

# THE ITA CONTRACTUAL FRAMEWORK CHECKLIST FOR SUBSURFACE CONSTRUCTION CONTRACTS

ITA - Working Group 3  
Contractual Practices

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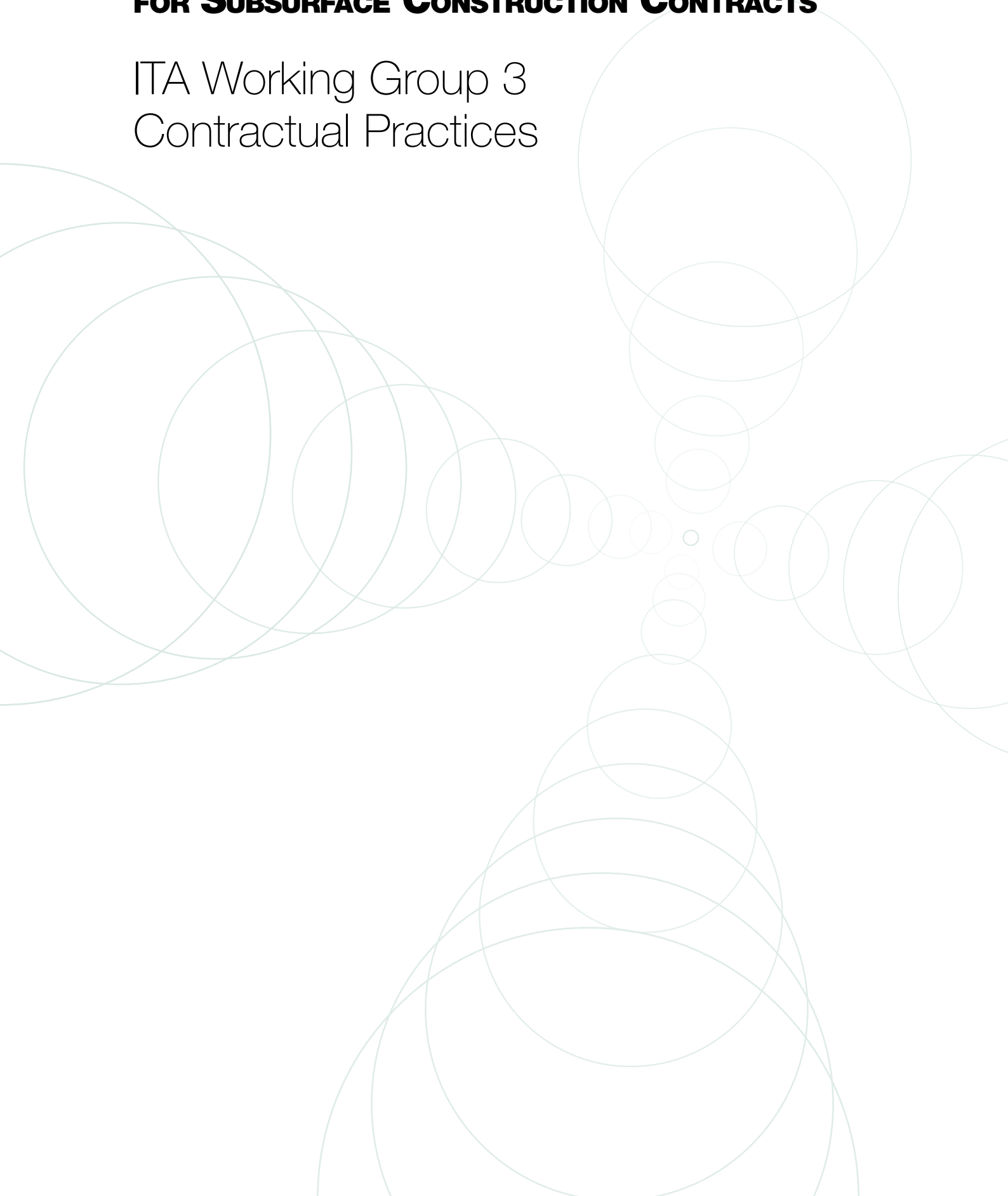
ITA

INTERNATIONAL TUNNELLING  
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## >> ABOUT THIS DOCUMENT

This document identifies the key contractual practice areas the ITA believes are fundamental for ensuring the success of subsurface construction projects.

The reason that this document has been prepared is because existing standard forms of construction guidelines and contracts do not adequately deal with the particularities of the subsurface environment. The ITA believes that the application of this framework will enhance the possibility of achieving the project objectives for all stakeholders.

This publication does not specify how each subject area should be resolved, for that is almost certainly a matter peculiar to each project – but recommends that the timely and appropriate consideration of all the matters raised in this publication is essential for the successful subsurface project delivery.

This document presumes that the reader has decided to proceed with subsurface construction option and seeks to optimize project delivery by developing and using the most appropriate contractual arrangements. This document details the subject areas which in the opinion of the ITA should be considered and where appropriate, dealt with as a minimum requirement within the contracts in order to provide the most favourable legal basis for the subsurface construction process in the specific circumstances of the project.

This document supersedes all previous documents issued by ITA WG3 - see note under 7 Conclusions.

## >> SUMMARY

Subsurface construction projects share many of the features of predominantly non subsurface construction projects however the importance of some common aspects and some unique features of subsurface projects warrant special contractual attention. In particular:

- Ensuring the inherent uncertainties of geological, geotechnical, hydro-geological and structural performance of the subsurface space are appropriately dealt with in the contract
- The nature and extent of geotechnical cost uncertainties are managed by an appropriate level of geotechnical investigations and analysis.
- Due regard is given to the mobilization and procurement of any specialized personnel and equipment that may be required to efficiently and effectively conduct the construction works. In some circumstances these may have long lead times and high start-up costs.
- Due regard is given to the scheduling of activities for testing and commissioning of any installed electrical and mechanical systems. Although such systems often only represent a small proportion of project cost they often account for a significant proportion of total project risk.
- Procedures be put in place for the timely identification of issues and effective resolution of them between the parties involved.
- Clear descriptions of the requirements and specifications of quality and performance required of all elements of the project are described including how they will be assessed and how any disputes will be resolved.
- Due provisions should be made for the cost consequences of any contractually unforeseen circumstances. These may be substantial due to the nature of subsurface construction. Careful consideration should be given to prescribing mechanisms which acknowledge and manage these uncertainties. The mechanism to specifically allocate these risks must be dealt with in the contract.
- Specialized dispute resolution processes including the use of experts accustomed to the unique issues in subsurface construction are recommended as a means of managing disputes.
- As sub-surface projects are capital intensive and it is essential for all parties that capital be efficiently and effectively redistributed in the project in accordance with the work which has actually been conducted and the unique demands of the works.

All major projects demand specialist contractual frameworks. Subsurface construction projects demand special attention in the areas noted. Failure to address these issues in a contract will almost certainly compromise the effective delivery of subsurface construction projects.

Furthermore, unfair allocation of risk in contracts will inevitably complicate the delivery of a subsurface construction project because an unfair bargain inevitably leads to conflict and disputes, as one or more of the parties struggle to survive unfair contractual burdens. In most subsurface construction projects disputes usually involve some aspect of unknown ground conditions or logistics. This is why focusing upon contractual aspects of ground conditions and logistics warrants such attention.

The specific arrangements used in each project will depend upon its unique characteristics including geological and hydro-geological context, excavation methodology, risk sharing arrangements and political demands.

With particular project delivery schemes, tunnel owners may seek to 'lock' in a contractor for a fixed price. Such a simplistic approach to the allocation of financial risk has been responsible for a large number of contractual disputes in subsurface projects due to the consequences of unexpected geological and other conditions.

Clients who would like a fixed price can expect to pay a premium for "certainty of price" because they will pay for risks which may not occur.

Contracts which include a mechanism for adjusting remuneration according to the conditions encountered will only pay for the risks that do occur. At the heart of risk management is the degree of understanding of the particularities of the subsurface environment. The benefits of the subsurface project need to be balanced in the contract with the risks of the subsurface unknowns. Balancing the expectation and capacities of the parties to a subsurface construction contract is a primary challenge for advisors in all countries.

The use of unit price method of measurement for payment provides a means of managing the risks associated with the actual conditions encountered and is commonly used in a range of contracts for managing and allocating risks in all or part of a subsurface construction project.

The ultimate goal of a successful contract is to achieve the project objectives of function, quality, safety, cost and schedule.

# 1 >> RESPONSIBILITIES AND PROCEDURES

## 1.1. CLEAR SPLIT AND BALANCE OF RESPONSIBILITIES

In subsurface construction projects there are a range of interdependent activities which must be undertaken for the benefit of all parties. Failure to clearly articulate who is responsible for those activities, such as geological investigation, geological interpretation, safety, environmental issues, insurance, system integration, commissioning and other matters directly related to the delivery of the project, will inevitably lead to delays, increased costs and disputes. Even where clear articulation as to responsibilities occurs it is inevitable that issues will arise which demand resolution. Procedures should be in place to deal with such issues.

The methodology for determining the split of responsibilities in such circumstances should be specified within the contract including the procedures to determine where the burden for the supply of resources and payment for such activities will lie. Failure to clearly articulate such matters within the contract will almost certainly result in increased costs, inefficient delivery and disputes.

## 1.2 DISPUTE RESOLUTION PROCESS

Failure to clearly articulate an appropriate dispute resolution process will almost certainly result in delays, increased costs and expensive litigation.

It is therefore regarded by the ITA, that to resort to traditional court procedures for the resolution of such disputes is not in the projects' best interests except in extreme circumstances. There are a range of modern mechanisms for the resolution of such disputes. These range from expert dispute resolution boards to arbitration and mediation. Each mechanism has its strengths and weaknesses.

ITA strongly recommends that whatever mechanism is chosen, it should be compatible with the highly technical nature of the root cause of many disputes in subsurface construction projects (typically contractual documents, programme requirements, engineering design, geotechnical, hydro-geological, and contractual performance) and recognizes the importance of on-going relationships between the parties in order to efficiently and effectively deliver the subsurface infrastructure.

Early identification of issues in need of resolution coupled with clear procedures to resolve disputes is considered at the heart of all effective construction project dispute resolution procedures

## 1.3 DEFINITION AND CONSEQUENCE OF NON PERFORMANCE

Subsurface construction projects must not only clearly define what is required in terms of works to be provided, payments and dispute resolution, but also provide the mechanisms to timely resolve such matters including, where necessary, directing a party to take an action, the award of damages and termination. Such provisions are essential within a contract in order to avoid or at least minimize ambiguities with respect to the consequences of a party's behaviors or circumstances which may arise during construction.

Such procedures should deal with issues ranging from disputes with respect to payment, the assessment, review and ultimate acceptance or rejection of works completed and detailed design. These procedures should also extend to administrative matters such as permits, facilities, standard of professional conduct, standards of works and equipment and changes in legislation and regulations.

Ultimately, it is the attention to these matters which provides the framework for the most efficient delivery of the project and, on occasions, the modification or even removal of parties from a project. Tunnel projects demand decisions to be made rapidly, capital to flow and the mobilization and demobilization of specialist teams and equipment.

## 1.4 IMPLEMENTATION OF FORMAL RISK MANAGEMENT PROCEDURES

The implementation of a formal risk management procedure in subsurface projects is highly encouraged. Formal risk management procedures, using risk registers, improve the capacity to identify, control, monitor, communicate, and contractually allocate risks. All parties involved in the project should participate in this process to manage and mitigate identified risks.

In some countries formal risk management procedures have become mandatory for obtaining insurance for underground projects.

## 2 >> MAJOR ELEMENTS AND ISSUES FOR SUBSURFACE PROJECTS

As with all construction projects, subsurface contracts demand rigorous attention to the Scope of Works to clearly define issues critical for a projects success. In the subsurface environment the need is typically for careful consideration of the:

- configuration of subsurface spaces
- environmental impacts during construction and operation
- archeological significance
- limited access to the working faces
- contract interfaces
- technical interfaces
- adjoining land uses and structures
- long term useful life
- other subsurface services including existing and future infrastructure
- ultimate use and maintenance of the works;

These matters are central to the success of the endeavor.

In subsurface projects the geotechnical, geological and hydro-geological contexts are never fully revealed until the excavation itself, and special equipment and expertise is normally required to successfully undertake the project. There are also unique challenges of delivering the infrastructure fit for the purpose intended, due to the often demanding interfaces between the surface and subsurface, challenging health, occupational safety and environmental considerations.

In subsurface construction projects due regard should be given to the special character of the works. It is considered essential that the nuances of subsurface construction are reflected in:

- the required scope.
- the construction methodology
- the manner in which fitness for purpose is to be assessed
- the obligations of parties with respect to the terms and conditions of payment.
- the specific allocation of contractual risks



From contracts which specify the quality and characteristics BOOT (e.g. design – bid – build contracts) to those which specify the functional performance (e.g. design – build contracts) it is of fundamental importance to clearly state the obligations and responsibilities of the parties. This may be expressed in any combination of prescriptive or performance terms depending upon the circumstances of the project – but it must be explicitly expressed.

It is also of fundamental importance that mechanisms for dealing with the disagreements and uncertainties which necessarily arise from time to time between the parties be explicitly addressed. In subsurface construction projects failure to resolve such issues quickly may substantially impact all parties due to long project timeframes and the fact that almost all key activities are on the projects critical path of the schedule. The manner in which such disagreements are to be resolved, and the mechanisms by which the outcomes will be enforced in terms of actions, payments and where necessary bringing all or part of the contract to an end, must be clearly agreed.

In each project there should be a clear definition of what constitutes substantive completion, despite the existence of defects. The manner and basis for determining what constitutes substantive completion, defects, and minor defects should be described.

Detailing such matters is considered fundamental for successful subsurface construction projects.



### 3 >> A TIME SCHEDULE

While all construction projects may require consideration of the scheduling and timing, subsurface construction projects demand rigorous scrutiny of scheduling and yet must also be able to accommodate unforeseen events. This apparent contradiction, between certainty and taking into account unforeseen events is at the heart of successful subsurface construction contracting. This is why it is the ITA's view that subsurface construction projects contracts must deal with variations to presumed geological and other conditions; this is to be regarded as the strength of such contracts. There are a range of contractual mechanisms available to achieve this outcome. The exact contractual mechanism chosen must reflect the special circumstances of each project.



Tunnel projects also demand specialist equipment, ranging from often highly project-specific tunnel excavation equipment, such as tunnel boring machines, which may have lead times from months to years, to equipment specially modified for work in the confined spaces. Furthermore work forces capable of working safely in subsurface conditions and using such equipment are often organized into specialist 'teams'. The ability of securing such teams for a project is often problematic.

In addition the time schedule provides an objective way of sequencing a range of interdependent activities. These activities range from the provision of surface land suitable for site installations to support the project to obtaining the necessary permits and approvals. Time scheduling is often more critical than in traditional construction projects due to the inherent limited access conditions.

Subsurface projects often require not only administrative permissions but also complex enabling works such as the diversion of existing sewers, electrical conduits, gas and other pre-existing subsurface utilities. There is normally a requirement to conduct detailed ground surveys along the alignment and adjacent properties at the surface as well as geological, hydro geological and geotechnical analysis of the subsurface. Commonly the subsurface utilities are poorly identified and documented leading to potential delays. Specific consideration should be given to apportioning such risks appropriately within the contract.

As part of the scheduling of activities it is essential that sufficient time and access to the works be provided for testing and commissioning of any installed electrical and mechanical systems. Although such systems often only represent a small proportion of project cost they usually account for a very significant proportion of total project risk. Provision should be made for appropriate testing and commissioning arrangements of such systems, within the project schedule.

It is recommended that a project schedule indicating the critical paths, dependencies, milestones, productivities be presented in an appropriate time line/location format as part of the contract documents.

Specific provisions to adjust the contractual time of the project should be considered.

The ITA therefore urges all those engaged in establishing subsurface construction projects to provide appropriate time scheduling bearing in mind the range of time critical issues such as, significant uncertainty of ground conditions and location, often long lead times for personnel, capital, insurance and equipment for securing the efficient and effective construction of subsurface infrastructure.



## 4 >> ALLOCATION OF RISK

In subsurface construction projects traditional methods of allocating risks may not necessarily be adequate, because the party who can best manage the risk may not – in subsurface works- be best able to bear the responsibility for the risk. The risks for unforeseen geological, geotechnical, hydro-geological and other factors can be very significant in subsurface projects. It is not always a case where the party who understands the risk can necessarily bear the risk. The exposure of any party should be commensurate with their commercial participation in the project. The amounts of money and resources required to address such issues may far exceed their commercial capabilities. These risks should be more carefully addressed in subsurface construction projects, to ensure that all parties are aware of the nature of the risk they bear, and which risks they are responsible for managing.

Administrative risks related to 3rd party approvals, permits and changes to laws and regulation should likewise be clearly allocated. In subsurface construction projects it is often the case that none of the parties have ultimate power with respect to such approvals, permits, laws and regulations. This is because subsurface construction projects necessarily and often require the approval of third parties, who may or may not be supportive of the project and are subject to changes in the law and regulations. Accordingly, the allocation of the risks for issues associated with such matters should not only be allocated, but mechanisms should be put in place to deal with the failures.

In subsurface construction projects there are often changes, which result in significant changes to the costs associated with the construction project which may or may not be related to unforeseen issues associated with geotechnical matters. It is desirable that mechanisms be put in place to address such cost variations. From time to time conditions are less onerous than expected and significant cost savings can be achieved. Both increases and reductions in costs can be provided for in the contract.

The use of differing site conditions clauses (DSCs), combined with Geotechnical Baseline Reports (GBRs), should be encouraged to promote equitable allocation of risks and facilitate dispute resolution.



It is also common that subsurface construction projects encounter issues associated with utilities and other third parties which are not foreseen at the time of contracting. Clearly specifying a mechanism to deal with such matters is considered prudent by the ITA in all subsurface construction contracts.

Due care should be given to force majeure events as subsurface construction projects are also prone to these types of disruptions. Since all supporting activities are located at or near the portals, force majeure events have the potential to significantly interfere with all subsurface development. Accordingly, they should be dealt with within the framework of the contract.

### DEFINITION OF INTENDED RESOURCES

All surface construction involves the employment of capital intensive equipment and frequently this is designed to suit the particular circumstances of the project. It is recommended that all contracts provide mechanisms to establish which equipment and corresponding technical details are provided for in the contract to serve as a basis for changes if a dispute arises.

### CLEAR TERMS AND CONDITIONS FOR PAYMENT

Subsurface construction projects demand clear mechanisms for payment. Balancing the legitimate needs of price certainty of a client and financier with the cash flow requirements of other parties demands a detailed pre-construction analysis as is practicable for the project. As a general rule – the more geotechnical data and interpretation available to parties in the early stages of a project, the greater is the certainty for meeting budgets and timely payments.

Due to the long lead times, high start-up costs, the range of specialist equipment and personnel required to design and construct such projects, certainty of cash flow is essential for the effective delivery of such infrastructure. Uncertainty in the mechanism or unreliability of payment jeopardizes such projects as a disruption to any sub-component due to the linear nature of projects frequently leads to a serious interruption to the critical path for project delivery.

Clearly stipulating the terms of payment, mechanisms for interim payment and the processes to certify that the works meet the acceptance criteria is essential. Where measurements or other analysis is required (often via a clearly defined inspection regime) in order to quantify payment, it is desirable that such procedures and mechanisms are clearly articulated in advance in the contracts.

In many contracts there will be a mechanism for variations to both the procedure and nature of payments and the works for which payments are made. Where such regulations exist they must be clearly stated.

When the owner or his representative receives a well-substantiated claim, with merits based on a valid differing site condition, they should acknowledge the claim at an early stage. Many times the impact of a claim is magnified because of the owner's and/or the engineer's refusal to process the claim promptly. It is in the interest of all project parties, to resolve disputes rapidly at the lowest possible working level. There should be a mechanism which clearly identifies the rights, responsibilities and consequences for initiation and duration of the claims process.

Where such mechanisms do not exist, there should be good reason for their non-existence, such as when a price premium has been paid by the client such as on a "fixed price" contract. Appropriately compensating contractors for work necessarily and reasonably done as a result of circumstances beyond their control is generally regarded by ITA as highly desirable. In many countries, despite technically falling outside the contract conditions, courts will award compensation for works necessarily completed for the benefit of the project.

Without such mechanisms within the contract and certainty that they will be followed and respected, it is inevitable that both the price for the infrastructure and the time for the infrastructures' delivery will be adversely affected.

Where there are real and genuine issues with respect to the flow of capital in a project, due regard should be made to communicating this fact to all of the parties. Failure to communicate such information almost certainly leads to the creation of disputes within the contract for the dubious purpose of deferring payments. Such manufacturing of disputes for the ulterior purpose of disguising cash flow issues is ultimately counter-productive, as it leads to a breakdown in the relationship between all parties. Clear terms and conditions for payment must therefore be a core feature of the contracts.

## 7 >> CONCLUSIONS

The relationship between parties in all subsurface construction projects is primarily governed by the written 'contract'.

Contracts are as variable as the demands of the worlds' projects and as creative as those who draft them. From standard form contracts, such as FIDIC, NEC and other public and private institutions, to uniquely drafted legal frameworks, which may even include special laws to expedite arrangements, the possibilities are almost boundless. This is why it is essential that special weight be given to the factors known by the ITA to be critical to the success of subsurface construction projects.

Effective risk allocation and management is of paramount importance for the successful completion of underground projects. The practices recommended in this document could improve the predictability of costs and the budgetary requirements of underground projects. It is essential that these special subsurface construction issues and the manner in which they are dealt with contractually be duly considered in all subsurface project contracts.

### ITA WG3 2010

#### Notes for the User

*The applicability of specific contractual provisions to any project can only be determined by detailed analysis of the unique circumstances of a project. Previously published ITA contractual propositions must not be adopted on a project without obtaining expert advice as to their applicability.*

*This document is an adjunct to, and not a substitute for, expert legal advice.*

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