[9:12 PM, 5/30/2021] shruthi gowda: Compass surveying

The direction of the survey line is defined by horizontal angle or bearing.

The direction of the survey line can either be established

1 with relation to each other (angle)

2 with relation to any meridian bearing

Instrument used for direction measurement

Surveyor's compass

Prismatic compass

Instruments used for angle measurement

Sextant

Theodolite

Basic definitions

Angle: The direction of the survey line with respect to another survey line meeting with it is known as angle.

Interior angle: In any closed polygon the direction of any side can be depicted by the angle it made with the adjacent side. This angle measured clockwise or anticlockwise is known as interior angle.

Azimuth: The smaller angle which a survey line makes with the true Meridian is called azimuth.

Meridian:

Meridian is an imaginary reference Line or it is a fixed direction in which the bearing of the survey lines are measured.

The meridians or reference line may be

True meridian

Magnetic meridian

Grid meridian

Arbitrary meridian

True meridian: The line or plane passing through the Geographic north pole, Geographic South Pole and any point on the surface of the Earth is known as true meridian. It is also known as geographical meridian. The direction of true Meridian at any station is constant and hence direction of a line with reference to this remains same over time.

Magnetic meridian: Magnetic meridian is a direction shown by a freely suspended and properly balanced magnetic needle unaffected by attractive forces. The location of the magnetic poles is constantly changing in the direction of magnetic meridian also changes.

Grid meridian: Sometimes for preparing a map some state Agencies assume several lines parallel to the true Meridian for a particular zone. These lines are termed as grid lines and the central line the grid meridian.

Arbitrary meridian: Any convenient direction from a survey station to some well defined permanent object is known as arbitrary meridian.

Different types of bearings

Based on meridian

True bearing

Magnetic bearing

Grid bearing

Arbitrary bearing

Based on direction

Fore bearing

Back bearing

based on meridian

True bearing: The angle between the true meridian and a line is known as true bearing of the line. It is also called as Azimuth.

Magnetic meridian: The angle between the magnetic meridian and a line is known as magnetic bearing or bearing of the line.

Grid bearing: The horizontal angle between a line and a grid Meridian is called grid bearing.

Arbitrary bearing: The horizontal angle measured between the arbitrary meridian and a line is known as arbitrary bearing. A theodolite or sextant is used to measure it.

Based on direction

Fore bearing: The bearing of a line measured in the direction of progress of survey is called fore bearing of the line. The bearing of the line measured in the forward direction is known as fore bearing.

Back bearing: The bearing of a line measured in the backward direction is known as back bearing.

Fore bearing = back bearing+ or - 180

Plus sign used if fore bearing is less than 180 and minus sign is used when fore bearing is greater than 180.

[9:25 PM, 5/30/2021] shruthi gowda: Systems of bearings

The systems of designation of bearings of Survey line are

Whole circle bearing (W C B) system

Quadrantal bearing (Q B) system

Whole circle bearing system

the whole circle bearing of a line is the horizontal angle measured clockwise from north limb of the Meridian. It will have values between 0 to 360 degree. The bearings measured with a Prismatic compass are W C B.

Quadrantal bearing or and reduced bearing system

Quadrantal bearing of a line is defined by the acute angle which the line makes with meridian. thus it depends on the quadrant in which the line present. It is measured in clockwise or anticlockwise direction either from North or from South Limb of the Meridian whichever is nearer. The system consists of four quadrants NE, SE,SW and NW. The value of the quadrantal bearing lies between 0 and 90 degree but the quadrants should always be mentioned.

The bearings measured with the surveyors compass are in quadrantal bearing system.

[10:09 PM, 5/30/2021] shruthi gowda: Magnetic declination

The horizontal angle which a magnetic meridian makes with the true or astronomic Meridian is called the magnetic declination or magnetic variation. If the north end of the compass needle deflects right to the true Meridian the declination is said to be east and if it deflects to the left of the true Meridian then declination is said to be West.

True Meridian of Survey line can be calculated from the following relation

True bearing = magnetic bearing + /- declination

Use plus sign if the declination is to the east and minus sign if it is to the west.

If we know the true bearing of a line and the magnetic declination of that place then magnetic bearing of Survey line can be calculated from the following relation

Magnetic bearing = true bearing +/- magnetic declination

use minus sign if the declination is to the east and Plus sign if it is to the west.

Isogonic line : Isogonic lines are the lines drawn through the points of same declination.

Agonic line: Agonic lines are the lines drawn through the points of zero declination.

Dip

The angle of inclination of magnetic needle with the horizontal plane is known as magnetic dip of the needle. The magnetic forces are parallel to the Earth's surface at the equator. hence the magnetic needle remains horizontal and dip is zero at the equator.

the angle of dip varies from 0 degree at the equator to 90 degree at the magnetic poles. That is its value is not constant but varies from place to place.

[10:32 PM, 5/30/2021] shruthi gowda: Traverse

Traverse consists of series of straight lines connected successfully at established points along the route of the survey. The points at the end of the traverse line are called traverse stations or traverse points. Distances between the Traverse stations are known as Traverse side and are measured either by direct measurement using a tape or other instruments. At stations where a Traverse side changes its direction are measured with a compass or Theodolite

There are two types of traverses

Closed traverse

Open traverse

Closed traverse

When series of a connected lines forms a closed circuit that is when the finishing point coincides with the starting point of the survey it is called closed traverse. Closed traverse is suitable for survey of boundaries Ponds, forest, estates, a village layout etc.

Open traverse

When a sequence of connected lines extends along the general direction and does not return to the starting point it is known as open traverse or unclosed traverse. Open traverse is suitable for the survey of roads, rivers, coastlines etc.

Methods of traversing

Traverse survey may be conducted by following methods

Chain traversing

Compass Traversing

Theodolite Traversing

Plane table Traversing

[10:44 PM, 5/30/2021] shruthi gowda: Errors in compass survey

They are

Instrumental errors

Personal errors

Natural errors

Instrumental errors

1. The needle is sluggish

2. The needle is not perfectly straight

3. The pivot is bent or Blunt

4. The pivot is not at the centre

5. The vertical hair in the sight vane is too thick or to loose.

6. The line of sight does not pass through the centre of the graduated Ring.

7. The graduated circle is not horizontal and graduations are not uniform and correct.

Personal errors

1. Compass is not centred properly over the station.

2. The compass is not properly levelled.

3. The graduated ring is read in the wrong direction.

4. Incorrect bisection of stations.

5. Carelessness in reading and recording.

Natural errors

1. Variation in declination

2. Magnetic changes in the atmosphere due to clouds and storms.

3. Local attraction due to proximity of local attraction forces.