20 May 10
Memo

To: ADSC SE Chapter
c/o Bruce Long, Long Foundations
From: Dan Brown
Re: Load Test Plan for Lawrenceville, GA

We have reviewed the boring information from the Lawrenceville site at Foundation Technologies yard. Rock was encountered 28ft to 37ft below grade and 10 to 20ft of core was obtained from each boring. Recovery was generally 50% to 100%, with the majority being 80%+ in each, and RQD was 0%-60% as indicated on Figure 1 below. The boring logs and pictures of the rock core are included in the attached memorandum from GeoHydro Engineers.

Four unconfined compressive strength (UCS) tests and 24 point load tests (12 diametral, 12 axial) were performed. The 4 UCS tests had q_u values ranging from 7000 to 11,000 psi, while q_u values correlated from the 12 axial point load tests ranged from 3000 to 16,000 psi.

Figure 1 shows my best estimates of the range of expected side shear, based on correlations with compressive strength. It appears that there are two zones of side shear. Borings B-3 and B-8, where rock was encountered at a depth of about 28 ft, indicate a zone with side shear in the range of 20 - 40 ksf in the rock down to a depth of 40 ft. Borings B-1 and B-7, which did not encounter rock until a depth of about 38 feet, indicate a zone with side shear in the range of 35 to 60 ksf below a depth of about 40 feet. Boring B-8 falls within this range.

Looking at the boring plan included in the GeoHydro Engineers memo, Borings B-1, B-7, and B-8 were all drilled close together. Using these borings, I expect that that we should mobilize 25 to 40 ksf in the upper zone and 35 to 60 ksf below that.

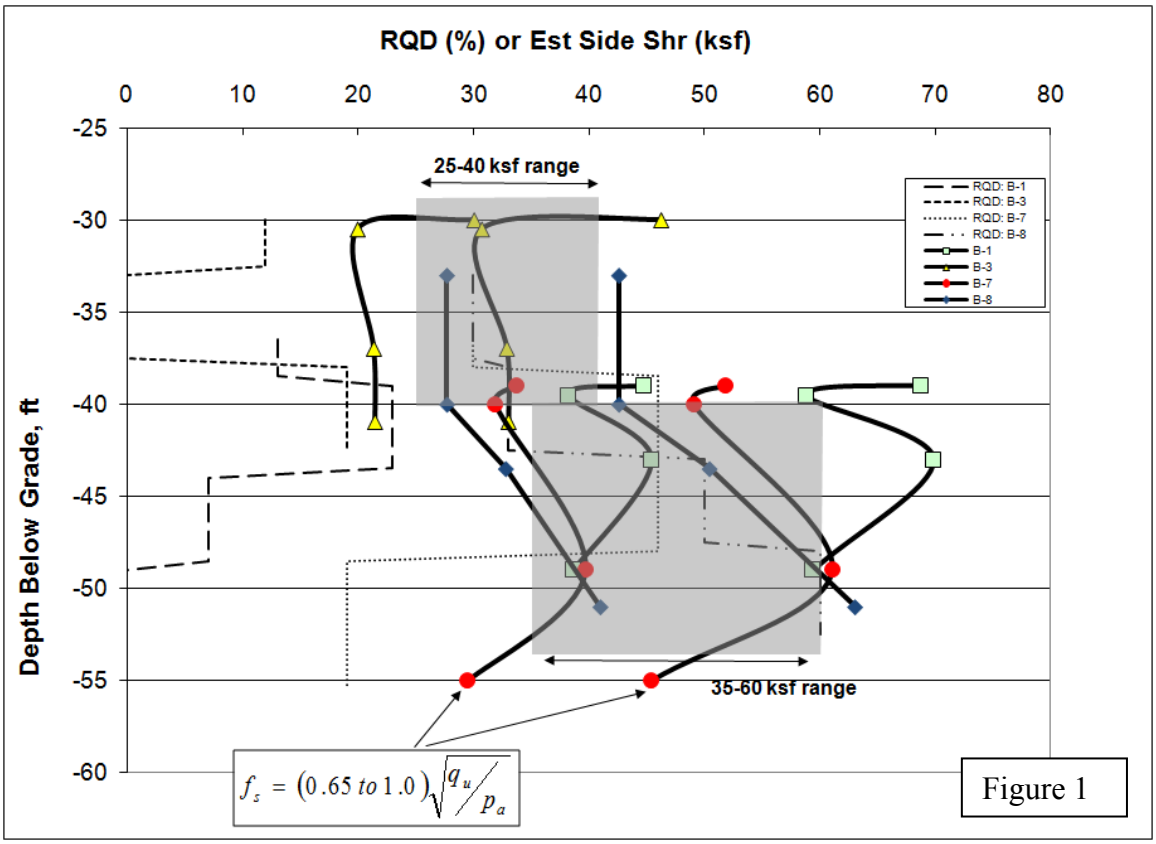

Figure 1

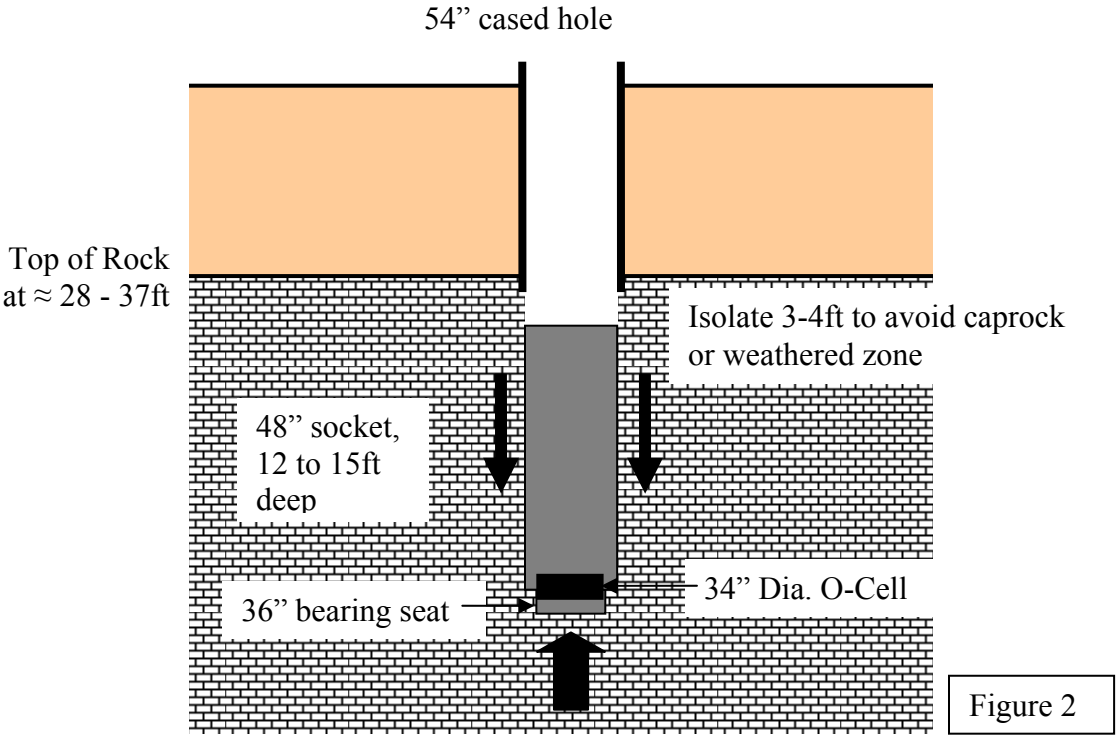

Figure 2

For the load tests, I suggest we repeat the plan used in Nashville as illustrated on Figure 2. The plan includes a 54" casing to rock, a 48" socket, and a 36" diameter "bearing seat" for the O-cell. This plan provides for the base resistance to act against a 36" diameter area and the side shear reaction to act against a 48" diameter socket. The high anticipated end bearing can thus be mobilized by utilizing a larger diameter socket for side shear reaction. Two tests are planned, one of which has a hand cleaned base and the other is to simply be machine-cleaned.

We may need to approach the installation with the possibility of changing the socket length. I foresee two possible scenarios based on the borings:

- Scenario 1: The weaker upper rock zone (as illustrated in B-3 and B-8) is encountered. A 15 foot socket would be appropriate.
- Scenario 2: Only the stronger, deeper rock zone is encountered (as illustrated in B-1 and B-7). In this case, the socket may have to be shortened to 12 feet to balance the anticipated side shear with the O-cell limit.

A single 34" diameter O-cell is proposed for each load test shaft. This cell has a rated load capacity of 6000 kips at 10,000psi cell pressure, and can generally be loaded to 9000 kips (15,000psi) if large displacements are not observed. The table below illustrates the values of side and base resistance that could be mobilized in the test setup from Figure 2.

Cell Load (pressure)	Mobilized Unit Side Shear (48" by 15ft socket)	Mobilized Unit End Bearing (36" dia. base)
6,000k (10,000psi)	32ksf	850ksf (5900psi)
9,000k (15,000psi)	48ksf	1275ksf (8850psi)

With the test setup above, I think we can mobilize large bearing values without the use of anchors and reaction beams. If we go smaller with the socket we risk not being able to mobilize high base resistance. If we go larger with the socket we risk pumping up against the limit of the cell and not mobilizing the maximum side resistance.

With the proposed sizes, even if the side shear came out lower than anticipated (say, 20ksf), we would still be able to mobilize about 530ksf unit end bearing before the side resistance is lost. If the socket provides 50ksf unit side shear or more in the lower rock, we will be unable to mobilize this much resistance but we would by then be at a base pressure exceeding the compressive strength of any concrete that might be used in a drilled shaft.

Consider this memo a proposal for proceeding to the next step.