NOVEMBER 8, 2006 - Synchro-Piles: Enhancing the Performance of Deep Foundations Using Post Grouted Drilled Shafts

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PRESENTATION SUMMARY

To a room of about 40, Phil King, a Licensed Professional Engineer with bachelor and master degrees in engineering from Texas A&M, and president of SynchroPile, Inc, gave a slide presentation entitled, "Synchro-Piles: Enhancing the Performance of Deep Foundations using Post Grouted Drilled Shafts".

Mr. King said the method of pre-stressing the end bearing area of drilled and cast in place concrete piers was developed to overcome the difficulties previously facing engineers who could not design for full end bearing capacity because end bearing of deep piers takes inches of settlement to develop while skin friction only takes a fraction of an inch to develop. The SyncroPile he presented allows synchronization of end bearing and skin friction capacities by pre-loading the pier tip so that substantial pier settlement is no longer required. In one project example he gave, the engineer was able to reduce the penetration of a 66" diameter pier from 130 ft to 75 ft when full end bearing could be utilized.

The patented method involves adding a special thick steel plate (painted yellow in the photo) at the bottom of the rebar cage before it is inserted into the pier hole. Connected to plate are: a) the shaft reinforcing, b) a grout membrane below the plate, and c) grout injection and return lines. Instrumentation can also be connected to the special plate if it is desired to accurately measure end bearing versus skin friction in load tests. However even without such instrumentation, the engineer can easily test each pier for full load capacity using the following construction procedure:

1. Drill pier hole
2. Insert pier reinforcing along with the special bottom plate installed and with grout lines installed and pre-filled with drilling mud
3. Place concrete in the pier shaft, allow to set
4. Inject grout below pile tip, bursting the grout membrane, while measuring grout pressure, grout return volume and pier upward deflection.

In pre-loading the tip the pier shaft is actually lifted by overcoming the skin friction along the shaft length. This reverse skin friction at lift-off will be equal to end bearing pressure from the grout. Thus, by ensuring the pier has lifted about ahalf inch as a result of the tip grouting the engineer can compute the pier's compressive capacity as the 2 x pier cross-sectional area x grout pressure.

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