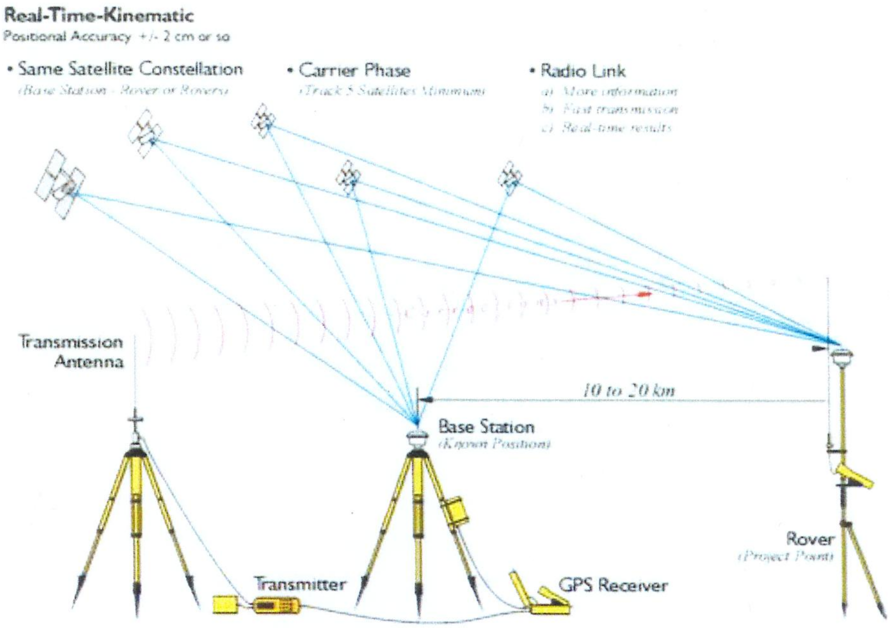
The term DGPS is sometimes used to refer to differential GPS that is based on pseudo ranges, aka code phase. Even though the accuracy of code phase applications was given a boost with the elimination of Selective Availability (SA) in May 2000 consistent accuracy better than the 2-5 meter range still 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 pseudo range based versions can offer meter- or even sub meter results.

Usually, pseudo range 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



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.

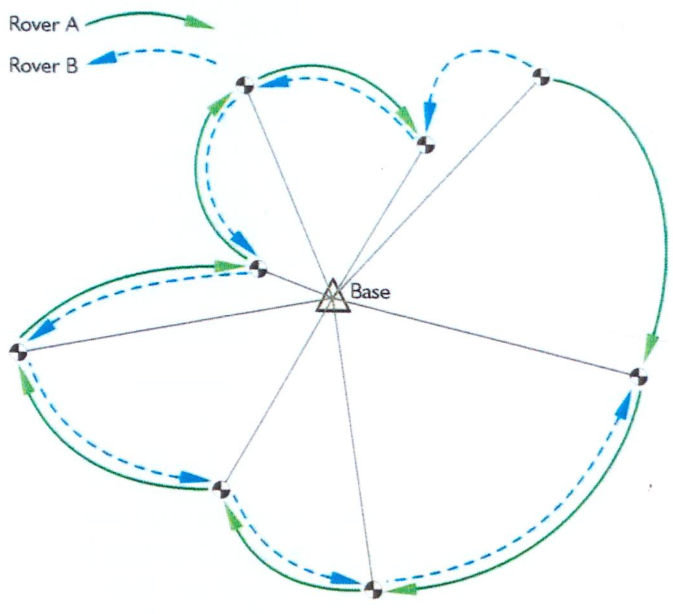
In this category of GPS surveying work there is sometimes a distinction made between code- based and carrier based solutions. In fact, most systems use a combination of code and carrier measurements so the distinction is more a matter of emphasis rather than an absolute difference. Well that's a bit 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 post processing.

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 receiver 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.

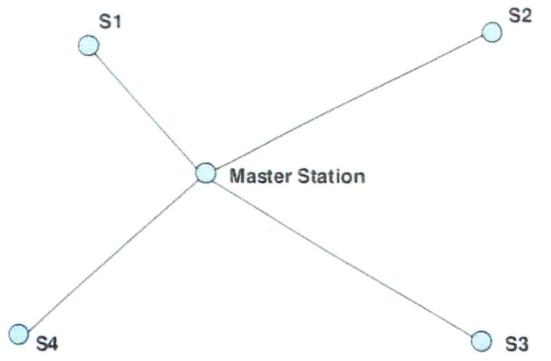
More efficiency can be achieved by adding additional roving receivers. However, as the number of receivers rises, the logistics become more complicated, and a survey plan becomes necessary. Also, project points that are simultaneously near one another but far from the control station should be directly 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.

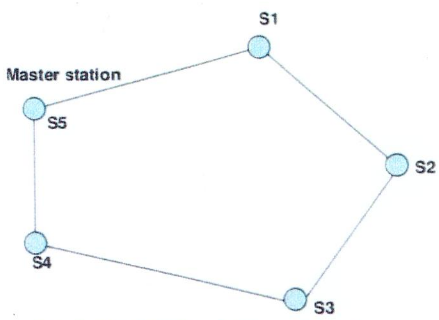
2. STATIC METHOD

I. Rapid Static Method



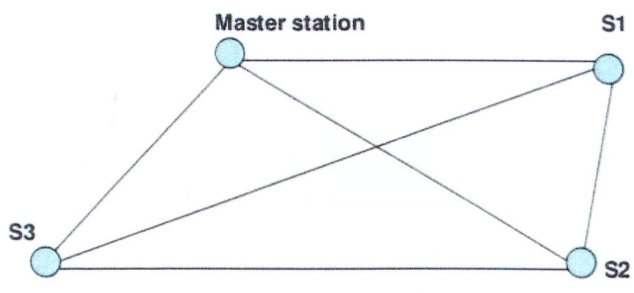
Schematic diagram of Rapid Static Method

II. Traverse Method



Schematic diagram of Traverse method

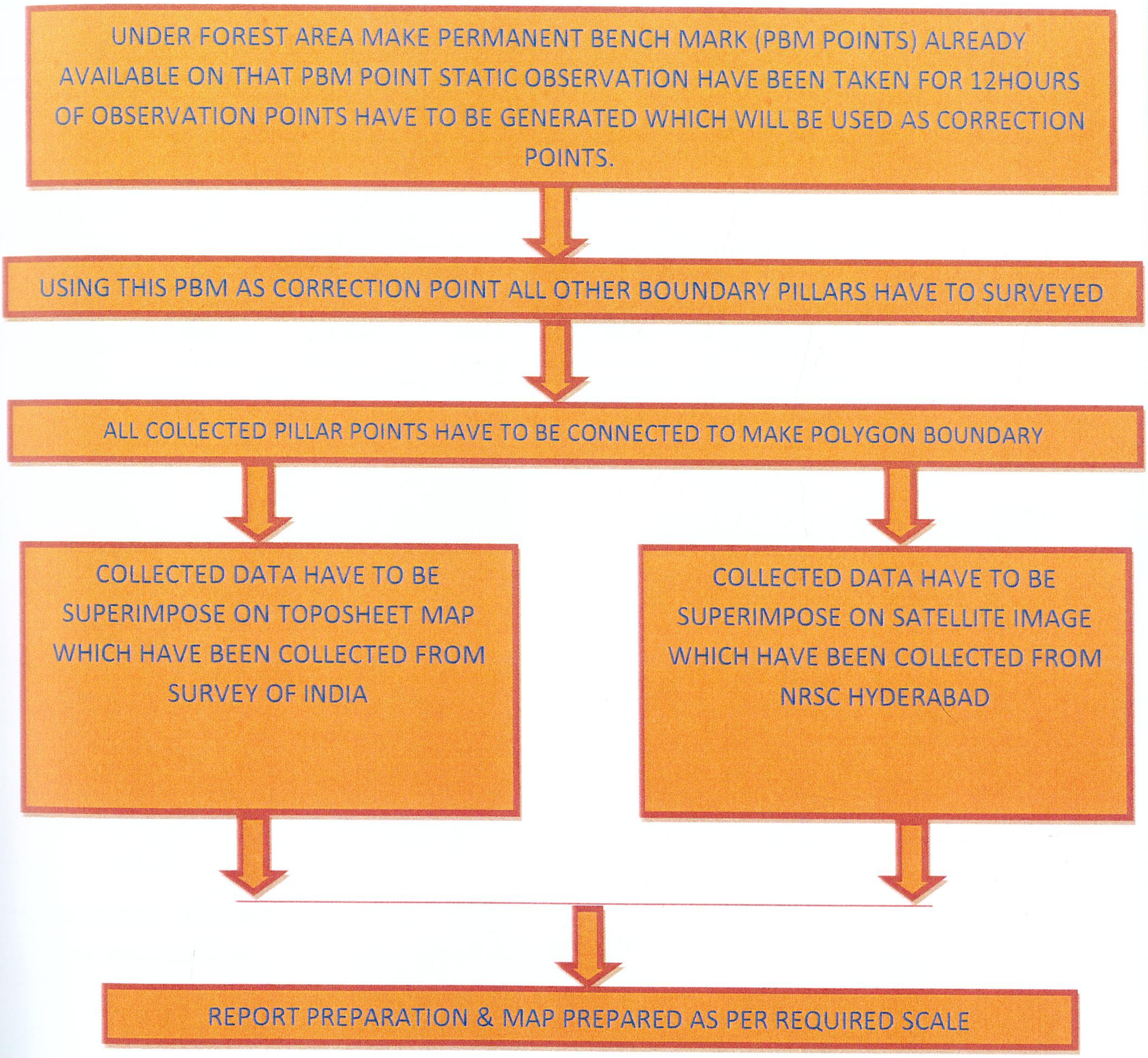
III. Trilateration Method



Trilateration method

3. METHODOLOGY USED

SURVEY METHODOLOGY UNDER FOREST

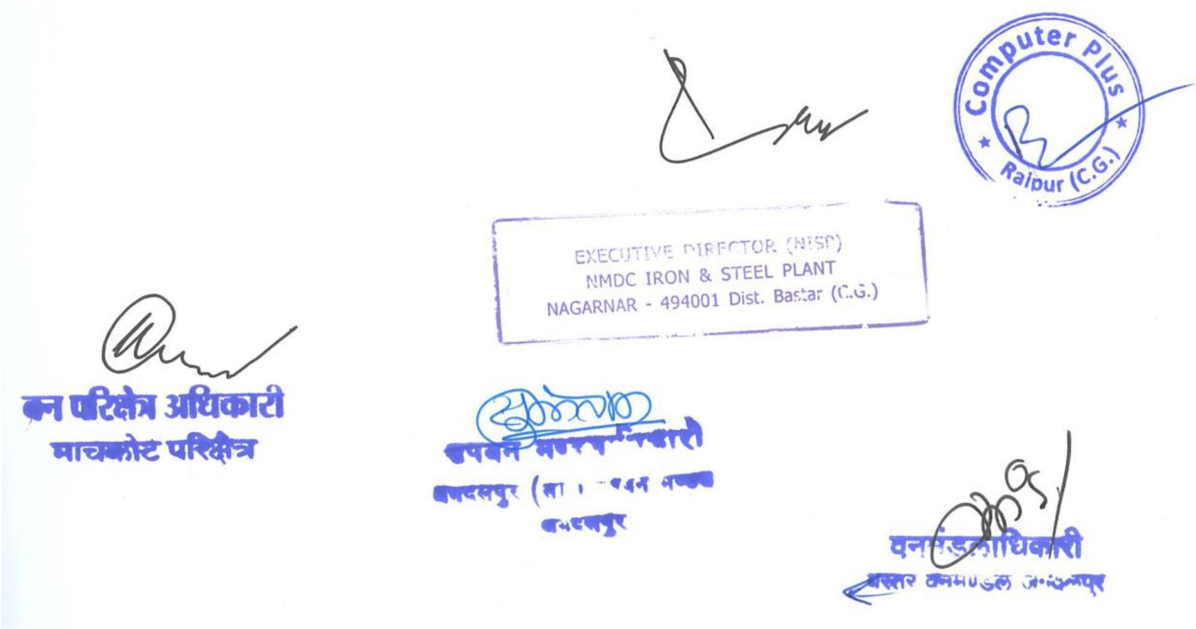


4. INTRODUCTION TO SURVEY SITE

The surveyed area for **Construction of ITI, Polytechnic, School & Other Associated Infrastructure of NMDC Iron and Steel Plant** is located in **Village Chokawada,** which comes under **Block Jagdalpur, Tehsil - Jagdalpur, District Bastar, Chhattisgarh**. Survey site is located **24.1 Km** from **Jagdalpur & Jagdalpur Railway Station** longitude latitude is **82° 0'51.65"E 19° 3'57.47"N**. Survey site comes under **Forest Division Bastar**, **Forest Range Machkote & Forest Circle Jagdalpur.**

AREA DETAILS & LAND CLASSIFICATION

S.No.	District Name	Division Name	Block Name	Range Name	Land Type	Khasra No.	Area (In Hectare)
1	Bastar	Bastar	Jagdalpur	Machkote	Revenue Forest	640	1.700
2						638	8.100
TOTAL							**9.800**



5. CONTROL POINT

PRIMARY CONTROL POINT (FIXING OF BASE STATION POINT)

NAME	P.C.P VILLAGE NAME	LONGITUDE	LATITUDE
GROUND CONTROL POINT 1	Chokawada	82° 12' 2.050" E	19° 3' 33.352" N

SURVEYED GROUND CONTROL POINTS

S.No.	PILLAR ID	LONGITUDE	LATITUDE
1	1	82° 11' 54.895" E	19° 4' 20.182" N
2	2	82° 11' 53.328" E	19° 4' 18.442" N
3	3	82° 11' 51.533" E	19° 4' 16.092" N
4	4	82° 11' 50.645" E	19° 4' 14.806" N
5	5	82° 11' 50.017" E	19° 4' 13.553" N
6	6	82° 11' 49.335" E	19° 4' 11.874" N
7	7	82° 11' 49.879" E	19° 4' 15.017" N
8	8	82° 11' 50.345" E	19° 4' 17.793" N
9	9	82° 11' 50.781" E	19° 4' 20.119" N
10	10	82° 11' 51.144" E	19° 4' 22.724" N
11	11	82° 11' 50.547" E	19° 4' 23.131" N
12	12	82° 11' 50.160" E	19° 4' 20.775" N
13	13	82° 11' 49.679" E	19° 4' 17.737" N
14	14	82° 11' 49.280" E	19° 4' 15.355" N
15	15	82° 11' 48.676" E	19° 4' 12.016" N
16	16	82° 11' 48.253" E	19° 4' 9.661" N
17	17	82° 11' 48.029" E	19° 4' 8.213" N
18	18	82° 11' 39.357" E	19° 4' 10.248" N
19	19	82° 11' 41.190" E	19° 4' 12.935" N
20	20	82° 11' 42.799" E	19° 4' 15.316" N
21	21	82° 11' 44.146" E	19° 4' 17.400" N
22	22	82° 11' 44.933" E	19° 4' 18.881" N
23	23	82° 11' 45.911" E	19° 4' 21.059" N
24	24	82° 11' 46.945" E	19° 4' 23.258" N
25	25	82° 11' 47.906" E	19° 4' 24.933" N
26	26	82° 11' 48.970" E	19° 4' 24.235" N

वनमंडलाधिकारी

Computer Plus Raipur (C.G.)

EXECUTIVE DIRECTOR (NISP)
NMDC IRON & STEEL PLANT
NAGARNAR Dist. Bastar (C.G.)

उपवन मण्डलाधिकारी

वन परिक्षेत्र अधिकारी
माचकोट परिक्षेत्र

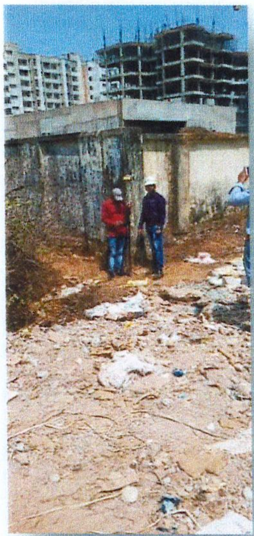
6. SURVEY DATE

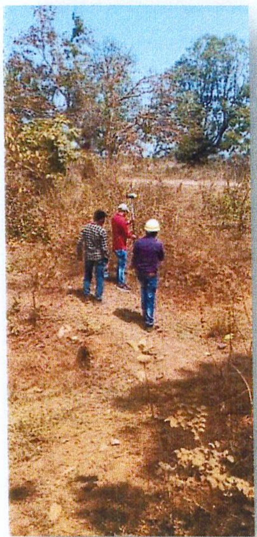
Survey Date	Observation	Survey Time	Village Name
24/02/2020	Pillar Survey	10:30 am To 05:45 pm	Chokawada

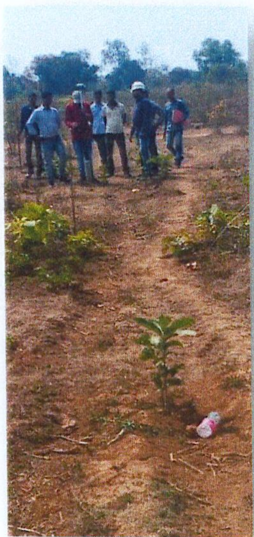
Weather was nice with clear sun light. Survey pillar marking has been done before itself so it was easy to get the location point. Survey has been done by the survey team members **Mr. Sanjay Gardiya, Mr. Santosh Sahu and Mr. Leeladhar Nishad**. The team was lead by **Mr. Santosh Sahu** and Report is prepared by **T.Preeti.**

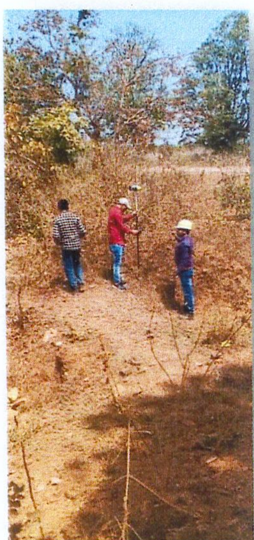
Base Station Photographs

Survey Photographs with Staff

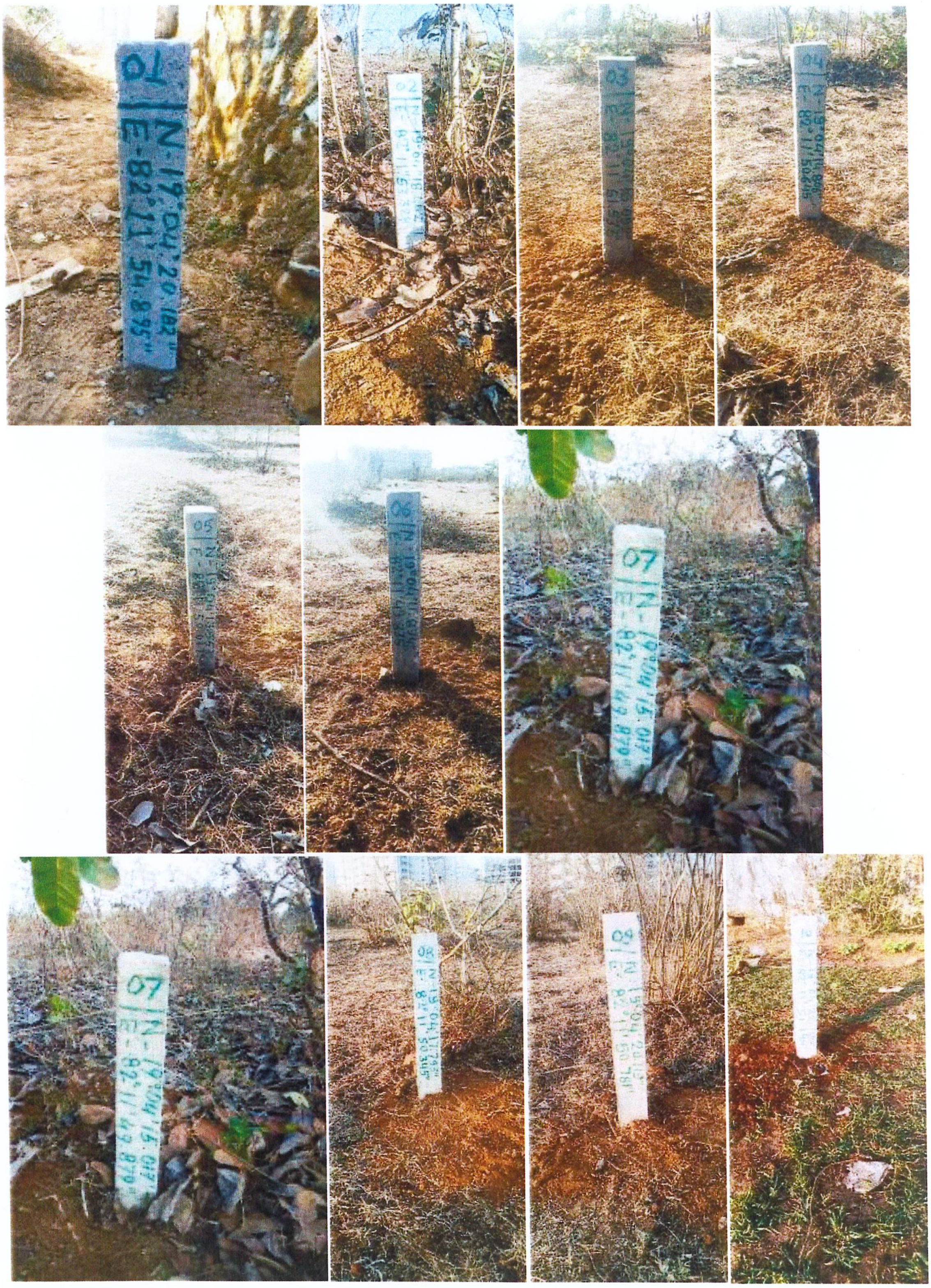








Survey Pillar Photographs

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