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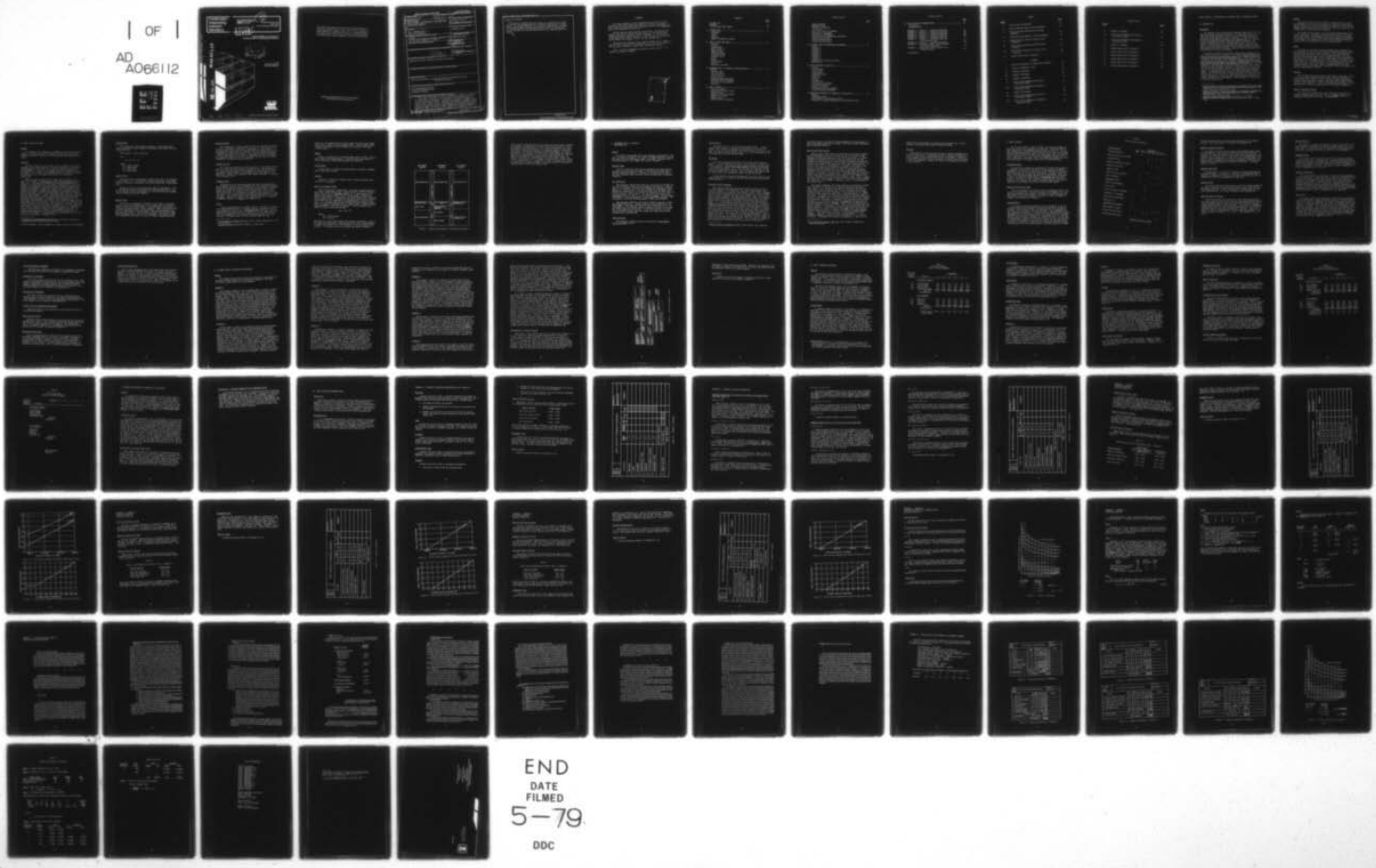

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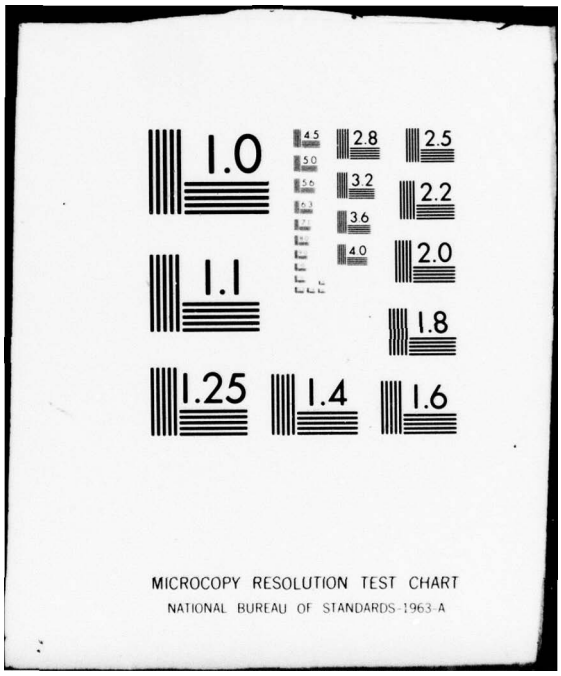
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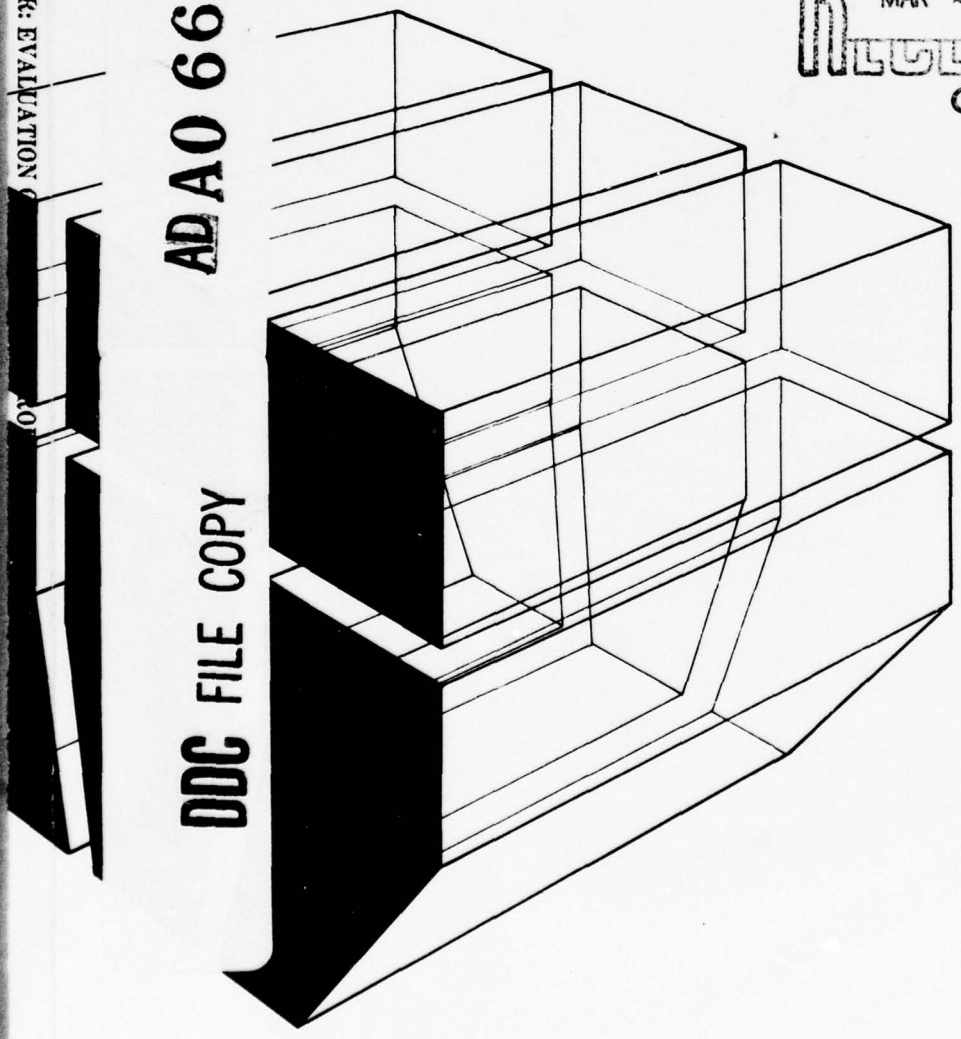
INTERIM REPORT P-99
March 1979
Profit Determination Procedures

LEVEL II

PROFIT PRIMER: EVALUATION OF ALTERNATE PROFIT DETERMINATION MODELS

by
John M. Deponai III
Rahim Ilker Adiguzel



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IR P-99 PROFIT PRIMER: EVALUATION

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This report evaluates six profit determination models as candidates for selection as the official profit determination procedure for the U.S. Army Corps of Engineers. In addition, it provides a summary of current profit theory; profit regulatory requirements; Government profit policy; and 19 profit factors, including the four major categories which comprise the weighted guideline (WGL) method of the Defense Acquisition Regulation (DAR). Of the six profit determination models considered, one will be selected for further development and calibration.

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Block 20 continued.

This report documents the first phase of a study which will (1) define "fair and reasonable" profit on construction contracts, change orders, and architect-engineer (A-E) contracts, (2) provide a procedure for computing a "fair and reasonable" profit objective on Corps contracts, and (3) facilitate the implementation of a selected profit procedure.

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FOREWORD

This report summarizes research conducted during FY78 for the Directorate of Military Construction, Office of the Chief of Engineers (OCE), under Intra-Army Order for Reimbursible Services Number MCC-E-78-02, "Profit Determination Procedures."

The OCE technical monitor was Mr. Frank Parker. The work was performed by the Facility Systems Division (FS), U.S. Army Construction Engineering Research Laboratory (CERL), Champaign, IL. The Principal Investigator was Mr. John M. Deponai III, and the Associate Investigator was Mr. Rahim Ilker Adiguzel. Mr. E. A. Lotz is Chief of FS.

Appreciation is expressed to Mr. James H. Johnson for his comprehensive initial research on the subject of profit, and to Mr. Foad Farid for his ideas on how best to apply cash flow analysis concepts.

COL J. E. Hays is Commander and Director of CERL, and Dr. L. R. Shaffer is Technical Director.

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PROFIT PRIMER: AN EVALUATION OF ALTERNATE PROFIT DETERMINATION MODELS

1 INTRODUCTION

Background

On 1 October 1976, the Department of Defense (DOD) Profit '76 Study Team made sweeping changes to Armed Services Procurement Regulation (ASPR) procedures for determining profit on negotiated Government contracts and to the DOD profit policy in general. In that same month, the Office of the Chief of Engineers (OCE) requested the U.S. Army Construction Engineering Research Laboratory (CERL) to develop a procedure for determining a "fair and reasonable" profit on Corps contracts. Although construction contracts and architect-engineer (A-E) contracts are specifically exempted from the ASPR* weighted guidelines (WGL) method for determining profit, they are subject to the ASPR profit policy and to the spirit of the ASPR.

Presently, guidance for the profit determination procedures to be used for A-E contracts is included in the Corps Architect-Engineer Contracting Procedures and Negotiations Guide FY78.[1] Another method which is used for A-E contracts is the descending profit curve technique, described in Engineer Manual (EM) 1110-345-30, Negotiation Manual -- Uniform Standards for Employment and Payment of A-E Services.[2] This EM was published in September 1952 by the Department of the Army (DA). DOD implementation was rescinded in June 1972 by DOD Directive 72-12 because the cost estimating methods presented in the manual were, by that time, in conflict with the ASPR. Parts of that same manual are referenced, however, in paragraph 18-306.2 (a) of the Army Procurement Procedure (APP).[3] The DA APP Board will not permit the Corps to remove EM 1110-345-30 from the list of official Corps publications until the Corps publishes a document to replace the profit determination procedures presented in that manual. Development of such a document is a major goal of the CERL profit study.

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1 Architect-Engineer Contracting Procedures and Negotiations Guide FY78 (Department of the Army [DA], Office of the Chief of Engineers, Directorate of Military Construction, 1978).

2 Negotiation Manual -- Uniform Standards for Employment and Payment of A-E Services EM 1110-345-30 (DA); Department of Defense [DOD] Directive 72-12 (DOD, June 1972).

3 Army Procurement Procedure (APP) (Department of the Army).

* ASPR was retitled the Defense Acquisition Regulation (DAR) in March 1978.

Purpose

The overall objective of this study is to define what is a "fair and reasonable" profit on Corps construction contracts, change orders, and A-E contracts; to develop a procedure for computing a "fair and reasonable" profit objective on Corps contracts; and to facilitate the implementation of a selected profit procedure.

The purpose of this report is to provide Corps managers with (1) a source of pertinent information concerning profit theory, profit regulatory requirements, and Government profit policy; and (2) to present and evaluate a wide range of profit determination models from which one or more models can be selected as official Corps procedures for determining a "fair and reasonable" profit on Corps contracts.

Scope

This report is designed to provide managers with information on which to base a decision as to which profit determination method should be adopted for use by the Corps of Engineers. Some consideration is given to model calibration, but only in a general sense. The "fine tuning" of the selected model will be accomplished in the next phase of the study and will be based, in part, on the results of a study to determine what is a "reasonable" profit in the construction and A-E industries and, in part, on the results of a limited field test of the selected procedure. Thus, this report is concerned mainly with the structure of the profit model, with the general format of the model, and with the theory behind the model.

Approach

The following approach was used in this phase of the study. First, a variety of profit factors were developed as the building blocks of profit determination models. Then, a variety of models (Appendices A through G) were developed to present traditional and new ways of determining a profit objective. Finally, the models were evaluated as to the usefulness of the profit factors used and of the overall procedure.

Mode of Technology Transfer

The final profit procedure will be transferred to the field as a change to Engineer Regulation (ER) 1180-1-1, Engineer Contract Instructions (Department of the Army, 1 December 1969).

2 PROFIT THEORY AND TERMS

General

This chapter is not intended as a defense of any particular profit theory. It attempts to provide conceptual clarity of certain profit considerations and a common set of definitions for use throughout the study.

Principle

The basic principle of this study is that a contractor should be rewarded for his* participation in a project according to the amount of his investment in the project and according to how much risk the investment entails. Focus is on the asset side of the contractor's balance sheet. This study is not concerned with how a contractor finances his operation, i.e., the composition or cost of a contractor's liabilities.

There are basically two types of assets that a contractor can invest in a project -- current assets (funds) and fixed assets (equipment, etc.). The amount of current-asset investment required for a project is a direct function of the project characteristics and of the contractual arrangements. The current-asset investment required for a project is essentially independent of the level of investment of contractor fixed assets. Suppose, for example, that one contractor bids a job with the intent of using rented equipment, and another contractor bids an equivalent sum on a job of equivalent scope, with the intent of using his own equipment. Further assume that both contractors apply the same use-rate system, such as the Associated General Contractors AGC Equipment Expense Schedule,[4] to determine their equipment costs. In both cases, the contractors need funds to pay for both the equipment and nonequipment costs of the project. On the one hand, the contractor pays a rental charge; on the other hand, the contractor, in effect, pays the same charge to himself to pay off an equipment loan, etc. Regardless of the level of fixed-asset investment, each contractor still needs to invest current assets in order to use the equipment on the job. This current-asset investment of funds is separate from the decision to invest in fixed assets. This hypothesis is very important, and its significance is discussed in Chapters 3 and 7.

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[4] Contractor's Equipment Ownership Expense, Sixth Edition (Associated General Contractors [AGC] of America, 1966).

* The male pronoun is used throughout this report to refer to both genders.

Balance Sheet

This study uses, for discussion purposes, a simplified balance sheet consisting of current assets, fixed assets, total debt, and total equity such that:

Total Assets = Total Liabilities

(or)

$$CA + FA = TD + TE$$

where
CA = current assets
FA = fixed assets
TD = total debt
TE = total equity.

Model Criteria

One criterion of a profit model is that it be "fair." For purposes of this report, "fair" is defined as producing equivalent results when applied to projects of equivalent risk, and as being free of unwarranted bias.

Another criterion is that the project model be "reasonable." This is interpreted to mean that the model will yield sensible results that are not extreme and that are generally in line with historical averages for the construction and A-E industry.

Wages of Risk

How much is a contractor's investment of his assets in a project worth? To make this determination, it is assumed that a contractor's annual rate of return should equal at least the opportunity offered by risk-free investments over a similar timespan. Then, a premium for risk should be added which varies according to the risk characteristics of the particular project. For this study, required rate of return (RRR) means the annual rate of return on an investment. For example, an RRR of 27 percent is equivalent to a rate of 2 percent compounded monthly.

Risk-Free Return

U.S. Treasury bill interest rates for bills of appropriate duration -- 3, 6, or 12 months -- are used in this study as a valid measure of risk-free annual rate of return for investments of current assets. For investments of fixed assets, the interest rate for a Government bond of a duration equivalent to the useful life of the fixed asset (equipment) is used as the annual rate of return. Government securities are generally accepted as being a risk-free investment and the rates are updated frequently in response to market conditions.

Premium for Risk

This annual rate should vary from 0 percent to some maximum percent which is a function of the industry characteristics. The determination of a practical upper bound for this premium for the construction industry and for the A-E industry is the subject of the next phase of the CERL study. However, for purposes of this report, 40 percent is assumed to be the upper limit.

Allowable Costs

Allowable costs are those which meet DAR tests of reasonableness and allocability, which are in consonance with the standards promulgated by the Cost Accounting Standards (CAS) Board (as applicable), and which conform to the specific limitations for exclusions set forth in DAR (ASPR) Section XV. For purposes of this report only, Costs of Facilities Capital (CFC) are specifically excluded from the category of allowable costs. This report considers the function served by CFC to be part of profit. However, this report also recognizes that CFC, as computed according to CAS 414,[5] is legally an allowable cost.

Profit

There are many opinions as to what "profit" is and what it results from. DAR (ASPR) Manual No. 1, Contract Pricing, characterizes profit as "the wages of risk," or the "...monetary excess realized...after the deduction of costs (both direct and indirect...)"[6] This definition of profit was adopted for this study with the understanding that "costs" include all "allowable costs" by DAR standards except CFC (See

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[5] Cost Accounting Standard (CAS) 414, Code of Federal Regulations, Title 4, Part 414.3.

[6] Contract Pricing, ASPR Manual, ASPM No. 1 (DOD, 1975).

Figure 1). An approximation of "profit" would thus be net job income before taxes, interest, and unallowable costs. In this report, profit is used in the sense of "profit objective" or "going in" (to negotiation) profit.

Markup

Markup is defined as the recording method used to relate a certain profit amount to allowable costs. It does not imply that there is a direct cause-effect relationship between cost and profit.

Profit Margin

Profit margin is "profit" (as defined above) divided by allowable costs (direct and indirect).

Turnover

Turnover is defined as allowable costs divided by average assets invested in the project.

Return on Investment (ROI)

There are many ways to define ROI. A variety of return measures -- net income, income before taxes, income after taxes, etc. -- can be related to a variety of investment measures, i.e., total assets, total equity, owner's equity, etc. For this study, return is defined as "profit" (see above) or, essentially, net income before taxes, interest, and unallowable costs. Investment is defined as the level of current or fixed assets that are committed to the performance of a specific contract. It is assumed that the level of monthly contract costs approximates the required investment level of current assets. Return on fixed-asset investments is discussed in Chapter 7. ROI is defined as the product of profit margin and turnover:

$$ROI = PM \times T/O$$

where

PM = profit margin
T/O = turnover

Note that for a given profit margin (for example, 10 percent), an ROI of 10 percent can be achieved if the turnover is 1.0; but if the turnover is higher (for example, 2.0), then the ROI will rise accordingly to 20 percent. To increase his ROI, a contractor may either increase his

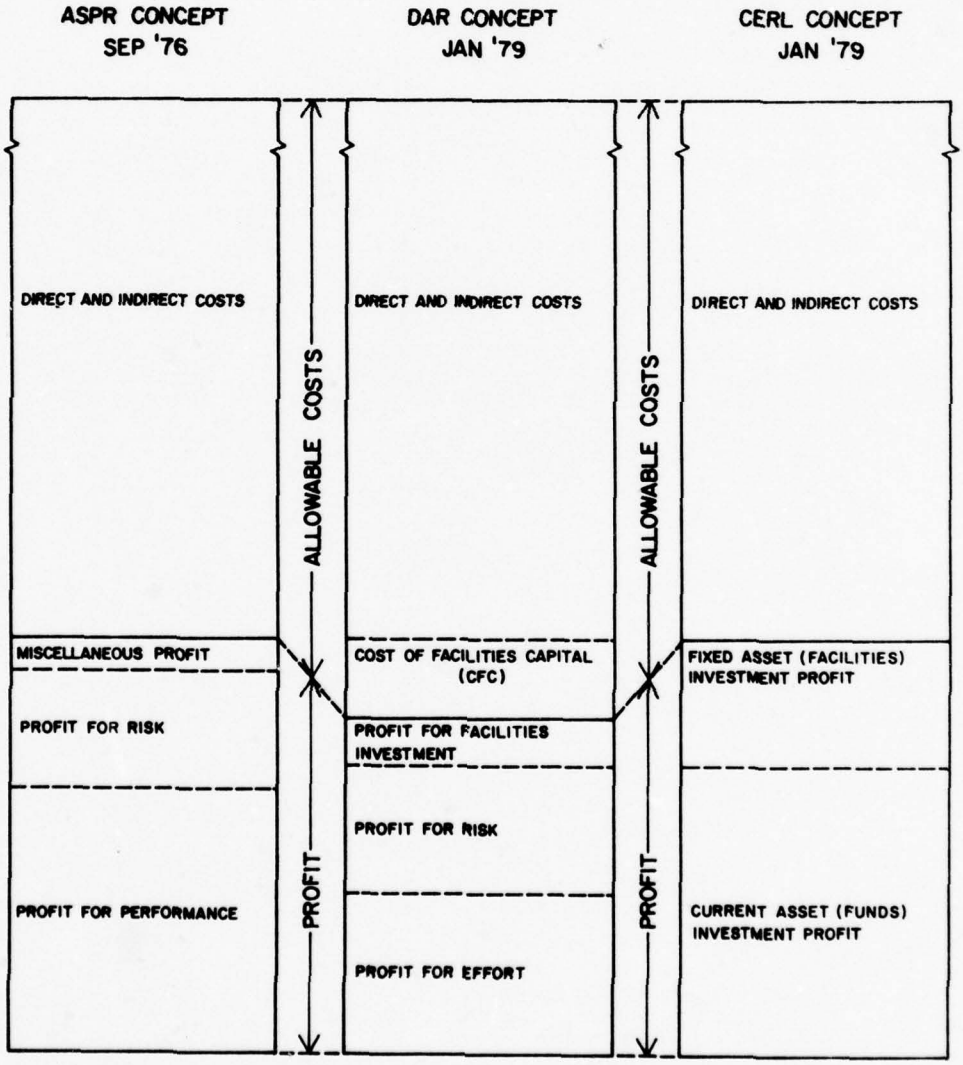

Figure 1. Relative relationship of three profit concepts.

profit margin or decrease the relative amount of current assets invested in a project. Assuming that the range of anticipated profit is fairly constrained (and traditionally, it is), then the contractor must focus his efforts on reducing the amount of investment needed to achieve the same output. He does this by shrewd cash-flow management: by "front loading" his cost schedule, by insisting on prompt payment for completed work, and by bargaining for a more favorable retainage policy. The effect is to reduce the average amount of current assets (funds) invested in the project. This increases the contractor's turnover, which in turn increases his ROI. Conversely, a delay in payment will increase the contractor's average investment, which will lower the contractor's turnover, which in turn will lower his ROI.

3 GOVERNMENT POLICY, PRINCIPLE, AND REGULATION

General

The effect of Government policy and regulatory requirements on the profit procedures proposed in this report is addressed below in the general order that the requirements appear in the DAR. Pertinent parts of the DAR discussed in this chapter are listed in Appendix H.

Contract Types

The Firm Fixed-Price (FFP) contract dominates the Corps construction and A-E contracting environment. FFP contracts are described in the DAR, paragraph 3-404.2(a). The DAR also provides for the use of Cost Plus Fixed Fee (CPFF) contracts, which are described in paragraph 3-405.6(a).

Fee Limitations

DAR paragraph 3-405.6(c)(2) limits the fee portion of the CPFF contracts to 10 percent of the estimated costs of the contract. However, fees up to 15 percent of the costs are allowed for experimental, developmental, or research work. The same paragraph also introduces the 6 percent fee limitation on A-E services for the design of public works or utility projects. The A-E fee in this case refers to the total fee inclusive of the A-E's cost (i.e., the contract price). The limitation is 6 percent of the estimated cost of the project being designed. This limitation is clarified in DAR paragraphs 18-306.2 and 18-306.3.

DAR paragraph 3-808.2(d) specifically prohibits fees that violate DAR-imposed limitations -- whether computed using the DAR-WGL or any other method. Thus, whatever method is used to determine a "fair and reasonable" fee, the fee must always be checked to insure that it does not violate these fee limitations. If the calculated fee is greater than the maximum allowed, then the maximum fee allowed must be used instead of the calculated fee.

Profit Ceilings

DAR paragraph 3-808.2(d) specifically prohibits local administrative ceilings on profit.

Profit Policy

DOD profit policy is stated in DAR paragraph 3-808.1. In developing a profit objective, due weight must be given to each of the effort, risk, facility investment, and special factors set forth in the DAR. The policy provides that the level of facility investment will be recognized when using the DAR-WGL method.

WGL Method

This profit determination method is described in DAR paragraph 3-808.2. For the purpose of this report, the term WGL, as used in the DAR, is defined as the specific profit formula presented and explained in DAR paragraph 3-808.4. This report does not interpret the term WGL to be used in the generic sense. This distinction is important to the correct interpretation of the DAR. Thus, alternate profit methods that use other profit factor weighting schemes are not WGL methods.

The WGL method is basically designed for use on the relatively few large contracts which account for the greatest percentage (dollar-wise) of DOD contracts.

Alternate Profit Procedures

DAR paragraph 3-808.2(b) provides the authority for the Corps to use profit determination procedures other than the WGL method. Such alternate methods, as a minimum, must consider a profit factor breakdown and must provide documentation of the profit objective. Profit factors such as capital investment will not be considered if they are not applicable to the procurement. For the purpose of this report, the sentence, "Where methods other than the weighted guidelines are used, the profit objective will be reduced by the amount of facilities capital cost of money...",[7] is interpreted to mean that such costs will be subtracted directly and in toto from the basic profit objective (BPO), as computed using an authorized alternate profit method. (The WGL method also provides for such a reduction on a statistical basis by using a 0.7 adjustment factor applied to the results of the contractor effort evaluation.) The inference here seems to be that it may not be worth the effort to compute the cost of facilities capital unless the WGL method is used to compute the profit. The concept is that reasonable interest on debt required to do business is recovered by the contractor from that amount of revenue that the Government calls profit. Thus, if special allowance is made separately for interest-related factors such as the cost of

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[7] Defense Acquisition Regulation (DOD, 8 March 1978), para 3-808.2(b).

facilities capital, such amounts should be deducted from that amount of profit that would ordinarily be granted if the cost of facilities capital was not computed separately.

Cost of Facilities Capital

DAR paragraph 3-1300 presents the DOD policy concerning allowable costs to help defray the costs of money for facilities capital; DAR paragraph 15-205.50 defines the cost of facilities capital. A complex procedure is defined by CAS 414 to establish criteria for the measurement and allocation of the costs of capital committed to establish criteria for the measurement and allocation of the costs of capital committed to facilities.[8] The procedure is also used to determine the value of facilities capital employed on a project. The intent of the policy is to encourage contractors to make facilities capital investments that will achieve cost reductions in subsequent Government contracts. The focus of the policy is on both the asset and liability sides of the contractor's balance sheet. The method does not provide an effective way for the Government to be selective in the reward of the facility investments that the contractor elects to make. Thus, a shrewd contractor could invest first in those facilities that achieve the least cost reduction, since the BPO is computed, in part, as a percentage of the project costs.

This report recommends that reward (profit) for contractor current-asset investment in the project be computed separately from that of fixed assets. This approach allows one to be selective, not only in which fixed assets are rewarded, but also in the amount of the reward allowed on each fixed-asset investment. Thus, one may elect to reward only those fixed-asset investments that contribute directly to job productivity. For example, in a construction contract one could reward investment in equipment and in construction plant, but elect not to reward the contractor's investment in overhead facilities such as office space. The cost of all facilities used would be reimbursed, but only the selected investments would be rewarded. There is an infinite variety of ways the problem of computing a "fair" return can be attacked given this general approach. The approach also has the advantage of being far less complex because it focuses entirely on the asset side of the balance sheet and does not have to circumvent the conflict with DAR paragraph 15-205.17, which states that "interest on borrowings (however represented)..., and costs relating thereto, are unallowable..." The difference, however, is more than one of perspective -- it is one of principle. To recognize the approach as acceptable, it must first be

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[8] Cost Accounting Standard (CAS) 414, Code of Federal Regulations, Title 4, Part 414.3

agreed that the investments in current and fixed assets are, in truth, separable investments which deserve separable rewards.

Use Rates

DAR paragraph 15-107 authorizes the use of "advance agreements" on particular cost items. DAR paragraph 15-402.1 discusses the application of this authorization to construction plant and equipment. (Construction equipment use rates could be designed to include in the rate itself a "fair and reasonable" allowance for return on the depreciation portion of the use rate.)

4 PROFIT FACTORS

The 19 profit factors listed in Table 1 are the basic elements of which the various profit proposals are comprised. The factors used in each proposal and in the DAR-WGL method are noted in Table 1. The factors are grouped according to their similarity to the four major categories of profit factors that comprise the WGL method; that is, contractor effort, contractor cost risk, facilities investment, and special factors. Additionally, two other factors are added which address the issue of minimum return. The scope of each factor is discussed below.

Contractor Effort

This WGL factor rewards the contractor on the basis of how much he is expected to contribute to the overall effort required for project completion. The job is evaluated by cost item. The more difficult the work represented by the cost item, the greater the reward. While the focus is on the type of effort required for job completion, the factor is really a reflection of the amount of performance risk the project entails. The factor is used in Proposal A, but the cost items used in Proposal A are different from those in the WGL method and are more appropriate to the construction and A-E contracting environment.

Relative Difficulty of Work

This factor rewards the contractor for his performance risks on the basis of the complexity of the job; the amount of knowledge, skill, and experience required; the firmness of the plans and specifications; and the possibility of future changes. The factor is used in Proposals B through F (see Appendices B through F).

Subcontracting

This factor rewards the contractor for his assumption of risk in inverse proportion to the amount of subcontracting used to accomplish the work. The rationale is that the more work that is subcontracted, the less direct risk there is to the contractor. The Government's ultimate negotiation objective is to obtain timely performance at the lowest reasonable price. With subcontracting, this objective is best achieved when the prime contract is awarded on a competitive basis. In the case of change orders, however, the contractor usually has far less incentive to minimize the subcontract costs than he would if he were bidding competitively for the work. Since the cost of subcontracted work already includes the profit of the subcontractor, less profit should be allowed

Table 1

Profit Factor Distribution

Profit Factors	WGL*	Proposal A	B	C	D	E	F
Contractor Effort	x	x					
Relative Difficulty of Work			x	x	x	x	x
Subcontracting			x				
Degree of Contractor Effort				x	x	x	
Contract Cost Risk	x						
Degree of Risk			x				
Type & Terms of Contract		x					
Type of Contract			x	x	x		
Management Risks							x
Period of Performance		x		x	x	x	
Size of Job			x				
Facility Capital Investment			x				x
Contractor's Investment	x						
Assistance by Government			x				
Productivity			x				
Independent Development	x						
Other Special Factors	x						
Constant Minimum Return	x	x	x	x	x	x	x
Variable Minimum Return			x	x			
	x	x				x	x

*Weighted guideline method

to the prime contractor on such work than on work that is not subcontracted. This factor appears in Proposal B (see Appendix B).

Degree of Contractor Effort

This factor is essentially the same as the preceding factor except that the emphasis is on the positive contribution of the prime contractor; i.e., what the contractor does versus what he does not do. The rationale for using the factor is the same as for subcontracting. This factor is used in Proposals C, D, and E, but only for change order situations, since in change order situations, the amount of the work to be subcontracted can be known fairly accurately beforehand. (See Appendices C, D, and E.)

Contract Cost Risks

This WGL factor is specifically limited to how much cost risk the contractor assumes. Evaluation is a function of the degree of cost responsibility assumed as indicated by the type of contract used, the reliability of costs, and the complexity of the task.

Degree of Risk

This factor rewards the contractor for the risks assumed because of the type of contract, the sufficiency and specificity of the contract, the working conditions, product responsibility, damage liability, and labor uncertainties. It is used in Proposal B only (Appendix B).

Type and Terms of Contract

This factor rewards the contractor for the risks associated with the type of contract; the clarity, quality, and completeness of the contract performance specifications; and the timing of the contract settlement (whether before or after the fact). This factor is intended to address only those risks associated with the content of the contractual instrument and not with actual performance of the work. Thus, the factor is similar to the degree of risk, but easier to evaluate. The factor is used in Proposals A, C, D, and E. (See Appendices A, C, D, and E.)

Type of Contract

This factor is peculiar to Proposal F, which is equivalent to the profit procedure described in EM 1110-345-30 (applicable to A-E contracts only). It addresses only the consideration of the type of contract used -- whether fixed price or cost plus. (See Appendix F.)

Management Risks

This factor rewards the contractor for the performance-related risks of the project. It addresses the risks associated with planning, scheduling, and control of project tasks including such aspects as duration of job, number of principal work tasks, "crash" requirements, and labor intensiveness of the job. The factor is used in Proposals A, C, D, and E (Appendices A, C, D, and E).

Period of Performance

This factor rewards the contractor, in part, for the performance risks of the project. Since long duration jobs entail forecasts of less accuracy than short duration jobs, the cost risk of the contractor is increased. One danger of considering this factor separate from the other performance risks is that the effect of meeting special performance requirements such as "crashing the schedule" may greatly alter the logic of the rationale behind this factor and may not be adequately compensated, especially if the algorithm (such as for Proposal B, Appendix B) applying this factor is deterministic, not subjective.

Size of Job

This factor rewards the contractor, in part, for the performance risks of the project. Bigger jobs enable contractors to cover more of their fixed costs and, therefore, the risks to do business overall are reduced. It might be argued that this factor is inherently unfair and arbitrary, since what is a large contract for one firm may be a small contract for another. Even if logical criteria are developed to define what large and small contracts are for an average size firm, the resulting algorithm would be fair only in the event all contractors were average size. And it would require that the definition of large and small be, theoretically, updated each year to account for inflation. (See Proposals B and F, Appendices B and F.)

Facilities Capital Investment

This WGL factor rewards the contractor for the degree of investment risk associated with the facilities needed to accomplish the work.

Contractor's Investment

This factor rewards the contractor for his investment risks. Such aspects as the amount of subcontracting, mobilization payment items, the amount of Government-furnished property, and the method of making progress payments are considered when evaluating this aspect of risk. The factor appears only in Proposal B (see Appendix B).

Assistance by Government

This factor rewards the contractor for his investment and performance risks in inverse proportion to the amount of Government property, equipment, facilities, and assistance used by the contractor. The factor appears only in Proposal B (see Appendix B).

Productivity and Independent Development

These WGL factors are not applicable to the construction and A-E contracting environment.

Other Special Factors

These WGL factors provide rewards to the contractor for the following DAR profit factors: Small Business and Minority Business Enterprise Participation, Labor Surplus Area Participation, and Energy Conservation. A suggested procedure for accommodating these concerns as an add-on profit to the BPO is presented in Chapter 5.

Constant Minimum Return

This is a de facto profit factor that exists because of the computational algorithms peculiar to several of the profit procedures. It is significant because it provides, as part of the BPO, an automatic minimum profit for which specific justification is not required. Proposals B and C provide a 3 percent minimum profit for construction contracts and change orders, and a 7 percent minimum for A-E contracts.

Variable Minimum Return

This is also a de facto profit factor which results from the computational algorithms peculiar to several of the other profit procedures. It provides, as part of the BPO, an automatic minimum profit which varies according to some project, contractual, or other consideration. For example, in the WGL method and in Proposal A, the minimum profit varies according to the mix of cost items; in Proposal E, the m nimum return varies as the treasury bill rate; and in Proposal F, the m nimum return varies according to the size of the job.

5 ALTERNATE PROFIT DETERMINATION PROCEDURES

General

This chapter discusses the structure and concept of each profit determination proposal described in Appendices A through G. The major criticisms of each proposal are also presented.

Proposal A

This proposal presents a profit procedure that is similar in format to the WGL method of the DAR. Cost items different from those in the WGL have been defined as more appropriate to the construction/A-E environment. Also, the WGL risk factor has been replaced with two factors of equal weight -- one to address contractual risks and one to address performance risks. For a particular project, the cost of the respective cost item is multiplied by an appropriate percentage selected from the range applicable to that cost item. This determines the dollar profit amount for each cost item. Risk-factor percentages appropriate for the project are selected and are multiplied by the entire cost of the contract to determine the dollar profit attributable to cost risk. The dollar profits are summed and the equivalent markup is recorded as a percentage of total costs. However, this procedure requires that project costs be first broken out by cost item; for small contracts, this procedure might be unduly time consuming. Also, the variable minimum return inherent in this approach is a function of the project characteristics, and not of alternate market investment opportunities.

Proposal B

This proposal is based on the method by which the Corps currently determines profit objectives; however the consideration of special profit factors has been added. The method rates the degree of importance of each of seven profit factors by assigning an appropriate rate to each factor such that the sum of the rates is 100 percent. A weight is then selected for each factor and the products of the respective rates and weights are summed to give the BPO as a percentage of contract costs. Add-on profit for special factors is then included, if appropriate. For A-E contracts, a markup range of 7 to 15 percent (plus any add-on profit) is possible. For construction-related contracts, a range of 3 to 12 percent (plus any add-on profit) is possible. Thus, minimum returns of 3 and 7 percent are automatic. However, for construction-related contracts and A-E contracts, the profit factors Contractor's Investment and Assistance by Government seem to be of limited use (each is currently rated at only 5 percent). The profit factors

Size of Job and Period of Performance have limitations (discussed previously), and the factor Size of Job should be recalibrated every year. The element of "subcontracting" must be considered in three different profit factors -- Degree of Risk, Contractor's Investment, and Subcontracting. This method is somewhat unfair in that a higher range of profit is automatically assigned to A-E jobs than to construction jobs -- without any consideration of the particular job requirements -- and its constant minimum return allowance is not responsive to the changing opportunities presented by alternative investments.

Proposal C

This proposal is similar to Proposal B in both format and computational method. The major difference is that fewer and hopefully more meaningful profit factors are used. The profit factor Degree of Contractor Effort is used only for change order contracts. A profit range of 3 to 12 percent is retained for construction-type contracts, and a range of 7 to 15 percent is retained for A-E contracts. (The special factors portion is retained and is addressed in more detail later in this chapter.) The effort-oriented factors are assigned half the total rate; except in the case of change orders, the balance of the total rate is split evenly between the two risk factors. For change orders, more emphasis is given to contractual risk to provide more leverage for early settlement of changes. The difficulty with this proposal is that there still exists a built-in profit differential between construction-related jobs and A-E jobs, and that its constant minimum return is not responsive to alternative investment opportunities. There are certainly cases that justify a profit differential between construction-related jobs and A-E jobs, but the differential should result from the requirements of the particular job, not just from the fact that it is an A-E job.

Proposal D

Although this proposal is similar to Proposal C in format, the computational method is a simpler arithmetic variation of that used in Proposal C. The logic and relative weights of the profit factors are essentially the same as Proposal C's, but the rates for Proposal D are related to a different base, and the weighting scheme addresses the entire range of each allocated rate. In other words, Proposal D does not provide for an automatic minimum profit. The weighting spread of Proposal D is always from 0.0 to 1.0, whereas Proposal C's spread is from 0.03 to 0.12 for construction-type contracts, and from 0.07 to 0.15 for A-E contracts. Thus, Proposal D's BPO ranges from 0 to 12 percent for construction-related contracts and change orders, and from 0 to 15 percent for A-E contracts. Criticisms of this method are that A-E

contracts still have a slight built-in profit advantage and that the procedure is not responsive to the effect of alternate investment opportunities.

Proposal E

This proposal is similar to Proposal D in both format and computational method. However, the rate assignments have been altered so that the A-E contracts no longer have any built-in profit differential. The maximum markup attributable to the first four profit factors has been reduced and an additional profit factor, Variable Minimum Return, is included to measure the influence of alternate investment opportunities. The most current treasury bill rate for bills of duration similar to the project duration is suggested as a possible basis for estimating this opportunity. An attenuation factor must be applied to the treasury bill rate to adapt this rate to the markup approach. (The rationale for this is explained below in the discussion of Proposal G. In this report, the attenuation factor is tentatively set at 0.2. If this proposal is selected, the attenuation factor will be altered during the calibration phase of this study.) This method, however, requires that the treasury bill rates (or any such indicator) be monitored, and this may introduce an unacceptable level of complexity to the profit determination process.

Proposal F

This proposal is essentially the same as the method presented in EM 1110-345-30. Basically, the profit is graphically computed as a function of three variables: contract type, size of job, and level of difficulty. The difficulties with this method arise from the fact that the profit factor Size of Job is not a good indicator of risk and should be recalibrated every year; that A-E contracts are afforded an automatic profit differential (independent of consideration of relative project difficulty) over the profit ranges currently used for construction contracts; that the profits allowed on fixed price contracts may be too high in some cases; and that the variable minimum return is a function of the type of contract and not of the alternate market investment opportunities.

Proposal G

This proposal applies the concept of net present value (PV) to the cash-flow characteristics of a project to determine the amount of profit to be assigned. An annual RRR is first determined for the project by summing an appropriate risk-free return and a premium for risk, which is

a function of the particular risk characteristics of a project. This RRR is then assigned as the discount rate used to relate the estimated cash flows (costs and revenues) of a project to the present, i.e., the start of the project. An estimate is made of the cost and revenue schedules of the project based on the nature of the project, the payment policy, and the retainage policy. The amount of revenue is equated to the costs plus a markup for profit -- the markup that will be used is unknown at the beginning of the procedure. The PVs of costs and revenues are determined for the discount rate appropriate to the project. Then the PV of costs is set equal to the PV of revenues and the equation is solved for the unknown variable, the markup. Proposal G is presented as the most accurate way of determining a "fair and reasonable" profit. However, practically speaking, it is too cumbersome to be a serious candidate for selection as the Corps profit model. It is presented as a tool to calibrate the model selected by the Corps.

The diagram in Figure 2 shows how Proposal G relates to Proposal E. Research to date indicates that the annual rate of return on current asset investment represented by a markup of "m" percent may be equivalent to 4 to 6 times the markup value. For example, a markup of 10 percent in a labor-intensive contract may be equivalent to an annual rate of return of 40 to 60 percent on the contractor's financial investment in the project. For a given markup, the effective annual rate of return is a function of the amount of markup allowed, the payment policy, the retainage policy, the investment mix (current vs fixed assets) of the job, and the duration of the project. Thus, for a fixed payment and retainage policy, Proposal E may represent a good approximation of Proposal G for projects of similar duration and of similar investment characteristics. If this is true, it is possible to more easily compute what equivalent annual return on investment is represented by a particular markup of project costs. This would allow the formulation of a more logical rationale for the calibration of the profit model selected for Corps use, because the annual rates of return allowed on construction and A-E contracts can be compared to national average annual rates of return for industries of comparable risk.

Consideration of Special Factors

These special factors may be applicable to some Corps contracts; if so, the contractors should be allowed the opportunity to reap the "social reward" allowed by the DAR. If they are not applicable to a particular contract, the factors could be ignored (i.e., weighted as 0.0). It is recommended that 0 to 2 percent of the BPO amount be added as additional profit for those contractors who actively support the Government's small business and minority business enterprise subcontracting programs. An additional profit of 0 to 2 percent of the BPO might similarly be allowed to those contractors who actively support the

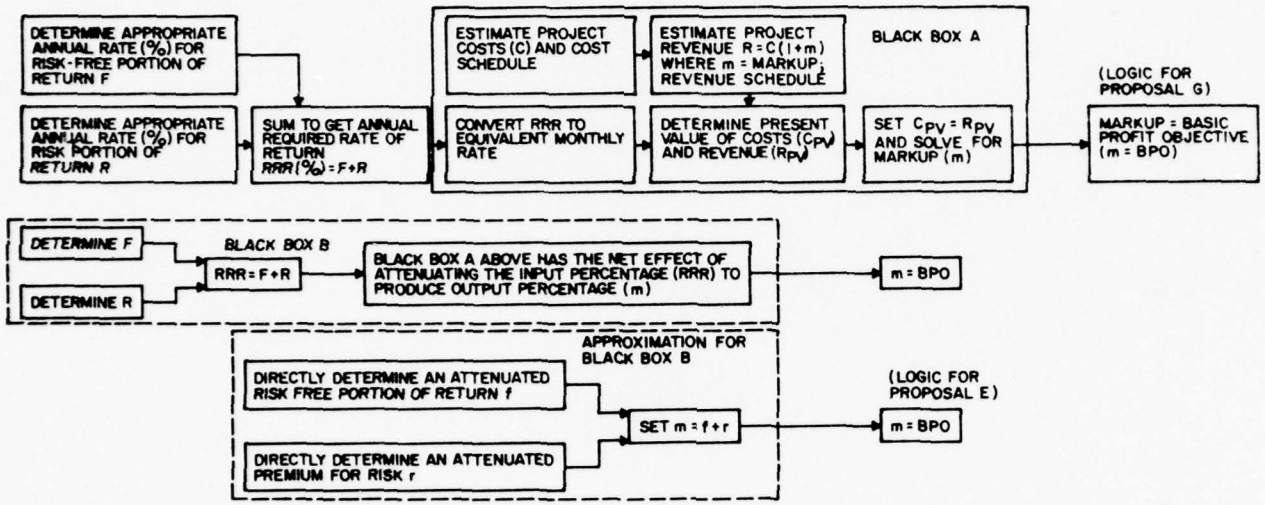


Figure 2. Logic for Proposals E and G.

Government's labor surplus area program. Finally, 0 to 1 percent of the BPO might be allowed as additional profit for those contractors who take extraordinary initiative to conserve energy.

Application

Examples of using each proposal to determine the BPO for a hypothetical A-E contract are presented in Appendix I.

6 PROFIT PROPOSAL EVALUATION

General

To evaluate the relative worth of Proposals A through F, each proposal is scored against the other proposals with respect to eight evaluation criteria. Four criteria pertain to the nature of the profit factors used -- inclusiveness, exclusiveness, significance, and comprehensiveness. Four criteria pertain to the nature of the procedure used -- simplicity, stability, fairness, and acceptability.*

The relative standing of each of the six proposals is rated on a scale of 1.0 to 6.0. The best model for each criterion is assigned a score of 6.0; the second-best model for each criterion is assigned a value of 5.0, and so on. At times, an average of the respective values is used. The model with the highest cumulative score for all criteria is ranked as the overall best model. The scope of each rating criterion and the rationale for assigning the relative scores to each model are discussed below for the case in which all criteria are weighted equally. These evaluations are summarized in Table 2.

Inclusiveness

To properly evaluate a proposal's inclusiveness, it is necessary to determine if the profit factors address both the risk-free portion of the reward and the premium for risk. Although all proposals provide a premium for risk, Proposal E is rated best because it is the only proposal that is designed to be, in part, a direct function of a risk-free opportunity investment measure. Proposal D is rated worst since it is the only proposal which does not provide for a risk-free return. While the other four proposals are not direct functions of alternate investment opportunity, they do provide some fixed or variable minimum return which can be construed as recognition that some minimum reward is appropriate. None of these four proposals is considered to be better than the others in this respect. Therefore, the sum of scores 2.0, 3.0, 4.0, and 5.0 was divided by 4.0 to obtain an average criterion score of 3.5 for each of these four proposals.

* Note that the criterion of "reasonableness" is not included. The "reasonableness" of a procedure cannot be determined until after the procedure is calibrated, and calibration will not be accomplished until the next phase of this profit study.

Table 2
Relative Ratings
(Equal Criterion Weights)

Criterion Relative Weight	Criteria	Proposals A	B	C	D	E	F
	For Profit Factors						
1.0	Inclusiveness	3.5	3.5	3.5	1.0	6.0	3.5
1.0	Exclusiveness	4.0	1.0	4.0	4.0	4.0	4.0
1.0	Significance	4.5	1.0	4.5	4.5	4.5	2.0
1.0	Comprehensiveness	4.5	2.0	4.5	4.5	4.5	1.0
	Subtotals (Average=14.0)	16.5	7.5	16.5	14.0	19.0	10.5
	For Procedure						
1.0	Simplicity	1.0	3.0	4.0	5.0	2.0	6.0
1.0	Stability	4.5	1.5	4.5	4.5	4.5	1.5
1.0	Fairness	5.5	1.5	3.0	4.0	5.5	1.5
1.0	Acceptability	1.5	3.0	4.0	5.5	1.5	5.5
	Subtotals (Average=14.0)	12.5	9.0	15.5	19.0	13.5	14.5
	Overall totals (Average=28.0)	29.0	16.5	32.0	33.0	32.5	25.0

Exclusiveness

To evaluate the exclusiveness of a proposal, it must be determined if the profit factors are mutually exclusive in their definition. Proposal B is rated worst since it poses the problem of multiple consideration of subcontracting in three separate profit factors. The other five proposals are generally equal with respect to this criterion and are assigned an average value of 4.0.

Significance

A proposal's significance is evaluated by determining if it employs profit factors which are important and useful. Proposal B is rated worst since two profit factors (Contractor Investment and Assistance by Government) are considered to be relatively insignificant and since two factors (Size of Job and Period of Performance) are of limited utility. Proposal F is rated next to last since its focus on amount of costs is of limited utility. The other proposals are considered to be of equal significance and are each assigned an average score of 4.5.

Comprehensiveness

To evaluate a proposal's comprehensiveness, it is necessary to determine if the profit factors that decide the "premium for risk" provide comprehensive coverage of all aspects of risk. Proposal F is rated worst since its coverage of contractual risk is limited only to consideration of the contract type. Proposal B is rated next to last because it is so deterministic in its application of two factors (Size of Job and Period of Performance) that it does not provide for adequate consideration of such aspects as "crashing the work," etc. The remaining proposals are each assigned an average score of 4.5.

Simplicity

A proposal which rates well in regard to "simplicity" is one whose procedure is easily applied. Proposal F is rated easiest since it involves reading a prepared graph (see Appendix F, Figure 1). Proposal A is rated least simple since it involves the determination of multiple "item cost" amounts on which to base profit. Proposal E is rated next to last since it involves the determination of the current treasury bill rates. Proposal B is rated lowest (3.0) of the remaining three factors since it requires consideration of the greatest number of profit factors. Proposal D is rated 5.0 since it involves a slightly more simple arithmetic approach than Proposal C, which is rated 4.0.

Stability

A proposal's stability is evaluated in terms of its freedom from the requirement to annually update its procedure. The Size of Job profit factor definitions of Proposals B and F should theoretically be updated each year to account for inflation. Each is therefore assigned an average low score of 1.5. The other proposals are considered to be of equal stability and are assigned average scores of 4.5. Note that even though the treasury bill rates may change from week to week, the definition of Proposal E itself would not require change.

Fairness

To determine if a proposal is "fair," it is necessary to evaluate its built-in and unwarranted bias. Proposals B and F are rated low -- an average of 1.5 -- since these two proposals have a built-in bias for smaller size jobs. Proposals A and E are rated 5.5 each since these two proposals have no built-in bias toward construction contracts or A-E contracts. Of the two remaining proposals, Proposal D is rated 4.0 since it gives less bias to A-E contracts than does Proposal C, which is rated 3.0.

Acceptability

A proposal is considered acceptable if it seems likely that its procedure will be adopted by those persons who must implement it. Evaluation of this criterion is extremely subjective, and the ratings presented here are this study's projections as to what the users' consensus might be. Proposals A and E will probably be least favorably regarded by users since they represent the most complicated approaches and are rated with a low average score of 1.5. Proposals D and F will probably be most acceptable to construction and A-E personnel, respectively, and are each given an average rating of 5.5. Proposals D and F represent the simplest approaches and are similar to the methods currently being used. Proposal C is rated 4.0 -- one point over Proposal B at 3.0 -- because Proposal C has fewer factors to be considered.

Profit Factor Evaluation

For the condition of equal criterion weights, Proposal E scores best for the cumulative profit factor evaluations. Proposals A and C also score well, but Proposals B and F score poorly. Proposal D is average (see Table 2).

Procedural Evaluation

For equal criterion weights, Proposal D is best in the procedural ratings. Proposal B scores worst, with its stability and fairness ratings counting heavily against it. Proposals A, E, and F are approximately average (see Table 2).

Overall Evaluation

For criterion weighted equally, Proposals C, D, and E all perform better than average with Proposal D having a slightly better score than C or E. The worst proposal is Proposal B. Proposal A is slightly better than average, and Proposal F is three points below average (see Table 2).

Differential Criterion Weights

Note that in the preceding evaluation, each criterion was given equal weight. A more realistic approach is to assign differential weights to each criterion according to its importance. This is achieved by multiplying the relative criterion ratings of Table 2 by the appropriate relative weight of each criterion. The resulting ratings are then subtotaled and totaled to obtain the adjusted relative ratings for each proposal. The result of one differential rating scheme (of which there are an infinite variety) is presented in Table 3. In this example, the procedural criteria are given a cumulative weight of twice the cumulative weight given to the profit factor criteria.

Note that in Table 3, Proposals D and E rate best overall. However, an examination of the subtotals for these two proposals shows that Proposal E is above average in both rating areas, whereas Proposal D is slightly below average in the area of profit factors. It is interesting to note that Proposal F, which is similar to the EM 1110-345-30 method, rates higher than Proposal B. Indications are that many of the Corps A-E contract administrators prefer the Proposal F format over the Proposal B format.

Alternate Weight Assignments

Table 4 is a blank rating table and is included here to allow the reader to assign his own weighting scheme.

Table 3
Relative Ratings
(Differential Criterion Weights)

Criterion Relative Weight	Criteria	Proposals A	B	C	D	E	F
	For Profit Factors						
2.0	Inclusiveness	7.0	7.0	7.0	2.0	12.0	7.0
1.0	Exclusiveness	4.0	1.0	4.0	4.0	4.0	4.0
3.0	Significance	13.5	3.0	13.5	13.5	13.5	6.0
1.0	Comprehensiveness	4.5	2.0	4.5	4.5	4.5	1.0
	Subtotals (Average=24.5)	29.0	13.0	29.0	24.0	34.0	18.0
	For Procedure						
4.0	Simplicity	4.0	12.0	16.0	20.0	8.0	24.0
2.0	Stability	9.0	3.0	9.0	9.0	9.0	3.0
6.0	Fairness	33.0	9.0	18.0	24.0	33.0	9.0
2.0	Acceptability	3.0	6.0	8.0	11.0	3.0	11.0
	Subtotals (Average=49.0)	49.0	30.0	51.0	64.0	53.0	47.0
	Overall totals (Average=73.5)	78.0	43.0	80.0	88.0	87.0	65.0

Table 4

Relative Ratings
(Reader's Criterion Weights)

Criterion Relative Weight	Criteria	Proposals A	B	C	D	E	F
	For Profit Factors						
	Inclusiveness						
	Exclusiveness						
	Significance						
	Comprehensiveness						
	Subtotals (Average=)						
	For Procedure						
	Simplicity						
	Stability						
	Fairness						
	Acceptability						
	Subtotals (Average=)						
	Overall Totals (Average=)						

7 REWARDING INVESTMENTS IN PRODUCTIVE FIXED ASSETS

General

In consonance with the basic hypothesis of this profit study -- that investments of a contractor's current assets and fixed assets represent separate and distinct investments -- it is suggested that a "fair and reasonable" reward for contractor investment in plant and equipment (fixed assets) be included directly as part of the use rate for each asset. The intent is that the reward for investing in productive fixed assets would replace the allowance for cost of facilities capital. Again, the focus is on the asset side of the balance sheet, not on the liability side.

Fixed-Asset Profit

The process of determining a "fair and reasonable" profit for plant and equipment investment could be developed by applying a variable risk-free return and a premium for risk to the depreciation schedule for the investment. The basis for the assignment of the risk-free return could be the interest rate for a Government bond of a duration similar to the useful life of the equipment being rated. The profit factors for determining the reward to be allowed as a premium for risk would be tailored to the risk characteristics of the particular fixed-asset investments. For example, one factor might be based on the relative market demand for the equipment; i.e., there is a bigger demand for air compressors than for 100-ton cranes, and therefore, air compressors are not as risky an investment and should receive less reward than a 100-ton crane. Another factor might be related to the estimated payback period for the piece of equipment. The longer the payback period, the more the risk is, and the more the reward should be.

Relationship to Current-Asset Profit

When computing the profit on a contractor's investment of current assets, the costs for the use of fixed assets should be included as part of the cost base. However, any part of an equipment use rate that is allowed as profit on the fixed-asset investment should not be included as part of the cost base on which the current-asset profit is computed. Thus, it is important that any equipment use rate method that includes profit for fixed asset investment be designed in such a manner that it is easy to determine how much of the use rate is assigned to profit.

Alternative -- Separate Computation of Fixed-Asset Profit

An alternative method is not to include the profit for fixed-asset investments in the use rates, but to compute it separately as a part of the profit objective for the whole job. The investments in plant and equipment would be classified generally according to the degree of risk they entail based on criteria such as relative market demand, pay-back period, etc. Appropriate rewards would then be computed using the amount of depreciable costs attributable to the project as the cost base. This fixed-asset investment profit would then be added to the profit allowed on current-asset investment.

8 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This report provides a summary of profit theory and regulatory requirements, and defines and evaluates six profit determination procedures as candidates for selection as the official profit determination procedure for the Corps of Engineers. Proposal E scores well in both profit factor selection considerations and in procedural considerations. Proposal D rates slightly higher overall than Proposal E, but scores slightly below average in the area of profit factor considerations.

Recommendations

It is recommended that the general format of Proposal E be adopted by the Corps; that consideration of special profit factors be included as part of the Corps profit procedure; that profit on fixed-asset investment and current-asset investment be computed separately; and that equipment use rates include a "fair and reasonable" profit allowance on the cost-of-ownership portion (depreciation) of the use rate.

APPENDIX A: PROPOSAL A WEIGHTING ALGORITHM (Use with Figure A1)

Materials

A weight from 0.01 to 0.03 is assigned according to the degree of managerial and technical effort necessary to obtain the materials. The following should be considered when determining the assigned weight:

1. The number of orders and suppliers.
2. Whether established sources are available or new sources must be developed.
3. Whether the contractor will obtain the material by routine orders from readily available suppliers or by detailed subcontracts, etc.

Labor

A weight from 0.05 to 0.12 is assigned according to the skill level of labor and the type of craftsmen to be used. The variety of required labor skills, contractor's manpower resources, etc., should also be considered.

Equipment

A weight from 0.05 to 0.07 is assigned according to the quality, complexity, and variety of equipment required. Any required special purpose items, and/or contractor's equipment resources, etc., should also be considered.

Subcontracted Items

A weight from 0.01 to 0.04 is assigned according to the degree of managerial and technical effort necessary for the prime contractor to administer subcontracts and to select subcontractors.

Overhead

A weight from 0.04 to 0.06 is assigned by considering:

1. The amount of labor within the overhead pools.

2. Whether the other elements of the overhead pools are routine expenses or significant contributing elements.

3. The utility of the contractor's accounting system, management expertise and effort required, etc.

Type of Terms of Contract

When proper contract type has been selected, a weight would usually be assigned by contract type within the following weight ranges:

Type of Contract	Weight Range
Cost Plus Fixed Fee	0.000 - 0.005
Cost Plus Incentive Fee	0.005 - 0.015
Fixed Price Incentive	0.015 - 0.025
Firm Fixed-Price	0.025 - 0.040

Then, within the given ranges, the weight is assigned according to (1) the completeness and clarity of the contract, and (2) the timing of contract negotiations (whether before or after the fact), etc.

Management Risks

A weight from 0.0 to 0.04 is assigned according to the degree of planning and scheduling risks involved. Jobs with long performance times would generally be assigned higher weightings than jobs with short performance times. The number of principal work tasks and whether or not the job is labor intensive should also be considered.

Special Factors

A possible weighting scheme is discussed on p 30.

☐ CC ☐ CO ☐ AE	PROFIT OBJECTIVE DETERMINATION WORKSHEET					CONTRACT NO. MODIFICATION NO.
FACTORS	WEIGHT RANGE %	WEIGHT ASSIGNED	ITEM COST $	PROFIT $	PROFIT %	REMARKS
1. MATERIALS	1-3					
2. LABOR	5-12					
3. EQUIPMENT	5-7					
4. SUBCONTRACTED ITEMS	1-4					
5. OVERHEAD	4-6					
6. TYPE & TERMS OF CONTRACT	0-4					
7. MANAGEMENT RISKS	0-4					
BASIC PROFIT OBJECTIVE:						
8. SPECIAL FACTORS	0-5% of B.P.O.					
PROFIT OBJECTIVE						

Figure A1. Proposal A worksheet.

APPENDIX B: PROPOSAL B WEIGHTING ALGORITHM

Weighting Algorithim for Construction Contracts and Change Orders (Use with Figure B1)

Degree of Risk

Where the work involves no risk or the degree of risk is very small, the weighting should be 0.03; as the degree of risk increases, the weighting should be increased (maximum of 0.12). Lump sum items will generally have a higher weighted value than unit price items for which quantities are provided. The following should be considered: the portion of the work to be done by subcontractors, the nature of the work, where work is to be performed, whether the negotiated cost is reasonable, the amount of labor included in costs, whether negotiation is before or after performance of the work, etc.

Relative Difficulty of Work

If the work is difficult and complex, the weighting should be 0.12. It should be proportionately reduced to 0.03 on the simplest of jobs. This factor is tied in, to some extent, with a degree of risk. The nature of the work, the individual/organization performing the work, where it is to be done, and the schedule of work should be considered, among other factors.

Size of Job

All work not in excess of $100,000 is weighted 0.12. Work estimated between $100,000 and $5 million is proportionately weighted from 0.12 to 0.05. Work from $5 to $10 million is weighted as 0.04. Work in excess of $10 million is weighted 0.03.

Periods of Performance

Jobs in excess of 24 months are weighted 0.12. Jobs of less duration are proportionately weighted to a minimum of 0.03, which is assigned to jobs of 30 days or less duration.

Subcontracting

This factor is weighted inversely proportional to the amount of subcontracting. Where 80 percent or more of the work is subcontracted, the weighting is 0.03; such weighting should be proportionately increased to 0.12, which is assigned when all the work is performed by the prime contractor.

Contractor's Investment

This factor is weighted from 0.03 to 0.12 on the basis of whether the degree of investment is below average, average, or above average. The amount of subcontracting, mobilization payment items, Government-furnished property, and method of making progress payments should be considered.

Assistance by Government

This factor is weighted from 0.12 to 0.03 on the basis of whether the amount of assistance is average or above average. The use of Government-owned property, equipment, and facilities, and the amount of Government expediting assistance should be considered.

Special Factors

A possible weighting scheme is discussed on p 30.

Weighting Algorithm for A-E Contracts (Use with Figure B1)

Degree of Risk

Where the design involves no risk or the degree of risk is very small, the weighting should be 0.07; as the degree of risk increases, the weighting should be increased (maximum 0.15). Contracts with options will generally have a higher weighted value than contracts without options for which quantities are provided. The following should also be considered: the portion of the design to be done by subcontractors, the nature of the design, the relationship of project estimated costs to actual estimated costs, responsibility for design, if the negotiated costs are reasonable, the amount and type of labor included in the costs, whether negotiation is before or after performance of the work, and the amount of principal time required.

Relative Difficulty of Work

If the design is difficult and complex, the weighting should be 0.15 and should be proportionately reduced to 0.07 on the simplest of jobs. This factor is tied in, to some extent, with the degree of risk. The nature of the design, the individual/organization executing the design, the design schedule, and whether the work is rehabilitation or new work should be considered.

Size of Job

All fees not in excess of $50,000 are weighted 0.15. Work estimated between $50,000 and $500,000 is proportionately weighted from 0.15 to 0.09. Work from $500,000 to $1 million is proportionately weighted from 0.09 to 0.07; work in excess of $1,000,000 is weighted 0.07.

Periods of Performance

Jobs with actual design time in excess of 180 days are weighted at 0.15. Jobs of less duration are to be proportionately weighted to a minimum of 0.07, which is assigned to jobs of 60 days or less duration.

Subcontracting

This factor is weighted inversely proportional to the amount of subcontracting. Where 80 percent or more of the design is to be subcontracted, the weighting is 0.07, and such weighting is proportionately increased to 0.15, which is assigned when all the design is performed by the prime contractor.

Contractor's Investment

This factor is weighted from 0.07 to 0.15 on the basis of whether the amount of investment is below average, average, or above average. The following should be considered: the amount of subcontracting, the amount of Government-furnished items, surveys, and soil tests used, and the method of making progress payments.

Assistance by Government

This factor is weighted from 0.15 to 0.07 on the basis of whether the amount of assistance is average or above average. The following should be considered: use of as-built drawings, Government surveys, soil explorations, and foundation recommendations.

Special Factors

A possible weighting scheme is discussed on p 30.

☐ CC ☐ CO ☐ AE	PROFIT OBJECTIVE DETERMINATION WORKSHEET				CONTRACT NO. MODIFICATION NO.
FACTOR	RATE		WEIGHT	VALUE %	REMARKS
	CC – CO	AE			
1. DEGREE OF RISK	20	25			
2. RELATIVE DIFFICULTY OF WORK	15	20			
3. SIZE OF JOB	15	15			
4. PERIOD OF PERFORMANCE	15	20			
5. SUBCONTRACTING	25	10			
6. CONTRACTOR'S INVESTMENT	5	5			
7. ASSISTANCE BY GOVERNMENT	5	5			
BASIC PROFIT OBJECTIVE					
8. SPECIAL FACTORS	0-5% of B.P.O.				
PROFIT OBJECTIVE					

Figure B1. Proposal B worksheet.

APPENDIX C: PROPOSAL C
WEIGHTING ALGORITHM
(Use with Figure C1)

Relative Difficulty of Work

The work is weighted according to the amount of knowledge, skill, and experience required of the contractor or A-E firm. If the work is difficult and complex, the weighting should be a maximum of 0.12 for construction contracts and change orders and 0.15 for A-E contracts. On the simplest of jobs, the weighting should be proportionately reduced to a minimum of 0.03 for construction contracts and change orders and 0.07 for A-E contracts. (See Figure C2.)

Degree of Contractor Efforts

The job is weighted proportionately to the amount of work actually done by the contractor. Where the contractor does 20 percent or less of the work, the weight is minimum (0.03). The weight is proportionately increased to a maximum (0.12) when all the work is performed by the prime contractor. (See Figure C3.)

Type and Terms of Contract

Where proper contract type has been selected, the weight for risks by contract type would usually fall within the weight ranges listed in Table C1.

Table C1

Weight Ranges for Risks by Contract Type -- Proposal C

Type of Contract	Weight Range (Construction Contracts/ Change Orders)	Weight Range (A-E)
Cost Plus Fixed Fee	0.03 - 0.04	0.07 - 0.08
Cost Plus Incentive Fee	0.04 - 0.06	0.08 - 0.10
Fixed Price Incentive	0.06 - 0.09	0.10 - 0.12
Firm Fixed-Price	0.09 - 0.12	0.12 - 0.15

Within the ranges of Table C1, the work is rated according to the completeness, clarity, and quality of the contract, the timing of contract negotiations (whether before or after the fact), etc.

Management Risks

Where the work includes only a small degree of planning and scheduling risk, the weighting is a minimum value (0.03 or 0.07); as the degree of risk increases, the weighting is increased to a maximum value (0.12 or 0.15). Jobs with long performance times will generally have a higher weighted value than jobs of short duration. The number of principal work tasks, whether the work is labor intensive, special control problems, "crashing" requirements, etc., should be considered.

Special Factors

A possible weighting scheme is discussed on p 30.

☐ CC ☐ CO ☐ AE	PROFIT OBJECTIVE DETERMINATION WORKSHEET					CONTRACT NO. MODIFICATION NO.
FACTOR	RATE			WEIGHT	VALUE %	REMARKS
	CC	CO	AE			
1. RELATIVE DIFFICULTY OF WORK	50	25	50			
2. DEGREE OF CONTRACTOR EFFORT	—	25	—			
3. TYPE & TERMS OF CONTRACT	25	35	25			
4. MANAGEMENT RISKS	25	15	25			
BASIC PROFIT OBJECTIVE						
5. SPECIAL FACTORS	0-5% of B.P.O.					
PROFIT OBJECTIVE						

Figure C1. Proposal C worksheet.

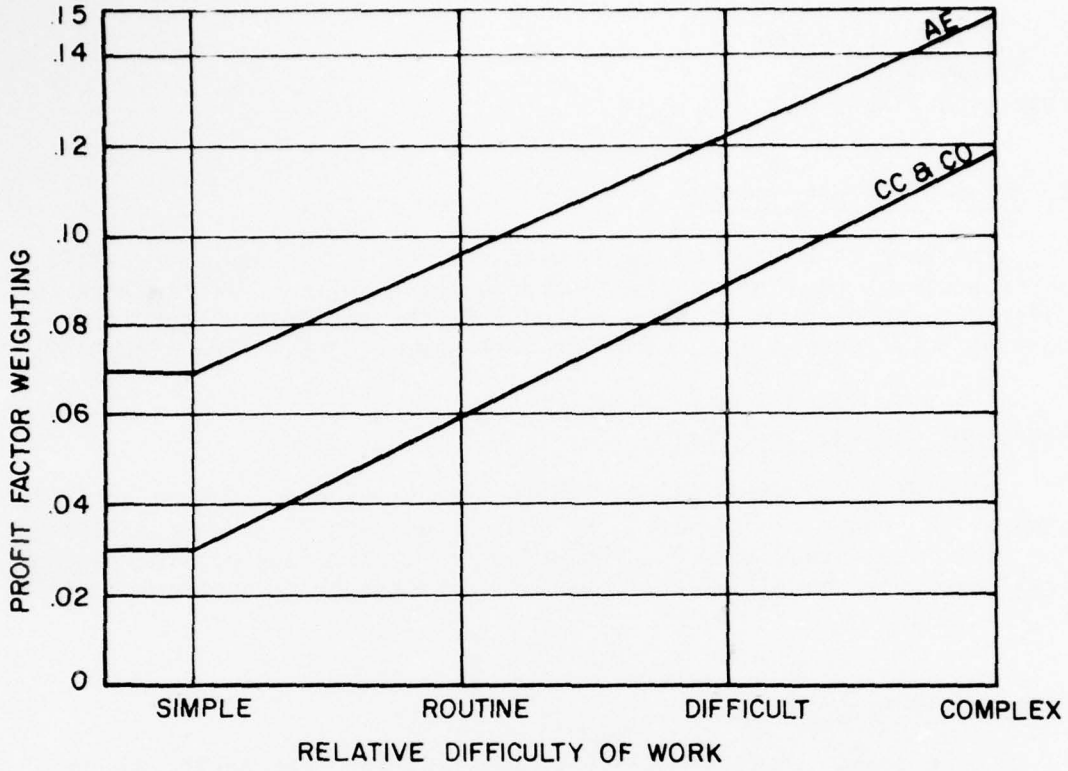


Figure C2. Profit factor weighting for relative difficulty of work.

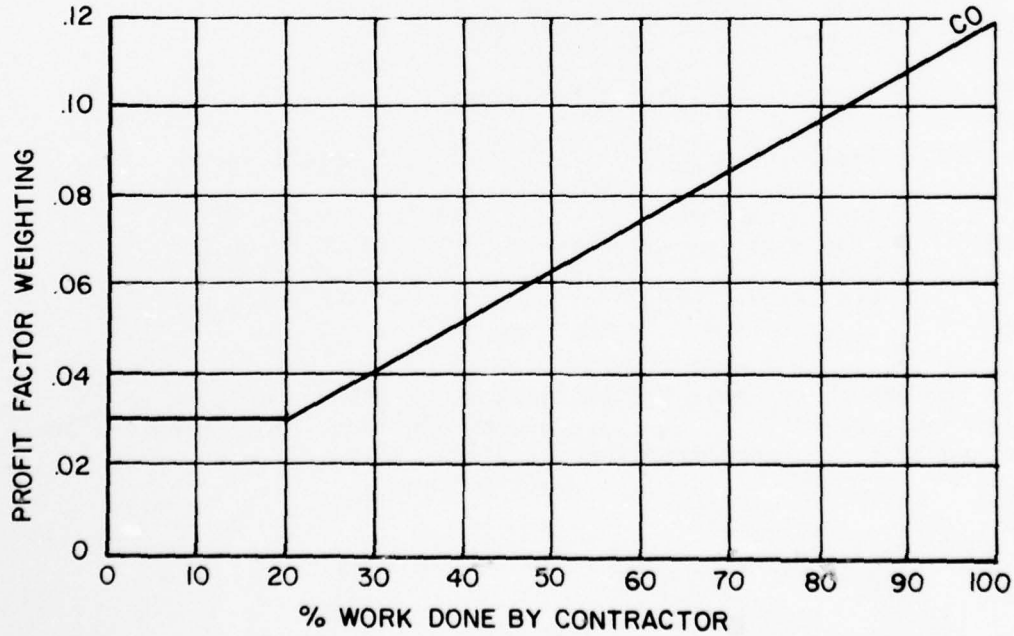


Figure C3. Profit factor weighting for degree of contractor effort.

APPENDIX D: PROPOSAL D
WEIGHTING ALGORITHM
(Use with Figure D1)

Relative Difficulty of Job

The work is weighted according to the amount of knowledge, skill, and experience required of the contractor or A-E firm. If the work is difficult and complex, it is weighted 1.0; the assigned weight is proportionately reduced to 0.0 for the most simple jobs. (See Figure D2.)

Degree of Contractor Effort

The job is weighted proportionately to the amount of work actually done by the contractor. Where the contractor does 20 percent or less of the work, the weight is 0.0. The weight is proportionately increased (maximum 1.0), when all work is performed by the prime contractor. (See Figure D3.)

Type and Terms of Contract

Where proper contract type has been selected, the profit factor weighting by contract type would usually fall within the weight ranges listed in Table D1.

Table D1

Profit Factor Weighting by Contract Type -- Proposal D

Type of Contract	Weight Range
Cost Plus Fixed Fee	0.0 - 0.2
Cost Plus Incentive Fee	0.2 - 0.5
Fixed Price Incentive	0.5 - 0.7
Firm Fixed-Price	0.7 - 1.0

Within the ranges of Table D1, the work is weighted according to the completeness, clarity, and quality of the contract; the timing of contract negotiations (whether before or after the fact); etc.

Management Risks

Where the work includes only a small degree of planning and scheduling risks, the weighting is 0.0; as the degree of risk increases, the weighting is increased to 1.0. Jobs with long performance time will generally have a higher weighted value than jobs with short performance time, for which the accuracy of forecasts is higher. The number of principal work tasks, whether or not the job is labor intensive, special control problems, "crashing" requirements, etc., should also be considered.

Special Factors

A possible weighting scheme is discussed on p 30.

☐ CC ☐ CO ☐ AE	PROFIT OBJECTIVE DETERMINATION WORKSHEET					CONTRACT NO. MODIFICATION NO.
FACTOR	RATE			WEIGHT	VALUE %	REMARKS
	CC	CO	AE			
1. RELATIVE DIFFICULTY OF WORK	6.0	3.0	7.5			
2. DEGREE OF CONTRACTOR EFFORT	—	3.0	—			
3. TYPE & TERMS OF CONTRACT	3.0	4.2	3.7			
4. MANAGEMENT RISKS	3.0	1.8	3.8			
BASIC PROFIT OBJECTIVE						
5. SPECIAL FACTORS	0-5% of B.P.O.					
PROFIT OBJECTIVE						

Figure D1. Proposal D worksheet.

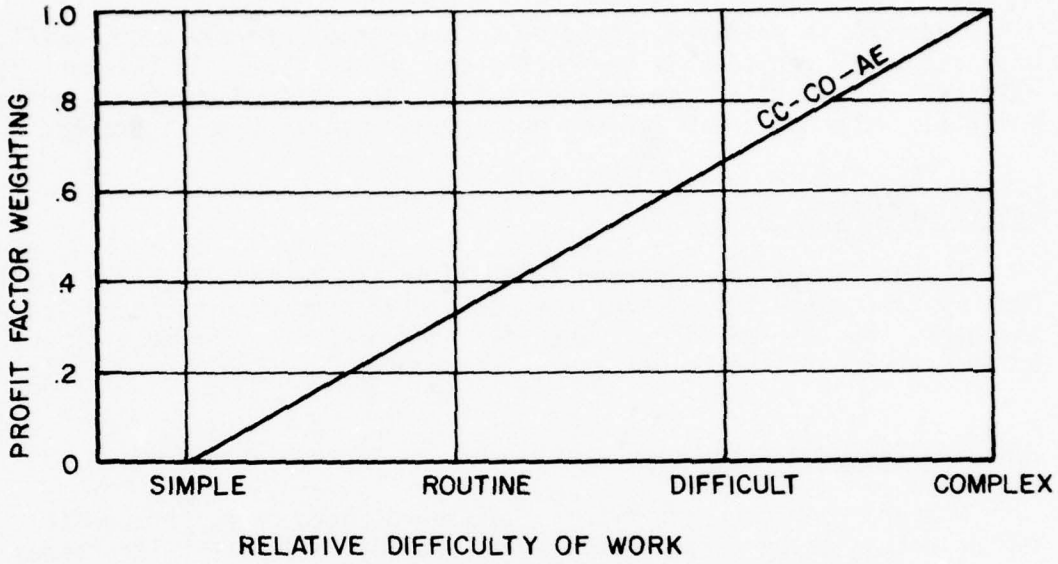


Figure D2. Profit factor weighting for relative difficulty of work.

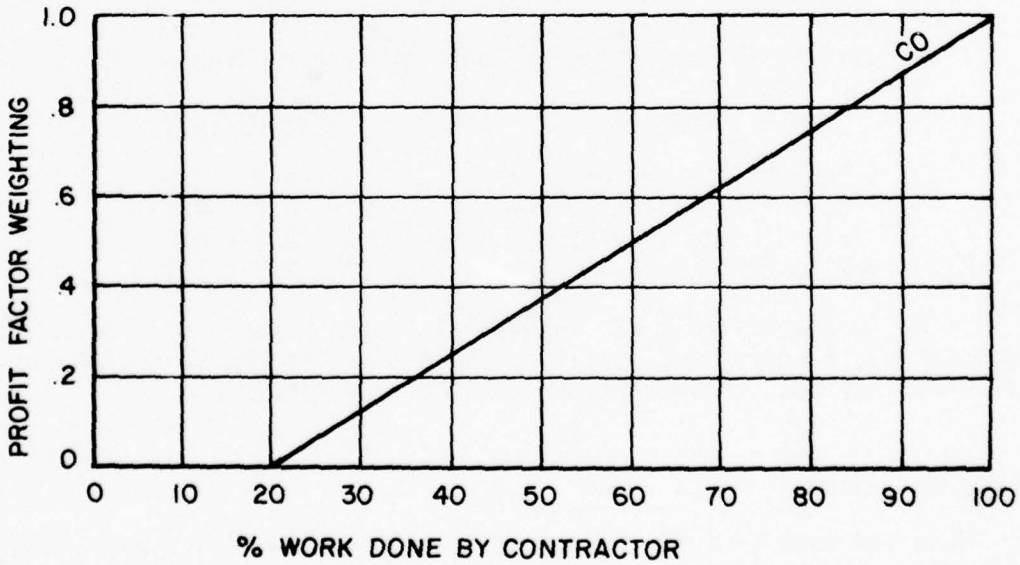


Figure D3. Profit factor weighting for degree of contractor effort.

APPENDIX E: PROPOSAL E
WEIGHTING ALGORITHM
(Use with Figure E1)

Relative Difficulty of Work

The work is weighted according to the amount of knowledge, skill, and experience required of the contractor or A-E firm. If the work is difficult and complex, the weight is 1.0; the assigned weight is proportionately reduced to 0.0 for the most simple jobs. (See Figure E2.)

Degree of Contractor Effort

The job is weighted proportionately to the amount of work actually done by the contractor. Where the contractor does 20 percent or less of the work, the weight is 0.0. When all the work is performed by the prime contractor, the weight is a maximum of 1.0. (See Figure E3.)

Type and Terms of Contract

Where proper contract type selection has been made, the profit factor weighting by contract type will usually fall within the ranges listed in Table E1.

Table E1

Profit Factor Weighting by Contract Type -- Proposal E

Type of Contract	Weight Range
Cost Plus Fixed Fee	0.0 - 0.2
Cost Plus Incentive Fee	0.2 - 0.5
Fixed Price Incentive	0.5 - 0.7
Firm Fixed-Price	0.7 - 1.0

Within the ranges of Table E1, the work is weighted according to the completeness, clarity, and quality of the contract; the timing of contract negotiations (whether before or after the fact); etc.

Management Risks

When the work includes only a small degree of planning and scheduling risk, the weighting is 0.0; as the degree of risk increases, the

weighting is increased to 1.0. Jobs of long duration will generally have a weighted value greater than jobs of short duration. The number of principal work tasks, whether or not the job is labor intensive, special control problems, "crashing" requirements, etc., should also be considered.

Variable Minimum Return

An attenuation factor 0.2 is applied to the current treasury bill rate for bills of duration similar to the estimated project duration. The 12-month rate is used for projects longer than 1 year.

Special Factors

A possible weighting scheme is discussed on p 30.

☐ CC ☐ CO ☐ AE	PROFIT OBJECTIVE DETERMINATION WORKSHEET					CONTRACT NO. MODIFICATION NO.
FACTOR	RATE			WEIGHT	VALUE %	REMARKS
	CC	CO	AE			
1. RELATIVE DIFFICULTY OF WORK	5.0	2.5	5.0			
2. DEGREE OF CONTRACTOR EFFORT	—	2.5	—			
3. TYPE & TERMS OF CONTRACT	2.5	3.5	2.5			
4. MANAGEMENT RISKS	2.5	1.5	2.5			
5. VARIABLE MINIMUM RETURN	TREASURY BILL RATE: _____			0.2		
BASIC PROFIT OBJECTIVE						
6. SPECIAL FACTORS	0-5% of B.P.O.					
PROFIT OBJECTIVE						

Figure E1. Proposal E worksheet.

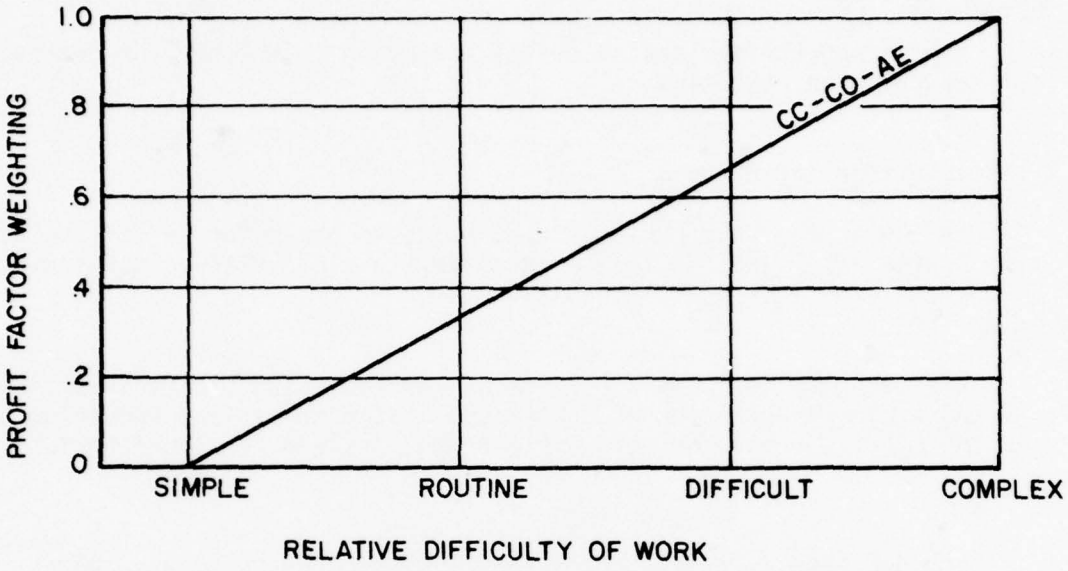


Figure E2. Profit factor weighting for relative difficulty of work.

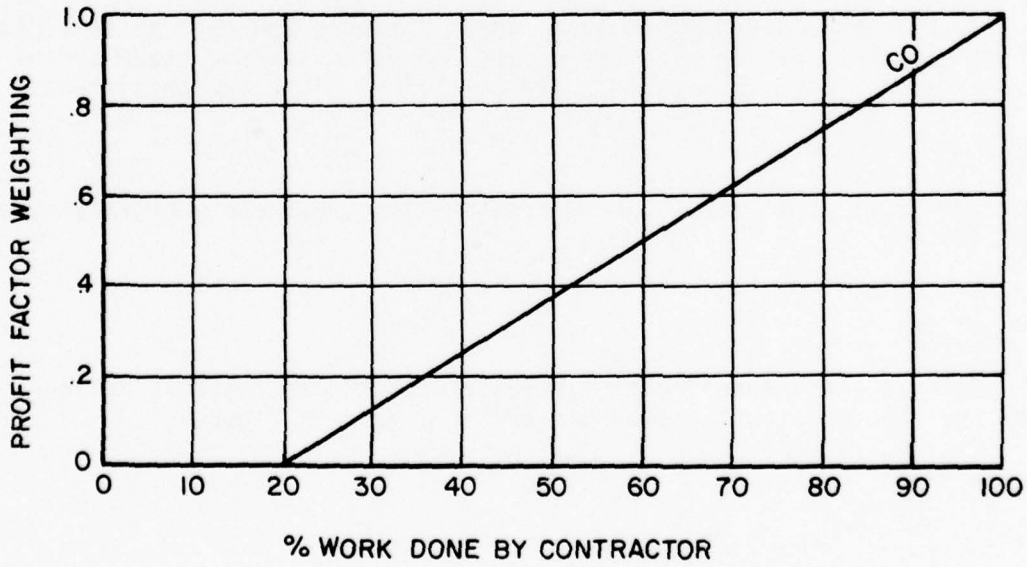


Figure E3. Profit factor weighting for degree of contractor effort.

APPENDIX F: PROPOSAL F
WEIGHTING ALGORITHM (A-E CONTRACTS ONLY)
(Use with Figure F1)

Type of Contract

Use the appropriate set of curves according to whether the contract is fixed price or cost plus.

Relative Difficulty of Work

Use the appropriate curve corresponding to the relative difficulty of work after applying the following definitions of relative difficulty.

Complex

This category includes work such as manufacturing plants involving continuous closed operation or other complicated operations requiring a high degree of process control. It does not include hot laboratories.

Difficult

Included here is work such as normal manufacturing plants, power plants, water treatment plants, sewage disposal plants, permanent hospitals, and laboratory buildings.

Routine

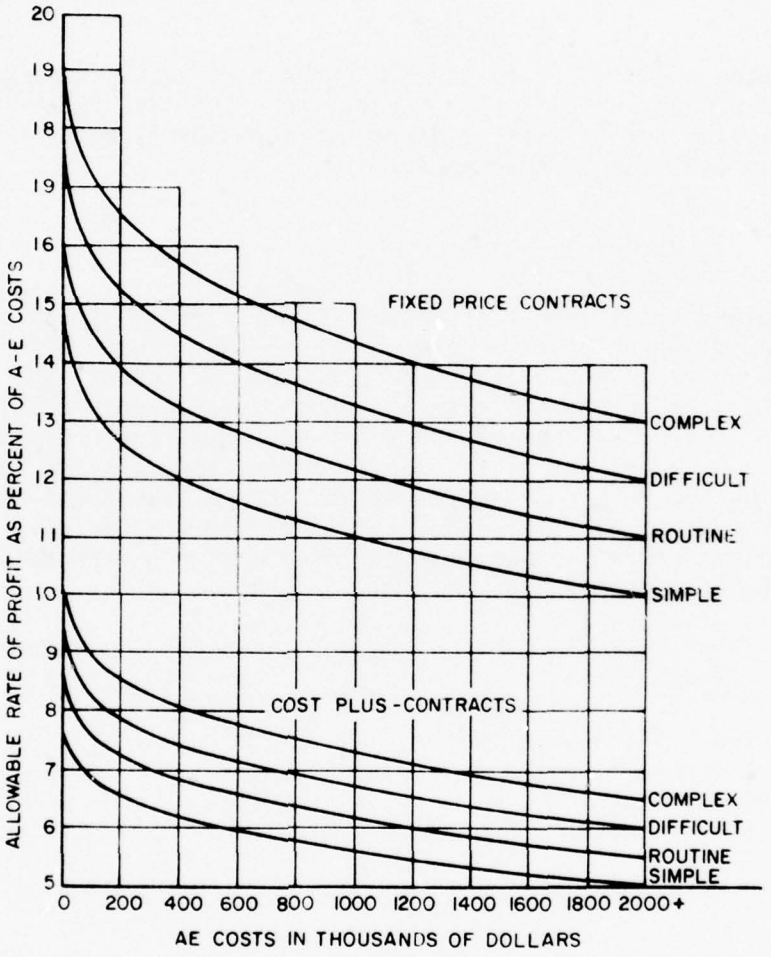
Work in this category includes administration and general services buildings, permanent housing, permanent barracks, sewers, storm drainage, water distribution systems, and electrical distribution systems.

Simple

This applies to work such as construction camps and emergency-type construction.

Size of Job

Using the estimated cost of the work and the appropriate curve, read the allowable markup from the vertical axis of Figure F1.



TYPE CONTRACT
(CHECK ONE)

——— FP

——— CP

DIFFICULTY
(CHECK ONE)

——— SIMPLE

——— ROUTINE

——— DIFFICULT

——— COMPLEX

JOB COST $ ———

BPO ——— %

Figure F1. Proposal F worksheet.

APPENDIX G: PROPOSAL G
WEIGHTING ALGORITHM

To determine profit using a cash-flow analysis approach, use the following procedure. (A sample application is presented in Appendix I.)

Step 1

Determine a "fair and reasonable" risk-free annual rate of return (F) for the project. Note: the current treasury bill rate for bills of duration similar to the estimated project duration is used in this appendix as an estimate of that rate.

Step 2

Determine a "fair and reasonable" annual rate (R) to allow an appropriate premium for risk for the project. The method used in this appendix is a modification of the approach used in Proposal E. Only three profit factors are used; the rate assignments for these factors are adjusted to an annual rate of return basis vs the markup basis used in Proposal E. However, the profit factor definitions and the instructions for weighting the rate assignments of the respective profit factors, as described for Proposal E, are also applicable to Proposal G. The following rate assignment scheme is used to determine a premium for risk (annual rate) for Proposal G:

Profit Factor	Rate (%)	Weight (0 - 1.0)	Value (%)
Relative Difficulty of Work	20	---	---
Type & Terms of Contract	10	---	---
Management Risks	10	---	---
Sum of Values = Premium for Risk:			

Step 3

Sum F + R to get the annual required rate of return (RRR) and convert to an equivalent monthly rate (rrr) using the equation:

$$(rrr) = (1 + RRR)^{1/12} - 1 \qquad \text{[Eq G1]}$$

Step 4

Estimate and record the estimated cash flow schedule of the project:

Month	1	2	...	ℓ	...	n	...	t	(Totals)
Costs	c_1	c_2	...	c_ℓ	...	c_n			C
Price	p_1	p_2	...	p_ℓ	...	p_n			P
Revenue				r_ℓ	...	r_n	...	r_t	R

where

t = month in which final payment is made
n = estimated job duration (in months)
ℓ = t-n = payment lag (in months)
c_i = amount required to pay the monthly project costs during month "i"
C = sum of all c_i (or) estimated project cost
p_i = price of work done during month "i", such that $p_i = c_i (1+m)$
m = cost markup used to determine profit
P = C(1+m) = estimated price of the project
r_i = ($p_{i-\ell}$)- (Retainage for month "i- ℓ"), except for $r_i = r_t$
$r_t = p_{(t-\ell)}$ + (all retainage), or, final payment
R = sum of all payments = P

and the simplifying assumption is made that cash must be on hand at the beginning of the month for all cash outlays that must be made by the contractor during the month and that payments are made at the beginning of the respective months.

Step 5

Determine the PV of costs and revenues. "Present" is defined to be the beginning of project month "1".

Beginning of Month	PVF @rrr %	Costs Actual	Costs C_{pv}	Revenue Actual	Revenue R_{pv}
1	$(pvf)_1$	c_1	$(pvc)_1$		
2	$(pvf)_2$	c_2	$(pvc)_2$		
⋮	⋮	⋮	⋮		
ℓ	$(pvf)_\ell$	c_ℓ	$(pvc)_\ell$	r_ℓ	$(pvr)_\ell$
⋮	⋮	⋮	⋮	⋮	⋮
n	$(pvf)_n$	c_n	$(pvc)_n$	r_n	$(pvr)_n$
⋮	⋮			⋮	
t	$(pvf)_t$			r_t	$(pvr)_t$
		Totals:	PVC		PVR

where

PVF = PV factors @rrr%

$(pvf)_i = \dfrac{1}{(1+rrr)^{i-1}}$

C_{PV} = PV of costs

$(pvc)_i$ = C_i $(pvf)_i$

PVC = sum of all $(pvc)_i$

R_{PV} = PV of revenues

$(pvr)_i$ = r_i $(pvf)_i$

PVR = sum of all $(pvr)_i$

Step 6

Set PVC = PVR; solve for the unknown markup (m); and record m as the BPO.

APPENDIX H: PERTINENT EXCERPTS FROM THE DEFENSE ACQUISITION REGULATION

3–404.2 *Firm Fixed-Price Contract.*

(a) *Description.* The firm fixed-price contract provides for a price which is not subject to any adjustment by reason of the cost experience of the contractor in the performance of the contract. This type of contract, when appropriately applied as set forth below, places maximum risk upon the contractor. Because the contractor assumes full responsibility, in the form of profits or losses, for all costs under or over the firm fixed price, he has a maximum profit incentive for effective cost control and contract performance. Use of the firm fixed-price contract imposes a minimum administrative burden on the contracting parties.

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3–405.6 *Cost-Plus-Fixed-Fee Contract.*

(a) *Description.* The cost-plus-fixed-fee contract is a cost reimbursement type of contract which provides for the payment of a fixed fee to the contractor. The fixed fee once negotiated does not vary with actual cost, but may be adjusted as a result of any subsequent changes in the work or services to be performed under the contract. Because the fixed fee does not vary in relation to the contractor's ability to control costs, the cost-plus-fixed-fee contract provides the contractor with only a minimum incentive for effective management control of costs.

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(c) *Limitations.*

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(2) 10 U.S.C. 2306(d) provides that in the case of a cost-plus-fixed-fee contract the fee shall not exceed ten percent (10%) of the estimated cost of the contract, exclusive of the fee, as determined by the Secretary concerned at the time of entering into such contract (except that a fee not in excess of fifteen percent (15%) of such estimated cost is authorized in any such contract for experimental, developmental, or research work and that a fee inclusive of the contractor's cost and not in excess of six percent (6%) of the estimated cost, exclusive of fees, as determined by the Secretary concerned at the time of entering into the contract, of the project to which such fee is applicable is authorized in contracts for architectural or engineering services relating to any public works or utility projects.) . . .

3-808 Profit, Including Fees Under Cost-Reimbursement Type Contracts.

3-808.1 *Policy.*

(a) *General.* It is the policy of the Department of Defense to utilize profit to stimulate efficient contract performance. Profit generally is the basic motive of business enterprise. The Government and defense contractors should be concerned with harnessing this motive to work for more effective and economical contract performance. Negotiation of very low profits, the use of historical averages, or the automatic application of a predetermined percentage to the total estimated cost of a product, does not provide the motivation to accomplish such performance. Furthermore, low average profit rates on defense contracts overall are detrimental to the public interest. Effective national defense in a free enterprise economy requires that the best industrial capabilities be attracted to defense contracts. These capabilities will be driven away from the defense market if defense contracts are characterized by low profit opportunities. Consequently, negotiations aimed merely at reducing prices by reducing profits, with no realization of the function of profit cannot be condoned. For each contract in which profit is negotiated as a separate element of the contract price, the aim of negotiation should be to employ the profit motive so as to impel effective contract performance by which overall costs are economically controlled. To this end, the profit objective must be fitted to the circumstances of the particular procurement, giving due weight to each of the effort, risk, facilities investment, and special factors set forth in this 3-808. This will result in a wider range of profits which, in many cases, will be significantly higher than previous norms.

(b) *Contracts Priced on the Basis of Cost Analysis.* When cost analysis is performed pursuant to 3-807.2, profit consideration shall be in accordance with the objectives set forth below.

The Government should establish a profit objective for contract negotiations which will:

(i) motivate contractors to undertake more difficult work requiring higher skills and reward those who do so;

(ii) allow the contractor an opportunity to earn profits commensurate with the extent of the cost risk he is willing to assume;

(iii) motivate contractors to provide their own facilities and financing and establish their competence through development work undertaken at their own risk and reward those who do so; and

(iv) reward contractors for productivity increases.

The weighted guidelines method set forth in 3-808.2 below for establishing profit objectives is designed to provide reasonably precise guidance in applying these principles. This method, properly applied, will tailor profits to the circumstances of each contract in such a way that long range cost reduction objectives will be fostered, and a spread of profits will be achieved which is commensurate with varying circumstances.

3-808.2 *Weighted Guidelines Method.*

(a) *General.*

(1) The weighted guidelines method provides contracting officers with (i) a technique that will insure consideration of the relative value of the appropriate profit factors described in 3-808.4 in the establishment of a profit objective and the conduct of negotiations; and (ii) a basis for documentation of this objective, including an explanation of any significant departure from this objective in reaching a final agreement. The contracting officer's analysis of these profit factors is based on information available to him prior to negotiations. Such information is furnished in proposals, audit data, performance reports, pre-award surveys and the like. The weighted guidelines method shall be used in all contracts where cost analysis is performed except as set forth in (b) below.

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(b) *Exceptions.*

(1) Under the following listed circumstances, other methods for establishing profit objectives may be used. Generally, it is expected that such methods will be supported in a manner similar to that used in the current weighted guidelines (profit factor breakdown and documentation of profit objective); however, investment and other factors inapplicable to the procurement will be excluded from the profit objective determination. Where methods other than the weighted guidelines are used, the profit objective will be reduced by the amount of facilities capital cost of money allocable in accordance with 15-205.50. Use of an approach other than weighted guidelines should result in a profit objective equal to or somewhat below previous objectives developed under the old profit calculation, which is consistent with the intent of the new profit policy that profit objectives for non-capital intensive contracts should be lower than for capital intensive contracts.

(i) contracts where an insignificant amount of facilities is required for efficient contract performance. The determination of the requirement for facilities should be based upon what is being procured and not upon the overall level of facilities available to the contractors. Examples of these contracts include, but are not limited to, architect-engineering contracts, personal or professional service contracts, engineering or logistic support service contracts, management contracts for the maintenance or operation of Government facilities, contracts that primarily require delivery of material supplied by subcontractors, and contracts for studies or reports;

(ii) termination settlements;

(iii) construction contracts;

(iv) cost-plus-award-fee contracts;

(v) contracts not expected to exceed $100,000.

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(d) *Limitation.* In the event this or any other method would result in establishing a fee objective in violation of limitations established by statute or this regulation, the maximum fee objective shall be the percentage allowed pursuant to such limitations. (See 3-405.) No local administrative ceilings on profit shall be permitted.

3–808.4 *Profit Factors.*

(a) The following factors shall be considered in all cases in which profit is to be specifically negotiated. The weight ranges listed after each factor shall be used in all instances where the weighted guidelines method is used.

PROFIT FACTORS	WEIGHT RANGES
A. CONTRACTOR EFFORT*	
Material Acquisition	
Subcontract Items	1 to 5%
Purchased Parts	1 to 4%
Other Material	1 to 4%
Engineering	
Direct Labor	9 to 15%
Overhead	6 to 9%
Manufacturing	
Direct Labor	5 to 9%
Overhead	4 to 7%
Other	
General Management	6 to 8%
B. CONTRACTOR RISK	0 to 8%
C. FACILITIES INVESTMENT	6 to 10%
D. SPECIAL FACTORS	
Productivity	
Independent Development	1 to 4%
Other	—5 to plus 5%

* An adjustment factor of .7 is applied to the results of the Contractor Effort evaluation to arrive at the dollar profit objective for this factor (see DD Form 1547). Also see 3-1300.5(a)(2).

(b) Under the weighted guidelines method the contracting officer shall first measure the "Contractor's Effort" by the assignment of a profit percentage within the designated weight ranges to each element of contract cost recognized by the contracting officer. . . . . Not to be included for the computation of profit as part of the cost base is the amount calculated for the cost of money for facilities capital. . . . . .

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(d) After the contracting officer has computed a total dollar profit for the Contractor's Effort, he shall then add the specific profit dollars assigned for cost risk, facilities investment risk, and special factors. . . . . .

3-1300 Facilities Capital Employed.

3-1300.1 *Policy.*

(a) It is the policy of the Department of Defense to recognize facilities capital employed as an element in establishing the price of certain negotiated defense contracts when such contracts are priced on the basis of cost analysis. The inclusion of this recognition is intended to reward contractor investments, motivate increased productivity and reduced costs through the use of modern manufacturing technology, and to generate other efficiencies in the performance of defense contracts. The recognition of contractor investments in the development of the profit objective will result in a profit objective based on a combination of effort, risk, and investment factors.

(b) Separate recognition shall be given to the cost of capital and the special risk associated with the facilities capital employed for defense contract purposes.

(1) The risk aspect of facilities capital employed shall be recognized as a part of profit when the profit objective is established in accordance with the guidelines set forth in 3-808. (See especially 3-808.7).

(2) Cost of money for facilities capital will be recognized as an allowable cost in those negotiated defense contracts priced on the basis of cost analysis. (See 15-205.50).

(c) *Applicability.* This policy shall apply to contracts awarded on or after 1 October 1976. This policy shall apply to modifications to contracts awarded prior to 1 October 1976, *provided* the contractor will estimate, accumulate and report the cost of the modification without incurring unreasonable administrative expense, and contract terms and conditions are amended to make 15-205.50 applicable to the modification. This policy and the above requirement shall apply to any tier subcontract or modifications thereto, upon the subcontractor's request, *provided* the prime contract or modification thereto was eligible as of the date of award for facilities capital cost of money in accordance with 15-205.50.

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3-1300.5 *Pre-Award Facilities Capital Applications.* Facilities Capital Cost of Money and Capital Employed as determined above, are applied in establishing cost and price objectives as follows.

(a) *Cost of Money.*

(1) *Cost Objective.* This special, imputed cost of money shall be used, together with normal, booked costs, in establishing a cost objective or the target cost when structuring an incentive type contract. Target costs thus established at the outset, shall not be adjusted as actual cost of money rates become available for the periods during which contract performance takes place.

(2) *Profit Objective.* Cost of money shall not be included as part of the cost base when measuring the contractor's effort in connection with establishing a pre-negotiation profit objective. The cost base for this purpose shall be restricted to normal, booked costs.

(b) *Facilities Capital Employed.* The profit objective as it relates to the risk associated with facilities capital employed shall be assessed and weighted in accordance with the profit guidelines set forth in 3-808.7.

15–107 Advance Agreements on Particular Cost Items.

(a) The extent of allowability of the selected items of cost covered in Parts 2 through 5 has been stated to apply broadly to many accounting systems in varying contract situations. Thus, as to any given contract, the reasonableness and allocability of certain items of cost may be difficult to determine, particularly in connection with firms or separate divisions thereof which may not be subject to effective competitive restraints. In order to avoid possible subsequent disallowance or dispute based on unreasonableness or nonallocability, it is desirable that contractors seek advance agreement with the Government as to the treatment to be accorded those special or unusual costs. Such agreements may also be initiated by the Government. Advance agreements may be negotiated either before or during a contract but should be negotiated before incurrence of the cost covered by the agreement. Any such agreement must be in writing, shall be executed by both contracting parties, and shall be incorporated in the present and future contracts to which it is applicable.

(b) The contracting officer is not authorized by this paragraph to agree to a treatment of costs inconsistent with Parts 2 through 5. For example, an advance agreement may not provide that, notwithstanding 15–205.17, interest shall be allowable.

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(g) Examples of cost on which advance agreements may be particularly important are:

(i) compensation for personal services including but not limited to allowances for off-site pay, incentive pay, location allowances, hardship pay and cost of living differential;
(ii) use charge for fully depreciated assets;
(iii) deferred maintenance costs;
(iv) precontract costs;
(v) independent research and development costs;
(vi) royalties;
(vii) selling and distribution costs;
(viii) travel costs, as related to special or mass personnel movements;
(ix) idle facilities and idle capacity;
(x) automatic data processing equipment;
(xi) bid and proposal costs; and
(xii) severance pay to employees on support service contracts.

15–205.17 *Interest and Other Financial Costs.* (CWAS-NA) Interest on borrowings (however represented), bond discounts, costs of financing and refinancing capital (net worth plus long-term liabilities), legal and professional fees paid in connection with the preparation of prospectuses, costs of preparation and issuance of stock rights, and costs related thereto, are unallowable except for interest assessed by State or local taxing authorities under the conditions set forth in 15–205.41. (But see 15–205.24.)

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15–205.50 *Facilities Capital Cost of Money (CWAS-NA).*

(a) Facilities capital cost of money (Cost of Capital Committed to Facilities) is an imputed cost determined by applying a cost of money rate to facilities capital employed in support of Defense contracts. A cost of money rate is derived from a common source and uniformly imputed to all contractors. Capital employed is determined without regard to its source as between equity or borrowed capital. The resulting cost of money is an imputed cost and is not a form of interest on borrowings as discussed 15–205.17.

(b) Facilities capital cost of money is allowable cost *provided* (i) the contractor's capital investment is measured, allocated to contracts, and costed in accordance with 3–1300, and (ii) the contractor maintains adequate records to demonstrate compliance with item (i).

(c) Cost of money for facilities capital need not be entered on the company's books of account. However, a memorandum entry of the cost shall be made. All relevant schedules, cost data and other data necessary to fully support the entry shall be maintained in a manner to permit audit and verification.

(d) Cost of money which is calculated, allocated and documented in accordance with these regulations shall be deemed an "incurred cost" for cost reimbursement purposes pursuant to the payment provisions of applicable cost type contracts. See E–509.5 re: applicability of cost of money for progress payment purposes under fixed-price contracts.

15–402.1 *Construction Plant and Equipment.*

(a) The widely varying conditions of climate, terrain, etc. applicable to individual Government construction projects make it impracticable to determine accurately the actual costs of depreciation of construction plant and equipment used on individual contracts. In addition, in certain cases it may be extremely difficult to determine or allocate accurately the cost of overhaul or repairs applicable in an individual contract since the period of incidence of such cost may not correspond with the period of benefit derived therefrom. Therefore, predetermined rates covering depreciation, and where appropriate overhaul and repair costs, shall be used to provide equitable average compensation to contractors for the use of construction plant and equipment under Government contracts. The rate schedule referred to in subparagraph (c), published by the Associated General Contractors of America, Inc., is generally appropriate to the types of construction projects awarded under fixed price type contracts. Accordingly, unless the contract specifically provides to the contrary, usage costs for construction plant and equipment under cost reimbursement type contracts and fixed price type contracts shall be determined as provided in subparagraphs (b) and (c), respectively.

(b) Allowable costs for construction plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor with the approval of the contracting officer for use under cost reimbursement type contracts shall be the subject of an advance understanding as set forth in 15–107 with respect to (i) depreciation, overhead and profit, and (ii) the costs incident to major, minor and running repairs, complete and thorough overhaul, and, loss or destruction of equipment.

(c) Evaluation of costs for the use of construction plant and equipment, in sound and workable condition, which are owned or controlled by a contractor or subcontractor and are furnished or the proper and economical performance of a fixed-price type contract shall be based upon the "Contractors' Equipment Ownership Expense Schedule" Sixth Edition, 1966, published by the Associated General Contractors of America, Inc. This represents a percentage of acquisition cost per working month or fraction thereof for the period of time the equipment is required for the job. If the equipment has already exceeded the assigned service life indicated by the percentage used for depreciation, one year shall be added to the actual age of the equipment and the depreciation percentage shall be revised accordingly. The allowance for equipment ownership expense, computed as provided herein shall be considered to include all costs of depreciation, major repairs and overhaul, and overhead applicable to the equipment. Accordingly, there shall be eliminated from all direct and indirect charges under the contract all costs applicable to items of equipment which are included in the allowance for ownership expense. In considering total costs under any contract, no allowance for overhead shall be applied to the allowance for equipment ownership expense. . . . . .

18–306.2 *Fixed-Price Architect-Engineer Contracts.*

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(b) In no event shall a firm fixed-price type contract for architect-engineer services for the preparation of designs, plans, drawings and specifications exceed the statutory limitation of six percent (6%) of the estimated construction costs of the project to which the architect-engineer services apply. If, however, the contract also covers any type services other than the preparation of designs, plans, drawings and specifications, that part of the contract price for such other services shall not be subject to the six percent (6%) limitation.

18–306.3 *Cost-Reimbursement Contracts.* Negotiation of the fee of such construction contracts and architect-engineer contracts shall be in accordance with 18–303.2 and 18–303.3, respectively. Statutory limitations on fees charged on construction contracts are set forth in 3–405.6. In negotiating an architect-engineer contract, the contract price, which includes the fee plus the estimated total reimbursable costs to be paid to the architect-engineer shall not exceed six percent (6%) of the estimated cost of the construction project to which such services apply. If, however, the contract also covers any type services other than the preparation of designs, plans, drawings and specifications, that part of the contract price for such other services shall not be subject to the six percent (6%) limitation.

APPENDIX I: APPLICATION OF EACH PROPOSAL TO AN EXAMPLE PROBLEM

Pertinent data describing a hypothetical A-E project are presented in Figures I1 through I6 and Table I1. Each example application considers the following factors:

Estimated cost = $100,000
Cost schedule (see application of Proposal G)
Cost item breakdown (see application of Proposal A)
Retainage policy: retain 10 percent until project completion
Estimated average payment lag: 2 months
Type contract: Firm Fixed-Price, good specifications
Estimated project duration: 5 months
Relative difficulty of work: difficult
Degree of risk: average
Assistance by Government: average
Amount of subcontracting: none
Amount of contractor investment: average

The results of applying each proposal to the example problem are:

Proposal:	A	B	C	D	E	F	G
BPO (%):	11.2	12.7	12.1	9.7	8.0	15.8	5.6

☐ CC ☐ CO ☑ AE	PROFIT OBJECTIVE DETERMINATION WORKSHEET					CONTRACT NO MODIFICATION NO
FACTORS	WEIGHT RANGE %	WEIGHT ASSIGNED	ITEM COST $	PROFIT $	PROFIT %	REMARKS
1. MATERIALS	1-3	.02	10,000	200		
2. LABOR	5-12	.10	40,000	4,000		
3. EQUIPMENT	5-7	—	—	—		
4. SUBCONTRACTED ITEMS	1-4	—	—	—		
5. OVERHEAD	4-6	.04	50,000	2,000		
6. TYPE & TERMS OF CONTRACT	0-4	.03	100,000	3,000		
7. MANAGEMENT RISKS	0-4	.02	100,000	2,000		
BASIC PROFIT OBJECTIVE:				11,200	11.2	
8. SPECIAL FACTORS	0-5% of BPO	—			—	
PROFIT OBJECTIVE					11.2	

Figure I1. Example application of Proposal A.

☐ CC ☐ CO ☑ AE	PROFIT OBJECTIVE DETERMINATION WORKSHEET				CONTRACT NO. MODIFICATION NO.
FACTOR	RATE		WEIGHT	VALUE %	REMARKS
	CC – CO	AE			
1. DEGREE OF RISK	20	25	.11	2.75	
2. RELATIVE DIFFICULTY OF WORK	15	20	.12	2.40	
3. SIZE OF JOB	15	15	.14	2.10	
4. PERIOD OF PERFORMANCE	15	20	.13	2.60	
5. SUBCONTRACTING	25	10	.15	1.50	
6. CONTRACTOR'S INVESTMENT	5	5	.11	.55	
7. ASSISTANCE BY GOVERNMENT	5	5	.15	.75	
BASIC PROFIT OBJECTIVE				12.65	
8. SPECIAL FACTORS	0-5% of B.PO		—	—	
PROFIT OBJECTIVE				12.65	

Figure I2. Example application of Proposal B.

☐ CC ☐ CO ☑ AE	PROFIT OBJECTIVE DETERMINATION WORKSHEET					CONTRACT NO MODIFICATION NO
FACTOR	RATE			WEIGHT	VALUE %	REMARKS
	CC	CO	AE			
1. RELATIVE DIFFICULTY OF WORK	50	25	50	.12	6.00	
2. DEGREE OF CONTRACTOR EFFORT	—	25	—	—	—	
3. TYPE & TERMS OF CONTRACT	25	35	25	.135	3.38	
4. MANAGEMENT RISKS	25	15	25	.11	2.75	
BASIC PROFIT OBJECTIVE					12.13	
5. SPECIAL FACTORS	0-5% of B.P.O.			—	—	
PROFIT OBJECTIVE					12.13	

Figure I3. Example application of Proposal C.

☐ CC ☐ CO ☑ AE	PROFIT OBJECTIVE DETERMINATION WORKSHEET					CONTRACT NO MODIFICATION NO
FACTOR	RATE			WEIGHT	VALUE %	REMARKS
	CC	CO	AE			
1. RELATIVE DIFFICULTY OF WORK	6.0	3.0	7.5	.65	4.88	
2. DEGREE OF CONTRACTOR EFFORT	—	3.0	—	—	—	
3. TYPE & TERMS OF CONTRACT	3.0	4.2	3.7	.8	2.96	
4. MANAGEMENT RISKS	3.0	1.8	3.8	.5	1.90	
BASIC PROFIT OBJECTIVE					9.74	
5 SPECIAL FACTORS	0-5% of B.P.O.			—	—	
PROFIT OBJECTIVE					9.74	

Figure I4. Example application of Proposal D.

☐ CC ☐ CO ☑ AE	PROFIT OBJECTIVE DETERMINATION WORKSHEET					CONTRACT NO. MODIFICATION NO.
FACTOR	RATE			WEIGHT	VALUE %	REMARKS
	CC	CO	AE			
1. RELATIVE DIFFICULTY OF WORK	5.0	2.5	5.0	.65	3.25	
2. DEGREE OF CONTRACTOR EFFORT	—	2.5	—	—	—	
3. TYPE & TERMS OF CONTRACT	2.5	3.5	2.5	.8	2.00	
4. MANAGEMENT RISKS	2.5	1.5	2.5	.5	1.25	
5. VARIABLE MINIMUM RETURN	TREASURY BILL RATE: 7.6			0.2	1.5	
BASIC PROFIT OBJECTIVE					8.0	
6. SPECIAL FACTORS	0-5% of B.P.O.			—	—	
PROFIT OBJECTIVE					8.0	

Figure I5. Example application of Proposal E.

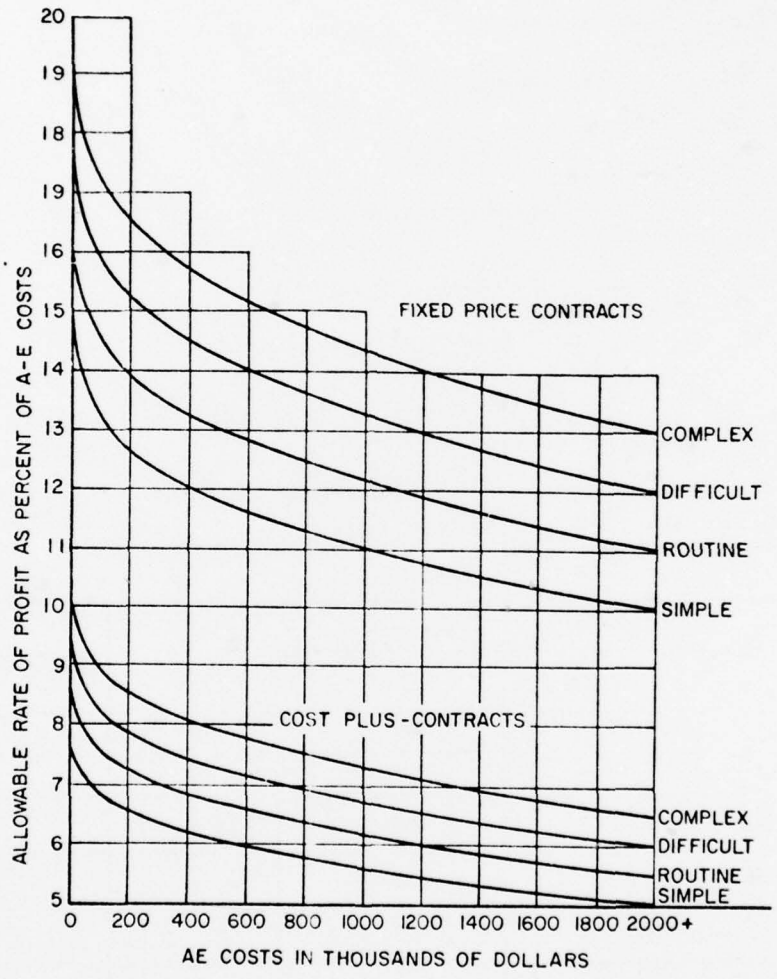

Figure I6. Example application of Proposal F.

Table I1

Example Application of Proposal G

Step 1: 6 month treasury bill rate = 7.6%

Step 2: premium for risk = 27% (sum of values below)

Profit Factor	Rate	Weight	Value
Relative Difficulty of Work	20	0.7	14
Type & Terms of Contract	10	0.8	8
Management Risks	10	0.5	5

Step 3: RRR = 7.6% + 27% = 34.6%

$rrr = (1.346)^{1/12} - 1 = .025 = 2.5\%$

Step 4: estimated cash flow schedule (in $1000)

Retainage Policy: Retain 10% of revenue earned until end of project

Month	1	2	3	4	5	6	7	(Totals)
Cost	10	25	25	25	15	-	-	$100
Price	10x	25x	25x	25x	15x	-	-	$100x
Revenue	-	-	9x	22.5x	22.5x	22.5x	23.5x	$100x

where

x = (1+m), and, m = markup required

Step 5: determine PV of costs and revenues

Beginning of Month	PVF @ 2.5%	Cost Actual	Cost C_{pv}	Revenue Actual	Revenue R_{pv}
1	1.000	10,000	10,000	--	--
2	.976	25,000	24,000	--	--
3	.952	25,000	23,800	9,000x	8,568x
4	.929	25,000	23,225	22,500x	20,903x
5	.906	15,000	13,590	22,500x	20,385x

Table I1 (con't)

Beginning of Month	PVF @ 2.5%	Cost		Revenue	
		Actual	C_{pv}	Actual	R_{pv}
6	.884	--	--	22,500x	19,890x
7	.862	--	--	23,500x	20,527x
		PVC =	95,015	PVR =	90,003x

Step 6: set PVC = PVR and solve for markup

$$95{,}015 = 90{,}003\ (1+m)$$

$$m = \frac{95{,}015}{90{,}003} - 1 = 0.056 = 5.6\%$$

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