# Surveying

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Lecture No -02

Module – 02

Basic Concepts of Surveying

okay hello so we are again in the another lecture on basic surveying and this is the lecture number two

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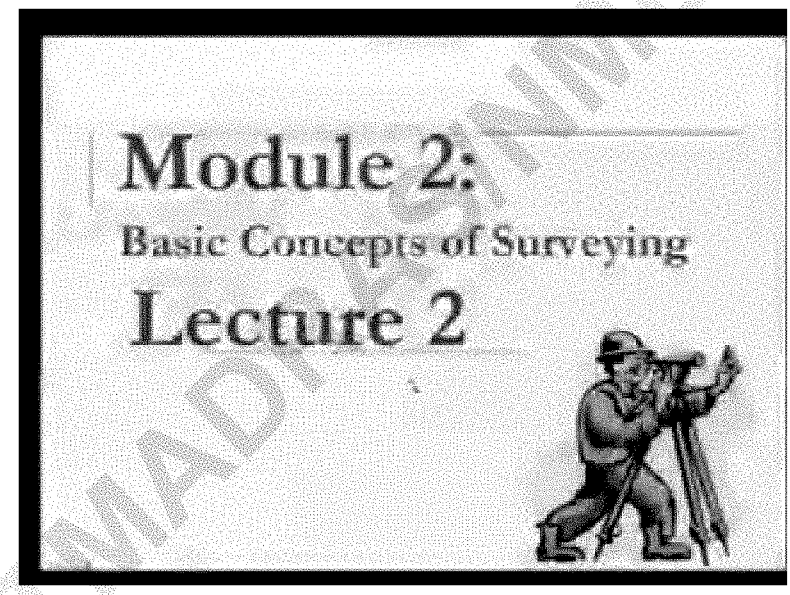


of module two our module two is on basic concepts of surveying

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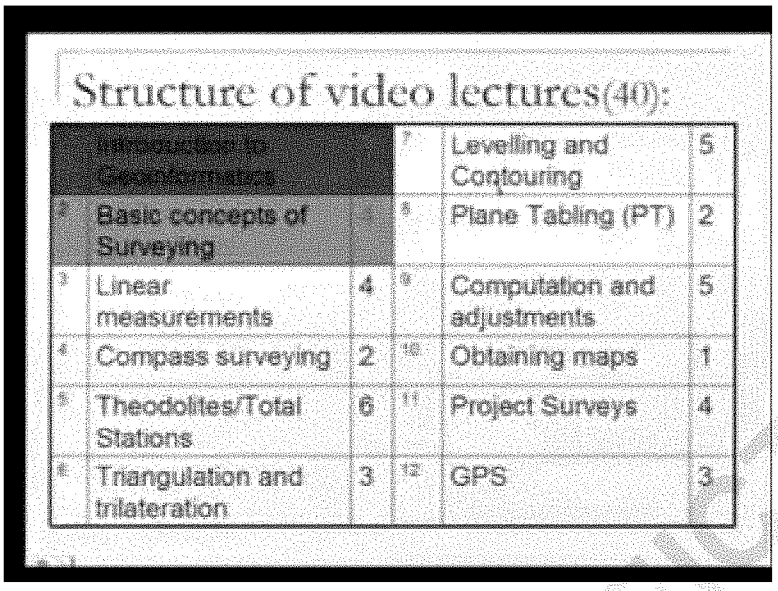


let us go back to the entire structure of the video lecture

we have already done our module one we are at the moment talking about module number two

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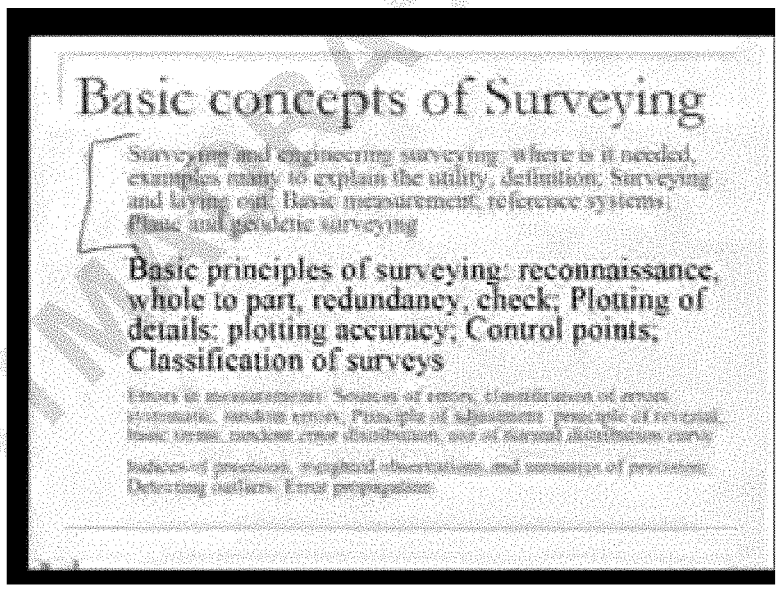


in module number two we have already discussed this particular part in our last lecture

so what we were talking in our last lecture let's just recapitulate that

we defined the surveying and also we said that how surveying is you know of concerned to the engineers may be mining may be civil any and basically our aim is to measure the ((geo)) (00:01:07) information

now we saw many examples we started from the building constructions the town planning example of Euro tunnel example of a build example of a road or route alignment and using all those examples we understood that how surveying is useful for an engineer

we cannot do surveying or other we cannot do any project without surveying because we need to bring the ground into the laboratory this is what we saw yesterday then only we can work on that ground

working is the planning the designing all those effects once the design is complete then what we do we take that design to the ground so again measurements are involved

so we need to do that thing so we saw it yesterday the where the surveying is required

then there are two types of surveying one is the surveying and the other one is the laying out surveying is bringing the ground into the laboratory doing the measurements there in the ground making the map doing some other kinds of measurements of geo information and then bringing it in the laboratory

then once it is in the laboratory we have worked upon it our design and planning other things

we take it out so that part was called laying out then what we discussed we discussed that surveying is basically about the measurements and we cannot measure without any reference

i gave you also an example of a child one year child and his father was telling me that his child is of this height then he told me oh he forgot he forgot to put the other hand the reference because child one year can't be of this height so the reference is required well he is this height he is this tall

so the reference is very important in any measurement and we saw that how reference is important for measuring the geo information we need reference for measuring the geo information

now what is the reference reference is a mathematically definable system

the geo information is on the surface of the earth can we use the geo information as such or rather can we use the earth surface as a reference it is not possible because earth surface is not definable we do not know the characteristic of the earth surface

we can't put any equation for that so we cannot use the earth surface as such

so what was the other thing the other thing was we thought of a surface which is physically adjusting that is equipotential surface or a surface which is always perpendicular to the direction of gravity this surface is also called the level surface or geoid

and the physical surface which is the geoid is the mean sea level or the surface of the water body because all over the water body there will be equipotential everywhere the potential will be same

so the surface of the water body ((makes)) (00:04:16) a surface which we say geoid

now we can make use of this geoid again as a reference but we had a problem the problem was the geoid is also not definable mathematically because geoid is basically controlled by the distribution of mass within the surface of within the earth because the mass distribution within earth controls the way the gravity ((factor)) (00:04:41) in all over the earth or the gravity forces because the mass distribution within the earth is not constant it's not uniform

so our geoid surface is again mathematically not definable

nevertheless one important thing that we saw yesterday that was about the height or the elevation in surveying or in any engineering we mean by height we say a point is higher than the other point provided the water will flow from this point to this point

so when we are talking of the geoid or the level surface a point which is on higher level surface and a point which is on lower level surface the water from the higher level surface will always flow to the lower level surface

so we can make use of geoid for measuring the height so what we did ah last time

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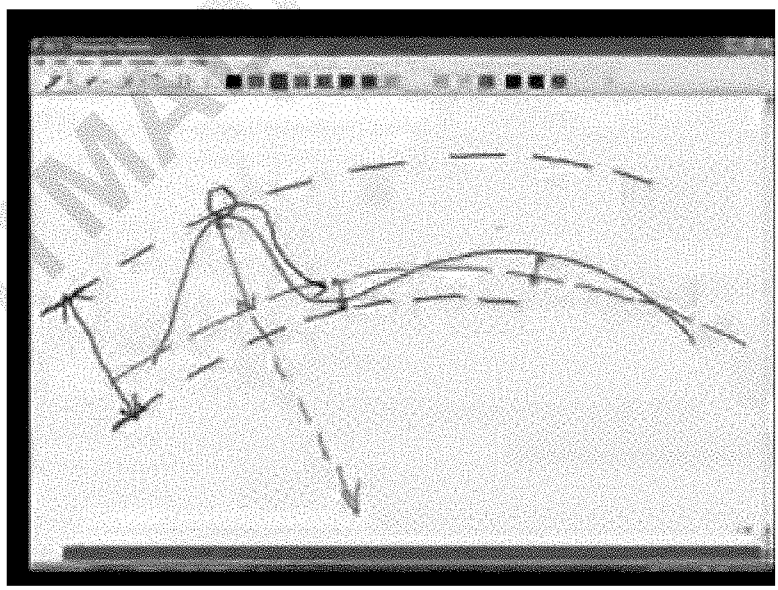

so i am going to draw the surface of the earth here and the geoid in this let us say like this

here in this part it is the surface of the sea may be so what we can do now

we can refer the height of point from the geoid so that's the direction of gravity

similarly here for this point we can refer the height of this point from the geoid also same thing here ((like that)) (00:06:15)

now what we what we are talking we are talking that there is another level surface here equipotential surface there is one more equipotential surface passing through this and i will see that if we put a water droplet here it will flow in this direction because this level surface is higher than this level surface

so what we say we say this point is higher than this point by this amount

so the two points are separated or the difference in elevation between two points is the separation of level surfaces which are passing through those two points

so in any engineering survey we use the geoid for measuring the elevation

well when we are talking about the geoid how about the X and Y

yes we can use a geoid for measuring the elevation but what about the X and Y the positions

so what we did for that we considered that for our earth

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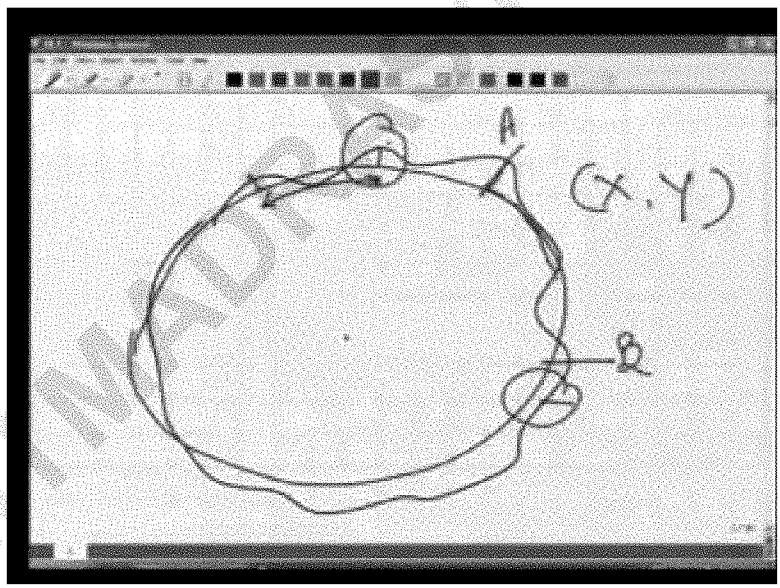


if we can fit an Ellipsoid this is the an Ellipsoid which is fitting best to the surface of the earth now this is an Ellipsoid for which we knew the mathematical equation and what we can do we can project our points on the Ellipsoid

so now the distance between these two points is actually the distance (( )) (00:07:56) in the Ellipsoid

we know the equation of the Ellipsoid so we know the characteristics of the Ellipsoid

so we can use the Ellipsoid for measuring X and Y

now another thing why we need a reference as you know that the Mount Everest is the highest mountain in the world how come why not the Alps because both of these have been measured using the same reference if both of these are measured using different references we cannot compare these two

so the Mount Everest is somewhere in one part of the world while the Alps are in other part of the world so in order to in order to compare these two we need one single reference which is passing through both of them and then only we can compare the elevations of these two or the heights of these two so for this purpose we need one reference system

well we are talking that our reference system is Ellipsoid ((is)) (00:09:00) here

and any two distances that we are measuring between points A and for example point B here is the distance along the curvature but of course the distance between the point A and B should be measured considering the curvature of the earth because this is how physically they are but this is true only if we are talking about a very large extent large area this is not true if the area is very small

so for our engineering surveys because in case of the engineering surveys our area ((marginally)) (00:09:34) is smaller

you know an engineering project for example let us see

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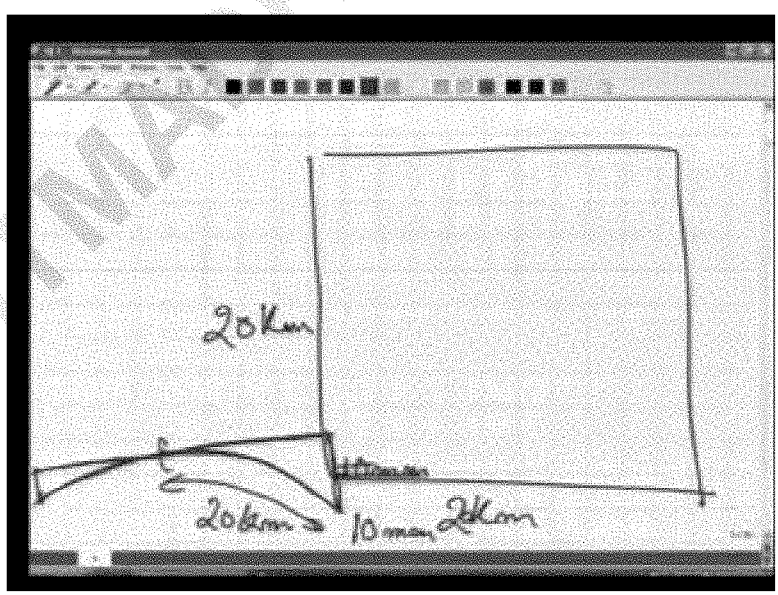


if it is in twenty kilometre by twenty kilometre then the separation of geoid or the Ellipsoid or the curvature of the earth form an horizontal plane plane in twenty kilometre is only ten mm

i am sorry not this way but this this represents means the distance in the length of the chord and the length of the arc is only for twenty kilometre the difference is only ten mm

what is the meaning of this the meaning of this is when we are doing using surveying or when we are doing the surveying for a small area we need not to consider the curvature why should we measure along the curvature

we can rather even if you are measuring along the curvature because the distance which we are measuring on the ground we can measure the distance by making a line which is horizontal and we measure this distance along the horizontal what we are doing we are not considering the curvature of the earth rather the other way we are considering our earth to be flat

so for small areas like this we can consider our earth to be flat

and we can easily carry out the surveying

so flat means in that case our reference plane

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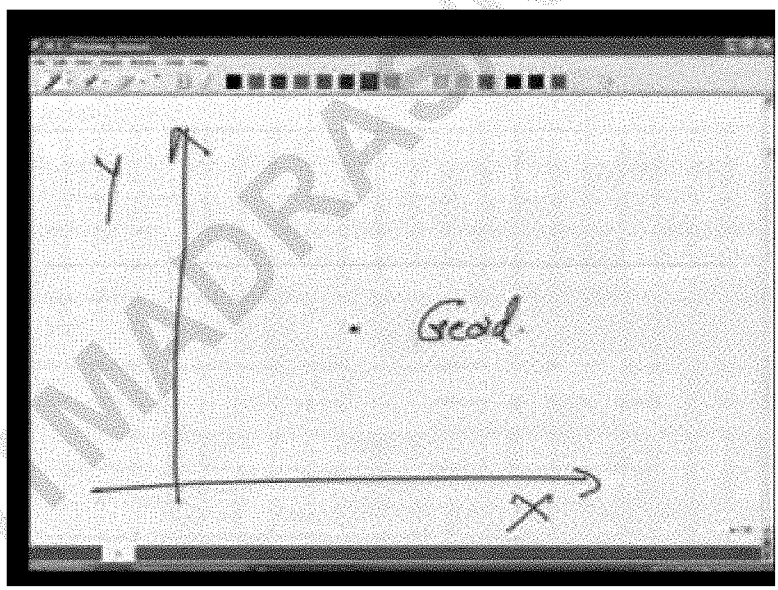


for X and Y will be like this X and Y while the Z are being measured from geoid i will give one more example

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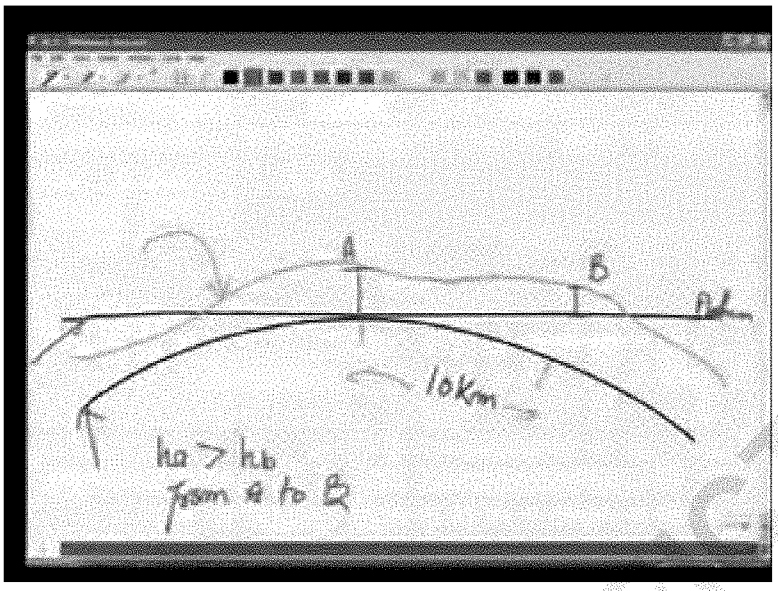


here is the earth as you see (( )) (00:11:35) surface of the earth and this surface here is the geoid and here is the flood plane which is tangential to the geoids at this plane

now in this example what we are seeing if we plot our point let's say or rather we measure the height of the point

there is a point A and a point B from deflect plane or the horizontal plane

by projecting these points here we measure this height as at the moment what we have seen

these two values so what we see in this case the height of A is more than height of B from the datum what is the meaning of this the meaning of this is in this case the water should flow from A from A to B because if we are considering the earth to be flat we are not measuring elevations from geoid rather we are measuring the elevations from a flat plane or a horizontal plane

in that case the water should flow from A to B well let's look at the geoid or the lower surfaces equipotential surfaces the equipotential surfaces in this case passing from A will be again parallel to the geoid

so we can draw it like this and also from B passing from B will be like this well what we observe onething very interesting

if you are looking at the equipotential surfaces in that case the equipotential surface or the level surface which is passing through B is higher than the equipotential surface from A

what is the meaning of that the meaning of this is the water will actually flow from B to A

not from A to B what is the case here

so {wha} (00:14:09) what do we mean by this we mean by this is if we are taking horizontal plane for measuring elevation our elevations will be wrong it might happen that we are giving the elevation to a point as here in this case A more than to a point B this height the water flowing from B to A

so we must always measure the elevations from the geoid not from the horizontal plane it is said that in all our engineering surveys we can consider our earth

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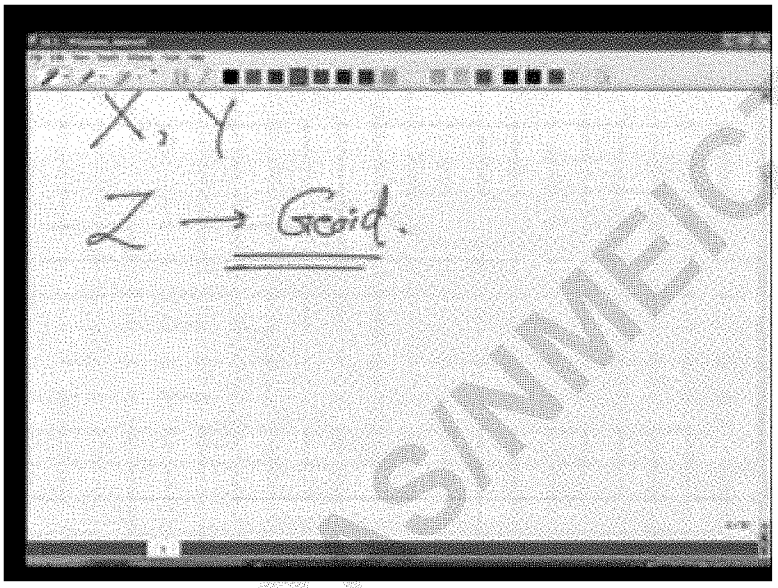


flat for X and Y but for Z we must measure from geoid

so this is an important concern we should keep that in mind so this is what called we have discussed last time these are important concept that's why i wanted to repeat these

what we'll do today today we'll start our discussion with some principles of surveying

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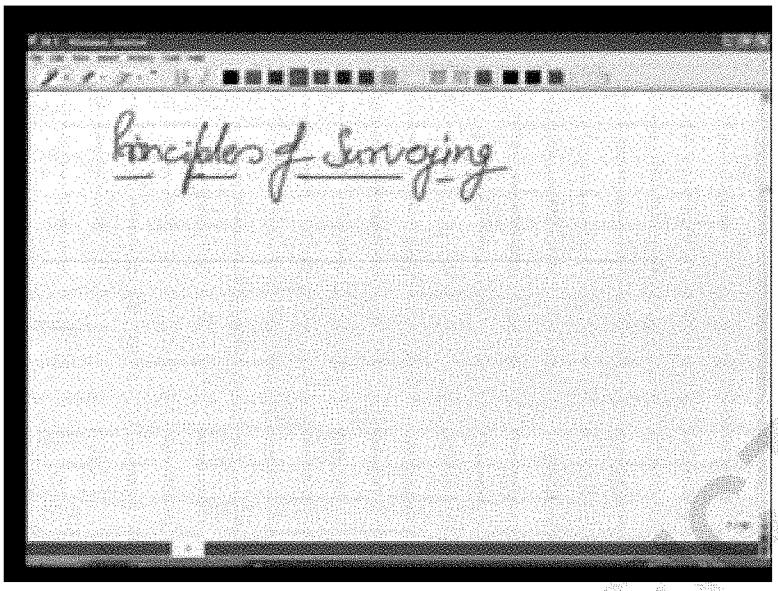


now what is the meaning of this the principles of surveying means there are some things which we should keep in our mind always whenever we are doing surveying and in order to explain all those things what i will do i will give you an example and we'll start with that example the example is let us say

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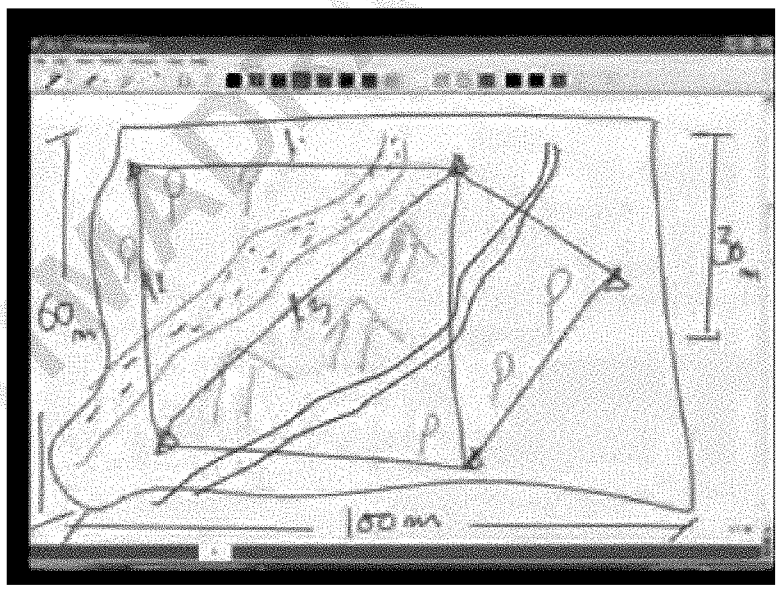


there is a field an area a terrain and in this terrain it may be of any size there in the ground there are some rivers here okay there are some houses let's say there are some houses here there are some route as well okay

we have got some more trees this is any you know any terrain could be like this while here is the river or a small rivulet you can just think of any area in your surrounding just think of that area our job is we want to make a map for this area

so while we are going through this process of making map for this area we'll go through many things which are very important and very basic for the surveying

now what those things are well number one when this job is given to you i ask you okay go to the field and make a map and i give you let us say a tape tape means something with which you can measure and the length of this is thirty metre okay

a tape having thirty metre length i give you that tape and i ask you to make a map of this area again to simplify the matter let us say this area is of around hundred metre by sixty metre in height okay

so it tells you about the extend now you can visualize any area any garden in your surrounding and you are given a tape and you are asked to make a map what will you do

now the number one thing which you would like to do you like to go to that area observe it rather you just have an idea okay what kind of my area is or should what kind of techniques should i use for my surveying can i use very good instrument should i use very good instrument that kind of stuff and can i reach each and every point in my area is every point accessible or not

so that part the very first part

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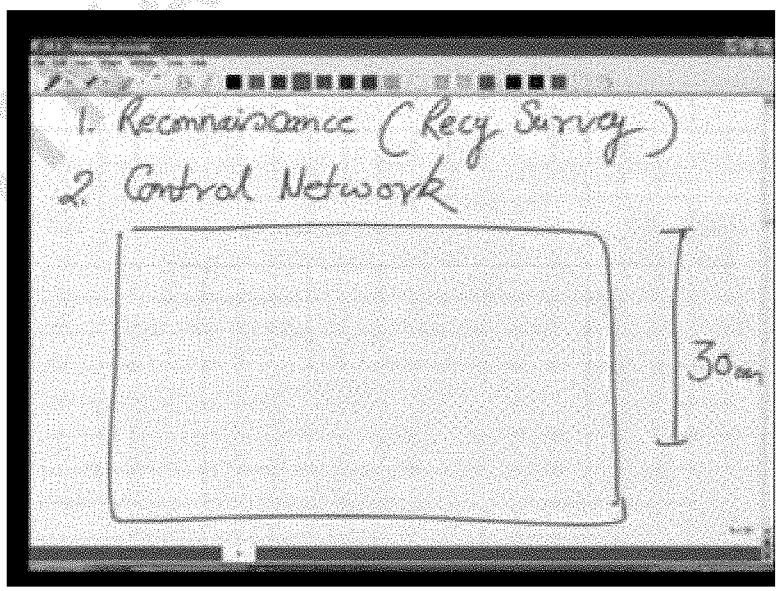

which we do is called reconnaissance reconnaissance survey and sometimes that is also referred as Recy so so you go into the area you do this Recy by doing this Recy what you try to do well you try to have an idea of the area

now once you have done the Recy the second thing that comes into picture is you establish a control network we'll talk about it what the control network is okay

what is the meaning of control network here

control network means something which will control your entire survey

now i'll i will tell you how we will do it here in this case let us say for the same area i am drawing it here (( )) (00:19:01) again

you [Noise] sorry you decide that because you have given you are given only a tape of thirty metre length and you have to make a map of this area it is not that you start from measuring individual tree okay

the distance between two trees the distance between two houses for example in this area how will you make the map

it is not that you start measuring the differences like this between the trees between the rivers between these trees from tree to the river from tree to the boundary these individual measurements no first you have to establish a control network

well the control network could be let us say that you establish a control network here another point here another point here another point here one more point here

i am considering here that it is possible for us to measure distance across the river using the tape just a small river you can do it okay

now what by doing that what you have done your network will look like a network of triangle will explain this thing

let us say natural network you will understand very soon the utility of this you decide about it this network is also decided at this stage of reconnaissance you decide about those points which will become your control point

now why we want to do it we want to do it because by establishing these some points and measuring the distance between these points very accurately what we can do we can take this skeleton of the area in the laboratory

now what is the meaning of that once you have you have gone into the ground you can do this measurements easily isn't because you have got the tape you spread the tape and measure

these distances the only thing is keep your tape horizontal because we consider our earth to be a small area to be flat

so by keeping the tape horizontally between these two points i can measure all these distances L one L two L three and similarly

so all these measurements are known to you well bringing the skeleton of the area into the laboratory how do we do it how do we plot that well we do it let us say we have a sheet of paper here and we want to make our map

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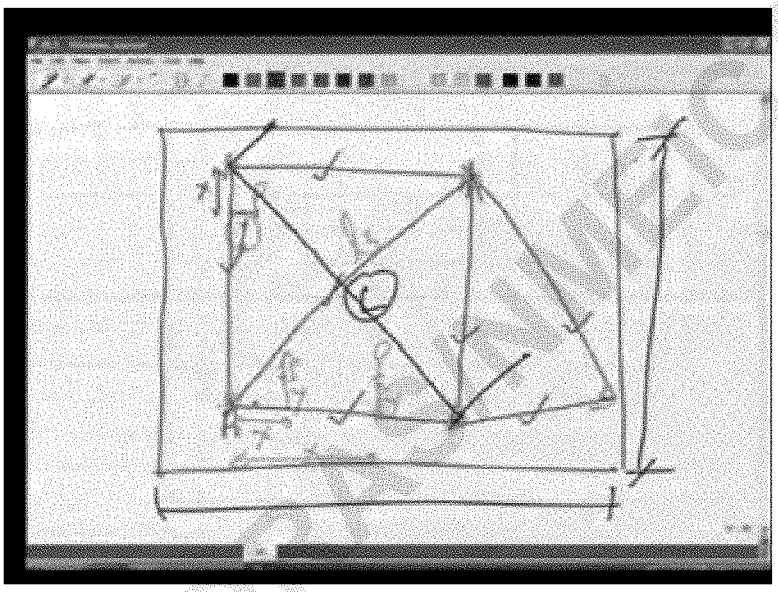

in this sheet all right we will start from our very first point the very first point for example let's say what A

so what we do in our sheet we'll locate this A just arbitrarily A

now from A we know as we had observed in the ground that we have lines going this way okay

so what we do we draw a line L three and L two and again from this point we take an arc from A ((that's)) (00:22:17) the very first line is drawn here Lone we can measure the angle also i am not talking about the angle now and from here we can take the arc of ((just)) (00:22:33) two length so this point is fix

similarly as per the triangulation figure there we'll draw the rest of the triangulation figure what you have done just by the measurements of these lengths there in the field you are able to draw the skeleton on to the sheet okay so the skeleton of the ground is here on the sheet is on the map

so what what we learned from this we learned one thing one principle here that is establishing control network okay

so in the case of the principle

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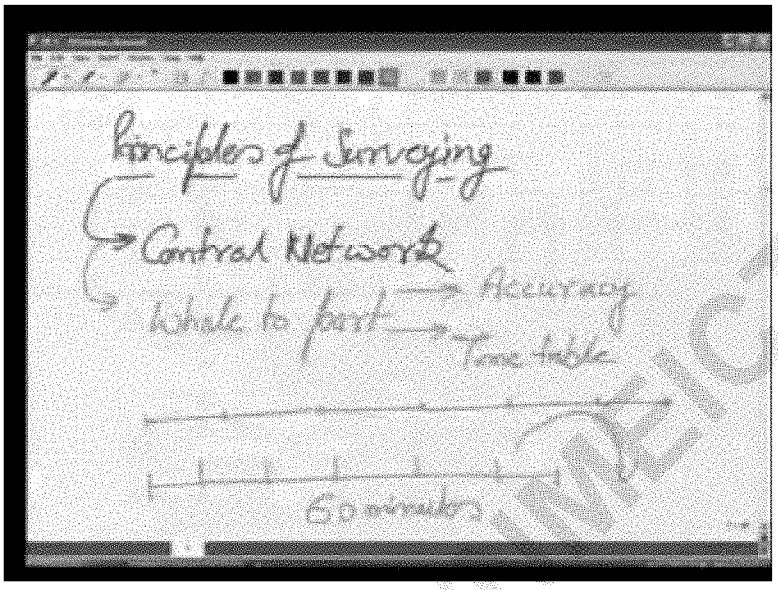


the principle what we learned here is control network always before we begin our survey we should establish a control network and the control network controls our survey we will see in a moment how

now in our area what we want to do we want to measure the individual things so to measure the individual things what i can do now from any tree i can drop a perpendicular here isn't

so what i know along this length a certain X the distance of a tree is Y okay

so what i will do i will do the same thing here along this at a certain length X we have the distance Y and at that Y we have a tree so what we have done we have now plotted one tree similarly i can plot the other trees also for example let's say for this house i take the measurements of this house from this line by drawing a perpendicular i measure this X i measure this Y by measuring this X and by measuring this Y what i can do in my map there is the X and here is the Y and we know there is a house here

so what i have done i have plotted the house also

so now you will start realising the significance of the control network

now some principles which we must follow and we must keep in our mind always one principle we will see is working from whole to part it is very important principle working

from whole to part what is the meaning of this the meaning is as we saw also here what we did first we map the skeleton of the area the meaning is first we map these distances

we didn't go to the individual features we didn't start measurements from individual features individual trees rather we mapped our area first in a big way

we measured these distances very accurately the L one L two L three L four L five all these we measured them very very accurately and then we plotted them here we brought the skeleton of the ground here on our map okay so this is you know what we did we are working first in the whole the skeleton of the area we are bringing at here

we are not bothered at that stage about the features but in the second stage now working from whole to part now we make use of the control network these triangulation figures and then we start plotting each and every detail

now what is the advantage of this

why should we do it

now for this principle of working from whole to part one advantage is accuracy why now you you take it like this see our first control network the triangulation figure we measured that very accurately and we made use of that in order for plotting

so our these stations or these survey stations are transferred here very accurately because we took at most care in measurement of length

now after that even if we are slightly here left in measuring this Y it doesn't matter because it is not going to affect the plotting of this house because these two are two different things

so plot of the house or may be plot of any other tree here if we are plotting by measuring the distance here and this distance so we can say X here and Y here

so by this i can plot this tree again this one independent plot so this particular plot it doesn't affect at all the accuracy of this plot

we made this (( )) (00:27:50) wrong in measuring this so it is not going to affect the entire you know the rest of the map

so our errors are not going to accumulate they are not going to add up while if i start doing the mapping let's say i start doing from part to whole in doing it from part to whole what is the meaning i measure the distance between these two trees i measure the distance between these two trees now

i measure the distance from here to the river from here to the river you know what i am doing any little error which i introduce in measuring the distance will be accumulated in all the measurements which i follow later on okay

so in working from whole to part we maintain the accuracy we restrict our surveys with the certain accuracy so this is very important thing

i can give you some more examples of this working from whole to part and this examples are from our daily life

now one example could be let's see the timetable it doesn't have to do anything with the surveying but to understand the concept of working from whole to part

the timetable means let us say for this lecture i was given a time of one hour

so what i have been given i have been given okay you have got time of one hour sixty minutes and i have to plan my lecture in this sixty minutes

so what i do well i have got sixty minutes now i plan my first part of the lecture second part of the lecture third part of the lecture i plan within this sixty minutes only it is not that i am going to you know go over the sixty minutes because i know my boundaries i know the whole had it been the otherwise i have not been given any time what i would do

i will plan my first part of the lecture second part of the lecture third part fourth part without knowing my boundaries i might spill over

so that's the idea that's the very you know we should understand because in our life also many things we do where we implement this principle of working from whole to part

now the next principle we have talked about one principle that is very important and the control network is a part of that that is working from whole to part

we discussed one more principle that is the reconnaissance observing the area before hand

the next principle now here itself if one of because what we have done we have taken utmost care and we measured these length what if some of this length are measured with errors what will happen in that case let us say this L three

when we measured it on the ground we measured it with some errors what will it do

if you measure it with some errors it will distorted my skeleton of the area all the measurements later on which i carried out will have some error now my map will be distorted

so what should we do how can we avoid this kind of thing to avoid this kind of thing there are two ways number one

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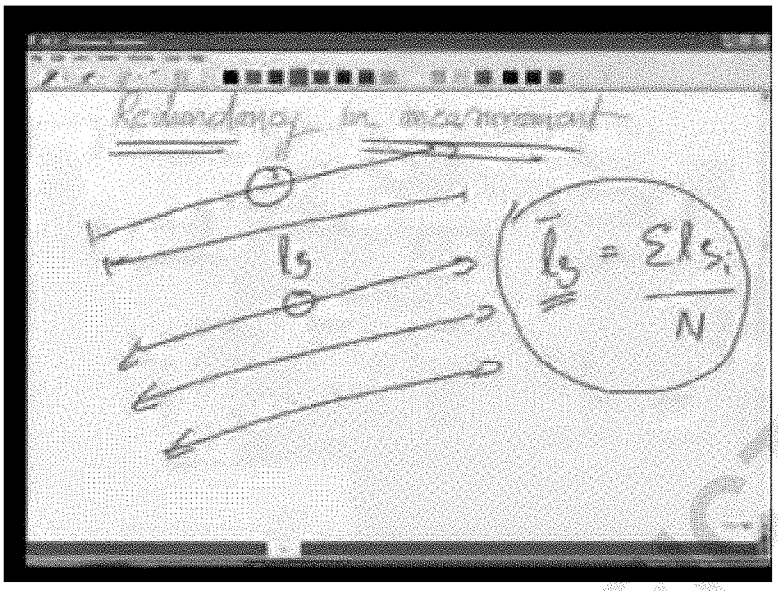


we say redundancy in measurement what is the meaning of that the meaning of that is if you are measuring a length L three we should measure it a number of times you measure this length from here to here number one time second time may be from this way may be third time fourth time

so what you are doing you are taking number of measurements for the same length why because may be one of the measurement is wrong the other measurement is the redundant measurement but i am sure that your final value which will get as the average of sigma l3i and number of the measurements what number of measurements you have done

so if you are taking the average of all these measurements which you have carried out for measuring L three your value is more accurate

you are more confident about your values than taking a single measurement so we should always keep in our mind that we should have redundancy in our measurement whenever we are doing the surveying whenever we are doing any measurement

the second one

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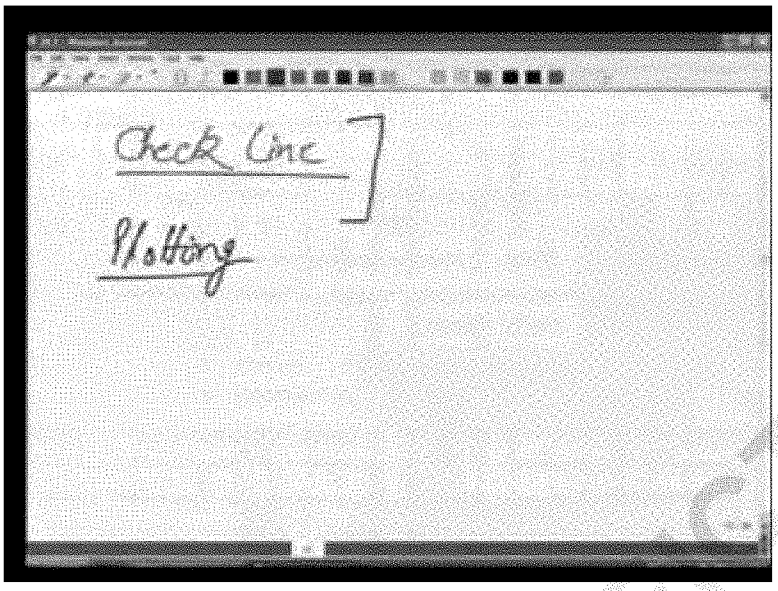


the second one is now here only we carried out all these length and we plotted them here is there any other way one way is the redundancy we introduce redundancy but is there any other way of checking the accuracy of this system

well one more method is possible and that method is we say check line

now what is this check line here in this diagram had we also measured there in the ground let us say this line

what we are doing we are not using this line which i say capital L for plotting my triangulation figure unless using it for the purpose i am using this check line later on

once i have plotted my network here okay all these points are plotted then i check the distance between this point and this point in the network and i compare it with the check line which i had measured in the field if my survey is correct if my skeleton is correct accurate then the measured line here in the map should be same as the line which was measured in the field if it is not so then we suspect there is some error in our skeleton

so always we can have either one or more number of control check lines in our survey so we should always go for the check line so now you understand what is the purpose of the check line so that we can check the accuracy of our work later on okay

now having said this

now we will talk about some more principles which we should keep in mind whenever we are doing in the surveying well next next thing comes to our mind is about plotting of the survey

because so far we were just saying that we have made a map but there are some things some important points which are involved which you should keep in mind whenever you are doing the plotting what those things are

here in this plot before you make the plot see the ground look at the ground file it was hundred metre by sixty metre huge area and what you are trying to do

you are trying to bring that into a sheet in the in the (( )) (00:34:59) drawing sheets

okay it's very very small than the actual ground

so how to bring that ground into the sheet well you know the answer i believe you have to talk about a thing called scale a scale means we want to convert the distances which are large than the ground into the smaller distances for here in the map

now about this scaling what are the scales what are their types number one way of representing the scale is

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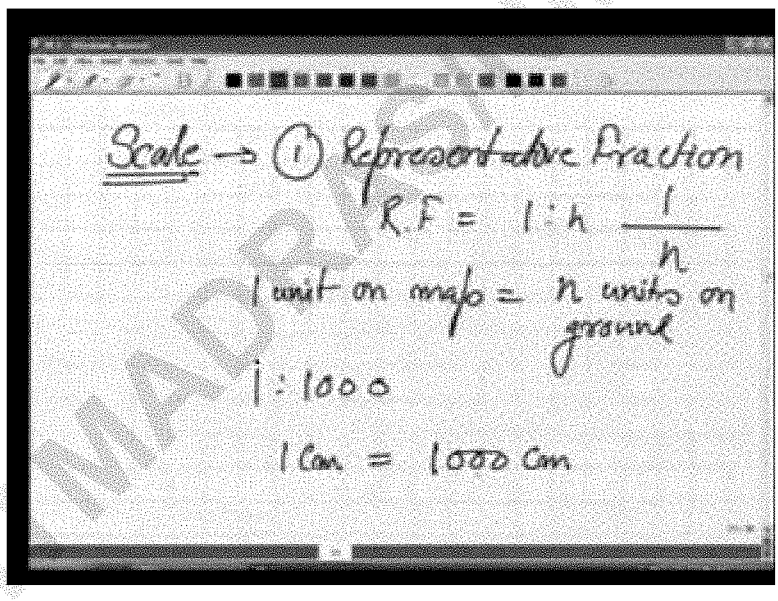


by representative fraction what is this we write this representative fraction also it is referred as RF as one is to n also many times you can write it as one by n what is the meaning of this the meaning of this is one unit on map is equal to n units on ground

well let us ((say it)) (00:36:18) if our map scale is one is to one thousand the meaning is one centimetre on the map is equal to one thousand centimetres on the ground

so a distance which is one thousand centimetres there in the ground we are representing here in our map by one centimetre

so this is how {we w} (00:36:43) we represent the scale there is one more way of representing the scale which is called

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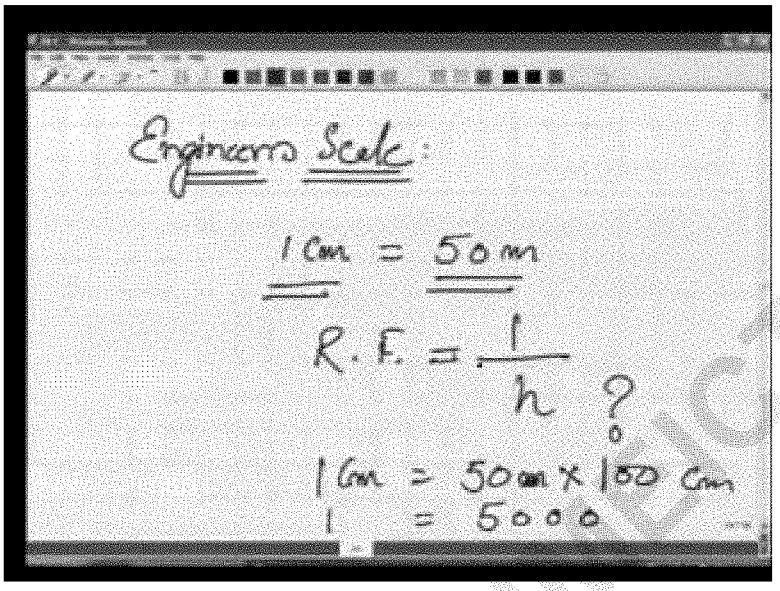


engineers scale what is this in case of the engineers scale we represent it as such for example let us say we write one centimetre is equal to fifty metre

what is the meaning of this this is the another way of writing the scale it's the same thing in fact it's the same thing as we represented in fraction but this is the another way we write it down

now here in this case again the meaning is fifty metre there in the ground is equivalent to one centimetre here on the map what you can do you can easily find the representative fraction for this one by n and you must compute what will be the value of n how can you compute you just convert this also in centimetre one centimetre is equal to fifty metre okay multiplied by let's say i write in centimetre hundred centimetre so one is equal to five zero zero zero to the value of an five thousand here

so we can convert the scales like this we can convert the RF into the engineers scale and vice versa there is one more way of writing this scale

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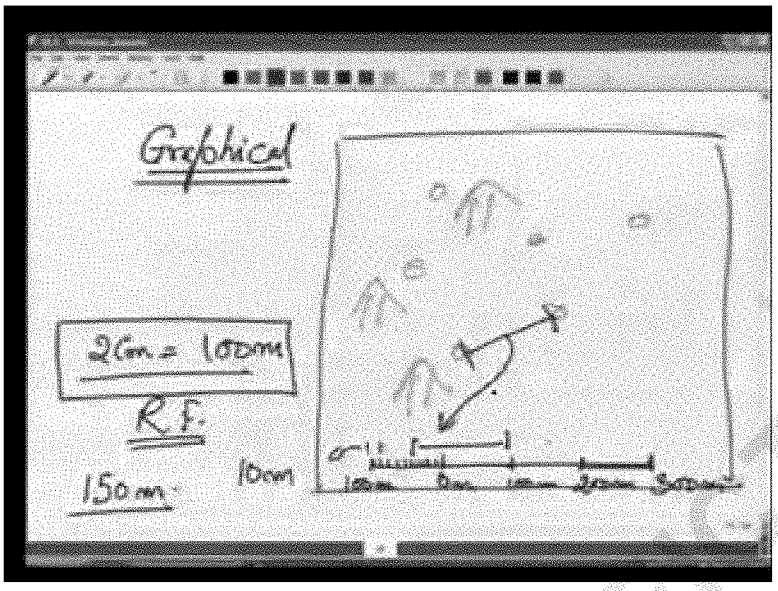


that is called the graphical scale well what is the graphical scale graphical scale is if you are making a map like this this is the map and in this map we have plotted some details whatever these things are okay

so there on the map itself what we do we plot our graphical scale now what is the meaning of this the meaning is here in our map we say okay

we make a line and on this line we write for example zero here hundred metre zero metre again hundred metre two hundred metre and three hundred metre further we divide this first one in ten parts so each of this is ten metre now what is the meaning of this what we are doing

we are writing on a scale on our map now any distance between these two points if i can measure this distance what i can do i can bring this distance here if i keep the distance here for example this way isn't what i have done i have brought this distance and kept it here

so you can measure the distance between this two to b one hundred metre plus one two three four five hundred fifty metre

see graphical scale is nothing but a graphical way of showing your scale because here in this case the distance is two centimetre

so what we have done two centimetre is equal to hundred metre so we can write the corresponding engineers scale also we can write the corresponding RF also

so the only difference in this case is that we are showing the scale by drawing a line on the map itself

now what are the advantages of this one very big advantage of this is for example let us say an engineers scale is given to you for this map and there is no graphical scale it is just their map without having any graphical scale and the scale of the map is given only by engineers scale

well after some time the map is made today and after let's say ten years twenty years or so the map has got shrunk or maybe it has expanded because ((it's a)) (00:41:20) paper or whatever the material there may be with moisture weak time and all that it may shrunk or expand

if it is so what will happen if this map has shrunk the distance between these two points which was earlier at now because it has shrunk will not remain anymore X rather it will be minus delta X

now if that is the case and now if you use your engineers scale in order to determine the distance between these two points there in the ground using map

so what you will do you will use not X you will measure the distance between these two points at X minus delta X you will apply the engineers scale or the representative fraction on this distance

so what will happen you will compute a distance which is wrong because there in the ground the distance is not X minus delta X rather the distance is X multiplied by the scale not X minus delta X multiplied by scale no this is not this is wrong this is correct but we will do it like this because what we are measuring on the map is only X minus delta X we did not know what was the X unless we know the amount of the shrinkage

well if you have a graphical scale on the map what what is what is going what is happening there now whatever is the amount of the shrinkage which has occurred between these two points we can assume the same shrinkage is taking place in the graphical scale also

so in the graphical scale it also shrink by the same amount so what we can do even if you are measuring X minus delta X we'll measure it here because this scale has also shrunk by the same amount the distance which will compute between these two points there in the ground will be the same distance is equal to this so that is one big advantage of the graphical scale well some more aspects

when we are talking about this map plotting of the map there is one more important thing that comes into the picture and that is we say plotting accuracy

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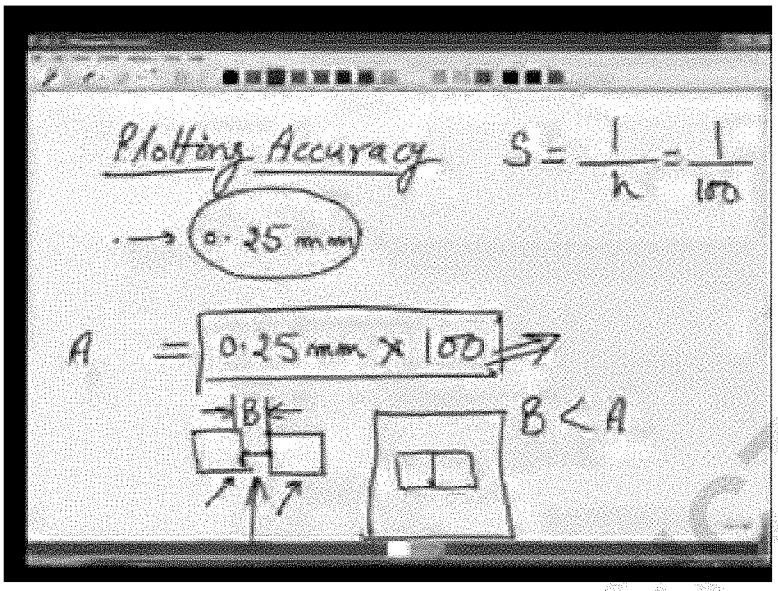


what is the meaning of this in your map the best that you can plot

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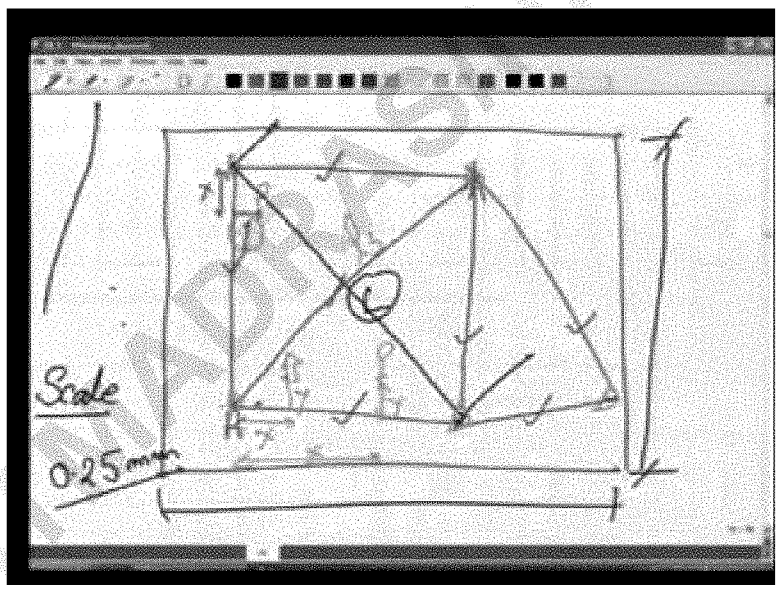


is let's say a dot and the size of the dot generally if you are going to be very very careful the size of the dot is zero point two five millimetre using the best possible plotting pen you can draw a dot of zero point two five mm diameter or even if we can say a line the thickness of the line is zero point two five mm

what is the meaning of this does it convey anything yes well when we are talking about the plotting accuracy there is a dot and the size of this dot is zero point two five mm on the map what it is equivalent to there in the ground well it will it will be equivalent to if you are

writing the scale S one by n let us say okay the n could be any number for example (( )) (00:45:04) one by hundred

what is the meaning of this a dot of this size there in the ground will be equivalent to zero point two five mm millimetre multiplied by hundred isn't

so what is this what is the meaning of this there in the ground if there are two objects let me tell you one object here in the ground and then another object if the distance between these two objects in the ground is let suggest particular value is we write it as A and the distance between these two is B if B is less than A what is the meaning of this if B is less than A even if we are measuring this B in the ground can we plot these two objects separately on one map once i am plotting the map i plot my first object where i plot my next object to plot my next object i cannot go here because the distance between these two is within this line itself

so my next object will be also plotted like this together isn't so what i mean to say i mean to say the plotting accuracy is very important it depend depends upon the scale depending upon the scale there will be a certain value there in the ground this particular value depending what the scale is this particular value will change here

so whatever is this multiplication the A value here in the ground if the object or the feature are smaller than the size we cannot show them here in the map okay or if the separation between two objects as we saw here is less than the plotting accuracy here in the ground we cannot show these two objects separated here in the map

so we should always keep in our mind that to what extent we should go and map this is very important this plotting accuracy should be measured very accurately in the ground as in the previous examples

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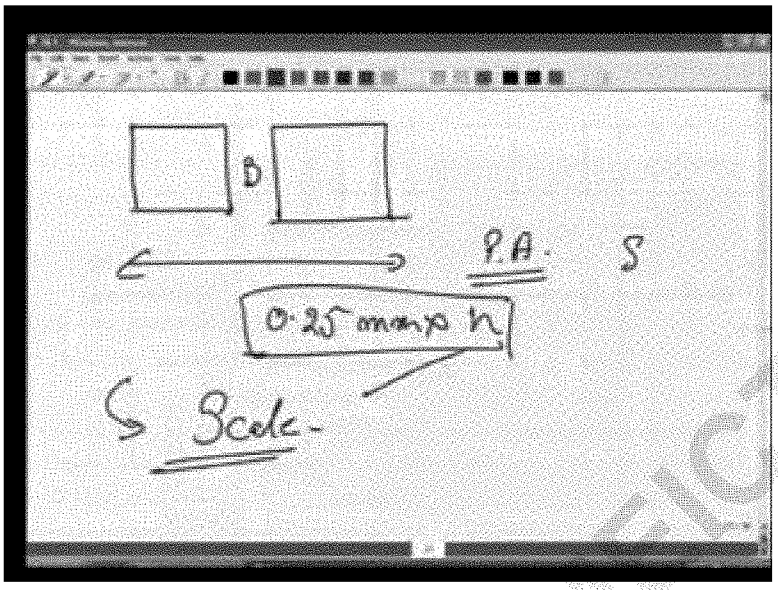


(( )) (00:47:35) we measure these two objects the distance is B should we measure these two objects as captured object there in the ground or should we measure them as one well the decision is to be taken by your plotting accuracy

what your plotting accuracy what your scale is because what you do you compute multiplied by your scale and any distance any object any separations there in the ground which is less than this value should not be measured because we are not able to plot it we will be able to plot the things which are more than this only

so this is very important we should always keep in our mind that what information we should measure in this field that is controlled by the scale okay

having seen all these things you know what we have we have seen so far we have seen some principles of surveying for example in any mapping exercise we must do the reconnaissance number one number two we should establish a control network because we want to work always from whole to part and then we fix the control network in our area first

we i gave you the way we can do it by triangulation we'll see it later on that we can do it by many methods we establish the control network we measured it very accurately so what its skeleton is fixed

we bring this skeleton into the laboratory plot it

now you work in part we measure the individual object okay and then while we are doing the plotting we need to see about the scale what a scale is to be chosen

well one more question here how to decide about the scale can you think of some point well the scale will be decided by number one

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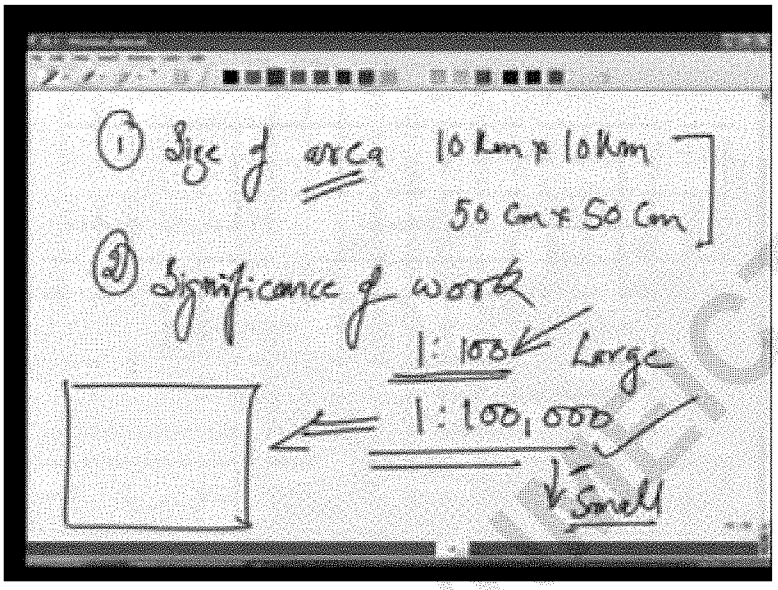


size of the area if there is an area for example ten kilometre by ten kilometre and you have plotting sheet of let us say fifty centimetre by fifty centimetre is the plotting area

so what will be the scale you know you can find the scale but this is not the only criteria by which we decide it size of the area many times its significance

what is the meaning of significance of work when you want to go for higher scale when you want to go for lower scale sometimes you want to go for higher scale you want to plot it one is to hundred sometimes you want to plot it one is to hundred thousand

when you want to plot it one is to hundred thousand the meaning is you want to plot a map of entire state of entire country okay

for example for the entire Uttar Pradesh you want to show in one map so we'll go for a scale like this because plotting at ((this)) (00:50:38) scale we can bring the entire state in our plotting area

plotting area is generally a drawing sheet or may be slightly larger than that so the entire state come in that and here in this case if we are talking about this scale what we are interested in we are interested in a synoptic view of the area not in the details because you don't expect to see individual houses individual roads individual trees at this scale but if you want to have a

very very detailed map you want to see the individual tree individual building their room everything you need to go for a scale like this

now out of these to this scale is called large while this scale is called small

we must keep in mind the value of because (( )) (00:51:32) we are writing the scale the scale is written as

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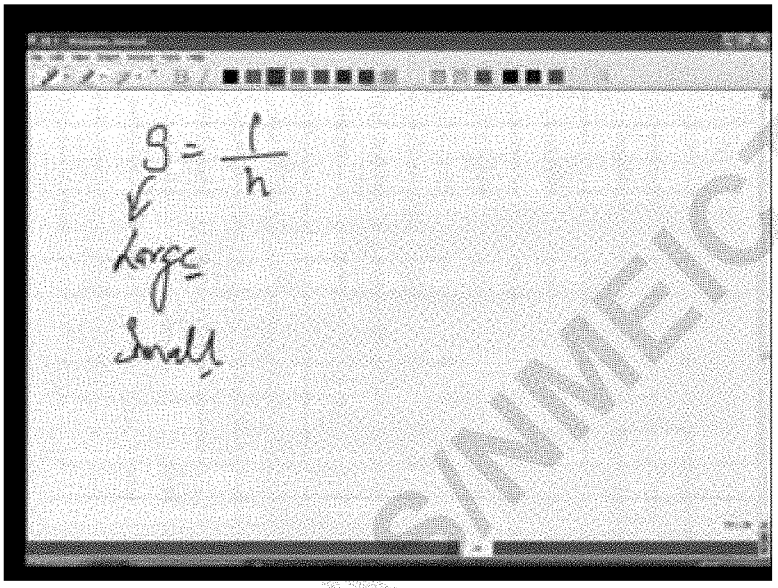


S one by n so depending this value of S the scale is said to be either large or small if S is large it is large if S is small it is small so we should know that when we say the scale to be large when we say the scale to be small in large scale and in the small scale the amount of the information will be different okay

now something about because {ifwe} (00:52:08) if we are doing some kind of repetition you know after talking about the scale we talked about the plotting accuracy

how plotting {accu} (00:52:14) accuracy is important because we can decide what level of information is to be captured in the ground is to be measured there in the ground it is decided by the plotting accuracy or its scale so we should know this thing we should be aware

then the other thing whenever we are doing any measurements we must do the measurements by some redundancy we should have redundant measurements

then the other thing we should always have the check line because we want to ensure after doing our work we can extract our work the accuracy of our work so we must have the check lines in our work

so these are all important principles of surveying

we should always keep in our mind whenever we are doing any job

now finally how we plot the details some little bit about it

this is very simple

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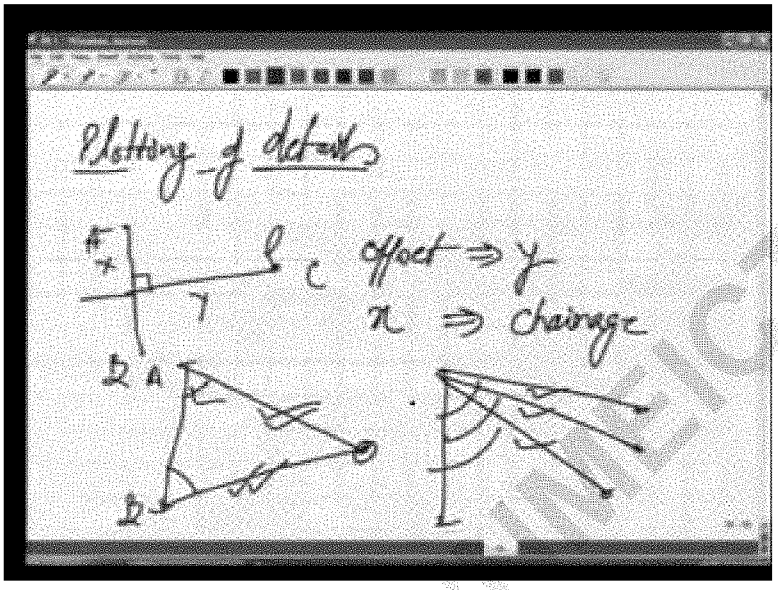


plotting of details

how do we plot the details as we are doing in the map also we saw it here in (( )) (00:53:15) we plotted some of the details

what we did in that case for example for this tree we measured the distance from this point to this point X and then from here we drew a perpendicular and we measured along the perpendicular the distance Y so making use of these two we can plot the scale

similarly there are many ways in which we can plot the details

now what what these ways are for example let us say if we have a line we know this two points A and B a third point C can be plotted by dropping a perpendicular and measuring this X as we did in the earlier case so this is called an offset

while the X offset is Y while the X is called chainage we will talk about it later also

so at this stage we have an offset of Y and at that point we have a tree this is how we can plot the tree well the other one now on the same point A and B we can plot a third point now by many ways you can measure either both the angles this point will ((fix)) (00:54:40)

we can measure one angle and one length this point will (( )) (00:54:45) okay we can measure both the length this length and as well as this length this point will (( )) (00:54:49) or we can go in the polar way

for example from this point you can plot many points now by measuring all these lengths and all these angles so all these details can be safe

so you can you can just know that how can we make use of simple geometry for plotting the things in the field we will talk about these things more later on finally a little bit about

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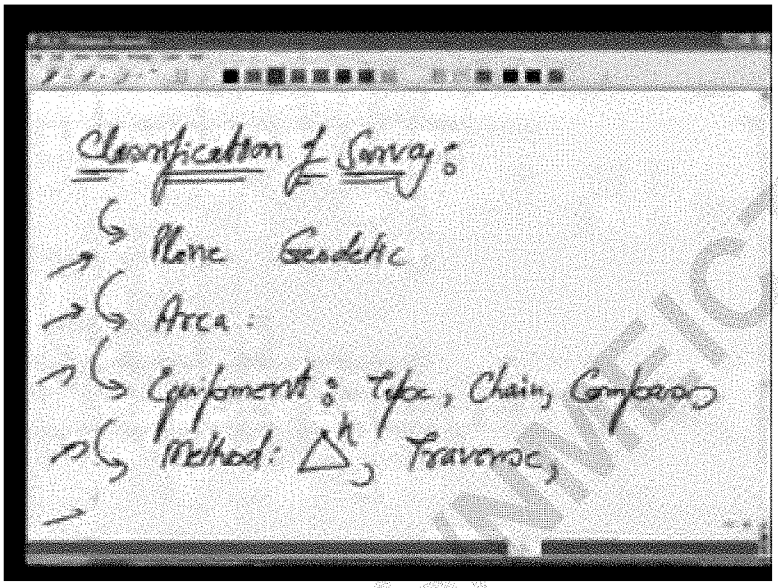


classification of survey you should look in your book about this because this is nothing very important about how we classify the survey we have seen already plane when we (( )) (00:55:41) reflect or Geodetic

the another classification is as per the area for what kind of area we are doing the classification is this a town is this a village an agriculture area so we do the classification based on area

also we can do the classification based on equipments

what equipment we are using are we using tape chain compass chevrolet total stations GPS as we'll see later on

so we can classify our survey this way also

then we can classify using the methods the techniques the meaning is are we using triangulation or we are using this traverse

we will talk about all these things later on or we are using any other methods for {classi} (00:56:47) for doing our surveying

so our surveying can be classified by all these various categories and one more classification is possible which we say by the function or the use who is using the survey who is doing it is

this a military survey is this an agricultural survey is this an hydra graphic survey you know who is the organisation who is doing that survey and what is the purpose for the survey may be some mining survey or is this a survey for any geographers

so depending those the functionality for which we are doing the survey

so we can classify our survey this is not very important not very important concept is involved in this

so i would i would like you to go through your book the text book and read about it

so i will finish my this video lecture here and will continue our discussions in the next video lecture

thank you very much