Surveying

Saturday, January 12, 2019 1:48 PM

Surveying or **land surveying** is the technique, profession, and science of determining the terrestrial or three-dimensional positions of points and the distances and angles between them. A land surveying professional is called a land surveyor. These points are usually on the surface of the Earth, and they are often used to establish maps and boundaries for ownership, locations, such as building corners or the surface location of subsurface features, or other purposes required by government or civil law, such as property sales.

Surveyors work with elements of geometry, trigonometry, regression analysis, physics, engineering, metrology, programming languages, and the law.

Surveying has been an element in the development of the human environment since the beginning of recorded history. The planning and execution of most forms of construction require it. It is also used in transport, communications, mapping, and the definition of legal boundaries for land ownership. It is an important tool for research in many other scientific disciplines.

From <https://en.wikipedia.org/wiki/Surveying>

They use equipment, such as total stations, robotic total stations, theodolites, GPS receivers, retroreflectors, 3D scanners, radios, handheld tablets, digital levels, subsurface locators, drones, GIS, and surveying software.

From <https://en.wikipedia.org/wiki/Surveying>

Historical Survey Equipment

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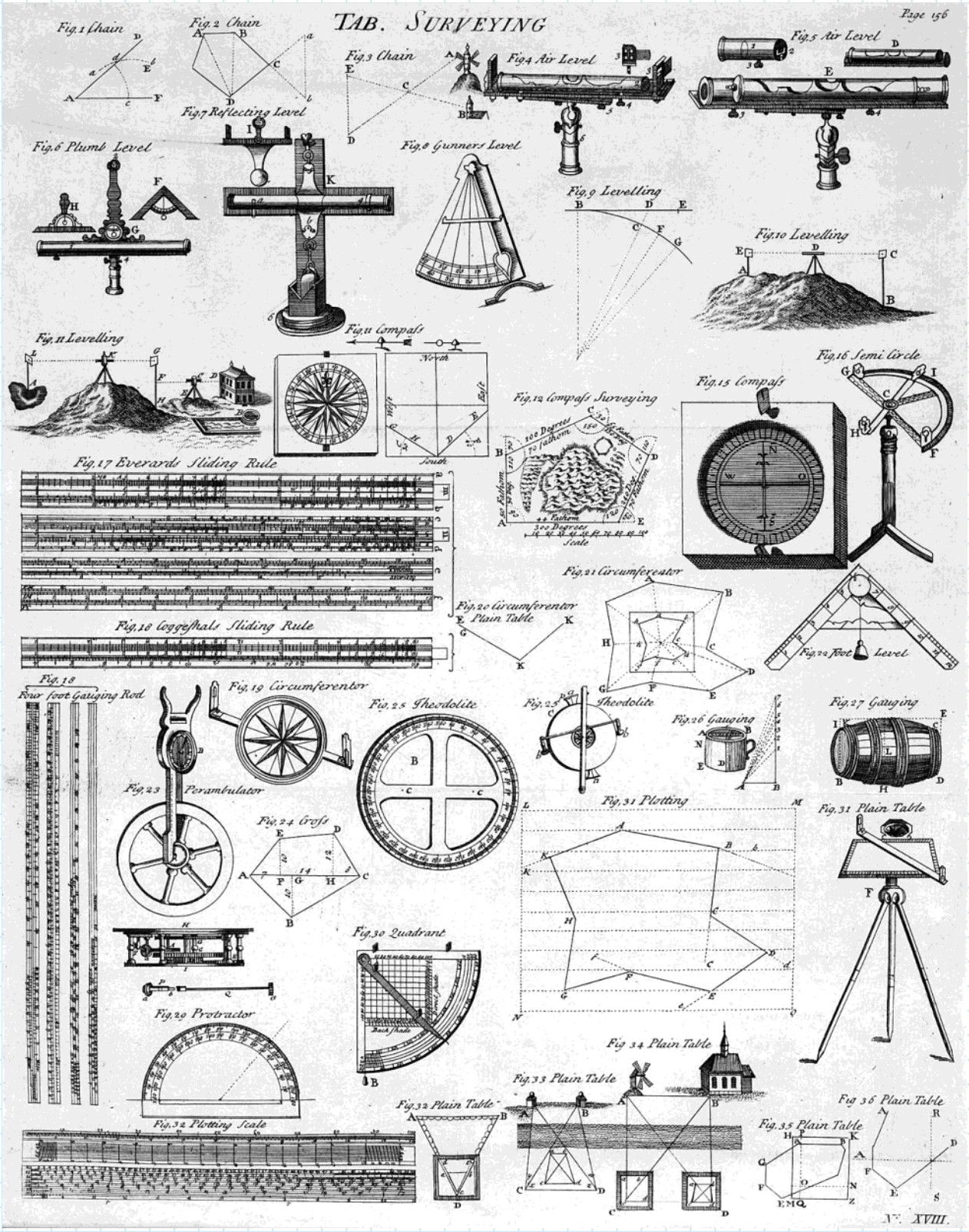

Surveying Equipment - Theodolites

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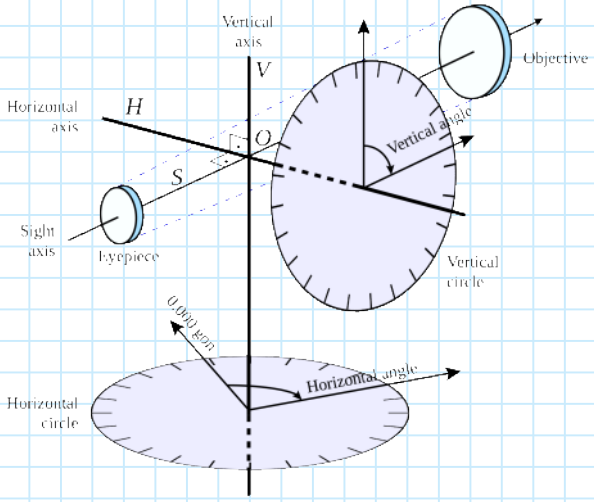

A **theodolite** /θiːˈɒdəlaɪt/ is a precision optical instrument for measuring angles between designated visible points in the horizontal and vertical planes. The traditional use has been for land surveying, but they are also used extensively for building and infrastructure construction, and some specialized applications such as meteorologyand rocket launching.[1] It consists of a moveable telescope mounted so it can rotate around horizontal and vertical axes and provide angular readouts. These indicate the orientation of the telescope, and are used to relate the first point sighted through the telescope to subsequent sightings of other points from the same theodolite position. These angles can be measured with great accuracy, typically to milliradian or seconds of arc. From these readings a plan can be drawn, or objects can be positioned in accordance with an existing plan. The modern theodolite has evolved into what is known as a total station where angles and distances are measured electronically, and are read directly to computer memory.
In a transit theodolite, the telescope is short enough to rotate through the zenith, otherwise for non-transit instruments vertical (or altitude), rotation is restricted to a limited arc.

From <https://en.wikipedia.org/wiki/Theodolite>

Surveying Equipment - Total Stations

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A **total station** (**TS**) or **total station theodolite** (**TST**) is an electronic/optical instrument used for surveying and building construction. It is an electronic transit theodoliteintegrated with electronic distance measurement (EDM) to measure both vertical and horizontal angles and the slope distance from the instrument to a particular point, and an on-board computer to collect data and perform triangulation calculations.[1]

Robotic or motorized total stations allow the operator to control the instrument from a distance via remote control. This eliminates the need for an assistant staff member as the operator holds the retroreflector and controls the total station from the observed point. These motorized total stations can also be used in automated setups knows as Automated Motorized Total Station (AMTS).

Contents

From <https://en.wikipedia.org/wiki/Total_station>

Functions

Angle measurement

Distance measurement

Coordinate measurement

Data processing

Mining

Mechanical and electrical construction

Meteorology

Surveying Equipment - GPS Theodolite or Total Station

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The Global Positioning System (GPS) employs trilateration to calculate the coordinates of positions at or near the Earth's surface. Trilateration refers to the trigonometric law by which the interior angles of a triangle can be determined if the lengths of all three triangle sides are known. GPS extends this principle to three dimensions

From <https://www.e-education.psu.edu/natureofgeoinfo/book/export/html/1620>

Surveying Equipment - Survey Level

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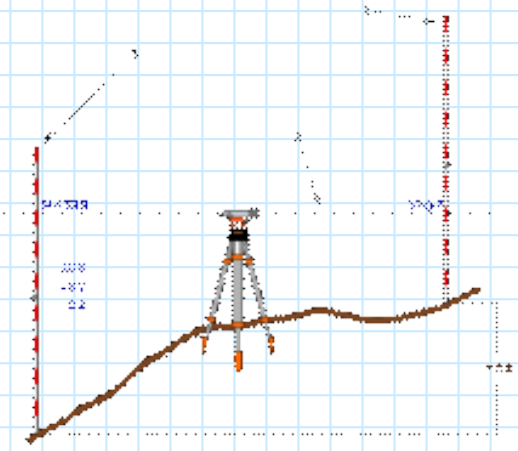

Surveyor's **level**, instrument used in **surveying** to measure the height of distant points in relation to a bench mark (a point for which the height above sea **level** is accurately known). It consists of a telescope fitted with a spirit **level** and, generally, mounted on a tripod.

Surveyor's level | instrument | Britannica.com
https://www.britannica.com/technology/surveyors-level

Surveying Equipment - Surveying Tape or Chain

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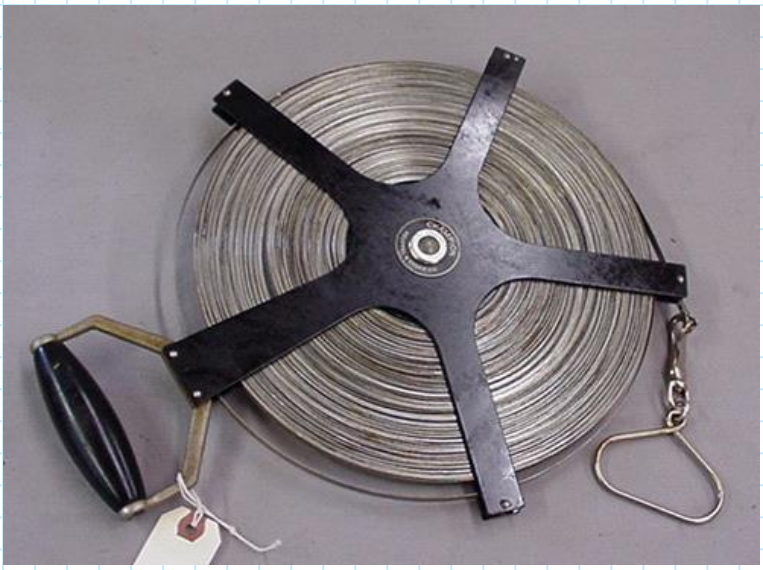

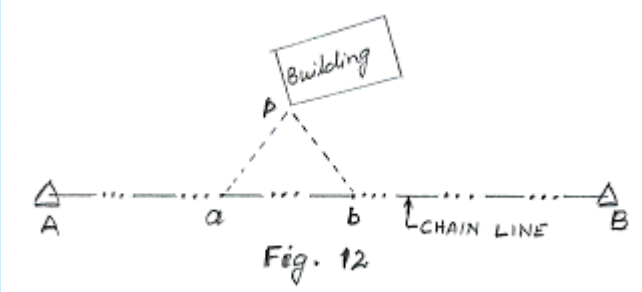

Fig. 12

Surveying Equipment - Retroreflector

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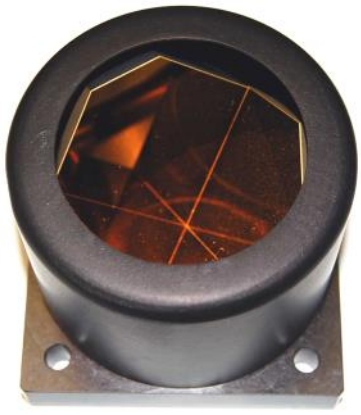


A gold corner cube retroreflector	
Uses	Distance measurement by optical delay line

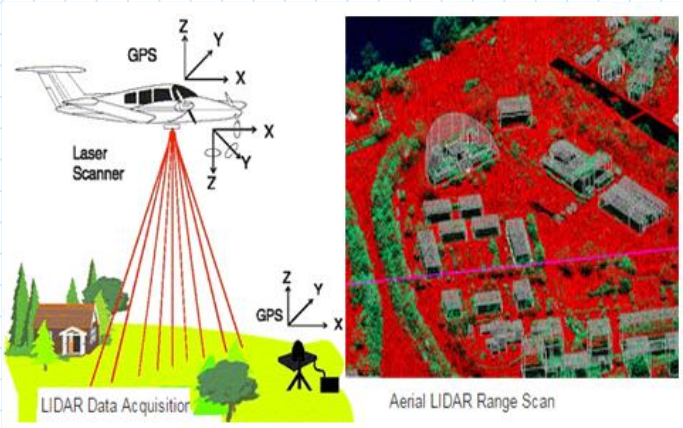
From <https://en.wikipedia.org/wiki/Retroreflector>

A **retroreflector** (sometimes called a **retroflector** or **cataphote**) is a device or surface that reflects radiation (light, usually) back to its source with a minimum of scattering. In a retroreflector the wavefront of the radiation is reflected straight back to the wave's source. This works at a wide range of angle of incidence, unlike a planar mirror, which does this only if the mirror is exactly perpendicular to the wave front, having a zero angle of incidence. Being directed, the retroflector's reflection is brighter than that of a diffuse reflector. Corner reflectors and cat eye reflectors are the most used kinds

From <https://en.wikipedia.org/wiki/Retroreflector>

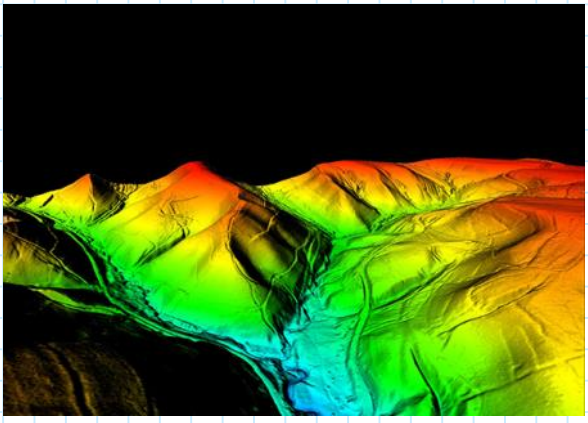
Surveying Equipment - LiDAR Methods

Tuesday, January 29, 2019 1:48 PM



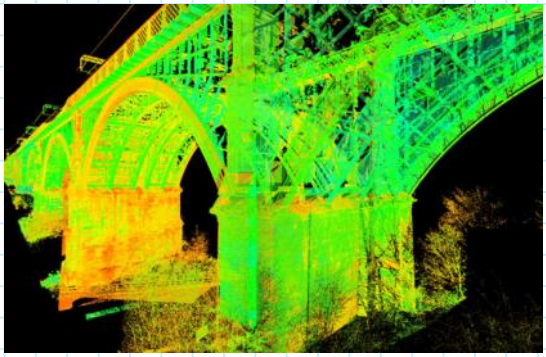
Airborne System

Drone Mounted LiDAR



Topography from Airborne Systems

Land or Terrestrial Scanners



Bridge Scanned by Terrestrial LiDar

Exercises

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THE BEAVER (Utah) PRESS Thursday, June 21, 1973

Utilities Disappointed At Interior Desision

Four electric utilitites involved in planning the proposed Kaiparowits Power Project in Southern Utah today expressed regret that Secretary of the Interior Morton has, in effect, rejected the project even before a comprehensive environmental impact report -- prepared at a cost of $1 million -- was filed.

Morton announced today that he will reject applications for right-of-way permits to construct the coal-fired electric generating plant on the Kaiparowits Plateau for environmental reasons.

The utilitites-- Southern California Edison, San Diego Gas & Electric, Arizona Public Service, and the Salt River Project (Phoenix)-- said they were "surprised and amazed" that Secretary Morton would act before fully reviewing a detailed environmental impact report which was scheduled to be filed with the Interior Department within the next 30 days.

Because of the comprehensive nature and findings of the environmental report, the partici-

Gen Watts Gets 2nd Highest Non-Combat Medal

The Nation's second highest non-combat medal was awarded to Utah's Adjutant General Thursday in ceremonies at Camp W.G. Williams.

Major General Maurice L. Watts was presented the Legion of Merit by the Deputy Commander of the Sixth U.S. Army, Major General Robert B. Smith.

The citation praised General Watts for his civic and military leadership and noted the high state of combat readiness of the Utah National Guard he commands.

General Watts was inducted into the Army in World War II and joined the National Guard after the war. He has served as Adjutant General since 1964.

He has also served five years as a member of a Church of Jesus Christ of Latter-Day Saint ward bishopric and on the Church's General Board of the YMMIA, a youth group of the LDS Church.

A graduate of the University of

Daredevil Show Set For Davis Stadium

A 14-man troop of stunt drivers, The King Kovaz Auto Daredevils, will present their one-hour forty-five minute show of close calls and comedy at the Davis Stadium Sunday and Monday. (June 24-25)

The show blends a variety of

Girl Scouts to Host 'Traces through Time'

Learning to live in the lifestyle of the Fremont Indians, who inhabited parts of Utah centuries ago, will comprise "Traces Through Time," National Wider Opportunity sponsored by the Utah Girl Scout Council July 25 - August 6 in the Vernal area.

Cooking, building fires with

1. Using a tape measure, determine how far a bicycle will travel (km) in 3 days (27 hours). The wheel is rotating at x revolutions per minute. Measure the revolutions in class

2. How far would the bike go, if the wheel is turning at 73 revolutions per minute?

3. Using a tape measure, measure the height of a wall or building. You cannot climb the building or wall but must make the measurement (estimate) from the base.

Bicycle Oedometer

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