Introduction to Aerial Photographs and Topographic maps (Chapter 3)

For this assignment you will require: a calculator and metric ruler. Objectives: you should be able to use a stereoscope to view a stereogram, a pair of aerial photographs; explain what a topographic map is and how it can be used to study landforms; use map scales to determine distances; determine the latitude and longitude of a place from a topographic map; use the Public Land Survey System (township and range) to locate features; explain how contour lines are drawn and be able to use contours to determine elevation, relief, and slope of the land; construct a simple contour map and topographic profile.

THE FOLLOWING QUESTIONS REFER TO CHAPTER 3 IN YOUR MANUAL
(Read the questions from your manual and place your answers in the following spaces provided.)

1. Complete questions 1 through 2 on the diagrams in you manual, page 49, 8th edition. This will give you the needed practice to move on to the following questions.

3. What is the white, curved feature that extends from the base of the cone to its summit?


Use the topographic map provided by your instructor for the following questions:

5. What is the name of your map?

6. Notice the small reference map and compass arrow in the lower margin of the map. In what part of the state (center, northwestern, southwestern, etc.) is the area depicted in this map located?

7. The names of adjoining maps are given along the four margins and four corners of your map.

• What is the name of the map that adjoins the Western edge of your map?

• What is the name of the map that adjoins the Northeastern edge of your map?

8. Information about when the area was surveyed and the map published is provided in the margin of the map. When was the area surveyed? When was the map published? If the map has been revised, when was the revision completed?

• Surveyed:  Published:  Revised:

9. Since the geographic North Pole and North Magnetic Pole of Earth do not coincide, the north arrow on a topographic map often shows the difference between true north or geographic (TN) and magnetic north (MN), the direction a compass would point, for the area represented this difference in degrees is called the magnetic declination. What is the magnetic declination for this map? Don’t forget to include the direction of declination.

• Magnetic declination:

10. In general what color(s) are used for the following types of features?

• Highways and roads:

• Buildings:

• Urban or populated areas are depicted using (color and/or features):

• Wooded areas:

• Water features:
11. Examine your topographic map as well as the large wall maps in the laboratory and write out the fractional scale for each in the following space. Then answer the following questions.

- Topographic map:  
- USA Map:  
- World Map:

- Which of the three maps has the largest scale (smallest denominator in the fractional scale)?

- Which of the three maps covers more square miles?

12. Depending upon the map scale, 1 inch on a topographic map represents various distances on Earth. Convert the following scales and round to the nearest mile. (Hint: 5280 feet = 1 mile.)

- 1:24,000  
  1 inch on map = feet on Earth
- 1:62,500  
  1 inch on map = mile(s) on Earth
- 1:250,000  
  1 inch on map = mile(s) on Earth

13. Examine figure 3.4 (7th edition) or figure 3.6 (8th edition) and complete the map description by choosing the appropriate terms (smaller or larger) (more or less).

- Maps with small fractional scales (e.g. 1:250,000) cover a ______________________ area and provide _________________ detail. Maps with large fractional scales (e.g. 1:24,000) cover a ______________________ area and provide _________________ detail.

14. What are the latitudes of the top and bottom edge of the map supplied by your instructor? Don’t forget to include whether the latitude is North or South of the Equator.

- Northern (top of map) edge: ° ‘ ”
- Southern (bottom of map) edge: ° ‘ ”

15. How many total minutes of latitude does the map cover?

16. What are the longitudes of the left and right edges of the map? Don’t forget to include whether the longitude is East or West of the Prime Meridian.

- Western (left side of map) edge: ° ‘ ”
- Eastern (right side of map) edge: ° ‘ ”

17. How many total minutes of longitude does the map cover?

18. The total minutes of latitude and total minutes of longitude covered by the map are equal. Why is the appearance of the map rectangular rather than square?
19. Your instructor will supply you with the names of two features (school, church, etc.) located on the map. Write the name of each feature, as well as its latitude and longitude. Don’t forget to include whether the latitude is North or South of the Equator and whether the longitude is East or West of the Prime Meridian.

- Feature name:
  - Lat: 
  - Long:

Feature name:

A. Lat: 

B. Long: 

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Figure 3.7 Hypothetical Public Land Survey System map, showing the locations of various parcels of land.
20. Use the PLS system described in figures 3.6 and 3.7 (7th edition) or figures 3.7 and 3.8 (8th edition) to label the townships, ranges, and sections in the following figure (3.7) (7th edition). Use the copy of Figure 3.7 (7th edition) provided on Page 3 of this packet to complete the following. Not all sections will be subdivided more than once, so you may not use all of the spaces provided below.

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<tr>
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<td>C:</td>
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21. Use the copy of Figure 3.7 provided on Page 3 of this packet to locate each of the areas described below on diagrams A, B, and C in figure 3.7 by placing the appropriate letter (D or E) on each of the three diagrams.

- D: SW ¼, SW ¼, Sec. 2, T3N, R3E
- E: SE ¼, NE ¼, Sec. 34, T4S, R5W

22. Your instructor will supply you with the name of a feature (school, church, etc.) located on the map provided by your instructor. Using the PLS (Public Land Survey system) write the name of the feature, as well as its complete PLS location.

- Feature name:
- Location:

23. Practice with the stereoscopes on figure 3.2 (7th & 8th edition) and compare the stereoscope image with the actual contour map.

24. Figure 3.14 (7th edition) or figure 3.16 (8th edition) shows both a perspective view and contour map of a hypothetical area situated along an ocean coast. The elevations in feet above mean sea level of several contour lines and points are identified on the map for reference. Use this figure to answer the following questions.

- What is the Contour interval? feet
- What characteristics of the contour lines indicate that the slopes are steep?
- Notice what happens to the contour lines as they cross a stream. The "peak" or "V" formed by a contour line as it crosses a stream points (upstream or downstream) Write your answer here, don’t circle it.
- What are the elevations of the points designated with the following letters?
  - A: feet
  - B: feet
  - C: feet
- The approximate elevation of the church is (12, 22, or 32) feet. Write your answer here, don’t circle it.
• What is the total relief shown on the map?

Highest elevation (ft) – lowest elevation (ft) = total relief (ft)

• What is the slope of the mountain located on the east side of the diagram from its summit (peak), directly south to the ocean?

Slope = feet/mile

Use the topographic map supplied by your instructor to answer the following questions.

25. What is the datum that has been used for determining the elevations of the map? A Datum is the various sets of data used to determine elevations, etc. and are used to construct the topographic map. The titles of these datums refer to specific sets of data. More than one datum may be used to construct the map.

• Datum(s):

26. What is the Contour interval of the map?

27. What are the lowest and highest elevations found on the map?

• Lowest:  
• Highest:

28. Your instructor will provide you with the names of three features (school, church, mine, etc.) located on the map. Write the elevation of each feature in the following spaces.

Feature name:  
Elevation:  

Feature name:  
Elevation:  

Feature name:  
Elevation:  

29. After examining the topographic map, describe the shape of the landscapes depicted by the map. For example, is it mountainous with sharp peaks, hilly, flat valleys, desert, forested, many lakes, etc.?

30. Use the copy of figure 3.11 (7th edition) or figure 3.12 (8th edition) included on page 6. To help understand the process of drawing a contour map, using a pencil, complete the contour map shown in figure 3.11. The points illustrated are of known elevation. The 100-foot contour line has been drawn to provide a reference. Using a 20-foot contour interval, draw a contour line for each 20-foot change in elevation below and above 100 feet (e.g. 80 feet, 60 feet, 120 feet, etc.) You will have to estimate the elevations between the points. Label each of the lines with the proper elevation.

31. Use the copy of figure 3.11 or figure 3.12 (8th edition) included on page 6. In Figure 3.11, in general, the land slopes toward the (north or south). Write your answer here, don’t circle it.

32. Use the copy of figure 3.11 or figure 3.12 (8th edition) included on page 6. After examining the contour lines and elevations in figure 3.11, show the directions that the streams are flowing by drawing arrows on the map.

33. Use the copy of figure 3.11 or figure 3.12 (8th edition) included on page 6. What is the average slope of the stream on the west side of the map you drew in Figure 3.11?

34. Slope = feet/mile
Figure 3.11 Construction of a contour map and profile. A. Complete this contour map. B. Graph to be used to construct contour map profile.
35. Use the profile graph in figure 3.11 B on the previous page to construct a (west-east) profile along the line A-A’ on the contour map you completed in figure 3.11 A. Follow the guidelines for preparing a topographic profile described in your manual. Your profile will show the relative shape of the topography along the line A-A’.

Extra Credit Questions for Chapter 3:

Use the copy of figure 3.10 (7th edition) or figure 3.11 (8th edition) included below to answer the following questions.

1. What is the contour interval for this topographic map? Feet

2. What is the difference in elevation between points A and B? Feet

3. Notice that every fifth contour line, called an index contour, is printed as a bold brown line and the elevation of that line is provided (in feet). List the elevations for each index contour shown on this map.

<table>
<thead>
<tr>
<th>Feet</th>
<th>Feet</th>
<th>Feet</th>
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</table>

4. Steep slopes are shown by closely spaced contours. Which of the four slopes shown with red arrows labeled (1-4) is the steepest? Which is the least steep?

- Steepest:  
- Least steep:

5. Hills are represented by a series of roughly circular closed contours. Which of the landforms labeled B, C, D, E, or F are hills?

- Hills:

6. Depressions (basins without outlets) are shown by closed contours with hachures (short lines) that point down-slope. Which of the landforms labeled D, E, F, or G are closed depressions?

- Depressions:

7. When contour lines cross streams or dry stream channels, they form a V that points upstream. **Draw arrows** on the copy of Figure 3.10 next to the three streams (shown in blue) to show the direction in which each is flowing.

8. Estimating the elevations of places not located on a contour line is done by extrapolation. For example, a point halfway between the 500- and 600-foot contour line would have an elevation of approximately 550 feet. Which of the following elevations is the best estimation for point N: (830 feet, 870 feet, or 890 feet)?

- Elevation of Point N: feet

9. Relief is defined as the difference in elevation between two locations, such as a hill and a nearby valley. What is the relief from the top of the hill (point D) to the valley (point H) below?

- Relief: Feet

10. What is the approximate elevation of point C? Feet
Figure 3.10  Contour map to be used to answer questions 23–32.