

**STATE****OF****TENNESSEE**

Rev. 8/20/18

January 1, 2021

**SPECIAL PROVISION****REGARDING****POTENTIALLY ACID PRODUCING MATERIALS**

**DESCRIPTION:** This work shall consist of locating, sampling, testing, and disposing of potentially acid producing materials as defined in the plans documents and in accordance with the Standard Specifications except as modified herein, or as directed by the Engineer.

Potentially acid producing materials are those rock, rock-like materials, and soil (including all rock types, minerals, ore deposits, coal, etc.) that contain sufficient amounts of certain minerals that could produce drainage at pH levels sufficiently less than background pH when exposed to atmospheric conditions and weathering processes. These minerals are typically pyrite, marcasite and chalcopyrite. Potentially acid producing materials are often referred to generally as “pyritic materials” or “pyrite” regardless of the actual mineral content of the material.

If acid producing materials exist in the excavation, proper monitoring, testing, and disposition of the material shall be required. If necessary, a water sampling plan will be prepared and water quality monitoring will be conducted throughout construction by a TDOT employed consultant at the direction of the Engineer and the TDOT Environmental Division. Detention / retention ponds, sampling, testing and treatment of any effluent for the disposal site shall be shown in the environmental documents and on the environmental plans sheets.

The following procedure describes the process of sampling and evaluating potentially acid producing materials in highway construction projects. The intent is to locate potentially acid producing material within a given cut interval before excavation of the material proceeds. When potentially acid producing material is encountered, it shall be disposed of under the direction of the Engineer and in accordance with contract plans and documents.

**Acid Producing Material Sampling and Evaluating Procedure:** The following sampling and evaluating procedures shall be followed for either rock or soil materials.

**Rock:** Prior to excavating any potentially acid producing rock materials as determined by the Engineer, samples of cuttings shall be obtained by the Engineer during the drilling operation and then tested using the acid/base accounting method. A minimum of three holes for each lot is to be sampled (additional holes may be sampled when deemed necessary by the Engineer). A lot shall consist of a volume equal to 5,000 square feet of surface area and the full depth of the drill hole. Holes to be sampled will be selected to obtain optimum coverage of the rock material.

A sample shall consist of approximately one cup of powdered rock material taken from the drill cuttings. Samples are to be taken at five foot intervals for the full depth of the drill hole.

Upon completion of the sampling procedure on three drill holes or more, the samples will be analyzed by the Engineer through the TDOT Geotechnical Section for potential acid production using the acid/base accounting method. Each sample will be analyzed for potential acid, potential alkalinity, per cent pyritic sulphur, net acid/base potential, and paste pH. Test results will be available in approximately 48 hours after laboratory receipt of the sample.

Soil: Prior to excavating any potentially acid producing soil material as determined by the Engineer, samples of soil shall be obtained and submitted for testing using the acid/base accounting method. The samples shall be obtained under the supervision of the Engineer by excavation of test pits conducted by the contractor to a depth of 5 feet or to the limit of excavation grade whichever is less. The Engineer will obtain the selected soil sample from the test pit, which shall consist of approximately 5 pounds. A test pit and sample shall be accomplished for every 5000 square feet of surface area of the proposed cut area. The sampling procedure shall be conducted for each 5 foot thickness of proposed cut.

Upon completion of the sampling procedure for each proposed cut section, the samples will be analyzed by the Engineer through the TDOT Geotechnical Section for potential acid production using the acid/base accounting method. Each sample will be analyzed for potential acid, potential alkalinity, per cent pyritic sulphur, net acid/base potential, and base pH. Test results will be available in approximately 48 hours after laboratory receipt of the sample.

Potentially acid producing material shall not be excavated prior to completion of the testing procedure. Any delays, idle equipment, etc. caused by the testing program will not form a basis for a claim for additional working time and/or compensation. Once the test results are known, the Engineer will make the final decision on the disposition of any material found to have acid drainage potential. Where the potentially acid producing material is geologically distinct from the surrounding materials and all of the excavated material shall be encapsulated, the Engineer, with the consultation and concurrence of the TDOT Geotechnical Engineering Section, may waive or adjust the requirements for testing of potentially acid producing rock being placed in an encapsulation site. If a portion of this geologically distinct layer has unknown pyritic content, is to be blended, or is to be placed as common fill, the testing requirements shall stand.

Treatment and Disposition of Acid Producing Materials: Potentially acid producing materials shall be treated and disposed of in accordance with the plans. These treatments may include full encapsulation, partial encapsulation, blending or hauling to an offsite landfill.

General: Disposal sites on sloping terrain shall be benched to provide stability for the embankment at no additional compensation.

When potentially acid producing material is encountered during construction, it must be separated to the extent feasible using normal excavation procedures and transported as soon as possible to the selected disposal site. At the disposal site the material shall be placed and treated as specified in the plans. Any questionable material identified during construction will be temporarily covered with ten (10) mil polyethylene sheeting until laboratory results determine its quality and manner of disposition. Excavated material which has not been excavated and/or

buried will be covered with polyethylene sheeting at the end of each daily excavation operation. Any exposed cut face on a slope that will be eventually covered with topsoil and matting (e.g. slopes that are not considered “rock slopes” that would be left as –is) shall be covered with the ten (10) mil polyethylene sheeting until such time that the stabilization measures such as topsoil, matting, bonded fiber matrix, sod, etc. as required by the Erosion Control Plans or elsewhere in the plans are implemented. The cost of polyethylene sheeting used for blending sites, off-site or on-site encapsulation areas shall be considered incidental and not for directly. Polyethylene sheeting used on the project slopes for temporary cover prior to stabilization will be paid for on the unit price basis for per square yard. Cost of polyethylene sheeting shall also include the cost of sandbags required to adequately hold the sheeting to the surface.

A temporary 6 inch compacted clay cap shall be required on top of any encapsulation or blending site not already brought to grade and completed where it will be left open more than 4 weeks without work except for the months of December, January, February, or March where the temporary 6 inch compacted clay cap shall be required if left open more than 2 weeks without work. This clay cap shall be scarified or removed prior to placement of further potentially acid producing rock in the encapsulation area. At the judgment of the Engineer and where practical, polyethylene sheeting may be substituted for the 6 inch clay cap. Any encapsulation area left open for more than 2 weeks without work shall be graded to drain to the closest detention pond and shall not have slumps, depressions or holes which would hold water on or directly above the encapsulated area. During construction of the encapsulation cell a temporary detention pond shall be used to collect runoff from the encapsulation area as directed by the TDOT Environmental Division and on the environmental plans sheets. This detention pond shall be sized to contain the runoff from the encapsulation area and shall only be required while encapsulation cell is under construction and not yet complete.

This provision will be placed on the plans in the Special Notes—Environmental sheet, on the Item Numbers sheet, and referred to on the encapsulation plans sheet.

**Materials:** Borrow Excavation (Graded Solid Rock) shall consist of sound, nondegradable limestone with a maximum size of three feet. At least 50 percent by weight of the rock shall be uniformly distributed between one foot and three feet in diameter, and no greater than 10 percent by weight shall be less than two inches in diameter. The material shall be roughly equi-dimensional. Thin, slabby material will not be accepted. When the crushed material is subjected to 5 alterations of the sodium sulfate soundness test (AASHTO T 104), the weighted percentage of loss shall not be more than 12. The contractor shall be required to process the material with an acceptable mechanical means (a screening process capable of producing the required gradation). The rock shall be approved by a representative of the Geotechnical Engineering Section, Division of Materials and Tests, before use.

Agricultural Limestone shall meet the requirements of Subsection 918.04. Limestone screenings may be substituted at the discretion of the Engineer with the consultation and concurrence of the TDOT Geotechnical Engineering Section. Representative limestone screening samples shall be provided to the TDOT Materials and Tests division for testing of gradation and suitability for use as a blending material or for use as blending with potentially acid producing rock in an encapsulation site. Limestone screenings shall have a Calcium Carbonate content of at least 95%. Limestone screenings with a Calcium Carbonate content of between 80% and 95% may be

used with the approval of the Geotechnical Engineering Section. However, this will increase the quantity and blending rate of the material. This blending rate will vary based on the Calcium Carbonate content of the screenings and will be supplied by the Geotechnical Engineering Section after submission of samples. This increase in quantity needed to compensate for lesser quality limestone screening samples shall be borne by the contractor as it is a substitution that will allow for use of less expensive materials.

Fine grained soil (AASHTO Classification A-4, A-5, A-6, A-7 with at least 50% passing the number 200 sieve) and Clay soil (AASHTO Classification A-6, A-7-5 or A-7-6 with at least 50% passing the number 200 sieve that also meets USCS Classification CH or CL) obtained from the roadway excavation may be used for encapsulation of potentially acid producing rock materials. If this material is not available from the roadway excavation, borrow material meeting the same criteria may be used.

#### COMPENSATION FOR ON-PROJECT DISPOSAL AREA

Method of Measurement: Road and Drainage Excavation (Acid Producing- On Site Disposal) shall be measured by the cubic yard in its original position by cross-sectioning the excavated area. Items associated with the encapsulation and /or blending shall be measured as follows: Borrow Excavation (Graded Solid Rock), Agricultural Limestone and Limestone screenings will each be measured by the ton. Road and Drainage Excavation (Unclassified) and Borrow Excavation (Select Material) will be measured by the cubic yard in its original position by cross-sectioning the area excavated. The geotextile and/or geomembrane will be measured by the square yard. Drainage rock shall be measured by the cubic yard. Sump pipe materials such as pipe boot, pipe and bentonite shall be considered incidental and the cost of these shall be included in the item cost for drainage rock. Fine grained soil and Clay soil as referenced above shall be paid for under Road and Drainage Excavation (Unclassified). If this material is not available from the roadway excavation, it will be paid for by the cubic yard under Borrow Excavation (Select Material).

Basis of Payment: The accepted quantities of materials will be paid for at the contract unit price and shall be full compensation for all excavation, hauling, site preparation, placement, encapsulation, treatment and incidentals associated with proper disposal of acid producing materials, with all work and material complete and in place.

In the event that a contract unit price is not available for any item needed for treatment and disposal of potentially acid producing materials, the work shall be performed in accordance with Subsection 104.02 D.

#### COMPENSATION FOR OFF-PROJECT DISPOSAL AREA

Method of Measurement: The potentially acid producing material to be disposed of and treated in accordance with the plans and documents at an offsite waste area, or hauled to a Landfill approved by the TDOT Environmental Division, will be measured by the cubic yard in its original position by cross sectioning the area excavated. Off project disposal area is any site not

designated as a disposal area on-project and for which there are no site specific design plans included in the contract plans.

Basis of Payment: The payment for excavation and disposal of potentially acid producing material will be paid for at the unit price per cubic yard of item Road and Drainage Excavation (Acid Producing-Off Site Disposal). This payment includes all incidentals associated with disposal of the potentially acid producing materials including all items involved with disposal (such as Graded Solid Rock, Agricultural Lime, Limestone Screenings, geotextile fabric, geomembrane, polyethylene sheeting, fine grained soil, clay soil, drainage rock, sump pipe, drainage rock, pipe boot and all incidentals). Payment is also inclusive of all other items associated with constructing an offsite waste area such as site preparation, obtaining permits, erosion/sediment control. Payment is also inclusive of engineering design, geotechnical analysis, environmental analysis and drawing preparation costs associated with offsite disposal area in accordance with the *TDOT Standard Specifications for Road and Bridge Construction* and any associated supplemental specifications..

The contract unit prices paid shall be full compensation for all excavation, hauling, site preparation, placement, encapsulation, treatment and incidentals associated with proper disposal of acid producing materials.

Other: The cost of the 10 (ten) mil polyethylene sheeting used as temporary slope cover of the projects slopes prior to placement of stabilization shall be paid per square yard. Cost of sandbags to adequately hold down the sheeting is included in the cost of the sheeting and will not be paid directly.