

**DIVISION E  
INSTRUCTIONS TO PROFESSIONALS REGARDING  
SUBSURFACE AND RELATED SITE INVESTIGATIONS  
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**SUBSURFACE AND RELATED SITE INVESTIGATIONS**

**E.1 SCOPE**

- A. The Professional will obtain assistance from his/her Civil/Structural Engineer as set forth in these instructions and be responsible for obtaining subsurface and related data that will yield sufficient information for an accurate evaluation of the existing subsurface and related conditions for the following purposes:
1. Analysis, design and construction of foundation and substructure.
  2. Analysis, design and construction of site work, including embankments, slopes retaining structures, underground structures, site and subsurface drainage, roads and pavements.
  3. Soil erosion and sedimentation control.
  4. Cost analysis and estimation of rock excavation.
  5. Analysis of excavation and fill problems.

**E.2 INITIAL INVESTIGATION AND INSPECTION, PRIOR TO SCHEMATIC DESIGN STAGE**

- A. Prior to schematic design phase, the Professional's Civil/Structural Consultant will, with the Professional's help, contact the University's Project Manager for this project for data mentioned in items (G) and (H) of the section E.4. The Civil/Structural Engineer will then visit the site of the proposed project and inspect by visual or physical means the topographical and geological conditions that are prevalent. Particular attention will be directed to the following:
1. Evidence of fill material.
  2. Outcrops of rock strata.
  3. Type of overburden.
  4. Features of the terrain.
  5. Substructure of adjacent buildings.
  6. Water levels (ground and other).
  7. Previous boring results and foundation reports on projects in the vicinity of the proposed facility.
  8. Preliminary subsurface and related site investigation report if available.

### **E.3 INITIAL ANALYSIS AND RECOMMENDATIONS - SKETCH SUBMISSION**

- A. Data obtained from the initial investigation and inspection will be analyzed by the Professional and his/her Civil/Structural Engineer and will constitute the basis for recommending one of the following procedures at the schematic design phase:
1. Proceed with design without further investigation.
  2. A limited number of test borings and/or test pits be completed and analyzed under his/her supervision. The Test Boring Plan, Specifications and Contract Documents form a part of the Schematic Design. These documents will be prepared by the Professional in accordance with Paragraphs E.4 and sections A through M below with necessary technical information from his/her Civil/Structural Engineer.
  3. Based on the initial investigation and inspection and analysis outlined in Paragraphs E.2 and E.3 above, a brief report bearing the title "INITIAL SUBSURFACE AND RELATED SITE INVESTIGATION REPORT" will be prepared by the Civil/Structural Engineer. Two (2) copies of this report will be included in the documents to be submitted for the Schematic Design to the University.

### **E.4 PREPARATION OF TEST BORING PLAN, SPECIFICATIONS AND PROPOSALS - SCHEMATIC DESIGN**

- A. If further investigation is to be made, the Professional will prepare a tracing, showing the location of test borings. The drawing will be the identical size of the other contract drawings, and will be titled and numbered "TEST BORING PLAN, SHEET NO. TB1". Where more than one (1) Test Boring Plan is required, the numbering will be consecutive, such as TB2, TB3, etc.
- B. Each test boring will be a suitable number, and the drawing will contain a schedule, showing the boring number, contract depth, and surface elevation. The surface elevation data, however, is not to be filled in by the Professional, until the elevations have been obtained at the time of staking out the holes.
- C. The drawing will contain a note to the effect that "all test borings will be carried to the depths listed in the schedule, except where rock is encountered prior thereto, in which case, the coring will extend five (5) feet into the rock, whether or not the final depth is more or less than the depth listed in the schedule, except that holes Nos. --- will be carried to the contract depth regardless of the material encountered." If necessary, the stipulated rock penetration may be increased 10, 15 or 20 feet into rock.
- D. In sections of the State where LIMESTONE FORMATIONS are predominant, it will be stipulated on the test boring drawing TB1, that rock coring will be carried to such depths that at least ten (10) feet of continuous bedrock has been intercepted, so as to insure against stopping just above a thin rock shelf. Furthermore, in these limestone regions, it will be stipulated on the test boring drawings, that rock coring will extend at least ten (10) feet below the proposed footing elevation and will meet the above criteria.
- E. The Professional, when preparing the drawings, must bear in mind that the test borings are made only for the purpose of obtaining accurate design information, such as bearing value of the soil and rock, cost data, and ground water conditions. Test boring drawings are not included in the contract drawings for the construction contracts.

- F. The contract depth of borings will be such as to extend at least ten (10) feet below the bottom of footings and will generally be listed in multiples of five (5) feet, at 10', 15', 20', etc. However, certain holes will be carried to a greater depth (50' to 100') and these holes will be carried to the contract depth regardless of the material encountered. The number and depth of these holes will be dependent on the size and complexity of the situation, but generally at least one (1) hole will be so designated.
- G. Auger borings may be stipulated on the Test Boring Plan in lieu of standard test borings, for shallow utility lines, where deemed appropriate by the Professional. Contract depth of auger borings will be at least two (2) feet below the bottom of the utility lines, but will only be carried to such depth as to determine the elevation of rock which may occur above the contract depth.
- H. At least one (1) test hole will be designated on the drawings as WATER OBSERVATION HOLE. Specifications will provide that before casings are withdrawn from these holes, a small steel pipe equipped with a well point be installed in these holes to a depth below the basement or lowest floor level. The pipe will be packed in coarse sand or gravel and will extend above grade so that during the period of design work, the ground water level may periodically be observed.

Test boring drawing must therefore indicate the elevation of the basement or lowest floor level, and the borings selected to be developed into ground water observation holes must be of such contract depth, regardless of conditions, so as to accommodate the well point and water pipe to the required depth.

- I. The Professional will prepare specifications for test borings. He/she will prepare the proposal and invitation to bidders. The proposal will be a lump sum price based on performing work required by the drawings and specifications and a schedule of contract quantities furnished by the Professional. The contract agreement will be between the Professional and the Contractor.
- J. An example of the Schedule of Contract Quantities to be prepared by the Professional and to be included in the Professional's request to Drilling Contractors for proposals is as follows:

SCHEDULE OF CONTRACT QUANTITIES

<u>No. Holes</u>	<u>Earth Drillings</u>	<u>Rock Coring</u>	<u>Total Footage</u>
45 Std. Borings	600 Lin. Ft.	275 Lin. Ft.	875 Lin. Ft.
30 Auger Borings	180 Lin. Ft.	-----	180 Lin. Ft.

**NOTE:** The Schedule of Contract Quantities will appear on the Test Boring Plan - TB1.

- K. In addition to the lump sum price, the Professional will request prospective bidders to furnish the unit prices listed below, which will be used to adjust the lump sum price, for variances between the Schedule of Contract Quantities and the actual work performed.
  1. Earth Drill (Standard Test Borings), complete, per lineal foot.
  2. Rock coring, complete, per lineal foot.
  3. Setting up equipment for drilling standard test borings.

4. Auger borings complete, per lineal foot.
  5. Test pits, complete, per test pit.
  6. Thirty (30") inch long undisturbed samples, per sample (if required).
- L. The Professional, when requesting proposals, must stipulate a date for receipt of proposals, the minimum number of drilling rigs to be used by the Contractor, and a specific date on which work (including submission of result drawings), must be complete. In establishing the completion date, the Professional will use the following guide:
1. Allow one (1) week after bid date for Authorization to Drilling Contractor to proceed.
  2. Number Weeks Drilling Time
 
$$\frac{\text{TOTAL FOOTAGE}}{35 \times \text{Number Rigs} \times 5}$$
  3. Allow two (2) or three (3) weeks for preparation and submission of result drawings.
- M. Test Boring Result Drawings: It is the responsibility of the Professional to specify additional requirements and to prepare all other contract documents. The Drilling Contractor will prepare drawings showing the results of the borings. These drawings will be identical in size to contract drawing TB1. The Drilling Contractor will place his/her title block in the lower left hand corner, leaving the lower right hand corner open for the Professional to insert any necessary information to properly identify the project. In no event will the Professional identify his/her firm with the test boring result drawings.

**E.5 AUTHORIZATION OF TEST BORING CONTRACT AWARD, TEST BORING INSPECTION WORK SOILS ENGINEER WORK AND TEST BORING HOLE LOCATION**

- A. Upon receiving approval of the Test Boring Plan, the Professional will solicit proposals from as many responsible and experienced Drilling Contractors as may be deemed reasonable (preferably not less than 3) by submitting to each of them one (1) set of contract documents. Proposals will be completed and signed by the Contractor and returned to the Professional with a transmittal letter on letterhead of the Contractor.
- B. At the same time, the Professional will draw the attention of his/her Civil/Structural Consultant to his/her responsibilities towards the performance of test boring work, observation of ground water levels and soils engineering work as required by Paragraphs E.6, E.7, E .11 and E.12 of these instructions and have him/her contact the University's Project Manager with recommendations for appropriate inspection work and soils engineering work and obtain his verbal concurrence.
- C. Upon receipt of bids, the Professional will prepare bid analysis consisting of a comparative statement, bid evaluation and recommendations for contract award. The Professional will submit proposals for test boring contract award, test boring inspection work and soils engineering work to the University's Office of Facilities Management for written confirmation to proceed with the contract.
- D. Unless otherwise advised, the test boring locations will be staked out by the Drilling Contractor.

**E.6 PERFORMANCE OF TEST BORING WORK: DIRECTION, INSPECTION, SOILS ENGINEERING WORK AND CHANGES**

- A. The test boring work will be properly directed by the Professional's Civil/Structural Engineer who will provide part-time inspections and also ensure reasonably correct identification of subsurface materials and ensure conformance of the work to contract documents. The Professional will have his/her Civil/Structural Engineer contact the University's Project Manager and discuss the program for test boring inspections and soils engineering work. Cost of this inspection and soil engineering work by the Civil/Structural Engineer is reimbursable (see Paragraph E.13). Obtaining ground water elevations is a part of the test boring inspection (see Paragraph E.7).
- B. If it is considered necessary to drill additional test borings or to make significant changes in the test boring program, the Civil/Structural Engineer of the Professional should promptly make this recommendation, to the University's Project Manager prior to completion of the previously approved test boring program.
- C. The Contractor's test boring logs are the basic records of subsurface data collected and are important. The primary purpose of inspection is to ensure correctness of this document and the Test Boring Result Drawings which are based on the logs. The Professional and his/her Civil/Structural Engineer are responsible for achieving the proposal of this inspection.

**E.7 GROUND WATER LEVELS**

It will be the responsibility of the Professional and his Civil/Structural Engineer to observe ground water levels at suitable intervals during the entire design stage and to tabulate and include this information in the Soils Report. Addendum should be prepared for observations made after preparation of Soils Report.

**E.8 RELEASING TEST BORING INFORMATION**

The Professional will furnish a copy of this Geotechnical Engineering report to Contractors upon receiving a letter of request. The Geotechnical Engineering reports are available for review at the University's Facilities Management Department. The University will not provide copies to Contractors.

**E.9 TIME OF COMPLETION OF INVESTIGATION**

The subsurface investigation will be completed prior to, and the results will be part of, the Design Development Phase.

**E.10 SUBMISSION OF DOCUMENTS TO THE UNIVERSITY**

References should be made to University Project Requirements and Contractual Agreements regarding documents to be submitted for various reviews.

**E.11 SERVICES OF FOUNDATION CONSULTANT**

- A. When deemed necessary by the Professional's Civil/Structural Engineer and the Professional and approved by the University, a qualified Foundation Consultant with a minimum of five (5) years experience will be retained for the purpose of furnishing any or all of the following services:

1. Providing technical assistance in programming the subsurface investigation. Please note that contract documents for test boring, auger boring and test pit work will be prepared by the Professional. The Professional will solicit bids and provide contract administration.
  2. Furnishing adequate qualified resident inspection during the execution of the subsurface investigation.
  3. Laboratory testing of soils and of rock core specimen.
  4. Checking Drilling Contractor's boring result drawings.
  5. Furnishing the subsurface and related site investigation report.
- B. Principals will be Registered Professional Engineers. Final reports will be prepared, signed, and sealed by a Registered Professional Engineer.
- C. The Professional will submit for approval, a detailed estimate of cost for field, laboratory, and office work.
- D. In addition, the Foundation Consultant, or a qualified Registered Professional Engineer from the Foundation Consultant's firm, familiar with the project, should be available for any job conferences or consultations during the design and/or construction phases of the project. The Professional will submit the name of the Registered Professional Engineer for approval and experience brochure to the University for approval.
- E. Upon completion of the boring contract, the Foundation Consultant will submit to the Professional four (4) copies of a complete report covering the field work and laboratory testing, with complete analysis of each and every boring and with recommendations for soil and rock bearing capacities. The Professional will retain one (1) copy, submit one (1) copy to the University's Project Manager and the remaining two (2) copies to the University with Preliminary Submission documents. The Table of Contents for subsurface and related investigation report is furnished in Paragraph E.12.
- F. As payment for the above professional foundation services, the Professional will be reimbursed for all costs incurred directly by the foundation engineering firm. These costs will be determined on the following basis:
1. For all work, excluding laboratory testing, the total cost will be salary cost (**AGREED MULTIPLIER**) (Principals' salaries not subject to multiplier) plus travel (**AGREED MILEAGE**)/mile, subsistence, and long distance telephone expenses. Invoices must be supported by payroll summaries showing names, classifications, hourly rates, and hours and dates worked.
  2. Costs for laboratory testing will be in accordance with firm's established unit prices for the various necessary tests.

## **E.12 SUBSURFACE AND RELATED INVESTIGATION REPORT**

Subsurface and Related Investigation Report will be prepared by the Civil/Structural Engineer or by the Soils Consultant, in accordance with Paragraph E.11. The Table of Contents is as follows:

1. Project location map.
2. Boring location plan.
3. Scope of Report.
4. Description of Site.
5. Field investigation.
6. Laboratory testing program (when required).
7. Brief Description of subsurface conditions.
8. Ground and surface water conditions and data.
9. Soil Profiles (if necessary).
10. Recommend soil and rock bearing capacity and elevations of corresponding bearing stratum at each bore hole.
11. Soil erosion and sedimentation control recommendations.
12. APPENDIX:
  - (a) Core boring logs.
  - (b) Laboratory test results (where applicable).
  - (c) Other data.

### **E.13 PAYMENT**

- A. Upon prior approval of the University's Project Manager, the Professional will be entitled to reimbursement as follows:
1. Actual cost of drilling (or test pit) work per Contractor's invoice.
  2. Actual cost of soil engineering work performed by the Civil/Structural Engineer in compliance with Paragraphs E 2, E 3, E 6, and E 7. This "actual cost" will consist of cost per technical payroll X (**AGREED MULTIPLIER**) plus cost of travel at (**AGREED MILEAGE**)/mile, subsistence, and long distance telephone expenses. Principal's salaries are not subject to multiplier.
  3. Actual cost of soil engineering work performed by the Civil/Structural Engineer in compliance with Paragraph E 12 .
  4. 10% markup of a + b + c.
  5. 10% markup on Items (b) and is not applicable if the Civil/Structural Engineer is an employee of the Professional.
  6. 10% markup of Items (a), (b) and (c) allows for preparation of test boring contract documents and related work by the Professional and coordination of soil engineering work by the Civil/Structural Engineer.

### **E.14 INVOICING**

- A. The Professional should present billings to the Facilities Management Office on his/her own invoice. One invoice should be submitted for test boring/test pit work and another one for inspection and soil engineering work. Originals and one (1) copy of invoices/bills and one (1) copy of back-up information.
- B. The Professional will obtain necessary assistance from the Civil/Structural Engineer and certify in his/her invoice for test boring/test pit work that the drilling/test pit contractor has performed the work satisfactorily in accordance with contract documents, that all quantities were verified by him and that it is in order to make payment for the amount claimed by the Contractor. The Professional will also certify that the reimbursement



claimed in his/her invoice has not been previously claimed by him/her in part or in full. One (1) copy of driller's invoice and one (1) copy of our letter authorizing the contract award must accompany this invoice.

- C. Invoice for soil engineering work rendered by the Soil Engineer or Civil/Structural Engineer must be accompanied by one (1) copy of our authorization letter.
- D. Rates in excess of the University's agreement requirements will not be used.
- E. Invoices must be signed by the Professional or his/her on-duty authorized representative.
- F. Back-up information must be signed by authorized personnel of the Soil Engineer or Civil/Structural Engineer.
- G. Invoices which are not in accordance with these instructions will not be processed. Invoices exceeding authorization will not be processed.
- H. Any questions should be directed to the University's Project Manager for this project.

#### **E.15 INSURANCE**

The soils consultant will be required to carry insurance with a minimum coverage of \$1,000,000 as outlined below:

During the course of the work, the Engineer will maintain:

1. Workman's Compensations Insurance as required by the Commonwealth of Pennsylvania for all employees working at the job site.
2. Comprehensive General Liability Insurance  
Bodily Injury: \$1,000,000/1,000,000 limits  
Property Damage: \$100,000/300,000 limits
3. Automobile Liability Insurance  
Bodily Injury: \$1,000,000/1,000,000  
Property Damage: \$100,000 limits
4. Professional Liability Insurance covering claims resulting from errors, omissions, or negligent acts of the Professional or his/her consultants with a maximum allowable deductible of \$25,000. Professionals will indicate in their proposal the level of coverage maintained.

**END OF DIVISION**

**APPENDIX-A**

**STANDARD FORM, RECEIPT FOR  
TEST BORING RESULT DRAWINGS**

University Project No. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

RECEIVED of \_\_\_\_\_,

retained Professionals for the above numbered project, unofficial test boring data, which is accepted by the undersigned under the following terms and conditions:

Any available data concerning subsurface materials or conditions which is based upon soundings, test pits or test borings, has been obtained by the retained Architects or Engineers for their own use in designing this project. Its accuracy or completeness is not guaranteed by The University of Pittsburgh or the Architects or Engineers, and in no event is it to be considered as part of the contract plans or specifications. Contractors must assume all risks in excavating for this project and will not be entitled to rely on any subsurface information obtained from the retained Architects or Engineers, or indirectly from The University of Pittsburgh. Bidders will therefore make their own investigation of existing subsurface conditions, and if they do not do so, The University of Pittsburgh will not be responsible in any way for the consequences.

\_\_\_\_\_  
(Bidder)

Dated \_\_\_\_\_ 20\_\_.