

WELCOME . . .

... to the sixth issue of "The Gregg Geo News". ...to the fifth issue of "The Gregg Geo News". The Geo News is being published to provide current information on the services we offer, equipment & technologies utilized and project experience.

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PROJECT SPOTLIGHT

- EXCITING OPPORTUNITIES IN MEXICO -



Conrad Leslie, V.P./Gregg Drilling - Mexico

Gregg Drilling was recently invited to participate in the Baja Norte Business Symposium held on August 6, 2008. The symposium discussed upcoming airports, seaports, railways, tourism, and waterfront development projects in Baja. The select group of invited speakers included the distinguished former governor for Baja California Norte, Lic. Ernesto Ruffo, the General Director of the Ensenada Port Administration, Ing. Carlos Jaurgui, the Secretary of Economic Development, Lic. Jose Gabriel Posada, and representatives from Baja Norte Rail and the Ensenada Airport project.

Conrad Leslie, Vice President of Gregg Drilling Mexico operations was among the select group of speakers. Mr. Leslie previously served as a Vice President for an ENR Magazine US TOP 80 environmental/geotechnical firm and has completed over 300 projects in Mexico including

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Robertson's Remarks

- SETTLEMENT CALCULATIONS USING THE CPT -

by: Dr. Peter K. Robertson



Traditionally the CPT has not been used extensively for the calculation of vertical settlements due to foundations loads. Partly this has been due to the somewhat poor correlation between CPT results and soil modulus. However, significant recent improvements have been made that provide much better estimates of soil modulus from CPT results. This recent work was based on over 20 years of experience measuring shear wave velocity with the CPT (i.e. SCPT). It is now possible to make good estimates of soil modulus from CPT

results over a wide range of uncemented soils, from soft clay to dense sands.

It is common practice in many parts of the world to estimate vertical settlement under footings using the simple one-dimensional formula:

$$S_1 = \sum \frac{\Delta\sigma_v}{M} \Delta z$$

Settlement,

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Gregg Drilling (Southern California)
Signal Hill, CA
(562) 427-6899

Gregg Drilling (Northern California)
Martinez, CA
(925) 313-5800

Pitcher Drilling (Northern California)
Palo Alto, CA
(650) 328-8910

Robertson's Remarks continued...

Where $\Delta\sigma_v$ is the change in vertical stress due to the loading and is generally calculated according to Boussinesq and M is the 1-D constrained modulus that can be estimated from the CPT. The settlement calculation is therefore a summation over the depth range where Δz is the interval between CPT readings. It should be noted that the above formula is based on linear elasticity and provides a settlement *proportional* to the load, and is unable to provide a non-linear prediction. The predicted settlement is meant to be the settlement under 'working conditions' (i.e. for a safety factor FS = 2.5 to 3.5).

The 1-D constrained modulus, M can be estimated from the CPT using the following:

$$M = \alpha_M (qt - \sigma_{vo})$$

When $Ic > 2.2$ (i.e fine-grained soils) use:

$$\begin{aligned} \alpha_M &= Q_{tn} && \text{when } Q_{tn} < 14 \\ \alpha_M &= 14 && \text{when } Q_{tn} > 14 \end{aligned}$$

When $Ic < 2.2$ (i.e. coarse-grained soils) use:

$$\alpha_M = 0.0188 [10^{(0.55Ic + 1.68)}]$$

The above 1-D formula can be applied to all soils. For clays the calculated settlement is only due to primary consolidation. Where secondary (creep) settlements can be large (i.e. soft clays and organic soils) it is important to add an estimate of the secondary settlement using:

$$S_s = C_\alpha \Delta z \log(t)$$

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WHAT'S NEW @ GREGG DRILLING

- New Drill Rig and Rig Monitoring System at Pitcher Drilling -



Pitcher Drilling's new 6 x 4 Mud Rotary Drill Rig

Pitcher Drilling, a wholly owned subsidiary of Gregg Drilling, would like to announce their new Fraste Multidrill XL drill rig mounted on a 6x4 Unimog U500 truck. The Fraste MD/XL is a top head drive rig with 11,000 lbs of pull-back and is an excellent rig for mud rotary drilling and rock coring. As an added feature, this rig includes a Jean Lutz drill rig monitoring system, a 140 lb auto-hammer for standard penetration testing, double clamps and a breakout wrench, and a drill pipe guide roller to keep drill pipe straight while down hole.

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Project Spotlight continued...



Gregg's minicone unit used in the Port of Ensenada dredging study.

work at three LNG marine terminals, five international airports and 12 railroad facilities. At the symposium, Mr. Leslie discussed his experience with working in Mexico, the challenges associated with environmental permitting, project logistics and selecting added value teaming partners. He also provided an overview on the innovative offshore geotechnical drilling capabilities of Gregg Drilling.

The new port of Cabo Colonet was among the various port projects highlighted in the symposium. This \$4 to \$5 billion dollar proposed mega port will be located approx. 180 miles south of San Diego, CA. It is considered Mexico's largest infrastructure project in history. Punta Colonet is expected to have a capacity of 2 million shipping containers annually when it opens in 2014 and will expand to 10 million containers (approx 5 times more than the Port of Long Beach and LA combined).

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Shaker Pit on new Fraste Multi-drill

While operating, the Fraste MD/XL utilizes a desanding cone and deck-mounted shaker pit to separate sand and large cuttings from the recirculated mud and deposit them directly into a drum. Also mounted on the deck is a jet shear mud mixer that discharges directly into the mud tub. These features make the Fraste largely self-contained.

The Jean Lutz LT3n rig monitoring system is a computer that monitors hydraulic pressures to record and display the following parameters:

- Depth
- Thrust Pressure
- Mud Pressure
- Torque
- Rotation
- Penetration Rate

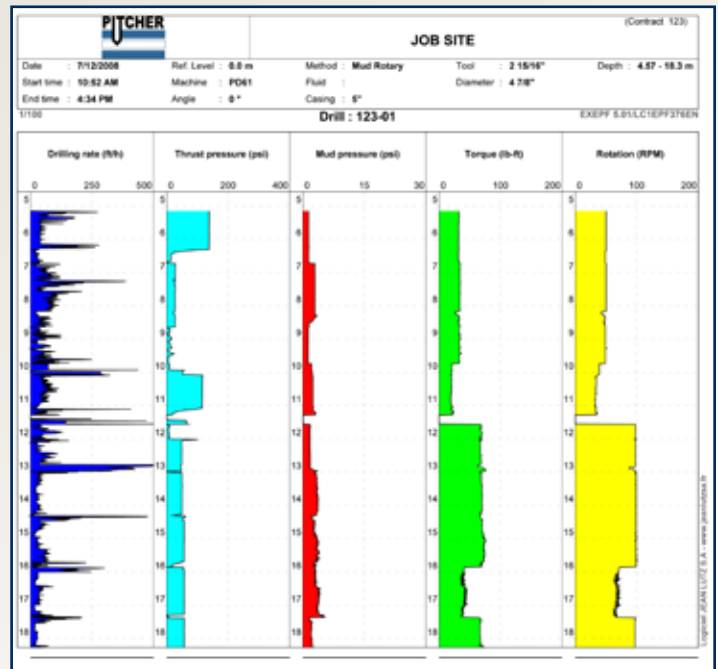
The saved data produces a customizable report (right) displaying all the recorded parameters, as well as compound parameters that can provide additional and continuous in situ information.

Where time (t) is in months and the coefficient of secondary consolidation (C_{α}) can be estimated from the CPT using:

$$C_{\alpha} = 0.04 [C_c / (1 + e_o)] = 0.1 (\sigma'_v / M)$$

The software program CPeT-IT (www.geologismiki.gr) performs the above settlement calculation within a sub-module of the program. The above simplified approach provides excellent prediction of settlement when compared with a number of case histories.

Contact Peter with any questions or comments regarding "Robertson's Remarks" at: probertson@greggdrilling.com. Visit www.cpt-robertson.com/links.html for previous issues of "Robertson's Remarks".



Sample data output from new rig monitoring system

Other planned port projects discussed at the symposium included the expansion of the Port of Ensenada and Port of El Sauzal, both of which involved Gregg Drilling for a portion of the site investigation.

Gregg Drilling is incorporated in Mexico and had diverse capabilities for geotechnical testing on and off-shore. By maintaining drilling and CPT equipment in Mexico, Gregg Drilling provides an excellent option for future infrastructure projects.

For more information on site investigation services in Mexico and Central America, please contact Conrad Leslie, Vice President, Gregg Drilling Mexico at: Email: cleslie@greggdrilling.com OR Phone: (858) 232-7169