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Contouring is, generally a leveling operation. The principal objective of contouring is to determine the points of the same reduced level (RL) on the ground. The types of equipment needed are the same for both leveling and contouring. The contour lines join the point of the same elevation directly or by the interpolation method. It shows the topographical features of the ground by comparing different contour lines of different elevations for a given closed area. Based on that topographical characteristic of the ground calculations for engineering projects are carried out. Fig. Contour LinesThe main elements of Contouring are : Contour LineContour IntervalHorizontal EquivalentContour LineContour Line is defined as the line of intersection of the level surface with the ground surface. It as an imaginary line passing through points of equal or constant reduced levels (RL) on the ground surface.For example, the contour of 98 m indicates that all the points on this line have a reduced level of 98 m. Similarly, for the contour of 99 m, all the points will have a reduced level of 99 m, and so on. Contour IntervalContour Interval is the vertical distance between any two consecutive contours as shown in the figure above. Suppose a map having contour lines of 100 m, 97 m, 94 m, and so on. The contour interval for the contour lines will be 3 m here. The interval in the contour line generally depends upon (i) The nature of the ground surface, (ii) The scale of the map prepared, and (iii) the purpose of the survey.Horizontal EquivalentThe horizontal equivalent is the horizontal distance between any two continuous contour lines. It is not constant and varies according to the steepness of the ground. For steep slopes, the horizontal equivalent is narrow while for flatter slopes it is wide.I hope you got complete information about Contouring [Contour Line, Contour Interval and Horizontal Equivalent] in this article.If found this article helpful feel free to share it with your friends.If you have any queries regarding the subject or you want to add something from your side please write it in the comment section provided below. A line joining points of equal elevations is called a contour line.It helps to visualize the relief of ground in two dimensional plane or map.The method of plotting contours in a plan or map is called contouring. A contour line marked by a heavier line weight to distinguish it from intermediate contour lines is called index contour line. An index contour line shows the elevation of nearby contour line. Figure: Elevation of nearby contour line. The difference in elevation between successive contour lines on a given map is fixed. This vertical distance between any two contour lines in a map is called the Contour Interval (CI) of the map. The choice of a suitable contour interval in a map depends upon four principle considerations. The contour interval depends upon the nature of the ground. For flat ground, a small contour interval is chosen, whereas for undulating ground, higher contour interval is chosen. The contour interval normally varies inversely to the scale of the map i.e. if the scale of map is large, the contour interval is considered to be small and vice versa. Accuracy needed in survey work also decides the contours interval. Surveying for detailed design work or for earthwork calculations need high accuracy so small contour interval is used. But in case of location surveys where the desired accuracy is less, higher contour interval should be used. If the contour interval is small greater time and cost is required in survey and map plotting. So, if the available time and cost is limited larger contour interval is used. Horizontal Equivalent: The horizontal distance between two points on two consecutive contour lines for a given slope is called the horizontal equivalent. a. Two contour lines donot cross each other except in the case of overhanging cliff. b. Contour overlap or unit in a single line in case of vertical cliff. c. If the contour lines are parallel and distance apart then it shows that the ground is gentle slope. d. If the contour line are spaced closer and non-uniform then it shows steep and undulated ground. e. A contour line must close upon itself through not necessarily within the limits of the map. f. A single contour line cannot split into two contour line. g. A closed contour line with one or more higher one inside represents a hill; similarly contour line with lower value inside indicates a depression or pond. h. Contour cross a water shead or ridge line at right angles. They form curves of U-shape around it with concave side of the curve towards the higher ground. Contour cross a valley line at right angles. They form sharp curves of V-shape across it with convex side of the curve towards the higher ground. i. Contours donot cross a river or stream. j. Contour donot have sharp turnings. The method of establishing/plotting contours is a plan or map is known as contouring. In general the field methods of contouring may be divided into two classes: a. Direct method and b. Indirect method. a. Direct method: Indirect method, the contour to be plotted is actually traced on the ground. Only the required points are surveyed then plotted. In this method work has mainly two folds. If 100m RL is to be plotted then first staff is placed on BM and then HI is to be found out, then staff point is searched on ground for the required RL of 100m as : RL= HI Staff reading (Staff reading = HI RL) When the staff(ground) point is located by required staff reading it is pegged and number of such types of points are joined to form the contour line. When the required points on the ground are located then such points should be suitably controlled by the control points or lines. In small area chain survey may be used but in large area traverse may be required. b. Indirect method: This method is suitable if the are is small and ground is not very much undulating. The area to be surveyed is divided into its number of squares. The size of squares may vary from 5-20m depending upon the contour and contour interval. The RL of each square corner are determined then required contour line is interpolated. In this method, cross-sections are run transverse to the center line of a road, railway or canal etc. This method is most suitable for railway route survey. Spacing of the cross section depends upon the terrain of the land. This method is suitable for hilly terrain. In this method contour point is located by stadia hair reading and the RL of the points are found. Instruments is places at fixed positions and reading is taken in a radial line at different angles and then RL of different points are found out. It is the process of spacing the contours between the plotted points. This method is based on the assumption that the slope of ground between two points is uniform. This method is extremely rough and is used for small scale work only. The position contour points between the guide points are located by estimation. By arithmetic calculation: This method is accurate but time consuming. Contour between the guide points are located by arithmetic calculation. In graphical method a piece of tracing paper in which several lines are drawn parallel to each other is used to located to contours. Nature of ground can be understood by studying contour map. So, planning can be performed without visiting site.A suitable site for economical alignment can be selected for any engineering project.Capacity of a reservoir or the area of a catchment can be approximately computed.The inter visibility between two points can be determined.A suitable route for a given gradient can be marked on the map.A section of the ground surface can be drawn in any direction.Quality of earthwork can be computed.Measurement and calculation of drainage area can be done.Distinguish Vertical Interval and Horizontal Equivalent.The difference in height between two adjacent contour lines is known as the Vertical Interval (V.I.). Whereas the distance between any two adjacent contour lines is called the Horizontal Equivalent (H.E.). The Horizontal Equivalent is calculated with the help of the scale of the map. The value of the H.E. is less when the slope is steep and more when the slope is gentle.shaalaa.comOn the Basis of Topographical Sheet - Interpret Contours on the Sheet (Height, Shape)Is there an error in this question or solution?. An imaginary line, on the ground, joining the points of equal elevation above the assumed datum is known as a contour line. and the process of plotting points of equal elevation or process of locating contours for different geometrical land is known as contouring in surveying.Counter Line is a plan projection of the plane passing through the points of equal height on the surface of the earth.To get full knowledge about Contouring in surveying please read carefully step by step.The vertical distance between any two consecutive contours is known as the contour interval. It is kept constant for a contour map to depict the correct topography of the terrain.The least horizontal distance between two consecutive contours, is called the horizontal equivalent. It is different for different contours and is dependent on the slope of the ground surface. Contours are comparatively less in hills than in plains.Two contours of different elevations dont cross each other except in the case of an overhanging cliff.Contours of different elevations dont unite to form one contour except in the case of a vertical cliff.Contours drawn closer indicate a steep slope and if drawn far apart represent a gentle slope.Contours equally spaced indicate a uniform slope. When contours are parallel, equidistant slope and straight, these represent an inclined plane surface. A contour at any point is perpendicular to the line of the steepest slope at that point.A contour line must close itself but not be necessary within the limit of the map itself.A set of ring contours with higher values inside represent a hill whereas a set of ring contours with lower values inside; represent a pond or a depression without an outlet.When contours cross a ridge or valley, they form the curve of V-shape around them. If the concavity of higher value contours lies towards the next lower value contours, they represent a ridgeline whereas if the concavity of lower value contours lies towards the higher-value contours, they represent a valley line.The same contour must appear on both sides of a ridge or a valley.Contours dont have sharp turnings.1. Direct method2. Indirect methodIn this method of contouring in surveying, the contour to be plotted is actually traced on the ground. Only those points are surveyed which happen to be plotted.After surveyed those points, they are plotted and contours are drawn through them. This method is slow and is used for small areas and where great accuracy is required.Vertical control:- the location of the points on the contour.Horizontal control:- plotting of the points by a plane table or compass or theodolite survey.In, this method of contouring in surveying, sufficient numbers of points are given spot levels. The location of such points can be conveniently plotted on a plane table section as these generally form the corners of well-shaped geometrical figures i.e. squares, rectangles, triangles, etc. the contours in-between spot levels are interpolated and drawn.This method is commonly used in small scale surveys of extensive areas.This method is cheaper, quicker and less tedious as compassed with a direct method of contouring.By square methodBy cross-section methodBy tachometric methodWhen the area to be surveyed is small and the ground is not very much undulating without any vegetative covers, this method is used for contouring.In this method, the entire area is divided into a number of squares, the side of which may vary from 5 m to 25 m depending upon the nature of the ground, contour interval and scale of the map. The corners of the squares are marked on the ground and spot levels of these points are given with a level. The squares are plotted on the map and RL of the corners is entered. Then the contours of desired values are interpolated.This method is suitable for preparing a contour map of a road, railway or canal alignment.In this method, cross-sections perpendicular to the center line of the area is set out.The spacing of the cross-section depends upon the contour interval, the scale of the map and the nature of the ground.Generally, the spacing of the cross-section at 20 min a hilly area and 100 in the flat area is adopted.Plot the center line and cross-section on the desired scale and enter their R.L. Then, the contours are interpolated w.r.t these R.L.This method is suitable for contouring the area of long strips with mountainous or undulation where direct chaining is difficult.In this method, a number of radial lines at known angular intervals are drawn on the ground and positions of the points at equal distances are marked. Then the vertical angle and staff readings (stadia hair readings) are observed and RL. and their horizontal distances from the instrument, positions calculated using tachometric formulae.The contours are drawn by interpolating the spot levels.The radial lines and the position of the points on each line are plotted on the desired scale. and their spot levels are entered.Contour maps are used to study the general character of the tract of the contouring without visiting the ground.Counter maps are used to decide the most economical and suitable sites for engineering work such as canals, sewers, reservoirs, roads, railways e.t.c.Contours maps are used to determine the catchment area of the drainage basin and the capacity of the proposed reservoir.Contour maps are used to compute the earthwork for filling and cutting along the linear alignment of projects such as a canal, roads e.t.c.Counters maps are used to ascertain the indivisibility of the points.Counters map are used to trace a contour gradient for the road alignment.Contours maps are used to draw a longitudinal section and x-section to ascertain the nature of the ground.Contours maps are used to calculate the water capacities of the reservoir.Contours maps are used to locate the best position of the guns, the line of march and camping grounds by the army commanders during wars.I hope you understood all about contouring in surveying.Like it ? Please Share it!!!Read Also,Advantages And Disadvantages Of Road Transport (Highway)Types of canals | Classification of canals | Alignment of canalsSeasoning of timber various method Natural and ArtificialDistinguish Vertical Interval and Horizontal Equivalent.The difference in height between two adjacent contour lines is known as the Vertical Interval (V.I.). Whereas the distance between any two adjacent contour lines is called the Horizontal Equivalent (H.E.). The Horizontal Equivalent is calculated with the help of the scale of the map. The value of the H.E. is less when the slope is steep and more when the slope is gentle.shaalaa.comOn the Basis of Topographical Sheet - Interpret Contours on the Sheet (Height, Shape)Is there an error in this question or solution?Copyright KnowledgeBoat 2025In addition to the relative positions in a plan, if a map shows the spatial configuration or relief of the topographic features, then it adds real value.There are various ways to represent relief through relief models, shading, form lines and contour lines. Among which, contour lines indicate elevations directly and quantitatively.Contouring in Surveying - Contour Lines & Contour IntervalsWe will discuss what is contouring and the important features of contouring used in civil engineering surveying.What is Contouring?A contour line is a continuous line or curve that is obtained by drawing the points at the same elevation on the ground above a chosen datum. It can also be defined as the intersection of level surface with the surface of the earth.In a map or plan, contours are represented as contour lines. The preparation of a contour plan for survey work and other office works are called as contouring.Contour represent the topographic configuration with better facility, accuracy and definiteness compared to other symbols.Contour Interval in Contour MapsThe vertical distance between two consecutive contours is termed as contour interval. It is desired to have three constant contour intervals throughout the map.But for certain areas, which extreme steep topography, variable contour intervals can be adopted. But, it is adopted for simple cases as it would give a false impression of steepness.So contour intervals are dependent on:Scale of the MapPurpose of the MapNature of the CountryTimeFunds1. Scale of the MapContour interval is inversely proportional to the scale of the map. The contour interval for different terrain for different scale are mentioned in the table below.In general, contour interval = (25/ number of cm per km) mFor highways and railways, the contour interval is kept up to 2mFor earthworks, building sites, dams etc.the interval is kept as small as 0.5mFor city surveys, a contour interval of 0.5 m may be adoptedFor geological surveys, 6 to 15 m can be adoptedFor town planning surveys, 0.5 to 2m interval can be chosen, for scale 1cm = 15 to 100mFor Location Surveys, interval of 2-3m for scale 1 cm = 50 to 200 m can be adoptedContour intervals varies based on topography. It is large for steep grounds and small for flat grounds.When the project time is less, the contour intervals are kept large to finish the work fast.When funds are short and limited, the contour intervals are kept large.Horizontal equivalent is defined as the horizontal distance between the consecutive contours.Horizontal equivalent is not a constant value.Horizontal equivalent varies from point to point with the steepness of the groundSteeper the ground, lesser is theHorizontal equivalentFigure-3: Horizontal Equivalent for a Regular SectionIn the figure-3 above, the section of a truncated cone is given with different elevation from A to H. Their respective contour lines are also drawn as shown in plan. The horizontal distance between the consecutive contours A and B is called asHorizontal equivalent in the plan.The figure-4 above shows a contour for a irregular section. For the steeper portion BB' in the elevation, you can see smaller horizontal equivalents are taken.Contour gradient is the line on the ground surface that maintains a constant inclination to the horizontal. It is determined using clinometer, theodolite or a gradienter.Contour gradient is determined as a field operation in locating roads and railways over a range of hills.Read More On:Characteristics of Contour Lines - How to Read Contour Lines in a Contour Map?Also Read:Declination and Angle of Dip in SurveyingBearings in Surveying - Meridian & Types of BearingsWatch Videos on Surveying in Official Channel Engineering Fanatics Join TheConstructor to ask questions, answer questions, write articles, and connect with other people. When you join you get additional benefits. Have an account? Sign In Email This Post There are three main differences between contour interval and horizontal equivalent as follows:S.NoContour IntervalHorizontal Equivalent1It is based on vertical levelsRepresents horizontal distance2No measurement or scaling is required since the contour levels are indicated on the contour linesThe distance must be measured on the map and converted to actual distance by multiplying with the scale of the map3In a given map the contour interval is a constantThe horizontal equivalent varies with slope. Closer distance indicates steep slope and wider distance gentle slope Advertisements We at engineeringcivil.com are thankful to Mr.Ramasesh Iyer for submitting this useful information to us. If you have a query, you can ask a question here.

Difference between vertical interval and horizontal equivalent class 8.