

GEONOTES

February 3, 1997

Documentation

Crewtime is by drill crew time sheets and daily activity's sheets.

Travel time is documented by drill crew time sheets and daily activity's sheets.

Both copies of any invoice should be highlighted.

February 3, 1997

Invoicing

Firms with Phase and Task codes should develop a legend sheet of applicable codes to include with each invoice so we may more easily see what has occurred.

February 28, 1997

Drawings

Bar scales (with units) are required on all drawings. This includes the Test Site Plan, Cross sections, and Profiles. In addition to bar scales, stationing is required on plan views and desirable along profile sheets at regular tick intervals.

February 28, 1997

Project Status

Geotechnical Firms should provide written status reports for all "active" projects to the Geotechnical Unit on a weekly basis. The format may be informal (a hand written fax will do) but should be as accurate and current as possible. Status reports should arrive between noon Friday and noon Monday.

April 15, 1997

Supportive Documents

Geotechnical Firms should include a Boring Quantity Summary Sheet with the Supportive Documents.

April 15, 1997

Penetration Test and Split Barrel Sampling of Soils

In order to maintain consistency with Field Office products, the Geotechnical Consultant Coordinator has established the following criteria for termination of penetration testing on DOT projects.

- *Drive the sampler with blows from the 63.5-kg (140-lb) hammer and count the number of blows applied in each 15-cm (0.5-ft.) increment until one of the following occurs:*
- *1) The sampler is advanced the complete 45-cm (1.5-ft.) interval.*
- *2) A total of 100 blows have been applied in any 2 consecutive 15-cm (0.5-ft.) intervals.*
- *3) A total of 50 blows have been applied with < 8-cm (0.25-ft) penetration.*
- ~~*4) There is no observed advance of the sampler during the application of 10 successive blows of the hammer.*~~
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November 5, 1997

Invoicing

Both copies should be **highlighted**. If an invoice is **highlighted** and then copied it is difficult to read the underlying information.

Time sheets should be grouped by employee then by date with the earliest date first.

If possible, please assemble invoices in a sequence consistent with the proposal format distributed at our August kickoff meeting. This proposal/invoicing format permanently resides on the Departments "public server" if you can access our "Homepage".

November 5, 1997 **Auger Refusal and Boring Termination**

Some misunderstandings have been identified recently regarding “Total depth”, boring termination statements, and standard penetration tests to verify auger refusal. We offer the following interpretation and comments about what we expect.

Policy - The total depth of the boring is *THE GREATEST DEPTH PENETRATED BY ANY MEANS*. The elevation of that point should be used in the termination statement.

Case 1 Auger refusal is achieved and no Penetration test is performed.

The termination statement should read “Auger Refusal

The inferred rock symbol should appear on all profiles and cross-sections.

Case 2 Auger refusal is achieved and a Penetration test is performed with no penetration.

The termination statement should read “Auger Refusal

The inferred rock symbol should appear on all profiles and cross-sections.

Case 3 Auger refusal is achieved and a Penetration test is performed with penetration.

The termination statement should read “Boring terminated at

The inferred rock symbol should appear on all profiles and cross-sections at the elevation of auger refusal.

November 5, 1997 **Supplemental Legend and Standard Legend**

When rock materials (SPT values >100) are penetrated without attempting to obtain core samples, the terminology on the “Standard Legend” is appropriate.

When coring is the primary method of advancing borings the terminology on the “Supplemental Legend” is appropriate. Description of rock materials should reflect the authors' observations based on the comments in the “Supplemental Legend.

March 31, 1998 **Pile Foundation Recommendations - Geotechnical Report**

Please be reminded that Mr. Moore (Bill) has directed that pile foundation recommendations should be made relative to an Ultimate Bearing Capacity of 800 kN (90 tons). We encourage you to follow this directive.

March 31, 1998 **Page Numbers**

Because we continue to have to make some insertions for resubmittals, we encourage firms to include page numbers on their reports.

March 31, 1998 **Level Rods**

Level readings should be taken with level rods in the appropriate units designated for your specific project. I have been reminded at the Branch level that Metric jobs will become the standard format.

March 31, 1998 **Samples for Gradation and Atterberg Limits**

Each significant soil stratum should be documented by at least one (1) sample tested for Gradation and Atterberg Limits.

August 12, 1998 **Pile Foundation Recommendations - Geotechnical Report**

Please be reminded that the bearing capacity for standard 12 inch or 310 x 79 steel piles has been increased. Recommendations should be made relative to an Ultimate Bearing Capacity of 1060 kN (120 tons).

August 25, 1998 **Estimates and proposals**

The salaries shown on estimates must match the salaries shown in Appendix C of the contract. The salaries shown on the invoice must match the current payroll register in fiscal (Todd's place).

August 19, 1999

Penetration Test and Split Barrel Sampling of Soils

In order to maintain consistency with Field Office products, the Geotechnical Consultant Coordinator has established the following criteria for termination of penetration testing on DOT projects.

- *Drive the sampler with blows from the 63.5-kg (140-lb) hammer and count the number of blows applied in each 15-cm (0.5-ft.) increment until one of the following occurs:*
- *1) The sampler is advanced the complete 45-cm (1.5-ft.) interval.*
- *2) A total of 100 blows have been applied in any 2 consecutive 15-cm (0.5-ft.) intervals.*
- *3) A total of 50 blows have been applied with < 8-cm (0.25-ft) penetration.*

March 1, 2000

Invoice documentation - Point of explanation

It is not necessary to send copies of boring logs (field or finished) as documentation with invoices. My staff will review quantities and notify me. If there are discrepancies between what they observe and what is invoiced, I will review them. If there are still unresolved discrepancies, I will discuss those with the contract manager. The same procedure is applicable to soil test. We will measure, count, etc. and pay by finished product quantities.

May 1, 2000

Elevations

LEVEL SURVEYS FOR ELEVATIONS OF BORINGS.

There have been some problems with boring elevations recently, as a result of benchmark elevation errors and incorrect level surveys. We will attempt to cross check (if possible) the benchmark elevations before they are provided to you. To make sure that the level surveys are as accurate as possible, the following guidelines are effective immediately.

All level notes will be submitted in the supportive documents. If a field book is used, a readable copy of the pages will be submitted in the supportive documents. The level notes should be neat and organized to the point that anyone with level survey experience should be able to look through the survey notes and clearly see where an elevation was obtained.

Structure Investigation Borings

- All borings performed for a structure foundation investigation will have a collar elevation accurate to 0.1 foot or 0.01 meter.
- The type of level survey performed at a structure foundation investigation depends on the following three conditions found at a site.
 1. *A boring is at a stake with an elevation provided by NCDOT.* No level survey for the boring elevation is necessary.
 2. *A boring is within 10 feet of a stake with an elevation provided by NCDOT.* A hand level can be used with or without a measured staff to obtain the boring elevation from the nearest stake. Notes provided to us will include: project number, date, instrumentman, rodman, stake designation, and elevation at the stake. If a measured staff is used with the level, notes will also include rod reading, elevation of boring, and somewhere on the notes the length of staff used. If a staff is not used, notes will have rod reading, height of instrument (elevation), rod reading #2, and elevation of boring.
 3. *A boring is greater than 10 feet from a stake with an elevation provided by NCDOT, or only a benchmark and elevation were provided.* A level survey with at least one turning point in the loop will be performed. A turning point is defined as a point where an elevation is obtained by a foresight, the instrument is moved,

August 1, 2001 REC & RQD Calculations - WHEN

RQD calculations are required after the following has been met...

Old Legend:

1. After auger refusal is achieved on hard rock **AND/OR**
2. The weathering description is determined to be between fresh & moderate.

August 1, 2001 STRATA REC & RQD Calculations – HOW & WHERE

Strata REC and RQD is calculated by only counting distance core barrel travels.

Any penetration of SPT tests done between core runs is not to be used in calculation of strata REC or RQD.

All strata REC and RQD lengths and calculations (%) are to be recorded on field core logs. The calculated percentages are to be reported on all final core logs.

Gint users have a space for strata REC and RQD lengths on final core logs and that is acceptable.

The following two changes are proposed based on the NEW LEGEND criteria for Hard Rock.

December 10, 2001 Auger Refusal and Boring Termination

Some misunderstandings have been identified recently regarding “Total depth”, boring termination statements, and standard penetration tests to verify auger refusal. We offer the following interpretation and comments about what we expect.

Policy - The total depth of the boring is *THE GREATEST DEPTH PENETRATED BY ANY MEANS*. The elevation of that point should be used in the termination statement.

For the OLD LEGEND the termination statements should read as follows:

Case 1 Auger refusal is achieved and no Penetration test is performed.

The termination statement should read “Auger Refusal at Elevation xxx.x on Hard Rock (rock name)”.

The inferred rock symbol should appear on all profiles and cross-sections at the elevation of auger refusal.

Case 2 Auger refusal is achieved and a Penetration test is performed with no penetration.

The termination statement should read “Auger Refusal at Elevation xxx.x on Hard Rock (rock name)”.

The inferred rock symbol should appear on all profiles and cross-sections at the elevation of auger refusal.

Case 3 Auger refusal is achieved and a Penetration test is performed with penetration.

The termination statement should read “Boring terminated at Elevation xxx.x in *Last material description*”.

The inferred rock symbol should appear on all profiles and cross-sections at the elevation of auger refusal.

For the NEW LEGEND the termination statements should read as follows:

Case 1 Auger refusal is achieved and no Penetration test is performed.

The termination statement should read "Boring Terminated by Auger Refusal at Elevation *xxx.x* in *Rock Classification* (Rock Name)" if the material above Auger Refusal is interpreted as Hard Rock.

The termination statement should read "Boring Terminated by Auger Refusal at Elevation *xxx.x* in *Last material description*" if the material at Auger Refusal is interpreted as other than Hard Rock.

The termination statement should read "Boring terminated by Auger Refusal at Elevation *xxx.x* on *Rock Classification* (Rock Name)" if the material at Auger Refusal is interpreted as Hard Rock by means other than Auger Refusal.

The inferred rock symbol should appear on all profiles and cross-sections if interpreted as Hard Rock.

Case 2 Auger refusal is achieved and a Penetration test is performed with no penetration.

The termination statement should read "Boring Terminated with Standard Penetration Test Refusal at Elevation *xxx.x* on *Rock Classification* (Rock Name)" if the material above SPT Refusal is interpreted as other than Hard Rock.

The termination statement should read "Boring Terminated with Standard Penetration Test Refusal at Elevation *xxx.x* in *Rock Classification* (Rock Name)" if the material above SPT Refusal is interpreted as Hard Rock.

The inferred rock symbol should appear on all profiles and cross-sections.

Case 3 Auger refusal is achieved and a Penetration test is performed with penetration.

The termination statement should read "Boring Terminated with Standard Penetration Test Refusal at Elevation *xxx.x* on *Rock Classification* (Rock Name)" if SPT Refusal is achieved and the material above SPT Refusal is interpreted as other than Hard Rock.

The termination statement should read "Boring Terminated with Standard Penetration Test Refusal at Elevation *xxx.x* in *Rock Classification* (Rock Name)"

if SPT Refusal is achieved and the material above SPT Refusal is interpreted as Hard Rock.

The termination statement should read "Boring terminated at Elevation xxx.x in *Last material description*" if SPT Refusal is not achieved.

The inferred rock symbol should appear on all profiles and cross-sections.

December 10, 2001

Penetration Test and Split Barrel Sampling of Soils

In order to maintain consistency with Field Office products, the Geotechnical Consultant Coordinator has established the following criteria for termination of penetration testing on DOT projects. **This criteria is also relevant for METRIC PROJECTS using the NEW LEGEND.**

- *Drive the sampler with blows from the 63.5-kg hammer and count the number of blows applied in each 15-cm increment until one of the following occurs:*
 - 1) *The sampler is advanced the complete 45-cm interval.*
 - 2) *A total of 100 blows have been applied in any 2 consecutive 15-cm intervals.*
 - 3) *A total of 50 blows have been applied with < 8-cm penetration.*

For ENGLISH PROJECTS using the NEW LEGEND the following criteria should be used.

- *Drive the sampler with blows from the 140-lb hammer and count the number of blows applied in each 0.5-ft. increment until one of the following occurs:*
 - 1) *The sampler is advanced the complete 1.5-ft. interval.*
 - 2) *A total of 100 blows have been applied in any 2 consecutive 0.5-ft. intervals.*
 - 3) *A total of 60 blows have been applied with <0.3-ft penetration.*

June 24, 2002

Reporting SPT Refusal

When SPT Refusal is encountered, represent the actual Blow count (50/0) on field boring logs, final boring logs, cross sections and profile instead of REF.

NEW LEGEND

(See August 1, 2001 entry for Old Legend)

When to report REC and RQD percentages in Non-Coastal Plain Material

When blow counts are <100 bpf, do not report REC and RQD percentages but do report the length of material recovered.

When blow counts are >100 bpf but <60/0.1', report REC percentages and length of material recovered but do not report RQD percentage.

When blow counts exceed 60/0.1' report both REC and RQD percentages with the respective lengths of material for each.

If in your opinion an exception would improve the product, exceptions to this position may be considered on a project per project basis if approved prior to the submittal of a review product.

When to report REC and RQD percentages in Coastal Plain Material

Report only REC percentages and length of material recovered when coring Coastal Plain material.

October 1, 2002

Supplement to Elevations

The benchmark (BM) used to calculate collar elevations and elevations for ground lines on cross section and profiles should be located outside the construction limits, however, this concept is not feasible for every project. We expect the benchmark noted on the legend sheet to be a NCDOT Location & Survey Unit control point typically listed on roadway profile sheets, structure preliminary general drawings or the Bridge Survey & Hydraulic Design Report. This may be a RR spike, Rebar with a punch mark, or Chiseled "X" or a "Capped Point" such as a DOT Baseline (BL) point. Thus, survey levels need to be referenced to and surveyed from NCDOT control points.

April 18, 2005

Sealing Geotechnical Exploratory Holes

Our goal is to eliminate the chance a contaminant will migrate through an exploratory borehole and contaminate the groundwater. This is most likely to occur in inhabited areas and along existing roadways. Our minimum requirements are listed below.

For exploratory holes in uninhabited areas outside of the existing right-of-way backfill the hole with drill cuttings and/or indigenous soil

For exploratory holes in inhabited areas and/or inside of the existing right-of-way backfill the hole with drill cuttings and/or indigenous soil to 18" below the ground surface and placing a 12" thick bentonite plug from 18" to 6" from the top of the boring. The remaining 6" inches below the ground surface should be filled with soil over the plug to help reestablish vegetation. If a contaminant encounters this plug the contaminant will at least be diverted around the plug and through natural ground.

Seal and grout artesian conditions in all exploratory holes.

In areas where a deep subaerial boring penetrates multiple potential aquifers, backfill the entire length of the boring with bentonite. The consequences of contamination may be significantly greater in this situation.

Providing Electronic Files

For all projects assignments requiring any type of product generated electronically we now require those files be turned in at the time of the final product submittal. The files provided should include everything required to generate your report, graphics, photo sheets, etc. The format of the files should be in the original file type and configuration you used at your firm. It does not matter if the NCDOT has the software, we want your files in their original format. We also need a readable electronic copy of your lab results (these can be a .pdf file or any Microsoft office type file). These files can be provided on a CD or by transfer to our FTP site. The purpose for this request is to provide a more secure backup of file data in case revisions need to be made in the future.

Structure Report Format

Our report format changed over a year ago but we have not published the changes in a format for all to see. The biggest changes are that all parts of the report are to be on 11x17 paper and there are no preliminary recommendations included.

11 x 17 Report Format

- “Structure Subsurface Investigation Title Sheet.” Includes Caution Notice and area to list Contents. (Available in electronic format on the server under <ftp://ftp.doh.dot.state.nc.us/Dept-Units/Geotech/Consult/>)
- NC Division of Highways Geotechnical Unit Soil and Rock Classification Legend and Abbreviations
- Written report on 11x17 paper with no recommendations. Include a section titled “Notes to the Designer” in place of recommendations that lists any items that may have some affect on design. List these as statements of fact that do not reference any particular foundation type or design.
- Site vicinity map.
- Plan View of boring locations and any other significant topographic features
- Profile
- Cross sections

- Final logs
- Scaleable color photographs of rock core behind corresponding core log (4 to a page)
- AASHTO soil test results for both disturbed and undisturbed samples (quality, PI, LL, moisture, and organic content)
- Rock test results summary chart
- Field scour report for all water crossings (Available in electronic format on the server under <ftp://ftp.doh.dot.state.nc.us/Dept-Units/Geotech/Consult/>) Geotechnically Adjusted Scour Elevations will be calculated by the NCDOT Geotechnical Unit (transmit electronically with review report submittal)
- Grain size distribution graphs.
- Site photos

January 10, 2008

NCDOT GEU Standard Folder Naming Convention

From this point forward, the GEU Consultant Group will send out all project files in a folder following the naming convention outlined in **Standard Folder Naming Configuration_consult.pdf** (modified 1-10-08). That folder will include all relevant digital files the consulting firm will need. All subsequent project files (CADD, lab tests, reports, photos, calculations, etc.) are expected to be placed in an appropriate subfolder following the naming conventions described in the above-mentioned document.

December 16, 2008

Standard Penetration Test

From this date forward, the following criteria for termination of penetration testing must be followed in order to satisfy the current NCDOT Subsurface Investigation, Soil and Rock Legend. *Use of any other SPT termination criteria is unacceptable and the test will be considered invalid.*

- *Drive the sampler with blows from the 140-lb hammer and count the number of blows applied in each 0.5-ft. increment until one of the following occurs:*
 - *1) The sampler is advanced the complete 1.5-ft. interval.*
 - *2) A total of 100 blows have been applied in any 2 consecutive 0.5-ft. intervals.*
 - *3) SPT Refusal, which is defined by the NCDOT Legend as penetration by a split-barrel sampler equal to or less than 0.1foot per 60 blows.*