

TENDER EVALUATION :
A MEANS OF ASSESSING THE
TRUE VALUE TO THE CLIENT

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September 1983

Submitted to the University of Cape Town
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for the degree of Master in Industrial Administration

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University.

Signed by candidate

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SEPTEMBER 1983

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TABLE OF CONTENTS

	<u>PAGE</u>
LIST OF FIGURES	(iii)
ABSTRACT	(iv)
GLOSSARY	(vii)
1. INTRODUCTION	1
2. PHILOSOPHY OF TENDER DOCUMENT	5
2.1 General	5
2.2 Method-Related Approach to Pricing a Tender	6
2.3 Preliminary and General Schedule	9
2.4 Fixed and Time-Related Items	11
2.5 Measurement and Payment of Preliminary and General Items	12
2.6 Advantages of the System Proposed	14
3. INFORMATION REQUIRED FROM THE TENDERER	19
3.1 Information Required in the Prequalification Application	19
3.2 Information Required in the Tender Document	20
3.3 Typical General Stipulations	21
3.4 Financial Questions	23
3.5 Technical Questions	29

(ii)

	<u>PAGE</u>
4. TENDER EVALUATION PROCEDURE	39
4.1 Scope	39
4.2 Evaluation Team	39
4.3 Document Register	41
4.4 Confidentiality of Documents	41
4.5 Evaluation Programme	42
4.6 Description of Evaluation Procedure	44
5. EVALUATION OF TENDERS	51
5.1 General	51
5.2 Presentation of Information	54
5.3 Financial Evaluation	54
5.4 Technical Evaluation	69
5.5 Value Judgement of Tenderers	76
5.6 Overall Financial Evaluation	77
6. CONCLUSIONS	81
7. RECOMMENDATIONS	83

APPENDICES

- A. References
- B. Example of a Proposed Preliminary and General Schedule

---oo0oo---

LIST OF FIGURES

<u>FIGURE</u>	<u>TITLE</u>	<u>PAGE</u>
4.1	Tender Evaluation Organogram	40
4.2	Tender Evaluation Programme	43
4.3	Tender Evaluation Procedure	45
4.4	Tender Evaluation Logic Diagram	46
5.1	Total Cost of Sections of the Works	60
5.2	Range of Effective Concrete Rates	62
5.3	Total Effective Cost of Concrete	64
5.4	Total Effective Cost of Concrete versus Base Cost	65
5.5	Cost of an Extension of Time for Tunnel	68
5.6	Programmed Resourcing Levels	73
5.7	Overall Financial Evaluation	79

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ABSTRACT

The advent of large multidisciplinary projects has necessitated an in-depth evaluation of tenders to ensure that the tenderer awarded the contract has submitted the lowest acceptable evaluated tender sum and has convinced the evaluation team that, by adequate resourcing and programming, he has appreciated the technical implications.

The objectives of this thesis were threefold:

- to discuss the need for a new approach to tender evaluation;
- to propose amendments to the traditional tender document to provide a basis for a detailed tender evaluation; and
- to propose methods of evaluating the information received from the tenderers so that the tender most suitable from both financial and technical considerations is recommended to the client.

An extensive literature survey revealed little relevant reference material and, as a result, the author's experience in the evaluation of tenders, together with input from engineers knowledgeable in this field, has formed the basis of this thesis.

To obtain the information necessary for the evaluation phase, the tender document must be so structured as to provide the tenderer with sufficient detail to adequately assess the complexity of the project and to provide the evaluation team with sufficient pertinent information to adequately evaluate the tender.

(v)

Typical information required of the tenderer is described and a method-related approach to pricing of the schedule of quantities discussed. This procedure is allied to the actual cost structure of the contract and apportions the preliminary and general section of the schedule into fixed costs and time-related costs. Quantity-related costs remain the basis for pricing the balance of the schedule. Advantages of the method-related approach include:

- assisting the tenderer in pricing the tender
- assisting the client in evaluating the tender
- assisting the engineer in a realistic assessment of costs for payment of claims resulting from changed conditions on site.

The tender evaluation period is considered to commence on receipt of tenders and conclude on submission of the evaluation team's recommendations to the client. A management system and procedure for evaluating tenders is outlined and each step described.

The evaluation of the financial and technical information provided is discussed and methods proposed for imparting the vast volume of information, by use of diagrammatic charts, to achieve the greatest impact in the most readily assimilable manner possible.

Construction activities are analysed by comparing tendered rates with a base rate, equating to a break-even rate, to assess whether the contractor will operate in a potential loss or profit situation. As contractors understandably are not prepared to work in a loss situation it is assumed that this loss amount will be obtained from outside loans or through on-site claims. This potential loss amount is added to the tender sum in the calculation of the overall evaluated tender sum.

The objectives of this thesis were achieved and the recommendations in brief are:

- that tender documents should be drawn up to provide sufficient pertinent information to evaluate tenders in detail;
- that a method-related approach to pricing a tender be adopted whenever possible;
- that the fact that a tenderer is prequalified or invited to tender should not be construed by the tenderer submitting the lowest tender sum as a right to the award of the contract;
- that the contract be awarded to the tenderer whose tender, after evaluation, is considered will provide the best quality of materials and workmanship with the best overall value to the client and in the shortest possible time.

It is hoped that this thesis will be useful as a reference document to clients and consultants in the preparation and evaluation of future tender documents.

GLOSSARY

Bid	the document priced and submitted to the client as an offer for constructing a project
Bidder	terminology for a contractor organisation prior to the award of a contract
Client	the party for whom a project is being constructed
Consultant	the party appointed by the client to design and prepare tender documents for a proposed project
Contractor	the company whose tender has been accepted by the client
Engineer	the party appointed by the client to administer the construction of a project
Fixed cost	see Clause 2.3.3
General item	see Clause 2.4.1
Method-related cost	see Clause 2.3.2
Plant item	see Clause 2.4.3
P & G item	items not forming part of the permanent works
Quantity-proportional cost	see Clause 2.3.1
Specific item	see Clause 2.4.2

(viii)

Schedule of quantities	the document listing items of work to be priced by the tenderer
Tender	same as for "Bid"
Tender documents	documents prepared by the consultant for pricing by the tenderer
Tenderer	same as for "Bidder"
Tender Sum	the sum named in the tender
Time-related cost	see Clause 2.3.4
Value-related cost	see Clause 2.3.5

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CHAPTER 1

INTRODUCTION

The majority of large, complex projects in South Africa such as SASOL, electricity generating power stations, vehicular and railway tunnels, etc, are funded by governmental or quasi-governmental organisations which are accountable to the community to ensure that the funds are wisely spent.

The larger the project the greater the public awareness and recent large projects have reached headline news as a result of overrun contract periods and overexpended budgets. And quite rightly too.

It is important to consider why this has been allowed to happen and investigate means of preventing it in the future. Better tender documents and better tender evaluation procedures would appear to be a good place to start.

In the past clients have been satisfied to select a tender on the basis of the "lowest responsible bidder" principle where a tenderer who is considered financially stable, has an acceptable track record on similar projects and has the lowest submitted tender sum, is awarded the contract.

Another method of selection adopted in some overseas countries is one where the highest and lowest tendered sums are disqualified and the contract is awarded to the tenderer who has submitted a price 10% higher than the average of the remaining prices. This procedure, known as the "Spanish system of price evaluation", assumes that the average of the middle tenders represents a realistic judgement of the true value of the work to be executed. The 10% allowance is to ensure a reasonable profit for the successful tenderer and thus ensure

his maximum co-operation during the construction phase. (In the author's experience, the greater the operating loss, the greater the lack of co-operation by the contractor on site and vice versa.)

There are other evaluation systems in use, but like the abovementioned two, most tend to concentrate on the initial, rather than the end, cost of the project.

These systems are no longer acceptable for the evaluation of large projects in that they do not adequately take account of:

- the overall end cost to the client;
- the objectives of the client, namely the shortest possible construction period, the highest quality of materials and workmanship and the lowest overall end cost;
- the technical competence of the tenderer for the work under consideration, i.e. plant and labour resourcing, programming, construction methods, etc.;
- the make up of tendered rates submitted to assess whether they are realistic when compared with current market prices.

Smith⁽¹⁾, Chief Inspector for the National Transport Commission endorses this point when he states:

"The Client's objectives reach far beyond a lowest price criteria and it is therefore becoming necessary to consider tender evaluation as a much wider concept where the time value of money, financial stability and technical considerations each have important roles to fulfill in the decision making process."

It is therefore necessary to revise existing evaluation procedures to ensure that the tenderer whose tender displays the best combination of financial and technical attributes in achieving the client's objectives, is awarded the contract.

To achieve this end, the consultant must prepare a tender document which firstly provides the tenderer with sufficient information to adequately assess the work envisaged and secondly to request such pertinent information as is considered necessary for a detailed financial and technical evaluation of each tender.

The objective of this thesis is therefore threefold:

- to discuss the need for a new approach to tender evaluation (above)
- to propose amendments to the traditional tender documents to provide a basis for a detailed tender evaluation
- to propose methods of evaluating the information received from the tenderers so that the tender most suitable from both financial and technical considerations is recommended.

Although an extensive literature search was undertaken, including the Lockheed and CSIR data bases, few reference documents were located. Much has been written on the tenderer's strategy in pricing a tender but little from the client's point of view. As a result, a heavy emphasis has been placed on the author's experience in evaluating tenders with supportive information from professional engineers knowledgeable in this field.

CHAPTER 2

PHILOSOPHY OF THE TENDER DOCUMENT

2.1 GENERAL

Allied to any successful contract is a sound specification. This is not for purposes of providing the engineer with a whip to meet out punishment to a contractor who steps out of line, but to provide a basis for mutual understanding and thereby goodwill. It is important that the client, consultant and contractor alike know exactly where they stand by defining their roles of responsibility, authority and respective rights. This goes a long way to alleviating any misunderstandings.

Although many clients have a specification suited to their particular needs it is preferable to all concerned that a standard specification such as the SABS version presently being drawn up be utilised whenever possible. Knowledge of the content of a standard specification will allow the tenderer to concentrate his efforts on programming and costing the works rather than looking for ambiguous clauses which consciously or otherwise will apportion unnecessary risk to him during the construction phase.

A point often overlooked by consultants is that it costs a contractor in excess of R250 000,00 to prepare a major tender submission. Many of the questions asked of a tenderer require exhaustive investigations to provide satisfactory answers, e.g. quality control manuals. Precious time spent on preparing the tender documents would appear superfluous unless there is some chance of being awarded the contract. The documents should therefore list all information required but only those items relevant to the preliminary evaluation should be selected for submission with the tender. The balance of the information, although contractually binding on all parties to supply it when called to do so, will only be necessary from a select few⁽²⁾.

Schedules of quantities in their present form are not structured to adequately assist in the detailed adjudication of tenders nor in the contractual environment where there is a high probability that claims will develop.

Complex multidisciplinary contracts require a high degree of interaction and programming between civil engineering and other contractors (e.g. mechanical and electrical) often in the same work area. A delay by any one of these contractors will cause a chain reaction of delays resulting in subsequent claims.

The most common problem area in the settlement of claims is the inability to allocate preliminary and general (P&G) items such as establishment, office, supervision, plant resources, services, insurance, transport and general contractual costs to specific cost centres of the project.

In the traditional schedule of quantities it is assumed that all unit rates for measured work items are proportional to quantities and that P&G items are not necessarily proportional to quantities. This uncertainty in definition results in a hesitance on the part of the tenderer in pricing certain P&G items such as mobilisation because he does not know how the engineer will include them in the payment certificate. Tenderers often consider it safer to distribute these P&G costs in the rates for measured work to be executed at the beginning of the contract than to risk that the engineer may certify the P&G amount pro rata to the value of total measured work.

On a project consisting of a number of work areas requiring similar or differing operations it becomes difficult, if not impossible, to apportion a realistic P&G cost to a claim, whether it be for an extension of time or any other reason, using the present system.

It is therefore desirable to include in the tender documents a mechanism which will not only assist in the evaluation of tenders but also limit, as far as possible, areas of dispute with respect to claims for additional payment for changed conditions.

The system proposed is allied to the actual cost structure of a contract and follows the British method-related approach as set out in the Standard Method of Measurement of 1976^(3,4).

Barnes and Thompson⁽⁵⁾ who were instrumental in the development of this method state that:

".... the shortcomings of the conventional bill of quantities stem primarily from its failure to represent the effect of methods and timing upon costs."

The method-related approach enables priced schedules of quantities to divide the value of work executed between quantity-proportional elements and the rest.

Barnes⁽⁴⁾ describes this as follows:

"In commissioning civil engineering work the employer buys the material left behind, but only hires from the contractor the men and machines to manipulate them, and the management skill to manipulate them effectively."

It is logical therefore to base the unit rates of scheduled items on the origin of their respective costs. This is imperative if the engineer is to retain the right to vary the quantity of that "material left behind" and if the financial uncertainties affecting the client and contractor are to be minimised.

It has been assessed⁽⁵⁾ from past contracts that 70% of claims and 55% of agreements on rates for extra and additional work using traditional schedules of quantities without method-related costs involved consideration of P&G costs. As these costs were not adequately detailed in the documents, time consuming negotiations were necessary, accompanied by discontent and suspicion.

The method-related approach assists greatly in preventing claims becoming contentious because a vehicle is provided to realistically distinguish costs related to time, method of construction and quantity.

A tender document incorporating more flexibility by means of a method-related approach has certain definite advantages, including:

- assisting the tenderer in the preparation of his tender
- assisting proper evaluation of tenders
- assisting in a more realistic approach to on-site assessments of cost implications of changed conditions, design changes, variations, unforeseen delays, etc.
- improving contractor's cash-flow situation
- committing the client and contractor to a method of financial payments at time of tender
- accommodating realistic payments for high cost plant employed on site for short durations.

It must be stated at this point that if a client is averse to apportioning financial risk, which is inherent in the proposed system, then changing to a method-related approach would serve no purpose.

2.3 PRELIMINARY AND GENERAL SCHEDULE

The P&G schedule of the schedule of quantities is made up of some or all of the following different cost items:

2.3.1 Quantity-proportional cost

A cost that is linearly proportional to the volume of work to be executed, the quantity of material, number of articles to be supplied or services rendered or any or all of these things in a scheduled item. Items are considered quantity-proportional unless stated to the contrary. These items are related to the permanent works, i.e. that material left behind.

e.g. 10 m³ concrete in bridge pier footing.

2.3.2 Method-related cost

A scheduled rate being a sum relating to the tenderer's intended method of constructing the works.

e.g. The provision, operation, maintenance and final removal of a concrete mixer.

2.3.3 Fixed cost

A method-related cost for a scheduled item which is executed without reference to time.

e.g. The provision and final removal of a concrete mixer.

2.3.4 Time-related cost

A method-related cost for a scheduled item, the cost of which is linearly proportional to the length of time tendered to execute the scheduled item.

e.g. The operation and maintenance of a concrete mixer for part duration of the contract period. If, on the engineer's instruction, the mixer is retained on site for an extended working period, the sum tendered is increased pro rata to the extended time period.

2.3.5 Value-related cost

A cost that is linearly proportional to the monetary value of a scheduled item or a group of scheduled items or the tendered sum. (All value-related costs are considered included in fixed or time-related items, or both, unless specifically detailed in the schedule.) This item is included for tenderers to price the cost of plant being held idle pending further use on site as instructed by the engineer.

e.g. The tendered value of a concrete mixer is R6 000,00 and is required to stand idle for 5 days on the engineer's instructions pending further work.

The rate tendered is say R15,00 for every R10 000,00 value of plant standing idle for one day.

Payment would be

$$5 \text{ days} \times \frac{\text{R15,00}}{\text{R10 000,00-day}} \times \text{R6 000,00} = \text{R45,00}$$

The ensuing section will discuss fixed and time-related costs and describe how these may be adapted to best suit the bid preparation, evaluation and contract execution phases.

2.4 FIXED AND TIME-RELATED ITEMS

The combined value of fixed and associated time-related items are considered to be the total cost for the provision, operation, maintenance and ultimate demobilisation and removal of the specified facility for the duration of its specified or tendered period. Any fixed cost item with no time-related item to which it can be directly associated is considered to constitute the total cost described above, and vice versa.

Both fixed and time-related items are further broken down into General Item, Specific Item and Plant Item categories which are described below. (Reference may be made to Annexure B which contains a typical P&G schedule.)

2.4.1 General Items

Items required for the full or part duration of the contract but cannot be allocated to a specific section of the Works.

e.g. contractor's main camp, various insurances, sureties, workman's compensation, financing obligations, quality assurance programme, construction programme, general on-site supervision, head office overheads, general plant for the whole site, etc.

2.4.2 Specific Items

Items of a general nature which may readily be allocated to a specific section of the Works for a programmed and tendered duration of construction which may be shorter than or equal to the contract period.

e.g. storage sheds and supervision costs for a specific section of the Works, etc.

2.4.3 Plant Items

Items of constructional plant which may be associated with the whole or specific sections of the Works for durations programmed and tendered.

e.g. tower crane and concrete mixer at a specific section of the Works.

2.5 MEASUREMENT AND PAYMENT OF PRELIMINARY AND GENERAL ITEMS

It is a fact in the construction industry that a contractor experiences a negative cash-flow at the commencement of a contract as a result of site establishment costs. The provision of detailed fixed and time-related costs for each section of the Works will assist tenderers in pricing the schedule to best accommodate the cash-flow problem. Although it will not prevent a negative cash-flow, it will improve the situation.

In the P&G schedule tenderers are required to tender a period (in weeks) for the intended duration of Specific and Plant Items as well as a valuation of plant in the case of Plant Items.

The plant valuation will be used in assessing value-related costs for plant standing idle as a result of an instruction from the engineer. It will also enable the engineer to make a payment pro rata to the value of any part of the facility which in his opinion has been provided and is functional for the execution of its intended purpose.

Dayworks, Provisional Sum and Prime Cost items are considered adequately covered in normal civil engineering contract documents and for the purpose of this thesis will not be discussed further.

The tenderer is required to complete the scheduled in full and items not filled in and extended to the amount column are considered to be 'nil' and the tender evaluated on this basis.

There will, however, be provision made for the tenderer to include such Plant Items as may be necessary to comply with his particular envisaged method of construction (e.g. a climbing shutter as opposed to a slipform shutter, etc.).

2.5.1 Fixed Cost Items

The unit of measurement for the fixed cost items listed in the schedule is the lump sum.

The lump sum tendered for each fixed cost item will usually be paid in the first payment certificate after the contractor has, in the opinion of the engineer, complied with his obligations as set out in the specification. However, where a particular scheduled item requires a facility to be dismantled and removed from site or to another section of the Works at the end of its intended purpose, a percentage (15% is considered reasonable) of the lump sum is withheld until this final operation has been accomplished to the satisfaction of the engineer.

2.5.2 Time-Related Cost Items

The unit of measurement for time-related cost items is the lump sum. Tenderers will be required to specify the time period in weeks for which the facility will be provided in accordance with his tendered construction programme. Any increase or decrease in the period of intended use of the facility, as a result of an instruction from the engineer, will result in a pro rata increase or decrease of the tendered lump sum, calculated by dividing the tendered sum by the time entered by the tenderer.

Payment of time-related sums associated with fixed cost items will only commence once the complete item or facility is, in the opinion of the engineer, in beneficial operation for the execution of the stated or implied function for which it was provided or established and commissioned.

If the facility is employed for a longer or shorter period than that tendered, and no instruction has been received from the engineer implicating an amended period of use of the facility, only the tendered sum will be paid.

2.5.3 Value-Related Items

The unit of measurement for value-related items will be a monetary value-day (e.g. R10 000-day).

Payment for value-related items is effected by authorisation of progressive amounts calculated pro rata to the monetary valuation of the relevant scheduled item, after the payment of fixed cost amounts for relevant Plant Items has been made.

2.6 ADVANTAGES OF THE SYSTEM PROPOSED

2.6.1 In Bid Compilation

The P&G schedule, with fixed and time-related cost items, is compiled by the consultant with the facility for tenderers to add additional items should they be considered necessary. The main reasons for this are firstly to ensure that all tenderers complete the schedule in a standardised format to assist with evaluation and secondly many of the fixed and time-related cost items depend on methods of work to be used and must therefore be entered and described by the tenderer.

To be able to prepare such a schedule the consultant will have to analyse and programme the work in detail as if he were a tenderer. This aspect which has not been given the attention it should have in the past, is to be welcomed and can only benefit all parties concerned.

Faced with this type of schedule, the tenderer too will have to analyse the work in more depth to be able to price the various items instead of merely allocating a percentage of the tendered sum to the P&G section.

2.6.2 In Tender Evaluation

The purpose of a financial evaluation is to assess the true overall cost to the client. Every construction company has its own policy of pricing a tender and some methods adopted are not always in the best interests of the client.

For instance, take an extreme hypothetical case where a tenderer allocates all his tendered amounts to fixed cost items and enters 'nil' next to all time-related and quantity related items. As a large proportion of the fixed cost items will be paid out immediately on provision of the facility or equipment, the contractor (as he would then be) would receive an enormous payment for work not yet completed. This tendering policy, known as "front end loading", is aimed at unbalancing a tender to improve a contractor's cash-flow situation possibly from losses incurred on a previous contract. This is definitely not in the client's interest.

By allocating fixed, time-related and quantity related items to a specific section of the Works, a value may be arrived at for comparison with other tenders.

This value may then further be broken down to obtain the total cost for various operations and thereby the total effective unit rate (inclusive of fixed and time-related costs) e.g. for excavation, shotcrete, formwork, reinforcement, concrete, etc.

These individual unit rates may then be used for tender comparison purposes to highlight inconsistent or unbalanced rates.

The evaluation process will be discussed in more detail later.

2.6.3 In Assessing Contractual Variations

On any contract, large or small, complex or simple, claims will arise. Disagreement does not normally occur on the actual work executed as the cost of labour, plant and material is usually readily quantifiable. The area of discontent usually exists in the allocation of P&G cost to the item of work. The proposed system goes a long way in clarifying this grey area.

On receipt of notification of a proposed variation (additional or extra work) from the engineer, the contractor will assess the cost and time implications of the variation and advise the engineer within a stipulated period (e.g. 7 days). The contractor will be required to specifically assess the time implications of such an order on both critical path and other activities by feeding the relevant information into the latest construction programme.

The net effect on the programme could result in one of the following:

2.6.3.1 Extension of Time Granted

If the engineer grants an extension of time to the Works or a section of the Works as a result of a variation or delay, adjustments will only be made to the time quantities tendered for those time-related items which in the opinion of the engineer are applicable to the Works or relevant section of the Works respectively. The time adjustment will be made pro rata to the tendered period and the time-related sum amended accordingly. No adjustment will be made to fixed cost items.

When the granted extension of time is assessed to be on the critical path for the section of the Works then the applicable time-related costs for adjustment will be:

- General Items
- relevant Specific Items
- relevant Plant Items

When the granted extension of time is assessed to be on a non-critical path for the section of the Works then the applicable time-related costs for adjustment will be only:

- relevant Specific Items and
- relevant Plant Items.

If an extension of time causes a non-critical operation to become critical, a proportion of the time-related General Items are added for the relevant critical time period.

2.6.3.2 Acceleration of the Works

If the engineer shall order an acceleration in the Works or section of the Works, the assessment of P&G costs associated with the acceleration will be as for an extension of time except that similar items for fixed costs will also be applicable.

2.6.3.3 Reductions

If a variation ordered by the engineer results in a reduction in the amount of work to be executed with associated reduced time to execute the work, the engineer may assess, evaluate and suitably reduce the time quantity tendered for the applicable time-related items.

Having amended the tender document to include a method-related approach for payment of work executed, the information requested of a tenderer can now be discussed.

CHAPTER 3

INFORMATION REQUIRED FROM THE TENDERER

3.1 INFORMATION REQUIRED IN THE PREQUALIFICATION APPLICATION

On large contracts requiring a particular type of expertise, and especially those involving international participants, potential tenderers are required to complete a prequalification application questionnaire. The reason for this is twofold, firstly it provides the client with the opportunity of selecting only those suitably qualified to tender and secondly to limit the number of tenders to be evaluated.

On smaller contracts prequalification is not normally required and the relevant questions are included in the tender documents.

For reasons of completeness, typical questions suggested by FIDIC⁽⁶⁾ for the prequalification evaluation of each company or joint venture are included hereunder:

- "- the structure and organisation
- their experience in both the type of work and the country or region in which it is to be undertaken
- the available resources, in terms of management capability, technical staff and construction (and, if appropriate, fabrication) facilities
- the extent to which any work would be likely to be sub-contracted
- their financial stability and resources necessary to execute the project
- their general suitability, taking into account any potential language difficulties"

Based on the evaluation of the completed questionnaires a select number of the potential tenderers (6 No. is considered reasonable) is chosen and invited to submit tenders for the contract.

3.2 INFORMATION REQUIRED IN THE TENDER DOCUMENT

In the preparation of a tender document there are three main objectives which must be fulfilled:

- to provide sufficient relevant information for a tenderer to assess, as accurately as possible, the magnitude and complexity of the project from financial and technical aspects
- to assist the evaluation team in assessing which tenderer will best fulfill the requirements of the client's goals (i.e. best quality of material and workmanship and best overall value for money in the shortest possible time)
- to provide suitable detailed breakdowns of financial and technical information for assessing realistic recompense to the contractor for delays and variations resulting from instructions from the engineer or from circumstances unforeseen at time of tender.

It is likely that tenderers will be requested to submit supportive documents with their tenders. It will greatly assist tenderers if a list of all such documents are displayed in a prominent position in the tender documents. This will prevent any misunderstandings and minimise later communication with the tenderer to obtain data omitted.

Before listing the various financial and technical questions to be asked of a tenderer, it is often useful to list certain important contractual obligations which could have an impact on the compilation of a tender submission. These may be called General Stipulations and merely highlight aspects covered elsewhere in the tender document.

3.3 TYPICAL GENERAL STIPULATIONS

Tender validity days after specified date for tender submission
Amount of security (Bond)	R..... or% of Contract Price
Duration of security	Until issue of Certificate of Completion or until due fulfillment of contract (end of period of maintenance). (Certain clients prefer the former with a large monetary retention during the period of maintenance, other clients prefer the latter with a much smaller monetary retention during the period of maintenance.)
Time within which security to be provided after notification of award days

Time within which to sign Contract Agreement after notification of award days
Time within which Works to be commenced days
Time of completion months
Special non-working days	e.g. Christmas Day, Good Friday, Ascension Day, Day of the Covenant
Programme to be furnished within days
Amount of penalty	R..... per calendar day
Period of maintenance months
Dayworks allowances to be used if Dayworks schedule not completed	.. % in respect of labour .. % in respect of materials .. % in respect of plant
Percentage retention	.. % of work done
Limit of retention money	R..... or % of Contract Price
Limit of retention during period of maintenance % of Contract Price
Minimum amount of interim certificates	R.....

Time within which payment days
to be made after certificate

Law governing contract e.g. Republic of South
Africa

3.4 FINANCIAL QUESTIONS

The following financial questions are considered necessary for inclusion in a major tender document. Each aspect should be contained in a separate appendix and signed by the tenderer in ink.

3.4.1 Schedule of Quantities

The schedule of quantities is to be completed in accordance with all the tender documents and a rate or price entered against each item. Items not priced will be considered as being covered by other rates or prices and given a value of 'nil'.

3.4.2 Percentage Adjustment of Tender

On completion of the schedule of quantities a tenderer may wish to adjust the total tender sum by a specific amount or individual schedules by differing amounts.

To prevent the tenderer unbalancing his tendered rates or prices at the last moment, a mechanism to adjust all rates and prices in a particular schedule by an equitable percentage would appear to be in the best interests of all concerned.

Provision may therefore be made for the tenderer to enter a percentage (positive or negative) on the summary page of each schedule. This percentage will then apply to each unit rate in that particular schedule and the reduced/increased schedule amount carried forward to the summary of schedules.

3.4.3 Contract Price Adjustment (CPA) Coefficients

The tenderer shall nominate the respective labour, plant, material and fuel coefficients for the escalation formula specified in the tender document (normally the Baxter formula for civil engineering contracts and the Haylett formula for building contracts).

On contracts involving different types of construction (e.g. earthworks, surface concrete works, underground works, etc.) which are sensitive to labour, plant and material resourcing variations, different coefficients for each such operation may be tendered.

3.4.4 Variations in Foreign Exchange Expenditure

Different clients have different requirements in this respect but the items listed below cover most questions likely to be asked.

3.4.4.1 Method of payment of foreign commitments.

One of the following methods may be nominated by the tenderer for foreign payments:

- to a nominated bank account in the currency of the country of origin or in such other currency as may be mutually agreed subject to approval by the monetary authorities, or

- in South Africa in Rands at the rate of exchange agreed at the time of contract award, i.e. only those variations between the tendered rate of exchange and the rate of exchange agreed at the time of contract award will be to the client's account, or
- in South Africa at the rate of exchange on which the tender price in Rands was based, i.e. no rate of exchange adjustment.

The name and address of the respective bank shall be stated in each case.

3.4.4.2 Rates of Exchange

As the schedule of quantities and tender sum will be expressed in Rands the ruling rates of exchange (normally those rates applying to the month prior to closing date of tender) must be specified.

3.4.4.3 Adjustments of importing costs

The various importation rates (e.g. for sea/airfreight, marine insurance, wharfage, landing charges, customs duties, import surcharges) on which the tenderer based his tender are to be specified. Any variation in these rates applied to the value included in the tender sum will be to the client's account. A variation in rate resulting from a variation in shipping mass/volume from that at time of tender will normally not be reimbursed.

The South African port on which the import charges are based shall be specified.

3.4.4.4 Adjustment of overseas manufacture, expatriate labour and other costs

The value of overseas manufacture, labour and material costs and expatriate labour shall be subject to adjustment in accordance with internationally recognised CPA methods. The tenderer shall stipulate what methods and associated indices are proposed.

3.4.4.5 Adjustment of local labour, plant, material and fuel costs

The CPA method stipulated in the tender document shall apply to all local labour, plant, material and fuel costs.

3.4.4.6 Import Control

Tenderers will be required to obtain a permit for importation of goods. The tenderer is to advise whether:

- he has such a permit and will import on this basis
- he does not possess a permit in which case he requires the client's assistance to obtain such a permit.

3.4.4.7 Estimated foreign exchange expenditure (expressed in Rands)

The tenderer is to submit detailed schedules of the estimated cost of items requiring foreign exchange (e.g. expatriate salaries, transfer costs, materials, plant and equipment, etc.). The total amount shall form the basis of payment of foreign exchange in accordance with the contract.

3.4.5 Constructional Plant Advance

On some contracts where large specialised equipment is required, a facility is provided by the client whereby an advance payment is made to assist the tenderer with his cash-flow planning. The advanced amount which is usually limited to a percentage of the tender sum (e.g. 15%) is often interest free and has to be repaid within a specified period which will be dependent on the contract period.

The tenderer is to state when during the construction period the advance will be required, the amount to be advanced and the currency of payment, if applicable.

3.4.6 Estimated Phased Earnings (Cash-flow)

The tenderer is to submit his phased estimated earnings for the duration of the contract period. A schedule detailing the periods (monthly or two monthly, etc.) and the applicable amount for each period is to be included with his submission. The information supplied must be consistent with the tendered construction programme submitted.

3.4.7 Dayworks Schedule

Tenderers are required to submit percentage mark-ups on the actual cost of labour, materials and plant for work executed on a Dayworks basis. The actual cost for each item plus the percentage mark-up shall be full compensation for all cost including profit, transport, operators in the case of plant, etc. Contract Price Adjustment does not apply to Dayworks items unless stated to the contrary.

If no percentages are tendered, percentages specified in the tender documents will apply.

Labour and material actual costs are normally fairly easy to assess by way of pay slips or invoices but plant items require further consideration.

Methods for assessing actual plant costs for Dayworks purposes include:

- according to plant rates supplied by the client organisation and updated at regular intervals
- based on a comprehensive list of plant items listed in the tender document with rates (R/hr, R/month) inserted by the tenderer. These rates would be escalated monthly by the ruling rate before the percentage mark-up could be applied.
- by reference to a recognised plant rate listing such as the rate guide contained in the official journal of the Contractors' Plant Hire Association (CPHA) which is updated on a monthly basis.

In the case of Dayworks plant standing idle on the instruction of the engineer a proportion of the plant rate and mark-up percent should be specified. An amount equal to 60% of the above total value is considered reasonable.

3.4.8 Alternative Proposals

The tenderer is required to complete a schedule listing all alternative proposals submitted. Financial aspects associated with these will be adjudicated in the same manner as for the basic tender submitted.

3.4.9 Qualifications with Financial Implications

All aspects not complying with the specification whether through lack of clarity of the tender documents or for any other reason must be listed and evaluated for acceptance and financial implications.

It is seldom advisable to extend the tendering period and a deadline should therefore be specified after which no further tenderers' questions will be answered. Thirty days before submission of tenders is suggested. Any aspects requiring clarification after this specified date shall be included in the tender submission stating how the tenderer has interpreted the particular item. If the item has, in the engineer's opinion, not been interpreted correctly, it must be valued for the purpose of evaluation and covered in later negotiations.

3.5 TECHNICAL QUESTIONS

As for the financial questions, each of the following technical questions should be contained in a separate appendix and signed in ink.

3.5.1 Major Plant and Equipment

The tenderer is required to tabulate that major plant and equipment immediately available for the contract and that to be acquired if awarded the contract. Each of these two tables shall be fully completed and indicate the description, size, capacity, condition, quantity, etc. of each piece of plant or equipment. The estimated dates of delivery and duration on site shall also be tendered.

It must be clearly stated that although the tenderer will not necessarily, at tender stage, be able to specify the exact plant to be used, it will be assumed that, if awarded the contract, plant and equipment of an equivalent or better standard will be provided at no additional expense to the client.

Irrespective of the plant listed in the tender, the contractor will be obliged to provide such plant necessary to ensure sufficient progress of the Works in accordance with the tender documents.

3.5.2 Organogram

The constitution of the tenderer's head office and site organisations shall be submitted in hierarchal form indicating lines of authority, responsibility and communication. Although preferable, it should not be mandatory at tender stage to allocate names to the various positions.

3.5.3 Phased Labour Resourcing and Accommodation

A phased listing of labour resources (White, Coloured and Black) on a monthly basis throughout the contract will assist in checking under- or over-resourcing.

Where a client offers the contractor housing in terms of the contract, married and single accommodation requirements need to be tendered.

3.5.4 Sources of Imported Materials

Certain contracts are governed by strict environmental constraints depending on the sensitivity of surrounding flora and fauna. On these contracts it may not be permissible to import certain materials onto the site for fear of upsetting the environmental equilibrium by contamination with foreign vegetation. Sources of materials need to be checked for compliance with environmental restrictions.

3.5.5 Permanent Rock Anchors

Tenderers are required to tender the types of permanent rock anchors and cable anchors intended for use in the Works and the proposed method of installation.

As this is a specialist operation, tenderers are to specify the specialist sub-contractor who will execute the work.

3.5.6 Prestressing System

Where prestressing work is specified, the tenderer is to indicate the system, size/capacity and strand type intended for use on each aspect of the Works.

3.5.7 Proposed Rates of Advance in Underground Works

Underground excavation is normally classified by the class of permanent support installed in a tunnel or shaft (i.e. Class 1 for sound rock with minimal support and Class 5 for very poor rock conditions with major support) all as indicated on the tender drawings.

The tenderer is to submit rates of excavation advance, in linear metres per calendar day, for each class of excavation for each tunnel or shaft of the Works.

This information must be compatible with the tendered construction programme.

3.5.8 Quality Assurance Programme

Quality assurance (QA) is becoming more and more popular with client organisations on large projects. Although the requirements for submission of a QA manual/plan/programme are detailed they are a necessity for the system to operate functionally. Also necessary is a total commitment from both the client and the contractor commencing at top management level and progressing right through the organisation.

It is considered that commitment to a standard QA document, whether it be the client's or the SABS version, should be sufficient at tender stage with only a select few being asked to submit full documents nearer the time of contract award.

3.5.9 Tendered Construction Programme

On complex projects it is often advisable to include in the tender documents a provisional logic diagram with a time scale indicating the inter-relationship of various operations and contractors during the construction period.

Although this will serve as a guide only, with no contractual relevance, it will assist in obtaining consistency in programmes from tenderers for evaluation purposes.

The tendered programme should be consistent in all respects with the information supplied in the tender such as cash-flow, plant and equipment resourcing, rates of advance, labour resourcing, stage completion dates, etc.

The type and format of the programme such as bar chart, critical path network, logic diagram, etc. should be specified in the tender document for the tender and construction phases.

3.5.10 Stage Completion Dates

Multidisciplinary contracts especially have a high degree of interaction and programming with other contractors (e.g. electrical and mechanical). These contractors are likely to have separate contracts with independent commencement and completion dates. The civil contractor can therefore not afford to finish late where these stage completion dates exist without receiving consequential claims.

Any such dates which affect the civil contractor's operations must be specified giving the stage number, the works to be completed and the stage completion date.

The tenderer must sign the bottom of the list of stage completion dates indicating that he is aware of and has accepted the implied restrictions to his programme.

3.5.11 Power Requirements

If, in terms of the tender documents, the client is responsible for providing electrical power to the site, it will be necessary to obtain the contractor's power requirements at each relevant portion of the Works.

The tenderer shall list the location requiring power and specify the requirements (e.g. 11 kV, 380 V, etc.).

3.5.12 Method Statements

The tenderer will be required to submit full statements of his proposed methods for the construction of the Works. Typical information required is listed under surface and underground works. Similar information shall be required for each definable section of the Works.

3.5.12.1 Surface Works

(a) Excavation/Earthworks

Details of the following:

- methods of excavation to be used
- types of plant and equipment to be used for excavation.

(b) Concrete Work

Details of the following:

- method of construction to be used
- method of placing concrete
- rated capacity of batching plant and storage capacities for aggregate and cement
- formwork
- concrete transporting and placing equipment

(c) Primary Rock Support in Excavations

Details of the following:

- equipment for installing rockbolts and rock anchors

- shotcrete equipment (rated capacity and number to be provided)
- drilling equipment for drainage holes and grouting (rated capacity and number to be provided)
- grouting equipment.

(d) Standby Equipment

Details of standby equipment (type and capacity) for power requirements.

(e) Site Transport

Details of transport for conveying site personnel, material and injured persons.

3.5.12.2 Underground Works

(a) Excavation and Support

Details of methods of excavation and support to be used including:

- number of faces to be worked simultaneously
- length of shift and number of shifts per week
- methods to be used
- sequence of operations and details of anticipated cycle times
- anticipated length of round to be drilled for each class of excavation

- provisions for access for shotcreting and rockbolting
- methods of dealing with water
- methods of muck handling
- methods of ventilating the Works

Details of the type of plant and equipment to be used including:

- access provisions for shafts by way of platforms, stages, hoists, headgears, ladderways and muck hoisting
- drilling, loading, mucking and hauling in shafts and tunnels
- installation of rockbolts and rock anchors
- shotcreting equipment
- grouting equipment
- dealing with water in shafts and tunnels
- standby equipment

(b) Concrete Work

Details of the following:

- methods of transporting and placing concrete
- formwork

- vibration equipment
- transporting plant and equipment for placing and compacting concrete

(c) Primary Support and Concrete Materials

Details of make and type of:

- rockbolts
- rock anchors
- additives for shotcrete and concrete
- proprietary systems of primary support

3.5.13 Alternative Tenders

Alternative tenders will only be considered if the basic tender has been completed fully and strictly in accordance with the tender documents.

Alternative tenders shall be completed in full as if they were basic tenders and listed on a separate schedule.

A tenderer should be encouraged to advise the client as early as possible of any alternative tender he proposes submitting to ensure that it is not unacceptable for technical or other reasons.

3.5.14 Qualifications with Technical Implications

Tenderers shall submit a schedule with aspects of their tenders which do not comply with the tender documents. These may be in the form of qualifications or clarifications (see also Clause 3.4.9)

3.5.15 Major Sub-contractors

Tenderers shall submit a schedule of proposed major and specialist sub-contractors together with details of those sections of the Works which the tenderer proposes to sub-let.

3.5.16 Letter of Authority from Board

Together with the submission, tenderers shall enclose a letter of authority from the Board of the company or joint venture, empowering a particular individual to sign the tender form on its behalf.

On receipt of the information requested in accordance with this chapter, the evaluation process can commence.

CHAPTER 4

TENDER EVALUATION PROCEDURE

4.1 SCOPE

For the purpose of this thesis, the tender evaluation phase will be considered to commence on receipt of the tender documents from the tenderer and conclude on the submission of the evaluation team's recommendations to the client. The period between receipt of the latter by the client and award of the contract does not normally require a significant input by the tenderer and consultant.

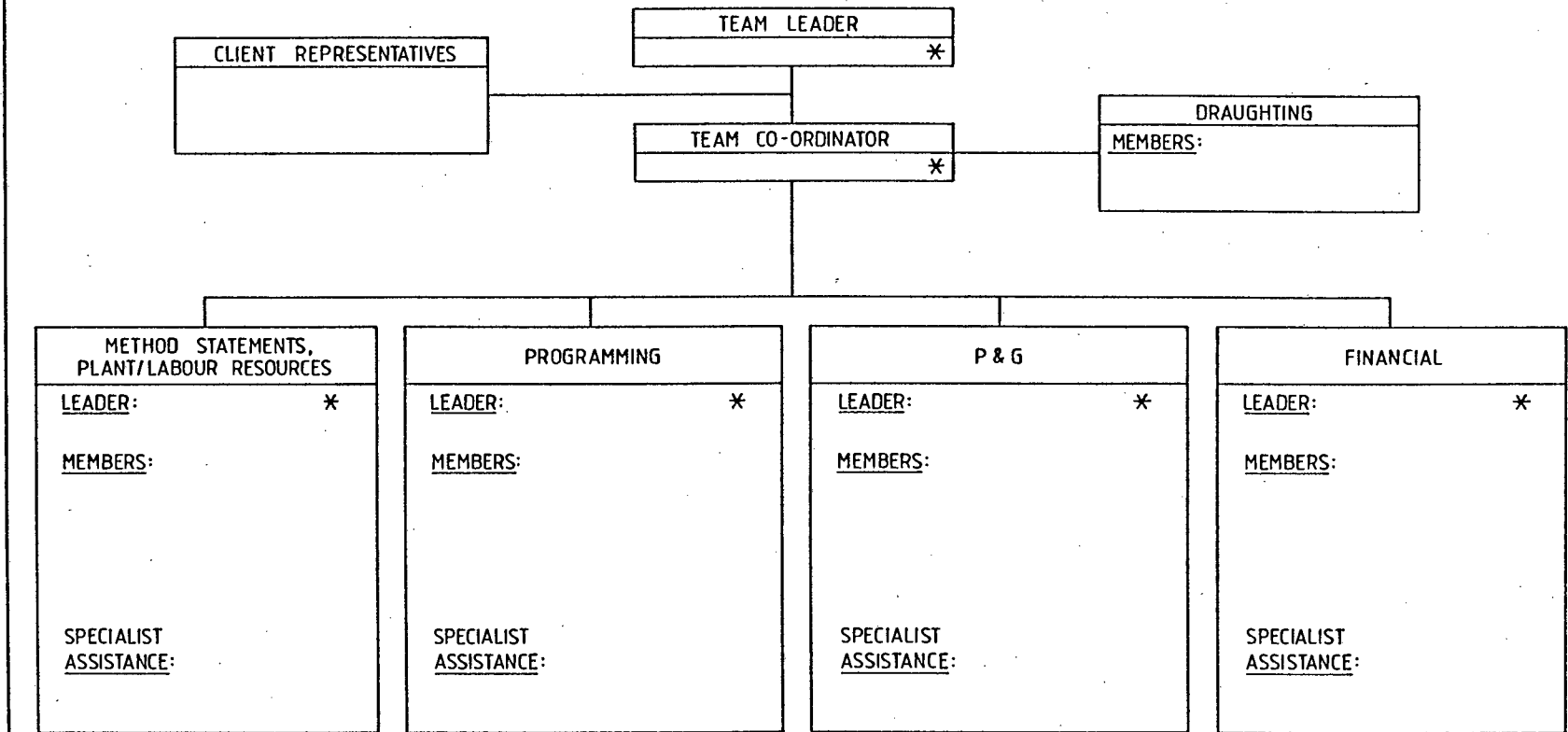
During the evaluation period, basic and alternative tenders are individually checked and later cumulatively evaluated to assess the most acceptable tender from both financial and technical viewpoints.

It is important that an appropriate procedure⁽⁷⁾ for evaluating tenders is established in advance so that the subsequent evaluation and comparison of tenders may lead to well balanced judgement and a timeous recommendation to the client.

4.2 EVALUATION TEAM

A typical evaluation team will follow the organogram format depicted in Figure 4.1. The team will have a Recommendation Board consisting of the team leader, co-ordinator and group leaders and will convene periodically to keep members informed of work being done by the individual groups and to discuss the inter-relationships of financial and technical matters.

TENDER EVALUATION ORGANOGRAM



LEGEND

* MEMBERS OF RECOMMENDATION BOARD

FIGURE 4.1

For a large project, the team will normally be divided into four groups namely financial, construction methods and plant, programming and preliminary and general (P&G). The latter has been included as a separate group as a result of the detailed P&G information requested in the tender documents.

The client will normally request an input at relevant stages and in fact many clients wish to undertake the evaluation of certain aspects themselves. Such aspects include foreign exchange cost implications, quality assurance manuals, etc.

4.3 DOCUMENT REGISTER

A register is drawn up to record all documents and correspondence received from tenderers and to whom they have been distributed for action. Each person receiving such a document will be responsible for ensuring the confidentiality and security of the document.

4.4 CONFIDENTIALITY OF DOCUMENTS

The contents of the tender submissions is considered strictly confidential and no communication is allowed to take place between tenderers and members of the evaluation team without prior approval from the client through the Board. Clients normally insist on all communication with tenderers being handled through their administrative departments. All tender documents received are stamped "Strictly Confidential" in red ink and all team members fully briefed on their responsibility toward the client.

It is advisable that an isolated set of offices is allocated to the evaluation team and that documents are not removed from this area. At night and over weekends the documents should be locked away.

4.5 EVALUATION PROGRAMME

As with any organisation, progress must be monitored regularly to ensure that activities are completed by specified dates. With large client organisations the date for submission of the evaluation team's recommendation is often not negotiable as a delay to this date has a ripple effect on the dates of committees through which the report must pass prior to final acceptance.

Figure 4.2 illustrates a typical programme in simple bar chart form to cover the evaluation period. Key events with corresponding key completion dates are indicated.

TENDER EVALUATION PROGRAMME

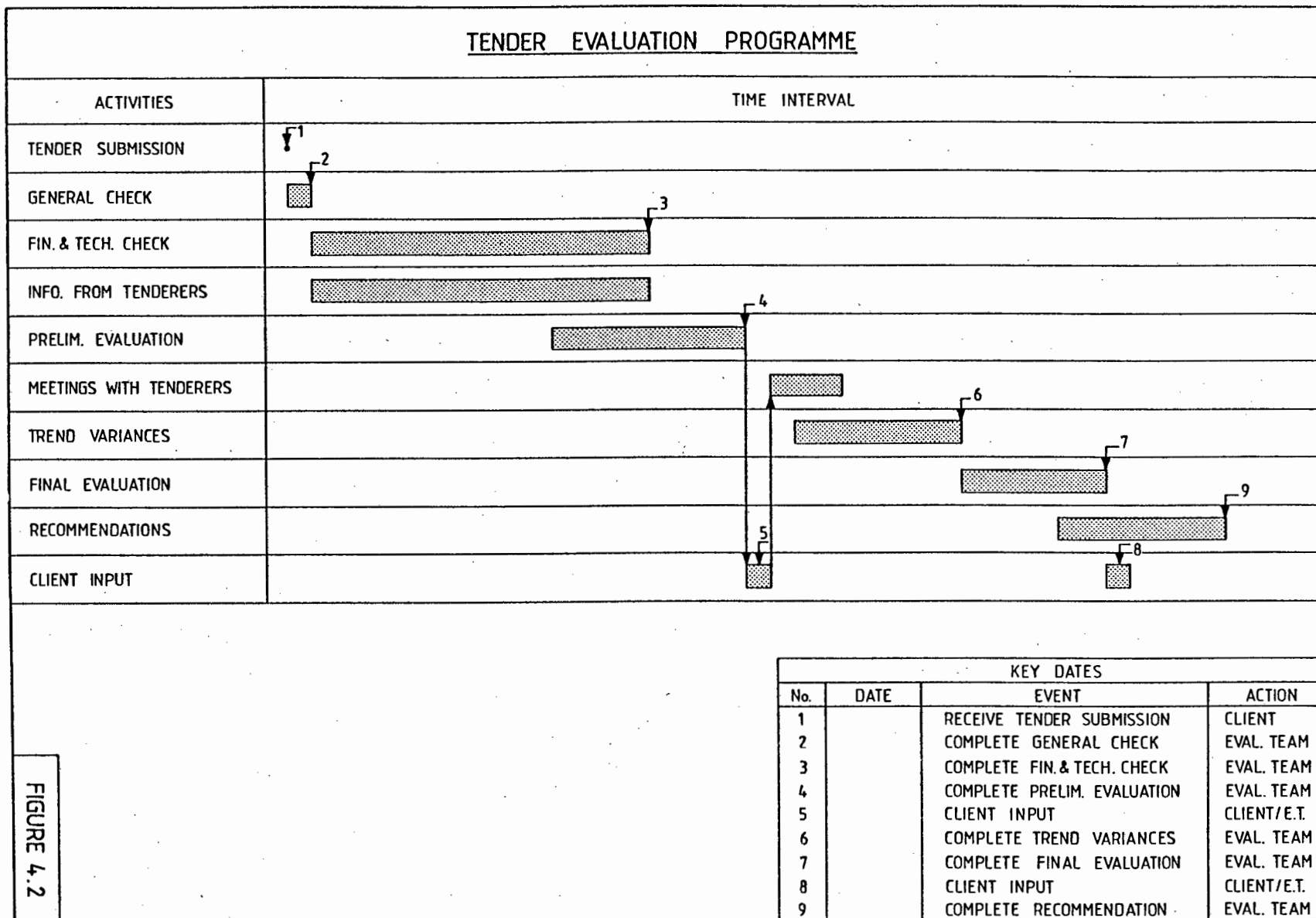


FIGURE 4.2

4.6 DESCRIPTION OF EVALUATION PROCEDURE

Prior to the date of tender submission standard charts listing relevant key factors are drawn up for each tender for ease of checking and evaluation. The initial chart indicates those documents received or omitted while later charts will list specific items for different sections of the Works. Data extracted from the tenders is noted against the relevant items listed so that during the evaluation process the data submitted by each tenderer may readily be compared.

The evaluation procedure can best be described by referring to the flow chart in Figure 4.3.

On receipt of one complete set of each submitted tender the evaluation process will commence and follow the steps shown on the logic diagram in Figure 4.4. Each step is described below.

TENDER EVALUATION PROCEDURE

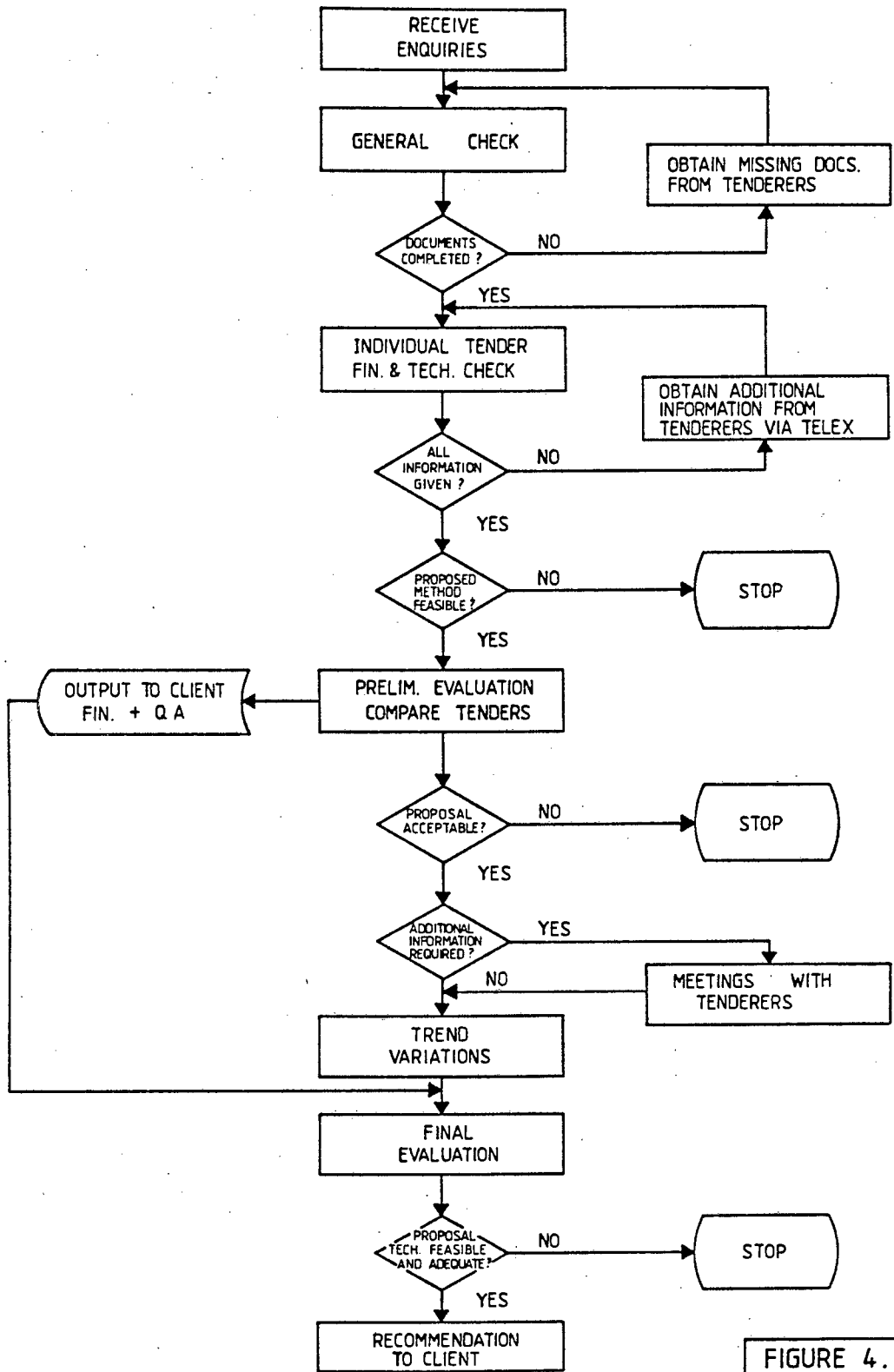


FIGURE 4.3

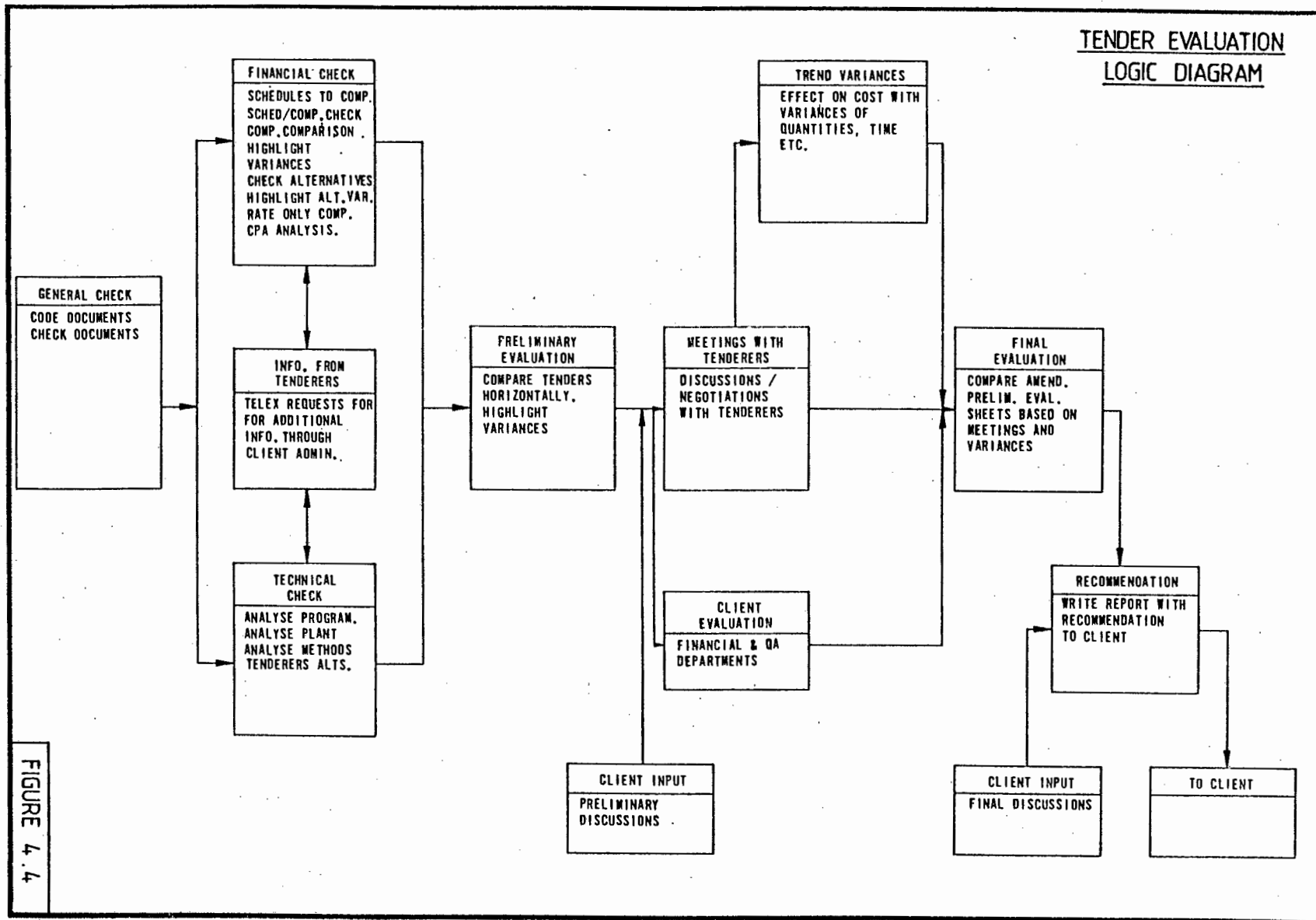


FIGURE 4.4

4.6.1 General Check

4.6.1.1 Document Receipt Check

The submitted tenders are checked to ensure that all documents requested have been enclosed. A previously prepared chart listing all such documents with three circles for each will indicate whether the document is enclosed, completed and signed. If any, or all three, of these is correct the circle is coloured in. Once completed this chart will provide a quick check of what documents are missing and these are immediately obtained from the tenderer by the client.

The detailed scrutiny of the contents of the documents will form part of a later exercise.

If it is a requirement that the client also receives a full set of completed tender documents from each tenderer, then the client too should complete a similar chart. A comparison of the client's and evaluation team's charts will immediately show up any discrepancies and these should be corrected at once.

4.6.1.2 Coding of Documents

A common procedure on major projects is for the tender submission to be bound in a few lever-arch type files. It is therefore important that each and every page of the document, attachments or enclosures is coded in the top right hand corner with a unique number. In this way all aspects of the submissions may be readily traced by referring to the document register described in Clause 4.3. The following coding system is proposed:

(a) Basic Tender

The basic tender (as opposed to an alternative tender) will receive a number from 1 to x (where x = total number of tenders received) in the order of the lowest to the highest tender sum submitted.

Paterson⁽⁸⁾ recommended that documents being evaluated should take on an anonymous presence to ensure impartiality. This is an admirable approach and one used in the past by the author. However, the anonymity within the evaluation team is unfortunately short lived as the tender submission has the tenderer's name stamped all over whether it be on the document cover, covering letter, submitted drawings or elsewhere.

It must, however, be stressed that any steps taken towards an impartial evaluation are to be encouraged even if this can only be achieved by an attitude of mind.

e.g. Second lowest tender would be

2	
---	--

(b) Alternative Tenders

As previously mentioned an alternative tender is considered as a separate tender during the evaluation process. Alternative tenders are given a suffix A, B, C, etc. to basic tender number.

e.g. the second alternative to basic tender No. 5 would be

5B	
----	--

(c) Pages of the document, enclosures or attachments are given a number 101, 102, 103 etc. respectively, one number per document.

e.g. Appendix G - Dayworks Schedule (Code 113) to the second lowest basic tender sum would be

2	113
---	-----

If the document consists of more than one page, the fourth page would be

2	1113/4
---	--------

4.6.2 Financial and Technical Checks

Each tender is subjected to a detailed financial and technical check on an individual basis to ensure compliance with the specifications. A comparison of different tenders will not take place at this stage. Any inconsistencies are clarified by the tenderer through the client.

4.6.3 Preliminary Evaluation

The individual tenders are compared with one another and major variations and discrepancies highlighted. A preliminary evaluation is done to supply the client with the initial indications of tender rankings. If required, certain relevant financial and technical data is forwarded to the client for in-house assessment and comment.

4.6.4 Meetings with the Client and Tenderers

Emanating from the preliminary evaluation, aspects requiring further clarification are discussed at meetings with the individual tenderers in the presence of the client.

4.6.5 Trend Variances

Once all information is received, changes to anticipated site conditions are simulated to assess the sensitivity of the tendered rates to quantity and time change and the overall cost implications associated therewith (e.g. poorer rock encountered in underground excavations, increased water inflows, etc.).

4.6.6 Final Evaluation

Information obtained during the preliminary evaluation is updated with any new data which may have come to light following meetings with tenderers, trend calculations and feedback on aspects investigated by the client. Charts and tables summarising the evaluation are prepared.

4.6.7 Recommendation

Based on the final evaluation assessment, the Recommendation Board's comments on the adequacy of the tenders and recommendations as to the selection of the prospective contractor are prepared in report form and submitted to the client.

The evaluation of the tenders is discussed in detail in the next chapter.

CHAPTER 5

EVALUATION OF TENDERS

5.1 GENERAL

Without the benefit of pertinent information, a tender cannot adequately be evaluated. In previous chapters a tender document format has been proposed which will greatly assist in the financial and technical evaluation of individual tenders and a procedure described to achieve this end.

The traditional principle of awarding a contract to the "lowest bidder" or the "lowest responsible bidder" is always in the back of one's mind when invited (prequalified) tenderers are involved. These tenderers, after all, have satisfied the client in respect of financial standing, technical capabilities and experience on projects of similar nature, size and complexity.

Assuming therefore that all invited tenderers are considered to be "responsible", the question is raised : "How can the contract be awarded to anyone other than the lowest bidder?" Smit⁽¹⁾ explains a major problem area:

"Judging from tenders received, too much emphasis has been placed on the tender price as such whereas the details of the manner in which this price was arrived at appears to be neglected.

The evaluation team is very often in a dilemma when a reputable firm with a fair price fails to gain the confidence of the team because of inconsistencies or omissions in the tender. Tenderers seem to have a misconception about the technical (executorial) side of their tenders which should play an equally important role in the evaluation process."

In other words we have reached a stage where the "lowest bidder" principle is no longer acceptable and the "lowest responsible bidder" principle takes on new and more intricate dimensions.

Once a tenderer has been invited to tender, the reasons for his selection and his status with the client should, in the author's opinion, be ignored and the tender best suiting the client's goals (i.e. shortest possible construction period, the highest quality of materials and workmanship and the lowest overall final cost) from technical, cost and time considerations should be awarded the contract. This aspect should be emphasised in the tender documents to prevent a tenderer speculating and submitting an unbalanced or very low tender in anticipation of being awarded the contract at any cost to himself. Naturally the rejection of low tenders must be on a strictly impartial basis with the client being provided with fully substantiated reasons.

The situation of selection is further complicated if on a major tender the lowest bid is very much lower than the next highest bid and the consultant's estimate for the Works.

Vorster⁽⁹⁾ likens this situation to a pack of wolves with an aggressive leader.

"You are either ahead of the pack and stand a real chance of taking a beating on the unexpectedly awkward jobs or you stay in the pack and run aimlessly and unsuccessfully through the market. You must go so that you are neither the bankrupt leader nor the deputy leader, but the successful leader."

To ensure the contract is not awarded to an unrealistic or reckless tenderer, the tenderer's pricing strategy must be analysed to ascertain whether it falls into one or more of the following categories⁽¹⁰⁾:

- (i) the tenderer has speculated that the billed quantities are incorrect and he intends exploiting these errors possibly by tendering unbalanced rates;

- (ii) the tenderer believes he has developed new techniques or has specialised plant, or can take other steps to achieve above average efficiency or a higher rate of production and consequently can reduce his cost significantly;
- (iii) the tenderer believes that there is scope for claims for extra payment which can be profitably exploited;
- (iv) the tenderer has failed to understand the complexity of the work and the construction programme;
- (v) the tenderer has underpriced items for reasons of his own choice, e.g. wishes to obtain the work even if it makes little contribution towards covering his fixed costs.

Point (ii) can readily be assessed from the method statements submitted while none of the other points is in the client's interest.

On underground works where changing conditions are a reality, a contractor runs a serious risk of losing substantial amounts of money through non-performance. This would cause significant delays to the completion date of the contract because the contractor would have provided insufficient resources initially and would then lack the cash resources to be able to provide the additional plant and personnel necessary for proper execution of the contract.

In such a situation the client is pressurised into assisting financially to keep the work moving and minimise further delays, with the potential loss of earnings to the client usually being far greater than just the increased payment claimed by the contractor.

It is therefore essential to investigate low bids critically to find out which of the above categories could apply. An attempt can then be made to quantify the missing information or estimate the magnitude of likely losses and what effect these could have on the final contract price.

5.2 PRESENTATION OF INFORMATION

As can be imagined a significant quantity of information is received for a major tender and this has to be assimilated, evaluated and presented in a form which will have a maximum impact on the client who will have a minimum knowledge of the tenders.

Tables of numbers and percentage differences and even graphs, although often very important and relevant, do not always provide a quick picture in the reader's mind of what is being conveyed.

It will be shown that illustrations in the form of diagrammatic charts can fulfill this function and these will be presented later for a simulated exercise (see Clause 5.3.7).

The old adage of "a good picture is better than a thousand words" is very relevant but it must be the correct picture for the purpose intended and it must be good.

The financial, technical and value (non-quantifiable) aspects of the tender evaluation are discussed hereafter.

5.3 FINANCIAL EVALUATION

5.3.1 Arithmetic Check

On receipt of the tenders, the schedules of quantities are checked either manually or by computer. Naturally the larger the project the more likely the latter method would be utilised. A computer has the added advantage that programmes are available to fulfill certain time-consuming operations quickly.

These include:

- Comparing unit rates of a number of tenders with a base tender which may be the lowest bid, the consultant's estimate or any other tender. The printout displays the tenders in column form and indicate the ratio of each unit rate to that of the base tender's rate.

By highlighting ratios (e.g. those less than 0,75 and those greater than 1,25 of the base rate) with luminous pens, inconsistent rates which may be speculative, unbalanced or otherwise are readily observed for closer examination of make-up.

- Schedules may be reduced or increased by tendered percentages as discussed in Clause 3.4.2 and the recalculated rates provided.
- Individual scheduled items may be extracted and extended amounts summated to obtain the total cost of an operation (e.g. concrete, formwork, reinforcing and prestressing items summated to give an all-in concrete cost).

5.3.2 Rate-Only Items

Rate-only items, i.e. unit rates tendered but not extended to the amount column, need comparative analysis to assess what effect they may have on the contract price if they are used.

5.3.3 Phased Estimated Earnings (Estimated cash-flow)

A useful check on the phased estimated earnings is to calculate an independent estimate based on the fixed costs, time-related costs and quantity-related costs for the various sections of the Works using the tenderer's construction programme. By plotting both the tendered and calculated curves on a time versus accumulated earnings graph, any discrepancies between the two become evident.

5.3.4 Contract Price Adjustment (CPA)

Using the phased estimated earning information and the CPA coefficients submitted in the tender, a simulated total phased estimated earnings curve, inclusive of CPA, is obtained for comparison.

5.3.5 Net Present Value

On contracts where differing construction periods are possible the net present value can be a useful tool in assessing the true value of the contract.

Vorster⁽¹¹⁾ states:

"Once the net cash flow (inclusive of CPA) for each tender has been found, it will be necessary to compare offers by discounting future cash flows at an interest rate equivalent to the cost of capital to the client and thereby determining the net present value of each bid (net present value) gives due recognition to time, escalation and the cost of time and should indicate which offer is relatively the most advantageous to the client (from a financial point of view)."

The author has, however, found that on large multidisciplinary projects with numerous fixed stage completion dates, and therefore little opportunity of varying the duration of the various construction activities or the contract period as a whole, net present value considerations have little effect on the contract price.

5.3.6 Dayworks Percentages

Dayworks percentages are similar to rate-only items in that their effect is not reflected in the tender sum. It is therefore important to make certain assumptions to assess their impact on the contract price.

Example:

From past contracts it is possible to estimate the value of Dayworks claims (before the contractor's percentage mark-up) as a percentage of the contract price - say 5%.

Assume an average ratio of Labour:Material:Plant input of say, 0,35:0,25:0,40 for Dayworks operations before contractor's mark-up

Contract price		R20 000 000-00
Value of Dayworks (before contractor's mark-up)	5%	R 1 000 000-00
Portion attributable to : Labour	(35%)	R 350 000-00
	: Material	(25%) R 250 000-00
	: Plant	(40%) R 400 000-00

Applying the tendered Dayworks percentages to the above labour, material and plant amounts, an estimate of the relative Dayworks cost will be obtained.

Tenderer 1 (Daywork mark-ups of labour 50%, materials 30%, plant 0%)

Effective Daywork cost = R1 250 000

Tenderer 2 (Daywork mark-ups of labour 100%, material 50%, plant 30%)

Effective Daywork cost = R1 595 000

i.e. Tenderer 2's evaluated contract price should be increased effectively by R345 000 relative to Tenderer 1.

5.3.7 Evaluation of Tendered Rates

On projects where one or two bids are very much lower than the "middle order batsmen", it is important to analyse the individual rates to assess whether they are reasonable when compared with similar rates in the marketplace.

In order to achieve this, fixed and time-related costs are extracted for each section of the Works. These costs are further broken down into specific activities such as:

- excavation
- underground support
- shotcrete
- concrete
- formwork, etc.

The fixed and time-related costs for each activity are combined with the respective quantity-related costs and a series of charts developed reflecting effective rates and effective total costs for each activity.

Similar diagrammatic charts are used to illustrate the total cost of each section of the Works which will include a proportion of fixed and time-related costs.

Reference to a hypothetical example at this point will best describe the evaluation of the tendered rates.

Hypothetical Example:

A large irrigation project is to be constructed and consists of a rockfill embankment, an outlet structure, a tunnelled pipeline under the embankment and an access bridge to the structure.

Let us analyse the tendered rates for the outlet structure and tunnel section, being surface and underground construction respectively. A similar approach would be used for the other sections of the Works.

Reference to the P&G Schedule in Appendix B will assist in understanding the concept being described.

5.3.7.1 Total Cost of Sections of the Works

Fixed and time-related costs for Specific and Plant Items applicable to the structure and tunnel are extracted separately from the P&G schedule. To these are added respective quantity-related amounts to obtain the total cost of the structure and tunnel.

These total costs are illustrated on the chart in Figure 5.1.

The most significant aspects to emerge from the chart are that:

- (i) tenderer No. 4 has a high time-related cost in the tunnel indicating that an extension of time would cost more than for the other tenders;
- (ii) the large time-related cost for tenderer No. 3 for General Items implies a more costly extension of time if the Works as a whole, i.e. the critical path, was affected.

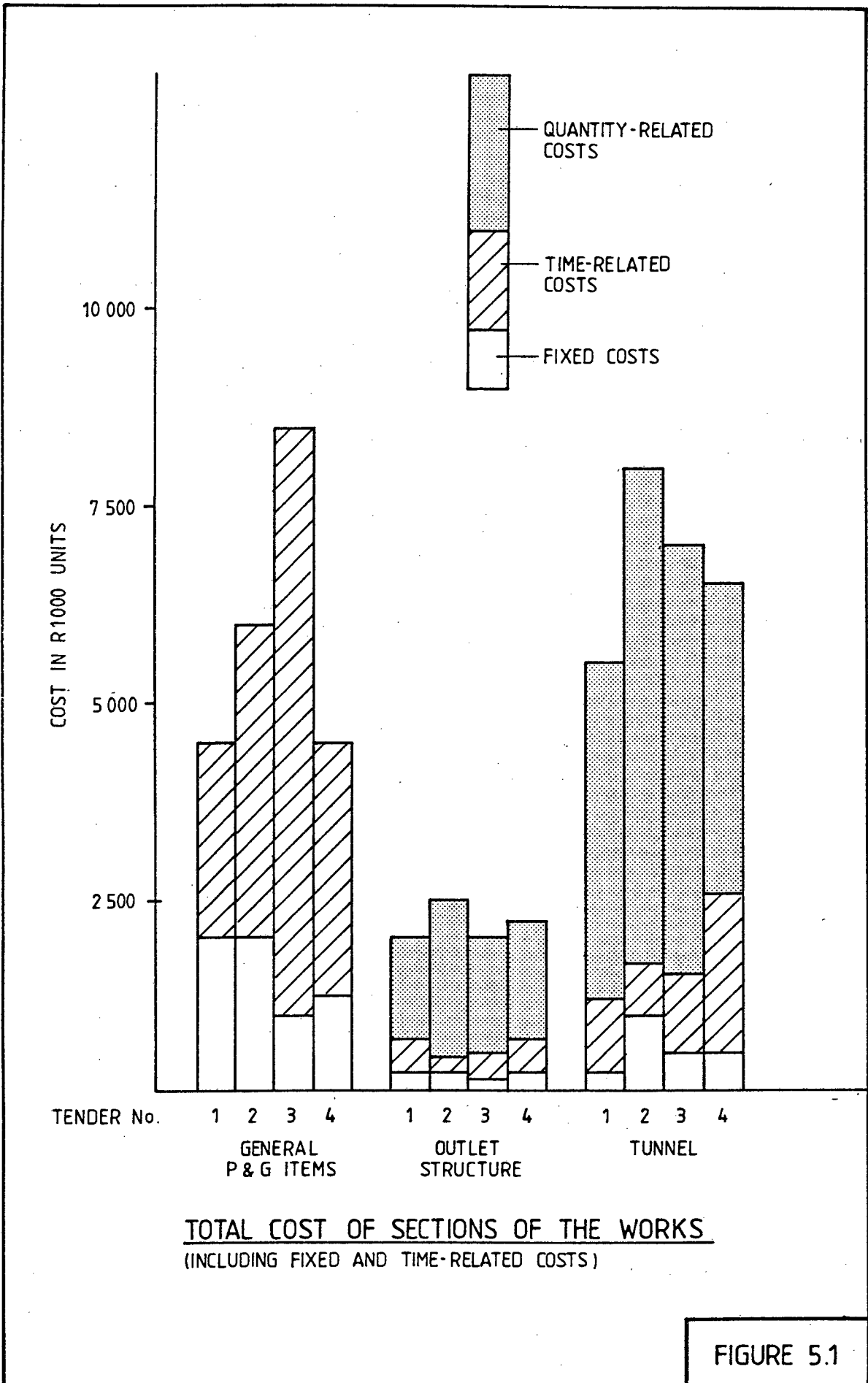


FIGURE 5.1

5.3.7.2 Effective Total Rates for Concrete

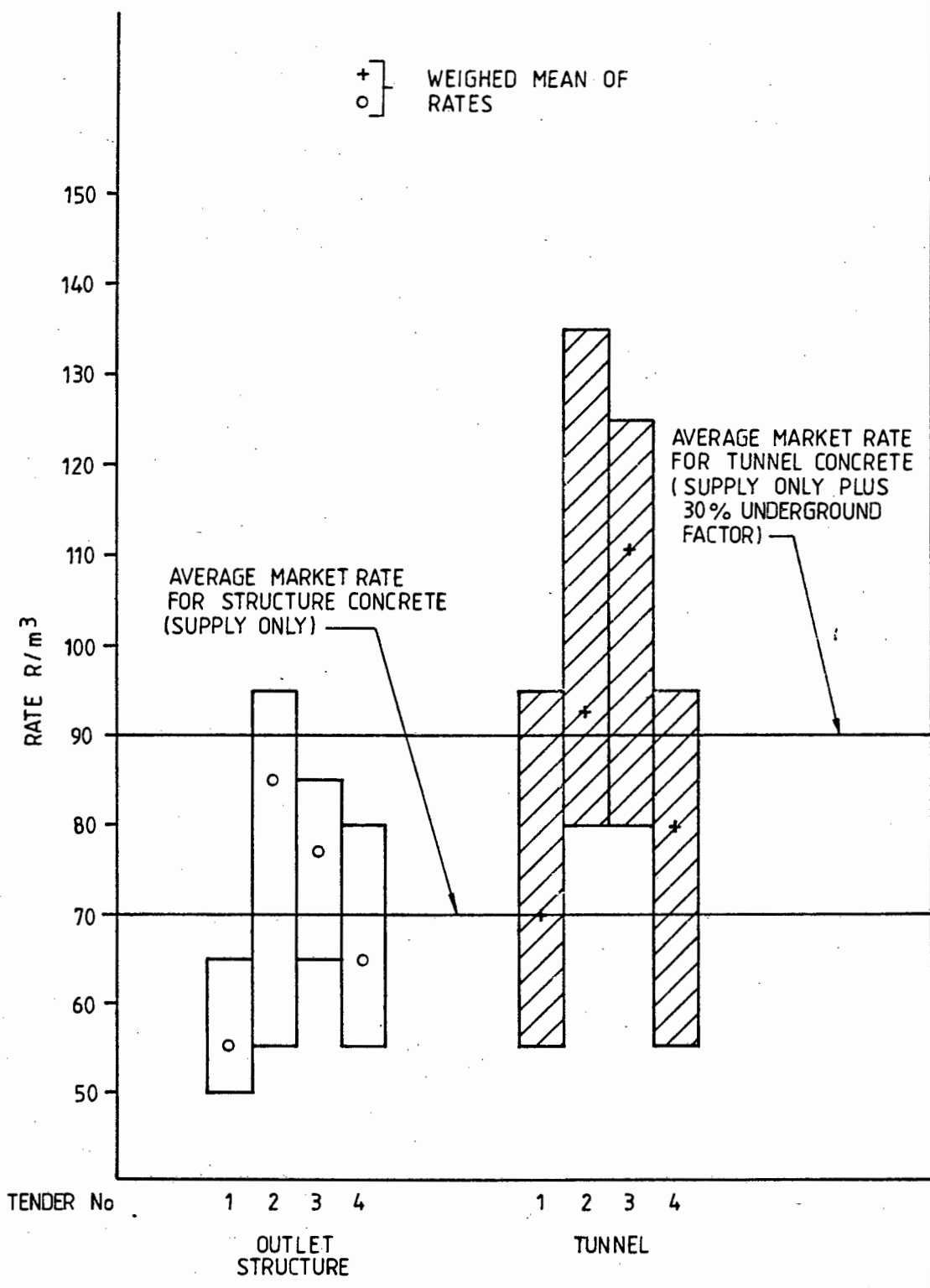
The fixed and time-related costs mentioned in Clause 5.3.7.1 are further broken down into structure and tunnel concrete. These are added to the respective quantity-related rates in proportion to the concrete volume to reflect effective total rates. Normally there are different concrete rates for each section (e.g. foundation, walls, slab, etc.) and the rates are weighted pro rata to the concrete volume to give a weighted average rate.

On underground works, overbreak (over-excavation) can have a decisive effect on the concrete rate. If, as is the case in many documents, no additional payment is made for overbreak, the additional concrete required needs to be considered when comparing against a base rate. The anticipated overbreak can usually be calculated as a percentage of the concrete lining to the tunnel and the rate should be increased accordingly.

The range of rates and weighted averages are given on the chart in Figure 5.2.

These rates need to be compared against a realistic base which, for this purpose, has been taken as the current market price, i.e. say R70/m³. From previous contracts it would appear that rates for underground work are on average 30% higher to account for handling disruptions, access problems and specialised equipment such as concrete pumps. An average rate of R90/m³ for tunnel concrete would appear reasonable.

These bases are marked on the chart for comparison of rates. Considering that the market price of concrete is for supply only (i.e. no cost of placing) while tendered rates are inclusive of supply and placing, the bases reflect a realistic base which can be equated to a break-even rate, i.e. minimal profit or loss.



RANGE OF EFFECTIVE CONCRETE RATES
 (INCLUDING FIXED AND TIME-RELATED COSTS
 ALLOCATED PRO-RATA TO VOLUME)

FIGURE 5.2

From Figure 5.2 it would appear that tenders 1 and 4 are operating in a loss situation for both structure and tunnel concreting activities. This is an undesirable situation as will be discussed later.

5.3.7.3 Total Cost of Concrete

By extending the effective rates by the respective quantities, a total cost for the concreting activities are obtained.

These are reflected on the chart in Figure 5.3.

The base rates selected are also extended and superimposed. The amounts of loss (below the line) or profit (above the line) are thus quantified and may be used in later evaluation decision making.

Another method of calculating a base is by using a value of 90% of the average of the lowest four tenders. It can be stated that with a normal spread of tender values from the recommended number of six prequalified tenders, a selection of the mean of the lowest four tenders would probably be on the low side of the median value and 90% of this amount would then definitely be less than the median.

A recent exercise showed that base rates, arrived at by the above two methods, were similar.

Figure 5.4 gives a quicker quantifiable assessment than Figure 5.3 of the profit or loss situation for each tender.

Once again the trend is evident indicating that tenders 1 and 4 will be operating in a loss situation for concreting activities in both the structure and tunnel sections of the Works.

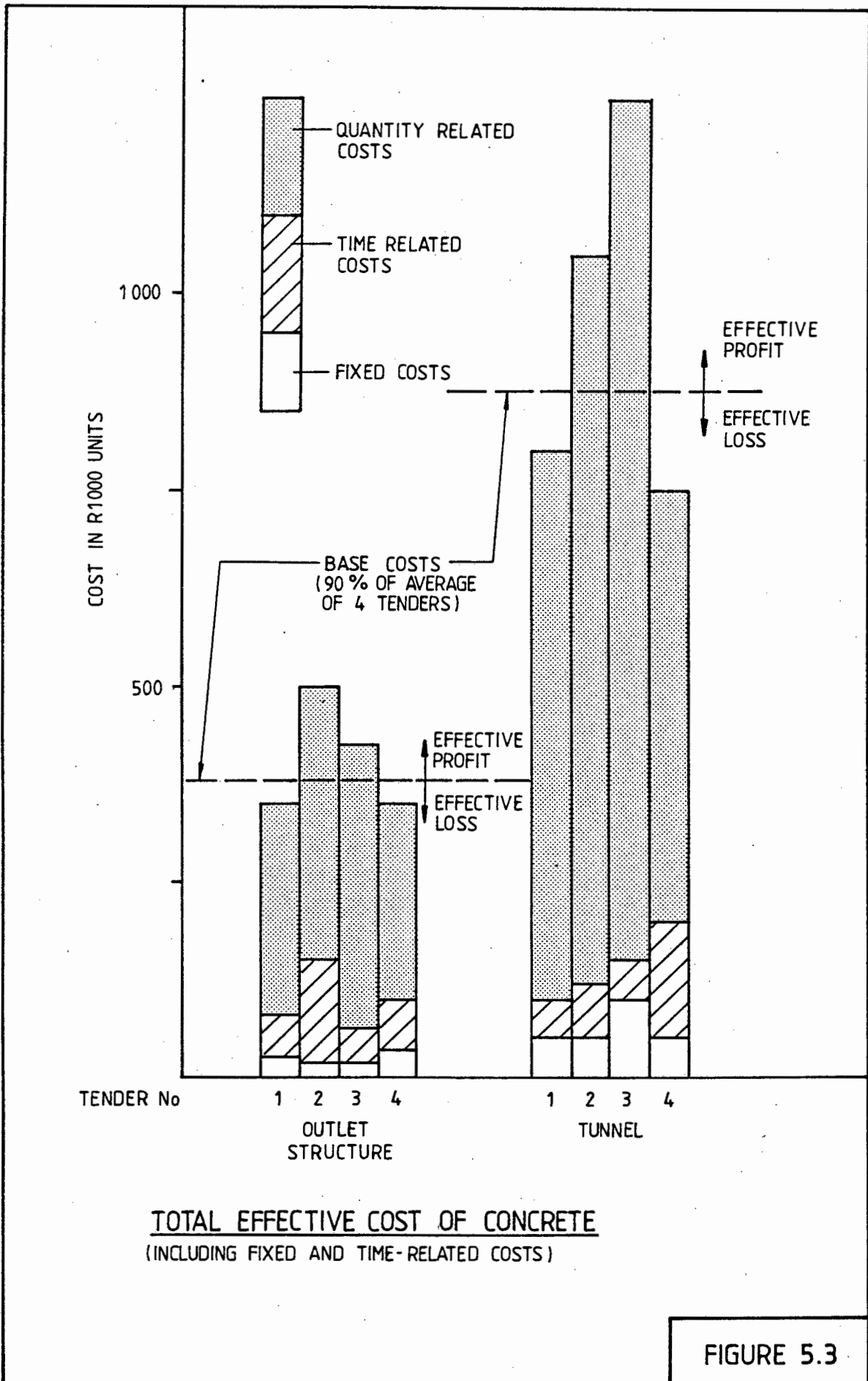
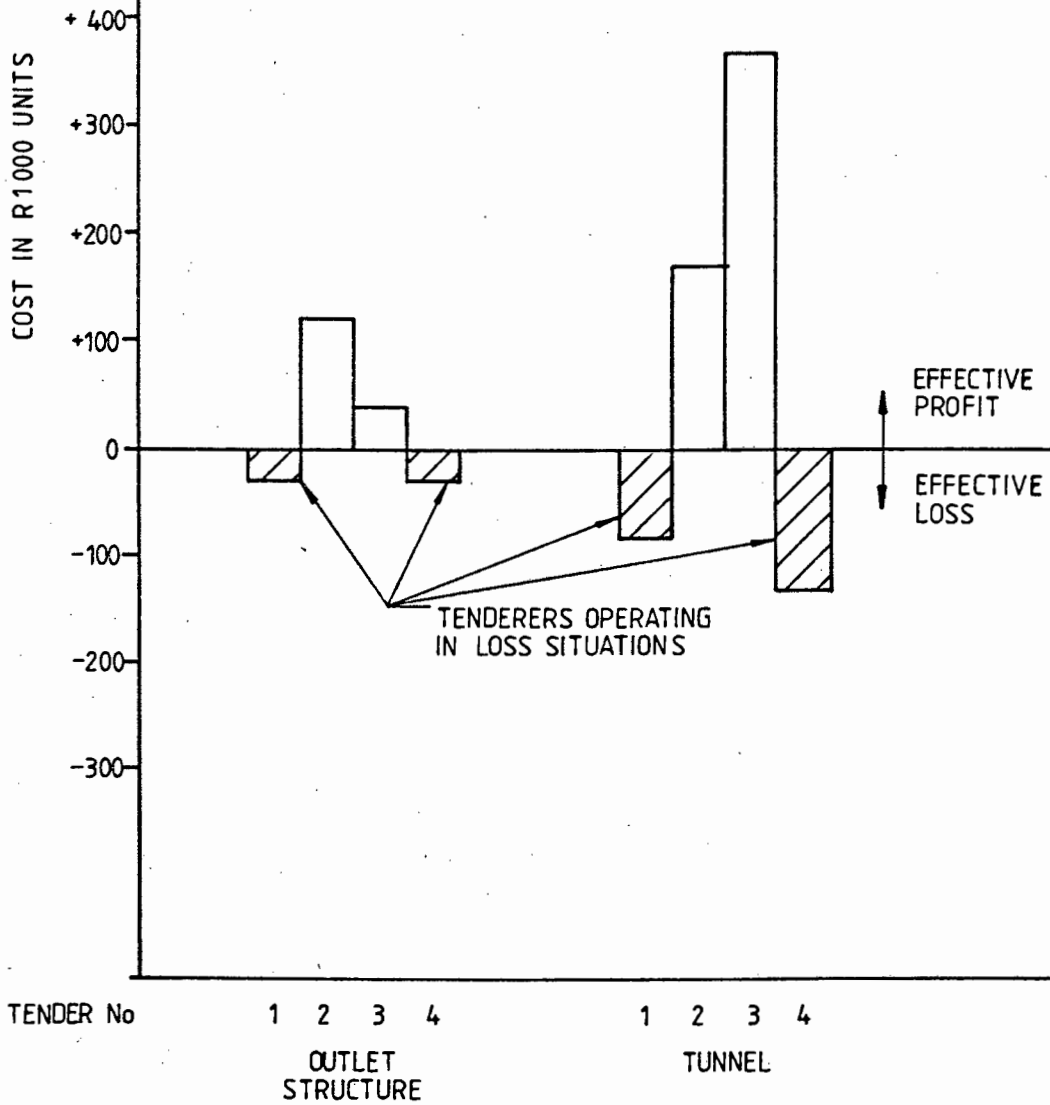


FIGURE 5.3

NOTE: THE EFFECT OF OVERBREAK HAS NOT BEEN INDICATED BUT IT WOULD REDUCE THE PROFIT AND INCREASE THE LOSS
 BASE COST = 90% OF AVERAGE OF 4 TENDERS



TOTAL EFFECTIVE COST OF CONCRETE VERSUS BASE COST
 (INCLUDING FIXED AND TIME-RELATED COSTS)

FIGURE 5.4

In a similar manner each activity for each section of the Works can be assessed and the relative profit or loss amounts quantified. These amounts are carried forward for the overall financial evaluation which will be discussed in Clause 5.6.

5.3.8 Financial Implications of Trend Variances

Variations in site conditions are simulated to assess the sensitivity of the contract price to change in quantities and time. Typical variations, or combinations thereof, include:

- extension of time to the whole Works;
- extension of time to sections of the Works;
- acceleration of sections of the Works;
- change in classification of underground excavation and support;
- variation in water inflow greater than specified or anticipated.

Extensions of time for non-critical path activities (see Clause 2.6.3.1) can readily be calculated for each section of the Works by dividing the total value of time-related costs for Specific and Plant Items attributable to that section by the tendered duration of construction (e.g. if duration is in weeks, cost of extension of time is in R/week).

Extensions of time for critical path activities are calculated as above except that a proportion of the time-related costs of General Items (R/week) is added to the above cost to arrive at the total cost (R/week).

When calculating an acceleration cost (e.g. R/week) it is assumed, for a hypothetical case, that the cost is proportional to the fixed costs for Specific and Plant Items for that section of the Works being accelerated. Time-related costs are undefinable at tender stage and therefore ignored.

Graphic representation of the above will indicate the cost effect of one week's extension or acceleration on sections of the Works. This exercise can be used to assess when the Works should be accelerated, in preference to an extension of time, at a lower cost to the client.

A typical graph indicating the effect of cost on an extension of time is given in Figure 5.5.

Excessive water inflows in underground excavations, which would result in disruption of cycle times, would be evaluated in a similar way to that described above.

A change in classification of underground excavation and support would cause a quantity as well as a time change. The cost of the quantity change would be assessed in the normal manner via billed rates while the time implications would be assessed as above.

Smit⁽¹⁾ discussed, with an illustration, the financial implications of excessive water and changing underground excavation conditions in more detail.

This type of sensitivity analysis gives a quantifiable indication of the financial risk attached to unforeseen variations in site conditions.

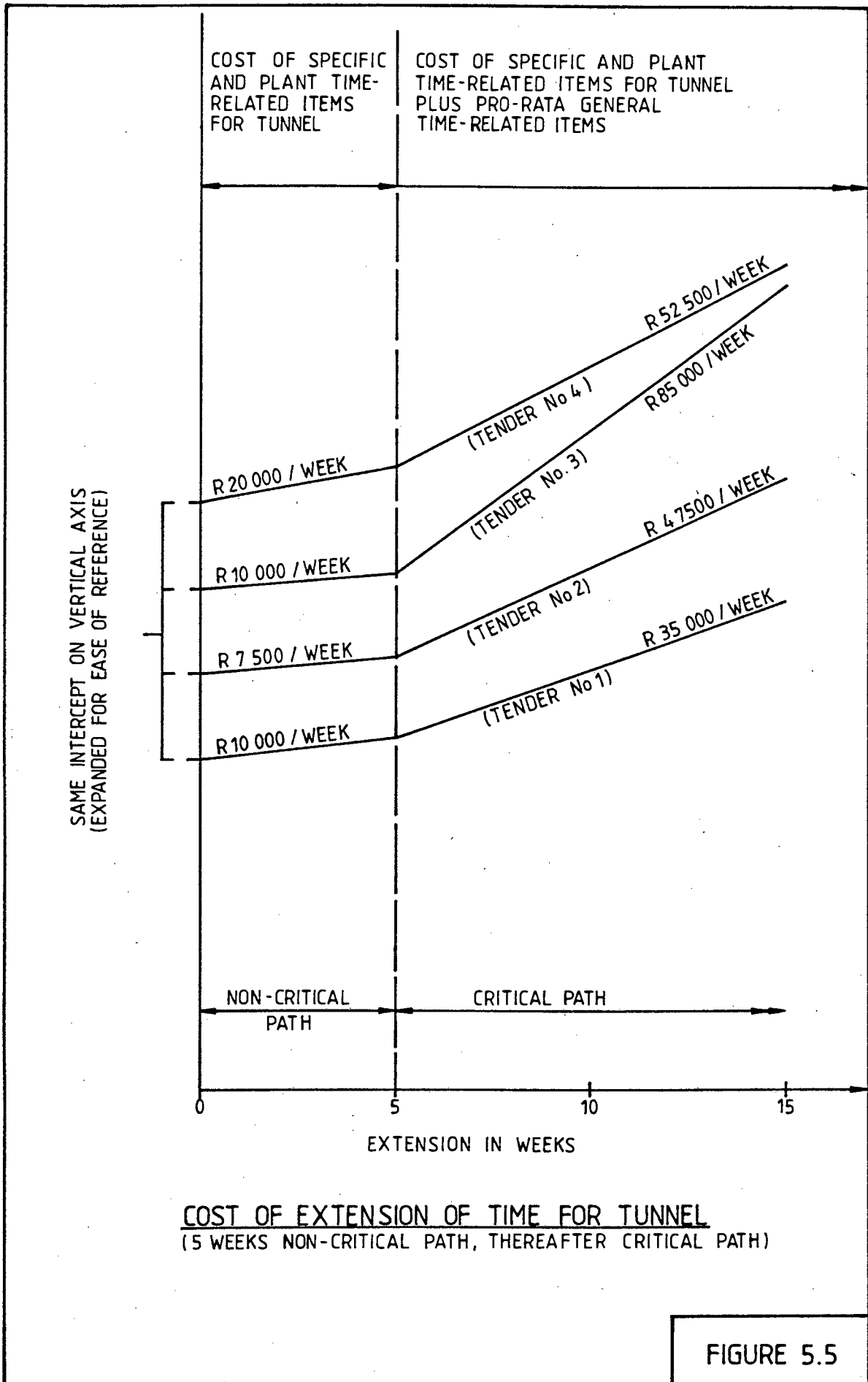


FIGURE 5.5

5.4 TECHNICAL EVALUATION

The technical evaluation consists of assessing and evaluating the information submitted by tenderers and includes:

- method statements
- tendered construction programme
- plant resources
- labour resources

None of the above aspects can be read in isolation as they are inter-related and dependent on one another. Only an overall assessment can have any true meaning on the final evaluation.

5.4.1 Method Statements

Typical information required of the tenderer is listed in Clause 3.5.12 and this can be expanded to suit a particular contract. But no matter how much information is requested and in what detail, some tenderers will only submit the bare minimum to ensure compliance with the tender documents.

This is unfortunate as the information submitted is the only indication that the evaluation team has of the tenderer's ability to execute the Works. As mentioned, previous experience, ability or standing of the tenderer should have no relevance during the evaluation phase.

It is therefore essential that a tenderer submits his tender containing such detailed information and description as will adequately indicate to the evaluation team the degree of appreciation he has for the complexity of both work and programming requirements.

To assess the technical adequacy of each tender, the method statements are scrutinised for:

- adequacy of method
- deviation from specified or normally used methods or techniques
- unrealistically fast underground excavation rates of advance
- incorrect sequencing of work
- adequacy of plant and labour resources

Underground works especially require special attention to ensure that the correct excavation equipment is proposed. By the very nature of the work, the physical dimensions severely limit the introduction of additional resources to accelerate progress should this become necessary. It is therefore necessary to quantify the risk of a contractor not adhering to the programme because of the methods used.

This can be done by means of a weighted point-count system whereby a particular method is given a rating from 1 to 10 (i.e. 1 = excellent, 5 = acceptable, 10 = unacceptable method, likely to result in severe time delays). All operations constituting the Works are rated and summated. The higher the total rating of a tender, the greater the financial risk to the client.

This system will assist in selecting a tender which has the most suitable construction methods and resourcing potential from the outset of the contract. This should ensure that any specified stage completion dates are achieved and thereby minimise claims resulting from delays.

5.4.2 Plant Resources

The plant items listed are to be consistent with the method statement describing the particular operation for which the plant is intended.

Unsatisfactory aspects are listed by the evaluation team for later clarification by the respective tenderer.

An indication of the perception that a tenderer has of a contract is the level to which concurrent activities are programmed and resourced.

By referring to the tendered construction programme and summing the number of concurrent activities programmed over equal intervals throughout the contract period, the tenderer's appreciation of plant resourcing can be assessed.

The individual activities are weighted to reflect increased resourcing expense e.g. underground excavation activities rated at 2 to 2,5, underground concrete activities rated at 1 to 1,5, etc. Normal surface activities are considered as unity.

A graphic representation of time intervals against the weighted number of concurrent activities reflects the resourcing potential. By integrating all these activities, i.e. the area under the curve, a measure of resourcing of the whole contract is obtained. Figure 5.6 illustrates this procedure.

A selection of a base depends on the type of contract involved but for complex projects involving numerous concurrent activities, a tender resourced by a tenderer with recent successful experience in the particular field of work is useful. A base resourcing level equal to 90% of the lowest four tenders may also be used as discussed before.

Once a realistic base is chosen, the areas under the curves being the integration of all activities over the contract period are calculated and compared with that of the base. (The base area equating to an effective 100% resourcing factor.)

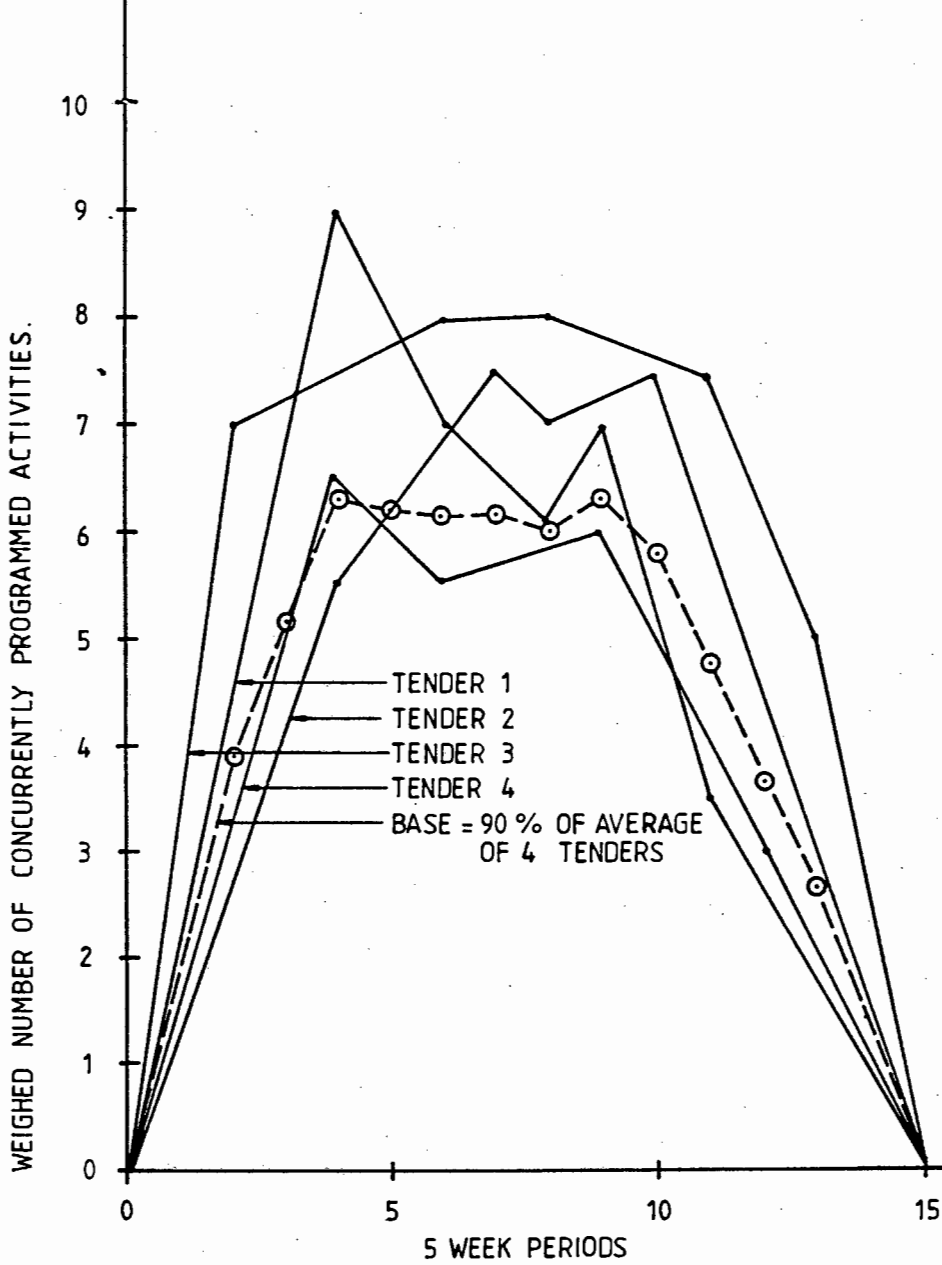
The base shown on Figure 5.6 has been taken as 90% of the average activity level of the four tenders indicated. The following comments can be interpreted from the graph:

- Tender 1 is under-resourced for the period 50 - 75 weeks but over-resourced for the period 0 - 40 weeks. On average the resourcing is similar to that of the base.
- Tender 2 is under-resourced for the period 0 - 25 weeks but over-resourced from 25 - 75 weeks with an average over-resourcing of 13%.
- Tender 3 is on average 20% over-resourced for the contract period.
- Tender 4 is under-resourced for the total contract period by an average of 9%.

Again the trend comes through that tenders 1 and 4 are borderline.

The cost of rectifying any under-resourcing may be quantified by applying the percentage under-resourcing (of the base) to the respective total fixed and time-related costs in the P&G schedule. The monetary value obtained can then be used in the overall financial evaluation discussed in Clause 5.6.

TOTAL RESOURCING: BASE 100 %
 (AREA UNDER THE CURVE) TENDER 3 = 120 % TENDER 4 = 91 %
 TENDER 1 = 99 % TENDER 2 = 113 %



PROGRAMMED RESOURCING LEVELS

FIGURE 5.6

5.4.3 Labour Resourcing

The information provided on phased unskilled and semi-skilled labour resourcing can be illustrated on a histogram (number of labourers versus time). Any significant under-resourcing should be clarified with the tenderer.

5.4.4 Programme Evaluation

As previously mentioned, a tentative construction programme in logic diagram format, included in the tender document, sets a standard for the submission of tenders. The standard programme will indicate, among other things, the interdependence of disciplines involved (e.g. civil, mechanical and electrical contractors). This provides a convenient base against which submitted programmes may be compared to identify areas of unrealistic time scales and sequence of construction.

A tenderer will, however, be permitted to depart in part, or totally, from the standard if his methods of work and resourcing so dictate.

The programmes are evaluated using certain criteria including:

- compliance with specified stage completion dates
- unrealistic sequence of construction
- agreement of total tendered times with progress rates tendered (e.g. for underground excavation)
- agreement with times tendered for fixed and time-related cost in the P&G schedule
- reasonable allocation of float time.

Some tenderers are reluctant to indicate float time and therefore indicate all activities as being on the critical path. This practice must be prevented for a realistic evaluation of the programme. It is the author's opinion that the tenderer should be advised in the tender documents that any float indicated will be available for use by the tenderer and he will not be penalised for not complying with his originally tendered time period, unless this period is or becomes critical, i.e. the tenderer "owns" the float.

5.4.5 Tabulation of Information

During the evaluation phase the development of a number of relevant charts is recommended to assist in comparison of technical information.

The project is divided into identifiable sections of the Works, e.g. inlet structure, tunnel, dam wali, etc, to simplify the evaluation.

Relevant information is recorded for each section of the Works on an A0 sheet which is divided into columns to reflect initially the description of the item and thereafter one column for each tender being evaluated. The tabulated information is then readily compared.

At the bottom of each column the section is given an overall evaluation symbol in the form of:

- X unacceptable aspects
- O acceptable
- good

These evaluation symbols are carried forward to a summary of the sections of the Works.

Although this chart represents a subjective evaluation it nevertheless gives an overall impression of the suitability of the tender from a technical viewpoint.

5.5 VALUE JUDGEMENT OF TENDERERS

There are some aspects of a tenderer/contractor which cannot be evaluated in financial or technical terms. They are value judgements but comments which will assist the client in making his final choice. They include:

5.5.1 Attitude Towards Submission of Claims

There are many reasons for the submission of claims on site and it is important that they be placed in perspective before tarnishing a contractor's name with a "claim oriented" brush. Some reasons are:

- legitimate claims in terms of the contract documents
- poorly prepared contract documents, i.e. full of loopholes
- unreasonableness on the part of the engineer's or contractor's representative, or both
- contractor's management policy.

It is the last reason to which clients quite rightly object and this approach can usually be fairly accurately assessed from past experience with the particular contractor.

In amplification of the clients' concern, Smit⁽¹⁾ reports that the Economic Development Committee for the British Civil Engineering Industry recommended to the Ministry of Transport that:

"..... when they consider a contractor's suitability for further contracts, to regard an irresponsible attitude towards the submission of claims as a factor to be taken into account."

5.5.2 The Quality of the Tender Submitted

This is a general assessment of each tender document submitted. Aspects to comment on include⁽¹²⁾:

- the apparent degree of interest and care taken by the tenderer in the preparation and presentation of his document and supplementary information requested by the client
- the apparent appreciation, or lack thereof, that the tenderer appears to have for the complexity of the project.

5.6 OVERALL FINANCIAL EVALUATION

From the foregoing it is possible to indicate quantitatively when a contractor will be operating in a profit or loss situation on the individual sections of the Works. While it is recognised that in some cases these amounts will be compensating, contractors are unlikely to accept a loss situation at any time. It must therefore be appreciated that the risk of claims, a drop in standard of workmanship and a reduction in progress, increases dramatically in sections where a loss potential exists.

The financial evaluation can be reflected in tabular form by listing the potential profit and loss amounts due to each tenderer. The arithmetic totals, of the profit and loss amounts, which yield negative amounts are added to the tender sum as this represents the amount that the contractor will have to receive via outside loans or claims to ensure that the total contract at least breaks even.

Figure 5.7 reflects the format of a typical overall financial evaluation.

Other amounts added to the tender sum are:

- quantifiable technical aspects, e.g. under-resourcing as discussed in clause 5.4.2
- additional funding on under-resourced amount
- CPA allowance
- loss of CPA due to under-recovery
- effect of Dayworks
- effect of qualifications
- cost of anticipated delay to the contract if tenderer awarded the contract.

A summation of all these amounts will give the effective final total evaluated amount. If there is a significant time variance in the contract period, the net present value should be calculated to assess any change in the evaluated ranking.

COMPARISON OF TENDERED ACTIVITY COST WITH BASE COST											
ITEM DESCRIPTION	QUANTITIES M ³	BASE COST (R1000 UNITS)	TENDER 1		TENDER 2		TENDER 3		TENDER 4		
			+	-	+	-	+	-	+	-	
1. <u>OUTLET STRUCTURE</u>											
EXCAVATION	65 000.	975.	40.	-	80.		75.				20.
CONCRETE (INCL.FORMWORK, REINFORCEMENT)	25 000.	1 750.		30.	125.		80				30.
OVERBREAK (NO ADDITIONAL PAYMENT)	(1 000)	(70)		70.		70.		70.			70.
SUB-TOTAL	-			60.	135.		85				120.
2. <u>TUNNEL</u>											
EXCAVATION (INCL.SUPPORT)	15 000.	900.		120.	210.		320.			40.	
CONCRETE LINING (INCL.FORMWORK, REINFORCEMENT)	8 000.	720.		80.	170.		375.				130.
OVERBREAK (NO ADDITIONAL PAYMENT)	(500)	(45)		45.		45.		45.			45.
SUB-TOTAL				245.	335.		650.				135.
3. <u>P & G ITEMS</u> (THOSE NOT INCL. IN 1 OR 2)	-	3 500.		220.	1 040.		820.				55.
4. <u>UNDER-RESOURCING</u> (% OF TOTAL P & G)	-	-	-	120.	-	-	-	-	-	-	1 080.
5. <u>COMPARISON WITH BASE COST</u> (Σ 1,2,3,4)	-	-	-	645.	1 510.	-	1 555.	-	-	-	1 390.
EVALUATED TENDER PRICE											
6. TENDER SUM				7 250.	8 240.		8 960.				8 870.
7. CPA ALLOWANCE				240	310.		340.				270.
8. DAYWORKS				820.	625.		650.				725.
9. QUALIFICATION EFFECT				5.	-		24.				-
10. CORRECTED TENDER SUM (Σ 6,7,8,9)											
5. ADDITIONAL FUNDING REQUIRED				645.	-		-				1 390.
11. INTEREST ON FUNDED CAPITAL	10%			65.	-		-				139
12. LOSS OF CPA ON FUNDED CAPITAL	25% OF(Σ 5,11)			178	-		-				382
13. COST OF LOSS SITUATION (Σ 5,11,12)				888	-		-				1 911
14. EVALUATION PRICE (Σ 10,11)				9 203	9 175.		9 974				9 776.

FIGURE 5.7

If it so happens that the lowest two or three tenders have similar evaluated totals, an assessment should be made as to whether the contractor will be working in a potential profit or loss situation. For reasons discussed above, the former situation is preferable.

From Figure 5.7 it can be seen that the ranking according to the submitted tender sum was (1st = lowest, 4th = highest):

1st	Tender No. 4
2nd	Tender No. 1
3rd	Tender No. 2
4th	Tender No. 3

but the overall financial evaluation yielded a ranking of:

1st	Tender No. 2
2nd	Tender No. 1
3rd	Tender No. 4
4th	Tender No. 3

From the above, tender 2 should be awarded the contract. This would seem realistic especially as tenders 1 and 4 would not have gained the confidence of the evaluation team with the low tendered rates and under-resourcing.

Before the contract could be awarded to tender 2 any concern with respect to non-quantifiable technical aspects or value judgements would have to be clarified/negotiated with the potential tenderer.

CHAPTER 6

CONCLUSIONS

1. For large contracts, most of which are funded by governmental and semi-governmental organisations, there is a need for an in-depth evaluation of tenders to ensure that client, and indirectly the public, get the best value for their money.
2. A contract should not necessarily be awarded to the lowest prequalified tender submitted. On the contrary, prequalification should play no part in the evaluation of tenders. Each tender should be considered as an entity on its own and evaluated in terms of the objectives of the client.
3. In order to evaluate a tender in more detail, certain pertinent questions must be asked in the tender document prepared by the consultant. The suggested financial and technical questions listed will provide the evaluation team with a sound basis for evaluating the tenders.
4. The introduction of a method-related approach of pricing a tender, which is allied to the actual cost structure of a contract, will benefit the following:
 - the tenderer in the pricing of his tender
 - the client in evaluating the tenders
 - the client and contractor in a realistic assessment of costs due to the contractor on-site.

5. It is important that an appropriate procedure for evaluating tenders is established in advance to ensure that subsequent evaluation leads to a well balanced judgement and timeous recommendations to the client.
6. The diagrammatic charts proposed are useful in imparting the maximum amount of relevant information to a client, who will usually have minimum knowledge of the contents of the tenders, in support of the recommendations made.
7. The risk of on-site claims will increase dramatically on sections of a contract where a potential financial loss situation exists. The methods proposed for evaluating the financial and technical information by quantifying those activities which will be operating in potential profit or loss situations provide a realistic basis for assessing the true value of the tender to the client.

CHAPTER 7

RECOMMENDATIONS

It is recommended that:

- serious attention is given by clients and consultants to drawing up tender documents with a view to evaluating tenders in more detail;
- a method-related approach to pricing a tender be adopted wherever possible in the schedule of quantities to assist tenderers, consultants and clients alike in the tender preparation, tender evaluation and contractual phases of a project;
- the fact that a tenderer has been prequalified or invited to tender should have no influence during the evaluation of tenders, i.e. the lowest tender submitted should not necessarily be awarded the contract;
- a detailed financial and technical evaluation of tenders, similar to that described, be adopted for all large projects to ensure that the contract is awarded to the tenderer who will provide the best quality of materials and workmanship in the shortest construction period with the best overall value to the client.

APPENDIX A

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PRELIMINARY AND GENERAL		FIXED COSTS					TIME-RELATED COSTS				
ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT		QUANTITY	UNIT	RATE	AMOUNT	
					R	C				R	C
	<u>PLANT ITEMS</u> (continued)										
440	Underground concrete transport and placing installations including pumps, piping, ancillary equipment, etc. to: (a) Tunnel (Value : R) (Time required : weeks)		Sum					Sum			
450	Non-mobile cranes and ancillary equipment, etc. to: (a) Outlet structure (Value : R) (Time required : weeks)		Sum					Sum			
460	Sliding formwork and ancillary equipment, etc. to: (a) Outlet structure (Value : R) (Time required : weeks)		Sum					Sum			
470	Formwork and ancillary equipment to underground concrete lining to: (a) Tunnel (Value : R) (Time required : weeks)		Sum					Sum			

PRELIMINARY AND GENERAL		FIXED COSTS					TIME-RELATED COSTS				
ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	AMOUNT		QUANTITY	UNIT	RATE	AMOUNT	
					R	C				R	C
	<u>PLANT ITEMS (continued)</u>										
	<u>General item for value-related costs</u>										
500	Items of plant, equipment and other facilities standing idle on instruction of the engineer pending further use, per R10 000-00 value of such items and facilities so idle.						200	Value-days			
CARRIED FORWARD TO SUMMARY OF SCHEDULES ON PAGE											