

CHAIN SURVEYING

SECTION/CATEGORY: **SURVEYING** | 16,148 VIEWS | TAGS: FIELD BOOK, FIELD WORK, OFFSETS, PERPENDICULAR OFFSETS USING CROSS STAFFS, PERPENDICULAR OFFSETS USING OPTICAL SQUARE AND PRISM SQUARE, PRISM SQUARE, SURVEYING

Chain survey is suitable in the following cases:

- (i) Area to be surveyed is comparatively small
- (ii) Ground is fairly level
- (iii) Area is open and
- (iv) Details to be filled up are simple and less.

In chain surveying only linear measurements are made i.e. no angular measurements are made.

Since triangle is the only figure that can be plotted with measurement of sides only, in chain surveying the area to be surveyed should be covered with a network of triangles. Figure 12.11 shows a typical scheme of covering an area with a network of triangles. No angle of the network triangles should be less than 30° to precisely get plotted position of a station with respect to already plotted positions of other station. As far as possible angles should be close to 60°. However, the arrangements of triangles to be adopted depends on the shape, topography, natural and artificial obstacles in the field.

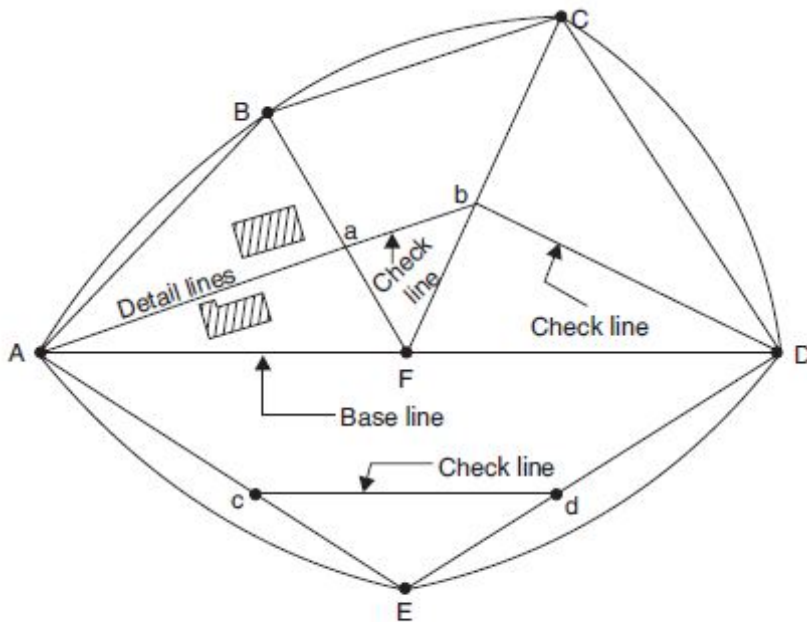


Fig. 12.11. Network of triangles

Technical Terms

Various technical terms used in connection with the network of the triangles in surveying are explained below:

Station: Station is a point of importance at the beginning or at the end of a survey line.

Main station: These are the stations at the beginning or at the end of lines forming main skeleton. They are denoted as A, B, C etc.

Subsidiary or tie stations: These are the stations selected on main lines to run auxiliary/secondary lines for the purpose of locating interior details. These stations are denoted as a, b, c, ..., etc., or as 1, 2, 3, ... etc.

Base line: It is the most important line and is the longest. Usually it is the line plotted first and then frame work of triangles are built on it.

Detail lines: If the important objects are far away from the main lines, the offsets are too long, resulting into inaccuracies and taking more time for the measurements. In such cases

the secondary lines are run by selecting secondary stations on main lines. Such lines are called detail lines.

Check lines: These are the lines connecting main station and a substation on opposite side or the lines connecting to substations on the sides of main lines. The purpose of measuring such lines is to check the accuracy with which main stations are located.

Selection of Stations

The following points should be considered in selecting station points:

- (i) It should be visible from at least two or more stations.
- (ii) As far as possible main lines should run on level ground.
- (iii) All triangles should be well conditioned (No angle less than 30°).
- (iv) Main network should have as few lines as possible.
- (v) Each main triangle should have at least one check line.
- (vi) Obstacles to ranging and chaining should be avoided.
- (vii) Sides of the larger triangles should pass as close to boundary lines as possible.
- (viii) Trespassing and frequent crossing of the roads should be avoided.

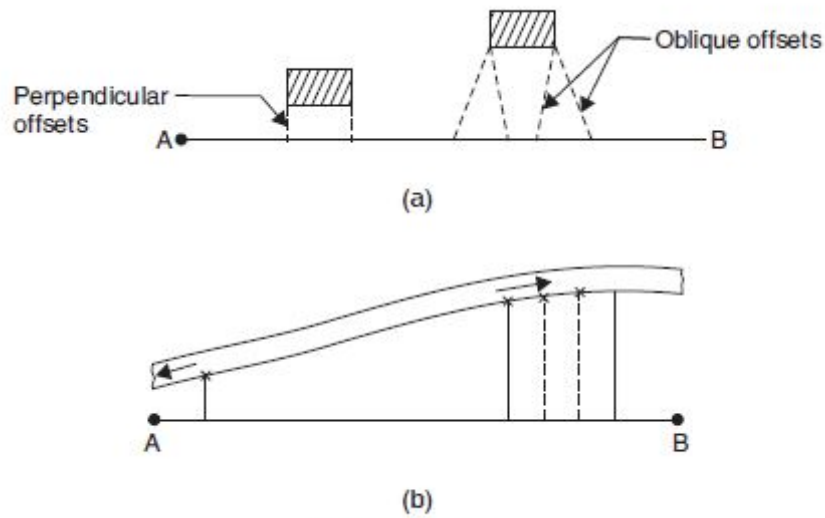


Fig. 12.12. Offsets

For setting perpendicular offsets any one of the following methods are used:

- (i) Swinging
 - (ii) Using cross staffs
 - (iii) Using optical or prism square.
- Perpendicular Offset by Swinging

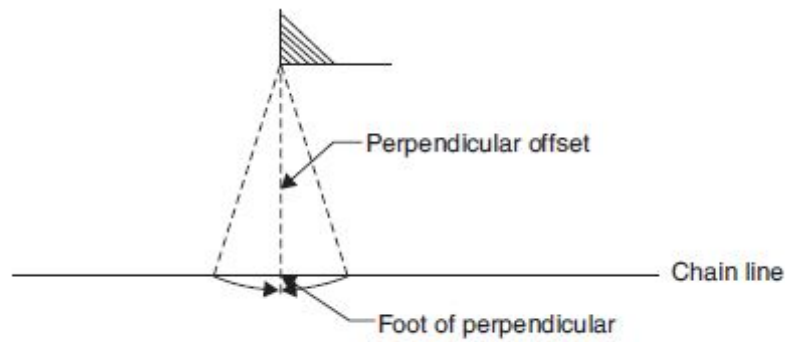


Fig. 12.13

Chain is stretched along the survey line. An assistant holds the end of tape on the object. Surveyor swings the tape on chain line and selects the point on chain where offset distance is the least (Fig. 12.13) and notes chain reading as well as offset reading in a field book on a neat sketch of the object.

Perpendicular Offsets Using Cross Staffs

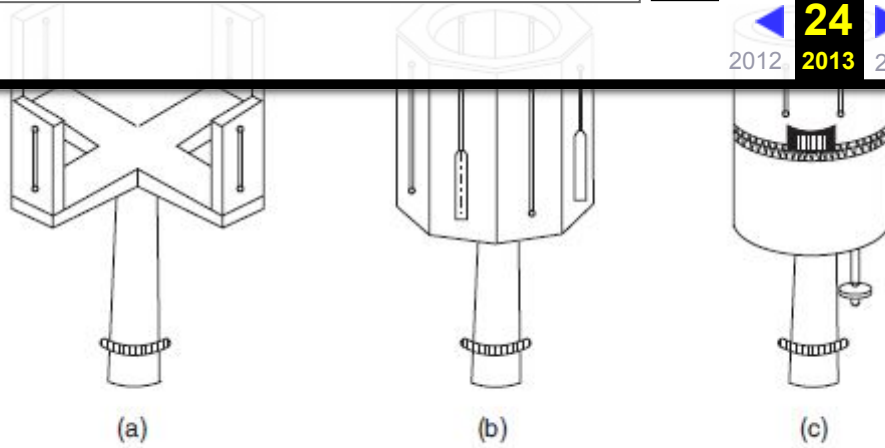


Fig. 12.14. Cross staff

Figure 12.14 shows three different types of cross staffs used for setting perpendicular offsets. All cross staffs are having two perpendicular lines of sights. The cross staffs are mounted on stand. First line of sight is set along the chain line and without disturbing setting right angle line of sight is checked to locate the object. With open cross staff (Fig. 12.14 (a)) it is possible to set perpendicular only, while with french cross staff (Fig. 12.14 (b)), even 45° angle can be set. Adjustable cross staff can be used to set any angle also, since there are graduations and upper drum can be rotated over lower drum.

Perpendicular Offsets Using Optical Square and Prism Square

These instruments are based on the optical principle that if two mirrors are at angle 'θ' to each other, they reflect a ray at angle '2θ'. Figure 12.15 shows a typical optical square.

Optical square consists of a metal box about 50 mm in diameter and 125 mm deep. In the rim of the box there are three openings:

- (i) a pin hole at E
- (ii) a small rectangular slot at G, and
- (iii) a large rectangular slot at F.

A and B are the two mirrors placed at 45° to each other. Hence the image of an object at F which falls on A gets reflected and emerge at E which is at right angles to the line FA. The mirror A which is opposite to the opening at F is fully silvered. It is fitted to a frame which is attached to the bottom plate. If necessary this mirror can be adjusted by inserting a key on the top of the cover. The mirror B which is in the line with EG is silvered in the top half and plain in the bottom half. It is firmly attached to the bottom plate of the box.

The ranging rod at Q is directly sighted by eye at E in the bottom half of the B which is a plain glass. At the same time in the top half of B, the reflected ray of the object at P is sighted. When the image of P is in the same vertical line as the object at Q, then the lines PA is at right angles to the line EB. This instrument can be used for finding foot of the perpendicular or to set a right angle.

Field Book

All observations and measurements taken during chain surveying are to be recorded in a standard field book. It is a oblong book of size 200 mm × 120 mm, which can be carried in the pocket.

There are two forms of the book (i) single line and (ii) double line. The pages of a single book are having a red line along the length of the paper in the middle of the width. It indicates the chain line.

All chainages are written across it. The space on either side of the line is used for sketching the object and for noting offset distances. In double line book there are two blue lines with a space of 15 to 20 mm in the middle of each book. The space between the two lines is utilised for noting the chainages. Figure 12.17 shows typical pages of a field books.

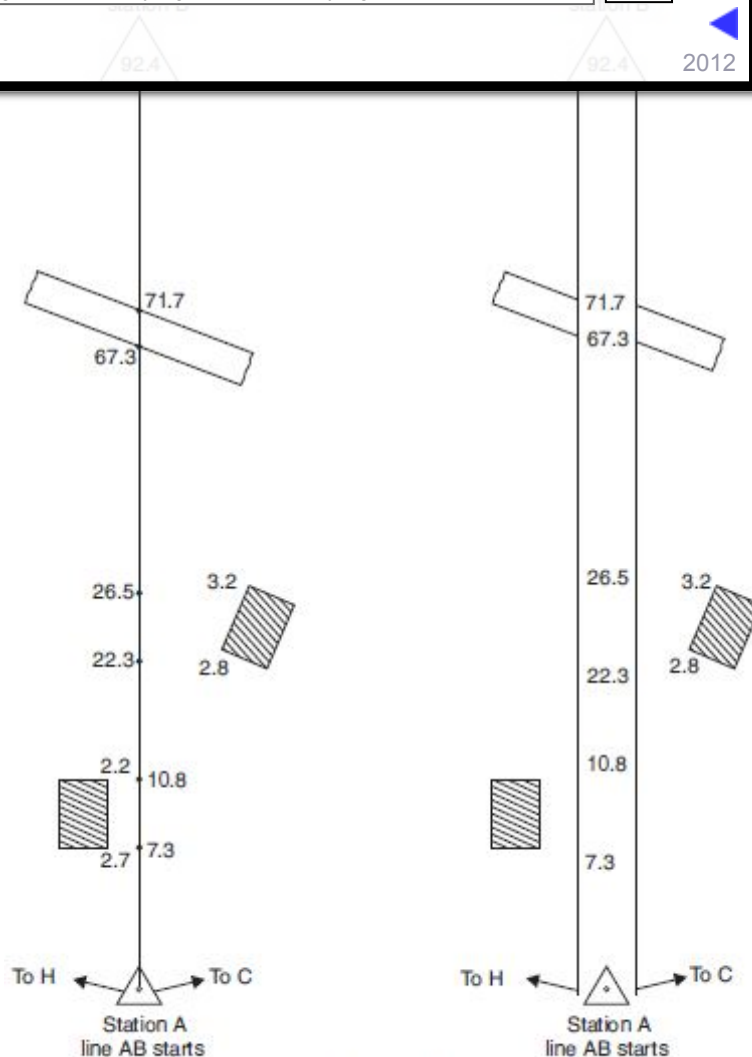


Fig. 12.17

Field Work

As soon as the survey party arrives in the field the following details are entered in the field book:

- (i) Title of the survey work
- (ii) The date of survey
- (iii) The names of the members of the party.

The field work may be divided into the following:

- (i) Reconnaissance survey.
- (ii) Marking stations, drawing reference sketches.
- (iii) Line by line surveying.

Reconnaissance survey consists in going round the field and identifying suitable stations for the network of triangles. Neat sketch of network is drawn and designated. The typical key plan drawn is similar to one shown in Fig. 12.11.

All main stations should be marked on the ground. Some of the methods used for marking are:

- (a) Fixing ranging poles
- (b) Driving pegs
- (c) Marking a cross if ground is hard
- (d) Digging and fixing a stone.

Then reference sketches are drawn in the field book so as to identify stations when the development works are taken up. For this measurements with respect to three permanent points are noted. The permanent points may be

- (a) Corner of a building
- (b) Posts of gates

Office Work

It consists in preparing the plan of the area to a suitable scale making use of measurements and sketches noted in the field book.

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16 RESPONSES TO CHAIN SURVEYING



Harsh Bansal says:

OCTOBER 2, 2012 AT 11:03 AM

thank you for the notes they are very helpful for me.....

Reply



Devaraj says:

JANUARY 7, 2013 AT 5:16 AM

express most useful my exms this notes..

Reply



Suliman Ahmed says:

NOVEMBER 12, 2012 AT 9:39 PM

Thanks

Reply



Nishan says:

JANUARY 1, 2013 AT 2:21 AM

its very goodbt a bit more info would make far more better

Reply

there is no need to go to the colleges for lectures i find everything here about surveying

Reply

Abdulhameed says:

JANUARY 18, 2013 AT 4:15 PM

Thank you for this helpful notes

Reply



Parashuram Kitti says:

JANUARY 21, 2013 AT 1:44 PM

thank you for the notesexpress most useful my exams this notes thank so much

Reply



MOHAMED RIYAS says:

FEBRUARY 5, 2013 AT 2:24 PM

Thank you

Reply

Rahul Tagad. says:

MARCH 2, 2013 AT 8:06 AM

It's very important for all enng. student.....so thank's very much.

Reply

Sumon says:

MAY 1, 2013 AT 2:19 PM

thanks

Reply

DANISH says:

MAY 6, 2013 AT 10:46 AM

THANKS

Reply

[25 captures](#)

9 Jan 2013 - 30 Jul 2014 AT 2:17 PM

Brilliant..... very helpful from exam perspective!!

[Reply](#)

Umesh Das says:

JUNE 3, 2013 AT 9:42 AM

i have a not surveying books so very helpful from your notes

[Reply](#)

SATINDER PAL says:

AUGUST 13, 2013 AT 3:48 PM

THANK FOR THIS NOTS

[Reply](#)

Kamal says:

AUGUST 31, 2013 AT 4:16 AM

Thanx a lot for providing us such a brilliant stuff. It is very useful.

[Reply](#)

Vishal Sannad says:

DECEMBER 12, 2013 AT 2:45 AM

thanku

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