

Surveying

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Lectures
Spring
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Lecture 6/

Contours

A contour or contour line is defined as a line of intersection of level surface with the surface of the ground. Thus, every point on a contour line has the same elevation. Therefore, contour line may also be defined as a line joining the points of equal elevation. The shore line of a reservoir with still water represents a contour line of fixed reduced level.



As the water level changes, the new shore line represents another contour of a different R.L. The contour lines of an area are presented in a map known as a contour map or topographic map. In addition to contour lines, a topographic map includes the features like streams, rivers, reservoirs, valleys, hills, bridges, culverts, roads, fences etc.

Contour interval. The constant vertical distance between two consecutive contour lines is called the contour interval. The contour interval is kept constant; otherwise the map will be misleading. The horizontal distance between any two consecutive contour lines is known as the “horizontal equivalent”. The horizontal equivalent, for a given contour interval depends on the nature of the ground. The contour interval depends upon the following factors:

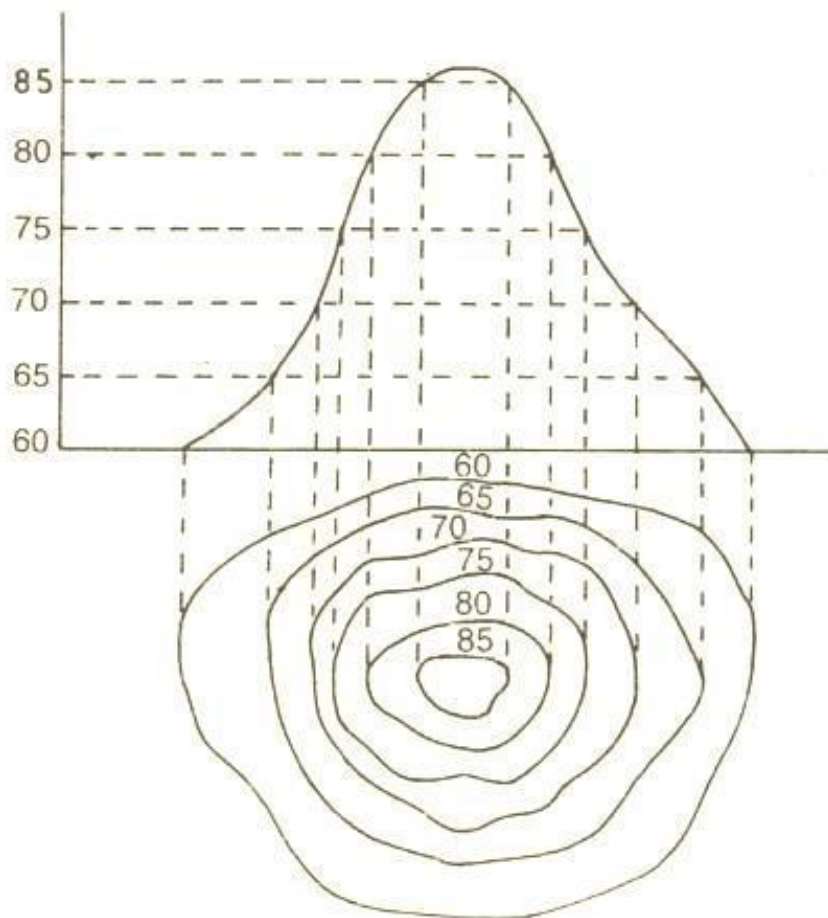
- (i) Time and fund available for field and office work.
- (ii) Purpose and extent of survey.
- (iii) Nature of the ground, and (iv) scale of the map.

The following contour intervals are generally used:

- (i) For flat agricultural land, calculation of earthwork, land leveling etc. 0.15 to 0.50 m,
- (ii) For construction of reservoirs and town planning 0.5 to 2m,
- (iii) For location surveys 2 to 3 m.
- (iv) For small scale topographic map of hilly area 3m to 25m.

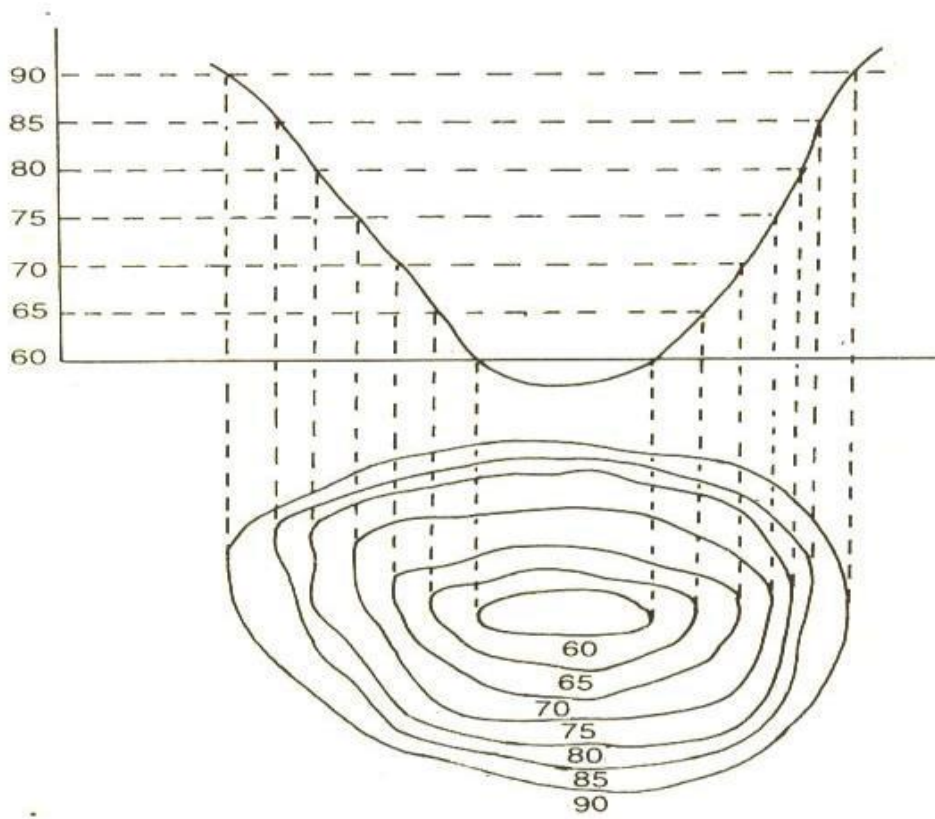
Characteristics of contour lines:

- (i) All points of contour line have the same elevation.
- (ii) Uniformly spaced contour lines indicate uniform slope whereas, straight, parallel and equally spaced lines indicate a plane surface.
- (iii) Widely spaced contour lines indicate a flat ground and closely spaced contour lines indicate steep ground.
- (iv) A series of closed contours with the higher values inside indicate a summit or hill.



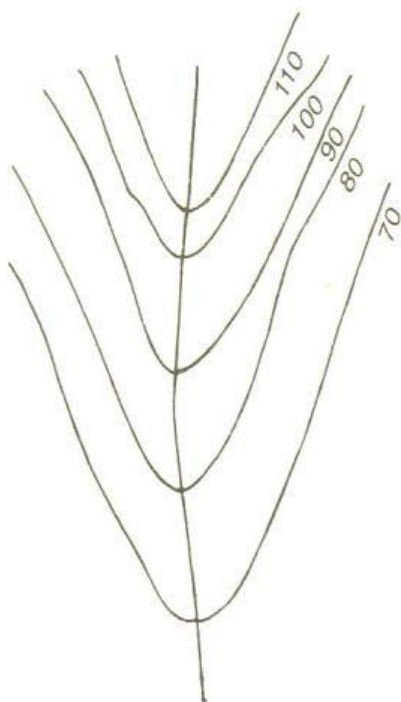
Hill

(v) A series of closed contours with the higher values outside indicate a depression.

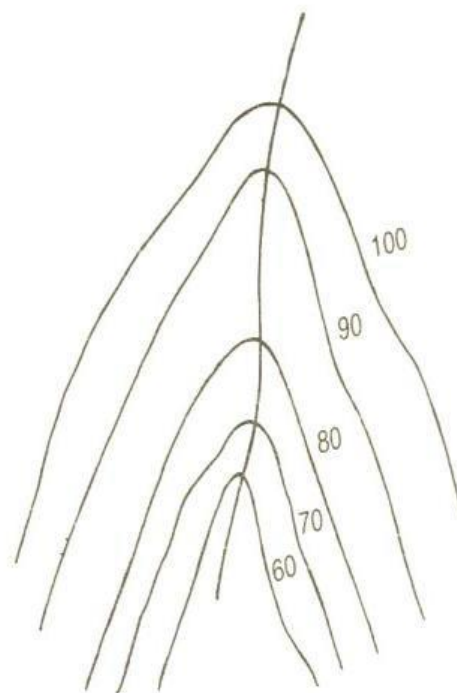


Depression

(vi) Contour lines cross a ridge or a valley line at right angles.



Ridge



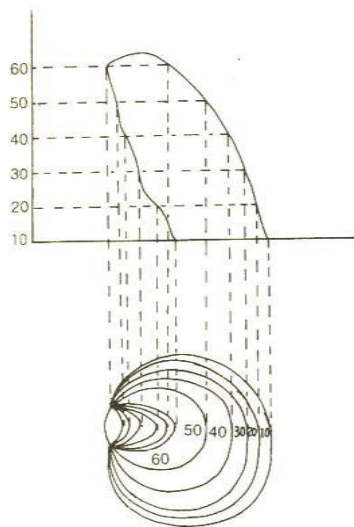
Valley

(vii) If the contour lines form U-shaped curves and higher values of contour are inside the loop, then it indicates a ridge line.

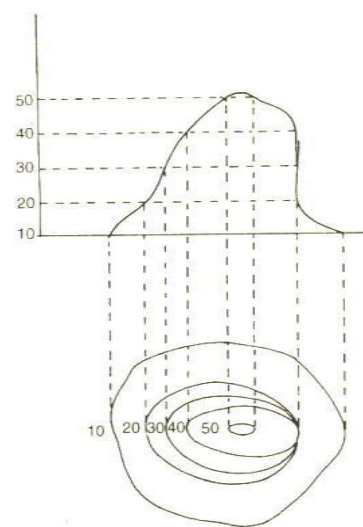
(vii) If the contour lines form V-shaped curves and the lower values of contour are inside the loop, it indicates a valley line.

(viii) Contour lines cannot cross one another or merge on the map except in case of an overhanging cliff.

(ix) If several contour lines coincide i.e. the horizontal equivalent is zero then it indicates a vertical cliff.

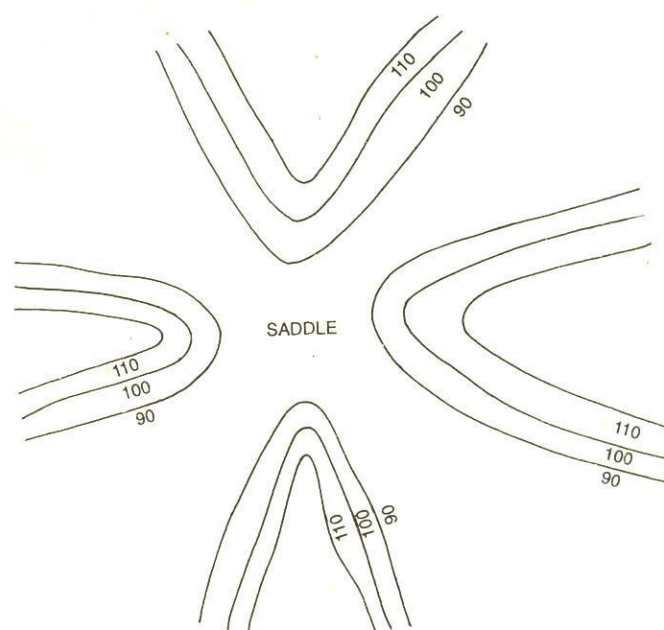


Cliff.



Vertical Cliff.

(x) Four sets of contours shown in the following fig. represent a saddle i.e. a depression between summits. It is a dip in a ridge or the junction of two ridges. Line passing through the saddles and summits give watershed line.



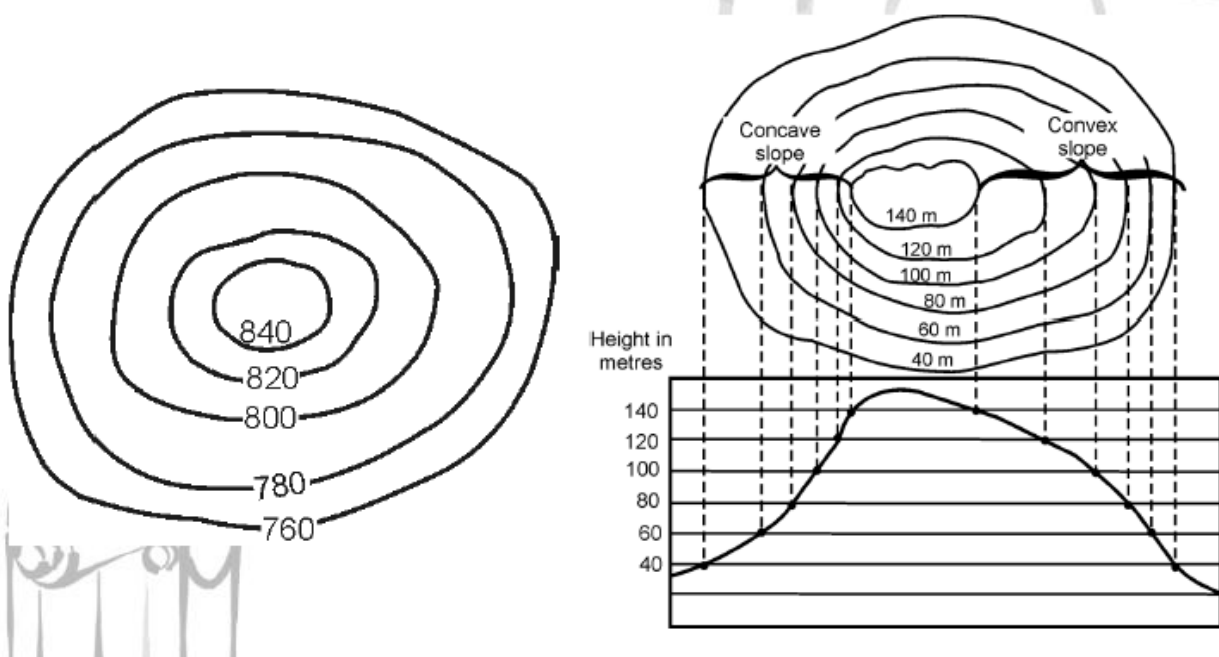
Use of contours

- (i) By inspection of a contour map, information regarding the characters of the terrain is obtained, whether it is flat, undulating or rolling etc.
- (ii) Contour map is very useful for taking up land leveling works.
- (iii) With the help of contour map, suitable site for reservoirs, canal, drainage channels, roads, railway etc. can be selected.
- (iv) Total drainage area and capacity of reservoirs can be determined with the help of contour map.
- (v) Computation of earth work is possible from contour map.

Characteristics of contours;

1. In surveying, a contour is an imaginary line which connects points with same elevation or height.
2. In more general sense, a contour line is a curve connecting points where the functional value is the same.
3. The vertical distance between the succeeding level surfaces forming the contours is called the *contour interval*.
4. The contour intervals election depends on the diversity of relief in the area being mapped as well as the purpose and scale of the map.
5. Contours cannot cross, split or join other contours.
6. The distance between contours indicates the steepness of a slope.
7. A contour must be a single continuous line and should not branch into two contours of the same elevation.

Representation



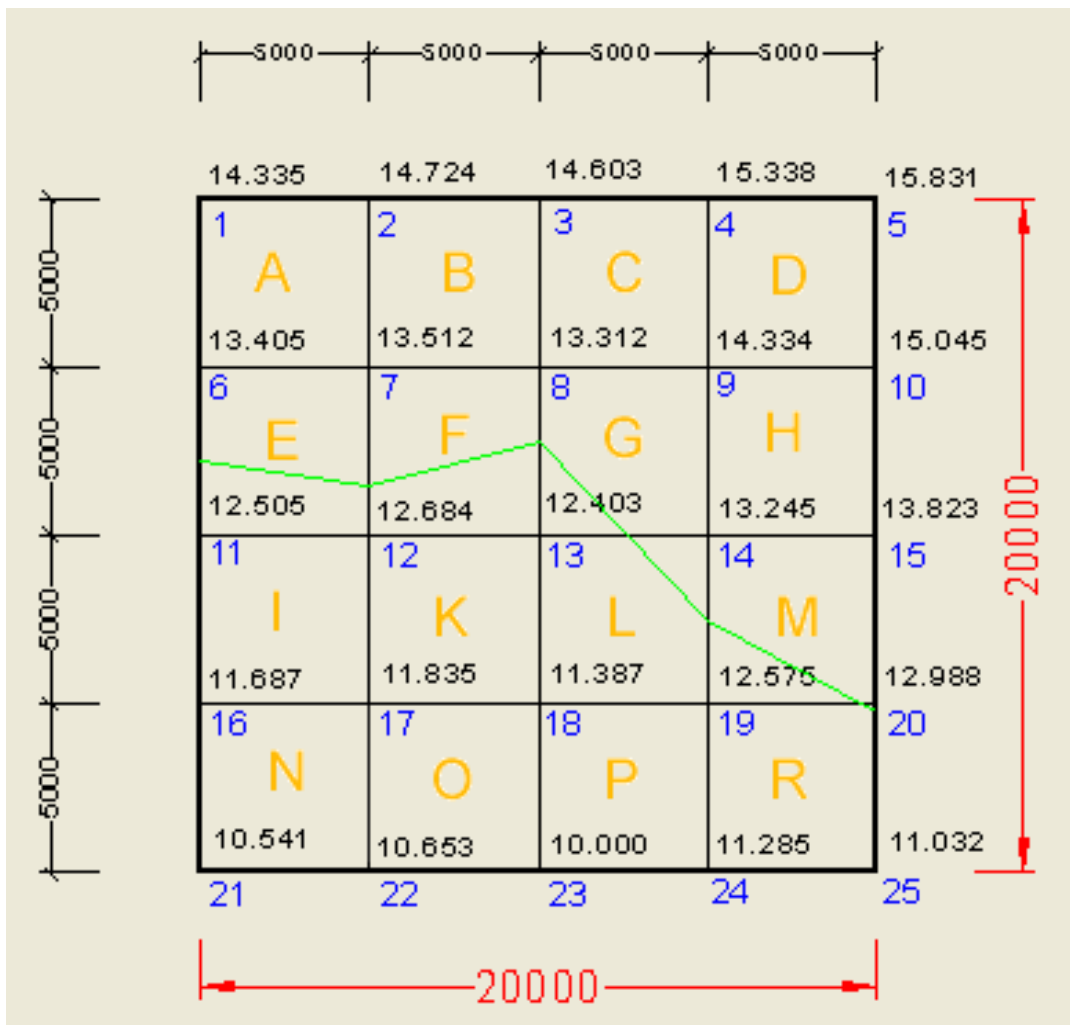
How to locate contour lines on a plan

- There are several methods used to locate contours.
- You practice only one of them as field work.
- It is called as locating contours by cross-sections.

Procedure

1. Mark approximately equally spaced contour points on the ground.
2. Make horizontal measurements to fix contour points on the plan.
3. Make measurements to determine the elevation of contour points.
4. Plot the points and write down their elevations on the plan.
5. Construct contours by interpolation.

Example 1:



Example 2:

