Name: _____

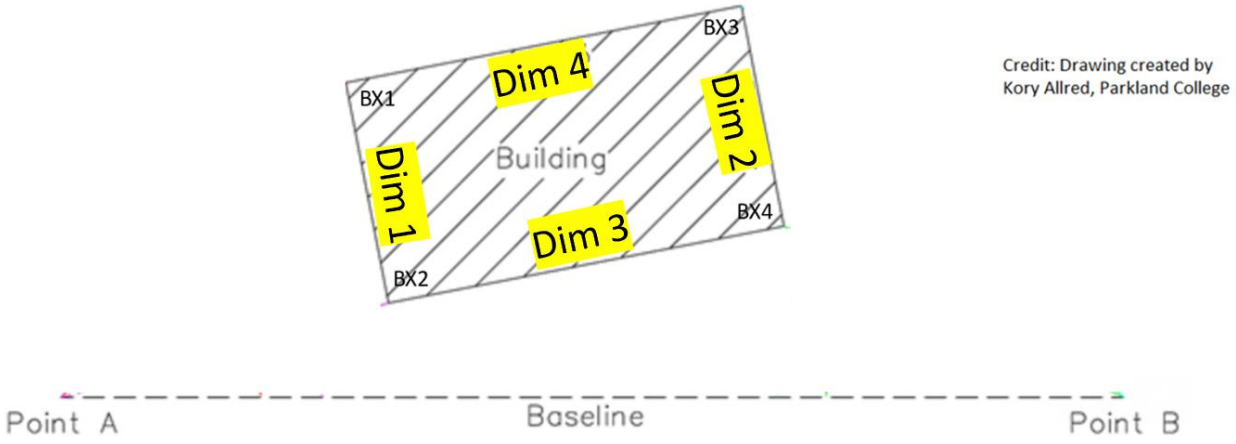
LAND SURVEYING: Using a TOTAL STATION and TRIG

You are a surveyor that has been called upon to conduct an impervious land surface survey.

> Side Note: Impervious surfaces are driveways/walkways/patios, decks/porches, houses/garages/barns, etc. that prevent natural rainwater from being absorbed and filtered through the ground. When water cannot soak into the ground naturally, the water can carry pollutants into local creeks and rivers which poisons fish, wildlife, and humans. In fact, the agricultural runoff from Illinois, consisting of fertilizer, insecticides, and herbicides, which travels to the Mississippi River and down to the Gulf of Mexico, is a main contributor of an ecological issue called the "Dead Zone" where marine life ceases to exist in a 7,000 square mile area of the Gulf.

Sources:
https://www.advsur.com/2019/05/an-in-depth-look-at-impervious-surface-hardcover-surveys/
https://www.noaa.gov/media-release/large-dead-zone-measured-in-gulf-of-mexico#:~:text=This%20year's%20Gulf%20of%20Mexico,according%20to%20NOAA%2Dsupported%20scientists

As cities or counties have zoning requirements for developing land that limit impervious surfaces, a client needs to know how much impervious surface area is left on a piece of property that currently contains a barn.



Credit: Drawing created by Kory Allred, Parkland College

To do this, we will need to find the area covered by the barn in comparison to the area of the land tract of land that the barn sits on. Note: The barn is the only object on this particular tract of land.

As such, we will need to find the dimensions of the barn which contains a rectangular footprint.

1. Having two known points, Point A and Point B, we first set the Total Station at Point A and measure the distance from Point A to Building Corner 1, labeled as BX1. Then, we use the Total Station to measure Angle 1 which is formed by the baseline and Distance 1.

The Total Station indicates:

Distance 1 to be _____ Angle 1 to be _____

2. Keeping the Total Station at Point A, we measure the distance from Point A to Building Corner 2, labeled as BX2. Then, we use the Total Station to measure Angle 2 which is formed by the baseline and Distance 2.

The Total Station indicates:

Distance 2 to be _____ Angle 2 to be _____

3. Now, that we have Angle 1 and Angle 2, what is the measure of the angle opposite Dim 1? ___

4. Since we have two sides of a triangle and the included angle, we can next find Dim 1 which is opposite the included angle. Using the Law of Cosines, what is Dim 1 for the barn? Show your work below.

5. While we physically calculated Dim 1, which is the distance between Building Corner 1 and Building Corner 2, for the barn, a Total Station can use measurement data to automatically calculate Dim 1. What was Dim 1 according to the Total Station? Was our calculation using the Law of Cosines consistent with the Total Station's measurement? Why or why not?

6. Of the barn has a rectangular footprint and we now know Dim 1, what should be Dim 2? Why?

7. Move the Total Station to Point B and use the Total Station to find Dim 2. What steps did you take to do this? What was Dim 2 according to the Total Station?

8. If Dimension 3 has already been measured to be 60.50 feet, what is the area of the space that the barn takes up? Show your work in the space below.

9. If A and B represent the corners of the square tract of land in which the barn sits on, and the distance between those points is 125.10 feet, determine the area of the square tract of land. Show your work in the space below.

10. What is the impervious surface percentage for the square tract of land? Show your work in the space below.

11. If the tract of land is zoned with a 15% impervious surface limit, how much area could still be covered with asphalt, concrete, etc. on this tract of land? Show your work in the space below.