STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
NASHVILLE, TENNESSEE 37243-0348

INSTRUCTIONAL BULLETIN No. 06-08

REGARDING DEFINTION OF TERMS USED FOR EARTH WORK GRADING CALCULATIONS AND NOTES TO BE ADDED TO THE PLANS PERTAINING TO EARTHWORK CALCULATIONS

The geotechnical report and geotechnical related drawings should be consulted by the roadway designer to determine what type of materials will be encountered during excavation and embankment construction for a project. The geotechnical report should provide enough information to determine the type materials described below and to determine appropriate shrink or swell factors. Some geotechnical reports may provide project specific recommendations for shrink and swell factors. It is recommended that the designer contact the Geotechnical Engineering Section as needed to clarify any questions arising regarding the nature of materials to be encountered and accounted for in the grading tabulations and bid quantities.

The following terms and definitions will be used by all TDOT Divisions so that a consistent definition is used in all phases of project development and in contract documents. Guidance to designers as to the material breakdown to be shown on the plans and cross-sections should be found in the geotechnical report.

A. SOIL MATERIAL Soil material is material that is predominantly made up of naturally occurring mineral particles which are fairly readily separated into relatively small pieces, and in which the mass may contain air, water, or organic materials. This material may contain rock pieces in the form of disconnected slabs, lenses, or boulders of less than approximately 0.5 cubic yards. The main soil groups consist of clay, silt, sand, gravel, cobbles, boulders (less than 0.5 cubic yard volume) or a combination of any of the constituents. For construction purposes, this material would typically be considered to be excavatable by conventional excavation machinery such as pans, track hoes, or front end excavators/loaders. This material would have a shrink factor as given in the shrink factors shown in Section 2-145.10 of the Design Guidelines or as recommended by the Geotechnical Engineering Section of the Materials and Tests Division.

B. SOLID ROCK MATERIAL Solid rock material is that naturally occurring material composed of mineral particles so firmly bonded together that relatively great effort is required to separate the particles (i.e. blasting or heavy crushing forces). For construction purposes, this material would typically have to be blasted to separate into

pieces small enough to load and transport on earth moving trucks and which when subjected to proper pre-split and production blasting would result in a uniform stable rock cut face. Note that this material would not by definition necessarily be a proven source of any rock type aggregate such as solid rock, graded solid rock, rip rap, or other rock aggregate construction products. This material would have a significant swell factor as given in swell factors shown in Section 2-145.10 of the Design Guidelines or as recommended by the Geotechnical Engineering Section of the Materials and Tests Division.

C. SOFT ROCK OR DEGRADABLE ROCK This material is that naturally occurring material composed of mineral particles that are so firmly bonded such that they are not fairly readily separated into small pieces yet has such relatively low bonding strength that would allow for separating into small pieces through moderate to heavy crushing forces. For construction purposes this material would have to be subjected to ripping type equipment, hoe rams, or rugged use of a large bulldozer in order to separate the material such that it can be readily loaded into earth moving trucks. These materials would typically be shales, claystones, siltstones, weathered sandstones, weathered schist and weathered gneiss. This material would have a relatively small shrink or swell factor depending on the type material and the degree of weathering, disintegration, or degradation.

D. TRANSISTIONAL MATERIALS This material is that material comprised of a combination of those materials described above occurring in either non-uniform interbedded layers of the above materials (i.e. shale material with relatively thin layers of solid rock such as hard limestone) or erratic localized changes of material types both laterally and with depth (such as a geologic formation resulting in pinnacled rock columns, floating boulders or lenses intercalated with clay soil, a common occurrence in certain regions of Tennessee). For construction purposes, this material may have to be excavated using a combination of excavation methods such as blasting of rock pinnacles, layers or boulders along with ripping of weathered rock and excavating of soil with track hoes or loaders all within a localized area. This material would not be suitable for the use of excavating pan type equipment.

COMMON EXCAVATION Common excavation is that sum of materials excavated from a project inclusive of all those materials described in **A**, **C**, and **D** above. The grouping of these materials is to generally define those materials that would not generally be acceptable to permanently place on a pre-split, blasted face and also to define those materials that would not be considered a source of a defined fill material such as solid rock fill, graded solid rock, rip rap or other rock type aggregates. Typically the materials in this grouping would have either a shrink factor or a relatively low swell factor as compared to solid rock material described in B above.

UNCLASSIFIED EXCAVATION Unclassified excavation is that sum of materials excavated from a project inclusive of all those items described in **A, B, C,** and **D** above. On most projects, road and drainage excavation will be listed as unclassified and is to be bid as one item regardless of the type material encountered. See section 203.02 (a) of the Standard Specifications for Road and Bridge Construction.

Generally, all earthwork for roadway projects will be paid for under Item 203-01, Road and Drainage Excavation (Unclassified), C.Y. or Item 203M01, Road and Drainage Excavation (Unclassified), M3. except in situations where special or unique conditions exist that would warrant bidding earthwork as either separate bid items or embankment in place bid items. For projects which earthwork items other than Road and Drainage Excavation (Unclassified) may be appropriate, the Design Manager will consult with both the Geotechnical Section and the Headquarters Construction Division to determine if other pay items are appropriate and what material type breakdown will be shown on the grading tabulation and earthwork balances in the plans.

The following notes shall be added to the plans as Special Notes on **ALL** projects for which a Geotechnical Report is prepared unless otherwise directed by the Design Manager after consultation with the Soils and Geology Section of the Materials and Tests Division and the Headquarters Construction Division. All grading quantities on the Estimated Roadway Quantities Sheet should also be footnoted "Refer to Special Notes."

The grading tabulations and resulting earthwork associated bid quantities were prepared utilizing available geotechnical information and/or reports prepared for this project. This information is provided for general information and estimation guidance only.

Boring depictions shown on the foundation data sheets, soils sheets, plans, and cross-sections indicate soil and rock conditions at the specific boring locations. Any soil profile and/or rock line is interpretive based on the judgment of the geotechnical engineer/geologist. The transition between borings and layers may vary significantly depending on the geologic formations encountered.

To assist in bid preparation for earthwork and foundation construction, detail rock and soil description and on some projects, rock core samples are available for inspection at the Materials and Tests headquarters at 6601 Centennial Boulevard, Nashville, TN or at the TDOT Region 1 Building in Knoxville, TN.

The contractor shall utilize all information provided in the plans, cross-sections and contract documents including any special provisions as well as utilizing his past experience with projects of similar nature, scope and location in preparation of his bid for earthwork items. It is the contractor's responsibility to determine and provide equipment and means necessary to conduct the excavation activities in accordance with plans and specifications.

Earthwork is paid for under item 203-01, Road and Drainage Excavation (Unclassified). No additional payment will be made for earthwork quantities based solely on a claim that the quantities shown in the grading tabulation or elsewhere in the plans are inaccurate with respect to the type of materials encountered during construction except as provided for by section 104.02 in the current edition of the Standard Specifications for Road and Bridge Construction or as amended in Supplemental Specifications.

Original signed by Jeff C. Jones
Jeff C. Jones, Civil Engineering Director
Design Division

JCJ:MA:ma

May 3, 2006