STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

September 2, 2011

MEMORANDUM TO: Mohammed Mulla, P.E., C.P.M.
Contracts and Statewide Services Manager

K. J. Kim, Ph.D., P.E.
Eastern Regional Geotechnical Manager

John Pilipchuk, L.G., P.E.
Western Regional Geotechnical Manager

FROM: Njoroge Wainaina, P.E.
State Geotechnical Engineer

SUBJECT: Revised Drilled Pier Pay Item and Testing Guidelines

The purpose of this memorandum is to update previous drilled pier pay item and testing guidelines for the 2012 *Standard Specifications*. This memorandum supersedes a previous memo entitled "Drilled Pier Pay Item and Testing Guidelines" dated April 27, 2010.

The 2012 *Standard Specifications* include a new Section 411 entitled "Drilled Piers". This new section includes all drilled pier testing pay items and 3 drilled pier pay items; ___ *Dia. Drilled Piers,* ___ *Dia. Drilled Piers in Soil* and ___ *Dia. Drilled Piers not in Soil.*

The guidelines for using a single drilled pier pay item vs. 2 drilled pier pay items have not changed. Use the single pay item when 10% or less of the total drilled pier quantity will be in crystalline or non-crystalline rock according to the Geotechnical Engineering Unit legend sheet. Otherwise, use 2 pay items and estimate half of weathered rock as drilled pier not in soil.

For projects with multiple bridges, the previous memo required that if any bridge on the project requires 2 drilled pier pay items based on the 10% criteria, use 2 drilled pier pay items for all bridges on the project. This is no longer required for Section 411 because the use of either a single drilled pier pay item or 2 drilled pier pay items is per bent instead of per project.

Drilled pier testing includes integrity testing (crosshole sonic logging [CSL] testing and pile integrity testing [PIT]), standard penetration tests (SPT) and the shaft inspection device (SID). CSL tubes are incidental to the drilled pier pay items and *CSL Testing* is paid as a separate pay item. PIT is performed by GEU personnel from the Central Office so there is no pay item for PIT. *SPT Testing* and *SID Inspections* are paid for as separate pay items. Each type of testing is addressed on the following page.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

TELEPHONE: 919-707-6850
Fax: 919-250-4237

www.ncdot.gov/doh/preconstruct/highway/geotech

LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

Integrity Testing

CSL testing and PIT are used to evaluate drilled pier integrity, which can be compromised by voids, intrusions, contamination, segregation and low strength concrete.

For railroad bridges with drilled piers, CSL testing is required for each pier. For all other bridges with drilled piers, recommend CSL testing when the following conditions occur.

- High potential for problems during concrete placement such as when long drilled piers with multiple levels of temporary casing are anticipated
- Slurry construction is anticipated
- Good possibility for large heads such as dry pours with drilled pier tip elevations well below the ground water elevation
- Artesian conditions are anticipated
- Little redundancy in drilled pier foundations such as hammerhead bents with a single drilled pier

For these high risk situations, recommend CSL testing for at least 20% of the drilled piers. For lower risk situations, recommend CSL testing for drilled piers as a contingency of 1 per bridge.

CSL testing is not required when there is a low potential for problems to occur during concrete placement such as for short drilled piers with permanent casing to rock. When CSL testing is omitted from a bridge with drilled piers, recommend PIT testing as a contingency with the Structure Standard Foundation Note.

SPT

SPT are used to evaluate the bearing conditions of the bottom of drilled pier excavations. SPT are generally required for drilled piers with the tip just into rock or not in rock as defined by Section 411 of the *2012 Standard Specifications*. For all other bridges with drilled piers, recommend SPT as a contingency of 1 per bridge.

SID

The SID is used to determine the bottom cleanliness of drilled pier excavations. The use of the SID is required for drilled pier excavations that will not be dewatered or when it will be difficult to inspect bottom cleanliness visually or with a steel probe. For all other bridges with drilled piers, recommend SID inspections as a contingency of 1 per bridge.

To require drilled pier testing, use the Structure Standard Foundation Notes that say the testing "is/are required". For contingency testing, use the Structure Standard Foundation Notes that say the testing "may be required". The current Structure Standard Drilled Pier Foundation Notes (LRFD) for 2012 lettings are attached for your reference.

Use the Drilled Pier Pay Items Form to recommend the appropriate quantity of drilled pier testing based on the guidelines above. This form is also used to recommend quantities of drilled pier not in soil, if applicable. For bents with a single drilled pier pay item, enter "none" or "0" for the drilled pier not in soil quantity. If drilled pier testing is required, recommend testing pay

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

TELEPHONE: 919-707-6850
Fax: 919-250-4237

www.ncdot.gov/doh/preconstruct/highway/geotech

LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

item quantities for each bent. If drilled pier testing may be required, recommend testing pay item quantities as totals only per bridge. The current Drilled Pier Pay Items Form for LRFD is attached for your reference.

If there are any questions about this memo, please contact Scott Hidden, P.E. at (919) 707-6856.

Attachments: Structure Standard Drilled Pier Foundation Notes - LRFD (4/18/11)
Drilled Pier Pay Items Form - LRFD (4/18/11)

cc: Greg Perfetti, P.E., State Bridge Design Engineer
Mike Robinson, P.E., State Bridge Construction Engineer
Randy Garris, P.E., State Contract Officer

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

TELEPHONE: 919-707-6850
Fax: 919-250-4237

www.ncdot.gov/doh/preconstruct/highway/geotech

LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610