Mixed Use Building - TS-1

Chicago, IL, 9/23/2015

The enclosed report contains the data and analysis summary for the SONICaliper shaft caliper, performed at Mixed Use Building (TS-1), Chicago, IL on Wednesday, September 23, 2015 by JAS. The shaft was calipered from a reference depth of 16.0 feet to a depth of 128.0 feet. The shaft excavation was supported by a permanent, 35.00 feet deep, 118.50 inches I.D., 1.00 inches thick steel casing. The thickness of the casing itself, if temporary, was added to the total volume calculation.

The minimum concrete volume is calculated to be 212.2 yd^3, based on the area of the calipered cross-sections and a Top of Concrete depth of 35.3 feet. (Note that this includes theoretical volume based on a nominal shaft cross-sectional area between depths of 128.0 feet and 134.8 feet, which was not calipered.)

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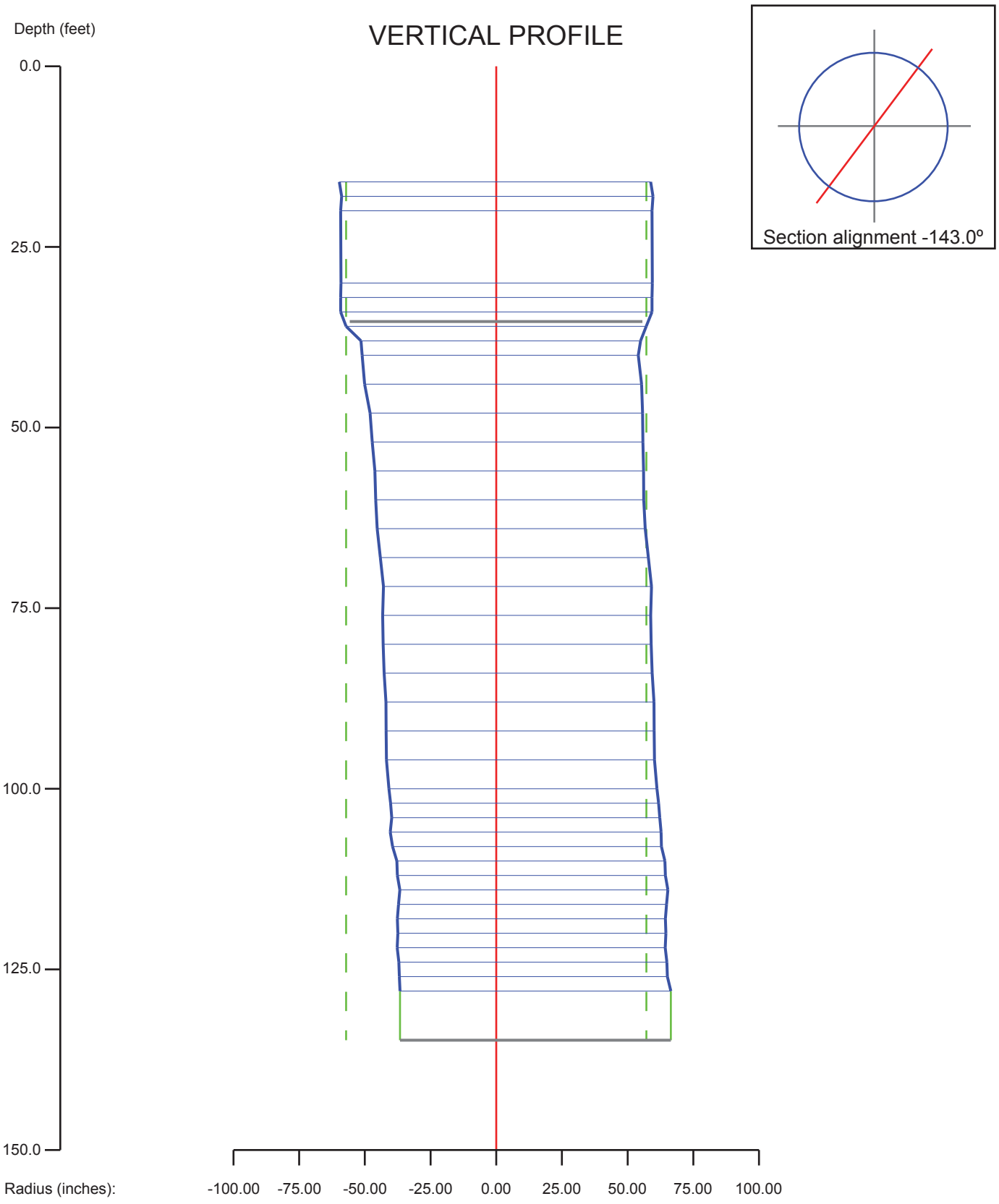

LOADTEST

SONICALIPER™

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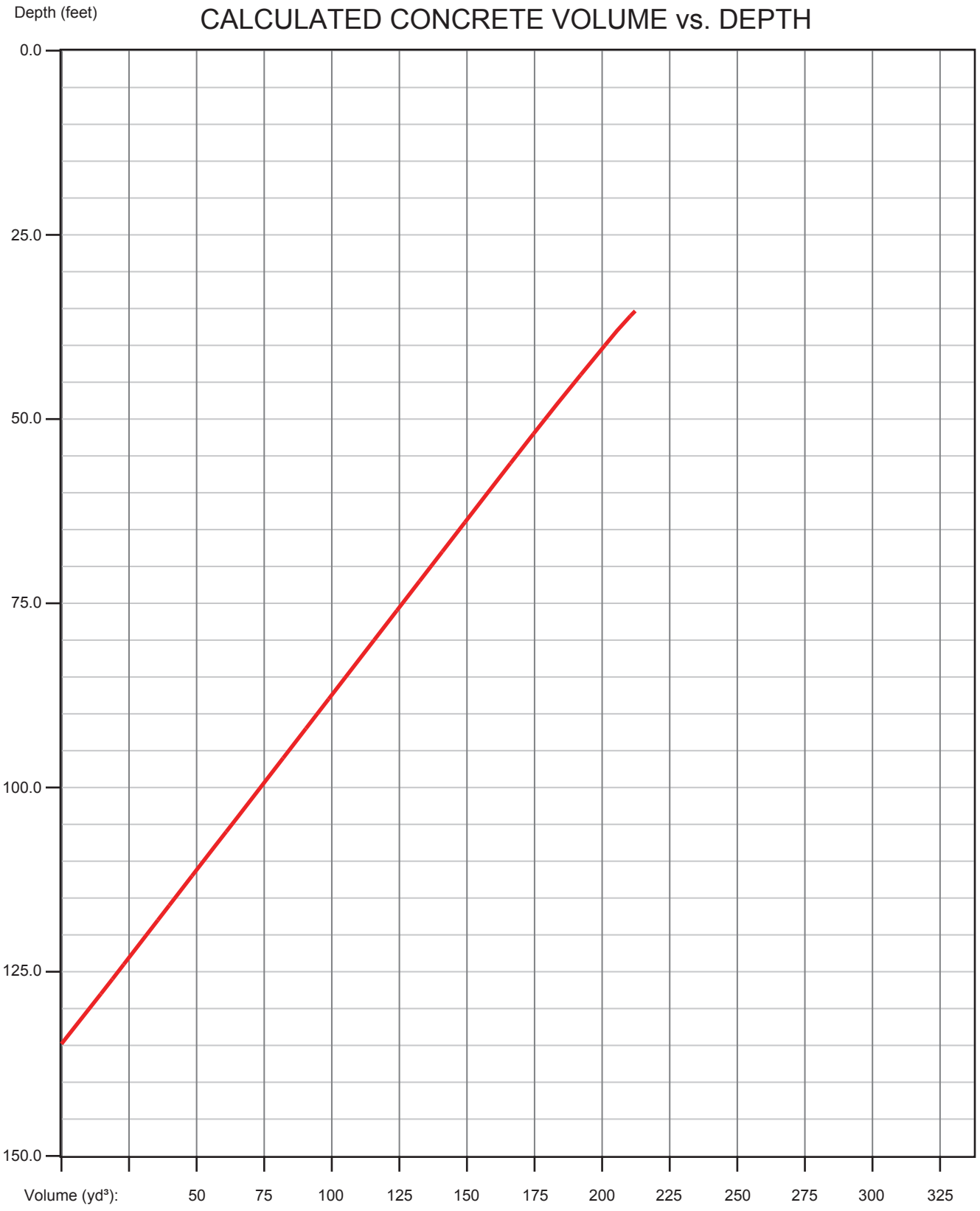
Chicago, IL, 9/23/2015



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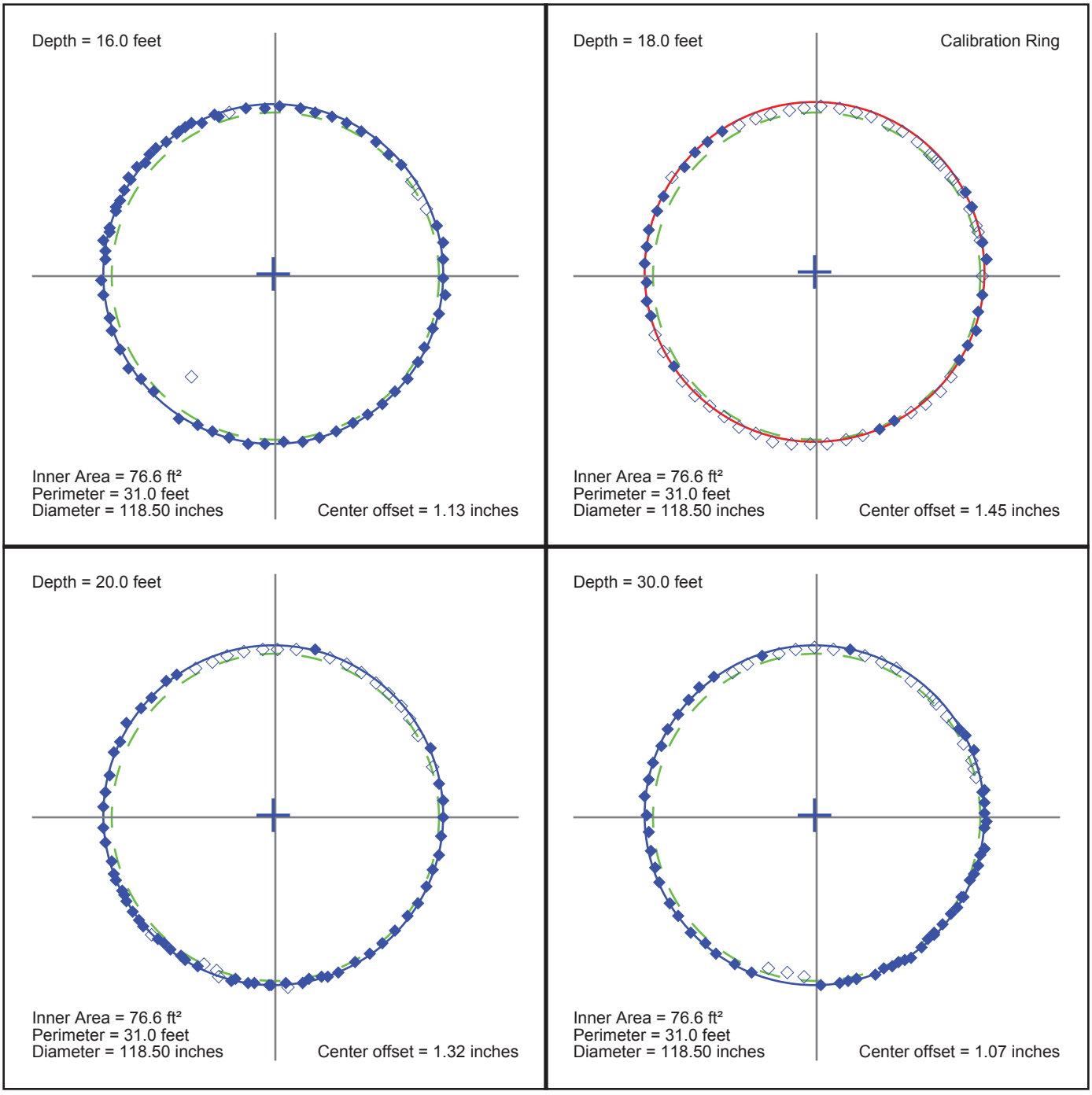

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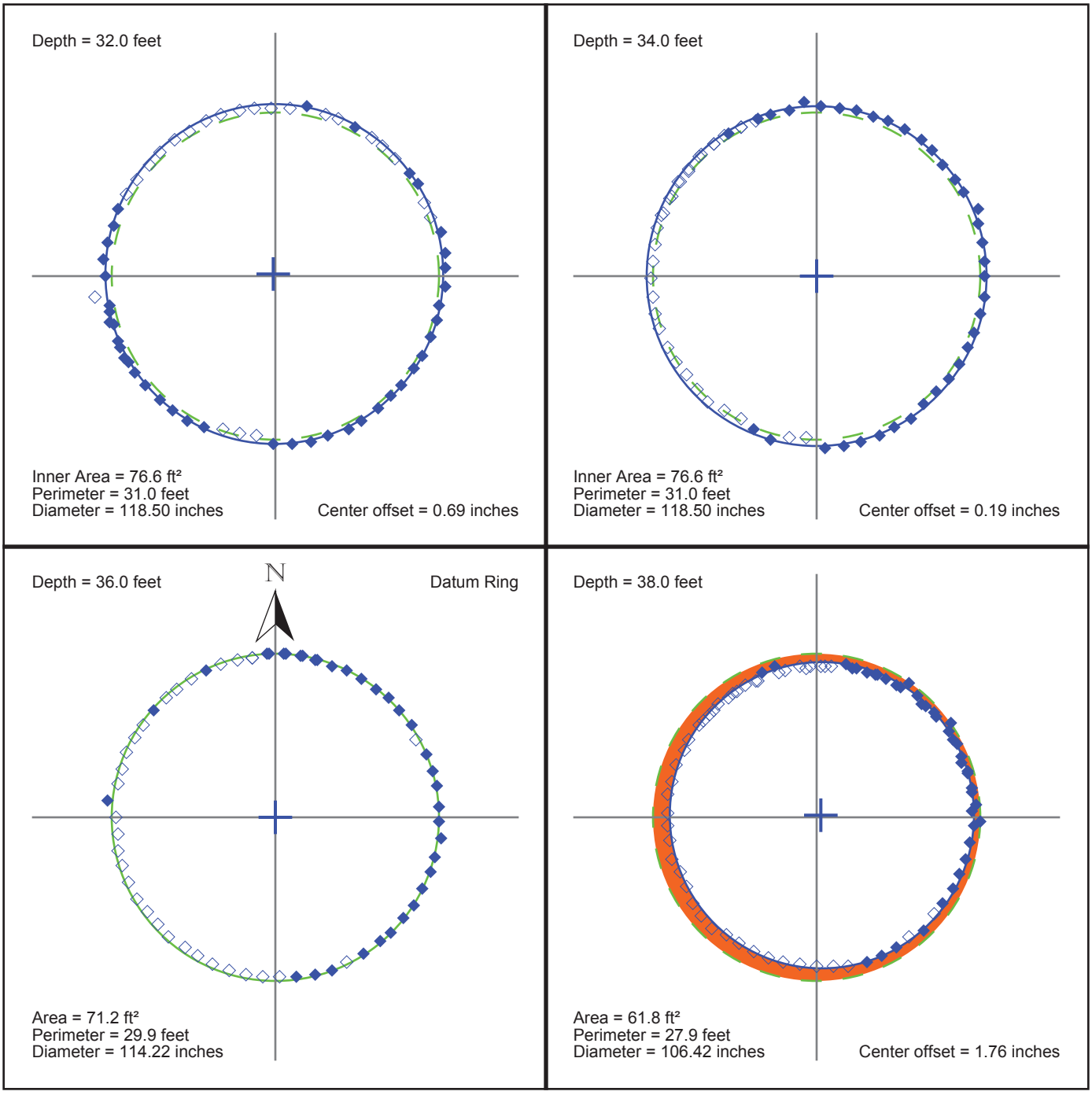

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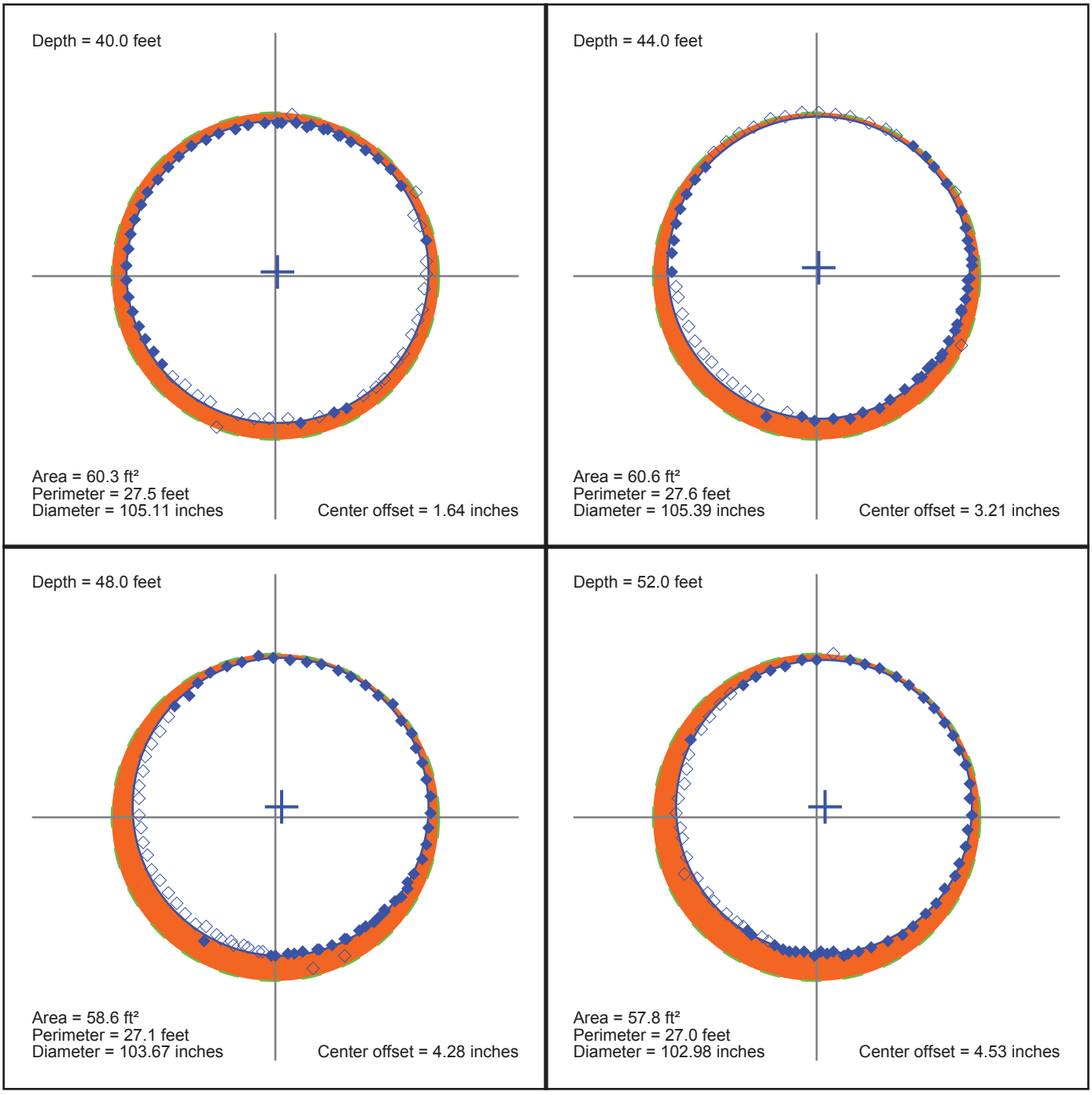

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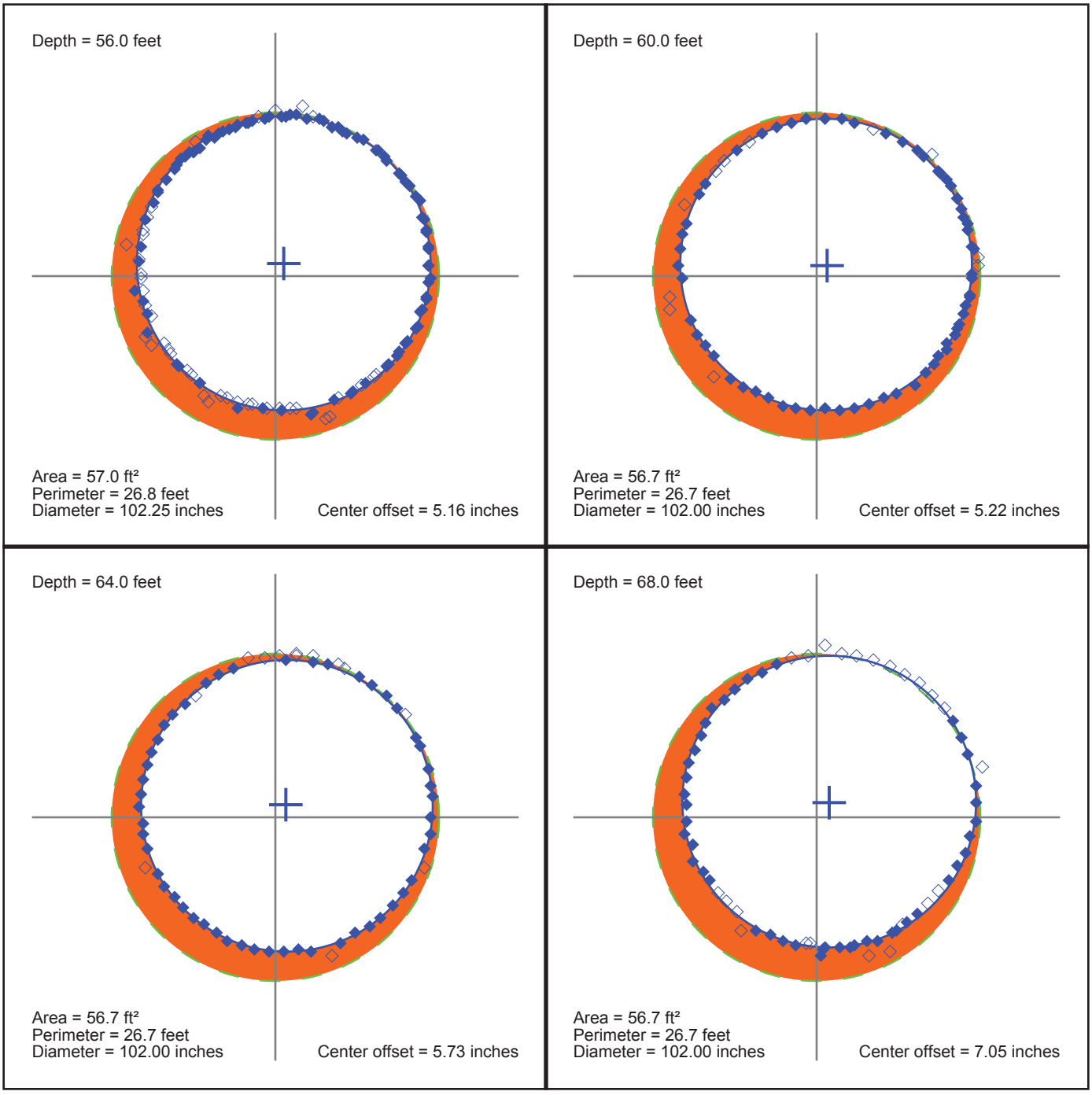

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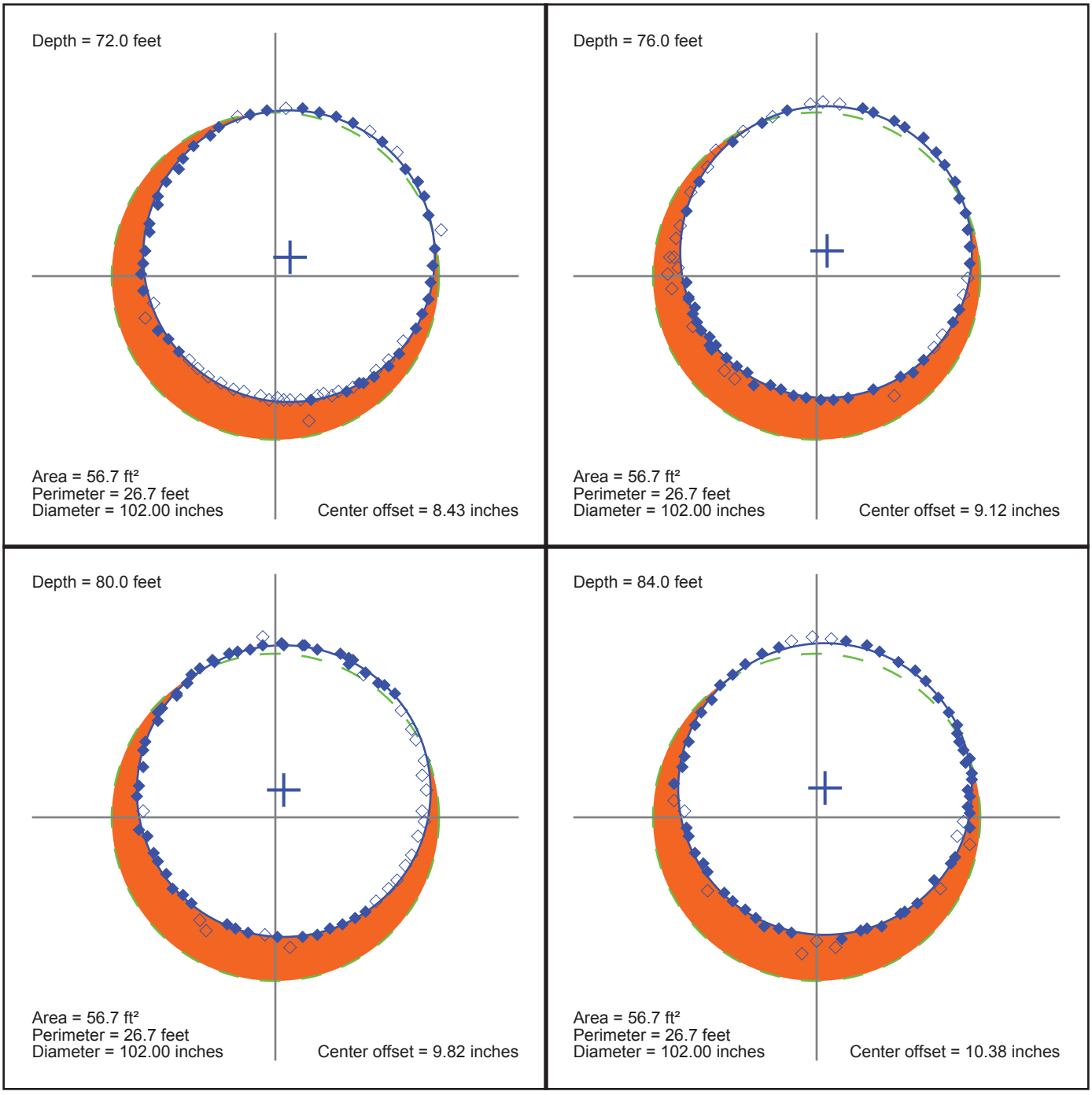

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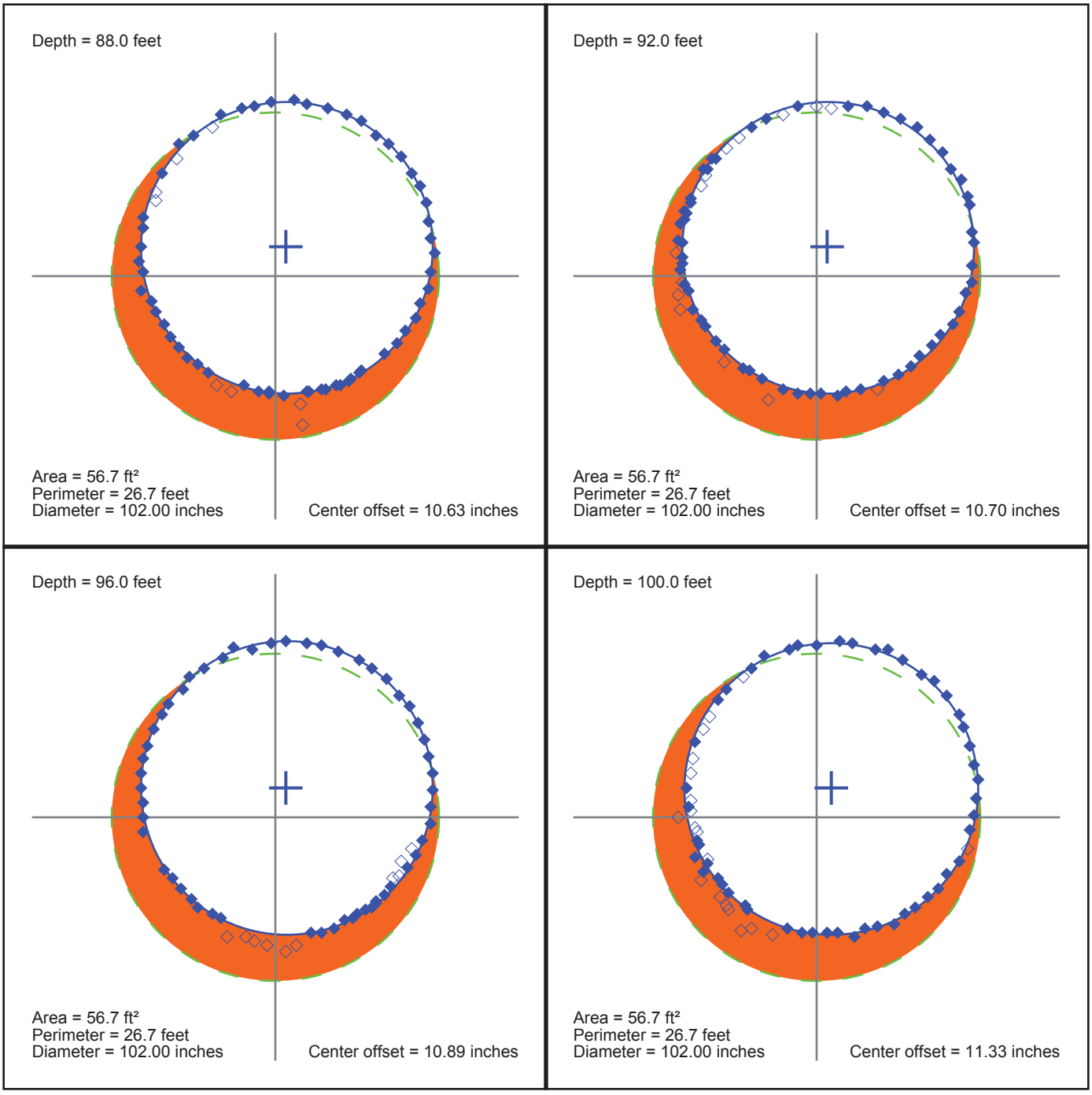

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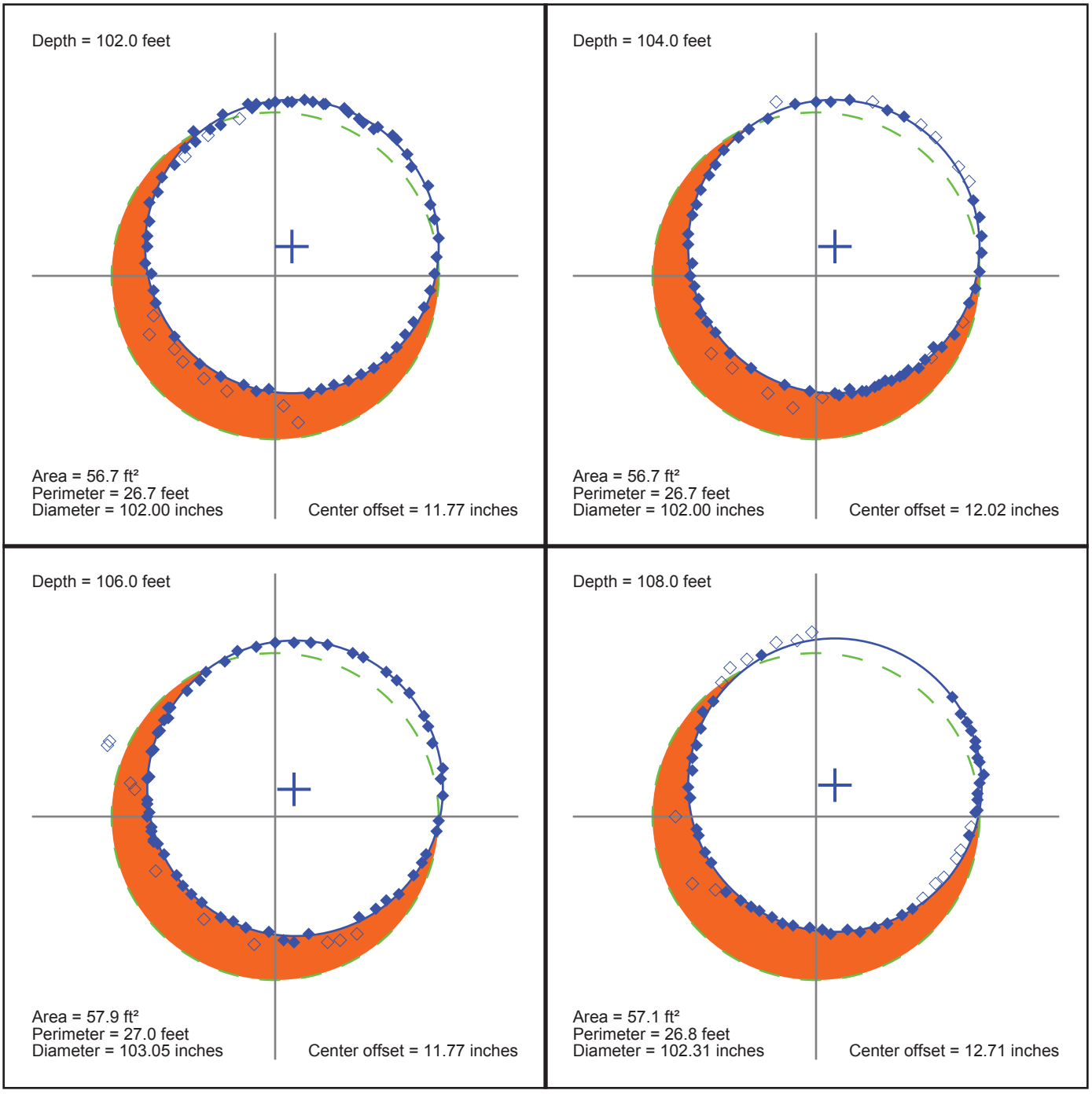

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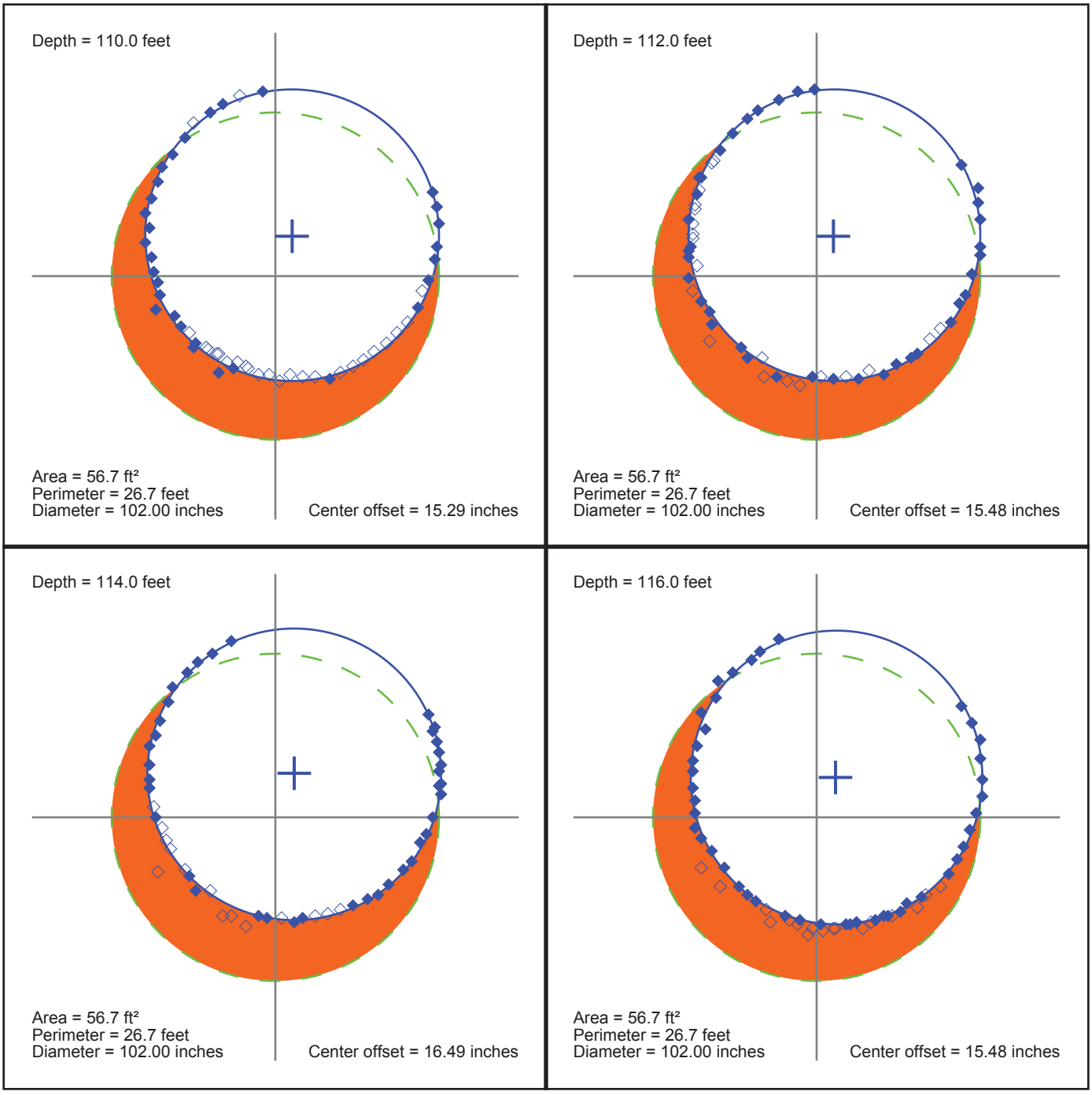

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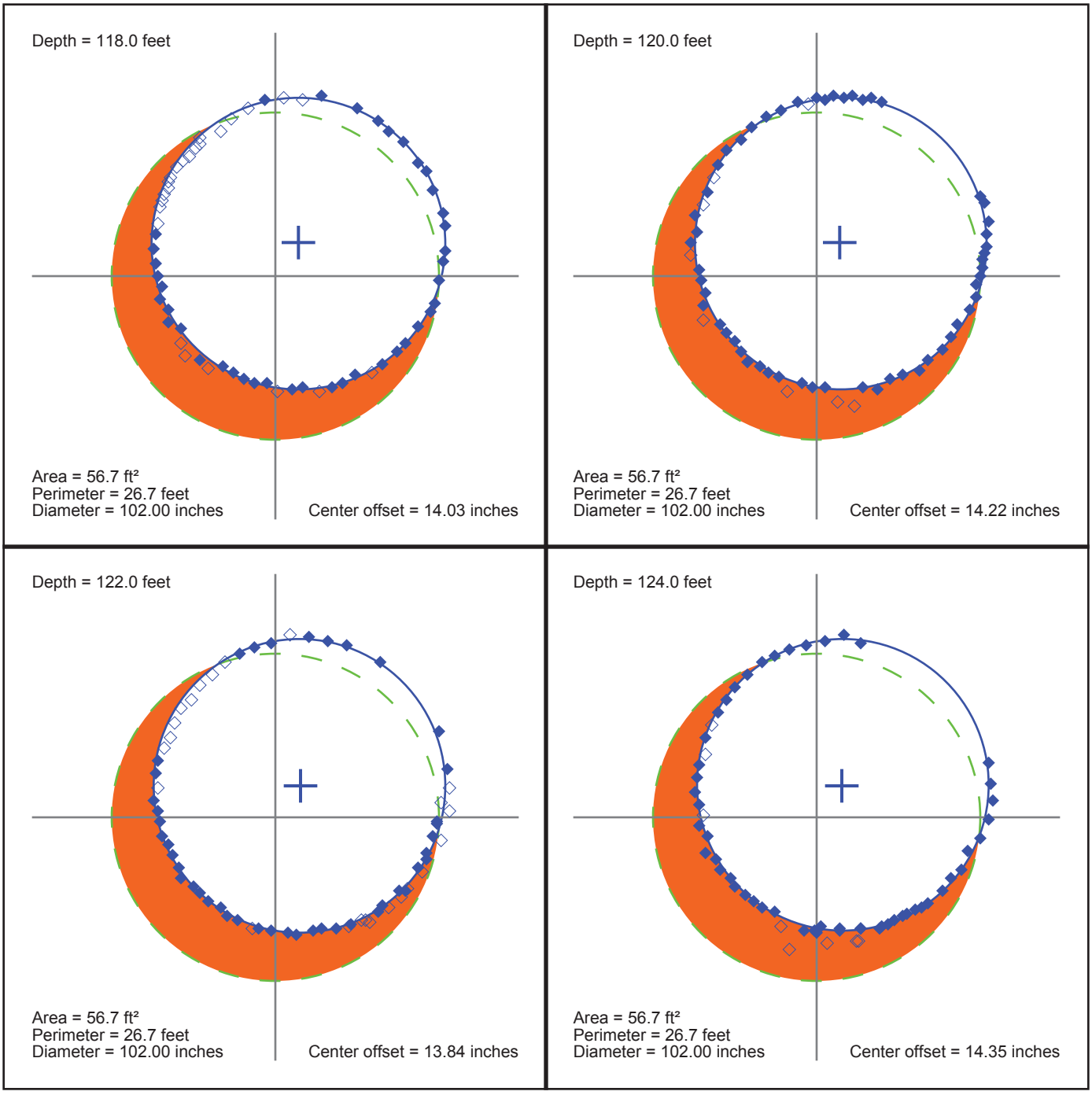

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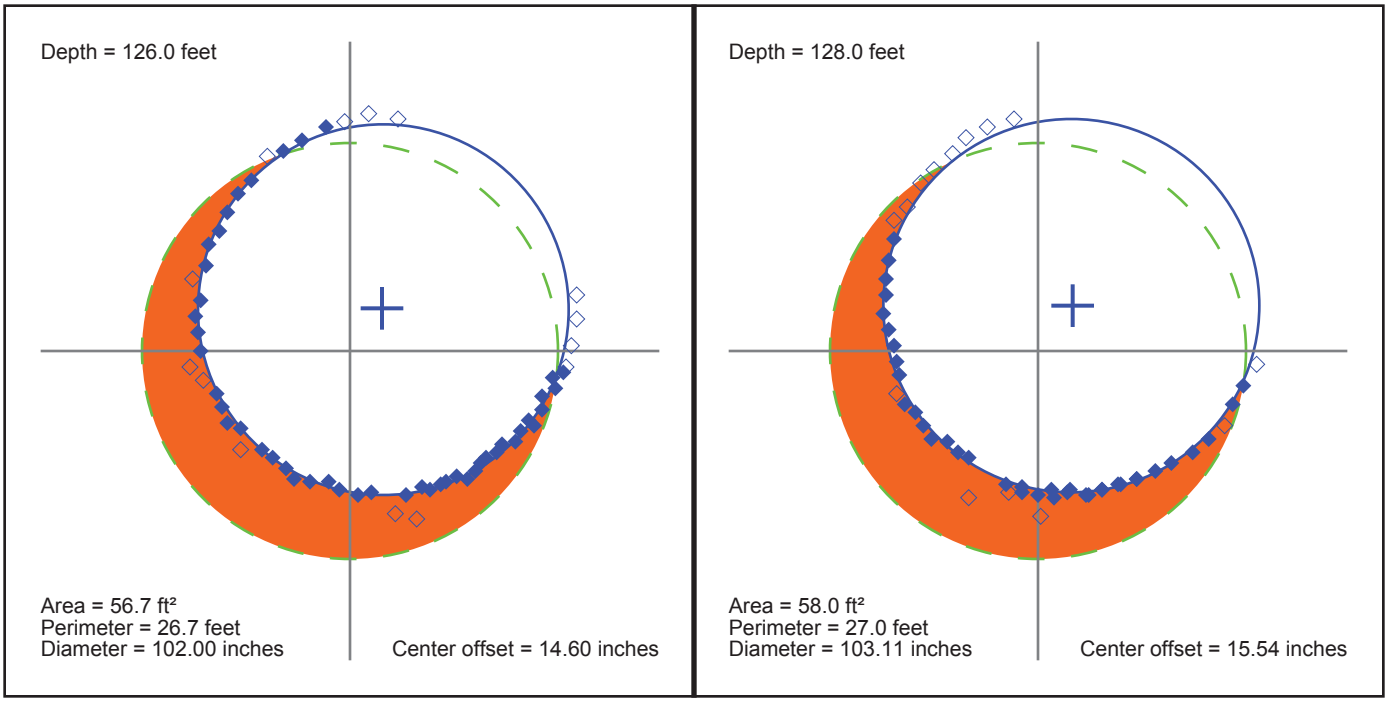

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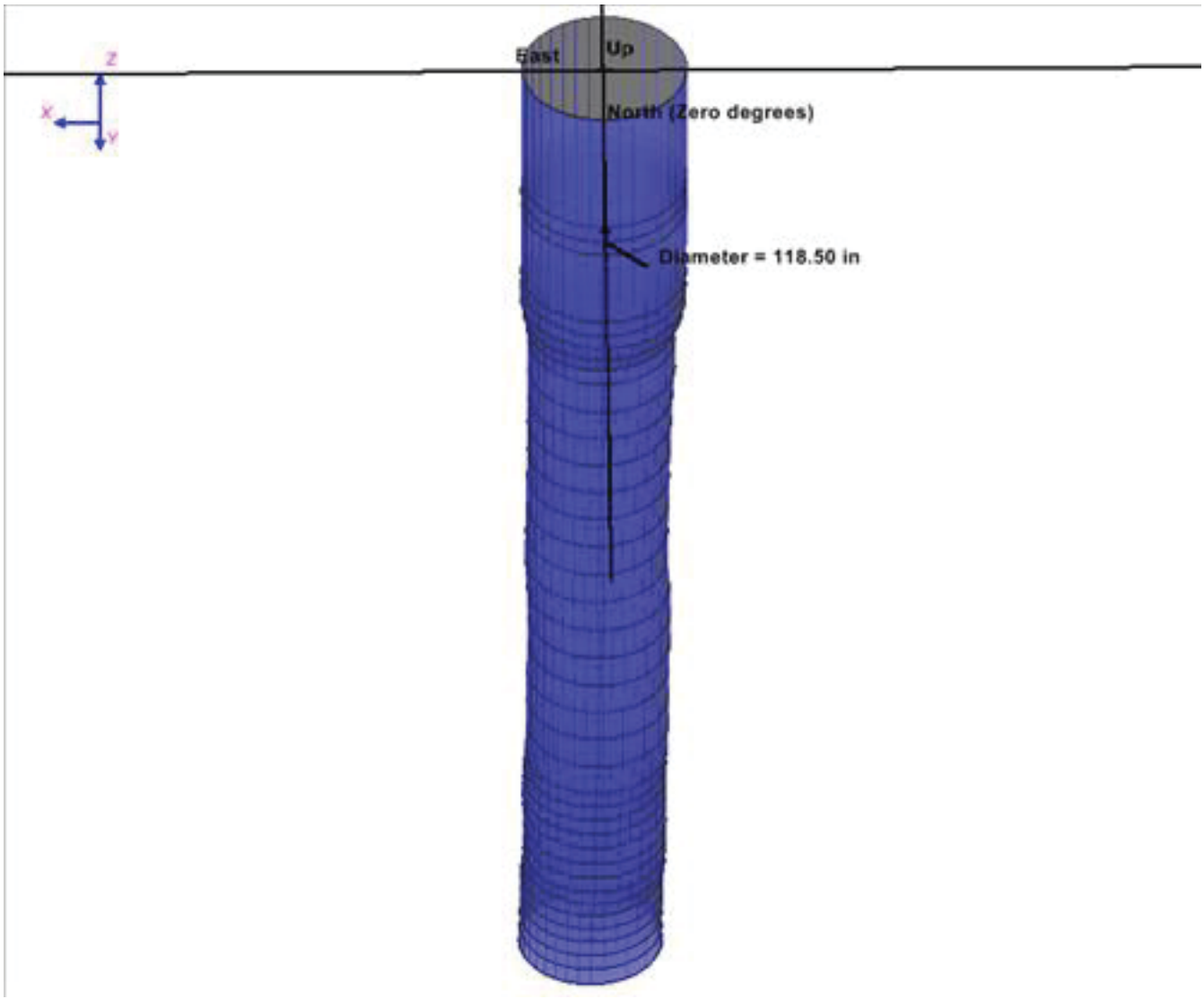


Looking North

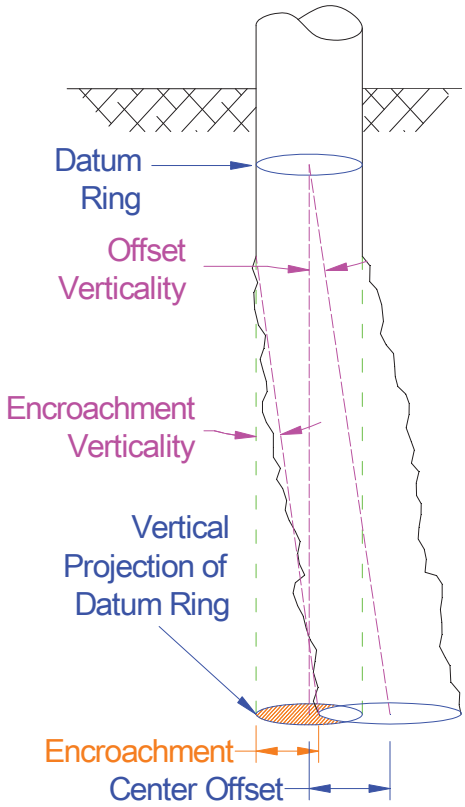
INTERPRETATION OF SONICALIPER FIELD DATA REPORT

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 preceding figures (profile ring plots), the diamond points represent individual profile data points. A geometric shape is fitted to the data points using the non-linear least-squares technique (see Gander et al) to approximate the cross-sectional profile of the shaft for verticality, perimeter area and volume calculations. Hollow diamonds designate rejected points which are not used in the data fitting.

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 onboard compass and/or gyroscope sensors.

Calibration: Because the properties of drilling fluids vary widely, a calibration must be performed for each shaft to determine fluid wavespeed. This is done by selecting a profile ring of known diameter (drilled shaft) or length & width (panel / barrette) as the "calibration ring". The data analysis then back-calculates the fluid wavespeed based on the known dimensions 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. For circular shafts, the maximum encroachment value for each profile ring is also given numerically. The user may also 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. Verticality is computed as the maximum encroachment or center offset (the "deviation") divided by change in depth, and may be expressed as an angle, 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.