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Successful cost management and value engineering in construction is based on accurate and early estimations of cost, and this book is the quickest route to creating a cost plan from scratch. The budgeting system described in this book will help the reader to:

- document project scope at a level that provides excellent cost control at design stage;
- establish the parameters of potential sites before selecting one;
- determine the amount of financing needed before deciding to bid on a project;
- make a detailed and robust building project budget;
- determine the rental rate necessary to see if a building project will be marketable.

The technique used is a parametric cost system, not the square foot cost system used by most who quote an up-front building cost. To help calculate the parameter quantities and price them as quantified, this book comes with five electronic templates to calculate program scope: space, configuration, HVAC loads, plumbing, and electrical. It also includes:

- the author's parametric cost database and cost template to prepare the construction estimate;
- a soft cost template to price out all related program costs, convert them to a monthly cash flow, incorporate financing costs, and then reveal the final budget;
- an operation and maintenance annual cost template to calculate those variable and fixed costs necessary to run the building and then convert the result into the necessary rental rate to capitalize all costs.

The spreadsheets, data, advice, and templates are all introduced through a detailed case study, placing everything in an easy-to-understand practical context. This will prove an invaluable guide not only for estimators and cost engineers, but also developers, clients, and architects.

Donald E. Parker is an independent building consultant whose long career has included establishing the first value engineering program for the US General Services Administration, managing their nationwide cost estimating program, performing value engineering design review services for the Kingdom of Saudi Arabia, and positions as Executive Vice President of National Government Properties and Senior Vice President of RRP Corp. He is a Fellow of the Society of American Value Engineers International and President of the prestigious Lawrence D. Miles Value Foundation.

Acknowledgements

Preface

This text is for those developers, owners, and project managers who must quote a rental rate for a building that is not yet designed. It is for those who need to know how much financing to seek before going ahead with a project. It is for those who need to know what a program of building requirements should cost in order to determine value engineering savings opportunity.

Parametric Cost Modeling for Buildings is based on the author's 35 plus years of cost engineering experience. For the past decade the author was directly involved in the asset management of three large portfolios of commercial properties located throughout the United States—some 560 buildings, 14.6 million square feet, valued at more than $1 billion.

His early career was with the federal government where he first developed and honed the parametric estimating tools presented in this text. With the government he was responsible for the prospectus budgeting of many major building projects while he served as Director of the General Service Administration (GSA) Cost Management Division.

With GSA he was instrumental in introducing their Capitalized Income Approach to Project Budgeting and wrote handbooks to introduce the UNIFORMAT system of estimating to the agency. For more than two decades he has held credentials both as a certified cost engineer and a certified value specialist—a combination that only a handful of people possess.

The author has spent his career either developing project budgets, or working with established budgets in efforts to optimize total building costs. Also, he was directly involved with the preparation of bids to quote rental rates or total costs (which were then capitalized) required to design, finance, construct, operate and maintain large government projects over specified lifecycle periods. Much of

the detailed information in this book is derived from the experience cited above plus several cost guideline manuals developed for facility directors of large building programs and from conducting numerous seminars on project cost control and value engineering.

In response to a solicitation for offers (SFO) to provide leased space for a tenant, the developer's challenge is to quote a final rental rate that is good for 10–20 years. Not only must this be done prior to starting design work, the rental rates quoted must often include sufficient cost to provide a full serviced facility (utilities, operations, maintenance, reserves for replacement management and insurance). Once this bid commitment is made and the lease is awarded to the developer the need to control cost becomes acute.

This book outlines an organized approach to determine a reasonable budget for commercial real estate that will improve the accuracy of the budget as well as enhance its use as a project management tool for overall project cost control. The book is designed for use by developers, owners, and their engineers, planners, project managers, architects and construction managers, design-build contractors, estimators, and value engineers. Its content has special significance for owners, agencies, or corporations embarking on large, new, or renovated building projects who desire an increased degree of overall confidence in their budget with better project cost control. Through its use a budget can be developed that will limit discrepancies in communications between the developer/owner and the designer. As such, it provides the basis of estimating (BOE) for control of work through the development process.

The book starts by introducing the traditional approach to budget estimating, describes the steps for a new approach, and provides an overview of the specific additional areas in which the technique can be used.

Subsequently, the book outlines the approaches recommended for developing the required input data for a comprehensive budget. Each chapter follows a step-by-step approach to preparing a budget that concludes in a rental rate necessary to support financing and developing the facility.

Accompanying this book are Excel formats, templates, cost database, and other tools illustrated in this book to assist in making the budget as described herein. They may be downloaded from the publisher's website, www.routledge.com/9781138016156, and are contained in a "zip" file that can be opened on the reader's hard drive and used.

Once the construction estimate is finished, provided Excel formats can be used to prepare the annual operating and maintenance costs for the facility, the soft cost budget for development, the cash flow schedule for computing interest during development, and the rent model for converting these costs to a rental rate.

The resulting formats from these computations provide highly organized, detailed budget documentation, which is useful to minimize discrepancies in owner intentions, design criteria, and resulting cost implications.

<div align="right">Donald E. Parker, PE, CCE, CVS</div>

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Introduction

Estimating is the process of predicting (or forecasting) within acceptable variances what the actual cost will be when a given project is completed. This text focuses on preparation of the initial estimate, the budget for commercial real estate development that determines the economic worth of the project in terms of the rental rate that must be obtained to retire its debt. Once a budget for a project is established, the task then is to control cost to stay within the budget to make the prediction come true.

One evaluates a budget as either being too high, too low or within an acceptable range. An acceptable budget would provide neither too little nor too much money to do the job. A budget that is too low manifests itself in cost overruns, the cutting back of requirements, and management headaches. A high budget is just as bad; it makes a developer noncompetitive, increases the cost of financing, and reduces the margin of profit at which the project can be sold.

The budget process described in this book reduces the risk of having a bad budget because the method used is directly based upon the project's specific criteria and scope rather than being general in nature. This text, beginning with Chapter 3, is a step-by-step estimating procedure that walks the fine line between using too little data to prepare a budget and requiring too much data to prepare a budget.

Conventional Practice

The most common method of budget preparation for commercial real estate (a new office building, hotel, shopping mall, etc.) is to estimate it on a cost per square foot basis. A survey taken by the Veteran's Administration[1] in 1974, which the author still believes

is valid, indicated that the square foot method of estimating was used by 82 percent of all architect-engineer (A-E) firms to prepare budget estimates.

These budgets, when compared to the actual construction low bid for the projects, showed the following ranges:

- extreme deviation   (28 percent above low bid, 38 percent below range = 66 percent low bid).
- mean deviation   (13 percent above low bid, 16 percent below range = 29 percent low bid).

Approximately 12 percent of the A-E firms surveyed used a modular quantity take-off method for budget preparation. This method indicated some improvement in accuracy over the square foot method of budget estimating. When compared to bid results, the deviations were as follows:

- extreme deviation   (21 percent above low bid, 10 percent below range = 31 percent low bid).
- median deviation   (14 percent above low bid, 10 percent below range = 24 percent low bid).

One of the largest variables in budgeting is the capability of the firm to exercise effective cost control through design development. From the above data one can see that cost control using a square-foot budget as a basis is virtually impossible. The ability to control cost to a budget seemed to improve as definition of the budget basis improved. As seen from the survey, the most commonly used budget technique for facilities is the use of the following overall method:

- identify the type of facility;
- budget the dollar per gross square foot ($/gsf).

The minimum information necessary for this type of budget is to know:

- historical cost for the facility type;
- desired gross square footage;
- geographical location;
- desired completion date.

Too often this minimum information is all that is known or used when budgets are prepared. Project budgets developed on this basis are totally inadequate for controlling cost during future design stages, and this method does not provide confidence that it includes all project required scope and criteria without overstating cost. For example, construction budgeting publications show a wide variation in historical cost per gross square foot, depending on the type of building.

Within building types, cost ranges similar to that shown by the following sample data[2] are typical:

- offices—mid rise $105–$172/gsf
- parking garages $37–$93/gsf
- auditoriums $111–$219/gsf
- court houses $167–$271/gsf.

Budgeting solely on this basis is "pick a number." When budgeting is performed in this manner one is limiting or selecting, without documentation, factors such as facility quality level, program content, space efficiency, facility configuration, and future lifecycle cost experience. Because these are undocumented, they cannot be controlled against the budget.

Budgeting Objectives

The developer really has two objectives when a project budget is developed: to win the bid and/or to secure funding. After these objectives are accomplished the need to control cost becomes paramount.

Win Bid and/or Secure Funding

The developer must win the bid with the lowest rental rate but not at the expense of failing to secure funding. These two objectives go hand in hand. If the rental rate is too low then finding permanent financing to take out the construction loan will be more difficult. The long term lender is interested in the estimated revenue stream to pay back the debt and operating expenses before equity.

Most developer and owner cost and cost control problems are created at the budget-planning stage of a project. More often than not, owner needs are not fully known and thus are oversimplified intentionally or unintentionally. Or, even worse, client needs are understated in order to win the bid or justify the project. For speculative development the specific needs of the client tenant are unknown.

Beyond responding to a request for proposals, a project starts in many ways; an idea in an executive's mind, a scheme from an advanced planning group, a request from a sales department for more product, a changing profit picture, or a need for more space.

The project budget is often prepared or used by marketing personnel to perform economic analysis to determine a return on investment (ROI). A lower budget provides a better ROI.

It is easy to over-simplify client needs at the budget stage and do it quite innocently without a definitive building concept. The owner/developer is trying to quantify a dream. Yet, it is known that the reliability of a budget improves in proportion to the amount of information available when it is created. The opinion that estimating is an art and not a science is only partially correct. Only when there is no information is estimating all art.

The estimating method described in this book indicates where information that can be used is available and how to develop useful information from project requirements.

Cost Control

The control cost objective becomes a requirement once funding has been received. Now that management is committed to a fixed rent and/or a fixed price, everyone must achieve it.

There is a difference between managing cost and controlling cost. To manage something is to succeed in accomplishing. To manage by cost is, then, to succeed in accomplishing a cost objective. Management is the act or manner of handling, directing or controlling something. Control is a process, that is, a systematic series of actions directed toward some end.

The dictionary[3] defines the term *control* in two ways: (1) to check or verify by comparison with a duplicate register or standard; (2) to regulate, exercise authority over, direct or command to take corrective action. This definition of control, when coupled with the term *cost*, gives no indication or solace that costs would not rise if cost control were practiced. Cost control does not promise the

end to the problems of management, be they inflation, overdesign, or anything else.

What it indicates is that one must have a budget baseline against which to compare so that management can spot deviations in time to take corrective action. The strong assumption in the term *control* is that management is willing to exercise authority—to make a decision.

Therefore, it is important that the method used to develop the project budget be precise enough to provide a basis for monitoring throughout the detailed design process. The estimating system proposed by this book does the job because it is based upon determining design parameters and quality levels, then pricing on a conceptual basis in enough detail to allow the control process to be effective. If the budget used to seek the project financing cannot be used in this fashion, then control of the budget during execution will be difficult or impossible to achieve.

The problem lies with the fact that many feel that cost control means the control of money or a budget review. In fact, when cost control is mentioned the first thing they do is look for the estimate to see what prices can be cut. Those that control costs by looking solely at estimates, money, or cash flow are overlooking key factors. One controls cost by controlling scope, not dollars. The key to achieving cost control through scope control lies in the definition of scope (see Chapter 2). The old-fashioned idea of viewing scope as building square feet is not sufficient. Scope control is achieved by identifying all requirements and generating a baseline document to record them. Such a system requires close monitoring by management, but it does permit verification to take place in order to regulate, thereby achieving the control function.

Response to an SFO

The estimating method proposed by this book has been used by the author many times to respond to a Solicitation for Offers (SFO) for the development of a new office building, clinic, computer laboratory, and a wide variety of commercial projects. SFOs are the common way federal and state governmental agencies request proposals for building space. The SFO process has also been used by major corporations to solicit space.

Offerors submitting proposals in response to SFOs could be offering to lease existing buildings or to provide a new building