

Content

Topic 1: Making basic	1
Topic 2: Imagery	5
Topic 3: Measurement	8
Topic 4: Modern Map	12
Topic 5: Management Maps	16

Mapping Revision 3.

3. Measurement

Barometric Heighting • **Air pressure** decreases with an increase of altitude—approximately 100 millibars per 800 metres or one inch of mercury per 1000 feet near sea level. • It also changes with temperature, humidity and weather, so it is unreliable • 1 atm = 1013.25mbar, 760mmHg, 14.696psi, 101.325 kPa

Heights by GPS • Conventional hand-held GPS are terrible at determining heights – This will be covered in later lectures • Using (more expensive) geodetic GPS receivers and differential processing, good heights can be obtained from GPS • Unless you are doing differential positioning, NEVER rely on heights from a GPS unit

What is **levelling**? • A measurement process whereby the **difference in height between two or more points** can be determined using a surveyor's level

When do we level? • Typical examples include : – To establish new vertical control (BM or TBM) – To determine the heights of discrete points – To provide spot heights or contours on a plan – To provide data for road cross-sections or volumes of earthworks – To provide a level or inclined plane in the setting out of construction works

- **Level surface** – A surface over which water will not flow – The direction of gravity is always normal to a level surface •

- **Horizontal surface** – A horizontal surface will be tangent to a level surface – Over short distances (

- **Datum** – A reference surface to which the heights of all points in a survey or on a site are referred – May be arbitrary or a national height datum – In Australia we have the Australian Height Datum (AHD) – The surface which defines the AHD is (approximately) Mean Sea Level (MSL) – And for the purposes of most tasks this is assumed to be a plane

- **Reduced Level (RL)** – The height of a point above the datum • **Benchmark (BM)** – A stable reference point of known RL – Usually used as the starting and finishing point when levelling • **Temporary Bench Mark (TBM)** – A point placed (e.g. peg, nail, spike) to provide a temporary reference point

- **Backsight (BS)** – Always the first reading from a new instrument station • **Foresight (FS)** – Always the last reading from the current instrument station • **Intermediate sight (IS)** – Any sighting that is not a backsight or foresight

- **Change point (CP)** – Location of the staff when the level is moved – Change points should be... • Stable • Well defined • Recoverable • e.g. sharp rock, nail, change plate, etc...

Equipment • Level • Tripod • Staff • Change plate • Staff bubble • 50 m tape measure (sometimes)

Types of Level • There are **3 basic types of surveyor's levels** – The dumpy – The tilting – The automatic • Many old instruments are dumpy, most modern ones are automatic • Ours are auto-levels, even if they are sometimes called dumpy...

Collimation error • Occurs when the line of sight (as defined by the cross-hairs) is not horizontal • Leads to an incorrect staff reading • Can be determined by the 2 peg test • Can be eliminated by keeping the distance from the level to the backsight equal to the distance from the level to the foresight – The error is the same in both cases, so it cancels • So, keep them equal within each set up