



VINAYAKA MISSION'S RESEARCH FOUNDATION

AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR

DEPARTMENT OF CIVIL ENGINEERING

17CVCC83- SURVEY PRACTICAL -I LAB

STANDARD OPERATING PROCEDURES

1. Standard operating Procedure of Chain

For chain surveying, at least two men are required, but frequently three people are employed.

They are:

- (1) The surveyor, who does the reading and booking,
- (2) The leader, and
- (3) The follower.
 - (i) To start the chaining of a line the follower holds the zero end of the chain in contact with the peg at the beginning of the line and presses the handle with his feet and stands firmly over it.
 - (ii) The leader holds another end of the chain and goes along with the arrows and ranging rods on the line.
 - (iii) Nearly at the end of the chain length, he stops and aligns with the help of ranging rod which he keeps vertical and faces the follower, who gives him instructions by his arms.
 - (iv) After alignment, the leader pulls the chain and inserts an arrow in to the ground to mark the end.

(v) The lateral measurements or offsets are taken from the chain line to any object that is to be plotted on the plan.

(vi) The chain line should be such that these offsets are as short as possible. While pulling the chain, care should be taken.

(vii) After taking the offsets, the leader picks up the [staff rod](#) and remaining arrows keeping the chain a little away from the line so that the arrow placed is not disturbed, starts moving ahead as before.

(viii) As the follower reaches the arrow with the near end of the chain, he should speak loud “chain” or “tape” to give a warning to the leader that he has nearly reached the arrow or a chain length and immediately the leader stops.

(ix) The follower holds the handle against the arrow and directs the leader to come in line as before.

(x) The leader again stretches the chain and fixes the arrow in the ground at another chain length or make a cross if the ground is firm.

(xi) Again, the leader walks in the line in the same manner and the follower now picks up the first arrow, comes to the second arrow and gives instructions for the third chain length.

(xii) Thus, the whole process is repeated until the end of the line is reached.

(xiii) The number of arrows with the follower is an indication of the number of full chain lengths completed at any time.

(xiv) After some time the number of arrows should be checked mutually by the follower and the leader so that no chain length is missed and no arrow is lost.

2. Standard operating Procedure of Plane Table

The following steps have to be performed in order to set up a plane table over a station:

1. Fixing the Table on the Tripod Stand

- The tripod stand is placed over the required station with its legs well apart.
- Then the table is fixed on it by a wing nut at the bottom.

2. Levelling the Table

- The table is levelled by placing the spirit level at different corners and various positions on the table.
- The bubble is brought to the centre of its run at every position of the table by adjusting the legs.

3. Centering the Table

- The drawing sheet is fixed on the table. A suitable point P is selected on the sheet to represent station P on the ground.
- A pin is then fixed on this selected point.
- The upper pointed end of the U-fork is made in contact with the station pin and the plumb bob which is suspended from the hook at the lower end is brought just over the station P by turning the table clockwise or anticlockwise or slightly adjusting the legs.
- This operation is called centring.
- The table is then clamped.
- Care should be taken not to disturb the levelling.

4. Marking the North Line

- The trough compass is placed on the right-hand top corner with its north end approximately towards the north.
- Then the compass is turned clockwise or anticlockwise so that the needle coincides exactly with the 0–0 mark.
- Now a line representing the north line is drawn through the edge of the compass.
- It should be ensured that the table is not turned.

5. Orientation

- When a plane table survey is to be conducted by connecting several stations, the orientation must be performed at every successive station.
- It may be done by a magnetic needle or by the backsighting method. The backsighting process is always preferred because it is reliable. During orientation, it should always be remembered that the requirements of centring, levelling, and orientation must be satisfied simultaneously.

3. Standard operating Procedure of Prismatic Compass

1. Collect a Prismatic Compass, a Sighting Pole and possibly a Chain for the Fieldwork. Try not to wear too many jewellery or rings as the metals can interfere with the compass readings.
2. Remember that Compass readings are made along straight segments of a boundary. Irregular paths (or boundaries) should therefore be first divided into straight segments before readings are taken.
3. To begin, pick the prismatic compass and locate the Starting Point (station 1). Let your partner move to station 2 with the sighting pole. Your partner must then hold the pole upright from the position marked station 2. Take a reading from your location (marked station 1) onto the sighting pole at station 2 and record the azimuth (angles) you get.
4. To verify whether the forward azimuth reading you made is correct, exchange positions with your partner (or preferably let your partner take a back azimuth onto the sighting pole now located at station 1). As a rule, if the forward azimuth is greater than 180° , you should subtract 180° from the forward azimuth to get the back azimuth but if the forward azimuth is less than 180° you should add 180° to it to get the back azimuth. With the rule, make a quick check of the forward azimuth you made and record it if it is right. If it is wrong, redo the reading all over.
5. Record the forward azimuth you read earlier.

6. Measure the segment of the boundary between station 1 and station 2 and record your answer beside the azimuth reading for this segment. You may use a chain or a tape and remember to take the measurement in feet. In the absence of a chain or a tape, you may take the measurements by pacing along the boundary and counting

the number of paces you make. Generally, a pace taken in a relaxed mood (not running) is about a yard (three feet) for many people. If you will use this method, you should first determine the length of your pace by marking three feet segments on the floor and walk along them for some time.

7. Walk along the boundary segment between station 1 and station 2 and make any other required readings such as resection or intersection then record such measurements on the page you have already opened. Make some sketches if necessary, to portray the features and positions you find in the field.

8. Now go to station 2 and let your partner move with the sighting pole to station 3. Take the forward and backward azimuths as explained above and record only the forward azimuth in your survey book. Check to make any required chain and compass readings along the segment between stations 2 and 3 and then move on to the next segment. Continue with the process in the same manner as described until all stations (or segments) are measured and the measurements recorded in your notebook.

9. Keep your note book entries for you shall use it to plot the shape of land you measure in the field. You will also hand in your note book entries for grading.

4. Standard operating Procedure of Dumpy Level

The procedure of dumpy level surveying starts with some temporary adjustments which are:

- Setting up of instrument
- Leveling up
- Focusing

Setting up of Dumpy Level

The instrument is fixed to the tripod stand using clamp screws.

Spread the tripod legs and position the instrument at convenient height.

Firstly fix the two legs in the ground at a point and centering of bubble in the bubble tubes is done by adjusting third leg.

Leveling up

The leveling up of an instrument is done using foot screws or leveling screws.

In this case, the telescope is arranged parallel to the any two leveling screws and the bubble in the tube is centered by turning both the screws either inwards or outwards.

When it is centered, then the telescope is turned 90° and the third screw is turned until the bubble come to center.

Repeat the process until the bubble in the tube always stays at the middle in any position of telescope.

Focusing

Focusing is done by adjusting eye piece and focusing screw.

Eye piece is adjusted until the cross hairs of diaphragm are clearly visible.

To eliminate the parallax error, a white paper is used to obtain sharp vision of cross hairs.

Focusing screw is adjusted to view the clear image of the objective or staff.

Focusing is said to be done when the cross hairs bisect the objective or staff with clear vision.

After completion the above temporary adjustments, now it's time to take levels of required positions or points.

The telescope is rotated towards the line of objective or staff and bisect it.

The levels are noted at different points which values are decided from a known bench mark point in that area.

R. H. H.
HoD/Civil Engg.