Determining the Area of a Field

All Kansas commercial industrial hemp producer licensees who plant industrial hemp must report planting information, such as acreage or area planted to the Kansas Department of Agriculture ("KDA"). Failure to provide accurate information may result in disciplinary sanctions of the license. Examples of how to measure an area using GPS coordinates and Google Earth and measuring the area by hand are provided within this document. Please note that KDA can answer questions but cannot provide direct assistance concerning report submissions.

Measuring an area using GPS coordinates and Google Earth

To determine an area of a location planted with industrial hemp, it is important to measure the area. If available, GPS coordinates and Google Earth may be used to achieve this.
https://www.google.com/earth/versions/#earth-pro

Step 1

Physically standing in the field, find GPS coordinates of each corner using a GPS locator or smartphone with a similar function. Record those GPS coordinates. The example provided below is that for shape similar to a rectangle.

Corner 1 GPS: 39.203154, -96.576563
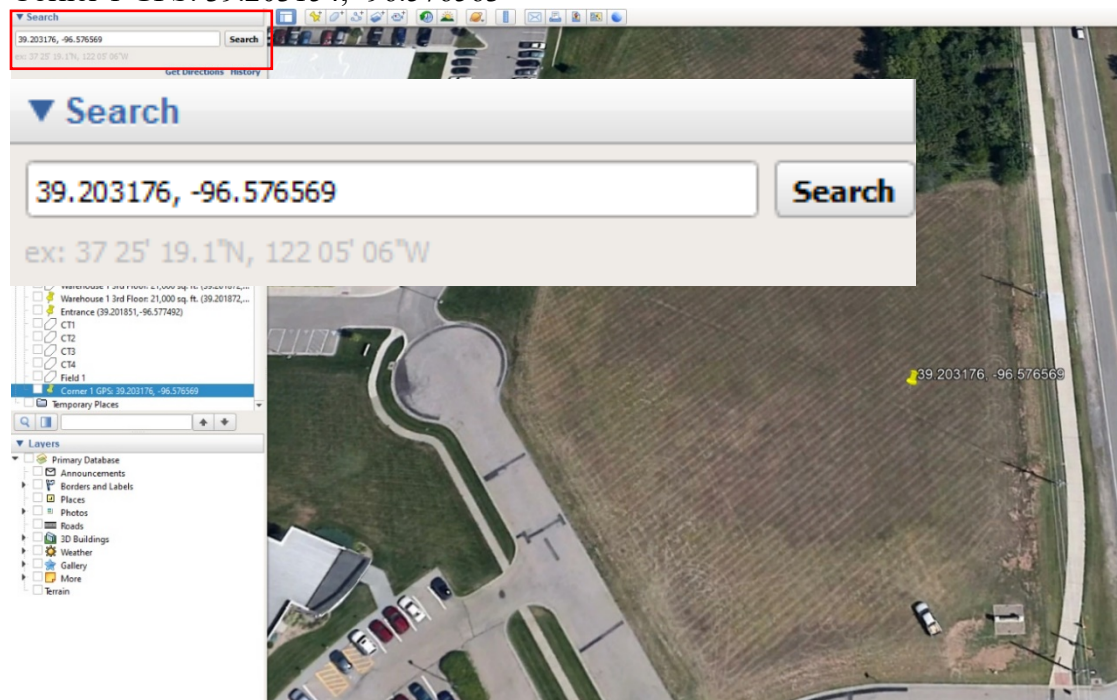Corner 2 GPS: 39.203045, -96.576490
Corner 3 GPS: 39.202884, -96.577133
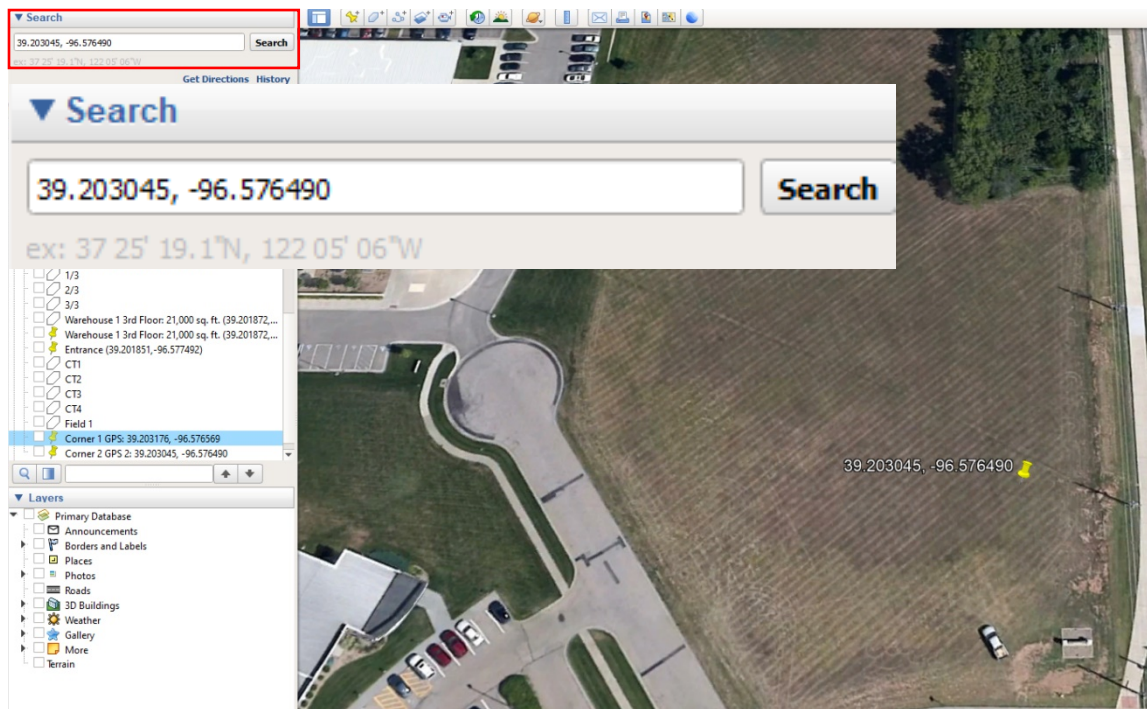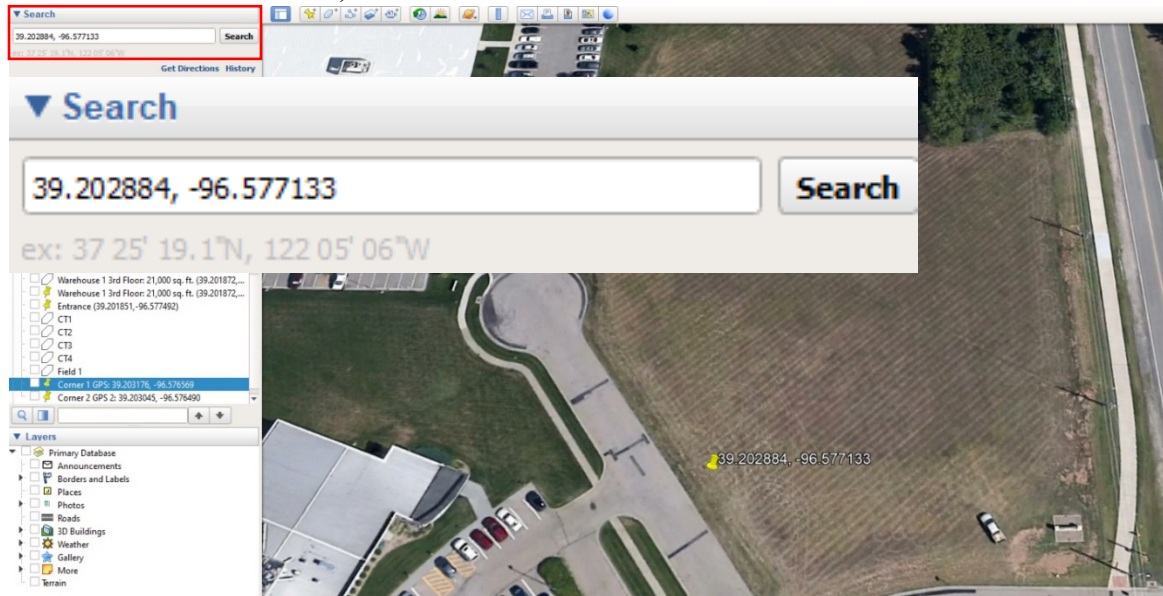Corner 4 GPS: 39.203029, -96.577274

Step 2

Search each corner GPS coordinate in Google Earth and save each corner GPS Coordinate.
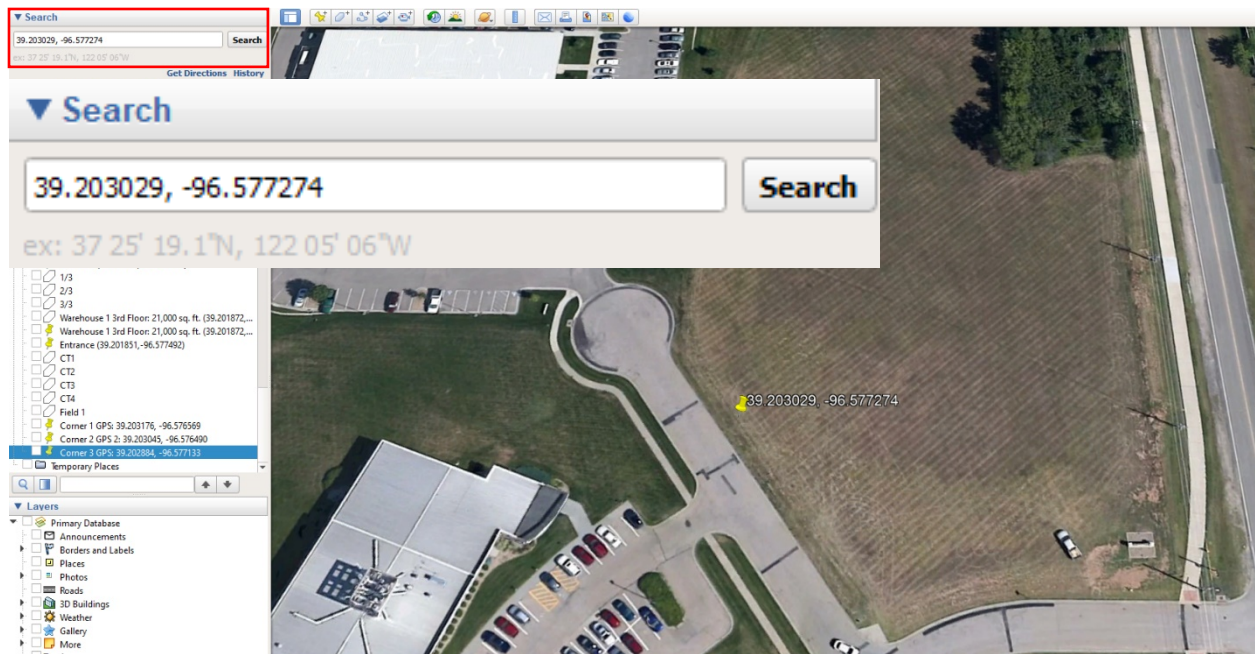
Corner 1 GPS: 39.203154, -96.576563

Corner 2 GPS 2: 39.203045, -96.576490
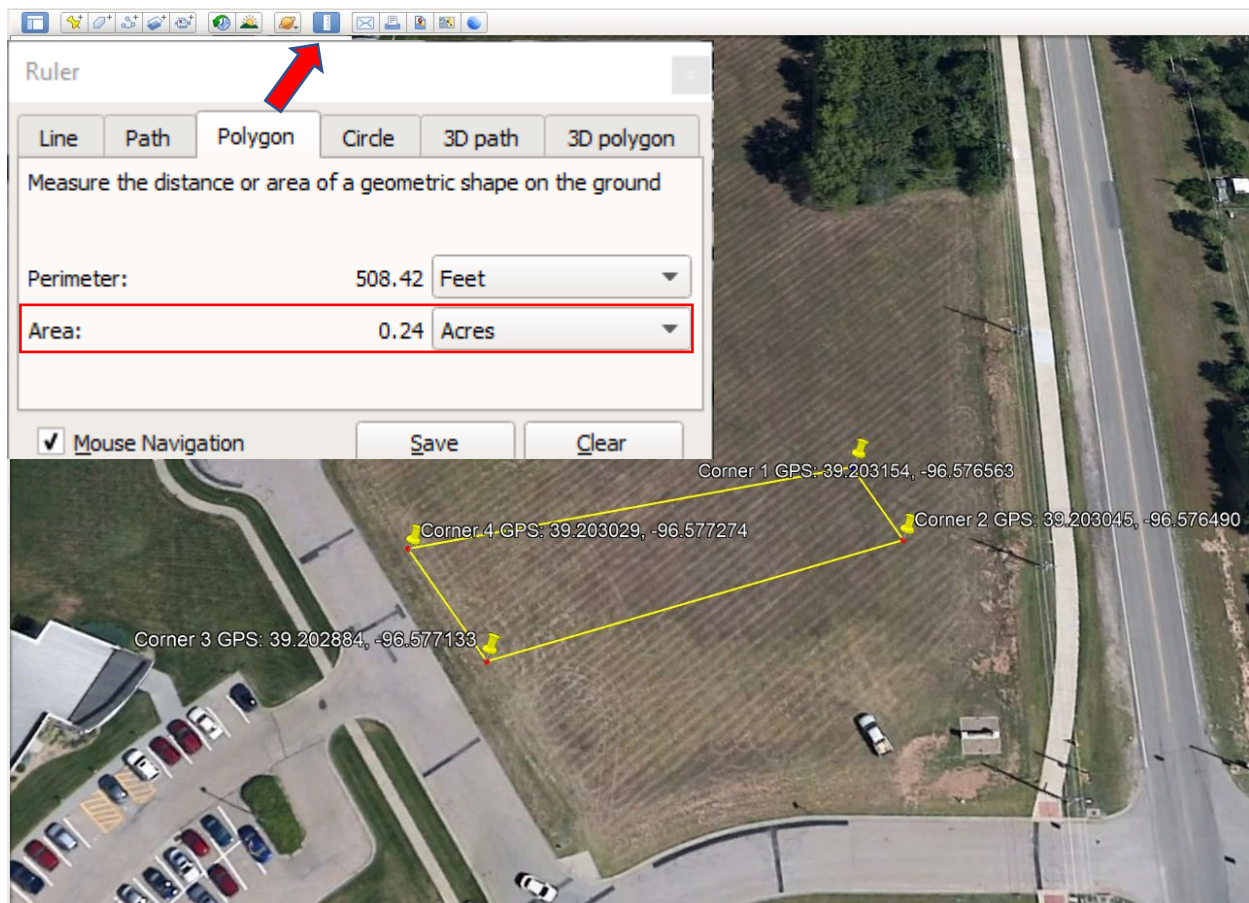

Corner 3 GPS: 39.202884, -96.577133

Corner 4 GPS: 39.203029, -96.577274

Step 3
Measure the approximate area using the polygon function in Google Earth.

Step 4

Include the value of the planted area with industrial hemp on the planting report. Only report the area planted (pink-filled area); do not report the total area licensed (area outlined in blue). An example may be seen below:
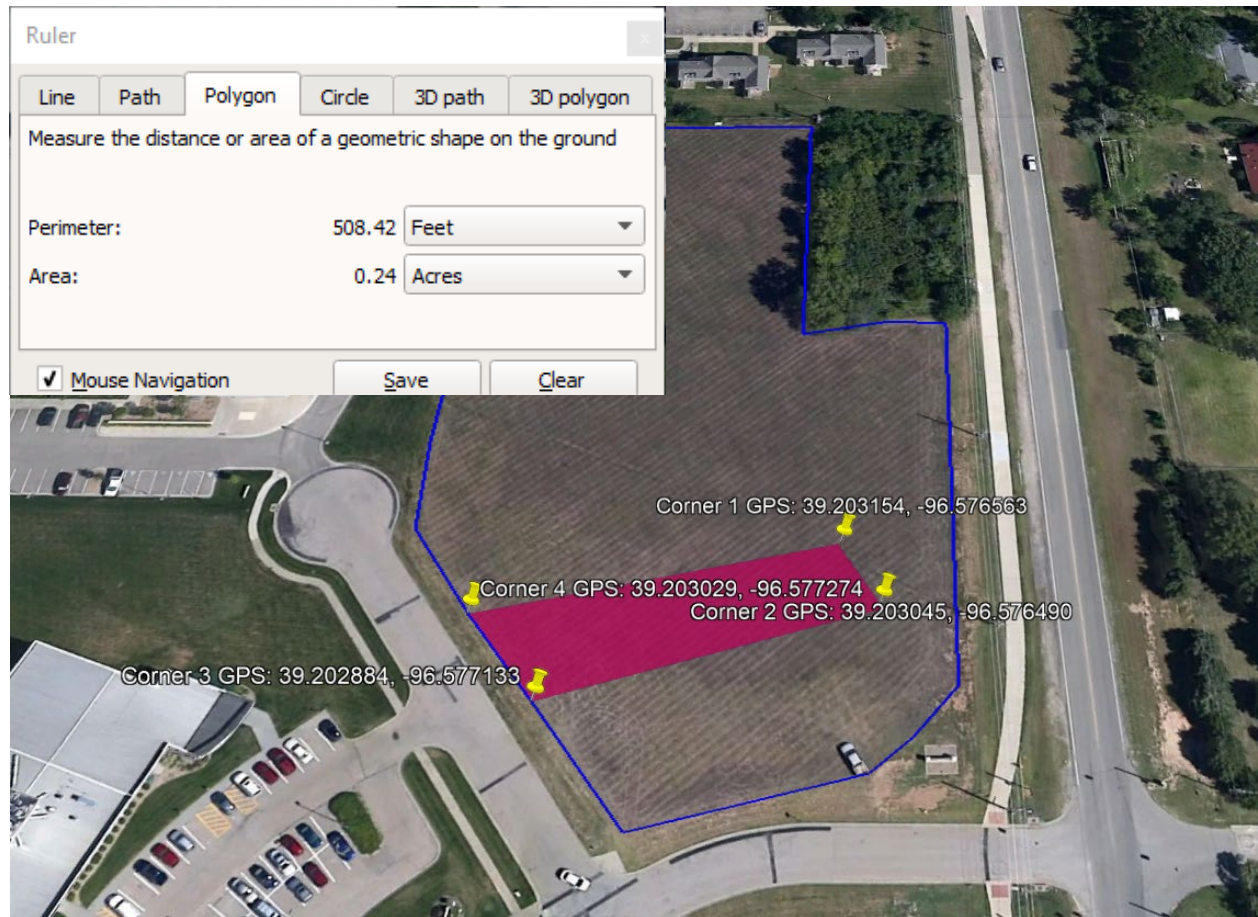
Measuring an area by hand

Determining area by hand may be achieved by physically measuring the field using a measuring tape or measuring wheel. If the planted area is a rectangle, circle or triangle, simple formulas below may be used.

Rectangle: The area of a rectangle is determined by multiplying the length by the width.
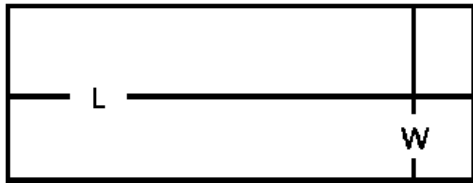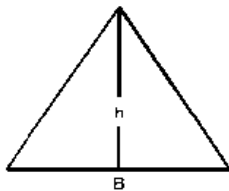
Area of a Rectangle = Length (L) x Width (W)

Circle: The area of a circle is the radius (one-half the diameter) squared, then multiplied by 3.14.
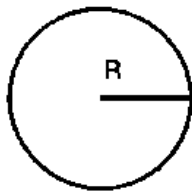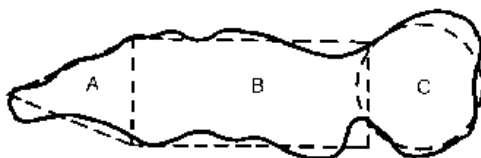
Area of a Circle= 3.14 x the radius x the radius.

Triangle: The area of a triangle is the base (b) multiplied by the height (h), divided by 2.

*Area of a triangle = $\frac{base(b) \times height (h)}{2}$*

Irregular:

Example 1: Irregularly shaped areas often can be reduced to one or more of these common shapes. Calculate the area of each, and then add them together to obtain the total area.

Area A + B + C = Total Area

Example 2: Another way is to establish a line down the middle of the property for the length, and then measure from side to side at several points along this line. Areas with irregular shape require more side to side measurements. The average of the side measurements can be used as the width. The area is then calculated similar to a rectangle.
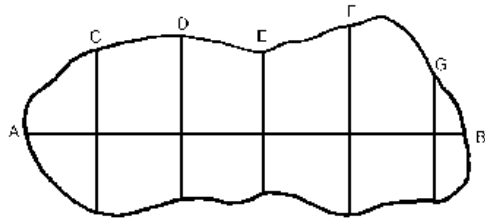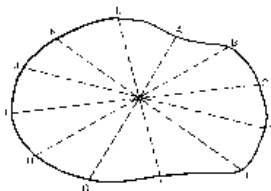

Length = line AB

$$Width = \frac{line\ C+D+E+F+G}{5}$$

Area = Length x Width

Example 3: A third method is to convert the area into a circle. From a center point measure distance to the edge of the area in 10 to 20 increments. Average these measurements to find the average radius. Then calculate the area, using the formula for a circle.

$$Area = (3.14) \times \left(\frac{line\ A+B+\ldots\ldots\ldots K+L}{Number\ of\ Increments}\right)^2$$

or simplified:

Area = 3.14 x the average radius squared

CREDIT: Shape diagrams, formulas and context derived from Frannie L. Miller, et al., *Turf Pest Control*, Kansas State University, September 2013.