



Setting Out

This training package provides information on setting out buildings, profiles, pegs, grid lines and levels for buildings common in South-East Asia and the South Pacific region.

It concentrates on setting out DANCER Elevated Timber Buildings, but is also suitable for other types of buildings.





Surveyor to Mark Boundaries, Corners and Levels

Preliminary Clearing

On a site with trees and other heavy vegetation, it may be necessary to carry out some site clearance prior to the survey to provide suitable lines of site.

Checking Requirements

Whilst it is tempting to set out a building based on previously established corner pegs, there is considerable risk that they have not been correctly located during the original survey, or have been subsequently moved. Use an experienced surveyor to establish and record the site corner pegs, the building corner pegs and the local level datum. Before commencing the setting out work, the Surveyor should check the approved plans to ensure that the boundary distances, heights and other critical dimensions meet the requirements of the site and relevant regulations. Check that there have been no drawing errors incorporated into the approved plans. Once construction has started it is difficult, if not impossible, to correct problems of set out. In particular, check all heights and reduced levels (RLs). Any errors or potential conflicts shall be brought to the attention of the Builder.

Detailed Survey Drawings

Local authorities may require a survey on completion of building works before issuing an occupation certificate. On completion of the survey, the Surveyor shall provide to the Builder certified plans showing the boundaries, corner points of the building, gridlines, benchmark and temporary benchmark.





Levels, Dimensions, Square, Setting Out

Levels

It is critical that all floor framing is level. Before commencing the set out, check that slab or timber floor framing is level. It may be necessary to pack the frames in the low areas or to rectify the high areas.

Dimensions and Square

Check the position and square of the concrete slab or footings before commencing construction. Measure diagonals and pairs of opposite sides to check square.

Setting Out

When setting out the wall framing, a small error in position can lead to misalignment of the other components, such as the roof. Base the set out on the longest side of a building, since this will reduce the likelihood of errors in square.

Profiles and Recovery Pegs

Sometimes profiles and corner pegs can be disturbed.

- To avoid disruption of profiles, ensure that they are placed an adequate distance from the earthworks.
- To recover lost profiles always measure from the principal grid line.

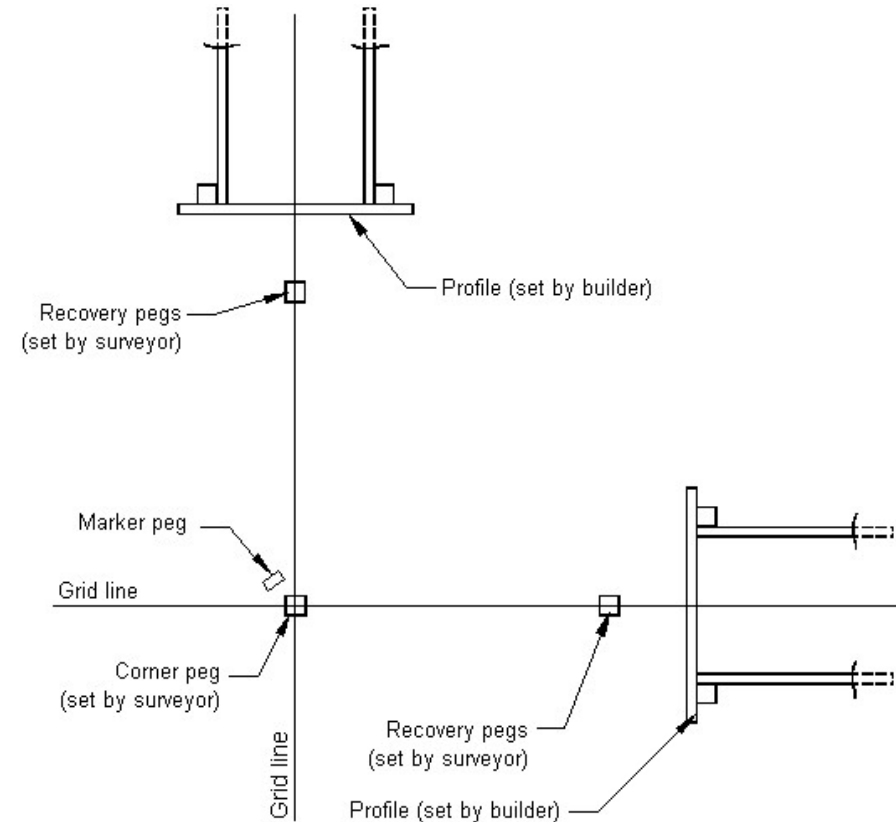
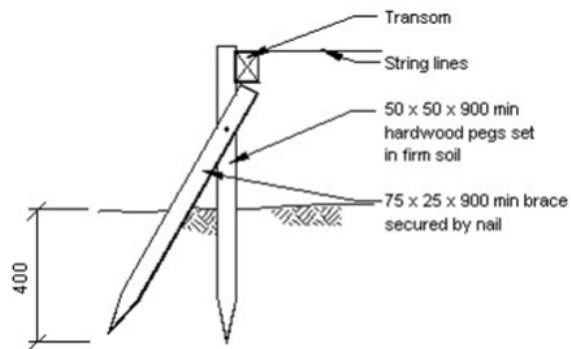
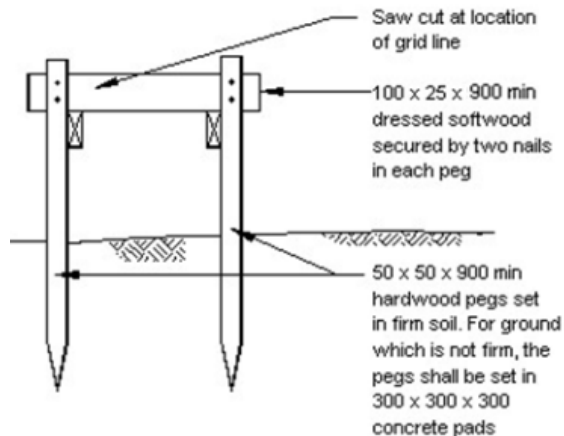
Marking Boundaries, Corners and Levels

The Surveyor shall mark by means of pegs, nails and paint the site boundaries, corner points of the building, gridlines shown on the drawings, benchmark and temporary benchmark. All pegs, nails and other marks shall be clearly identified by paint, coloured ribbon and/or star pickets and protected against damage.



Profiles and Recovery Pegs

Where earthmoving machinery traverses the site, corner pegs will almost certainly be disrupted. Timber profiles (and perhaps offset pegs) are erected at some distance beyond the limits of any earthworks. Profiles establish the plan position of the main building grid lines. It is difficult (but not impossible) to simultaneously establish both plan position and level using the same profiles, although it is best to establish levels independently of the profiles. Pegs for marking gridlines and the like shall be 50 x 50 x 450 mm minimum hardwood with a sharpened point. Timber for profiles shall be dressed softwood.

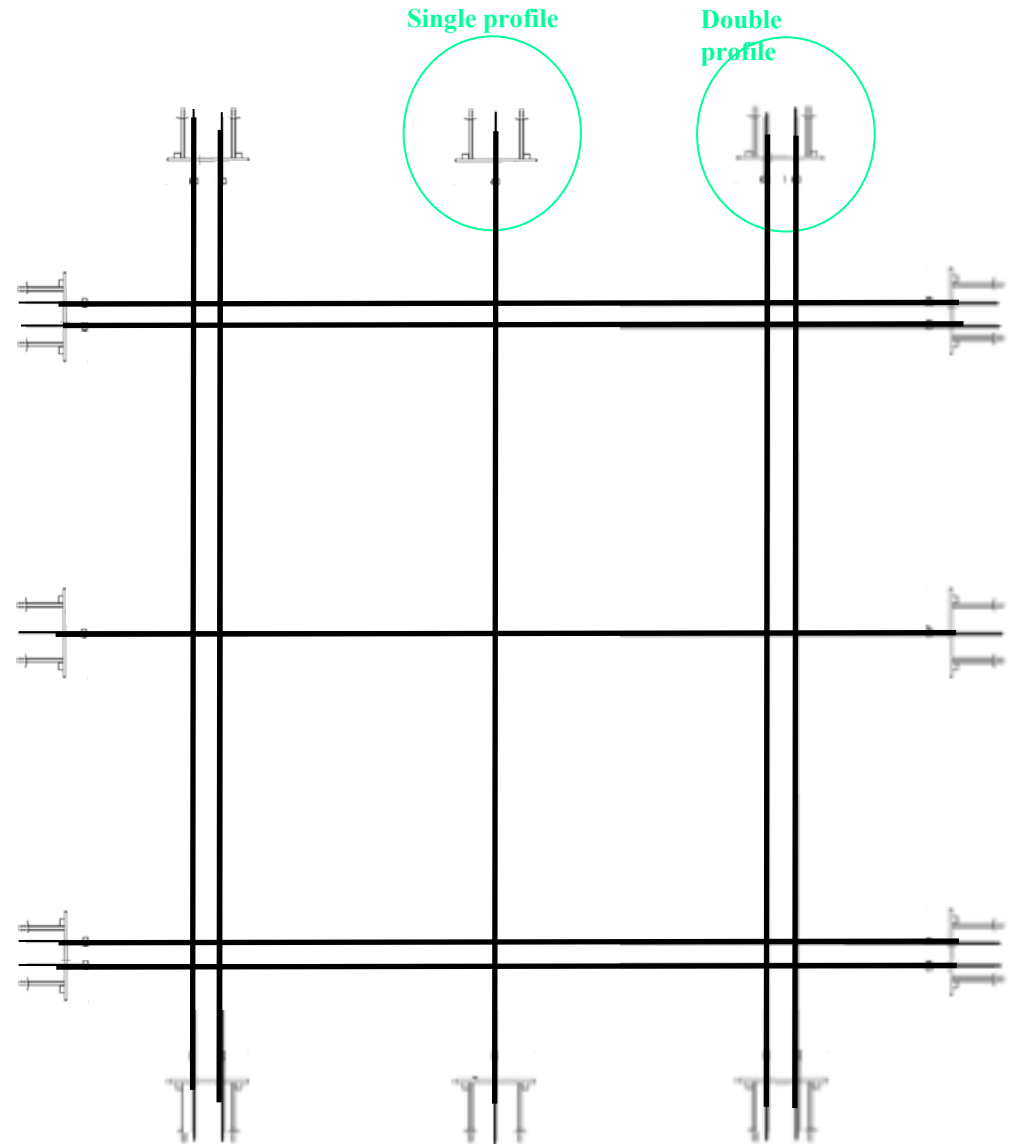
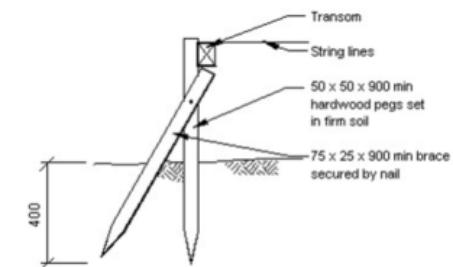
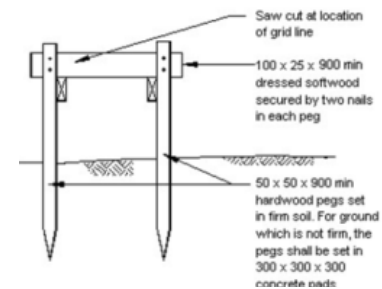
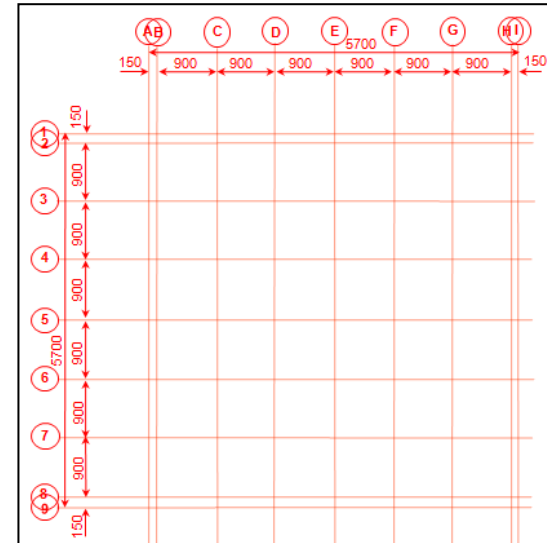


Typical Layout of Profiles and Pegs



Profiles for Setting Out Gridlines

Set out grid lines as per the drawing. Where to grid lines are close together, set out both on the same profile.

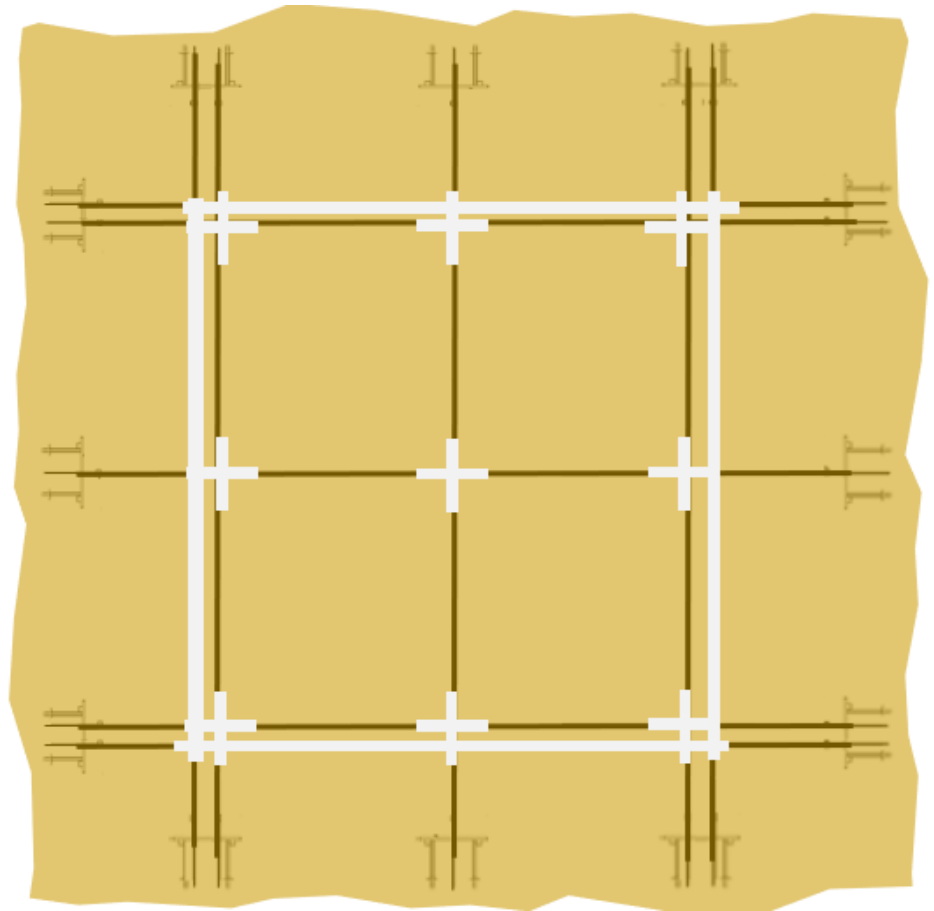




Marking with Lime

After the gridlines are established and the string lines positioned, the outline of the building and footing positions may be marked on the ground using hydrated lime, if it is available.

String lines are removed later to permit excavations to take place, and footings may be located approximately using the lime outline.

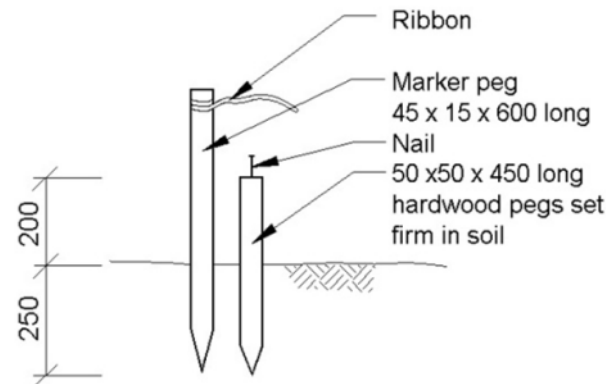
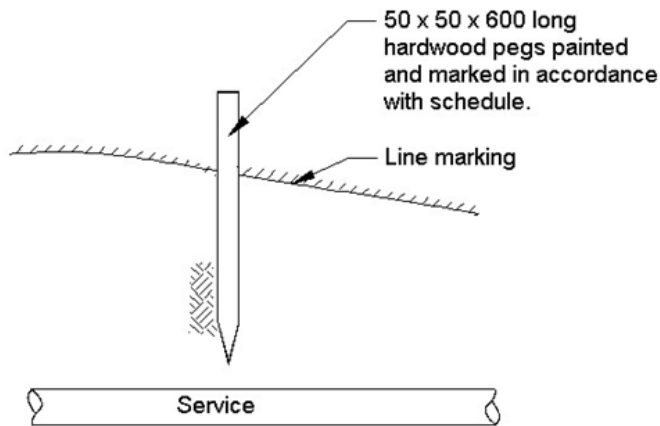




Services

A common problem in urban areas is the unearthing of services such as sewer pipes, water pipes, electrical conduits, telephone, gas and the like.

- Emergency telephone numbers of a plumber and electrician shall be prominently displayed in the site office.
- Obtain from the local authority or services authorities the location of all services.
- Mark these clearly on a site plan.
- Mark their location on the ground using pegs and lime. Marker pegs shall be 45 x 15 x 600 mm minimum softwood with a sharpened point.



Marking of Services

Corner or Offset Pegs with Marker Pegs

SERVICE	COLOUR
Electricity	
Water	
Drainage	
Telephone	
Gas	
Survey	



Dimensions, Square, Setting Out

Depending on the equipment available, setting out may be by one of the following methods:

- Electronic distance measuring equipment or electronic digital theodolite - generally used by surveyors or major builders.
- Manual theodolite - generally used by established builders.
- Tape and geometric calculation - generally used in remote locations where expert surveyors are not operating.



Acknowledgement: Universal
<http://www.universalinstruments.com.au/>

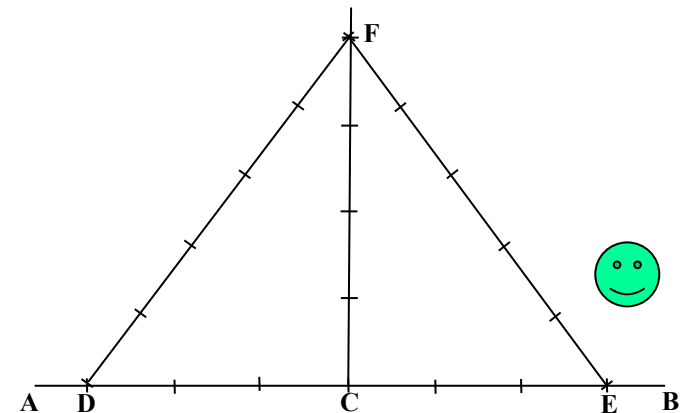
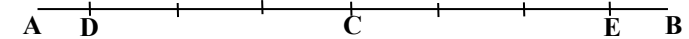
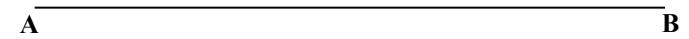


The following geometric calculations are useful:



Setting out a right angle (90°)

1. Establish a base line at least 8 metres long. Place pegs with nails in the top at each end of the base line “A”, and “B”, and draw a string line tight between the two nails.
2. Locate on the base line the point where the line at right angles must intersect. Place a peg with a nail in the top at this point “C”.
3. Using a tape, measure and place pegs with nails in the top at a fixed distance (say 3 metres) in both directions along the base line, “D” and “E”.
4. Using two tapes simultaneously, measure a distance of 5 metres from both points “D” and “E”. Where these points coincide, place a peg with a nail in the top “F”.
5. The line “F-C” is perpendicular to line “A-B”. That is, angles “ACF” and “BCF” are both right angles (90°).
6. To check the accuracy of this set out, measure the distance “F-C”. It should be 4.0 metres.





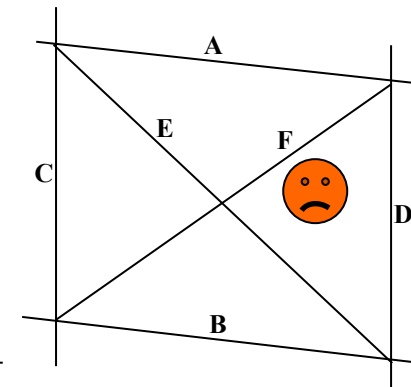
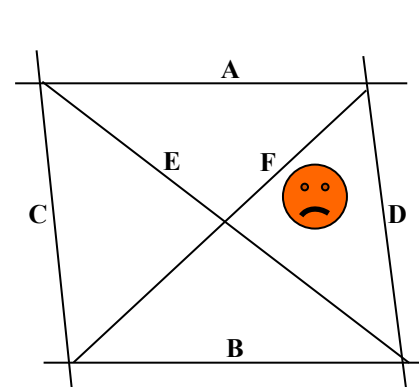
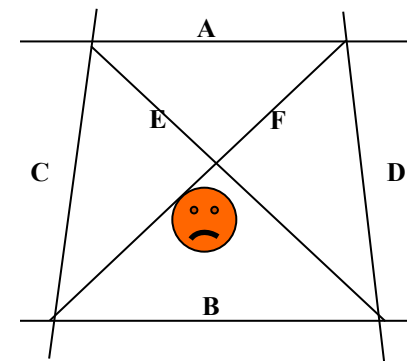
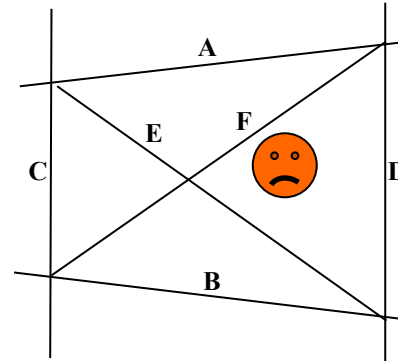
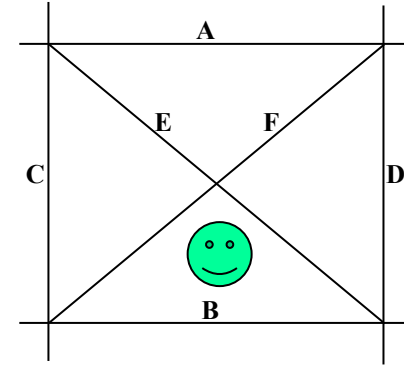
Checking for “square”

To check whether the grid lines are “perpendicular” to each other or are “skewed”, measure the diagonals across the rectangle formed by the grid lines and measure each pair of opposite sides of the shape.

- If the diagonals are equal and both sets of opposite sides are equal, the grid lines correctly form rectangles; that is the lines are perpendicular to each other, at right angles (90°) and the shape is a rectangle.

$$A = B, C = D, E = F$$

- If the diagonals are equal but the opposite sides are not equal, the grid lines are skewed and must be corrected.
 - Even though $A = B$ and $E = F$, the shape will not be a rectangle if $C \neq D$.
 - Even though $C = D$ and $E = F$, the shape will not be a rectangle if $A \neq B$.
- If the diagonals are not equal although the opposite sides are equal, the grid lines are skewed and must be corrected.
 - Even though $A = B$ and $C = D$, the shape will not be a rectangle if $E \neq F$.

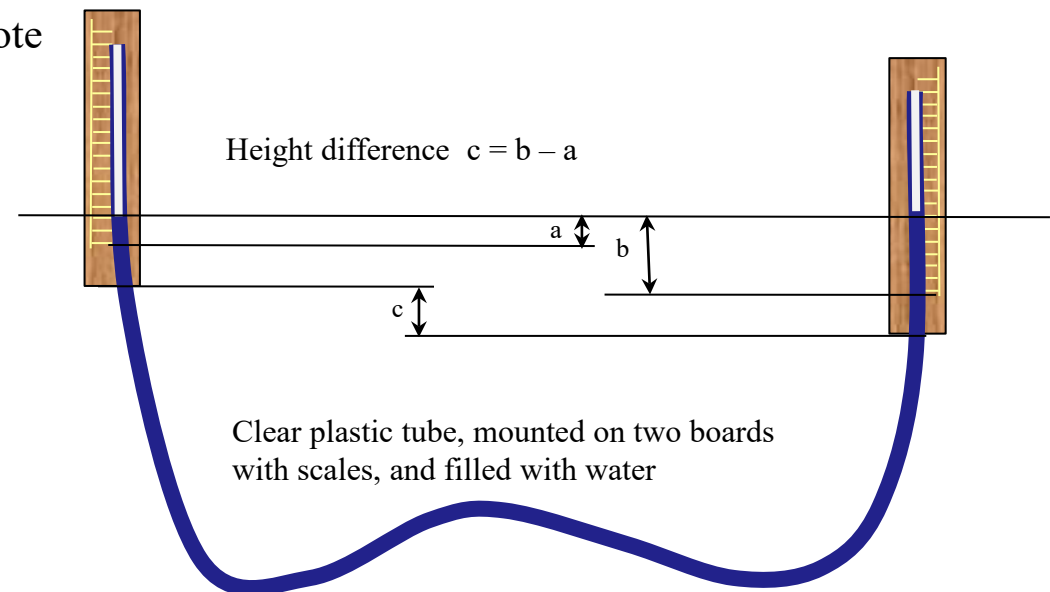




Levels

Depending on the equipment available, the establishment of levels may be by one of the following methods:

- Laser levels – generally used by surveyors or major builders
- Automatic levels – generally used by surveyors or major builders
- Manual tilting levels – less common on modern building sites
- Water level gauge – generally used in remote locations where surveyor's levels are not available



Disclaimer & Copyright

Disclaimer

This training package covers broad engineering principles and building practices, with particular emphasis on affordable housing and associated village infrastructure in the Asia-Pacific region. These broad principles and practices must be translated into specific requirements for particular projects by professional architects, engineers or builders with the requisite qualifications and experience.

Associated sample specifications and drawings are available in electronic format, with the express intention that architects, engineers and builders will edit them to suit the particular requirements of specific projects. The design, construction and costing of structures must be carried out by qualified and experienced architects, engineers and builders, who must make themselves aware of any changes to the applicable standards, building regulations and other relevant regulations. The authors, publishers and distributors of these documents, specifications and associated drawings do not accept any responsibility for incorrect, inappropriate or incomplete use of this information.

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