




Field Staff Skills Training

Instrument Training Session


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Instrument Test Procedure

- Instrument identification
- Instrument set up and disassembly
- Shooting grades and rod reading
- Measurement recording and interpretation (horizontal and vertical)

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Instrument Identification

- Builders Levels
 - Provides a level horizontal plane that measurements can be taken with using a measuring rod (story pole) to determine differences in grade in relation to the leveling plane.

- Types of Builders Levels
 - Standard Builders Level
 - Laser Level

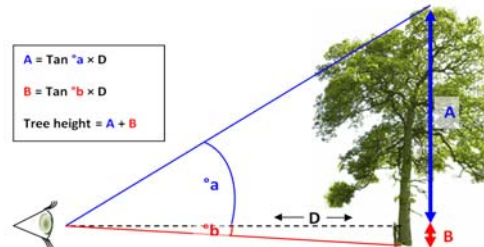


3



Instrument Identification

- Transit Level
 - Like the builders level, but also allows vertical angle measurements. Typically used by surveyors for advanced site measurements.



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Instrument Set Up and Disassembly

- Tripod Set Up
 - Pick a location that allows good site lines to the points being measured.
 - Open tripod and tighten extension screws (if applicable).
 - Provide a wide, stable base and securely set legs into soil, while keeping the mounting plate reasonably level.



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Instrument Set Up and Disassembly

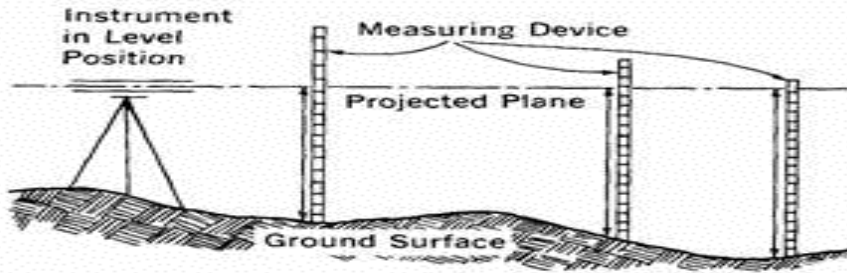
- Instrument Set Up
 - Remove instrument from case and handle with two hands.
 - Set instrument on tripod and thread mounting screw into base.
 - Be careful not to cross thread.
 - Do not over tighten.
 - Level the instrument using the leveling screws.
 - Be careful not to bind leveling screws.



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Shooting Grades and Rod Reading

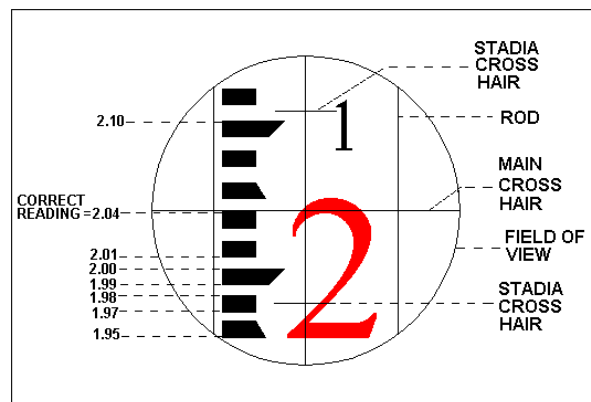
- Shooting grades is the action of measuring and recording the distance between the leveling plane of the instrument and the distance to the point of measurement.



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Shooting Grades and Rod Reading

- Reading the Survey Rod
 - Inch rod
 - 10^{ths} rod



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Shooting Grades and Rod Reading



Builders Level

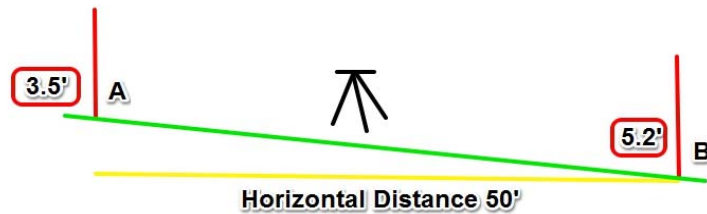


Laser Level



Interpreting Grades

| | | |
|------------------------|-------|---|
| Point A | 3.5' | $\frac{VD}{HD} = \text{slope}$ |
| Point B | 5.2' | |
| Vertical Distance (VD) | -1.7' | $1.7 / 50 = -0.034 = 3.4\% \text{ slope}$ |



Note: When shooting grades with a story pole, the greater the reading on the rod, the lower the elevation.



Instrument Tips:

- Be sure to handle instrument safely (two hands).
- Practice setting up and leveling different instruments.
- Make sure the survey rod is level before taking measurements.
- Attend equipment familiarization before the test.
- Don't rush, there is plenty of time during the test session to complete the task.


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Laser Safety




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A photograph of a man in a dark shirt using a surveying instrument. Two bright red laser lines are projected from the instrument, one passing through each of his eyes. He is smiling slightly. The background is a textured, reddish-brown wall.

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