AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

Name of the Lab- Survey practical II laboratory

Standard Operating Procedures (SOP)

Theodolite

A theodolite works by combining optical plummets (or plumb bobs), a spirit (bubble level), and graduated circles to find vertical and horizontal angles in surveying. An optical plummet ensures the theodolite is placed as close to exactly vertical above the survey point. The internal spirit level makes sure the device is level to to the horizon. The graduated circles, one vertical and one horizontal, allow the user to actually survey for angles.

How to Use a Theodolite

1. Mark the point at which the theodolite will be set up with a surveyor's nail or a stake. This point is the basis for measuring angles and distances.

2. Set up the tripod. Make sure the height of the tripod allows the instrument (the theodolite) to be eye-level. The centered hole of the mounting plate should be over the nail or stake.
3. Drive the tripod legs into the ground using the brackets on the sides of each leg.
4. Mount the theodolite by placing it atop the tripod, and screw it in place with the mounting knob.
5. Measure the height between the ground and the instrument. This will be used a reference to other stations.
6. Level the theodolite by adjusting the tripod legs and using the bulls-eye level. You can make slight tunings with the leveling knobs to get it just right.
7. Adjust the small sight (the vertical plummet) found on the bottom of the theodolite. The vertical plummet allows you to do ensure the instrument remains over the nail or stake. Adjust the plummet using the knobs on the bottom.
8. Aim the crosshairs in the main scope at the point to be measured. Use the locking knobs on the side of the theodolite to keep it aimed on the point. Record the horizontal and vertical angles using the viewing scope found on the theodolite's side.

Advantages of Using a Theodolite

Theodolites have many advantages when compared to other leveling instruments:

- Greater accuracy.
- Internal magnifying optical system.
- Electronic readings.
- Horizontal circles can be instantly zeroed or set to any other value.
- Horizontal circle readings can be taken either to the left or right of zero.
- Repeat readings are unnecessary

Standard Operating Procedures (SOP)

Tacheometer

A Tacheometer is used in surveying to determine vertical and horizontal angles by combining optical plummets (or plumb bobs), a spirit (bubble level), and graduated circles. An optical plummet ensures that the theodolite is positioned as vertically above the survey point as possible. The device's internal spirit level ensures that it is parallel to the horizon. The graduated circles, one vertical and one horizontal, enable the user to conduct an actual angle survey.

How to Use a Tacheometer

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2. Set up the tripod. Make sure the height of the tripod allows the instrument (the theodolite) to be eye-level. The centered hole of the mounting plate should be over the nail or stake.
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Standard Operating Procedures (SOP)
Total station

A total station is an electronic/optical instrument used in modern surveying and building construction (EDM). It has a microprocessor, data collector, and storage system. The instrument measures sloping distance, horizontal and vertical angles. This microprocessor unit can calculate horizontal distance, point coordinates, and reduced level of point. Total station data can be downloaded into computers/laptops for further processing. Land surveyors and civil engineers use total stations to record features in topographic surveys or to set out features (such as roads, houses or boundaries). Police, crime scene investigators, private accident reconstructionists, and insurance companies use them to measure scenes.

Principle

It is based on the measurement of time for the distance travelled by wave.

1) Total Station Generates a beam that is sent to the prism and returned back.

2) The Time-of-Flight is determined by the Total Station.

3) Knowing the speed of light,the distance can be computed as- Distance = Velocity x Time.

Equipments Used

1) Total station and tripod.

2) prism and tripod.

Dos

- ✓ Center and level the base of plane table accurately.
- ✓ Crosshairs must be focused sharply.
- ✓ Measure height of the instrument and height of prism above ground.
- ✓ Always take 3 or more observations of each point to take the average.
- ✓ Apply check for horizontal angles.

Don'ts

- ✓ Handle the Total Station and Prism with utmost care.If dropped accidently, Digital display of Total Station may get damaged and Prism may also be broken.
- ✓ While shifting the instrument from one station to another station, always keep it in box for transport.
- ✓ Protect the instrument from heavy rains.

Steps to perform experiment

Step-1) Click on EQUIPMENT SETUP Button.

Step-2) After this, you need to setup autolevel instrument by placing it on the tripod using keyboard keys i.e. q:left movement,w:right movement,s:up movement,x:down movement.

Step-3) After this, click on LEVEL SETUP Button & setup blue bubble dot to the center by using keyboard keys i.e.l:left movement,r:right movement,u:up movement,d:down movement.

Step-4) After this, click on the NEXT Button.

Step-5) Press t key and p key to show tripod & prism.

Step-6) Click on the START Button.

Step-7) Press v key for total station view of object.

Step-8) Click on the VIEW READINGS Button to show readings.

Step-9) Click on the FINISH Button to close the simulation.

Standard Operating Procedures (SOP)
Dumpy level

A dumpy level, also known as an automatic level or builder's level, is a tool designed to find the height of land masses. Though these devices may look intimidating or confusing, dumpy levels are fairly easy to use once you know how to set them up and what kinds of measurements they provide.

How to Use a Dumpy Level

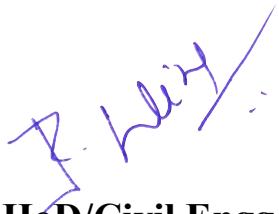
1. Find a benchmark location near the spot you want to measure.
2. Set your tripod up near the spot you want to measure
3. Connect your device to the tripod and position it over 2 leveling screws.
4. Level the device by adjusting the 2 leveling screws.
5. Turn your telescope 90 degrees and adjust the third leveling screw.
6. Check your level's calibration by turning it 180 degrees.
7. Remove your dumpy level's lens cap.
8. Adjust the eyepiece until you can see the device's crosshairs.
9. Twist the device's focusing knob until the image is clear.
10. Position an E staff on top of your benchmark spot.

11.Find the height difference between your level and the benchmark spot.

12.Calculate your level's actual height using the benchmark height.

13.Find the height difference between your level and the unmeasured spot.

14.Calculate the spot's actual height using your level's height.



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