



# A COMPARATIVE STUDY OF CONVENTIONAL SURVEYING TECHNIQUES WITH TOTAL STATION AND GPS

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## ABSTRACT

*Today advanced Surveying techniques are improving accuracy of measurements of distance, height, area and positional information of an area. Total station is an advanced instrument which is mainly used for measuring horizontal distance, slope distance, remote objects height and area of a land parcel now a days this instrument is majorly used for determining the land area information. The objectives of this thesis is to evaluate and compare accuracy and time expenditure of conventional methods like Chain, Tape, Plane Table and Theodolite with Total Station (TS) and Global positioning system (GPS).by Comparing the accuracy and the required time of these measurements will improve the knowledge about how much the precision and accuracy can be achieved by advanced instruments and at which time expense. It is possible to conduct survey with less man power and less time while using Total station. In the Campus of Karpagam Academy of Higher Education (KAHE) football ground was taken as study area. The aim of the study is to compare the land survey results conducted by conventional methods with Total Station and GPS. The study area was measured using conventional methods like Chain, Tape, Plane Table and theodolite Total Station (TS) and Global positioning system (GPS). The collected data was processed in AUTO CAD and terrasync. The results were compared and analyzed. The campus will be measured using total station. Finally the plots are represented separately with the scale and area information.*

**Key words:** GPS, Total Station, AUTOCAD, KAHE etc.

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## 1. INTRODUCTION

Surveying has been an essential element in the development of the human environment for so many centuries. It is an essential requirement in the planning and execution of every form of construction. Surveying was essential in the fields of transportation, construction, building, apportionment of land, and details mapping. Total station surveying defined as the use of electronic surveying equipment used to perform horizontal and vertical measurement in reference to a grid system A total station integrate the function of a electronic theodolite for measuring angles, and an EDM for measuring distance, The total station simplified the procedure of traversing by integrating the EDM into the theodolite and reading all measurement digitally The introduction of satellite positioning system has provide the surveyor with an additional measurement technology to perform survey tasks. Although RTK GPS is now widely used, there are still many surveyors who do not benefit from GPS technology because of a perception of complexity and expense. Integrated GPS and total station system significantly, are easy to use and provide a cost effective entry point to GPS technology

## 2. AIM AND OBJECTIVES

The ultimate aim of this study is to compare different conventional surveying techniques with Total Station (TS) and Global Positioning System (GPS). To achieve this aim the following objectives were carried out.

- To measure the study area using Chain surveying, Tape surveying, Plane table surveying, Theodolite surveying methods
- To measure the study area Total Station (TS)and Global Positioning System(GPS)
- To plot the measurement from different methods using Auto CAD
- To analyses the results and compare the accuracy as well as time expense.

## 3. STUDY AREA

We have taken the football ground from Karpagam Academy of Higher Education (KAHE) as sample from the study area. The ground is in rectangular shape. There are 8 pillars in the ground it is closed by the steel roof.



(a)

(b)

**Figure 1** Football ground-study area

## 4. DATA COLLECTION

The measurement of length, breadth and area were collected using the following methods.

- Chain surveying
- Tape surveying
- Plane table surveying
- Theodolite surveying
- Total Station surveying
- Handheld GPS surveying

In chain survey method we have collected length and breadth measurements of football ground in Karpagam Academy of Higher Education from this measurement we have plotted the boundary diagram in AUTO CAD

In tape survey method we have collected length and breadth measurements of football ground in Karpagam Academy of Higher Education from this measurement we have plotted the boundary diagram in AUTO CAD

In plane table survey method we fixed the table in center of the ground then taken four radiated lines and measured the radiated lines and measured the football ground. Karpagam Academy of Higher Education from this measurement we have plotted the boundary diagram in AUTO CAD

In theodolite survey method, we have collected the four angles and measured the base line length of football ground in Karpagam Academy of Higher Education from this measurement we have plotted the boundary diagram in AUTO CAD

By using total station, the area where collected using area determination options from the application menu.in this method we have directly got the area using Electro Magnetic Distance Measurement (EDM) and reflector prism. We measured the football ground. Karpagam Academy of Higher Education from this measurement we have plotted the boundary diagram in AUTO CAD

## 5. METHODOLOGY

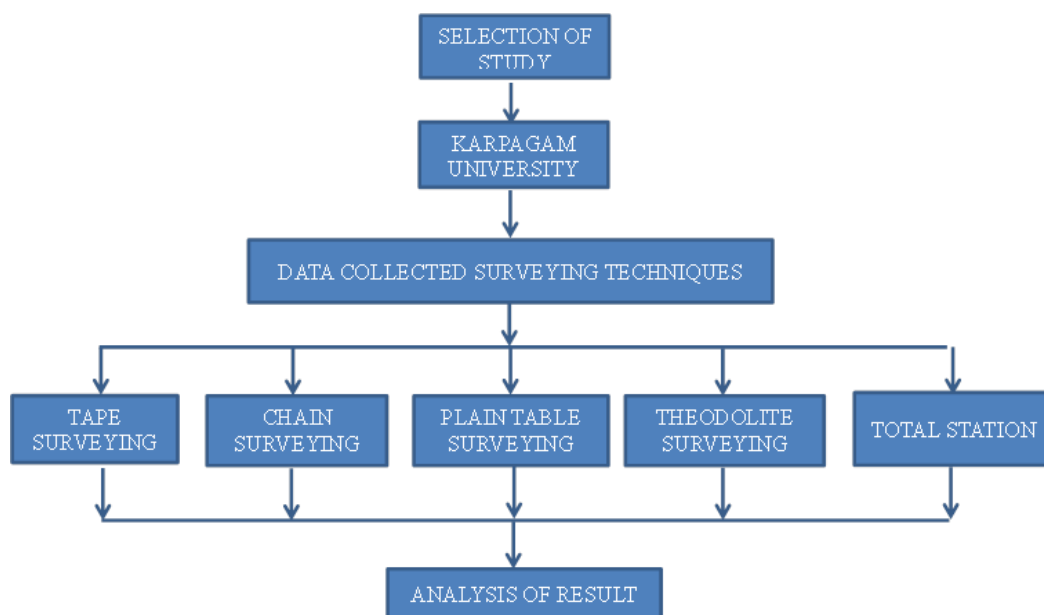
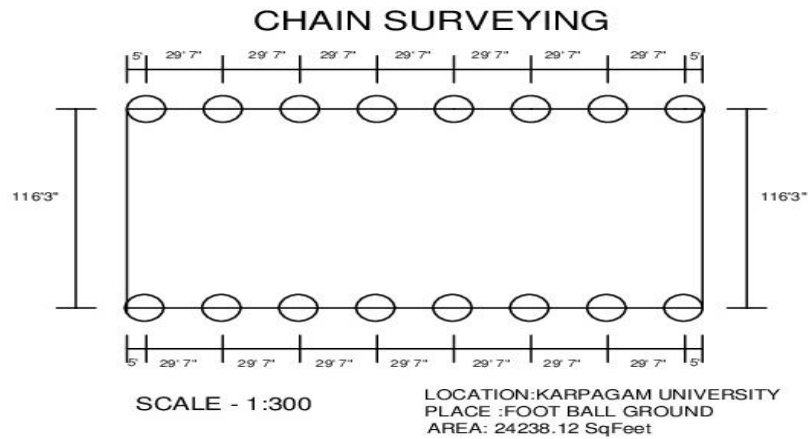


Figure 2 Diagrammatic representation of methodology

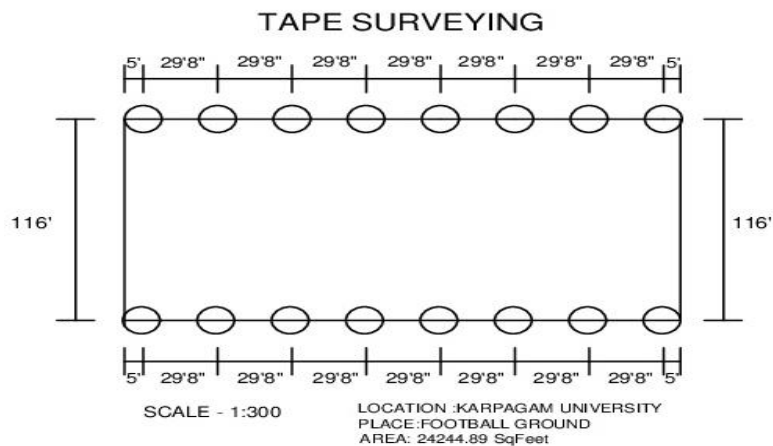
## 6. RESULTS

We analyzed football ground using Chain surveying, Tape surveying, Plane table surveying, Theodolite surveying and Total station to measure the area. We have plotted the measured area using AUTO CAD.



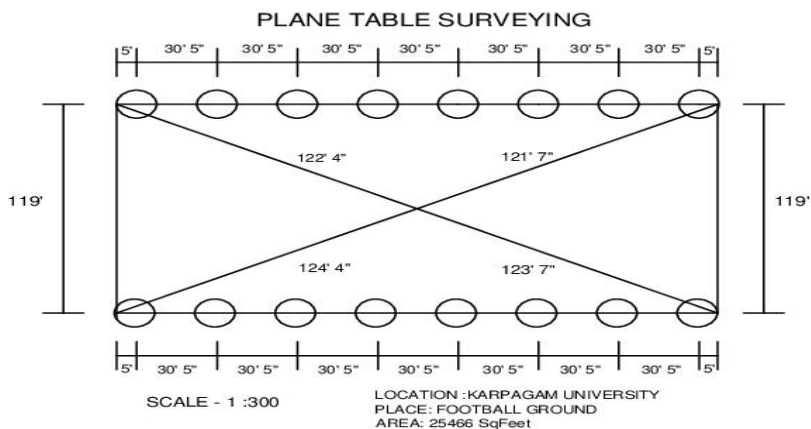
(a)

**Figure 3** Result of Chain surveying



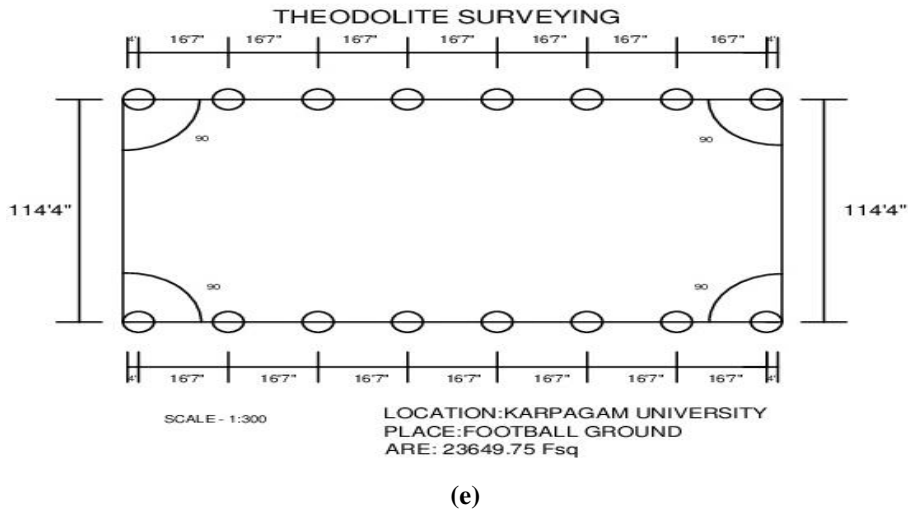
(b)

**Figure 4** Result of Tape surveying

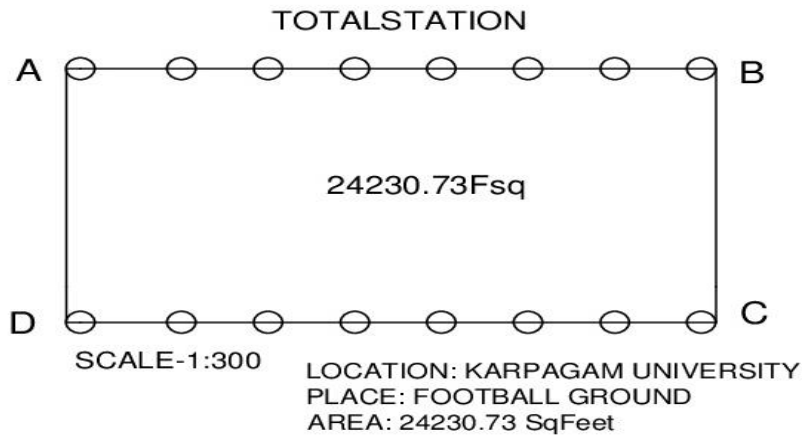


(d)

**Figure 5** Result of Plane table surveying

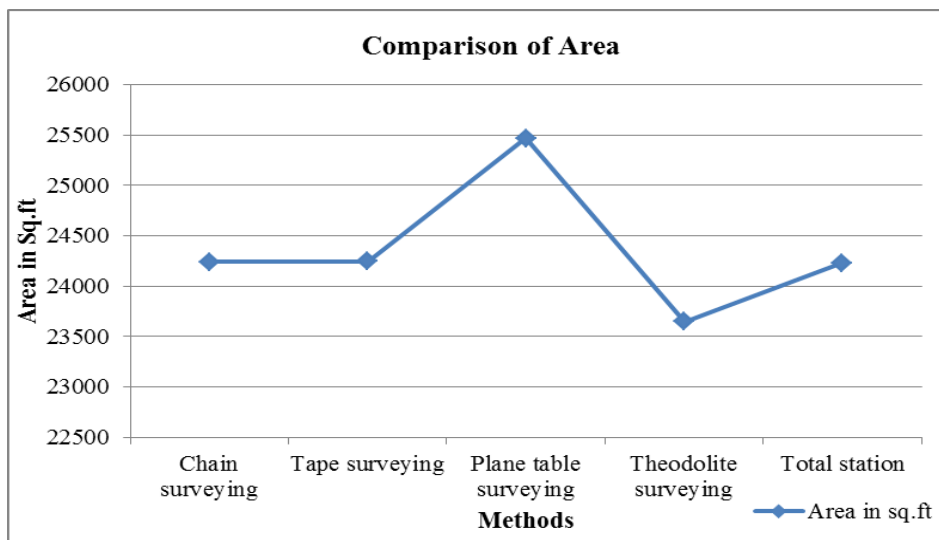


**Figure 6** Result of Theodolite surveying



**Figure 7** Result of Total station

Above figure (a), (b) (c) (d) (e) shows the plot of the study area. Using difference method the method of survey, scale, location, place, area and dimensions where clearly shown.



**Figure 8** Comparison of area



Figure 9 Time expense

## 7. CONCLUSIONS

In this Present study we have used four surveying techniques (Tape, Chain, Plane table, Theodolite, Total station & GPS) to compare the accuracy and time expenditure of each techniques. We have selected football ground in Karpagam Academy of higher education. As our study area the area was measured by using the four techniques with help of total station & GPS. Finally we have analysis the data collected by different methods from this four technique Total station given good accuracy level and compare to other technique.

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