

Elements Of Civil Engineering

COMPASS SURVEY

COMPASS SURVEY - Introduction

- Triangulation survey – better for accuracy
- Limitations – area to be surveyed is too large, not possible to form tri-angle due to obstacles, obstructions in chaining
- TRAVERSE SURVEY
- For traversing – it is necessary to know directions of survey lines

Compass Survey – Introduction Cont.

- **Meridian** – The directions of survey lines are measured in terms of angles with some pre-decided fixed directions, this fixed direction is called **Meridian**.
- Every time when the survey line changes its direction, its angle with meridian is measured.
- Usually, the **line joining magnetic North and South poles** is considered as meridian known as **Magnetic Meridian**.

Compass Survey – Introduction Cont.

- Magnetic needle – a thin strip of magnet
- when suspended freely points towards magnetic North
- This property is used to prepare the instrument called – COMPASS
- **Compass** – An instrument used for measuring angles of survey lines with magnetic meridian
- Prismatic compass – the most suitable instrument for compass survey

Compass Survey

Use of Prismatic Compass

- Use of Prismatic Compass in Surveying
 - To know the North Direction
 - To carry out Traverse survey
 - To measure angles between survey lines
 - To know bearing (angle with magnetic meridian) of survey line
 - To establish on ground, a line having desired bearing
 - To locate on ground, the point shown on map
 - To locate on the drawing, the position of a point on ground

Compass Survey

Compass - Components and Functions

- Compass box – a box in which all the components of compass are housed
- Pivot – a pointed support for the magnetic needle, prepared from hard steel
- Magnetic Needle – a thin magnetic plate, indicates North direction
- Agate cap – a small piece of hard glass provided on the top of pivoted point, to reduce wear and tear of point of pivot

Compass Survey

Compass - Components and Functions Cont.

- Compass Ring – a light wt ring attached to magnetic needle
 - graduations showing 0° to 360° showing degrees and half degrees
 - 0 deg is marked on south end of needle
 - Reason – when we sight North direction, object vane remains towards North and eye vane is towards south, reading is observed through prism which is attached to eye vane, the reading must be zero in this situation of compass

Compass Survey

Compass - Components and Functions Cont.

- Ring is graduated – to note the deflection angle between magnetic North and Survey line
- Figures on ring are written inverted so that they appear in normal position when looked through prism
- Glass Cover – prevents dust nuisance and disturbance of needle due to wind
- Prism – readings printed on horizontal face of compass ring can be read from vertical position
- Prism cap – provided at bottom of prism, closes window of prism when not in use

Compass Survey

Compass - Components and Functions Cont.

- Eye vane – kept on prism side of compass, slit is provided in eye vane for ranging and bisecting purpose and for reading bearing
- Sun glasses – attached to eye vane and are useful to protect eyes from sun rays
- Focusing stud for prism – useful for focusing prism and keeping at proper ht so that readings can be clearly seen
- Hinged strap – provided for holding prism and sun glasses

Compass Survey

Compass - Components and Functions Cont.

- Object Vane – provided to bisect object, hair/wire is attached for precise bisection
- Hair – vertical hair/wire for bisecting object
- Adjustable mirror – useful to bisect objects which are too low or too high
- Brake pin – a pin, when pushed it touches spring brake and oscillations of compass ring are damped
- Brake – is used to damp oscillations of needle & bring it to still position quickly

Compass Survey

Compass - Components and Functions Cont.

- Lever lifting pin – when object vane is brought to horizontal position, this pin is pressed downwards, which lifts lever and there by magnetic needle is lifted up. This prevents sharp point of pivot from wear and tear.
- Needle lifting lever – a lever to lift needle off sharp pivot when compass not in use
- Socket – is small threaded piece of tube attached to the bottom of compass, used to attach compass to top of the tripod stand
- Rider – is counter wt, provided to balance magnetic needle

Compass Survey

Procedure for Using

- **Centering** tripod stand with compass on station – use pegs, ranging rod, tripod, plumb bob
- **Levelling** the compass – i.e. pivot in vertical position and magnetic needle in horizontal position
 - Release threads of ball and socket arrangement
 - Bring top surface of compass in horizontal position
 - Check with cylindrical pencil or any other object
 - Tighten threads of ball and socket arrangement
 - Remove iron articles lying near compass

Compass Survey Procedure for Using – cont.

- **Measuring angle** between line AB and magnetic meridian
 - Carry out centering and leveling at station A
 - Slide prism cap below the prism, open window
 - Look through prism, adjust prism up or down till graduations and readings on ring are seen clearly
 - Bring object vane in vertical position
 - Rotate compass slowly, bring it in position so that bottom of ranging rod is bisected by vertical hair when you see through slit of eye vane
 - Allow compass ring to be steady, apply brakes if required when oscillations is about half
 - Note the reading

Compass Survey Procedure for Using – cont.

- **Check points** before observing reading
 - Compass is in level position
 - Magnetic needle is free
 - Iron articles are away from the compass
 - Plum bob suspended from the compass is over peg
 - Sighting vain hair bisects the ranging rod
 - Prism cap is open
 - Prism is focused properly
 - Needle is stand still

Compass Survey - Definitions

- **Meridian** – a straight line on surface of earth selected as a reference line for the purpose of measuring angles.
 - **True Meridian** – a line joining geographical North and South poles
 - **Magnetic Meridian** – the direction indicated by freely suspended magnetic needle which is not affected by any local attraction
 - **Arbitrary Meridian** – For small survey work one line is selected and the angles of survey lines are measured w.r.t this selected line
- **Bearing** – horizontal angle between a line and the selected line (meridian)