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TRANSPORTATION ENGINEERING – I

DEPARTMENT OF CIVIL ENGINEERING

FACULTY OF ENGINEERING & TECHNOLOGY

SURVEYING UNIT-1 LECTURE - 1

Topics to be covered:

- Definition
- Uses
- Principles
- Classification

DIFINITION OF SURVEYING

Surveying is the art of determining the relative positions of different objects on the surface and below the surface of the earth by measuring the horizontal and vertical distances between them and by preparing a map to any suitable scale. Thus in discipline, the measurements are taken in the horizontal plane alone.

Levelling is the art of determining the relative vertical distances of different points on the surface of the earth. Therefore, in levelling, the measurements are taken only in the vertical plane.

The aim of surveying is to prepare a plan or map to show the relative positions of the objects on the surface of the earth. The map is drawn to some suitable scale .It shows the natural features of a country such as towns, villages, roads, railways, rivers, etc. Maps may also include details of different engineering works, such as roads, railways, irrigation, canals, etc.

USES OF SURVEYING

Surveying may be used for the following various applications:

To prepare a topographical map which shows the hills, valleys, rivers, villages, towns, forests ,etc. of a country.
To prepare a cadastral map showing the boundaries of fields, houses, and other properties.
To prepare an engineering map showing details of engineering works such as roads, railways, reservoirs, irrigation canals, etc.
To prepare a military map showing the road and railway communications with different parts of a country. Such a map also shows the different strategic points important for the defence of a country.
To prepare a contour map to determine the capacity of reservoir and to find the best possible route for roads, railways, etc.
To prepare a geological map showing areas including underground resources exist.
To prepare an archeological map including places where ancient relics exist.

PRINCIPLE OF SURVEYING

The general principles of surveying are:

1. To work from the whole to the part.

2. To locate a new station by at least two measurements (linear or angular) from fixed reference points.
   According to the first principle, the whole area is first enclosed by main stations (i.e. controlling stations) and main survey lines (i.e. controlling lines). The area is then divided into a number of parts by forming well conditioned triangles.

   A nearly equilateral triangle is considered to be the best well-conditioned triangle. The main survey lines are measured very accurately with a standard chain. Then the sides of the triangles are measured. The purpose of this process of working is to prevent accumulation of error. During this procedure, if there is any error in the measurement of any side of a triangle, then it will not affect the whole work. The error can always be detected and eliminated.

PRINCIPLE OF SURVEYING

According to the second principle, the new stations should always be fixed by at least two measurements (linear or angular) from fixed reference points. Linear measurements refer to horizontal distances measured by chain or tape. Angular measurements refer to the magnetic bearing or horizontal angle taken by a prismatic compass or theodolite.

CLASSIFICATION OF SURVEYING

Generally, surveying is divided into two major categories:
plane and geodetic surveying.

PLANE SURVEYING is a process of surveying in which the portion of the earth being surveyed is considered a plane. The term is used to designate survey work in which the distances or areas involved are small enough that the curvature of the earth can be disregarded without significant error. In general, the term of limited extent.
For small areas, precise results may be obtained with plane surveying methods, but the accuracy and precision of such results will decrease as the area surveyed increases in size. To make computations in plane surveying, you will use formulas of plane trigonometry, algebra, and analytical geometry.

GEODETIC SURVEYING is a process of surveying in which the shape and size of the earth are considered. This type of survey is suited for large areas and long lines and is used to find the precise location of basic points needed for establishing control for other surveys. In geodetic surveys, the stations are normally long distances apart, and more precise instruments and surveying methods are required for this type of surveying than for plane surveying. The shape of the earth is thought of as a spheroid , although in a technical sense, it is not really a spheroid.

CLASSIFICATIONS OF SURVEYING

Based on the purpose (for which surveying is being conducted), Surveying has been classified into:

Control surveying : To establish horizontal and vertical positions of control points.
Land surveying : To determine the boundaries and areas of parcels of land, also known as property survey, boundary survey or cadastral survey.
Topographic survey : To prepare a plan/ map of a region which includes natural as well as and man-made features including elevation.
Engineering survey : To collect requisite data for planning, design and execution of engineering projects. Three broad steps are

1) Reconnaissance survey : To explore site conditions and availability of infrastructures.
2) Preliminary survey : To collect adequate data to prepare plan/map of area to be used for planning and design.
3) Location survey : To set out work on the ground for actual construction/execution of the project.

•**Route survey** : To plan, design, and laying out of route such as highways, railways, canals,pipelines, and other linear projects

CLASSIFICATIONS OF SURVEYING

- **Astronomic surveys** : To determine the latitude, longitude (of the observation station) and azimuth (of a line through observation station) from astronomical observation.
- **Mine surveys** : To carry out surveying specific for opencast and underground mining purposes.


“Thank you”