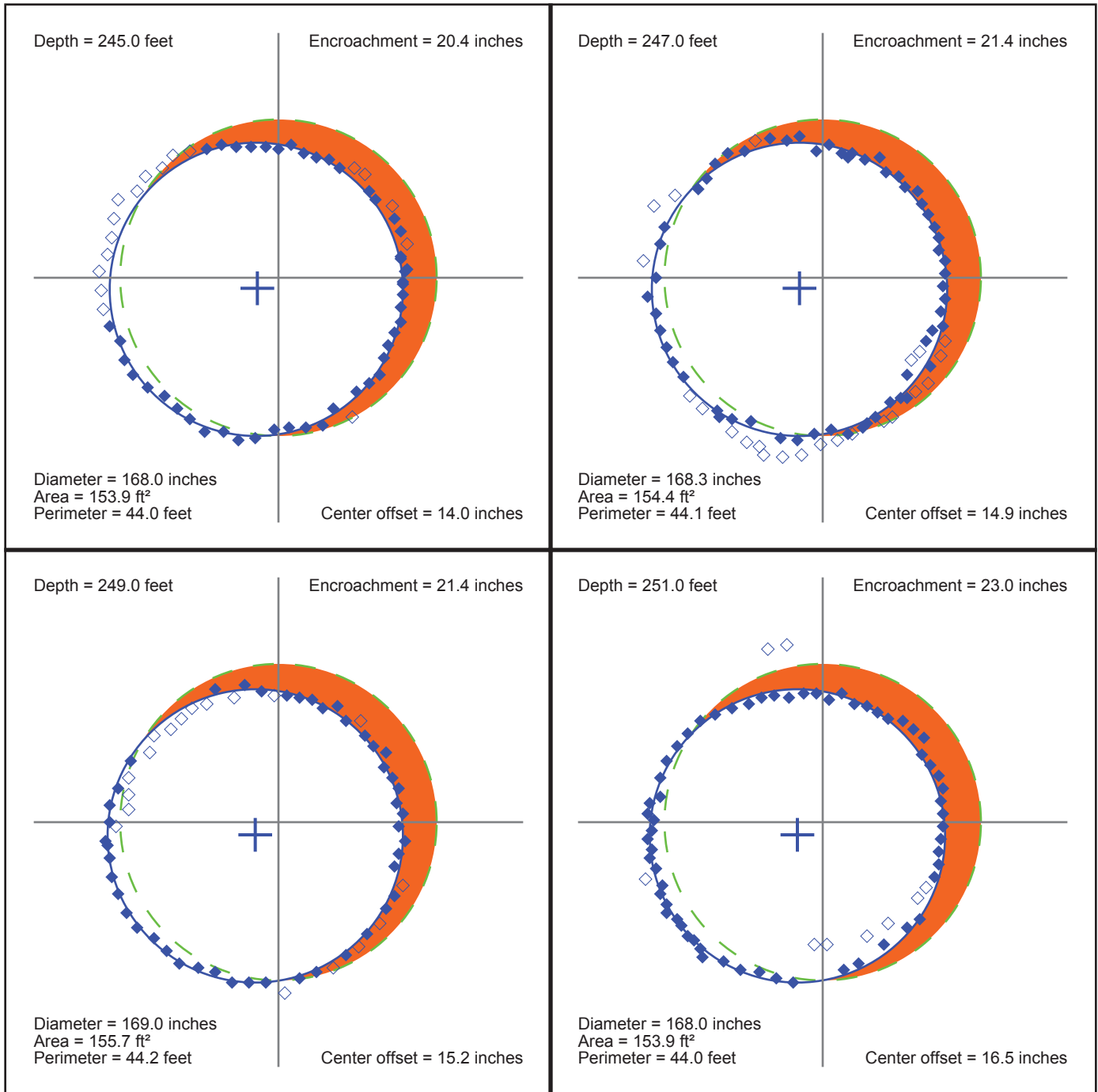


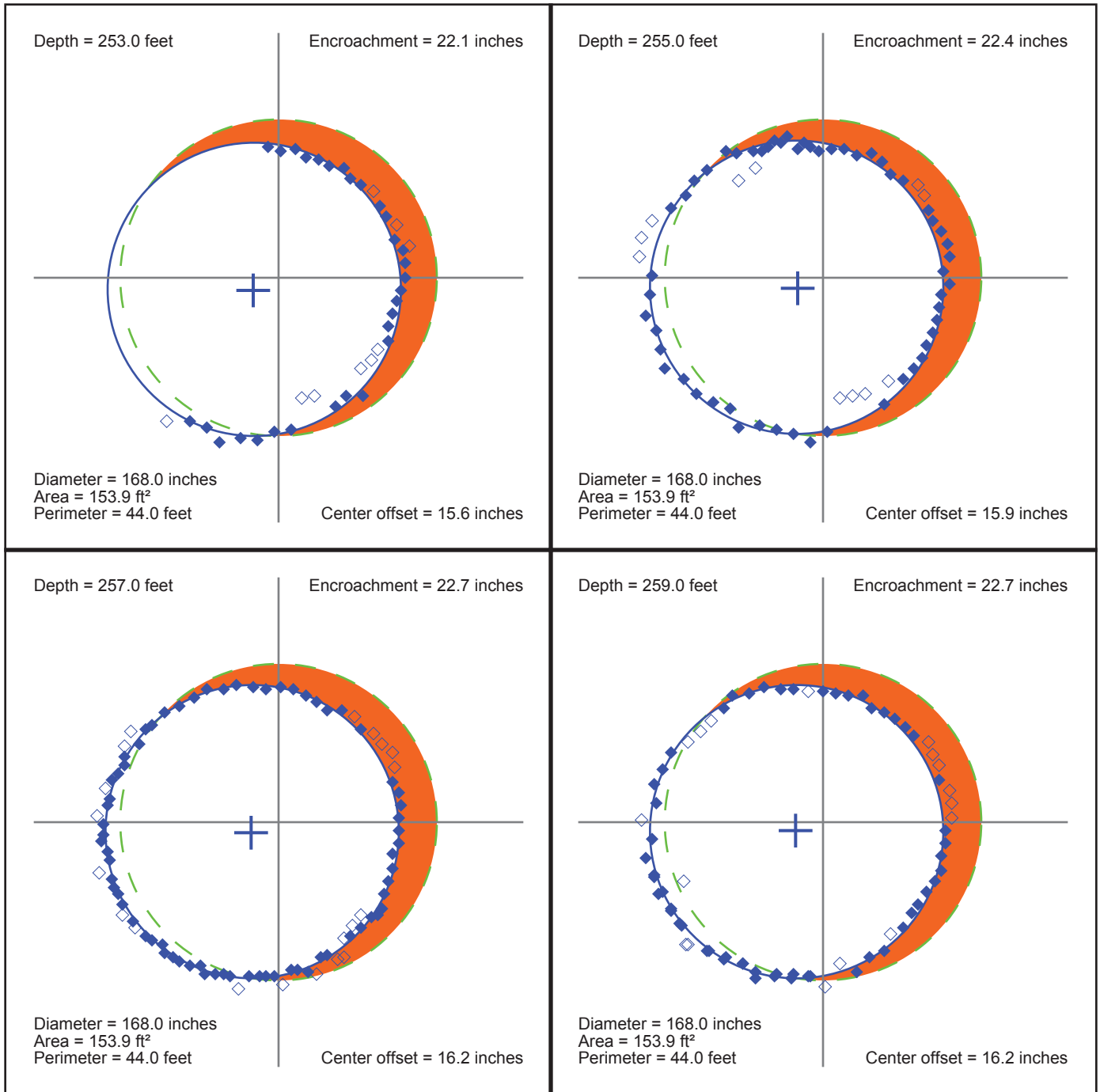
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



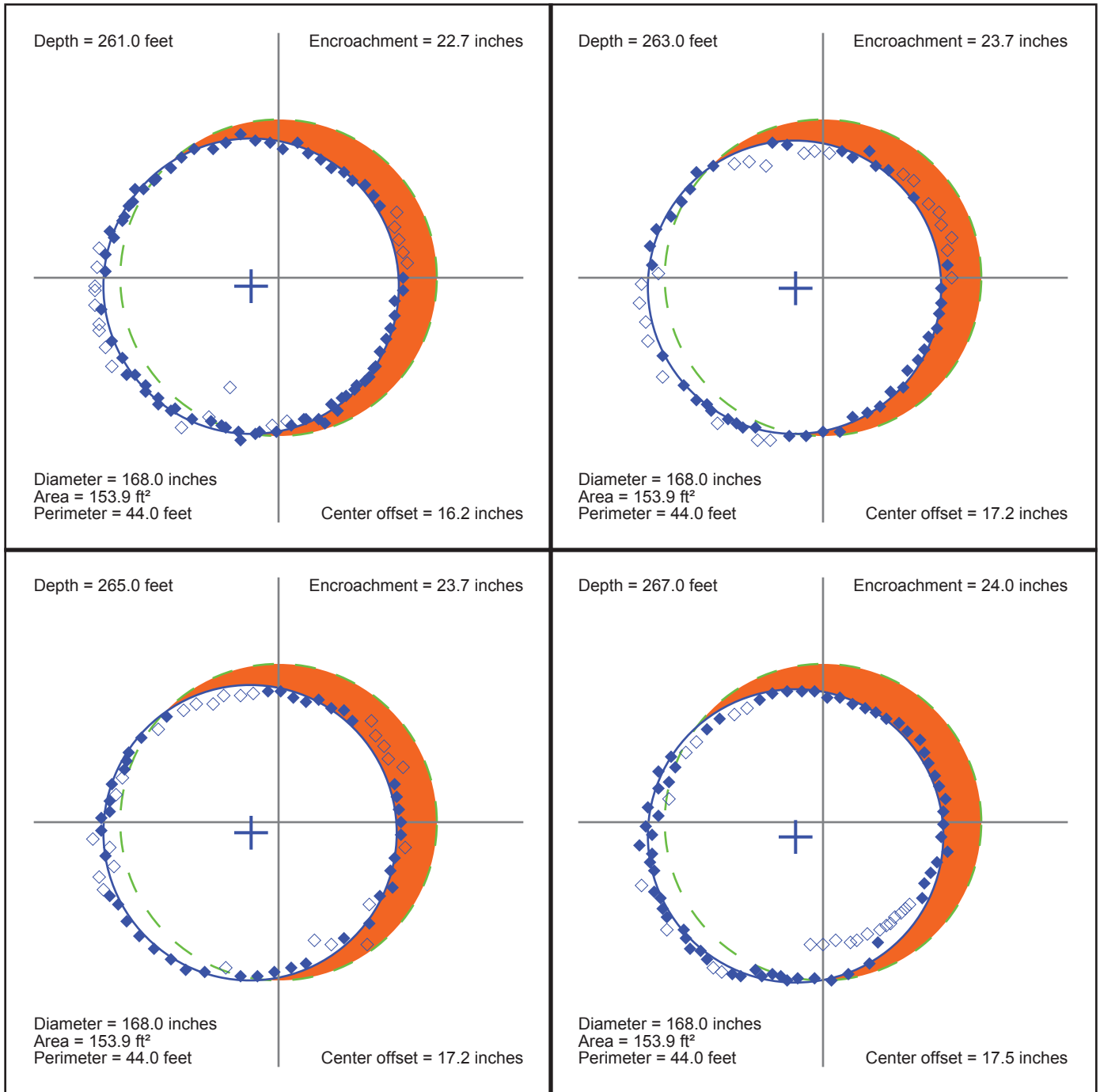
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



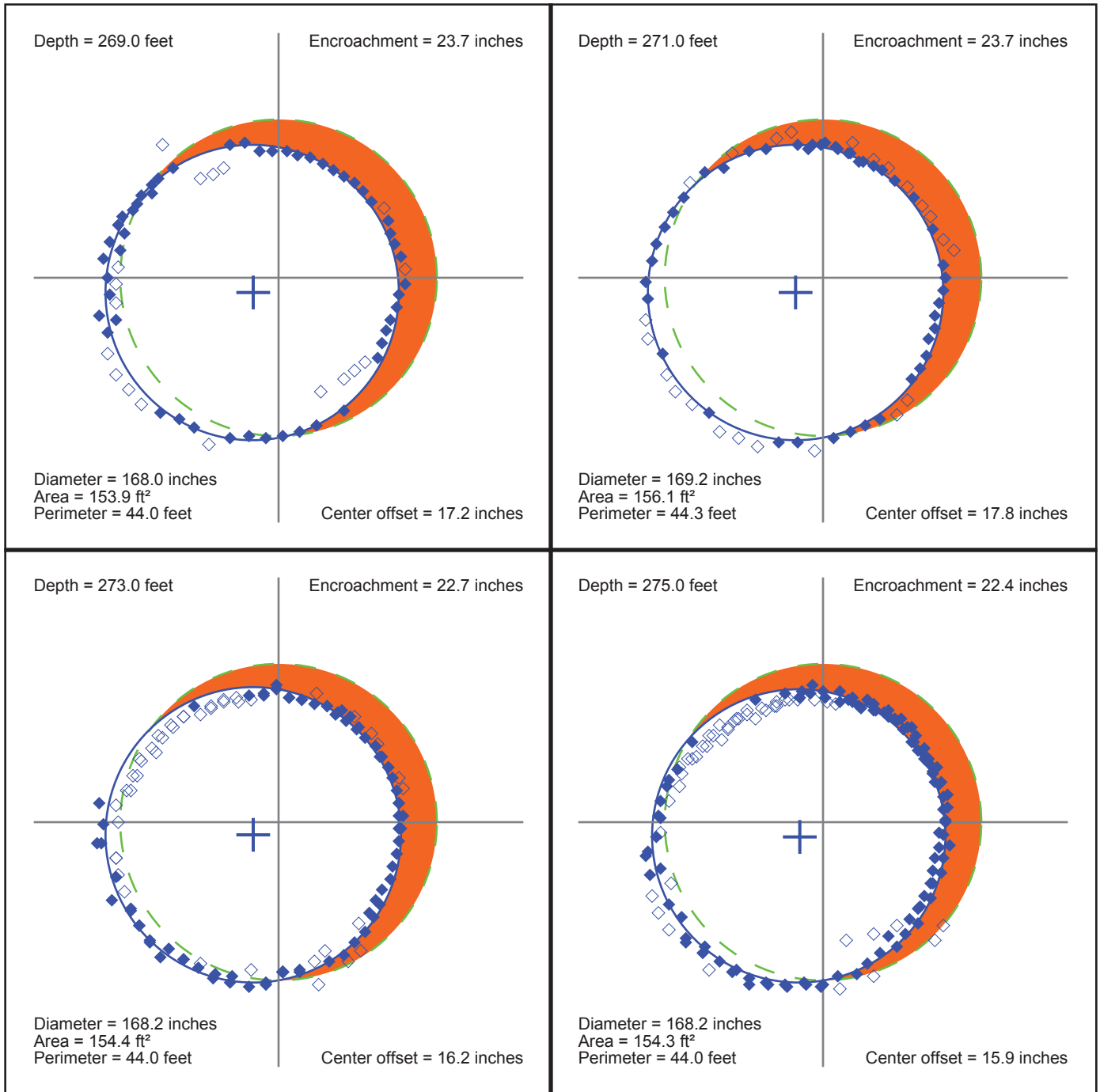
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



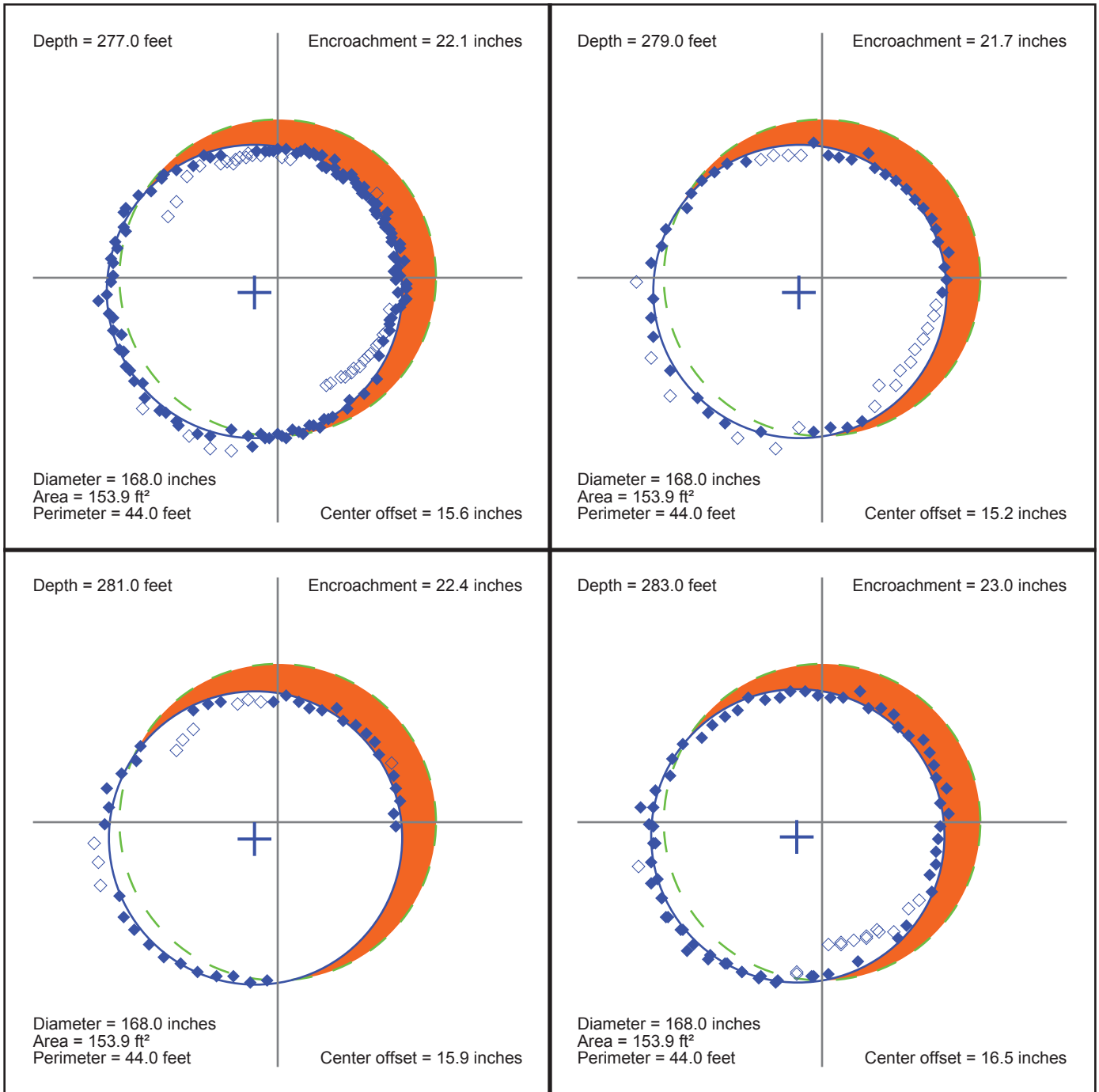
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



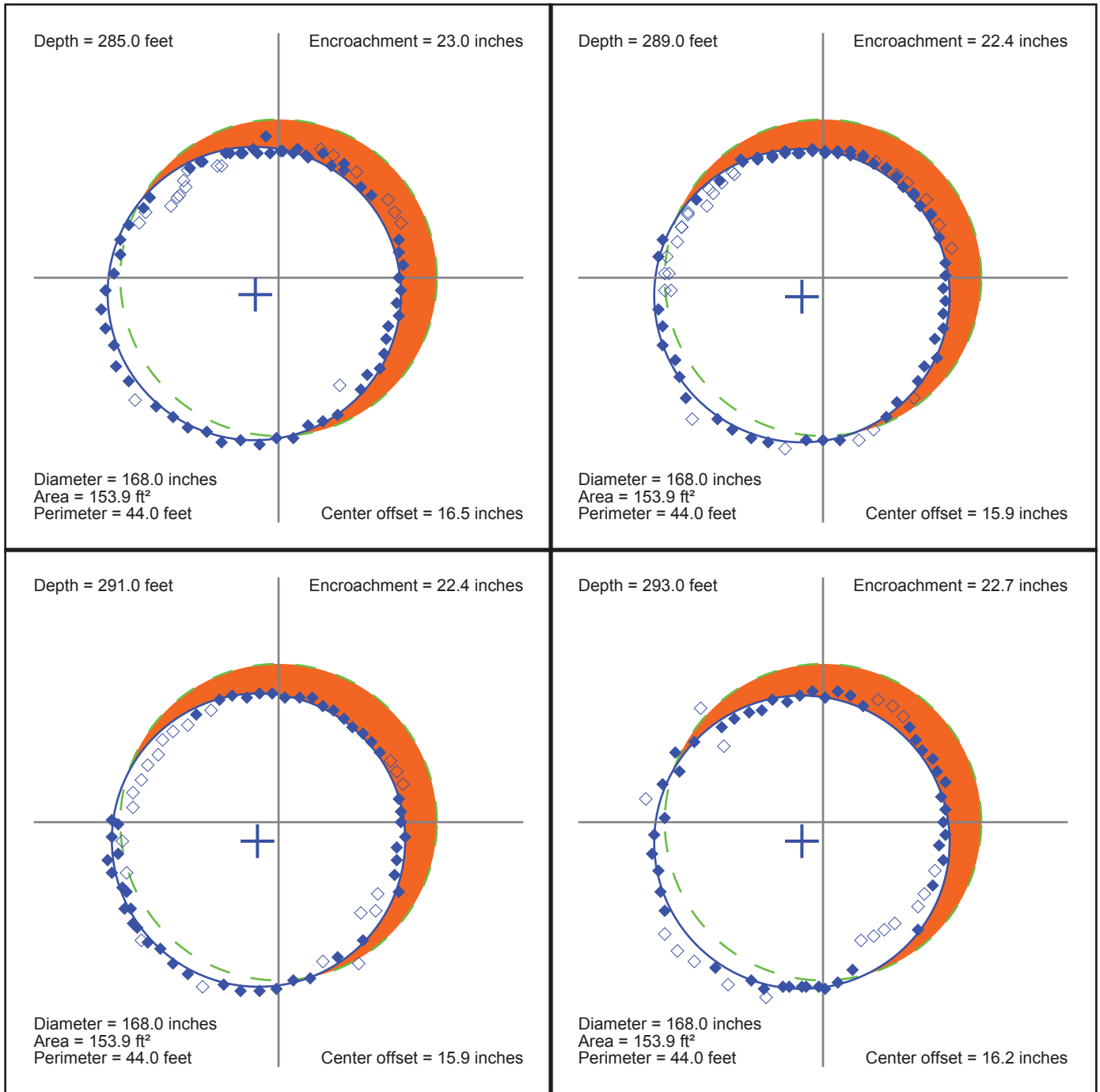
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



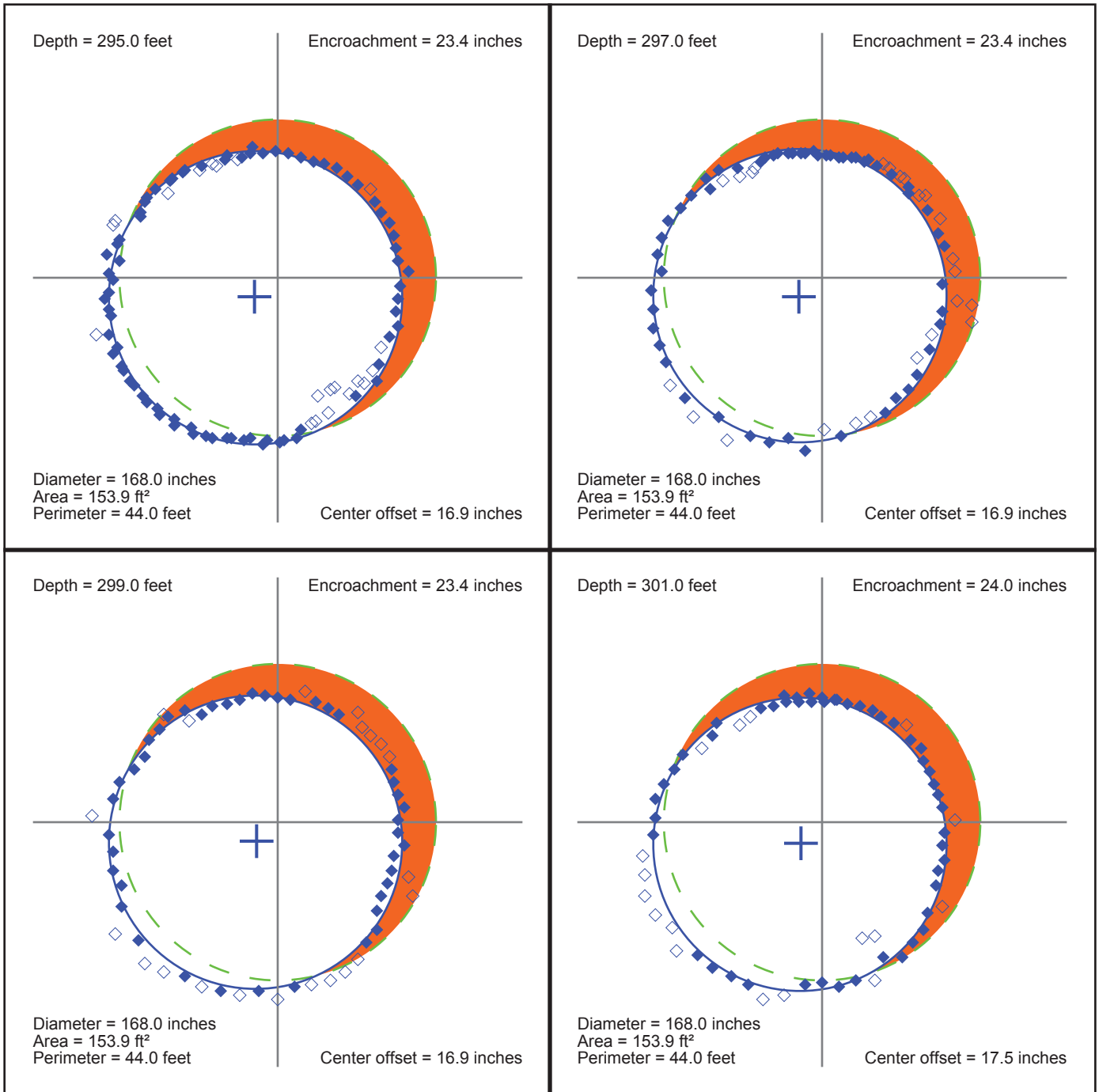
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



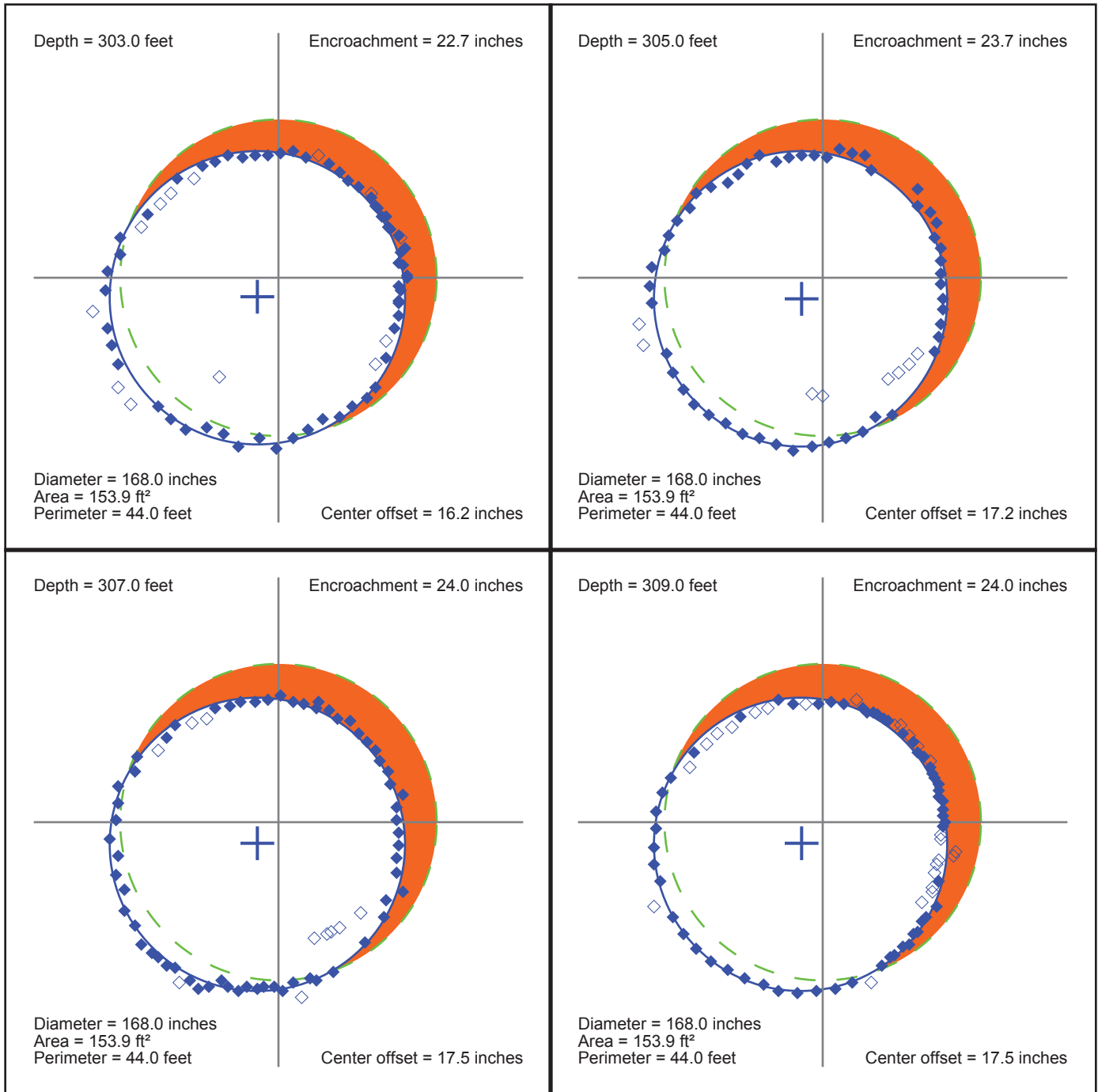
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



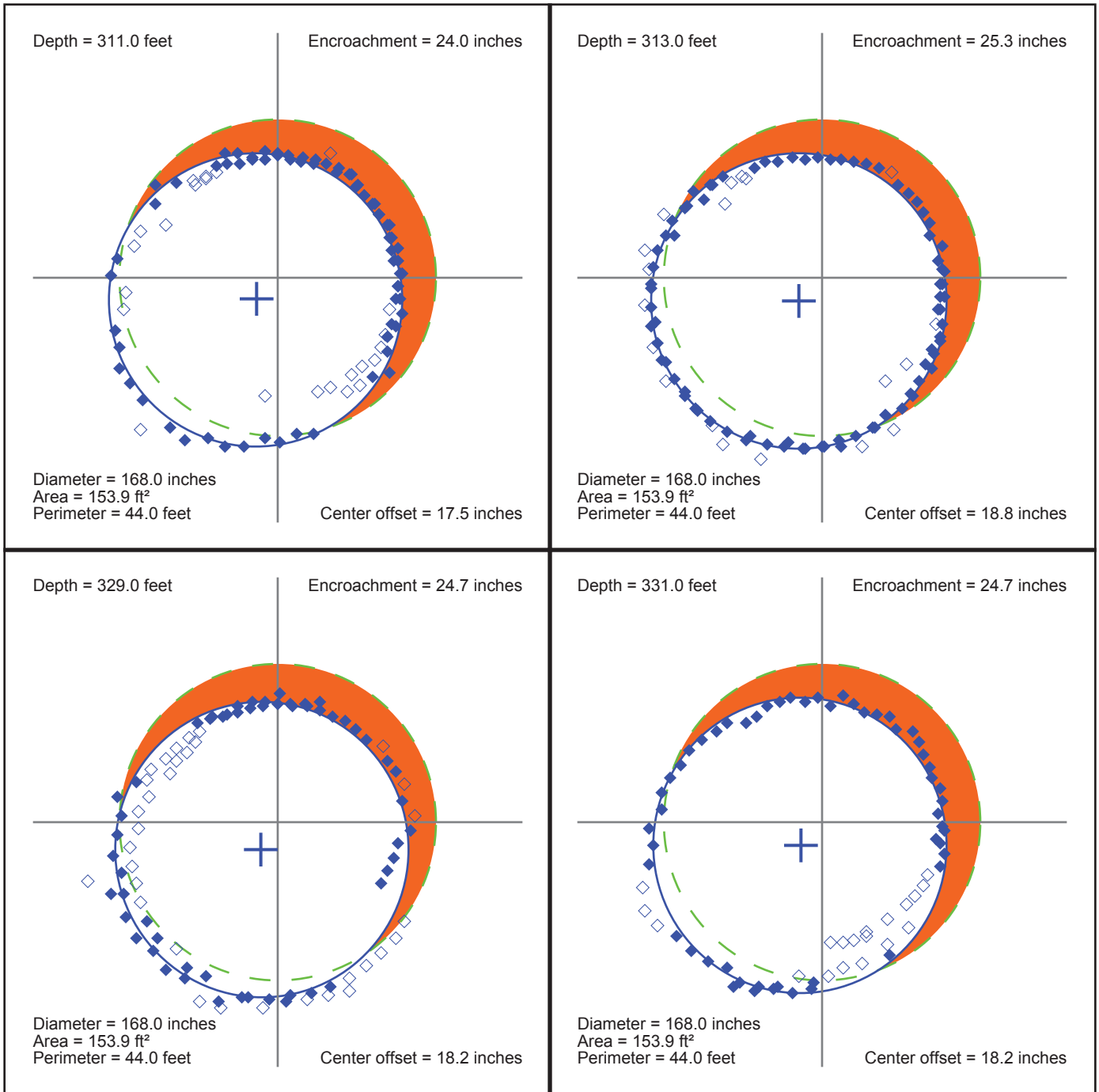
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



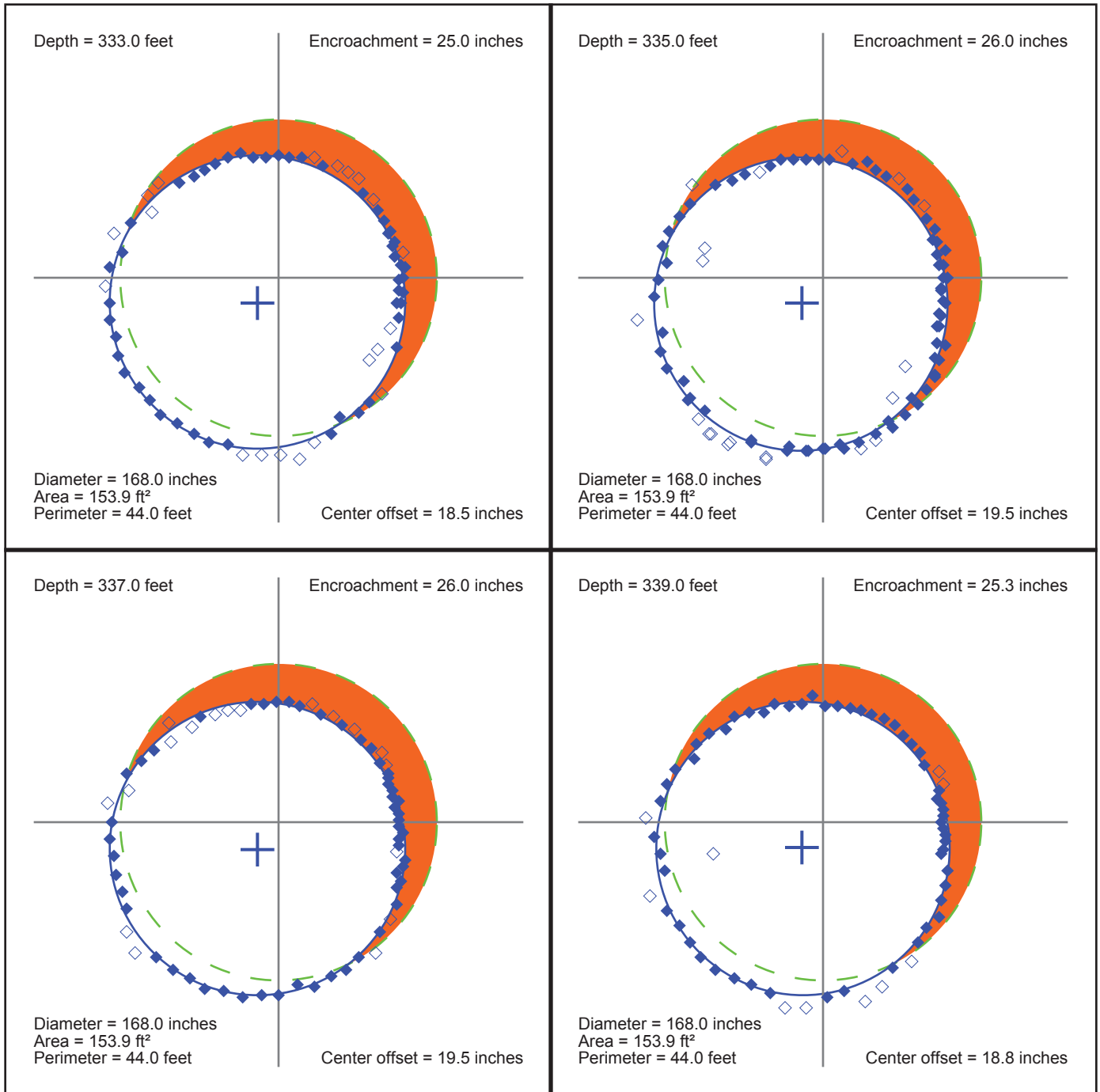
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



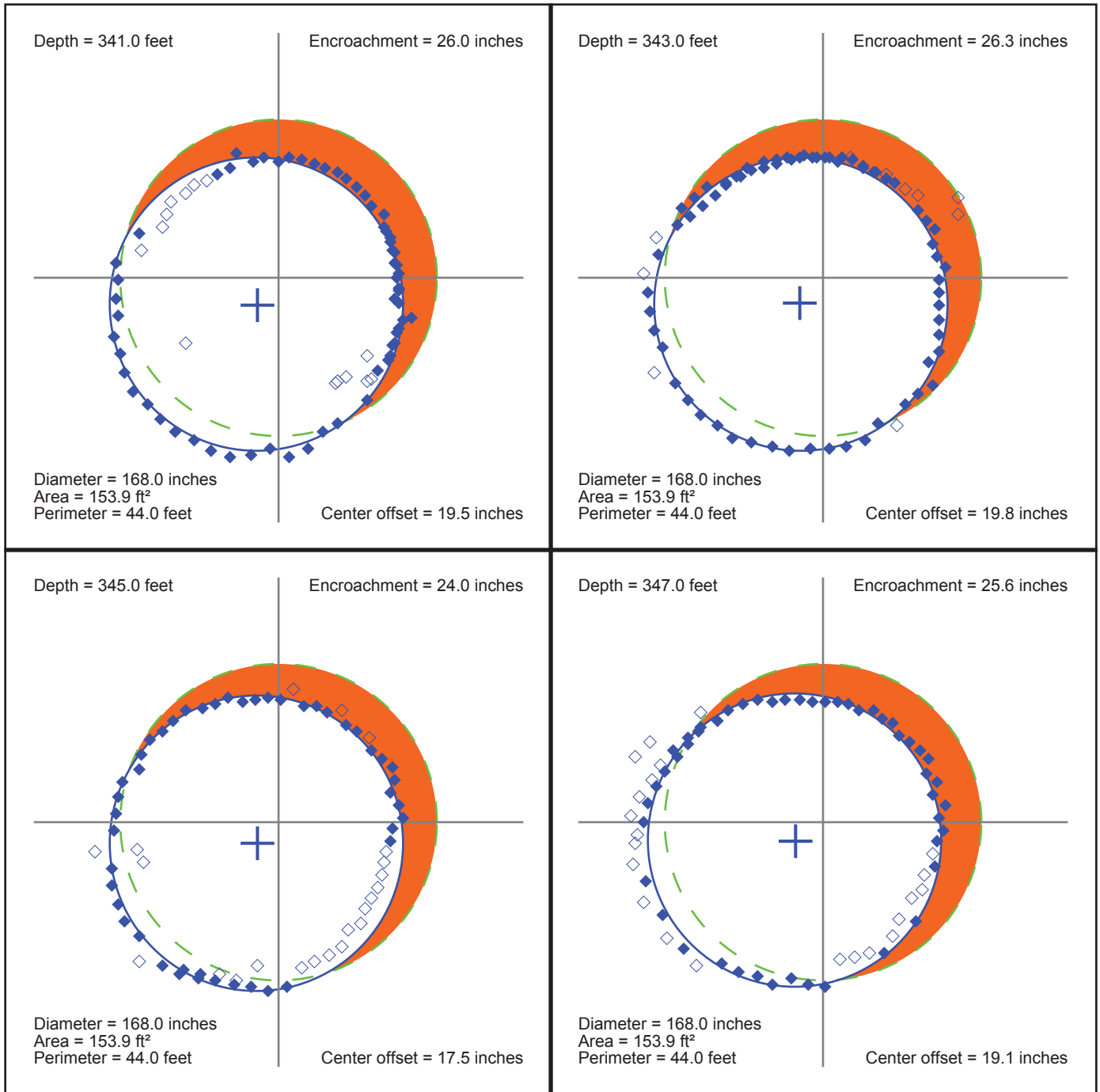
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



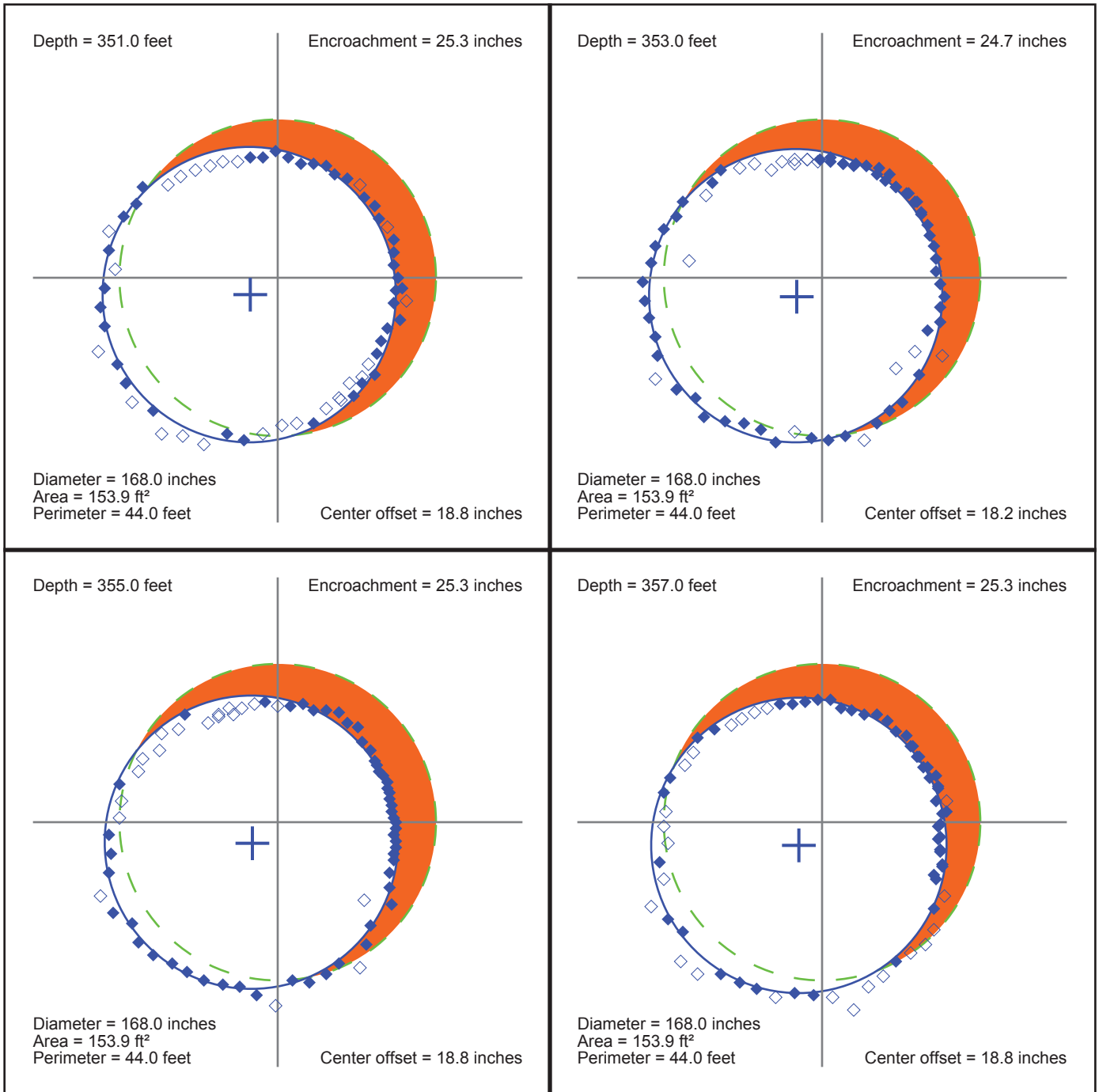
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



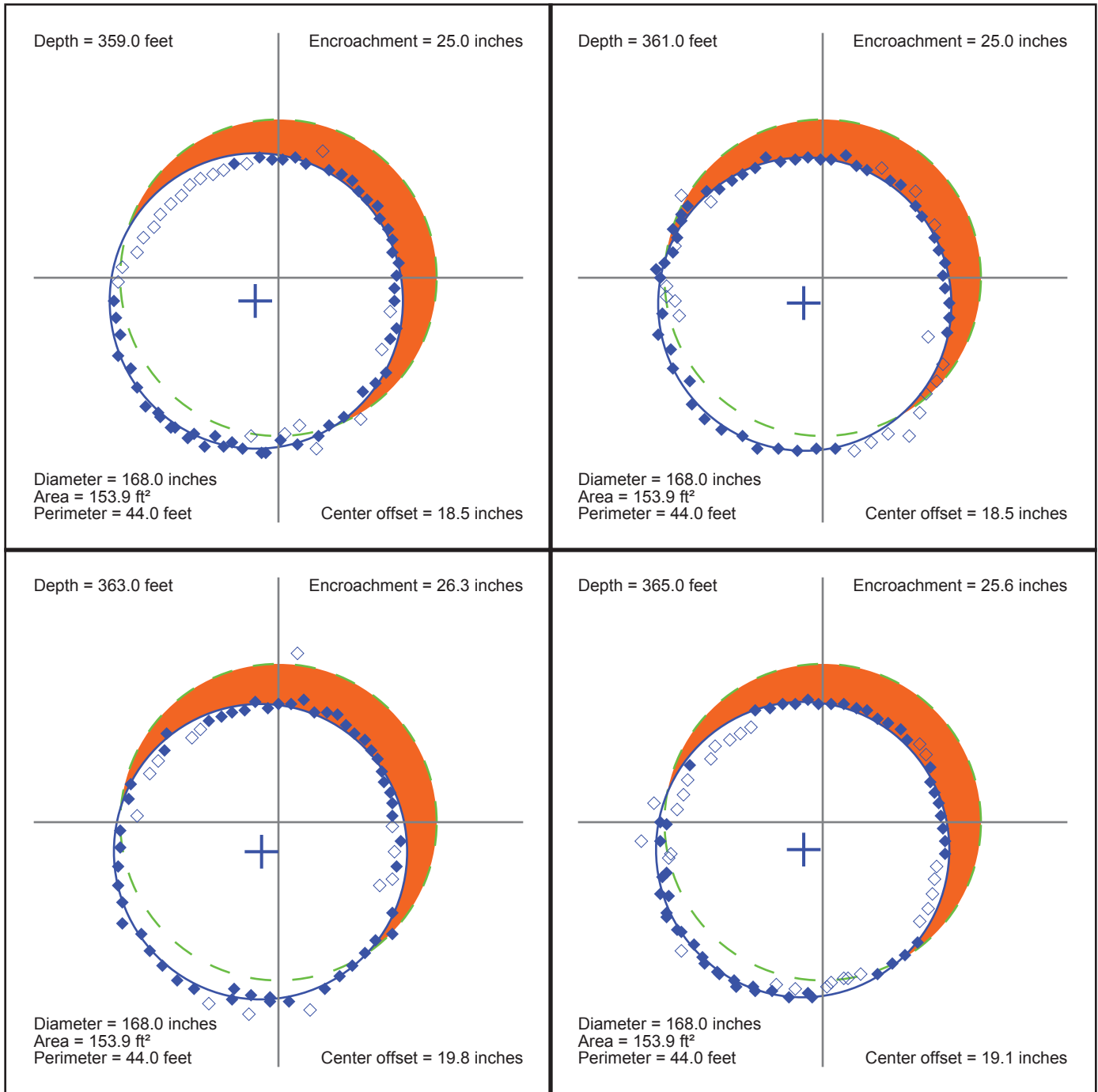
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



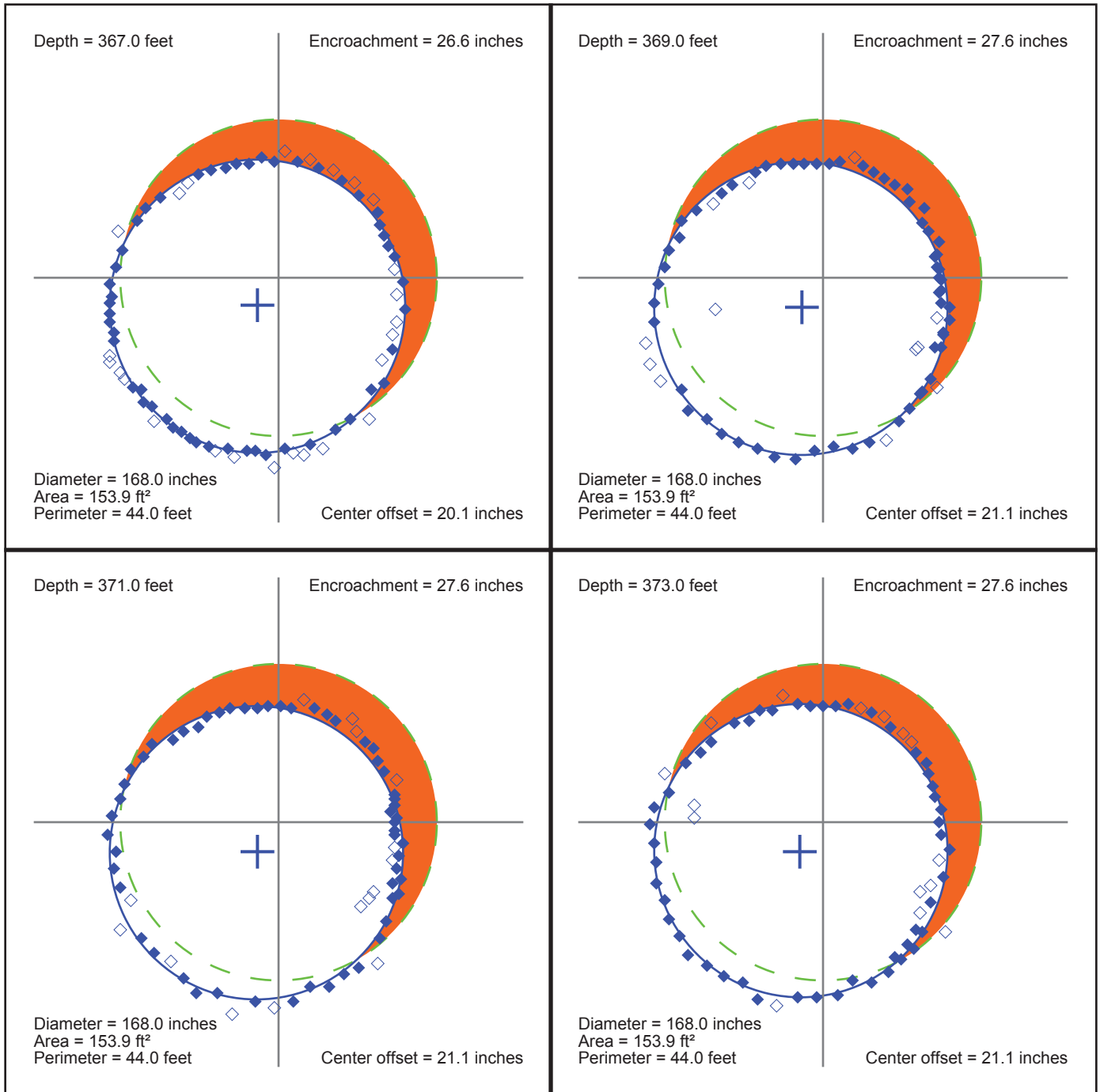
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



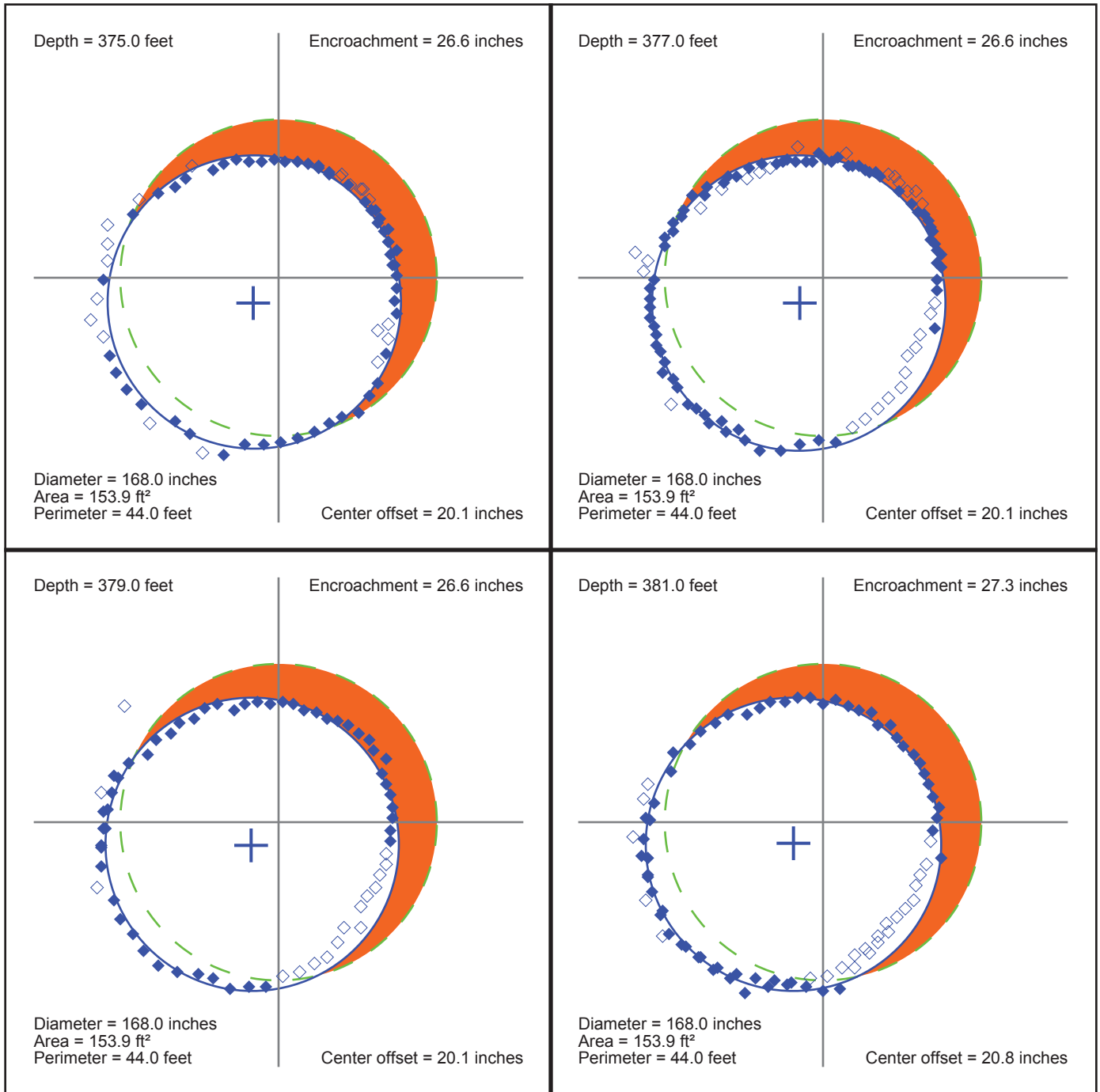
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



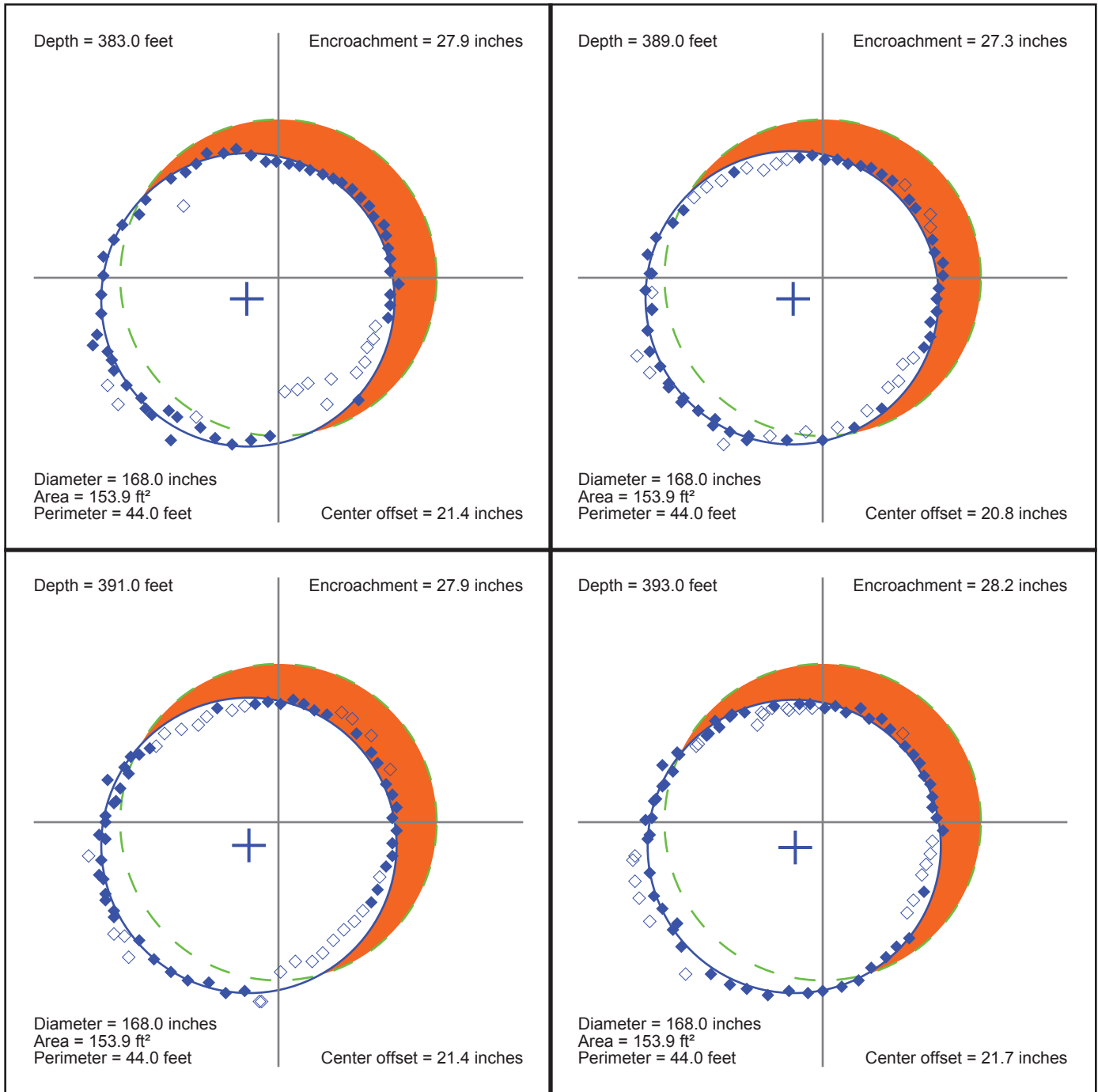
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



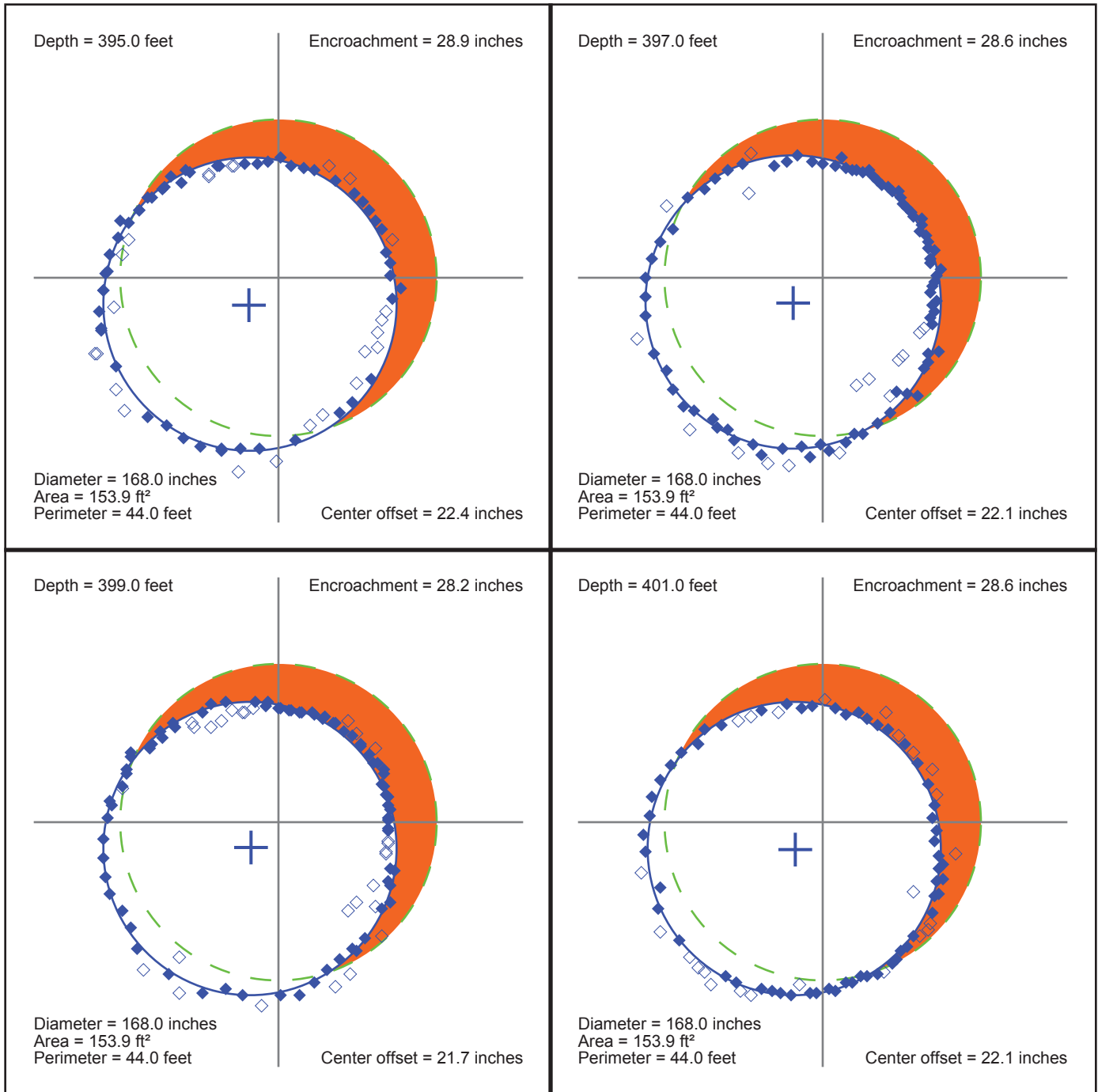
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



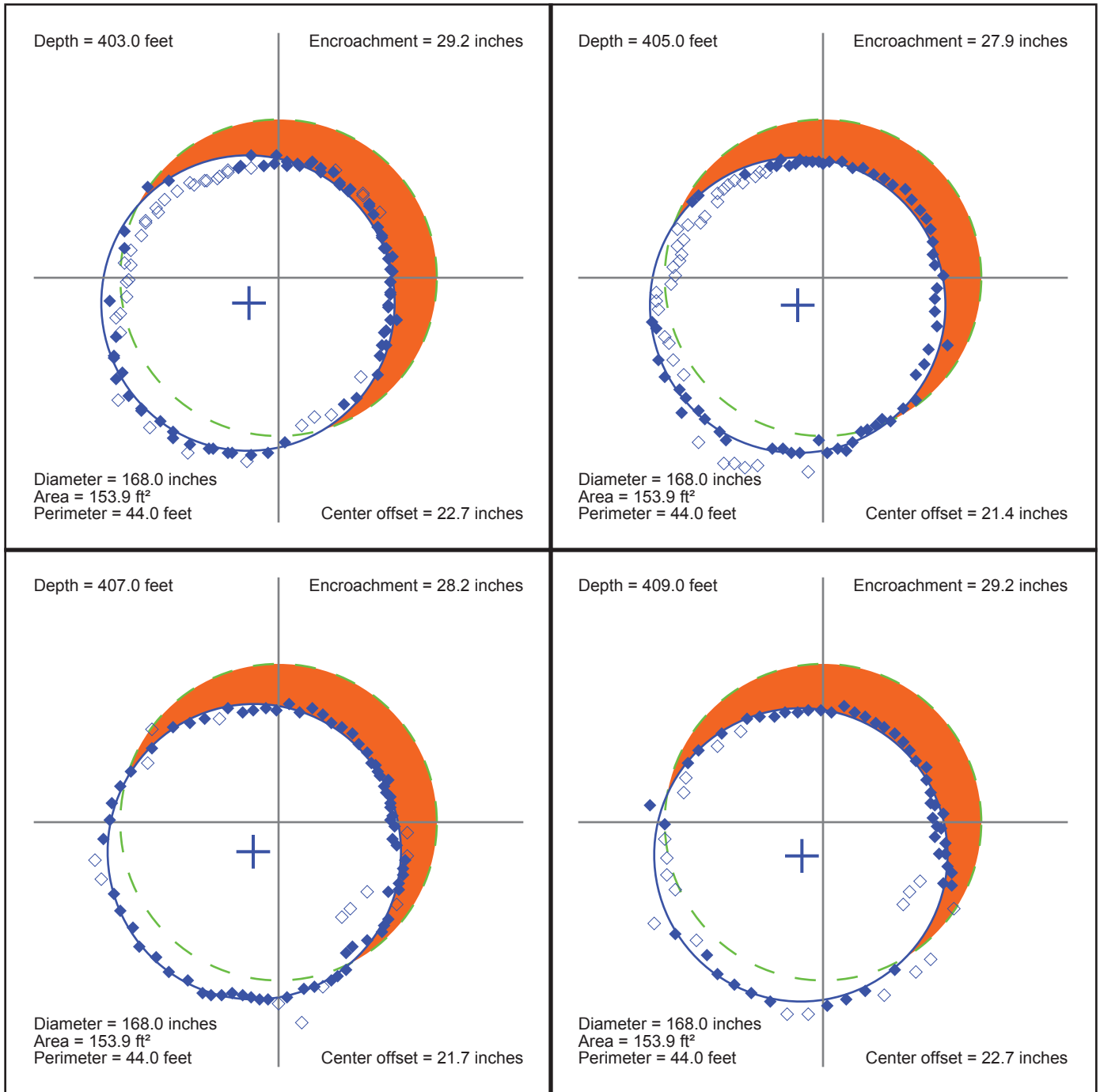
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



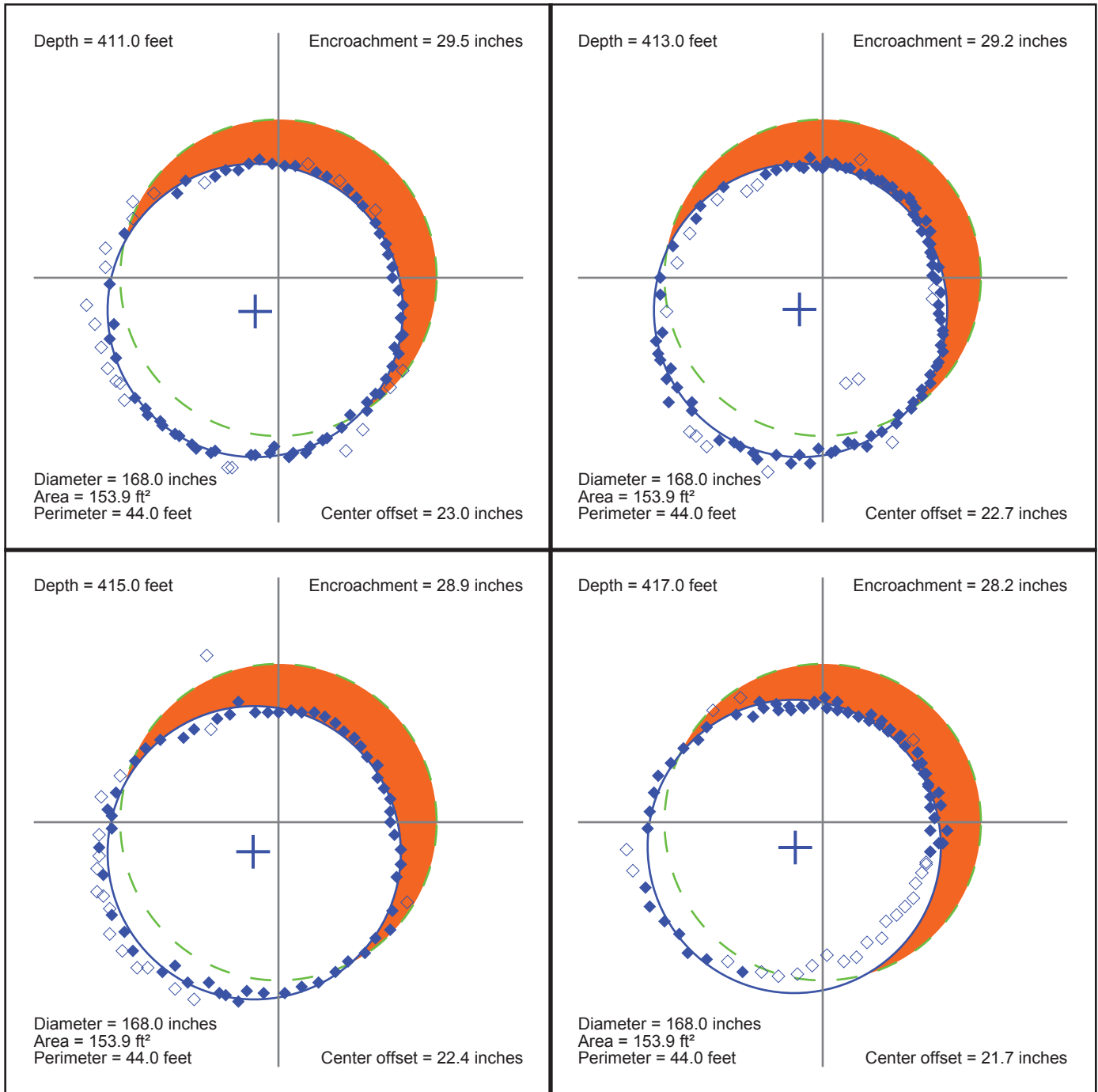
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



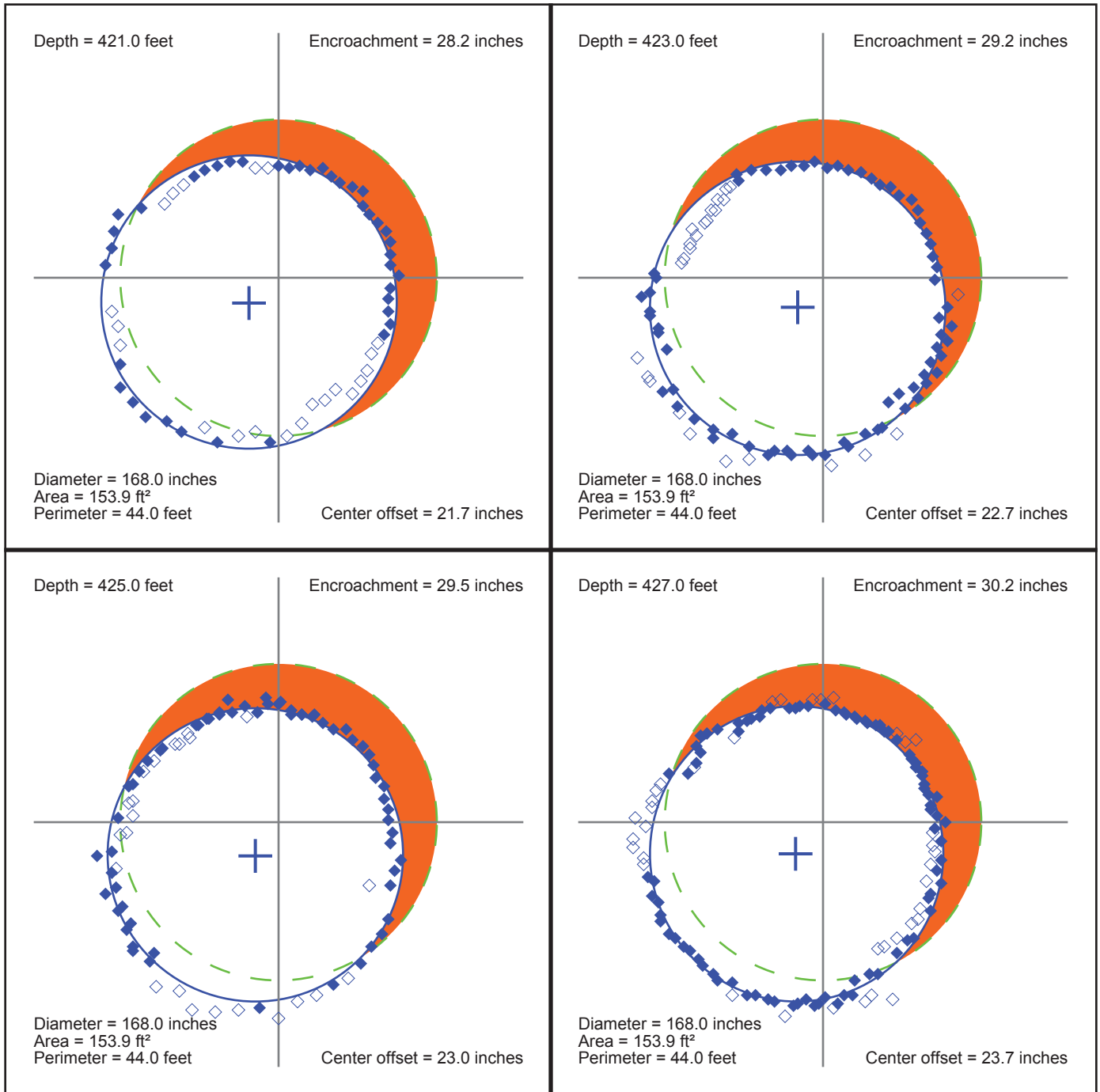
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



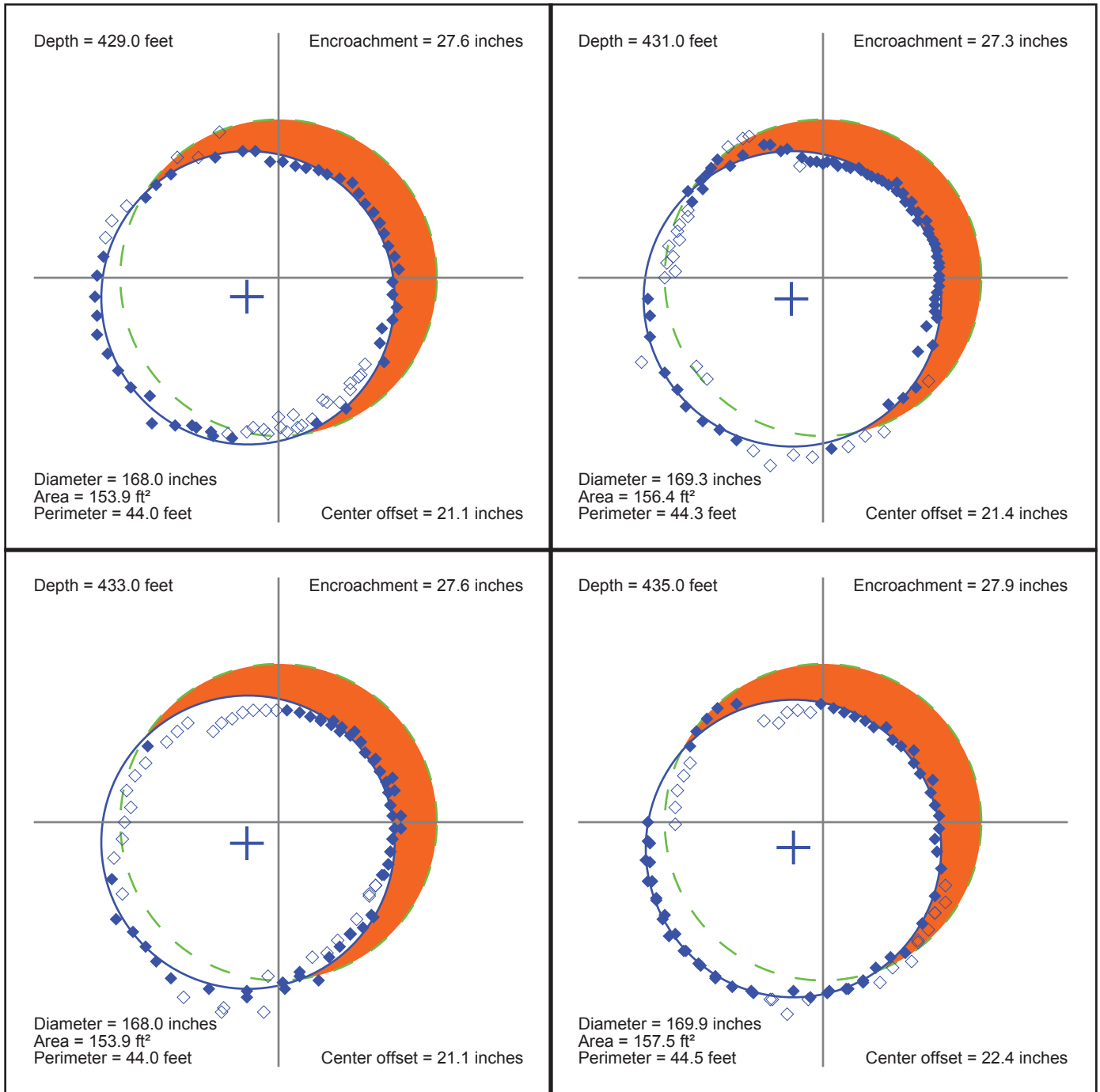
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



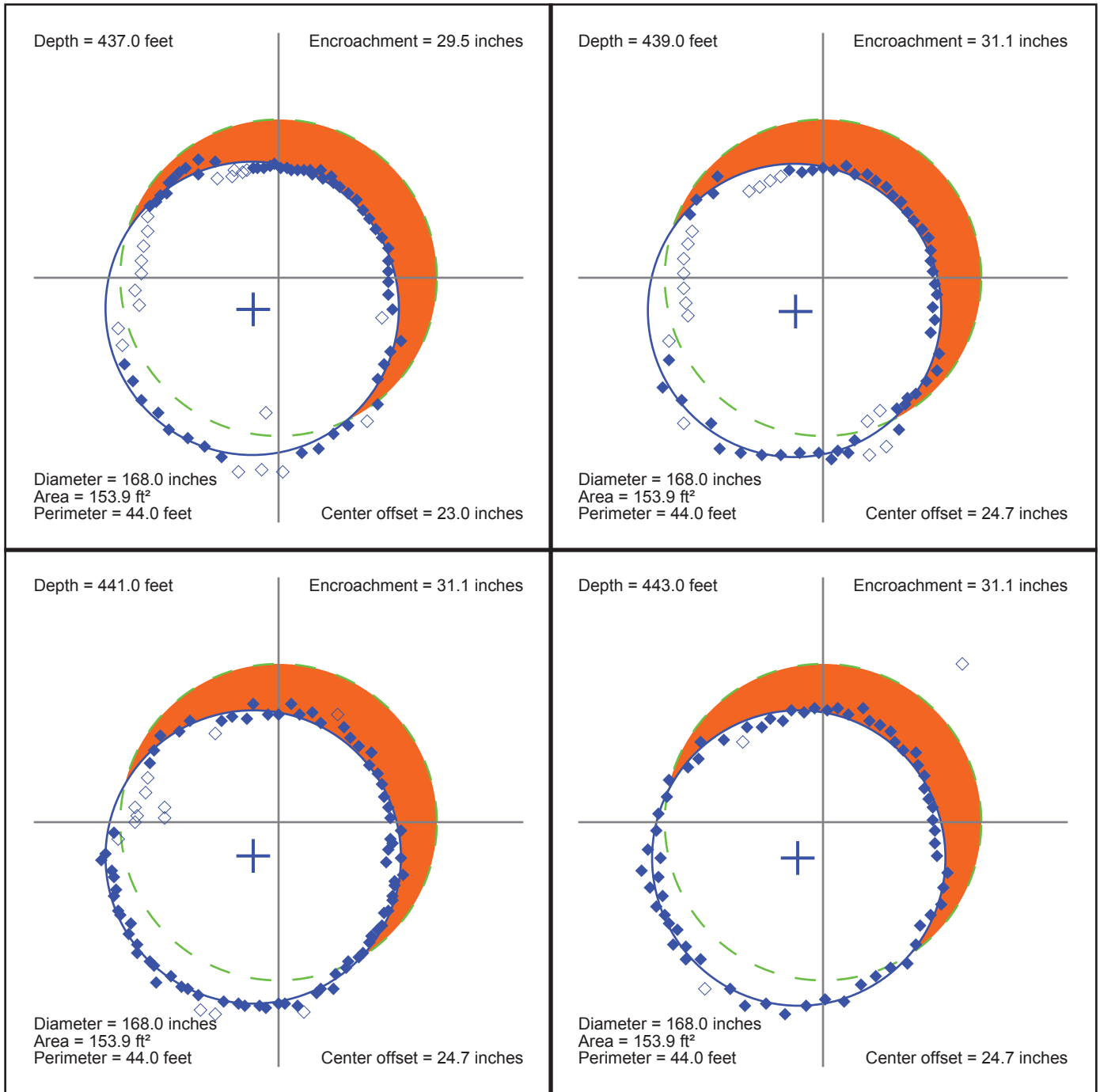
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



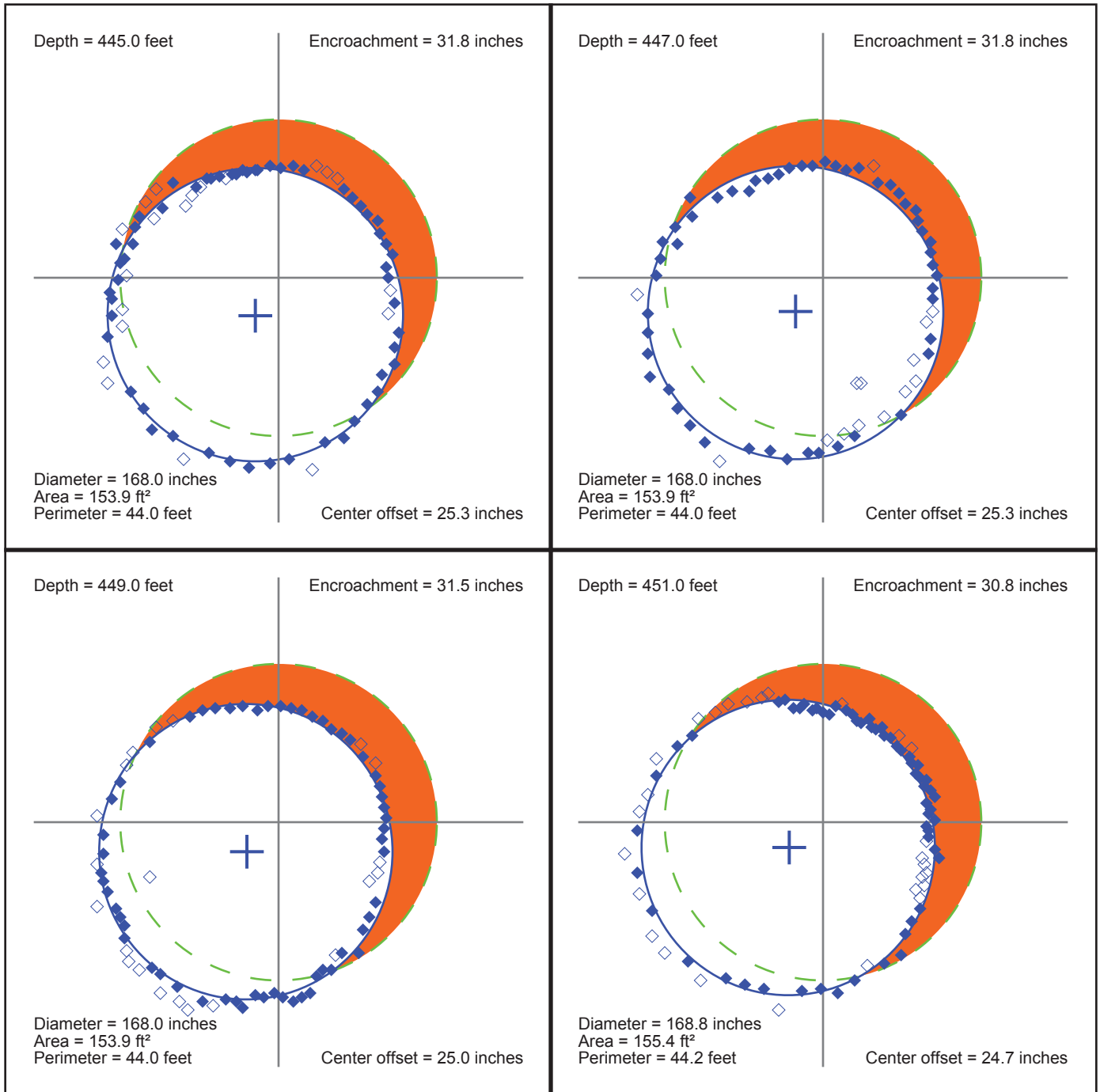
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



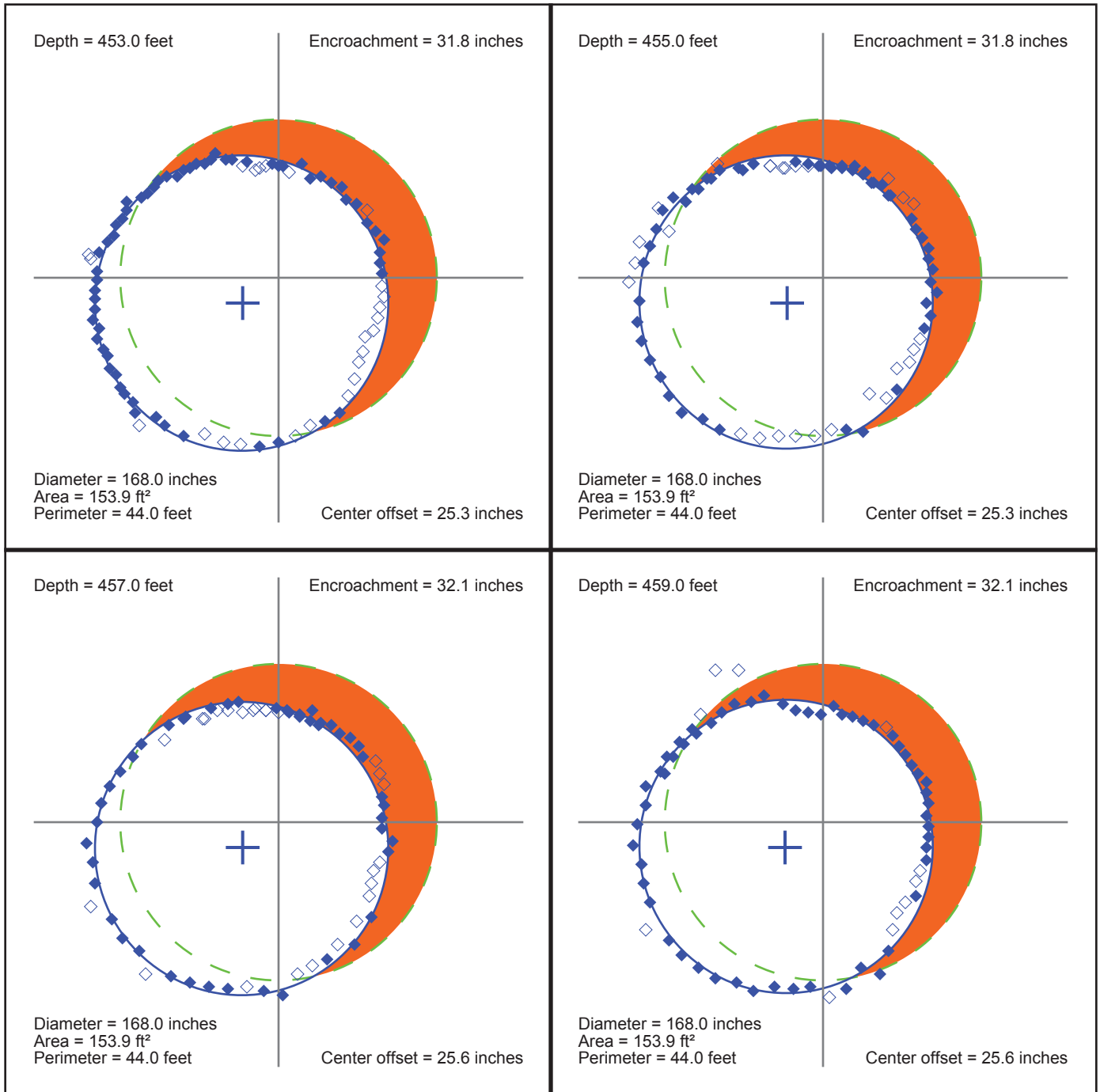
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



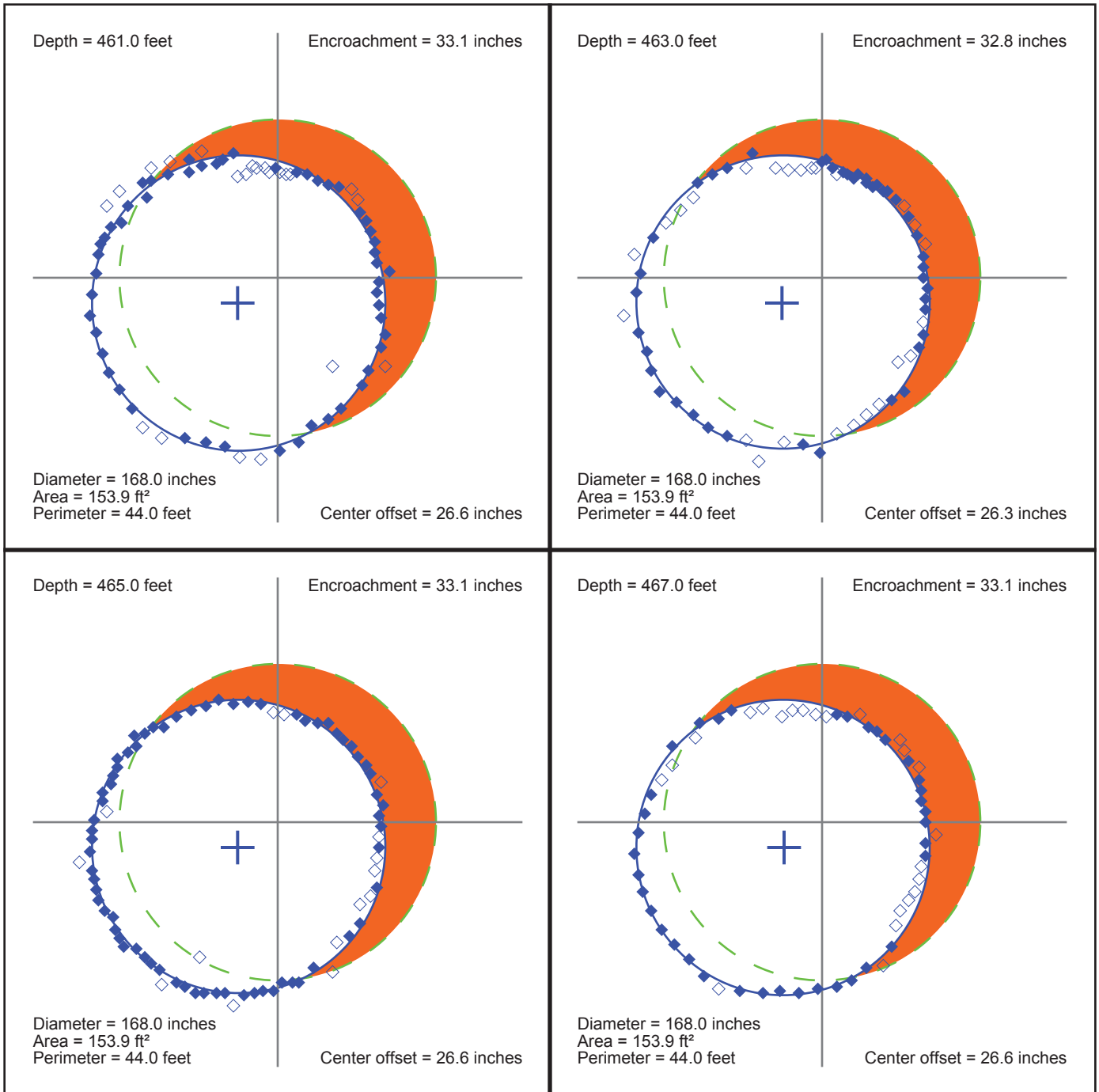
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



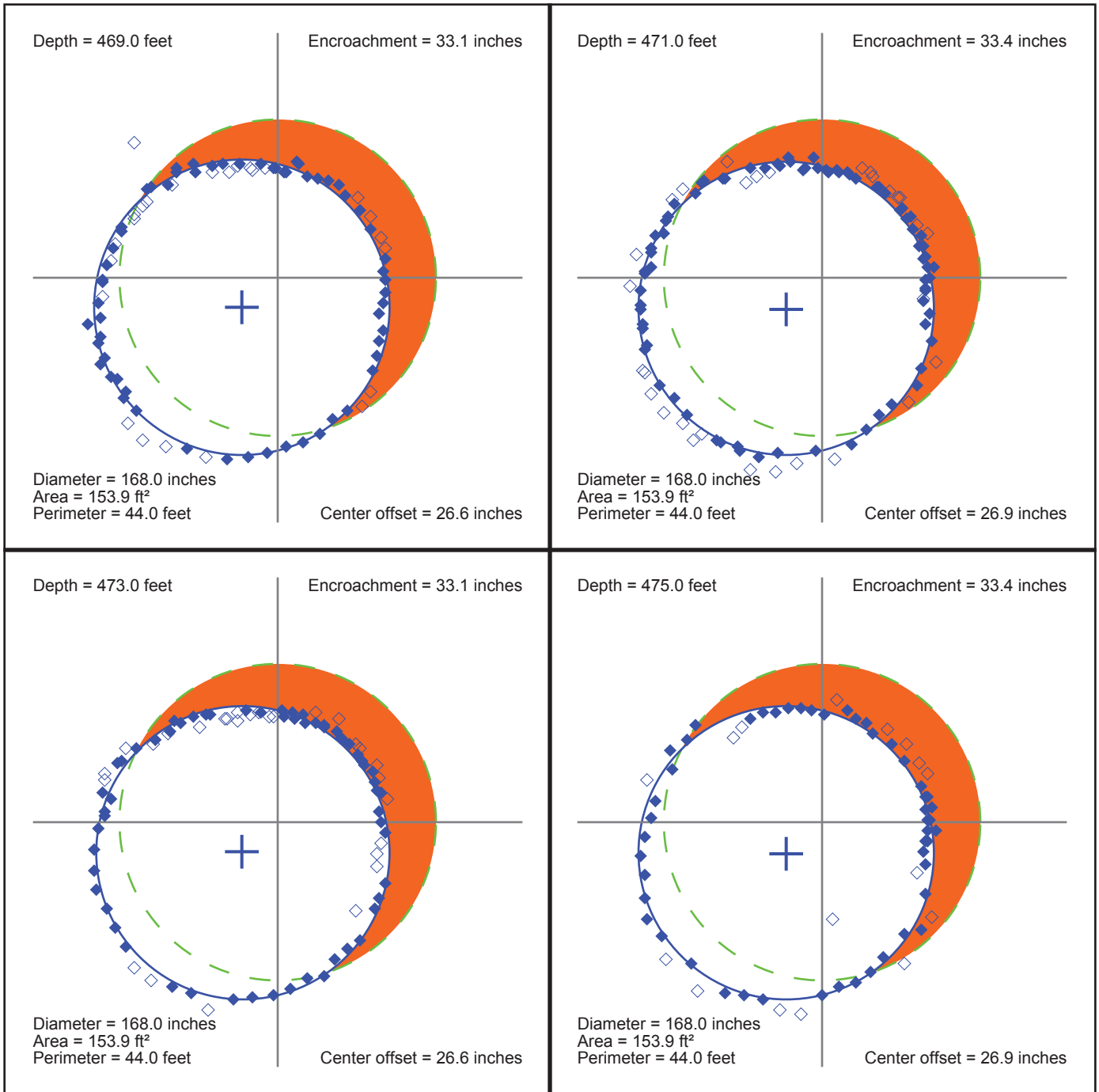
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



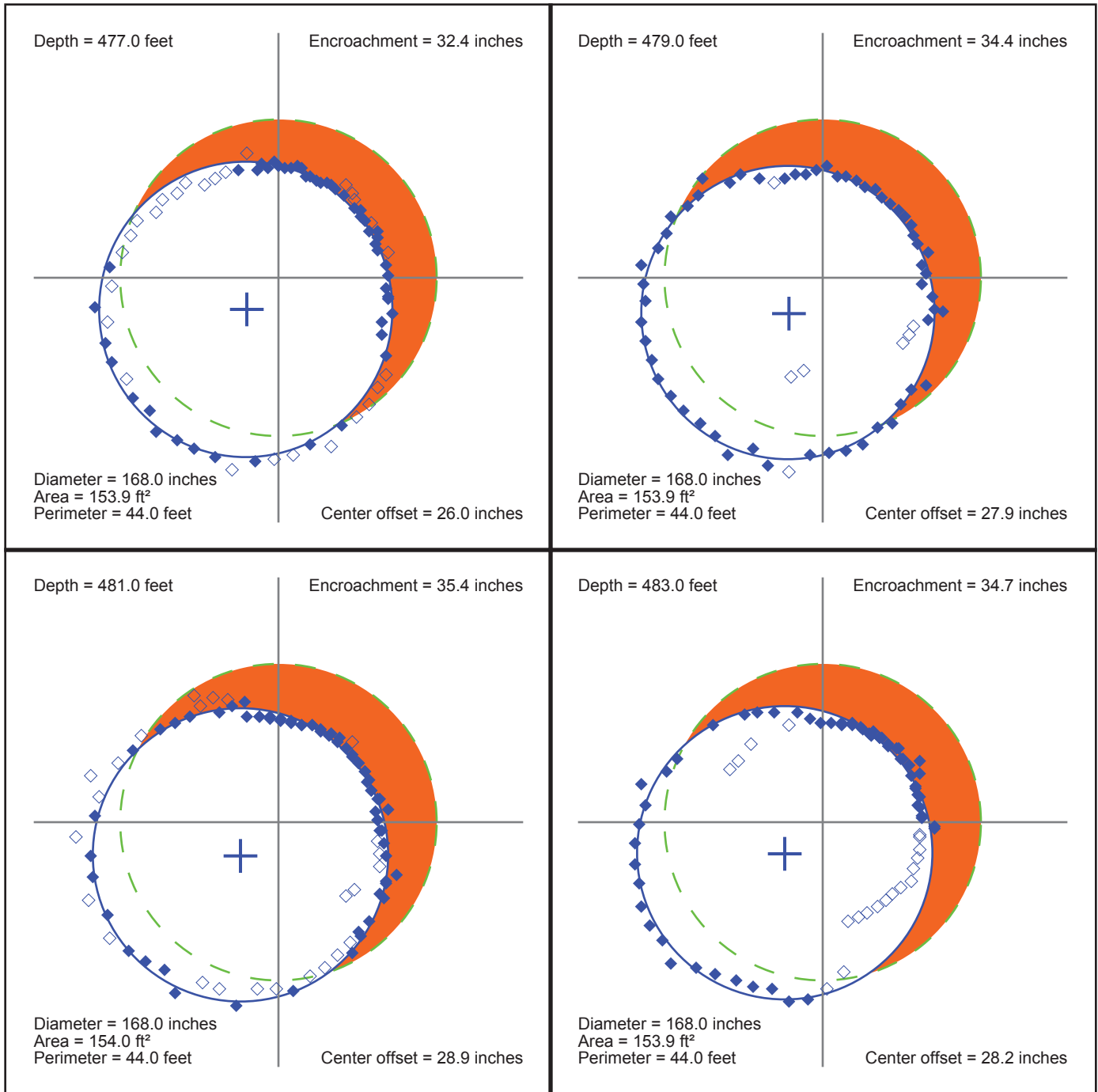
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



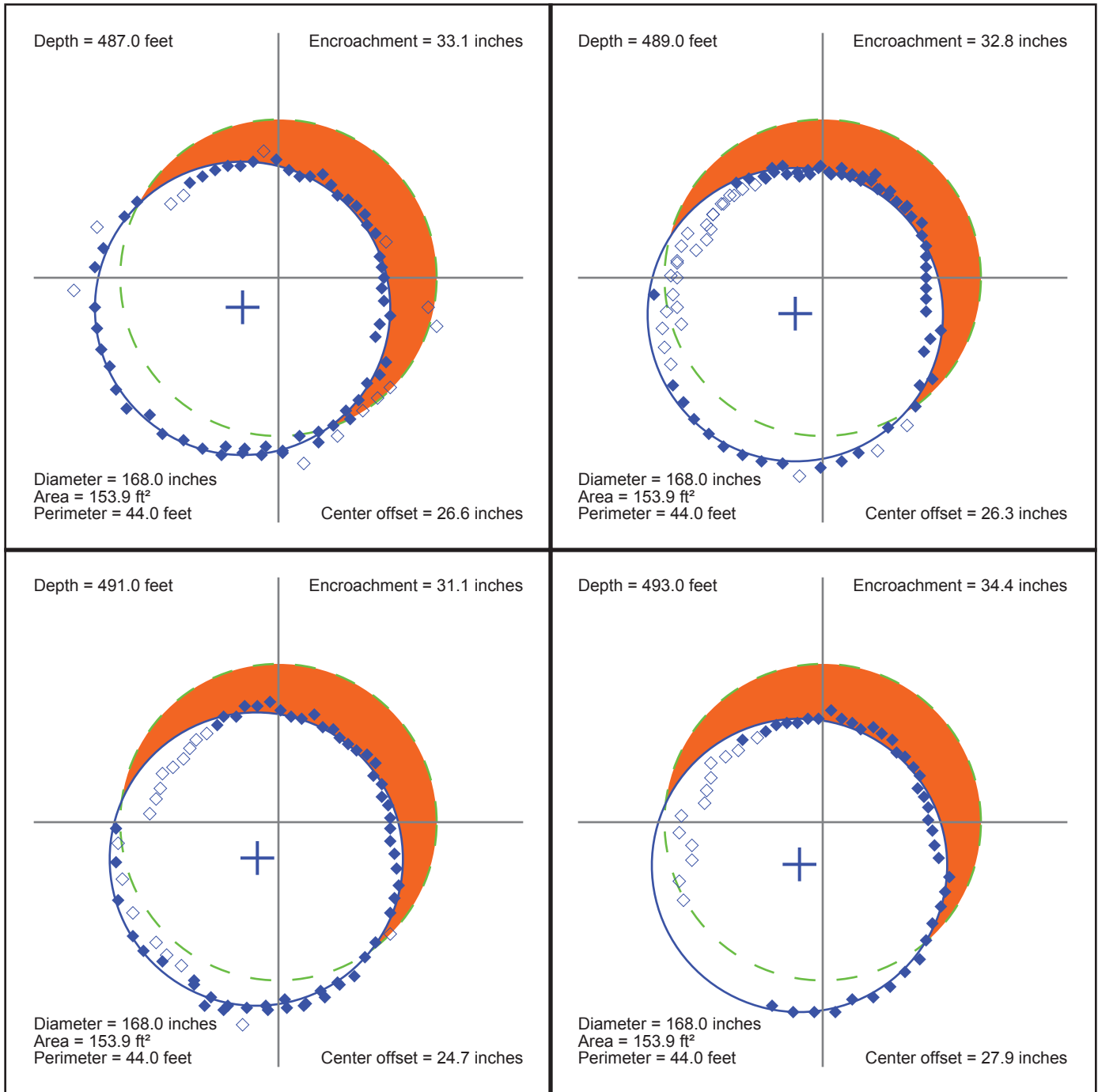
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



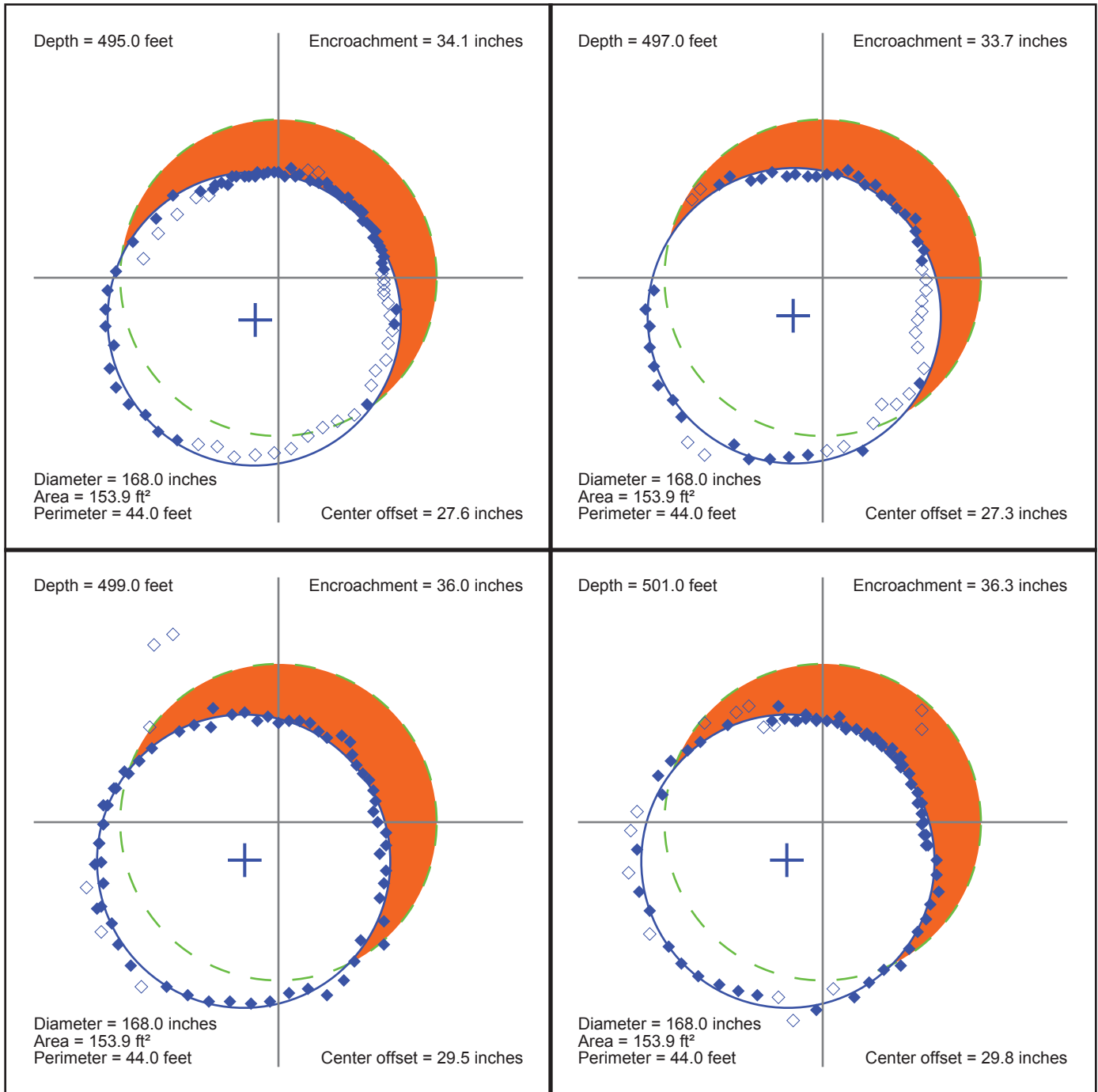
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



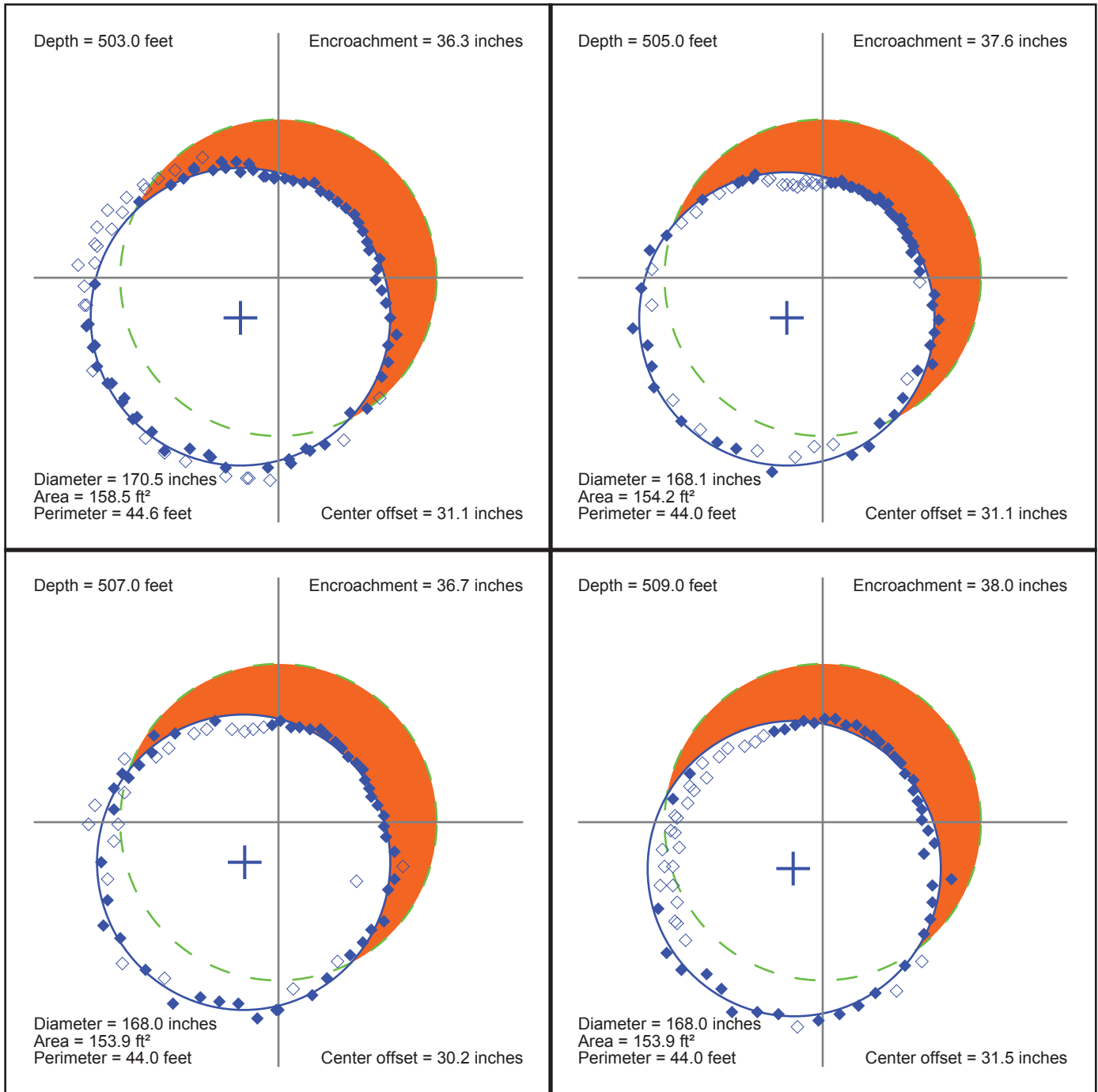
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



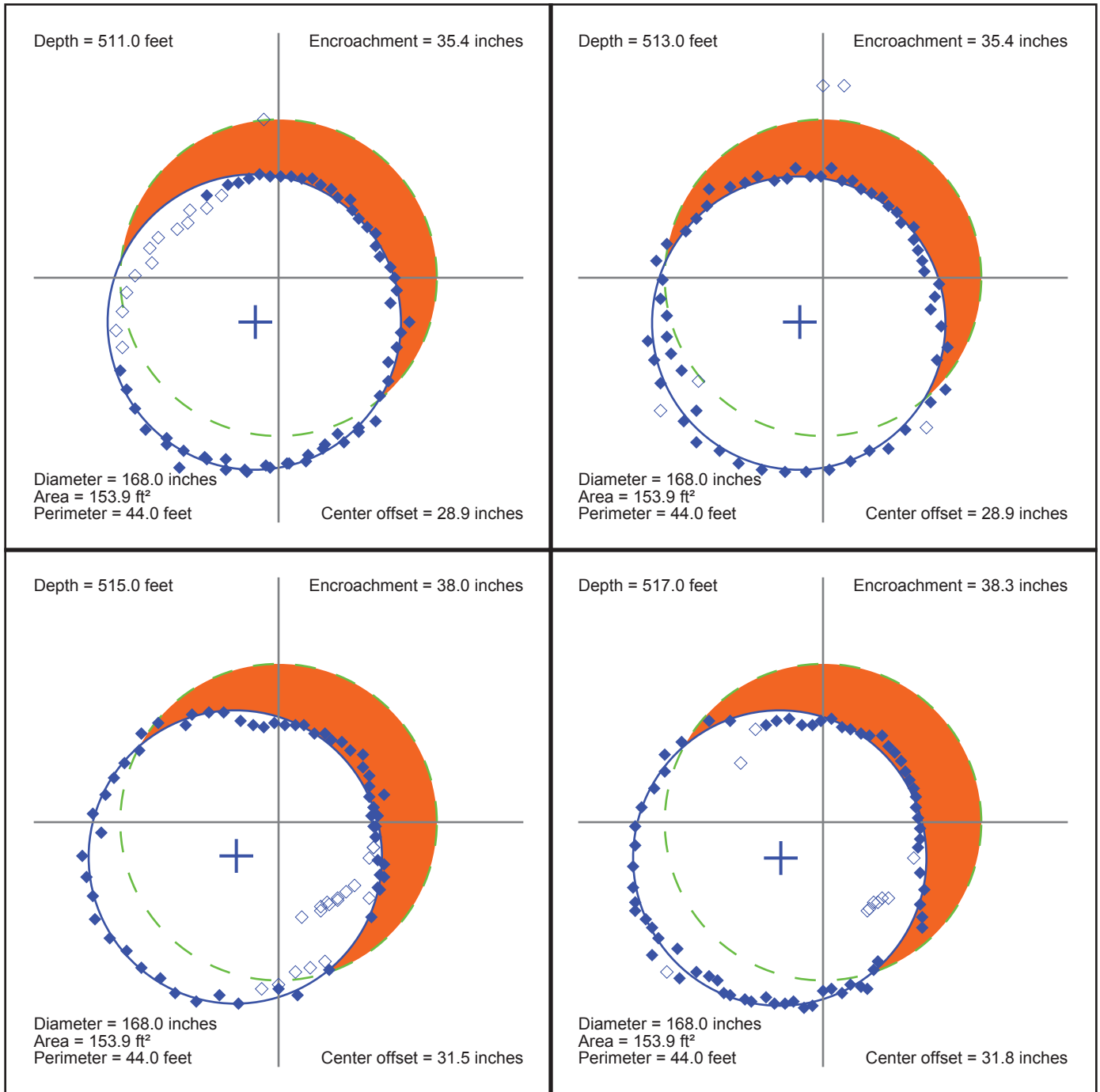
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



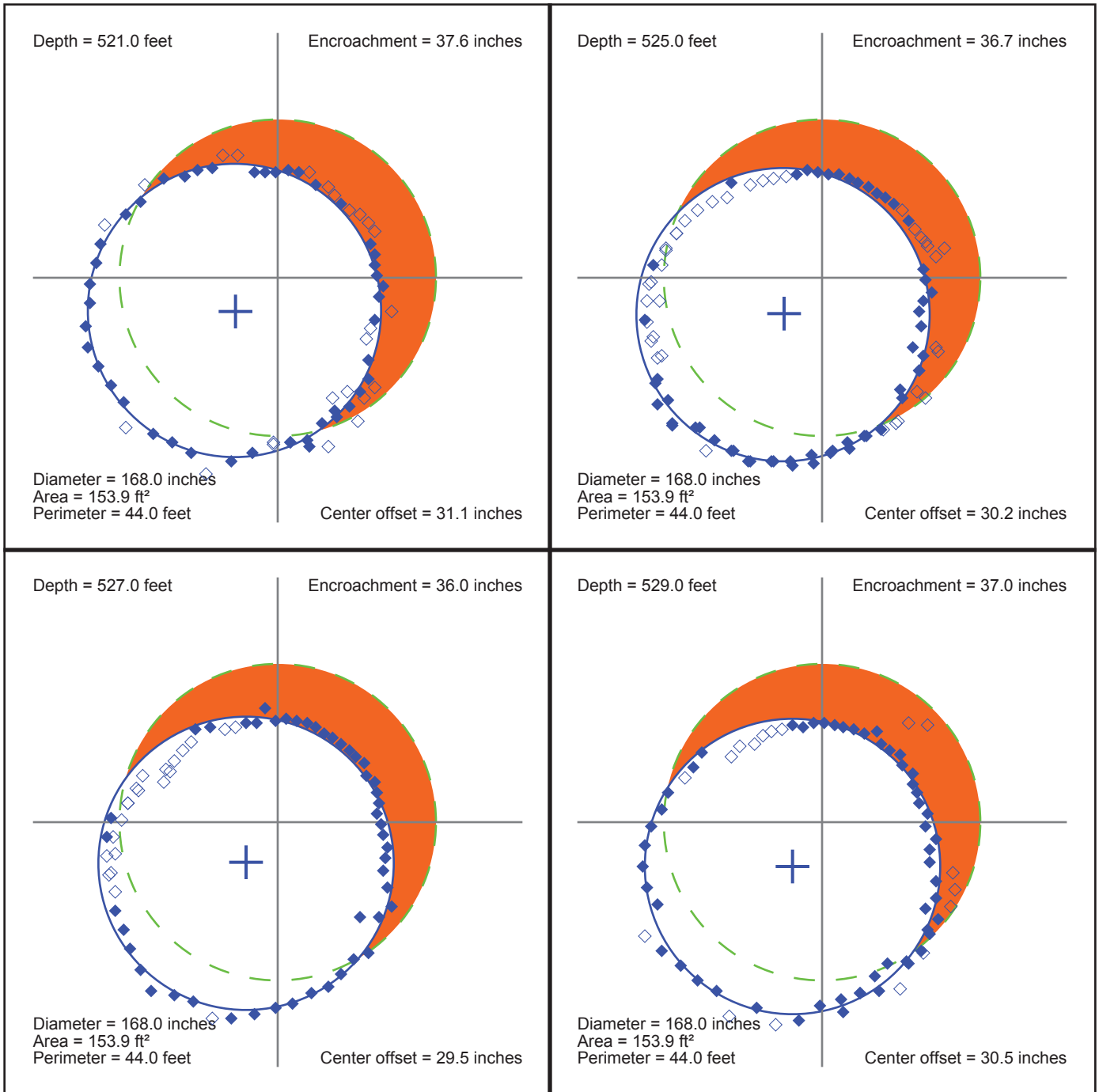
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



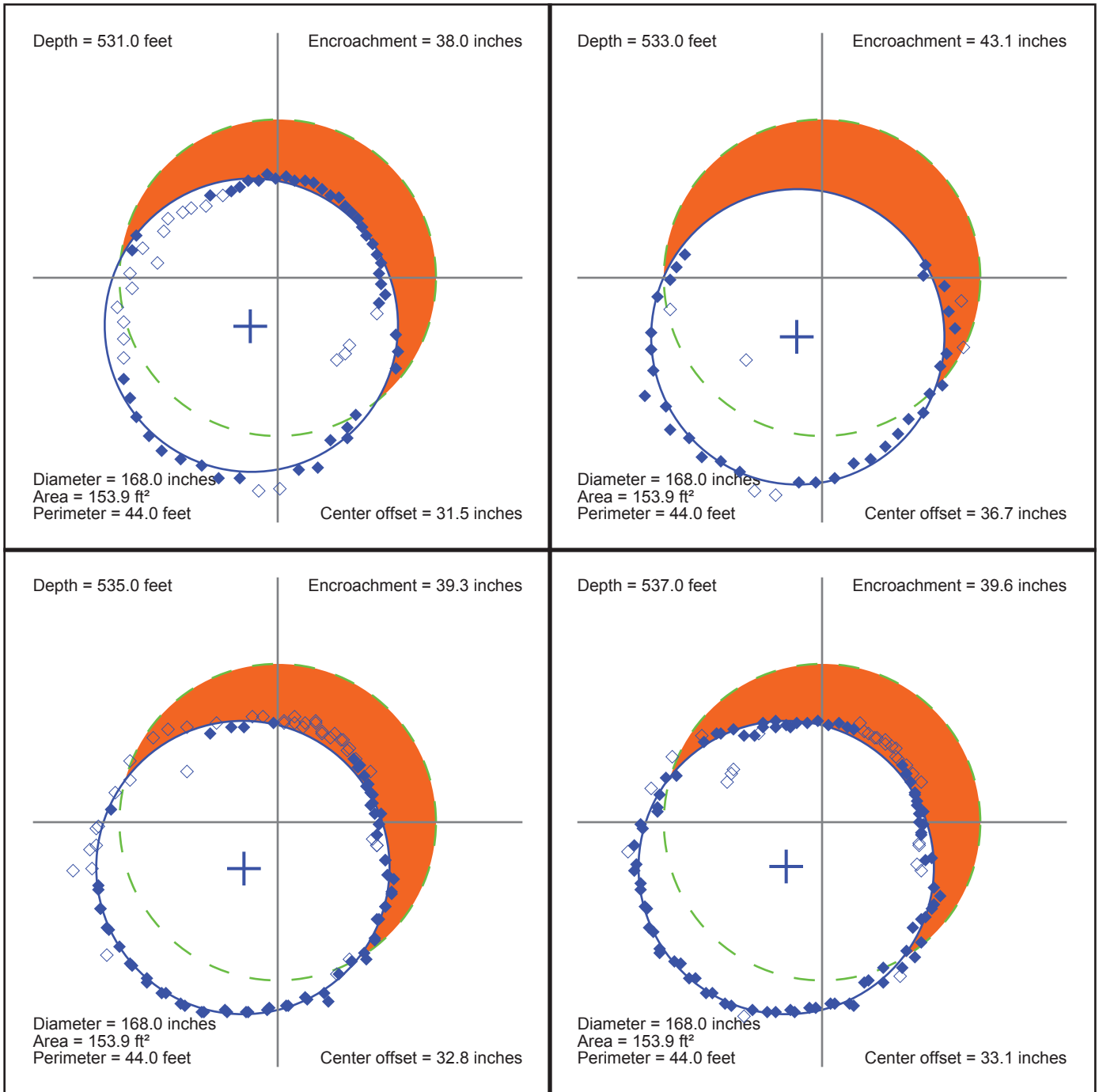
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



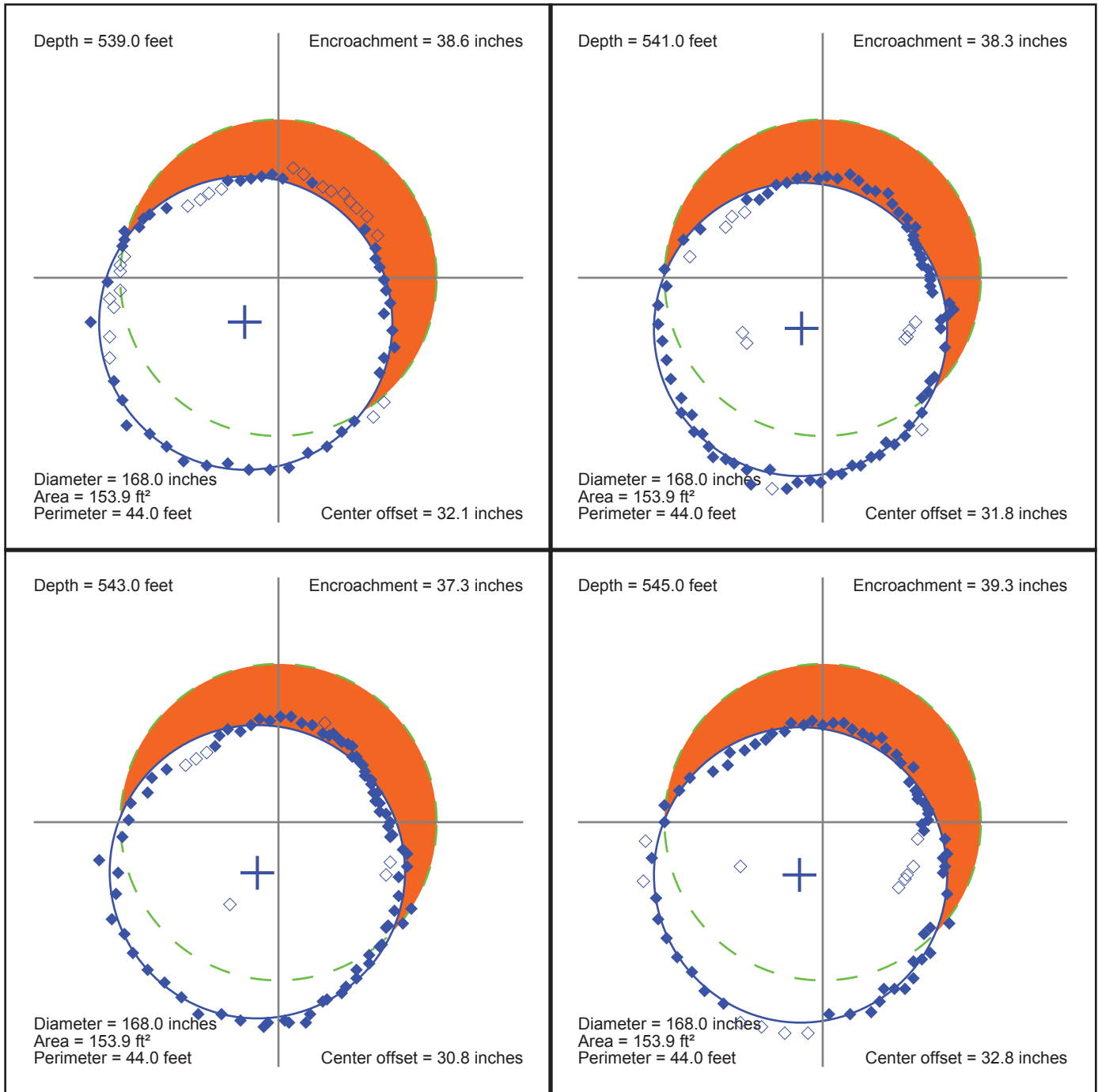
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



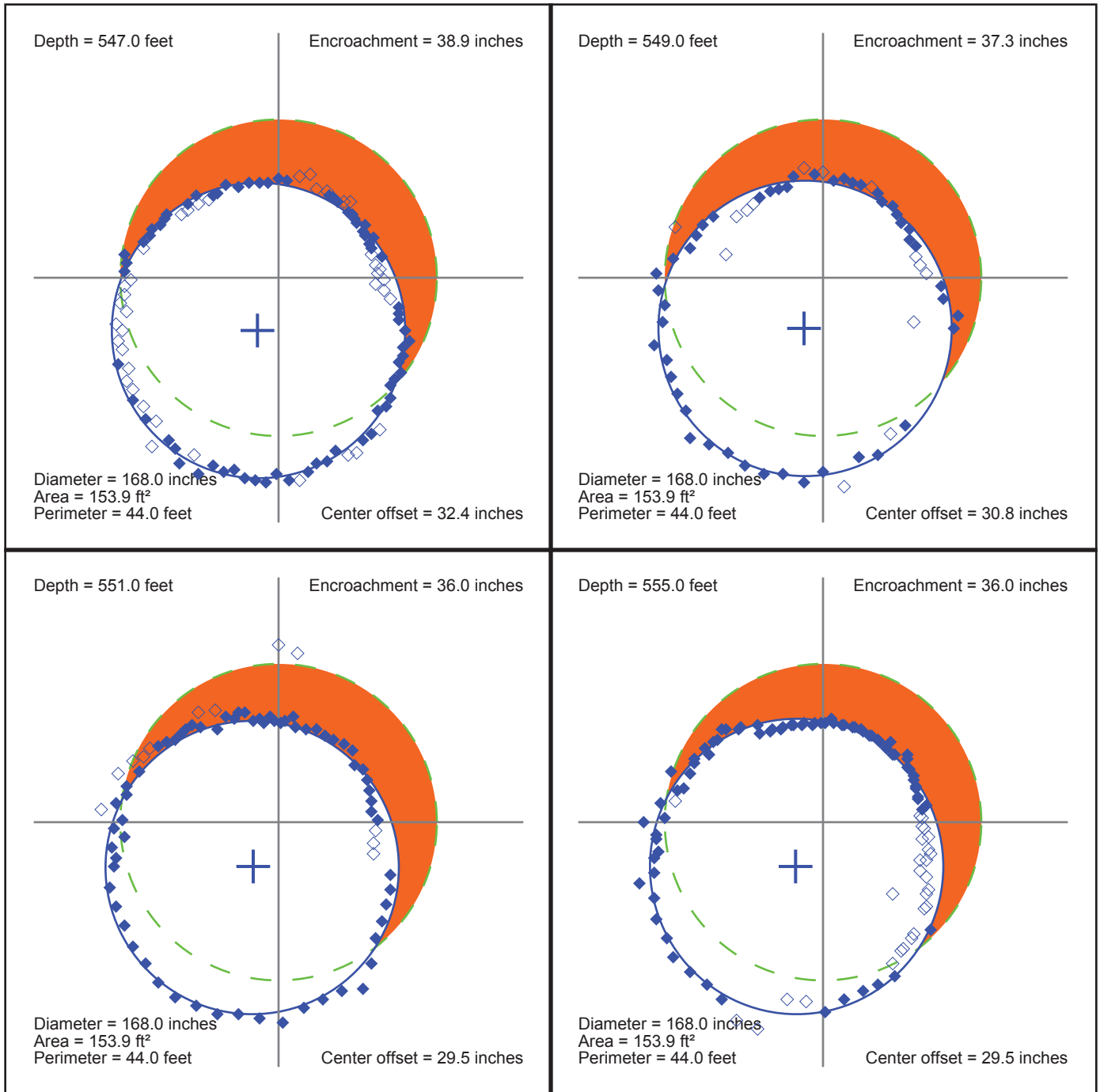
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



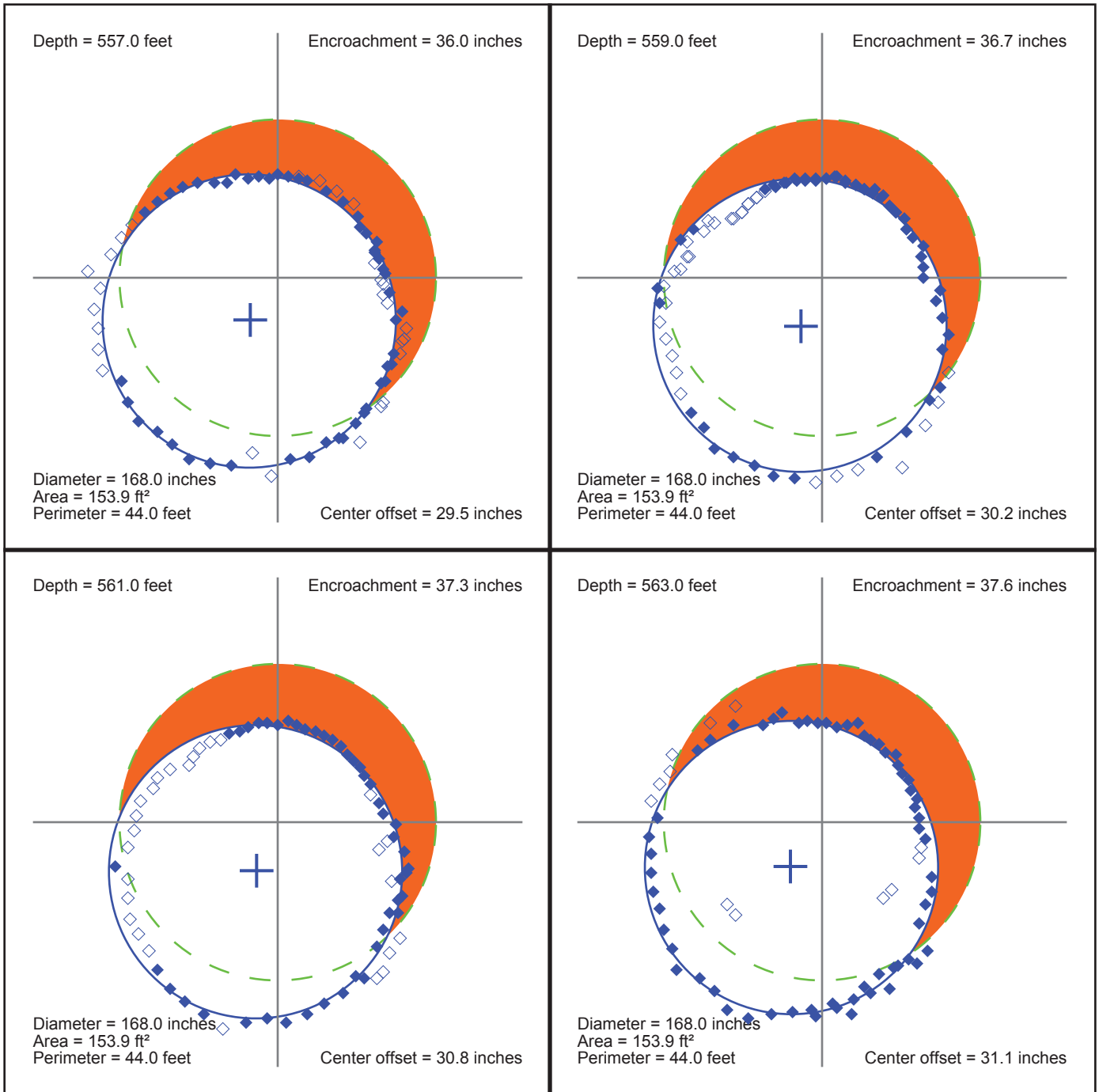
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



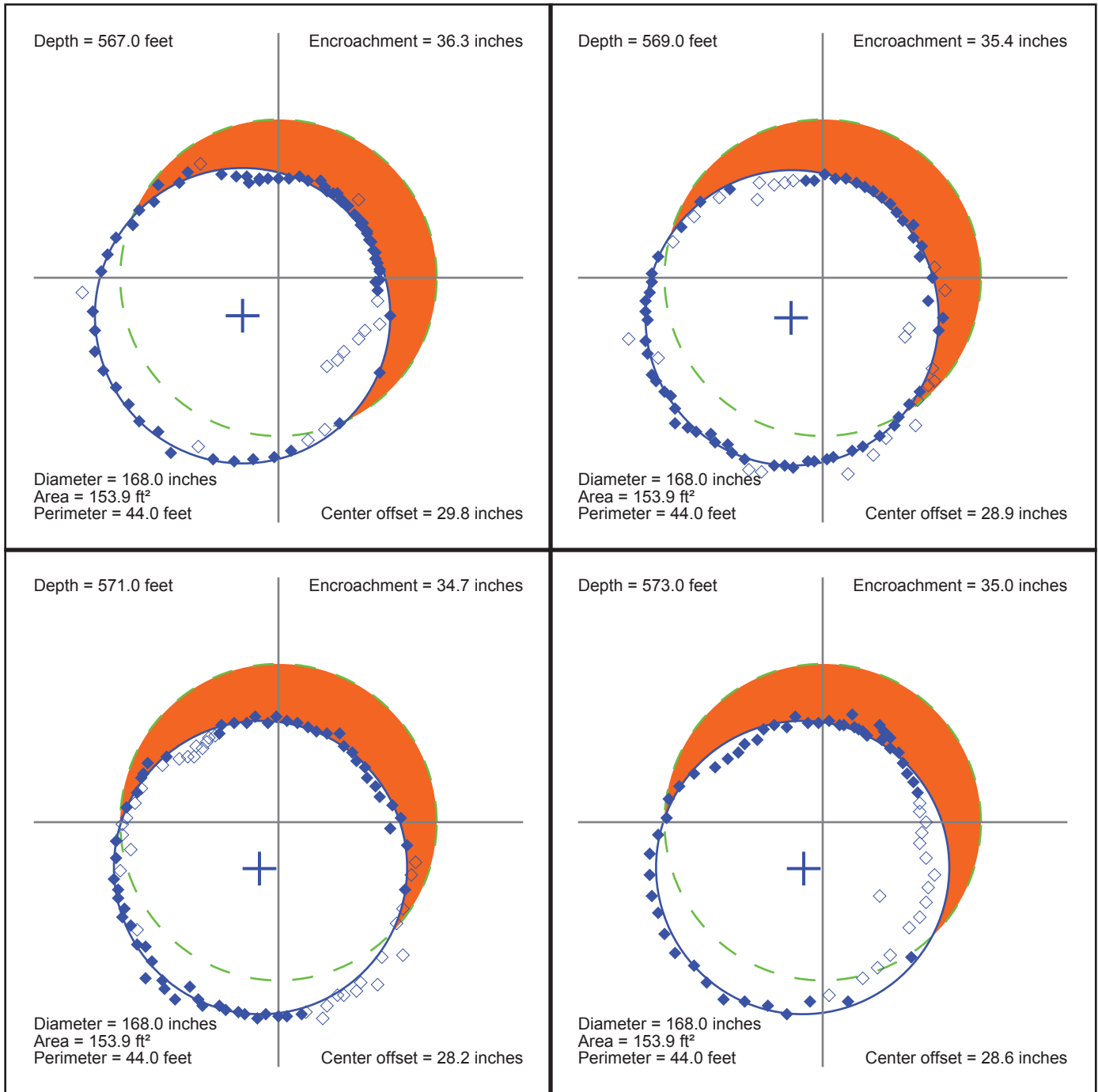
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



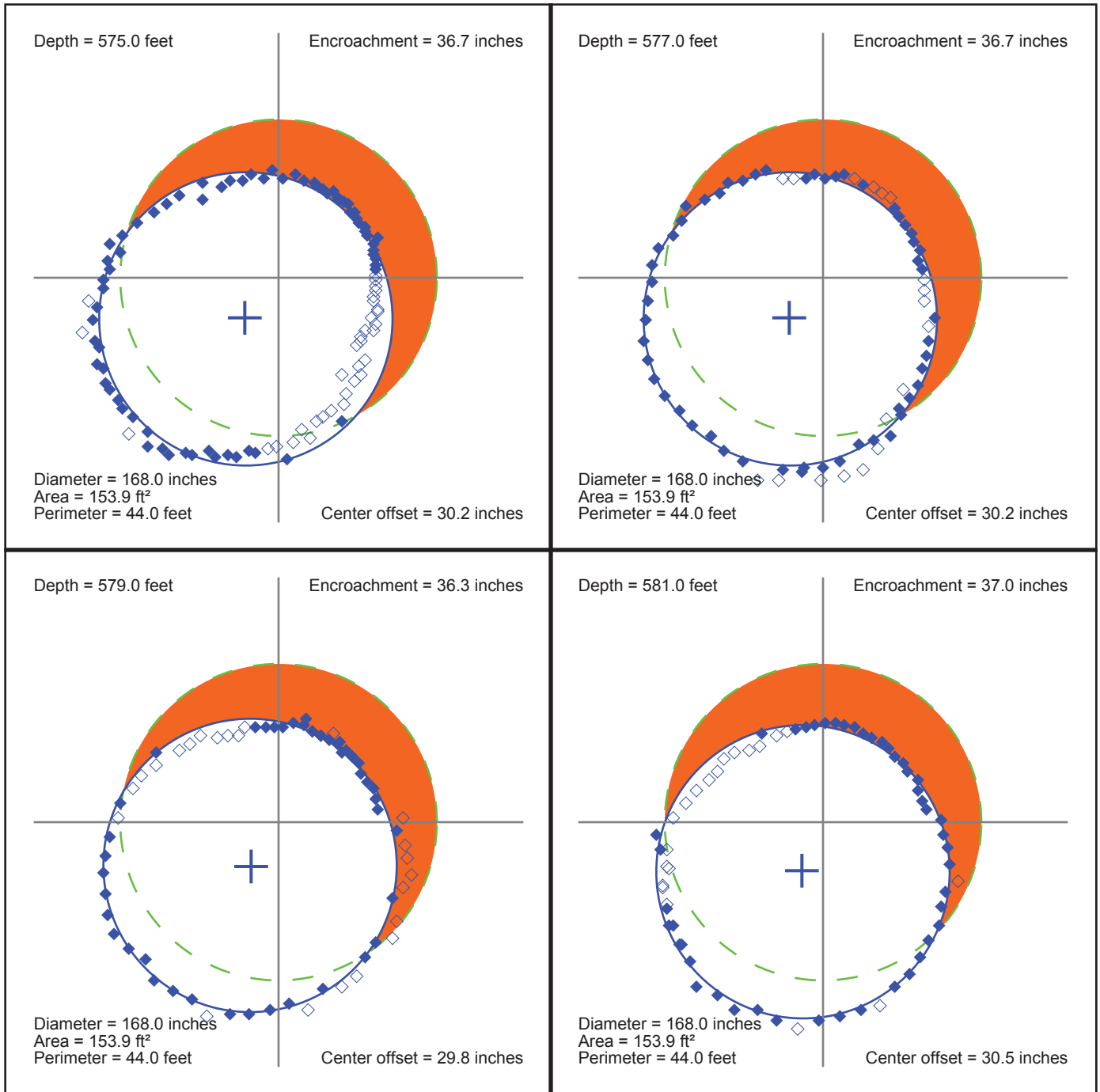
Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



Dodge Hill - 1/1

Sturgis, KY, 8/16/2011



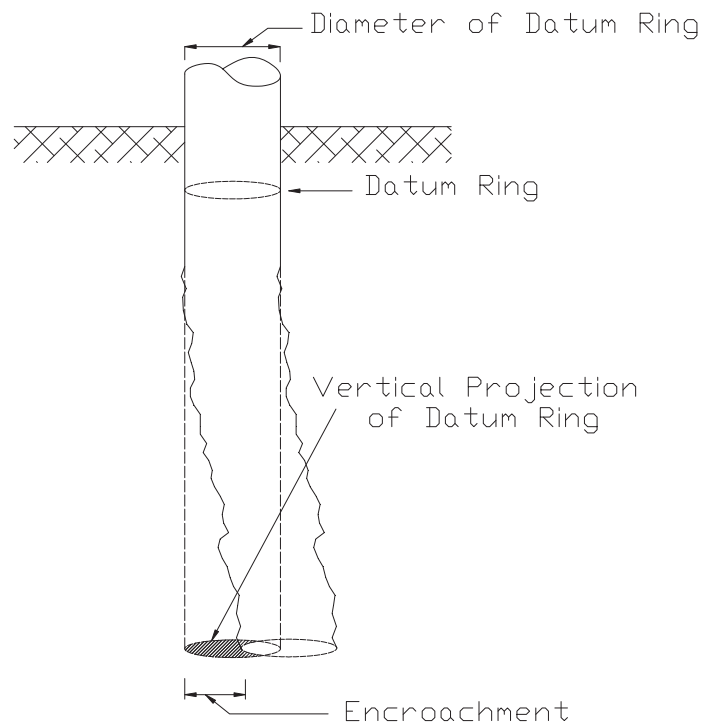
INTERPRETATION OF SONICALIPER FIELD DATA REPORT

General: The SONICaliper is a profiling sonar device, specially adapted to function in drilling fluids. Each 360° pass generated with the SONICaliper device produces up to one hundred twenty individual echo returns (profile data points). In the attached figures (profile ring plots), the diamond points represent individual profile data points. A circle is fitted to the data points using a proprietary double-step least-squares technique, to approximate the cross-sectional geometry of the shaft. A center location and diameter are calculated for each profile ring circle.

Deployment: The device is lowered into the shaft excavation in incremental depths. At each depth, a 360° sweep of the shaft wall is performed. The device is assumed to hang vertically in the shaft (any deviation from verticality can be noted using onboard pitch and roll sensors). Any twist in the device relative to its initial orientation is compensated by an onboard compass sensor.

Calibration: Because the properties of drilling fluids vary widely, a calibration must be performed for each shaft to determine fluid wavespeed (and thus calculate range data). This is done by selecting a profile ring of known diameter (usually, but not always the upper-most profile ring) as the “calibration ring”. The data analysis then back-calculates the fluid wavespeed based on the known diameter of this ring. The fluid wavespeed is assumed to be constant over the entire column of fluid depth.

Shaft Verticality: To determine shaft verticality, a profile ring (usually, but not always the calibration ring) is selected as the “datum ring”. The geometric centers of the datum ring and all other profile rings are compared. The “center offset” listed on the figures indicates the divergence of each profile ring center point from the datum ring center point. “Encroachment” is presented graphically as the shaded area representing the portion of the shaft wall which would encroach into the perfectly vertical projection of the datum ring to the depth in question. The maximum encroachment value for each profile ring is also given numerically. The user may choose to display computed values for the vertical inclination of the shaft between each ring and the datum ring, for both encroachment and center offset. Inclination may be expressed as a percentage or as a deviation:depth ratio.



Calipered Volume: The cross sectional area of each profile ring is determined and a cumulative volume for the calipered portion of the shaft is calculated. Note that this volume is a minimum.