

## **MODERN CADASTRAL SURVEY FOR LAND RECORD MANAGEMENT - A CASE STUDY OF PART OF CHENNAI CITY**

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The changing scenario in governance especially for survey and land records department in state demands advanced information technologies and tools. The need of the day is creation of a comprehensive Land Information System, which has great potential in the field of land records management and can be used as multi-purpose administrative tool.

Over the past ten years GPS has emerged as a major tool for undertaking precise surveys. More recently, it has made inroads in those applications requiring lower precision surveys and is fast becoming a primary technology for acquiring data for input into geographical and land information systems (GIS/LIS). So GPS receivers can provide coordinates, which are sufficiently accurate for cadastral purposes in rural areas.

More importantly, these receivers offer an opportunity to significantly lower the cost and time typically required for cadastral surveys. In addition to providing a framework of control stations the GPS & Total station can also be used to survey and incorporate details of various important landmarks. Any changes in the holding geography can also be surveyed and the spatial database can accordingly be modified. It also makes a direct download of survey data possible into various GIS packages where one can then modify edit the spatial data as per the need.

### **NEED FOR THE STUDY**

Digital cadastral map in coordinate system can be used as one of the input to create LIS. Hence creation of coordinate based digital cadastral is needed.

Use of modern equipment, GPS and Total station not only gives accuracy but also one can prepare coordinate based cadastre with ease.

Mapping software help us directly downloading the observed data in computer system, which in turn saves time.

### OBJECTIVES OF THE STUDY

The objectives of the present study are

1. To study the limitations and problems of conventional surveying and find out the solution of modernization of cadastral survey.
2. To prepare the modern cadastral procedure using total station and GPS.
3. Creation of Land Information System using coordinate based cadastre.

### LOCATION AND EXTENT OF STUDY AREA

Anna University Campus lies between Latitudes  $13^{\circ}00'00''N$  -  $13^{\circ}02'00''N$  and Longitude  $80^{\circ}12'00''E$  -  $80^{\circ}15'30''E$ . Anna University Campus is bounded on the North by Adayar River and by Raj Bhavan on the South. The total geographical extent of the area is about 100 hectares.

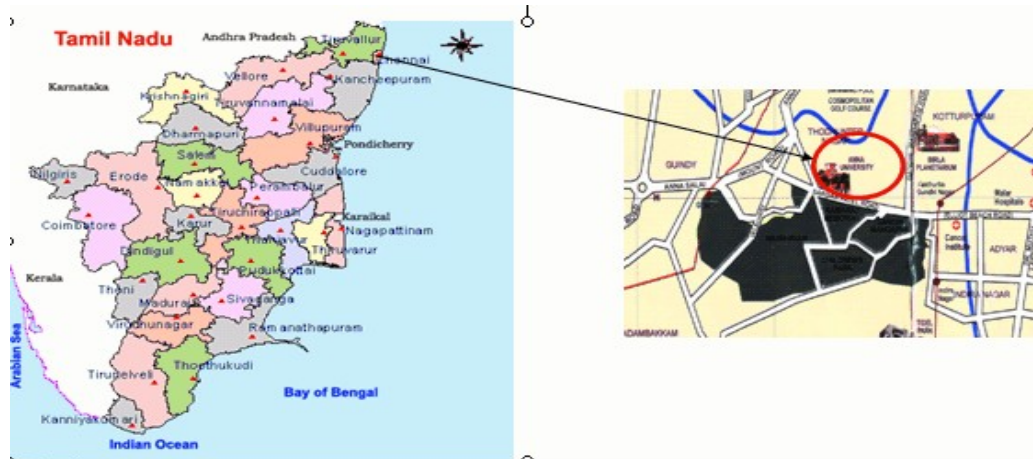


FIGURE – 1. LOCATION MAP

### METHODOLOGY:

The methodology consists of boundary demarcation, traverse survey, computation of data, preparation of skeleton, location of holdings and field demarcation, field measurement., plotting of village map and finishing the map and area computation.

**IDENTIFICATION/DEMARCATON OF BOUNDARIES:**

Demarcate the boundaries (larger circuits) and identifying the station location for establishing the ground control points is the location study.

**ESTABLISH THE GROUND CONTROL POINTS:**

Ground Control Points (GCP) as a monument are already existing as **Bijunction** or **Trijunction** at village level. Ground control points can also be established using GPS. Minimum of two GCP are need for detailed surveying using Total station. By static method of GPS Survey one can get the spherical co-ordinates in WGS-84 co-ordinate system. These coordinates can be converted into Grid co-ordinates [Easting, Northing, Height] using projection and transformation.

**TRAVERSING:**

Traversing can be done by using Total station. Traversing work consists of outer and inner traversing. Outer traversing covers the major area, which are the major circuits. Inner traversing can be divided into block and khandam traversing. Outer traverse can be divided into two to four parts then it is known as khandam traverse. Sub-division of khandam traverse is the block traverse.

The reason for subdividing the outer traverse into blocks are to minimize the errors in traversing and to start the survey work from any two visible station. After traversing the errors can be computed and distributed to all the stations. Coordinates of each station can be obtained from traversing work. These coordinates are input to the Total station for detailed surveying.

**DETAILED SURVEYING:**

Location sketch of each and every details of the field such as building, roads, platforms etc., should be drawn . These detailed sketch will be helpful during the plotting

work. Total Station is used for high-density grid co-ordinate based survey work. Before commencing a survey it is required to have station and back station co-ordinates and their exact location. The instrument should be kept over the station point and the station and back station co-ordinate should be fed in the total station. The orientation can be taken with respect to the station and back station co-ordinates. The results of orientation should be studied carefully. If the result is within the tolerance (0.005m) the survey can be started.

All the remaining points including minor bends in buildings, roads and platforms can be identified and the prism kept exactly over the point. The measurement can be taken using Infra Red (IR) mode by pressing a distance key in Total station and the value can be recorded. Continue the same procedure until the end.

If any inaccessible point or the points are invisible from the stations, station shifting is necessary. Before doing the station shifting a feasible location should be identified [(i.e) from that location, the station point and inaccessible point should be visible] and the back station setup to be established. This is called change point, so the value of the change point can be recorded before doing the station shifting. Now the instrument can be taken to the change point (C.P) and the orientation should be taken and further survey can be conducted.

#### **4.3.2 DOWNLOADING AND MAPPING:**

Downloading is a process of transferring the data from instrument to the computer using data transfer cable and interface software (Also the data can be transferred from Compact Flash Card (C.F. Card) to the computer using card reader). A connecting cable has two ends, one end as lemo and another one end as ninepin communication port (com. port) connector.

Using the above said cable lemo end should be connected in the instrument and the other end can be connected com. port in the CPU of the computer.

Using down loading software, it will exposed the memory of the instrument and the job list will be displayed and this will let us to select the destination area where the data to be stored. Now we can select the jobs from the job list, which we want to transfer and the same can be stored in the computer. Then with the help of mapping software (LISCAD), the map is generated in the computer.

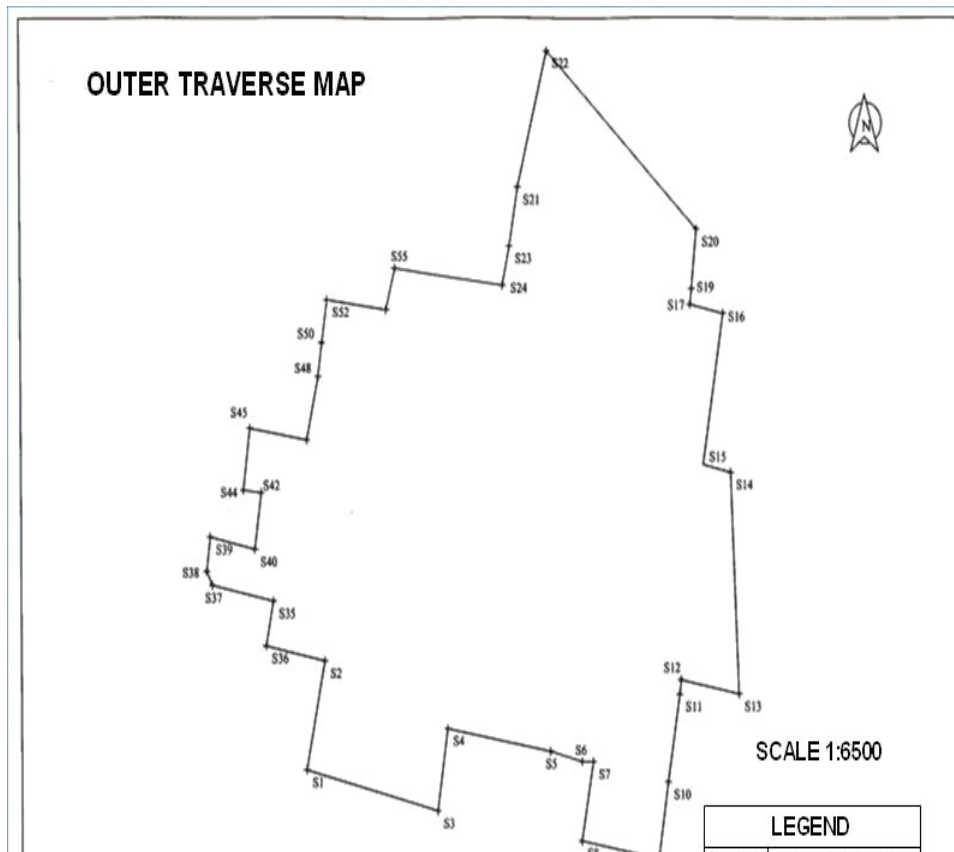
**4.4 CREATION OF LAND INFORMATION SYSTEM:**

The output of the digital map obtained from the total station survey can be input to the GIS packages for the Creation of land information system. The map obtained from the mapping software (LISCAD) is exported to the AUTOCAD software for the creation of separate layers for buildings, roads, platforms, trees, departments etc., then this file can be converted into **dx**f format for input to the ARCGIS. The attributes of buildings such as building name, area, perimeter can be added. By this way, the attributes can also be added to all the features of the map.

**ADVANTAGES OF MODERN SURVEYING TECHNIQUES:**

The accuracy of the modern surveying techniques is limited to 2mm

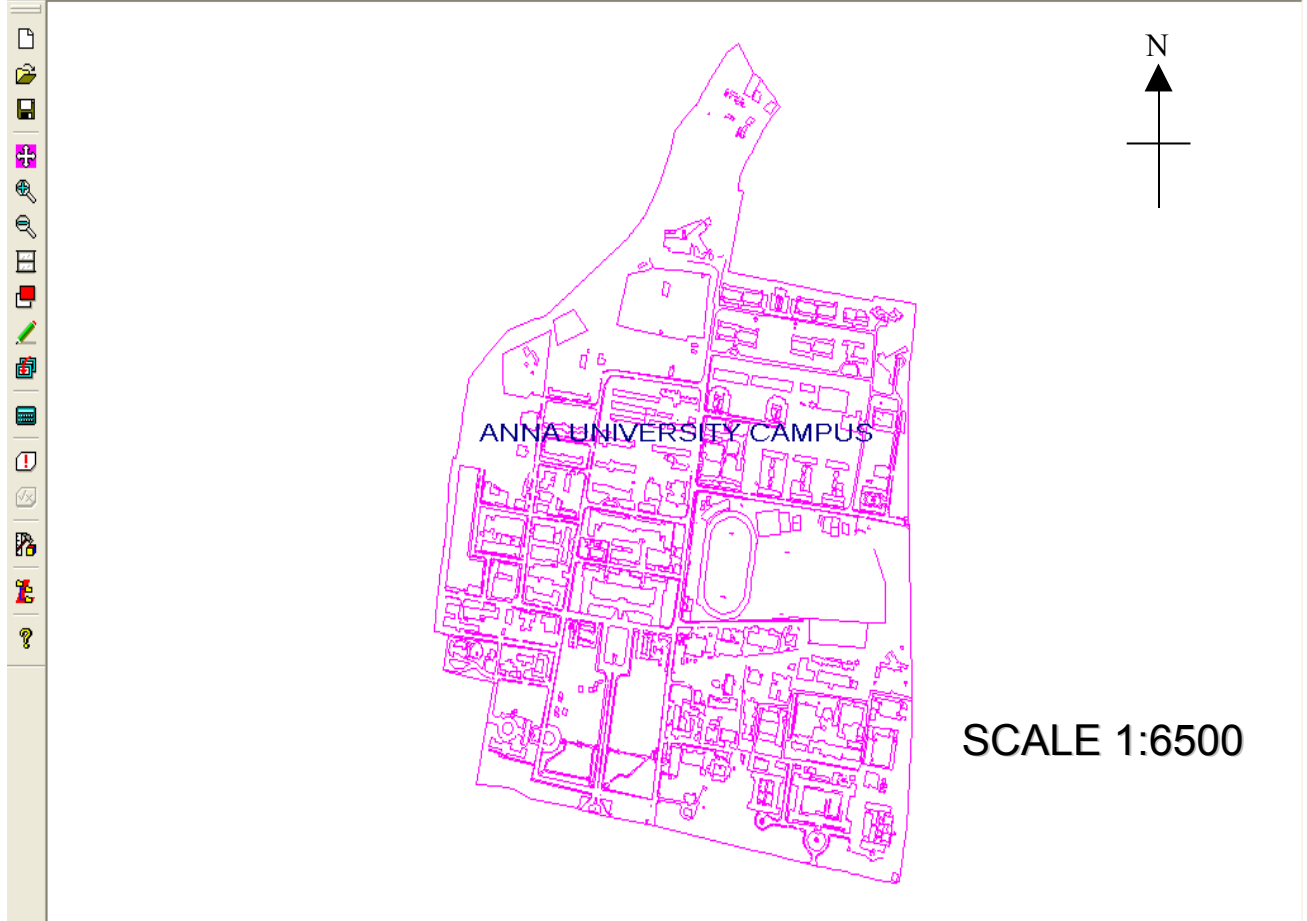
1. Modern surveying is based on coordinate system
2. Errors are almost controlled in the modern surveying
3. Plotting of field measurement book, village map and taluk map is easy due to the availability of layer based on – off options in the softwares.
4. Map representation is simple
5. Plotting can be done by using special survey editing Software (LISCAD)
6. Creation of land information system is possible
7. Time consuming is less.
8. Area computation is simple and easy



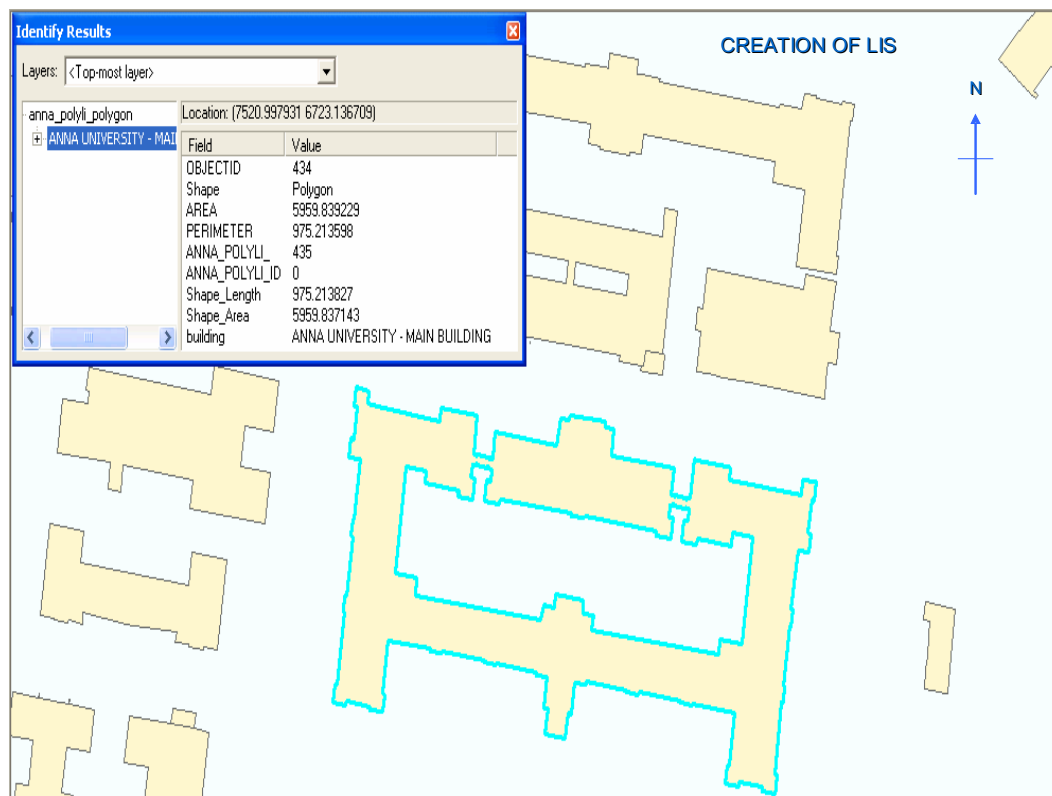
LISCAD - Utilities - "outer boundary - polygon" - [Plan View]

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**FIGURE – 3 . DETAILED SURVEYING MAP**



**FIGURE – 4 . CREATION OF LAND INFORMATION SYSTEM**

## CONCLUSION

In this thesis GPS and Total station techniques are used for establishing the control points and surveying respectively. This will give best results when compared to the conventional techniques. Techniques, Computerized storage, retrieval and analysis techniques are the universally accepted methodology for numerous information management applications. It attempts to preserve, maintain and analyze records in computer form accruing in the numerous benefits associated with this technology. The land influences development of a region and its availability. The-changing scenario in development and modern governance demands advanced technologies and tools for better understanding of needs and planning.

The need of the day is creation of a comprehensive Land Information System. CADD and GIS technologies have great potential in the field of land records and creation of LIS that serve as multipurpose administrative tool