

**Oklahoma Department of Transportation
Geotechnical Services for Roadway Design Division
Fee Schedule
June 29, 2011**

Staff. The Geotechnical Engineering Consultant will provide an Oklahoma Registered Professional Engineer (PE) who has at least four (4) years of experience in geotechnical engineering to perform the supervision of field logging & sampling, in situ testing, and laboratory testing. Resumes of the Geotechnical Engineering Consultant's Geotechnical Engineer and field engineers are to be submitted to the Roadway Design Division for approval. Interviews will be required.

Method of Payment. Unless otherwise specified, the price per unit of work or lump sum item shall include all engineering, labor, personnel, equipment, materials, etc., necessary to complete that unit of work. Failure to follow the procedures as stated will result in non-payment of the unit price item. The most current ASTM or AASHTO test procedure and supporting tests referenced shall be used. The units of work are defined as follows:

1. **Soil Classification.** Soil Classification includes gradation and plasticity index and shall be paid for a unit price per sample. This charge item includes all testing, calculation of Atterberg limits and all related indices, i.e. liquidity index and classification. Samples for soil mechanics and foundation analysis testing shall be performed according to ASTM D 4318 and D 422 test procedures on each sample. Samples for roadway testing shall be performed according to AASHTO T87, T88, T89, and T90 test procedures for each sample. If a hydrometer analysis is needed, it will be paid for under charge item 6A.
2. **Moisture Content.** Moisture Content shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to obtain the sample and perform the test according to ASTM D 2216 and AASHTO T 265. Moisture content required for other tests such as unconfined compression, etc. will be reimbursed under those test costs and will not be paid for under this item.
3. **Specific Gravity.** Specific Gravity shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform the test according to ASTM 854 and AASHTO T 100.
4. **Chunk Density.** Chunk Density shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform the test according to AASHTO T233.
5. **pH test.** pH test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform the test according to the ASTM D 4972 and AASHTO T289.

6. **Hydrometer, Double Hydrometer or Pin Hole Tests.** Hydrometer or Pin Hole Test shall be paid for at a unit price per test. These charge items shall include all operations and materials necessary to perform each test according to AASHTO T 88, ASTM D 422, D 4221 or ASTM D 4647, respectively.
7. **Electrical Resistivity Test.** Electrical Resistivity Test shall be paid for at a unit price per test. This charge item includes all operations and materials necessary to perform the test sample preparation according to AASHTO T 289 and testing according to ASTM G 57 for bridges, or to perform the test sample preparation and testing according to AASHTO T 288 for roadway.
8. **Soluble Sulfate Test.** Soluble Sulfate Test shall be paid for at a unit price per test. This charge item includes all operations and materials necessary to perform this test according to the OHD L-49 procedures which can be found on the ODOT, Materials Division website. <http://www.okladot.state.ok.us/materials/materials.htm>
9. **Slake Durability Test.** Slake Durability Test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform this test according to ASTM D 4644.
10. **Unconfined Compression Test.** Unconfined Compression Test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary for preparation of samples and to perform this test for soil and rock. Preparation and tolerances for rock specimens shall be in accordance with ASTM D 4543 requirements.
 - A. UC test of soil and rock according to ASTM D 2166 and ASTM D 2938, respectively.
 - B. Uniaxial compression test of intact rock core specimens with axial strain measurement and corresponding Intact Rock Modulus according to ASTM D 3148. The use of linear variable differential transformers (LVDTs) meeting the precision requirements of ASTM D 3148 is acceptable.
11. **Point Load Test.** Point Load Test shall be paid for at a unit price per specimen. This charge item shall include all operations and materials necessary to perform this test in accordance with ASTM D 5731.
12. **Moisture-Density Test.** Moisture-Density Test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform the tests according to AASHTO T 99 Methods A, B, C and D; AASHTO T-180 Methods, A, B, C and D; ASTM D 698 Procedures A, B, and C; and ASTM D 1557 Procedures A, B, and C. Each test will include a minimum of five (5) moisture/density points.

13. **One-Dimensional Consolidation Test.** One-Dimensional Consolidation Test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform this test according to ASTM D 2435.
14. **Drained Direct Shear Test.** Drained Direct Shear Test shall be paid for at a unit price per test for cohesionless soil and cohesive soils, respectively. These charge items shall include all operations and materials necessary to perform this test according to ASTM D 3080. Each test will include a minimum of three (3) points.
15. **Triaxial Shear.** Triaxial Shear Test shall be paid for at a unit price per test for unconsolidated undrained and consolidated drained with pore pressure measurement, respectively. These charge items shall include all operations and materials necessary to perform this test according to ASTM D 2850 and D 4767. Each test will include a minimum of three (3) points.
16. **Resilient Modulus Test.** Resilient Modulus Test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform the test according to AASHTO T 307.
17. **Swell and Swell Pressure Test.** Swell and Swell Pressure Test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform this test according to ASTM D 4546.
18. **Geotechnical Drilling.** Geotechnical Drilling shall be paid from top of ground to bottom of the hole at a unit price per foot for soil, soft rock and shale, and hard rock, respectively. These charge items shall include all operations and materials necessary to advance the hole. This includes borings for sampling and testing by means of the Standard Penetration Test split spoon sampler, thin-walled tube sampler, and the Texas Cone Penetrometer. Sampling techniques shall be performed according to ASTM D 1586 and D 1587 respectively. Hard rock coring shall be performed in accordance with ASTM D 2113.
19. **Standard Penetration Test.** Standard Penetration Test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform the test according to ASTM D 1586.
20. **Texas Cone Penetration Test, TCPT.** Texas Cone Penetration Test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform the test as outlined in the Specifications for Geotechnical Investigation.

21. **Dynamic Cone Penetration Test, DCPT.** Dynamic Cone Penetration Test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform the test according to ASTM D 6951.
22. **Thin-Walled Tube Sample.** Thin-Walled Tube sampling shall be paid for at a unit price per sample. This charge item shall include all operations and materials necessary to perform the test according to ASTM D 1587.
23. **Mechanical and Electrical Friction Cone and Piezocone, Penetration Testing of Soils.** Mechanical and Electrical Friction Cone and Piezocone, Penetration Testing of Soils shall be paid from top of ground to the depth at refusal at a unit price per foot of cone advancement. This charge item shall include all operations and materials necessary to perform this test according to ASTM D 3441 and D 5778.
24. **Pressuremeter Test.** Pressuremeter Test shall be paid for at a unit price per test. This charge item includes all operations and materials necessary to perform the test according to ASTM D 4719.
25. **Dilatometer Test.** Dilatometer Test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform the test according to ASTM D 6635.
26. **Seismic Test.** Seismic Test shall be paid for at a unit price per shot point along each survey spread. This charge item includes all operations and materials necessary to perform seismic tests according to the following criteria:
 - A. (A. & B.)

Engineering Surveys to accurately profile geologic layers (bedrock and/or water table) and to determine depths to layers. For engineering surveys, at least five shot points per spread are required with a forward, reverse, beyond end shots, and at least one intermediate shot. Shot points and geophones will be surveyed for vertical and horizontal control. Short geophone spacing and sufficient number of shot points will be required to achieve overlapping reciprocal arrivals necessary for accurate depth to refractor determination.
 - B. (B. & C.)

Rippability Surveys to determine seismic velocities for rippability assessment. For rippability surveys, at least two shot points per spread are required with a forward and reverse shot. If bore hole data is not available to establish a geological profile, more rigorous field procedures described above for Engineering Surveys will be required to profile geologic layers.

27. **Monitoring Well.** Monitoring Well shall be paid for at unit price per foot of well installed. This charge item shall include all operations and materials necessary to install monitoring wells according to ASTM D 5092. Monitoring wells shall include a locking protective cover, and be constructed of 2" minimum ID PVC flush thread casing with factory slotted PVC screen. The unit price does not include drilling. Drilling shall be paid for at the contract unit price for Geotechnical Drilling. The unit price includes development of the well, and a water table reading after completion of the well according to ASTM D 4750.
28. **Field Permeability Test.** Field Permeability Test shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform this test according to procedure identified in the AASHTO Manual Subsurface Investigations, subsection B.6.3 as either a falling head, constant head or rising head test with further reference to Hvorslev (1951).
29. **Water Sampling and Testing.** Water Sampling and Testing shall be paid for at a unit price per test. This charge item shall include all operations and materials necessary to perform the sampling and testing outlined in the Specifications for Geotechnical Investigation.
30. **Hole Abandonment.** Hole Abandonment shall be paid for at a unit price per foot for borings that penetrate the groundwater table. This charge item includes all operations and materials necessary to decommission boreholes according to the most current specifications: AASHTO R-22 and Specifications 785:35-11-2 of the Oklahoma Water Resources Board Requisitions. The unit price includes abandonment and decommissioning of geotechnical exploratory boreholes and monitoring wells.
31. **Dozer Working Time.** Dozer Working Time (including operator) shall be paid for at a unit per hour of dozer working time. Mobilization (includes demobilization) costs for the dozer and operation shall be paid at the hourly rate for a maximum of four hours for each project.
32. **Traffic Control.** Traffic Control shall be paid for as a lump sum for mobilization and a unit rate per day. This charge item includes all operations and materials necessary to perform traffic control according to Chapter IV of the Manual on Uniform Traffic Control Devices when performing testing and investigative operations on mainline paving such as FWD testing, pavement coring, and in-place subgrade sampling of existing pavement sections. Charges for this work must be negotiated for each task order.
33. **TowBoat/Barge.** Towboat/Barge and its crew shall be paid as a lump sum for mobilization and unit rate per day. Charges for this work must be negotiated for each task order.

34. **Mobilization of Equipment.** Mobilization of Equipment shall be paid for at unit price per mile. Round trip mileage shall be computed from Oklahoma City, Tulsa, or the actual location of equipment, whichever is less. This includes mobilization and demobilization of all equipment necessary to perform the subsurface investigation.
35. **Engineering.** Engineering shall be paid for at a unit price per hour. This charge item includes all operations and materials necessary to perform Engineering Analyses as outlined below in items A-C. It also includes all items and operations necessary for preparing and writing reports, drafting, making recommendations and other correspondence.
- A. **Slope Stability Analyses.** Each analysis shall reference the analysis method and software used and include the accompanying factor of safety obtained
 - B. **Settlement Analyses.** Each analysis shall include ultimate settlement and time rate of settlement calculations. In the case of spread footings, the analysis shall include all calculations necessary to size the footing. Analyses shall be presented in the form of a drawing to show the embankment or footing, the soil layers, parameters and all the calculations. Surcharge loading and/or wick drain analyses shall also be considered where applicable.
 - C. **Seismic Analyses.** Several hand methods and computer modeling programs are available for refraction analysis. If significant surface or bedrock relief is present, computer analysis will be required. If hand methods are used, at least two different methods shall be used with one method being the "Delayed Time" method. For Engineering Surveys, velocities of each layer and geologic profile with depths to each layer under every shot point and geophone shall be determined. For Rippability Surveys, velocities of each layer and a general geologic profile shall be determined. An assessment of rippability shall be presented.
 - D. **Report Preparation.** As a minimum, each report will address those items required in the most current ODOT Geotechnical Specifications. Activities under this item include boring location plan preparation, drafting of boring location plan, and writing and typing the text of the report.
 - E. **Miscellaneous Analysis.** This item is for other analyses not specifically outlined above. The unit price shall be on an hourly basis. The scope of the specific analysis will be included in each task order.
36. **Miscellaneous Labor, Materials and Equipment as required to meet Section 404 Requirements.** Miscellaneous Labor, Materials and Equipment as required to meet Section 404 Requirements shall be paid for on a lump sum basis. This charge item shall include all miscellaneous labor, materials, and equipment necessary to complete the

work, i.e., erosion control measures such as hay bales. Charges for this work must be negotiated for each task order.

- 37. Pavement Deflection Testing, Pavement Evaluation and Pavement Coring.** Pavement Deflection Testing, Pavement Evaluation, Ground Penetrating Radar (GPR), and Pavement Coring shall be paid for under items for mobilization/use of equipment, pavement coring, distress identification, GPR, and deflection testing. Traffic Control will be paid for under item 31. Mobilization/use of pavement coring equipment shall be paid for at a unit price per day. Mobilization/use of distress identification equipment, GPR equipment, and deflection testing equipment (FWD) shall be paid on a unit rate basis. Charges for this work must be reviewed and approved by ODOT prior to performing any work associated with this item. Pavement Coring shall be paid for at a unit price for asphalt pavement cores and unit price for concrete cores. Composite Cores shall be paid for at a unit price for Concrete Cores. This includes all operations and materials to cut 4 or 6 inch (100 or 150mm) diameter cores and repair core holes. Concrete pavement shall be repaired with grout and asphalt pavement shall be repaired with cold patch. Distress Identification shall be based on 10% sampling and shall identify distress types and severities as detailed in the FHWA publication No. FHWA-RD-03-031 "Distress Identification Manual for the Long Term Pavement Performance Program". Distress Identification, GPR testing, FWD testing and data analysis including the identification of uniform sections and back calculations of pavement layer moduli using the latest version of Modulus and/or AASHTO, shall be paid as for each Lane-Mile tested.
- 38. Site Access.** Site Access shall be paid at a unit price per hour while someone is on site for purposes such as securing access to private property or obtaining water level readings in a previously completed monitoring well. There shall also be a unit price per mile which includes travel time and vehicle mileage costs. Round trip mileage shall be computed from Oklahoma City, Tulsa, or the actual location of personnel whichever is less.
- 39. Pedological Research/Assessment.** Pedological Research/Assessment shall be paid at a unit price per hour. This item is for a "Desk Top" evaluation of mapped soils and units crossed by the proposed alignment. Work under this item includes plotting the proposed alignment on the County Soil survey map and determining which mapped units will be crossed. The NRCS national database is to be used as a resource in obtaining the most current soil series descriptions.
- 40. Survey for New Alignment Borings.** Surveys to locate geotechnical borings for projects on new alignment shall be paid as a lump sum and will be negotiated for each task order. The survey coordinates shall be referenced to plan stations and elevations.