

4.1 HORIZONTAL CONTROL

Every survey, from mapping a continent to a small plot of land, depends upon a carefully measured framework which is thereafter treated as free from error. Subsequently, the details are filled in the framework by less elaborate methods. The fixation of a framework for a survey is known as *horizontal control*.

Horizontal control usually consists of a combination of triangulation and traverse. For most of the surveys of small extent, e.g., plane surveys, where direct linear measurements are impossible, triangulation is most suited. It is also suitable when long sights are taken.

In triangulation, a number of lines of sight are required at each station. When the sights are long, the stations are elevated by building towers. In case the distances are short, the expense of towers offsets any saving and traverse becomes economical. Triangulation is most suited for hilly areas, whereas traversing is suitable for flat areas.

Triangulation is preferred for hills and undulating areas, since it is easy to establish stations at reasonable distances apart, with intervisibility. In plane and crowded areas, it is not suitable as the intervisibility of stations is affected.

The main disadvantage of triangulation is the accumulation of error in the lengths and directions of lines, since both of them, for successive lines, depend upon the computations for those of the preceding line, which necessitates a number of check bases.

In triangulation, the entire area to be surveyed is covered with a framework of triangles. If the length and direction of one side, and all three angles of a triangle are measured precisely, the lengths and directions of the remaining two sides of the triangle can be computed. The length of the first line, which is measured precisely is known as **base line**. The other two computed sides are used as new base lines for two other triangles interconnected with the first triangle. By extending this process, i.e., the measurement of the further interconnected triangles and using the computed sides, a chain or network of triangles can be spread over the entire area. The apex of the triangles so located with a relatively greater accuracy provide horizontal control of the survey. Thus, triangulation may be defined as a system of multiplying ground controls on the earth's surface. As a check, the length of one of the sides of the last triangle is also measured and compared with the computed one this side is known as check base.