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BASIC CONCEPTS

Contents
❖ Introduction,
❖ Basic definitions,
❖ Different Disciplines (& Surveys) in Geomatic Engineering.
❖ Co-ordinate systems
❖ Angular systems,
❖ Error types.

Coordinate Systems

It is very mandatory to fully understand the aspect of coordinate systems. This is critical for data management and analysis considering its integration. For example, a Agricultural Engineer may wish to analyze the best location for a new site of operation surrounded by Mines and other Engineering facilities. This would call for an overlay of data from the Mining Engineer and a Civil Engineer, which may lead to some transformation of systems in most cases.

Coordinate Systems

- By now understand that the earth is NOT flat but Spherical. Question: If the earth is spherical, how are plans/maps flat?

- Maps are made as a plane reproduction of the earth, and this leads to what is termed as projection system to reproduce the earth on the plane in the most accurate with least distortion.

- For this reason, we have a number of projection systems suitable for different parts of the world and different use.

- In Zambia, Universal Transverse Mercator (UTM) is used. Imagine a sphere wrapped in a cylinder then split open.

Coordinate Systems

Transverse Mercator Projection

Developed Cylinder
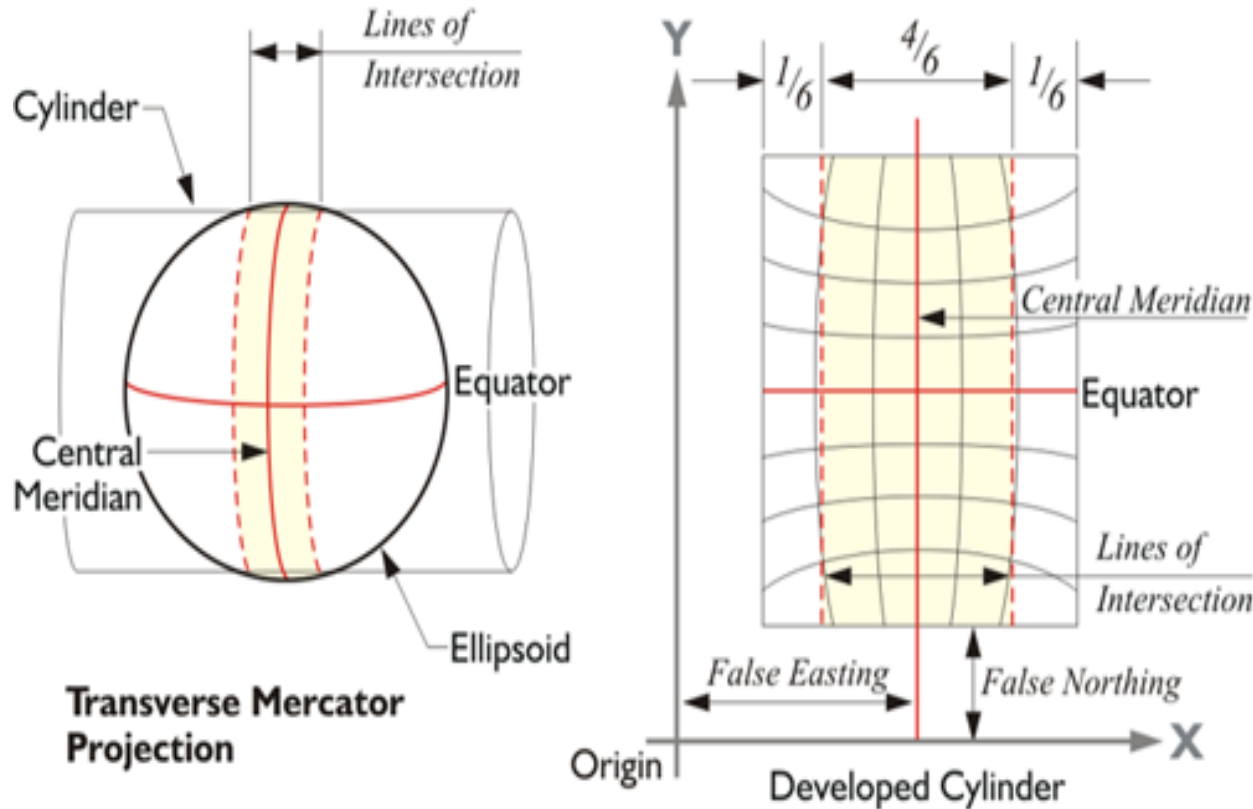
Specifications:
Units: metre

Orientation:
Easting (E) =
Positive to the East,
Negative to the West

Northing (N) =
Positive to the North,
Negative to the South

Therefore, a point P may be defined as P(E,N) = P(1000m, 1000m).

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Angular Systems

- Angles are normally measured in the following systems:
  - degrees (360 to one complete rotation), minutes (60 to 1 degree) and seconds (60 to one minute).
  - However some instruments measure in gons (400 to one complete rotation) and decimal fractions (0.001 gon=l milligon; 0.0001 gon=l centesimal second).

  Full details of this will be discussed under angular measurements in the next topic.