

Chapter-8

Topographic Surveying and Mapping

Topographic Survey:

- Determine position of natural and man made features
- Features drawn to scale on plan or map
- Determine ground elevations (contours, cross-sections and profiles)
- Vast majority done by aerial survey
- EDM and total station (x-y zonal location) and vertical location (elevation) by one sighting
- Rectangular and polar surveying techniques
- Rectangular technique:
 - Right angle offsets for location detail
 - Cross section for elevation and profiles
- Polar technique use stadia or electronic techniques

Scales and Precision:

Scale: Ratio between plan distance and ground distance

Consistent through the plan

Equivalences e.g. 1" = 50'

Fractions e.g. 1 : 500

Table 8.1

Small scale and intermediate scale done by aerial survey

- Reason for survey determine appropriate precise technique
 - **If points to be plotted on at scale 1:500 → precision 0.25 m**
 - **If points to be plotted on at scale 1:20,000 → precision 10 m**
 - Some details can be precisely determined → e.g. bldg corner
 - Some details cannot precisely determined → e.g. stream banks
 - Some details can be determined with moderate precision → e.g. single large tree

Details that can be well defined is located with more precision then is required just for plotting because:

- It take little effort
- Uniform practice
- Some details are shown as layout dimensions

- If area contain only natural feature, stadia is used
- All topographic surveys are tied into both horizontal and vertical control (Benchmark)
- Horizontal control could be:
 - - Closed transverse
 - Transverse from coordinate grid monuments
 - Close to another coordinate grid monuments
 - Route centerline
 - Assumed baseline

- Measurement taken to establish control are more precise than other measurements
- Control should be accurate and well references
- Control should be used for additional work (e.g. layout)

7.3 Location by Right Angle Offset

- Used in all topographic survey except mapping
- Provide location of details and area elevation taken by X-section
- Measure distance to base line and station on baseline
- Baseline laid by stakes (nails) each 100' or 20/30 in,
- Sketch in note book
- Tape can be laid on baseline if terrain is smooth
- Details on both sides of baseline or make split baselines
- Penta prism or (swing-arm technique (Appx.)
- SAT good result for short of test 15 m otherwise use penta prism or transit

Cross Section and Profile

- Cross section to the baseline
- Profile along the baseline
- Elevation plotted as spot elevation, contours or end area for construction quantity estimation
- Intervals 20/30 in. – in changing terrain 10-15 m + any sudden change in terrain (top, bottom of slopes)