RAMA UNIVERSITY

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TRANSPORTATION ENGINEERING – I

DEPARTMENT OF CIVIL ENGINEERING

FACULTY OF ENGINEERING & TECHNOLOGY

SURVEYING UNIT-1 LECTURE - 3

Topics to be covered:

- Offsets
- Ranging

Offsets

Offsets are the lateral measurements from the baseline to fix the positions of the different objects of the work with respect to the baseline. These are generally set at right angle offsets. It can also be drawn with the help of a tape.

1. According to Direction:

(i) Perpendicular offsets, and

(ii) Oblique offsets

(i) Perpendicular Offsets:

The distances measured at right angles to the chain line from the objects are known as perpendicular or rectangular or right offsets such as CD (Fig. 3.3.) Usually the offsets are perpendicular offsets. In the strict sense, an offset means a perpendicular offset.

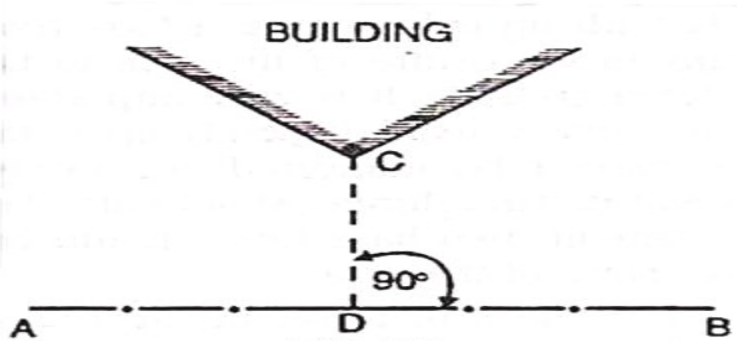


FIG. 3.3

(ii) Oblique Offsets:

All offsets which are not at right angles to the main survey lines are known as oblique or tie line offsets such as CD and CE (Fig. 3.4.) When the object to be plotted is at a long distance apart from the chain line or it is an important one such as a corner of a building, oblique offsets are taken. These are also taken to check the accuracy of right angled offsets and to locate the position of stations in various surveys. Sometimes they help in reducing the number of main survey lines.

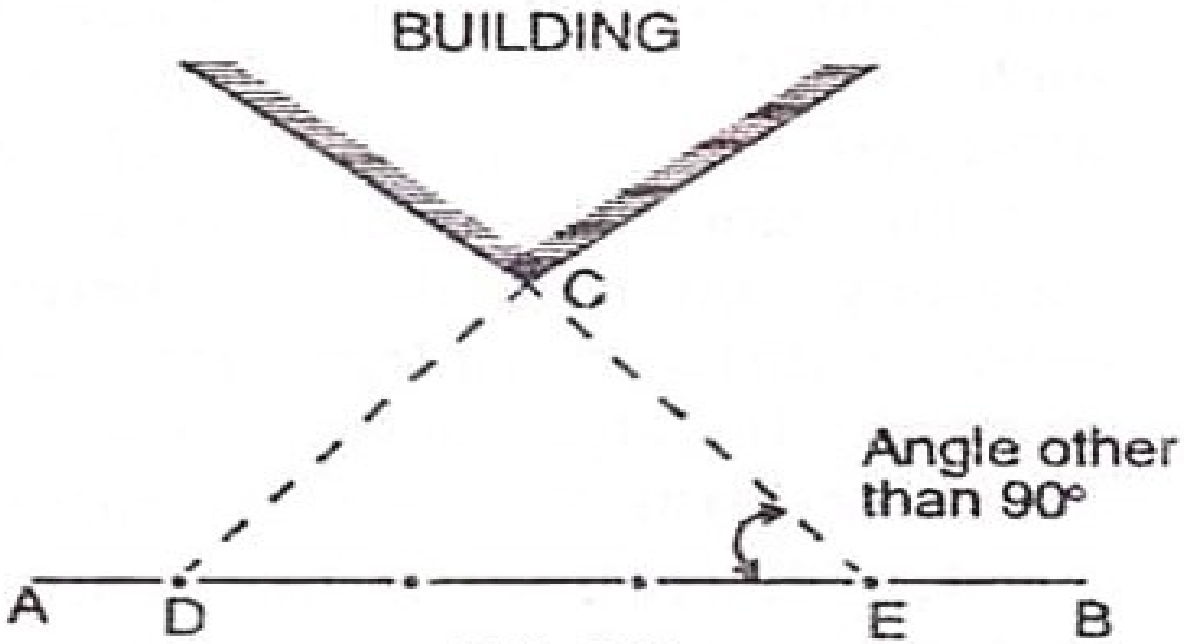


FIG. 3.4

2. According to the Length:

(i) Short offsets

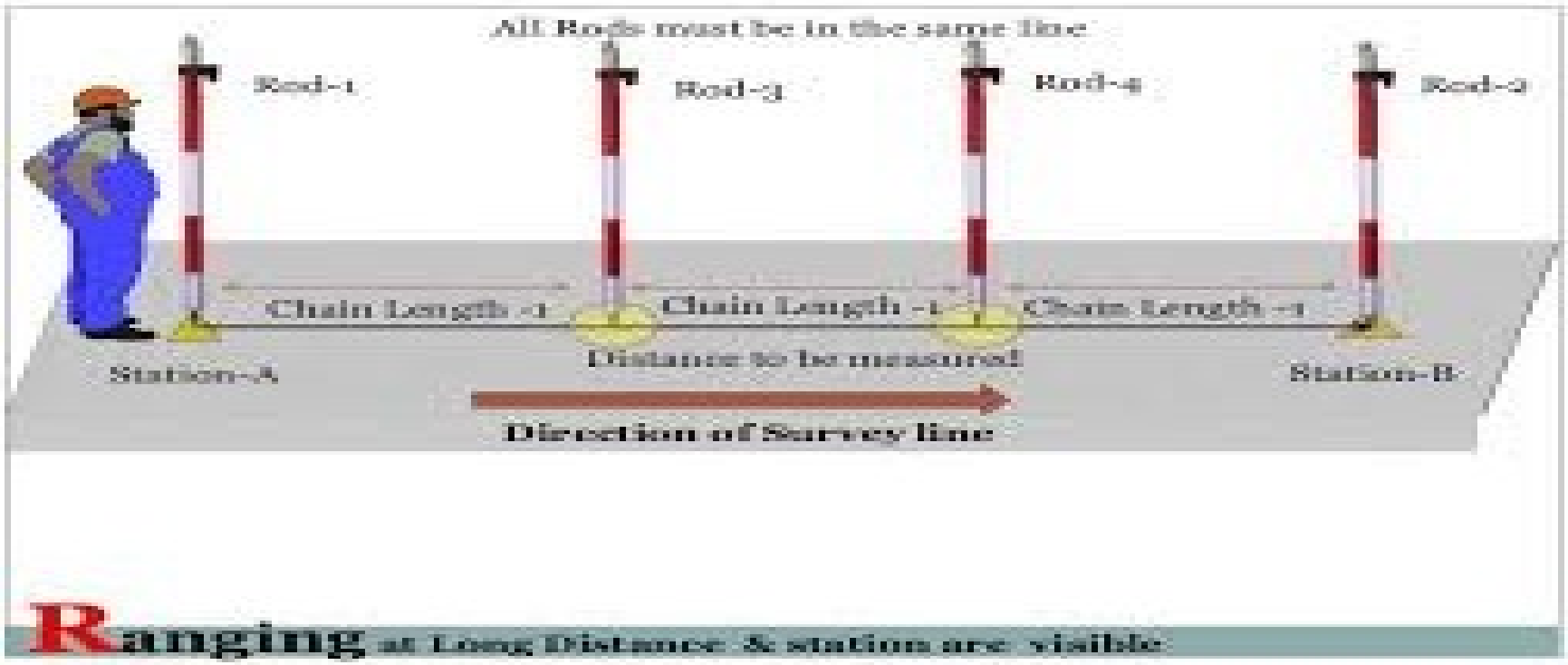
(ii) Long offsets.

Generally the offsets are called short when they are less than 15 m in length and long when their length exceeds 15 m.

The Offsets should as far as possible be short ones as they are less liable to be erroneous due to incorrect length of tape or incorrect direction than if they are long. Also short offsets can be measured more quickly and accurately than long ones. Tie lines should be drawn to avoid long offsets.

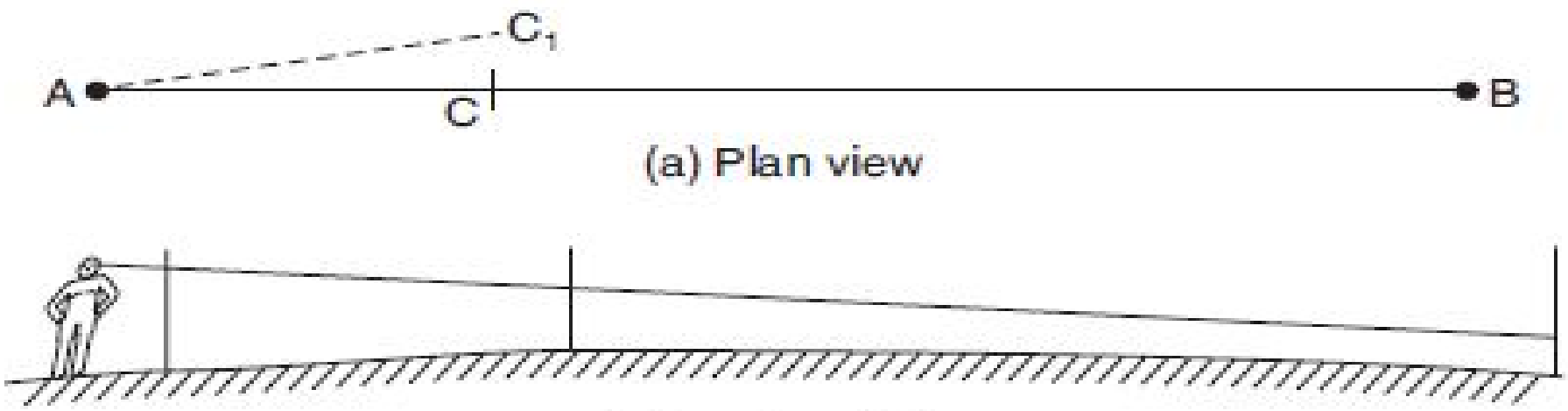
Ranging

When a survey line is longer than a chain length, it is necessary to align intermediate points on chain line so that the measurements are along the line. The process of locating intermediate points on survey line is known as ranging. There are two methods of ranging viz., direct ranging and reciprocal ranging.



Direct Ranging

If the first and last points are intervisible this method is possible. Figure 12.18 shows the intervisible stations A and B in which an intermediate point C is to be located. Point C is selected at a distance slightly less than a chain length. At points A and B ranging rods are fixed. The assistant holds another ranging rod near C. Surveyor positions himself approximately 2 m behind station A and looking along line AB directs the assistant to move at right angles to the line AB till he aligns the ranging rod along AB. Then surveyor instructs the assistant to mark that point and stretch the chain along AC.



(a) Plan view

(b) Sectional view

Fig. 12.18. Direct ranging

Indirect or Reciprocal Levelling

Due to intervening ground, if the ranging rod at B is not visible from station A, reciprocal ranging may be resorted. Figure 12.19 shows this scheme of ranging. It needs two assistants one at point M and another at point N, where from those points both station A and station B are visible. It needs one surveyor at A and another at B. To start with M and N are approximately selected, say M1 and N1. Then surveyor near end A ranges person near M to position M2 such that AM2N1 are in a line. Then surveyor at B directs person at N, to move to N2 such that BN2M2 are in a line. The process is repeated till AMNB are in a line.

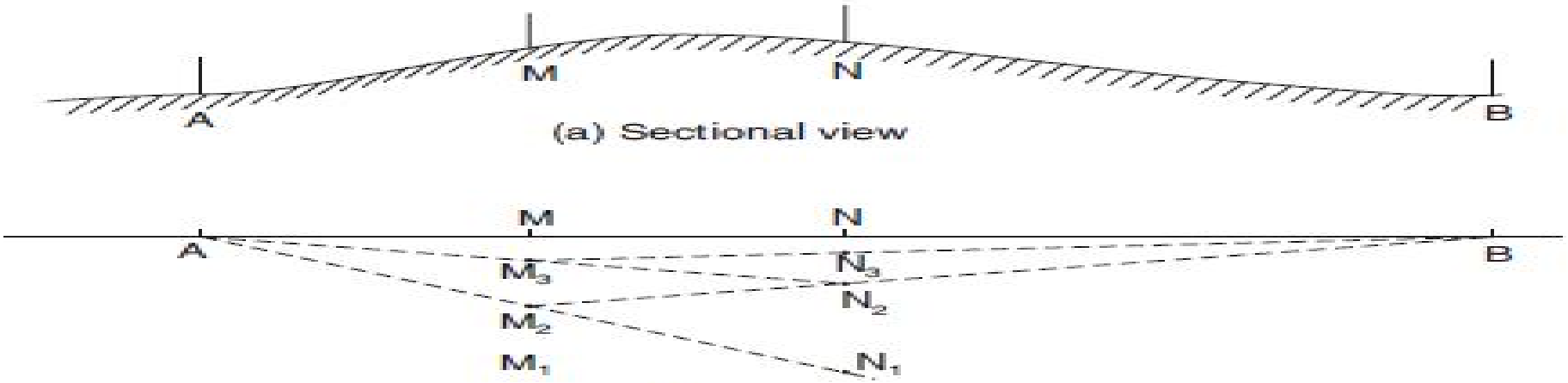


Fig. 12.19. Reciprocal ranging

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.

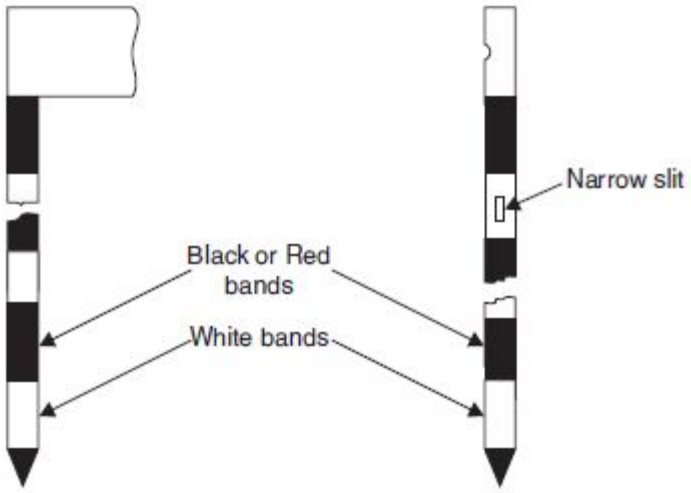


Fig. 12.7 Ranging rod

Fig. 12.8. Offset rod


“Thank you”