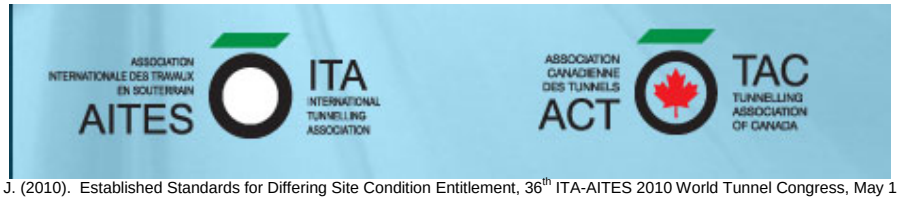

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Established Standards for Differing Site Condition Entitlement

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1. Introduction

The "changed conditions clause" was first used in the United States on federal government contracts since circa 1926. The intent was to eliminate inclusion of funds for contingencies by contractors and at the same time protect the contractors if unforeseen conditions were in fact encountered. Later the clause was renamed to the "differing site condition clause. Over time, the clause was also included in all local contracts having any federally funding at all. Subsequently, nearly all public and many private contracts now include the clause.

These standards were developed based on United States contract case law, most notably on Weeks Dredging & Contracting vs. US (Corps of Engineers). Six technical elements were identified by the court and subsequently modified by this author to better define the technical issues associated with entitlement for differing site condition claim entitlement (Tarkoy, 1988).

The technical elements were utilized, tested, and refined over a period in excess of twenty years in state and federal courts, Board of Contract Appeals, Disputes Review Boards, American Arbitration Association, Arbitration, and Mediation. The technical elements (Tarkoy, 1988, 1998, 2008) have been utilized by the US Department of Justice, US Army Corps of Engineers, US Bureau of Reclamation, Metropolitan Sanitary District of Greater Chicago, City of Evanston, New York City, Alaska Power Authority, Bolivian Presidential Commission, Washington Metropolitan Area Transit Authority, Eurotunnel, Metropolitan Water District of Southern California, DFW International, Massachusetts Water Resources Agency, and on behalf of numerous contractors, equipment manufacturers, and other owners. The American Arbitration Association, American Society of Civil Engineers, Disputes Review Board Foundation, and a number of Federal agencies have sponsored this author's continuing education course on differing site condition entitlement.

These standards have been widely utilized, widely accepted by various adjudicating bodies, and reflect the standards incorporated in various differing site condition clauses worldwide.

Utilization of these standards have reduced the conflict inherent and associated with different site condition entitlement, making resolution of claims mechanical rather than adversary.

1.1. Components of a DSC

A differing site condition claim consists of **Entitlement** and **Quantum**.

Entitlement must be established before quantum can even be considered. Unfortunately, most contractors approach a claim by first presenting the costs they wish to recover without actually

establishing entitlement. Such a process is less than palatable to an owner and generally doomed to failure.

1.2. Bases for Entitlement

There are two types of differing site conditions:

- Type 1 - Conditions different than indicated (in plans, geotechnical documents, and specifications) or anticipate based on local experience.

- Type 2 - Conditions different than normally encountered in the type of environment and work under consideration.

Most DSC claims fall into Type 1, while Type 2 is generally more difficult to establish.

2. Elements of Entitlement for a DSC

The six elements of a differing site claim entitlement demands the following:

1. There must be a difference between reasonable anticipated (indicated) and documented encountered conditions.
2. There must be a difference between reasonable anticipated and documented encountered construction performance.
3. A cause-and-effect relationship must be demonstrable between differences in conditions and differences in construction performance.
4. An impact on time and/or costs must be a demonstrable.
5. Contract conditions must be fulfilled, such as:
    a. Reliance,
    b. Notice,
    c. Mitigation, and
6. No other factors (self-inflicted) may have caused the increased time and costs to perform the contract.

For entitlement to be established, all six elements must be fulfilled. The application of the foregoing principles for entitlement in a differing site condition claim span international projects and are consistent with AGC, AIA, EJCDC, FAR, and FIDIC, contract language.

2.1. Difference in Conditions

It is inherent in a differing site condition claim that there must at least be a difference between anticipated and encountered conditions. An example of a difference is illustrated in **Figure 1.** Differences are not always so easily illustrated.

A shear zone encountered in a bored tunnel (**Figure 2,** on the right) caused the TBM to sink into the invert. At the contractor's request, the condition was examined and it was found that the core nearest this shear zone:

1. Reported an RQD = 10%,
2. Consisted of altered core, and
3. Contained soil material (**Figure 2,** on the left).

Hence, the contractor's assertion of a DSC was unfounded, as found by his own consultant.

Figure 1: Difference in Conditions

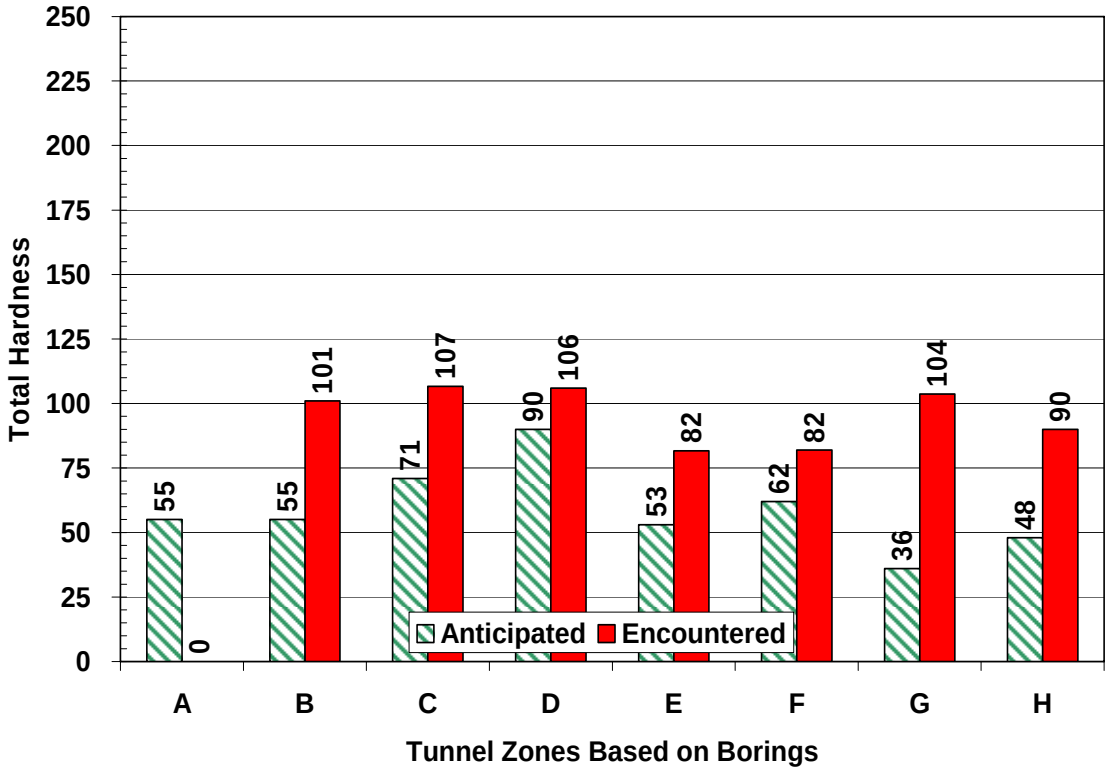
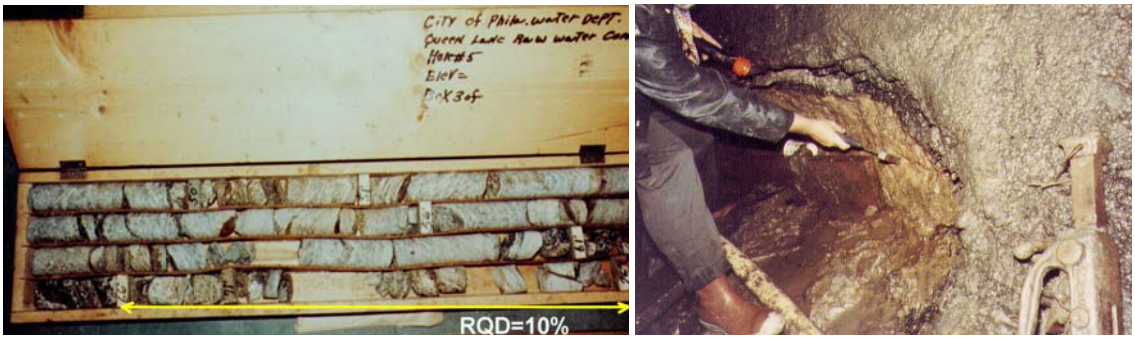


Figure 2: No Difference in Conditions

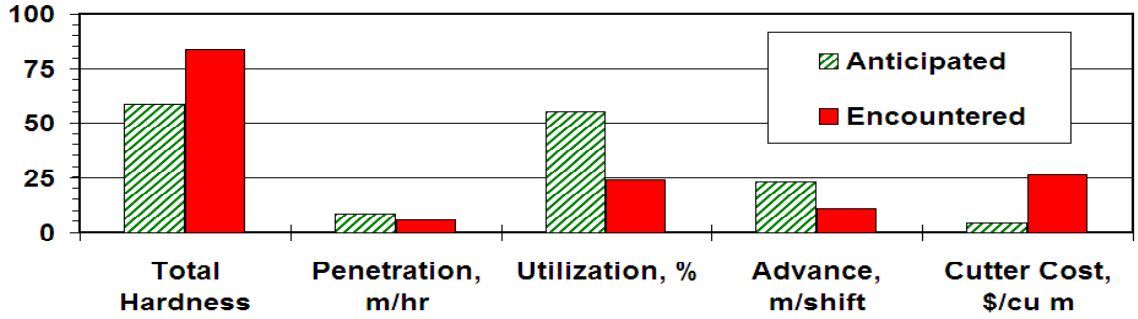


2.2. Difference in Performance

Unless there is a difference in performance of excavation, support, stabilization, the required supplies and tools, or time to complete the project, it would be difficult to prove that the contractor suffered a delay or additional costs.

In a bored tunnel, the difference between anticipated and encountered rock hardness was coincidental with the lowered TBM performance in terms of penetration rate, TBM utilization, TBM Advance rate, and the increase in cutter costs as illustrated in **Figure 3**.

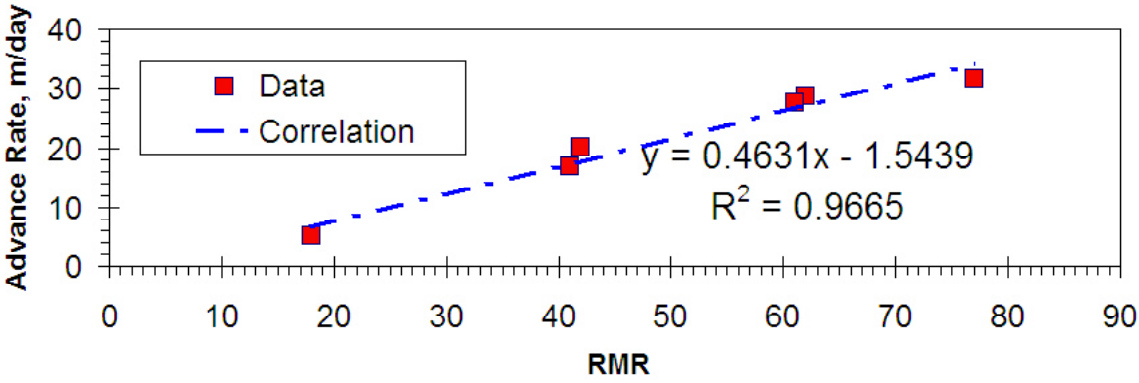
Figure 3: Difference in Performance



2.3. Cause & Effect

The difference between anticipated and encountered conditions must be the cause of the difference between the anticipated and encountered construction performance. This can be illustrated directly by correlation curves such as in **Figure** 4**.**

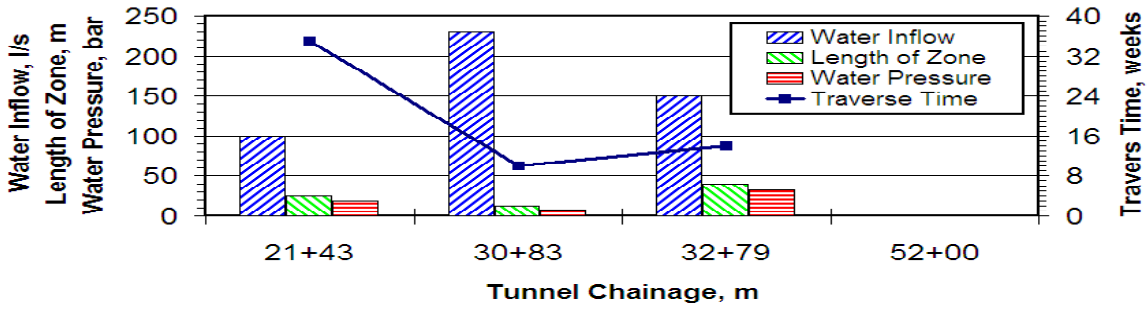
Figure 4: Cause and Effect



2.4. Impact

The unanticipated conditions must have an impact on time and costs. This impact must be illustrated in time and space, that is, at the time of the occurrence and/or the location of the unanticipated condition. The impact of water inflow, water pressure, and shear zone length on time to traverse the zone are illustrated in **Figure 5**.

Figure 5: Impact of Water Inflow & Pressure, Zone Length, on Traverse Time



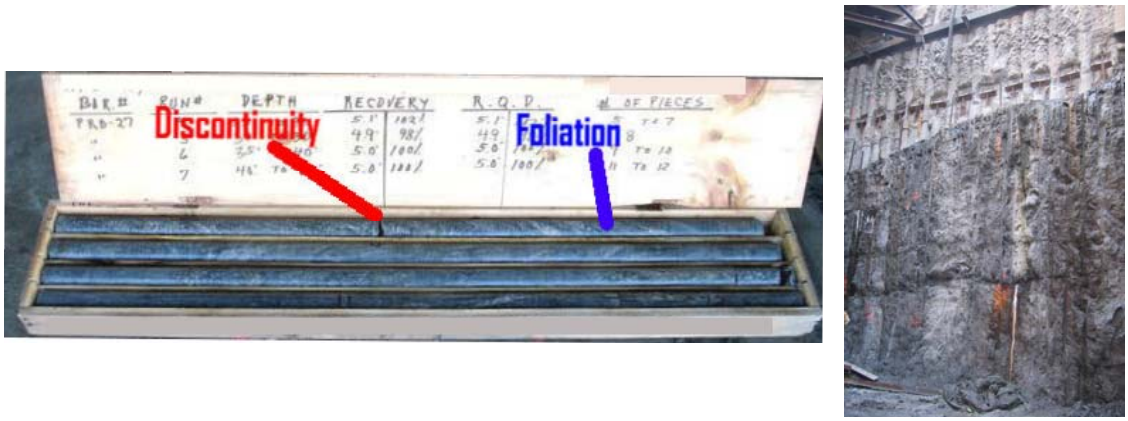
2.5. Contract Conditions

All contract conditions must be met, namely reliance on available information, notice (in writing), and mitigation of impact of unexpected conditions.

Reliance

The rock core for an open cut excavation to be performed without blasting is illustrated in **Figure 6** on the left along with the final cut slope in **Figure 6** on the right. The core is obviously massive and not amenable to efficient breakage by even the largest of impact hammers available at the time. The core was not viewed by the contractor or the contractor's consultant, yet the consultant recommended rock excavation by impact hammer. Needless to say, the contractor had a great deal of difficulty excavating the massive rock by impact hammer. Blasting was later allowed by the owner to ameliorate the contractor's difficulty. Subsequently the contractor submitted a claim which was denied by a Disputes Review Board.

Figure 6: No Reliance (on core to assess impact hammer feasibility for cutting slope)



Notice

Although the notice requirement is not always crucial or enforced by all courts, some jurisdictions, such as New York State, take timely notice very seriously.

Notice provided by a contractor on a project was 18 months (01-Sep-05 to 28-Feb-07) late, subsequent to what was later claimed to be the start of unanticipated rock mass conditions in Sep 2005. Furthermore, 90% of the rock had been excavated by the time notice was provided and it was impossible for the owner to investigate the claimed unanticipated character of the rock. The time of notice coincidentally followed the appearance of a consultant on site, pretending research intentions. The consultant subsequently provided a report entitled "**Petrographic** [microscopic] **Analysis for Rock Mass Characterization"** which was less than plausible, most notably by the adjudicating body.

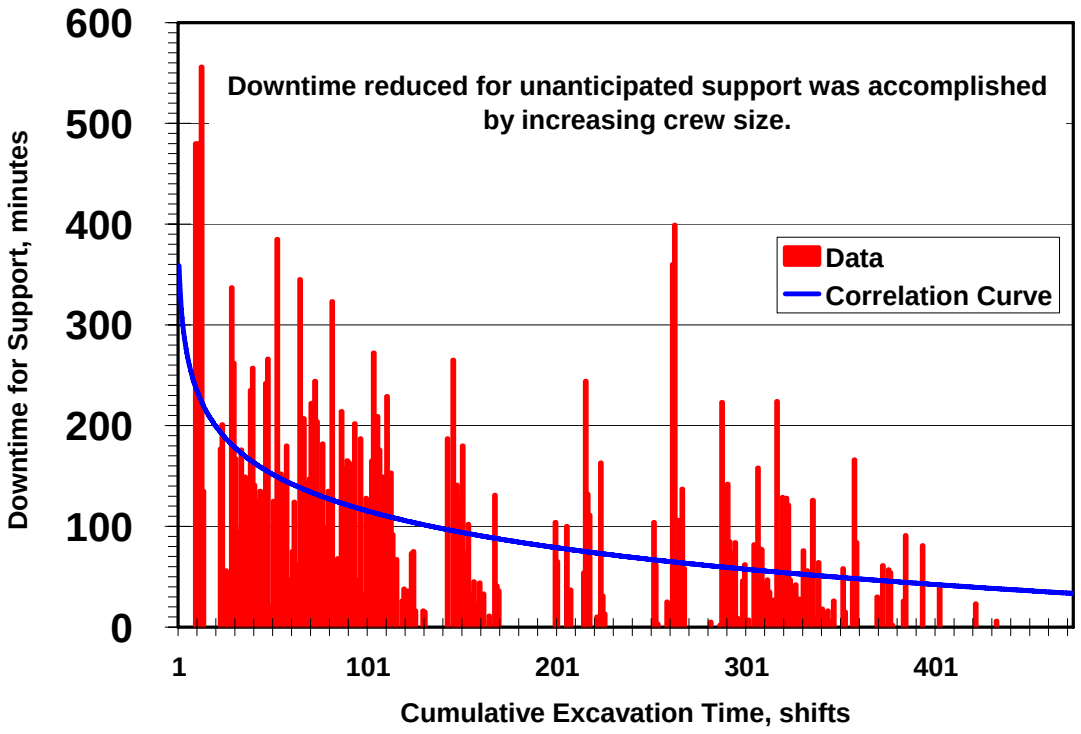
Furthermore, the contractor had already been allowed to excavate rock by blasting prior to October 2005 to ameliorate difficulties preceding that date with impact hammer excavation. The Notice for the claim was only given February 28, 2007.

Mitigation

The contractor is required to mitigate the impact of the unforeseen conditions.

In a tunnel with an unanticipated larger quantity of ground requiring steel support, the contractor was delayed setting steel rib support. In response, to mitigate the effect of unanticipated conditions, the project manager chose to increase the size of his crew to mitigate the unanticipated time delay as a result of unanticipated length of ground requiring steel rib support. Needless to say, he was successful as illustrated in **Figure 7**.

Figure 7: Mitigation (well illustrated)



2.6. No Other Causes

No other causes may be responsible for the additional time claimed to complete the job or for additional costs that are part of the claim. The selection of means, methods, equipment, and construction progress are the responsibility of the contractor. The impact of the selection of means, methods, equipment, and construction progress that are inappropriate for the indicated project conditions and constraints will disqualify any possibility of entitlement.

On a number of micro-tunnelling projects (**Figure 8**), equipment selected by the machine manufacturer was inconsistent with indicated and anticipated conditions. Subsequently, DSC claims were made by the machine manufacturer to avoid liability. An arbitrator found against the machine manufacturer. In another case, the machine manufacturer suggested a DSC to the contractor, hired a geotechnical consultant to bolster the spurious claim, and finally handed the matter over to the contractor to sue the owner for a DSC.

These principles, properly identified, utilized, based on reliable evidence, implemented with sound geological and engineering principles, and presented with clarifying illustrative methods will yield effective results. Application & utilization of these standards have resulted in the outcome of an average annual claim value of $100 million/year over the last 20 years.

Figure 8: Bad Judgment in the Selection of Cutterhead for Indicated Conditions

3. DSC Clause Reconciliation

A typical differing site condition clause has been reconciled with 6 elements presented herein for consistency between the clause and technical principles in **Figure 9**. Well written clauses contain and require that all of the principles for entitlement be fulfilled as illustrated in **Figure 9**.

4. Proposed Contract Language

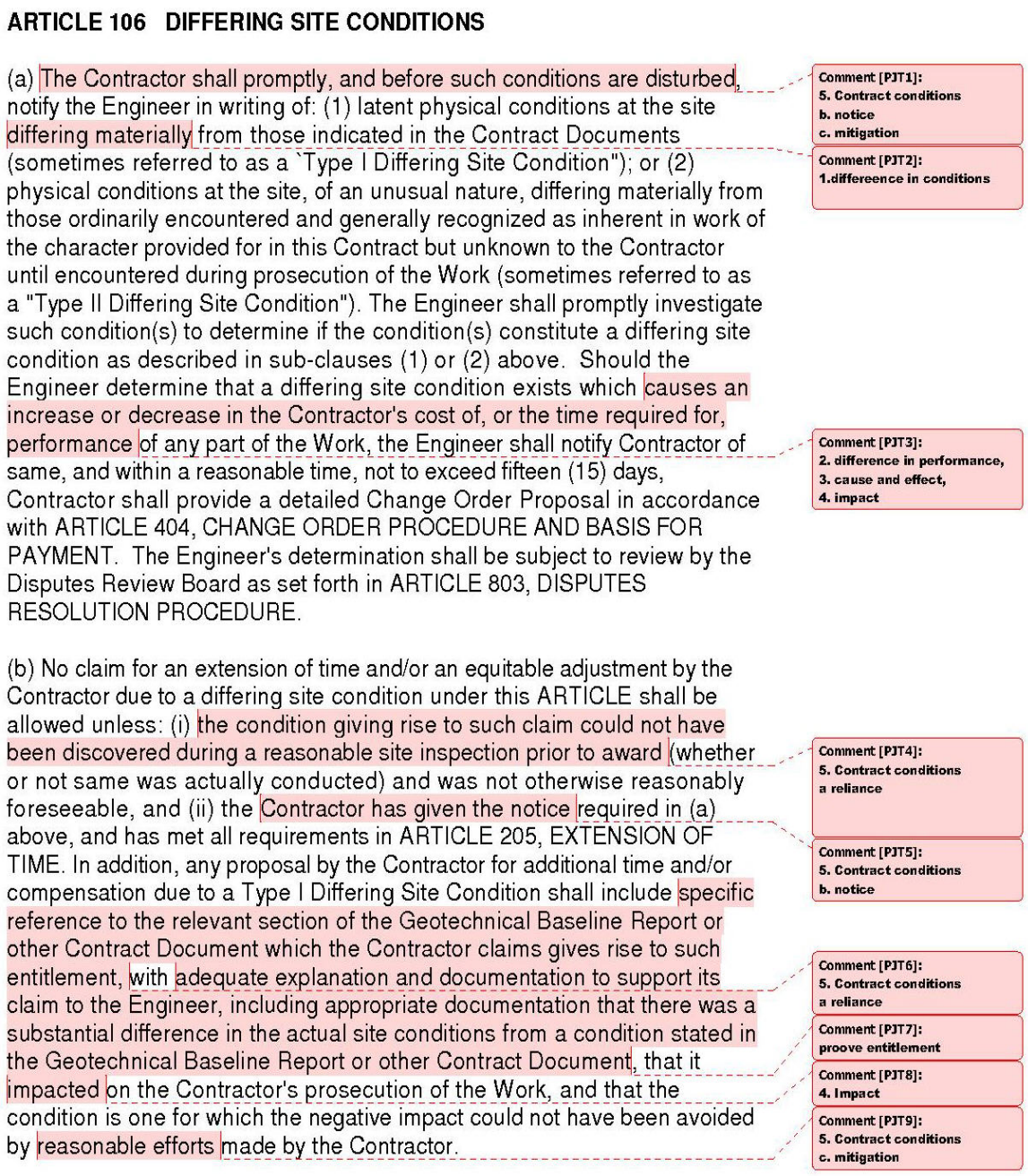
We propose that contract language clearly require adherence to a number of principles to assure a consistent and reliable baseline for construction estimates that incorporate all of the existing available information by specifically stating and requiring:

1. Reliance on geotechnical data and examine soil and rock samples,
2. Documentation to relate geotechnical conditions to contractor's cost estimate, means, methods, equipment, and progress,
3. Entitlement to be analyzed, prepared, presented and adjudicated on the basis of the 6 standard elements for entitlement,
4. Reliance on the intent of the DSC clause, and
5. Adherence to project and contract details.

5. Conclusion

Use of the foregoing technical principles will promote evaluation of entitlement by testing for 6 standard elements, simple quantitative investigation of differences, investigation of cause and effect relationships, and conformance to contract conditions. It will minimize qualitative, hazy, unidentifiable, and inferential comparisons. Such specific distinctions will diminish the opportunity for spurious claims or allow the denial of legitimate claims which promote adversary relationships. On the other hand, the fulfillment of the 6 standard elements will conclusively establish entitlement on purely technical bases.

Figure 9: Reconciliation of a DSC Clause and Six Elements for Entitlement



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