A GUIDE TO SOIL REPORTS AND DIFFERING SITE CONDITIONS FOR CONSTRUCTION PROFESSIONALS

1990

R. MARTIN PONDELICK

The Pennsylvania State University

The Graduate School

The Department of Civil Engineering

A GUIDE TO SOIL REPORTS AND DIFFERING SITE CONDITIONS FOR CONSTRUCTION PROFESSIONALS

A Thesis in

Civil Engineering

by

R. Martin Pondelick

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

December 1990

We approve the thesis of R. Martin Pondelick.

Date of Signature

H. Randolph Thomas
Professor of Civil Engineering
Thesis Advisor

8/1/90

Gary R. Smith
Assistant Professor of
Civil Engineering

8/1/90

D. R. Hiltunen
Assistant Professor of
Civil Engineering

8/3/90

Michael S. Bronzini
Professor of Civil Engineering
Head of the Department of
Civil Engineering

8/3/90

ABSTRACT

This thesis investigated the legal criteria involved in deciding differing site condition (DSC) disputes in construction contracting. Legal precedent was researched to determine the rules used by the courts to decide these disputes. The rules were arranged in a flowchart to provide as a guide for construction professionals to use to resolve DSC disputes. Each rule was discussed in detail and examples of cases were provided highlighting how the courts used each rule. Flowcharts were prepared for contracts containing a DSC clause and those that did not. The differences between these contracting methods was discussed. The rules used to decide DSC disputes were found to be consistent between jurisdictions.

The use of soil reports in deciding DSC disputes was also researched. The elements and steps of a complete soil report are listed and discussed along with common problems in soil reports which have led to court cases are also discussed.

Keywords: Soil classification; Soil mechanics; Litigation; Contract proposals. (MM)

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

I would like to express my sincere gratitude to:
Dr. H.R. Thomas for his insight, candid discussions, and assistance in preparing this thesis,
Dr. Gary Smith and Dr. Dennis Hiltunen for their support and guidance as thesis committee members,
my loving wife, Trina, for the support, encouragement and hours of proofreading during the preparation of this thesis, and the
United States Navy for the opportunity to attend The Pennsylvania State University and earn a Master of Science degree.

Chapter 1

INTRODUCTION

A major risk inherent in many construction projects is unusual or unexpected subsurface conditions leading to differing site condition (DSC) claims. A 1984 study shows DSC as the basis of about 34% of all federal contract modifications.[1]

It is not difficult to understand why DSC disputes are so common. The actual conditions are concealed at the time of the bid and are not discovered until after construction is in progress.

The only method to investigate the subsurface conditions, before the bid, is a soil investigation normally involving borings. These borings are often the center of the DSC dispute. The area covered by the borings is small compared to the excavation area. The typical boring is only a few inches in diameter, while the excavation site may be thousands of feet. This forces the owner and contractor to make broad extrapolations and interpolations of the conditions between the borings. Also, there are no uniformly applied industry standards for the contents of a soil boring report. This lack of consistency sometimes causes incomplete soil reports to be provided to contractors. This situation may cause the owner to interpret the borings

differently than the contractor thus, creating a dispute.

Although DSC disputes are common, few contract managers are familiar with the legal principles or rules of interpretation. This forces disputes that could be resolved at the field level to be elevated to formal claims and litigation.

Problem Statement

The legal resolution of DSC disputes is not well understood by construction professionals causing unnecessary litigation. Also, construction professionals have no evaluation criteria for soil reports to ensure completeness. These incomplete soil reports often lead to a DSC dispute.

Objective

The object of this thesis is to provide contract professionals with a field applicable DSC resolution and prevention guide. This will include the rules used by the courts to resolve DSC disputes and guidelines for reviewing the soil reports. The rules used by the courts may be used to decide DSC disputes at the field level without the need for legal action. The soil report guidelines will allow

contract managers to better review soil reports prior to issuing them to contractors.

Scope

Case law research was performed primarily from reported appellate decisions available in the Penn State library system. Legal treatises and papers were consulted as background and overview material. Only DSC disputes involving subsurface conditions were included.

Methodology

Legal and construction treatises were reviewed to determine the current state of knowledge concerning DSC disputes. These treatises further lead to key cases and legal articles. The cases were reviewed for the rules used by appellate courts in deciding the cases. Numerous cases were reviewed and the decisions were compared to assess the consistency of the various jurisdictions.

The cases were also reviewed to determine how the information in the soil report affected the decision. The elements of the soil report used by the court to decide the case were identified. These elements were combined with information from geotechnical texts to develop a checklist

for a complete soil report. Only the factual portion of the soil report was studied, since interpretations of the facts are usually not considered in the DSC dispute resolution process.

Background

Improving DSC dispute resolution and prevention involves understanding the methods of DSC recovery and the preparation of a soil report.

Methods of recovery for DSC

The construction industry has developed two approaches for contractually handling DSC disputes. The first is for the contract to be silent on DSC and DSC remedies. If a contractor wishes to receive additional monies, he/she must prove a breach of contract. Generally, a breach of contract involves proving a misrepresentation. A misrepresentation may occur in two ways. The contractor may attempt to show that the owner provided incorrect information, or, the contractor may claim that the owner provided correct information, but withheld qualifying information. Either situtation may lead to additional compensation for the contractor.

The second approach is to include a DSC clause in the construction contract. Examples of two DSC clauses are included in Appendix A. These clauses allow the contractor to receive additional compensation without having to prove a contractual breach. The federal DSC clause provides for recovery in two instances. The first is when the conditions indicated by the contract are different from those actually encountered. This is called a Type I DSC. The second situation is when the conditions encountered are different from those normally encountered in the type of work being contracted. This is a Type II DSC. Since dispute resolution can be done within the contract, a DSC clause usually results in a quicker resolution.

A DSC clause also allows the bids to contain less contingency for subsurface conditions. The contractor can lower the bid since the owner will pay the added costs, should the contractor encounter conditions that are different from those expected by the bidding documents. The disadvantage is that the owner must maintain a contingency fund should the conditions turn out to be different. Therefore, the total project cost cannot be accurately estimated. If the owner does not have a contingency fund or chooses not to bear the financial risk of added costs during contract performance, that owner should not use a DSC clause. By not including a DSC clause, the owner is

informing the contractor that the risk for subsurface cond tions is on the contractor, and the owner will not approve changes in contract price. The owner in return receives a higher bid price than may have been received if a DSC clause was present.

The soil report

The soil report is often the critical element in DSC disputes. Soil information provided to prospective bidders in the bidding package is normally obtained directly from the soil report and is often considered a representation of the subsurface conditions. If the actual conditions are different from those representations, the contractor may be entitled to additional compensation, even if the contract does not contain a DSC clause.

The soil information provided in the contract is more critical in contracts with a DSC clause since the DSC clause allows the contractor to rely heavily on this information. The DSC clause "makes it clear that bidders are to compute their bids, not upon the basis of their own pre-award (subsurface) surveys or investigations, but upon the basis of (the subsurface conditions) indicated and shown in the specifications and on the drawings."[2] However, the courts often consider the soil report the primary indicator of

subsurface conditions when a DSC clause is present. "Borings are nevertheless considered the most reliable reflection of subsurface conditions."[3] "The most reliable and most specific indicator (are) the borings."[4]

Organization

This thesis is divided into five chapters. Chapter 2 covers disputes involving misrepresentation. The rules used by the courts are presented in a flowchart and are described in the text. Chapter 3 covers disputes when a DSC clause exists. The rules are also presented in a flowchart with accompanying text explaining each rule. Chapter 4 provides an overview of the preparation of a soil report. The steps involved in doing a subsurface investigation are presented with the information that should be included in every soil report. Deficiencies with the soil report that have lead to numerous court cases are also discussed. The fifth chapter is the summary and conclusions.

Chapter 2

MISREPRESENTATION

In the absence of a Concealed Conditions or Differing Site Conditions (DSC) clause, the owner assigns all the risk for unknown subsurface conditions to the contractor[5]. The contractor has the option to perform a subsurface investigation to discover any latent conditions, or simply add sufficient contingency to cover the uncertainty. Without a DSC clause, the contractor assumes the risk if the material is different from expected, and normally cannot recover additional related costs from the owner. In W.H. Lyman v. Village of Gurnee, a misrepresentation of subsurface conditions case, the court stated:

> It is well settled that a contractor cannot claim it is entitled to additional compensation simply because the task it has undertaken turns out to be more difficult due to weather conditions, the subsidence of the soil, etc.[6]

Overview

The only recourse for a contractor seeking to recover additional costs due to a DSC, without a DSC clause, is to prove that: 1) the owner provided incorrect or misleading

information that the contractor was entitled to rely upon or 2) the owner did not disclose relevant information.[7] In essence, the contractor must prove that a breach of contract occurred.

Figure 2.1 provides the rules that courts have applied to decide cases involving misrepresentation in DSC disputes. The decisions are often complex, and the accompanying text should be used in conjunction with the flowchart. Table 2.1 provides a summary of the elements involved with each decision node.

The left side of Figure 2.1 is used when the issue is incorrect or misleading information. These rules will be discussed first. The right side of Figure 2.1 is used when the issue is the failure to disclose relevant information. This is commonly called "withholding" and is a form of misrepresentation. These rules will be discussed later in the chapter.

Many cases researched were based upon implied warranty. While implied warranty is a separate legal theory, the rules for recovery are the same as misrepresentation. Therefore, implied warranty cases will not be discussed separately in this paper.

If the misrepresentation is fraudulent, a course of action in tort may be possible. "A misrepresentation may also be the basis for an affirmative claim for liability for

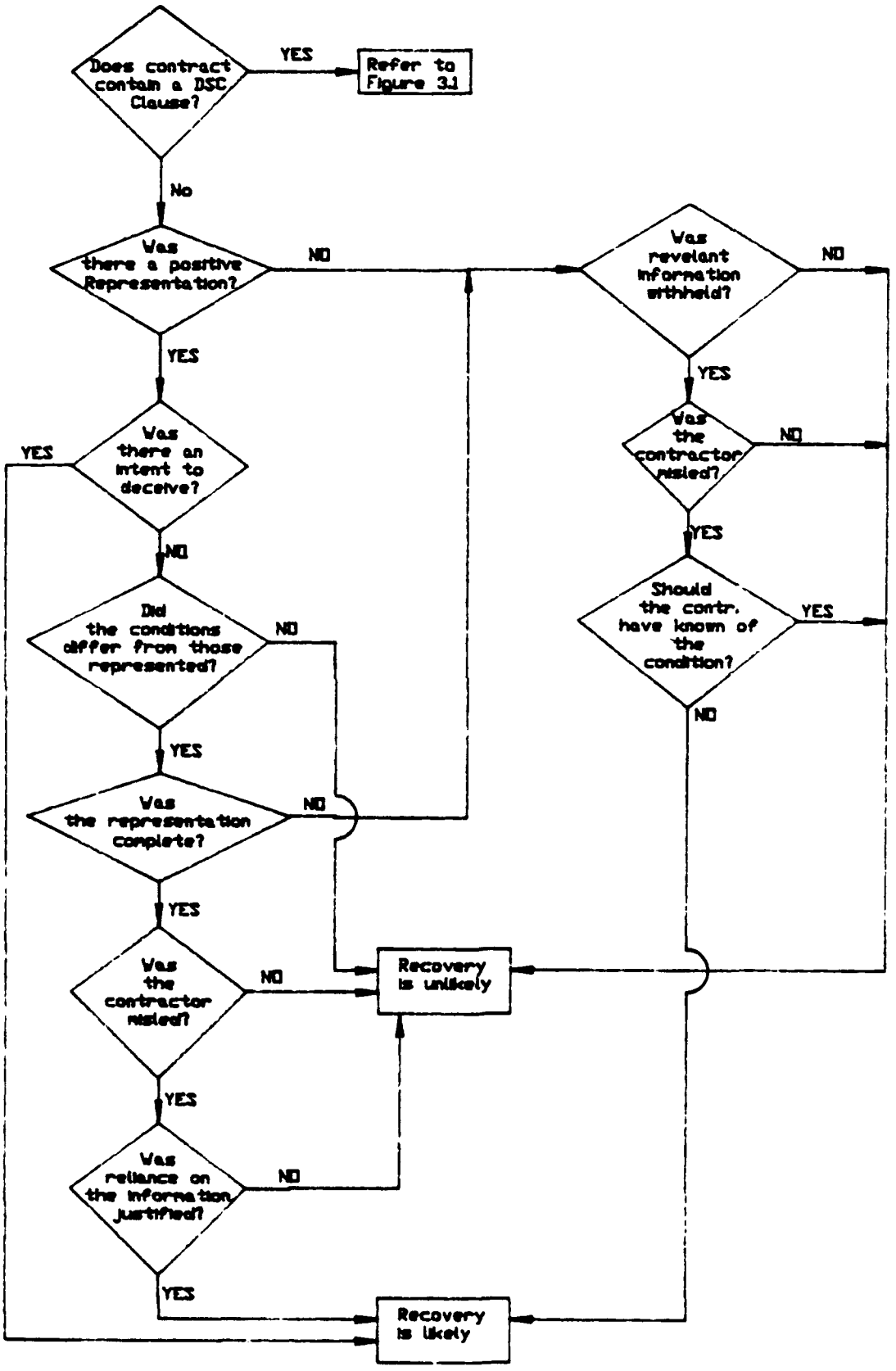


Figure 2.1 Misrepresentation

Table 2.1 Summary of Misrepresentation Rules

Does contract contain a DSC clause?
Recovery under a DSC clause is recommended to be tried first.

INCORRECT INFORMATION FURNISHED

Was there a positive representation?
There must be a positive representation.
- Positive, material statement.
  A representation must be a positive material statement furnished by the owner to the bidders for use in preparing the bid.
- Exculpatory clauses and disclaimers.
  Only disclaimers of soil reports that are express, unqualified and specific will supercede reliance on representations furnished by the owner.

Was there an intent to deceive?
If fraud is involved, the contractor is likely to recover.

Did the conditions differ from those represented?
The actual conditions must differ materially from those represented. Minor variations are not sufficient.

Was the representation complete?
The representation may be correct in what was provided, but qualifying information was withheld.

Was the contractor misled?
The contractor must have been misled by the representation.

Was reliance on the information justified?
There may be information that would reduce reliance on the representation. The contractor cannot claim he/she was damaged by information he/she was not justified in relying.
- Other contract clauses.
  Other contract clauses may provide enough information to reduce reliance on the representation.
- Test reports available outside the contract.
  Test reports reasonably available outside the contract may reduce reliance on the representation.
- Site visit.
  The site visit may reduce reliance.
- Contractor experience.
  The contractor's experience in the area may reduce reliance.

Table 2.1 (continued)

WITHHOLDING

Was relevant information withheld?
: Did the owner withhold information in his/hers possession that was important to the bidders? Did the owner withhold information that qualified information provided?

Was the contractor misled?
: The contractor must have been misled by the information not furnished.

Should the contractor have known of the condition?
: Was there information available that would have indicated to the contractor that the condition existed, even though the owner did not provide the information? Sources of information include; the contract as a whole, test reports available outside the contract, a reasonable site visit and the contractor's experience.

misrepresentation under the law of torts."[8] Tort claims are beyond the scope of this paper.

The principles governing the legal aspects of misrepresentation were developed in cases decided in early to mid part of this centry. While some of the cases referenced in this thesis may appear dated, a study by the Transportation Reasearch Board found these cases to still be the current law.

> A detailed investigation of every available case up to the present indicates either little or no modification in the rules announced in the eariler cases.[9]

Does Contract Contain a DSC Clause?

Many construction contracts contain specific provisions for handling a DSC. Generally, it is easier to recover additional expenses through the terms of the contract because it is not necessary to show a breach of contract. Chapter 3 describes the rules when a DSC clause is present. However, the presence of a DSC clause does not preclude a contractor from seeking recovery based on misrepresentation. Also, the Court of Claims has determined that administrative presentation of a claim for changed conditions does not prevent litigation based on misrepresentation.[10]

Incorrect Information Furnished

For recovery, the contractor must show that the information provided was reasonably relied upon and incorrect. The rules for recovery are given by the left side of Figure 2.1.

Was there a positive representation?

"A misrepresentation is an assertion that is not in accord with the facts."[11] For a misrepresentation to exist, there first must be a representation. This representation must be a positive, material statement of the conditions that were anticipated. Also, the statement must not be negated by specific, express and unqualified disclaimers.

Positive, material statement. To recover additional costs, the contractor must prove that the representation in question was a positive, material statement about the nature of the subsurface conditions anticipated during construction. The courts have not announced a general rule as to what constitutes a positive representation. Rather, the determination a representation is positive or not is based on the particular facts of each individual case.

However, it is clear that a positive representation must exist. The courts have stated; "It (the statement of conditions) was a positive and material representation as to a condition within the knowledge of the Government..."[12] "... the specifications spoke with certainty as to a part of the conditions to be encountered..."[13] "The plaintiff (contractor)... had a right to rely upon the positive representations that were made by the defendant regarding the subsurface conditions..."[14]

Also the statement must more than merely suggest the condition. **Wunderlich v. State** discusses this issue at length. This case revolved around the contractor's use of an owner's internal memo. The memo stated the testing program indicated a particular borrow pit <u>may</u> provide satisfactory material for the project. When the pit failed to provide adequate material, the contractor claimed the memo was a representation the pit <u>would</u> provide adequate material. The court denied the contractor's claim stating the memo was only suggestive of construction conditions expected. The court stated, "But if statements honestly made may be considered as suggestive only, expenses caused by unforeseen conditions will be placed on the contractor,..."[15]

Also no misrepresentation was found when "the (trial) court held that the representations were intended to be

suggestive of construction conditions, but that they were not to be relied upon with exactness."[16]

These two cases highlight that a contractor can only consider presentation of facts to be positive representations. Opinions and interpretations will not be considered.

Sweet differentiates between facts and opinions by saying: "Reporting the result of tests is clearly a factual representation, while professional judgements that seek to draw inferences from this information may be simply opinions."[17]

The results of a testing program, such as borings, are considered positive representations. These testing results are considered positive even though a drilling operator may make certain interpretations and "educated guesses" during the drilling program. However, if interpretations of these testing results are made, they will not be considered positive. To avoid confusion, interpretations of testing results should always be separated from the results themselves.

Where there is no DSC clause, soil borings and test pits can only positively represent conditions at the boring or test pit location and not for the entire area. As stated by one court:

> Of course, anyone would realize that the actual subsoil conditions might, except where and to the

> depth shown by the borings, be different than so shown. The actual conditions were hidden. The borings were merely indications, at certain places and to certain depths, from which deductions might be drawn as to actual conditions along the line and to the depths of such borings. Both parties knew that deductions so drawn might prove untrue when necessary excavations were made.[18]

Exculpatory clauses and disclaimers. Frequently, a conflict arises when specific representations are made, but the contract also alerts the contractor that what is represented may not be correct. While most contracts disclaim the accuracy of subsurface tests, few such clauses have been enforced. These general exculpatory clauses have been found to have little effect in negating positive material statements. For a disclaimer to be enforced it must be express, unqualified and specific. The State of New Jersey effectively uses a subsurface conditions clause to disclaim subsurface conditions. The clause is reproduced in the appendix. As stated in **Sasso Contracting v. State:**

> While we might agree with the trial judge that general exculpatory clauses will not relieve the State from responsibility for its express representations, it is otherwise where the relevant language of the contract is so straightforward, unambiguous and categorical as this is in placing responsibility for subsurface investigations on the contractor.[19]

However, most disclaimers are not specific and the rulings are usually more in line with E.H. Morill v. State:

> The responsibility of a governmental agency for positive representations ... is not overcome by the general clauses requiring the contractor to examine the site, to check up on the plans, and to assume responsibility for the work ...[20]

Disclaimers will be very narrowly construed with respect to shifting the risk to the contractor for inaccurate representations of subsurface conditions.

Was there intent to deceive?

Most misrepresentations occur where incorrect information is provided innocently. However, several cases found where the soil report was purposely changed to induce lower bids. In these cases, the courts ruled for the contractor. In **City of Salinas v. Souza & McCue Construction Company** the city was installing a sewer line in an area known to have extremely wet and often quicksand-like conditions. The city engineer directed the geotechnical firm to take borings at specific locations along the proposed sewer line to avoid the wettest areas. The court ruled for the contractor finding that the city's actions were fraudulent.[21]

Contracts often contain clauses designed to provide immunity against liability for fraudulent misrepresentation. These have little effect when the

misrepresentation is fraudulent. As stated in **O'Neill Const. Co. v. City of Philadelphia**, "... no one can escape liability for his own fraudulent statement by inserting in a contract, a clause that the other party shall not rely upon (the fraudulent statements)."[22]

Did the conditions differ from those represented?

An essential requirement to recover additional costs is proof that the actual conditions at the project site were different from those represented. While this requirement appears trivial and obvious, it is discussed in most DSC cases. If the contractor cannot prove that the conditions were different, then no equitable adjustment will be made.

O'Neill Const. Co. v. City of Philadelphia represents how far this rule may extend. The contract required the installation of a sewer line. The contractor filed a claim when wooden cribbing was encountered instead of loose stone as shown on the soil report. The soil report that was provided to the contractor stated that the borings were taken along the proposed center line of the sewer. In reality they had been taken 12 feet away from the center line. The court found that the conditions along the center line of the sewer were as shown in the borings, even though the borings were actually taken 12 feet away. The court

denied the contractor's claim stating:

> Plaintiff (contractor) did not establish by evidence that the condition along the center line of the sewer was other than what the borings represented it to be.[23]

If the conditions are the same as those represented, then the contractor is not damaged and does not have a claim. In this case, it did not matter that the information provided was not a correct presentation of the investigation. The actual conditions were found to be the same as the report.

This step becomes of particular importance when considering that borings are only accurate "as far as they go." The boring sheet may be entirely accurate and complete, but still not show all the conditions that will be found in the subsurface.

> The bare statement that the boring sheet may be relied upon as accurate is entirely different from saying that the subsoil along the bridge line is as shown by the boring sheet.[24]

In that case, the contractor could not prove that the actual conditions differed from the representation, but merely that the borings did not reflect the total conditions encountered.

Was the representation complete?

While the representation may have been correct, important information may have been withheld. For instance, a boring may be provided to contractors with known, relevant information omitted.

The case of **United States v. Atlantic Dredging Co.,** arose from a contract for dredging a portion of the Delaware River. The government made test borings utilizing the probe method and the field log showed where the boring had to be stopped due to obstructions. When a map showing the results of the soil report was prepared, it only showed the completed borings. There was no mention of how the borings were made, that obstructions were encounte ed, or that a field log had been prepared. When the contractor found different material than shown by the maps, it continued with the project thinking its interpretation was incorrect.

> It (the contractor) did not know at the time (of bidding or a subsequent change order) of the manner in which the test borings had been made. Upon learning that they had been made with the probe method, it then elected to go no further with the work, that is, upon discovering that the belief expressed was not justified and was in fact a deception.[25]

This is a case of withholding. One important way for a withholding to occur is "the defendant (owner) makes representations, but does not disclose facts which materially qualify the facts disclosed, or which render his

disclosure likely to mislead."[26] The rules for withholding are given later in this chapter.

Was the contractor misled?

When inaccurate information is provided, the contractor must also show that he/she was misled by the misrepresentation. In **Morrison-Knudsen Company v. United States**, the court stated:

> ... mere proof of the defendant's (owner) misrepresentations is not sufficient to justify a judgement in favor of the plaintiff. A further prerequisite to recovery by the plaintiff is proof that the plaintiff was misled by such misrepresentations.[27]

Proof of being misled is often found in the contractor's bidding sheets. If the contractor did not rely upon the misrepresentation in preparing the bid, then there is no damage and therefore no owner liability. If the contractor used the misrepresentation to prepare the bid, then he/she must also prove that the bid would have been different if the information was provided correctly.

Was reliance on the information justified?

The contractor not only has to prove that he/she was misled, but reasonably misled. Normally, contractors will not be reasonably misled if other readily available

information existed that would have given a more complete understanding of the conditions to be expected. This information may come from many sources, such as other contract clauses, test reports that were available but were not included in the contract documents, site visits, and the contractor's own experience. If this other information acts to modify the representation, then the contractor's reliance was not justified.

Other contract clauses. The contract must always be "read as a whole." Other contract clauses often modify or clarify the boring data and other subsurface information furnished to bidders. All contract provisions must be read together to determine what is required.

In **Morrision-Knudsen Company v. United States**, the court stated that the contractor was not justified in relying on borings showing no permafrost in the excavation area. The court said:

> ... the contract contained a provision that specifically informed the plaintiff (contractor) of the likelihood of encountering permafrost. ... the incorrect data (soil borings) which the defendant furnished to the plaintiff... represented only a portion of the material which the defendant furnished to the plaintiff and other prospective bidders regarding subsurface conditions...[20]

In this case, the court ruled that a misrepresentation existed at the two borings in dispute. However, the contractor was only reasonably misled by the misrepresentation in the area directly around the

boreholes. The court ruled the contractor was only entitled to recovery for permafrost found within 10 feet of the disputed borings. The contractor was awarded $1,609 on his claim of $25,049 and was not awarded costs.

Other readily available information. Usually soil reports are made available to the contractor, but are not included as part of the bidding package. If the bid documents or normal construction practice indicates to the contractor that these reports exist, then he/she must consult them or assume the risk of knowing their content.

In **C.W. Blakeslee v. United States**, the soil report was available for review in the Resident Engineer's office. The information was based on wash borings. The contractor reviewed the wash boring map but did not review the boring log. The map only showed the stratification of the soil. It did not show any boulders or indicate that the boring contractor had used explosives to get through boulders to continue some of the wash borings. The contractor filed a claim when numerous boulders were found in the work area. The court in denying the claim stated:

> The method of making the borings and the fact that dynamite was used and similar information is recorded in the log book. Plaintiff (contractor) knew this but made no effort to consult the log book, which was available to them. Plaintiff therefore have no one but themselves to blame for the fact that at the time they submitted their bid they did not know that dynamite had been used by the defendant in making the borings and can not be heard to complain that they were misled or damaged by the defendant because of that fact.[29]

The need to review and consider all relevant information is further illustrated by **Flippen Materials v. United States.** The dispute involved a quarry operation for concrete aggregate. The boring profiles provided to the bidders showed cavities without stating what was in those cavities. However, the field logs showed that the cavities were filled with clay. This clay made the quarry material unsuitable for concrete aggregate. The court ruled that the drawings were not incorrect as far as they went. The plaintiff had been directed to review the field logs for the complete story. The contractor failed to do so. In ruling against the contractor the court stated:

> ... but we think the fair residue of the opinions is that a contractor cannot call himself misled unless he has consulted the relevant Government information to which he is directed by the contract, specifications and invitations to bid. As we read them, the decisions of the Supreme Court and of this court do not permit the contractor to rest content with the materials physically furnished to him.[30]

Outside information as a representation. The above section shows a contractor must refer to all readily available information known to exist. However, this information is not considered a positive representation. Only information provided to the contractor for use in preparing a bid is considered a positive, material statement.

In **Foundation Co. v. State,** the state issued a

contract that required caissons be sunk to bedrock. The plans did not show the expected depth of the caissons but did give an estimated quantity of material to be removed to reach bedrock. The contract did not state that borings had been made when, in fact, wash borings were taken and showed bedrock at about elevation 148. Before bidding, the successful contractor learned of the borings and requested copies which the State supplied. When the work began, bedrock was found much deeper than elevation 148. The contract allowed the State to have the contractor complete the project at the original unit prices if contract estimates were exceeded. The estimates were exceeded and the State directed the contractor to perform the work at the original unit prices. The contractor filed a claim, requesting additional monies, arguing that the borings misrepresented the bedrock at elevation 148. The court in denying the contractor's claim stated:

> ... damages might be recovered from the State for misrepresentations, upon which the bidder might rely, the boring sheet was not such a representation. It formed no part of the plans upon which the contract was based. It was not prepared or used for that purpose. It was an independent bit of information or supposed information in the possession of the State, to which the bidder resorted in making the investigations which it was required to make. If it relied upon this paper, it did so at its own risk. The most it could ask for in regard to this information was good faith.[31]

These cases emphasize the need for the contractor to study all information identified in the bidding package or

reasonably available. However, the contractor cannot follow this outside information with the same confidence as information provided in the bidding documents.

Site visit. A favorite defense of owners is the site visit clause similar to the federal site visit clause presented in Appendix A. The site visit clause typically requires the contractor to become familiar with the site and local conditions. Unlike disclaimers which act to negate a representation, the site visit clause acts to modify and reduce reliance on the information provided by the representation.

When a site visit clause exists, courts will require contractors to perform the visits in a reasonable manner. However, this requirement does not extend to making an independent subsurface investigation unless specifically directed to do so by specific contract clauses (see N.J. subsurface conditions clause in Appendix A). **Hollerbach v. United States** is a landmark case with respect to site visits. The court, referring to site visit clauses, said:

> We think it would be going quite too far to interpret the general language of the other paragraphs as requiring independent investigation of facts which the specifications furnished by the government as a basis of the contract left in no doubt.[32]

The Supreme Court stated in this case that contractors need not do independent subsurface investigations unless directed by specific contract language. If the owner

desires the contractors to make independent investigations, the contract should direct them to do so in clear, unambiguous terms.

Even though a subsurface investigation is not required, the site visit must still be performed in a reasonable and prudent manner. In **Warren Brothers Company v. New York State**, the contractor should have observed 12-18 inch rocks along a shoulder of a highway to be repaired. The contractor bid the job expecting rocks no larger than 6 inches. The court in denying recovery stated:

> Furthermore, it appears that an appropriate inspection of the job site by claimant (contractor), a requirement imposed by the proposal and contract, would have revealed the actual condition had not such an inspection been confined to driving along the highway in an automobile.[33]

Contractor experience. The courts have sometimes considered contractor experience in deciding cases. However, this criteria seems to be a "rule of last resort." An example is **Morrision-Knudsen v. United States.** In this case, the court ruled that the contractor was not reasonable when he/she relied on two borings showing no permafrost to indicate that the entire site would not have permafrost. The court, in addition to other reasons, stated that the contractor should have known that some permafrost would be encountered since he/she was "experienced in the area and had a general knowledge of the widespread, though discontinuous, existence of permafrost."[34]

Withholding

Another form of misrepresentation is when relevant information, that the owner is aware of, is withheld from the contractor. These rules are presented on the right side of Figure 2.1.

Was relevant information withheld?

A withholding is another form of misrepresentation. In **Warner Construction Corp. v. Los Angles**, the court stated:

> It is the general rule that by failing to impart its knowledge of difficulties to be encountered in a project, the owner will be liable for misrepresentation if the contractor is unable to perform according to the contract provision.[35]

The court further stated there are three instances that a misrepresentation may be caused by not providing information to a contractor.

> In transactions which do not involve fiduciary or confidential relations, a course of action for nondisclosure of material facts may arise in at least three instances: (1) the defendant makes representations but does not disclose facts which materially qualify the facts disclosed, or which render his disclosure likely to mislead; (2) the facts are known or accessible only to the defendant, and defendant knows they are not known to or reasonably discoverable by the plaintiff; (3) the defendant actively conceals discovery from the plaintiff.[36]

Failure to disclose all relevant facts can occur when the results of soil borings are given, but particular

information about the borings is not provided or made available to the contractor. In **Christie v. United States**, the government had made borings but failed to reveal that buried logs had been found during the boring operation. When the drilling rig hit an obstruction, the crew moved the rig until a full boring could be completed. This boring was then recorded as if it was the planned position. No mention was made of the unsuccessful borings. The field engineer doing the borings felt that the information was not important enough to include in the boring report. The contractor discovered numerous buried logs and cemented sand and gravel that greatly increased the cost of construction. Although the boring logs were correct in what was presented, the court ruled in favor of the contractor due to the withholding of vital information.

Sometimes soil reports are purposely concealed from the contractors. This situation will likely lead to recovery. In **Valentini v. City of Adrian**, the city took borings that revealed quicksand along the route of a proposed sewer. This information was never given to the contractor, nor was the contractor informed that the borings had been made. The court stated:

> ... the city, through its consulting engineers had knowledge of the unfavorable subsurface conditions; that these conditions were not made known to the plaintiff (contractor); that as a result of encountering these unfavorable subsurface conditions of quicksand and excessive water, plaintiffs

> construction of the sewer was delayed and resulted in the greatly increased costs of construction...[37]

The contractor was awarded damages.

For a withholding to occur, the information has to be within the knowledge of the owner or agent. The owner cannot be held liable for information that it does not know exists. Owners are not required to search their old records and interview all of their employees, rather, the information withheld must be known to the people actually involved in the construction. "The law puts no affirmative duty on public officers to search through old files for plans of existing structures before contracting..."[38]

Was the contractor misled?

The contractor must prove that the bid would have been significantly different if the information was furnished. While no dollar amount can be cited, courts utilize phrases like; "greatly increased costs of construction"[39] and "far more difficult and expensive to penetrate and excavate."[40] The difference must be fairly substantial and not inconsequential.

Should the contractor have known of the condition?

The same steps that will make a contractor not justified in relying on a representation, will make him/her aware of an unstated condition. These are; (1) interpreting the contract as a whole, (2) site visit, (3) other readily available information outside the contract and (4) contractor experience.

An example of 2 and 3 above is found in **Wiechmann Engineers v. State** where a boulderous condition was found at the job site. A soil report that showed the boulderous conditions was not provided by the State, but would have been provided, if requested. The contractor did not request a copy of the report even though the contractor knew it existed. Also, the boulders were readily apparent from a visual inspection of the site. Although the State had withheld the soil report, the court ruled that the contractor should have known of the condition. The court in ruling against the contractor stated:

> ... knowledge of the boulderous condition was not known or accessible only to the State, nor did the State have such facts as were not known or reasonably discoverable by plaintiff, if plaintiff had made what would have been admittedly a reasonable and prudent inquiry.[41]

Summary

Misrepresentation claims may be based on the owner providing an incorrect representation or withholding vital information. Both are difficult to prove since the contractor has the contractual risk for the subsurface conditions. The contractor must prove an incorrect representation or that a withholding occurred and must further prove that he/she was reasonably misled.

Table 2.1 provides an overview of the misrepresentation rules discussed in this chapter. Many of the elements of the rules are given in this table. This table used with Figure 2.1 will provide a field applicable DSC resolution guide.

Chapter 3

THE DIFFERING SITE CONDITION CLAUSE

The use of a Differing Site Condition (DSC) clause has increased in popularity as owners seek to reduce the cost of construction contracting.[42] With the DSC clause contractors do not have to include contingencies to cover the costs of unknown subsurface conditions. The DSC clause provides relief if the actual conditions are different from those expressed by the contract or reasonably expected. The gamble of the unknown site conditions is taken out of the contractor's bid, and the owner pays for difficult work only if it is actually encountered. As stated by **Al Johnson Const. Co. v. Missouri Pacific Rail Company:**

> The purpose of the changed conditions clause is thus to take at least some of the gamble on subsurface conditions out of the bidding. Bidders need not weigh the cost and ease of making their own borings against the risk of encountering an adverse subsurface, and they need not consider how large a contingency should be added to the bid to cover the risk. They will have no windfalls and no disasters. The government benefits from more accurate bidding, without inflation for risks which may not eventuate. It (the government/owner) pays for difficult subsurface work only when it is encountered and not indicated in the logs.[43]

The standards for deciding a DSC dispute, when a DSC clause exists, are not exactly the same as misrepresentation discussed in Chapter 2. A misrepresentation is a breach of contract and the burden of proof is on the contractor to show that the owner misrepresented the conditions. With a DSC clause, the contractor only needs to show that the actual conditions were different from those reasonably indicated or suggested by the contract documents. The court has held there is a difference.

> In misrepresentation, the wrong consists of misleading the contractor by a knowingly or negligently untrue representation of a fact or a failure to disclose where a duty requires disclosure... Some degree of culpability -either untruth or such error as is the legal equivalent- must, however, be shown... The claim based upon the modern changed conditions clause is very much different, though it may arise from the same facts and be joined with a claim for misrepresentation... Misrepresentation is not the issue... the changed conditions clause eliminates the factual elements of misrepresentation and any need to impose a burden on plaintiff to prove those elements.[44]

Thus, the requirement for a positive, factual representation does not apply.

Introduction

Most owners use a version of the Federal DSC Clause. The Federal and AIA versions of the DSC clause can be found in Appendix A. These two clauses are essentially the same. The DSC clause is divided into two parts, commonly called

Type I and Type II. A Type I dispute requires the contract to have an indication of the subsurface conditions. A Type II dispute requires the actual conditions to be different from what could be reasonably expected. Each of these types will be described in more detail later in this chapter.

Since the federal clause is used in many contracts, federal precedent is heavily relied upon and most of the discussion will focus on the Federal DSC Clause. The courts have ruled that when the wording is similar to the federal clause, then federal precedent may be used to decide the dispute.[45,46,47] However, if a different clause is used, exact wording must be carefully evaluated. For example, some clauses allow recovery for a Type I condition, but not a Type II.[48]

Figure 3.1 provides the rules that the courts have used in deciding DSC disputes when a DSC clause exists. Each of these decision steps is discussed in this chapter. Table 3.1 gives a brief synopsis of the elements of each rule.

It should be noted that even when the contract contains a DSC clause, the contractor can still seek damages under the theory of misrepresentation. Misrepresentation is discussed in detail in Chapter 2.

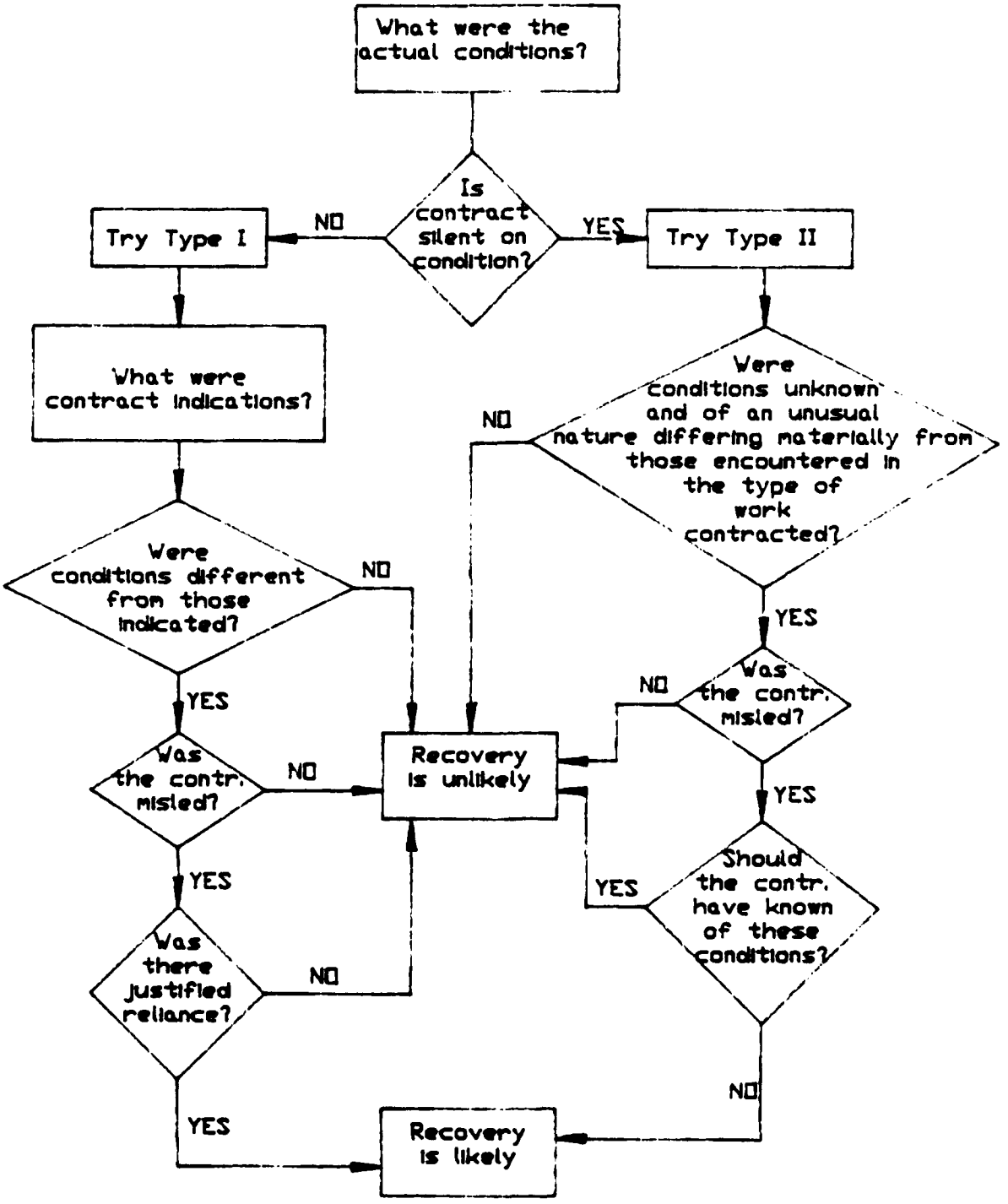


Figure 3.1 Differing Site Condition Clause

Table 3.1 Summary of DSC Clause Rules

What were the actual conditions?

A factual determination of the conditions actually found at the project site.

Is the contract silent on the condition?

If the contract is silent, then Type II DSC should be pursued. If contract is not silent, then try Type I.

For a Type I DSC

What did the contract indicate?

The contract must indicate what conditions are expected.

Plans and specifications furnished by the owner for use in the bidding.

Indications are provided to the contractor in the information furnished for bidding.

Indications may be found in the design details and specifications. The directions for proceeding with the work may constitute an indication.

The soil report as an indication.

The soil borings are the most reliable and specific indication of the subsurface conditions.

Indications of subsurface water in the soil report.

Recent court rulings have held that if the water table is not shown on the borings, then the water table is below the depth of the borings.

Disclaimers of the soil report.

Disclaimers of the soil report must be specific and unambiguous. Courts often rule the disclaimers as contradictory to the purpose of the DSC clause.

Were conditions different from those indicated?

The conditions must be different for a claim to exist. The difference must be substantial and not incidental.

Was the contractor misled?

The contractor must have been misled for a claim to exist.

Table 3.1 (continued)

Was there justified reliance?

Contract as a whole.

The contract read in its entirety may cause the contractor to disbelieve the indications and therefore not be misled.

Site visit.

The contractor must perform a reasonable site visit. The information readily available from that site visit may reduce reliance of the contract indications. The contractor need not do his/her own soil borings.

Contractor experience.

The contractor's experience in the area may reduce reliance on the indications.

For a Type II DSC

Were the conditions unknown and of an unusual nature differing materially from those encountered in the type of work contracted?

The conditions must be unknown to both parties at the time the bid was submitted. The condition cannot be reasonably expected in the type of work contracted.

Was the contractor misled?

The contractor must have been misled by the unknown condition.

Should the contractor have known of the condition?

If the contract as a whole, the site visit or the contractor's experience indicates that the condition may exist, then a Type II will not be upheld.

What were the actual conditions?

Both Type I and Type II disputes require comparing expected conditions to the actual. Since this research relied upon Appellate Court decisions, the question of actual conditions was normally already resolved as a factual issue by the trial court.

The case of **United Contractors v. United States** brings the importance of this step to light.

> Since the actual conditions must differ materially from those expected, the initial inquiry is whether United (contractor) ran into significant amounts of water in excavating. If no such factual finding has been or can be made, plaintiff's (contractors) case fails at the outset.[49]

The determination of the actual conditions is a factual matter and not one of legal or contractual interpretation.

Is the contract silent on the condition?

Once the actual conditions are determined, the contract is evaluated to see if there may be an indication of the conditions. This is the key differentiation between Type I and Type II disputes. If there is no indication of the conditions, then the contract is said to be silent on those conditions. In this case the contractor must base a claim on a Type II DSC. If the contract is not silent, then there

may be statements that qualify as indications, and a Type I DSC. There may be instances that both a Type I and Type II can be claimed. In these cases, the rules presented may be followed independently.

Type I

A Type I exists when subsurface or latent physical conditions at the site differ materially from those indicated in the contract.

What did the contract indicate?

This issue is an important point of departure from misrepresentation disputes where the requirement is there must be a positive factual representation. In a Type I dispute, there need not be actual representations. "An indication may be proven, moreover, by inferences and implications which need not meet the test for a misrepresentation or representation..."[50] "A contractor cannot be eligible for an equitable adjustment for changed conditions unless the contract indicated what those conditions would supposedly be..."[51]

Unlike misrpresentation cases, courts have shown a willingness to rely on soil reports in addition to plans and

specifications when a DSC clause is present.

Plans and specifications. Contract indications are normally found in the plans and specifications. Contractors are expected to bid on what is shown in these contract documents. If the actual conditions are different from the indications contained therein, the DSC clause will allow the contractor to recover additional expenses for the work.

> The changed conditions clause makes it clear that bidders are to compute their bids, not upon the basis of their own preaward (subsurface) investigations, but upon the basis of what is indicated and shown in the specifications and on the drawings.[52]

Design details may be sufficient to give an indication of the subsurface conditions. These descriptions and instructions may or may not be accompanied by a soil report. In Vann v. **United States** a soil report was not prepared even though the contract drawings showed the floor of the ocean to be rock. The contractor found the actual bottom to be a spoil pile instead of rock. The spoil pile greatly hindered the pile driving operation. The court ruled that a valid DSC claim existed since the contract indicated rock, and rock did not exist.[53] The contractor recovered.

In **Foster v. United States**, the contract contained an exhaustive soil report. The court stated that the contract directions provided sufficient indications of the subsurface

without the need to rule on the soil report itself.

> ...the court is of the view that the other indications in the contract of an impermeable subsurface permitting excavation in the dry - the notation as to the types of concrete; the direction that 'all concrete shall be placed in the dry'; the omission from the concrete provisions of the documents of any provision for a concrete seal or a class of concrete of which seals are made; and the so called '6 tons' note - are sufficient in themselves, without the logs, to sustain the determination that a changed condition was encountered.[54]

The contract directions and design details can give the contractor an indication of the subsurface conditions expected. More often, however, subsurface indications come from the soil report.

The soil report as an indication. A soil report is the primary indicator of subsurface conditions. This soil report may be the reporting of a simple test pit or more sophisticated boring and test methods. The court in **United Contractors v. United States** stated:

> Borings are nevertheless considered the most reliable reflection of subsurface conditions.[55] and The most reliable and specific indicator - the borings - had shown that water would not interfere with excavation.[56]

and in **Woodcrest Construction v. United States** the court stated:

> ... the main purpose of such borings is to indicate subsurface conditions which would not otherwise be discovered.[57] (underline added)

The soil report and particularly the borings are the prime indicator of subsurface conditions. However, the soil report need not only be based on borings to give an indication of the subsurface. In **Ruff v. United States**, a soil report was prepared using test pits. The test pits discovered only yellow clay in the area of construction. The contractor hit rock and claimed for the additional expenses. The court in ruling for the contractor stated that the soil report and test pits gave the contractor the indication that the entire subsurface was yellow clay. Since the contractor hit rock, a valid claim for Type I DSC existed.[58]

Indications of subsurface water. Groundwater has been found to be a common cause of many DSC disputes. Often these disputes are caused by the water table not being shown on the soil report or contract plans. In the earlier case of **Ragonese v. United States** the United States Court of Claims stated:

> The plans and specifications set out the character of the soil disclosed by these borings, but said nothing one way or another about subsurface water. It, therefore, cannot be said that the contractor encountered subsurface or latent conditions materially different from those specifically shown on the drawings or indicated in the specifications.[59]

Here the court reasoned that if a contract is silent on a condition, a Type I DSC claim cannot be upheld. However,

the same court later modified what constitutes silence on the subject of groundwater indications in soil borings. In **United Contractors v. United States**, the water table was not shown. The court while discussing the **Ragonese** ruling stated:

> But United (contractor) claims that the plans furnished bidders not only failed to indicate the unusually high water table, but showed the water table to be at or below grade. ... Our conclusion is that the drawings (borings), properly viewed, did speak 'one way * * * about subsurface water' ... Carefully read, the (soil) profiles in this contract indicated that water would not be encountered in meaningful amounts in excavating for the project.[60]

Another case reinforced the view that a water table, not shown, is an indication that the water table exists below the level of the borings. In **Woodcrest Construction Company v. United States** the water table was again omitted from the borings. The court stated:

> Although no actual representation was made by the government that there was no ground water, and thus, we cannot say there was a warranty, the effect upon the contractor of furnishing core boring logs without indicating the groundwater shown by such borings may be the same as if a representation had been made.[61]

The courts now hold the view, stated by **United** and **Woodcrest**, that if the water table is not shown, then it is an indication that the water table is below the level of the borings.

It appears that the **Ragonese** case came to a different

conclusion based on how the cases were argued in front of the court. In **United** the contractor convinced the court that a water table must always exist. Therefore, if one is not shown, it must exist below the level of the borings. It does not appear however, that **Ragonese** argued this point. Possibly **Ragonese** did not address this point since all costs were recovered based on misrepresentation.

Disclaimers of the soil report. Often owners will try to reduce their liability by disclaiming responsibility for the accuracy of the soil report. The courts have not upheld these disclaimers when a DSC clause exists. Normally, these disclaimers are general in nature and not specific enough to override the DSC clause provisions. In **United Contractors**, the court stated:

> It is true that Provision 1-07 also provided that 'the Government does not guarantee that materials other than disclosed by the explorations will not be encountered, or that the proportions of the various materials will not vary from those indicated by the logs of the explorations.' But we have held, in comparable circumstances, that broad exculpatory clauses, identical in effect to this one, cannot be given their full literal reach, and do not relieve the defendant (government) of liability for changed conditions as the broad language would seem to indicate. ... General portions of the specifications should not lightly be read to override the Changed Conditions Clause. It takes clear and unambiguous language to do that...[42]

Thus, courts are unlikely to uphold a general disclaimer if a DSC clause is present. To do so would negate the purpose of the DSC clause, that is, to reduce contract costs

by encouraging contractors not to include contingency costs in their bids.

Indications versus representations. The cases researched, in total, show that the court will allow the contractor much more leeway in its determination of expected conditions when a DSC clause is present. While a representation must be a positive material statement, an indication may be comprised of implication and inferences. This allows the contractor freedom to reasonably interpolate between borings. Therefore, if the ground conditions between borings appears obvious, than it may be considered an indication of those conditions. However, these same borings would probably not be a representation for conditions between the borings in a misrepresentation case. In misrepresentation the borings are only valid at the area directly reported by the borings.

Were conditions different from those indicated?

The actual conditions must be materially different from those indicated. Minor and inconsequential differences are not sufficient to sustain a claim. While no clear rule exists for what is a material difference, common sense should prevail. The courts usually make statements such as; "These changes were plainly substantial modifications of the

work to meet changed conditions."[63] Therefore, a difference that does not clearly affect the contractor's work, can not be the cause of a claim.

Was the contractor misled?

The contractor must have been misled by the incorrect indication. There are two steps to proving the contractor was misled. First, the contractor must show that he/she bid the project according to the incorrect indication. Second, the contractor must show that the bid would have been different if the indication was correct. Only if the bid would have been different, can the contractor say that he/she was damaged.

> Plaintiff (contractor) must prove ... and that it was damaged as a result of the material difference between the expected versus the encountered conditions.[64]

Was there justified reliance?

The issue here is whether the contractor reasonably interpreted the contract indications. There are times that the contractor may not be justified in relying on the contract indications. Some things that may reduce its reliance on the contract indications include: the contract as a whole, a site visit or the contractor's own experience.

If any of these signify that the indications are incorrect, then the contractor is not justified in relying on those indications.

> Plaintiff (contractor) must prove that it reasonably relied upon its interpretation of the contract plans and specifications...[65] We return once more to the central issue, was Granite-Grove's (contractor) interpretation reasonable?[66]

To determine if the contractor was reasonable, the court will often place itself in the shoes of the contractor. The court will then determine if the contractor acted reasonably.

> A proper technique of contract interpretation on this problem is for the court to place itself into the shoes of a 'reasonable and prudent' contractor and decide how such a contractor would act in appellant's (contractor's) situation.[67]

Contract as a whole. The contract must always be read in its entirety to determine the contract indications. Aside from disclaimers of the borings, there are often other clauses that will reduce reliance on indications of the subsurface. In **Foster** the court looked to see if other contract statements reduced the contractor's reliance on the indication given by the soil borings that the contractor could pour concrete "in the dry."[68]

> The next problem is whether anything else in the contract documents barred plaintiff (contractor) from concluding from the borings that, relatively dry earth would be encountered.[69]

For other contract indications to override the soil

borings, they must be specific statements, not the generalities that are found in many contracts. In **United Contractors,** the court said the general statement that high ground water existed cannot negate the precise information given by the borings.[70]

Site visit. Contracts usually require the contractor to become familiar with the construction site prior to submitting a bid. If readily apparent conditions contradict contract indications, then the contractor can not reasonably rely on those indictions. An example of the federal site visit clause can be found in Appendix A.

The court has affirmed that the contractor is responsible for conditions that are readily apparent. In **Mojave Enterprises v. United States** the contractor estimated the amount of rock it had to remove from a hiking trail using the plans furnished to it by the government. The contractor did not conduct a site visit although there were opportunities to do so. A site visit would have made it obvious that the drawings were not meant to reveal the actual amount of rock to be removed, but merely to indicate that rock removal was part of the project. The court denied the contractor's claim stating that the contractor acted unreasonably when it based the bid solely on the drawings without making a site visit.[71]

The court expects the site visit to be performed

professionally and to the standard of other reasonable contractors.

> A reasonable site investigation is properly evaluated against what a rational, experienced, prudent and intelligent contractor in the same field of work would discover.[72] This is not to say, of course, that such (contract) indications would excuse a site inspection or that such site inspection need not discover patent indications plainly, to a layman, contradicting the contract documents.[73]

Owners often deny a claim stating that the site visit clause required the contractor to perform an independent subsurface investigation. However, the courts do not support that view.

> In the cases arising under the modern changed conditions clause, caution continues to be observed that the duty to make an inspection of the site does not negate the changed conditions clause by putting the contractor at peril to discover hidden subsurface conditions or those beyond the limits of an inspection appropriate to the time available. The contractor is unable to rely on contract indications of the subsurface only where relatively simple inquiries might have revealed contrary conditions.[74] ... we are not inclined to view the requirement that the contractor examine the construction site, under the circumstances of this case (presence of a DSC clause), as contemplating that the contractor make its own separate test borings before submitting its bid.[75]

Contractor experience. The contractor's experience may alert him/her to an existing condition. If the contractor knows or should know that the actual conditions are different from those indicated, he/she cannot receive a windfall due to that incorrect indication. This test is discussed in some cases, but rarely given full weight unless

there is other evidence that the contractor was unreasonable. In **Morrision-Knudsen v. United States** the court stated that the contractor should have expected to encounter permafrost even though the borings did not show any in the area of construction. The court in making this determination, not only cited the contractor's experience in the area, but that the borings outside the construction area showed permafrost and the contract had specific clauses warning of permafrost.[76]

However, if the contractor ignores information that is known to exist, the contractor cannot claim he/she was being reasonable. In **Leal v. United States** the contractor found the water table higher than it expected. It was discovered during the trial that the borings showed the water table with the abbreviation "WT." The borings did not however define what the abbreviation "WT" meant. The court denied the contractor recovery stating:

> There was sufficient information in the drawings and specifications to indicate to an experienced operator the existence of a water table in the valley.[77]

Type II

A Type II DSC claim occurs when "unknown physical conditions at the site, of an unusual nature, which differ

materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract" are encountered (See DSC clause in Appendix A). A Type II condition requires a variance between the site conditions actually encountered and those reasonably expected in the type of work contracted.

A Type II claim will only be successful if the contract is silent on a given condition. If the contract is not silent, then the condition cannot be "unknown physical conditions."

Were the conditions unknown and unusual?

This is the central issue in resolving Type II disputes. The condition needs to be unknown and different from what a reasonable contractor would expect in doing the type of work involved in the contract. An example is a quarry contractor not able to get acceptable rock from the only "approved" quarry that the government provided for use by the contractor. In **Kaiser Industries v. United States** the contractor could not get rock of the correct size from the government furnished quarry. The court stated:

> Certainly, encountering a condition in a 'quarry' - let alone an 'approved' quarry - which makes it not a usable quarry at all for the purposes involved, should, it seems clear, normally be considered an

> 'unusual' one not 'ordinarily encountered and generally recognized as inhering in' quarrying operations. Thus, it seems almost self-evident that plaintiff (contractor) would be entitled to an equitable adjustment under this plain language of the above quoted second part of Article 4 (the DSC clause).[78]

Clearly, the above conditions were not anticipated by either party when the contract was made. This is an important point in Type II disputes. If the condition was anticipated by either party, then a Type II condition cannot exist.

The condition need not be a freak to be covered by Type II, but merely unknown and unusual for the type of work contracted. In **Western Well Drilling v. United States** the court stated:

> The term 'unusual' does not refer to a condition which would be deemed a geologicial freak but rather a condition which would not be anticipated by the parties to the contract in entering into their initial agreement.[79]

Was the contractor misled?

The contractor needs to prove he/she was reasonably misled by the condition not being indicated in the contract. The steps to proving this are similar to the steps for a Type I condition. That section should be consulted for resolution of this issue.

Owner Not Insurer

The presence of a DSC clause does not mean that the owner will totally cover the mistakes and losses a contractor might face. Owners are not insurers of contractors. In **Blauner v. United States** the contractor made a mistake about the type of material that was to be removed. The court stated:

> The defendant (owner) is not an insurer of contractors against loss. Where a contractor has miscalculated, and, through its own negligence in not examining the site, has failed to take into consideration conditions which actually existed and which had been called to his attention in the specifications by a warning to visit the site, and sustains a loss, no claim arises.[80]

Also, the DSC clause does not change existing policy on acts of God. In **Arundel v. United States** the contractor sued for a higher unit price when required to remove only 70 percent of what the contract estimated. The court determined that the reduced quantities were due to a hurricane after the bids had been received and opened. In ruling against the contractor the court stated:

> It is a general principle of law that neither party to a contract is responsible to the other for damages through a loss occasioned as a result of an act of God, unless such an obligation is expressly assumed.[81]

Summary

Table 3.1 provides an overview of the DSC clause rules discussed in this chapter. This table provides the major criteria used in evaluating the rules. This table when used with Figure 3.1, provides a field applicable DSC resolution guide.

Recovery for DSC claims is normally easier for a contractor when a DSC clause exists. The DSC clause provides relief without the contractor needing to prove a breach of contract. The clause helps both the owners and the contractors. The owner receives the benefit of reduced bids since the contractor should have removed a large portion of the contingency it might have otherwise included if a DSC clause did not exist. The contractor receives assurances that the contract will be modified if the conditions are different from those reasonably expected. In theory, neither party will be unreasonably damaged nor will either receive a windfall.

Chapter 4

THE SOIL REPORT

The soil report, prepared by the owner, is usually the only investigation of the subsurface conditions that is performed before the actual start of construction. The soil report is critical because it provides the contractor with the primary indication of what the subsurface conditions will be when excavation begins. An understanding of the way the soil report is prepared and what information should be provided is necessary to avoid or resolve DSC disputes.

Factual and Interpretative Data

The geotechnical report is normally produced before construction to provide the necessary geotechnicial information for the design of the project. The report will usually contain both collected data and an interpretation of that data.

The collected data consists of: field data, laboratory data, historical data, and regional geological information. Not all of these elements will always be included in a single report.[82] The field data can include: borehole

logs, geologic surface maps, geophysical data, underground water table, and occurrences of springs, gases, mines, sinkholes, etc. Field observations should record any unusual features or occurrences observed during the testing program. Laboratory data include standard tests for the properties of the materials encountered and other tests that the geotechnical firm or designer thinks are relevant. Historical data should include information on other construction in the area and results of previous soil investigations on or near the site. These data should include only observations and facts.

The interpretation of data should be clearly separated from the factual portion of the report. Since the soil report is the basis for the information provided in the contract, the contract writer must be aware of what is fact and what is interpretation. The degree of confidence in, or opinions about the validity of, the individual extrapolations and interpretations should be made clear.[8,7] Since only factual information is usually placed in a contract, the term "soil report" will hereafter refer only to the collected data portion of the geotechnical report, not to interpretations of the data.

The scope of the soil report varies from project to project, depending upon the owner's requirements and the project size. The soil report may be a single, hand dug

test pit to hundreds of borings using the latest geophysical methods. No matter how large or small the scope, the same elements are involved in the practical and legal use of the soil report.

Duty to Disclose the Soil Report

Owners will usually do a soil investigation to aid in the design of the project. Owners should make this soil report available, without disclaimers, to contractors for their review. The availability of the soil report reduces contingencies placed in the bid for unknown subsurface conditions. Owners receive lower costs and contractors are able to bid the expected conditions instead of gambling on them. A National Academy of Science study of site investigations for underground construction projects stated:

> It is in the owner's best interests to conduct an effective and thorough site investigation and then to make a complete disclosure of it to the bidders. Disclaimers in contract documents are generally ineffective as a matter of law, as well as being inequitable and inexcusable in most circumstances.[84]

However, while it is advantageous for all owners to release the soil report to prospective contractors, only Government owners are required by law to make it available.[85]

Steps in Preparing a Soil Report

The steps involved in preparing a soil report should be understood so a proper review of the soil report may be conducted. A contract manager should discuss these steps with the geotechnical engineer and decide to what extent each will be performed for the project under consideration.

The ideal steps for soil investigations are listed in Table 4.1. These are the ideal study and the actual study may be modified based on time and cost constraints.

Preliminary desk study

All investigations should begin with a thorough search for all existing information which could shed light on actual subsurface conditions at the site. Old and recent topographic maps, geologic maps, previous subsurface explorations, records of government agencies and private firms, and engineering articles should all be researched.[84]

Air photograph interpretation

Aerial photography is a very useful tool to the planner of a soil investigation. This is especially true for

Table 4.1 Ideal Steps for a Site Investigation

1. Preliminary desk study or fact findings survey.
2. Air photography interpretation.
3. Site walkover survey.
4. Preliminary subsurface investigation.
5. Detailed subsurface testing.
6. Laboratory testing.
7. Evaluation of data.
8. Final report preparation.
9. Liaison by the geotechnical engineer with the site staff during construction.

projects where no construction has been done previously in the area or projects that cover an extended area, such as irrigation and highway projects. A well trained and experienced specialist can interpret aerial photographs with surprising accuracy. The specialist should have a thorough understanding of the general geology of the area with extensive knowledge of geology, geomorphology, pedology, groundwater hydrology, and soil engineering. The information which may be obtained includes, but is not limited to, the type of bedrock, structural characteristics of the rock, the type and thickness of overburden, surface and subsurface drainage, depth of groundwater, and the relative percentage of sands and gravels. Although this information may be obtained from aerial photography alone, it is best utilized along with field and laboratory tests.[87]

Site walkover study

The proposed site should be thoroughly inspected by a geologist and/or soils engineer after review of data available from the above methods, and before actual drilling. The primary objective is to obtain as much surface and subsurface information as possible before starting the drilling program. The types of information

obtained include; accessibility of the site, topography and surface drainage. This site walkover may include test pits.[ee]

Preliminary subsurface exploration

An initial exploration program will normally be conducted. This investigation may include borings, geophysical methods or test pits. Appendix B provides methods of subsurface exploration. The amount of testing and depth will vary depending on the type of construction and money available. This study should contain enough detail for the general site characteristics to be discovered. The geotechnical engineer should be in contact with the designer on critical features which are important to the designer. The preliminary exploration results are used in three ways. The first is to determine if the information gathered during the first phases appears to be correct and to find possible trouble areas in the site. The second is to provide information to the designer for the preliminary design. The third and often forgotten step is to determine construction difficulties. This step, while not critical to design, has a major influence on the cost of the project. Leaving out this step has created difficulties in the administration of the contract. During this phase,

samples should be taken for laboratory analysis.[89]

Detailed subsurface testing

Following the preliminary study, the designer and geotechnical engineer should have a fair idea of the information gaps that exist. The detailed study should fill in those gaps and answer any questions regarding the final design or construction difficulties. This study may be done with borings and/or geophysical methods. Questions the designer needs answered for final design are of the utmost importance during this step. Samples should also be retrieved during this phase for laboratory analysis. The testing program should remain flexible so the designer or geotechnical engineer may modify the study as conditions warrant.[90]

Laboratory testing

Samples received should be taken to a qualified laboratory for testing. The laboratory tests are too numerous to mention here, but the designer and geotechnical engineer should jointly determine the testing necessary for adequate determination of the soils engineering properties.[91]

Final report preparation

Numerous intermediate reports may be prepared during the testing program. However, all information gained during the program should be incorporated in the final report. The final report should have the factual information clearly separated from the interpretations in the report. Any interpretations made should state what assumptions were made and the basis for the interpretation. The final report should include; project and site descriptions, a description of the site geology and geologic maps, description of pertinent previous explorations, description of exploration program, results of all field investigations with boring logs, results of geophysical tests, groundwater conditions, results of laboratory testing, and other clarifying information on how the study was conducted. The report may also contain recommendations on further testing.[92]

Liaison during construction

The geotechnical firm's work should not end when the final report is submitted. The firm should be available during construction for further testing and consultation, if needed. The firm should also be confirming if the results

of the study are accurate. Methods improvement can be accomplished if the firm finds where omissions may have been made in the testing program.[93]

Factual Elements of a Soil Report

Table 4.2 provides recommended factual elements that should be included in all soil reports. Interpretative information should be clearly separated from the factual portion of the report to highlight the information which the contractor can rely. The elements provided have been derived from legal cases and geotechnicial texts and papers.

Background information on the study

This section should cover the common elements of the entire program.

Reasons for the testing and testing goals. The reasons for the testing and goals of the testing program need to be spelled out clearly in the report. This basic knowledge is necessary for the report to be useful in later studies. This section should include the overall project scope and the goals as presented by the owner.[94]

Testing firm's name and address. The firm responsible for performing the testing needs to be identified in case

Table 4.2 Recommended Factual Elements of a Soil Report

- Background information on the study
  - Reasons for the testing and testing goals.
  - Testing firms name and address.
  - Equipment used in testing program.
  - Plot plan of site showing bore hole locations.
  - Names of crew performing testing and contact information.
  - Type of sampler(s).
  - Location of actual samples.
- Field logs
  - Administrative information.
    - Boring number.
    - Boring date.
    - Project title.
    - Boring location.
    - Supervisor's and inspector's names.
    - Drill rig type and identifying number.
    - Method of advancing hole.
  - Soil profile.
    - Ground elevation.
    - Depth and thickness of each strata.
    - Depth of each sample.
    - Sample identification.
    - Recovery rate of each sample.
    - Visual determination of soil.
    - Blow count.
    - Sampler identification.
    - Casing information.
    - Water table.
    - Reason for ending the hole.
  - Operation description.
    - Continuous diary entries of drilling.
    - Advancement rate of hole.
    - Obstructions encountered.
    - Delays to the drilling.
    - Any unusual occurrences.
- Final boring logs
  - Administrative matters similar to the field log.
  - Laboratory results.
  - Scaled soil profile as modified by labrotory testing.
  - Proper USC or similar soil classification of each soil.

further information is required.

Equipment used in the testing program. The boring equipment and method of advancing the hole and taking the samples need to be described in detail. This should cover the entire program with minor variations listed on the boring logs. The type of equipment used for testing is of critical importance to a bidding contractor. For instance, in **United States v. Atlantic Dredging,** the court determined the contractor was entitled to abandon the contract and receive additional compensation when the contractor learned how the borings were made. The court ruled that the government had withheld information which amounted to a misrepresentation by not indicating the borings were made using the probe method.[95] Also, if equipment is changed or modified during the program, the changes and reasons should be clearly identified.

Plot plan of site showing borehole locations. A site plan giving the location of all borings must be included. Boring numbers and definite survey lines should also be included. All borings attempted, even if not completed, should be recorded.[96]

Results of desk study. The results of the desk study should be presented with appropriate maps and expected results. If new maps were generated during the desk study, they should also be included.

Location of actual samples. Obviously, the actual samples cannot be sent with the soil report. Therefore, the location where the samples will be stored should be listed in the report. The procedure for inspection should also be included.

Field boring logs

A sample of an ideal field log is given in Figure 4.1. While details will vary from company to company, this figure provides the standard information required. This log should be prepared for each hole attempted, whether or not the hole was completed. While Figure 4.1 shows the soil profile and operation description utilizing different scales, many logs combine the two with adequate success. The choice of an actual log should be decided by the geotechnicial firm doing the testing.

Administrative matters of the boring. Each boring should contain the boring number, boring date, project title, boring location, supervisor and inspector's names, drill rig type and identifying number, and method of advancing hole. These elements should be on each boring even if presented in the background information. If different methods of advancing the hole are used, they should be listed in the operation description.[97] This

BORING NO. B-3
SHEET 1 OF 1

FIELD LOG - SUBSURFACE EXPLORATION

JOB NO. 9847 JOB TITLE Overlook Hydroelectric Project
LOCATION Hivolt R.M COORDINATES N119 579.05 E 90,843.31
DRILL Failing 1500 ANGLE Vertical REFERENCE ELEV 950 15 DATUM MSL
DRILLING CONTRACTOR J. Lynne DRILLER W. Edward INSPECTOR P. John

DEPTH IN FEET (ELEVATION)	BLOWS ON SAMPLER FOR 6 INCHES (% RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING
0	4,7,7,6 (95%)		1 Sample No. 1. Reddish-brown f sandy CLAY; trace roots; stiff. (CL)	2" SS		
	(100%)		2 Sample No. 2 Reddish-brown f sandy CLAY; stiff. (CL)	6" I.D DEN		
5	(93.5%)		3 Sample No. 3 (Upper 15"): Dark reddish-brown c.m-f sandy CLAY; trace f gravel m.s. 3/8", very stiff. (CL)	6" I.D DEN		
	(91.7%)		4	6" I.D DEN		
10	(95.9%)		5 Sample No. 3 (Lower 15"): Brown clayey c.m-f SAND and c.m-f GRAVEL; m.s. 3"; dense. (GC)	6" I.D DT CB	Uncased as of April 6	
	(83.4%)		6	6" I.D DT CB		
	(100%)		7	6" I.D. DEN		
15	(41.7%)		8 Sample No. 4: Brown clayey c.m-f SAND and c.m-f GRAVEL; m.s. 2"; dense. (GC) Sample No. 5. (Upper 11"): Brown clayey c.m-f SAND and c.m-f GRAVEL; m.s. 3"; dense. (GC) Sample No. 5 (Lower 13") Brown f sandy CLAY; very stiff. Sample No. 6 Brown f sandy CLAY; very stiff. (CL) Sample No 7 Brown f sandy CLAY; very stiff. (CL) Sample No 8 Brown c.m-f gravelly c.m-f	6" I.D DTCB		
20						

DATE	DEPTH IN FEET FROM	TO	DESCRIPTION OF OPERATION AND REMARKS
Apr 5 1971			8:00 A.M - 12.00 Set rig over hole and prepared to drill.
	0	2	2:00 P.M. - 2:30 P.M. Started hole by driving split spoon (SS) from 0 to 2 Sample length = 1.3'
	0	2	2:30 P.M. - 2:50 P.M. Cleaned hole with tricone bit
			2:50 P.M. - 5:00 P.M. Further work delayed due to only Denison starting barrel at site being used at second rig.
Apr 6			7:00 A.M. - 9:00 A.M. Prepare equipment to take Denison sample using sawtooth bit
	2.0	4.5	9:00 A.M. - 9:20 A.M. Took Sample 2 Rotary speed = 120 RPM; downward pressure = 100 psi. Sample length = 30"; loss = 0
	4.5	7.0	9:30 A.M. - 10:10 A.M. Took Sample 3 100 RPM; 110 psi. Drilling harder in lower 15"; drill water changed color at ~ 15". C = 28"; L = 2".
	7.0	9.5	10:20 A.M. - 10:40 A.M. Took Sample 4. 125 RPM; 120 psi. C = 27.5"; L = 2.5"
	7.0	9.5	10:40 A.M. - 10:55 A.M. Cleaned hole with chopping bit with upward deflected jets
	9.5	11.5	11:00 A.M. - 11:25 A.M. Took Sample 5. Bottom-discharge diamond bit; 125 RPM; 120 psi. Drilling easier at 11". C = 23", L = 1".
	11.5	13.5	11:30 A.M. - 12:00 A.M. Took Sample 6. 100 RPM; 90 psi. C = 20"; L = 4"
	13.5	15.0	1:00 P.M. - 1:15 P.M. Took Sample 7. Sawtooth bit. 100 RPM; 95 psi. C = 30"; L = 0.
	15.0	17.0	1:15 P.M. - 1:45 P.M. Took Sample 8 Diamond bit. 130 RPM; 100 psi. Tools pulled from hole when barrel would not advance farther. Possible boulder has been encountered. C = 5"; L = 7"

Source: Foundation Engineering Handbook (1975).

Figure 4.1 Ideal Field Boring Log

administrative information is critical to the total understanding of the information provided. These elements can be found across the top of Figure 4.1 except for the date which can be found in the operation description.

Soil Profile. Each boring should have a scaled soil profile. This profile should contain the ground elevation, depth and thickness of each strata, depth of samples, sample identification, recovery rate of each sample, a visual determination of type of soil, blow count, sampler information if it varies within the hole, casing information, water table, and reason for ending the boring.

Most of this information is on the left side of Figure 4.1 with the exception of; ground elevation, water table, and reason for ending the hole. The ground elevation is shown across the top and the reason for ending the hole is in the operation description. The water table was not encountered in this hole. The identification of the water table is a common cause of many disputes involving DSC. A discussion of the water table information is provided later in this chapter.

The reason that the borehole was stopped must be clearly identified. A boring is only valid to the depth it goes and no further. Any boring that positively identifies material below the depth of the boring should be subject to suspicion.[98] As can be seen in Figure 4.1, the hole was

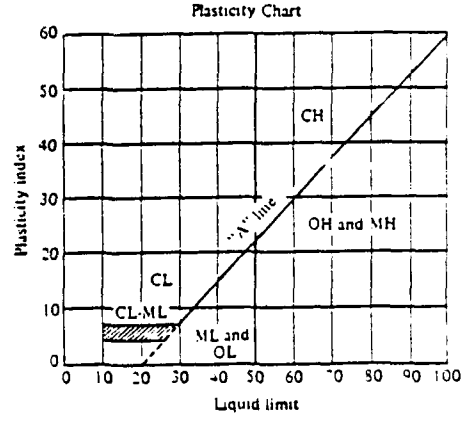
stopped when the barrel would go no further. It states only the possibility that a boulder was encountered.

Common sense must be used in reviewing soil reports. The identification of soil strata is imprecise and the identification of thin strata is nearly impossible unless they are radically different. "If a report shows thin strata of soil of similar character or an effusive classification, then someone is trying to be funny instead of accurate."[99] Figure 4.1 shows soil strata under the "symbol" column and has each strata at least four feet in thickness. Also, the sample identification is clear and concise utilizing a standard soil classification. In this case the Unified Soil Classification (USC) System was used. The USC is presented in Figure 4.2. It is highly recommended that the USC or similar classification be used.

Operation description. An accurate description of the operation should be included for each boring attempted. The description should include method of advancing the hole if it varies within the hole, advancement rate of the hole, obstructions encountered, observations made by the drilling crew, and any delays to the drilling operation.

This information can be found on the right side of Figure 4.1. The operation description is similar to a diary and diary-like entries are encouraged. The operation description should always be linked to the depth of

Major Divisions			Group Symbols	Typical Names	Laboratory Classification Criteria	
Coarse-grained soils (More than half of material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4, $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW	
		Gravels with fines (Appreciable amount of fines)	GM[a] d / u	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterberg limits below "A" line with P.I. greater than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6, $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
			SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM[a] d / u	Silty sands, sand-silt mixtures	Atterberg limits above "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7	
Fine-grained soils (More than half material is smaller than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse grained soils are classified as follows: Less than 5 per cent: GW, GP, SW, SP. More than 12 per cent: GM, GC, SM, SC. 5 to 12 per cent: *Borderline* cases requiring dual symbols[b]	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			OL	Organic silts and organic silty clays of low plasticity		
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			CH	Inorganic clays of high plasticity, fat clays		
			OH	Organic clays of medium to high plasticity, organic silts		
	Highly organic soils		Pt	Peat and other highly organic soils		



[a] Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.
[b] Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

Source: Foundation Engineering Handbook (1975).

Figure 4.2 Unified Soil Classification System

operation. Failure to describe the operation accurately has been the cause of disputes and is discussed later in this chapter.

Final boring logs

The final boring logs should contain administrative and soil profile information similar to the field logs but in a typed and presentable format. The final logs should also contain the results of the laboratory analysis of the soil and be a compilation of all field borings. The soil profile should have been modified to ensure the results of laboratory testing are included. These logs should utilize USC classifications or a similar classification system. The USC is shown in Figure 4.2.

Figure 4.3 is an example of a final boring log. The top of this figure is the administrative matter discussed in the field log. The left side is a typed, presentable soil profile showing the field results as modified by laboratory analysis. Notice the water table identification is at a depth of about two feet. The right side is the results of the laboratory analysis in this log. All laboratory tests performed are recorded with the results.

BORING NO. B - 25
SHEET 1 OF 1

SUBSURFACE EXPLORATION LOG

JOB NO. 9067 JOB TITLE BOOTSTRAP INDUSTRIAL PARK
LOCATION SAN LUIS O R COORDINATES N98995 07 E46253 85 DATE MARCH 7-8 1971
DRILL ACKER TEREDO ANGLE VERTICAL BEARING - REFERENCE EL. +2.0 DATUM MSL
DRILLING CONTRACTOR SUBSUR EXPLO INC DRILLER J MARTINEZ INSPECTOR M WOOD
SAMPLER HAMMER WT. 140 LBS. DROP 30 IN CASING HAMMER WT. 300 LBS DROP 24 IN

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN OR SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS	REMARKS
0	14,17,15 (67%)		1 Light brown dense SAND and GRAVEL, trace silt (FILL)	2" SS		13						
(+0.5)	19,15,16 (75%)		2			48						
3/8/72 (-1.5)	8,1,1 (40%)		3			56						
5	Push WOH (70%)		4 Dark brown very soft amorphous PEAT (OH)	2.8" SP		30						
	Push WOH (65%)		5			15						
(-6.0)						16	550.2	553.2	180.1	1.84	C,T	
10	2,1,2 (80%)		6 Gray very loose silty fine SAND, trace shell fragments (SM)	2" SS		13						
						13						
						5						
(-11.7)						7					G	
15	4,5,3 (80%)		7			9						
	Push 200 psi (100%)		8 Gray loose SILT, trace fine sand, trace shell fragments (ML)			8						
						6						
						6						
20	Push 200 psi (95%)		9	2.8" SP		8						
(-19.4)						10						
	Push 250 psi (92%)		10			12	36.5	43.2	30.1	2.70	C,T	
25	Push 225 psi (100%)		11 Medium stiff gray-green-yellow mottled silty CLAY, trace fine sand (CL)			15						
						13						
						12						
	3,3,9 (90%)		12	2" SS		18						
(-27.0)						29						
30	(100%)		13 Very stiff red and white CLAY, trace fine sand (CH)	2.8" D		38						
						46	29.2	37.5	20.4	2.71	C,T	
						52						
						55						
						58						
						50						
	9,12,12 (93%)		14	2" SS		55						
(-32.0)						48						
35			Bottom of Boring			69	37.4	84.6	35.6	2.73	T	
						85						

LEGEND*
- Denison Sample
- Stationary Piston Sample
- Split Spoon Sample
- Groundwater Table

ABBREVIATIONS*
- C Consolidation Test
- D Denison Sampler
- G Grain Size
- SP Stationary Piston Sampler
- SS Split Spoon Sampler
- T Triaxial Test
- WOH Weight of Hammer

* The legend and abbreviations shown here in the "Remarks" column are normally presented on a separate page

Source: Foundation Engineering Handbook (1975).

Figure 4.3 Typical Final Boring Log

The final boring log will most likely be the one furnished to the bidders. The final logs must therefore accurately reflect the facts discovered in the field borings and laboratory testing. Errors in transposing the data may lead to a DSC claim.

Common Problems in Soil Reports

Many DSC disputes involve discrepancies in the soil report. If construction professionals are aware of these problems and review soil reports accordingly, many DSC disputes can be avoided.

Water table

The most common problem encountered is the failure to show or correctly locate the water table. Since the water table is of prime importance to the contractor, construction managers should ensure that the water table is depicted accurately.

Failure to show a water table on the borings is a representation that the water table exists below the level of the borings. In **United Contractors v. United States** the court stated:

> Carefully read, the profiles in this contract indicated that water would not be encountered in

> meaningful amounts in excavation for the project... Since the condition (high water table) existed it is difficult to understand why the borings failed to reveal it.[100]

The borings are the most reliable reflection of the subsurface conditions.[101] Therefore, if the water table is not shown on those borings, it is difficult for the owner to contend that the contractor should have known of the condition. Quoting from a case where there was a DSC clause:

> Had the government core borings correctly indicated that ground water was present, we could say that plaintiff should have known of subsurface conditions.[102]

and from a case involving misrepresentation:

> It is, therefore, difficult to say whether or not plaintiff should have expected to encounter large quantities of water. ... Certain it is, that if the defendant had furnished (the contractor) with the information (the government/plaintiff) had in its possession, (the contractor) would have expected to encounter the water. This would have removed all doubt.[103]

Qualifying information omitted from the report

The owner must ensure that all information discovered during the investigation is contained in the soil report. All factual information must be provided or a misrepresentation may exist. This will happen if information is excluded that qualifies other information

that is provided. All information concerning the program, even if the geotechnical firm feels it is not important, should be included. An example is **Christie v. United States.** The government had encountered buried trees and logs during the boring operation, but did not record this information on the field logs. The court ruled against the government stating:

> (The findings) establish that borings were made and that the drill met 'obstructions which from the particles broken off and floating to the surface would indicate they might be logs.' These obstructions, though in some instances noted because of the formation, were not indicated on the drawings. And this was found: 'When such obstructions were met, the apparatus was moved elsewhere until a place was found where the drill would penetrate, and the result was recorded as if taken at the place staked out.' ... The indications of buried logs were called to the attention of the resident engineer and he was asked if they should be noted in the record of borings, to which he replied that he did not consider them of enough importance to be noted.[104]

The court ruled, "there was a deceptive representation of the material and it misled (the contractor)."[105]

The testing firm must record all occurrences of difficulties encountered during the drilling program. Failure to do so may result in a misrepresentation and a possible claim during construction.

Accurate depiction of the material

Many of the cases studied involve actual material that was different from that shown in the soil report. It is difficult to determine if this difference was due to carelessness by the testing firm or that soil borings cannot be 100% accurate. However, the contract manager must be attuned to the testing program so errors can be reduced as much as possible. Accurate presentation of the material found is the sole purpose for doing a soil investigation. If the material is inaccurately described, the owner may be liable to provide additional money to the contractor under misrepresentation or a DSC clause.

In **Al Johnson Const. Co. v. Missouri Pac R. Co.**, the owner provided the results of ten core borings to the contractor. These borings showed the subsurface to be gray to black shale in the soft to moderately hard range. Upon construction, the contractor encountered up to five foot layers of milky white vein quartz and gray quartzitic sandstone. This rock formation greatly increased the cost of construction. The court found that the hard rock formations were substantiality different from those indicated by the boring results furnished by the owner. The contractor recovered its additional costs.[104]

The contract manager must ensure that the information

provided or made available to the contractor is a complete and accurate depiction of the test results.

Conclusions

The soil report is critical to the resolution of DSC disputes. Construction managers who have a better understanding of the report will be able to review it for applicability to construction purposes. Table 4.2 should be used as a guide to determine if a complete report has been provided. If information has been omitted, the reasons should be identified and resolved before releasing the report to prospective contractors. If the soil report is reviewed for completeness prior to release to contractors, many DSC disputes may be avoided.

Chapter 5

SUMMARY AND CONCLUSIONS

This thesis provides the rules used by the courts to decide DSC disputes and guidelines for reviewing soil reports. Both elements will provide construction professionals with valuable tools for resolving and preventing DSC disputes.

Summary

The construction industry has adopted two methods for contractually managing DSC disputes. The first is for the contract to be silent on DSC remedies and the second is for the contract to contain a DSC clause. If there is no DSC clause a contractor will usually claim misrepresentation to recover the extra costs. Flowcharts were developed for the rules used by the courts to resolve both misrepresentation and DSC clause disputes. Both are discussed in detail in Chapters 2 and 3, respectively.

Legal cases were carefully reviewed to determine the important elements of the soil report were used by the courts to rule on DSC disputes. These were combined with

recommendations from geotechnical texts and papers to develop review guidelines for soil reports. These guidelines cover the steps of a soil report and factual elements that should be included. These guidelines are discussed in Chapter 4.

Misrepresentation

Recovery for DSC, when the contract does not contain a DSC clause, is usually based on misrepresentation. Misrepresentation may consist of the owner providing incorrect factual information or withholding relevant information. Figure 2.1 provides a flowchart of the rules used by the courts to decide misrepresentation disputes.

Incorrect factual information provided. Five steps are necessary to determine if the contractor is entitled to additional compensation when incorrect information is provided. First, the contractor must prove that the owner made a positive, factual and material representation concerning the conditions expected. This representation must be made in the contract documents made available to the contractor. Presence of statements generally disclaiming liability for those representations have been shown to be largely ineffective. Exculpatory language is only upheld

when it is very specific and unqualified. Also, if the representation was accurate but not complete, the contractor may have a claim based on withholding. Second, if the representation was an intent to deceive the contractor concerning the actual conditions, The contractor will probably recover. Third, the conditions encountered must be substantially different from those represented. Fourth, the contractor must have been misled by the representation. The contractor's bid would have to have been different if the representation was provided correctly. Finally, the contractor must have acted reasonably when relying on the representation. Other contract clauses, test reports available outside the contract, a reasonable site visit or the contractor's experience may have given the contractor reason to question the accuracy of the representation.

Withholding. Three steps are required to determine if recovery is likely for a misrepresentation when the owner withheld information. First, the contractor must show that the owner withheld knowledge that was relevant to the contractor. This information must have been in the owner's knowledge. This withheld knowledge may be discrete information critical to the construction or may be information that materially qualified other information that was given. Second, the contractor must have been misled by

not having the information. In essence, the bid would have been different had the owner provided the information. Finally, the condition should not have been reasonably discoverable by the contractor. A claim will probably be disallowed if other contract clauses, test reports available outside the contract, a reasonable site visit or the contractor's experience would have informed the contractor of the condition.

DSC Clause

A DSC clause patterned after the federal DSC clause provides two instances when recovery may be provided for a DSC. These are commonly called Type I and Type II conditions. Both types involve conditions that were different from those reasonably expected by a professional contractor examining the contract documents. A Type I is based on the contract indications while a Type II is based on conditions that were unknown and unusual. Figure 3.1 provides a flowchart of the rules used by the court to decide these cases.

Type I. There are four steps to determining if recovery is likely for Type I conditions. First, the contractor must show that the owner made an indication of the conditions.

This indication does not have to be a positive material representation, but only reasonably suggest the conditions. Indications may be found in the plans and specifications or the soil report. Statements attempting to disclaim responsibility for indications have not been looked upon favorably by the courts. Courts usually rule that general disclaimers of subsurface information contradict the purpose of a DSC clause and give the disclaimer no weight in the decision. Second, the contractor must show that the conditions were substantially different from those indicated in the contract. Third, the contractor must have been misled by the indiction. He/she must show the bid would have been different if the indication had shown the conditions correctly. Finally, the contractor has to show reasonable reliance on the indication. Other contract clauses, a reasonable site visit or the contractor's own experience may cause him/her to doubt the contract indications. The contractor cannot recover damages for following an indication known to be incorrect.

Type II. There are three steps to determine if recovery is likely for a Type II conditions. First, the contractor must show the conditions were "unknown and of an unusual nature differing materially from those encountered in the type of work contracted." The conditions must be unknown to

both parties at the time of bid. Also, the conditions must be different than could be reasonably expected in the type of construction contracted. Second, the contractor must show he/she was misled by not being aware of the condition. The conditions must also have a substantial impact on the contractor's operation. Finally, the contractor must show he/she could not reasonably discover the condition. Other contract indications, a reasonable site visit, or test reports outside the contract may have provided indications that the condition existed.

The soil report

The soil report was the key element in many DSC disputes. Often the reports were incorrect or incomplete. Identification was made of the steps involved in preparing a soil report. These steps are listed with the intended purpose of each described. The factual elements of a soil report are listed and described in detail. These elements have either been the cause of a DSC dispute or are recommended by various geotechnical publications. The elements were divided into what was needed for the background, the field log, and final log portion of a soil report. Common problems with soil reports which have led to

disputes are identified and discussed. These include identification of the water table, qualifying information left out of the report, and inaccurate description of the testing results.

Conclusions

Based on this thesis, it is concluded that the legal system uses a uniform set of rules for deciding DSC disputes. These rules are consistent throughout the various jurisdictions. No difference was found in the application of the rules between Federal, State or local government contract disputes. While not enough private cases were researched for a positive conclusion, it is felt that these cases are also consistent with the rules. This is in agreement with the Supreme Court when it stated that the government will be liable in the same circumstances that private individuals are liable in misrepresentation cases.[107]

There are three prime areas that resolution of misrepresentation and DSC clause disputes differ. These are attempts to disclaim responsibility for subsurface conditions, representations/indications of the subsurface conditions and what outside information may be used to determine subsurface conditions.

Disclaimers of subsurface conditions are completely ineffective when a DSC clause exists. Disclaimers are sometimes upheld in misrepresentation cases if they are specific, express and unqualified. Most disclaimers do not meet these criteria.

In contracts that contain a DSC clause the indications may be comprised of implications and inferences. These indications may be obtained by reasonable interpolations of soil borings. However, in misrepresentation cases, the representation must positively state the conditions. In misrepresentation, soil reports and borings are only valid at the specific location of each boring and interpolation is not permitted.

In contracts that contain a DSC clause, the contractor may be entitled to use information provided outside of the contract as an indication of subsurface conditions. Therefore, a soil report available outside the contract may be an indication in a DSC clause dispute. However, in misrepresentation cases, only information that is provided in the contract may be used as a positive representation. Soil reports provided outside the contract are not positive representations. Only the boring map or other information provided in the contract documents meet the criteria for a positive representation.

Recommendations for Further Research

The following areas are recommended for further research.

1. Identification of how to correctly interpret the soil report for use in preparing bids.
2. Research to determine if the DSC clause reduces disputes and claims in construction contracting.
3. Research to determine if owners are considering construction requirements in developing soil investigations.

REFERENCES AND NOTES

1 J. Sweet, 1989, Legal Aspects of Architure, Engineering, and the Construction Process 4th Ed., West Publishing Company, New York, NY., page 564.

2 **A.S. Horner Constr. Co.**, ASBCA No. 5334, 59-2 BCA Section 2321 at 10,577.

3 **United Contractors v. United States**, 368 F.2d 585, 597, 177 Ct.Cl. 151 (1966).

4 Ibid., page 598.

5 B.M. Jervis, and P. Levin, 1988, Construction Law Principles and Practice, McGraw-Hill Book Company, New York, NY., page 139.

6 **W.H. Lyman Const. Co. v. Village of Gurnee**, 403 N.E.2d 1325, 1328, 84 Ill.App.3d 28, 38 Ill.Dec. 721 (1980).

7 J. Sweet, 1989, Legal Aspects of Architecture, Engineering, and the Construction Process 4th Ed., West Publishing Company, New York, NY.

8 Restatement of the Law, Contracts 2d, §159, page 425.

9 J.C. Vance, (1978), "Legal Effect of Representations as to Subsurface Conditions," Selected Studies in Highway Law, Vol. 3, Transportation Research Board, Washington, DC.

10 Gaskins, "Changed Conditions and Misrepresentations of Subsurface Materials", 24 Fordham L. Rev. 588, 595/596 (1956).

11 Restatement of the Law, Contracts 2d, §159, page 426.

12 **Hollerback v. United States**, 233 U.S. 165, 169, 43 S.Ct. 533, 58 L.Ed.898 (1914).

13 Ibid., page 172.

14 **Morrison-Knudsen Company v. United States**, 345 F.2d 535, 539, 170 Ct.Cl. 712 (1965).

15 **Wunderlich v. State**, 423 P.2d 545, 548, 56 Cal.Rptr. 473, 65 Cal.2d 777 (1967).

16 **Dravo Corp. v. Com. Dept. of Highways,** 564 S.W.2d 16, 19 (Ky.App., 1977).

17 J. Sweet, 1989, Legal Aspects of Architecture, Engineering, and the Construction Process, West Publishing Company, New York, NY., page 553.

18 **Elkan v. Sebastian Bridge Dist.,** 291 F. 532, 538 (8 Cir. 1923).

19 **Sasso Contracting Co. v. State,** 414 A.2d 603, 605, 173 N.J.Super. 486 (App.Div. 1980), cert. denied 85 N.J. 101, 425 A.2d 265 (1980).

20 **E.H. Morrill Company v. State,** 423 P.2d 551, 554, 56 Cal.Rptr. 479, 65 Cal.2d 787 (1967).

21 **City of Salinas v. Souza & McCue Construction Co.,** 424 P.2d 921, 57 Cal.Rptr. 337, 66 Cal.2d 217 (1967).

22 **O'Neill Const. Co. v. City of Philadelphia,** 6 A.2d 525, 528, 335 Pa. 359 (1939).

23 Ibid., page 529.

24 **Elkan v. Sebastian Bridge Dist.,** 291 F. 532, 540 (8 Cir. 1923).

25 **United States v. Atlantic Dredging Co.,** 253 U.S. 1, 12, 40 S.Ct. 423, 64 L.Ed. 735 (1919).

26 **Wiechmann Engineers v. State Dept. of Pub. Works,** 107 Cal.Rptr. 529, 535, 31 Cal.App.3d 741 (1973).

27 **Morrison-Knudsen Company v. United States** 345 F.2d 535, 539, 170 Ct.Cl. 712 (1965).

28 Ibid., page 540.

29 **C.W. Blakslee & Sons, Inc., et al. v. United States,** 89 Ct.Cl. 226, 246 (1939), cert. denied, 309 U.S. 659, 60 S.Ct. 512, 84 L.Ed. 1007 (1940).

30 **Flippen Materials v. United States,** 312 F.2d 408, 414, 160 Ct.Cl. 357 (1963).

31 **Foundation Co. v. State,** 135 N.E. 236, 238/239, 233 N.Y. 177, (1922).

32 **Hollerback v. United States,** 233 U.S. 165, 172, 43 S.Ct. 533, 58 L.Ed.898 (1914).

33 **Warren Bros. Co. v. New York State Thruway Auth.,** 309 N.Y.S.2d 139, 139, 34 N.Y.2d 770 (1974).

34 **Morrison-Knudsen Company v. United States,** 345 F.2d 535, 540, 170 Ct.Cl. 712 (1965).

35 **Warner Construction Corp. v. City of Los Angeles,** 466 P.2d 966, 1001, 2 Cal.3d 285, 85 Cal.Rptr. 444 (1970).

36 Ibid.

37 **Valentini v. City of Adrian,** 79 N.W.2d 885, 888, 347 Mich. 530 (1956).

38 Annotation, "Public Contracts: Duty of Public Authority to Disclose to Contractor Information Allegedly in its Possession, Affecting Cost or Feasibility of Project," 86 ALR3d 182, 246 (1978).

39 **Valentini v. City of Adrian,** 79 N.W.2d 885, 888, 347 Mich. 530 (1956).

40 **Christie v. United States,** 237 U.S. 232, 239, 59 L.Ed. 933, 35 S.Ct. 565 (1915).

41 **Wiechmann Engineers v. State Dept. of Pub. Works,** App.,107 Cal.Rptr. 529, 536, 31 Cal.App.3d 741 (1973).

42 M. Stokes, and J.L. Finuf, 1986, Construction Law for Owners and Builders, McGraw-Hill Book Company, New York, NY.

43 **Al Johnson Construction Co., v. Missouri Pacific Railroad Company,** 426 F.Supp 639, 647 (8 Cir 1976), aff'd 553 F.2d 103 (8 Cir 1976).

44 **Foster Constr. C.A. & Williams Bros. Co. v. United States,** 193 Ct.Cl 587, 602/603, 435 F.2d 873 (1970).

45 **Metro. Sewerage Comm. v. R.W. Constr. Inc.,** 72 Wis.2d 365, 241 N.W.2d 371 (1976).

46 **Town of Longboat Key v. Carl E. Widell & Son,** Fla.App., 362 So.2d 719, 722 (1978).

47 **Sornsin Const. Co. v. State,** 590 P.2d 125, 129, 180 Mont. 248 (1978).

48 **Metro. Sewerage Comm. v. R.W. Constr. Inc.**, 72 Wis.2d 365, 241 N.W.2d 371 (1976).

49 **United Contractors v. United States**, 368 F.2d 585, 594, 177 Ct.Cl. 151 (1966).

50 **Foster Constr. C.A. & Williams Bros. Co. v. United States**, 193 Ct.Cl 587, 604, 435 F.2d 873 (1970).

51 **North Slope Technical Ltd., Inc. v. United States**, 14 Cl.Ct. 242, 252 (1988).

52 **Al Johnson Construction Co., v. Missouri Pacific Railroad Company**, 426 F.Supp 639, 647 (1976).

53 **Vann v. United States**, 420 F.2d 968, 986, 190 Ct.Cl. 546 (1970).

54 **Foster Constr. C.A. & Williams Bros. Co. v. United States**, 193 Ct.Cl 587, 592, 435 F.2d 873 (1970).

55 **United Contractors v. United States**, 368 F.2d 585, 597, 177 Ct.Cl. 151 (1966).

56 Ibid., page 598.

57 **Woodcrest Construction Company v. United States**, 408 F.2d 406, 410, 187 Ct.Cl. 249 (1969), cert. denied, 398 U.S. 958, 90 S.Ct. 2164, 26 L.Ed.2d 542 (1970).

58 **John K. Ruff v. United States**, 96 Ct.Cl. 148, 163 (1942).

59 **Ragonese v. United States**, 120 F.Supp 768, 769, 128 Ct.Cl 156 (1954).

60 **United Contractors v. United States**, 368 F.2d 585, 595/596, 177 Ct.Cl. 151 (1966).

61 **Woodcrest Construction Company v. United States**, 408 F.2d 406, 410, 187 Ct.Cl. 249 (1969), cert. denied, 398 U.S. 958, 90 S.Ct. 2164, 26 L.Ed.2d 542 (1970).

62 **United Contractors v. United States**, 368 F.2d 585, 598, 177 Ct.Cl. 151 (1966).

63 **Foster Constr. C.A. & Williams Bros. Co. v. United States**, 193 Ct.Cl 587, 624, 435 F.2d 873 (1970).

64 **North Slope Technical Ltd., Inc. v. United States,** 14 Cl.Ct. 242, 252 (1988).

65 Ibid.

66 **Granite-Groves v. Wash. Metro Area Transit Auth.,** 845 F.2d 330, 336 (D.C. Cir. 1988).

67 **North Slope Technical Ltd., Inc. v. United States,** 14 Cl.Ct. 242, 252 (1988).

68 **Foster Constr. C.A. & Williams Bros. Co. v. United States,** 193 Ct.Cl 587, 592, 435 F.2d 873 (1970).

69 **United Contractors v. United States,** 368 F.2d 585, 597, 177 Ct.Cl. 151 (1966).

70 Ibid., page 598.

71 **Mojave Enterprises v. United States,** 3 Cl.Ct. 353, 358 (1983).

72 **North Slope Technical Ltd., Inc. v. United States,** 14 Cl.Ct. 242, 253 (1988).

73 **Stock & Grove, Inc. v. United States,** 493 F.2d 629, 631, 204 Ct.Cl. 103 (1974).

74 **Foster Constr. C.A. & Williams Bros. Co. v. United States,** 193 Ct.Cl 587, 615, 435 F.2d 873 (1970).

75 **Town of Longboat Key v. Carl E. Widell & Son,** 362 So.2d 719, 722 (Fla.App. 1978).

76 **Morrison-Knudsen Company v. United States** 345 F.2d 535, 540, 170 Ct.Cl. 712 (1965).

77 **Leal v. United States,** 276 F.2d 378, 383/384, 149 Ct.Cl. 451 (1960).

78 **Kaiser Industries Corporation v. United States,** 340 F.2d 322, 325, 169 Ct.Cl. 310 (1965).

79 **Western Well Drilling Co. v. United States,** 96 F.Supp 377, 379 (9 Cir 1951).

80 **Blauner Construction Company v. United States,** 94 Ct.Cl. 503, 511 (1941).

81 **Arundel Corp. v. United States**, 103 Ct.Cl. 688, 712 (1945), cert. denied, 326 U.S. 752, rehearing denied, 326 U.S. 808 (1945).

82 National Research Council, 1984, Geotechnical Site Investigations for Underground Projects, National Academy Press, Washington, DC., Chapter 2.

83 Ibid.

84 National Research Council, 1984, Geotechnical Site Investigations for Underground Projects, National Academy Press, Washington, DC., page 3.

85 Annotation, "Public Contracts- Duty to Disclose," 86 ALR3d 182.

86 Hans F. Winterkorn, and Hsai-Yang Fang, 1975, Foundation Engineering Handbook, Van Nostrand Reinhold Company, New York, NY., Page 3.

87 Ibid., Pages 4/5.

88 Ibid., Page 6.

89 C.R.I. Clayton, N.E. Simons, and M.C. Matthews, 1982, Site Investigation, Halsted Press, New York, NY.

90 Ibid.

91 Ibid.

92 Hans F. Winterkorn and Hsai-Yang Fang, 1975, Foundation Engineering Handbook, Van Nostrand Reinhold Company, New York, NY., Page 65.

93 C.R.I. Clayton, N.E. Simons and M.C. Matthews, 1982, Site Investigation, Halsted Press, New York, NY.

94 A.D. Robb, 1982, "Site Investigation," ICE Works Construction Guides, Thomas Telford Ltd, London, U.K.

95 **United States v. Atlantic Dredging Co.**, 253 U.S. 1, 12, 40 S.Ct. 423, 64 L.Ed. 735 (1919).

96 H.A. Mohr, 1943, "Exploration of Soil Conditions and Sampling Operations," Soil Mechanics Series No. 21, Graduate School of Engineering, Harvard University, Cambridge, MA.

97 Hans F. Winterkorn and Hsai-Yang Fang, 1975, Foundation Engineering Handbook, Van Nostrand Reinhold Company, New York, NY.

98 H.A. Mohr, 1943, "Exploration of Soil Conditions and Sampling Operations," Soil Mechanics Series No. 21, Graduate School of Engineering, Harvard University, Cambridge, MA., page 6.

99 Ibid., page 7.

100 **United Contractors v. United States**, 368 F.2d 585, 596, 177 Ct.Cl. 151 (1966).

101 Ibid., page 597.

102 **Woodcrest Construction Company v. United States**, 408 F.2d 406, 409, 187 Ct.Cl. 249 (1969), cert. denied, 398 U.S. 958, 90 S.Ct. 2164, 26 L.Ed.2d 542 (1970).

103 **Ragonese v. United States**, 120 F.Supp 768, 771, 128 Ct.Cl 156 (1954).

104 **Christie v. United States**, 237 U.S. 232, 240, 59 L.ED. 933, 35 S.Ct. 565 (1915).

105 Ibid., page 241.

106 **Al Johnson Construction Co., v. Missouri Pacific Railroad Company**, 426 F.Supp 639 (8 Cir 1976), aff'd 553 F.2d 103 (8 Cir 1976), page 644.

107 **MacArthur Brothers Company v. United States**, 258 U.S. 6, 12, 42 S.Ct. 225, 66 L.Ed. 433 (1922)

TABLE OF CASES

A.S. Horner Constr. Co., ASBCA No. 5334, 59-2 BCA Section 2321.

Al Johnson Construction Co., v. Missouri Pacific Railroad Company, 426 F.Supp 639 (8 Cir 1976), aff'd 553 F.2d 103 (8 Cir 1976).

Kaiser Industries Corp. v. United States, 340 F.2d 322 (1965).

Leal v. United States, 276 F.2d 378, 149 Ct.Cl. 451 (1960).

Loftis v. United States, 76 F.Supp 816 (1948).

W.H. Lyman Const. Co. v. Village of Gurnee, 403 N.E.2d 1325, 84 Ill.App.3d 28, 38 Ill.Dec. 721 (1980).

MacArthur Brothers Company v. United States, 258 U.S. 6, 42 S.Ct. 225, 66 L.Ed. 433 (1922).

Metro. Sewerage Comm. v. R.W. Constr. Inc., 72 Wis.2d 365, 241 N.W.2d 371 (1976).

Mojave Enterprises v. United States, 3 Cl.Ct. 353, (1983).

E.H. Morrill Company v. State, 423 P.2d 551, 56 Cal.Rptr. 479, 65 Cal.2d 787 (1967).

Morrison-Knudsen Company v. United States, 345 F.2d 535, 170 Ct.Cl. 712 (1965).

North Slope Technical Ltd., Inc. v. United States, 14 Cl.Ct. 242 (1988).

O'Neill Const. Co. v. City of Philadelphia, 6 A.2d 525, 335 Pa. 359 (1939).

P.J. Maffei Bldg. Wrecking Corp. v. United States, 732 F.2d 913 (1984).

Ragonese v. United States, 120 F.Supp 768, 128 Ct.Cl 156 (1954).

Ruff v. United States, 96 Ct.Cl. 148, (1942).

City of Salinas v. Souza & McCue Construction Co., 424 P.2d 921, 57 Cal.Rptr. 337, 66 Cal.2d 217 (1967).

Sornsin Const. Co. v. State, 590 P.2d 125, 180 Mont. 248 (1978).

Stenerson v. City of Kalispell, 629 P.2d 773 (Mont. 1981).

Stock & Grove, Inc. v. United States, 493 F.2d 629, 204 Ct.Cl. 103 (1974).

Tobin Quarries, Inc. v. United States, 114 Ct.Cl. 286 (1949).

Town of Longboat Key v. Carl E. Widell & Son, Fla.App., 362 So.2d 719, (1978).

United Contractors v. United States, 368 F.2d 585, 177 Ct.Cl. 151 (1966).

United States v. Atlantic Dredging Co., 253 U.S. 1, 40 S.Ct. 423, 64 L.Ed. 735 (1919).

Valentini v. City of Adrian, 79 N.W.2d 885, 347 Mich. 530 (1956).

Vann v. United States, 420 F.2d 968, 190 Ct.Cl. 546 (1970).

Warner Construction Corp. v. City of Los Angeles, 466 P.2d 966, 2 Cal.3d 285, 85 Cal.Rptr. 444 (1970).

Warren Bros. Co. v. New York State Thruway Auth., 309 N.Y.S.2d 139, 34 N.Y.2d 770 (1974).

Western Well Drilling Co. v. United States, 96 F.Supp 377 (9 Cir 1951).

Wiechmann Engineers v. State Dept. of Pub. Works, 107 Cal.Rptr. 529, 31 Cal.App.3d 741 (1973).

Woodcrest Construction Company v. United States, 408 F.2d 406, 187 Ct.Cl. 249 (1969), cert. denied, 398 U.S. 958, 90 S.Ct. 2164, 26 L.Ed.2d 542 (1970).

Wunderlich v. State, 423 P.2d 545, 56 Cal.Rptr. 473, 65 Cal.2d 777 (1967).

BIBLIOGRAPHY

American Law Institute, 1979, Restatement of the Law, Contracts 2d, American Law Institute Publishers, St. Paul, MN.

Clayton, C.R.I., Simons, N.E. and Matthews, M.C., 1982, Site Investigation, Halsted Press, New York, NY.

Cobb, J.E., 1984, "Micro-computers and Construction Disputes," thesis presented to University of Colorado, Boulder, CO., in partial fulfillment of the requirements for the degree of Master of Science.

Cottington, J. and Akenhead, R., 1984, Site Investigation and the Law, Thomas Telford Ltd., London, U.K.

Diekmann, J.E. and Kruppenbacher, T.A., 1984, "Claims Analysis and Computer Reasoning," Journal of Construction Engineering and Management, ASCE, 110(4).

Dowding, C.H., 1978, Site Characterization & Exploration, American Society of Civil Engineers, New York, NY.

Gaskins, "Changed Conditions and Misrepresentations of Subsurface Materials," 24 Fordham L. Rev. 588 (1956).

Hohns, H.M., 1979, Preventing and Solving Construction Contract Disputes, Van Nostrand Reinhold Company, New York, NY.

Hvorslev, M.J., 1949, Subsurface Exploration and Sampling of Soils for Civil Engineering Purposes, Waterways Experiment Station, Vicksburg, MS.

Jervis, B.M. and Levin, P., 1988, Construction Law Principles and Practice, McGraw-Hill Book Company, New York, NY.

Kendall, R.J., "Changed Conditions as Misrepresentation in Government Construction Contracts," 35 Geo. Wash. L. Rev. 978 (1967).

Mohr, H.A., 1943, "Exploration of Soil Conditions and Sampling Operations," Soil Mechanics Series No. 21, Graduate School of Engineering, Harvard University, Cambridge, MA.

National Research Council, 1984, Geotechnical Site Investigations for Underground Projects, National Academy Press, Washington, DC.

Perloff, W.H. and Baron, W., 1976, Soil Mechanics, John Wiley & Sons, New York, NY.

Richter, I. and Mitchell, R.S., 1982, Handbook of Construction Law and Claims, Reston Publishing Company, Reston, VA.

Robb, A.D., 1982, "Site Investigation," ICE Works Construction Guides, Thomas Telford Ltd, London, U.K.

Sweet, J., 1989, Legal Aspects of Architure, Engineering, and the Construction Process 4th Ed., West Publishing Company, New York, NY.

Teahan, J.E., 1989, "An Investigation of the Legal Criteria Governing Differing Site Conditions Disputes on Construction Contracts," thesis presented to The Pennsylvania State University, University Park, PA, in partial fulfillment of the requirements for the degree of Master of Science.

J.C. Vance, (1978), "Legal Effect of Representations as to Subsurface Conditions," Selected Studies in Highway Law, Vol. 3, Transportation Research Board, Washington, DC.

Winterkorn, Hans F. and Fang, Hsai-Yang, 1975, Foundation Engineering Handbook, Van Nostrand Reinhold Company, New York, NY.

Appendix A

CONTRACT CLAUSES

FEDERAL DSC CLAUSE

(a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of (1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.

(b) The Contracting Officer shall investigate the site conditions promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, an equitable adjustment shall be made under this clause and the contract modified in writing accordingly.

(c) No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (a) above for giving written notice may be extended by the Contracting Officer.

(d) No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

AIA DSC CLAUSE

4.3.6 Claims for Concealed or Unknown Conditions. If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the observing party shall be given to the other party promptly before conditions are

disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract are justified, the Architect shall so notify the Owner and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within 21 days after the Architect has given notice of the decision. If the Owner and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Architect for initial determination, subject to further proceedings pursuant to Paragraph 4.4.

NEW JERSEY SUBSURFACE DISCLAIMER

Article 1.2.12 Subsurface Conditions: It is the obligation of the Bidder to make his own investigations of subsurface conditions prior to submitting his Proposal. Borings, test excavations and other subsurface investigations, if any, made by the Engineer prior to the construction of the project, the records of which may be available to bidders, are made for use as a guide for design. Said borings, test excavations and other subsurface investigations are not warranted to show the actual subsurface conditions. The Contractor agrees that he will make no claims against the State, if in carrying out the Project he finds that the actual conditions encountered do not conform to those indicated by said borings, test excavations and other subsurface investigations.

Any estimate or estimates of quantities shown on the Plans or in the form of proposal, based on said borings, test excavations and other subsurface investigations, are in no way warranted to indicate the true quantities. The Contractor agrees that he will make no claims against the State, if the actual quantity or quantities do not conform to the estimated quantity or quantities, except in accordance with the provisions of Art. 1.8.4.

FEDERAL SITE VISIT CLAUSE

Conditions at Site of Work. Bidders should visit the site to ascertain pertinent local conditions readily determined by inspection and inquiry, such as the location, accessibility and general character of the site, labor conditions, the character and extent of existing work within or adjacent thereto, and any other work being performed thereon.

Appendix B

METHODS of SUBSURFACE EXPLORATION

TYPE	METHOD	MEASUREMENT OR METHOD OF ADVANCE	INDICATION OF CHANGE IN MATERIAL	TYPE OF FORMATION	USE IN CIVIL ENGINEERING
GEOPHYSICAL (1)					
	Gravitational				
	Graviaeter	Intensity of gravitational field	Anomalies in gravitational field	Rock ledges, domes, intrusions, faults, steeply inclined strata	Not used in Civil Engineering
	Torsion Balance	Curvature of gravitational field	No depth control		
	Magnetic	Intensity of magnetic field supplemented by inclination, declination	Anomalies in gravitational field Limited depth control	Ore bodies, faults, ridges and intrusions. Igneous, and magnetic rock	Recon. of rock ledges, faults Rapid, economical Application limited
	Electrical (Galvanic)				
	Resistivity	Current and potential drop	Variation in resistivity	Rock, soils, and ground water Horizontal and inclined strata at shallow to medium depths	Recon. of general stratigraphy Detection of irregularities Rapid, fairly reliable with correlation borings
	Potential Drop Ratio	Ratio of potential drop between 3 points	Variation in potential drop ratio		
	Seismic				
	Refraction	Travel times of refracted waves	Velocity of compression waves		
	Reflection	Travel times of reflected waves	Velocity of compression waves	Deposits at depths over 2000 ft	Not used in Civil Engineering
	Continous Vibration	Continous waves, variable frequency phase, amplitude, power, settlement	Variation in velocity, amplitude etc. of shear waves	Soil and rock, shallow depths, Horizontal and inclined strata	Recon. of general stratigraphy, dynamic properties

(1) Only principle methods listed

TYPE METHOD	MEASUREMENT OR METHOD OF ADVANCE	INDICATION OF CHANGE IN MATERIAL	TYPE OF FORMATION	USE IN CIVIL ENGINEERING
PROBING OR SOUNDING				
Rod Alone				
Simple Point	Driving by drop hammer	Blows Penetration	All soil without large stones	Recon of rock and rough soil profiles
Screw Point	Static pressure and rotation	Revolutions Penetration	Medium to hard cohesive soils	Rapid but not always reliable
Cone or Disk	Static pressure Constant speed	Force Penetration	Soft to stiff and dense soils	Shallow recon. and control tests
Rod with a Sleeve Pipe				
Wash Point	Alternation jetting and jacking	Variation in point resistance alone	Primarily cohesionless soils	Compactness profile in sand/silt
Large Cone Point	Alternating jacking and driving of rod and sleeve pipe In some cases concurrent jacking of rod and sleeve		Soft to hard and dense soils without stones and boulders	Recon., detect irregularities, detail stratigraphy but without positive identification Fast, inexpensive, indication of compactness, strength and bearing capacity.
Flush Cone Point				
Cone and Collar				
Kjellman "Insitu" Method	Insertion and withdrawal of resistor	Withdrawal resistance	Primarily soft and loose soils	
ACCESSIBLE EXPLORATIONS				
Test pits and Trenches, Caissons, Tunnels	Excavation by hand and power tools, use of explosives, sheeting of walls	Inspection, mapping sampling, and testing material in-situ	Soil and rock, unstable soils require ground water control, compressed air, or freezing	Detailed and special explor. Expensive but best of all methods except when load reduction causes soil displacement and disturbance
Accessible Borings	Power operated disk or bucket auger, single tube core barrels, mucking			

TYPE	METHOD	MEASUREMENT OR METHOD OF ADVANCE	INDICATION OF CHANGE IN MATERIAL	TYPE OF FORMATION	USE IN CIVIL ENGINEERING
BORINGS					
	Displacement Boring				
	Slit, Cup Sampler	Driving closed sampler into soil, rotation, release of piston, sampling	Blows or static force versus penetration	Loose to medium cohesionless soils Soft to stiff cohesive soils	Recon. and detailed exploration Rapid under favorable conditions
	Piston Sampler				
	Wash Boring (3)	Light chopping, strong jetting Removal of cuttings by circ. water	Cutting in water Rate of progress (2)	Soft to stiff cohesive and fine to coarse cohesionless soils	Recon. to special exploration, ground water Inexpensive equip.
	Percussion Drilling	Power chopping Periodic removal of slurry with bailers or sandpumps	Cuttings in slurry Rate of progress (2)	Soil and rock but difficult in soft sticky clay or loose sand	Penetrate gravel, boulders, rock Supplementing wash, auger borings
	Rotary Drilling	Power rotation of bit, cuttings removed by circ. drilling fluid	Cuttings in fluid Rate of progress (2)	Soil and rock, except stoney or very porous soil, fissured rock	Detailed and special exploration Fast, water observation difficult
	Auger Boring	Hand or power ops. periodic withdrawal or contin. auger	Soil removed representative sample	Medium to stiff cohesive soils Partly saturated sand and silt	Shallow recon. or detailed explor. Power ops. very fast
	Continuous Sampling	Alt. sampling and cleaning with drive samplers or core barrels	Samples obtained are representive, or undisturbed	All soils and rock cohesionless soils may require freezing	Best method for detail soil exp. Majority of exp. in rock

(2) Samples of cuttings, settled from wash water, slurry, or drilling fluid, are called "wet samples." They are non-representative and inadequate for positive identification of soil strata. However, the borings make separate sampling operations possible.

(3) Wash borings with representative samples taken at each stratum often called "Dry Sample Borings."