Topographic Maps and Contours

Academic Resource Center
Topography: The relief features or configuration of an area.

*How do we measure it?
Topographic Maps

How do they do it?

Contour Lines
Contour Lines

- Contour lines, or isohypses, connect points of equal elevation.

- Consider a receding water level.
Contour Map Characteristics

- **Index Contours** are used to label the elevation of their associated points.
- Bolded to facilitate reading of the map.
- Often occur in intervals of five contour lines.
Contour Map Characteristics

• **Contour Interval:** Horizontal distance between two contours
  
  • *Close together:* Steep slope
  
  • *Far apart:* Gradual slope
Contour Map Characteristics

- **Valleys**: Lines form a “V” pattern along valleys.
- “Vs” point upstream; indicating the direction of the stream flow.
- Streams **always** flow downhill.
- Contours can and do cross streams.
Contour Map Characteristics

- **Concurrency**: Contour lines *never* cross or divide.
- **Cliffs**: May appear to merge on vertical cliffs, but are stacked.
- **Caves**: May appear to cross in caves, but go under one another.
Contour Map Characteristics

• **Hills and knobs** are shown as closed, concentric contours.

• **Closed depressions and basins** are shown as closed contours with hatches pointing downslope.
Contour Map Characteristics

- Other geologic features commonly expressed by contour maps include:
  - Drumlins
  - Sink Holes
  - Sand Dunes
  - Volcanos
  - Dissected Plateaus
  - Rolling Hills
  - Folds
Contour Map Generation

• In the field, points and their elevations are measured using automatic levels, total stations, or GPS devices.

• Geotechnical engineers use these points to generate topographic maps.
Contour Map Generation
Contour Map Generation

- **Estimating Contour Intervals:**
  - Use an engineering scale
  - Measure the distance between two points
  - Divide the distance by the number of contours
  - Mark the points along the interval
Contour Map Generation

- **Example:**
  - Contours are to be placed every ten feet.

- \( d = 300 \text{ feet} \)
- There are to be three contour lines on this interval.
- Divide 300 feet by 3 to get one contour every 100 feet.
- Mark four points (two on the endpoints, and two between) and draw the contours.
Topographic Profiles

- Cross-sectional view of a portion of a topographic map.
- Used to demonstrate the vertical scale of landforms.
- Usually use an exaggerated scale.
Topographic Profiles

• **Generating profiles:**

  • Draw a line between the two points bounding the desired profile area.
  • Place a folded sheet of paper along the line.
  • Mark each contour line intersecting the paper.
  • From each mark, indicate the vertical height with a dot on a scale.
  • Connect the height dots with a smooth line.
Other Mapping Methods

• Aerial Photography
  - Extensive visual details
  - Allow stereoscopic viewing
  - Lack information about rock bodies, terrain, and other geologic features
Other Mapping Methods

- Landsat and Radar
  - Earth Resources Observation System (EROS): satellite array
  - Can see through cloud cover
  - Can be enhanced with false color
  - Used by Google Earth
Other Mapping Methods

- **Computer Generated Terrain Models**
  - Store vast amounts of data
  - Can be rendered from Landsat and radar data
  - Vertical scale can be exaggerated
  - Reveals features that may not be immediately apparent
Other Mapping Methods

- Geologic Maps
  - Display different rock types in an area
  - Readily available on United States Geological Survey websites
  - Usually lack elevation information
Questions?