



VALUING VARIATIONS IN DREDGING CONTRACTS

ABSTRACT

Variations have the potential to generate substantial extra costs and pose significant delay and disruption to a dredging project. Moreover, the valuation of a variation can be a contentious issue between contracting parties. Often the engineer has an obligation under the terms of the contract to value any varied work. Where appropriate the engineer should apply the contract rates, such as where the work executed under the variation is of a similar nature and carried out under similar conditions to work set out in the contract.

The issue for the engineer in valuing a variation is usually the extent to which the varied work matches the character of that in the original contract rates and prices. With respect to the costs of dredging, as these are capital intensive, the discussion on how to value varied works almost always turns to the valuation of the cost of the vessel itself.

Whilst CIRIA's *A guide to cost standards for dredging equipment* is a valuable tool for assessing some of the contractor's costs, it does not provide comprehensive means of assessing a variation to a dredging contract.

INTRODUCTION

Variations in dredging contracts are almost inevitable, even with the best prepared contract. This need may arise during the performance of the works for the engineer or employer to direct the contractor to modify the scope or nature of the work. The variation usually results in extra or different or less work. As an understood norm, when there is extra work, the contractor will fairly consider itself entitled to a commercial rate including profit and additional overheads for that extra work. It is not reasonable to ask a contractor to carry out work for costs alone. To avoid disputes, many contracts set out guidelines as to how to value variations. Ultimately, the contract should provide for an independent valuation if the contractor and employer are not able to reach an agreement.

Many definitions of the word "variation" exist both in standard and bespoke contracts. The *FIDIC Form of Contract for Dredging and Reclamation Works* (2006, 2016), also known as the FIDIC Blue Book (Figure 1), defines variation as a "change to the Specification

Above: Variations in a dredging contracts are inevitable. It is essential to look into how variations should be valued fairly and efficiently.

and/or Drawings (if any) which is instructed by the Engineer...". Thus, changes can be very broad and of a minor or major nature and may result in a change in the character of the work or a change in conditions, or both.

Variations if managed badly have the potential to cause problems for a project. Variations may generate substantial extra costs and pose delay and disruption to a project. Moreover, the valuation of a variation can be a contentious issue between contracting parties.

This article looks closely at how variations should be valued and in particular how and when CIRIA's *A guide to cost standards for dredging equipment* can be used to assist employers to ensure that variations are valued fairly and efficiently.

REQUIREMENT TO CARRY OUT A VARIATION

A variation clause is a key boilerplate provision to include in a contract. The clause in a contract caters to the contractor to perform additional or varied work. In its absence the contractor is not bound to carry out such additional work at the original contract rates and prices or indeed at all. One example of this is the case of *Blue Circle Industries Plc v Holland Dredging Company (UK) Ltd* (1987).

It was found that the construction of a bird island from disposed dredged material was fully and completely outside of the scope of the original dredging work and therefore constituted a new and separate contract.

This obligation should also be counter-balanced by the need of a marine contractor to be able to refuse to carry out a variation where it would require the mobilisation of other equipment to the site not previously allocated to the site or maintaining the existing equipment on the site for far longer than anticipated. Thus, preventing the contractor from being able to utilise the equipment for other committed projects.

THE TIER RULE

The assessment of the valuation of variations of civil engineering projects has a history going back in excess of sixty years with the United Kingdom's Institution of Civil Engineer's (ICE) editions of the *Conditions of Contract* setting the industry ground rules to guide the engineer administering the contract. Under Clause 52 of the ICE Contract, the engineer could revert to the 3-tier rule (Abrahamson, 1979 & Eggleston, 1993).

Rule 1: Valuation at Contract Rates and Prices

Rule 2: Valuation using Contract Rates so far as is reasonable, or

Rule 3: Fair Valuation

The engineer has an obligation under the contract to assess the valuation of any varied work and to apply the contract rates where the work under the variation is of a similar nature and performed under similar circumstances to that set out in the contract. When the work is not identical or similar, rates and/or prices for other work in the contract are used as a basis to form a new rate or price with suitable adjustments to reflect the difference. This difference could be due to changes in conditions, character, quantity, or other reasons provided for by the contract. Failing that the engineer could make an assessment of a 'fair' valuation.

The issue for the engineer in assessing any valuation of a variation is usually the extent to which the varied work matches in character to that provided for in the contract rates and

prices. The engineer has to make a fair assessment based on the facts particular to the matter. This is often a bone of contention between contractor and engineer. The contractor often argues that the variation cannot be valued at the existing rates or that the variation is significantly dissimilar to the existing scope of work to such an extent that new rates and prices should be applied. This may be a valid assertion by the contractor but the engineer may be mindful that this may also be an attempt by the contractor to want more than the original rates which may have proven to be unprofitable.

THE FIDIC CONTRACTS

The various FIDIC Contracts from 1960s to the late 1990s adopted the ICE Contract's principle of valuation of variations, which was virtually unamended in the FIDIC Red Book (1987, 1992).

The provision states: *"If the Contract does not contain any rates or prices applicable to the varied work, the rates and prices in the Contract shall be used as the basis for valuation so far as may be reasonable, failing which, after due consultation by the Engineer with the Employer and the Contractor, suitable rates or prices shall be agreed upon between the Engineer and the Contractor"*.

The FIDIC contract committee chose the word

'suitable' in place of the word 'fair' as espoused in the ICE Contract. Clearly, the core obligation of 'reasonableness' on the part of the engineer as the basis for a valuation by the engineer remained.

The FIDIC Rainbow Suite of Contracts of 1999 departed somewhat from the ICE tier definitions and Clause 12.3 states: *"a new rate or price shall be appropriate for an item of work if... (ii) no rate or price is specified in the Contract for this item, and (iii) no specified rate or price is appropriate because the item of work is not of similar character, or is not executed under similar conditions, as any item in the Contract"*. The FIDIC contract committee at the time chose the words 'similar character' and 'similar conditions' presumably as a guide to the engineer when making a valuation determination.

Separately, rates may be adjusted for quantity variance:

- if the quantity increases or decreases by more than 10% from the quantity in the "Bill of Quantities" or
- If the value of the item comprises more than 0.01% of the "Accepted Contract Amount" or
- if the "Variation" directly changes the unit cost by more than 1%.

The main purpose of this clause is to allow for an adjustment in the overhead recovery where the quantity of an item which has a rate is increased or decreased by more than 10%. The idea behind it is that the original rate includes an element of overhead recovery based on the anticipated quantities so if the actual quantity is less then the contractor will under recover its overhead costs as included in the rates. Conversely, if the actual quantity is more than 10% then the rate will be reduced to prevent the over recovery of costs included in the rates.

There is also provision in the FIDIC Rainbow Suite for the contractor to propose value engineering, under which the contractor shares in the savings that are generated at a share range set out in the contract. However, in practice, this is rarely used on marine infrastructure projects.

The 3-tier rule was introduced in the first

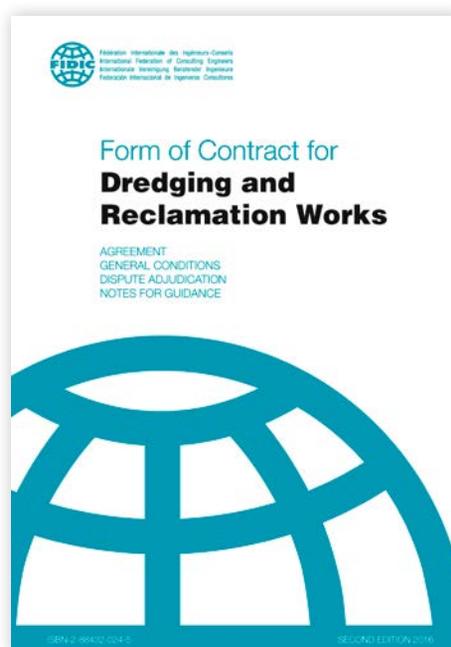


Figure 1. The second edition of the FIDIC Blue Book.



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edition of the FIDIC Blue Book and was retained in the new edition. Though this rule is given in a similar format found in the ICE Contracts in both editions of the FIDIC Blue Book, it was expanded to 5 tiers to include lump sum pricing and dayworks with a change from 'suitable' rates to 'appropriate' rates (Table 1).

The FIDIC Blue Book "Notes for Guidance" states: "An agreed lump sum should be the first method to be considered as it can

FIDIC Form of Contract for Dredging and Reclamation Works (2006, 2016)

10.2 "Valuation of Variations"

Variations shall be valued as follows:

- a) at an agreed lump sum price, or
- b) where appropriate, at rates in the Contract, or
- c) in the absence of appropriate rates, the rates in the Contract shall be used as the basis for valuation, or failing which
- d) at appropriate new rates, as may be agreed or which the Engineer considers appropriate, or
- e) if the Engineer so instructs, at daywork rates set out in the Appendix for which the Contractor shall keep records of hours of labour and Contractor's Equipment, and of Materials used.

Table 1: The expanded 5-tier rule on valuing variations in both editions of the FIDIC Blue Book.

encompass the true cost of a Variation and avoid subsequent dispute over the indirect effect. The Employer can invite the Contractor to submit an itemised make-up (Sub-Clause 10.5 [Variation and Contractor's Claim Procedure]) before instructing the Variation so that an agreed lump sum can form part of the instruction".

An added provision under the FIDIC Blue Book (2006, 2016) Clause 10.1 states: "If the Engineer gives an instruction which will require either the mobilisation of major dredging equipment additional to that which is intended for use on the Works or the early mobilisation of such intended equipment, the Contractor shall notify the Engineer of this immediately. The Contractor shall be under no obligation to comply with this instruction until the time and cost effects of compliance have been agreed between the Employer and the Contractor". The latter part of this provision serves as a fair safeguard for the contractor so it is not obliged to carry out a variation with equipment other than that already on the site unless the value of the variation is agreed.

The FIDIC Blue Book (2006, 2016) Clause 10.5 further provides: "The Contractor shall submit to the Engineer an itemised make-up of claims including time and cost effects within 28 days of the instruction or of the event giving rise to the claim or such other reasonable time as may be agreed by the Engineer". The engineer is, therefore, able to make a fair assessment of a variation claim using the contractor's itemised make-up.

CONTRACT RATES 'FOR BETTER OR WORSE'

Under the 'tier rule' the engineer makes his assessment of the variation using the rates in the contract as the basis for valuation, or failing which at appropriate new rates, as may be agreed or which the engineer considers appropriate. In order to do so he will need to make an assessment of the build-up of the unit rates in the contract. The engineer should be aware that he is obliged to apply the contract rates even if he considers these rates to be inordinately high or low.

This was confirmed in the United Kingdom legal case of *Henry Boot Construction Ltd v Alstom Combined Cycles* (2000). In the case,

the engineer decided it was not reasonable to use the contract rates for temporary sheet piling as the basis of valuation. He considered the rate was inordinately high and would result in an unjustified windfall to the contractor. In summary, the court was keen to provide commercial certainty to construction contracts whilst acknowledging the decision of the court may lead to rates being applied that result in substantial profit or loss for a contractor.

Therefore, it is important when negotiating and preparing a contract to be aware of the individual unit rates, not just the overall price, and the potential impact in terms of overall costs to both the employer and contractor should the original scope of work be varied. This has been seen in dredging contracts in the past where dredging of rock has been priced as an incidental 'star rate' based on a small quantity and indicative rock hardness. Sometimes, following the contract being awarded and site investigation, the quantity turns out to be far more than envisaged and it takes far longer to carry out the works. In this case, the contractor does not recover the cost of its preliminaries if they are priced in the unit rate.

The contract unit rates are generally considered as fixed and sacrosanct, and not subject to correction (M. Sergeant & M. Wieliczko, 2014). As the Henry Boot case showed, both contractor and employer are bound to the application of contract rates where applicable, for better or worse.

A manner often adopted in construction contracts to deal with potential variations is to include a "Schedule of Rates" or a set of "Daywork Rates" for labour, materials and equipment in any proposed contract. These rates can then be applied by the engineer when a variation arises. However, the conundrum for the engineer is the lack of transparency in the rates provided by the tenderer with his bid and the widely held perception that "Daywork Rates" are often artificially inflated by contractors. This issue can be avoided at the tender stage if tenderers are required to include a notional 100 hours for each "Daywork" item in the "Bills of Quantities" which are then priced and extended. In this way, it minimises the inflating

of rates and consequently the tender price. The engineer has no real idea of how the actual contract rates were derived as prospective bidders to a project are usually not required to submit details at the pre-contract stage on how the contract rates were calculated. The bidder's estimator will have prepared a tender estimate that forms the basis of the "Contract Price" that was ultimately agreed between employer and contractor. However, this is kept under wraps for commercial reasons and may only be revealed if the contractor is seeking to demonstrate that the original contract rates do not apply to varied works.

NEW ENGINEERING CONTRACT

The UK's New Engineering Contract (NEC3) introduced a new methodology for valuing variations requiring the contractor to submit his quotation for the varied work before the instruction to proceed is given by the engineer. This approach shifts the risk to the

contractor whose quotation has to include all costs of the variation including the costs of delay, disruption and risk.

This is similar to the FIDIC Red and Yellow Books (1999) Clause 13.3 procedure for the contractor to submit a proposal. It is advantageous to the employer as the final cost including disruption and extended time is known prior to the instruction. In addition, the majority of the risk is transferred to the contractor. On the other hand, it is advantageous to the contractor as it controls the assessment and valuation of the variation and it may lead to speedy resolution of the valuation of the variation. In practice, however, the majority of contracts provided to the engineer to determine any new rates is often done after the work has been executed based on the actual costs. Clearly, in the latter approach the employer carries the major risks of the valuation of the variation and the determination of what the actual costs are.

COST STANDARDS

With respect to the actual costs of dredging, the discussion of how to value varied works almost always turns on the valuation of the cost of the vessel itself. Contracts generally give no guidance as to the determination of how a rate is derived. Determining the 'actual' cost of a vessel is notoriously difficult given that the vessel owner itself has to determine how to recoup the cost of the vessel over its operational lifetime (Figure 2).

The dredging industry in the Netherlands has for many years used cost standards for various types of dredging vessels to calculate the allowance for Depreciation and Interest (D&I) and Maintenance and Repair (M&R) costs. These were originally developed by the Dutch contractors' organisation, NIVAG, in the 1970s and later by VGBouw. Later, the role of publisher was taken over by CIRIA, the UK's construction industry research and information association. CIRIA published its *A guide to*



Figure 2: Cost standards is utilised to calculate the allowance for D&I and M&R costs of dredging vessels.



Figure 3: CIRIA's 2009 edition of *A guide to cost standards for dredging equipment* book.

cost standards for dredging equipment in 2005 with an updated issue in 2009 (Figure 3). Each year, the IADC publishes a time-cost factor index for various groupings for updating these costs.

The value of the vessel is calculated with the application of complex formulas using vessel characteristics to derive an assessment of the valuation value "V" from which D&I and M&R can be calculated. The formulas and tables found in the CIRIA's *A guide to costs standards* book are often used as an objective and measurable basis for parties (employer, engineer and contractor) to assess and verify the reasonableness of a dredging contractor's tender estimate or "price" as to its likely dredging costs. This is especially the case in situations where the parties require or need to resort to an independent and objective benchmark for assessment.

Several types of costs are specifically excluded in CIRIA. They include: the costs of the contractor's technical services department (overhead), crew cost, staff cost, lubricants, fuels and water, laying up and idle time, wear to soil touching components, spare parts, insurance, mobilisation and demobilisation, general overhead and profit. Thus, it can be assumed that whilst *A guide to cost standards*

gives an indication of a significant part of a vessel cost when deployed on a project it is only an approximation at best. Also, it is far from complete when compared to the contractor's original tender estimate or contract rate breakdown.

PRICE RATHER THAN COST

It can be said that the basis for valuing variations under most standard forms of contracts is the concept of 'price' rather than 'cost'. The rationale behind it is that the contractor is only in the business of carrying out work for profit. By using the rates identified in the contract bills or schedules of rates as a basis, either directly or indirectly, for valuing the additional works, the idea is that variations will be valued at the same degree of profit (or loss) as established by the original tender.

The intention of contractual provisions will normally be to maintain the competitive element in the valuation of variations as represented by the contract bills of quantities or schedules of rates if used. This is so that the parties' original bargain as to the contract rates and prices forms the basis of valuation. In this respect the use of CIRIA's *A guide to costs standards* may seem to be subjective as it does not represent the contractor's price, but rather it is an assessment of the partial allowable cost. However, it can be used to test the contractor's proposed rate and original build-up to see whether they are reasonable.

Disputes may arise where cost forms the basis when determining a 'fair' valuation of the intended variation with respect to the allowance for head office overheads, site overheads and profit. This was resolved in the United Kingdom case of *Weldon Plant v Commission for New Towns* (2000). It was held that in the absence of special circumstances a fair valuation has to include an element of profit as well as an element to cover for fixed and running overheads. It is for this reason that it is wise to have tenderers submit details of their tender build-up including overheads and profit. This is because the cost elements can be detailed at the time of contract formation rather than they are disputed at a later date. In addition, head office overheads can usually be calculated by reference to

pricing information from the tender estimate or by using the contractor's audited accounts. Both the FIDIC Red and Yellow Book (1999) specifically state that when rates cannot be deduced from the contract rates and prices, then an assessment based on 'reasonable cost' is required. "Cost" is defined in FIDIC (1999) as "all expenditure reasonably incurred (or to be incurred) by the Contractor, whether on or off the Site, including overhead and similar charges, but does not include profit". However, in the FIDIC Red Book's Clause 12.3, a new rate or price, a reasonable "Cost" is allowed that includes a reasonable profit. This provision would indicate that it is necessary to show that cost had actually been incurred if the valuation of the variation was being undertaken after the event. However, if for some reason the contractor provided no proof of costs incurred, it is likely that the engineer would still have an obligation to value the work. He does so by taking a view as to what those costs were likely to have been. The repetition of the word "reasonable" for both cost and profit in the variation clause of the FIDIC Red Book may be somewhat disconcerting for all contract parties.

TENDER ESTIMATE OR BUILD-UP OF CONTRACT RATES

There is no standard form of contract, be it FIDIC or any other, which requires the contractor to submit its tender estimate as part of the substantiation for the valuation of a variation. The FIDIC Blue Book only requires under Clause 10.5 "an itemised make-up of claims including time and cost effects within 28 days of the instruction or of the event giving rise to the claim". So, it is beneficial to the employer, the contractor as well as the engineer supervising the project that the contract rates can be broken down into several elements. These are: the respective costs for labour, materials, equipment, fuel, overhead and profit elements at the date the contract was entered into. This is better than the engineer reverting to CIRIA's *A guide to cost standards* as a means of establishing a best guess on how part of the contract rates were derived.

When preparing the tender documents the employer and engineer are in the best position to get prospective bidders to submit

breakdowns of the proposed contract rates, production calculations, details of site and general overheads and profit. These details can form part of the tender documentation submitted by each prospective bidder that can also be used to compare between bidders and their respective equipment and production calculations. The clear benefit is that whilst not forming part of the contract documents they can be referred to at a later date when the valuation of a variation arises.

There is a concern that the contractor may be pressured into revealing sensitive pricing information. However, this is outweighed by the added benefit when it comes to agreeing to the valuation of any variations which may arise during the time of the project. In addition, the variation methodology as espoused in the NEC3 and FIDIC Blue Book Clause 10.1, requires the contractor to submit its proposed quotation for the work including time and costs effects before the instruction to proceed is given.

Establishing a fair valuation for variations on dredging projects is not an easy task. The engineer needs considerable experience of the dredging process and sound judgement to settle the valuation of variations as they arise. Ideally, the engineer needs a well-prepared contract with the appropriate schedules to provide for pricing any variations. The parties need to have a thorough appreciation of the methods of dredging, the dredging cycle, production estimating practice as well as the valuation of the costs of capital equipment and scheduling of the dredging works. Most importantly, the contractor should keep comprehensive and meticulous daily records of the factors relevant to the variation as if it is not valued fairly in the contractor's opinion. As such, the 'as-built' records will form the basis of the dispute should the contractor elect to instigate a formal dispute resolution process.

CONCLUSIONS

Whilst CIRIA's *Cost Standards for Dredging Equipment* is a valuable tool for assessing the allowance for some of the contractor's costs, it is not a complete solution for contracting parties to assess the valuation of a variation for a dredging contract. It can be recommended the administrator of the employer's contract should obtain a breakdown from the contractor of the most significant contract rates before the contract is signed for use. This is when valuing variations during the lifetime of the project or when the contract includes schedules and overhead and profit

mark-ups from the tender documents. However, in commercial practice this opportunity is rarely used by employers and engineers with disputes concerning valuation of variations. This often arises when contractors submit breakdowns of unit rates post contract award which the employer or engineer find less than convincing. The variation methodology as espoused in the NEC3 and FIDIC Blue Book is recommended. It requires the contractor to submit its proposed quotation for the work including time and costs effects before the instruction to proceed is given.

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