

**Online Surveying FE 208**  
**Lecture 7**

**Traversing**

**Learning Objectives for this Lecture**

1. Know the main types of traverses
2. Know the advantages and disadvantages for each type of traverse
3. Know the different ways to measure traverse angles
4. Know the procedures for referencing stations
5. Know how to write the survey reference stake
6. Know how to calculate angular mis-closure for a closed traverse
7. Know the duties/responsibilities for each survey traverse field position

**Traversing**

A series of consecutive lines whose lengths and directions have been determined from field measurements.

Angles can be interior, exterior, or deflection

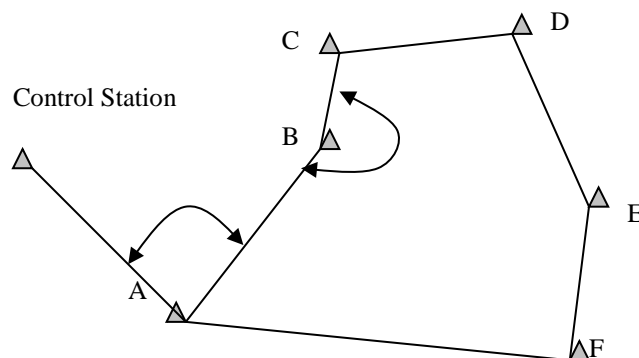
**Two types of traverses**

- Closed
- Open

**Closed traverses**

**Polygon traverse: (Also called an Interior-Angle Traverse)**

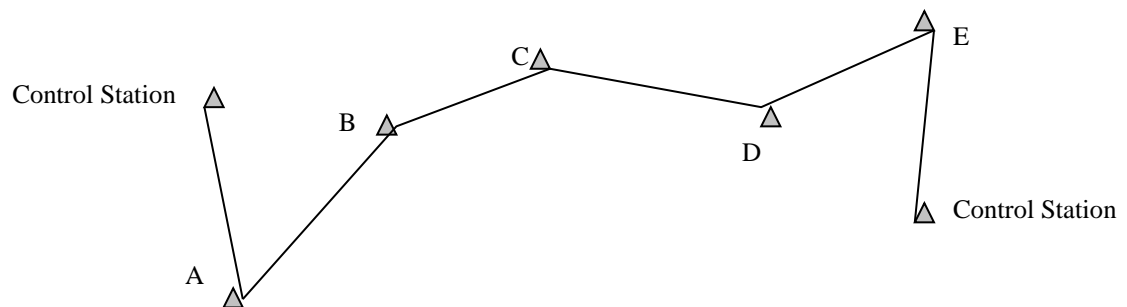
A polygon traverse has its lines return to the point of beginning forming a closed figure. Only the beginning bearing from the control station is necessary if all other interior angles are measured





### **Link traverse:**

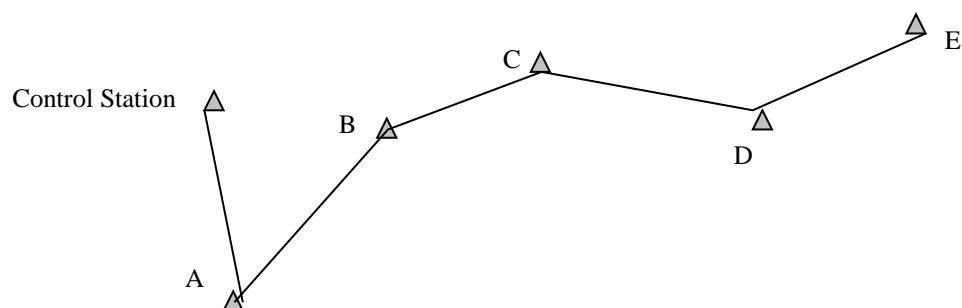
A link traverse has its lines finish to a point of that has a positional accuracy equal to or greater than the starting point. The link type must have a closing reference direction



The advantage of the closed polygon is that error checks can be made almost immediately. The expected angle sums are already known and coordinate geometry will give an error check on departures and latitudes (explained later).

### **Open traverse:**

An open traverse has its lines finish to a point that is neither connected to the starting point, nor connected to a finishing control point. Measurements are generally repeated to avoid mistakes



Disadvantage: There are no quick error checks on an open traverse. Best procedures are to measure all lengths multiple times to validate lengths and to read back sights with all foresights to validate direction.

### Methods of measuring traverse angles

- Compass bearings
- Interior angles
- Angles turned right
- Deflection angles
- Azimuths

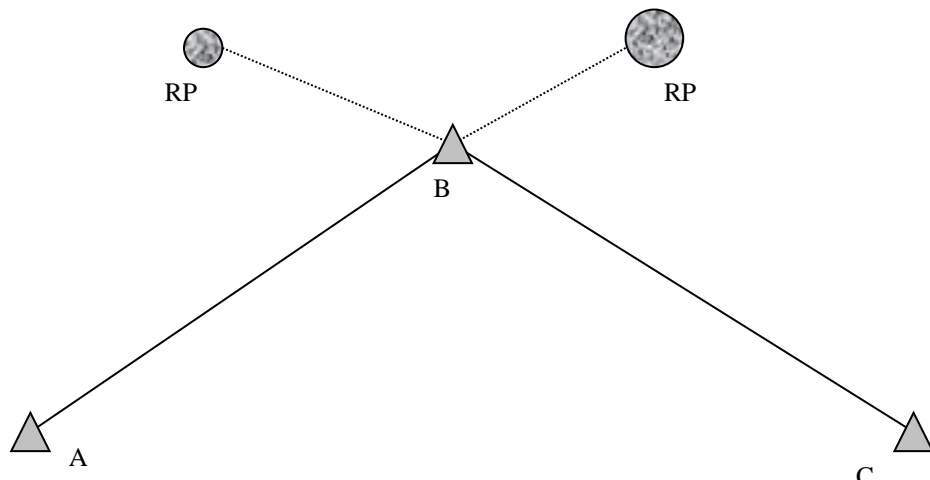
### Referencing traverse stations

Traverse stations should always be referenced by:

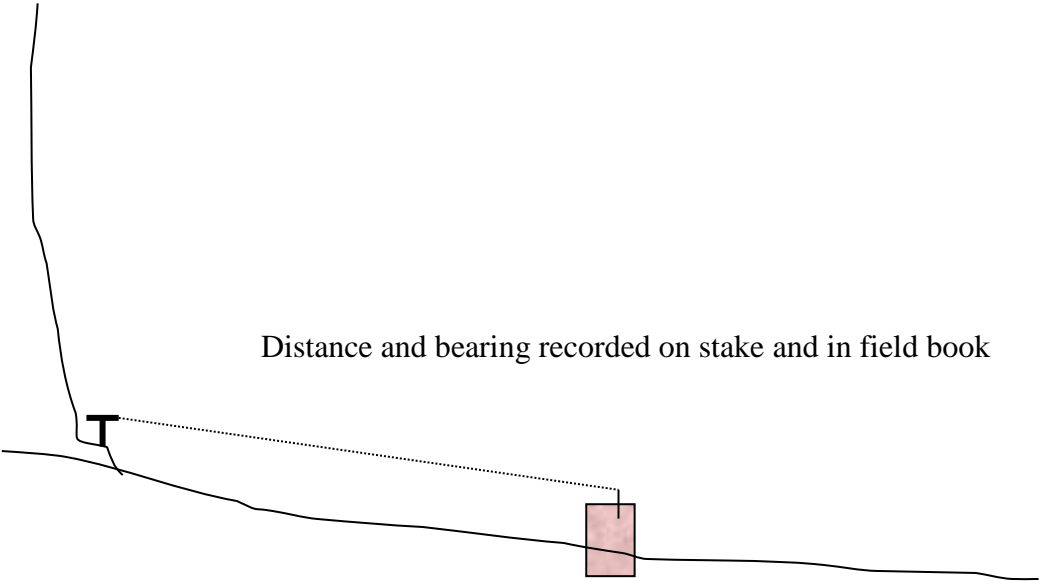
- **Tie points**
- **Ties**
- **RP's**

### Specifics about RP's

- Generally two points
- At right angles or greater
- Short lengths but outside construction limits

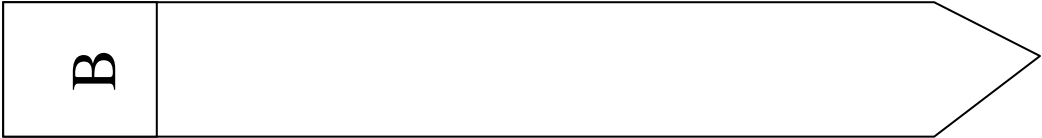


**Example RP**

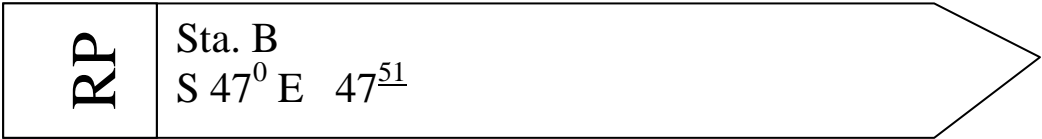


**Field stakes**

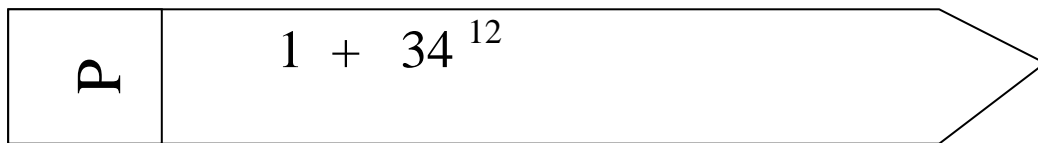
**Stationing for closed traverse**



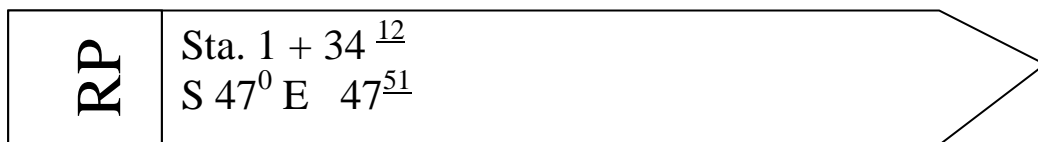
**RP for closed traverse**



### Stationing for open traverse

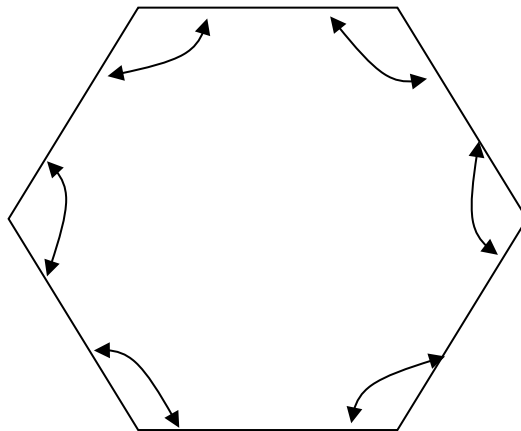


### RP for open traverse



### Angle misclosure for a closed traverse

$$= (\text{the sum of the interior angles}) - ((n-2) \times 180^0)$$



$$\text{Sum of the angles} = 6-2 \times 180^0 = 720^0$$

## **Traverse field procedures**

Ideal field crew size is three persons:

1. Head Chain
2. Rear Chain
3. Notebook

### **Head Chain Person**

- a. Carries the zero end of the tape
- b. Pull tension when ready (let rear chain know!)
- c. Read/record the decimal (tenths) mark measurement
- d. Identify/set/mark survey points ahead
- e. Read and report back compass readings (backsights)
- f. Read and report back clinometer readings back

### **Rear Chain Person**

- a. Carries the measurement end of the tape
- b. Read/record the foot mark measurement
- c. Read and report front compass readings (foresights)
- d. Read and report back clinometer readings ahead

### **Notebook Person**

- a. Responsible for accuracy and **complete** data recording
- b. Calls out data reported (repeated)
- c. Follows all notebook keeping procedures
- d. Verifies station numbers/letters
- e. Completes an end-of-day field book check **prior** to leaving the field