RAMA UNIVERSITY

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FACULTY OF RNGINEERING AND TECHNOLOGY (DEPARTMENT OF CIVIL ENGINEERING)

Lecture -05
TEMPORARY ADJUSTMENT OF PLANE TABLE

Temporary adjustment of Plane Table

- It is necessary to check whether the accessories satisfies some basic conditions and if required, necessary adjustments are to be done before starting any plane table surveying work. The operations involved in this are known as temporary adjustment of plane table. The conditions needed to be tested and subsequent adjustments are as follows:

1. **The surface of the board should be a perfectly plane.**

- **Test :** It is tested by placing a straight edge on the top surface of the plane table in different directions. If there is no gap between the base of the straight edge and the surface of the plane table then the surface is perfectly plane. Otherwise, the surface is not perfectly plane.

- **Adjustment :** If the gaps are minute, those are removed by rubbing with sand paper and for more gaps, the table should be replaced.

2. **The fiducial edge of the alidade should be straight.**

- **Test :** It is tested by drawing a fine line on the paper along the fiducial edge of the alidade. Then, by reversing the alidade, end for end, and placing against the line drawn, a line is to be drawn again along the fiducial edge. If the two lines coincide, the edge is straight. Otherwise, the edge is not straight.

- **Adjustment :** The fiducial edge of the alidade is to be made straight by filing and then test is repeated till satisfactory outcome.

TEMPORARY ADJUSTMENT OF PLANE TABLE

3. **In fully opened condition, the sight vanes of the alidade should be perpendicular to its base**.

- **Test :** Hang a plumb bob at a distance of about 5 to 10 m from the plane table. Bisect the string of the plumb bob through the alidade placed on properly leveled plane table. If the sighting slit, the object vane hair and the plumb bob string lie the same vertical line, the vanes of the alidade are perpendicular to the base of the alidade. Otherwise, it requires adjustment.

- **Adjustment :** is being carried out by inserting packing under the base of the sight vanes or by filing the base, as required. The test and adjustment get repeated till satisfactory outcome is achieved.

4. **The telescopic alidade if used should be in perfect adjustment.**

- The testing and adjustment of the telescopic alidade are to be carried as discussed in case of theodolite.

ERRORS IN PLANE TABLE SURVEYING

Errors in plane table surveying are of three types :

1. Instrumental errors
2. Errors in plotting
3. Errors due to manipulation and sighting

INSTRUMENTAL ERRORS

Instrumental errors are the primary source of errors in plane table surveying which can occur in the following ways :

I. Errors will occur if the top surface of the plane table is not flat or contains undulations.

II. The fittings of the tripod and plane table should be tightly fastened. Loose fittings can make the plane table unstable and cause errors while drawing.

III. The magnetic compass used in plane table surveying should represent accurate direction otherwise an error may occur due to the wrong orientation of plane table.

IV. When the beveled edge or fiducially edge of the alidade is not straight or curved, an error occurs in the drawing.

V. Both sight vane and object vane of alidade should be perpendicular to the base of an alidade- if not, there will be an error in sighting.

VI. Faulty Spirit level or level tube may not keep the plane table in horizontal position, therefore an error may occur.

ERRORS IN PLANE TABLE SURVEYING

Errors in Plotting

Errors may occur during plotting as well and they could be due to :

I. Use of poor quality drawing sheet may affect the scale of the drawing. It is due to the expansion or contraction of drawing paper against temperature changes. Well-seasoned drawing sheet will not expand or contract due to weather fluctuations.

II. The pencil used for plotting should contain thin and sharp nose. Usage of a thick pencil may alter the scale of drawing especially in the case of very small scale drawings.

Errors of Manipulation and Sighting:

Errors of manipulation and sighting come under personal errors or man-made errors. They may occur due to any of the following cases :

I. The boar not being horizontal.

II. The table not being accurately centered.

III. The table not being correctly oriented.

IV. The table not being properly clamped.

V. The objects not being correctly sighted.

VI. The alidade not being correctly centered on the station-pointing the paper.

VII. The rays not being accurately drawn through the station point.

TESTING AND ADJUSTING THE PLANE TABLE SURVEYING:

1. The Board:

I. The upper surface of the board should be a perfect plane:

a. Test: Apply a straight edge in all directions.

b. Adjustment: If the surface is not perfectly plane, remove high parts by planning or sand papering.

II. The upper surface of the board should be perpendicular to the vertical axis of the instrument:

a. Test set up and level the table: Place a spirit level on the table and bring the bubble in the central position. Turn the table through 180 and see if the bubble remains central or not. Then place the level at 90 to its previous position, and repeat, if the bubble remains central on reversal in both the above cases, the adjustment is correct.

b. Adjustment: If not correct half the apparent error by inserting a packing or washer between the underside of the board and its support. Repeat the whole process until the bubble remains central after reversal in each case.

2. The Alidade:

I. The ruling edge of the alidade should be a straight line:

a. Test: Select two points on the sheet at a distance approximately equal in length to the length of the alidade. Join these points by drawing a fine line along the edge. Reverse the alidade end for end and place it against the end points, and again draw a line. If the two lines coincide, the alidade is correct.

b. Adjustment: If not, correct the edge by repeated filing and testing.

TESTING AND ADJUSTING THE PLANE TABLE SURVEYING:

II. The alidade spirit levels should have their axes parallel to the base of the alidade:

a. Test: Place the alidade on the table and bring the bubble of one of the levels of the alidade central by the foot-screws of the table. Mark the position of the alidade, lift and reverse it through 180 and replace it within the marks. If the bubble still remains in the centre of its run, the adjustment is correct.

b. Adjustment: If not, bring the bubble half way back by means of level tube adjusting screws and the remaining half by the foot-screws and repeat until the test is satisfied. Test and adjust the second level tube in the same way.

III. The sight vanes of the plain alidade should be perpendicular to the base of the alidade:

a. Test: Suspend a plumb line at a short distance from the instrument. Place the alidade on the levelled table and observe whether the sighting slit and vertical hair of the object vane appear parallel to the plumb line.

b. Adjustment: If not, adjust by filing or packing the base of the sights.

In the case of telescopic alidade, the conditions of adjustments are:

I. The line of collimation should be perpendicular to the horizontal axis of the telescope.

II. The horizontal axis should be parallel to the base of the alidade.

III. The telescope level should be parallel to the line of sight.

IV. The vertical circle should read zero when the line of sight is horizontal.

ADVANTAGES & DISADVANTAGES OF PLANE TABLE SURVEYING

Advantages of Plane Table Surveying

Some of the advantages of plane table surveying are:

I. It is one of the most rapid method of surveying.

II. Field-notes are not required, and thus the possibility of mistakes in booking is eliminated.

III. Measuring of lines and angles is mostly dispensed with since they are obtained graphically.

IV. Since the map is plotted in the field, there is no chance of omitting necessary measurement.

V. The surveyor is fully confident about the true representation of the area since he can always compare his work with the actual features on the ground and cannot, therefore, over-look any essential detail.

VI. The surveyor can check the accuracy of his work more frequently and from any position he may desire, thus eliminating all error at the spot.

VII. It is particularly suitable for filling in details in hilly areas and in magnetic areas where chain and compass surveys are not suitable.

VIII. Contours and other irregular objects may be accurately represented on the map since the tract is in view.

IX. It is less costly than theodolite survey.

X. No great skill is required in making a satisfactory map and the work can be entrusted even to a subordinate.

ADVANTAGES & DISADVANTAGES OF PLANE TABLE SURVEYING

Disadvantages of Plane Table Surveying:

Some of the disadvantages of plane table surveying are:

I. It is unsuitable for work in a wet climate, and is difficult in high wind.

II. It is not useful for large scale surveys and accurate work.

III. It is not suitable for surveying a densely wooded area.

IV. The instrument is heavy and cumbersome and the various accessories, being loose, are likely to be lost.

V. The absence of field-notes is sometimes inconvenient if the survey has to be replotted to a different scale.

VI. Only day time can be availed of for the field and plotting work whereas in other methods of surveying, day time can be used for field- work and night or even hot and rainy days can be utilised for plotting.

THANK YOU