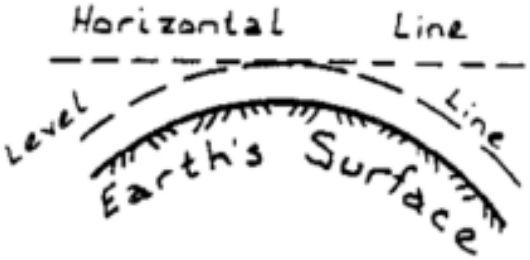
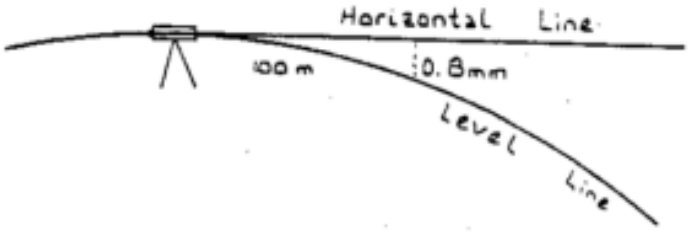
NOTES AND WORK BOOK – SURVEYING

LEVELLING:

- *Levelling:* The determination of relative heights of points on the earth's surface.
- *Level Surface:* One which is everywhere normal to the direction of gravity as indicated by a suspended plumbob. E.G. Surface of a quiet lake. As the Earth is curved, it follows that a level surface must also be a curved surface.
- *Horizontal Line:* A line tangential to the level surface at one point. When a telescope is set up horizontally (using a spirit bubble) at a point, the line of sight at any direction will be a horizontal line. For short lengths of sight, the horizontal line and the level line will coincide.





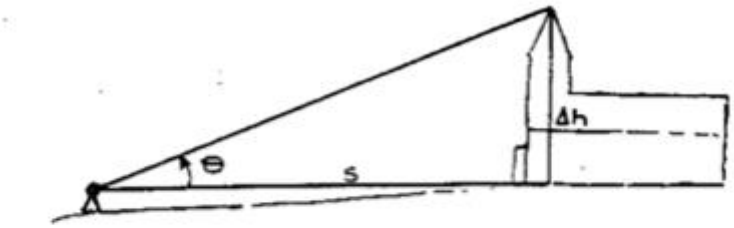
- *Datum:* A level surface to which all heights are referred. It is given a value of zero in most cases. The most common datum is mean sea level, where Mean High Water Mark can be found by tide gauge readings.
- *Reduced Level (RL):* The RL of a point is its height below/above the adopted Datum. It implies an absolute height (instead of relative).
- *Bench Mark (BM):* A permanent mark for which an RL has been determined by survey means and which is recorded with some recognised Authority. They are represented on plans and on the ground by a triangle. The value of the RL of the BM can be obtained from the Authority who placed it (council, Sydney Water, RTA).

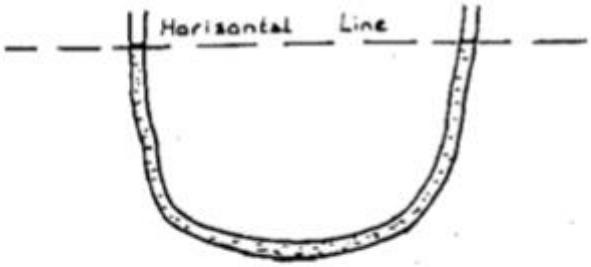
DATUMS:

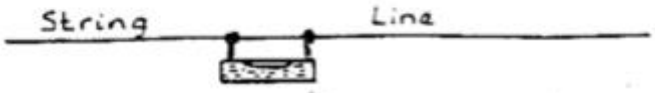
- Standard Datum.
  - Following 1897, each state adopted its own "Standard Datum".
  - However, issues lied at State boundaries. Lines of levels radiating from each capital city along roads or railways met and the levels from each end did not agree.
  - A uniform datum was decided (Australian Height Datum).
- Australian Height Datum.
  - A study was conducted around the Mean Sea Level around the whole of the Australian coastline.
- For the Sydney Metropolitan Area.
  - AHD Height (RL) = Standard Datum Height (RL) – 0.046m

LEVELLING METHODS:

- *Baromatric Levelling:* A barometer is used to measure differences in atmospheric pressure, which can then be concerted into changes in elevation. Aeroplane's altimeters use this principle.
- *Trigonometrical Levelling:* If a vertical angle and horizontal distance is read to a point, the height can be found by solving the right-angle triangle.
- *Water Levelling:* On building sites a plastic tube filled with water can be used to establish a horizontal line in places where normal techniques would be very difficult. E.G. Carpenters working from one side of a large door to another and slip form construction on large buildings.
- *Line Levelling:* When tradesman using a string line wish to ensure it is horizontal, a spirit bubble can be hung from the string line.
- *Spirit (Differential) Levelling:* Where large distances have to be covered, it is far too restricted towork with a string line/water level, so a telescope is attached to a spirit bubble and the horizontal line is defined optically. If a large ruler (staff) is now held over the points in question, the difference in height between those points can be found.







- Difference in height:
  - Difference in Height = First Staff Reading – Second Staff Reading