

# Risk allocation in the FIDIC forms of contract, and the Emerald Book's place in the Rainbow Suite

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**ABSTRACT:** The previously available FIDIC contract forms (Red, Yellow, Silver, Gold, Green Books) are different between themselves, in particular with regards to risk allocation between the Employer and the Contractor. However, they have not been drafted with regards to the risks related to sub-surface conditions. In order to prepare a contract form that is suitable for Underground Works a joint task group put in place by FIDIC and the ITA developed the “Emerald Book”. The balanced risk allocation, which is one of the core principals of the Emerald Book, will contribute to significantly lowering the project cost, improving cost stability and will allow for easier project implementation. This paper aims to highlight the approach to risk in the different books of the Rainbow Suite and show the changes implemented in the Emerald Book in order to apply the principle of balanced risk allocation to Underground Works.

## 1 INTRODUCTION

As is well known to all members of the ITA, there is an ever-growing demand for utilizing underground space for infrastructure. The difficulty in predicting underground behavior and conditions poses unique challenges regarding construction practicability, time and cost. Thus, allocation of underground risks among the stakeholders becomes critical in underground construction. To address these unique risks the International Tunnelling and Underground Space Association (ITA) and the International Federation of Consulting Engineers (FIDIC) joined forces to draft the new FIDIC Form of Contracts for Underground Works (the “Emerald Book”). To accomplish this, the two organizations set up a joint task group (TG10). The Emerald Book has been modelled on the 2017 FIDIC Yellow Book (Conditions of Contract for Plant & Design Build) but with significant innovations tailored to underground construction. Consistent with FIDIC's philosophy of achieving a fair allocation of risks among the parties, the Emerald Book has been drafted with a view to promoting a balanced risk allocation that is specifically adapted to the risks inherent and unique to underground works.

## 2 RISK

### 2.1 *What is risk*

In general, risk can be defined as possible events during the execution of a project that can lead to loss or damage or a possible gain to the parties involved. These possible events, which can have an impact on the project, are a consequence of uncertainties and unknowns before the execution of the works. These multiple uncertainties are to be dealt with throughout the project implementation from the stage of the feasibility study throughout to the preparation of the tender documents until the completion of the works.

By implementing a risk management system throughout the project development certain risks can be eliminated and dealt with, however there will be risks that have to be handled

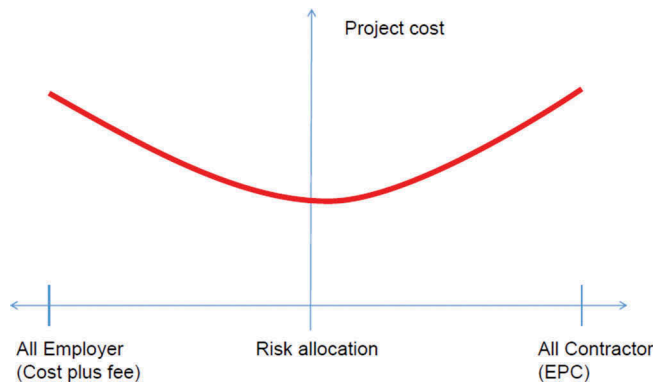


Figure 1. Contract price in relation to risk allocation.

throughout the execution of the works. During the construction, it can only be two parties that will be able to carry the consequences of uncertainties, namely the Client and the Contractor.

## 2.2 Why risk allocation is important

If risks materialize during the execution of the works these events, become a liability and will result in cost and/or loss of time. In order to have a fair and balanced contract it is important to clearly allocate risks to a party, which will allow the responsible part to account for these liabilities.

An unbalanced risk allocation will lead to escalation of project cost and can even make a project economically unviable.

As it can be seen on the above graph, that not only one-sided risk allocation towards the Contractor will increase the cost of a project, but all risks carried by the Client increase the cost as well.

Improper risk allocation may also result in extended construction times, high number of claims and disputes as well as wastage of resources.

Proper risk identification, management and fair distribution of the responsibility for certain risks will increase the efficiency of project execution and will reduce the disputes significantly which will allow for a smooth project implementation.

## 2.3 Who shall be responsible for certain risk scenarios

Allocation of risk is a principle that developed over the last decades and through the time the distribution became more and more precise. In the early days it has been suggested by Abrahamson that risk should be allocated to a party if:

- the risk is within the party's control;
- the party can transfer the risk, for example, through insurance, and it is most economically beneficial to deal with the risk in this fashion;
- the preponderant economic benefit of controlling the risk lies with the party in question;
- to place the risk upon the party in question is in the interests of efficiency, including planning, incentive and innovation; and/or
- if the risk occurs, the loss falls on that party in the first instance, and it is not practicable, or there is no reason under the above principles

Which was later simplified by Bunni to these four principles which are followed in the newer contract forms:

- Which party can best control the risk and/or its associated consequences?

- Which party can best foresee the risk?
- Which party can best bear that risk?
- Which party ultimately most benefits or suffers when the risk eventuates?

#### 2.4 *How risk allocation is handled in FIDIC contract forms*

FIDIC documents if used correctly and not amended too much by the Employer are generally considered as fair and balanced contract forms. Depending on the type of work different contract forms have been developed by FIDIC which are drafted with the mindset of fair risk allocation in regard to the type of work.

Over the evolution of the different contract forms, the allocation of risk has been amended and became more detailed to be up to date with construction developments.

As a principle the main risks are distributed between the parties in the General Conditions of Contract. However as no project is alike these general principles must be adapted to suite the project requirements, risk acceptance by the parties and local regulations. These modifications are handled in the Particular Conditions, which are usually drafted by consultants for the Client. However, there is a tendency that the PCC are misused in a way to assigned risk unilaterally to the Contractor.

#### 2.5 *FIDIC golden principles*

FIDIC has realized the tendency described under 2.4 and has developed following principles which it strongly recommends that the Employer, the Contractor and all drafters of the Special Provisions take all due regard of the five FIDIC Golden Principles. These principles are part of the new set of the rainbow suite as well as the Emerald book:

GP1: The duties, rights, obligations, roles and responsibilities of all the Contract Participants must be generally as implied in the General Conditions, and appropriate to the requirements of the project .

GP2: The Particular Conditions must be drafted clearly and unambiguously.

GP3: The Particular Conditions must not change the balance of risk/reward allocation provided for in the General Conditions.

GP4: All time periods specified in the Contract for Contract Participants to perform their obligations must be of reasonable duration.

GP5: All formal dispute's must be referred to a Dispute Avoidance/Adjudication Board (or a Dispute Adjudication Board, if applicable) for a provisionally binding decision as a condition precedent to arbitration.

These FIDIC golden principles are described and explained in the publication FIDIC's Golden Principles, and are necessary to ensure that modifications to the General Conditions:

- are limited to those necessary for the particular features of the Site and the project, and necessary to comply with the applicable law;
- do not change the essential fair and balanced character of a FIDIC contract; and - the Contract remains recognizable as a FIDIC contract.

### 3 RISK ALLOCATION IN DIFFERENT FIDIC CONTRACT FORMS

The risk allocation in the FIDIC rainbow suite was drafted with the mindset of fair distribution of risks and liabilities considering the relevant contractual model. Therefore, it is obvious that risks are allocated differently in design-bid-build contracts (FIDIC Red Book), design-build contracts (FIDIC Yellow Book) and EPC/turnkey contracts (FIDIC Silver Book).

In order to understand the place of the Emerald Book in the rainbow suite the risk relevant to underground constructions and their allocation in the different contract forms are described

below. In general, all risks outlined below are related to the uncertainty of precise prediction of ground conditions and the behavior of the ground in regard to the excavations.

### 3.1 *FIDIC Red Book*

For the execution of projects using the Red Book, the Employer will engage a designer to develop the design and tender the works based on BOQ rates. The Contractor will execute the works as per the design and instructions by the Employer/Engineer and will therefore be relieved on any of the risks related to changing ground conditions as these are dealt with by new applicable design to be provided by the Employer and by an increase of quantities.

Generally, this contract form would be a good option for underground works as the ground related risks are to be handled by the Employer, however, it does over impose the Employer with risks and does not allow for innovative solutions from the Contractor. The Red Book solution also requires an Employer that is keen to take the responsibility of the design. The industry sees the tendency that the Employers like to hand over the design responsibility to the Contractor as this reduces the problems of suitability of the design for the Contractor's equipment.

### 3.2 *FIDIC Yellow Book*

For the execution of projects using the Yellow Book, the design responsibility lies with the Contractor, which allows for innovative solutions from the Contractor and a design that is suitable for the Contractor's equipment.

As per the Yellow Book's contract conditions there is a clause to deal with unforeseen ground conditions, however this is generally a point of disputes between the parties what was foreseeable for an experienced Contractor. As these changed ground conditions usually imply changes to the cost and time for completion these need to be claimed by the contractor, which often leads to long lasting arguments between the parties and are often problematic for the smooth executions of projects.

Claims and in many cases, their slow administration have a negative impact on the cash flow of the Contractor which is additionally hampering the execution of the project.

These claims lead to an "increase" in project cost and "longer" time for completion, which is often problematic for the Employer as he is running over his budget. However, these are no real increases of cost and time as these are a necessity due to the ground conditions encountered.

### 3.3 *FIDIC Silver Book*

For the execution of projects using the Silver Book, most of the risks are to be handled by the Contractor. The Silver Book is, as already outlined in the introductory note, NOT suitable for underground constructions. However, several Clients use this contract form to push all risks towards the Contractor, which is not fair and will generally bring problems during construction and/or results in high project costs to the Client.

## 4 THE EMERALD BOOK

It was one of the first tasks by the task group developing the Emerald Book to decide if the new Emerald book shall be based on the Red or Yellow Book principles. The Task Group decided on the Yellow Book, which was confirmed by the FIDIC Contract Comity and by the availability of the new version published in 2017 it was jointly agreed to use the new Yellow Book as the bases. This "godmother" document was amended in several aspects to ensure that the Emerald Book is suitable to be a fair and well-balanced contract form for underground works.

The fundamental difference between underground works and most other kinds of works lies in the fact that the realization of underground works involves largely the creation of the necessary space within the ground, the behavior or response of which is impossible to know

perfectly in advance. Therefore, the ground related risks and related aspects have been intensively looked at.

The two main principles of the Emerald Book are:

- The ground and groundwater related risks are assigned to the Employer, as the party who will most benefit from the completed project and as the party that can best control these risks.
- The performance related risk arising from expected ground conditions are assigned to the Contractor.

The provisions drafted considering following points:

#### 4.1 *Design*

Based on the Guidance for the Preparation of Tender Documents which is part of the Emerald Book the Employer will provide an Employer's reference design which shall be compatible with the Employer's Requirements and be consistent with the GBR. This is however no detailed design which should be the responsibility of the Contractor (or the contractor's designer)

#### 4.2 *Geology and geotechnical behavior*

It is recommended that all available geological and geotechnical information are disclosed to all tenderers for information only.

Next to that, a geotechnical contractual baseline is to be included in the tender/contract documents that sets out the contractual limits of the conditions anticipated to be encountered during construction, thus providing clear distinctions in the contract documents between expected and unexpected underground conditions and behavior.

The Contractor shall be entitled to rely on the contents of the Geotechnical Baseline Report, including the anticipated sub-surface conditions as set out in the Baseline Schedule, irrespective of any discrepancies or contradictions that may exist between such conditions and the conditions described in Site Data or other documents made available by the Employer under Sub-Clause 2.5.

#### 4.3 *Remeasurement of items that depend on sub-surface conditions*

The risk of quantities for the excavation and support of the underground structure lies with the Employer and to honor this principal a remeasurement clause was introduced to remunerate the Contractor for the works that are directly influenced by the underground conditions.

This can be either done by definition of excavation and support classes which are paid as units or even BOQ items for additional support measures.

The concept of remeasurement applies for direct as well as indirect cost items and by applying this method the time related cost which are a matter of disputes in a lot of contracts are dealt within the well defined system.

This remeasurement only applies for activities related to excavation and support and all other works to be performed by the Contractor are to be remunerated considering the lump sum offer.

#### 4.4 *Adjustment of Time*

Sub clause 13.8.3 outlines the procedure how the ground and production related risks are to be considered during the execution of the project.

The time allowed in the Completion Schedule (as amended as a result of any previous adjustments under this Sub-Clause, or any extension of time granted to the Contractor) for the completion of the Works, Sections and Milestones (if any) comprising the Underground Works, shall be reassessed (reduced or extended) by applying the production rates provided by the Contractor in the Baseline Schedule, to the actual quantity of each item of work

necessarily carried out and measured, as recorded, agreed and/or confirmed by the Engineer pursuant to Sub-Clause 3.2.2 [Engineer's Specific Duties and Authority for Underground Excavation and Lining].

Based on this reassessment, and if and to the extent that the Time for Completion of the Works, Section or Milestone is impacted, an adjustment (reduction or extension) shall be calculated for such Time for Completion based only on the logical sequential links provided in the Completion Schedule.

By the adjustment of time rather than a variation, the time for completion is an easy mathematical function of the ground conditions encountered and the production rates offered by the Contractor. So as long as the ground conditions are inside the GBR no claim is required to deal with an extension or shortening of time for completion.

## 5 CONCLUSIONS

During the development of the Emerald Book the drafters tried to follow the main principals of ground related risks are to be borne (or benefited from) by the Employer and production related risks are to be carried by the Contractor.

In order to achieve this and to prepare a document which will be widely used by the underground industry the Emerald Book was based on the FIDIC Yellow Book, however applying kind of Red Book philosophy (for time and cost) for the excavation and support.

Based on the principles applied the Emerald Book stands in between the Red Book and the Yellow Book in regard to risk allocation.

The balanced risk allocation, which is one of the core principals of the Emerald Book, will contribute to significantly lowering the project cost, improving cost stability and will allow for easier project implementation.

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*Caveat: at the moment of writing of this article, the FIDIC Emerald Book is still under review. Part of the content may therefore be in contrast with the published Form of Contract. The reader should always consult the published FIDIC Form of Contract for Underground Works.*

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