

The Importance of Dalhousie Survey Camp for Graduate Engineering Students

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ABSTRACT:

Surveying is the branch of civil engineering which deals with measurement of relative positions of an object on earth's surface by measuring the horizontal distances, elevations, directions, and angles. Surveying is typically used to locate and measure property lines; to lay out buildings, bridges, channels, highways, sewers, and pipelines for construction; to locate stations for launching and tracking satellites; and to obtain topographic information for mapping and charting. It is generally classified into two categories: Plane surveying (for smaller areas) and Geodetic surveying (for very large areas). Surveying is the art of making suitable measurements in horizontal or vertical planes. This is one of the important subjects of civil engineering. Without taking a survey of the plot where the construction is to be carried out, the work cannot begin. Dalhousie provides all type of location in a platform .

Key Words : 1.Surveying 2.Measurement 3.Topography 4. Elevation 5. Map

Sub Area : Surveying

Broad-Area : Civil Engineering

INTRODUCTION

Talking about the past, initially the geometrical and legal description of local lands and county seats, gained importance throughout the early modern period as legal and economic arguments came to rely on accurate descriptions and, increasingly, on measurement and "plotting." By the late seventeenth century, surveying included the mapping of larger political or geographical

units. By the eighteenth, military leaders and colonial governors, as well as landed individuals, employed surveyors and cartographers. Techniques and instruments developed throughout the period produced a coherent body of theory and practice used for imperial mapping in the late eighteenth and nineteenth centuries.

The applications of surveying may be explained in following points:

1. To prepare the topographical map which shows hills, rivers, forests, valleys, etc.
2. To prepare the engineering map showing engineering details like highways, railways, canals, dams, reservoirs, etc.
3. To prepare the contour map to determine the best possible route and amount of earthwork required.
4. To prepare the geographical and political map.
5. To prepare archeological map showing the places where ancient relics may have lied.
6. To prepare cadastral map showing boundaries of properties like houses, buildings, fields, colonies, etc.

Purpose of Surveying in the field of Civil Engineering

To layout our marked positions of proposed structures on the ground. Purpose of Surveying in the field of Civil Engineering

- To determine the relative positions of the existing features of the ground.
- To layout our marked positions of proposed structures on the ground.
- To determine areas, volumes and other related quantities.
- To prepare a map of a country of detailed out location of cities, towns, villages and major roads.
- To prepare the engineering detailed plans and sections of various sections such as roads, railways, bridges, dams and other structure.
- To prepare a topographical map showing details of hills, valleys and rivers.

Instruments and techniques

The most commonly used instruments in surveying are a tape or chain for determining shorter distances, a level to determine height or elevation differences, and a theodolite, set on a tripod, to measure angles (horizontal and vertical), combined with the process of triangulation. Starting from a position with known location and elevation, the distance and angles to the unknown point are measured.

The Romans are said to have used the plane table, which consists of a drawing board mounted on a tripod or other support and a straightedge along which lines are drawn. It was the first device capable of recording or establishing angles. The primary tool used by surveyors in North America from the 1600s through the end of the 1800s was a "Gunter's chain," measuring 66 feet long, usually with 100 swiveled links. A retractable steel tape to replace the chain was patented

in 1860 by W. H. Paine of Sheboygan, Wisconsin. The U.S. Geological Survey was formed in 1879 and began mapping in the 1880s, relying on the chain-and-compass method of surveying. By the early 1900s, surveyors were working with plane tables equipped with telescopic alidades with vertical-angle arcs, allowing lines of survey to be plotted directly from the field. Leveling instruments have been used since 1896 to set permanent elevation benchmarks.



Figure 1: Dr. Arvind Dewangan – Astd. Professor in Civil Engineering Department at H.C.T.M. Kaithal concentrate with theodolite in the Dalhousie site on 23-July- 2009 near Station no. 5

In surveying, measurements may be made directly, electronically, by the use of optical instruments, by computations from known lines and angles, or by combination methods. Instruments used for direct linear measurements include the Gunter's chain (known also as the surveyor's chain), which is 66 ft (20 m) long and divided into 100 links; the engineer's chain, 100 ft (30 m) long and also consisting of 100 links; the tape, usually of steel, which has largely superseded chains; and the rod. Tapes and rods made of Invar metal (an alloy of steel and nickel) are used for very precise work because of their low coefficient of thermal expansion. In many situations electronic instruments, such as the geodimeter, which uses light waves, and the tellurometer, which uses microwaves, provide a more convenient and more accurate means of determining distance than do tapes and rods. The height of points in relation to a datum line (usually mean sea level) is measured with a leveling instrument consisting of a telescope fitted

with a spirit level and usually mounted on a tripod. It is used in conjunction with a leveling rod placed at the point to be measured and sighted through the telescope.



Figure 2 : Rajinder singh Camp student from H.C.T.M. Kaithal with during leveling

A more modern instrument is a total station, which is a theodolite with an electronic distance measurement device (EDM). A total station can also be used for leveling when set to the horizontal plane. Since their introduction, total stations have made the technological shift from being optical-mechanical devices to being fully electronic. Modern top-of-the-line total stations no longer require a reflector or prism (used to return the light pulses used for distancing) to return distance measurements, are fully robotic, and can even e-mail point data to the office computer and connect to satellite positioning systems, such as a Global Positioning System. Though real-time kinematic GPS systems have increased the speed of surveying, they are still horizontally accurate to only about 20 mm and vertically accurate to about 30–40 mm.

Surveys based on photographs are especially useful in rugged or inaccessible country and for reconnaissance surveys for construction, mapping, or military purposes. In air photographs, errors resulting from tilt of the airplane or arising from distortion of ground relief may be

corrected in part by checking against control points fixed by ground surveys and by taking overlapping photographs and matching and assembling the relatively undistorted central portions into a mosaic. These are usually examined stereoscopically.

Historically, distances were measured using a variety of means, such as with chains having links of a known length, for instance a Gunter's chain, or measuring tapes made of steel or invar. To measure horizontal distances, these chains or tapes were pulled taut according to temperature, to reduce sagging and slack. Additionally, attempts to hold the measuring instrument level would be made. In instances of measuring up a slope, the surveyor might have to "break" (break chain) the measurement- use an increment less than the total length of the chain.

Historically, horizontal angles were measured using a compass, which would provide a magnetic bearing, from which deflections could be measured. This type of instrument was later improved, with more carefully scribed discs providing better angular resolution, as well as through mounting telescopes with reticles for more-precise sighting atop the disc (see theodolite). Additionally, levels and calibrated circles allowing measurement of vertical angles were added, along with verniers for measurement to a fraction of a degree—such as with a turn-of-the-century transit.

The simplest method for measuring height is with an altimeter – basically a barometer – using air pressure as an indication of height. But surveying requires greater precision. A variety of means, such as precise levels (also known as differential leveling), have been developed to do this. With precise leveling, a series of measurements between two points are taken using an instrument and a measuring rod. Differentials in height between the measurements are added and subtracted in a series to derive the net difference in elevation between the two endpoints of the series. With the advent of the Global Positioning System (GPS), elevation can also be derived with sophisticated satellite receivers, but usually with somewhat less accuracy than with traditional precise leveling. However, the accuracies may be similar if the traditional leveling would have to be run over a long distance.

Triangulation is another method of horizontal location made almost obsolete by GPS. With the triangulation method, distances, elevations and directions between objects at great distance from one another can be determined. Since the early days of surveying, this was the primary method of determining accurate positions of objects for topographic maps of large areas. A surveyor first needs to know the horizontal distance between two of the objects. Then the height, distances and angular position of other objects can be derived, as long as they are visible from one of the original objects. High-accuracy transits or theodolites were used for this work, and angles between objects were measured repeatedly for increased accuracy. See also Triangulation in three dimensions.

Turning is a term used when referring to moving the level to take an elevation shot in a different location. When land surveying, there may be trees or other obstructions blocking the view from the level gun to the level rod. In order to "turn" the level gun, one must first take a shot on the rod from the current location and record the elevation. Keeping the level rod in exactly the same location and elevation, one may move the level gun to a different location where the level rod is still visible. Record the new elevation seen from the new location of the level rod and use the

difference in elevations to find the new elevation of the level gun. Turning is not only used when there are obstructions in the way, but also when drastically changing elevations. You can turn up or down in elevation but the gun must always be at a higher elevation than the base of the rod. A level rod can usually be raised up to 25 feet high, which enables the gun to be set much higher. However, if the gun is lower than the base of the rod, you will not be able to take a shot because the rod cannot be lowered beyond the ground elevation.



Figure 2. Er Jagdish Chand Asstt. Professor in Civil Engineerin Deptt. H.C.T.M. preparing for drawing theory after survey

Levelling

Levelling is the art of representing relative positions in the vertical plane of different points on the earth's surface.

It helps in determining the areas that are to be levelled to achieve a certain slope.

Principles of Surveying

All the surveys that are conducted are based on two fundamental principles. They are as follows:

1. Working from whole to part
2. Fixing a point with reference to two fixed points

Working from whole to part

In order to localize errors and prevent their accumulation, a set of control points is always established with great precision first for the whole area to be surveyed.

Later on, details are filled in between these control points to a relatively smaller precision.

This fundamental work principle is known as “Working from whole to part”.

Fixing a point with reference to two fixed points

Survey stations are fixed by at least two measurements, either both linear or angular measurements or linear and angular measurements from two control points.

Responsibilities

One of the most important things that a surveyor does is to determine the property boundaries. While this may or may not be a big deal as far as buildings are concerned, but if the project is something such as a road, it can significantly alter the desired route. Land surveyors will often note elevation changes and other physical features that could be important as a project progresses. This can add a considerable amount of time to the work involved, but it can be invaluable to those who need to depend on those measurements when making their designs. Surveyors also transfer the designs from the paper to the actual field. Surveys may be performed to determine the suitability of a site for a given project.

Once the surveying is complete, a report is made detailing the findings and sent to the interested parties. In some cases, land surveyors may be asked to explain their findings. In particularly contentious situations, such as a legal dispute involving land, they may even be called on to testify in court. However, such situations are extremely rare.

Education requirement

According to the U.S. Bureau of Labor Statistics (BLS), it was once possible to launch a career in land surveying with minimal education, but that's no longer the case. Due to the increasingly technical nature of the profession, most employers require you to hold a bachelor's degree in surveying, mapping or geomatics. Such degree programs usually include courses such as calculus, geographic information systems (GIS) and cartography. Some states require surveyors to complete a degree program that's approved by the Accreditation Board for Engineering and Technology (ABET). But still in most of the places in the world, a person with diploma level education may get into this profession.

Importance of Surveying to Civil Engineers

The planning and design of all Civil Engineering projects such as construction of highways, bridges, tunnels, dams etc are based upon surveying measurements.

Moreover, during execution, project of any magnitude is constructed along the lines and points established by surveying.

Thus, surveying is a basic requirement for all Civil Engineering projects.

Other principal works in which surveying is primarily utilised are

- to fix the national and state boundaries;
- to chart coastlines, navigable streams and lakes;
- to establish control points;
- to execute hydrographic and oceanographic charting and mapping; and
- to prepare topographic map of land surface of the earth.

Survey Camp, Dalhousie (HP) was held from 16th August, 2012 as part of the academic curriculum of E-Max School of Engineering & Applied Research, Badhuali, Ambala. The site chosen for the camp was Dalhousie (HP) which is bounded by thick forest of Pine and Deodar trees. Dalhousie (HP) is located at an altitude of 2010 metres above sea level. A very successful camp was held and around 120 students left for 4 weeks full of survey exercises. The students were equipped with instruments in the morning, with instructions on how to use these with guides available to them during camp. In addition, the students were introduced to some of the latest surveying techniques. The camp was coordinated by Mr. Deepankar Kumar Ashish (Asst. Professor & Head), Mr. Aman Sharma (Asst. Professor), Mr. Sandeep Dhiman (Asst. Professor), Mr. Naveen Hooda (Asst. Professor), Mr. Ajeet Kumar Dass (Lecturer), Mrs. Ekta Madan (Asst. Professor), Mr. Ashok Thakur (Lecturer), Mr. Ashwani (Lecturer), Miss. Pryanika (Lab Tech.) & Mr. Ravi Kumar (Lab Tech.) of Civil Engineering Department.

Methods of Surveying

The practice of measuring angles and distances on the ground and plotting them accurately on map is generally termed as surveying. It is the technique and science used to determine accurate distances and angles between the terrestrial and three dimensional space positions of points. These points are taken from the positions on earth's surface and the method of surveying is used to develop land maps and boundaries for the purpose of land ownership and other governmental purposes. Chains with links of known lengths are one of the ways used to measure the distance in surveying. A compass capable of providing magnetic bearing and from which deflections could be measured is used to measure horizontal angles. Generally surveys are non experimental and descriptive methods related to research. Surveys are scientific research methods and it can be used extensively in library and information science so that attitudes and characteristics of a wide range of subjects can be determined, like quality of user system interfaces & reading habits of library users. There are two basic methods of surveying. They are cross sectional surveys and longitudinal surveys.

Cross sectional & longitudinal surveys

To gather information on a population at a single point in time generally cross sectional surveys are used. A cross-sectional survey questionnaire determines the relationship between two factors, for instance the relation between religiousness of parents and views on Internet sifting. Longitudinal surveys can be collected over a period of time. Next step by the researcher may is analyze changes in found in surveying and attempt to describe them. The three main types of longitudinal surveys are trend studies, cohort studies, and panel studies.

Importance of Surveying Methods in Civil Engineering

Creativity and technical knacks are deployed in Civil Engineering in order to make sure that the amenities important for modern life works safely and efficiently. Land Surveying is an important aspect in construction, and this is done with an aim to verify the exactness of the existing records. Information obtained by surveying is used to prepare legal documents like deeds and leases. Planning, designing and establishing the boundaries of properties which include services such as mapping, construction layout services, angle, elevation, area and volume can be done with the help of Surveying. Site examination and selection with the usage of computerized measuring instruments which covers information related to geography and topography are the major methods of surveying. These investigations help to find the best site location. Civil engineering survey works on various regions such as turning out of maps and plans which can help in designing and planning civil engineering structures. This field also includes supervising construction and this helps to ensure the precision of magnitude and tolerances.

CONCLUSION

For better understanding to the different types of surveying techniques and methods the Dalhousie city provide all types of fields in earth surface by which learner can learn all the mojour activities of processes. Being a graduate engineer this place provides various types of location what the survey camp need.

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