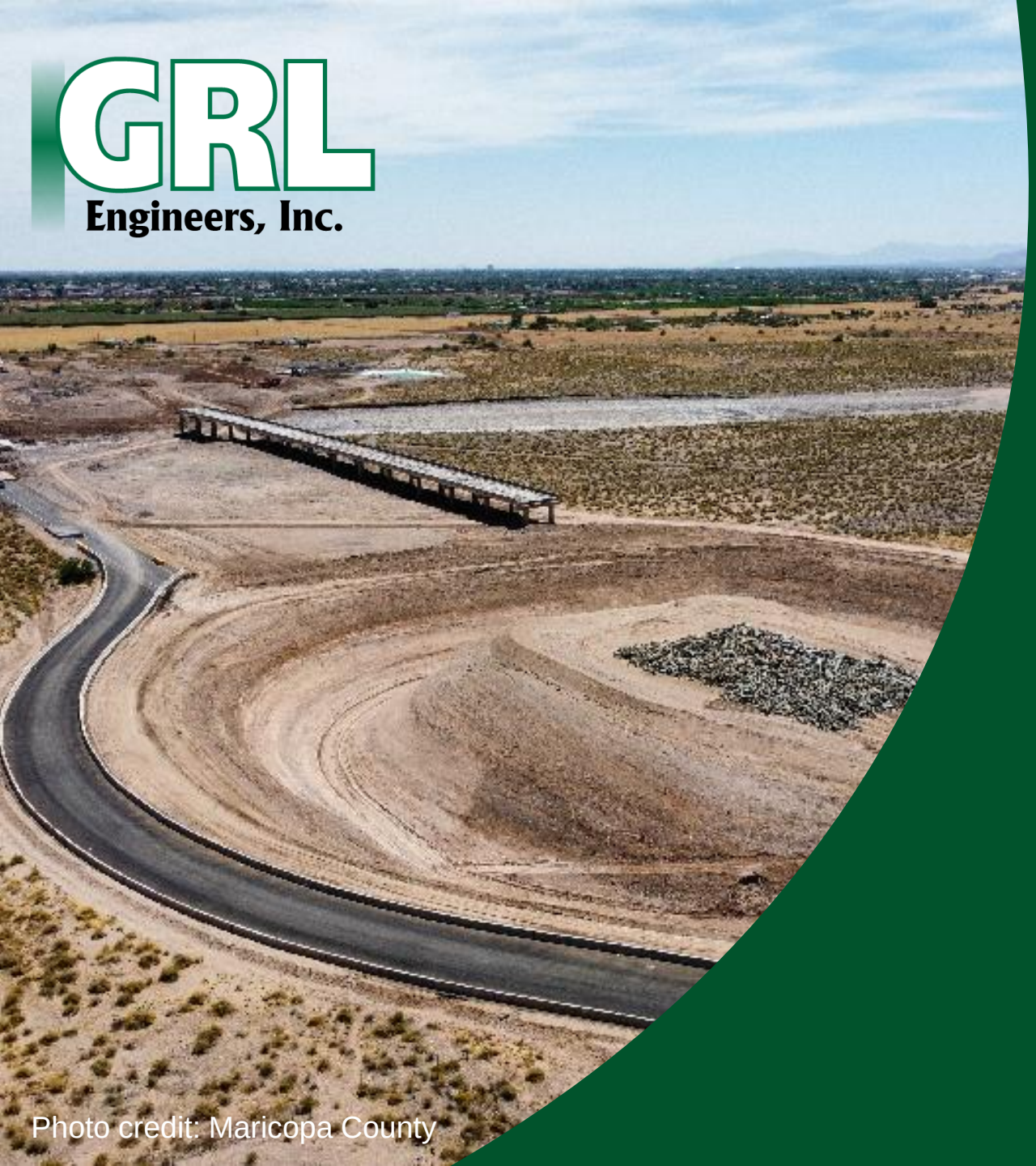



Photo credit: Maricopa County

# GILBERT ROAD BRIDGE IN ARIZONA

## A Comparison of Different QA/QC Testing Methods

Camilo Alvarez, P.E.

# PROJECT DETAILS

10’ diameter reaching depths of 165’ from grade

Keller scope included installation of 8 piers, each consisting of 2-10’ diameter by approximately 140’ long drilled shafts, and 2 abutments with 3 drilled shafts (7’ x 125’)

Testing methods included: TIP, SHAPE, CSL & GGL

Photo credit: Maricopa County

# NDT Testing Procedures

GGL – Measures density around close to 4 inches of radius around access tube

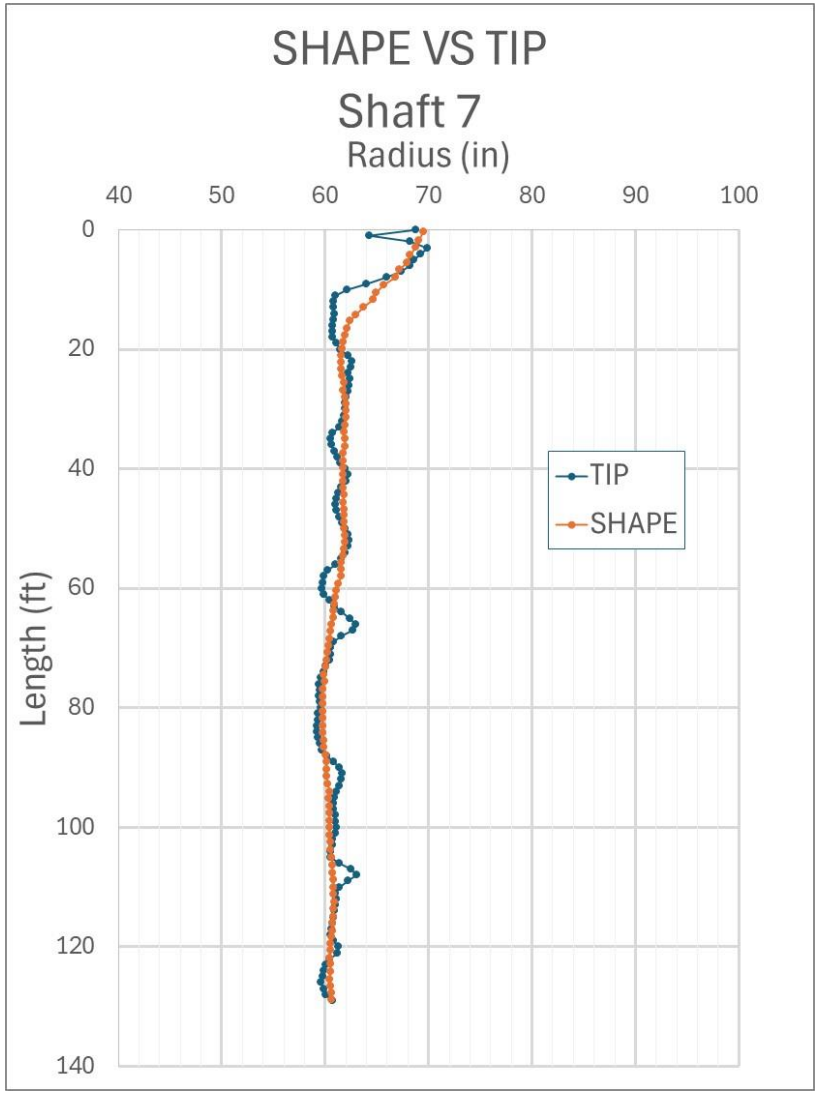
CSL – Measures FAT between available access tubes via sonic pulses.

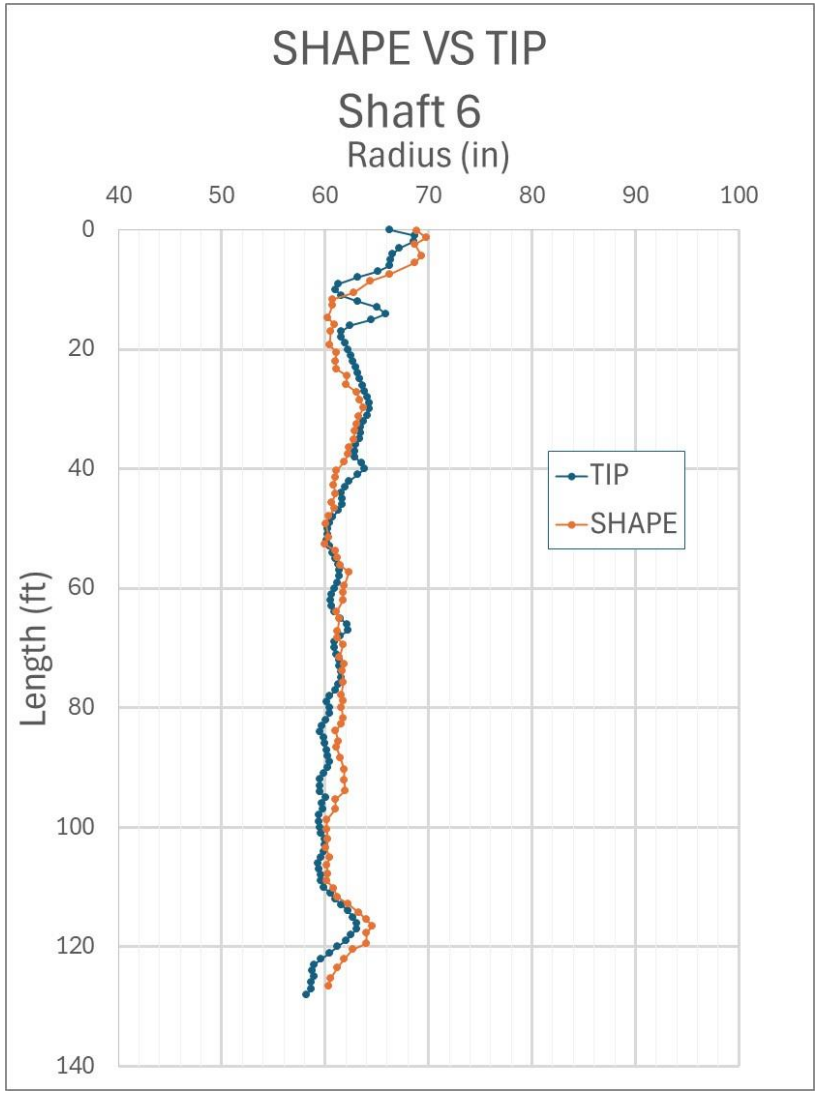
SHAPE – Measures as build hole.

TIP – Measures temperature and determines relative radius (distance between cage and outside radius of shaft).

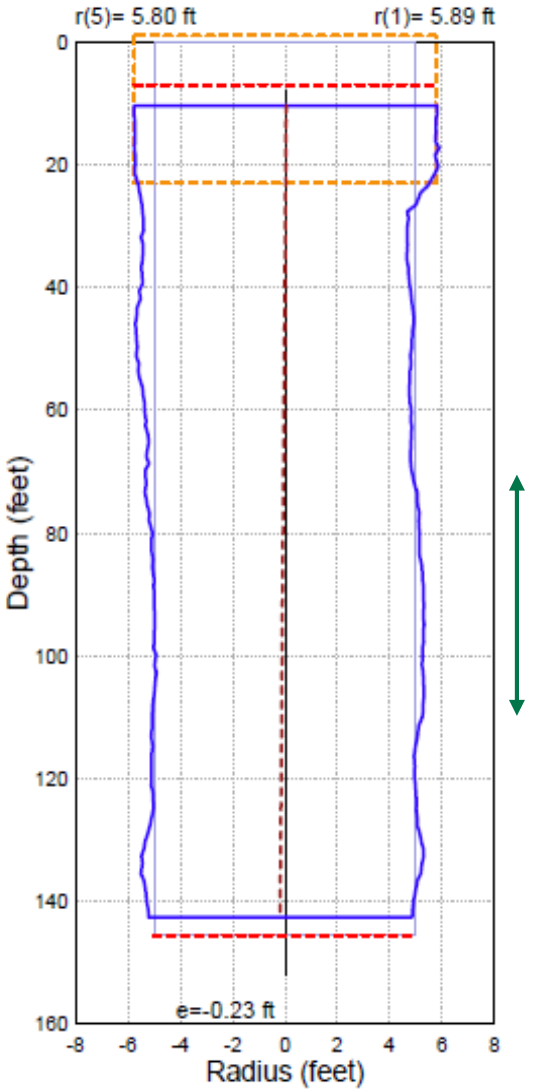
Photo credit: Maricopa County

# SHAPE VS TIP - SHAFT DIAMETER

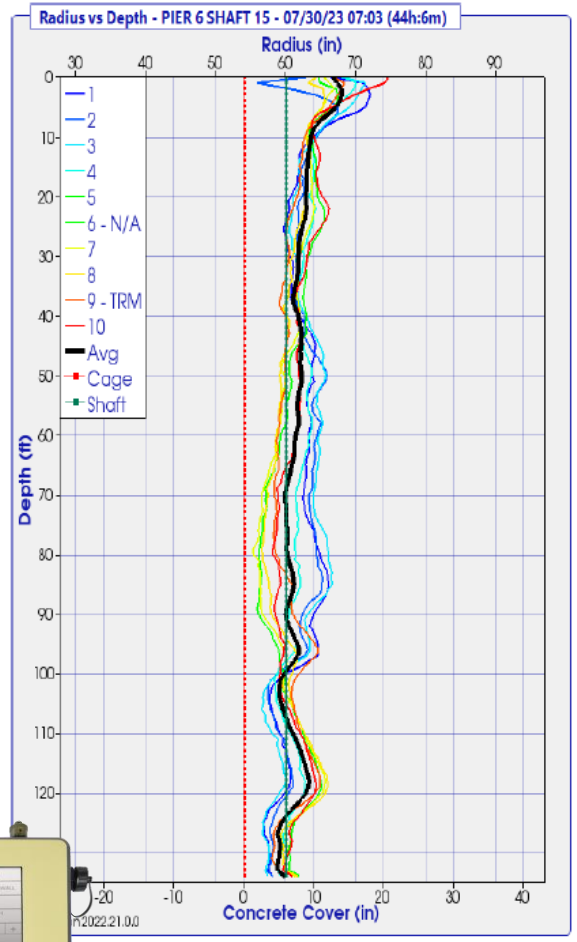


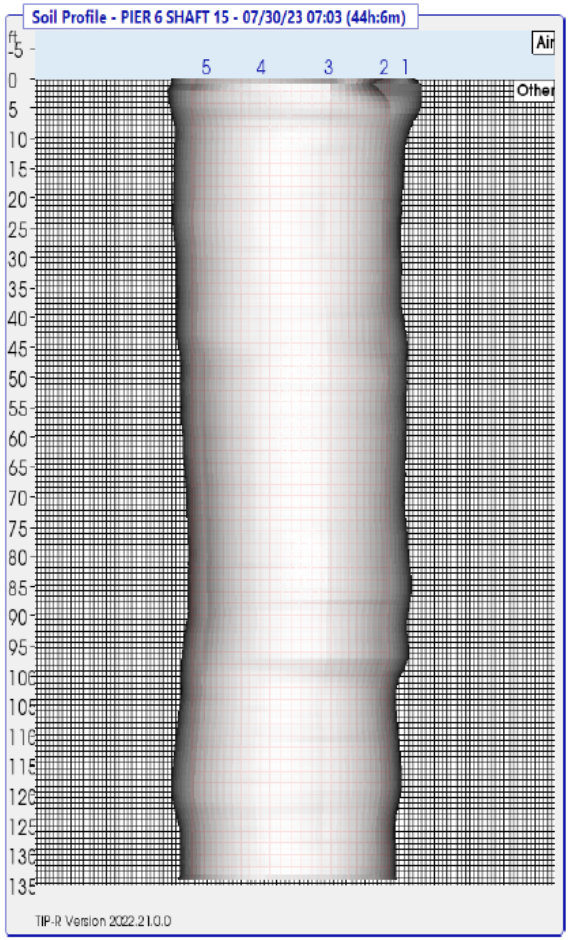
# SHAPE VS TIP - SHAFT DIAMETER


Cage Shifting due to verticality

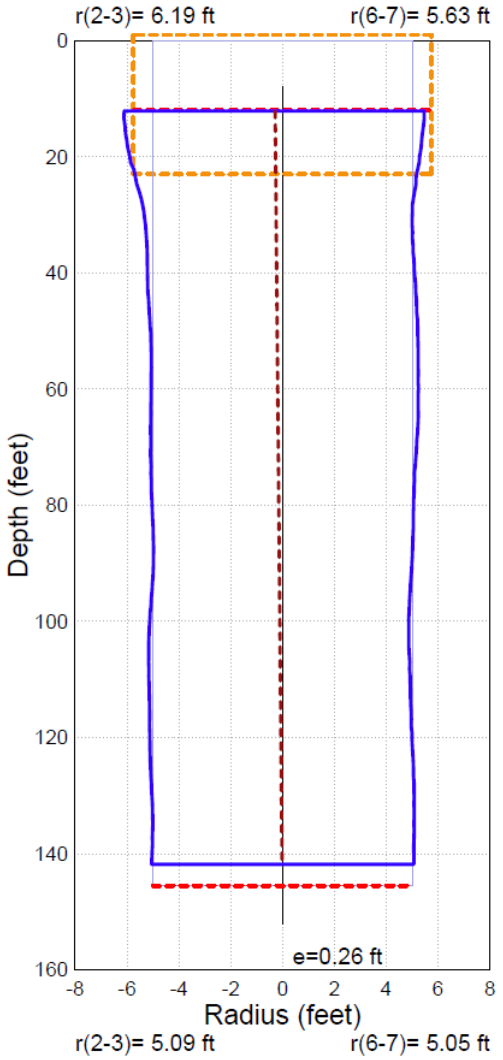




Radius vs Depth

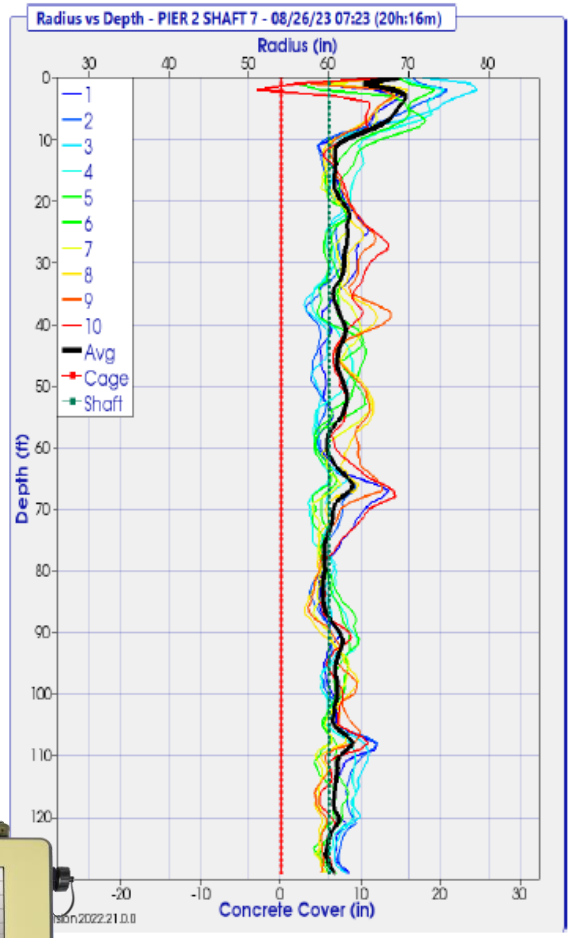



Pile Interpretation

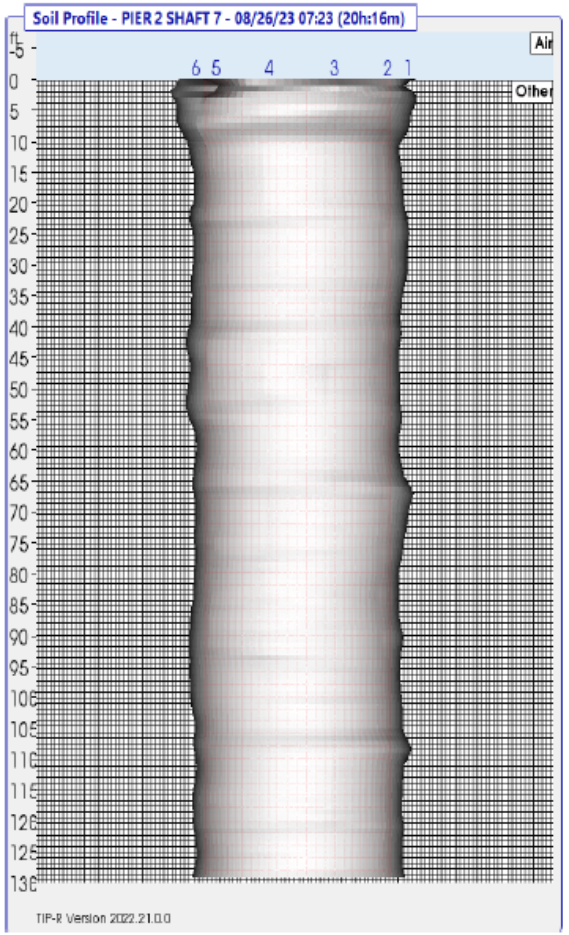
# SHAPE VS TIP - SHAFT DIAMETER

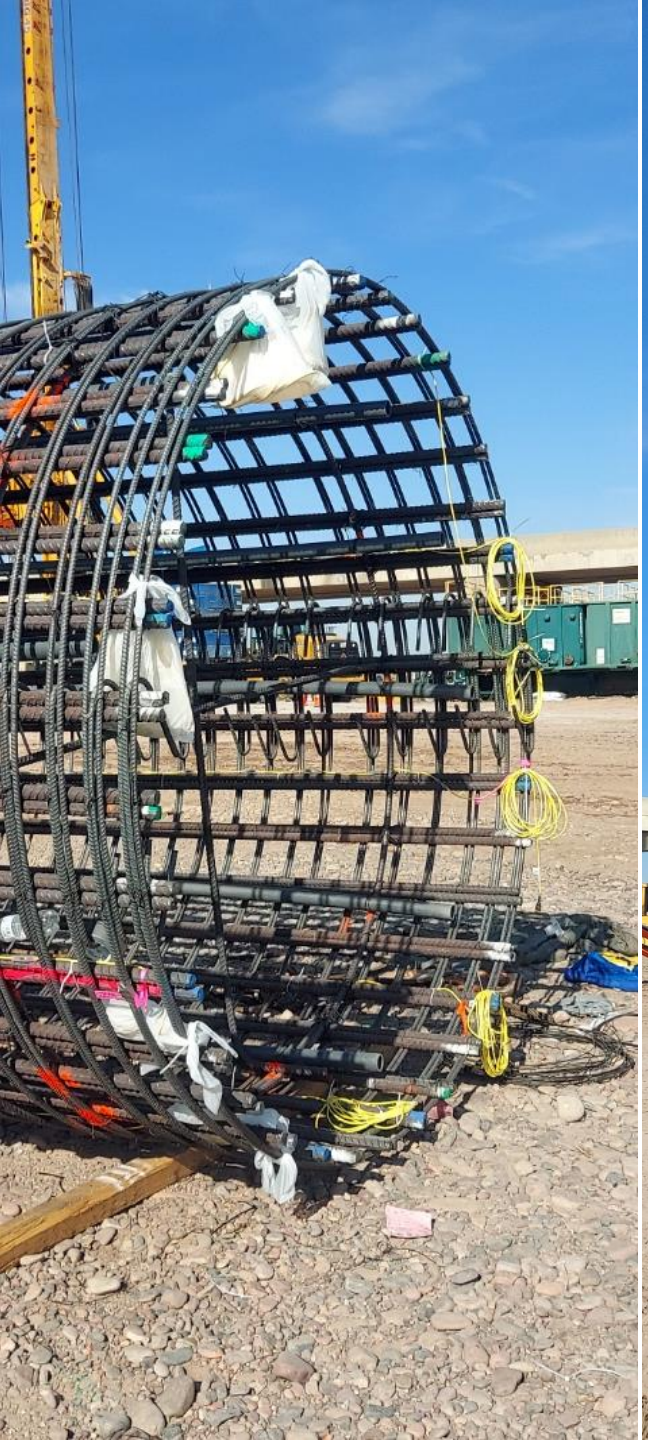


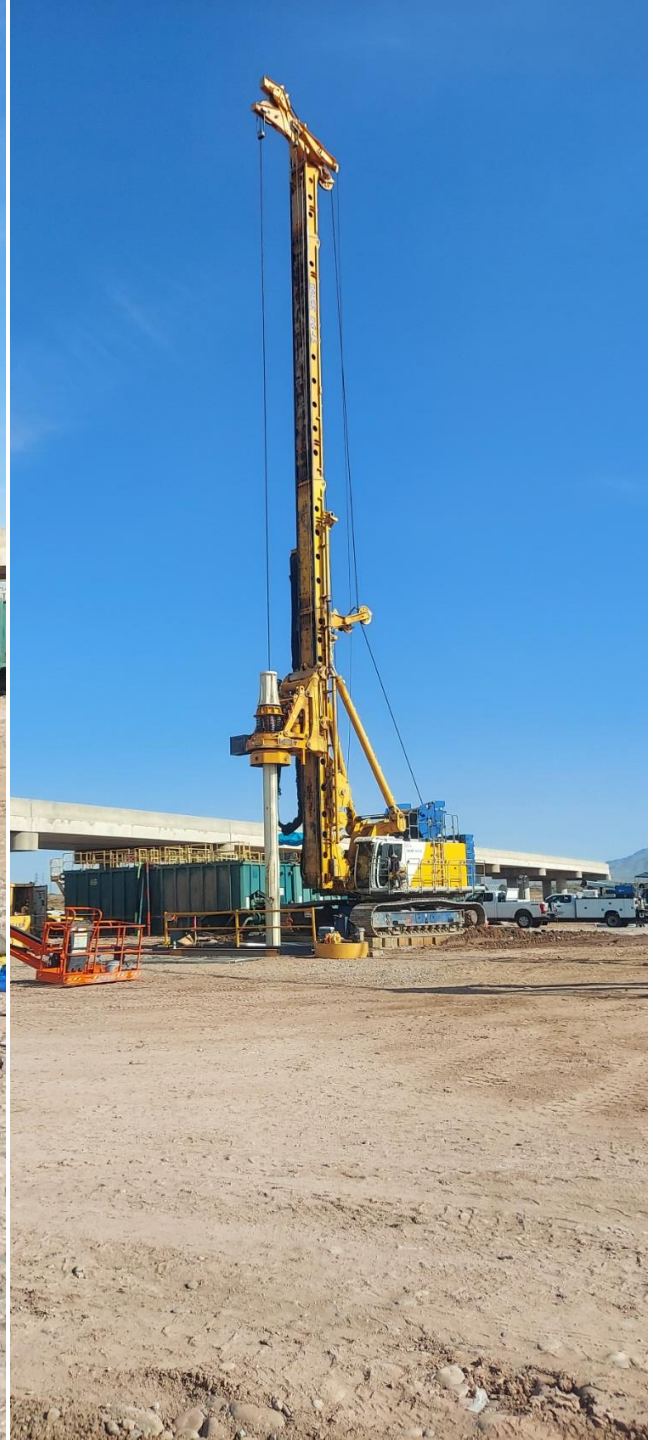



Radius vs Depth




Pile Interpretation

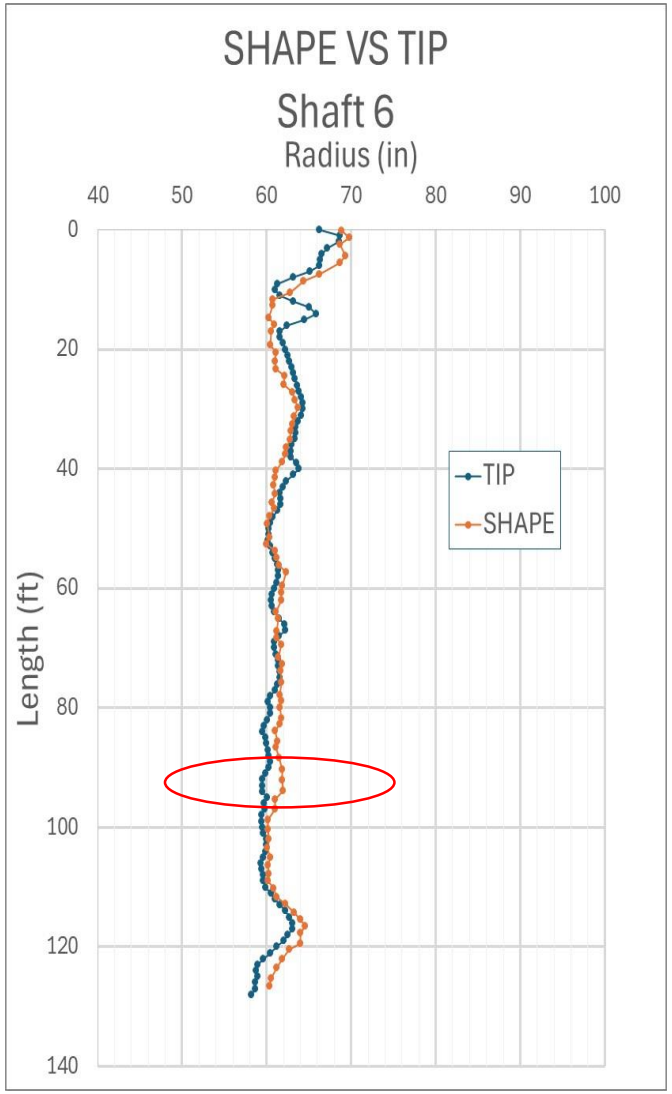




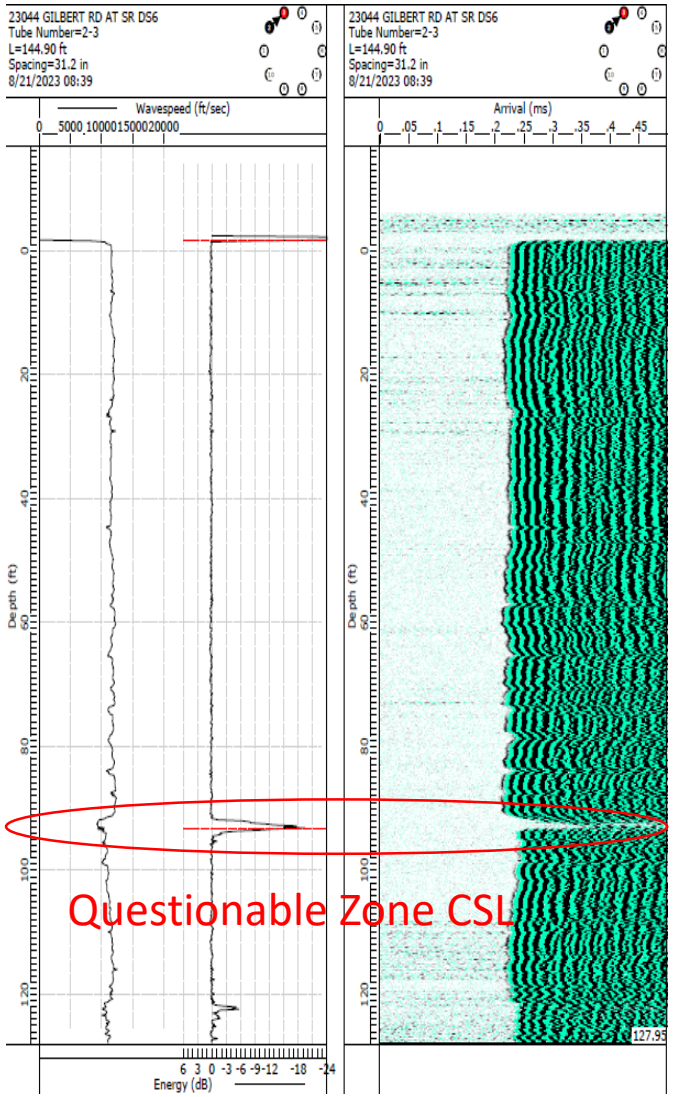
# COMPARING TIP AND SHAPE TESTS

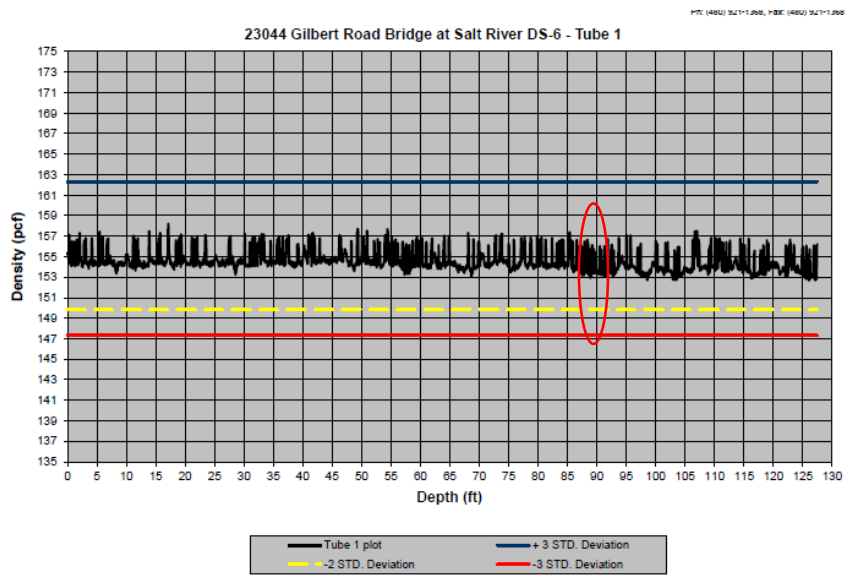
- Clear relationship
- Results within 1-1.5 inches of each other after testing 22 shafts
- Combination of both tests allows easy location of an issue
- Combination helps understanding cage placement & design

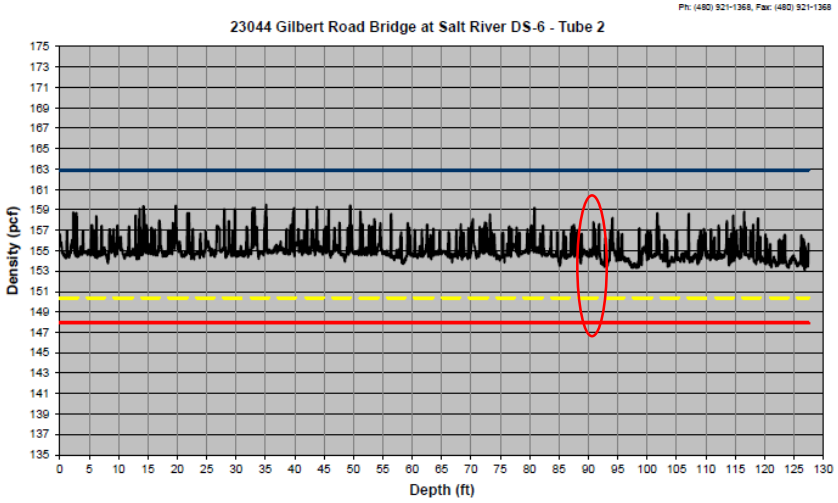
# SHAPE VS TIP VS CSL VS GGL



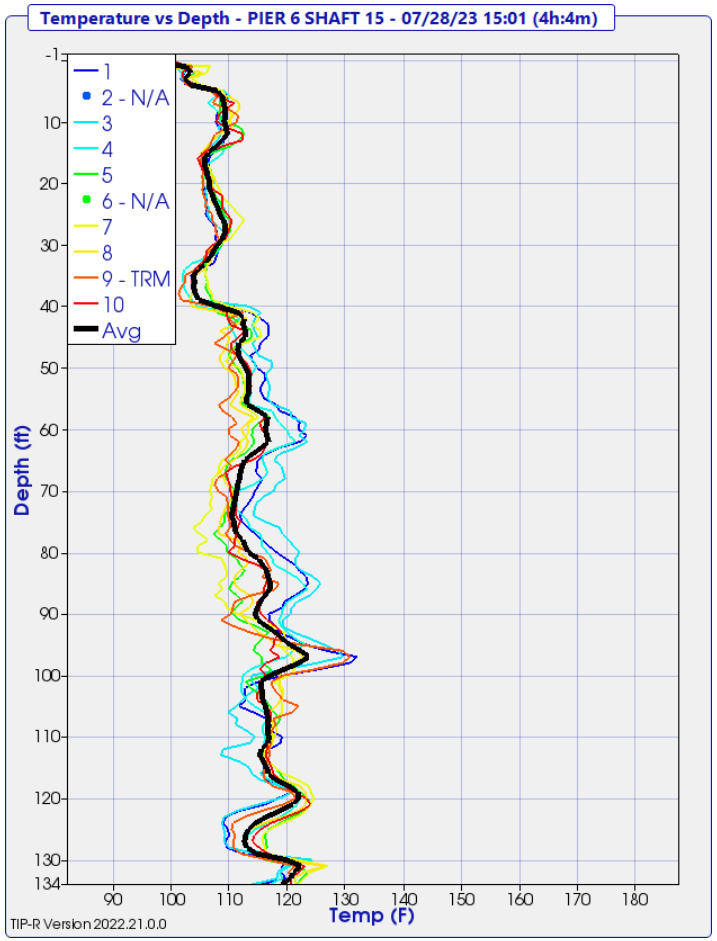

Access tubes 1, 2, 3 and 4 (wires 8, 9 and 10)
91-93 ft

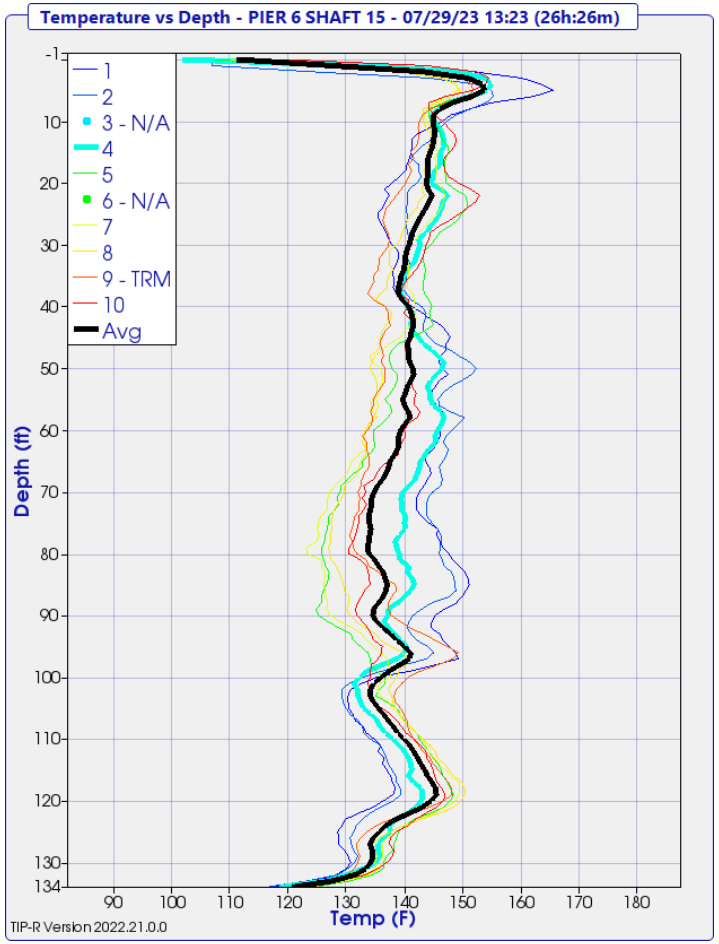


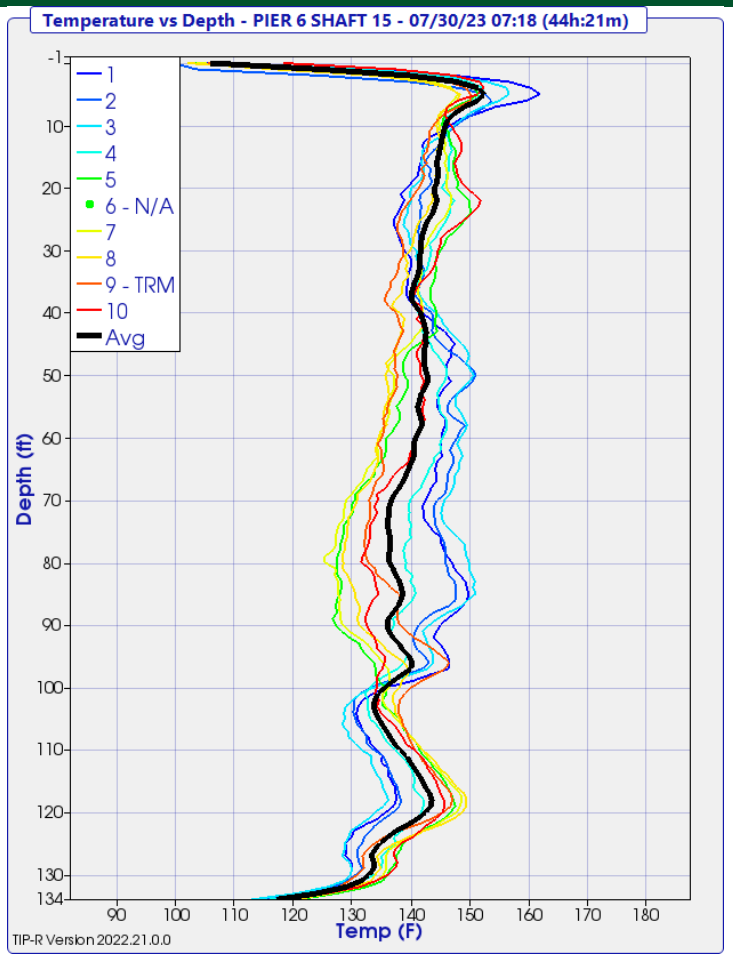



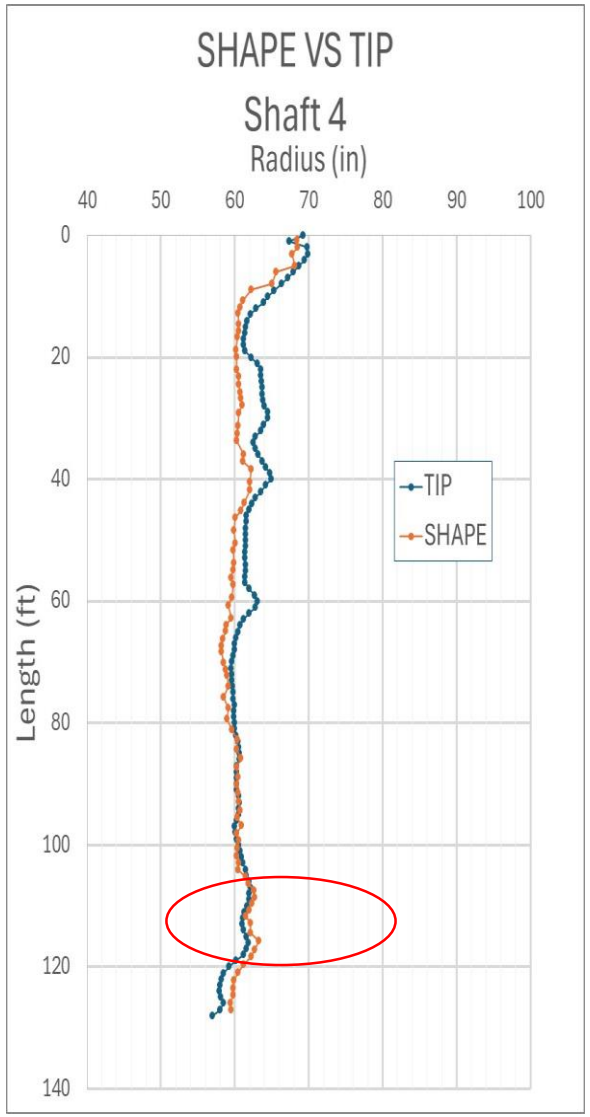
# SHAPE VS TIP VS GGL



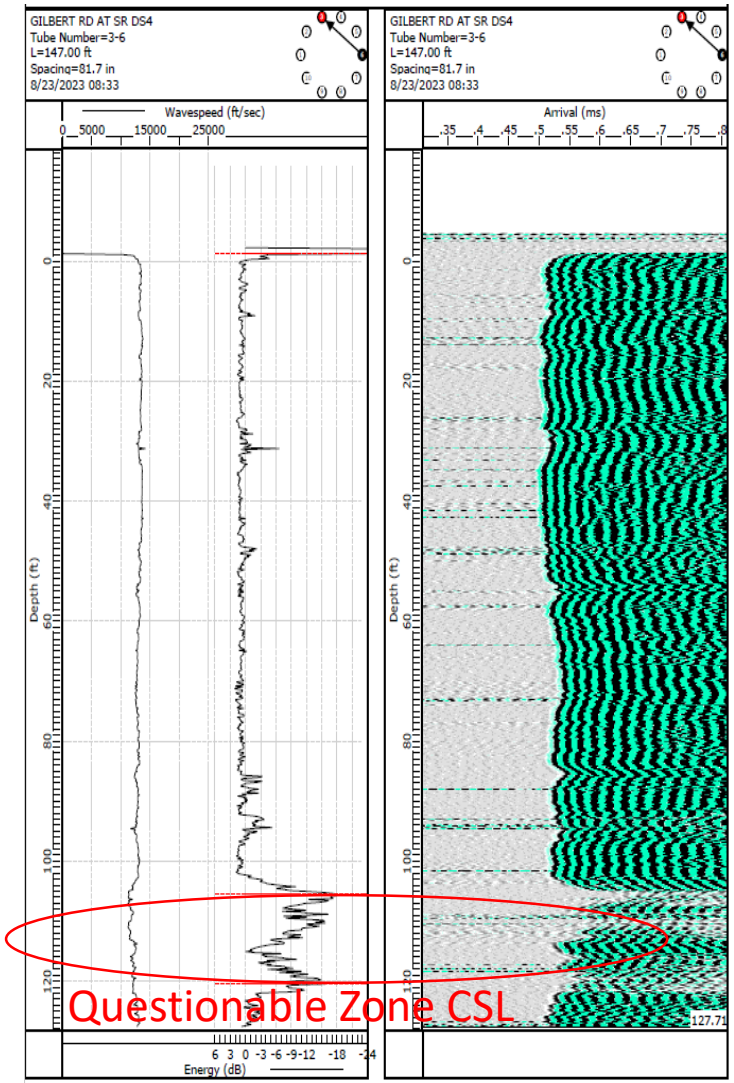



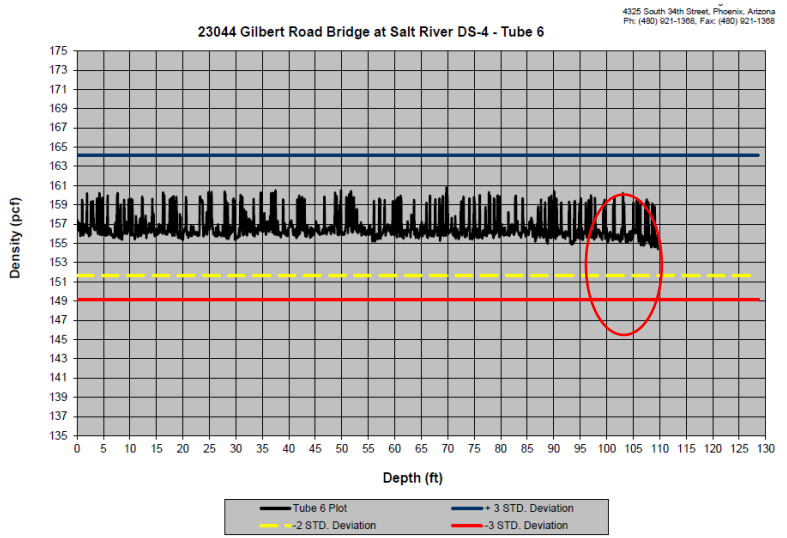



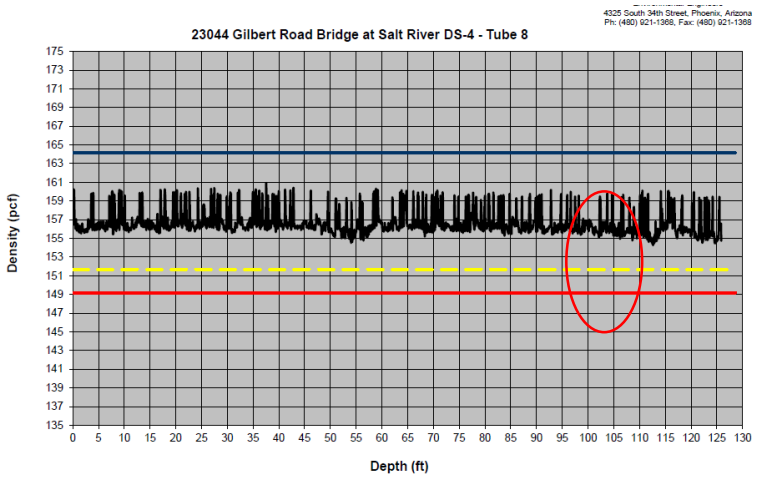
# SHAPE VS TIP VS GGL



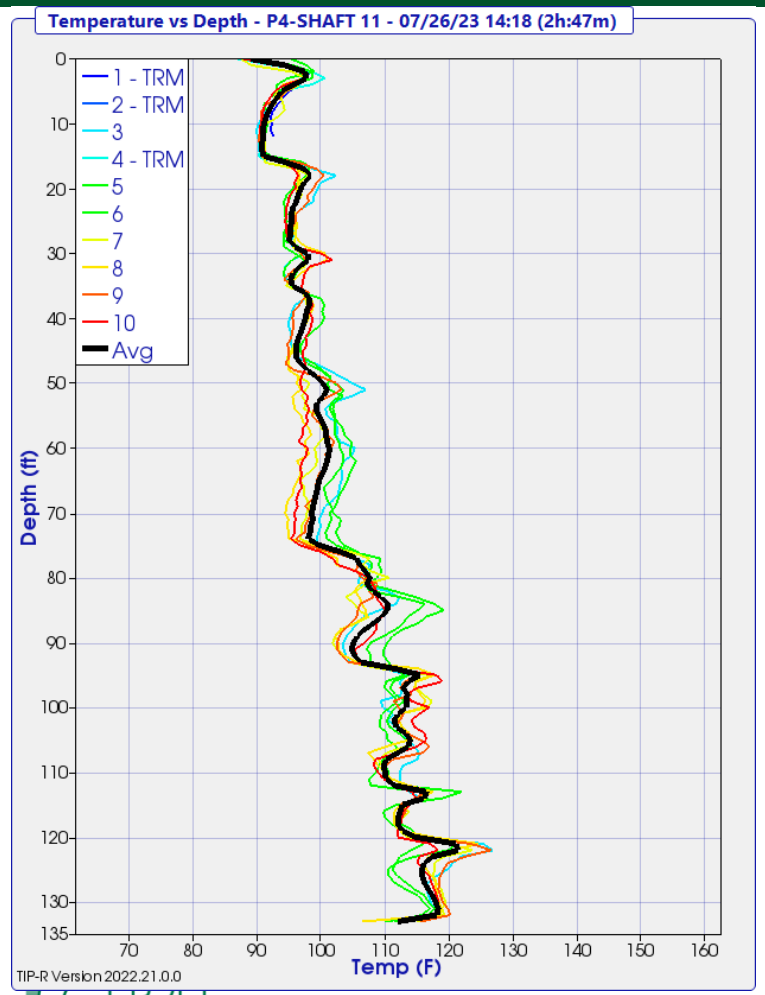

Access tubes 6, 7 and 8 (wires 7, 8 and 9)
110-120 ft

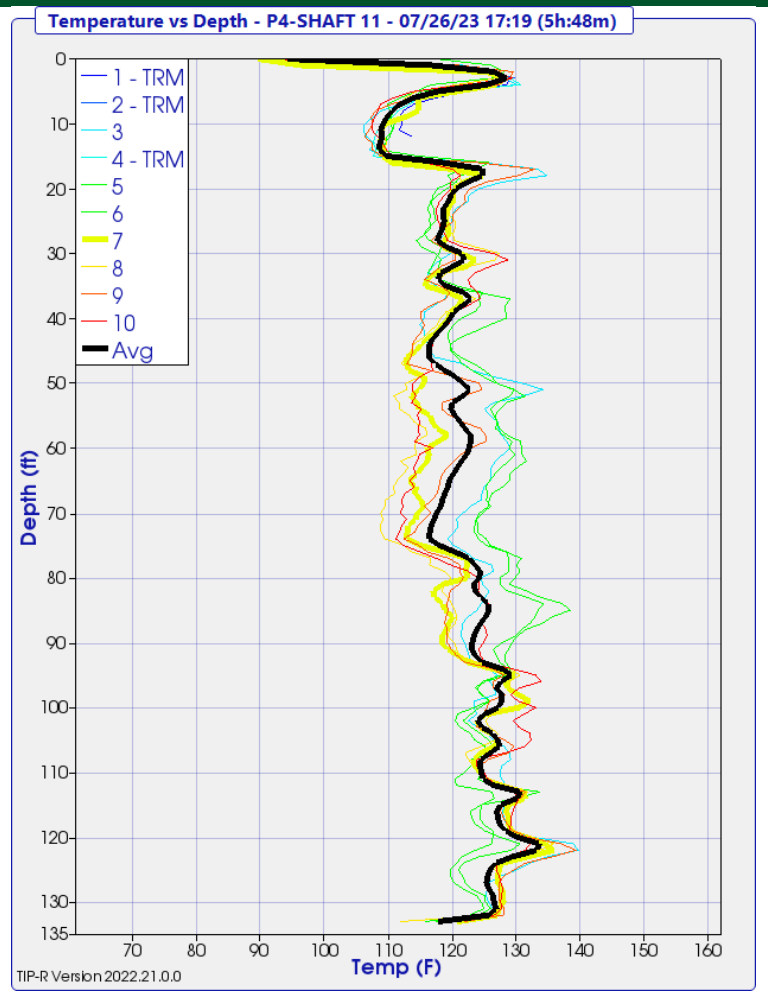


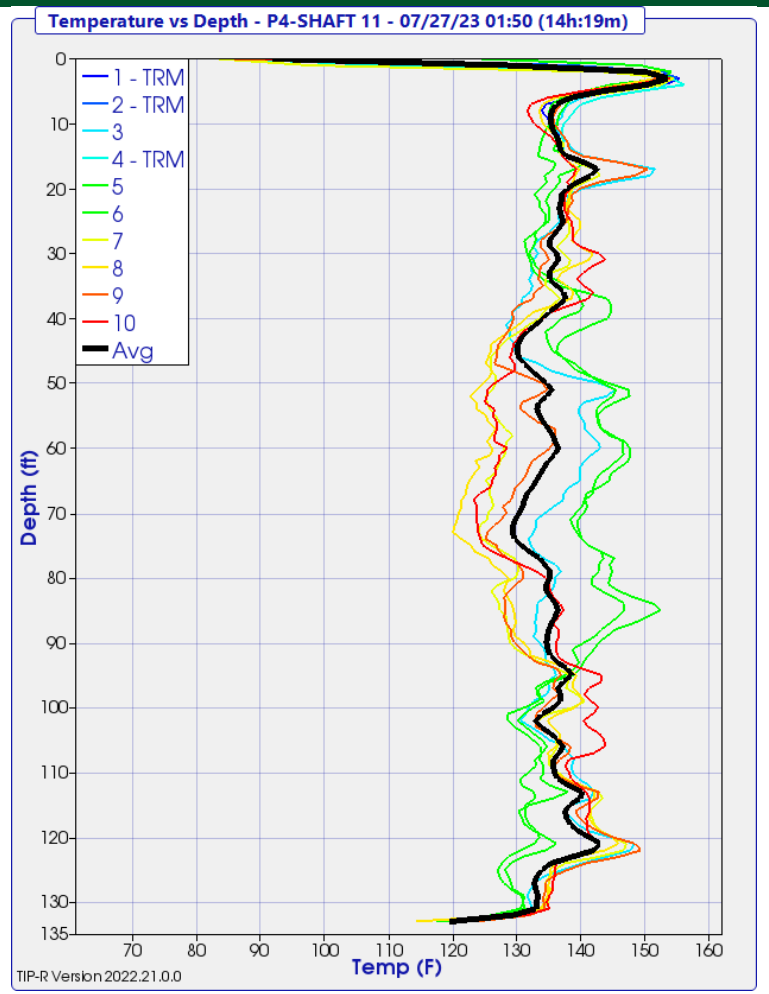



# SHAPE VS TIP VS GGL



# COMPARING DIFFERENT TESTS

Why is CSL showing issues while TIP and GGL are not

Debonding is clearly an issue. Does it explain all questionable zones?

Should we test with CSL on PVC access tubes?

GRL Engineers, Inc.

Questions / Comments?