WELL CONDITIONED TRIANGLE

- any error in angular measurement has a minimum effect upon the computed lengths
- To ensure that two sides of any triangle are equally affected, these should, therefore, be equal in length.
- This condition suggests that all the triangles must, therefore, be isosceles
- best shape of an isosceles triangle is that triangle whose base angles are **56°14′** each
- EQUILATERAL TRIANGLE
- having an angle less than 30° or more than 120° should not be considered.

square of the probable error (L^2) that would occur in the sixth place of the logarithm of any side, if the computations are carried from a known side through a single chain of triangles after the net has been adjusted for the side and angle conditions

$$L^2 = \frac{4}{3} d^2 R$$

d is the probable error of an observed direction in seconds of arc, and R is a term which represents the shape of figure

$$R = \frac{D - C}{D} \Sigma(\delta_A^2 + \delta_A \delta_B + \delta_B^2)$$

D = the number of directions observed excluding the known side of the figure,

$\delta A, \delta B, \delta C$ = the difference per second in the sixth place of logarithm of the sine of the distance angles A, B and C, respectively. (Distance angle is the angle in a triangle opposite to a side), and

C = the number of geometric conditions for side and angle to be satisfied in each figure. It is given by

$$C = (n' - S' + 1) + (n - 2S + 3)$$

$$C = (n' - S' + 1) + (n - 2S + 3)$$

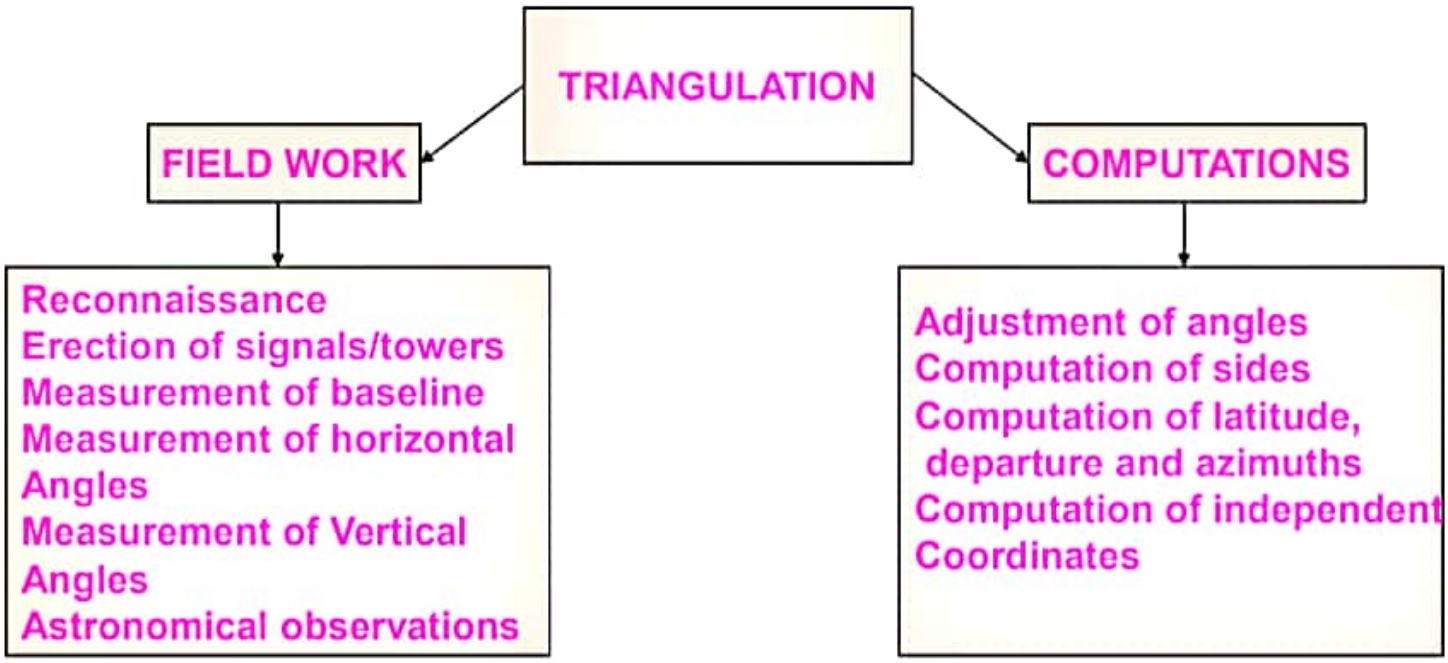
n = the total number of lines including the known side in a figure,

n' = the number of lines observed in both directions including the known side,

S = the total number of stations, and

S' = the number of stations occupied.

TRIANGULATION SURVEY



RECONNAISSANCE

- Examination of terrain to be surveyed.
- Selection of suitable sites for measurement of base lines.
- Selection of suitable positions for triangulation stations.
- Determination of intervisibility of triangulation stations.
- Selection of conspicuous well-defined natural points to be used as intersected points.
- Collection of miscellaneous information regarding:
  - ✓ Access to various triangulation stations
  - ✓ Transport facilities
  - ✓ Availability of food, water, etc.
  - ✓ Availability of labour
  - ✓ Camping ground.

Instruments

- Small theodolite and sextant for measurement of angles.
- Prismatic compass for measurement of bearings.
- Steel tape.
- Aneroid barometer for ascertaining elevations.
- Heliotropes for ascertaining intervisibility.
- Binocular.
- Drawing instruments and material.
- Guyed ladders, creepers, ropes, etc., for climbing trees.

SIGNALS AND TOWERS

- ***signal*** is a device erected to define the exact position of a triangulation station so that it can be observed from other stations
- ***tower*** is a structure over a station to support the instrument and the observer, and is provided when the station or the signal, or both are to be elevated

NON LUMINOUS SIGNALS –

Pole signal, target signal, pole and brush signal, beacons

LUMINOUS SIGNALS-

Sun signals – Heliotrope

Night signals - Oil lamps, electric lamps, acetylene lamps, Magnesium lamps

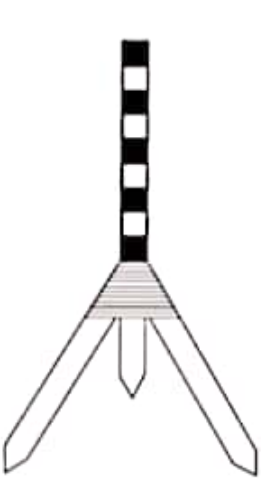
Criteria for selection of triangulation stations

- should be intervisible. For this purpose the station points should be on the highest ground such as hill tops, house tops, etc.
- easily accessible with instruments.
- form well-conditioned triangles.
- located that the lengths of sights are neither too small nor too long.
- at commanding positions so as to serve as control for subsidiary triangulation, and for possible extension of the main triangulation scheme.
- useful for providing intersected points and also for detail survey.
- In wooded country, the stations should be selected such that the cost of clearing and cutting, and building towers, is minimum.
- Grazing line of sights should be avoided, and no line of sight should pass over the industrial areas to avoid irregular atmospheric refraction.

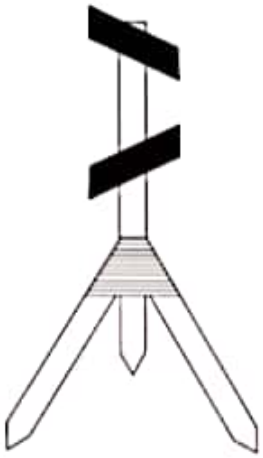
Station mark

- should be permanently marked on the ground so that the theodolite and signal may be centred accurately over them
- ***Guidelines***

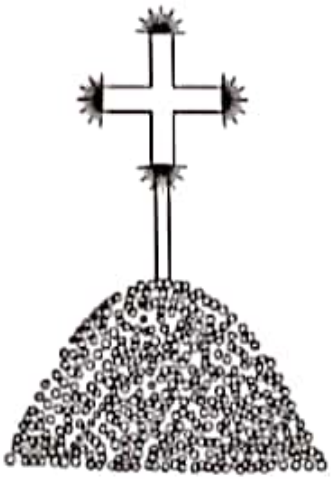
NON- LUMINOUS SIGNALS



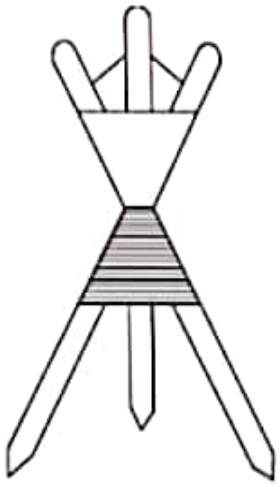
Pole signal



Target signal

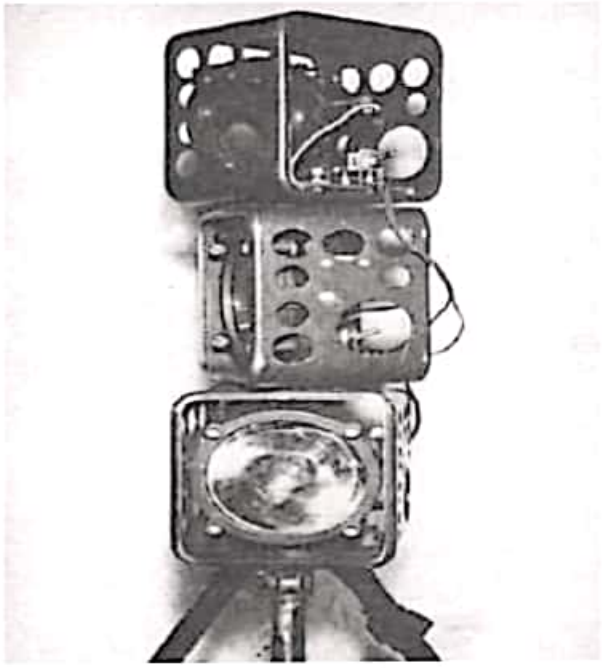


Pole & brush signal



Beacon

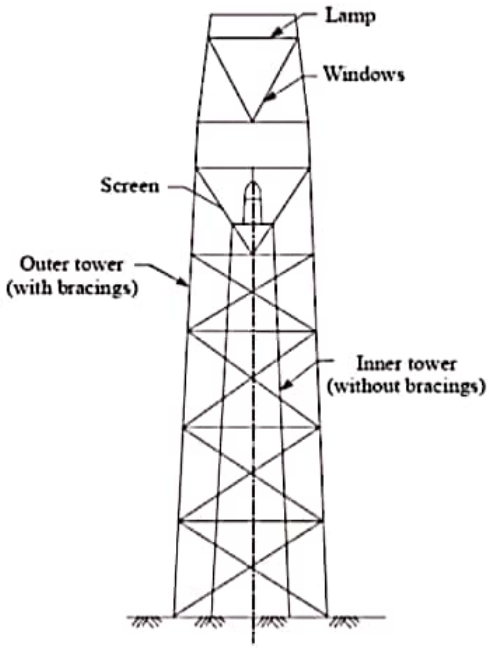
LUMINOUS SIGNALS



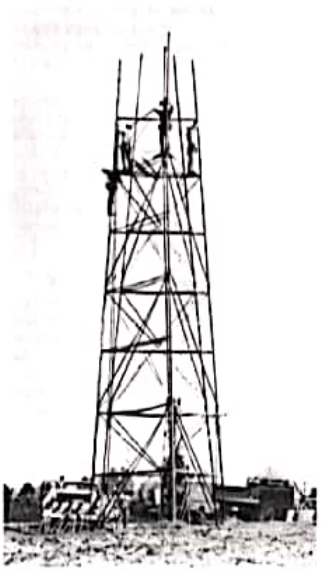
NIGHT SIGNALS

TOWERS

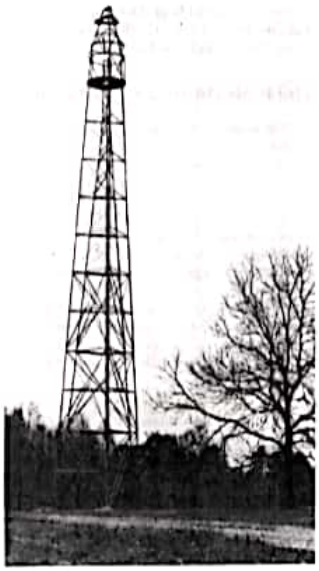
Required in flat areas to elevate instrument, observer, reflectors



TOWERS



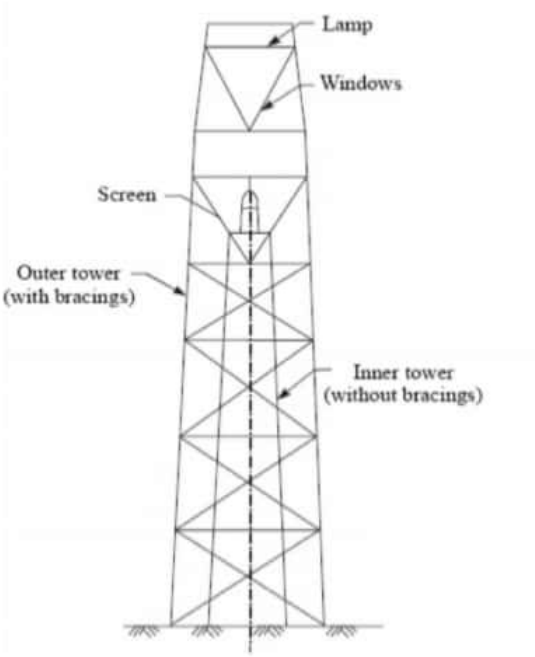
Bilby tower- construction



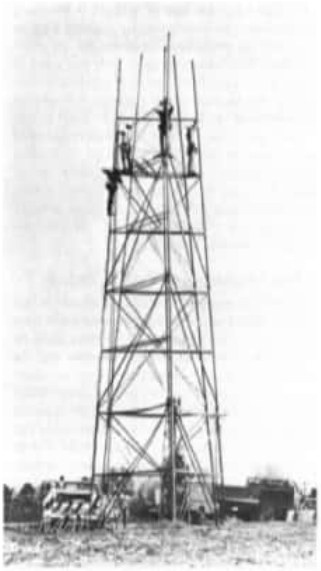
Completed tower

TOWERS

Required in flat areas to elevate instrument, observer, reflectors



TOWERS



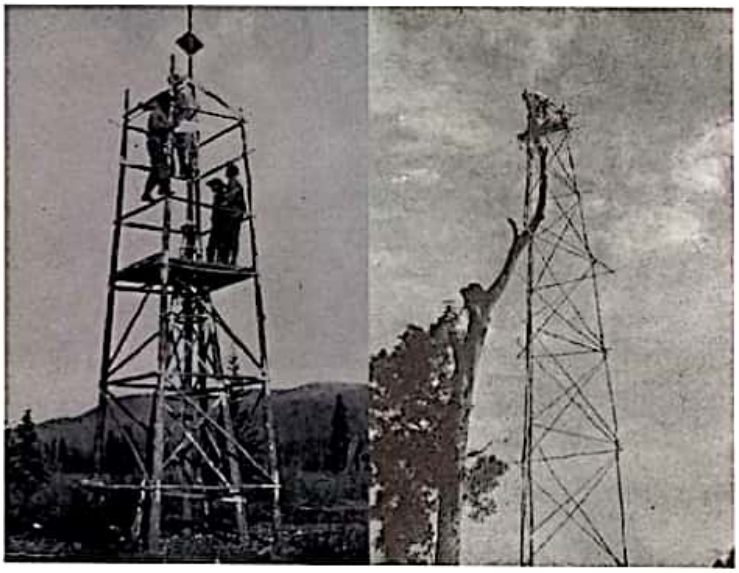
Bilby tower- construction

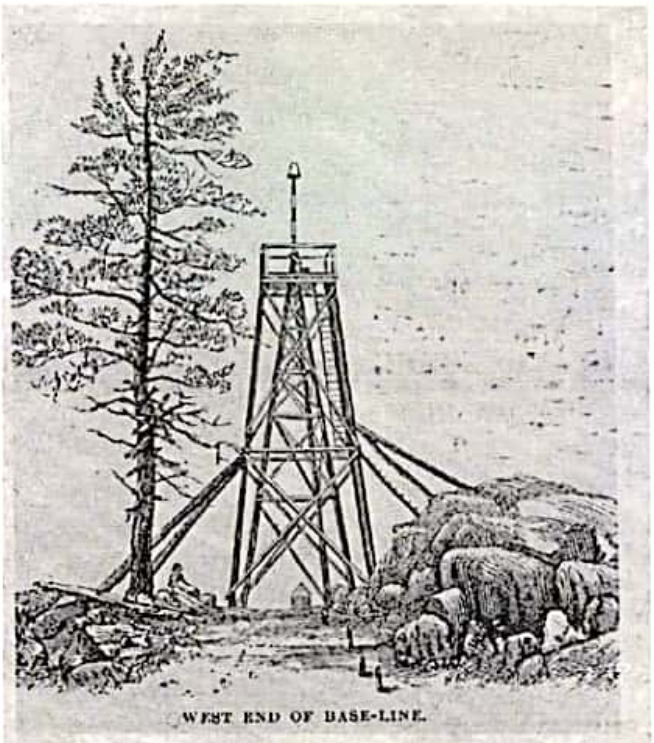
Completed tower

TOWERS

Truck mounted observation tower

Portable mast-for lights/reflectors





Survey tower with signal pole and tin cone
At end of Epping Base Line