

Finding Value in Deep Foundation Test Results

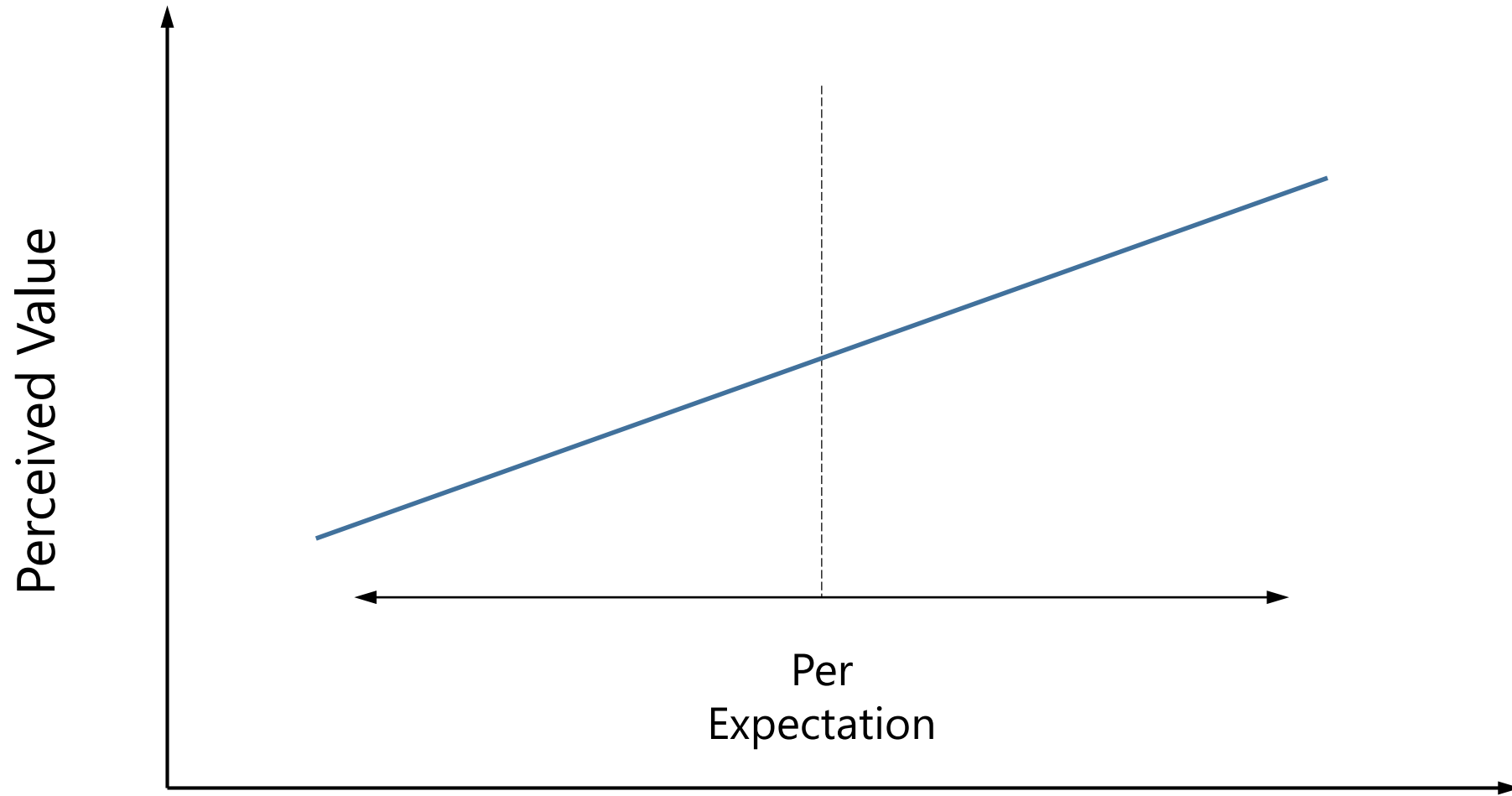
(Expectation vs. Reality in Texas Shale)

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Perceived Value

Generally, “value” in a client’s mind correlates directly with maximum test load. If it’s close to anticipated, the client is satisfied. If it’s above expectation, the client may be happy (will potentially save money on value engineering, or at least sleep well at night). If the result is below expectation, the client is generally unhappy, silently calculating project delays and unexpected costs.



Test Result (Shaft Capacity)

Value on the Up-Side – Easy to See

A recent article in a trade magazine describes a typical test result on the “right” side of the value curve – cost of test was 2.5% of overall drilled shaft contract cost; however results of the test were used to realize a 6.5% savings in direct costs (redesign) as well as an associated 10% shortening of contract schedule.

-Foundation Drilling Magazine, July 2018, pp. 18-24.

Background

LTC tested several similar 18" to 24" diameter ACIP piles tipped in the Dallas-Ft. Worth area shale formation over the past year. The foundation contractor was the same on all the projects, thus creating an opportunity to amass a small database with relatively fewer variables than is typical for deep foundation projects.

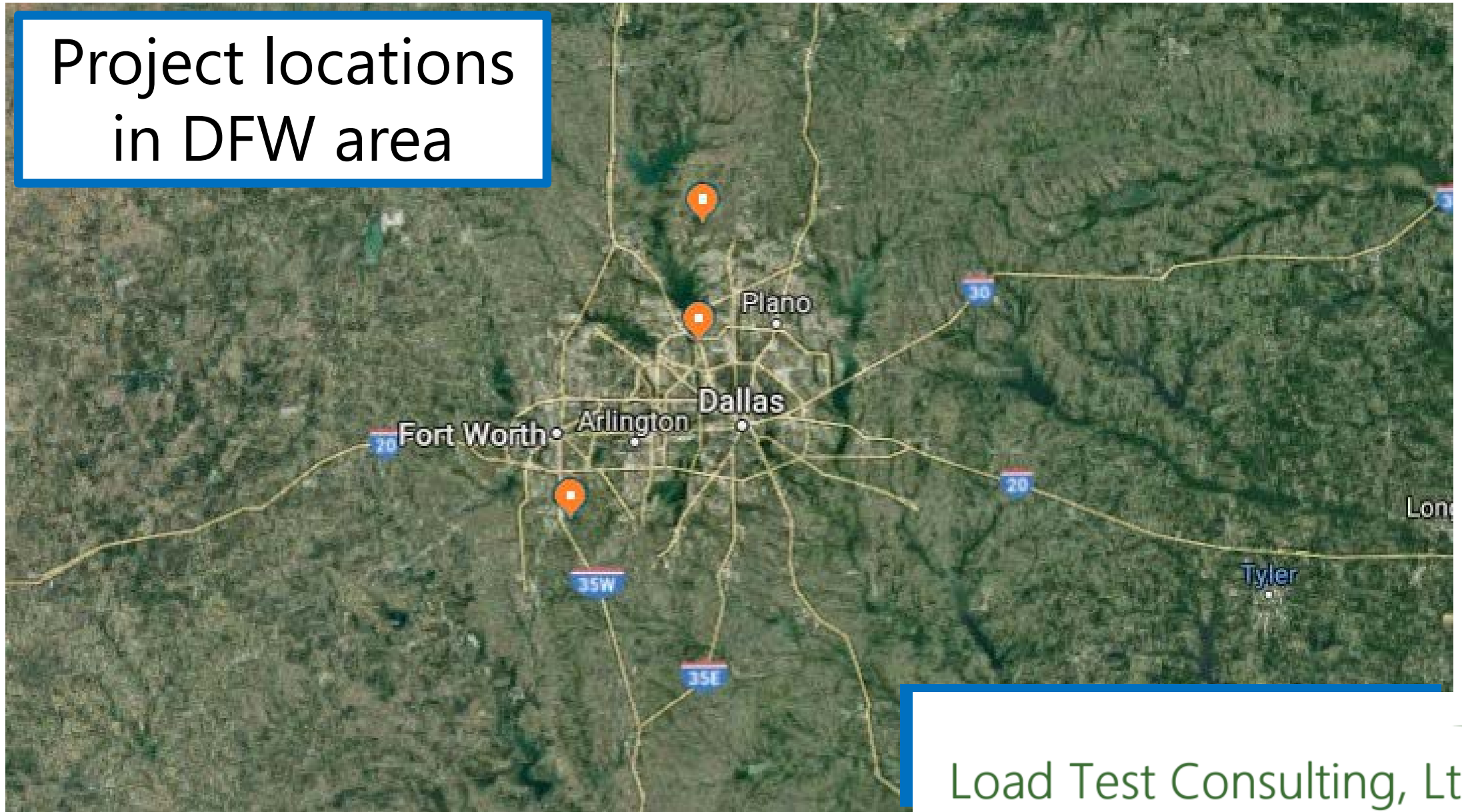
Is Texas in the South-east?



Guess so...
go Aggies!

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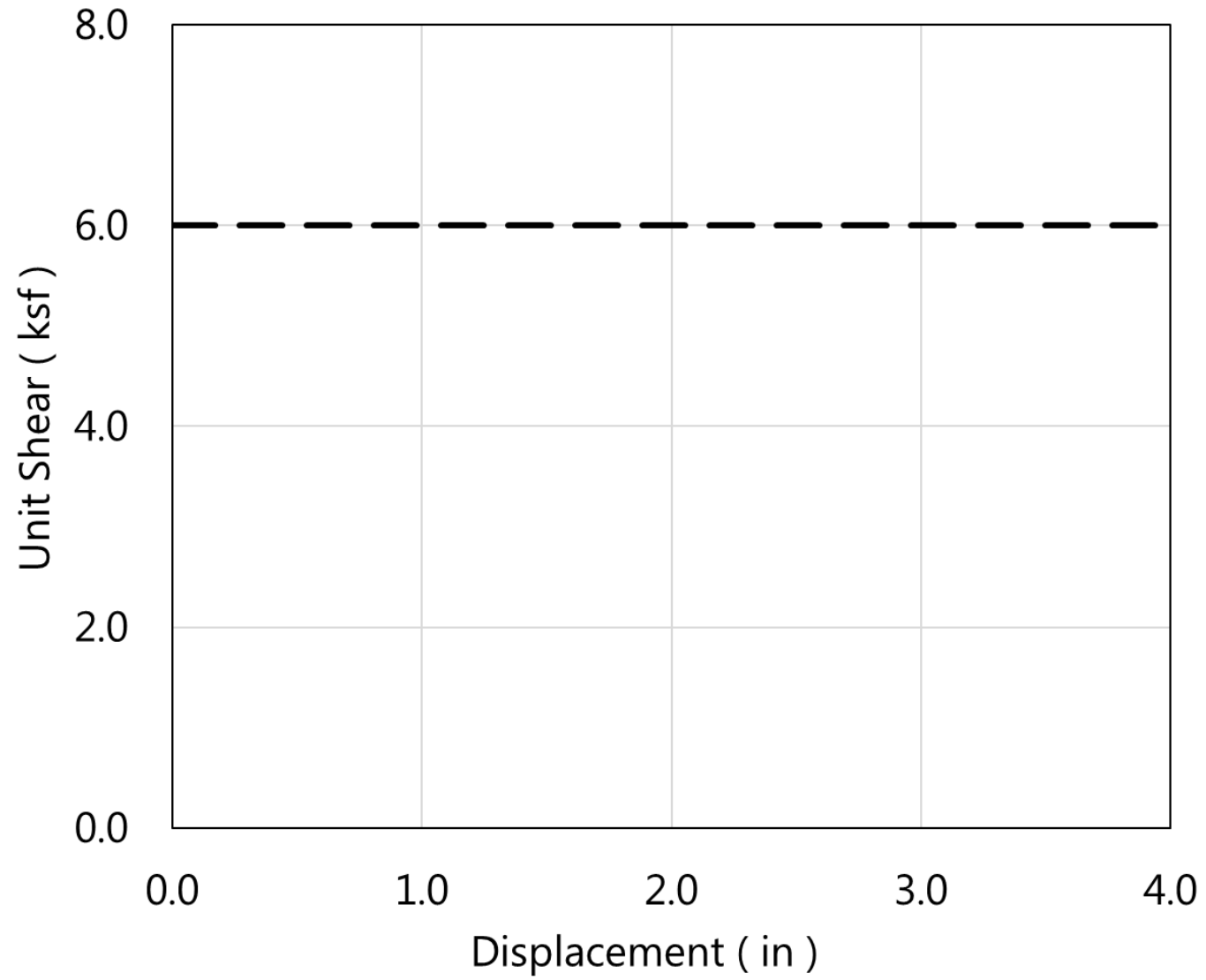
Project locations in DFW area

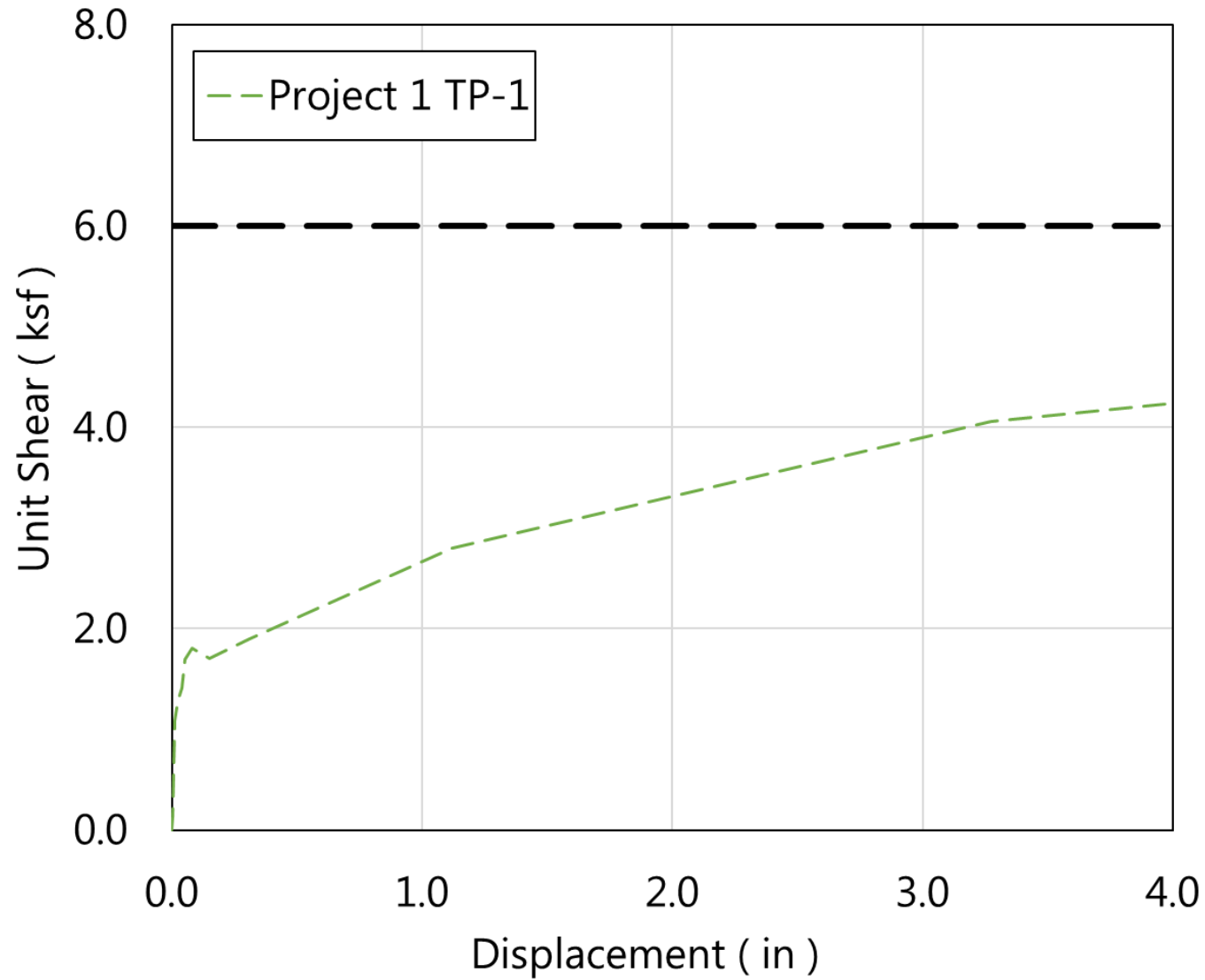


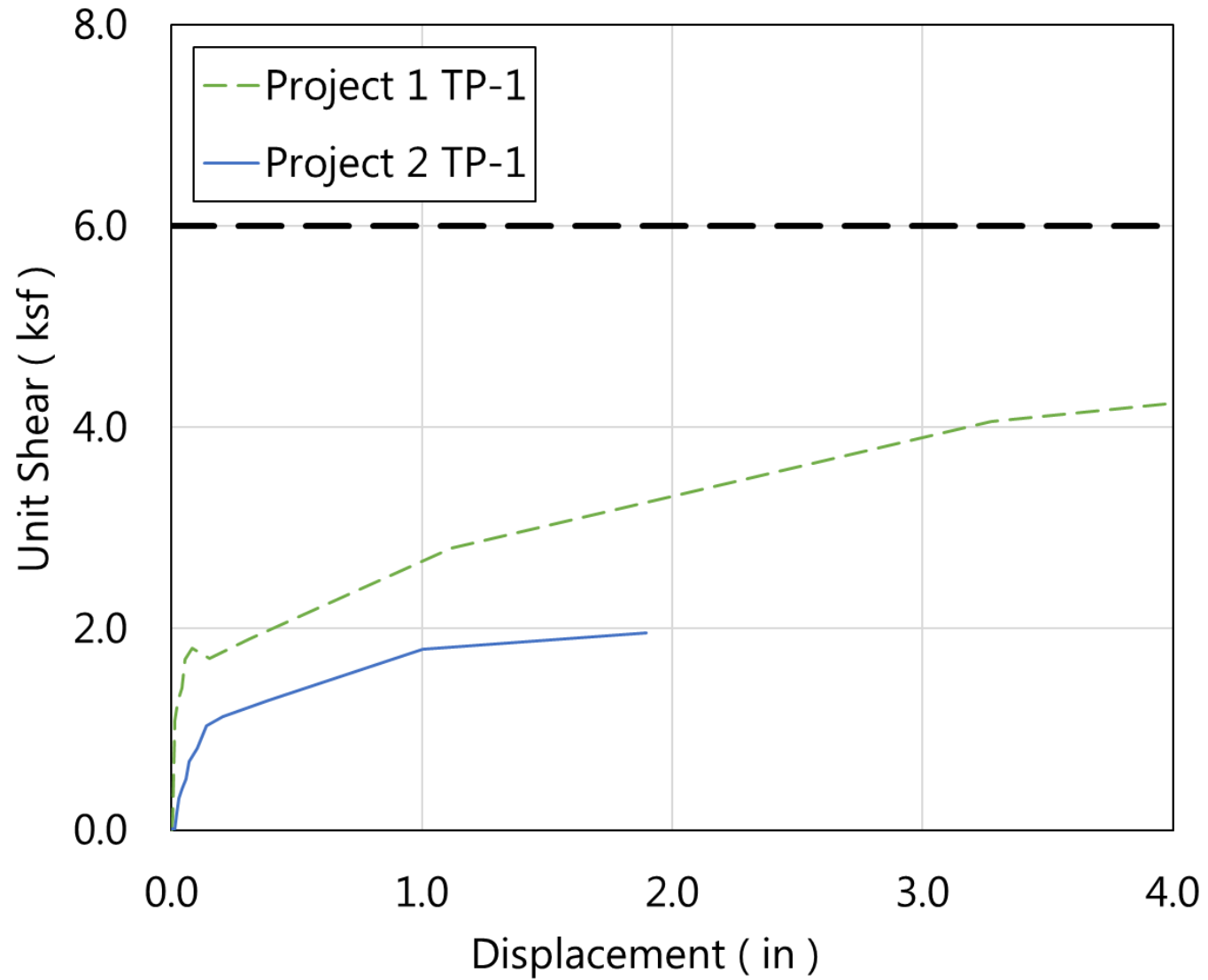
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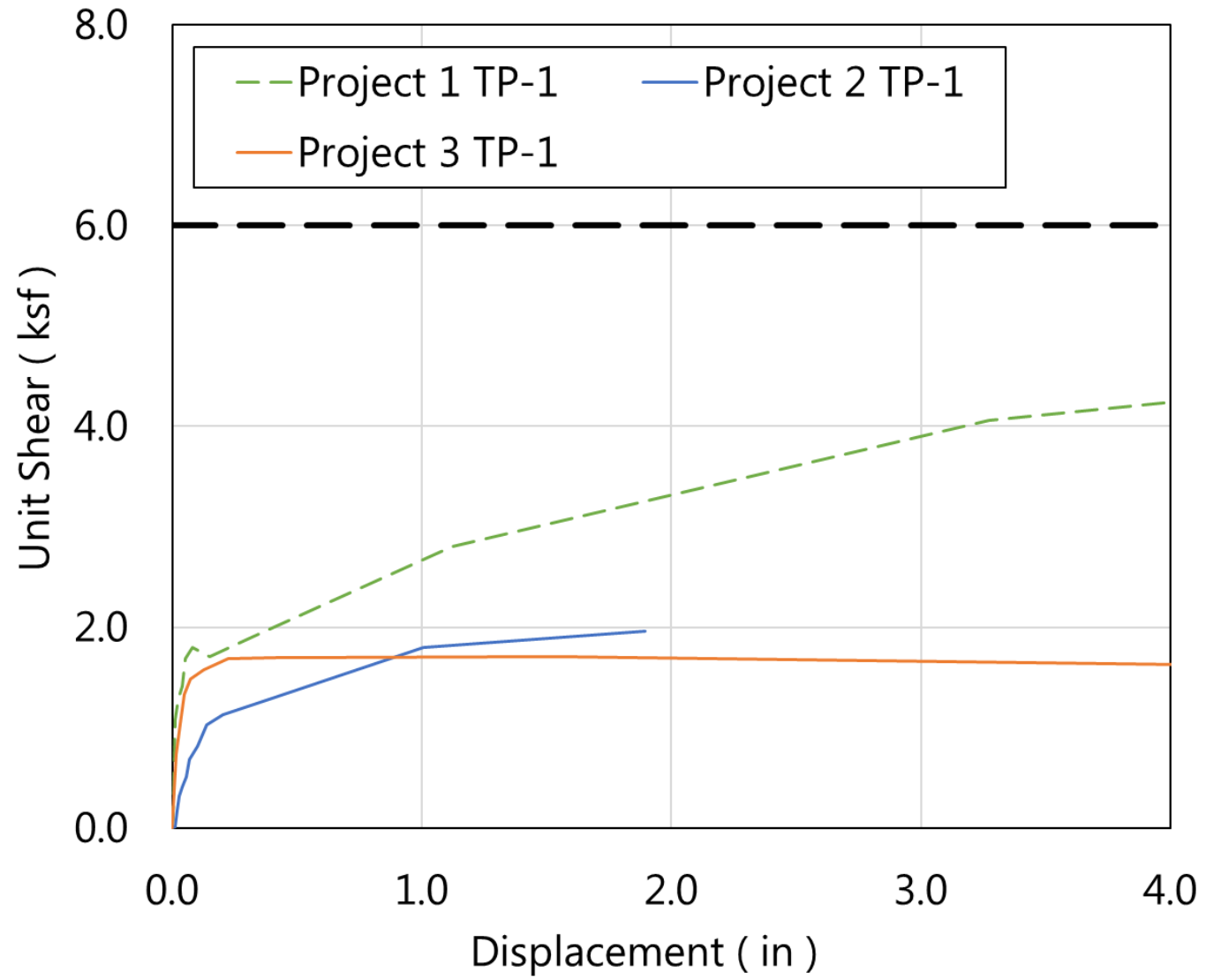
Expectation

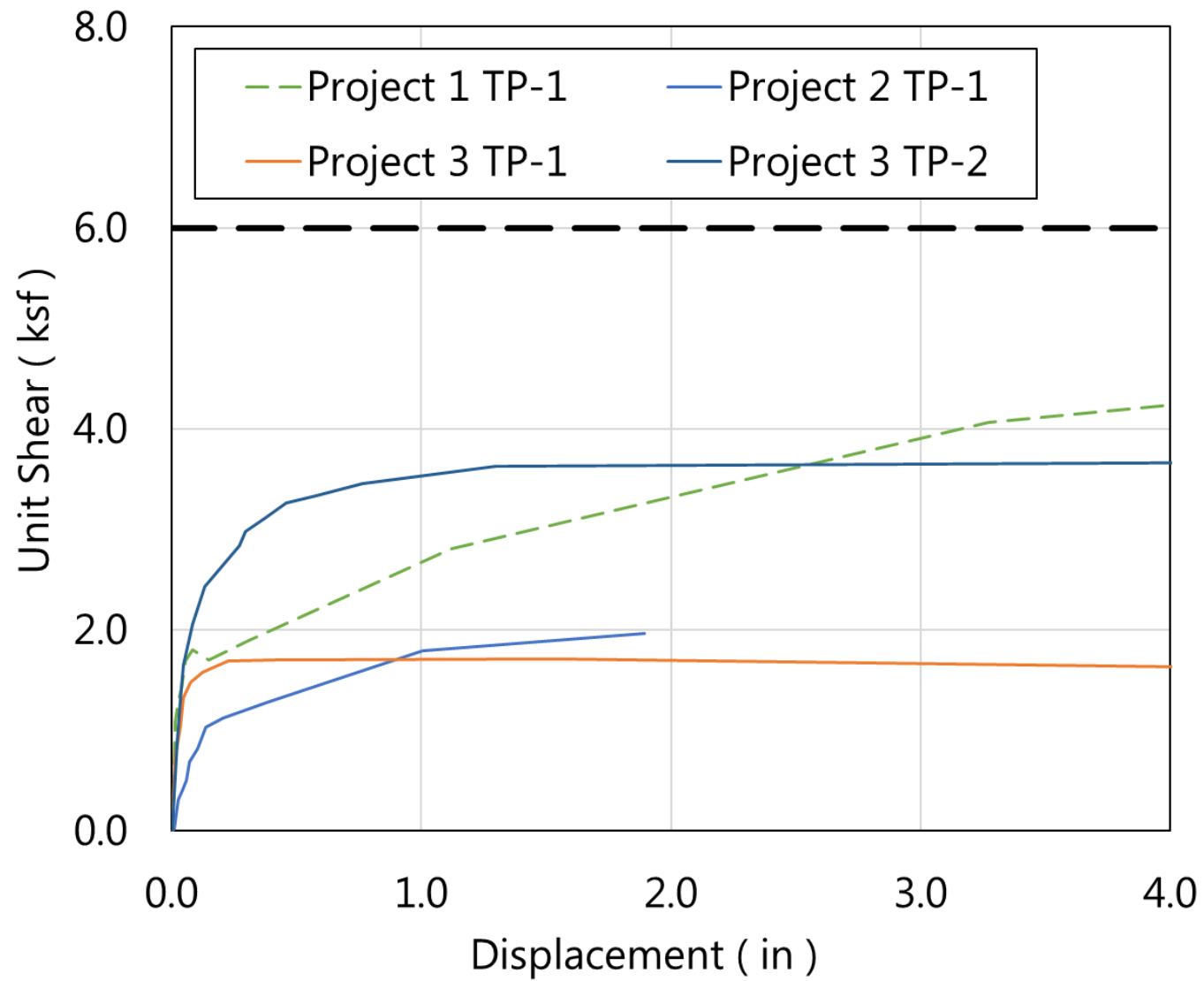
Foundation contractor has had prior experience in the area. His expectation was for 6 ksf in the shale, which he was hoping to use in an aggressive value-engineering redesign.

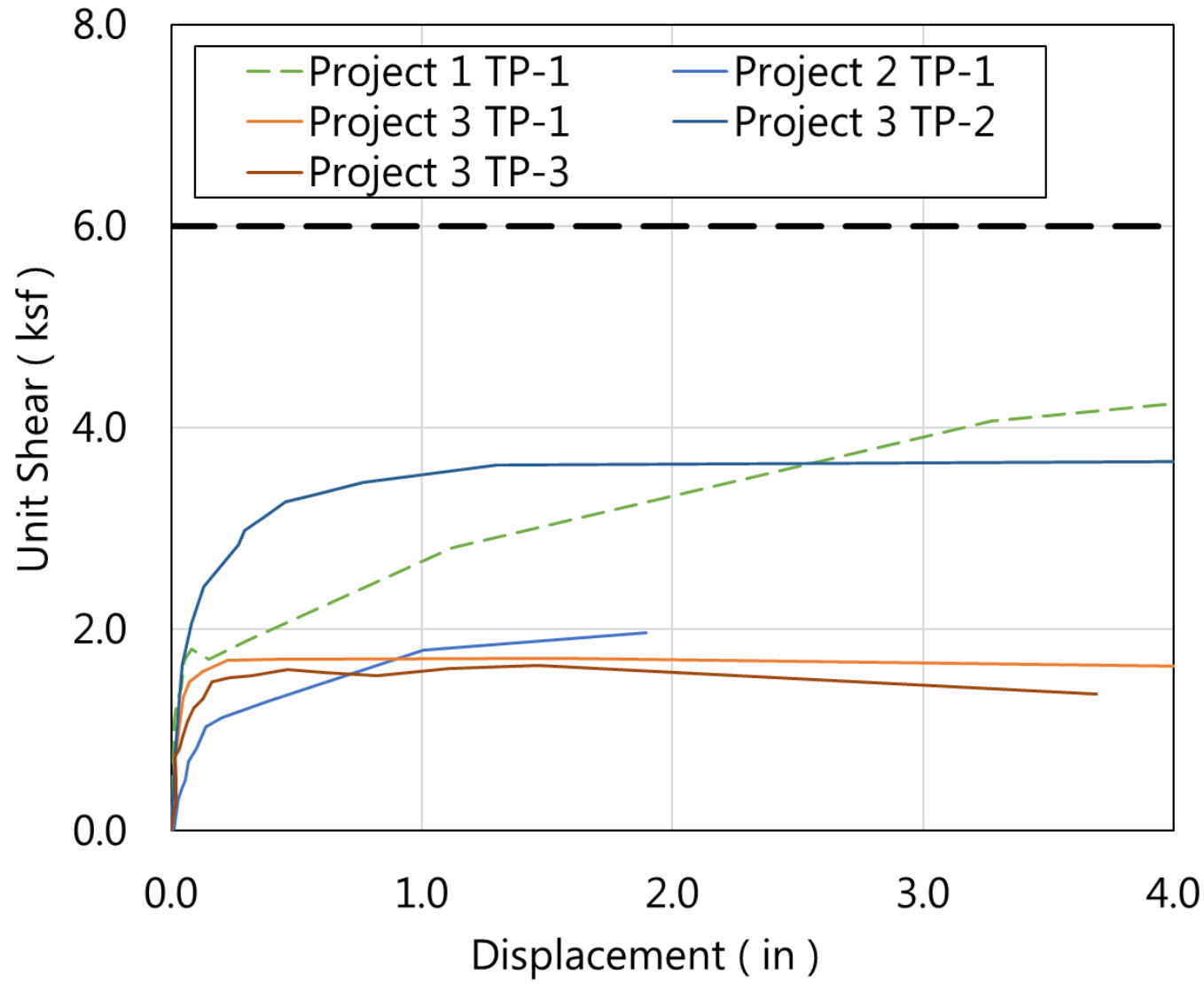






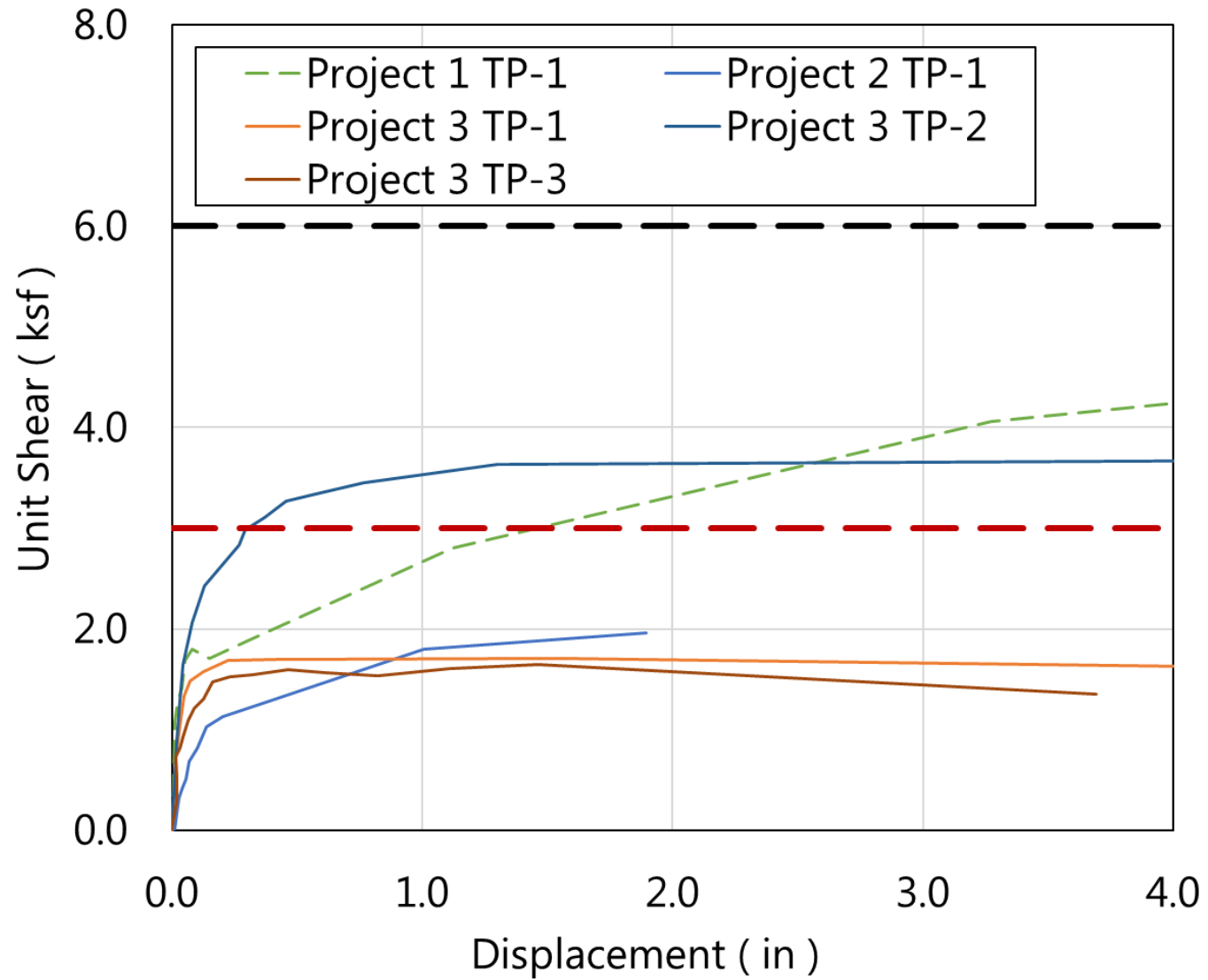




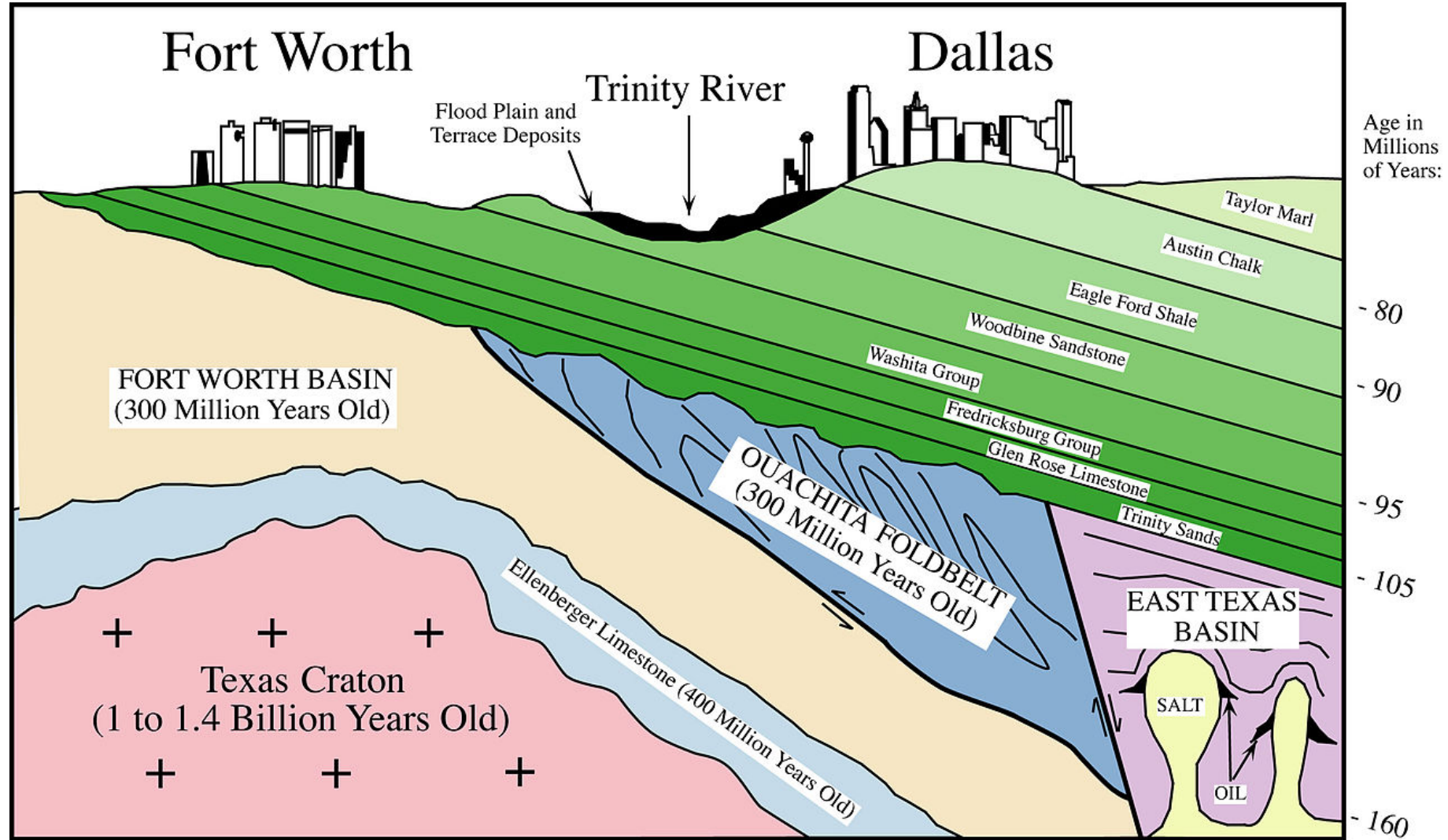


Why did the test results not meet expectation?

TxDOT Design Manual method seemed to generate an adequate prediction

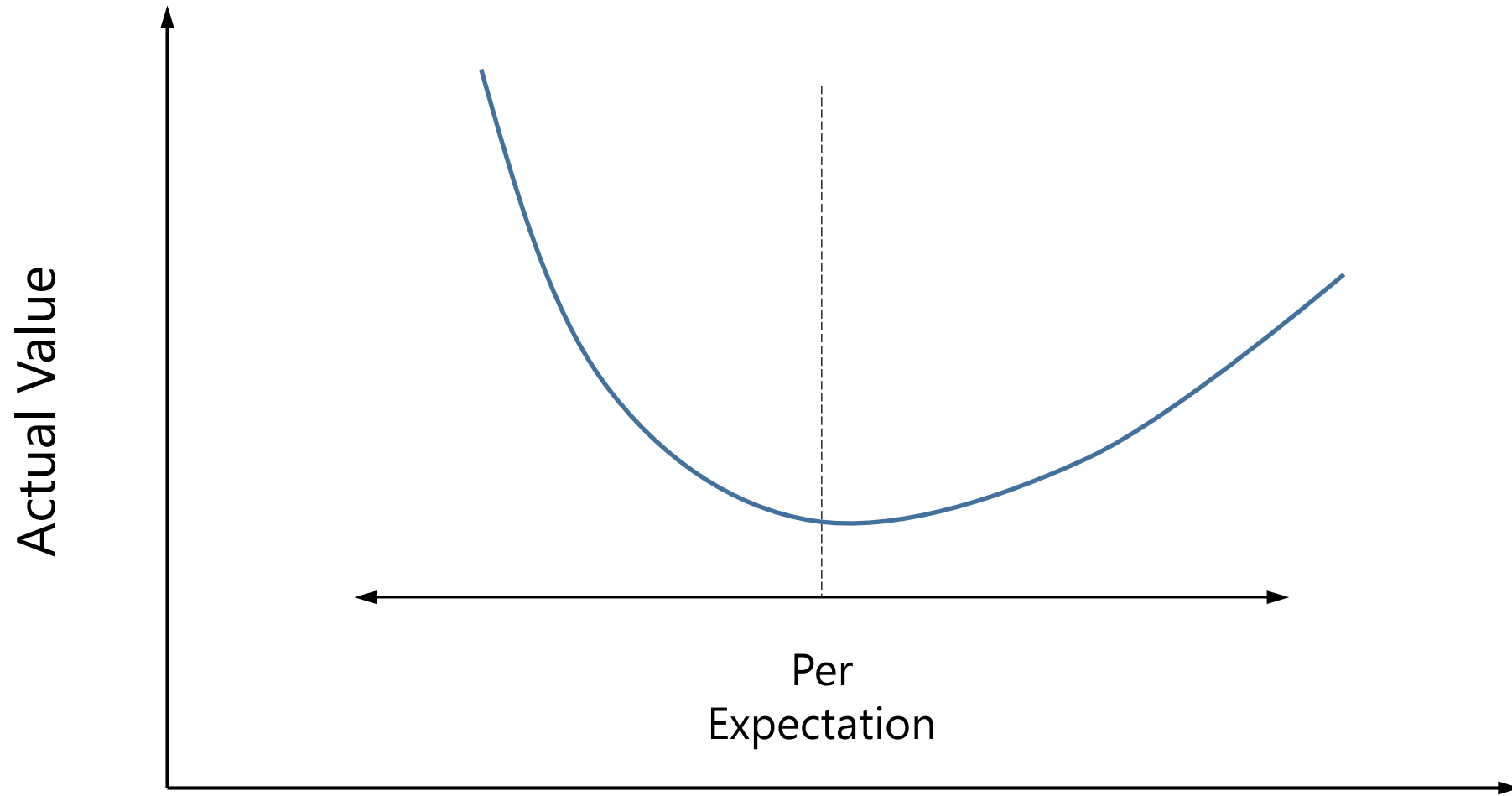


Is DFW shale really uniform?



Actual Value

- Not proportional to the result.
- Minimal value when test results meet expectations.
- Greater value when test results do not match expectation, regardless if it is higher or lower, the engineer has learned something new.



Test Result (Shaft Capacity)

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What is avoided on the far left side of the curve...



Millennium Tower, San Francisco

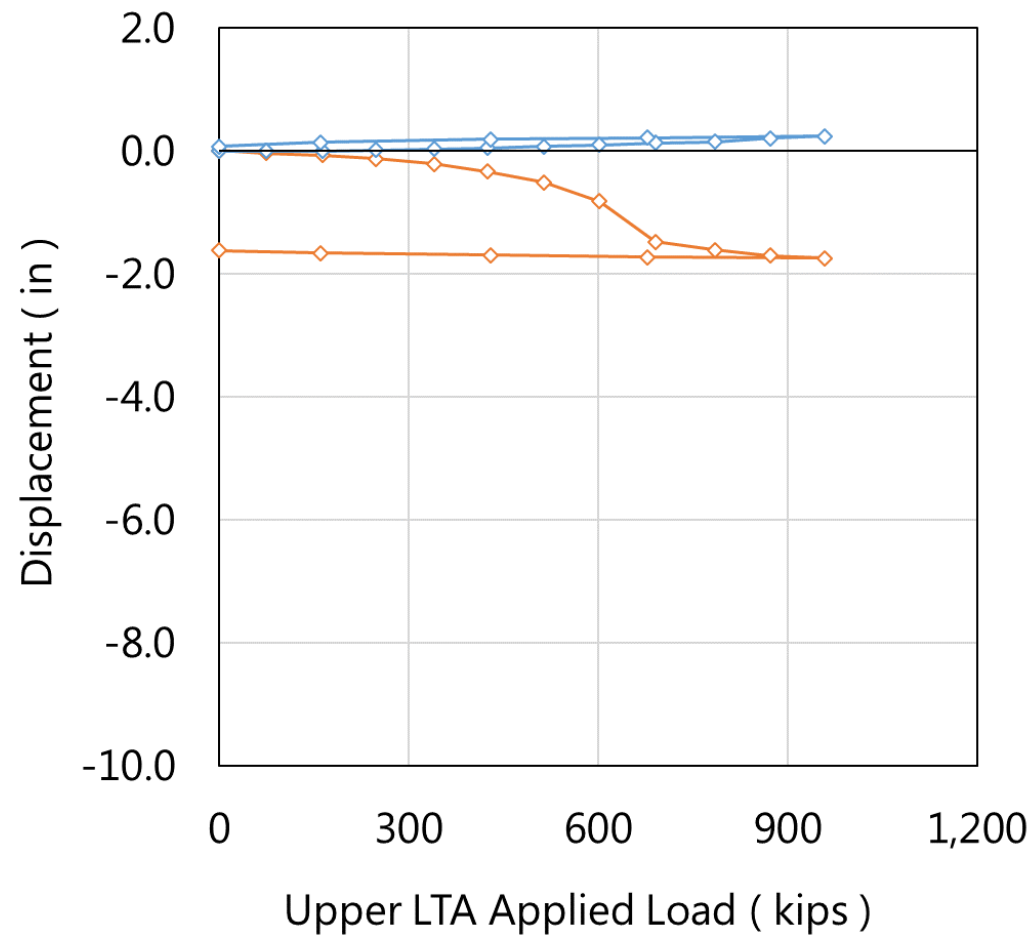
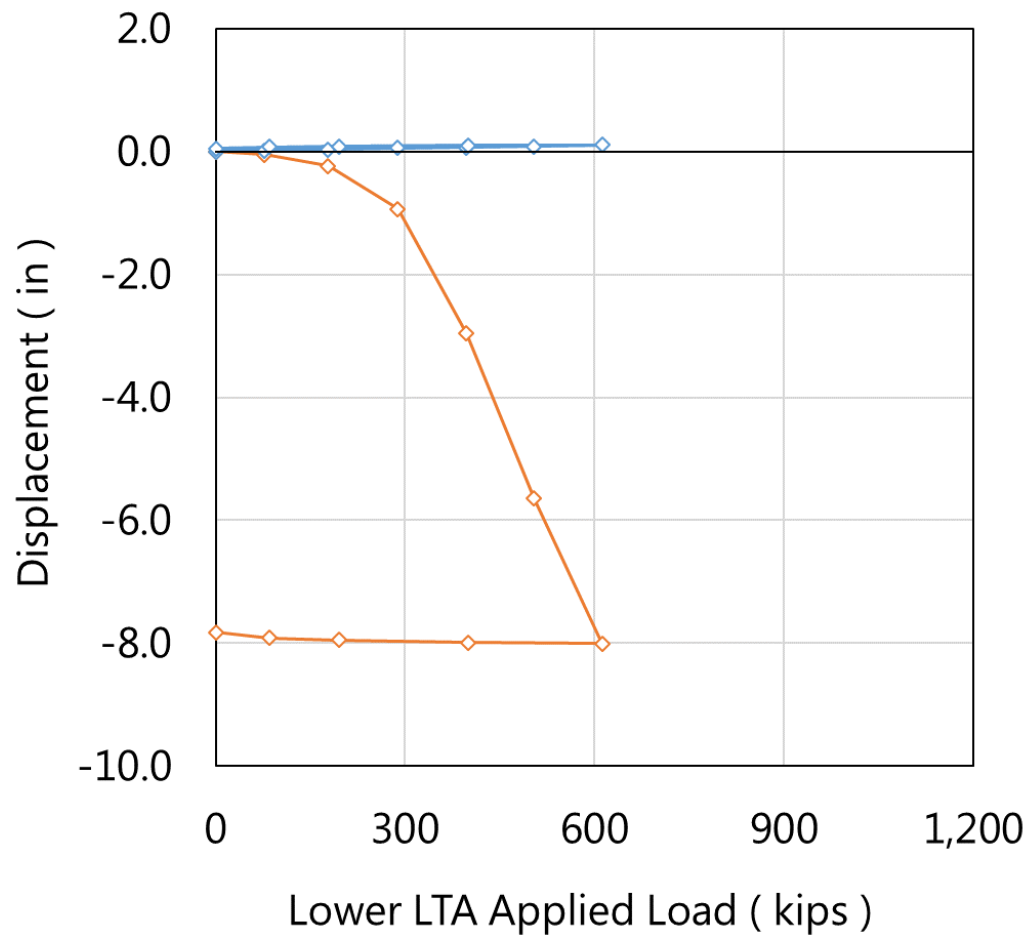
- Original cost: \$300 million
- Repair estimate: \$500 million
- Tear down / rebuild: Don't ask

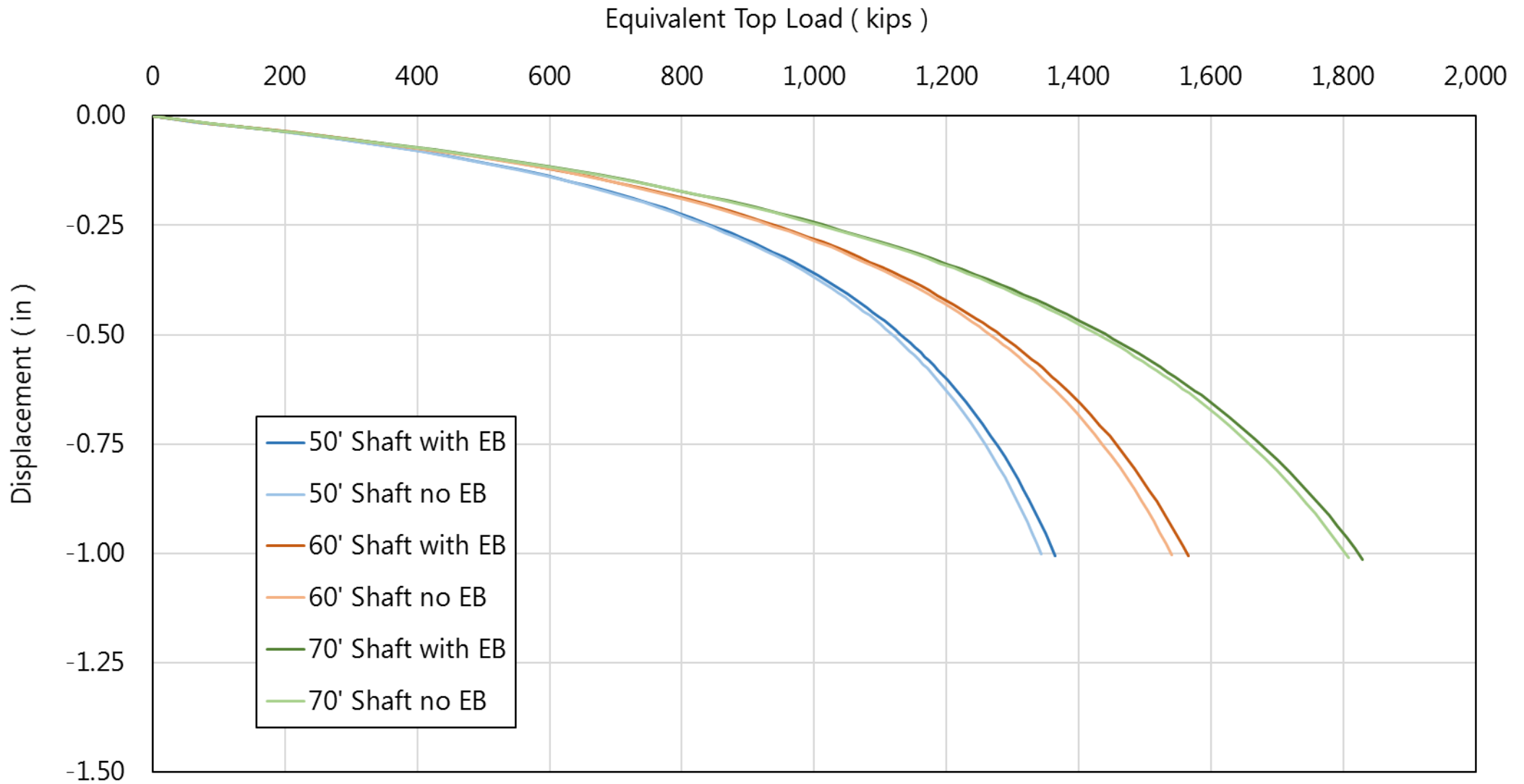


What is avoided on the far left side of the curve...



- Millennium Tower repair has precedents (3 Church Street in Singapore, 2002)
- Micropiles used to correct 39 mm tilt
- Repairs took 2 years, building is now known as Samsung Hub...





Conclusion

- Real value of a load test is not confirmation, it is knowledge.
- “Ground-truth” knowledge ultimately benefits everyone (contractor, designer and owner).
- The earlier that testing is performed, the more value the results will generate for the project.