Risk and Other Important Clauses in the New FIDIC Emerald Book - 1st Ed. 2019
(Conditions of Contract for Underground Works)

Donald Del Nero, PE, CDT
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Agenda

Introduction

Emerald Book Overview & Other International Forms of Contract

Emerald Risk Allocation & Dispute Resolution

Emerald DSC Clause & DSC Clause Alternatives

Emerald Contract Document Precedence Compared

Presenter’s Commentary on Underground Contracts
Introduction
Presentation Primary Goal....

A General Review of the Emerald Book
Standardized General Conditions for Design-Build Underground Works...and other Helpful Guidance
Use of FIDIC Standard Forms of Contract/GC’s

*The FIDIC Standard Forms of Contracts are the Most Widely Used Contract Conditions for the Construction Industry Worldwide, Especially for Large-scale Infrastructure Projects*

Adapting the FIDIC Standard Forms of Contract for Underground Construction Projects

A. Marulanda
INGETEC, Bogotá, Colombia.
Introduction – Nine Types of FIDIC GC’s

Fédération Internationale des Ingénieurs-Conseils (FIDIC) Contracts – Rainbow Suite

- **Blue Book**: Contract for Dredging and Reclamation Work
- **Gold Book**: Contract for Design, Build, and Operation Projects
  - **Green Book**: Short Form of Contract
- **Pink Book**: Multilateral Development Bank Harmonized (New Version of FIDIC Red Book)
- **Red Book**: Conditions of Contract for Construction, for Building and Engineering Works Designed by Employer (DBB)*
- **Silver Book**: Conditions of Contract for EPC Turnkey Projects
- **White Book**: Model Services Agreement (for construction or engineering professionals)
- **Yellow Book**: Conditions of Contract for Plant and Design-Build (for electrical and mechanical plant works and for building and engineering works design by the Contractor)*

* Red and Yellow most used worldwide...
FIDIC/ITA EMERALD BOOK (Design-Build) 
CONDITIONS OF CONTRACT FOR UNDERGROUND WORKS 

--HISTORY OF DEVELOPMENT—
Jointly Developed by FIDIC and ITA-AITES

In 2014 ITA and FIDIC Established Task Group 10 “Contract Form for Tunneling and Underground Works”

Essentially a Modified FIDIC Yellow Book for D-B Underground Works
Emerald Book Overview & Other International Forms of Contract
TOC of an “Emerald” Contract Agreement...

a) Letter of Acceptance
b) Letter of Tender
c) Addenda
d) Particular Conditions A – Contract Data, Completion Schedule and the Schedule of Baselines
e) Particular Conditions B – Special Provisions
f) Geotechnical Baseline Report
g) General Conditions (primary focus of Emerald Book)
h) Employer’s Requirements
i) Other Schedules
j) Contractor’s Proposal
k) JV Undertaking
l) Geotechnical Data Report, Contract Risk Management Plan, and Contract Risk Register
Global Construction Contract Std. Forms

- International Federation of Consulting Engineering (FIDIC)
- Engineers Joint Contract Document Committee (EJCDC) – C700-2018 (also available D-B, Progressive D-B, and P3)
  - Canadian Contract Document Committee (CCDC)
  - American Institute of Architects GC’s (AIA)
- American General Contractors of America – No. 415 (AGC)
  - Design-Build Institute of American GC’s – DBIA 535
  - Institution of Chemical Engineers
- Austrian Standard ON B 2203 ÖNORM B 2203-1
- Swiss Society of Engineers and Architects Norm 118/198
  allocation of ground risk not addressed in Swiss Civil Law
  - The Norwegian Tunneling Contract System – NoTCoS
  - New Zealand Standard NZS3910:2013
  - Joint Contracts Tribunal - UK
- New Engineering Contract Std. Forms – ICE/UK
  - Public Procurement Contract EU – 2014
  - Scottish Building Contract Committee
  - Provincial GC’s
- US Code of Federal Regulations (CFR) & Federal Acquisition Regulations (FAR)
  - Local, County, & State GC’s
Criteria for Selection of General Conditions, Contract Form and Delivery Method

- Type of Work
- Design Duration
- Construction Duration
- Cost Certainty
- Schedule Certainty
- Project Complexity
- Project Risk Profile
- Owner Risk Tolerance
- Risk Mitigation and Risk Allocation
- Dispute Resolution

- Market Conditions
- Client’s Level of Involvement in Design
- Client’s Level of Involvement in Construction
- Capacity for Variations
- Design, Construction, and Management Preferences
- Funding Mechanism
- Design Responsibility
Key Observations

FIDIC RAINBOW SUITE OF GENERAL CONDITIONS

--NOT PLUG AND PLAY MECHANISMS--

Axiom No. 1 - Every underground project has unique known unknowns and unknown unknowns

Axiom No. 2 – FIDIC GC’s are NOT necessarily fully-integrateable into US and CDN Std. GC’s...Emerald GC’s integration worth the effort though!
Why could the Emerald Book be a Quantum Leap for the Underground Industry?

--Design-Bid-Build is now Alternative Project Delivery for Underground works!—

• Design-Build*
• Public-Private-Partnerships*
• Construction Management @ Risk*
• Indefinite Delivery/Indefinite Quantity (ID/IQ - FHWA)*
• Engineering-Procurement-Construction*

*All have varying degrees of design-build components
“Possibly the Most Open (contractor) Book form of Underground Contract in Existence Today!”

By Don Del Nero
Key Nomenclature*

General Conditions

General Requirements (often in Div. 1)

Supplementary Conditions

Special Conditions (US) or Special Provisions (CDN)

*https://archexamacademy.com/know-the-difference-general-conditions-general-requirements-supplementary-conditions-special-conditions/
Key Nomenclature

**General Requirements:**

- General Requirements are an inherent part of the specifications
  - Administratively governs the specification sections
- Contains specifics directly applicable to a particular project
- Contains specific administrative procedural requirements
- Contain variables directly applicable for specific project
  - Must be written separately for each project
**Key Nomenclature**

**Supplementary Conditions:**

- Modify the General Conditions, thus are an inherent part of the Contract for Construction

- Modify the constants for a specific region or project by accommodating the legal, physical, or climatic conditions of the specific project.

  - Take precedence over general conditions

- Must be written separately for each project

  - Format is follows the General Conditions
Key Nomenclature – General Conditions

*Parties procedural rights and how they will interact with each other throughout the course of the project.* (AIA A201-2017 Article 7)

*The General Conditions are only one part of a full set of tender documents...*
Key Nomenclature

*Special Conditions or Special Provisions:*

- Extends anything not included or modified in the Supplementary Conditions, thus are an inherent part of the Contract for Construction.
- Extend the Conditions for a specific region, or project, or owner/organization.
- Is likely a standard document issued by the owner (usually a public agency) to be attached to the general and supplementary conditions.
- Are new items, and do not follow the format of General Conditions.
Emerald Risk Allocation & Dispute Resolution
The FIDIC Golden Principles (1st Edition - 2019)*

FIDIC strongly recommends that the Employer, the Contractor and all drafters of the Special Provisions take all due regard of the five FIDIC Golden Principles:

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: Unless there is a conflict with the governing law of the Contract, all formal disputes 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.

*The essential features of a FIDIC Contract that make the risk/reward allocation fair and balanced
Emerald Book Dispute Resolution Process – aka “Escalation Ladder”

Field Participants from Contract Parties
Executive Representatives from Contract Parties
Dispute Avoidance & Adjudication Board
Mediation
Arbitration
Judiciary
Highlighted Emerald Risk Avoidance, Risk Management, and Risk Allocation Tools

• Words and Expression Definitions
• General Conditions Clauses
• Contract Risk Register – Updated Every 3 Months (by DB’r)
• Contract Risk Management Plan – Updated Every 3 Months (by DB’r)
• Dispute Avoidance/Adjudication Board (1 or 3 member jointly selected)
  • Schedule of Contractor’s Key Equipment & Listed Asset Value
• Adjustments in Contractor Labor Cost (up or down)
  • Value Engineering Clause
• Geotechnical Data Report
• Geotechnical Baseline Report
• Contractor Requirement to Accept or Deny Engineer’s Field Reports
• Established Contract Document Priority
• Schedule of Performance Guarantees
  • Bill of Quantities
• Schedule of Rates and Prices
• Advance Payment Certificate (e.g. mobilization, TBM, design)
Highlighted Emerald Risk Avoidance, Risk Management, and Risk Allocation Tools

• Variable Pricing Structures
  o Fixed-rate (low risk items)
    o Time-related
    o Quantity-Related
    o Value-related
  (e.g. insurance, permits, indirects)
  (unit rates for excavation and lining works will not be adjusted for changes in quantity – 13.8.2 but schedule adjustments will be made with changes in quantity)

• Schedule of Baselines – Excavation
• Schedule of Baselines - Lining

• Emerald Clause 7.3 QA by Employer/Owner
• Emerald Clause 7.4 QC by Contractor
• Contractor Derived Quality Management System
• Unforeseeable Physical Conditions Clause
Note on Emerald GBR Philosophy....

Emerald expands on the GBR Gold Book scope and concepts primarily by the incorporation of risk-sharing mechanism based on the remeasurement of excavation support and lining unit rates as construction proceeds.

(*Several Emerald GBR Principles have been developed and applied since the 70’s in various European countries, such as Austria, Switzerland, and Norway, among others*)

*EasyChair Preprint No. 1765 – Considerations on the Practical Development of the GBR for the FIDIC Emerald Book and Similar Contract Forms by Alexandre RA Gomes*
Highlighted Emerald Clauses/Documents that may be Considered “Unconventional” in N.A.:

Project Time can be Extended if the Amount of “Bad” Ground is Greater than Depicted in the GBR but Project Time can also be Reduced if the Amount of “Good” Ground is Greater than Depicted in the GBR

*(the intent is to foster fair and balanced risk allocation)*
Highlighted Emerald Clauses/Documents that may be Considered “Unconventional” in N.A.:

Highlighted Emerald Clauses/Documents that may be Considered “Unconventional” in N.A:

Emerald Clause 1.16 Contractor Supplied, Maintained, and Updated Risk Register and Risk Management Plan
(GIRM 2015 – Section 4 – Owner Responsible for Project Risk Register and Project Risk Management Plan throughout all Stages of the Project)
## Schedule of Baselines

**Excavation**  
(has parallels to Escrow Bid Documents)

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### In a general sense, the Contractor carries the risk of pricing and production rates and the Owner/Engineer carries the risk for Quantities

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**Example Schedule of Baselines - EXCAVATION**

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Production rate</th>
<th>Estimation</th>
<th>Unit Price</th>
<th>WO</th>
<th>Adjusted Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excavation Section 1</strong> (see GPR drawing X1)</td>
<td>m</td>
<td>1.00/0.00</td>
<td>350.00</td>
<td>150.00</td>
<td>121.00</td>
<td>131.00</td>
</tr>
<tr>
<td><strong>Excavation Section 2</strong> (see GPR drawing X2)</td>
<td>m</td>
<td>1.00/0.00</td>
<td>300.00</td>
<td>150.00</td>
<td>121.00</td>
<td>131.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>2.00/0.00</td>
<td>500.00</td>
<td>150.00</td>
<td>241.00</td>
<td>261.00</td>
</tr>
</tbody>
</table>

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### Excavation

- Reduction of sound levels, measured by the owner/Engineer
- Reduction of sound levels, measured by the architect
- Reduction from 10 m to 20 m (SS 1)
- Reduction from 20 m to 30 m (SS 2)
- Geotechnical operations
- Blasting
- Trenching
- Other work (special)

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### Production time from wet excavation in

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Production rate</th>
<th>Estimation</th>
<th>Unit Price</th>
<th>WO</th>
<th>Adjusted Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excavation Section 1</strong> (see GPR drawing X1)</td>
<td>h</td>
<td>10.00/0.00</td>
<td>10.00</td>
<td>10.00</td>
<td>121.00</td>
<td>131.00</td>
</tr>
<tr>
<td><strong>Excavation Section 2</strong> (see GPR drawing X2)</td>
<td>h</td>
<td>10.00/0.00</td>
<td>10.00</td>
<td>10.00</td>
<td>121.00</td>
<td>131.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>20.00/0.00</td>
<td>20.00</td>
<td>20.00</td>
<td>241.00</td>
<td>261.00</td>
</tr>
</tbody>
</table>

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### Total production time

- **Excavation:** 29.82
- **Other work:** 0.78

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### Total production time (WO)

- **Excavation:** 29.82
- **Other work:** 0.78

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**Schedule of Baselines**

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**Excavation** has parallels to Escrow Bid Documents
Schedule of Baselines

Lining
(has parallels to Escrow Bid Documents)

In a general sense, the Contractor carries the risk of pricing and production rates and the Owner/Engineer carries the risk for Quantities.
FIDIC Companion Document (to help reduce implement FIDIC GC’s)....

FIDIC Procurement Procedures Guide – 1\textsuperscript{st} Ed. 2011
\hspace{1cm} (soon to be updated)
Other Prominent Tunnel Industry Risk Avoidance, Management, & Allocation Guidance

• Recommended Contract Practices for Underground Construction (2nd Ed. 2019 by UCA of SME)
• Design-Build Subsurface Projects (2nd Ed. 2010 UCA of SME)
• Public-Private Partnerships and Design-Build – Opportunities and Risks for Consulting Engineers (2nd Ed. 2017 ACEC)
• A code of Practice for Risk Management of Tunnel Works (2nd Ed. 2013 ITIG – Revisions under Consideration)
Risk Avoidance, Management, & Allocation Guidance Axioms

“Uncertainty is a Feature that is Unavoidable in Tunneling. But it can be Understood and Controlled so that it does not Cause Damaging Risk” by Sir Alan Muir Wood

“The only Borehole that can be Relied Upon to Describe the Ground Conditions Precisely would be One the Length of the Tunnel and Several Feet Larger in Diameter” by Sir Harold Harding

“Professional Judgement Cannot be Codified” By Don Del Nero
“Master the Ground or be Mastered by it”
By Don Del Nero

“A Bad Settlement is Always Better than a Good Lawsuit”
by Honorable Thomas D. Roti

“We cannot solve our problems with the same level of thinking that created them”
by Albert Einstein
The Differing Site Condition clause is the primary mechanism for commercial relief for the constructor for a change in ground conditions from those represented as “reference” ground conditions or “contractual” ground conditions in the tender documents.
Differing Site Condition – Nomenclature Variations

• Changed Conditions
  • Unforeseeable Physical Conditions (FIDIC)
  • Differing Subsurface or Physical Conditions (EJCDC)
  • Concealed Physical Conditions (CCDC)
  • Materially Different Conditions
Absence of a Differing Site Condition Clause

*Absent a differing site conditions clause, the doctrine of sanctity of contract places the risk on the contractor if the work is more difficult, costly, or time-consuming than expected, unless due to the owner’s breach of contract, performance is rendered impossible by an Act of God, change in the applicable law, or the facts and circumstances support an equitable defense to this rule.

*https://www.sgrlaw.com/differing-site-conditions-what-are-they-and-are-you-protected/
Absence of a Differing Site Condition Clause

“It is a well-settled rule of law that if a party by his contract charges himself with an obligation possible to be performed, **he must make it good unless its performance is rendered impossible by Act of God, the law, or the other party. Unforeseen difficulties, however, great, will not excuse him . . . .** [T]he rule rests upon a solid foundation of reason and justice. It regards the sanctity of contract. It requires parties to do what they have agreed to do. **If unexpected impediments lie in the way and a loss must ensue, it leaves the loss where the contract places it. If the parties have made no provision for dispensation, the rule of law gives none. It does not allow a contract fairly made to be annulled, and it does not permit to interpolated what the parties themselves have not stipulated.” **Dermott v. Jones**, 69 U.S. 1,2 7; 17 L. Ed. 762 (1864).
The Common Law Rule – Illusory Protection for Owners

Under the Common Law Rule, the Contractor, in a Fixed-Price Contract, Assumes all Risk of Additional Time or Cost Impact Due to Unforeseen Conditions
Emerald Book Unforeseeable Physical Conditions
(Clause 4.12)

In this Sub-Clause, “physical conditions” means natural physical conditions, physical obstructions (natural or man-made), pollutants and reactions of the ground to Excavation, which the Contractor encounters at the Site during execution of the Works, including subsurface and hydrological conditions but excluding climatic conditions at the Site and the effects of those climatic conditions.

If the Contractor encounters physical conditions which the Contractor considers to have been Unforeseeable and that will have an adverse effect on the progress and/or increase the Cost of the execution of the Works, the following procedure shall apply.

However the impact on progress and/or Cost of any conditions that are described in the Geotechnical Baseline Report shall not be assessed under this Sub-Clause but under Sub-Clause 13.8. [Measurement of Excavation and Lining Works and Adjustment of Time for Completion and Contract Price].
No DSC Clause in FIDIC Silver GC’s...

Logic is often that EPC Turnkey price is what it is and the owner desires no cost overruns....may be false economy based on court precedent!
Brief History of US DSC Clauses...

Type I DSC Clause – First “changed condition” clause was used on November 22, 1921. Included in standard form of GC’s for construction contracts that were completed after August 20, 1926.

Type II DSC Clause – First introduced in Federal contracts in 1935

Approved by POTUS for Federal contracts in 1985. DSC Clause now mandated by Federal Regulations for use in US Gov. contracts and in contracts with full or partial Federal funding.

DSC Clause approved by....US Feds, AIA, EJCDC, ASCE, AASHTO, AGCOA, DBIA, NSPE, ACEC, and numerous other state and municipal governments
DIFFERING SITE CONDITIONS (APR 1984) (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 inhering in work of the character provided for in the contract.

The Subcontractor shall demonstrate the following elements for a determination of merit and to receive recovery:

1. There must be a difference between reasonably anticipated and documented encountered conditions,
2. There must be a difference between reasonably anticipated and documented encountered construction performance,
3. A cause-and-effect relationship must be demonstrable between the differences in conditions and difference in construction performance,
4. There must be a demonstrable impact on time or costs, and Contract conditions must be fulfilled (including, but not limited to conditions such as reliance, notice, and mitigation).

In addition, Subcontractor must rely on all available geotechnical information and assumptions and baseline statements provided in the Geotechnical Baseline Report, have viewed the available soil and rock samples, have “walked” the tunnel alignment and viewed conditions at shaft and staging areas, and provide evidence of reasonable interpretation into material behavior.

*Paraphrased from World Tunneling, “Managing the Unforeseen”, March 2008*
Emerald Contract Documents Precedence
Contract Document Precedence

Emerald Book:

The documents forming the Contract are to be taken as mutually explanatory of one another. If there is any conflict, ambiguity or discrepancy, the priority of the documents shall be in accordance with the following sequence:

(a) the Contract Agreement;
(b) the Letter of Acceptance;
(c) the Letter of Tender;
(d) the Particular Conditions Part A – Contract Data, the Completion Schedule and the Schedule of Baselines;
(e) the Particular Conditions Part B – Special Provisions;
(f) the Geotechnical Baseline Report;
(g) these General Conditions;
(h) the Employer’s Requirements;
(i) the other Schedules;
(j) the Contractor’s Proposal;
(k) the JV Undertaking (if the Contractor is a JV); and
(l) any other documents forming part of the Contract, including the Geotechnical Data Report, the Contract Risk Register and the Contract Risk Management Plan.

US Example:

Agreement
Supplementary Conditions
General Conditions
Specifications Division 00
Specifications Division 01
Specifications Division 02-17
Drawings
Geotechnical Baseline Report
Geotechnical Data Report
Bonds
Contractor’s Bid
Presenter’s Commentary on Underground Contracts
Presenter’s Commentary…

- Emerald Book is Quantum Leap for the Underground Industry!
- Local Legal Council Recommended to Review Implementation of Emerald Book Clauses
- Review Emerald General Conditions Against Funding Agency Requirements
- Conform Emerald Book Nomenclature to Local Norms
- Align Dispute Resolution Procedures to Local Statutes
- Decide if Dispute Avoidance/Adjudication Board (Emerald DAAB) Renderings are Binding
- Clause 3.1 The Engineer – Define “All Authority Necessary” and Compare with Typical US and CDN Professional Liability Insurance Coverage Limitations
- Confirm Contract Document Precedence is Consistent with Local Statutes
- Adjust DSC Clause Depending on Jurisdictional and or Federal Gov. Considerations
- Decide what General Conditions Clauses should Apply to Subcontractors
- Define Experienced Contractor (part of Unforeseeable Conditions)
- Define Cost Sharing Apportionment from Value Engineering Proposals
- Define “Guarantee” under the Schedule of Performance Guarantees
Presenter’s Commentary…

• Although the Emerald Book is a quantum leap in contracts for underground works there is one minor glitch noticed by the presenter:
  o Sub-clause 1.16 – Contractor required to provide the Contract Risk Register and Contract Risk Management Plan for review by the Engineer within 28-days after the commencement date. APPARENT CONFLICT: The Contract Risk Register and Contract Risk Management Plan form part of the Contract
Emerald Book and The FIDIC Golden Principles - Purchase & Download

http://www.fidic.org

Disclaimer: It is not the intent of this presentation to endorse any specific form of contract for underground works. Additionally, the views and opinions expressed in this presentation do not necessarily reflect the official position of FIDIC and ITA.
Thank you.

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Solving the world’s toughest challenges