

**Practical No: 02** Determine area of open field using chain and cross staff survey.

**I. Practical Significance:**

The area of open field can be determined by using chain and cross staff survey where main survey line is the longest line of survey work and the offset are made perpendicular to that line. This is the most suitable method of area calculation for an open field.

**II. Industry/Employer expected outcome(s):**

- Calculating the area of open field by using chain and cross staff.

**III. Course Level Learning Outcome (COs):**

- CO 2- Undertake cross staff and compass survey for the given field.

**IV. Laboratory Learning Outcome (LLO):**

- LLO 2.1 Undertake chain and cross staff survey for the given plot.

**V. Relevant Affective Domain related Outcome(s):**

- Using Safe behaviors effectively.
- Maintain high standards of hygiene.
- Efficient application of tools, equipment's and machinery.
- Professional and ethical standards.

**VI. Relevant Theoretical Background:**

Chain and cross staff survey is used to locate the boundaries of a field and to determine its area. A chain line is running through the center of the area which divides the area into a number of triangles and trapezoids. The offsets to the boundary are taken in order of their chainages.

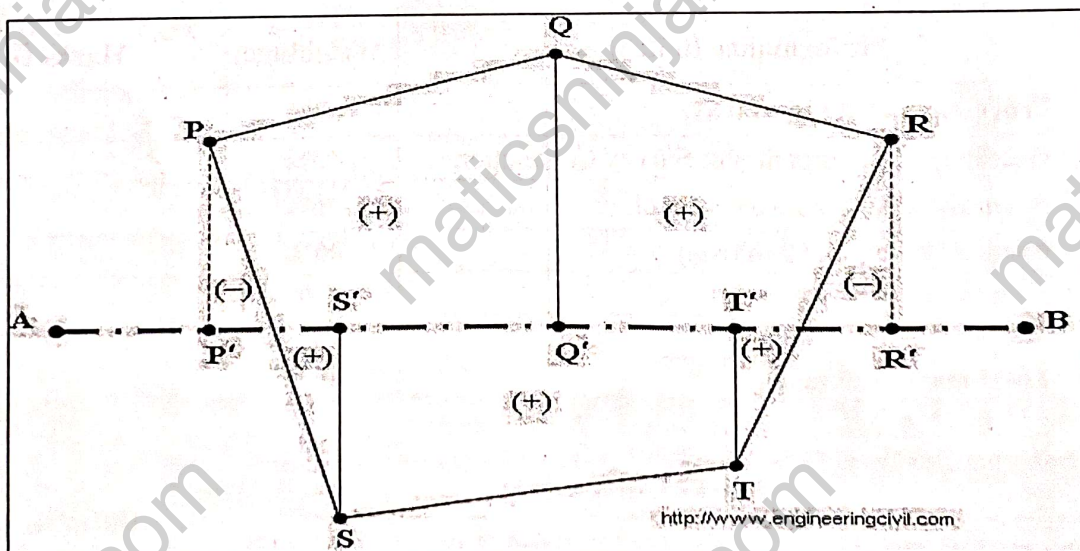


Figure 2.1: Chain and cross staff survey.



**VII. Required resources/equipment:**

Sr. No.	Resource required	Particulars	Quantity
01	Metric Chain	20m/30m	2 nos.
02	Metallic or PVC tape	15m/20m/30m	1 nos.
03	Ranging rods	2m length	10 nos.
04	Pegs	Wooden	2 nos
05	Arrows	GI wired	2 nos
06	Open cross staff/optical square	As per IS specification	2 nos
07	Line ranger	As per IS specification	2 nos.

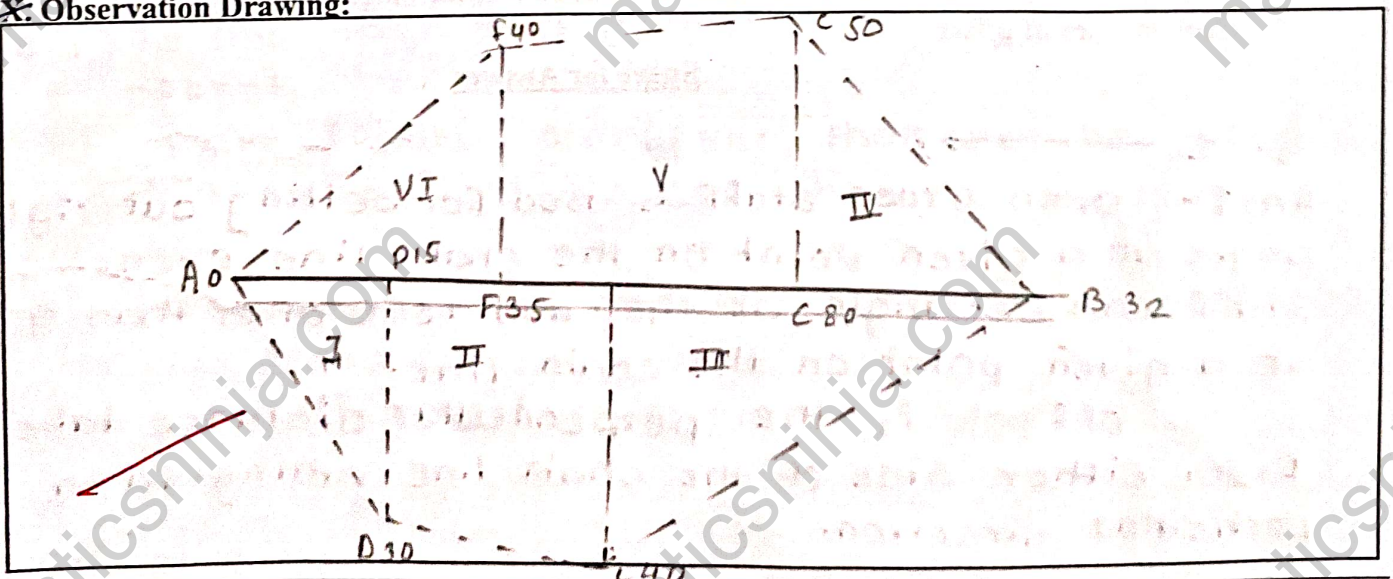
**VIII. Precautions to be followed:**

1. Main/Base line should run through the center of field and should cover complete field.
2. Offset to base line should be truly perpendicular.
3. Avoid long offset.

**IX. Procedure:**

1. First collect the all instruments as per mentioned in point no VII from the survey lab.
2. Let, A and B are the two points in the field through which the base line is passing.
3. Do the ranging for the line AB by using direct method of ranging.
4. After ranging of line AB lay the chain over line AB.
5. After that select the approximate points of offset and fix the arrow there.
6. Take the open cross staff place on the line AB on predefined point of offset.
7. The one observer will bisect the ranging rod of any one of the end station and another observer will bisect the ranging rod fixed on end of offset.
8. Accurate and simultaneous observation of both the observer will set the perpendicular offset to main survey line.
9. Then measure the distance of offset on base line and also measure the distance of offset line.
10. Set more offset to the main line and note down the observations and measurements.
11. Record and draw all the accurate observation in field book.

**X. Observation Drawing:**





Sr. No.	Figure	Chainage (m)		Base line (m)	Offset (m)		Mean offset (m)	Area (in m <sup>2</sup> )		Remarks
		From	To		First	Second		(+ve)	(-ve)	
1	$\Delta AOb$	0-15	15	0-30	0	30	$\frac{0+30}{2} = 15$	225		
2	$\Delta bDc$	15-45	30	30-40	30	40	35	1050		Area
3	$\Delta cCB$	45-90	45	40-0	40	0	20	900		= base
4	$\Delta BEe$	80-90	10	0-50	0	50	25	250		x
5	$\Delta EeFf$	80-35	45	50-40	50	40	45	2025		mean
6	$\Delta FfA$	35-0	30	40-0	0	0	20	600		offset
Total Area (sq. m)								5050m <sup>2</sup>		
Net Area (sq. m)										

#### XI. Results:

Total Area of the field = 5050 Sq. m

#### XII. Interpretation of results:

Write the help of metric chain ranging rods and pegs we determined location and direction of a base line is determine area of open field using chain

#### XIII. Conclusions:

corresponding ground area is 5050 meter square

#### XIV. Practical Related Questions:

1. Distinguish between offset setting by open cross staff and line ranger.
2. Explain types of offset.

Space for Answer

Q. 1  $\longrightarrow$ ?

Ans:- open cross staff is used for setting out right angle at a given point on the chain line french cross staff can set angle at 45° and 135° other than 90° at a given point on the chain line.

offset is the perpendicular distance taken from either side of the chain line running in a particular direction.



An offset staff is used for measuring distance of 10 links or less, to a precision of  $1/10^{\text{th}}$  of a link.

Q. 2  $\longrightarrow$  ?

Ans:- Offset printing:

i] Wet offset printing:- Uses water or other fluids to increase ink adhesion or prevent adhesion in blank areas.

ii] Waterless offset printing:- Uses a silicon film to repel ink from blank area.

- chain surveying offset:-

i] perpendicular offsets:- A lateral measurement taken at a right angle to a survey line.

ii] oblique offset:- A lateral measurement taken at a non-right angle to a survey line.

- kafka offset:-

i] log-end offset:- the last message in a kafka partition

ii] committed offset:- the last message a consumer processed in a partition.

iii] Consumer lag:- The difference between the committed offset and the last offset

- offset

i] short offset:- An offset that can be judged by the naked eye or is less than 15 meters

ii] Long offset:- an offset that is greater than 15 meters.