Field Exercise No. 2
Title: Determining Area of a Rectilinear Field by Tape

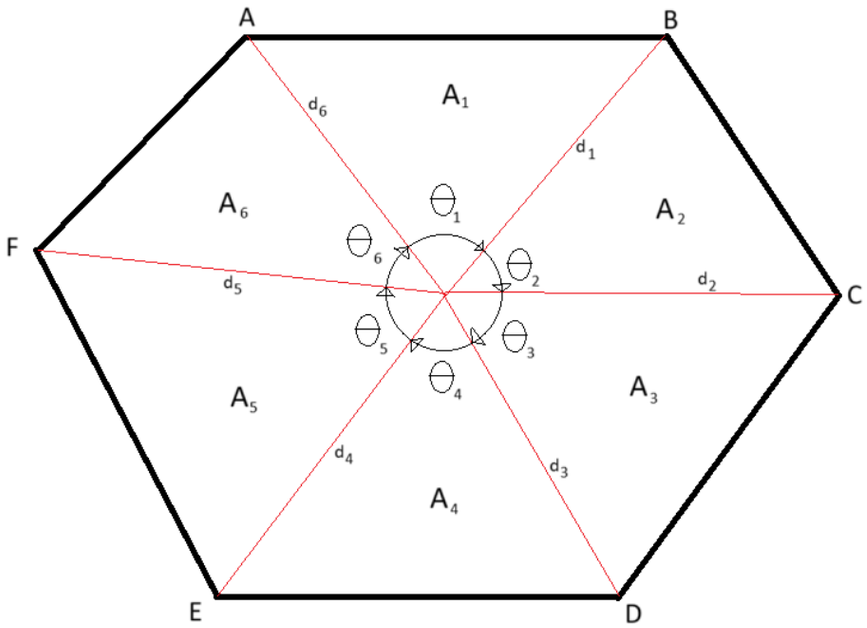
Objectives: a. To learn how to measure horizontal angles with tape.
b. To determine the area of a rectilinear field with tape.

Instruments & Accessories: Range Poles, Steel Tape, Markers

Procedure:

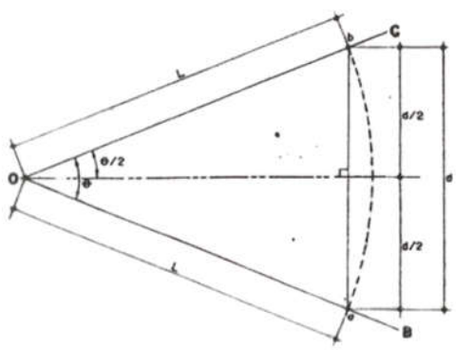
1. Establish the corners of the assigned field and also establish within the field a centrally-located point.
2. Subdivide the field into a convenient series of connected triangles (refer to accompanying figure). Use markers to mark the vertices of each triangle. Call these points A, B, C, and etc.
3. From the centrally – located point, measure distances to each point defining the corners or vertices of each triangle. Call these distances d_1, d_2, d_3, and etc.
4. Using the chord method of measuring angles by tape, determine all the angles about the central point, i.e., Θ_1, Θ_2, Θ_3, and etc.
5. Refer to the accompanying sample tabulation for the recording of observed field data.

Figure 1 – A.



Computations:

1. Determining the Values of Included Angles.
   With the use of a tape, the chord method of measuring angles may be applied to determine the value of an angle. The following formula is used,



Where:
L = any convenient length
d = chord distance
Θ = angle to be measured

INCLUDED ANGLE	CHORD DISTANCE	LENGTH OF SIDE	COMPUTED ANGLE	CORRECTION	ADJUSTED ANGLE
Θ_1					
Θ_2					
Θ_3					
Θ_4					
Θ_5					
Θ_6					

2. Determining Area of each Triangle
   In each triangle, since the length of two sides and the included angle can be determined, the area of the triangle may be calculated by the following formula,

   $A = \frac{1}{2}\, ab \sin(\theta)$ Where: A = area of the triangle

   a, b = the two measured sides of the triangle (d_1,d_2)

   Θ = included angle

TRIANGLE	SIDES		INCLUDED ANGLE	AREA
	1ST	2ND		

3. Calculating the Total Area
   The total area of the field is the sum of the calculated areas of the series of connected triangles into which the field is subdivided, or

   $A_T = A_1 + A_2 + A_3 + A_4 + A_5 + A_6$

Conclusion

Guide Questions for Writing Conclusions in Surveying Fieldwork

1. Did the results of the fieldwork meet the stated objectives of the exercise?
2. Were the intended procedures followed correctly and consistently?
3. How reliable and accurate were the measurements obtained?
4. Were there noticeable discrepancies or errors in the data? If yes, what might have caused them?
5. Did the computed values agree with the expected or theoretical results?
6. Were adjustments or corrections applied to improve accuracy?
7. What difficulties were encountered during the fieldwork?
8. How might human error, instrument limitations, or environmental factors have affected the results?
9. How did teamwork and proper division of tasks contribute to the success of the activity?
10. How can the lessons learned from this exercise be applied to future surveying tasks or real-world engineering projects?
11. What key takeaways did you gain from this fieldwork exercise?
12. How did this activity improve your understanding of surveying principles and practices?