



U.S. Department  
of Transportation

**Federal Highway  
Administration**

# Memorandum

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Subject: INFORMATION: Transmittal of Geotechnical Engineering Notebook Issuance GT-15  
Geotechnical Differing Site Conditions

Date: May 2, 1996

From: Chief, Bridge Division  
Office of Engineering

Reply to  
Attn of: HNG-31

To: Regional Administrators  
Federal Lands Highway Program Administrator

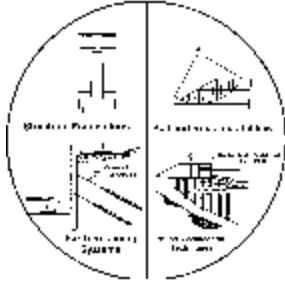
Based on a request from the field at the last Regional Geotechnical Engineers' Workshop, the attached Geotechnical Engineering Notebook Issuance GT-15, entitled "Geotechnical Differing Site Conditions", has been prepared. The intent of the document is to provide guidance to design and construction engineers involved with geotechnical aspects of highway projects. The issuance contains information on subsurface information acquisition, disclosure of subsurface information in contract documents, procedures for evaluating claims of subsurface related changed conditions, and the use of geotechnical design summary reports.

The issuance, which was prepared by Messrs Richard Cheney of the Bridge Division and Andy Muñoz, Region 6 Geotechnical Engineer, has received extensive review by the FHWA, the States, and industry. The FHWA regional reviews included both regional engineers and regional counsels.

Please distribute this issuance to holders of the Geotechnical Engineering Notebook. If any questions arise concerning this document, please contact Mr. Richard Cheney at 202-366-1568.

*/s/ original signed by  
Stanley Gordon  
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attachment



U.S. DEPARTMENT OF TRANSPORTATION

**FEDERAL HIGHWAY ADMINISTRATION**

## **GEOTECHNICAL ENGINEERING NOTEBOOK**

Geotechnical Guideline No.15

TITLE

Geotechnical "DIFFERING SITE CONDITIONS"

### **EXECUTIVE SUMMARY**

The 23 Federal Code of Regulations (CFR 635.109) contains policies, requirements, and procedures for standardized "changed conditions" clauses for Federal aid highway projects. In summary, unless prohibited by State law, Part 635 requires that a "differing site condition" clause shall be made part of and incorporated into each highway project approved under Title 23.

This guideline provides information on geotechnical aspects of differing site conditions, adequate site investigation, disclosure and presentation of subsurface information by highway agencies, and the use of such information in mitigating or resolving contractor claims of differing site conditions.

Recommendations are provided for disclosure of factual, qualified and interpretive geotechnical information. The uses of geotechnical design summary reports are described and a typical report outline provided in the appendices.

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## 1. PURPOSE:

The purpose of this document is to provide guidelines on the practical application of a "**Differing Site Condition**" (DSC) contract clause, as related to subsurface conditions, and to address the variable nature of soil and rock materials when used as a foundation or construction material. This guideline should be of benefit to Geotechnical, Design and Construction personnel.

Recommendations are provided on disclosure and presentation of subsurface information to bidders. The objective of these recommendations is, in part, to decrease bidding contingencies on subsurface items, address unexpected subsurface problems early, and provide a basis for equitable resolution of contractor claims based on differing subsurface conditions. Without a DSC clause, the risk of subsurface conditions is borne by the contractors who in turn must increase the price bid to mitigate the risk.

## 2. BACKGROUND:

The history of Federal efforts to deal with changed conditions substantially predates the current DSC clause which applies to Federal-Aid work. In 1926, the Federal Board of Contracts and Adjustments required the inclusion of a DSC clause in all Federal construction contracts. The Board's action was taken to reduce or eliminate the contingency factor for subsurface conditions and to limit the latent costs incurred by contractors for pre-bid subsurface explorations. The original clause only applied where the conditions varied materially from those indicated. In 1935, the clause was broadened to include situations where the contract is silent regarding subsurface conditions but the contractor encounters unforeseen, unusual conditions which differ materially from conditions ordinarily encountered.

The current DSC clause, as stated in 23 Code of Federal Regulations, CFR 635.109, applies to all Federal-Aid highway contracts. Note that the Code requires that all Federal-Aid Highway Contracts include the stated DSC clause unless prohibited or otherwise defined pursuant to State law.

A contractor filing a DSC claim is claiming either that ground conditions are materially different from those that would be expected from a reasonable interpretation of the contract documents or that an unusual, unknown physical condition exists which materially differs from those ordinarily encountered. A significant portion of contractor claims and problems during construction

involves subsurface conditions and soil/rock construction materials. This is due primarily to the complexity and variability of natural earth and rock formations and materials. Jury awards in the millions of dollars for contractor claims based on DSC have been recorded. No record exists of annual jury awards due to changed subsurface conditions on Federal-Aid highway projects. However, the Army Corps of Engineers has documented that in the last decade (1980-1990), contract claims have escalated by more than 200% and now average more than one billion dollars annually.

Early recognition of geotechnical problems during the design stage is still the best way to reduce the risk of geotechnical construction problems and thereby bid prices. This normally means conducting an adequate subsurface investigation in advance of final design. The complete disclosure of available subsurface information in the contract documents is also an important factor in both preventing contractor claims and in obtaining fair bids for the work to be performed. Pertinent subsurface information may be presented in detail in either the contract documents or made available at a central location for bidder inspection. The amount of subsurface information actually presented and the method of presentation in the contract documents can vary depending on the complexity of the project. The most complex projects often include a "**Geotechnical Design Summary Report**" (GDSR) as a legal part of the contract documents to establish a common ground (baseline) for resolution of potential claims related to subsurface conditions.

### **3. THE DIFFERING SITE CONDITIONS (DSC) CLAUSE:**

Subsurface conditions at a particular site are the result of natural geologic processes modified in time by physical events, such as erosion, or by man.

Highway agencies routinely provide subsurface information to the contractor in good faith to permit a general appraisal of below ground conditions. However unanticipated latent ground conditions can and do occur. In such cases the contractor should be fairly compensated for extra work associated with the unforeseen condition.

The following guidelines and recommendations were developed to apply the DSC clause, as stated in 23 CFR 235.109, to geotechnical features; and to assist construction personnel in the effective handling of project DSC notices or claims which involve geotechnical features.

**A. Guideline for Wording of a "DIFFERING SITE CONDITION" (DSC) Contract Clause for Inclusion in Agency Specifications (from the 23 Code of Federal Regulations CFR 235.109):**

- 235.109a.** During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract are encountered at the site, the party discovering such conditions shall promptly notify the other party in writing of the specific differing conditions before the site is disturbed and before the affected work is performed.
- 235.109b.** Upon written notification, the Engineer will investigate the conditions, and if it is determined that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any work under the contract, an adjustment, excluding anticipated profits, will be made and the contract modified in writing accordingly. The Engineer will notify the contractor of the determination whether or not an adjustment of the contract is warranted.
- 235.109c.** No contract adjustment which results in a benefit to the contractor will be allowed unless the contractor has provided the required written notice.
- 235.109d.** No contract adjustment will be allowed under this clause for any effects caused on unchanged work. (This provision may be omitted by the State Highway Agencies at their option.)

This DSC clause contains several important points, which are described below for clarity, in relation to geotechnical features.

**!** **TYPES OF CONDITIONS** - The DSC clause grants relief for two distinct types of conditions.

- 1.** "Subsurface or latent physical conditions at the site differing materially from those indicated in this contract"; commonly referred to as a Type I DSC, and,

2. "Unknown physical conditions at the site of an unusual nature differing from those ordinarily encountered and generally recognized as to be inherent in work of the character provided for in this contract"; commonly referred to as a Type II condition.

! **CONDITIONS ABOVE GROUND** - The DSC clause is not limited to buried, subsurface differing site conditions. Changes in ground elevations from those shown in the contract, such as filling which was done after the borings were completed, are an example of a differing site condition at or above ground level.

! **NO FAULT** - The assignment or proof of guilt is not necessary for a DSC claim. The only requirement is proof that conditions which were encountered differed materially from those indicated in the contract, or, those which should have reasonably been anticipated for the particular work and/or that particular site.

! **KNOWLEDGE** - Recovery is barred if the contractor knew or could have reasonably known of the condition, as for example through a site visit.

! **DAMAGE** - The DSC must be the cause of the damage which is alleged in the notice. The written notice should contain the details of the DSC, and how the condition differed materially to result in the damage.

! **NOTICE** - The clause requires notice of any DSC, in writing, promptly and before any such conditions are further disturbed. This portion of the clause can produce a contentious dispute unless good faith is exhibited by all parties. The purpose of this notice is to allow the agency an opportunity to both determine whether or not such condition exists, before the evidence is destroyed, and mitigate cost consequences by changing the design or terminating the work. The agency's geotechnical engineer should respond promptly to inspect the site in a reasonable time before the contractor continues work. Potential impacts due to deterioration of site conditions should be considered when establishing time frames for oral/written reports of the condition by the contractor and the agency response to the contractor. However unless failure to give notice prejudices the owner, a claim will not be barred.

! **PHYSICAL CONDITION** - The DSC clause only relates to physical conditions; not governmental, political or economic causes that may effect the contract.

**B. Definition of a Geotechnical "DIFFERING SITE CONDITION":**

! **TYPE I DSC CONDITION** - A Type I condition requires that a subsurface or latent condition was encountered which differed materially from what was indicated in the contract documents. Therefore the contract documents must contain some indication of conditions to be expected and the actual conditions must vary from that indication. Two general types of indications exist; "express indications" and "general or design indications". Express indications include such items as boring locations, ground elevations, logs, subsurface investigation reports, ground water levels, and foundation investigation reports, which are made available to bidders. General or design indications are the inferences that can reasonably be made from reading the plans and specifications.

The test for a Type I DSC is to compare the conditions indicated with those actually encountered. If conditions differ, a Type I DSC exists. Remember, a Type I DSC cannot exist if the contract is silent regarding subsurface or latent conditions. In such cases either a Type II DSC or breach of contract claim may be filed by the contractor.

The task of performing a subsurface investigation usually falls to the agency. The agency not only desires to avoid the unnecessary costs of bidders who include contingencies for unknown risks but also to avoid the latent costs for pre-bid subsurface investigations by bidders. The results of the agency's investigation are used both in project design and provided to the bidders as part of the contract documents. The resulting design implies, and the subsurface data describes, the conditions on which bidding and construction will be based. The representation of these results also provides the basis for application of the DSC clause. Type I DSC claims usually occur when the agency does not conduct an adequate subsurface investigation and prepares plans based on assumptions as to the nature of the subsurface condition.



In general a Type I DSC is easier to prove than a Type II DSC as noted in the following example.

*A highway maintenance building was designed to occupy a 50 m square footprint in an area described geologically, in project reports prepared by the agency, as containing dune sands. A field inspection of the site disclosed gently rolling topography common to sand dune areas. The plans contained the boring logs for four borings taken at the corners of the proposed building. In addition, the soil samples, lab test information and the foundation report were made available to the bidders. All subsurface information showed fine sand material for the full depth of the soil profile. The basement excavation was bid based on a lump sum quantity removal. A massive boulder, 10x10x5 meters, in dimensions, was encountered during the excavation. The removal of the boulder by blasting represented a Type I DSC as subsurface conditions differed materially from what was indicated in the contract documents.*

! **TYPE II DSC CONDITION** - Type II DSC are those physical site conditions which are unusual, unknown, and differ materially from what is ordinarily encountered and generally recognized as involved in the particular item of work or geographic area. Type II DSC are conditions which were not indicated on the contract documents, which the contractor did not have knowledge from any other source, and which would not be reasonably anticipated. The burden of proof is heavy and on the contractor to show that conditions are unusual in nature and differ materially from those ordinarily encountered. Contractors can have a basis for recovery even though the contract is silent about the condition because Type II DSC does not involve a comparison between contract indications and actual facts.

A Type II DSC involves comparison between the actual condition and what the contractor would reasonably expect, taking into account all factors that a prudent bidder customarily considers in making a judgement regarding the quantity, quality, and methods for performing the work. Judgements are based on what a reasonably experienced contractor [not a geologist or geotechnical engineer] would have observed during a pre-bid inspection after a study of the contract documents. The main questions to be answered are, "Was the bidder's judgement and interpretation reasonable at the time of bidding and was the condition unusual for the geographic area?"

Also, an unusual condition must be unknown at the time of bidding to qualify as a Type II DSC. If the condition is unusual and unknown to both the agency and the contractor or just the contractor, a DSC exists. If an agency is aware of the condition but fails to disclose the information in a reasonable fashion prior to bidding, the avenue exists for contractors to claim on the basis of misrepresentation, concealment or breach of contract.

If the contractor knows of the condition, prior to bidding, a Type II condition cannot be claimed. Also a differing site condition does not exist if the condition should have reasonably been expected by the contractor. Unknown physical conditions at the site do not include unusual and abnormal conditions which would have been discovered by a reasonable site inspection by the contractor. Failure to visit the site, particularly when alerted to do so in the plans, may cause the bidder's judgement to simply be "a guess, premised in error" which forms no basis for recovery.

A simple, fundamental test in establishing a Type II differing site condition is that of reasonable expectations versus actually encountered conditions as shown in the following example.

*A highway maintenance building was designed to occupy a 50 m square footprint in an area known locally to contain dune sands. A field inspection of the site disclosed gently rolling topography common to sand dune areas. However, the plans were silent on the subsurface conditions. The basement excavation was bid based on a lump sum quantity removal. A massive boulder, 10x10x5 meters in dimensions, was encountered during the excavation. The removal of the boulder by blasting represented a Type II DSC as no subsurface information was included in the contract documents, the condition did not match either the commonly known area geology or local excavation knowledge and could not have been ascertained by the bidder during the site inspection.*

#### **4. GUIDELINES FOR A MINIMUM SUBSURFACE INVESTIGATION:**

An adequate site investigation is needed to minimize the potential for construction problems, change orders, and claims. Such an adequate site investigation should include sufficient amounts of boring, sampling and testing to identify potential sources of construction problems which were identified during terrain reconnaissance or site inspection. Accepted standard procedures from ASTM, AASHTO or as established by the agency should be followed in the investigation process.

Appendix A contains guideline site investigation criteria. This information is excerpted from the FHWA "Checklist and Guidelines for Review of Geotechnical Reports and Preliminary Plans and Specifications" Manual.

#### **5. GUIDELINES - SUBSURFACE INFORMATION MADE AVAILABLE TO BIDDERS:**

In December 1994, the FHWA completed a National survey of highway agency practice in disclosure of subsurface information in contract documents. The results of the survey, which are attached as Appendix B, show variations in practice between agencies but the majority of agencies have adopted an open disclosure policy for factual subsurface information. The question of whether to disclose or not to disclose has many aspects, both legal and engineering, to be considered before the agency renders a decision.

##### **A. Disclosure of Subsurface Information:**

The term "disclosure" is taken in this guideline as a formal notification to the bidders of pertinent subsurface information which was available to the designers up to the time of project advertisement. Disclosure usually is in the form of a list of subsurface information, placed in the contract documents, which is available to the bidders. In general, subsurface information may be designated as factual, interpretive, or qualified (such as old borings from historical records which may or may not be factual). The pertinency issue, of which information not to disclose, usually deals with interpretive or qualified information that the agency deems not to have an impact on construction of the project. Examples of non-pertinent information may include geotechnical information related to superseded alignments, technical or economic comparisons of design alternates, etc.

Disclosure of subsurface information to bidders has been a sensitive topic in the past for highway agencies. However, in past studies on the topic of disclosure, certain principles have become clear:

- ! Courts have stated that agencies have a duty to disclose, to the contractor, pertinent information that the agency possesses or knows is available if such information could reasonably be expected to have a material effect on bidding or construction of the project.
- ! Ambiguous disclaimers normally go against the agency and in favor of contractors.
- ! General disclaimers are disfavored and often ruled unenforceable by courts.
- ! Narrowly tailored, specific disclaimers may be accepted by the courts.
- ! The agency assumes the risk in the following situations:
  1. pertinent subsurface information is withheld,
  2. inaccurate test data or results are provided,
  3. the bidders are not provided either adequate subsurface information or a reasonable opportunity to conduct subsurface investigations, or,
  4. defective plans or specifications are provided; although the defects may constitute a separate and different legal issue.
- ! Interpretive information made, available to bidders, should have been analyzed and interpreted by qualified geotechnical engineers or engineering geologists.

## **Goals**

Information disclosed in the contract documents should establish the design engineer's geotechnical basis regarding anticipated conditions for design and construction. Thus the agency, through the designer, establishes the data base on which the geotechnical baseline should be established. Such full disclosure of information represents the agency's recognition that preestablishing such a baseline is good business. This approach results in a cooperative

climate with the contractor since the initial emphasis is openness and candor. The agency's established geotechnical baseline should provide the basis for identification and resolution of differing condition claims.

### **Concerns**

The main concerns over full disclosure have been expressed for disclosure of interpretive information; not for factual information. The fear is that the geotechnical engineer's interpretation in the development of the geotechnical baseline could be incorrect. Overly conservative interpretations may restrict the contractor's willingness to be innovative and therefore increase costs. On the other hand, if the interpretation is overly optimistic, the potential for claims during construction may increase. Concerned agencies may restrict disclosure to only factual data and leave interpretation to the contractor. Concerns over disclosure should **not** be addressed by the inclusion of exculpatory (excuse from fault) clauses such as:

*"The contractor is advised that the Department does not guarantee the contents of the reports, borings, tests & other material used to compile such reports, and assumes no responsibility whatsoever as to the accuracy thereof stated in the records."*

*"Statements as to the condition under which the work is to be performed, including plans, surveys, measurements, dimensions, calculations, estimates, borings, etc., are made solely to furnish a basis for comparisons of bids, and the Party of the First Part [The Commonwealth] does not guarantee or represent that they are even approximately correct. The contractor must satisfy himself by his own investigation and research regarding all conditions affecting the work to be done, and labor and material needed, to make his bid in sole reliance thereon."*

In addition to demeaning the work of agency professional engineers, such clauses cause contractors to add contingencies for perceived increases in risk.

## **Reasons to Disclose**

The agency spends months in project development to collect information about subsurface conditions at the project site. The agency's engineers assess the reliability and representativeness of the available data in project design. The contractor, on the other hand, has a limited time during bidding in which to assimilate all the available data and develop his interpretation. The inclusion of geotechnical information in the contract provides both the agency and contractor a consistent geotechnical baseline for determination of what constitutes a differing site condition.

Nothing can remove the risk of encountering a differing site condition. But the potential for costly disputes and possible litigation over what constitutes a differing condition is greatly reduced, if not eliminated, with a well-defined geotechnical baseline. Further, an adequate subsurface investigation will reduce contractor contingencies, enhance the contractor's opportunity to be innovative and allow a rapid, equitable settlement when a claim results from an apparent differing condition. The contractor is also protected by having a well-defined basis for preparing the bid and a clear definition of the limits of exposure to unanticipated subsurface conditions. Failure to disclose may create a legal cause for action under the "superior knowledge doctrine."

### **B. Presentation of Subsurface Information:**

Presentation of subsurface information to bidders can take several forms. The key rule to follow is that all involved parties have access to the presented information.

Factual information pertinent to the work is commonly shown in detail on the contract documents. Factual information may include the results of subsurface investigation methods, field or lab testing, records from preconstruction test programs and instrumentation records. Soil or rock samples are factual information which is commonly made available to the bidders. Factual information represents an actual condition that exists at a specific location at a specific time. Factual information is presumed to be obtained by qualified personnel using standard techniques. Factual data is commonly reproduced in a summary or a plot to permit the bidders an opportunity to easily interpret the data.

Some factual information may need to be qualified, as the source of the data may not be under the control of the agency or the design staff. The most commonly qualified data are historic subsurface information or geologic/pedologic records or historic construction records which are used to supplement project subsurface information. Such information, if pertinent and properly qualified as to limitations of use, may be presented in either the contract documents or made available at a prescribed time and location for inspection by bidders.

Interpretive geotechnical information, if pertinent, is commonly made available at a prescribed time and location for inspection by the bidders. Such information represents the opinions based on factual data by qualified geotechnical engineers or engineering geologists of the agency. Interpretive information may include contour plans of subsurface deposits, subsurface profiles, or, foundation reports which have unique information that pertains to project geotechnical features.

Complex projects may use a **"Geotechnical Design Summary Report" (GDSR)** approach where the agency prepares a stand alone report that is made part of the specifications by reference. The GDSR contains the design engineer's geotechnical interpretations regarding anticipated conditions for design and construction. A typical GDSR contains not only the subsurface data but offer opinions on both anticipated ground behavior and construction difficulties. The function of the GDSR is not to simply repeat factual information contained elsewhere in the contract documents, but to describe the thought process that led to the design and specifications included in the plans. Experience indicates that the GDSR provides a more realistic portrayal of actual conditions likely to be encountered than the raw data reports (with little or no interpretation) which are commonly provided in contract documents. Many claims (and resulting settlements) have been based on one or two words included (or omitted) on boring log descriptions that the contractor has subsequently maintained were key in his bid preparation. A clear statement of the conditions to be assumed during bid preparation will facilitate resolution of disputes in a more timely and cost-effective manner for both agency and contractor. A typical outline of a GDSR is included in Appendix C.

In summary, the presentation of subsurface information should focus the bidder's attention on data which is pertinent to the subsurface conditions at the project site. Extraneous information should be either excluded or qualified, if of limited use.

**C. Recommendations:**

The current AASHTO guidance on disclosure of subsurface information as stated in the AASHTO Manual on Subsurface Investigations (1988) should be followed by highway agencies.

*"It is generally considered desirable and prudent to make all pertinent geotechnical data available to bidders, and to require contractor acknowledgment of the availability, either in writing or by the inclusion (of the information) in the (contract) documents. There should be appropriate contract clauses clearly stating the limitations and applicability of the data that is made available. It is also desirable to make pertinent interpretive information available to bidding contractors to clarify geotechnical aspects of the project and provide a uniform basis for bidding. However there is less agency acceptance of a policy of disseminating interpretive information, particularly if it is to be included in the contract documents, and there is a greater need for clear contract stipulations as to the purpose of the information and the obligation of the contractor to draw his own conclusions."*

Consideration should be given to the following:

- ! All pertinent subsurface information should be disclosed in the contract documents. The disclosure may take various forms but a summary of all disclosed subsurface information should be included. The summary should be easily accessed by the bidders through the index sheet of the pertinent contract document.
- ! All bidders should be provided equal opportunity to access the same information.
- ! Factual subsurface data which is pertinent to the project subsurface conditions should be presented in an easily understood fashion on the contract documents. Extraneous factual data should not be presented in detail in the contract documents, but may be made available at a designated location and time for bidder inspection. Whenever possible, and particularly at wall or structure locations, factual data from subsurface explorations should be reproduced in a scaled profile. Pertinent soil test results should be extracted from the test forms and summarized. Pertinent information from comprehensive preconstruction test program reports should be excerpted for inclusion in the contract documents.



- ! Pertinent soil and rock samples should be made available at a designated time and location for inspection by the bidders. The contract documents should contain a notice of sample availability.
- ! The agency should qualify the use of any preexisting surface or subsurface data which may be neither factual nor applicable to the project.
- ! Interpretive subsurface information pertinent to the project subsurface conditions should be made available at a designated time and location for inspection by the bidders. Interpretive information should be clearly labeled to represent the opinion of qualified engineers or engineering geologists of the agency and should not be a substitute for personal interpretations of the contractor.
- ! A geotechnical design summary report should be prepared by the agency for complex projects which involve substantial underground work. The GDSR should be legally incorporated as part of the contract documents.

Additional activities, which can be incorporated into the contract to promote fairness between the agency and contractors, include the following.

- ! Plan for a pre-bid meeting to discuss subsurface conditions.
- ! Include the differing site condition clause directly in the contract documents and list the appropriate page number where the clause can be found in the summary of subsurface information.
- ! Use specific plan notes to communicate experience with the type of subsurface condition at a specific project site to all prospective bidders. An example follows:

*"Although boulders in large quantities were not encountered on this site in borings, which are numbered BAF-1 through BAF-4, previous projects in this area have found large quantities of boulders. Therefore, the Contractor should be expected to encounter substantial boulder quantities in excavations. The contractor should include any perceived extra costs for boulder removal in this area in the bid price for Item xxx."*

The purpose of the note is to share, with the bidders, information which the agency has in its possession regarding the potential quantity of boulders at the site and state how the contractor should base the bid for excavation of the area. Also the term, "boulders," denotes a specific size of material to be removed, which is of a high degree of difficulty as compared to "cobbles." Boring logs can also be reviewed to determine if the soils were described as **with cobbles** (denoting only cobble-sized particles), **with boulders** (denoting only boulder-sized particles) or **with cobbles and cobbles**. The exact number or size or hardness of boulders at a site cannot be determined with currently available exploration procedures. Special notes can help the bidders assess the risk and the need to upset bid prices to account for the risk.

! Specific disclaimer clauses can be used as plan notes to define what the agency considers factual data and what is subject to interpretation. The use of specific disclaimer clauses is preferred to the use of a general disclaimer clause which is often unenforceable. An example of a specific disclaimer would be a statement such as;

*"The boring logs for BAF-1 through BAF-4 are representative of the condition at the location where each boring was made but conditions may vary between borings."*

This plan note serves to warrant that the agency used proper techniques to locate, drill, and log the borings which are shown on the contract plans. Soil conditions encountered at the warranted location of these boring which differ materially from those stated on the logs form the basis for a Type I DSC. Soil conditions between borings, which differ materially from those stated in the boring logs, may form the basis for a Type II DSC but not a Type I DSC.

**6. EVALUATION PROCEDURE FOR A DIFFERING SUBSURFACE CONDITION:  
(Is there a changed subsurface condition?)**

Immediately on notification of a differing site condition claim, the agency's geotechnical staff should perform a field review of the site of the differing site condition. Remember that the agency has the responsibility to promptly investigate the condition of the site and the contractor has the responsibility to keep the site undisturbed for a reasonable time.

Completely document the conditions which were encountered by the contractor. This may involve extracting samples from the site, reading existing instrumentation, interviewing inspectors, and requesting more exploration at this site or other similar sites on the project. The geotechnical engineer should direct all requests for extra work by the contractor, such as soil sample extraction, etc., through the engineer in charge. The agency should also document the date of notification (both oral and written), date of investigation, and the date of follow-up meetings with the contractor on how the alleged DSC will be addressed.

- Step 1** - Review subsurface information gathered by the agency for the design of the project. Review the information presented in the plans, specifications & estimates package and other information made available to bidders, both during project advertising and at the pre-bid meeting.
- Step 2** - Document any non-disclosed items and assess any impact on the claimed differing site condition.
- Step 3** - Review actual subsurface conditions at the project site. Record actual conditions by photographs, notes and/or video methods. Remember to inscribe each exhibit with the date, time, and author's name to validate the work.
- Step 4** - Make comparison and document any differences.
- Step 5** - Consider the following items in making a decision on a "Differing Subsurface Site Condition."
  - a.** Are soils, and/or rock, types materially different from those indicated in the contract documents?
  - b.** Are soils, and/or rock, physical properties materially different from those indicated in the contract documents?
  - c.** Are ground water levels materially different from those shown in the contract documents?
  - d.** Are ground elevations materially different from those shown in the contract documents?
  - e.** Should the contractor have recognized the condition during a field inspection?

- f.** Did the contractor provide a prompt written notice (although absence of such notice may not bar a claim depending on State law or prejudice to the owner) of the condition?
- g.** Did the agency promptly respond to the condition notice and was the condition still exposed during the inspection?
- h.** What was the effect on overall project performance?
- I.** What was the effect on construction equipment?
- j.** What was the effect on time to perform work?
- k.** What was the effect on cost to perform work?

See Attached Flowcharts for "Management of Differing Subsurface Site Conditions" and "Decision" included in Appendix D.

## APPENDIX A

### Guidelines for Minimum Boring, Sampling and Testing Criteria

For more detailed information on guidelines for site exploration and information on review of plans with geotechnical features, please consult FHWA ED-88-053; CHECKLIST AND GUIDELINES FOR REVIEW OF GEOTECHNICAL REPORTS AND PRELIMINARY PLANS AND SPECIFICATIONS, October 1985.

APPENDIX A

GUIDELINES "MINIMUM" BORING, SAMPLING, AND TESTING CRITERIA

The most important step in geotechnical design is to conduct an adequate site investigation. The number, depth, spacing and character of borings, sampling and testing to be made in a site specific exploration program are so dependent on site conditions and design objective that no rigid rules can be established for minimum criteria. Usually the extent of the work is established as the work progresses. The following are considered reasonable guidelines to produce the minimum data needed to allow cost -effective design and minimize construction claim problems.

Geotechnical Feature	Minimum Number of Borings	Minimum Depth of Borings
Structure Foundation	1 per substructure unit under 30 m in width.  2 per substructure unit over 30 m in width.  Large, diameter or non-redundant drilled shaft foundations should follow GT-14 criteria.	Advance borings: (1) through unsuitable foundation soils, such as peats, highly organic soils, soft fine-grained soils, etc., and into competent material of suitable bearing capacity. (2) to depth where added stresses due to estimated footing loads is less than 10% of the existing effective soil overburden stress. (3) minimum of 3 m into bedrock if bedrock is encountered at shallower depth.
Retaining Walls	Borings spaced every 30 to 60 m. Some borings should be in front of and in back of the wall.	Extend borings to depth of 2 times the wall height or minimum of 3 m into bedrock.
Bridge Approach Embankments Over Soft Ground	When approach embankments are to be placed over soft ground, at least one boring should be made at each embankment to determine the problems associated with stability and settlement of the embankment. Typically, test borings taken for the approach embankments are located at proposed abutment locations to serve a dual function.	The same as established above for bridge foundation.  Additional shallow explorations, hand auger holes taken at approach embankment locations, are an economical way to determine depth of unsuitable surface soils or topsoil.
Cuts and Embankments	Borings typically spaced every 60 m (erratic conditions) to 150 m (uniform conditions) with at least one boring taken in each separate landform.  For high cuts and fills, should have a minimum of 2 borings along a straight line perpendicular to CL or planned slope face to establish geologic cross-section for analysis.	<u>Cuts:</u> 1) In stable materials extend borings minimum 3 to 6 m below grade or to refusal. 2) In weak soils, extend borings below grade to: firm materials, or to the depth of cut below grade whichever occurs first.  <u>Embankments:</u> Extend borings to firm material or to depth of twice the embankment height. Wide embankments may require deeper borings to account for pressure distribution to deeper depths when settlement problems are anticipated.
Landslides	Minimum 2 borings along a straight line perpendicular to CL or planned sloe face to establish geologic cross-section for analysis. Number of sections depends on extent of stability problems. For an active slide, place at least one boring above and below one sliding area.	Extend borings to an elevation below active or potential failure surfaces and into a hard stratum, or to a depth for which failure is unlikely because of geometry of cross-sections.  Slope inclinometers used to locate the depth of an active slide must extend below base of the slide.
Materials Sites (Borrow Sources Quarries)	Borings spaced every 30 to 60 m.	Extend exploration to base of deposit or to depth required to provide needed quantity.

Silty-Clay Soils

SPT and "undisturbed" thin wall tube samples should be taken at 1.5 m intervals or at significant changes in strata. Take alternate SPT and tube samples in same boring or take tube samples in a separate, undisturbed, borehole. SPT jar or bag samples should be sent to lab for classification testing and verification of field visual soil identification. Tube samples should be sent to the lab to allow consolidation testing (for settlement analysis) and strength testing (for slope stability and foundation bearing capacity analysis). Field vane shear testing is also recommended to obtain in place shear strength of soft clays, silts, and fine fibrous peats.

Sand-Gravel Soils

SPT (split-spoon) samples should be taken at 1.5 m intervals or at significant changes in soil strata. Continuous SPT samples are recommended in the top 4.5 m of borings made at locations where spread footings may be placed in natural soils. SPT jar or bag samples should be sent to lab for classification testing and verification of field visual soil identification.

Rock

Continuous cores should be obtained in rock or shales using double or triple tube core barrels. In structural foundation investigations, core a minimum of 3 m into rock to insure it is bedrock and not a boulder. Core samples should be sent to the lab for possible strength testing (unconfined compression) if for foundation investigation. Percent core recovery and RQD value should be determined in field or lab for each core run and recorded on the boring logs.

Ground Water

Water level encountered during drilling, at completion of boring, and at 24 hours after completion of boring should be recorded on the boring logs. In low permeability soils such as silts and clays, a false indication of the water level may be obtained when water is used for drilling fluid and adequate time is not permitted after hole completion for the water level to stabilize (more than one week may be required). In such soils a plastic pipe water observation well should be installed to allow monitoring of the water level over a period of time. Seasonal fluctuation of water tables should be determined where fluctuation will have significant impact on design or construction (e.g., borrow sources, footing excavation, excavation at the toe of landslide, etc.). Artesian pressure and seepage zones, if encountered, should also be noted on the boring log. In landslide investigations, slope inclinometer casings can also serve as water observation wells by using "leaky" couplings (either normal aluminum couplings or PVC couplings with small holes drilled through them) and pea gravel backfill. The top 300 mm or so of the annular space between water observation well pipes and borehole wall should be backfilled with grout, bentonite, or sand-cement mixture to prevent surface water inflow which can cause erroneous groundwater level readings.

Soil Borrow Sources

Exploration equipment that will allow direct observation and sampling of the subsurface soil layers is most desirable for material site investigations. Such equipment which can consist of backhoes, dozers, or large diameter augers, is preferred for exploration above the water table. Below the water table, SPT borings can be used. SPT samples should be taken at 1.5 m intervals or at significant changes in strata. Samples should be sent to lab for classification testing to verify field visual identification. Groundwater level should be recorded. Observation wells should be installed to monitor water levels where significant seasonal fluctuation is anticipated.

Quarry Sites

Rock coring should be used to explore new quarry sites. Use of double or triple tube core barrels is recommended to maximize core recovery. For a riprap source, spacing of fractures should be carefully measured to allow assessment of rock size that can be produced by blasting. For an aggregate source, the amount and type of joint in-filling should be carefully noted. If assessment is made on the basis of an existing quarry site face, it may be necessary to core or use geophysical techniques to verify that nature of rock does not change behind the face or at depth. Core samples should be sent to lab for quality tests to determine suitability for riprap or aggregates.

APPENDIX B

FHWA National Survey of Geotechnical  
Information Included in Bid Documents by  
Highway Agencies (December 1994)



**FHWA SURVEY: Geotech Information Included in Bid Documents -- December 1994**

Questions	Alaska	Arizona	Arkansas	California	Central Federal Lands
1. Is the full GTR available to bidders?	Yes	Yes	Yes	Yes	Yes
2. Is GTR legally considered part of "Contract Documents"?	No	No	Yes	Yes	Yes
3. Do standard specs/special provisions state what subsurface info is available and where for bidders review?	No	Yes	No	Yes	Yes
4. Are soil/rock samples available for inspection by bidders? If yes, where?	Yes - Rock core, but no soil.	Yes - Lab	Yes -- Materials Lab	Yes	Yes -- Usually Lab
5. Are boring/testhole logs in contract plans?	Yes -- for Bridges	Yes	Yes	Yes	Yes -- Structures only.
6. Are boring/testhole logs in contract special provisions?	No	No	No	No	No
7. If displayed on plans -- how is subsurface data presented for: 1) Structure Foundations? 2) Grading (Cuts & Fills)? a. Plan & profile sheets? b. Cut/fill x-sections?	1) Yes -- Test hole logs on foundation data sheet  2) No -- But GTR made available and listed in the "Invitation to Bid"	1) Yes  2) Yes	1) Graphic logs for large jobs. On foundation data sheets for small jobs.  2) On cross-sections for large jobs.	1) Yes  2) a. Yes b. Yes	1) Yes  2) a. No b. No
8. Are boring/testhole logs included in GTR/Plans/SP's final logs?	Yes	Yes	Yes	Yes -- Plans	Yes
9. Are "Differing Site Condition" claims a significant problem for your agency? If yes, is it predominately related to earthwork or foundations?	No	No	No	Yes	No
10. Do you use geotech info to fight differing site condition claims?	Yes	Yes	Yes	Yes	Yes
11. Is a "pre-bid" meeting typically held on major projects w/difficult or complex geotech conditions/features?	No	Yes	No	No	Yes
12. What actions has your agency taken to reduce number of geotech related claims/change orders?	There have been no actions taken to reduce the geotech related claims other than to do a very complete geotech study in the beginning.	Construction partnering.	Little or no claims submitted due to geotech info. Additional borings are taken on jobs where geotech problems are expected.	Upgrade the Geotech expertise by combining them w/Engineering Geology.	Increase awareness of "potential for claims." Establish standard operating procedures/guidelines. Continuous improvement.
Comments: GTR = Geotechnical Report "Final" testhole logs are field logs revised to include lab test/classification data.	When we have claims our policy is to work them out with the Contractor prior to going to court. We tend to pay and pay quick in some cases.				

**FHWA SURVEY: Geotech Information Included in Bid Documents -- December 1994**

Questions	Colorado	Connecticut	Delaware	District of Columbia	Eastern Federal Lands
1. Is the full GTR available to bidders?	Yes	Yes -- Upon request.	Yes	Yes	Yes
2. Is GTR legally considered part of "Contract Documents"?	No	No	No	No	Yes
3. Do standard specs/special provisions state what subsurface info is available and where for bidders review?	No	?	Yes	No	Yes
4. Are soil/rock samples available for inspection by bidders? If yes, where?	Yes -- Headquarters	Yes -- Test Boring Office	No	Yes - Lab	Yes - Lab/Yard-Sevierville, TN*
5. Are boring/testhole logs in contract plans?	Yes	Yes	Yes	Yes	Yes - For structures/walls
6. Are boring/testhole logs in contract special provisions?	No	No	No	No	No
7. If displayed on plans -- how is subsurface data presented for: 1) Structure Foundations? 2) Grading (Cuts & Fills)? a. Plan & profile sheets? b. Cut/fill x-sections?	1) Engineering Geology sheet is required for all structures.  2) Mostly on profile sheets.	1) Edited boring logs usually on own sheet.  2) Rock lines & unsuitable excavation limits.	1) As graphic logs.  2) On plan & profile sheets.	1) No  2) No	1) Yes -- Graphic logs.  2) No
8. Are boring/testhole logs included in GTR/Plans/SP's final logs?	Yes	Yes	Yes	Yes	No**
9. Are "Differing Site Condition" claims a significant problem for your agency? If yes, is it predominately related to earthwork or foundations?	No	No	Yes	Yes -- Earthwork/Foundations	Yes*** - Tunnels
10. Do you use geotech info to fight differing site condition claims?	Yes	Yes	Yes	Yes	Yes
11. Is a "pre-bid" meeting typically held on major projects w/difficult or complex geotech conditions/features?	Yes	Yes	No	Yes	No
12. What actions has your agency taken to reduce number of geotech related claims/change orders?	Conduct geotech investigations thoroughly. Review all F.O.R. plans by Geotech staff. Once different conditions are encountered, work "with" contractor to resolve differences. Dept. will conduct additional investigation to justify any claims.			Contingency item in special provisions for change in site condition.	Geotech Quality Action Team Geotech Process Management Team (planned) Greater Internal Review
Comments: GTR = Geotechnical Report "Final" testhole logs are field logs revised to include lab test/classification data.					*They are not advertised as available but are upon request. **With some exceptions. ***One project \$10M

**FHWA SURVEY: Geotech Information Included in Bid Documents -- December 1994**

Questions	Florida	Idaho	Illinois	Indiana	Iowa
1. Is the full GTR available to bidders?	Yes*	Yes -- Upon request.	Yes	Yes	Yes
2. Is GTR legally considered part of "Contract Documents"?	No	No*	No	Yes	Yes
3. Do standard specs/special provisions state what subsurface info is available and where for bidders review?	Yes	Yes	No	Yes	Yes -- All information always in.
4. Are soil/rock samples available for inspection by bidders? If yes, where?	Yes -- Materials Lab	Yes Project/Headquarters Office	No	No	Yes -- Major structures only.
5. Are boring/testhole logs in contract plans?	Yes	Yes	Yes -- Only for structures foundations.	Yes -- Structure borings.	Yes
6. Are boring/testhole logs in contract special provisions?	No	No	No	No	No
7. If displayed on plans -- how is subsurface data presented for: 1) Structure Foundations?  2) Grading (Cuts & Fills)? a. Plan & profile sheets? b. Cut/fill x-sections?	1) Yes -- Graphic logs.  2) Yes -- Graphic logs.	1) Yes -- Graphic logs.  2) No	1) Yes -- Just boring logs.  2) No	1) Yes -- Graphic logs.  2) a. Yes -- Graphic logs. b. Yes -- Graphic logs.	1) Yes  2) a. Yes b. Yes
8. Are boring/testhole logs included in GTR/Plans/SP's final logs?	Yes	Yes	Yes	Yes	Yes
9. Are "Differing Site Condition" claims a significant problem for your agency? If yes, is it predominately related to earthwork or foundations?	No	Yes -- Earthwork	No	Yes -- Foundations*	No
10. Do you use geotech info to fight differing site condition claims?	Yes	Yes	Yes	Yes	Yes
11. Is a "pre-bid" meeting typically held on major projects w/difficult or complex geotech conditions/features?	Yes	Yes	Yes	No**	Yes
12. What actions has your agency taken to reduce number of geotech related claims/change orders?	Training construction inspectors on what and what not to do. Train designers for proper info. presentation.	Make all information on Foundation Investigations available to the contractors. Thoroughly review and check consultant's work. Better communication between construction and materials through design reviews.	Perform thorough geotech investigation in accord. w/IDOT policies & procedures. Anticipate, to the extent possible, any difficult subsurface conditions. See item #11 above. Perform timely construction inspection to identify potential problems.	Revised our method of analysis. Using new technology for pile driving, i.e. WEAP, PDA, static pile load test. Also, doing six demo projects on pile driving. Once completed, will revise our specs & make necessary corrections to our manuals & guidelines.	Full disclosure of geotech info. Appropriate specs and job requirements. Good communication - i.e., partnering with contractor.
Comments: GTR = Geotechnical Report "Final" testhole logs are field logs revised to include lab test/classification data.	*The geotech report is available to bidders upon request.	*In gray area -- "yes" if it is specifically referred to in contract documents.		* Specifically H-pile in sand, but not too often.  ** Review contract documents before letting.	

**FHWA SURVEY: Geotech Information Included in Bid Documents -- December 1994**

Questions	Kansas	Kentucky	Louisiana	Maine	Maryland
1. Is the full GTR available to bidders?	Yes	Yes	No	Yes	Yes
2. Is GTR legally considered part of "Contract Documents"?	Yes	No	No	No	No
3. Do standard specs/special provisions state what subsurface info is available and where for bidders review?	Yes	No	No	No	Yes
4. Are soil/rock samples available for inspection by bidders? If yes, where?	Yes -- Headquarters Lab	Yes -- Headquarters Lab Rock samples only.	No	Yes -- Lab	Yes -- Lab
5. Are boring/testhole logs in contract plans?	No	No	Yes	Yes	Yes
6. Are boring/testhole logs in contract special provisions?	No	No	No	No	Yes
7. If displayed on plans -- how is subsurface data presented for: 1) Structure Foundations?  2) Grading (Cuts & Fills)? a. Plan & profile sheets? b. Cut/fill x-sections?	1) Yes -- Graphic logs plus interpreted engineering geology.  2) Yes -- On cross sections.	1) Yes  2) a. Yes b. Yes	1) Yes (graphic logs)  2) *	1) Yes  2) Displayed on plan set sent to Design Div. This info is partially carried to bid plans, i.e. ledge lines.	1) Yes -- Boring info only -- no interpretation or profiles.  2) Boring info only.
8. Are boring/testhole logs included in GTR/Plans/SP's final logs?	No	No	Yes	Yes	Yes
9. Are "Differing Site Condition" claims a significant problem for your agency? If yes, is it predominately related to earthwork or foundations?	No	No	No	No	Yes*
10. Do you use geotech info to fight differing site condition claims?	Yes	No	Yes	No	Yes
11. Is a "pre-bid" meeting typically held on major projects w/difficult or complex geotech conditions/features?	Yes	Yes	No	Yes -- If needed; not usual practice.	Yes
12. What actions has your agency taken to reduce number of geotech related claims/change orders?	We have not experienced a significant number of claims. Therefore, we have not taken any actions to modify our procedures.	Establish better communication between design, construction & the Geotech Branch	Writing tighter specs on problems that arise.	None	More comprehensive subsurface investigations. Improved, more concise wording in specs and special provisions.
Comments: GTR = Geotechnical Report "Final" testhole logs are field logs revised to include lab test/classification data.			* No response.	Geotech info is standardly provided to MDOT's Design Div. & available to contractor & others. MDOT proj. resident is provided w/soils rpt. Bridge project plans contain soils info. Foundation info, stratification & logs are on "Foundation Survey Sheet".	*Question 9 - How significant is "significant"? Note that while we show boring data on plans we do not classify excavation quantities soil/rock.

**FHWA SURVEY: Geotech Information Included in Bid Documents -- December 1994**

Questions	Massachusetts	Michigan	Minnesota	Mississippi	Missouri
1. Is the full GTR available to bidders?	No -- (in general)	No	No	Yes	Yes -- Upon request.
2. Is GTR legally considered part of "Contract Documents"?	No -- (in general)	Yes	No	No	No
3. Do standard specs/special provisions state what subsurface info is available and where for bidders review?	Yes	No - Special cases only	No - (sometimes)	Yes	Yes
4. Are soil/rock samples available for inspection by bidders? If yes, where?	Yes -- Lab	No - Special cases only	Rock cores @ HQ	Yes -- Lab	Yes -- Headquarters Lab (Only rock core on major projects)
5. Are boring/testhole logs in contract plans?	Yes	Yes	Only on Bridge Plans	Yes	Yes
6. Are boring/testhole logs in contract special provisions?	No	Yes	No - only on special projects	No	No
7. If displayed on plans -- how is subsurface data presented for: 1) Structure Foundations?  2) Grading (Cuts & Fills)? a. Plan & profile sheets? b. Cut/fill x-sections?	1) Separate sheets, graphic logs.  2) Separate sheets, graphic logs.	1) No  2) No	1) Yes  2) a. No b. No	1) Yes -- Graphic logs.  2) No	1) Yes (graphic logs) Selected logs shown in Bridge Plans  2) No
8. Are boring/testhole logs included in GTR/Plans/SP's final logs?	Yes	Yes	Yes	Yes	No Usually based on field logs
9. Are "Differing Site Condition" claims a significant problem for your agency? If yes, is it predominately related to earthwork or foundations?	Yes -- Both	No	Yes -- Earthwork	No	Yes -- Earthwork
10. Do you use geotech info to fight differing site condition claims?	Yes	Yes	Yes	Yes	Yes - Geotech info reviewed for all cases, used in some.
11. Is a "pre-bid" meeting typically held on major projects w/difficult or complex geotech conditions/features?	Yes	Yes	No (sometimes)	No	Yes
12. What actions has your agency taken to reduce number of geotech related claims/change orders?	Try to have a more detailed and extensive subsurface program.	More extensive testing. Require Contractor to supply borrow soil.	On current project we are not providing shrinkage factor and shifting responsibility to contractor by having contractor bid cu yd exc. and bid cu yd embankment.		Recently revised Sec. 102 of Standard Specs. Provide "factual" info to all bidders upon request.
Comments: GTR = Geotechnical Report "Final" testhole logs are field logs revised to include lab test/classification data.					Our new policies have not yet been tested in court.

**FHWA SURVEY: Geotech Information Included in Bid Documents -- December 1994**

Questions	Montana	Nebraska	Nevada	New Hampshire	New Jersey
1. Is the full GTR available to bidders?	No	No	Yes*	Yes	No
2. Is GTR legally considered part of "Contract Documents"?	No	No	No	No	No
3. Do standard specs/special provisions state what subsurface info is available and where for bidders review?	No	No	Yes	Yes	Yes
4. Are soil/rock samples available for inspection by bidders? If yes, where?	Yes/No -- See Comments(1)	No	Yes -- Headquarters Lab	No -- Not specifically addressed in contract/bid docs.	Yes -- Headquarters Office
5. Are boring/testhole logs in contract plans?	Yes/No -- See Comments (2)	Yes	Yes	Yes -- Structures only.	No
6. Are boring/testhole logs in contract special provisions?	No	No	No	Unusual projects only.	Yes
7. If displayed on plans -- how is subsurface data presented for: 1) Structure Foundations?  2) Grading (Cuts & Fills)? a. Plan & profile sheets? b. Cut/fill x-sections?	1) Yes -- Graphic logs.  2) No -- Not shown in plans.	1) Yes -- Graphic logs.  2) *	1) Yes  2) Yes**	1) Yes -- Graphic logs.  2) No -- Not shown in plans.	1) N/A  2) N/A
8. Are boring/testhole logs included in GTR/Plans/SP's final logs?	No	Yes	Yes	Yes	No
9. Are "Differing Site Condition" claims a significant problem for your agency? If yes, is it predominately related to earthwork or foundations?	No	No	No	No	No
10. Do you use geotech info to fight differing site condition claims?	Yes	No	Yes	Yes	Yes
11. Is a "pre-bid" meeting typically held on major projects w/difficult or complex geotech conditions/features?	Yes	No	Yes	No	No
12. What actions has your agency taken to reduce number of geotech related claims/change orders?	Increased the amount of subsurface investigation holes to adequately represent materials on project. Increase amount of lab testing.		Be specific & accurate as economically possible. Include all data obtained in field exploration, i.e. show all borings & associated data on log of test borings.	Have made clarifications to specifications regarding availability of geotech info. Send GTR to AGC, who exhibits GTR with plans during bidding period.	1) Revising soil/rock I.D. format on log to be more "construction oriented". 2) Greater emphasis on designs which stress "constructability".
Comments: GTR = Geotechnical Report "Final" testhole logs are field logs revised to include lab test/classification data.	The MDT Geotech Sec. is considering placing all borehole info on the plans. Currently, (1) Bidders can inspect samples at MDT Headquarters. (2) Structure foundation info on plans, but grading info left off.	* No Response	* Made available but only logs of test borings included in plans.  ** Only for special cases, i.e. soft ground, high fills or landslides.		Continued from above.  3) Considering allowing contractors to access "final" Geotech reports. Currently only allowed to purchase boring logs. Lab and test results provided free.  4) Final logs are typed field logs, not combined with lab results.

**FHWA SURVEY: Geotech Information Included in Bid Documents -- December 1994**

Questions	New Mexico	New York	North Carolina	North Dakota	Ohio
1. Is the full GTR available to bidders?	Yes	No	Yes	Yes	No*
2. Is GTR legally considered part of "Contract Documents"?	No	No	No	No	Yes
3. Do standard specs/special provisions state what subsurface info is available and where for bidders review?	No	Yes	Yes*	Yes	Yes
4. Are soil/rock samples available for inspection by bidders? If yes, where?	No	Yes -- Rock cores.*	Yes -- Field Office or Geotech Unit	Yes	No
5. Are boring/testhole logs in contract plans?	Yes *	No	No	Yes	Yes
6. Are boring/testhole logs in contract special provisions?	Yes **	No	No	No	No
7. If displayed on plans -- how is subsurface data presented for: 1) Structure Foundations? 2) Grading (Cuts & Fills)? a. Plan & profile sheets? b. Cut/fill x-sections?	1) Yes  2) No -- but available for review in Geotech Report.	1) Yes  2) a. No b. Yes	1) Yes -- On preliminary design plans, not construction plans.  2) a. Yes b. Yes	1) Yes  2) a. Yes b. No	1) Yes -- Plotted on plan and profile views.  2) Yes -- Plotted on plan and profile views.
8. Are boring/testhole logs included in GTR/Plans/SP's final logs?	Yes	Yes**	Yes	Yes	Yes
9. Are "Differing Site Condition" claims a significant problem for your agency? If yes, is it predominately related to earthwork or foundations?	No	No	Yes -- both	No	No
10. Do you use geotech info to fight differing site condition claims?	Yes	Yes	Yes	No	Yes
11. Is a "pre-bid" meeting typically held on major projects w/difficult or complex geotech conditions/features?	Yes	Yes	Yes	Yes	No
12. What actions has your agency taken to reduce number of geotech related claims/change orders?	The Dept does not explore aggregate pits for projects. No longer include a possible surfacing pit in plans -- contractor responsible for locating own source.	NYSDOT warns contractor, by special notes, of subsurface conditions that may present specific problems.	We are reviewing our disclaimer clause. Have increased number of borings. Have added new pay items, e.g., drilled shaft coring in rock.	No claims and few change orders.	Have added contingency quantities for undercut of soft subgrade and embankment foundations under low fills (and other situations).
<b>Comments:</b> GTR = Geotechnical Report "Final" testhole logs are field logs revised to include lab test/classification data.	*Boring logs are summarized on Bridge Foundation Sheet in plans. **Boring log summaries included in special provisions for specialty contracts, i.e. densification of collapsible soils, grout injection, vertical drains, etc.	*Rock cores available in Region Office Lab. **Logs are made available to bidders separately from plans and special provisions.	*Availability of subsurface information is conveyed in the announcement soliciting bids. NCDOT Attorneys don't want GTR to be part of contract documents.		*Only large plan sheets included in contract plan. Standard note says where to find additional soil information, if available.

**FHWA SURVEY: Geotech Information Included in Bid Documents -- December 1994**

Questions	Oregon	South Carolina	South Dakota	Texas	Utah
1. Is the full GTR available to bidders?	Yes -- Earthwork No -- Foundations	No	Yes*	Yes	Yes
2. Is GTR legally considered part of "Contract Documents"?	No	No	No	No	No
3. Do standard specs/special provisions state what subsurface info is available and where for bidders review?	Yes	Yes	Yes**	No	Yes
4. Are soil/rock samples available for inspection by bidders? If yes, where?	Yes -- Project Office or Region HQ	Yes -- Lab	Only on special projects that have prebid meeting.	Yes -- Lab (seldom)	Yes -- Geotech Lab*
5. Are boring/testhole logs in contract plans?	Yes -- Structures Only	Yes	Yes	Yes	Yes
6. Are boring/testhole logs in contract special provisions?	No	No	No	No	No
7. If displayed on plans -- how is subsurface data presented for: 1) Structure Foundations?  2) Grading (Cuts & Fills)? a. Plan & profile sheets? b. Cut/fill x-sections?	1) Yes - Foundation data sheets show consolidation of Exploration log data  2) No	1) Yes -- Borings only.  2) Yes -- Profile sheets - copy in Main Bldg.	1) Yes  2) b. Seismic data for rock made available. Special problems (settlement) separate foundation sheet.	1) Graphic logs - yes. We never attempt to show subsurface profiles.  2) No - very seldom.	1) Yes - A summary of test data is attached to the geotech rpt.  2) No**
8. Are boring/testhole logs included in GTR/Plans/SP's final logs?	No	Yes	Yes	No	Yes
9. Are "Differing Site Condition" claims a significant problem for your agency? If yes, is it predominately related to earthwork or foundations?	Yes -- Earthwork No -- Foundations	No	No***	No -- Foundations (very few)	No
10. Do you use geotech info to fight differing site condition claims?	No -- Earthwork Yes -- Foundations	Yes	Yes	Yes -- We try, but usually are not successful.	Yes
11. Is a "pre-bid" meeting typically held on major projects w/difficult or complex geotech conditions/features?	Yes	Yes	Yes	Yes	Yes
12. What actions has your agency taken to reduce number of geotech related claims/change orders?	Foundation unit stays in direct control of special provisions that are related to substructures. Have std soil & rock class. manual. Have revised Pile Spec 00520. Have formed Geotech Team to help set stds statewide.	Escrow Bid Documents Tighter Claims Procedures	Emphasis on partnering, maintain good communications w/contractor associations. Following new plan note now put on all subsurface sheets in the plans: "The geotechnical engineering activity has on file all of the boring logs for this product. These logs	Try to get best info possible. Also, are obtaining more borings on projects.	Testholes drilled at footing locations. Geologist required to describe surface geology and size and concentration of surface cobbles/boulders. Site photos in GTR. Cobbles/boulders and difficult drilling noted on logs.
Comments: GTR = Geotechnical Report "Final" testhole logs are field logs revised to include lab test/classification data.	Continued from above.  Adopted 1988 AASHTO Manual on Subsurface Investigations. Prebid meetings & partnering. Trying to make geotech information more available.		Continued from above and additional results of laboratory test are available for review at the Central Office in Pierre."  *At Central Office. ** Say available, but does not say where. ***Some recent claims on deep foundations due to new scour criteria.	The concept of partnering has put us in the position of paying geotech claims when we should not be just to stay on "good terms" w/contractor.	*Only recall one time in last 5 years that contractor inquired about subsurface profile or inspected samples. **Considering including logs in plans.



**FHWA SURVEY: Geotech Information Included in Bid Documents -- December 1994**

Questions	Western Federal Lands	Wyoming	Summary of Responses
1. Is the full GTR available to bidders?	Yes	No	31 - Yes 11 - No
2. Is GTR legally considered part of "Contract Documents"?	Yes	No	10 - Yes 32 - No
3. Do standard specs/special provisions state what subsurface info is available and where for bidders review?	Yes	Yes	27 - Yes 14 - No
4. Are soil/rock samples available for inspection by bidders? If yes, where?	Yes - Headquarters -- Some jobs at project office.	No	32 - Yes 10 - No
5. Are boring/testhole logs in contract plans?	No	Yes - (optional)	36 - Yes 6 - No
6. Are boring/testhole logs in contract special provisions?	No	No	
7. If displayed on plans -- how is subsurface data presented for: 1) Structure Foundations?  2) Grading (Cuts & Fills)? a. Plan & profile sheets? b. Cut/fill x-sections?	N/A	1) Yes  2) a. Yes (soils profile) b. No (cut/fill x-sections) Other: Yes-Pits & Quarry layout sheets.	38 - Yes 4 - No  22 - Yes 20 - No
8. Are boring/testhole logs included in GTR/Plans/SP's final logs?	Yes	No	33 - Yes 9 - No
9. Are "Differing Site Condition" claims a significant problem for your agency? If yes, is it predominately related to earthwork or foundations?	No -- Some Earthwork	No	12 - Yes 30 - No
10. Do you use geotech info to fight differing site condition claims?	Yes	Yes	38 - Yes 4 - No
11. Is a "pre-bid" meeting typically held on major projects w/difficult or complex geotech conditions/features?	No	Yes	28 - Yes 14 - No
12. What actions has your agency taken to reduce number of geotech related claims/change orders?	Increased the effort during design to identify and report geotechnical conditions in the field.	Include seismic data; all excavation is bid as unclassified except in rare instances, rock ex.	Majority emphasized doing good work/conducting thorough GT investigations. Prepare good GTR's and contract documents. Use standard Operating procedures/guidelines. Inc. awareness of claim potential/closer internal review/better wording of specifications. Good communication and partnering w/contractor and construction personnel.
Comments: GTR = Geotechnical Report "Final" testhole logs are field logs revised to include lab test/classification data.		We get very few requests for drill log information. Lately some interest in raw seismic data.	Thoroughly review and check consultant's work. Better communication w/design and construction. Greater emphasis during design on "constructability" issues. Testholes drilled at footing locations. Cobbles/boulders & difficult drilling noted on logs. Use special notes to warn contractor of anticipated subsurface problems. Upgrade capability by combining geotechnical engineers and engineering geologists. Train construction inspectors on what to do and what not to do. Send GTR to AGC to exhibit w/plans during bidding period. Strive for continuous improvement.

## Appendix C

### Geotechnical Design Summary Report (GDSR)

The length of the GDSR will vary, depending on the complexity of the project, but should always be limited to no more than fifty pages, including figures. To accomplish the objective of the GDSR, the report must contain at least the following:

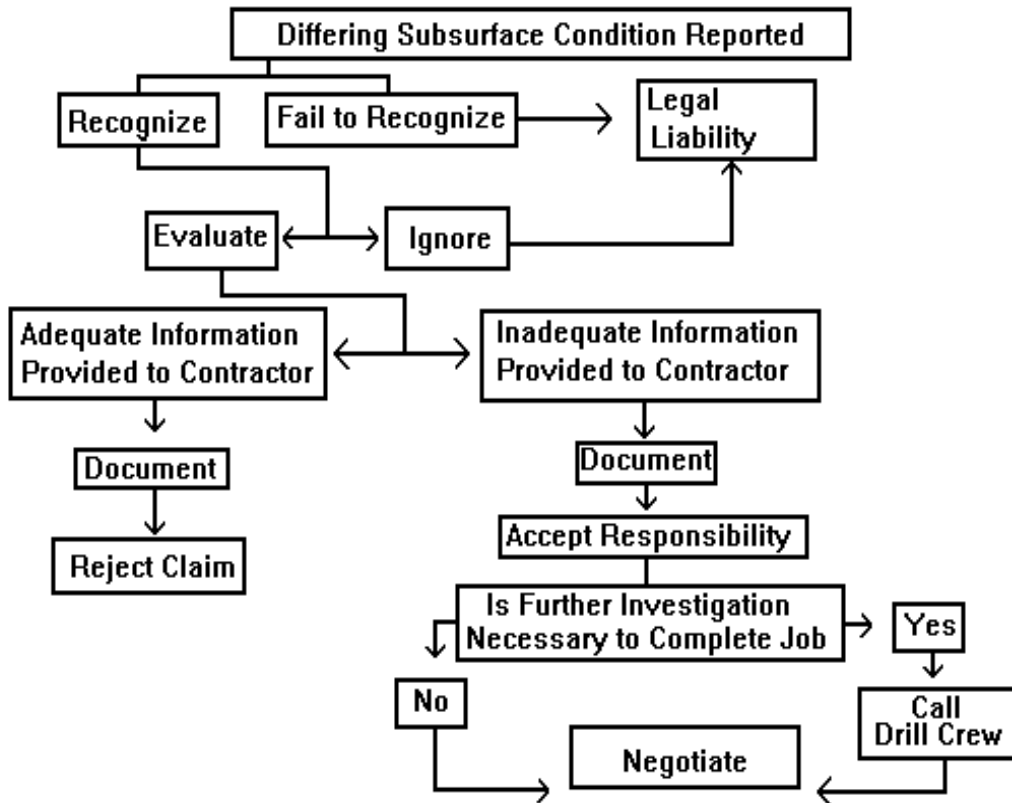
- A. Title** - Identify the contract.
- B. Introduction** - This report describes the subsurface conditions anticipated and the influence these anticipated subsurface conditions have had upon the design. In addition, emphasize that the report is intended to assist prospective bidders in evaluating the requirements for excavating and supporting the ground, to enable the contractor to plan the work, to assist the engineer in reviewing the contractor's submittal and operations, and to establish a geotechnical baseline which will serve as the basis for identification of differing conditions.
- C. Project Summary** - A brief general description of the project.
- D. Sources of Information** - Reference sources of information that have been used in developing the GDSR, such as subsurface investigation reports, including boring logs, construction experience reports, and geological reports by other agencies or individuals. (These sources should not be made a part of the GDSR, but should be made available for bidder review.)
- E. Geologic Setting** - Regional geology discussion, geologic map and generalized cross-section of the region. Site Exploration; description of subsurface investigations that have been carried out. Site Geology; profile of subsurface conditions with discussions of physiography, stratigraphy, structure and ground water conditions. Nomenclature should be well defined and based on standard classification systems to the maximum extent possible. Local terms such as "Glacial Till" should be avoided or clearly defined and used with caution, as they may have different connotations in different geographic areas and may lead to misinterpretations among bidders.
- F. Geologic Features of Engineering and Construction Significance** - Bedrock weathering profiles (if projected at or near the tunnel). Engineering properties of each distinguishable rock or soil unit. Geologic hazards such as faults or shear zones in rock, boulders in soils, or gas. Groundwater conditions, including range of

variation and relationship to rock and soil units. Present streams and old stream channels

- G. Manmade Features of Engineering and Construction Significance -** Sensitive surface and subsurface structures, Existing and abandoned utilities, Possible sources of hazardous or toxic substances
- H. Selection of Ground Support -** soil, rock, and mixed face conditions should be addressed in separate subsections). Definitions - Initial and Final Support. Types of initial and final support considered and any special considerations relative to the design and construction of the subject project
- I. Design of Ground Support -** soil, rock, and mixed face conditions should be addressed in separate subsections). Initial Support, including discussion of assumptions and considerations regarding such items as minimum support requirements, system design responsibility (owner or contractor), excavations and support sequence, expansion of supports, grouting, construction and short term loading.
- J. Anticipated Ground Behavior and Construction Difficulties -** soil, rock, and mixed face conditions should be addressed in separate subsections). This section should describe anticipated ground behavior in response to construction operations within each soil or rock unit and describe specific construction difficulties that should be anticipated. Discussion within this section should include the following: definitions of ground behavior terminology (including effects of groundwater seepage or inflow); impacts of construction equipment and procedures, excavation and support sequences, blasting, ground modification (grouting, freezing, etc.), and groundwater control; previous local tunneling experience; potential effects on existing and new facilities in the project area; special cultural or environmental constraints; and required instrumentation and monitoring.
- K. Construction Specifications -** Discussion of the reasons for important or unusual requirements. Statements of special conditions and allocation of risks between owner and contractor *e.g. boulders should be anticipated and will be paid for at separate unit prices for boulders greater than 500 mm in maximum dimension. Boulders less than 500 mm, in maximum dimensions, are considered incidental to normal excavation and will not be paid for separately.*

APPENDIX D-1

Flowchart for Management of Differing Subsurface Site Conditions



Appendix D-2  
Decision - Flowchart

