

Contract Domain Model

for FIDIC-Based Contract Payments

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1: Contract Domain Model (Payments)

1.1: Overview

This document explains the contract processing life cycle for contracts managed by consulting engineering firms, such as those based on FIDIC Conditions Of Contract or similar concepts. It includes coverage of the contract processing steps performed manually by engineers or automated by specialist web solutions (such as Clipcode Knowledge Networks - <http://www.clipcode.com>).

We examine how contracts are structured, how contract pricing and contract policy is defined, what calculations are performed, which constraints are used, applicable business rules and general processing logic. The aim of this document is to bring everyone - contract managers, contract stakeholders, financial staff, system administrators and software developers - onto the same page regarding what is needed to manage FIDIC-based contracts.

The current version of this document focuses on contract payment certificates and variation orders. Future updates will look at other aspects of contracts, such as cashflow, contractual notices, securities and dispute resolution.

For explanations of individual terms please consult the glossary at the end of this document.

1.2: FIDIC

FIDIC (Fédération Internationale des Ingénieurs-Conseils) is the international federation of consulting engineers. It has member associations in the major countries around the world and most of the world's large consulting engineering firms are members. FIDIC's goals includes being the global voice for the consulting engineering industry, continued professional education of its members, promoting best business and ethical practices and defining widely used conditions of contract. The FIDIC website at <http://www.fidic.org> provides further details of its activities.

1.2.1: FIDIC Conditions Of Contract

FIDIC has drawn up a practical collection of templates for conditions of contract to be used on large-scale projects. These have gained widespread adoption on international engineering projects and have been shown to be very successful in balancing the rights and obligations of all contract stakeholders. Drawing on best practices in contract management and years of real-world experience of

being used on many substantial projects, the FIDIC Conditions of Contract have continuously evolved and are now considered the leading form of contracts for large international engineering projects.

The FIDIC Conditions of Contract may be used “as is” but can also be customised. They are a (good & substantial) starting point for Conditions of Contract but often need to be supplemented/edited to tailor them to local situations or to suit the needs of specific projects. The FIDIC Conditions Of Contract have been adopted by many governments and international development banks as their standard forms of contract and they have made certain changes to them.

All these contract variants are based around a core set of shared concepts and it is these we wish to identify and discuss in this Contract Domain Model.

1.2.2: FIDIC Documents

The Conditions Of Contract documents are copyright by FIDIC and can be purchased from their on-line bookshop at:

- <http://www.fidic.org/bookshop/>

or from its member associations. Please note that the actual FIDIC Conditions Of Contract documents are NOT provided as part of Clipcode Knowledge Networks (which focuses instead on the execution of such contracts).

An excellent book on FIDIC contracts is:

- “The FIDIC Forms Of Contract”, 3rd Edition, by Nael G. Bunni, ISBN: 978-14051-2031-9, Blackwell Publishing, 2005.

1.2.3: Employer (Client) – Engineer - Contractor

Many large-scale energy, construction, environmental and civil engineering projects involve a contractor working to complete a project for a client/employer under the guidance of a consulting engineer.

If you needed to build a house for your family, you would instruct an architect to help first with the design of the house and later the on-going verification that the building contractor is constructing the building to the right design and to the right quality. The architect will also certify to you that the contractor is entitled to regular interim payments for work completed, an additional payment when you move into the completed house and a final payment after you have spent a while living in the house and making sure everything is satisfactory.

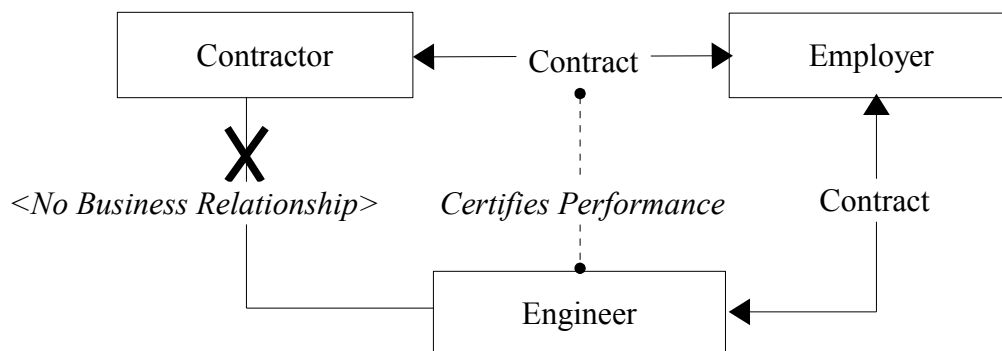
FIDIC contracts are based on the same idea, but on a much, much larger scale. The project’s commissioning organisation (the organization which wants the project built and who pays the bills) is sometimes called the client, sometimes

called the employer. In FIDIC contracts, it is always called the “employer” (a term we will use from now on).

The company that performs the construction work is called the “contractor” in FIDIC contracts. In some forms of FIDIC contracts, the contractor will also be responsible for the design itself.

The consulting engineering firm is known as the “engineer” in FIDIC contracts (the term we will use) but can sometimes be called the consultant. The engineer is often, though not always, responsible for the design. The engineer is responsible for certifying to the employer that the contractor has performed its duties according to the contract.

Figure 1.1: Employer, Engineer And Contractor



With FIDIC, a contract exists between the contractor and the employer and a totally separate contract exists between between the employer and the engineer. There is no contractual relationship between the contractor and the engineer. Neither should there be any business relationship (e.g. ownership, partnership) between them, as it is important that the engineer be independent of the contractor in order to provide the necessary impartial and objective oversight.

1.2.4: The Need For Consulting Engineers

Large infrastructure projects (e.g. power stations, cross-country road systems, huge building campuses, underground metro systems) require many contractors with various skill sets to work in a coordinated manner in order to bring the project to a successful conclusion. Often costing hundreds of millions of dollars, these projects are complex, time-consuming, exposed to many changes and can easily go wrong if not subjected to proper professional guidance.

Employers often wish to have firm control over how the project is run, yet realise they need professional help with the design and management of the project. The employer (government agencies, multinational corporations,

international organisations) may not have the requisite engineering skills to manage complex engineering projects and therefore will bring in professional expertise, in the form of consulting engineering firms. These experts act as competent and trustworthy intermediaries and help manage dealings with the various contractors.

In some projects, the employer will hand off the entire construction project to a main contractor, who in turn will deal with the subcontractors. Only this main contractor will have direct contractual agreements with the employer. The employer pays the main contractor and only deals with it. The main contractor pays the sub-contractors and guides them as needed.

In other projects, the employer will divide the construction project into multiple sections, and allocate groups of sections to different contractors. Each of these contractors will need to be managed separately and yet the progress of work coordinated with the other contractors. In both scenarios, the employer benefits from having consulting engineers available to ensure the project progresses in an optimal manner.

A mix is also possible, using the idea of a main contractor and multiple sub-contractors, but the employer has a more direct role in the selection and payment of the sub-contractors.

1.2.5: Quick Tour Of Contract Payment Certification

To greatly simplify, here is a quick tour of what's involved in processing payments based on FIDIC contracts.

It is the contractor's responsibility to carry out the construction and allied work. It is the engineer's responsibility to certify to the employer that the work (or a portion of it) is satisfactorily completed and authorise that the payment should be issued. It is the employer's responsibility, upon receipt of the engineer's certificate, to directly pay the contractor within an agreed time frame.

At the beginning of the project, the employer and contractor agree on the contract price. A contract is divided into multiple sections, each of which is priced separately and can (and usually will) proceed at a different pace.

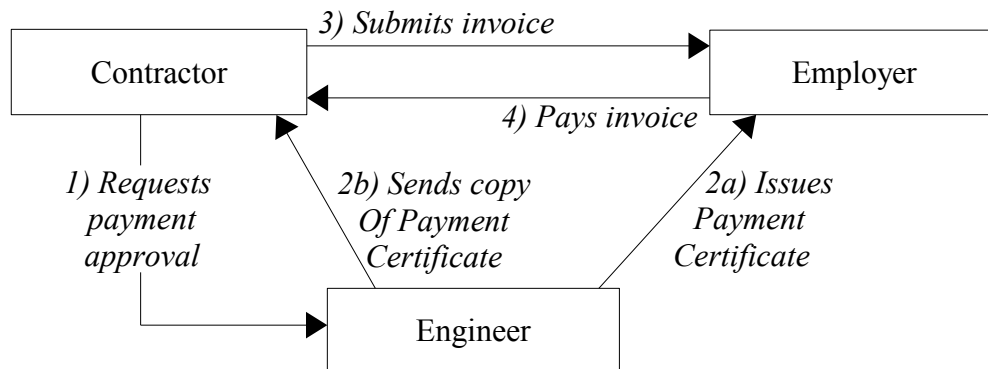
Multiple payment types can be defined, which allow different kinds of payments to be issued at different stages of each section of works. For example, there could be an advance payment up front, interim (e.g. monthly) payments, a payment when the employer takes over the completed site and a single final payment after any final issues have been resolved.

Once the contractor thinks it is due a payment under the contract, it informs the engineer, who verifies if this is the case and how much is due. The engineer then

issues a business document, called a payment certificate, to the Employer stating that a payment should be made, how much, and for which section(s). A copy is also sent to the contractor. The contractor then sends an invoice to the employer who in turns pays the stated amount. Various attachments are need to carry further details of the contract payment processing. Various reports also need to be generated to assist the employer.

From time to time over the contract's life cycle, changes may be needed to be make to the pricing of sections of works, or sections removed or added. The engineer, in consultation with the employer and the contractor, issues a business document called a Variation Order (VO) that clearly indicates the agreed changed pricing.

Figure 1.2: Issuing Payment Certificates



Managing payment certificates can be performed manually or via ad-hoc techniques (e.g. a custom Excel spreadsheet), but since the process quickly becomes become complex, a richer web solution (such as Clipcode Knowledge Networks - <http://www.clipcode.com>) helps to more efficiently manage the entire payment certificate process and the varied information flows around it.

2: Defining Contracts

With regards to contract payments, a contract consists of:

- Contract Details
- Contract Price
- Sections
- Variation Orders
- Payment Certificates

We need to examine each of these in turn. As part of this discussion, we will define sample business rules and user-defined contract policy which control how each area is processed.

Since FIDIC contracts can be (and often are) customized, then the processing of such contracts also needs to be flexible to allow custom extensions. So a foundational structure is needed which allows added features as needed.

There are of course aspects to contracts other than payments - such as contractual notices, cash flow and risk management - and these also need to be managed, but in the current version of this document we focus on contract payments only.

2.1: Contract Details

For each contract we need to specify a few initial details.

We need to specify the Contract Number, identify the employer and the contractor, details about the contractors bank account(s) for electronic funds transfer by the Employer and date the contract commenced.

2.1.1: Business Rules

The Contract Number is a string (integers, letters and other characters, such as '-' and '/')

The Contract Number is set during contract creation and may not be changed later.

2.1.2: Configuration Options

Regex for contract number

Whether the Contract Number may be changed after creation

Default employer

Employer cannot be changed after

What cannot be changed after contract activation:

Employer

Contractor

Currencies in which contract is denominated

Custom Strings

CustomStringID:

CustomStringValue:

(Copied during cert/vo generation).

Document-Designer (Custom Documents)

Placing Custom Strings

Boilerplate Text for docs

Text for underneath

API to call (need to register user-friendly name during extension init)

FileRefNo-VO

FileRefNo-Cert

<%Contract-Number%>

2.2: Contract Price

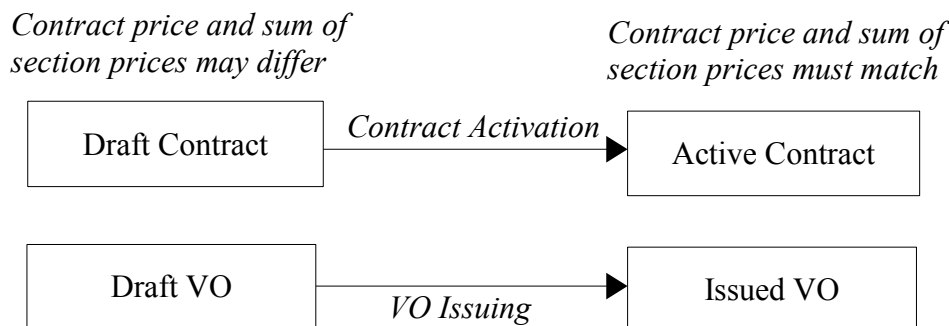
The contract price is the amount, in one or more currencies, that the employer and contractor have agreed that the contracted works should cost.

The contract price must be set during contract drafting (before contract activation) and may be changed via Variation Order (VO), which is the mechanism (discussed later) how changes to contract pricing are agreed over the lifetime of the contract.

A contract is partitioned into multiple sections, and in turn each section is divided into subsections. Each subsection has an agreed price too. A section price is the sum of the prices of its subsections.

At the point a contract is being activated and when a VO is being issued, then for each currency that is used, the contract price must exactly equal the sum of the sections. During drafting of the contract and drafting of a Variation Order, the contract price may differ from the sum of the sections, as it may be that at a particular point it has been agreed how much the new overall contract price should be, but it has yet to be finalised which subsections need to be changed. This must be finalised before the contract can be activated/VO issued.

Figure 2.1: Contract And VO Drafting



Where a contract price is denominated in more than one currency, they are for all intents and purposes separate. It can be that a change occurs in a VO reducing the contract price in one currency and increasing it in another, thus allowing monies to be moved from one currency to another, but all calculations are based on the individual currencies.

2.2.1: Business Rules

A contract price may not be 0.

The currencies in which the contract price is denominated may only be defined during contract preparation.

2.2.2: Configurable Settings

Whether currencies may be added by variation order

Whether the contract price for each currency can be 0.

Whether at least one contract price for a currency must be > 0 .

Default currency for knowledge network

Max Number Of Currencies: 2

when Contract Pricing is auto-set to sum of sections.

In Preparation

Active

Active Awaiting Recovery

Recovery from a single Certificate

Recovery from Multiple Certificates (must allow issuing of 0 certs)

2.3: Sections

A contract is divided into multiple sections, which in turn are divided into subsections, which are more manageable partitions of the project.

2.3.1: Committed Sum And Provisional Sum Categories

Sections are categorised into committed sums and provisional sums. A committed sum is an amount the employer has agreed to pay the contractor in future provided a specific block of work is completed according to specification. A provisional sum is an amount that is likely (but not definitely) needed in future to cover expected or unforeseen additional expenses. It is part of the overall budget for the project that the employer has allocated, but it may or may not be needed in future. Also, it has not yet been decided which section the work will become part of.

Payment certificates may only be issued for committed sum sections. The monies in a provisional sum must first be reassigned via VO to a committed sum before it can be used in a payment certificate.

2.3.2: Types Of Sections

Four section types are supported:

- Section Of Works (a committed sum section)
- Other Section (a committed sum section)

- Customs & Import Duties (a committed sum section)
- Provisional Sum Section (a provisional sum)

It is quite possible that customised contracts may need additional section types, but the above should cover most standard needs.

Sections of works are those where the main construction work is carried out. Customs & Import Duties (C & I Duties) are for import taxes. A provisional sum section is for monies that may (or may not) be needed in future but have not yet been allocated to a specific section of works.

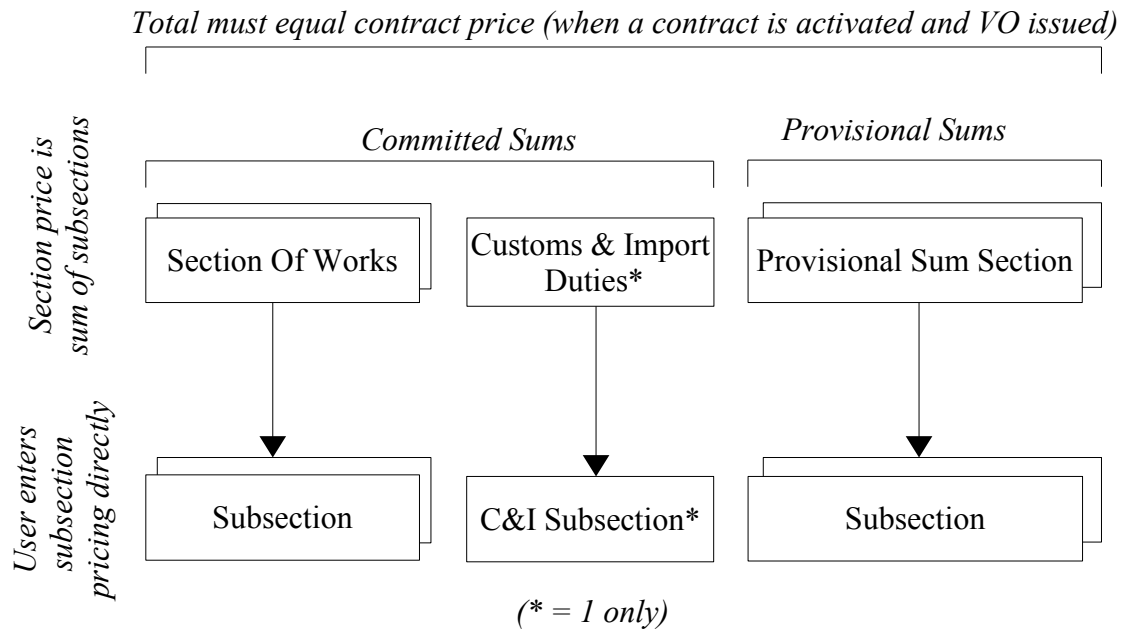
The naming of sections of work must be unique - regardless of section type (one cannot have a regular committed sum section called "spare parts" and a provisional sum section called "spare parts").

There may be zero, one or more sections of works (usually one or more). There may be zero, one or more provisional sum sections. There may be zero or one Customs & Import Duties section. The Customs & Import Duties section can only be added via VO.

The section price is not defined directly - instead, a price for each subsection within the section is defined. The section price is then automatically calculated from the sum of the subsections.

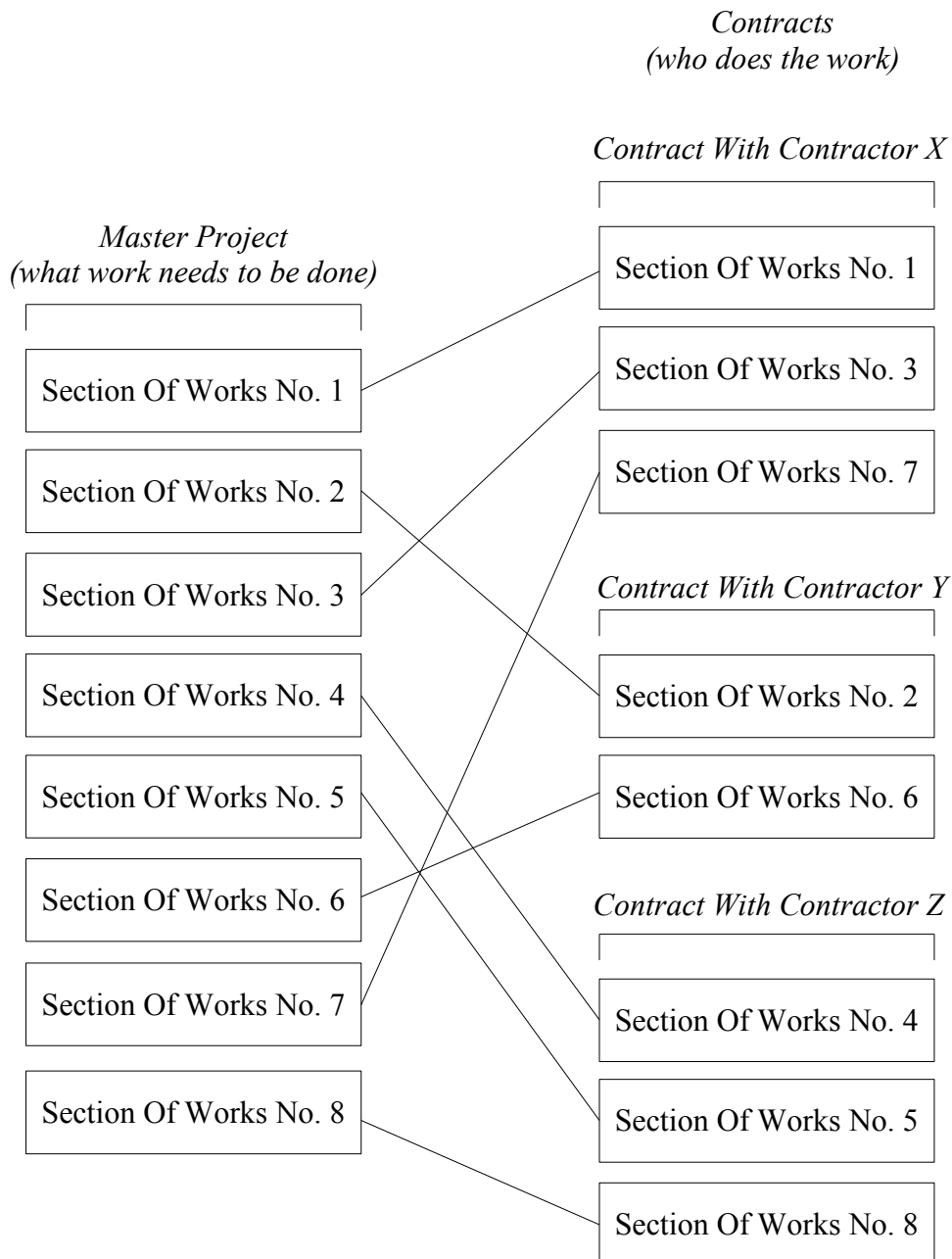
Each section of works section and each provisional sum section may have zero, one or more subsections. It is valid (though rare) for a section to have no subsections (assume they will be added in future VOs).

The Customs & Import Duties section has a single subsection (which is added automatically when the subsection is created). This subsection may not be deleted and extra subsections may not be added to it.

Figure 2.2: Sections And Subsections**2.3.3: Section Of Works' Numbering**

Each section of works is identified by a section of works' number. The Customs & Import Duties section and the provisional sum sections do not have such numbers.

The numbers for section of works on a single contract need not be contiguous. Though a contract is an agreement between the employer and one contractor, it is often carried out in the context of a much larger master project, which may involve many contractors, each with one or more contracts with the employer.

Figure 2.3: Section Numbering

The master project may have very many sections of works and these may be (but need not be), numbered contiguously. Some of the sections are allocated to one contract and some to others, and the section numbering for each allocation need not be contiguous. For example, one contract may get section 1, 2, 5 and 9,

whereas a different contract may get 3, 6 and 11. A single section of works may not be allocated to more than one contract. It is quite possible that new sections will be added to the project and superfluous section removed during the lifetime of the project, and these changes will also be reflected in the sections in the the contracts.

The provisional sums and the Customs & Import Duties for a particular contract are not part of the master project, and hence do not need numbering.

2.3.4: Business Rules

No section value may be negative.

A section value may be zero.

The number of a section of works does not change over its lifetime.

A Customs & Import Duties section cannot be removed by VO once it has been added (however, its value may be altered in a VO).

Payments always come from committed sections.

Sections may be removed, but remain as part of the contract for historical processing. Sections that have been removed may not, via a later variation order, have the section price changed, or in payment certificates, have payments made against them.

2.4: Variation Orders (VOs)

FIDIC-based contracts are often part of huge projects that last for many years, and it is likely that over this period the contract price and the price of some individual sections of works will change, subject to agreement between the employer and contractor. In addition, some new sections may be needed and some of the original sections can be removed. More or less work may needed to be completed, or the character of the required work may change, all of which impacts the pricing.

To facilitate such scenarios, a business document called a Variation Order, or commonly known as a VO, may be issued identifying the agreed alterations to pricing. A VO consists of a letter and a VO Attachment. The letter is written by the engineer and clearly outlines what changes to the workload are required. The letter is different for each VO. The VO Attachment is a tabular listing of the agreed update section pricing for the contract and the new contract price.

The contract price must be defined during contract drafting but later it need not change in every VO. For example, a VO might involve moving a block of money from one section to another (incrementing one and decrementing the other by

the exact same amount in the same currency), leaving the overall contract price unchanged.

Each VO has a VO Number, which starts at 1 and increments sequentially. It is often useful to think of the initial contract price and initial pricing for the sections as VO No. 0 (the beginning variation, just one of many) and over the lifetime of the contract there may be many variations.

An entire section may be removed by VO, or just a subsection within it. If a payment has already been made for that subsection, then recovery may be needed (discussed shortly).

The most recently issued VO is defines the currently active contract pricing, and any certificates that are prepared are based on it, and not a later VO that is in preparation.

If a subsection, for which one or more payment certificates has been issued, is then removed by VO or has price reduced in a VO, then there may be a need to recover monies from the contractor from a different subsection. This is known as Recovery and will be discussed later, after we examine payment certificates.

2.4.1: Business Rules

A VO may not be “recalled” once issued (unlike certificates).

Only one VO at a time may be drafted.

When a VO is about to be issued, there may be no draft certificates.

Before a VO can be issued, the contract price and sum of section pricing for all sections must be equal.

The contract price cannot be less than the amount already paid to the contractor.

A section removed in one VO cannot be added back in a later VO.

A subsection removed in one VO cannot be added back in a later VO.

2.5: Payment Certificates

The engineer issues certificates to the contractor when it is entitled to payments from the employer. The payment rules associated with a payment certificate can vary greatly between contracts and what we outline below is a good representation of a model that will work for many contracts. Additional payment instructions may need to be defined for those who have customized their contracts.

In addition to general details such as name of employer and contractor, the contract number and date, a payment certificate consists of a table of payment instructions. Each payment instruction applies to a particular section and states the amount of work completed, percentage due and amount due. The payment certificate also lists the total work completed and total amount due.

2.5.1: Payment Instruction Types

Payment Instructions

Percentage

Bring Value Up To vs. ActualValue

Not More Than:

Singleton (PerCert, PerSectionAndPerCert, Multi)

AppliesToSectionType

AdvancePayment

RegularPayment

CustomsPayment

RecoveredPayment

DivertedPayment

2.5.2: Payment Certificate Types

Five payment certificate types are supported.

- Advance Certificate - usually paid at the beginning of the project and is a prepayment to the contractor for work to be done in future
- Interim Certificate - (often paid on a monthly basis) is part payment for

work completed

- Customs Certificate - enables the Contractor to retrieve money it paid for Customs from the Employer
- Taking Over Certificate - signifies that the Employer is taking over responsibility for a section of work
- Final Certificate - the last certificate for a section of works

Apart from Customs Certificate, each certificate lists the Work Completed amount and a Payment Due amount. The Payment Due amount is percentage (different for each certificate type) of the Work Completed.

The Customs Certificate takes its funds from the sole Customs & Import Duties section. All other certificate types take their funds from sections of works. No payments are ever made from provisional sections.

All payment calculations are based on subsections and their values are combined for the sections that appear in the Certificate.

There can be only one final certificate per section of works. When the final certificate has been issued for that section, it may appear on no further certificates. There can be multiple advance, interim and taking over certificates per section of works. An advance certificate is usually issued at the start of the contract, and if the price of the section is altered in a VO, then a new advance certificate may be issued. Interim certificates are the most common as they are usually issued at regular intervals, such as monthly. Usually only one taking over certificate is issued for a section of works, but on rare occasions multiple may be needed.

2.5.3: Business Rules

A payment certificate may only be issued for a positive amount. Payment certificates for zero or negative amount are not issued. (Where there are multiple currencies, then at least one must be non-zero but the others may be zero). This has implications when recovery is needed after a VO, as the amount to be recovered must be less than the amount to be paid, so overall there is a positive payment. Rules for recovery are described later.

The % that appears on certificates for regular payments and recovery after overpayments (discussed later) must be either 15, 65, 95 and 100. The % for diversion payments (discussed later) may be set by the user.

All payment calculations are based on subsection pricing, not section pricing.

2.6: Advance Certificate

The Advance Certificate brings the amount paid so far for a subsection up to 15% of the Work Completed. These values can be calculated automatically without user input.

Advances are only paid for sections of works (not for the C&I section, and not for provisional sum sections). Zero, one or more Advance Certificates may be issued for a contract. If no advance is to be paid, then no Advance Certificate will be issued. Often (but not always), if an Advance Certificate is needed it will be the first certificate issued. For example, if Subsection A of Section X has its price set to \$1,000 and an Advance Certificate is generated (let's call it Cert No. 1), then a Certificate will show one line for Section X showing "Work Completed" set to \$1,000, %Due to "15%" and Payment Due to "\$150".

If later after a VO that increases the subsection price, the amount paid so far for a subsection will be less than 15% of the subsection price, so then another Advance Certificate may be issued. An additional Advance Certificate may be issued if a new subsection were added. The contractor may be paid the 15% on the additional subsection price. For example, if in a VO the Subsection A were increased to \$1,500 and a new Subsection B (Part of Section Y) with price \$200 added. If only Cert No.1 has been issued and a new Advance Cert is generated, then it will have two lines - Section X showing "Work Completed" set to \$500, %Due set to 15% and Payment Due set to \$75; and Section Y with "Work Completed" set to \$200, %Due to 15% and Payment Due to \$30.

As an alternative to the scenario just outlined, if Subsection A (which is part of Section X) has its price increased to \$1,500 and a new Subsection B was added to Section X with price of \$200 in a VO, and then an Advance Cert was generated, it will have one line, Section X, with "Work Completed" set to \$700, %Due set to 15% and Payment Due set to \$105.

If a VO reduces the price of a subsection, and earlier an advance was paid for that subsection, then this is in effect an overpayment - the contractor is only due 15% of the smaller amount. The excess is recovered via a mechanism described shortly (this adds a negative amount to the next certificate, thus in effect recovering the excess).

If a VO increases one subsection price and decreases another - both within the same section, then the 15% advance can be paid for the increased subsection, and is recovered from the decreased subsection. This complies with the rule that all payment calculations are based on subsections.

An Advance Cert brings the amount paid for a subsection up to 15%, so if an earlier (eg. Interim) certificate were issued, then the payment is not always 15%

of the full subsection price for an initial Advance Certificate or 15% of the increase (by VO) in a subsection price for a subsequent Advance Certificate.

Provided they represent non-zero payments, multiple Advance Certificates can be issued after any number of previous Advance Certificates, Interim Certificates, Taking Over Certificates, Final Certificates, and/or Customs Certificates.

2.7: Interim, Taking Over and Final Certificates

There are three regular payment-type certificates:

- Interim - 65%
- Taking Over - 95%
- Final - 100%

Apart from the percentages, these work much the same way - though there are differences. All three deduct payments from sections of works only. The Interim Certificate pays 65% of the work completed, whereas the Taking Over and Final Certificates brings payments up to 95%/100% respectfully of the work completed. An Interim Cert can never bring the amount paid for a subsection to above 80% of the subsection price.

It should be noted that issuing Taking Over and Final Payment Certificates have contractual implications beyond payments - people should review the specific terms of the contracts they work with for more details.

2.8: Customs Certificates

Some countries apply Customs & Import Duties (C&I Duties) on supplies the contractor needs to import in order to fulfill the contract. Usually the contract states that the contractor may recover these fees from the employer. A Customs Certificate is used for this purpose.

An attachment to the Customs Certificate needs to identify for each customs transaction, the receipt number, the data, amount of duty, any deductions and the amount reimbursable.

100% of the sum of the amount to be reimbursable is to be paid in the certificate.

A Customs Certificate deducts the payment due from the Customs & Import Duties section (a committed sum).

2.8.1: Business Rules

The C&I section, if present, cannot be removed by VO, and its price cannot be reduced in a VO to below any previous certified C&I payments.

2.9: Recovering Over-Payments After VO

The subsection price may be reduced in a VO or the subsection removed. When a payment has already been made for that subsection, then, in light of the new subsection price (either zero, or smaller than previously), part or all of earlier payment(s) may be deemed to be overpayments. These need to be recovered on the next certificate (of any type except C&I Duties).

When a new certificate is being created, it needs to be calculated whether any overpayments have occurred, and if so, a corresponding recovery amount (negative of the overpayment - thus erasing it) needs to be added to the certificate. Any positive payments for that certificate are also added, and the amount payable is the sum. In effect, the amount to be recovered has been deducted from the certificate.

Sample Recovery:

Imagine a contract was created with Section X's price set to 1000 and Section Y's price set to 2,000. Then imagine two certificates were issued - the first an advance, which paid 15% of 1,000 for Section X, and the second, an interim certificate, which paid 65% of 1,000 for Section X. Then imagine Section X was removed in a VO. The next certificate to be issued needs to recover the overpayment for Section X. Imagine it is an interim cert and Section Y for 2,000.

| Description of Works Completed | Value of Plant Shipped/ Work Completed | Due % | Payment Due (USD) |
|---------------------------------------|---|--------------|--------------------------|
| Section X | -1000 | 15 | -150 |
| Section X | -1000 | 65 | -650 |
| Section Y | 2000 | 65 | 1300 |
| | TOTAL | | 500 |

If the price of a section of works is reduced and earlier an advance payment was certified for it, then there will have been an overpayment, and this will need to be recovered.

For example, if Section Z had its price initially set to 100, and then an Advance Certificate was issued (150), and then a VO changed its value to 500, then during the next certificate $1000 - 500 * 15\% = 75$ needs to be recovered.

2.9.1: Business Rules

Recovering overpayments is available on all certificate types except Customs & Import Duties.

2.10: Diversions

It may occur on a contract that equipment has been supplied and/or blocks of work completed and these initially were part of one subsection and invoiced and paid for, and then later it is agreed that these should be part of a different subsection (e.g. it could be a piece of expensive equipment in a warehouse, and initially was intended for site X, but now needs to go to site Y).

The sum of any diversions on a particular certificate will always be zero. No extra payment is being made – instead money that was paid for one subsection in a previous certificate is now paid for a different one – money has been diverted from one subsection to another. The contractor has the exact same amount of money after a diversion as before, just that it has it for a different subsection. A diversion is identified by a “Work Completed” amount and a percentage, thus yielding amount to be paid. The percentage is set by the user and may be any number between 1 and 100 (e.g. 90). It is not restricted to 15, 65, 95 and 100.

A certificate with a diversion will contain one or more sections with negative amounts and one or more sections with positive amounts, and the total of these must equal zero. The number of positives and negatives need not be the same – i.e. A large delivery of supplies which was for one section may be diverted to two other sections, thus resulting in a certificate with one negative diversion and two positive diversions.

Sample diversion:

| Description of Works Completed | Value of Plant Shipped/ Work Completed | Due % | Payment Due (USD) |
|--------------------------------|--|-------|-------------------|
| Section X | -1000 | 65 | -650 |
| Section Y | 700 | 65 | 455 |
| Section Z | 300 | 65 | 195 |
| | TOTAL | | 0 |

2.10.1: Business Rules

After a diversion, the amount paid so far for a subsection cannot be negative. Diversions can be placed on all certificate types, except Customs & Import Certificates.

It is unlikely, but amounts may be taken out of one subsection of a section and

put into a different subsection of the same section (thus the certificate document will show a 0 payment for this section).

2.11: Recalling A Certificate

If there is a mistake in an issued certificate, it may be recalled, the error fixed and the certificate re-issued.

2.11.1: Business Rules

Only the most recently issued certificate may be recalled.

A certificate cannot be recalled if a VO has been issued after that certificate.

A recalled certificate may be deleted (and thus a certificate of a different type issued - e.g. An Interim Cert could be recalled and then deleted, and later a Taking Over Cert, with the same cert number, issued).

2.12: Percentage Calculations

All percentage calculations are based on the subsection pricing, and rounding is to the nearest value to the subunit count for the currency in use (US\$10.151 becomes US\$10.15 and US\$10.158 becomes US\$10.16; BD10.1234 becomes BD10.123 and BD 10.1239 becomes BD10.124).

When the value to be rounded is the digit 5 followed by all zeros (US\$10.1250000 or BD25.1375000) then it is rounded down (US\$10.12 and BD25.137). The Bankers' algorithm (when the rounding digit is 5, increment the previous digit if it is not even, resulting in US\$10.12 and BD25.138) is not used.

3: Glossary

Employer - The organisation which requires the work to be performed and ultimately issues payments based on the payment certificates.

Contractor - The organisation performing the work. The contractors receive the payment certificates from the engineer and submits them to the Employer for actual payment.

Payment Certificate - business documents that are authorisations of payment to be made to contractors.

Payment Certificate Attachment - An attachment that is issued with each payment certificate. This attachment lists the value of each section of work, the amount paid to date and the amount paid for the section of work on this certificate.

Fils - The subunit of certain currencies such as the Bahrain Dinar which - unlike most other currencies, uses three decimal places, not two (e.g. BD 34.123)

Customs Attachment - information regarding customs payments that the Employer requires.

Section Of Works - A bounded amount of work that needed to be completed. A section of works has a section name and a section number, both of which are to appear on the attachment accompanying the payment certificate

Variation Order - A change to the agreed contract (could be the addition, deletion or change in value of a section or work, or a change to the total contract price; also could be a combination of these). A variation order consists of a letter (specific to each VO) and a Variation Order Attachment which lists the pricing changes.

Variation Order Attachment - A document which shows the impact of the variation order on the contract.

VO - see Variation Order

Overpayments - When a VO reduces or removes a subsection for which an earlier payment certificate made a payment, then it may be deemed that an overpayment has been made for that subsection. Such overpayments must be recovered when creating the next certificate.

Diversions - When equipment or workloads already paid for need to be diverted from one subsection to another, a certificate may contain a diversion. The sujm

of diversions for a particular certificate must always be zero, since they involve no additional payments.

Contract - The agreements between an employer and contractor that are managed by the engineer that describe work to be completed and is that are the basis for payment certificates

Contract Price - the sum of the prices of the sections of work that are part of the contract. At all times, the contract price is the sum of the price of the contract sections.

Provisional Sums - Specific sections whose amounts are not yet committed, but may well need to be in future. Common provisional sum sections include one for a contingency sum and a provisional amount for customs & import

Contingency Sum - Amount to be used for unforeseen changes in the contract price (one type of provisional sum).

Committed Sums - The amount the Employer has committed to pay for this contract (definitively agreed to the payment, provided the terms for the contract are fulfilled). For an active contract, Committed Sums is equal to the Contract Price less the provisional sums.

Dual Currency Contract - The Contract Price (and the prices of the Sections Of Work) to be denominated in either one or two currencies - "Dual currency contracts" use the latter. Note that for a dual currency contract, the two amounts specified in different currencies are both to be paid. (It could be that the work is to be performed in two countries and the contractor wishes to invoice in the currency of the country where the work is performed.). The total contract price is the sum of the contract prices for both currencies.

Customs And Import Duties (C&I) - Taxes paid for imports.

C&I - See Customs and Import Duties

Lump-sum Contract - A contract where there is agreement between the Employer and Contractor on the amount to be paid (e.g. a fixed-price contract), and any changes to this over the course of the contract requires a variation order.

Measured Contract - A contract where the Employer pays the Contractor for the amount of work performed, as measured on an on-going basis (e.g. a day rate per worker is paid, or some other measure such as amount of concrete poured, area of paving completed).