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TRANSPORTATION ENGINEERING – I  
DEPARTMENT OF CIVIL ENGINEERING  
FACULTY OF ENGINEERING & TECHNOLOGY

## SURVEYING UNIT-1 LECTURE - 2

### Topics to be covered:

- Chain surveying
- Equipments
- Survey stations



# CHAIN SURVEYING

This is the simplest and oldest form of land surveying of an area using linear measurements only. It can be defined as the process of taking direct measurement, although not necessarily with a chain.

**EQUIPMENTS USED IN CHAIN SURVEYING** These equipments can be divided into three, namely (i) Those used for linear measurement. (Chain, steel band, linear tape) (ii) Those used for slope angle measurement and for measuring right angle (Eg. Abney level, clinometer, cross staff, optical squares) (iii) Other items (Ranging rods or poles, arrows, pegs etc).

**Chain:-** The chain is usually made of steel wire, and consists of long links joined by shorter links. It is designed for hard usage, and is sufficiently accurate for measuring the chain lines and offsets of small surveys.



## CHAIN SURVEYING

Chains are made up of links which measure 200mm from centre to centre of each middle connecting ring and surveying brass handles are fitted at each end. Tally markers made of plastic or brass are attached at every whole metre position or at each tenth link. To avoid confusion in reading, chains are marked similarly from both ends (E.g. Tally for 2m and 18m is the same) so that measurements may be commenced with either end of the chain.

**Ranging rod** : A ranging rod (or range rod) is a surveying instrument used for marking the position of stations, and for sightings of those stations, as well as for ranging straight lines. Initially these were made of light, thin and straight bamboo, or of well seasoned wood such as teak, pine or deodar. They were shod with iron at the bottom and surmounted with a flag about 250 mm square in size. Nowadays they are made of wood, metal or fibreglass. The rods are usually about 30 mm in diameter and 2 m or 3 m long, painted with alternating bands, such as red and white, red and yellow, or black and white, in lengths of 200 mm (i.e. one link length of metric chain), 500 mm, or one foot. These colours are used so that the rod can be properly sighted in case of long distance or bad weather. Ranging rods of greater length, e.g. 3 to 6 m, are called ranging or range poles, and are used for very long survey lines. Another type of ranging rod is known as an offset rod, which has no flag at the top. It is used for measuring small offsets from the survey line when the work is of an ordinary nature.

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# CHAIN SURVEYING



RANGING ROD

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# CHAIN SURVEYING

## Offset Rods

These rods are also similar to ranging rods and they are 3 m long. They are made up of hard wood and are provided with iron shoe at one end. A hook or a notch is provided at other end. At height of eye, two narrow slits at right angles to each other are also provided for using it for setting right angles.

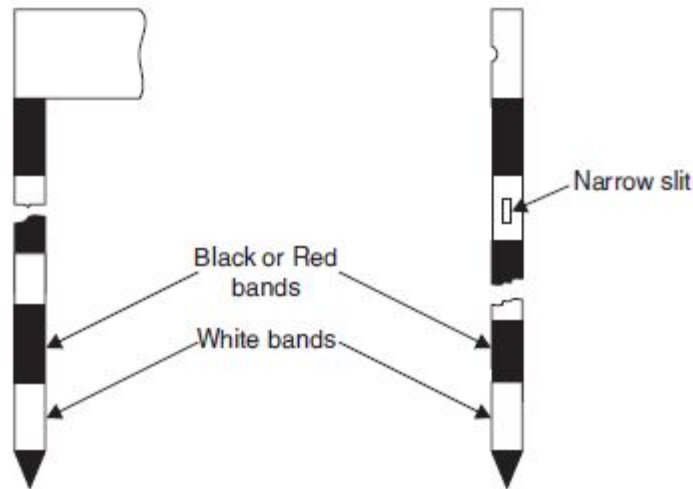
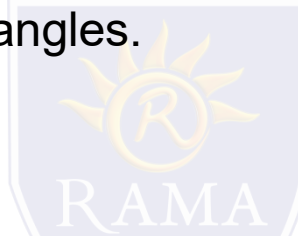


Fig. 12.7 Ranging rod

Fig. 12.8. Offset rod

# CHAIN SURVEYING

## Plumb Bob

A typical plumb bob is shown in Fig. 12.9. In measuring horizontal distances along sloping ground plumb bobs are used to transfer the position to ground. They are also used to check the verticality of ranging poles.

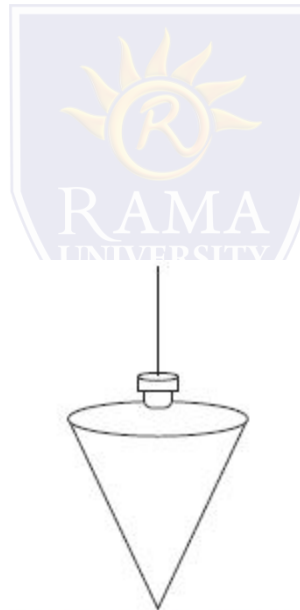


Fig. 12.9. Plumb bob

# CHAIN SURVEYING

## **Survey Station**

Survey stations are of two kinds

- Main Stations
- Subsidiary or tie

## **Main Stations**

Main stations are the end of the lines, which command the boundaries of the survey, and the lines joining the main stations recalled the main survey line or the chain lines.

## **Subsidiary or the tie stations**

Subsidiary or the tie stations are the points selected on the main survey lines, where it is necessary to locate the interior detail such as fences, hedges, building, etc.

## **Tie or Subsidiary Lines**

A tie line joints two fixed points on the main survey lines. It helps to check the accuracy of surveying and to locate the interior details. The position of each tie line should be close to some features, such as paths, buildings, etc.

## **Base Lines**

It is the main and longest line, which passes approximately through the center of the field. All the other measurements to show the details of the work are taken with respect to this line.



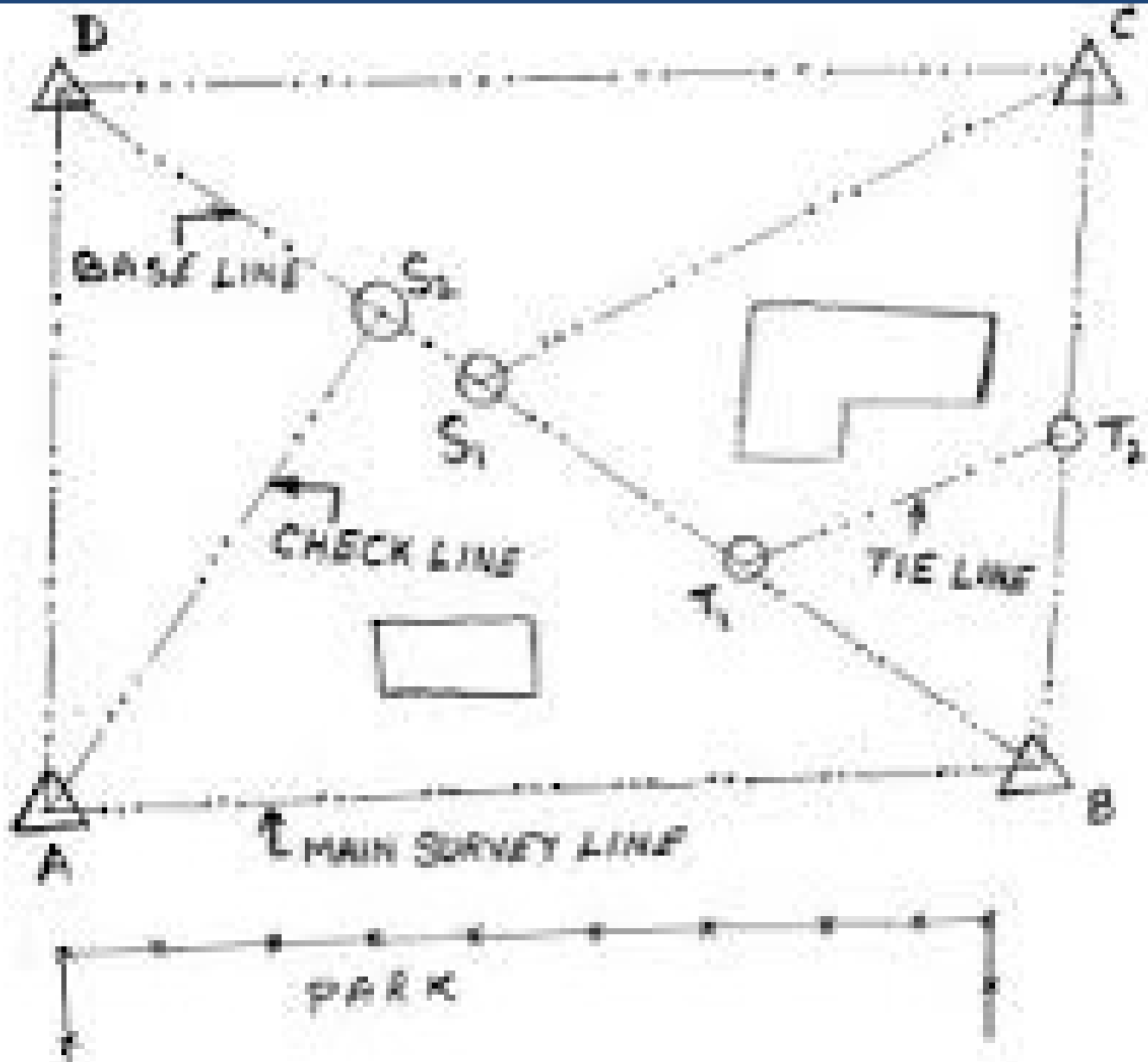
# CHAIN SURVEYING

## Check Line

A check-line also termed as a proof-line is a line joining the apex of a triangle to some fixed points on any two sides of a triangle. A check-line is measured to check the accuracy of the framework. The length of a checking line, as measured on the ground should agree with its length on the plan.



# DEFINITION OF SURVEYING





**“Thank you”**

