

CE200 SURVEYING

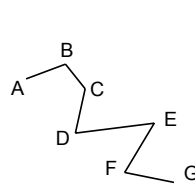
Lecture 4.1
August 20, 2007

TRAVERSE CALCULATION

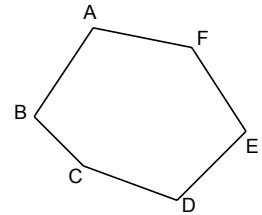
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A *traverse* is a chain of straight lines to be used as a basis for the measurement of detail.

There are two types :



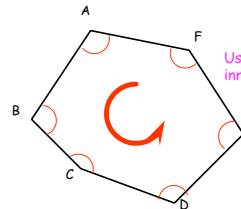
Open Traverse



Closed Traverse

In order to find the coordinates in horizontal plane.

- ❖ At least the coordinates of one point must be given or chosen arbitrarily.
- ❖ At least the azimuth of one side (leg) must be given or chosen arbitrarily.
- ❖ The horizontal distances between successive points must be measured.
- ❖ The horizontal angles between successive legs must be measured.



Using a theodolite we can measure all the inner (or outer) angles.

$$\Sigma (\text{Inner Angles}) = (2N - 4) * 90^\circ$$

$$\Sigma (\text{Outer Angles}) = (2N + 4) * 90^\circ$$

The difference between Σ Measured Angles and Σ Inner (or Outer) Angles is the Angular Misclosure

$$\text{Maximum Angular Misclosure} = 2 * \text{Accuracy of Theodolite} * \sqrt{(\text{No. of Angles})}$$

If the misclosure is acceptable then distribute it equally to all angles.
Greater than tolerance go back to the field and re-measure!!

- ❑ Set up this instrument at instrument station, and level it. So that the vertical axis comes to vertical position, horizontal circle is in a horizontal plane, vertical circle in a vertical plane.
- ❑ Aim the telescope at the left-hand target, read the vertical circle and note the reading of horizontal circle.
- ❑ Aim the telescope at the right-hand target, read the vertical circle and note the reading of horizontal circle.
- ❑ The difference between the two horizontal circle readings will give the horizontal angle.

Possible Errors

1. inaccurate centring - theodolite & target
2. non-vertical target
3. parallax
4. atmospheric effects
5. theodolite not level
6. incorrect use of theodolite
7. mistakes in reading or booking

Fieldwork 4, Phase 1: Finding the coordinates of reference points by traversing.

- Each subgroup will take the reference points as traverse points and form a closed traverse.
- Make necessary measurements and calculate the X,Y coordinates. (horizontal distances and horizontal angles in two ways as three sets).
- Take 11000.00, 11000.00 m (for subgroup 1.1) for the coordinates of one of your reference point.
- Estimate the azimuth of the leg of your traverse, starting from the point with the given coordinates.
- Make your calculations and balance your misclosures.



Warning!

Phase I: Angular Measurements
Rod & Tripods / Theodolite & Tripod

instrument height is not important for phase 1

Phase II: Tacheometry
Tape & Staff / Theodolite & Tripod

instrument height must be measured for phase 2

* Your reference points form a traverse. The instrument is set at a reference point and aimed to another reference point.

* Angular measurements (vertical and horizontal angles) are read at face I and face II, for 3 sets.

* For 3 sets and 2 target points: $400^\circ / 3 * 2 = 66^\circ$
So Set I: 0° , Set II: 66° , Set III: 132°

* It is difficult to set the theodolite! Circular bubble must be in the center. To do this you can use legs of the tripod by changing the heights. Tubular bubble is brought to the middle using the foot screws. The instrument must exactly be over the reference (traverse=station) point.

