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PROJECT FINANCE DURING CONSTRUCTION

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16. Abstract

This report addresses the issues of financing the construction of transit and bus facilities. Financing methods can have a profound effect on the ultimate cost and effectiveness of particular projects. The report consists of six chapters including a literature review, a set of case studies and the presentation of appropriate procedures. Chapter 1 provides a brief review of literature on construction finance as well as defining the objective and scope of the investigation. Chapter 2 describes current construction financing practices of transit agencies, citing data from four recent federally assisted projects. Chapter 3 presents the basic concepts and relationships pertinent to financing of projects during construction. Chapter 4 presents appropriate methods for analysis of project finance alternatives including the development of spreadsheet template for financial evaluation which can be used by local agencies. Chapter 5 proposes some innovative financing strategies and discusses their merits under various circumstances. Chapter 6 presents a summary and recommendations on the basis of the investigation.

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METRIC CONVERSION FACTORS

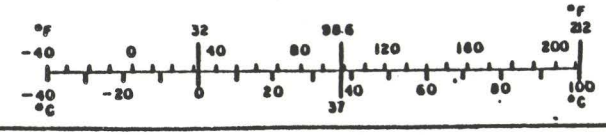
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



PROJECT FINANCE DURING CONSTRUCTION
EXECUTIVE SUMMARY

Cash flow management and financing strategies during the construction phase can have a profound effect on the ultimate cost and effectiveness of particular projects. Sudden stoppage during construction due to inadequate funds can greatly increase costs. Short term finance of construction can be a major cost category to contractors and suppliers, and these costs will be reflected in bid prices. Coordinating multiple sources of capital funds may require transit agencies to bridge temporary gaps in funding or may present opportunities for taking advantage of excess funds at particular times. In essence, the timing of payments to the various parties in construction can mean the difference between profitability and loss for private participants as well as greatly affecting the financial planning of transit agencies. Thus, improved management of cash flow and innovative financing during construction offers the possibility of significant cost savings.

Public ownership of large, urban transit systems in the United States was only established in the last thirty years. Initially, there was little attention given to finance during construction on the part of transit agencies. Grant obligations were made to transit agencies by higher levels of government and all expenditures were covered from these obligations. At times, there was some delay between the receipt of a bill from a contractor and the availability or approval of governmental funds; this delay was typically covered by delaying payments to contractors. As a result, contractors assumed the costs of short term finance, and higher contractor bids reflected these costs. Contractors normally do not have access to the lowest cost financing, so forcing contractors to perform this task will result in higher than necessary construction costs. Even after bids are received and contracts signed, delays in payments may form the basis for a successful claim against an agency on the part of the contractor.

As shown in this report using data from several case study projects, financing costs can be an appreciable portion of total cost. For example, contractors on one project had an average cumulative billings due of $ 13 million including delayed payments and retainage. At a short term financing rate of twenty percent, compound interest payments amounting to $ 24 million would be required to finance this balance over the course of the project, representing four percent of the total project cost. At the same time, the transit agency also had a negative cash balance since receipts of revenues lagged behind payments to contractors. This average shortfall of $ 13 million also had to be financed and, over the course of the project, would have required compound interest payments of $ 12 million at a short term borrowing rate of twelve percent. These substantial financing costs increased the cost of the project and represent an opportunity for cost savings through the imposition of innovative financing techniques.

Another reason that construction finance has become important is the variability in inflation and real cost changes in construction experienced over the past decades. In periods of high inflation, good financial planning is essential to avoid massive cost overruns. Traditional financing arrangements from fixed grant totals is especially vulnerable to problems resulting from unanticipated inflation since an initial grant may not cover intervening cost inflation. Innovative financial strategies may also permit changes in the timing of construction to reduce construction costs or to achieve earlier completion. In eras of restricted government capital budgets, changing the timing of construction may result in savings

(through construction cost savings or earlier system benefits) that exceed any financing costs.

A third reason for the increasing importance of construction finance has been the change in grant arrangements on the part of the federal government. In many cases, the federal government will provide only a grant for a fixed amount rather than for a percentage of the ultimate construction cost. Participation by private partners is also actively encouraged. Experience of private participation include selling air rights for development over transit facilities or receiving right of way donations from private organizations. These new policy initiatives make transit agencies more responsible for financial management.

As a result of these new developments, transit agencies must now become much more active and sophisticated in construction finance and cash flow management. The purpose of this report is to summarize the fundamental principles of construction finance and to detail the various calculations required to evaluate construction financing alternatives. A number of innovative financial strategies are discussed and illustrated. Examples and insights developed from detailed case studies of four different transit construction projects are also reported. One of these case studies is a major reconstruction project while the other three are rehabilitation projects of smaller scale.

The methods developed in this report can be applied to virtually any combination of innovative financing schemes or revenue schemes. Formulas relevant to such calculations are documented in the body of the report along with examples of impacts of different strategies. Examples of innovative strategies were illustrated by reference to example calculations and a representative project, such as:

1. *Construction timing to reduce costs*
   By altering the time at which construction occurs, construction cost savings may be obtained or earlier completion of the facility may be accomplished. These possibilities arise due to difference in inflation rates in construction and/or seasonal effects influencing construction costs. For example, avoiding a three percent difference in inflation rate for construction in one project could result in a savings of nearly ten percent of the total cost.

2. *Payment and retainage concession financing*
   By delaying payments and holding excessive retainage from responsible contractors, agencies require contractors (or sub-contractors and material suppliers) to bear the substantial cost of short term financing. Contractors are particularly ill-prepared to accomplish such financing since they often face substantial borrowing costs. Bid prices for construction and supplies will reflect such real financing costs over the long run. As an example, eliminating payment delays in one project would save four percent of the total construction cost (a total of $ 24 million) based on an assumed borrowing interest rate of twenty percent.

3. *Grant or revenue anticipation financing*
   Several transit agencies are already using grant or revenue anticipation borrowing in order to achieve earlier completion of facilities. While this financing strategy will normally increase costs associated with facility construction, it can be desirable in cases in which benefits from earlier completion will exceed financing charges. Even with such financing strategies, different alternatives for borrowing exist and should be evaluated to select the most desirable.

4. *Financial institution opportunity financing*
   Different borrowing opportunities always exist, and financially astute organizations attempt to obtain the most advantageous borrowing arrangements. Both contractors and agencies should seek out lower interest rates in view of the large costs of short term

financing as noted in the example cited earlier.

In examining these and other financing alternatives, it quickly becomes apparent that the various participants in the facility construction process have widely varying financial circumstances and incentives. Private participants such as suppliers, engineers and contractors are subject to taxes and borrowing limits. Financial interest charges and equipment depreciation result in tax deductions for these private participants. Due to differences in risk and financial circumstances, borrowing costs will vary among the different private and public participants. The desired rate of return on equipment and facility investments will likewise vary among the various participants. Understanding these different influences is of great importance in assessing the desirability of alternative financing mechanisms, so this report briefly reviews this institutional and organizational background.

This report contains several distinct approaches to the issues associated with construction financing. First, an extensive literature review in the domains of engineering, accounting and finance was conducted. From this literature review, several possible innovative financing strategies have been identified. Second, four detailed case studies of current financing practices by transit agencies were conducted. The highlights of the financial transactions for these projects during construction are presented in the report appendices. These case studies revealed the use of distinct financing strategies such as revenue anticipation bonds and notes. Financing burdens imposed on both transit agencies and on construction contractors were found to be significant and present opportunities for innovative finance in the case studies.

As a third component, several chapters in the report detail the various considerations and calculations associated with the evaluation of alternative financing strategies. This review requires some attention to the relationship among the contractors, owners and financial institutions in financing construction projects. These different participants have differing circumstances and objectives that influence financing decisions. While the emphasis in this discussion has been placed on project finance during construction, it is important to recognize the possibility of privatization of public projects. Methods to evaluate private ownership of transit facilities are also developed in this report. More specifically, calculation methods for evaluating various financing strategies have been developed, and a spreadsheet template useful to cash flow management and financial evaluation for a transit agency has been implemented on a microcomputer.

With the assistance of the spreadsheet template, examples of possible financing strategies for construction projects are presented, and the effects of various factors in project finance on the construction costs are evaluated for different scenarios. In evaluating such innovative financing arrangements, it is important to recognize the varying financial circumstances and incentives of various participants in order to tailor the strategies to meet their needs. However, the analysis and experience reported reported here suggest that substantial cost savings may accrue from good financing arrangements and cash flow management.

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1. INTRODUCTION

1.1 The Importance of Construction Finance

Cash flow management and financing strategies during the construction phase can have a profound effect on the ultimate cost and effectiveness of particular projects. Sudden stoppage during construction due to inadequate funds can greatly increase costs. Short term finance of construction can be a major cost category to contractors and suppliers, and these costs will be reflected in bid prices. Coordinating multiple sources of capital funds may require transit agencies to bridge temporary gaps in funding or may present opportunities for taking advantage of excess funds at particular times. In essence, the timing of payments to the various parties in construction can mean the difference between profitability and loss for private participants as well as greatly affecting the financial planning of transit agencies. Thus, improved management of financing during construction offers the possibility of significant cost savings.

Public ownership of large, urban transit systems in the United States was only established in the last thirty years. Initially, there was little attention given to finance during construction on the part of transit agencies. Grant obligations were made to transit agencies by higher levels of government and all expenditures were covered from these obligations. At times, there was some delay between the receipt of a bill from a contractor and the availability or approval of governmental funds; this delay was typically covered by delaying payments to contractors. As a result, transit agencies simply relied on grants for capital funds and forced contractors to accomplish any short term finance. As a result, contractors assumed the costs of short term finance, and higher contractor bids reflected these costs. While this simple treatment of finance has had exceptions, it is still a common mode of financial management.

Several developments have occurred to increase the importance of construction finance to transportation agencies. First, the recognition came that imposing all short term financing arrangements on contractors may actually result in higher long term costs. For example, A. Maevis noted ([51], p. 444):

> ...there were days in New York City when city agencies had trouble attracting bidders; yet contractors were beating on the door to get work from Consolidated Edison, the local utility. Why? First, the city was a notoriously slow payer, COs (change orders) years behind, decision process chaotic, and payments made 60 days after close of estimate.
>
> Con Edison paid on the 20th of the month for work done to the first of the month. Change orders negotiated and paid within 30 days–60 days. If a decision was needed, it came in 10 days.
>
> The number of bids you receive on your projects are one measure of your administrative efficiency. Further, competition is bound to give you the lowest possible construction price.

Even after bids are received and contracts signed, delays in payments may form the basis

for a successful claim against an agency on the part of the contractor. It is also the case that contractors do not have access to the lowest cost financing, so that forcing contractors to perform this task will result in higher than necessary construction costs. As shown later in this report using data from an actual project, these financing costs can be an appreciable portion of total cost.

A second reason that construction finance has become important is the variability in inflation and real cost changes experienced over the past decades. In periods of high inflation, good financial planning is essential to avoid massive cost overrruns. Traditional financing arrangements from fixed grant totals is especially vulnerable to problems resulting from unanticipated inflation since an initial grant may not cover intervening cost inflation. Innovative financial strategies may also permit changes in the timing of construction to reduce construction costs or to achieve earlier completion. In eras of restricted government capital budgets, changing the timing of construction may result in savings (through construction cost savings or earlier system benefits) that exceed any financing costs.

A third reason for the increasing importance of construction finance has been the change in grant arrangements on the part of the federal government. In many cases, the federal government will provide only a grant for a fixed amount rather than for a percentage of the ultimate construction cost. Participation by private partners is also actively encouraged. Experience of private participation include selling air rights for development over transit facilities or receiving right of way donations from private organizations. These new policy initiatives make transit agencies more responsible for financial management.

As a result of these new developments, transit agencies must now become much more active and sophisticated in construction finance and cash flow management. The purpose of this report is to summarize the fundamental principles of construction finance and to detail the various calculations required to evaluate construction financing alternatives. A number of innovative financial strategies are discussed and illustrated. Experience and insights developed from detailed case studies of four different transit construction projects are also reported. One of these case studies is a major reconstruction project while the other three are rehabilitation projects of smaller scale.

1.2 Objective and Scope

In examining financing alternatives, it quickly becomes apparent that the various participants in the facility construction process have widely varying financial circumstances and incentives. Private participants such as suppliers, engineers and contractors are subject to taxes and borrowing limits. Financial interest charges and equipment depreciation result in tax deductions for these private participants. Due to differences in risk and financial circumstances, borrowing costs will vary among the different private and public participants. The desired rate of return on equipment and facility investments will likewise vary among the various participants. Understanding these different influences is of great importance in assessing the desirability of alternative financing mechanisms, so this report will briefly review this institutional and organizational background.

Generally, this report will focus on project level financing strategies. In most instances, this is entirely appropriate since grants and other financial arrangements are made at the project level. However, in some instances short term financing strategies are implemented at the agency level that influence project level cash flow management. The differences between project specific and agency-wide or multi-project financial management will also be discussed.

It is important to differentiate between construction and long term financing of projects. This distinction is commonly made in the private sector where different funding sources for these different periods are common. In the public sector, it may require some explanation. Construction financing is only applicable during the actual planning, design and construction of a facility. On completion, construction financing arrangements are usually terminated. Long range financing is then instituted in which mortgage funds are secured and different sources of revenue coordinated. This report focuses on the former period; discussions of long term financing arrangements appear elsewhere. (See, for example, [27, 44, 80, 26, 41, 65, 78]). While on many projects the two phases of finance are distinct, it may also be the case that particular revenue sources are available during construction and subsequently. An example is a dedicated tax for a transit agency; this special case of tax revenue can be treated as just another revenue source during construction.

Some strategies for construction financing considered in detail in this report include:

- *Construction Timing Costs and Benefits*: Changing the timing of construction can avoid inflationary increases, otherwise reduce construction costs, or result in earlier completion and greater benefits.
- *Payment and Retainage Concession Financing*: Reducing the financing costs of contractors can result in lower bids and construction costs.
- *Grant or Revenue Anticipation Financing*: Borrowing in anticipation of grant receipts can speed up project completion.
- *Private Participation Financing*: Tax implications and differing discount or interest rates must be considered with private participation.

1.3 Organization of the Report

In the remainder of this chapter, a brief overview of relevant literature is provided. Specific literature references are provided in the body of the report. Following this overview, the remaining chapters describe existing financing practices, the principles and calculations relevant to construction finance, and some innovative financing alternatives.

Cash flow management as generally practiced is described in Chapter 2 for four recent federally assisted transit facility construction projects. The projects range from the reconstruction of a trolley line as a part of a light rail system and rehabilitation of bus maintenance facilities. The project cash flow data, including the timing of cash flows of

construction, have been provided by project managers. This chapter gives a description of funding arrangements and contractual obligations of these transit projects in order to gain insight to the possibility of introducing some innovative financing strategies in the future.

Chapter 3 of this report discusses the relationships among contractors, owner and financial institutions in construction ventures. Each of the innovative financing strategies considered pertains to one or more of the working relationships that appear in practice.

Chapter 4 of this report introduces the calculations necessary to manage cash flow for construction projects. A spreadsheet template useful to cash flow management and financial evaluation for a transit agency is described. The electronic spreadsheets designed for microcomputers provide capability for simple user interaction in handling extensive numerical calculations related to financial planning. The template described in this report allows consideration of multiple revenue sources and financing strategies, including overdraft financing and revenue bonds. Simulation experiments inquiring about "what if" conditions can also be accommodated.

Chapter 5 presents the evaluation of various financial strategies with respect to their cost impacts. With the assistance of the financing template, possible financing strategies are evaluated for various financing scenarios. Also considered and discussed are the possible institutional barriers to implementing innovative financing strategies. Particular attention has been given to develop procedures for analyzing the impacts of alternative financing strategies on transit construction projects.

The final chapter of the report presents conclusions which address the expected impacts of innovative strategies on transit facility construction projects and recommendations for implementing innovative financial strategies in future projects.

1.4 Literature on Construction Financing

The construction or reconstruction of transit system facilities requires a cooperative working relationship among a variety of public and private project participants. Professionals from a number of different disciplines may be involved, including experts in banking, accounting, construction management, finance, and transportation. Each of these professions has developed its own theoretical and applied literature that bears on some part of the construction financing problem. To review the literature of construction financing thus requires some familiarity with the literature in these disparate professional fields. In this section, a brief overview of the professional literature is provided. Detailed references to the professional literature are provided in later chapters as appropriate in the discussion of individual topics. The articles, books, and reports considered are listed in the reference section of this report.

One way to categorize the literature on construction finance is on the basis of organizations and the relationships among organizations. Figure 1-1 illustrates a general schematic of the relationships that exist between the various parties involved in the

construction of transit facilities. More specifically, these relationships are 1) contractors and the public agency, 2) contractor and financial market institutions, and 3) public agency and financial market institutions. In addition to these primary organizations, ancillary professionals and organizations are often involved, such as accountants, lawyers or regulatory agencies. In what follows, literature relevant to these various organizations and their inter-relationships is considered. Before examining these specific roles, however, a general introduction to literature on cash flow management and corporate finance is provided.

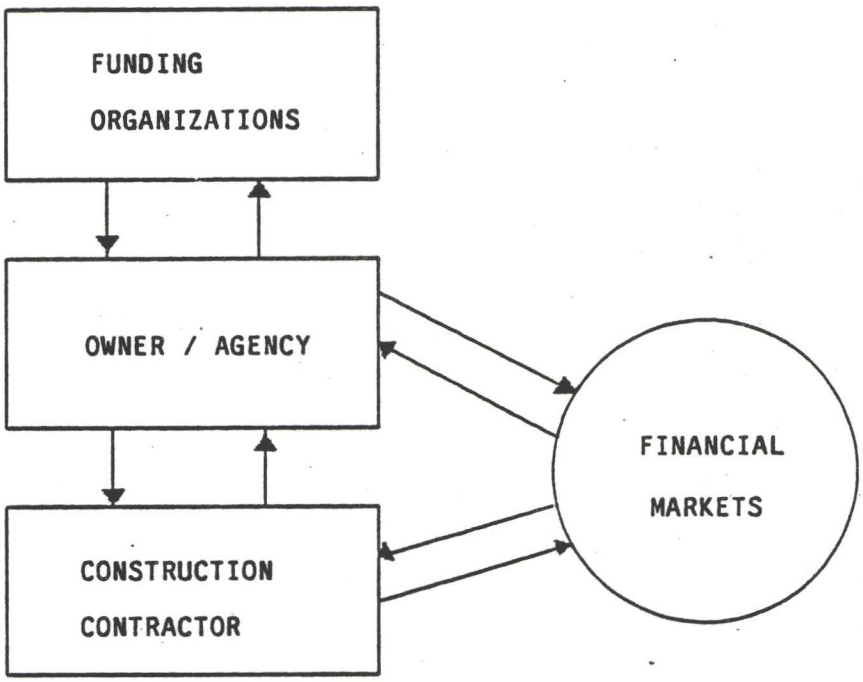


Figure 1-1: Project Relationships Governing Financing Strategies

General Literature on Construction Financing

Textbooks and journals in Engineering Economics cover both the basic principles of construction cash flow as well as advanced topics [8, 7, 80, 59, 81, 63]. The topics of most textbooks include evaluating project net present value, internal rate of return, benefit cost ratio, depreciation and inflation. Some of the advanced topics discussed in journals include uncertainty, public versus private facilities, and joint venture projects.

Literature on financial management [15] and accounting in the construction industry are

also relevant [19, 21, 23, 40]. In addition to these general references, accounting guides such as AICPA's *Construction Contractors* [4] provide guidance to the construction industry on the application of accounting principles.

Cash flow management is a topic of some importance in its own right. Some references discuss the importance of effective cash flow management and financial reporting in establishing and maintaining credibility [68, 46, 71, 14, 79]. In essence, cash flow management is intended to insure a smooth and reliable flow of funds, to take advantage of short term opportunities to reduce borrowing costs or obtain interest income, and to insure proper accounting and protection of funds. An important element in managing cash flow in construction is inflation. Neglecting to account for inflation in cash flow can yield misleading results in profit measures [76, 77, 6, 8, 9, 50]. The construction industry is particularly sensitive to the rate of inflation. For the construction contractor, inflation carries implications relating to labor, materials, equipment depreciation, cost control, energy, bidding markup, and others.

Financial Institutions and Markets

Financial institutions are the source of loan funds for agencies and contractors. By financial institutions, we include banks, the various organizations involved in bond markets, and other nonbank lenders. The instruments and arrangements for providing construction financing are quite diverse from such institutions; Chapter 3 describes some alternative financing strategies. A good introduction to the role of financial institutions in construction funding appears in [68]. International financial markets for construction are discussed in [25].

With respect to financial institutions, a major segment of literature is concerned with the security of loans extended to construction contractors and the efficiency of payment disbursements from the lender to the contractor. Articles published in journals of financing and banking such as *Credit and Financial Management*, the *Journal of Commercial Bank Lending* and the *American Banking Association Journal* provide insight to the lenders point of view on construction loan evaluations. A particular concern for financial institutions is the security of loans made to construction contractors since these loans do not usually have the security of the constructed facility. Numerous articles discuss the attributes of a construction contractor that should be considered when deciding whether or not to extend credit. (See for example [43, 24, 28, 10, 12, 11]). Construction contractors are viewed by lenders as risky borrowers relative to firms in other industries. Reasons cited for this view include low investment capital, the high number of firms in the industry, and problems of diversion of contract funds to illegitimate purposes so that financial control on the part of a lender is a problem. In light of the unique risks involved with lending to construction contractors, much of the banking and financing literature on construction financing addresses methods of evaluating the credibility of contractors.

In addition to the complexities in evaluating the credit worthiness of contractors, the banking and financing community is also concerned with the numerous problems associated

with disbursing advances on construction loans from commercial banks. Following the approval of a construction loan, there are generally two methods of disbursing construction advances, the voucher plan or progress payments. Under the voucher plan, the lender makes payments directly to the subcontractors, material suppliers, etc. Because the payments are direct, there is little opportunity for delays or conflicts associated with relying on the general contractor to disburse payments. Although this method of disbursement is safe, it requires considerable effort and bookkeeping on the part of the lender. An alternative to the voucher plan is for the lender to issue progress payments to the developer or general contractor upon specified project milestones or time periods. This method of disbursement offers some administrative advantage to the lender, however, since progress payments must often pass through numerous parties before being received by the appropriate subcontractor or material supplier. Implications of these alternative payment arrangements are discussed in [35, 24, 11].

The competition within the financial markets is often intense with numerous participants jockeying for more business [5, 3, 53, 54, 68] or better returns [38, 29]. This competition provides considerable opportunities for innovative finance, as discussed in Chapter 4.

The contractors point of view on commercial bank loans is presented in accounting and construction management literature such as *Journal of Accountancy, Construction Contracting* and *ASCE Journal of the Construction Division* [46, 5, 37, 47, 66, 34]. Contractors are most concerned with maximizing their credit limit and reducing financing costs.

Role of the Owner Agency

As noted above, the role of an owner agency is critical in successful construction finance and cash flow management. As shown in Figure 1-1, the owner agency is the central actor in project management and construction finance. Surprisingly, however, relatively little literature is addressed at the role of an owner agency. An exception to this rule are the numerous reports of specific problems that financing arrangements may have had on specific projects in magazines such as *Engineering News Record*. (See, for example, [30, 31, 32]).

Most of the existing literature concentrates on investment analysis and long term financing arrangements [9, 22, 69, 73, 80]. Literature on the estimation and management of cash flows also exists [6, 33, 36, 42, 50]. Tax implications of alternative ownership arrangements is also of importance [45]. Another focus of attention is on the various alternatives for owner/contractor agreements [39, 60, 75]. Finally, some literature reviews various methods by which construction costs can be reduced, including some discussion of financing alternatives [34, 51, 48].

A few articles address alternative financing arrangements directly, including issues of accounting and evaluation [67, 62, 74, 18, 49]. Coordination of different funding sources

is also important [1]. These subjects will form the bulk of the discussion in Chapters 3 to 5 of this report. Analysis of the efficiency and effectiveness of different grant programs on influencing agency behavior is also a subject of considerable attention in the theoretical literature [72, 64, 70, 20].

2. CURRENT CONSTRUCTION FINANCING PRACTICES OF TRANSIT AGENCIES

2.1 Selection of Projects

Before considering further applications of the systematic methods for calculating cash flows and for evaluating financing strategies during construction, it is appropriate to consider financing arrangements that are prevalent in federally assisted transit facility construction projects. In this chapter, we present four transit construction or rehabilitation projects as examples. These projects have been selected among recent and well documented projects undertaken by transit agencies serving urban areas. Interviews were conducted with project and financial managers as well as a review of accounting reports and other documentation for these studies.

After consultation with various transit agencies, the four projects selected for case study were:

1. Stage I Light Rail Transit Reconstruction, Port Authority Transit of Allegheny County (PAT), Pittsburgh, PA.
2. Everett Maintenance Facilities, Massachusetts Bay Transit Authority (MBTA), Boston MA.
3. Reservoir Carhouse-yard-station, MBTA, Boston, MA
4. Northwest Bus Maintenance Facility, Mass Transportation Administration (MTA), Baltimore, MD.

The first is a major reconstruction project involving land acquisition, utility relocation, tunneling, as well as the construction of 1.1 miles of new subway in the downtown area. The remaining three case study projects are rehabilitation or reconstruction projects of moderate size.

2.2 Project Data

The objective of collecting data for these case studies is to document typical cash flows and funding procedures for the four transit facility projects. Thus, it is necessary to identify those cash flow attributes that not only provide insight to the financial status of the project but also may be derived directly from data typically compiled by agencies. In this section the technical and financial significance of the project data are described. The data collected is compiled and listed in the appendices of this report; each appendix corresponds to the data compiled for a given case study project. Because the projects and agencies differ in size and organization, the data are not compiled in the same manner for all projects. For example, some data for two case study projects are disaggregated by contract; however the Light Rail Transit Reconstruction project consists of over 160 contracts. Compiling data at the contract level for such a large project would not be practical in this report.

Each appendix is divided into two or more parts; Part I for each appendix is the same, while the remaining parts differ from one project to the next and are described in the respective sections of this chapter. Part I of each appendix is a summary of accounts for all contracts. The quantities of interest are derived from a monthly log of the following attributes:

1. **total billings from contractors**– the total amount billed to the transit agency for all contracts, for a given month.

2. **payments by the transit agency**– the total amount paid by the transit agency to all contractors, for a given month.

3. **retainage or release**– the total amount withheld, in a given month, by the transit agency when making payments to contractors. Usually retainage is a pre–determined proportion of the total billings from contractors as specified in the relevant project documents. A positive value for this quantity represents retainage withheld, while a negative value represents past retainage released to the contractors.

4. **receipts from federal government**– the amount of federal grant funds actually received in a given month.

5. **receipts from state and local governments**– the amount of state and local grants actually received in a given month.

Each of the tables of data compiled in Part I are intended to characterize the status of some financial aspect of the project from the transit agency point of view. For example, the direct financing necessities (or opportunities) of the transit agency for a given project period correspond to a deficit or surplus in the project cash flow. Intuitively, this surplus or deficit is the difference between the total (or cumulative) money *received* for the project and the total (or cumulative) money *paid* for the project. This difference may also be expressed as the cumulative receipts from the federal and local governments *less* the cumulative payments made to the contractor(s). If this difference is positive for a continuum of project periods, the transit agency should have an investment opportunity. However, a stream of negative values for this difference represents a project deficit for which financing on the part of the agency will be required. In the expression below, cumulative surplus or deficit for a given period is shown more explicitly as the difference in cumulative receipts and cumulative payments for the period. The cumulative payments (or receipts) for a given period are simply the sum of all the payments (or receipts) from the beginning of the project through the period in question. Cumulative payments and receipts therefore, can be directly derived from a record of monthly payments and monthly receipts for the project:

cumulative surplus or deficit = cumulative receipts – cumulative payments

The data included in this report is compiled in such a way that the origin of transit agency financial deficits and surpluses can be determined. In other words, by tabulating the components of the cumulative surplus or deficit, it can be determined which of these

components is cause for the financial deficit or surplus. For example, suppose that the local funding commitment for a project is 20 percent of costs while, due to delays, the actual receipts are less than 20 percent of payments. Also suppose that for an extended period the cumulative payments *exceed* cumulative receipts so that there is a cumulative deficit. Then there is evidence that the cumulative deficit could be attributed to a delay in the receipts of local funds.

However, a transit agency also incurs other expenses such as administrative, construction inspection and force accounts in addition to contract payments. Hence, there is a drawdown of the cumulative surplus from revenue receipts to cover the expenses other than contract payments and to reduce the possibility for the agency to accumulate surplus funds. In cases where only contract payment data are available, the term cumulative surplus will not include other internal expenses of the agency in this report.

It is important to note that the cumulative surplus or deficit does not entirely explain the financial status of the agency for a given project. For example, a project may show a cumulative surplus (receipts exceed payments), however, the agency might have a remaining balance with its contractors. If such a remaining balance is brought to zero, the cumulative surplus could be brought to a cumulative deficit. Thus, it is necessary to tabulate a cumulative monthly record of any unpaid balance with contractors. The cumulative unpaid balance for a particular project period is simply the difference between the cumulative billings from contractors and the cumulative payments by the agency, the equation below. Where the cumulative billings for a given period are the sum of the billings from the beginning of the project through the period in question:

$$\text{cumulative unpaid balance} = \text{cumulative billings} - \text{cumulative payments}$$

Thus, both cumulative surplus/deficit and cumulative unpaid balance are necessary to characterize the financial status of a project from the transit agency point of view. These attributes are tabulated for combined contracts in Part I, Table 4 of each of the appendices. Also, in Part I, Tables 1, 2 and 3 of each appendix are monthly logs of quantities such as cumulative retainage, federal receipts, local receipts, and monthly billings from contractors. These are intermediate quantities in computing the cumulative surplus/deficit and the cumulative unpaid balance that appear in Table 4.

The remaining sections of this chapter provide a brief description of the four transit projects selected. Included in the descriptions are 1) project background, 2) the scope of the work performed, 3) project funding and 4) exploratory data analysis. The exploratory data analysis involves examination of various plots of the cumulative surplus and unpaid balance for a particular project. By examining such plots, a preliminary assessment as to the potential effectiveness of innovative financing can be made. More detailed assessments are deferred until Chapter 5.

2.3 Pittsburgh Light Rail Transit (LRT) Reconstruction

Background

There are nearly 135,000 weekday commuters into Downtown Pittsburgh, of which about 60 percent use public transportation. Most commute from the East and South suburbs. The Port Authority of Allegheny County (PAT) provides the East and South Busways and South Hills Trolley system to service its public transit commuters. In an effort to upgrade the trolley service and alleviate congestion on downtown streets, PAT sought funds for the Stage I Light Rail Transit (LRT) Reconstruction Project.

Project Description

In 1978 PAT submitted an application to the Urban Mass Transportation Administration (UMTA) requesting funding for the LRT project. Construction of the LRT began in September 1981, and is scheduled to be completed in the early months of 1987. Stage I of the project consisted of the complete reconstruction of 10.5 miles of right-of-way from downtown Pittsburgh branching to the south suburbs [61]. Also included were the construction of a 1.1 mile subway line in the Pittsburgh central business district, the purchase of 55 new light rail transit vehicles (LRV) and the construction of LRV maintenance facilities. Other features of the project include three underground stations in the heart of downtown Pittsburgh and updating the signal and electrical systems along the existing trolley lines. The subway and underground stations of the downtown LRT route are shown in Figure 2-1.

Project Funding

In May of 1979, UMTA approved funding for the LRT project. However, due to funding constraints, UMTA requested that the project be separated into two parts, stages I-A and I-B. Consequently, $265 million of the estimated total $480 million was initially committed to fund stage I-A. This two stage plan was later changed to a full funding contract. In May of 1983; the Port Authority accepted a $384 million full funding contract offer from UMTA covering 80 percent of the $480 million initial project estimate. The remaining 20 percent of the capital costs were to be provided by the Commonwealth of Pennsylvania (16.66 percent) and the County of Allegheny (3.34 percent).

Notes in anticipation of grants from the county, state, and federal governments were issued to finance construction of the Light Rail Transit. The objective of the advanced construction notes was to avoid delays commonly encountered with grant disbursements for public projects. The notes were issued at an 8% annual interest rate throughout fiscal years 1984, 1985 and 1986 and were backed by government grant commitments.

In the project years prior to 1984, revenue bond financing was not used to disburse grant revenues. In these first five years of the project, the authority used the "letter of credit" system of requesting grant monies. While this system was in use, the committed

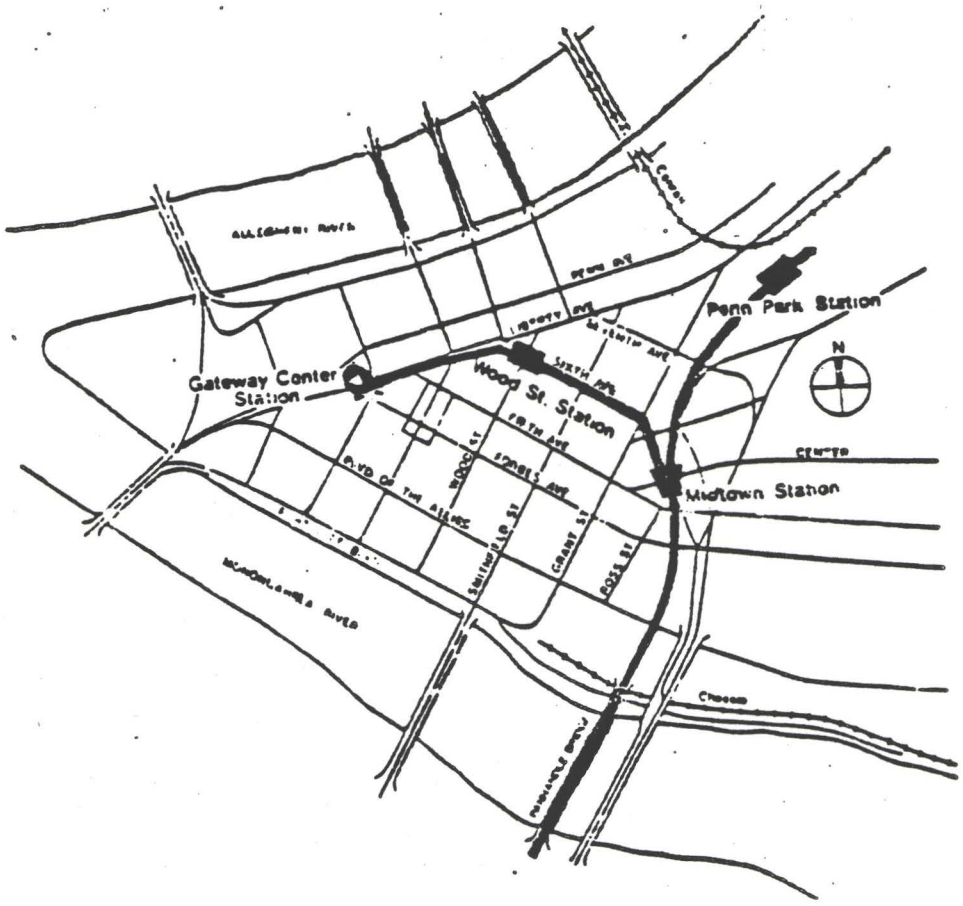


Figure 2-1: Downtown Subway of the Pittsburgh LRT Reconstruction Project

state shares were not issued to PAT directly by the state government. The entire 20 percent local share was paid by the county and later reimbursed by the state. As a result, and because the data is compiled from an agency point of view, the receipts from the state and county governments may be combined into one local share. Thus, Table 2 of each part in Appendix A only tabulates two categories of receipts: federal and local.

Project Cost Overruns

In May of 1984 the Port Authority submitted an application for amended grant for the Stage I LRT project. Additional funds were necessary due to $125 million in extraordinary costs. The Port Authority felt that at least $106.2 million of these extraordinary costs were justifiable according to the terms of the grant contract between PAT and UMTA.

The application cites seven causes for the $125 million in cost overruns:

1. Inflation allowance: construction
2. Inflation allowance: non-construction
3. Expansion of the number of contracts
4. Three year increase in project duration
5. Nine month delay in start of project
6. Required changes in project scope
7. Required changes in the Light Rail Vehicle contracts

A list of these seven causes and the associated overrun values appear in Table 2-1. Note that most of the cited justifications can be directly or indirectly attributed to inflation. For example, certain fixed costs are increased when the duration of the project was increased by three years (column four in Table 2-1). However, the majority of the associated cost increase shown in the table is the inflated cost of performing some of the work at a later time.

Despite the $125 million escalation in these areas, the Port Authority did manage to reduce project costs by $46 million in other areas. PAT attributes this savings to "cost effective project management" and "timely release of federal funds in FY 1984 and FY 1985" [61]. The $125 million project deficit coupled with the $46 million in project savings, yielded a net deficit of $79 million. Thus, the amended grant application called for $79 million in project relief (63.2 federal, 13.167 state and 2.633 local).

Exploratory Data Analysis

The data for the Light Rail Transit reconstruction project are compiled as tables in Appendix A. Because of the large number of contracts associated with the LRT project, the case study data was not compiled for individual contracts. The quantities that appear in each of the tables are a summation over all of the project contracts.

The data is reported in two parts. Part I is a summary of accounts for all categories of payments and receipts, and Part II is a breakdown of payments and receipts by construction categories. In other words, the summary data in Part I is a summation over all of the construction categories itemized in Part II. There are 14 categories of construction considered. Note that the payment structure is not the same for all categories. For example, while retainage is withheld from the contractors in the *construction: fixed facility* category; there is no retainage from *insurance* contracts.

The cumulative unpaid balance and the cumulative surplus/deficit are reported in Part I, Table 4 of Appendix A. Plots of each of these quantities versus the project period provides insight to the financial obligations or opportunities for both the contractors and PAT. Figure 2-2 shows the cumulative unpaid balance (including retainage) over the course

Table 2-1: Summary of LRT Extraordinary Costs (in $ thousands)

	(A) Inflation Allowance Construction	(B) Inflation Allowance Non-Construction	(C) Expand Number of Contracts	(D) Cost of Spreading Work 3 Additional Years	(E) Delay in Start of Program from 9/78 to 6/79	(F) Refinements to the Initial Program	(G) Refinements to LRV Contracts	TOTAL
ENGINEERING	-	5,984	2,566	13,395	3,171	5,999	500	31,065
REAL ESTATE	-	2,532	-	2,532	1,342	-	-	6,406
CONSTRUCTION/ PROCUREMENT	24,632	-	8,160	-	16,893	11,191	-	60,406
FORCE ACCOUNT and UTILITIES	-	907	-	907	480	-	-	2,294
INSURANCE	-	1,155	-	5,660	612	-	-	7,427
LIGHT RAIL VEHICLE	8,634	-	-	-	2,589	-	1,500	4,019
PROJECT ADMINISTRATION	-	666	-	3,000	353	-	-	4,019
TOTAL	33,266	11,244	10,716	25,494	25,440	17,190	2,000	125,350

of the LRT project. This quantity represents the necessary amount of money to be financed by contractors, and in the case of the LRT project this amount increases overall. The mean value of the cumulative unpaid balance is $12.625 million, meaning that on the average, contractors financed $12.625 million in a given project period (month). The maximum amount to be financed by contractors in a given month was $26.741 million.

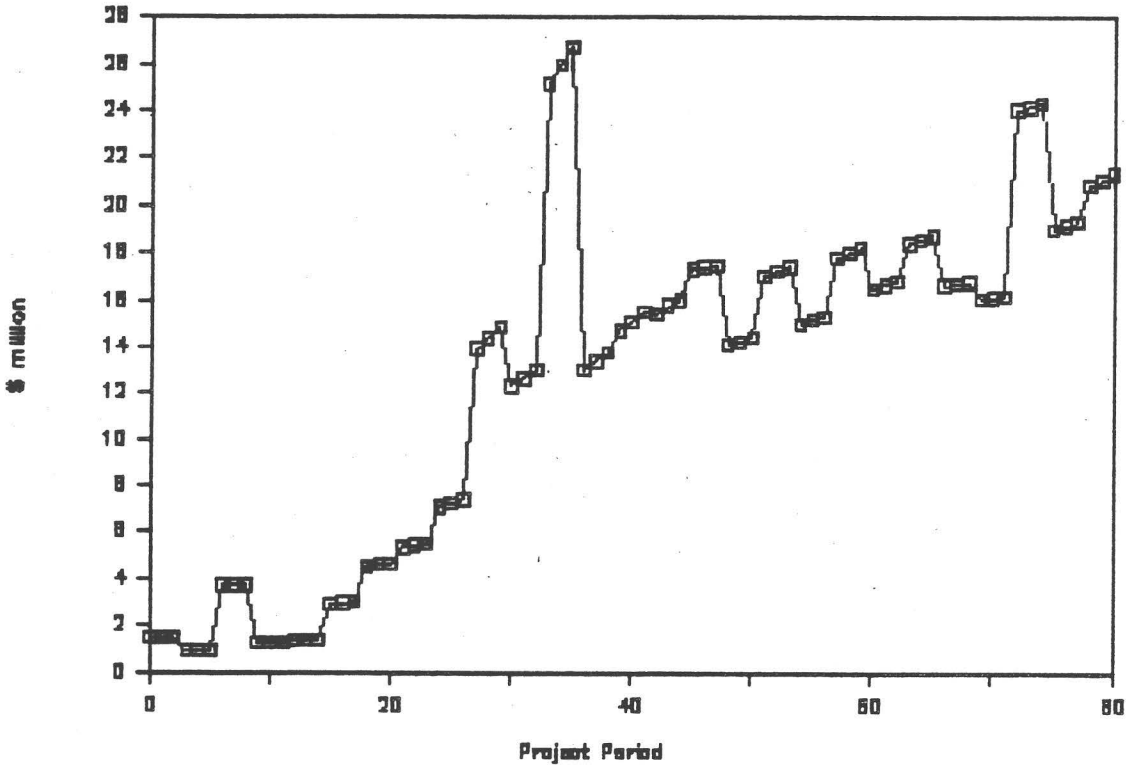


Figure 2-2: Cumulative Unpaid Balance: Pittsburgh LRT Reconstruction

Figure 2-3 is a plot of the cumulative surplus/deficit over the course of the LRT project. An immediate observation here is that the quantity is always negative, meaning that throughout the project the cumulative payments by the agency *exceed* the cumulative receipts from funding sources. This deficit increases (gets more negative) steadily throughout the project. Thus, the transit agency must finance this deficit if it is to avoid project delays. The average value of the deficit in a project period is $12.585 with a maximum value $26.706 million.

By this simple examination of the LRT project data, an approximate assessment of the need for innovative financing arrangements may be made. Here it is seen that financing on the part of both the contractors and the agency is necessary. An examination of the

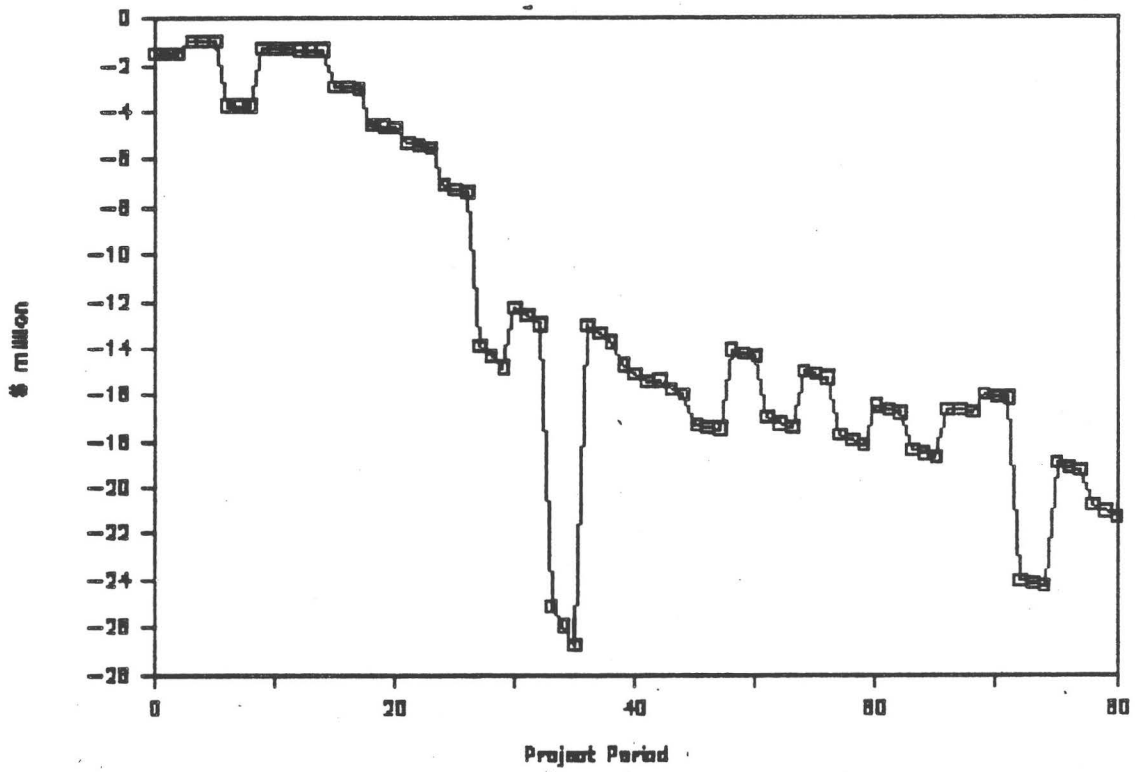


Figure 2-3: Cumulative Surplus/Deficit Pittsburgh LRT Reconstruction

cumulative unpaid balance showed that contractors must finance an average of $12.625 million in a given period, while a review of the cumulative surplus/deficit showed that the agency must finance an average of $12.585 million.

2.4 Everett Maintenance Facility Rehabilitation

Background

The Everett Maintenance Facilities are the Massachusetts Bay Transit Authority's primary overhaul repair shops in Boston, MA. for maintenance of both its steel-wheeled and automotive vehicles. The facilities are located in Everett, northwest of Broadway between Chemical Lane and Bowdoin St.

The Everett Shops were in operation since the 1920's. The workload for the Everett facility increased over the years and, by 1973, the shop was servicing over 1100 buses in addition to the fleets of rail vehicles for the Central Subway of Boston. Despite this increase in working demand on the facilities, they have received little or no renovation. As a result, the Everett facility was deteriorating and outdated.

Project Description

A rehabilitation project was formally proposed in June of 1978. The rehabilitation was divided into four contracts and included (1) upgrading of the central stores and utilities (2) a bus overhaul addition and remodeling (3) a main repair shop addition and remodeling and (4) a new heating plant [55].

The phase of the rehabilitation analyzed in this case study is the renovation of the Bus Overhaul Shop. The renovated buildings provide the receipt of damaged buses or their major elements, cleaning of buses and storage of repaired parts. The renovation also included pits, hoists, and other mechanical accessories where parts can be broken down, cleaned, and repaired. A dynamometer test area was also installed for testing overhauled bus engines.

Project Funding

The original application for the Everett Maintenance Facilities called for total reconstruction of the facilities. However this application was revised upon the request of UMTA to a lesser scope; rather than total replacement, UMTA recommended that the facilities be renovated and rehabilitated. Capital funding for this revised project was approved in September 1978. In addition to the renovation of the Bus Overhaul shop, the revised grant application for the Everett Facilities included the construction of a new Central Heating Facility, additions and reorganization of the Main Repair Sop, site work and utilities.

The renovation of the Bus Overhaul Shop is described in Amendment #2 to the original capital grant application for the reconstruction of the Everett Maintenance Facilities. The estimated project cost was $9,251,764 with an 80 percent federal share (grant) of $7,401,140 and a local share of $1,850,354. The local share was funded by general obligation bonds issued by the MBTA to the general public. Any non-justifiable project cost overrun was to be funded with a similar bond issue. During the first half of construction, the MBTA withheld 5% of the construction expenses from its contractors. This retainage was released to the contractors over the remainder of the construction period.

The MBTA is authorized to issue bonds for capital improvements and other limited purposes within an overall cap on indebtedness. Bonds are to be repaid from general system revenues, assessments on communities served, and assistance from the Commonwealth of Massachusetts. New bonds were issued in 1977 ($75 million), 1979 ($60 million), and 1981 ($45 million), 1982 ($68.3 million), and 1983 ($121 million) [57].

Exploratory Data Analysis

The project data for the Everett Maintenance Facility Rehabilitation is reported in Appendix B. Data similar to that of the Light Rail Transit Reconstruction was collected for the Everett Maintenance Facility Project. However, the *Status of Payments and Retainage* and the *Breakdown of Receipts* columns (Parts II and III) are reported on the contract level.

Part I, Table 4 of Appendix B reports the combined cumulative unpaid balance and cumulative surplus/deficit. A plot of these quantities provides a preliminary assessment of the financing obligations or investment opportunities for the contractors and transit agency. Figure 2-4 shows a plot of the cumulative unpaid balance over the course of the Everett Facilities project. From the figure it is clear that the MBTA did have an outstanding balance with contractors for the entire construction period. The mean value for this unpaid balance is $577,900. That is, on the average, contractors had to finance $577,900 in a given month. The maximum amount financed by contractors in a given month was $1.804 million.

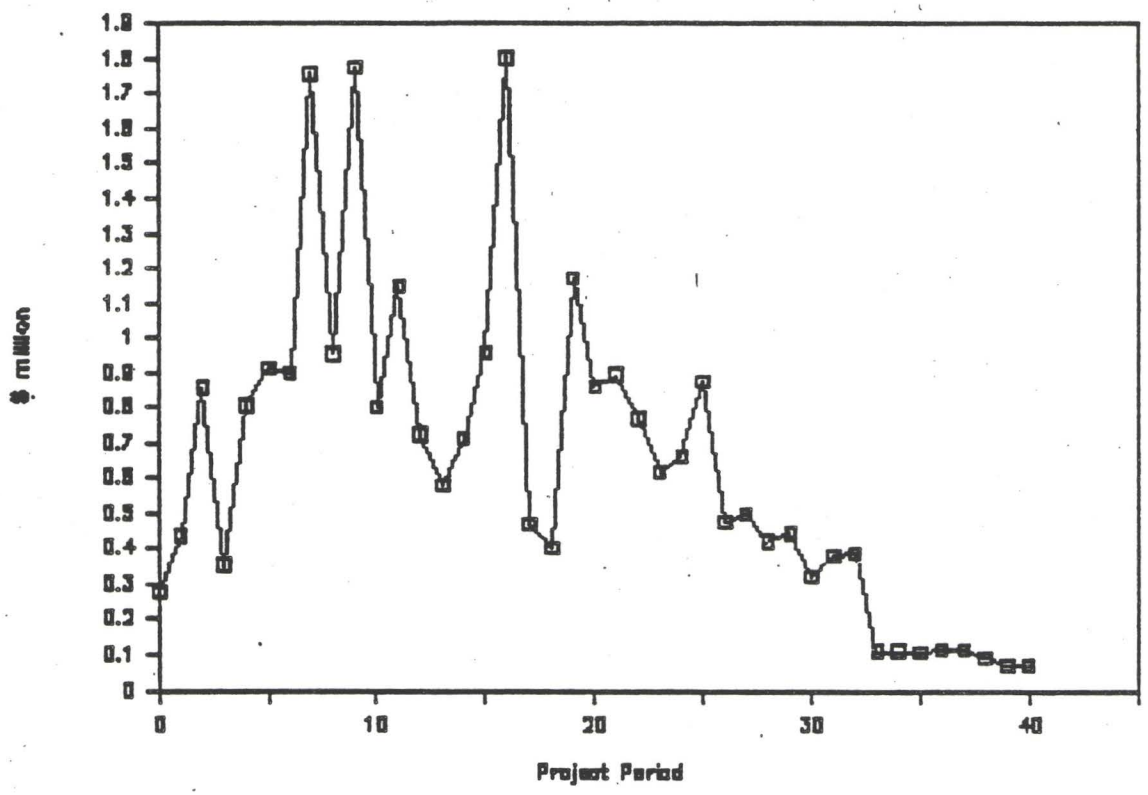


Figure 2-4: Cumulative Unpaid Balance: Everett Maintenance Facility Rehabilitation

The cumulative surplus over the course of construction, Figure 2-5, represents the amount of money to be financed by the MBTA. For the Everett Facilities project cumulative receipts from funding sources are equal to or exceeded cumulative payments from contractors for all periods of construction. The average surplus available to the agency in a given project period was $234,100, while the maximum funding surplus was $1.357 million. It should be noted, however, that expenses of the agency other than contract payments are not included in the computation of the surplus.

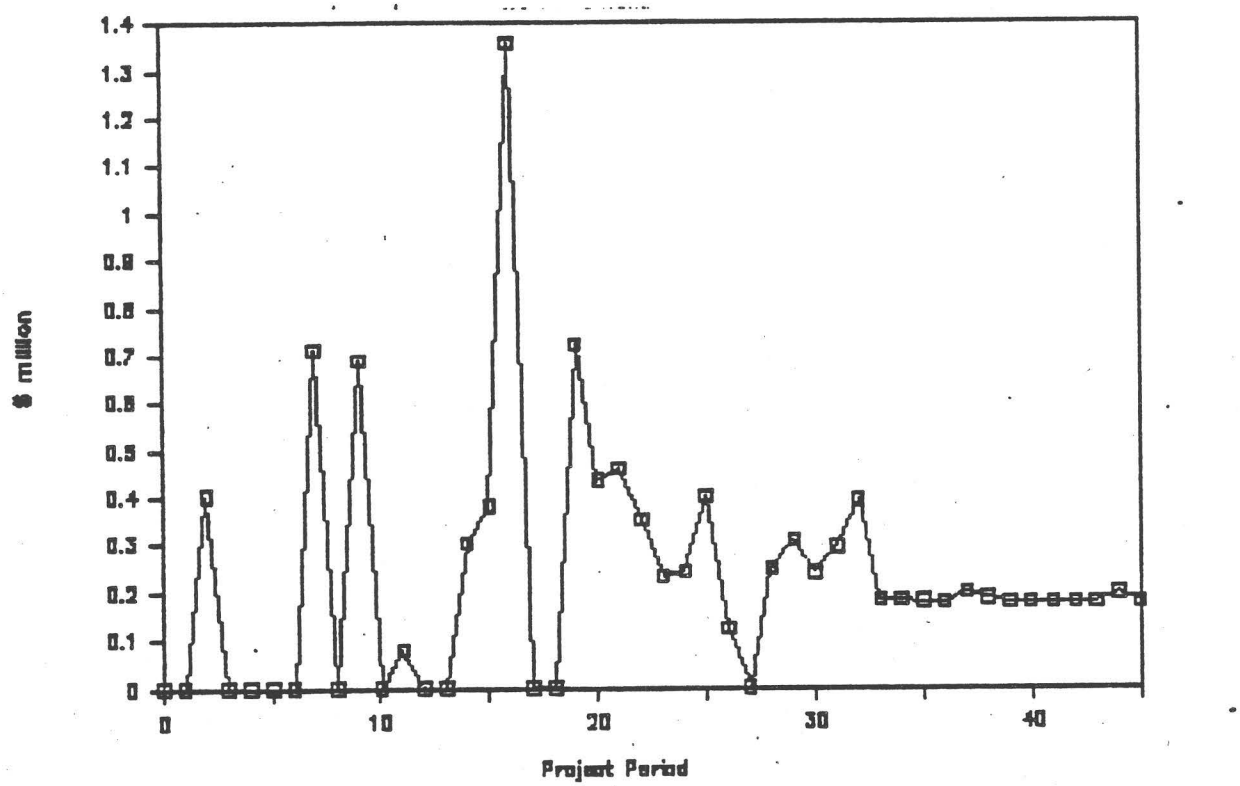


Figure 2-5: Cumulative Surplus/Deficit: Everett Maintenance Facility Rehabilitation

Because of the large financing costs incurred by the contractors in this project, it is possible that a reduction in project costs could be realized through innovative financing arrangements.

2.5 The Reservoir Carhouse-Yard-Station Reconstruction

Background

The Reservoir Carhouse-yard-station complex is part of the Green Line System in Boston, MA. The "Green Line" is the MBTA's street car system, consisting of surface car lines extending from the western and southwestern suburban areas into the Central Subway. This subway is the oldest in North America and serves the Boston central business district and connects with the MBTA's other three rapid transit lines. Figure 2-6 shows the orientation of the Reservoir Carhouse-yard-station with the Green Line and other lines of the subway system. From the Central Subway, the Green Line extends across the Charles River to Lechmere Square in Cambridge via an elevated section and viaduct. The Line also branches East to Riverside as well as South to Arborway.

The surface lines which feed the Central Subway operate in major avenues, primarily in median strips on Commonwealth Avenue, Beacon Street, and Huntington Avenue. The Riverside Line operates for 9.4 miles on the private right-of-way of a former steam railroad.

The carhouse-yard-station rehabilitation was part of an extensive upgrading program of the Green Line System. The Green Line System Improvement Project, initiated in 1972, was originally proposed as an omnibus improvement program for all elements of the Green Line System. The program scope was updated to one concentrating on the refurbishment of the surface branch lines to the west of the Central Subway.

Project Description

The Reservoir carhouse-yard-station complex has a pivotal role in the Green Line System; it is the only carhouse with access to three of the four branch lines. The complex provides maintenance and support for Light Rail Vehicles using the Green Line System. The new facility will accommodate vehicle maintenance, inspection and repair functions, including personnel support facilities [56]. The functions of the shop and its layout are divided into areas for main vehicle overhaul, support of vehicle and personnel operations and vehicle washings.

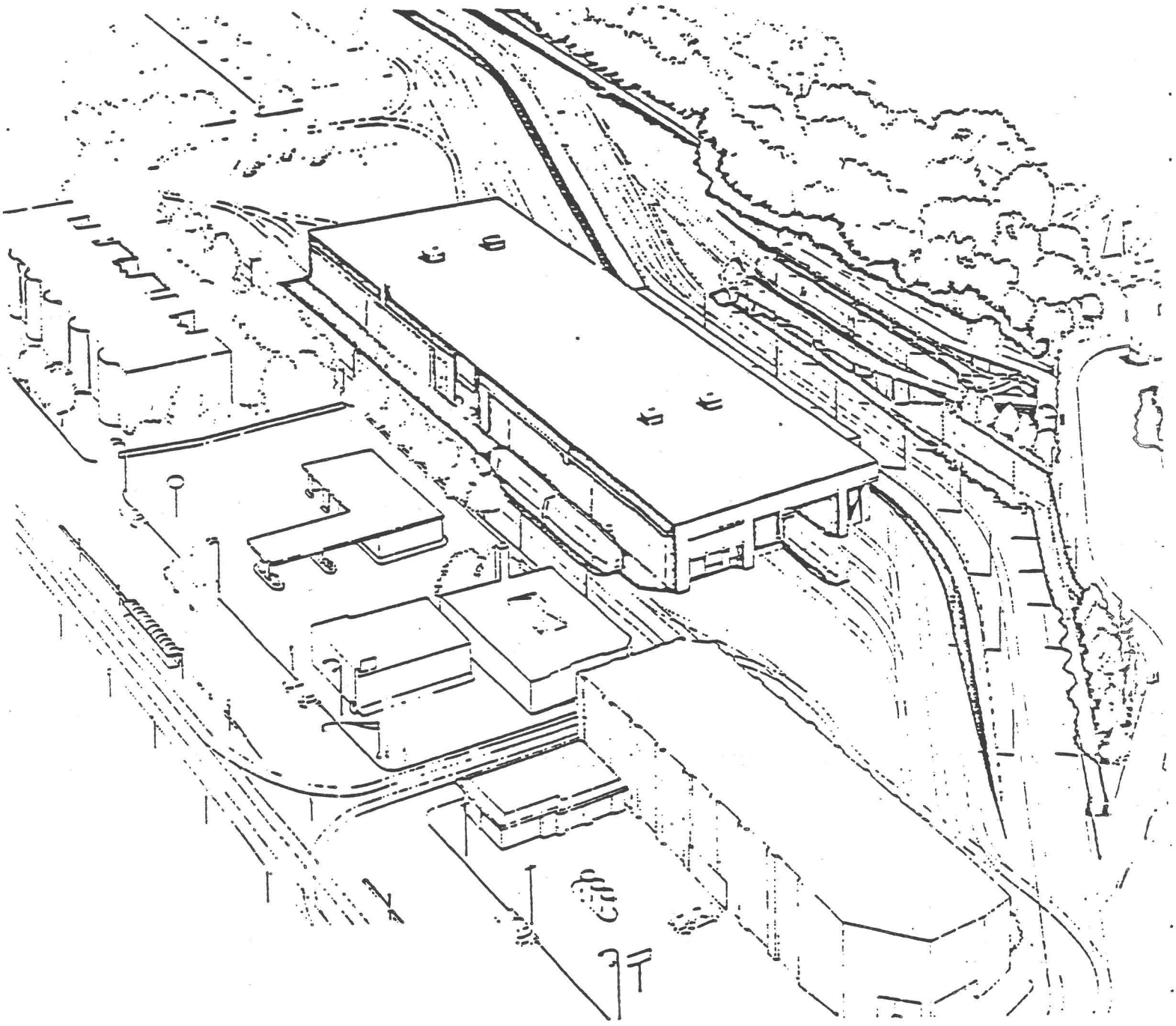
The plan for the rehabilitation of the Reservoir carhouse-yard station complex was to: (1) construct a new carhouse to replace the existing facility; (2) move all the storage and yard movements into the lower yard in an improved orientation with the new carhouse; (3) separate the Riverside Branch revenue trackage from storage and yard movements; (4) increase the flexibility of train movements

The Reservoir facilities reconstruction was divided into two major phases. The first phase a reconfiguration of yard storage tracks, which began in September 1980 and was completed in the Spring of 1982. At that time, the second phase consisting of the new carhouse and lead tracks was begun.

Project Funding

The original capital grant application for the Green Line System Improvement Project was submitted to UMTA in December 1971 and a federal grant of $25,413,330 was awarded to the MBTA. Since that award, many amendments have been added to the original application. The Reservoir Carhouse-yard-station project constitutes amendment number 6 of the Green Line System Improvement Project. The estimated capital cost of the station was $14,186,915 with an 80 percent federal share (grant) of $11,349,532 and a local share of $2,837,383. The local share was funded by general obligation bonds issued by the MBTA to the general public. Any non-justifiable project cost overrun was to be funded with a similar bond issue. During the first half of construction, the MBTA withheld 5% of the construction expenses from its contractors. This retainage was released to the contractors over the remainder of the construction period.

Figure 2-6: The Reservoir Carhouse-yard-station complex



Exploratory Data Analysis

The project data for the Reservoir Carhouse-yard-station Rehabilitation is reported in Appendix C. Data similar to that of the Everett Maintenance Facility Project is reported; including the columns *Status of Payments and Retainage* and *Breakdown of Receipts* for individual contracts (Parts II and III).

Part I, Table 4 of Appendix C reports the combined cumulative unpaid balance and cumulative surplus/deficit. A plot of these quantities provides a preliminary assessment of the financing obligations or investment opportunities for the contractors and transit agency. Figure 2-7 shows a plot of the cumulative unpaid balance over the course of the Carhouse Station project. From the figure it is clear that the MBTA did have an outstanding unpaid balance with contractors for the entire construction period. The mean value for this unpaid balance is $354,200. That is, on the average, contractors had to finance $354,200 in a given month. The maximum amount financed by contractors in a given month was $1.675 million.

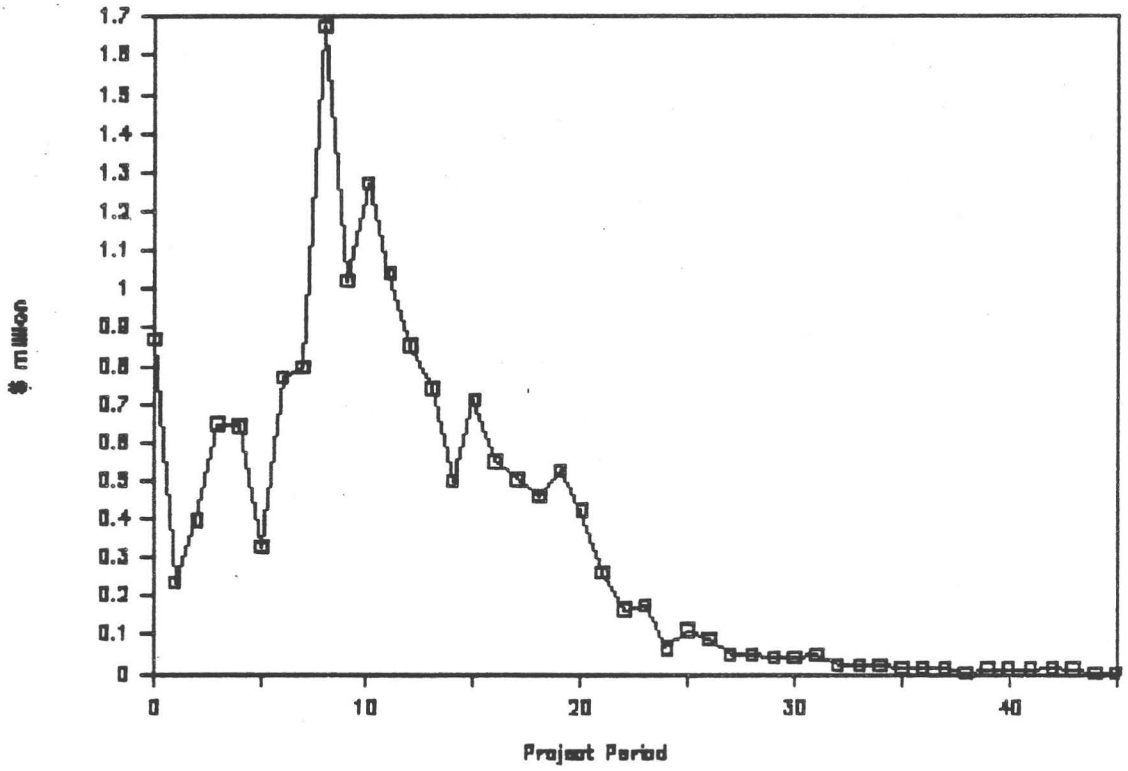


Figure 2-7: Cumulative Unpaid Balance: Reservoir Carhouse-yard-station Rehabilitation

The cumulative surplus over the course of construction, Figure 2-8, represents the amount of money to be financed by the MBTA. For the Carhouse-yard-station project, cumulative receipts from funding sources are equal to or exceeded cumulative payments from contractors for all periods of construction. The average surplus available to the agency in a given project period is $112,700, while the maximum funding surplus is found to be $761,000. It should be noted, however, that expenses of the agency other than contract payments are not included in the computation of the surplus.

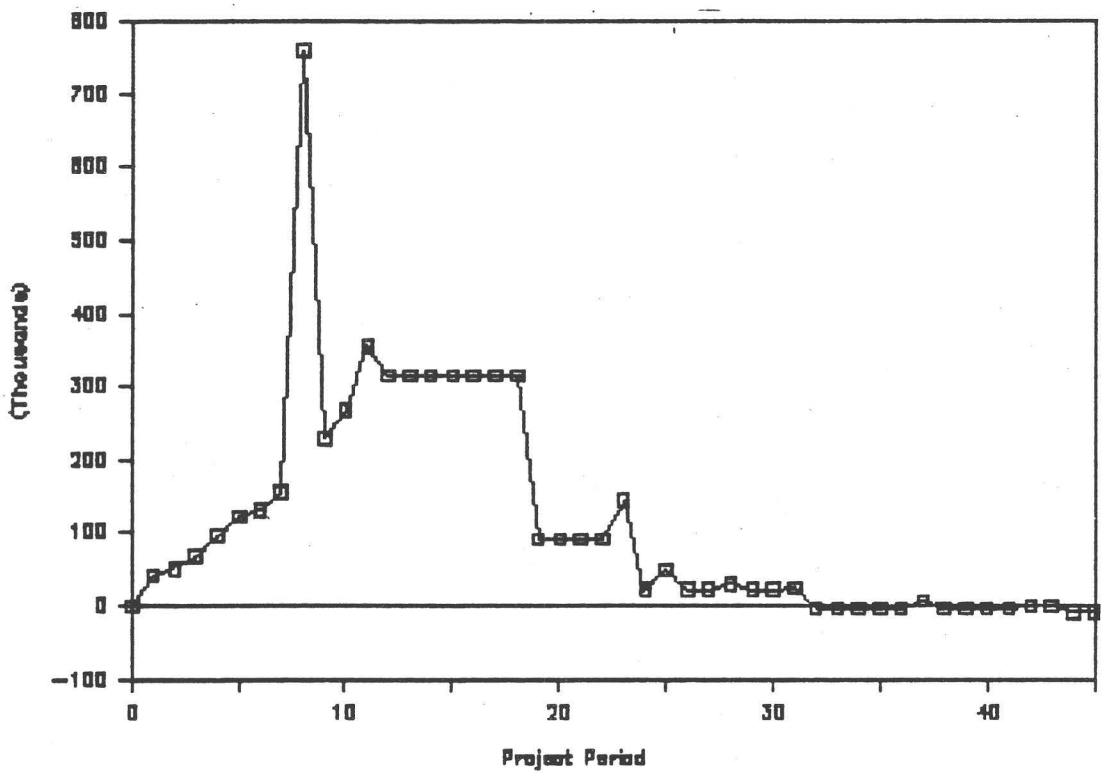


Figure 2-8: Cumulative Surplus/Deficit Reservoir Carhouse-yard-station Rehabilitation

Because of the large financing costs incurred by the contractors in this project, it is possible that a reduction in project costs could be realized through innovative financing arrangements.

2.6 Northwest Bus Maintenance Facility Reconstruction

Background

The Northwest Bus Maintenance Facility in Baltimore, MD. is a facility intended to replace

the Retreat Street Operating Division, a 108 year old facility that was closed in June of 1982. The new facility is believed to significantly impact bus maintenance turn-around time by relieving crowded conditions at existing facilities.

Project Description

The Northwest Bus Maintenance Facility will provide storage for 250 buses and some articulated buses. The facility will consist of two buildings; the site layout provides for easy access to two of Baltimore's main arterial roads [58]. The first building will accommodate areas for bus washing, fueling, storage, other operations and offices. The second building is designed to provide diagnostic, preventive and routine maintenance work such as tune-ups, oil changes, component replacement and air-conditioning repair. The building will also house a parts storage area and a mezzanine level for employees.

Project Funding

The grant awards for land acquisition of the Northwest Bus Maintenance facility were awarded in 1978. This award was a component of previous grant projects approved by UMTA. Capital funds for the construction of the facility itself was approved in early 1984.

It is useful to note the unique structure of Baltimore's Mass Transit Administration (MTA). The MTA, unlike other transit agencies, is an agency under the Maryland Department of Transportation. Thus, any shortfalls in grant receipts can be financed by the general funds of the State of Maryland. Although shortfalls do not present financing obligations to the MTA, the financing costs still exist.

Exploratory Data Analysis

The data for the Northwest Bus Maintenance Facility Reconstruction is reported in Appendix D. All of the data reported for the project is for combined contracts (Part I Tables 1-4). The cumulative balance and cumulative surplus/deficit are reported in Table 4. Because of the financing arrangement between the MTA and the State of Maryland, there are no shortfalls in cumulative payments to contractors and cumulative receipts from funding sources.

However, as shown in Figure 2-9, there exists a positive cumulative unpaid balance to contractors throughout the course of the project. The average value of this unpaid balance is $3.014 million, with a maximum of $4.751 million. This means that on the average contractors had to finance $3.014 million in a given month of the project.

2.7 Comments on Existing Financial Arrangements

In each of four recent transit facility projects, cash flow data including billings from contractors, payments by agency, retainage, and receipts from funding sources has been compiled. From this data, two indicators of financial obligation or investment opportunity

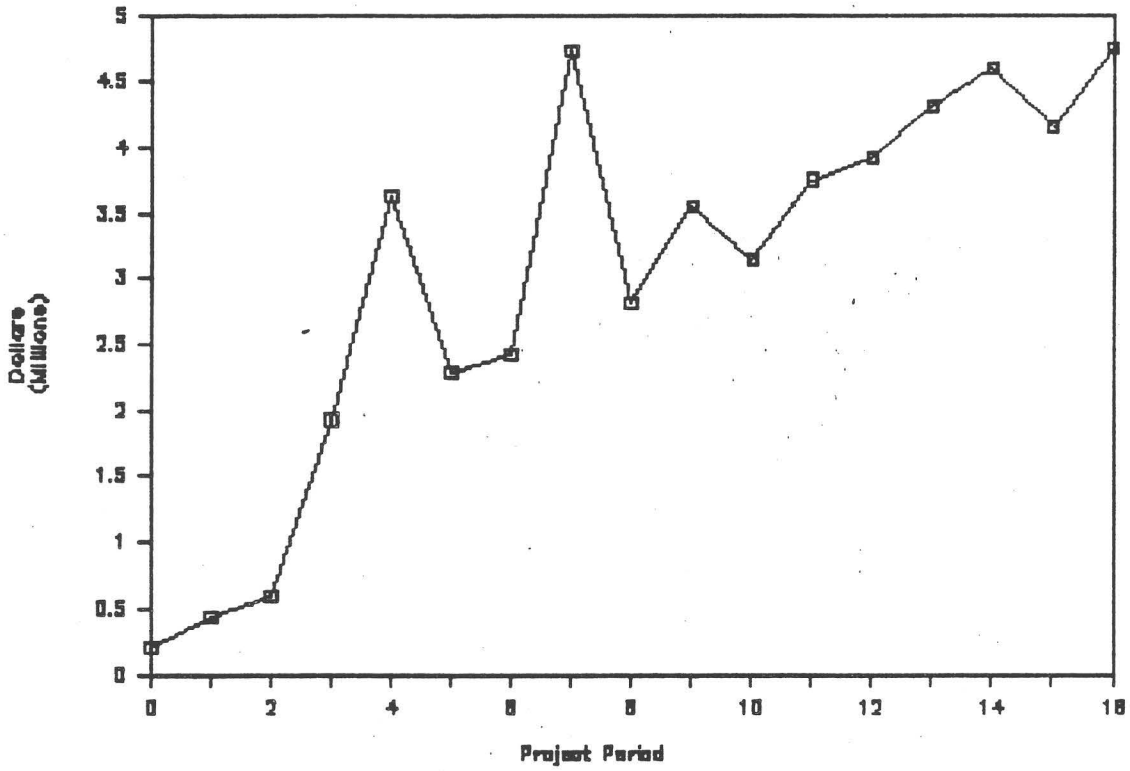


Figure 2-9: Cumulative Unpaid Balance: Northwest Bus Maintenance Facility Reconstruction

for the contractors and transit agency were derived. These indicators, cumulative unpaid balance and cumulative surplus/deficit were plotted as part of an exploratory data analysis to assess the potential of innovative financing arrangements. Mean and maximum values for these quantities are reported for each project in Table 2-2.

In investigating the current construction financing practices of transit agencies it was found in all cases that the agency maintained a positive unpaid balance with contractors throughout the project duration. Thus, in each of the projects, there were significant financing obligations placed on contractors.

In the case of the Light Rail Transit Reconstruction in Pittsburgh, PA, a large cumulative deficit was realized by the transit agency throughout the project. The large cumulative deficit shows a large financing burden on the part of the transit agency. Thus, there is potential to reduce total project costs through innovative financing arrangements. Several case studies illustrate the use of revenue bonds to accomplish bridging of short term finance. The calculations required to review such financing alternatives are discussed in the following two chapters.

Table 2-2: Summary of Unpaid Balance and Surplus/Deficit for Four Transit Projects

	Maximum Cumulative Unpaid Balance	Mean Cumulative Unpaid Balance	Maximum Cumulative Surplus/Deficit	Mean Cumulative Surplus/Deficit
Pittsburgh LRT	26,741,000	12,625,000	− 26,706,000	− 12,585000
Everett Maint. Facilities	1,804,000	578,000	1,357,000	234,000
Resevoir Carhouse-yard-station	1,675,000	354,000	761,000	113,000
Northwest Maint. Facility	4,751,000	3,014,000	0	0

Unlike PAT of Allegheny County, PA, the MBTA in Boston, MA incurred a financing surplus for the projects considered. Knowing that the financing surplus resulted from cumulative receipts less cumulative payments, the source of the surplus could be attributed to either payment arrangements with contractors or receipt arrangements from funding agencies. In both MBTA projects, the "letter of credit system" of federal grant transfer was used prior to 1983 and the "wire transfer system" was used for all project periods after 1983. In general, grant monies were requisitioned upon the billings of contractors. Under the letter of credit system, delays in federal grant receipts ranged from one to two weeks from the requisition date. Under the wire transfer system federal grant money was transferred in one business day. However, payments to contractors were usually delayed by one month. Because the delays in payments to contractors generally exceeded the delays in grant receipts, a financing surplus was realized.

In the case of the Northwest Facility Reconstruction project in Baltimore MD, there was neither a cumulative deficit or surplus. This can be attributed to the unique organization of the MTA. Because the MTA is part of the Maryland Department of Transportation, funds from the general State Treasury were used to bridge any delays in grant receipts.

It appears to be general practice for transit agencies to retain portions of contractor billings as well as delay payments to contractors by approximately one month. We have seen that there is a significant financing burden on contractors in the form of cumulative unpaid balance throughout the project duration. Later in this report it will be shown that

such financial obligations to contractors can significantly increase project cost. In the case of the LRT reconstruction, financing burdens existed for the transit agency as well as contractors. Thus, from examination of construction financing practices of transit agencies, it is worthwhile to consider innovative financing alternatives. In Chapter 5 of this report, several scenarios of innovative financing arrangements are applied to the LRT project and their effectiveness is discussed.

3. FINANCING OF PROJECTS DURING CONSTRUCTION

3.1 Relationships Among Contractors, Owner and Financial Institutions

During the construction of a project, the contractor and the owner often arrange individually or jointly with financial institutions to provide the necessary cash flows to facilitate construction. In order to consider alternative plans for effective financing, it is necessary to examine the significant issues affecting the parties involved and the relationship among them, particularly in light of changing operating conditions and fluctuating economic environments.

In this chapter, we shall first analyze the cash flows from the perspective of a contractor with respect to an owner agency. Contractors often rely on overdraft financing from a bank account to finance unreimbursed construction expenses. As may be expected, the fluctuations in inflation rates and market interest rates directly affect the profits of the contractor, but also indirectly affect the contract price in bidding, negotiation or settlement of disputes. Second, we shall consider the possibility of various choices offered by financial institutions to the contractor for financing a project during construction. Finally, we shall discuss the role of the owner in reducing the contract price through active participation in making financing arrangements for the project.

When the sponsor of a constructed facility is a public agency, it may consider the possibility of leasing the facility from a private owner as well as owning the facility. Thus, the financing of such a facility will take on some special characteristics in addition to those met with straightforward finance during construction. These implications are considered in the final section.

3.2 The Contractor's Perspective

For a contractor, the cash flow profile of expenses and incomes for a construction project typically follows the work in progress for which the contractor will be paid periodically. The markup by the contractor above the estimated expenses is included in the total contract price, and the terms of most contracts generally call for monthly reimbursements of work completed less retainage. For the example in Figure 3-1, the choice of one year as a time period for discounting is motivated by the desire to reduce the number of time periods in illustrating the effects of financing costs and inflation on multi-year projects for which the impacts are most evident. At time period 0, which denotes the beginning of the construction contract, a considerable sum may have been spent in preparation. The expenses which occur more or less continuously for the project duration are depicted by a piecewise continuous curve while the receipts (such as progress payments from the owner) are represented by a step function as shown in Figure 3-1. The receipts from the owner for the work completed are assumed to lag one period behind expenses except that a withholding proportion or remainder is paid at the end of construction. However, the method of analysis described in this report is applicable to

realistic situations where a time period is represented by one month and the number of time periods is extended to cover delayed receipts as a result of retainage.

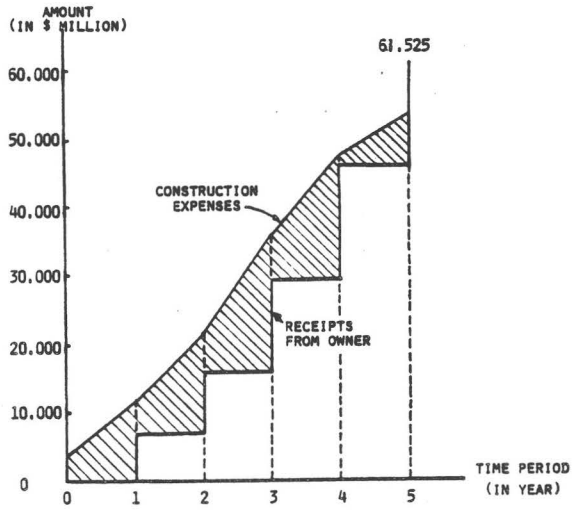


Figure 3-1: Construction Expenses and Periodic Receipts from the Owner

While the cash flow profiles of expenses and receipts are expected to vary for different projects, the characteristics of the curves depicted in Figure 3-1 are sufficiently general for the purpose of discussion. In particular, let the time periods in Figure 3-1 be expressed in years for a n-year project. Then, the expenses incurred and the incomes received at the end of each year t can be tabulated as in Table 3-1, in which E_t represents construction expenses (excluding interest payments) in year t, and P_t represents receipts from owner payments in year t, for t=0,1,2,...,n. (Note that n=5 in the case of Table 3-1). Since E_t is defined as negative for expenses and P_t as positive for receipts, the net cash flow at the end of year t (excluding interest expenses) for $t \geq 0$ is given by:

$$A_t = P_t + E_t \tag{3.1}$$

The cumulative cash flow at the end of year t just before receiving payment P_t (for $t \geq 1$) is:

$$F_t = N_{t-1} + E_t \tag{3.2}$$

where N_{t-1} is the cumulative net cash flows from year 0 to year (t-1). Furthermore, the cumulative net cash flow after receiving payment P_t at the end of year t (for $t \geq 1$) is:

$$N_t = F_t + P_t = N_{t-1} + A_t \tag{3.3}$$

The gross operating profit G for a n-year project is given by:

$$G = \sum_{t=0}^{n} (P_t + E_t) = \sum_{t=0}^{n} A_t = N_n \tag{3.4}$$

where N_n is the net cash flow for t=n. The computation of these quantities has been carried out in Table 3-1.

Table 3-1: Illustrative Expenses and Receipts ($ Millions)

End of year, t (1)	Construction expenses, E_t (2)	Receipts from owner, P_t (3)	Net cash flow (operation only), A_t (4)	Cumulative cash before receipt (operation only), F_t (5)	Cumulative net cash flow (operation only), N_t (6)
0	−3.782	0	−3.782	0	−3.782
1	−7.458	+6.473	−0.985	−11.240	−4.767
2	−10.425	+9.334	−1.091	−15.192	−5.858
3	−14.736	+13.348	−1.388	−20.594	−7.246
4	−11.429	+16.832	+5.412	−18.675	−1.834
5	−5.679	+15.538	+9.859	−7.513	+8.025
	−53.500	+61.525	+8.025		

The measure G of gross profits has the disadvantage that the time value of money is not considered in its calculation. In general, a contractor would prefer to receive profits as early as possible. Calculating the net present value (NPV) or the net future value (NFV) of the cash stream corrects for such time preferences:

$$NPV_{t=0} = \sum_{t=0}^{n} A_t (1 + i)^{-t} = NFV (1 + i)^{-n} \tag{3.5}$$

$$NFV_{t=n} = \sum_{t=0}^{n} A_t (1 + i)^{t} = NPV(1 + i)^{n} \tag{3.6}$$

where the interest rate, i, in this case, should be set equal to the contractor's minimum attractive rate of return (MARR) representing his time preference for money. The NPV will generally be less than the gross profit G, and the NFV will generally be greater.

Since the net cash flow A_t (for t=0,1,....,n) for a construction project represents the amount of cash required or accrued after the owner's payment is plowed back to the project at the end of year t, the internal rate of return (IRR) of this cash flow is often cited in the traditional literature in construction [39] as a profit measure. To compute IRR, let the net present value (NPV) of A_t discounted at an annual rate i be zero, i.e.,

$$NPV = \sum_{t=0}^{n} A_t (1+i)^{-t} = 0 \qquad (3.7)$$

Then, the resulting i (if it is unique) from the solution of Eq. (3.7) is the IRR of the net cash flow A_t. Aside from the complications that may be involved in the solution of Eq. (3.7) as observed in most textbooks of engineering economics, the resulting i = IRR has a meaning to the contractor only if the firm finances the entire project from its own equity. This is seldom if ever the case since most construction firms are highly levered, i.e. they have relatively small equity in fixed assets such as construction equipment, and depend almost entirely on borrowing in financing individual construction projects. The use of the IRR of the net cash flows as a measure of profit for the contractor is thus misleading. It does not represent even the IRR of the bank if the contractor finances the project through overdraft since the gross operating profit would not be given to the bank. As a result, useful measures of project profits must consider financing expenses.

3.3 Overdraft Financing by the Contractor

Since overdraft is the most common form of financing for small or medium size projects, we shall first consider the financing costs and effects on profit of the use of overdrafts. The amount of overdraft at the end of year t is the cumulative net cash flow N_t if the interest on the overdraft for each year t is paid by the contractor at the end of each year. Furthermore, if N_t is positive, a surplus is indicated and the subsequent interest would be paid to the contractor. Most often, N_t is negative during the early time periods of a project and becomes positive in the later periods when the contractor has received payments exceeding expenses; thus, in the example in Table 3−1, the surplus in year 5 represents the gross profit when the project is terminated.

If the contractor uses overdraft financing but pays the annual interest on the accumulated overdraft at a borrowing rate i, then the annual interest for the accumulated overdraft N_{t-1} from the previous year (t−1) is given by:

$$I_t = i\, N_{t-1} \qquad (3.8)$$

Suppose that the annual interest on the construction expenses E_t for year t (for $t \geq 1$) can be approximated by:

$$\bar{I}_t \cong \frac{iE_t}{2} \qquad (3.9)$$

Then the total annual interest paid for overdraft financing becomes

$$\hat{I} = I_t + \bar{I}_t = i\, N_{t-1} + \frac{iE_t}{2} \qquad (3.10)$$

If the contractor can further defer the payments of annual interest until the end of the project while the interest on such deferred payments are compounded to the end of the project, then the amount of additional overdraft D at the end of the project (t=n) is equal to the net future value (NFV) of $\hat{I}_t$ compounded at the annual rate i to period t=n. That is:

$$D = [NFV]_{i,t=n} = \sum_{t=1}^{n} \hat{I}_t (1+i)^{n-t} \tag{3.11}$$

where D is defined as negative for overdraft. The gross operating profit less the financing costs (i.e., the additional overdraft to finance the interest payments) becomes:

$$\hat{G} = G + D \tag{3.12}$$

Furthermore, the cumulative cash flow at the end of year t including accumulated interest charges just before receiving P_t (for $t \geq 1$) is seen to be:

$$\hat{F}_t = F_t + \sum_{k=1}^{t} \hat{I}_k (1+i)^{t-k} \tag{3.13}$$

Finally, the cumulative net cash flow including accumulated interest charges after receiving payment P_t at the end of year t (for $t \geq 1$) is:

$$\hat{N}_t = \hat{F}_t + P_t \tag{3.14}$$

For t=n, we have $\hat{N}_n = \hat{G}$.

It is important to emphasize that the method of financing a construction project affects not only the costs of financing (and thus the overall profit) but also the cash flow management for the project. In the example just cited, two possible schemes may be used for overdraft financing: (1) using limited overdrafts to cover the cumulative shortfall during construction while paying the annual interest for such borrowing from company funds, and (2) using additional overdrafts to cover the cumulative shortfall resulting from both construction and interest expenses. For the former case, the contractor must prepare to pay the annual interest as indicated in column (4) for $\hat{I}_t$ in Table 3-2, which has a different time value for each year. In the latter case, the contractor pays nothing while the project is in progress but pays a lump sum of $ 6.641 million obtained by noting n=5 in Eq. (3.11), which reflects the time value at the end of five years. That is,

$$D = [NFV]_{11\%} = \sum_{t=1}^{5} \hat{I}_t (1.11)^{5-t} = -6.641$$

Furthermore, for the latter case, $\hat{G} = G + D = 8.025 - 6.641 = \$1.384$ million, which is identical to $\hat{N}_5$ in Column (6) of Table 3-2. The computation of remaining quantities using Equations. (3.13) and (3.14) is carried out in Table 3-2.

If a contractor is free to borrow as much as needed, the maximum amount of overdraft for each scheme is different, as indicated by the differences in the magnitudes of F_t and $\hat{F}_t$ in Tables 3-1 and 3-2 respectively. The corresponding magnitudes of overdraft over

Table 3-2: Interest Due to Overdraft Financing ($Millions)

End of year, t (1)	Interest due to cumulative net cash (operation only), I_t (2)	Interest due to current year expenses, $\bar{I}_t$ (3)	Total annual interest, $\hat{I}_t$ (4)	Cumulative cash before receipt (with interest), $\hat{F}_t$ (5)	Cumulative net cash flow (with interest), $\hat{N}_t$ (6)
0	0	0	0	0	−3.782
1	−0.416	−0.410	−0.826	−12.066	−5.593
2	−0.524	−0.573	−1.097	−17.206	−7.872
3	−0.644	−0.810	−1.454	−24.284	−10.936
4	−0.797	−0.628	−1.425	−24.187	−7.354
5	−0.202	−0.312	−0.514	−14.154	+1.384

time for these two cases are also shown in Figure 3−2. Note that the areas in Figure 3−2(a) correspond to the shaded portion between the expense and payment curves in Figure 3−1, whereas in Figure 3−2(b), the magnitude of overdrafts are affected by the inclusion of interest expenses charged at the end of each period and compounded to the end of the project. If the minimum attractive rate of return of the contractor is the same as the borrowing rate, then the two overdraft financing schemes have equivalent effects.

3.4 Effects Of Inflation on Contract Price

In times of economic uncertainty, the fluctuations in inflation rates and market interest rates affect profits significantly. The total contract price is usually a composite of receipts in then−current dollars at different payment periods. Hence, estimated expenses are also expressed in then−current dollars.

Cash flows in then−current dollars can be converted to constant dollars at t=0 or t=n for the purpose of evaluating the profit in constant dollars. Let j represent the constant inflation rate per period, i' represent the interest rate including inflation, and i denote the interest rate excluding inflation for the same period. Then:

$$i = \frac{i'-j}{1+j} \tag{3.15}$$

If j is small compared to 1, i can be approximated by:

$$i \cong i' - j \tag{3.16}$$

Conversely,

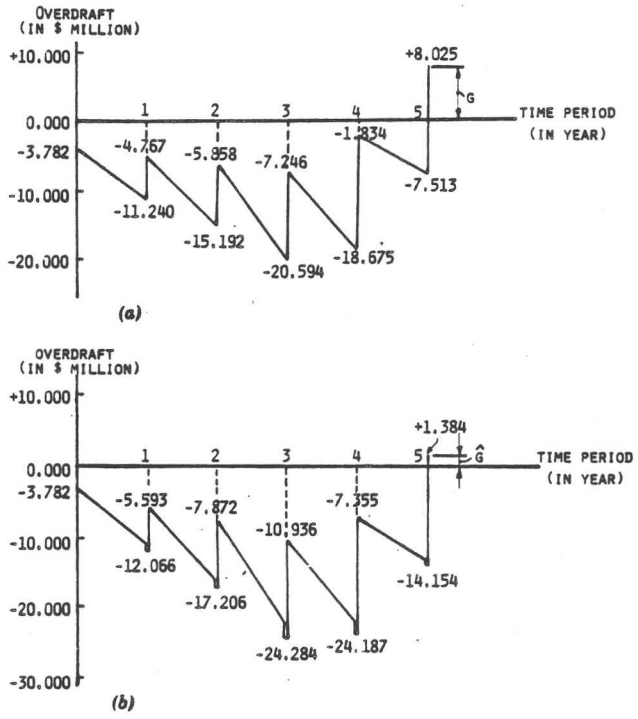


Figure 3-2: Overdraft for Project Financing: (a) Annual Interest Paid at End of Each Year; (b) Annual Interest Accrued to Overdraft Until End of Project

$$i' = i + j + ij \tag{3.17}$$

If both i and j are small compared to 1, i' can be approximated by:

$$i' \cong i + j \tag{3.18}$$

Then, the net cash flow A'_t in then-current dollars for period t may be expressed as A_t in constant dollars of period 0 as follows:

$$A_t = A'_t (1+j)^{-t} \tag{3.19}$$

To illustrate, suppose that the expenses and receipts for the construction project in Table 3-1 are expressed in then-current dollars in an inflationary situation with annual inflation rate of 4%. The market interest rate reflecting this inflation is now 15%. In considering these expenses and receipts in then-current dollars and using an interest rate of 15% including inflation, we can recompute the cumulative net cash flow (with interest) in Table

3-3. Thus, the gross profit less financing costs becomes $\hat{G} = \hat{N}_n = -\$1.786$ million. In brief, there will be a loss rather than a profit after deducting financing costs and adjusting for the effects of inflation with this project.

Table 3-3: Overdraft Financing Based on Inflated Dollars ($Millions)

End of year, t (1)	Interest due to cumulative net cash (operation only), I_t (2)	Interest due to current year expenses, $\bar{I}_t$ (3)	Total annual interest, $\hat{I}_t$ (4)	Cumulative cash before receipt (with interest), $\hat{F}_t$ (5)	Cumulative net cash flow (with interest), $\hat{N}_t$ (6)
0	0	0	0	−3.782	−3.782
1	−0.567	−0.559	−1.126	−12.366	−5.893
2	−0.715	−0.782	−1.497	−17.984	−8.650
3	−0.879	−1.108	−1.987	−25.792	−12.444
4	−1.087	−0.857	−1.944	−26.597	−9.765
5	−0.275	−0.426	−0.701	−17.324	−1.786

Suppose further that besides the inflation rate of 4%, the project is suspended at the end of year 2 due to a labor strike and resumed after one year. Also, assume that while the contractor will incur higher interest expenses due to the work stoppage, the owner will not increase the payments to the contractor. The cumulative net cash flows for the cases of operation only and of operation and financing expenses are recomputed and tabulated in Tables 3-4 and 3-5 respectively. The construction expenses and receipts in then-current dollars resulting from the work stopping are shown in Figure 3-3(a) while the net cash flow of the project including financing (with annual interest accumulated in the overdraft to the end of the project) is shown in Figure 3-3(b). It is noteworthy that, with or without the work stoppage, the gross operating profit declines in value at the end of the project as a result of inflation, but with the work stoppage it has eroded further. When higher interest rates in an inflationary environment are taken into account, the combined effects of inflation and the work stoppage on the net cash flow lead to a loss of $5.401 million (including financing costs) which is yet higher than the $1.786 million loss when there is no work stoppage.

3.5 Choices Offered by Financial Institutions

Of course, a construction project can be financed in many ways other than through the use of overdrafts. For example, the contractor can obtain loans so as to reduce the magnitude of overdraft on its primary account. As an illustration for the project with expenses and receipts given in Table 3-1, assume that a series of loans $\bar{P}_t$ is obtained and

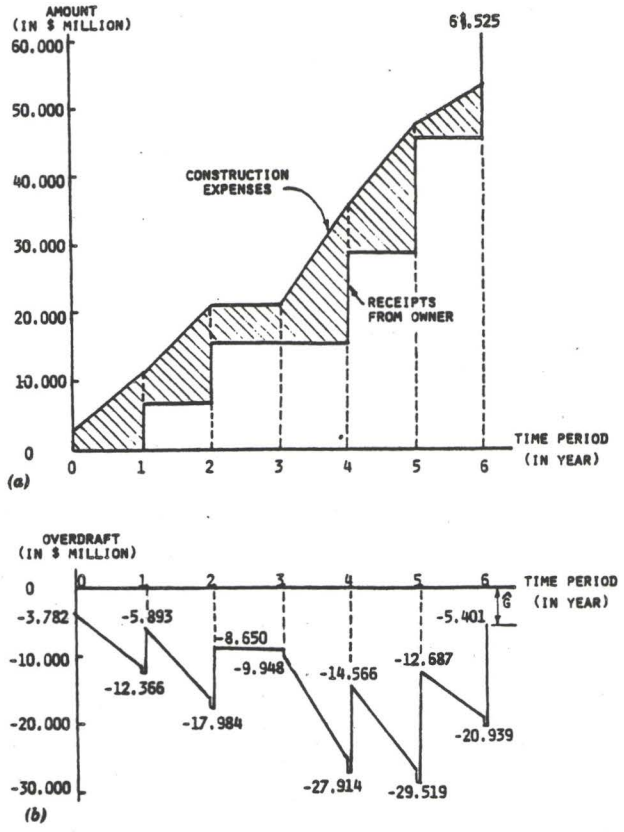


Figure 3-3: Effects of Inflation and work Stoppage: (a) Expenses and Receipts in Inflated Dollars; (b) Overdraft Including Accrued Annual Interest

a schedule of repayments $\bar{E}_t$ of principal and interest is negotiated as shown in Table 3-6. Assume further that there is either no inflation or the effects of inflation have been removed as described above for both the operating and financing cash flows. It can easily be seen from the repayment schedule that the interest rate of the loans is 11% in this table. This can be verified by noting that the net cash flow for this financing plan is:

$$\bar{A}_t = \bar{P}_t + \bar{E}_t \tag{3.20}$$

and that

$$[NFV]_i = \sum_{t=0}^{t=n} \bar{A}_t (1+i)^{n-t} = 0 \tag{3.21}$$

or

Table 3-4: Then-Current Expenses and Receipts Due to Work Stoppage ($Millions)

End of year, t (1)	Construction expenses, E_t (2)	Receipts from owner, P_t (3)	Net cash flow (operation only), A_t (4)	Cumulative cash before receipt (operation only), F_t (5)	Cumulative net cash flow (operation only), N_t (6)
0	−3.782	0	−3.782	−3.782	−3.782
1	−7.458	+6.473	−0.985	−11.240	−4.767
2	−10.425	+9.334	−1.091	−15.192	−5.858
3	0	0	0	−5.858	−5.858
4	−15.325	+13.348	−1.977	−21.183	−7.835
5	−11.877	+16.832	+4.955	−19.712	−2.880
6	−5.906	+15.538	+9.632	−8.786	+6.752
	−54.773	+61.525	+6.752		

Table 3-5: Overdraft Financing with Work Stoppage and Inflation ($Millions)

End of year, t (1)	Interest due to cumulative net cash (operation only), I_t (2)	Interest due to current year net cash, $\bar{I}_t$ (3)	Total annual interest, $\hat{I}_t$ (4)	Cumulative cash before receipt (with interest), $\hat{F}_t$ (5)	Cumulative net cash flow (with interest), $\hat{N}_t$ (6)
0	0	0	0	−3.782	−3.782
1	−0.567	−0.559	−1.126	−12.366	−5.893
2	−0.715	−0.782	−1.497	−17.984	−8.650
3	−0.879	0	−0.879	−9.948	−9.948
4	−0.879	−1.149	−2.028	−27.914	−14.566
5	−1.175	−0.891	−2.066	−29.519	−12.687
6	−0.432	−0.443	−0.875	−20.939	−5.401

$$[\text{NPV}]_i = \sum_{t=0}^{n} \bar{A}_t \, (1+i)^{-t} = 0 \qquad (3.22)$$

The computation of these quantities for n=5 has been carried out in Table 3-6.

It is important to note that as long as the contractor is free to borrow from or deposit any amount in a bank at a rate of i=11%, it does not matter theoretically how this series

Table 3-6: Financing Cash Flow and its Effects ($Millions)

End of year, t (1)	Loans, $\bar{P}_t$ (2)	Repay-ments, $\bar{E}_t$ (3)	Net cash flow (financing), $\bar{A}_t$ (4)	*NFV* of $\bar{A}_t$ (financing), $\bar{A}_t(1+i)^{n-t}$ (5)	*NPV* of $\bar{A}_t$ (financing), $\bar{A}_t(1+i)^{-t}$ (6)
0	+5.000	0	+5.000	+8.426	+5.000
1	+5.000	−0.550	+4.450	+6.756	+4.009
2	+8.000	−1.100	+6.900	+9.436	+5.600
3	+8.000	−1.980	+6.020	+7.417	+4.402
4	0	−15.860	−15.860	−17.065	−10.447
5	0	−14.430	−14.430	−14.430	−8.564
				0	0

of loans will be used to reduce the overdraft. At one extreme, the contractor may choose to depend on overdrafts and use none of the loan credit available for construction expenses except depositing the loan funds in the bank. Then at the end of the project (t=5), the accrued interest from the series of loans will be just sufficient to balance the repayments as indicated by a zero net future value of the stream of cash flows $\bar{A}_t$. At the other extreme, the contractor may use as much loan credit as possible to reduce the overdraft, but that will have no effect on the gross operating profit after deducting financing costs. In reality, long term credit is charged a lower interest rate with some fixed issuing charge. As long as the fixed charge for issuing a loan is small, it normally becomes desirable to use long term credit to reduce interest charges on overdraft accounts.

As an example, suppose that the interest rate for long-term credit is 9% with a fixed charge of $260,000 at t=0 for the series of loans in Column (2) of Table 3-7, and this fixed charge (1% of the sum of the loans over the years) is recorded as repayment at t=0 in Column (3) of the table. Ignoring the fixed charge, it can be shown that the net cash flow for financing indeed has an IRR of 9%, ie.,

$$[\text{NPV}]_{9\%} = \sum_{t=0}^{n} \bar{P}_t\,(1+i)^{-t} + \sum_{t=1}^{n} \bar{E}_t\,(1+i)^{-t} = 0 \qquad (3.23)$$

Using this financing scheme, the interest due to current year expenses $\bar{I}_t$ can be recomputed using i=9% in Eq. (3.9), and the results for $t \geq 0$ are recorded in column (5) of Table 3-7. Hence, the combined net cash flow $\hat{A}_t$ in year t for operating and financing is given by:

$$\hat{A}_t = A_t + \bar{I}_t + \bar{A}_t \qquad (3.24)$$

where A_t is the operating net cash flow given in Column (4) of Table 3-1. From the values of $\hat{A}_t$ recorded in Column (6) of Table 3-7, it can be seen that the cumulative net cash in earlier years will bear interest (assumed to be 9%) until it is needed for repayment of loans in later periods. Thus, for any year t, the cumulative net cash is given by:

$$\hat{N}_t = \sum_{k=1}^{t} [\, \hat{A}_{k-1} (1+i) + \hat{A}_k \,] \qquad (3.25)$$

where k is a dummy variable for summation. The results of calculating $\hat{N}_t$ are recorded in Column (7) of Table 3-7, where $N_5 = \hat{G}$ at t=5 is found to be $ 2.403 million.

Table 3-7: Long-Term Financing at Lower Rate ($Millions)

End of year, t (1)	Loans, $\hat{P}_t$ (2)	Repayments, $\hat{E}_t$ (3)	Net cash flow (financing), $\hat{A}_t$ (4)	Interest due to current year expenses, $\hat{I}_t$ (5)	Net cash flow (combined), $\hat{A}_t$ (6)	Cumulative net cash (combined), $\hat{N}_t$ (7)
0	+5.000	−0.260	+4.740	0	+0.958	+0.958
1	+5.000	−0.450	+4.550	−0.335	+3.230	+4.274
2	+8.000	−0.900	+7.100	−0.469	+5.540	+10.199
3	+8.000	−1.620	+6.358	−0.663	+4.329	+15.446
4		−15.340	−15.340	−0.514	−10.442	+6.394
5		−14.170	−14.170	−0.255	−4.566	+2.403

Consequently, the contractor will receive a profit after financing of $2.403 million at the end of the project if long-term credit is used, as opposed to $1.384 million if the financing is obtained through overdrafts. With different methods and terms of financing large-scale construction projects, the difference can be quite substantial.

3.6 Owner's Contribution to Project Cost

The owner of a constructed facility usually has a better credit rating and can secure loans at a lower borrowing rate, but there are some notable exceptions to this rule, particularly for construction projects in developing countries. Under certain circumstances, it is advisable for the owner to advance periodic payments to the contractor in return for some concession in the contract price. This is particularly true for large-scale construction projects with long duration for which financing costs and capital requirements are high. Suppose that an owner can obtain long term credit at an annual interest rate of 9%, but the contractor must use overdraft at a rate of 11% for financing the project with cash flow requirements in Table 3-1. If the owner is willing to assume the credit for the

series of loans in Table 3-7 and to advance these amounts to the contractor, the gain in lower financing costs can be shared by both parties through prior agreement.

Unfortunately, the choice of construction financing is often left to the contractor who alone cannot take advantage of all available options. The owner is often shielded from participation through the traditional method of price quotation for construction contracts. For example, the project with cash flow requirements in Table 3-1 would be quoted as a construction project of $61.525 million in spite of the fact that the payments made at different time periods have different time values even if there is no inflation. There is no hint of the cost of the project in constant dollars at a specific time, let alone the cost of financing as opposed to the cost of operation. This practice merely exacerbates the problem by excluding the owner from participating in decisions which may reduce the cost of the project.

Under conditions of economic uncertainty, a premium to hedge the risk must be added to the estimation of construction cost by both the owner and the contractor. The larger and longer the project is, the greater is the risk. For an unsophisticated owner who tries to avoid all risks and to place the financing burdens of construction on the contractor, the contract prices for construction facilities are likely to be increased to reflect the risk premium charged by the contractors. In dealing with small projects with short durations, this practice may be acceptable particularly when the owner lacks any expertise to evaluate the project or the financial stability to adopt innovative financing schemes.

However, for large scale projects of long duration, the owner cannot escape the responsibility of participation if it wants to avoid catastrophes of run-away costs and expensive litigation. The construction of nuclear power plants in the private sector and the construction of transportation facilities in the public sector in the last decades offer ample examples of such problems. If the responsibilities of risk sharing among various parties in a construction project can be clearly defined in the planning stage, all parties can be benefited to take advantage of cost saving and early use of the constructed facility.

3.7 Private Ownership of Public Facilities

In recent years, various organizational ownership schemes have been proposed to raise the level of investment in constructed facilities. For example, independent authorities are assuming responsibility for some water and sewer systems, while private entrepreneurs are taking over the ownership of public buildings such as stadiums and convention centers in joint ventures with local governments. Such ownership arrangements not only can generate the capital for new facilities, but also will influence the management of the construction and operation of these facilities.

A particular organizational arrangement or financial scheme is not necessarily superior to all others in each case. Even for similar facilities, these arrangements and schemes may differ from place to place or over time. For example, U.S. water supply systems are owned and operated both by relatively large and small organizations in either the private or

public sector. Modern portfolio theory suggest that there may be advantages in using a variety of financial schemes to spread risks. Similarly, small or large organizations may have different relative advantages with respect to personnel training, innovation or other activities.

While it is difficult to conclude definitely that one or another organizational or financial arrangement is always superior, different organizations have systematic implications of the ways in which constructed facilities are financed, designed and constructed. Moreover, the selection of alternative investments for constructed facilities is likely to be affected by the type and scope of the decision-making organization.

Differences in Required Rates of Return

A basic difference between public and private ownership of facilities is that private organizations are motivated by the expectation of profits in making capital investments. Consequently, private firms have a higher minimum attractive rate of return (MARR) on investments than do public agencies. The MARR represents the desired return or profit for making capital investments. Furthermore, private firms often must pay a higher interest rate for borrowing than public agencies because of higher bonds to public agencies. With higher required rates of return, we expect that private firms will require greater receipts than would a public agency to make a particular investment desirable.

In addition to different minimum attractive rates of return, there is also an important distinction between public and private organizations with respect to their evaluation of investment benefits. For private firms, the returns and benefits to cover costs and provide profit are *monetary revenues*. In contrast, public agencies often consider *total* social benefits in evaluating projects. Total social benefits include monetary user payments plus users' surplus (e.g., the value received less costs incurred by users), external benefits (e.g., benefits to local businesses or property owners) and nonquantifiable factors (e.g., psychological support, unemployment relief, etc.). Generally, total social benefits will exceed monetary revenues.

While these different valuations of benefits may lead to radically different results with respect to the extent of benefits associated with an investment, they do not necessarily require public agencies to undertake such investments directly. First, many public enterprises must fund their investments and operating expenses from user fees. Most public utilities fall into this category, and the importance of user fee financing is increasing for many civil works such as waterways. With user fee financing, the required returns for the public and private firms to undertake the aforementioned investment are, in fact, limited to monetary revenues. As a second point, it is always possible for a public agency to contract with a private firm to undertake a particular project.

All other things being equal, we expect that private firms will require larger returns from a particular investment than would a public agency. From the users or taxpayers point of view, this implies that total payments would be *higher* to private firms for identical

services. However, there are a number of mitigating factors to consider, as we shall consider in the following.

Tax Implications of Public Versus Private Organizations

Another difference between public and private facility owners is in their relative liability for taxes. Public entities are often exempt from taxes of various kinds, whereas private facility owners incur a variety of income, property and excise taxes. However, these private tax liabilities can be offset–at least in part–by tax deductions of various kinds.

For private firms, income taxes represent a significant cost of operation. However, taxable income is based on the gross revenues less all expenses and allowable deductions as permitted by the prevalent tax laws and regulations. The most significant allowable deductions are depreciation and interest. By selecting the method of depreciation and the financing plan which are most favorable, a firm can exert a certain degree of control on its taxable income and, thus, its income tax.

Another form of relief in tax liability is the investment tax credit which allows a direct deduction for income tax purposes of a small percentage of the value of certain newly acquired assets. The percentage of the cost of the asset that represents the investment tax credit depends on the estimated useful life of the asset.

Of course, a firm must have profits to take direct advantage of such tax shields, i.e., tax deductions only reduce tax liabilities if before–tax profits exist. In many cases, investments in constructed facilities have net outlays or losses in the early years of construction. Generally, these losses in early years can be offset against profits occurred elsewhere or later in time. For example, profits from existing facilities can be used to offset losses or to finance construction for new facilities. Without such offsetting profits, losses can be carried forward by the firm or merged with other firms' profits, but these mechanisms will not be reviewed here.

Effects of Financing Plans

Major investments in constructed facilities typically rely upon borrowed funds for a large portion of the required capital investments. For private organizations, these borrowed funds can be useful for leverage to achieve a higher return on the organizations' own capital investment.

For public organizations, borrowing costs which are larger than the MARR results in increased "cost" and higher required receipts. Of course, incurring these costs may be essential if the investment funds are not otherwise available: Capital funds must come from somewhere. But it is not unusual for the borrowing rate to exceed the MARR for public organizations. In this case, reducing the amount of borrowing lowers costs, whereas increasing borrowing lowers costs whenever the MARR is greater than the borrowing rate.

To sum up, private organizations generally require a higher rate of return than do public bodies, so the required receipts to make the investment desirable are higher for the private organization than for the public body. However, consideration of tax shields and introduction of a suitable financing plan may reduce this difference. The relative levels of the MARR for each group and their borrowing rates are critical in this calculation.

Effects of Capital Grant Subsidies

An important element in public investments is the availability of capital grant subsidies from higher levels of government. For example, interstate highway construction is eligible for federal capital grants for up to 90% of the cost. Other programs have different matching amounts, with 50/50 matching grants currently available for wastewater treatment plants and various categories of traffic systems improvement. These capital grants are usually made available solely for public bodies and for designated purposes.

While the availability of capital grant subsidies reduces the local cost of projects, the timing of investment can also be affected. In particular, subsidies may be delayed or spread over a longer time period because of limited funds. To the extent that (discounted) benefits exceed costs for particular benefits, these funding delays can be costly. Consequently, private financing and investment may be a desirable alternative, even if some subsidy funds are available.

Implications for Design and Construction

In the preceding analysis, we have considered the effects of different perspectives and financial considerations on a single investment alternative. These considerations also have implications for design and construction choices. For example, an important class of design decisions arises relative to the trade-off between capital and operating costs. It is often the case that initial investment or construction costs can be reduced, but at the expense of a higher operating costs or more frequent and extensive rehabilitation or repair expenditures. It is this trade-off which has led to the consideration of "life cycle costs" of alternative designs. The financial schemes reviewed earlier can profoundly effect such evaluations.

For financial reasons, it would often be advantageous for a public body to select a more capital intensive alternative which would receive a larger capital subsidy and, thereby, reduce the project's *local* costs. In effect, the capital grant subsidy would distort the trade-off between capital and operating costs in favor of more capital intensive projects.

The various tax and financing considerations will also affect the relative merits of relatively capital intensive projects. For example, as the borrowing rate increases, more capital intensive alternatives become less attractive. Tax provisions such as the investment tax credit or accelerated depreciation are intended to stimulate investment and thereby make more capital intensive projects relatively more desirable. In contrast, a higher minimum attractive rate of return tends to make more capital intensive projects less attractive.

As a final note, some other effects may also be important. First, private firms are liable for sales, property and other taxes which would tend to increase the costs and required user fee payments. Of course, these tax payments represent benefits to the local governments rather than an increase in social or total costs. Second, private firms might be more efficient than public organizations in planning, design and construction.

4. METHODS FOR ANALYSIS OF PROJECT FINANCE

4.1 Cash Flow Calculations

Recently, more attention has been given in the literature to the effects of financing costs on the economic feasibility of constructed facilities [45]. The effects of financing costs on construction greatly depend on the financing strategy employed [9]. Thus, there is a need for a systematic procedure for evaluating the effects of various financing strategies on the project cash flows. Spreadsheet templates are powerful tools for evaluating the alternative financing strategies that exist for both the construction contractor and contracting agency.

In this chapter, a spreadsheet template useful to cash flow management in a transit agency is described. The electronic spreadsheets designed for microcomputers provide capability for rapid user interaction in handling the extensive numerical calculations related to financial planning. The template described in this paper allows consideration of multiple revenue sources and financing strategies, including overdraft financing and revenue bonds. Simulation experiments inquiring "what if" conditions can also be accommodated. Since various participants in the facility construction process have widely varying financial circumstances and incentives, the spreadsheet template must be flexible.

For an owner agency, cumulative expenditures for a project represent payments to contractors or suppliers, while cumulative receipts represent grant, tax or other revenues. Suppose that the payments are made to the contractors by the agency during a period and can be approximated by a piecewise continuous curve as shown in Figure 4-1, while the grant funds are received at the end of a period as represented by the step-function in the same figure. To the extent that grant revenues do not *exactly* match expenditures, problems in financing can arise. Shortfalls in revenues must be bridged, whereas excess revenues present an opportunity for investment income. Moreover, there may be opportunities for reducing the total cost by altering the shape of the expenditure curve or that of the payment curve.

As an example, consider a public project which is funded by federal and local grants. The anticipated duration of the project is six years with receipts from grant funds allocated at the end of each year to cover 90% of payments to contractors for that year while the remaining 10% of the total payments to contractors will be allocated at the end of the sixth year. The end-of-year payments are given in Table 4-2 in which t=0 refers to the beginning of the first year. The net cash flow in Table 4-2 indicates that receipts are behind contract payments. To fund this shortfall, the public agency might borrow funds through bank overdrafts or some other mechanism to cover the expenses during the year and on the cumulative overdraft due to a shortfall from grant funds at the end of each year. In this example, we show the cash flow calculations for two financing mechanisms, i.e., overdraft financing and revenue bonds.

In order to make an appropriate comparison of the effects of various financing

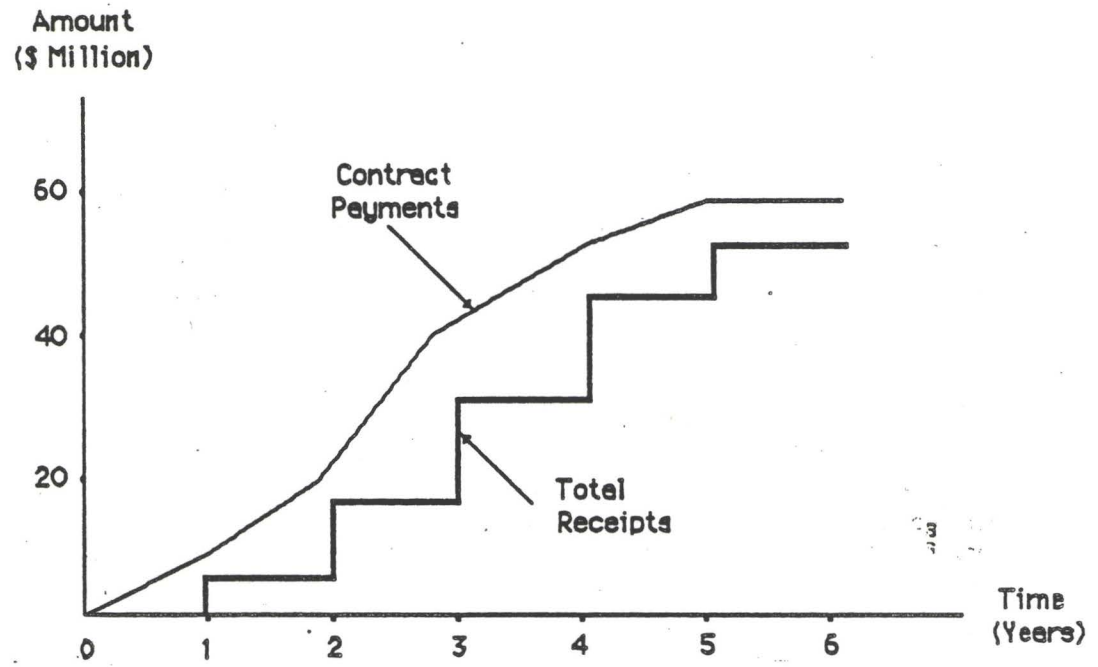


Figure 4-1: Contract Payments and Revenue Receipts over Time

Table 4-1: Interests Resulting from Overdraft Financing (in $ million)

End of Year t	Payments by Agency E_t	Total Receipts P_t	Net Cash Flow A_t	Cumulative Cash Flow N_t
(1)	(2)	(3)	(4)	(5)
0	0	0	0	0.000
1	-6.473	5.826	-0.647	-0.647
2	-9.334	8.401	-0.933	-1.580
3	-13.348	12.013	-1.335	-2.915
4	-16.832	15.149	-1.683	-4.598
5	-15.538	13.984	-1.554	-6.152
6	0	6.152	6.152	-0.000
	-61.525	61.525	-0.000	

strategies, the net present value (NPV) of a cash flow A_t for t=0,1,2,...,n discounted at the minimum attractive rate of return (MARR) for the public agency is used to account for the time value of money. For MARR = r,

Table 4-2: Contract Payments and Revenue Receipts over Time (in $ million)

End of Year	Interest of Cumulative Overdraft	Interest on Payments in Year t	Total Annual Interest	Accumulation Until Year n=6
t	I_t	$\bar{I}_t$	$\hat{I}_t$	$\hat{I}_t(1+i)^{n-t}$
(1)	(2)	(3)	(4)	(5)
0	0.000	0.000	0.000	0.000
1	0.000	-0.356	-0.356	-0.600
2	-0.071	-0.513	-0.585	-0.887
3	-0.074	-0.734	-0.908	-1.242
4	-0.321	-0.926	-1.246	-1.536
5	-0.506	-0.855	-1.360	-1.510
6	-0.677	0.000	-0.677	-0.677
				-6.451

$$NPV = \sum_{t=0}^{n} A_t(1 + r)^{-t} \tag{4.1}$$

4.2 Overdraft Financing

In overdraft financing, the interest on the cumulative overdraft due to a shortfall from grant funds at the end of each period t is given by

$$I_t = N_{t-1} i \tag{4.2}$$

where N_{t-1} is the cumulative net cash in period t−1, (positive for a balance and negative for a shortfall), and i is the interest rate for that period. For $t > 0$, the interest on the average expenses during the period t can be approximated by

$$\bar{I}_t = i\, E_t/2 \tag{4.3}$$

where E_t is the payment by the agency for period t (recorded with a negative sign since it is a cost). Then the total annual financial or interest expenses incurred by the public agency will be the sum of the interest charges.

$$\hat{I}_t = (N_{t-1} i) + (iE_t/2) \tag{4.4}$$

Using additional overdrafts to cover cumulative shortfalls resulting from I_t until the end of year n, the total interest at t=n is given by

$$D = [NFV]_i = \sum_{t=1}^{n} \hat{I}_t(1+i)^{n-t} \tag{4.5}$$

where NFV is the net future value at the end of year n. Thus, no interest payment is made at ends of periods 1 to n−1. A numerical example of overdraft financing using an annual interest rate i=10% for borrowing is shown in Table 4−1. Note that at n=6, there is an overdraft of D= −6.451 which the agency must repay the bank.

Of course, the agency may choose to pay the annual interest for the overdraft at the end of each year without accumulating them to the end of the last period n. Then, the net present value for such interest payments discounted at a MARR of r is given by

$$[NPV]_r = \sum_{t=1}^{n} \hat{I}_t(1+r)^{-t} \tag{4.6}$$

For the values of $\hat{I}_t$ in Table 4−1, discounted at r=10%, $[NPV]_r$= −3.567 for limited overdraft financing. By contrast, the net present value of D= −6.451 discounted at r=10% is $[NPV]_r$= −3.642. Since the borrowing rate i=11% is higher than the MARR r=10%, it is more costly to accumulate the annual interests as additional overdrafts until the end.

4.3 Revenue Bond Financing

A second possible financing strategy is to issue revenue bonds during construction. The purpose of revenue bonds is for a public agency to borrow funds, secured by a grant or other revenue commitment, to cover delays in receipts. The agency borrows an amount Q (including issuing cost), in period t=0 at a specified interest rate i where Q is defined as negative for borrowing. The issuing cost of the bond is kQ where k is a percentage of the amount borrowed. The net amount (1 − k)Q received from borrowing is deposited in a separate revenue bond account in period t = 0. In each subsequent period t, the agency draws from the revenue bond account an amount equal to the shortfall in grant receipts N_t plus the bond interest on the borrowed amount Q during period t. Noting that net cumulative cash flow in period t is given by

$$A_t = P_t + E_t \tag{4.7}$$

For t>0, the interest $\bar{I}_t$ on the average payments during the period t as determined by Equation (4.3) will also be paid out from the project account. Let C_t be the drawdown of the project account in period t. For t=0, $C_0=A_0$; and for t>0

$$C_t = A_t + \bar{I}_t + Qi \tag{4.8}$$

Let R_t be the project account balance in period t (defined as positive for deposit in the account). Then, for t = 0

$$R_0 = -(1 - k)Q + C_0 \tag{4.9}$$

The running balance in the project account can earn interest at a rate h; thus the balance of the project balance in period t (for t>0) is

$$R_t = (1 + h)\, R_{t-1} + C_t \tag{4.10}$$

Because the bond rate i for borrowing will generally exceed the investment rate h in the bond account and since issuing costs increase with the amount borrowed, the agency financial manager should minimize the amount of money borrowed under the revenue bond strategy. Thus there is an optimal value for Q such that all estimated grant shortfalls are covered and interest payments and expenses are minimized. At the optimal level of Q, all values of R_t should be positive or zero since the repayment of Q in the terminal period n is not included in R_n. To minimize Q, a value of Q is selected such that at least one of these R_t values is zero. The cash flow profile for the six year transit project under revenue bond financing (using a year for the period) for the same numerical example is shown in Table 4-3. Using a bond rate i=8%, project account interest rate h=7% and the issuing cost at k=5% of the bond value, the optimal value for Q is found to be -11.032. This is the amount just sufficient to cover the shortfalls in grant receipts as shown by an account balance of zero in year 5. In practice, it may be desirable to select a Q value slightly higher to account for uncertainty in the expense and revenue streams.

For revenue bond financing, the shortfall for the repayment of Q at t=n is $(Q+R_n)$, since Q is defined as negative for borrowing. Hence the present value of the shortfall for revenue bond financing discounted at a MARR of r is

$$[NPV]_r = (Q + R_n)(1 + r)^{-t} \tag{4.11}$$

For the numerical example in Table 4-3, Q= -11.032 and R_6= +5.269, hence, the shortfall at n=6 is given by $(Q+R_6)$= -5.763. Note that the value of Q is affected by the bond rate i and the interest rate h for the project account as well as the percentage k for the issuing cost.

In comparing the value of $(Q+R_6)$= -5.763 at n=6 resulting from revenue bond financing with the value of D= -6.451 at the same period resulting from overdraft financing, it is obvious that revenue bond financing is preferred since the value $(Q+R_6)$ is higher (less negative) than that of D. Similarly, the present value of $(Q+R_6)$ is -3.253 against the present value of D which is -3.642 and more negative.

Table 4-3: Project Financing Using Revenue Bond (in $million)

End of Year	Net Cash Flow	Interest of Payment in Year t	Withdrawal from Account	Project Account Balance	Revenue Bond Cash Flow
t	A_t	$\bar{I}_t$	C_t	R_t	$\bar{A}_t$
(1)	(2)	(3)	(4)	(5)	(6)
0	0	0.000	0.000	10.480	10.480
1	-0.647	-0.259	-1.788	9.426	-0.882
2	-0.933	-0.373	-2.189	7.896	-0.882
3	-1.335	-0.534	-2.751	5.698	-0.882
4	-1.683	-0.673	-3.239	2.858	-0.882
5	-1.554	-0.622	-3.058	0.000	-0.882
6	6.152	0.000	5.269	5.269	11.914

On the other hand, if the agency pays the annual interest without accumulating them to the last period, then $[NPV]_r$ = -3.567 from *limited* overdraft financing as opposed to $[NPV]_r$ = -3.253 for revenue bond financing. Consequently, revenue bond financing is still more as desirable than limited overdraft financing in this case because of the much lower borrowing rate.

4.4 Variations in Financing Cash Flows

The cash flows representing payments to contractors and revenue receipts may vary from the basic cash flow presented earlier. Certainly, many variations of cash flows may be considered to evaluate their consequences. For example, the timing of payments to contractors may coincide with that of revenue receipts. Then, the relationship between the two will be as as shown in Figure 4-2, and the term $\bar{I}_t$ in Equation (4.3) will be zero.

If the timing of payments to contractors always coincides with that of grant receipts, then there will be no interim interest for any period t, i.e. $\bar{I}_t$=0. The effects of interim interests on project financing for both overdraft and revenue bond cases for the data in Table 4-2 are recorded in Table 4-4. It can be seen that the matching of the timing of payments and receipts reduces the expenses in both cases.

On the other hand, if the contractor is paid without retainage at the end of each period but the agency receives the same amount one period later, the result can be quite detrimental to the agency. Even without interim interest in the period because payments

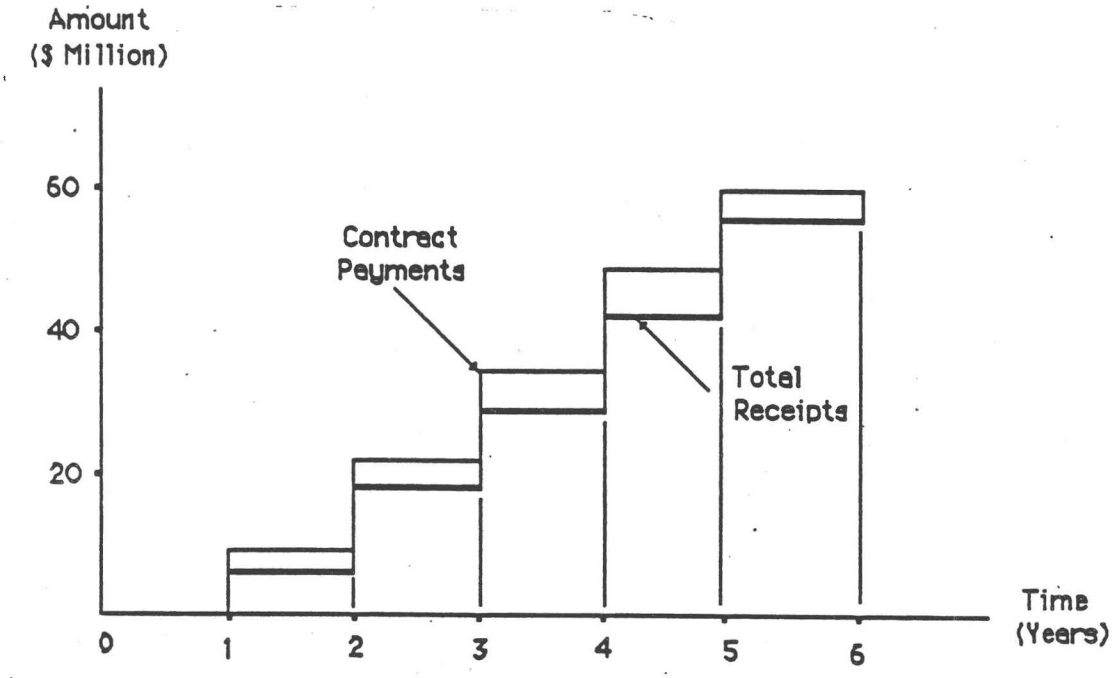


Figure 4-2: Projects with Identical Payment and Receipt Periods

and receipts are transacted at the ends of periods only, the shortfalls are large. Consider the same project in Table 4-1 for which the revenue receipts P_t lag behind the contract payments E_t by one period $P_{t+1} = -E_t$ for t=1, 2, 3, 4 and 5 instead of the values P_t given in Table 4-1. Then the resulting shortfalls for both overdraft and revenue bond financing corresponding to $\bar{I}_t=0$ are summarized in Table 4-5.

In the computational procedures discussed thus far, it has been implicitly assumed that the amounts of the particular cash flow increments, the timing of these increments, and the rate of discount are known with certainty. In reality, forecasts of these quantities are highly uncertain. Many potential cash flow uncertainties exist for both the construction contractor and transit agency. Unforeseen circumstances such as cost overruns or changes in grant provisions can dramatically alter the cash flows, and consideration should be given to the uncertainty of such quantities. An analytical approach to accommodating for uncertainty in cash flow items is discussed in [17].

The effects of uncertainty may be observed by developing "what if" scenarios of circumstances affecting the cash flow profiles. For example, if the project is not to begin for a sufficiently long period of time, there is significant uncertainty associated with borrowing rates. In such an instance, the calculations presented here may be repeated for different borrowing rates, thus generating the range of possible values for project worth under a given financing strategy.

In the construction of public projects, the cash flow period is often taken to be one

Table 4-4: Effects of Delay of Revenue Receipts by Agency (in $ million)

Items	Overdraft Financing (i = 11%, r = 10%)		Revenue Bond Financing (i=8%. h=7%, k=5%, r=10%)	
(1)	$\bar{I}_t = iE_t/2$ (2)	$\bar{I}_t = 0$ (3)	$\bar{I}_t = iE_t/2$ (4)	$\bar{I}_t = 0$ (5)
D	-6.451	-1.979	---	---
Q	---	---	-11.032	-7.880
$[NPV]_{r=10\%}$	-3.642	-1.117	-3.253	-1.332

Table 4-5: Effects of Interim Interests in Financing (in $ million)

Items	Overdraft Financing (i = 11%, r = 10%)		Revenue Bond Financing
(1)	Accumulated to n= 6 (2)	Limited to Current year (3)	(i = 8%. h = 7%, k = 5%, r = 10%) (4)
D	-12.531	---	---
Q	---	---	-24.954
$[NPV]_{r=10\%}$	-7.073	-6.940	- 6.442

month, thus the calculations of net cash flow, cumulative net cash, interest, and net present

value are made for every month of the project. In general the interest rate per period must be specified whether the period is one month or one year, and other related values are computed accordingly. It may also be the case that receipts are based on projections from past expenses, so that the calculation of expected receipts are required. Editing and updating data are often necessary to perform sensativity analysis. With all of these calculations it becomes clear that the numerical calculations in construction cash flow can be extensive. In the sections that follow, electronic spreadsheets are shown to be valuable aids in performing the calculations necessary for construction cash flow and financial evaluation.

4.5 Spreadsheets and Non-Procedural Programming

Electronic spreadsheets, first introduced in 1978, have become highly popular in the business world [2]. Some of the most popular business applications of spreadsheets include budget planning, depreciation calculations and capital investment analysis. Spreadsheets programs are conceptually easy to learn and offer some significant advantages to conventional procedural programming.

Spreadsheets are simply a programming environment for organizing and manipulating data. The data are organized into a matrix of rows and columns forming cells. Cells can store data in many forms such as letters, numerical values, and formulas. Formulas usually contain references to other cells. Thus, cells may be *linked* together by formulas. The power of the spreadsheet is seen upon changing the data of a given cell. When a change is made in the data of one cell, the data of all cells linked to it are updated accordingly.

More generally, spreadsheets are a form of non-procedural programming. Unlike procedural programs which lead the user through a controlled and fixed flow of procedures or statements, spreadsheet environments allow the user to interact with any portion of the spreadsheet at anytime. Also, in non-procedural programming environments, the programmer may add or remove programming statements at anyplace and at anytime. Procedural languages or environments do not provide such flexibility.

Spreadsheets can be developed and saved for multiple uses as templates for specific applications. In templates, user input, formulas, and output can be organized in a modular fashion and extensive user aids can be provided. Templates for hundreds of applications including personal finance and construction management have become commercially available.

As a simple example of a spreadsheet programming environment, consider the computation of discounted cash flows using a 10 percent discount rate in Table 4-6. The table represents a portion of a spreadsheet where the columns are referenced by letters and the rows by numbers. The net cash flow for each period and the discount rate are simple numerical data entries. The time periods are listed in column A rows 11 through 17, the constituent cash flow stream to present is listed in column B, rows 11 through 17, and the interest rate appears in cell C4. The discounted cash flow stream is listed in column C, rows 11 through 17; each of these cells contains a formula discounting the

cash flow value in column B to period 0; the calculated value from the formula is displayed on the computer screen as shown in Table 4-6. For example, the cell C13 contains the following formula:

$$C13 = B13 * (1 + C4)^{-2}$$

or, in the notation of the spreadsheet program LOTUS 123™:

B13*(1.+C4)^-2.

The cell containing the Net Present Value (NPV) of the cash flows, C19 has the following formula:

C19 = SUM(C11..C17)

Note that these formulas are *linked* to the cash flow data and the discount rate. Thus, to re-evaluate the NPV for a discount rate of 20 percent, the entry in cell C4 need only be changed from 10 to 20. Additional periods can be easily added to the cash flow stream using the copying and transfer utilities found in all spreadsheet packages. Also, the data in this example can be linked to other cells in order to compute other quantities such as net future value (NFV) and cumulative interest payments [7].

Because spreadsheets are non-procedural, there are no restrictions as to what operation the user can perform. In this simple example, the user is free to either change the cash flow values, append periods to the cash flow stream, change the interest rate, program an additional formula or work on a different portion of the spreadsheet.

The data manipulating and calculating properties of spreadsheets allow one to study the results of "what if" scenarios and quickly simulate a financial or physical system [52]. Given a system of inputs (numerical data stored in cells), formulas linking these cells, and outputs, new scenarios are created by changing the numerical values of the input data. Most spreadsheets contain features and functions that can be readily applied to templates for financial evaluation [13]:

1. Mathematical operators such as summation and exponentiation are useful in computing such quantities as net present values, cumulative cash flows, and interest payments.

2. Conditional operators such as *if-then-else* statements allow a logical modeling of financial strategies. For example, consider an overdraft strategy where the proportion of construction expenditure borrowed is conditional on the period of the project. This rule can be easily represented in an *if-then-else* format.

3. Graphics are a powerful advantage of spreadsheet environments. In evaluating financing strategies, graphics such as XY plots are useful in viewing drawdown forecasts or cumulative project expenditures versus cumulative project receipts.

Table 4-6: Example of Spreadsheet Cash Flow Calculation

	A	B	C	D
1				
2				
3		MARR		
4		r (in %) =	10	
5				
6	==========	==========	==========	
7	End of	Net	Discounted	
8	Year	Cash	Net	
9	t	Flow	Cash Flow	
10	==========	==========	==========	
11	0	0	0.000	
12	1	-0.647	-0.588	
13	2	-0.933	-0.771	
14	3	-1.335	-1.003	
15	4	-1.683	-1.150	
16	5	-1.554	-0.965	
17	6	6.152	3.473	
18				
19	Net Present Value =		-1.004	

4. User interfaces such as menus, text editors, and help facilities make spreadsheets easy to learn and use. Also the conceptual representation of data into rows and columns facilitate the use of spreadsheets. Templates using these facilities allow financial managers to duplicate the effects of financing strategies under numerous scenarios.

4.6 A Template for Agency Financial Evaluation

The template described in this chapter is divided into five separate sections for *introduction, data entry, financial strategy development, pre-evaluation* and *evaluation*. The *introduction* section is for guiding the user in working with the template. Project specific information such as interest rates, estimated expenditures and revenues are entered in the *data entry* section. Note that information entered in the *data entry* section is that project information which is independent of any financing strategy. A section is provided for *financial strategy development*, where financing streams for particular strategies can be computed. The cells in the *pre-evaluation* section contain intermediate formulas that link the input data with the output data. Finally, the *evaluation* section provides an evaluation of the scenario entered including graphics. The general flow of a financial evaluation session is shown in Figure 4-3; however the user may interact with any of the template sections at any time. Issues in spreadsheet design and organization are discussed in [16].

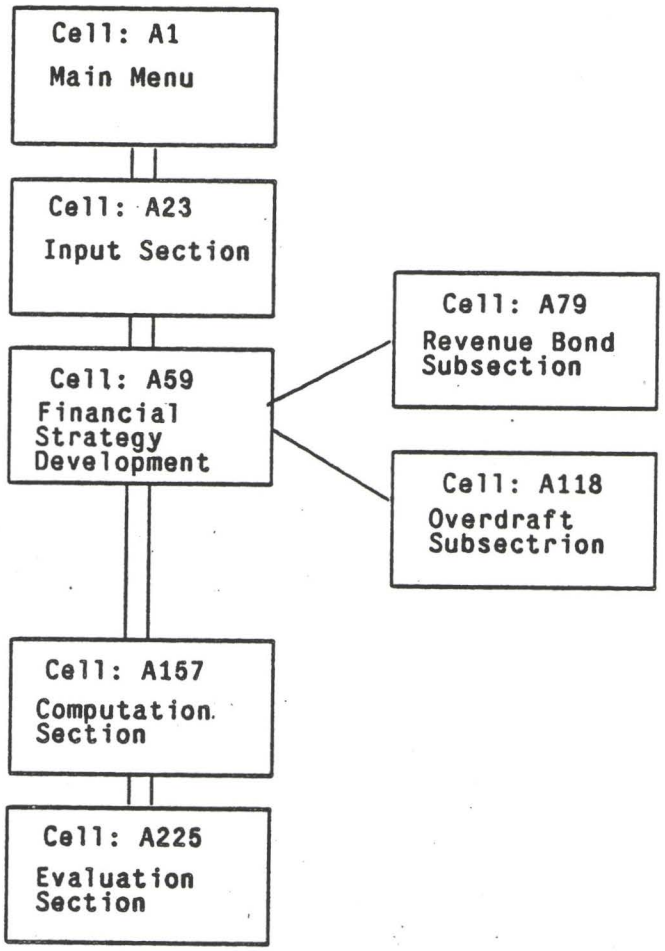


Figure 4-3: Sectional Overview of the Financial Evaluation Template

To illustrate the organization and use of the template, consider the six year example project described earlier. Because revenues receipts do not *exactly* match expenditures, problems in financing can arise. Two possible financing strategies are to (1) borrow for the initial expenditures and use overdrafts to cover expenses during the year and (2) to issue revenue bonds for shortfalls in revenue receipts.

Evaluating the two strategies begins with entering the template. The *introduction* section is menu-formatted to indicate locations on the spreadsheet prepared for specific purposes. Simple commands can be made to go to any particular template section. The purpose of this section of the template is to assist the user; thus, this section is never altered. Table 4-7 shows the layout of data entry section for this example. For each of the six periods, the analyst must enter estimates for payments by the agency and revenues from various sources (in this case matching federal and state grants). The payments by the agency and grant revenues for this example, are identical for both alternative financing schemes. Also the opportunity cost of capital or MARR for the agency must be entered, and a value of 10% will be used for this example. The only computation performed in this section is a totalling of the revenues. In cases in which receipts are a function of expenses, formulas to calculate revenues could be added to columns D, E and F.

Table 4-7: Data Entry Section of the Financial Evaluation Template

	A	B	C	D	E	F	G
25							
26	Hit Home to return to main menu						
27							
28			Periodical discount rate or MARR		Number of periods:		
29			10 %		6		
30							
31							
32	Please enter estimated payments and receipts:						
33							
34			enter revenue source "A":	federal grant			
35							
36			enter revenue source "B":	local grant			
37							
38			enter revenue source "C":	other			
39							
40							

41	Project Period t	Expected date	Estimated Payments by Agency	Estimated Revenues			Total Estimated Revenues
42				federal grant	local grant	other	
43	0	1/23/80	0.000	0.000	0.000	0.000	0.000
44	1	1/16/81	6.473	4.661	1.165	0.000	5.826
45	2	1/30/82	9.334	6.721	1.680	0.000	8.401
46	3	1/24/83	13.348	9.610	2.403	0.000	12.013
47	4	1/10/84	16.832	12.119	3.030	0.000	15.149
48	5	1/23/85	15.538	11.187	2.797	0.000	13.984
49	6	1/14/86	0.000	4.922	1.230	0.000	6.152
50							
51	Total		61.525	49.220	12.305	0.000	61.525
52							

The *financial strategy development section* is divided into subsections; a subsection for each possible financing scheme. A portion of the subsection for overdraft financing is shown in Table 4-8. For overdraft financing, the annual interest rate for borrowing and the portion of expenses for which interest will be paid, must be entered; two possible values are 11% and 50% respectively. The former refers to the borrowing rate i=10% while the latter refers to the factor 1/2 (=50%) representing approximately the average interest of payments in period t. Upon entering these values, the financing costs associated with expenses and cumulative overdraft are calculated and shown.

Table 4-8: Overdraft Financing Subsection of the Financial Evaluation Template

	A	B	C	D	E	F	G
126							
127							
128	Hit Home to return to main menu						
129							
130		Overdraft Financing:					
131							
132		Borrowing rate per period:					
133			11 %				
134							
135		Interest of payment in periods (percent approximation)					
136			50 %				
137							
138							
139							
140	==========	==========	==========	==========	==========	==========	==========
141	Project	Expected	Pre-Financing	Cumulative	Interest of	Interest	Total
142	Period	date	Net Cash	Net Cash	Payments	Cumulative	Annual
143	t		Flow	Flow	in Year t	Overdraft	Interest
144	==========	==========	==========	==========	==========	==========	==========
145	0	1/23/80	0.000	0.000	0.000	0.000	0.000
146	1	1/16/81	-0.647	-0.647	-0.356	0.000	-0.356
147	2	1/30/82	-0.933	-1.580	-0.513	-0.071	-0.585
148	3	1/24/83	-1.335	-2.915	-0.734	-0.174	-0.908
149	4	1/10/84	-1.683	-4.598	-0.926	-0.321	-1.246
150	5	1/23/85	-1.554	-6.152	-0.855	-0.506	-1.360
151	6	1/14/86	6.152	-0.000	0.000	-0.677	-0.677

The revenue bond financing subsection is shown in Table 4-9. Values for the bond interest rate, account investment rate, and the issuing cost must be entered. In this example we let the bond rate equal 8%, the project account interest rate equal 7%, and the issuing cost equal 5% of the bond value. This subsection displays the shortfalls of grant receipts, the revenue bond cash flow and the cumulative balance of the bond account; these quantities are recalculated upon entering an estimate for the borrowing value. The template informs the user whether a given estimate is above or below the optimal value.

The *evaluation* section of the template contains intermediate calculations necessary to obtain the net present worth of the project cash flow under each of the financing alternatives, i.e. revenue bond financing versus limited overdraft financing. Here it is clear that the revenue bond financing is preferred, because the shortfalls are algebraically greater than that of overdraft financing. However, the evaluation could be otherwise if some

Table 4-9: Revenue Bond Financing Subsection of the Financial Evaluation Template

	A	B	C	D	E	F
84						
85	Hit Home to return to main menu					
86						
87		Revenue Bond Financing:				
88						
89		Periodical interest on bonds:		Issuing cost:		
90			8 %	5 %		
91						
92		Periodical interest on bond account:				
93			7 %			
94						
95	Interest of payment in periods (in %):					
96			50 %			
97		Total value of revenue bonds issued:				
98			11.032			
99						
100	Minimum project account value through					
101	period t=n-1:		0.000			
102						

Project Period t	Expected date	Pre-financing Net Cash Flow	Interest of Payments in Year t	Withdrawal from Account	Project Account Balance
0	1/23/80	0.000	0.000	0.000	10.480
1	1/16/81	-0.647	-0.259	-1.788	9.426
2	1/30/82	-0.933	-0.373	-2.189	7.896
3	1/24/83	-1.335	-0.534	-2.751	5.698
4	1/10/84	-1.683	-0.673	-3.239	2.858
5	1/23/85	-1.554	-0.622	-3.058	0.000
6	1/14/86	6.152	0.000	5.269	5.269

conditions are changed. Consider the *limited* overdraft financing strategy discussed in Section 4.3; here annual interests are paid in each of the t periods of the project. Therefore, unlike overdraft financing, the net present value of interest payments is dependent on the MARR of the agency. The user may wish to view this section which provides such intermediate quantities as: the net cash flow stream, cumulative net cash flow, present value of financing costs and others. Table 4-10 is a view of a portion of the computation section for this example.

The *evaluation* section displays the resulting net present value of the after-financing

Table 4-10: Pre-evaluation Section of the Financial Evaluation Template

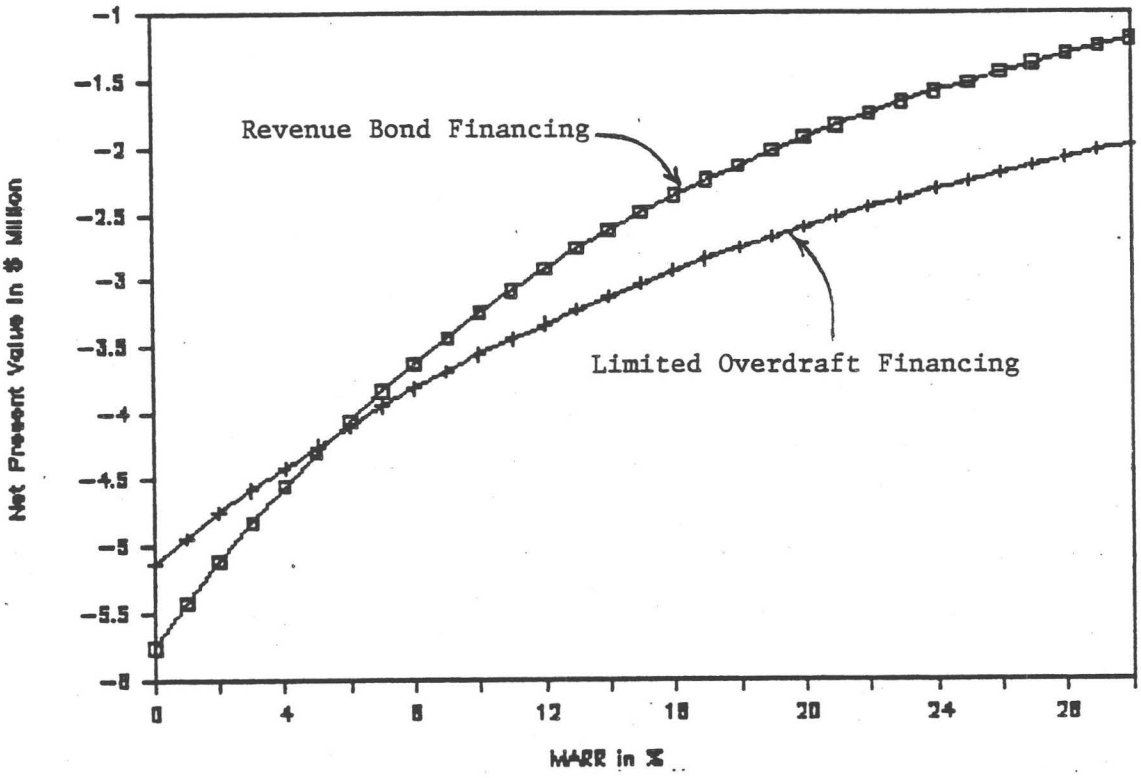
	A	B	C	D	E	F
164						
165						
166	Hit Home to return to main menu					
167						
168						
169	MARR =					
170	10 %					
171						
172						
173	Project Period t	Expected date	Pre-financing Net Cash Flow	Deficit from Revenue Bond Financing	Interest Overdraft Financing	Limited Overdraft Financing
174						
175						
176						
177	0	1/23/80	0.000	0.000	0.000	0.000
178	1	1/16/81	-0.647	0.000	0.000	-0.356
179	2	1/30/82	-0.933	0.000	0.000	-0.585
180	3	1/24/83	-1.335	0.000	0.000	-0.908
181	4	1/10/84	-1.683	0.000	0.000	-1.246
182	5	1/23/85	-1.554	0.000	0.000	-1.360
183	6	1/14/86	6.152	-5.763	-6.451	-0.677
184						
185		Present Value:	-1.004	-3.253	-3.642	-3.567
186						

project cash flow under a financing alternative and provides a menu of graphical utilities for evaluation and report generation. The graphical plots include cumulative expenditures and cumulative receipts vs. time, receipts less expenditures vs. time, and net present value vs. interest rate.

An evaluation between the two financing alternatives considered in this example can be made directly by comparing the shortfalls in period t=6 due to revenue bond financing $(Q-R_6) = -5.763$ and the annual interests due to limited overdraft financing which are shown in the *pre-evaluation* subsection (Table 4-10). The *evaluation* section allows one to view the project cash flows and present values under both financing strategies.

Finally, an example of graphic display of a plot of the net present value (NPV) versus the minimum attractive rate of return (MARR) for the two alternative financing strategies for the six-year project example is shown in Figure 4-4. As indicated in Table 4-10, in which MARR=10% is used, the revenue bond financing is preferred over both cumulative overdraft and limited overdraft financing. The breakeven point between limited overdraft financing and revenue bond financing for this case appears at MARR=5.6% in Figure 4-4 below which the limited overdraft strategy becomes more desirable.

Figure 4-4: Graphical Display of NPV versus MARR for Two Financing Strategies



5. EVALUATION OF INNOVATIVE FINANCING STRATEGIES

5.1 Significance of Choice of Financing Strategies

The general background and methods for evaluating various financing strategies have been explained in Chapters 3 and 4. In general, cash flow management from the viewpoint of a contractor is remarkably similar to that of the owner agency. Both parties are interested in the minimization of financing costs, particularly in the uncertain economic environment of fluctuating inflation and interests rates. Consequently, the methods for analysis of project finance developed previously are applicable to the contractor–owner interface although they have been developed primarily from the viewpoint of a transit agency.

In this chapter, we consider various innovative financing strategies for cost savings during the construction of transit facilities. The impacts of such financing strategies can be evaluated by means of the methods developed and the examples cited in Chapters 3 and 4. Other results of analysis are also cited for illustration.

Although the emphasis of this report is on project finance during construction, it will be a remiss if it does not address at least briefly the possibility of privatization of public projects. Consequently, private participation financing also includes the long–term financing of a facility which may be leased back to the agency for operation or may even be managed by a private organization.

5.2 Construction Timing Costs and Benefits

The construction industry is sensitive to such cyclic economic factors as inflation, unemployment, interest rates, materials prices and wage increases. For this reason, effects of inflation and the cyclical variations in construction costs can have significant impacts on the the overall cost of a transit project. The objective of *construction timing costs and benefits* is to take advantage of cost saving opportunities or early use of facilities. From a construction process point of view, there is an ideal seasonal period for the activity to be performed. Deviation from the ideal period will lead to an increase in construction costs and duration, and often, a decrease in the quality of completed works. Costs increases, schedule delays, and decreases in quality can be substantial for particularly sensitive activities such as earthwork or concreting.

An additional possible opportunity for savings in this regard is the construction demand for the region. During times of low construction demand, there are less project opportunities for area contractors, thus bidding will be more competitive (lower bid prices) than in situations of high construction demand. The financially astute agency will call for bids during times of low construction demand wherever possible.

It has been shown in Section 3.4 that in an inflationary environment, the combined effects of inflation and the work stoppage can erode the profit and produce a loss for the contractor. Using the same computational techniques, we can assess various possibilities for savings under different construction schedules for mitigating the adverse effects.

For very large transit projects such as the Pittsburgh Light Rail Transit System (LRT), a significant cost item relevant to *Construction Timing Cost and Benefits* is inflation. As noted in Section 2.3 PAT estimated that $106.16 million of the $125.35 million in project cost overruns can be directly or indirectly attributed to inflation [61].

High inflation related cost overruns are not surprising in labor and energy intensive industries such as construction. In general, the resources heavily used in construction tend to escalate faster than general price levels. Thus, there is a difference of inflation rates representing the escalation of construction prices over a period of time. By changing the timing of contracts and purchases, agencies can take advantage of inflation reduction opportunities and realize significant savings in the construction costs of the facility. In other words, the use of *Construction Timing Costs and Benefits* can reduce or eliminate the difference in inflation rates associated with construction.

For example, let us assume that in the construction of the Pittsburgh LRT, the Port Authority had taken every opportunity to time contracts and construction expenditures according to the cyclic economic factors affecting construction. Then, the costs associated with the different in inflation rates would be greatly reduced or eliminated. An estimate of such a cost reduction can be computed using the data for payments by agency compiled for the LRT project (Appendix A, Part I, Table 1). By assuming a difference of inflation rates of 3 percent over the entire construction duration, the reduced project cost under *Construction Timing Cost and Benefits* can be computed by deflating the agency payments by 3 percent. The actual cumulative payments over the 80 month duration are $483.2 million. By deflating the payments over these periods by 3%, the deflated cumulative payments become $432.9 million, with a difference of $50.3 million. The cost savings under this financing scheme is simply the difference between the actual agency payments and the deflated agency payments. Thus, a cost savings of $50.3 million might have been realized through *Construction Timing Cost and Benefits* by avoiding the three percent differential inflation. Assuming a minimum attractive rate of return (MARR) of 10 percent for the transit agency, the 1986 value of such savings (as reflected by the *net future value*) is $56.3 million.

5.3 Payment and Retainage Concession Financing

The owner agency of a transit facility construction project has a considerable influence on the financing position of the contractor. Those owner practices which relate to payments made to the contractor and the retainage withheld are particularly important to cash flow during construction. Most of these practices are contractually established before the bids are prepared. In most projects, owners withhold or retain a portion of the payments owed to the contractor for each of the contract periods. Still other contract arrangements include a pre-determined delay in payments to contractors. Both of these measures place financing obligations on construction contractors. The purpose of retainage is to act as an incentive for contractors to perform the contracted work to the owner's satisfaction. Retainages usually range from five to fifteen percent of the construction expenditures and are generally awarded to the contractor at the end of terminal period

without paying any foregone interest. This foregone interest is often reflected in the form of higher bid prices of contractors.

In *Retainage Concession* financing, retainage obligations and payment delay policies are relaxed upon establishment of contractor credibility. In other words, if during the course of the project, the contractor has performed to the owner's satisfaction, then the owner will exercise latitude in executing contractor payments by discontinuing retainage. Retainages may even be unnecessary from the outset of the project if the contractor has performed satisfactorily in a prior contract with the agency. If such circumstances are contractually stated prior to bidding, contractors can make concessions in the form of lower bid prices.

An example of owner assisted financing for construction in return for price concessions by the contractor has also been cited in Section 3.6. The computation techniques for such tradeoffs have been illustrated in Section 3.5, which can also be used to assess other forms of retainage concession agreed upon by the owner agency and the contractor. The project cost savings associated with employing *Payment and Retainage Concession Financing* can be estimated using data for the total retainage. Let us assume that any retainage must be financed by contractors using overdrafts at a borrowing rate of 20 percent. The formulas necessary to compute the financing costs of overdrafts from the contractor point of view are discussed in Chapter 3.

Consider again the Light Rail Transit Recenstruction project. Here approximately 5 percent of the contract billings for 4 of the 14 construction items in the project were retained throughout the duration of the contract (see Appendix A, Part II, Tables 1-14). The total retainage for these construction items is show in Appendix A, Part I, Table 1. If retainage is omitted in exchange for an equivalent concession in project price, a significant savings in project cost can be realized. The total savings from concessions on retainage (including interest) on the four construction items for which portions of billings were retained is found to be $26.134 million. The total results from a cumulative retainage withheld from contractors of 14.140 million with the interest on the retainage totaling $12.429 million.

5.4 Grant or Revenue Anticipation Financing

It has been mentioned in previous sections that despite the commitments of federal or state grants for transit projects; the receipt of such grants tend to lag one period behind expenditures. This principle may be observed by examining Part I Tables 1 and 2 of each of the four appendices. Given the current structure of grant requisitions and receipts, public agencies and contractors are discouraged from taking advantage of various cost reduction and benefit producing options. Without financing, contractors and owner agencies do not have sufficient equity to respond to cost effective opportunities. Such cost effective opportunities from early commitment include correcting unforeseen contingencies, taking advantage of lower resource prices by bulk purchases, earlier completion of facilities and others.

Under *grant or revenue anticipation financing* loans (in various forms) are secured to the contractor or agency through the anticipation of committed grants from the federal, state or local governments. With such loans their is sufficient equity to participate in the cost saving opportunities stated above. Also, through early purchases and contract awards made possible by the anticipation of grant receipts, much or all of the cost overruns due to inflation can be avoided.

Examination of the summary of extraordinary costs associated with the LRT Reconstruction (Table 2-1) shows that not only are there inflation costs associated with the delays in grant receipts, but there was a three year increase in the project duration and a nine month delay in the start of the project. Such extensive delays in project completion yield significant losses from delayed use of the facility. Each of the delays in project completion were attributable to delays in grant commitments [61]. Therefore, if the agency was allowed to act on the anticipation of grant commitments, such delays could have been avoided.

Consider the opportunities available to the Port Authority under *Grant or Revenue Anticipation Financing*. These opportunities may best be seen by examining the plot of the actual cumulative payments over the course of the project. The total cumulative payments actually incurred is approximately $483.2 million over a 80 month duration beginning in June 1979.[1] Under grant or revenue anticipation financing, the cumulative payments are $377.2 million or equivalent to $106 million less over a 56 month duration beginning in September 1978. Figure 5-1 shows a plot of the *actual* cumulative payments and *possible* cumulative payments under grant and revenue anticipation financing.

Note that under grant anticipation financing, the total payments or project costs are $106 million less than actually incurred due to reduced construction prices based on early commitment of resources. Also, project completion is 3 years and 9 months earlier due to opportunities to act on the anticipation of grant receipts as early as possible. The possible earlier completion time can yield significant benefits through early use of the facility. The opportunities under this financing arrangement are often overlooked.

Another example of grant or revenue anticipation financing are revenue bonds (described in Section 2.3) where bonds, secured by grant commitments, are issued in order to cover shortfalls in grant receipts in early periods.

5.5 Financial Institution Opportunity Financing

Construction firms are continually faced with cash shortages brought about by the high cost of equipment, materials and labor, high interest rates, and other industry characteristics that yield financial burdens. Often, traditional bank loans do not meet the special financing needs of contractors. Down payments on traditional bank loans can be a drain on the cash flow of a contractor. However, finance and leasing companies can offer flexible financing

[1] The cumulative total payment reported here dates to April, 1986. The project will not be complete until mid 1987.

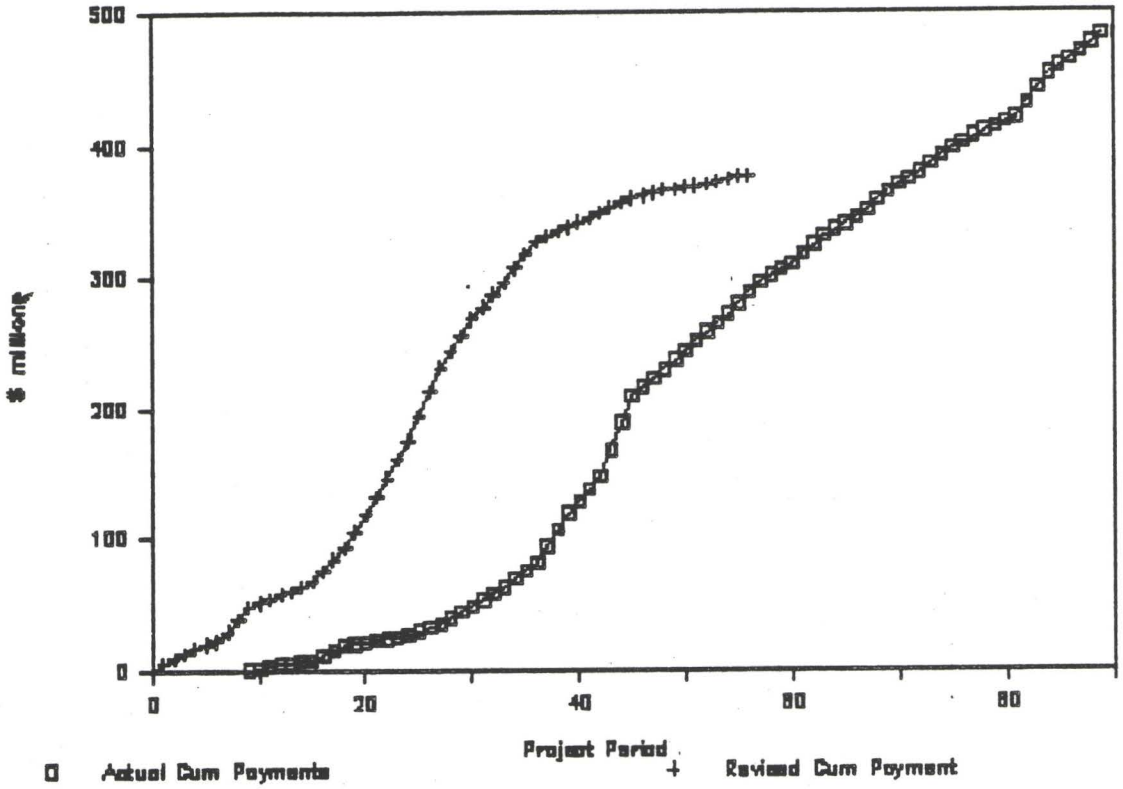


Figure 5-1: Illustrative Project Savings Under Grant or Revenue Anticipation Financing

arrangements in order to meet the special needs of contractors. Under *financial institution opportunity financing* contractors utilize relatively flexible loan arrangements offered by institutions other than commercial banks. These financing sources may be used in conjunction with bank loans to build a well-rounded financing strategy.

For example, arrangements could be made with a financial institution for using the equity in the existing fleet as financing collateral. Often contractors bypass this financing alternative because they underestimate the value of their equipment fleet. One reason for underestimating equipment value is that on the firms balance sheet, equipment is depreciated at an accelerated rate. In determining collateral values however, finance companies apply the fair market value of the equipment (which is usually significantly higher than the book-depreciated value). Also contractors often overlook that the prices of their used equipment are rising with inflation, just as new equipment is.

Another construction industry characteristic that is suitable to the flexible financing of finance companies is the its seasonal effects. Construction activity is usually high in the summer months and low in the winter; contractors' incomes are affected by such seasonal

trends. A financing arrangement available to contractors through finance companies is a payment plan that is consistent with the seasonal trends of the construction industry. In such a payment plan, loan payments are not scheduled during the winter months when activities and payments decline. In other words, the plan makes allowance for the nonproductive time of a construction firm and is designed to help the contractor match his work level and income to his expenses.

Cash flow constraints of contractors are not limited to the lag in payment receipts from owners. Maintaining a productive fleet of construction equipment can manifest unexpected cash flow burdens. For example, a piece of equipment critical to project activity may break down unexpectedly and require replacement. Financing the replacement through a traditional bank loan could drain the cash flow of the contractor. A financing arrangement available through a finance company is to schedule loan payments in accordance with the depreciation of the equipment. In other words, payments decline with the increasing maintenance requirements as the equipment ages over time. The contractor using accelerated depreciation can deduct much of the early payments as a depreciation expense.

An additional circumstances where flexible financing arrangements are suitable is a rare equipment purchasing opportunity. Here a contractor might come across an opportunistic offer on a piece of equipment during the low demand season. Because the contractor will not realize significant returns on the equipment investment until the peak construction season, a financing arrangement with smaller payments near the time of purchase is preferred.

In essence, *Financial Institution Opportunity Financing* has two significant impacts related to project costs. First, the flexible financing arrangements available through certain financial institutions allow contractors to borrow money at significantly lower interest rates. The reduced borrowing rate results in less interest paid by the contractor for any unpaid balance. Anticipation of lower interest payments will be recognized as lower bid prices by contractors, thus a decrease in the project cost. Second, special financing arrangements can increase the credit limit of contractors, reducing the likelihood of project delays due to cash deficiencies.

The computation techniques for assessing various types of opportunity financing offered by financial institutions may be based on the principles developed in Section 3.5. The effects of bond rates and investments on the example in Table 4–2 (Chapter 4) have been computed and shown in Table 5–1 for illustration. While a higher bond rate i (frim 8% to 9%) requires a larger loan Q, the higher investment rate h (from 6% to 7%) for the project account reduces the size of the loan Q.

Using the LRT Reconstruction project data provided in Appendix A, we will estimate the possible savings through a reduced borrowing rate for contractors due to *Financial Institution Opportunity Financing*. The amount of money to be financed by contractors, thus the amount affected by the financing strategy, is the *unpaid balance*, or contractor billings less agency payments (Part I, Table 4). If the contractors finance this unpaid

Table 5-1: Effects of Bond Rates and Investment Rates on Revenue Bond Financing (in $ million)

Items (1)	i = 8%, k = 5%		i = 9%, k = 5%	
	h = 6% (2)	h = 7% (3)	h = 6% (4)	h = 7% (5)
Q	-11.547	-11.032	-12.842	-12.233
$[NPV]_{r=10\%}$	-3.567	-3.253	-4.429	-4.055

i = bond rate
k = percent of loan as issuing cost
h = investment rate for project account

balance through traditional bank loans, then it is reasonable to assume an interest rate of 20 percent. However, it is likely that through special arrangements with certain financial institutions an interest of 12 percent is possible. Let us assume that contractors must pay interest on the cumulative loan balance.

The savings due to Financial Institution Opportunity Financing under this scenario is the difference in the cumulative loan balance including interest due to the difference in borrowing rates. Since the total unpaid balance is $19.837 million, the cumulative balance at 20% interest is $43.490 million while that at 12% interest is $31.458, leading to the difference of $12.032 million. In other words, $12.031 million in price concessions from contractors is possible, yielding a savings to the agency.

5.6 Private Participation Financing

Over the past decades large federal subsidies have been a disincentive for private financing techniques in mass transit. However, under recent federal budgets the federal government is encouraging private participation in financing the construction of mass transit facilities. Private participation is especially appropriate for transit systems in urban communities where large corporations have office space. It is clear that employees of such corporations (thus the corporations themselves) can directly benefit from transit servicing their home and work area.

Under *private participation financing* corporations and other private institutions who benefit from transit systems provide grants or financing of transit facility construction. An extended application of this category of financing arrangement are financing agreements in which a transit system operator obtains financial support directly from the incorporated communities existing within the geographic area served.

Another form of private participation in financing transit facilities is the long term financial arrangement beyond construction whereby a private organization essentially owns the facility and leases it to the transit agency for operation. Hence, the facility will eventually be paid for by the income from the fare box over a specified period of time. Aside from the advantage of tapping the private sources for financing the project when public funds are unavailable, there is the additional advantage of reducing the project cost under some circumstances.

As an example of the perspectives of public and private organizations, consider the potential investment on a constructed facility with a projected useful life of seven years. Let t = 1, 2, ..., 7 denote the end of each of the subsequent years. Furthermore, let C_o be the cost of acquiring the facility at t = 0, and C_t be the cost of operation in year t. Then, the net receipt A_t in year t is given by

$$A_t = B_t - C_t \tag{5.1}$$

in which A_t may be positive or negative for t = 0, 1, 2, ..., 7.

Let the minimum attractive rate of return (MARR) for the owner of the facility be denoted by i. Then, the net present value (NPV) of a project as represented by the net cash flow discounted to the present time is given by

$$NPV = \sum_{t=0}^{7} A_t(1 + i)^{-t} = \sum_{t=0}^{7} B_t(1 + i)^{-t} - \sum_{t=0}^{7} C_t(1 + i)^{-t} \tag{5.2}$$

In economic analysis (1), a project is acceptable if NPV #≥# 0. When the annual gross receipt is uniform, i.e., B_t = B for t = 1, 2, ..., 7 and B_o = 0, then, for NPV = 0.

$$B \sum_{t=0}^{7} (1 + i)^{-t} = \sum_{t=0}^{7} C_t(1 + i)^{-t} \tag{5.3}$$

Thus, the minimum gross uniform annual receipt, B, which makes the project economically acceptable can be determined from Equation (5.3) once the acquisition and operation costs, C_t of the facility are known and the MARR is specified.

Different MARRs for Public and Private Organizations

For the facility cost stream of a potential investment shown in Table 5-2, the required gross uniform annual receipts B are different for public and private ownerships since these two types of organizations usually choose different values of MARR. With a MARR of 10%, a public agency requires at least B = $184,000. By contrast, a private firm using a 20% MARR before tax while neglecting other effects such as depreciation and tax deduction would require at least B = $219,000. In other words, the gross receipt streams for both public and private ownerships in Table 5-2 will satisfy the condition NPV = 0

when each of them is netted from the cost stream and discounted at the appropriate value of MARR, i.e., 10% for a public agency and 20% (before tax) for a private firm. Thus, this basic analysis case suggests that public provision of the facility has lower user costs.

Table 5-2: Required Uniform Annual Gross Receipts for Public and Private Ownership of Constructed Facilities

Year t (1)	Facility cost, C_t (2)	Public Ownership: Gross receipt, B_t (3)	Public Ownership: Net Receipt $A_t = B_t - C_t$ (4)	Private Ownership: Gross receipt, B_t (5)	Private Ownership: Net Receipt $A_t = B_t - C_t$ (6)
0	500	0	-500	0	-500
1	76	184	108	219	143
2	78	184	106	219	141
3	80	184	104	219	139
4	82	184	102	219	137
5	84	184	100	219	135
6	86	184	98	219	133
7	88	184	96	219	131
		NPV (i = 10%) = 0		NPV (i = 20%) = 0	

*All monetary amounts are in thousands of dollars.

Effects of Tax Shields for Private Firms

In the case of private firms, the effects of depreciation and tax deduction can be analyzed in detail. Generally, the after-tax cash flow can be computed from the before-tax cash flow for a potential project with a useful life of n years. This can be computed as follows:

$$Y_t = A_t - X_t(A_t - D_t) \tag{5.4}$$

in which for any given year t = 1, 2, ..., n, A_t = before-tax net receipt; D_t = the depreciation; X_t = marginal tax rate; and Y_t = after-tax cash flow. Suppose that the marginal tax rate of the firm is 36% in each year of operation, and losses can always be offset by company-wide profits. Suppose further that the salvage value of the facility is zero at the end of seven years so that the entire amount of cost can be depreciated by means of the sum-of-the-years'-digits (SOYD) method. Then, the net receipt before tax in Column 6 of Table 5-2 can be used as the starting point for computing the after-tax cash

flow according to Equation (5.4) which is carried out step-by-step in Table 5-3. (Dollar amounts are given to the nearest $1,000). Using a 14.25% MARR after tax, the discounted after-tax flow to t = 0 (i.e., the net present value) turns out to be zero. In other words, the required gross uniform annual receipt for this project is 14.25% MARR after tax is also B = $219,000. It means that the MARR of this private firm must specify a 20% MARR before tax in order to receive the equivalent of 14.25% MARR after tax.

Table 5-3: Effects of Depreciation and Tax Deductions for Private Ownership

Year t (1)	Net receipt before-tax, A_t (2)	Depreciation (SOYD), D_t (3)	Taxable income $(A_t - D_t)$ (4)	Income Tax $X_t(A_t - D_t)$ (5)	After-tax cash flow, Y_t (6)
0	-500	0	0	0	-500
1	143	125	18	6	137
2	141	107	34	12	129
3	139	89	50	18	121
4	137	71	66	24	113
5	135	54	81	29	106
6	133	36	97	35	98
7	131	18	113	41	90
		$\Sigma D_t = 500$		NPV (i = 14.25%) = 0	

*All monetary amounts are in thousands of dollars.

Effects of Borrowing for Public Agencies

For public agencies which do not pay taxes on receipts from investment, the effect of financing through borrowing is given by

$$\hat{A}_t = A_t + \bar{A}_t \tag{5.5}$$

in which A_t = net cash flow for acquisition and operation; $\bar{A}_t$ = financial cash stream for loan and scheduled repayment; and $\hat{A}_t$ = combined net cash flow reflecting financial leverage.

Using the net receipt A_t in Column 4 of Table 5-4, which has been obtained from a uniform annual gross receipt of $191,000, we introduce the financial streams $\bar{A}_t$ which

included a loan of $400,000 with an annual repayment of $88,000 corresponding to an interest rate of 12%. Then the levered cash flows $\hat{A}_t$ is computed to Equation (5.6), and the results are recorded in Table 5-4. Note that for a loan at 12% interest, the net present value of the levered cash flow $\hat{A}_t$ is $7,000 when discounted at a 10% MARR for the public agency. The minimum required uniform annual gross receipt is B = $190,000 in order to make NPV = 0.

Table 5-4: Effects of borrowing on Publicly Owned Facilities

Year t (1)	Facility cost, C_t (2)	Gross receipt, B_t (3)	Net receipt, (no loan) A_t (4)	Loan and payment (12% interest) $\bar{A}_t$ (5)	Cash flow (levered for (12% interest) $\hat{A}_t$ (6)
0	500	0	-500	+400	-100
1	76	191	115	- 88	27
2	78	191	113	- 88	25
3	80	191	111	- 88	23
4	82	191	109	- 88	21
5	84	191	107	- 88	19
6	86	191	105	- 88	17
7	88	191	103	- 88	15
				NPV (i = 10%) = 7	

*All monetary amounts are in thousands of dollars.

Effects of Leverage and Tax Shields for Private Organizations

The after tax cash flow of a private firm including the effects of tax shields for interest can be determined from the relationship:

$$\hat{Y}_t = A_t + \bar{A}_t - X_t(A_t - D_t - I_t) \tag{5.6}$$

in which $\bar{A}_t$ is the financial cash stream indicating that at any given year t = 1, 2, ..., n; the amount $\bar{A}_t$ = scheduled repayment of a loan $\bar{A}_o$ secured at t = 0, I_t = interest charge on the loan; and $\hat{Y}_t$ = after-tax cash flow including financial leverage as well as tax shield. Consider for example, the financial cash stream A_t in Column 4 of Table 5-5, in which a loan of $400,000 is secured at t = 0 for an annual interest of 12%, resulting in a series of uniform annual payments of $88,000 in order to repay the principal and interest. In other words, by borrowing $400,000 (80% of the facility cost) at 12% annual interest, the

investment becomes more attractive to the private firm. This is expected because of the tax shield for the interest and the 12% borrowing rate which is lower than the 14.25% MARR after-tax for the firm. If the gross uniform annual receipt of this firm is B = $191,000 the net receipt before tax A_t computed by Equation (5.1) will yield the results in Column 2 of Table 5-5. The after tax cash flow Y_t can be obtained in Table 5-5, using the same investment credit, depreciation method and tax rate. Since the net present value of $\hat{Y}_t$ in Column 7 of Table 5-5 discounted at 14.25% is zero, the minimum required uniform annual receipt for the potential investment is $175,000.

Table 5-5: Effects of Financial Leverage and Tax Shields on Private Ownership

Year t (1)	Net receipt before tax (no loan), A_t (2)	Depreciation (SOYD) D_t (3)	Loan and Scheduled payment, $\bar{A}_t$ (4)	Interest on loan, I_t (5)	Income tax (46% rate) $X_t(A_t - D_t - I_t)$ (6)	After tax cash flow (levered) $\hat{Y}_t$ (7)
0	-500	0	+400	0	0	-100
1	115	125	-88	48	-21	48
2	113	107	-88	43	-13	38
3	111	89	-88	38	- 6	29
4	109	71	-88	32	2	19
5	107	54	-88	25	10	9
6	105	36	-88	18	18	- 1
7	103	18	-88	9	27	-12
		$\Sigma D_t = 500$			NPV (i = 14.25%) = 0	

*All monetary amounts are in thousands of dollars.

The effects of various factors on the minimum uniform annual gross receipts are summarized in Table 5-6. Although the required amounts for private organizations are shown to be higher than those for public agencies in this example, the situation can be altered with different interest rates on loans and/or different MARRs for these organizations. Consequently, the possibility of using long-term private financing and lease back cannot be overlooked of dismissed.

Table 5-6: Various Effects of Financial Arrangements on Public and Private Organizations

Conditions (1)	Minimum Required Uniform Annual Receipts (2)
1. Public Organization (MARR = 10%)	
No loan	$184,000
80% loan at 12% interest	$190,000
2. Private Organization-No loan (Before-tax MARR = 20%)	$219,000
3. Private Organization (after-tax MARR = 14.25%)	
No loan	$219,000
80% loan at 12% interest	$191,000

6. CONCLUSION

6.1 Summary

This report has examined the cash flow management of transit agencies and suggested some possible innovative strategies for construction projects. Such considerations have become increasingly important in the era of restricted government capital budgets, deregulation of financial markets and fluctuating interest rates. Changes in the grant arrangements with the federal government also require greater attention to cash flow management and innovative financing. For example, some recent grant arrangements will provide a fixed amount rather than a fixed percentage of the ultimate construction cost of the project. Private participation in projects is also becoming common. Coordinating diverse funding sources requires considerable attention and, in many cases, short term financing arrangements to bridge gaps in revenue receipts.

This report contains several distinct approaches to the issues associated with construction financing. First, an extensive literature review in the domains of engineering, accounting and finance was conducted. From this literature review, several possible innovative financing strategies have been identified. Second, four detailed case studies of current financing practices by transit agencies were conducted. The highlights of the financial transaction for these projects during construction are presented in the Appendices. These case studies revealed the use of distinct financing strategies such as revenue anticipation bonds and notes. Financing burdens imposed on both transit agencies and on construction contractors were found to be significant and present opportunities for innovative finance in the case studies.

As a third component, several chapters in the report detail the various considerations and calculations associated with the evaluation of alternative financing strategies. This review requires some attention to the relationship among the contractors, owners and financial institutions in financing construction projects. These different participants have differing circumstances and objectives that influence financing decisions. While the emphasis in this discussion has been placed on project finance during construction, it is important to recognize the possibility of privatization of public projects through long-term financing. Effects of private ownership of transit facilities were also considered. More specifically, calculation methods for evaluating various financing strategies have been developed, and a spreadsheet template useful to cash flow management and financial evaluation for a transit agency has been implemented on a microcomputer. Finally, with the assistance of the spreadsheet template, examples of possible fiancing strategies for construction projects are presented, and the effects of various factors in project finance on the construction costs are evaluated for different scenarios.

6.2 Recommendations

The methods developed in this report can be applied to virtually any combination of innovative financing schemes or revenue schemes. Formulas relevant to such calculations are documented in the body of the report along with examples of impacts of different strategies. Innovative strategies were illustrated by reference to example calculations using the data of a representative project. Possible financing strategies recommended for consideration include, but are not limited to:

1. *Construction timing to reduce costs*
   By altering the time at which construction occurs, construction cost savings may be obtained or earlier completion of the facility may be accomplished. These possibilities arise due to a difference in inflation rates in construction and/or seasonal effects influencing construction costs. For example, avoiding a three percent difference in inflation rates for construction in one project resulted in a savings of nearly ten percent of the total cost.

2. *Payment and retainage concession financing*
   By delaying payments and holding excessive retainage from responsible contractors, agencies require contractors (or sub-contractors and material suppliers) to bear the substantial cost of short term financing. Contractors are particularly ill-prepared to accomplish such financing since they often face substantial borrowing costs. Bid prices for construction and supplies will reflect such real financing costs over the long run. As an example, eliminating payment delays in one project would save four percent of the total construction cost (a total of $24 million) based on an assumed borrowing interest rate of twenty percent.

3. *Grant or revenue anticipation financing*
   Several transit agencies are already using grant or revenue anticipation borrowing in order to achieve earlier completion of facilities. While this financing strategy will normally increase costs associated with facility construction, it can be desirable in cases in which benefits from earlier completion will exceed financing charges. In addition, different alternatives for borrowing exist and should be evaluated to select the most desirable.

4. *Financial institution opportunity financing*
   Different borrowing opportunities always exist, and financially astute organizations attempt to obtain the most advantageous borrowing arrangements. On the unpaid balance associated with one project (amounting to an average of about $13 million), the difference over the lifetime of the project with a twelve percent rather than a twenty percent borrowing rate amounts to $12 million.

5. *Private Participation Financing*
   Private institutions which benefit from transit systems should be encouraged to participate in financing the construction of mass transit facilities. Another form of private participation financing is the long term financial arrangement beyond construction whereby a private organization essentially owns the facility and leases it back to the transit agency for operation.

In evaluating such innovative financing arrangements, it is important to recognize the varying financial circumstances and incentives of various participants in order to tailor the strategies to meet their needs.

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APPENDICES

Appendix A. Stage 1 Light Rail Transit: PAT; Pittsburgh, PA

I. Summary of Accounts for All Categories of Payments and Receipts (in $ million)
- Table 1 Status of Project Payments and Retainage
- Table 2 Status of Project Receipts
- Table 3 Status of Project Payments and Receipts
- Table 4 Cummulative Project Payments and Receipts

II. Breakdown of Payments and Receipts by Categories (in $ million)
- Table 1 Appraisals
- Table 2 Land
- Table 3 Utility Location
- Table 4 Power and Incline: Service Equipment
- Table 5 Force Account Materials
- Table 6 Force Account Labor
- Table 7 Insurance
- Table 8 Project Maintenance
- Table 9 Light Rail Vehicles
- Table 10 Relocation
- Table 11 Power and Incline: Support Equipment
- Table 12 Construction: Fixed Facilities
- Table 13 Construction: Right-of-Way
- Table 14 Engineering

Appendix B. Everett Maintenance Facilities: MBTA; Boston, MA

I. Summary of Accounts for All Contracts (in dollars)
- Table 1 Status of Project Payments and Retainage
- Table 2 Status of Project Receipts
- Table 3 Status of Project Payments and Receipts
- Table 4 Cummulative Project Payments and Receipts

II. Breakdown of Payments and Retainage by Contracts (in dollars)
- Table 1 Contract #: M2CN08
- Table 2 Contract #: M2CN09

III. Breakdown of Receipts by Contracts (in $ dollars)
- Table 1 Contract #: M2CN08
- Table 2 Contract #: M2CN09

Appendix C. Resevoir Carhouse-yard-station: MBTA; Boston, MA

I. Summary of Accounts for All Contracts (in dollars)
- Table 1 Status of Project Payments and Retainage
- Table 2 Status of Project Receipts
- Table 3 Status of Project Payments and Receipts
- Table 4 Cummulative Project Payments and Receipts

II. Breakdown of Payments and Retainage by Contracts (in dollars)
- Table 1 Contract #: M2CN01
- Table 2 Contract #: M2CN04

III. Breakdown of Receipts by Contracts (in dollars)
- Table 1 Contract #: M2CN01
- Table 2 Contract #: M2CN04

Appendix D. Northwest Bus Maintenance Facility

I. Summary of Accounts for All Contracts (in dollars)
- Table 1 Status of Project Payments and Retainage
- Table 2 Status of Project Receipts
- Table 3 Status of Project Payments and Receipts
- Table 4 Cummulative Project Payments and Receipts

II. Breakdown of Payments and Retainage by Contracts (in dollars)
(Data not available)

APPENDIX A

Stage 1 Light Rail Transit: PAT; Pittsburgh, PA

Agency:	PAT; Pittsburgh, PA
Project Title:	Stage 1 Light Rail Transit
Type of Work:	Reconstruction of Facility
Duration for Study:	87 months
No. of Contracts:	Apprx. 160

I Summary of Accounts for All Categories of Payments and Receipts (in thousands of dollars)

Table 1: Status of Project Payments and Retainage for All Project Accounts

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	1,513.7	0.0	0.0	0.0
1	10/79	1,513.7	1,513.7	0.0	0.0
2	11/79	1,513.7	1,513.7	0.0	0.0
3	12/79	967.0	1,513.7	0.0	0.0
4	01/80	967.0	967.0	0.0	0.0
5	02/80	967.0	967.0	0.0	0.0
6	03/80	3,731.0	967.0	0.0	0.0
7	04/80	3,731.0	3,731.0	0.0	0.0
8	05/80	3,731.0	3,731.0	0.0	0.0
9	06/80	1,255.7	3,731.0	0.0	0.0
10	07/80	1,255.7	1,255.7	0.0	0.0
11	08/80	1,255.7	1,255.7	0.0	0.0
12	09/80	1,352.0	1,255.7	0.0	0.0
13	10/80	1,352.0	1,351.0	1.0	1.0
14	11/80	1,352.0	1,351.0	1.0	1.9
15	12/80	2,873.1	1,351.0	1.0	2.9
16	01/81	2,873.1	2,815.0	58.1	61.0
17	02/81	2,873.1	2,815.0	58.1	119.0
18	03/81	4,373.8	2,815.0	58.1	177.1
19	04/81	4,373.8	4,315.7	58.1	235.2
20	05/81	4,373.8	4,315.7	58.1	293.3
21	06/81	4,989.5	4,315.7	58.1	351.4
22	07/81	4,989.5	4,893.3	96.1	447.5
23	08/81	4,989.5	4,893.3	96.1	543.6
24	09/81	6,448.2	4,893.3	96.1	639.8
25	10/81	6,448.2	6,281.0	167.2	807.0
26	11/81	6,448.2	6,281.0	167.2	974.2
27	12/81	12,800.9	6,281.0	167.2	1,141.4
28	01/82	12,800.9	12,346.3	454.5	1,595.9
29	02/82	12,800.9	12,346.3	454.5	2,050.4
30	03/82	9,812.4	12,346.3	454.5	2,505.0

31	04/82	9,812.4	9,477.3	335.1	2,840.0
32	05/82	9,812.4	9,477.3	335.1	3,175.1
33	06/82	21,639.5	9,477.3	335.1	3,510.1
34	07/82	21,639.5	20,844.0	795.5	4,305.6
35	08/82	21,639.5	20,844.0	795.5	5,101.2
36	09/82	7,137.4	20,844.0	795.5	5,896.7
37	10/82	7,137.4	6,769.7	367.8	6,264.5
38	11/82	7,137.4	6,769.7	367.8	6,632.2
39	12/82	7,728.1	6,769.7	367.8	7,000.0
40	01/83	7,728.1	7,345.3	382.8	7,382.8
41	02/83	7,728.1	7,345.3	382.8	7,765.5
42	03/83	7,254.4	7,345.3	382.8	8,148.3
43	04/83	7,254.4	6,862.3	392.1	8,540.4
44	05/83	7,058.4	6,862.3	196.0	8,736.4
45	06/83	8,206.6	6,862.3	196.0	8,932.4
46	07/83	8,206.6	8,134.3	72.2	9,004.7
47	08/83	8,206.6	8,134.3	72.2	9,076.9
48	09/83	4,766.4	8,134.3	72.2	9,149.1
49	10/83	4,766.4	4,620.0	146.4	9,295.5
50	11/83	4,766.4	4,620.0	146.4	9,441.8
51	12/83	7,243.6	4,620.0	146.4	9,588.2
52	01/84	7,243.6	7,033.3	210.3	9,798.4
53	02/84	7,243.6	7,033.3	210.3	10,008.7
54	03/84	4,587.9	7,033.3	210.3	10,219.0
55	04/84	4,587.9	4,433.7	154.3	10,373.2
56	05/84	4,587.9	4,433.7	154.3	10,527.5
57	06/84	6,905.3	4,433.7	154.3	10,681.8
58	07/84	6,905.3	6,683.7	221.6	10,903.4
59	08/84	6,905.3	6,683.7	221.6	11,124.9
60	09/84	4,966.2	6,683.7	221.6	11,346.5
61	10/84	4,966.2	4,801.3	164.8	11,511.3
62	11/84	4,966.2	4,801.3	164.8	11,676.2
63	12/84	6,379.7	4,801.3	164.8	11,841.0
64	01/85	6,379.7	6,210.3	169.3	12,010.3
65	02/85	6,379.7	6,210.3	169.3	12,179.6
66	03/85	4,116.3	6,210.3	169.3	12,349.0
67	04/85	4,116.3	4,065.3	51.0	12,399.9
68	05/85	4,116.3	4,065.3	51.0	12,450.9
69	06/85	3,345.5	4,065.3	51.0	12,501.9
70	07/85	3,345.5	3,277.0	68.5	12,570.4
71	08/85	3,345.5	3,277.0	68.5	12,638.8
72	09/85	11,153.2	3,277.0	68.5	12,707.3
73	10/85	11,153.2	11,019.2	134.0	12,841.3
74	11/85	11,153.2	11,019.2	134.0	12,975.4
75	12/85	5,683.9	11,019.2	134.0	13,109.4
76	01/86	5,683.9	5,515.2	168.7	13,278.1
77	02/86	5,683.9	5,515.2	168.7	13,446.8
78	03/86	7,014.0	5,515.2	168.7	13,615.6
79	04/86	7,014.0	6,751.6	262.4	13,878.0
80	05/86	7,014.0	6,751.6	262.4	14,140.4
Total ==>		504,538.7	483,188.2	14,140.4	

Table 2: Status of Project Receipts for All Project Accounts

Period	Date	Total Receipts	Federal Share	Local Share	Cumulative Receipts
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	0.0	0.0	0.0
2	11/79	4,743.0	3,794.4	948.6	4,743.0
3	12/79	218.7	174.9	43.7	4,961.7
4	01/80	776.0	620.8	155.2	5,737.7
5	02/80	776.0	620.8	155.2	6,513.7
6	03/80	0.0	0.0	0.0	6,513.7
7	04/80	0.0	0.0	0.0	6,513.7
8	05/80	0.0	0.0	0.0	6,513.7
9	06/80	9,697.5	7,758.0	1,939.5	16,211.2
10	07/80	0.0	0.0	0.0	16,211.2
11	08/80	251.3	201.0	50.3	16,462.4
12	09/80	4,576.4	3,661.1	915.3	21,038.9
13	10/80	2,906.3	2,325.0	581.3	23,945.1
14	11/80	422.6	338.1	84.5	24,367.8
15	12/80	2,749.8	2,199.8	550.0	27,117.5
16	01/81	0.0	0.0	0.0	27,117.5
17	02/81	3,655.4	2,924.4	731.1	30,772.9
18	03/81	2,270.5	1,816.4	454.1	33,043.5
19	04/81	2,426.0	1,940.8	485.2	35,469.5
20	05/81	2,481.7	1,985.4	496.3	37,951.2
21	06/81	3,990.8	3,192.6	798.2	41,942.0
22	07/81	6,242.8	4,994.2	1,248.6	48,184.8
23	08/81	5,244.8	4,195.8	1,049.0	53,429.6
24	09/81	3,950.4	3,160.3	790.1	57,380.1
25	10/81	0.0	0.0	0.0	57,380.1
26	11/81	3,276.6	2,621.3	655.3	60,656.6
27	12/81	1,784.6	1,427.7	356.9	62,441.2
28	01/82	5,872.7	4,698.2	1,174.5	68,313.9
29	02/82	4,716.0	3,772.8	943.2	73,029.9
30	03/82	0.0	0.0	0.0	73,029.9
31	04/82	8,371.5	6,697.2	1,674.3	81,401.5
32	05/82	9,780.3	7,824.3	1,956.1	91,181.8
33	06/82	0.0	0.0	0.0	91,181.8
34	07/82	9,465.7	7,572.5	1,893.1	100,647.5
35	08/82	13,283.0	10,626.4	2,656.6	113,930.5
36	09/82	7,764.4	6,211.5	1,552.9	121,694.8
37	10/82	16,135.5	12,908.4	3,227.1	137,830.3
38	11/82	0.0	0.0	0.0	137,830.3
39	12/82	17,500.0	14,000.0	3,500.0	155,330.3
40	01/83	2,835.3	2,268.2	567.1	158,165.6
41	02/83	23,267.9	18,614.3	4,653.6	181,433.5
42	03/83	0.0	0.0	0.0	181,433.5
43	04/83	9,522.1	7,617.7	1,904.4	190,955.6
44	05/83	0.0	0.0	0.0	190,955.6
45	06/83	2,179.6	1,743.7	435.9	193,135.2

46	07/83	0.0	0.0	0.0	193,135.2
47	08/83	8,212.2	6,569.8	1,642.4	201,347.4
48	09/83	0.0	0.0	0.0	201,347.4
49	10/83	12,500.0	10,000.0	2,500.0	213,847.4
50	11/83	2,920.2	2,336.2	584.0	216,767.6
51	12/83	6,583.1	5,266.5	1,316.6	223,350.7
52	01/84	5,500.0	4,400.0	1,100.0	228,850.7
53	02/84	22,182.4	17,745.9	4,436.5	251,033.1
54	03/84	11,526.0	9,220.8	2,305.2	262,559.0
55	04/84	10,219.1	8,175.2	2,043.8	272,778.1
56	05/84	18,108.7	14,487.0	3,621.7	290,886.8
57	06/84	0.0	0.0	0.0	290,886.8
58	07/84	10,212.1	10,212.1	0.0	301,098.9
59	08/84	9,571.3	7,515.0	2,056.3	310,670.3
60	09/84	9,178.9	9,178.9	0.0	319,849.2
61	10/84	9,966.5	6,792.6	3,173.9	329,815.7
62	11/84	637.5	558.9	78.7	330,453.2
63	12/84	8,601.4	8,601.4	0.0	339,054.6
64	01/85	6,140.2	5,907.3	232.9	345,194.8
65	02/85	6,039.5	6,039.1	0.4	351,234.3
66	03/85	6,913.6	6,614.5	299.1	358,147.9
67	04/85	5,308.7	4,812.3	496.5	363,456.7
68	05/85	8,885.2	8,885.2	0.0	372,341.8
69	06/85	3,594.3	3,594.3	0.0	375,936.2
70	07/85	5,376.9	5,376.9	0.0	381,313.1
71	08/85	4,334.9	4,334.5	0.3	385,648.0
72	09/85	4,915.4	3,820.9	1,094.5	390,563.3
73	10/85	17,138.9	7,374.5	9,764.4	407,702.2
74	11/85	3,223.6	3,223.6	0.0	410,925.8
75	12/85	2,584.6	2,584.6	0.0	413,510.4
76	01/86	20,738.1	20,738.1	0.0	434,248.5
77	02/86	2,948.6	2,948.6	0.0	437,197.1
78	03/86	11,511.8	3,490.3	8,021.5	448,708.9
79	04/86	3,959.2	3,649.0	310.2	452,668.1
80	05/86	3,683.8	3,683.5	0.3	456,351.9
Total ==>		456,351.9	372,645.5	83,706.4	

Table 3: Status of Project Payments and Receipts for All Project Accounts

Period	Date	Total Receipts	Total Payments	Receipts less Payments	Cumulative Surplus or Deficit
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	1,513.7	(1,513.7)	(1,513.7)
2	11/79	4,743.0	1,513.7	3,229.3	1,715.7
3	12/79	218.7	1,513.7	(1,295.0)	420.7
4	01/80	776.0	967.0	(191.0)	229.7
5	02/80	776.0	967.0	(191.0)	38.7
6	03/80	0.0	967.0	(967.0)	(928.3)
7	04/80	0.0	3,731.0	(3,731.0)	(4,659.3)
8	05/80	0.0	3,731.0	(3,731.0)	(8,390.3)
9	06/80	9,697.5	3,731.0	5,966.5	(2,423.8)
10	07/80	0.0	1,255.7	(1,255.7)	(3,679.5)
11	08/80	251.3	1,255.7	(1,004.4)	(4,683.9)
12	09/80	4,576.4	1,255.7	3,320.8	(1,363.1)
13	10/80	2,906.3	1,351.0	1,555.3	192.1
14	11/80	422.6	1,351.0	(928.4)	(736.2)
15	12/80	2,749.8	1,351.0	1,398.8	662.5
16	01/81	0.0	2,815.0	(2,815.0)	(2,152.5)
17	02/81	3,655.4	2,815.0	840.4	(1,312.1)
18	03/81	2,270.5	2,815.0	(544.5)	(1,856.5)
19	04/81	2,426.0	4,315.7	(1,889.6)	(3,746.2)
20	05/81	2,481.7	4,315.7	(1,833.9)	(5,580.1)
21	06/81	3,990.8	4,315.7	(324.9)	(5,905.0)
22	07/81	6,242.8	4,893.3	1,349.5	(4,555.5)
23	08/81	5,244.8	4,893.3	351.5	(4,204.0)
24	09/81	3,950.4	4,893.3	(942.9)	(5,146.9)
25	10/81	0.0	6,281.0	(6,281.0)	(11,427.9)
26	11/81	3,276.6	6,281.0	(3,004.4)	(14,432.4)
27	12/81	1,784.6	6,281.0	(4,496.4)	(18,928.8)
28	01/82	5,872.7	12,346.3	(6,473.6)	(25,402.4)
29	02/82	4,716.0	12,346.3	(7,630.3)	(33,032.7)
30	03/82	0.0	12,346.3	(12,346.3)	(45,379.1)
31	04/82	8,371.5	9,477.3	(1,105.8)	(46,484.9)
32	05/82	9,780.3	9,477.3	303.0	(46,181.9)
33	06/82	0.0	9,477.3	(9,477.3)	(55,659.2)
34	07/82	9,465.7	20,844.0	(11,378.3)	(67,037.5)
35	08/82	13,283.0	20,844.0	(7,561.0)	(74,598.5)
36	09/82	7,764.4	20,844.0	(13,079.6)	(87,678.2)
37	10/82	16,135.5	6,769.7	9,365.8	(78,312.3)
38	11/82	0.0	6,769.7	(6,769.7)	(85,082.0)
39	12/82	17,500.0	6,769.7	10,730.3	(74,351.7)
40	01/83	2,835.3	7,345.3	(4,510.0)	(78,861.7)
41	02/83	23,267.9	7,345.3	15,922.5	(62,939.2)
42	03/83	0.0	7,345.3	(7,345.3)	(70,284.5)
43	04/83	9,522.1	6,862.3	2,659.8	(67,624.8)
44	05/83	0.0	6,862.3	(6,862.3)	(74,487.1)
45	06/83	2,179.6	6,862.3	(4,682.7)	(79,169.8)

46	07/83	0.0	8,134.3	(8,134.3)	(87,304.1)
47	08/83	8,212.2	8,134.3	77.9	(87,226.3)
48	09/83	0.0	8,134.3	(8,134.3)	(95,360.6)
49	10/83	12,500.0	4,620.0	7,880.0	(87,480.6)
50	11/83	2,920.2	4,620.0	(1,699.8)	(89,180.4)
51	12/83	6,583.1	4,620.0	1,963.1	(87,217.3)
52	01/84	5,500.0	7,033.3	(1,533.3)	(88,750.6)
53	02/84	22,182.4	7,033.3	15,149.1	(73,601.5)
54	03/84	11,526.0	7,033.3	4,492.7	(69,108.9)
55	04/84	10,219.1	4,433.7	5,785.4	(63,323.5)
56	05/84	18,108.7	4,433.7	13,675.0	(49,648.4)
57	06/84	0.0	4,433.7	(4,433.7)	(54,082.1)
58	07/84	10,212.1	6,683.7	3,528.5	(50,553.6)
59	08/84	9,571.3	6,683.7	2,887.7	(47,666.0)
60	09/84	9,178.9	6,683.7	2,495.3	(45,170.7)
61	10/84	9,966.5	4,801.3	5,165.1	(40,005.6)
62	11/84	637.5	4,801.3	(4,163.8)	(44,169.4)
63	12/84	8,601.4	4,801.3	3,800.1	(40,369.3)
64	01/85	6,140.2	6,210.3	(70.1)	(40,439.4)
65	02/85	6,039.5	6,210.3	(170.8)	(40,610.3)
66	03/85	6,913.6	6,210.3	703.3	(39,907.0)
67	04/85	5,308.7	4,065.3	1,243.4	(38,663.6)
68	05/85	8,885.2	4,065.3	4,819.8	(33,843.7)
69	06/85	3,594.3	4,065.3	(471.0)	(34,314.7)
70	07/85	5,376.9	3,277.0	2,099.9	(32,214.8)
71	08/85	4,334.9	3,277.0	1,057.9	(31,156.9)
72	09/85	4,915.4	3,277.0	1,638.4	(29,518.6)
73	10/85	17,138.9	11,019.2	6,119.6	(23,398.9)
74	11/85	3,223.6	11,019.2	(7,795.6)	(31,194.5)
75	12/85	2,584.6	11,019.2	(8,434.7)	(39,629.2)
76	01/86	20,738.1	5,515.2	15,222.9	(24,406.3)
77	02/86	2,948.6	5,515.2	(2,566.5)	(26,972.8)
78	03/86	11,511.8	5,515.2	5,996.6	(20,976.2)
79	04/86	3,959.2	6,751.6	(2,792.4)	(23,768.6)
80	05/86	3,683.8	6,751.6	(3,067.7)	(26,836.3)
Total ==>		456,351.9	483,188.2	(26,836.3)	

Table 4: Cumulative Payments and Receipts for All Project Accounts

Period	Date	Cumulative Billing from Contractors	Cumulative Receipts	Cumulative Payments	Unpaid Balance (Bill.-Pay.)	Cumulative Surplus (Rec.-Pay.)
0	09/79	1,513.7	0.0	0.0	1,513.7	0.0
1	10/79	3,027.3	0.0	1,513.7	1,513.7	(1,513.7)
2	11/79	4,541.0	4,743.0	3,027.3	1,513.7	1,715.7
3	12/79	5,508.0	4,961.7	4,541.0	967.0	420.7
4	01/80	6,475.0	5,737.7	5,508.0	967.0	229.7
5	02/80	7,442.0	6,513.7	6,475.0	967.0	38.7
6	03/80	11,173.0	6,513.7	7,442.0	3,731.0	(928.3)
7	04/80	14,904.0	6,513.7	11,173.0	3,731.0	(4,659.3)
8	05/80	18,635.0	6,513.7	14,904.0	3,731.0	(8,390.3)
9	06/80	19,890.7	16,211.2	18,635.0	1,255.7	(2,423.8)
10	07/80	21,146.3	16,211.2	19,890.7	1,255.7	(3,679.5)
11	08/80	22,402.0	16,462.4	21,146.3	1,255.7	(4,683.9)
12	09/80	23,754.0	21,038.9	22,402.0	1,352.0	(1,363.1)
13	10/80	25,105.9	23,945.1	23,753.0	1,352.9	192.1
14	11/80	26,457.9	24,367.8	25,104.0	1,353.9	(736.3)
15	12/80	29,331.0	27,117.5	26,455.0	2,876.0	662.5
16	01/81	32,204.0	27,117.5	29,270.0	2,934.0	(2,152.5)
17	02/81	35,077.1	30,772.9	32,085.0	2,992.1	(1,312.1)
18	03/81	39,450.9	33,043.5	34,900.0	4,550.9	(1,856.5)
19	04/81	43,824.6	35,469.5	39,215.7	4,609.0	(3,746.2)
20	05/81	48,198.4	37,951.2	43,531.3	4,667.1	(5,580.1)
21	06/81	53,187.9	41,942.0	47,847.0	5,340.9	(5,905.0)
22	07/81	58,177.3	48,184.8	52,740.3	5,437.0	(4,555.5)
23	08/81	63,166.8	53,429.6	57,633.7	5,533.1	(4,204.0)
24	09/81	69,615.0	57,380.1	62,527.0	7,088.0	(5,146.9)
25	10/81	76,063.2	57,380.1	68,808.0	7,255.2	(11,427.9)
26	11/81	82,511.4	60,656.6	75,089.0	7,422.4	(14,432.4)
27	12/81	95,312.3	62,441.2	81,370.0	13,942.3	(18,928.8)
28	01/82	108,113.1	68,313.9	93,716.3	14,396.8	(25,402.4)
29	02/82	120,914.0	73,029.9	106,062.7	14,851.3	(33,032.7)
30	03/82	130,726.3	73,029.9	118,409.0	12,317.3	(45,379.1)
31	04/82	140,538.7	81,401.5	127,886.3	12,652.4	(46,484.9)
32	05/82	150,351.1	91,181.8	137,363.7	12,987.4	(46,181.9)
33	06/82	171,990.6	91,181.8	146,841.0	25,149.6	(55,659.2)
34	07/82	193,630.2	100,647.5	167,685.0	25,945.2	(67,037.5)
35	08/82	215,269.7	113,930.5	188,529.0	26,740.7	(74,598.5)
36	09/82	222,407.1	121,694.8	209,373.0	13,034.1	(87,678.2)
37	10/82	229,544.6	137,830.3	216,142.7	13,401.9	(78,312.3)
38	11/82	236,682.0	137,830.3	222,912.3	13,769.7	(85,082.0)
39	12/82	244,410.1	155,330.3	229,682.0	14,728.1	(74,351.7)
40	01/83	252,138.2	158,165.6	237,027.3	15,110.9	(78,861.7)
41	02/83	259,866.3	181,433.5	244,372.7	15,493.6	(62,939.2)
42	03/83	267,120.7	181,433.5	251,718.0	15,402.7	(70,284.5)
43	04/83	274,375.1	190,955.6	258,580.3	15,794.8	(67,624.8)
44	05/83	281,433.5	190,955.6	265,442.7	15,990.8	(74,487.1)
45	06/83	289,640.0	193,135.2	272,305.0	17,335.0	(79,169.8)

46	07/83	297,846.6	193,135.2	280,439.3	17,407.2	(87,304.1)
47	08/83	306,053.1	201,347.4	288,573.7	17,479.5	(87,226.3)
48	09/83	310,819.5	201,347.4	296,708.0	14,111.5	(95,360.6)
49	10/83	315,585.8	213,847.4	301,328.0	14,257.8	(87,480.6)
50	11/83	320,352.2	216,767.6	305,948.0	14,404.2	(89,180.4)
51	12/83	327,595.8	223,350.7	310,568.0	17,027.8	(87,217.3)
52	01/84	334,839.3	228,850.7	317,601.3	17,238.0	(88,750.6)
53	02/84	342,082.9	251,033.1	324,634.6	17,448.3	(73,601.5)
54	03/84	346,670.8	262,559.0	331,667.9	15,002.9	(69,108.9)
55	04/84	351,258.8	272,778.1	336,101.6	15,157.2	(63,323.5)
56	05/84	355,846.7	290,886.8	340,535.2	15,311.5	(49,648.4)
57	06/84	362,752.0	290,886.8	344,968.9	17,783.1	(54,082.1)
58	07/84	369,657.2	301,098.9	351,652.6	18,004.6	(50,553.6)
59	08/84	376,562.5	310,670.3	358,336.2	18,226.2	(47,666.0)
60	09/84	381,528.6	319,849.2	365,019.9	16,508.7	(45,170.7)
61	10/84	386,494.8	329,815.7	369,821.2	16,673.5	(40,005.6)
62	11/84	391,460.9	330,453.2	374,622.6	16,838.3	(44,169.4)
63	12/84	397,840.6	339,054.6	379,423.9	18,416.7	(40,369.3)
64	01/85	404,220.2	345,194.8	385,634.2	18,586.0	(40,439.4)
65	02/85	410,599.9	351,234.3	391,844.6	18,755.3	(40,610.3)
66	03/85	414,716.2	358,147.9	398,054.9	16,661.3	(39,907.0)
67	04/85	418,832.5	363,456.7	402,120.2	16,712.3	(38,663.6)
68	05/85	422,948.8	372,341.8	406,185.6	16,763.2	(33,843.7)
69	06/85	426,294.3	375,936.2	410,250.9	16,043.4	(34,314.7)
70	07/85	429,639:8	381,313.1	413,527.9	16,111.9	(32,214.8)
71	08/85	432,985.3	385,648.0	416,804.9	16,180.4	(31,156.9)
72	09/85	444,138.5	390,563.3	420,081.9	24,056.6	(29,518.6)
73	10/85	455,291.8	407,702.2	431,101.1	24,190.6	(23,398.9)
74	11/85	466,445.0	410,925.8	442,120.4	24,324.6	(31,194.5)
75	12/85	472,128.9	413,510.4	453,139.6	18,989.3	(39,629.2)
76	01/86	477,812.8	434,248.5	458,654.8	19,158.0	(24,406.3)
77	02/86	483,496.7	437,197.1	464,169.9	19,326.8	(26,972.8)
78	03/86	490,510.7	448,708.9	469,685.1	20,825.6	(20,976.2)
79	04/86	497,524.7	452,668.1	476,436.7	21,088.0	(23,768.6)
80	05/86	504,538.7	456,351.9	483,188.2	21,350.4	(26,836.3)

II Breakdown of Status of Payments and Retainage by Categories (in thousands of dollars)

Table 1: Appraisals

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	9.3	0.0	0.0	0.0
1	10/79	9.3	9.3	0.0	0.0
2	11/79	9.3	9.3	0.0	0.0
3	12/79	0.0	9.3	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	10.7	0.0	0.0	0.0
7	04/80	10.7	10.7	0.0	0.0
8	05/80	10.7	10.7	0.0	0.0
9	06/80	0.0	10.7	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	7.0	0.0	0.0	0.0
13	10/80	7.0	7.0	0.0	0.0
14	11/80	7.0	7.0	0.0	0.0
15	12/80	2.0	7.0	0.0	0.0
16	01/81	2.0	2.0	0.0	0.0
17	02/81	2.0	2.0	0.0	0.0
18	03/81	9.3	2.0	0.0	0.0
19	04/81	9.3	9.3	0.0	0.0
20	05/81	9.3	9.3	0.0	0.0
21	06/81	4.7	9.3	0.0	0.0
22	07/81	4.7	4.7	0.0	0.0
23	08/81	4.7	4.7	0.0	0.0
24	09/81	12.0	4.7	0.0	0.0
25	10/81	12.0	12.0	0.0	0.0
26	11/81	12.0	12.0	0.0	0.0
27	12/81	12.7	12.0	0.0	0.0
28	01/82	12.7	12.7	0.0	0.0
29	02/82	12.7	12.7	0.0	0.0
30	03/82	11.3	12.7	0.0	0.0
31	04/82	11.3	11.3	0.0	0.0
32	05/82	11.3	11.3	0.0	0.0
33	06/82	15.0	11.3	0.0	0.0
34	07/82	15.0	15.0	0.0	0.0
35	08/82	15.0	15.0	0.0	0.0
36	09/82	2.0	15.0	0.0	0.0
37	10/82	2.0	2.0	0.0	0.0
38	11/82	2.0	2.0	0.0	0.0
39	12/82	6.0	2.0	0.0	0.0
40	01/83	6.0	6.0	0.0	0.0
41	02/83	6.0	6.0	0.0	0.0
42	03/83	2.7	6.0	0.0	0.0
43	04/83	2.7	2.7	0.0	0.0
44	05/83	2.7	2.7	0.0	0.0
45	06/83	6.7	2.7	0.0	0.0

46	07/83	6.7	6.7	0.0	0.0
47	08/83	6.7	6.7	0.0	0.0
48	09/83	6.7	6.7	0.0	0.0
49	10/83	6.7	6.7	0.0	0.0
50	11/83	6.7	6.7	0.0	0.0
51	12/83	6.7	6.7	0.0	0.0
52	01/84	6.7	6.7	0.0	0.0
53	02/84	6.7	6.7	0.0	0.0
54	03/84	3.3	6.7	0.0	0.0
55	04/84	3.3	3.3	0.0	0.0
56	05/84	3.3	3.3	0.0	0.0
57	06/84	3.0	3.3	0.0	0.0
58	07/84	3.0	3.0	0.0	0.0
59	08/84	3.0	3.0	0.0	0.0
60	09/84	0.0	3.0	0.0	0.0
61	10/84	0.0	0.0	0.0	0.0
62	11/84	0.0	0.0	0.0	0.0
63	12/84	0.7	0.0	0.0	0.0
64	01/85	0.7	0.7	0.0	0.0
65	02/85	0.7	0.7	0.0	0.0
66	03/85	0.0	0.7	0.0	0.0
67	04/85	0.0	0.0	0.0	0.0
68	05/85	0.0	0.0	0.0	0.0
69	06/85	0.0	0.0	0.0	0.0
70	07/85	0.0	0.0	0.0	0.0
71	08/85	0.0	0.0	0.0	0.0
72	09/85	0.0	0.0	0.0	0.0
73	10/85	0.0	0.0	0.0	0.0
74	11/85	0.0	0.0	0.0	0.0
75	12/85	0.0	0.0	0.0	0.0
76	01/86	0.0	0.0	0.0	0.0
77	02/86	0.0	0.0	0.0	0.0
78	03/86	1.7	0.0	0.0	0.0
79	04/86	1.7	1.7	0.0	0.0
80	05/86	1.7	1.7	0.0	0.0
Total ==>		400.0	398.3	0.0	

Table 2: Land

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	1,175.0	0.0	0.0	0.0
1	10/79	1,175.0	1,175.0	0.0	0.0
2	11/79	1,175.0	1,175.0	0.0	0.0
3	12/79	0.0	1,175.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	2,719.3	0.0	0.0	0.0
7	04/80	2,719.3	2,719.3	0.0	0.0
8	05/80	2,719.3	2,719.3	0.0	0.0
9	06/80	0.0	2,719.3	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	5.7	0.0	0.0	0.0
13	10/80	5.7	5.7	0.0	0.0
14	11/80	5.7	5.7	0.0	0.0
15	12/80	0.0	5.7	0.0	0.0
16	01/81	0.0	0.0	0.0	0.0
17	02/81	0.0	0.0	0.0	0.0
18	03/81	446.7	0.0	0.0	0.0
19	04/81	446.7	446.7	0.0	0.0
20	05/81	446.7	446.7	0.0	0.0
21	06/81	454.3	446.7	0.0	0.0
22	07/81	454.3	454.3	0.0	0.0
23	08/81	454.3	454.3	0.0	0.0
24	09/81	48.7	454.3	0.0	0.0
25	10/81	48.7	48.7	0.0	0.0
26	11/81	48.7	48.7	0.0	0.0
27	12/81	205.0	48.7	0.0	0.0
28	01/82	205.0	205.0	0.0	0.0
29	02/82	205.0	205.0	0.0	0.0
30	03/82	478.0	205.0	0.0	0.0
31	04/82	478.0	478.0	0.0	0.0
32	05/82	478.0	478.0	0.0	0.0
33	06/82	270.3	478.0	0.0	0.0
34	07/82	270.3	270.3	0.0	0.0
35	08/82	270.3	270.3	0.0	0.0
36	09/82	207.0	270.3	0.0	0.0
37	10/82	207.0	207.0	0.0	0.0
38	11/82	207.0	207.0	0.0	0.0
39	12/82	170.7	207.0	0.0	0.0
40	01/83	170.7	170.7	0.0	0.0
41	02/83	170.7	170.7	0.0	0.0
42	03/83	315.3	170.7	0.0	0.0
43	04/83	315.3	315.3	0.0	0.0
44	05/83	315.3	315.3	0.0	0.0
45	06/83	274.7	315.3	0.0	0.0

46	07/83	274.7	274.7	0.0	0.0
47	08/83	274.7	274.7	0.0	0.0
48	09/83	61.0	274.7	0.0	0.0
49	10/83	61.0	61.0	0.0	0.0
50	11/83	61.0	61.0	0.0	0.0
51	12/83	80.0	61.0	0.0	0.0
52	01/84	80.0	80.0	0.0	0.0
53	02/84	80.0	80.0	0.0	0.0
54	03/84	70.7	80.0	0.0	0.0
55	04/84	70.7	70.7	0.0	0.0
56	05/84	70.7	70.7	0.0	0.0
57	06/84	(362.0)	70.7	0.0	0.0
58	07/84	(362.0)	(362.0)	0.0	0.0
59	08/84	(362.0)	(362.0)	0.0	0.0
60	09/84	58.3	(362.0)	0.0	0.0
61	10/84	58.3	58.3	0.0	0.0
62	11/84	58.3	58.3	0.0	0.0
63	12/84	35.0	58.3	0.0	0.0
64	01/85	35.0	35.0	0.0	0.0
65	02/85	35.0	35.0	0.0	0.0
66	03/85	(0.3)	35.0	0.0	0.0
67	04/85	(0.3)	(0.3)	0.0	0.0
68	05/85	(0.3)	(0.3)	0.0	0.0
69	06/85	0.3	(0.3)	0.0	0.0
70	07/85	0.3	0.3	0.0	0.0
71	08/85	0.3	0.3	0.0	0.0
72	09/85	68.0	0.3	0.0	0.0
73	10/85	68.0	68.0	0.0	0.0
74	11/85	68.0	68.0	0.0	0.0
75	12/85	2.3	68.0	0.0	0.0
76	01/86	2.3	2.3	0.0	0.0
77	02/86	2.3	2.3	0.0	0.0
78	03/86	66.7	2.3	0.0	0.0
79	04/86	66.7	66.7	0.0	0.0
80	05/86	66.7	66.7	0.0	0.0
Total ==>		20,552.0	20,485.3	0.0	

Table 3: Utility Relocation

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	0.0	0.0	0.0
2	11/79	0.0	0.0	0.0	0.0
3	12/79	0.0	0.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	0.0	0.0	0.0	0.0
7	04/80	0.0	0.0	0.0	0.0
8	05/80	0.0	0.0	0.0	0.0
9	06/80	0.0	0.0	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	0.0	0.0	0.0	0.0
13	10/80	0.0	0.0	0.0	0.0
14	11/80	0.0	0.0	0.0	0.0
15	12/80	0.0	0.0	0.0	0.0
16	01/81	0.0	0.0	0.0	0.0
17	02/81	0.0	0.0	0.0	0.0
18	03/81	87.3	0.0	0.0	0.0
19	04/81	87.3	87.3	0.0	0.0
20	05/81	87.3	87.3	0.0	0.0
21	06/81	67.3	87.3	0.0	0.0
22	07/81	67.3	67.3	0.0	0.0
23	08/81	67.3	67.3	0.0	0.0
24	09/81	787.0	67.3	0.0	0.0
25	10/81	787.0	787.0	0.0	0.0
26	11/81	787.0	787.0	0.0	0.0
27	12/81	388.3	787.0	0.0	0.0
28	01/82	388.3	388.3	0.0	0.0
29	02/82	388.3	388.3	0.0	0.0
30	03/82	127.3	388.3	0.0	0.0
31	04/82	127.3	127.3	0.0	0.0
32	05/82	127.3	127.3	0.0	0.0
33	06/82	61.3	127.3	0.0	0.0
34	07/82	61.3	61.3	0.0	0.0
35	08/82	61.3	61.3	0.0	0.0
36	09/82	68.0	61.3	0.0	0.0
37	10/82	68.0	68.0	0.0	0.0
38	11/82	68.0	68.0	0.0	0.0
39	12/82	67.3	68.0	0.0	0.0
40	01/83	67.3	67.3	0.0	0.0
41	02/83	67.3	67.3	0.0	0.0
42	03/83	165.7	67.3	0.0	0.0
43	04/83	165.7	165.7	0.0	0.0
44	05/83	165.7	165.7	0.0	0.0
45	06/83	126.7	165.7	0.0	0.0

46	07/83	126.7	126.7	0.0	0.0
47	08/83	126.7	126.7	0.0	0.0
48	09/83	37.7	126.7	0.0	0.0
49	10/83	37.7	37.7	0.0	0.0
50	11/83	37.7	37.7	0.0	0.0
51	12/83	17.0	37.7	0.0	0.0
52	01/84	17.0	17.0	0.0	0.0
53	02/84	17.0	17.0	0.0	0.0
54	03/84	42.3	17.0	0.0	0.0
55	04/84	42.3	42.3	0.0	0.0
56	05/84	42.3	42.3	0.0	0.0
57	06/84	118.0	42.3	0.0	0.0
58	07/84	118.0	118.0	0.0	0.0
59	08/84	118.0	118.0	0.0	0.0
60	09/84	(1.0)	118.0	0.0	0.0
61	10/84	(1.0)	(1.0)	0.0	0.0
62	11/84	(1.0)	(1.0)	0.0	0.0
63	12/84	217.0	(1.0)	0.0	0.0
64	01/85	217.0	217.0	0.0	0.0
65	02/85	217.0	217.0	0.0	0.0
66	03/85	104.0	217.0	0.0	0.0
67	04/85	104.0	104.0	0.0	0.0
68	05/85	104.0	104.0	0.0	0.0
69	06/85	131.3	104.0	0.0	0.0
70	07/85	131.3	131.3	0.0	0.0
71	08/85	131.3	131.3	0.0	0.0
72	09/85	44.0	131.3	0.0	0.0
73	10/85	44.0	44.0	0.0	0.0
74	11/85	44.0	44.0	0.0	0.0
75	12/85	47.0	44.0	0.0	0.0
76	01/86	47.0	47.0	0.0	0.0
77	02/86	47.0	47.0	0.0	0.0
78	03/86	50.0	47.0	0.0	0.0
79	04/86	50.0	50.0	0.0	0.0
80	05/86	50.0	50.0	0.0	0.0
Total ==)		8,261.0	8,211.0	0.0	

Table 4: Power and Incline Service Equipment

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	0.0	0.0	0.0
2	11/79	0.0	0.0	0.0	0.0
3	12/79	0.0	0.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	0.0	0.0	0.0	0.0
7	04/80	0.0	0.0	0.0	0.0
8	05/80	0.0	0.0	0.0	0.0
9	06/80	0.0	0.0	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	0.0	0.0	0.0	0.0
13	10/80	0.0	0.0	0.0	0.0
14	11/80	0.0	0.0	0.0	0.0
15	12/80	0.0	0.0	0.0	0.0
16	01/81	0.0	0.0	0.0	0.0
17	02/81	0.0	0.0	0.0	0.0
18	03/81	0.4	0.0	0.0	0.0
19	04/81	0.4	0.3	0.0	0.0
20	05/81	0.4	0.3	0.0	0.1
21	06/81	0.4	0.3	0.0	0.1
22	07/81	0.4	0.3	0.0	0.1
23	08/81	0.4	0.3	0.0	0.2
24	09/81	13.2	0.3	0.0	0.2
25	10/81	13.2	12.0	1.2	1.4
26	11/81	13.2	12.0	1.2	2.6
27	12/81	27.1	12.0	1.2	3.8
28	01/82	27.1	24.7	2.5	6.3
29	02/82	27.1	24.7	2.5	8.7
30	03/82	98.6	24.7	2.5	11.2
31	04/82	98.6	89.7	9.0	20.2
32	05/82	98.6	89.7	9.0	29.1
33	06/82	31.2	89.7	9.0	38.1
34	07/82	31.2	28.3	2.8	40.9
35	08/82	31.2	28.3	2.8	43.8
36	09/82	97.2	28.3	2.8	46.6
37	10/82	97.2	88.3	8.8	55.4
38	11/82	97.2	88.3	8.8	64.3
39	12/82	60.1	88.3	8.8	73.1
40	01/83	60.1	54.7	5.5	78.6
41	02/83	60.1	54.7	5.5	84.0
42	03/83	8.8	54.7	5.5	89.5
43	04/83	8.8	8.0	0.8	90.3
44	05/83	8.4	8.0	0.4	90.7
45	06/83	10.2	8.0	0.4	91.1

46	07/83	10.2	9.7	0.5	91.6
47	08/83	10.2	9.7	0.5	92.1
48	09/83	11.6	9.7	0.5	92.6
49	10/83	11.6	11.0	0.6	93.1
50	11/83	11.6	11.0	0.6	93.7
51	12/83	16.5	11.0	0.6	94.2
52	01/84	16.5	15.7	0.8	95.0
53	02/84	16.5	15.7	0.8	95.8
54	03/84	2.1	15.7	0.8	96.6
55	04/84	2.1	2.0	0.1	96.7
56	05/84	2.1	2.0	0.1	96.8
57	06/84	10.9	2.0	0.1	96.9
58	07/84	10.9	10.3	0.5	97.4
59	08/84	10.9	10.3	0.5	97.9
60	09/84	182.0	10.3	0.5	98.4
61	10/84	182.0	173.3	8.7	107.1
62	11/84	182.0	173.3	8.7	115.7
63	12/84	1.8	173.3	8.7	124.4
64	01/85	1.8	1.7	0.1	124.5
65	02/85	1.8	1.7	0.1	124.6
66	03/85	0.4	1.7	0.1	124.6
67	04/85	0.4	0.3	0.0	124.7
68	05/85	0.4	0.3	0.0	124.7
69	06/85	14.7	0.3	0.0	124.7
70	07/85	14.7	14.0	0.7	125.4
71	08/85	14.7	14.0	0.7	126.1
72	09/85	86.1	14.0	0.7	126.8
73	10/85	86.1	82.0	4.1	130.9
74	11/85	86.1	82.0	4.1	135.0
75	12/85	1.8	82.0	4.1	139.1
76	01/86	1.8	1.7	0.1	139.2
77	02/86	1.8	1.7	0.1	139.3
78	03/86	52.5	1.7	0.1	139.4
79	04/86	52.5	50.0	2.5	141.9
80	05/86	52.5	50.0	2.5	144.4
Total ==>		2,181.3	1,984.0	144.4	

Table 5: Force Account-Materials

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	0.0	0.0	0.0
2	11/79	0.0	0.0	0.0	0.0
3	12/79	0.0	0.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	0.0	0.0	0.0	0.0
7	04/80	0.0	0.0	0.0	0.0
8	05/80	0.0	0.0	0.0	0.0
9	06/80	0.0	0.0	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	78.7	0.0	0.0	0.0
13	10/80	78.7	78.7	0.0	0.0
14	11/80	78.7	78.7	0.0	0.0
15	12/80	73.7	78.7	0.0	0.0
16	01/81	73.7	73.7	0.0	0.0
17	02/81	73.7	73.7	0.0	0.0
18	03/81	23.7	73.7	0.0	0.0
19	04/81	23.7	23.7	0.0	0.0
20	05/81	23.7	23.7	0.0	0.0
21	06/81	60.7	23.7	0.0	0.0
22	07/81	60.7	60.7	0.0	0.0
23	08/81	60.7	60.7	0.0	0.0
24	09/81	14.7	60.7	0.0	0.0
25	10/81	14.7	14.7	0.0	0.0
26	11/81	14.7	14.7	0.0	0.0
27	12/81	20.3	14.7	0.0	0.0
28	01/82	20.3	20.3	0.0	0.0
29	02/82	20.3	20.3	0.0	0.0
30	03/82	33.3	20.3	0.0	0.0
31	04/82	33.3	33.3	0.0	0.0
32	05/82	33.3	33.3	0.0	0.0
33	06/82	58.0	33.3	0.0	0.0
34	07/82	58.0	58.0	0.0	0.0
35	08/82	58.0	58.0	0.0	0.0
36	09/82	15.0	58.0	0.0	0.0
37	10/82	15.0	15.0	0.0	0.0
38	11/82	15.0	15.0	0.0	0.0
39	12/82	15.7	15.0	0.0	0.0
40	01/83	15.7	15.7	0.0	0.0
41	02/83	15.7	15.7	0.0	0.0
42	03/83	16.0	15.7	0.0	0.0
43	04/83	16.0	16.0	0.0	0.0
44	05/83	16.0	16.0	0.0	0.0
45	06/83	6.3	16.0	0.0	0.0

46	07/83	6.3	6.3	0.0	0.0
47	08/83	6.3	6.3	0.0	0.0
48	09/83	19.3	6.3	0.0	0.0
49	10/83	19.3	19.3	0.0	0.0
50	11/83	19.3	19.3	0.0	0.0
51	12/83	55.0	19.3	0.0	0.0
52	01/84	55.0	55.0	0.0	0.0
53	02/84	55.0	55.0	0.0	0.0
54	03/84	73.7	55.0	0.0	0.0
55	04/84	73.7	73.7	0.0	0.0
56	05/84	73.7	73.7	0.0	0.0
57	06/84	3.7	73.7	0.0	0.0
58	07/84	3.7	3.7	0.0	0.0
59	08/84	3.7	3.7	0.0	0.0
60	09/84	(146.3)	3.7	0.0	0.0
61	10/84	(146.3)	(146.3)	0.0	0.0
62	11/84	(146.3)	(146.3)	0.0	0.0
63	12/84	13.0	(146.3)	0.0	0.0
64	01/85	13.0	13.0	0.0	0.0
65	02/85	13.0	13.0	0.0	0.0
66	03/85	15.0	13.0	0.0	0.0
67	04/85	15.0	15.0	0.0	0.0
68	05/85	15.0	15.0	0.0	0.0
69	06/85	77.3	15.0	0.0	0.0
70	07/85	77.3	77.3	0.0	0.0
71	08/85	77.3	77.3	0.0	0.0
72	09/85	1.3	77.3	0.0	0.0
73	10/85	1.3	1.3	0.0	0.0
74	11/85	1.3	1.3	0.0	0.0
75	12/85	3.7	1.3	0.0	0.0
76	01/86	3.7	3.7	0.0	0.0
77	02/86	3.7	3.7	0.0	0.0
78	03/86	33.3	3.7	0.0	0.0
79	04/86	33.3	33.3	0.0	0.0
80	05/86	33.3	33.3	0.0	0.0
Total ==>		1,695.0	1,661.7	0.0	

Table 6: Force Account-Labor

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	0.0	0.0	0.0
2	11/79	0.0	0.0	0.0	0.0
3	12/79	0.0	0.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	0.0	0.0	0.0	0.0
7	04/80	0.0	0.0	0.0	0.0
8	05/80	0.0	0.0	0.0	0.0
9	06/80	0.0	0.0	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	11.7	0.0	0.0	0.0
13	10/80	11.7	11.7	0.0	0.0
14	11/80	11.7	11.7	0.0	0.0
15	12/80	97.0	11.7	0.0	0.0
16	01/81	97.0	97.0	0.0	0.0
17	02/81	97.0	97.0	0.0	0.0
18	03/81	42.3	97.0	0.0	0.0
19	04/81	42.3	42.3	0.0	0.0
20	05/81	42.3	42.3	0.0	0.0
21	06/81	27.3	42.3	0.0	0.0
22	07/81	27.3	27.3	0.0	0.0
23	08/81	27.3	27.3	0.0	0.0
24	09/81	25.3	27.3	0.0	0.0
25	10/81	25.3	25.3	0.0	0.0
26	11/81	25.3	25.3	0.0	0.0
27	12/81	26.3	25.3	0.0	0.0
28	01/82	26.3	26.3	0.0	0.0
29	02/82	26.3	26.3	0.0	0.0
30	03/82	38.3	26.3	0.0	0.0
31	04/82	38.3	38.3	0.0	0.0
32	05/82	38.3	38.3	0.0	0.0
33	06/82	151.0	38.3	0.0	0.0
34	07/82	151.0	151.0	0.0	0.0
35	08/82	151.0	151.0	0.0	0.0
36	09/82	225.7	151.0	0.0	0.0
37	10/82	225.7	225.7	0.0	0.0
38	11/82	225.7	225.7	0.0	0.0
39	12/82	146.0	225.7	0.0	0.0
40	01/83	146.0	146.0	0.0	0.0
41	02/83	146.0	146.0	0.0	0.0
42	03/83	124.0	146.0	0.0	0.0
43	04/83	124.0	124.0	0.0	0.0
44	05/83	124.0	124.0	0.0	0.0
45	06/83	138.0	124.0	0.0	0.0

46	07/83	138.0	138.0	0.0	0.0
47	08/83	138.0	138.0	0.0	0.0
48	09/83	264.7	138.0	0.0	0.0
49	10/83	264.7	264.7	0.0	0.0
50	11/83	264.7	264.7	0.0	0.0
51	12/83	252.0	264.7	0.0	0.0
52	01/84	252.0	252.0	0.0	0.0
53	02/84	252.0	252.0	0.0	0.0
54	03/84	252.0	252.0	0.0	0.0
55	04/84	252.0	252.0	0.0	0.0
56	05/84	252.0	252.0	0.0	0.0
57	06/84	98.7	252.0	0.0	0.0
58	07/84	98.7	98.7	0.0	0.0
59	08/84	98.7	98.7	0.0	0.0
60	09/84	55.3	98.7	0.0	0.0
61	10/84	55.3	55.3	0.0	0.0
62	11/84	55.3	55.3	0.0	0.0
63	12/84	88.7	55.3	0.0	0.0
64	01/85	88.7	88.7	0.0	0.0
65	02/85	88.7	88.7	0.0	0.0
66	03/85	134.0	88.7	0.0	0.0
67	04/85	134.0	134.0	0.0	0.0
68	05/85	134.0	134.0	0.0	0.0
69	06/85	110.0	134.0	0.0	0.0
70	07/85	110.0	110.0	0.0	0.0
71	08/85	110.0	110.0	0.0	0.0
72	09/85	63.3	110.0	0.0	0.0
73	10/85	63.3	63.3	0.0	0.0
74	11/85	63.3	63.3	0.0	0.0
75	12/85	34.7	63.3	0.0	0.0
76	01/86	34.7	34.7	0.0	0.0
77	02/86	34.7	34.7	0.0	0.0
78	03/86	50.0	34.7	0.0	0.0
79	04/86	50.0	50.0	0.0	0.0
80	05/86	50.0	50.0	0.0	0.0
Total ==>		7,369.0	7,319.0	0.0	

Table 7: Insurance

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	0.0	0.0	0.0
2	11/79	0.0	0.0	0.0	0.0
3	12/79	0.0	0.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	4.0	0.0	0.0	0.0
7	04/80	4.0	4.0	0.0	0.0
8	05/80	4.0	4.0	0.0	0.0
9	06/80	0.0	4.0	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	0.0	0.0	0.0	0.0
13	10/80	0.0	0.0	0.0	0.0
14	11/80	0.0	0.0	0.0	0.0
15	12/80	0.0	0.0	0.0	0.0
16	01/81	0.0	0.0	0.0	0.0
17	02/81	0.0	0.0	0.0	0.0
18	03/81	4.0	0.0	0.0	0.0
19	04/81	4.0	4.0	0.0	0.0
20	05/81	4.0	4.0	0.0	0.0
21	06/81	0.0	4.0	0.0	0.0
22	07/81	0.0	0.0	0.0	0.0
23	08/81	0.0	0.0	0.0	0.0
24	09/81	25.0	0.0	0.0	0.0
25	10/81	25.0	25.0	0.0	0.0
26	11/81	25.0	25.0	0.0	0.0
27	12/81	0.0	25.0	0.0	0.0
28	01/82	0.0	0.0	0.0	0.0
29	02/82	0.0	0.0	0.0	0.0
30	03/82	4.7	0.0	0.0	0.0
31	04/82	4.7	4.7	0.0	0.0
32	05/82	4.7	4.7	0.0	0.0
33	06/82	46.0	4.7	0.0	0.0
34	07/82	46.0	46.0	0.0	0.0
35	08/82	46.0	46.0	0.0	0.0
36	09/82	369.3	46.0	0.0	0.0
37	10/82	369.3	369.3	0.0	0.0
38	11/82	369.3	369.3	0.0	0.0
39	12/82	475.7	369.3	0.0	0.0
40	01/83	475.7	475.7	0.0	0.0
41	02/83	475.7	475.7	0.0	0.0
42	03/83	299.0	475.7	0.0	0.0
43	04/83	299.0	299.0	0.0	0.0
44	05/83	299.0	299.0	0.0	0.0
45	06/83	487.3	299.0	0.0	0.0

46	07/83	487.3	487.3	0.0	0.0
47	08/83	487.3	487.3	0.0	0.0
48	09/83	142.3	487.3	0.0	0.0
49	10/83	142.3	142.3	0.0	0.0
50	11/83	142.3	142.3	0.0	0.0
51	12/83	334.3	142.3	0.0	0.0
52	01/84	334.3	334.3	0.0	0.0
53	02/84	334.3	334.3	0.0	0.0
54	03/84	18.3	334.3	0.0	0.0
55	04/84	18.3	18.3	0.0	0.0
56	05/84	18.3	18.3	0.0	0.0
57	06/84	112.3	18.3	0.0	0.0
58	07/84	112.3	112.3	0.0	0.0
59	08/84	112.3	112.3	0.0	0.0
60	09/84	162.7	112.3	0.0	0.0
61	10/84	162.7	162.7	0.0	0.0
62	11/84	162.7	162.7	0.0	0.0
63	12/84	270.7	162.7	0.0	0.0
64	01/85	270.7	270.7	0.0	0.0
65	02/85	270.7	270.7	0.0	0.0
66	03/85	228.0	270.7	0.0	0.0
67	04/85	228.0	228.0	0.0	0.0
68	05/85	228.0	228.0	0.0	0.0
69	06/85	103.0	228.0	0.0	0.0
70	07/85	103.0	103.0	0.0	0.0
71	08/85	103.0	103.0	0.0	0.0
72	09/85	273.7	103.0	0.0	0.0
73	10/85	273.7	273.7	0.0	0.0
74	11/85	273.7	273.7	0.0	0.0
75	12/85	151.7	273.7	0.0	0.0
76	01/86	151.7	151.7	0.0	0.0
77	02/86	151.7	151.7	0.0	0.0
78	03/86	166.7	151.7	0.0	0.0
79	04/86	166.7	166.7	0.0	0.0
80	05/86	166.7	166.7	0.0	0.0
Total ==>		11,036.0	10,869.3	0.0	

Table 8: Project Administration

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	29.0	0.0	0.0	0.0
1	10/79	29.0	29.0	0.0	0.0
2	11/79	29.0	29.0	0.0	0.0
3	12/79	0.0	29.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	41.3	0.0	0.0	0.0
7	04/80	41.3	41.3	0.0	0.0
8	05/80	41.3	41.3	0.0	0.0
9	06/80	0.0	41.3	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	51.3	0.0	0.0	0.0
13	10/80	51.3	51.3	0.0	0.0
14	11/80	51.3	51.3	0.0	0.0
15	12/80	51.0	51.3	0.0	0.0
16	01/81	51.0	51.0	0.0	0.0
17	02/81	51.0	51.0	0.0	0.0
18	03/81	94.0	51.0	0.0	0.0
19	04/81	94.0	94.0	0.0	0.0
20	05/81	94.0	94.0	0.0	0.0
21	06/81	8.3	94.0	0.0	0.0
22	07/81	8.3	8.3	0.0	0.0
23	08/81	8.3	8.3	0.0	0.0
24	09/81	55.7	8.3	0.0	0.0
25	10/81	55.7	55.7	0.0	0.0
26	11/81	55.7	55.7	0.0	0.0
27	12/81	81.0	55.7	0.0	0.0
28	01/82	81.0	81.0	0.0	0.0
29	02/82	81.0	81.0	0.0	0.0
30	03/82	25.0	81.0	0.0	0.0
31	04/82	25.0	25.0	0.0	0.0
32	05/82	25.0	25.0	0.0	0.0
33	06/82	85.7	25.0	0.0	0.0
34	07/82	85.7	85.7	0.0	0.0
35	08/82	85.7	85.7	0.0	0.0
36	09/82	102.7	85.7	0.0	0.0
37	10/82	102.7	102.7	0.0	0.0
38	11/82	102.7	102.7	0.0	0.0
39	12/82	215.7	102.7	0.0	0.0
40	01/83	215.7	215.7	0.0	0.0
41	02/83	215.7	215.7	0.0	0.0
42	03/83	111.7	215.7	0.0	0.0
43	04/83	111.7	111.7	0.0	0.0
44	05/83	111.7	111.7	0.0	0.0
45	06/83	146.3	111.7	0.0	0.0

46	07/83	146.3	146.3	0.0	0.0
47	08/83	146.3	146.3	0.0	0.0
48	09/83	144.3	146.3	0.0	0.0
49	10/83	144.3	144.3	0.0	0.0
50	11/83	144.3	144.3	0.0	0.0
51	12/83	175.0	144.3	0.0	0.0
52	01/84	175.0	175.0	0.0	0.0
53	02/84	175.0	175.0	0.0	0.0
54	03/84	175.3	175.0	0.0	0.0
55	04/84	175.3	175.3	0.0	0.0
56	05/84	175.3	175.3	0.0	0.0
57	06/84	168.3	175.3	0.0	0.0
58	07/84	168.3	168.3	0.0	0.0
59	08/84	168.3	168.3	0.0	0.0
60	09/84	159.3	168.3	0.0	0.0
61	10/84	159.3	159.3	0.0	0.0
62	11/84	159.3	159.3	0.0	0.0
63	12/84	232.7	159.3	0.0	0.0
64	01/85	232.7	232.7	0.0	0.0
65	02/85	232.7	232.7	0.0	0.0
66	03/85	227.7	232.7	0.0	0.0
67	04/85	227.7	227.7	0.0	0.0
68	05/85	227.7	227.7	0.0	0.0
69	06/85	218.3	227.7	0.0	0.0
70	07/85	218.3	218.3	0.0	0.0
71	08/85	218.3	218.3	0.0	0.0
72	09/85	213.3	218.3	0.0	0.0
73	10/85	213.3	213.3	0.0	0.0
74	11/85	213.3	213.3	0.0	0.0
75	12/85	183.0	213.3	0.0	0.0
76	01/86	183.0	183.0	0.0	0.0
77	02/86	183.0	183.0	0.0	0.0
78	03/86	200.0	183.0	0.0	0.0
79	04/86	200.0	200.0	0.0	0.0
80	05/86	200.0	200.0	0.0	0.0
Total ==>		9,588.0	9,388.0	0.0	

Table 9: Light Rail Vehicles

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	0.0	0.0	0.0
2	11/79	0.0	0.0	0.0	0.0
3	12/79	0.0	0.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	0.0	0.0	0.0	0.0
7	04/80	0.0	0.0	0.0	0.0
8	05/80	0.0	0.0	0.0	0.0
9	06/80	0.0	0.0	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	0.0	0.0	0.0	0.0
13	10/80	0.0	0.0	0.0	0.0
14	11/80	0.0	0.0	0.0	0.0
15	12/80	0.0	0.0	0.0	0.0
16	01/81	0.0	0.0	0.0	0.0
17	02/81	0.0	0.0	0.0	0.0
18	03/81	0.0	0.0	0.0	0.0
19	04/81	0.0	0.0	0.0	0.0
20	05/81	0.0	0.0	0.0	0.0
21	06/81	0.0	0.0	0.0	0.0
22	07/81	0.0	0.0	0.0	0.0
23	08/81	0.0	0.0	0.0	0.0
24	09/81	(1.0)	0.0	0.0	0.0
25	10/81	(1.0)	(1.0)	0.0	0.0
26	11/81	(1.0)	(1.0)	0.0	0.0
27	12/81	0.7	(1.0)	0.0	0.0
28	01/82	0.7	0.7	0.0	0.0
29	02/82	0.7	0.7	0.0	0.0
30	03/82	0.0	0.7	0.0	0.0
31	04/82	0.0	0.0	0.0	0.0
32	05/82	0.0	0.0	0.0	0.0
33	06/82	887.7	0.0	0.0	0.0
34	07/82	887.7	887.7	0.0	0.0
35	08/82	887.7	887.7	0.0	0.0
36	09/82	799.0	887.7	0.0	0.0
37	10/82	799.0	799.0	0.0	0.0
38	11/82	799.0	799.0	0.0	0.0
39	12/82	887.7	799.0	0.0	0.0
40	01/83	887.7	887.7	0.0	0.0
41	02/83	887.7	887.7	0.0	0.0
42	03/83	887.7	887.7	0.0	0.0
43	04/83	887.7	887.7	0.0	0.0
44	05/83	887.7	887.7	0.0	0.0
45	06/83	3,851.3	887.7	0.0	0.0

46	07/83	3,851.3	3,851.3	0.0	0.0
47	08/83	3,851.3	3,851.3	0.0	0.0
48	09/83	0.0	3,851.3	0.0	0.0
49	10/83	0.0	0.0	0.0	0.0
50	11/83	0.0	0.0	0.0	0.0
51	12/83	233.3	0.0	0.0	0.0
52	01/84	233.3	233.3	0.0	0.0
53	02/84	233.3	233.3	0.0	0.0
54	03/84	(233.3)	233.3	0.0	0.0
55	04/84	(233.3)	(233.3)	0.0	0.0
56	05/84	(233.3)	(233.3)	0.0	0.0
57	06/84	592.7	(233.3)	0.0	0.0
58	07/84	592.7	592.7	0.0	0.0
59	08/84	592.7	592.7	0.0	0.0
60	09/84	533.3	592.7	0.0	0.0
61	10/84	533.3	533.3	0.0	0.0
62	11/84	533.3	533.3	0.0	0.0
63	12/84	533.0	533.3	0.0	0.0
64	01/85	533.0	533.0	0.0	0.0
65	02/85	533.0	533.0	0.0	0.0
66	03/85	926.0	533.0	0.0	0.0
67	04/85	926.0	926.0	0.0	0.0
68	05/85	926.0	926.0	0.0	0.0
69	06/85	546.0	926.0	0.0	0.0
70	07/85	546.0	546.0	0.0	0.0
71	08/85	546.0	546.0	0.0	0.0
72	09/85	6,643.0	546.0	0.0	0.0
73	10/85	6,643.0	6,643.0	0.0	0.0
74	11/85	6,643.0	6,643.0	0.0	0.0
75	12/85	5.7	6,643.0	0.0	0.0
76	01/86	5.7	5.7	0.0	0.0
77	02/86	5.7	5.7	0.0	0.0
78	03/86	0.0	5.7	0.0	0.0
79	04/86	0.0	0.0	0.0	0.0
80	05/86	0.0	0.0	0.0	0.0
Total ==>		51,278.0	51,278.0	0.0	

Table 10: Relocation

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	0.0	0.0	0.0
2	11/79	0.0	0.0	0.0	0.0
3	12/79	0.0	0.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	0.0	0.0	0.0	0.0
7	04/80	0.0	0.0	0.0	0.0
8	05/80	0.0	0.0	0.0	0.0
9	06/80	0.0	0.0	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	0.0	0.0	0.0	0.0
13	10/80	0.0	0.0	0.0	0.0
14	11/80	0.0	0.0	0.0	0.0
15	12/80	7.7	0.0	0.0	0.0
16	01/81	7.7	7.7	0.0	0.0
17	02/81	7.7	7.7	0.0	0.0
18	03/81	51.7	7.7	0.0	0.0
19	04/81	51.7	51.7	0.0	0.0
20	05/81	51.7	51.7	0.0	0.0
21	06/81	159.0	51.7	0.0	0.0
22	07/81	159.0	159.0	0.0	0.0
23	08/81	159.0	159.0	0.0	0.0
24	09/81	15.3	159.0	0.0	0.0
25	10/81	15.3	15.3	0.0	0.0
26	11/81	15.3	15.3	0.0	0.0
27	12/81	121.3	15.3	0.0	0.0
28	01/82	121.3	121.3	0.0	0.0
29	02/82	121.3	121.3	0.0	0.0
30	03/82	9.7	121.3	0.0	0.0
31	04/82	9.7	9.7	0.0	0.0
32	05/82	9.7	9.7	0.0	0.0
33	06/82	59.3	9.7	0.0	0.0
34	07/82	59.3	59.3	0.0	0.0
35	08/82	59.3	59.3	0.0	0.0
36	09/82	28.0	59.3	0.0	0.0
37	10/82	28.0	28.0	0.0	0.0
38	11/82	28.0	28.0	0.0	0.0
39	12/82	53.3	28.0	0.0	0.0
40	01/83	53.3	53.3	0.0	0.0
41	02/83	53.3	53.3	0.0	0.0
42	03/83	12.7	53.3	0.0	0.0
43	04/83	12.7	12.7	0.0	0.0
44	05/83	12.7	12.7	0.0	0.0
45	06/83	13.0	12.7	0.0	0.0

46	07/83	13.0	13.0	0.0	0.0
47	08/83	13.0	13.0	0.0	0.0
48	09/83	9.3	13.0	0.0	0.0
49	10/83	9.3	9.3	0.0	0.0
50	11/83	9.3	9.3	0.0	0.0
51	12/83	8.7	9.3	0.0	0.0
52	01/84	8.7	8.7	0.0	0.0
53	02/84	8.7	8.7	0.0	0.0
54	03/84	10.7	8.7	0.0	0.0
55	04/84	10.7	10.7	0.0	0.0
56	05/84	10.7	10.7	0.0	0.0
57	06/84	15.0	10.7	0.0	0.0
58	07/84	15.0	15.0	0.0	0.0
59	08/84	15.0	15.0	0.0	0.0
60	09/84	9.0	15.0	0.0	0.0
61	10/84	9.0	9.0	0.0	0.0
62	11/84	9.0	9.0	0.0	0.0
63	12/84	44.7	9.0	0.0	0.0
64	01/85	44.7	44.7	0.0	0.0
65	02/85	44.7	44.7	0.0	0.0
66	03/85	2.7	44.7	0.0	0.0
67	04/85	2.7	2.7	0.0	0.0
68	05/85	2.7	2.7	0.0	0.0
69	06/85	3.0	2.7	0.0	0.0
70	07/85	3.0	3.0	0.0	0.0
71	08/85	3.0	3.0	0.0	0.0
72	09/85	1.0	3.0	0.0	0.0
73	10/85	1.0	1.0	0.0	0.0
74	11/85	1.0	1.0	0.0	0.0
75	12/85	0.0	1.0	0.0	0.0
76	01/86	0.0	0.0	0.0	0.0
77	02/86	0.0	0.0	0.0	0.0
78	03/86	1.7	0.0	0.0	0.0
79	04/86	1.7	1.7	0.0	0.0
80	05/86	1.7	1.7	0.0	0.0
Total ==>		1,910.0	1,908.3	0.0	

Table 11: Power and Incline Support Equipment

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	0.0	0.0	0.0
2	11/79	0.0	0.0	0.0	0.0
3	12/79	0.0	0.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	0.0	0.0	0.0	0.0
7	04/80	0.0	0.0	0.0	0.0
8	05/80	0.0	0.0	0.0	0.0
9	06/80	0.0	0.0	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	0.0	0.0	0.0	0.0
13	10/80	0.0	0.0	0.0	0.0
14	11/80	0.0	0.0	0.0	0.0
15	12/80	0.0	0.0	0.0	0.0
16	01/81	0.0	0.0	0.0	0.0
17	02/81	0.0	0.0	0.0	0.0
18	03/81	0.0	0.0	0.0	0.0
19	04/81	0.0	0.0	0.0	0.0
20	05/81	0.0	0.0	0.0	0.0
21	06/81	0.0	0.0	0.0	0.0
22	07/81	0.0	0.0	0.0	0.0
23	08/81	0.0	0.0	0.0	0.0
24	09/81	0.0	0.0	0.0	0.0
25	10/81	0.0	0.0	0.0	0.0
26	11/81	0.0	0.0	0.0	0.0
27	12/81	0.0	0.0	0.0	0.0
28	01/82	0.0	0.0	0.0	0.0
29	02/82	0.0	0.0	0.0	0.0
30	03/82	0.0	0.0	0.0	0.0
31	04/82	0.0	0.0	0.0	0.0
32	05/82	0.0	0.0	0.0	0.0
33	06/82	693.4	0.0	0.0	0.0
34	07/82	693.4	630.3	63.0	63.0
35	08/82	693.4	630.3	63.0	126.1
36	09/82	682.0	630.3	63.0	189.1
37	10/82	682.0	620.0	62.0	251.1
38	11/82	682.0	620.0	62.0	313.1
39	12/82	1,106.2	620.0	62.0	375.1
40	01/83	1,106.2	1,005.7	100.6	475.7
41	02/83	1,106.2	1,005.7	100.6	576.2
42	03/83	1,801.1	1,005.7	100.6	676.8
43	04/83	1,801.1	1,637.3	163.7	840.5
44	05/83	1,719.2	1,637.3	81.9	922.4
45	06/83	(555.1)	1,637.3	81.9	1,004.3

46	07/83	(555.1)	(528.7)	(26.4)	977.8
47	08/83	(555.1)	(528.7)	(26.4)	951.4
48	09/83	682.9	(528.7)	(26.4)	925.0
49	10/83	682.9	650.3	32.5	957.5
50	11/83	682.9	650.3	32.5	990.0
51	12/83	1,129.4	650.3	32.5	1,022.5
52	01/84	1,129.4	1,075.6	53.8	1,076.3
53	02/84	1,129.4	1,075.6	53.8	1,130.1
54	03/84	893.2	1,075.6	53.8	1,183.9
55	04/84	893.2	850.7	42.5	1,226.4
56	05/84	893.2	850.7	42.5	1,268.9
57	06/84	1,524.6	850.7	42.5	1,311.5
58	07/84	1,524.6	1,452.0	72.6	1,384.1
59	08/84	1,524.6	1,452.0	72.6	1,456.7
60	09/84	1,054.6	1,452.0	72.6	1,529.3
61	10/84	1,054.6	1,004.3	50.2	1,579.5
62	11/84	1,054.6	1,004.3	50.2	1,629.7
63	12/84	1,281.4	1,004.3	50.2	1,679.9
64	01/85	1,281.4	1,220.3	61.0	1,740.9
65	02/85	1,281.4	1,220.3	61.0	1,801.9
66	03/85	299.3	1,220.3	61.0	1,863.0
67	04/85	299.3	285.0	14.3	1,877.2
68	05/85	299.3	285.0	14.3	1,891.5
69	06/85	801.2	285.0	14.3	1,905.7
70	07/85	801.2	763.0	38.2	1,943.9
71	08/85	801.2	763.0	38.2	1,982.0
72	09/85	509.5	763.0	38.2	2,020.2
73	10/85	509.5	485.3	24.3	2,044.4
74	11/85	509.5	485.3	24.3	2,068.7
75	12/85	583.3	485.3	24.3	2,093.0
76	01/86	583.3	555.5	27.8	2,120.7
77	02/86	583.3	555.5	27.8	2,148.5
78	03/86	846.5	555.5	27.8	2,176.3
79	04/86	846.5	806.2	40.3	2,216.6
80	05/86	846.5	806.2	40.3	2,256.9
Total ==>		39,918.0	36,732.7	2,256.9	

Table 12: Construction: Fixed Facility

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	0.0	0.0	0.0
2	11/79	0.0	0.0	0.0	0.0
3	12/79	0.0	0.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	0.0	0.0	0.0	0.0
7	04/80	0.0	0.0	0.0	0.0
8	05/80	0.0	0.0	0.0	0.0
9	06/80	0.0	0.0	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	10.6	0.0	0.0	0.0
13	10/80	10.6	9.7	1.0	1.0
14	11/80	10.6	9.7	1.0	1.9
15	12/80	638.7	9.7	1.0	2.9
16	01/81	638.7	580.7	58.1	61.0
17	02/81	638.7	580.7	58.1	119.0
18	03/81	638.7	580.7	58.1	177.1
19	04/81	638.7	580.7	58.1	235.2
20	05/81	638.7	580.7	58.1	293.2
21	06/81	915.0	580.7	58.1	351.3
22	07/81	915.0	831.8	83.2	434.5
23	08/81	915.0	831.8	83.2	517.7
24	09/81	911.7	831.8	83.2	600.9
25	10/81	911.7	828.8	82.9	683.7
26	11/81	911.7	828.8	82.9	766.6
27	12/81	2,507.8	828.8	82.9	849.5
28	01/82	2,507.8	2,279.8	228.0	1,077.5
29	02/82	2,507.8	2,279.8	228.0	1,305.5
30	03/82	1,266.7	2,279.8	228.0	1,533.5
31	04/82	1,266.7	1,151.5	115.2	1,648.6
32	05/82	1,266.7	1,151.5	115.2	1,763.8
33	06/82	3,112.3	1,151.5	115.2	1,878.9
34	07/82	3,112.3	2,829.3	282.9	2,161.8
35	08/82	3,112.3	2,829.3	282.9	2,444.8
36	09/82	1,633.1	2,829.3	282.9	2,727.7
37	10/82	1,633.1	1,484.7	148.5	2,876.2
38	11/82	1,633.1	1,484.7	148.5	3,024.6
39	12/82	1,522.0	1,484.7	148.5	3,173.1
40	01/83	1,522.0	1,383.7	138.4	3,311.5
41	02/83	1,522.0	1,383.7	138.4	3,449.8
42	03/83	1,251.4	1,383.7	138.4	3,588.2
43	04/83	1,251.4	1,137.7	113.8	3,702.0
44	05/83	1,194.6	1,137.7	56.9	3,758.9
45	06/83	1,030.8	1,137.7	56.9	3,815.7

46	07/83	1,030.8	981.7	49.1	3,864.8
47	08/83	1,030.8	981.7	49.1	3,913.9
48	09/83	1,189.7	981.7	49.1	3,963.0
49	10/83	1,189.7	1,133.0	56.7	4,019.6
50	11/83	1,189.7	1,133.0	56.7	4,076.3
51	12/83	1,634.9	1,133.0	56.7	4,132.9
52	01/84	1,634.9	1,557.0	77.9	4,210.8
53	02/84	1,634.9	1,557.0	77.9	4,288.6
54	03/84	1,172.1	1,557.0	77.9	4,366.5
55	04/84	1,172.1	1,116.3	55.8	4,422.3
56	05/84	1,172.1	1,116.3	55.8	4,478.1
57	06/84	1,558.9	1,116.3	55.8	4,533.9
58	07/84	1,558.9	1,484.7	74.2	4,608.2
59	08/84	1,558.9	1,484.7	74.2	4,682.4
60	09/84	1,112.3	1,484.7	74.2	4,756.6
61	10/84	1,112.3	1,059.3	53.0	4,809.6
62	11/84	1,112.3	1,059.3	53.0	4,862.6
63	12/84	1,136.5	1,059.3	53.0	4,915.5
64	01/85	1,136.5	1,082.3	54.1	4,969.7
65	02/85	1,136.5	1,082.3	54.1	5,023.8
66	03/85	385.4	1,082.3	54.1	5,077.9
67	04/85	385.4	367.0	18.4	5,096.2
68	05/85	385.4	367.0	18.4	5,114.6
69	06/85	311.2	367.0	18.4	5,132.9
70	07/85	311.2	296.3	14.8	5,147.8
71	08/85	311.2	296.3	14.8	5,162.6
72	09/85	530.6	296.3	14.8	5,177.4
73	10/85	530.6	505.3	25.3	5,202.6
74	11/85	530.6	505.3	25.3	5,227.9
75	12/85	780.2	505.3	25.3	5,253.2
76	01/86	780.2	743.0	37.2	5,290.3
77	02/86	780.2	743.0	37.2	5,327.5
78	03/86	2,469.6	743.0	37.2	5,364.6
79	04/86	2,469.6	2,352.0	117.6	5,482.2
80	05/86	2,469.6	2,352.0	117.6	5,599.8
Total ==>		83,103.2	74,976.9	5,599.8	

Table 13: Construction: Right-of-Way

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	0.0	0.0	0.0	0.0
1	10/79	0.0	0.0	0.0	0.0
2	11/79	0.0	0.0	0.0	0.0
3	12/79	0.0	0.0	0.0	0.0
4	01/80	0.0	0.0	0.0	0.0
5	02/80	0.0	0.0	0.0	0.0
6	03/80	0.0	0.0	0.0	0.0
7	04/80	0.0	0.0	0.0	0.0
8	05/80	0.0	0.0	0.0	0.0
9	06/80	0.0	0.0	0.0	0.0
10	07/80	0.0	0.0	0.0	0.0
11	08/80	0.0	0.0	0.0	0.0
12	09/80	0.0	0.0	0.0	0.0
13	10/80	0.0	0.0	0.0	0.0
14	11/80	0.0	0.0	0.0	0.0
15	12/80	0.0	0.0	0.0	0.0
16	01/81	0.0	0.0	0.0	0.0
17	02/81	0.0	0.0	0.0	0.0
18	03/81	0.0	0.0	0.0	0.0
19	04/81	0.0	0.0	0.0	0.0
20	05/81	0.0	0.0	0.0	0.0
21	06/81	141.9	0.0	0.0	0.0
22	07/81	141.9	129.0	12.9	12.9
23	08/81	141.9	129.0	12.9	25.8
24	09/81	914.5	129.0	12.9	38.7
25	10/81	914.5	831.3	83.1	121.8
26	11/81	914.5	831.3	83.1	205.0
27	12/81	2,464.7	831.3	83.1	288.1
28	01/82	2,464.7	2,240.7	224.1	512.2
29	02/82	2,464.7	2,240.7	224.1	736.2
30	03/82	2,320.3	2,240.7	224.1	960.3
31	04/82	2,320.3	2,109.3	210.9	1,171.2
32	05/82	2,320.3	2,109.3	210.9	1,382.2
33	06/82	4,914.1	2,109.3	210.9	1,593.1
34	07/82	4,914.1	4,467.3	446.7	2,039.8
35	08/82	4,914.1	4,467.3	446.7	2,486.6
36	09/82	1,633.1	4,467.3	446.7	2,933.3
37	10/82	1,633.1	1,484.7	148.5	3,081.8
38	11/82	1,633.1	1,484.7	148.5	3,230.2
39	12/82	1,522.0	1,484.7	148.5	3,378.7
40	01/83	1,522.0	1,383.7	138.4	3,517.1
41	02/83	1,522.0	1,383.7	138.4	3,655.4
42	03/83	1,251.4	1,383.7	138.4	3,793.8
43	04/83	1,251.4	1,137.7	113.8	3,907.6
44	05/83	1,194.6	1,137.7	56.9	3,964.5
45	06/83	1,030.8	1,137.7	56.9	4,021.3

46	07/83	1,030.8	981.7	49.1	4,070.4
47	08/83	1,030.8	981.7	49.1	4,119.5
48	09/83	1,189.7	981.7	49.1	4,168.6
49	10/83	1,189.7	1,133.0	56.7	4,225.2
50	11/83	1,189.7	1,133.0	56.7	4,281.9
51	12/83	1,634.9	1,133.0	56.7	4,338.5
52	01/84	1,634.9	1,557.0	77.9	4,416.4
53	02/84	1,634.9	1,557.0	77.9	4,494.2
54	03/84	1,172.1	1,557.0	77.9	4,572.1
55	04/84	1,172.1	1,116.3	55.8	4,627.9
56	05/84	1,172.1	1,116.3	55.8	4,683.7
57	06/84	1,558.9	1,116.3	55.8	4,739.5
58	07/84	1,558.9	1,484.7	74.2	4,813.8
59	08/84	1,558.9	1,484.7	74.2	4,888.0
60	09/84	1,112.3	1,484.7	74.2	4,962.2
61	10/84	1,112.3	1,059.3	53.0	5,015.2
62	11/84	1,112.3	1,059.3	53.0	5,068.2
63	12/84	1,136.5	1,059.3	53.0	5,121.1
64	01/85	1,136.5	1,082.3	54.1	5,175.3
65	02/85	1,136.5	1,082.3	54.1	5,229.4
66	03/85	385.4	1,082.3	54.1	5,283.5
67	04/85	385.4	367.0	18.4	5,301.8
68	05/85	385.4	367.0	18.4	5,320.2
69	06/85	311.2	367.0	18.4	5,338.5
70	07/85	311.2	296.3	14.8	5,353.4
71	08/85	311.2	296.3	14.8	5,368.2
72	09/85	1,688.1	296.3	14.8	5,383.0
73	10/85	1,688.1	1,607.7	80.4	5,463.4
74	11/85	1,688.1	1,607.7	80.4	5,543.8
75	12/85	2,178.4	1,607.7	80.4	5,624.1
76	01/86	2,178.4	2,074.7	103.7	5,727.9
77	02/86	2,178.4	2,074.7	103.7	5,831.6
78	03/86	2,142.0	2,074.7	103.7	5,935.3
79	04/86	2,142.0	2,040.0	102.0	6,037.3
80	05/86	2,142.0	2,040.0	102.0	6,139.3
Total ==>		92,049.2	83,711.0	6,139.3	

Table 14: Engineering

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/79	300.3	0.0	0.0	0.0
1	10/79	300.3	300.3	0.0	0.0
2	11/79	300.3	300.3	0.0	0.0
3	12/79	967.0	300.3	0.0	0.0
4	01/80	967.0	967.0	0.0	0.0
5	02/80	967.0	967.0	0.0	0.0
6	03/80	955.7	967.0	0.0	0.0
7	04/80	955.7	955.7	0.0	0.0
8	05/80	955.7	955.7	0.0	0.0
9	06/80	1,255.7	955.7	0.0	0.0
10	07/80	1,255.7	1,255.7	0.0	0.0
11	08/80	1,255.7	1,255.7	0.0	0.0
12	09/80	1,187.0	1,255.7	0.0	0.0
13	10/80	1,187.0	1,187.0	0.0	0.0
14	11/80	1,187.0	1,187.0	0.0	0.0
15	12/80	2,003.0	1,187.0	0.0	0.0
16	01/81	2,003.0	2,003.0	0.0	0.0
17	02/81	2,003.0	2,003.0	0.0	0.0
18	03/81	2,975.7	2,003.0	0.0	0.0
19	04/81	2,975.7	2,975.7	0.0	0.0
20	05/81	2,975.7	2,975.7	0.0	0.0
21	06/81	3,150.5	2,975.7	0.0	0.0
22	07/81	3,150.5	3,150.5	0.0	0.0
23	08/81	3,150.5	3,150.5	0.0	0.0
24	09/81	3,626.2	3,150.5	0.0	0.0
25	10/81	3,626.2	3,626.2	0.0	0.0
26	11/81	3,626.2	3,626.2	0.0	0.0
27	12/81	6,945.5	3,626.2	0.0	0.0
28	01/82	6,945.5	6,945.5	0.0	0.0
29	02/82	6,945.5	6,945.5	0.0	0.0
30	03/82	5,399.2	6,945.5	0.0	0.0
31	04/82	5,399.2	5,399.2	0.0	0.0
32	05/82	5,399.2	5,399.2	0.0	0.0
33	06/82	11,254.3	5,399.2	0.0	0.0
34	07/82	11,254.3	11,254.3	0.0	0.0
35	08/82	11,254.3	11,254.3	0.0	0.0
36	09/82	1,275.3	11,254.3	0.0	0.0
37	10/82	1,275.3	1,275.3	0.0	0.0
38	11/82	1,275.3	1,275.3	0.0	0.0
39	12/82	1,479.7	1,275.3	0.0	0.0
40	01/83	1,479.7	1,479.7	0.0	0.0
41	02/83	1,479.7	1,479.7	0.0	0.0
42	03/83	1,007.0	1,479.7	0.0	0.0
43	04/83	1,007.0	1,007.0	0.0	0.0
44	05/83	1,007.0	1,007.0	0.0	0.0
45	06/83	1,639.7	1,007.0	0.0	0.0

46	07/83	1,639.7	1,639.7	0.0	0.0
47	08/83	1,639.7	1,639.7	0.0	0.0
48	09/83	1,007.3	1,639.7	0.0	0.0
49	10/83	1,007.3	1,007.3	0.0	0.0
50	11/83	1,007.3	1,007.3	0.0	0.0
51	12/83	1,666.0	1,007.3	0.0	0.0
52	01/84	1,666.0	1,666.0	0.0	0.0
53	02/84	1,666.0	1,666.0	0.0	0.0
54	03/84	935.3	1,666.0	0.0	0.0
55	04/84	935.3	935.3	0.0	0.0
56	05/84	935.3	935.3	0.0	0.0
57	06/84	1,502.3	935.3	0.0	0.0
58	07/84	1,502.3	1,502.3	0.0	0.0
59	08/84	1,502.3	1,502.3	0.0	0.0
60	09/84	674.3	1,502.3	0.0	0.0
61	10/84	674.3	674.3	0.0	0.0
62	11/84	674.3	674.3	0.0	0.0
63	12/84	1,388.3	674.3	0.0	0.0
64	01/85	1,388.3	1,388.3	0.0	0.0
65	02/85	1,388.3	1,388.3	0.0	0.0
66	03/85	1,409.0	1,388.3	0.0	0.0
67	04/85	1,409.0	1,409.0	0.0	0.0
68	05/85	1,409.0	1,409.0	0.0	0.0
69	06/85	718.0	1,409.0	0.0	0.0
70	07/85	718.0	718.0	0.0	0.0
71	08/85	718.0	718.0	0.0	0.0
72	09/85	1,031.3	718.0	0.0	0.0
73	10/85	1,031.3	1,031.3	0.0	0.0
74	11/85	1,031.3	1,031.3	0.0	0.0
75	12/85	1,712.3	1,031.3	0.0	0.0
76	01/86	1,712.3	1,712.3	0.0	0.0
77	02/86	1,712.3	1,712.3	0.0	0.0
78	03/86	933.3	1,712.3	0.0	0.0
79	04/86	933.3	933.3	0.0	0.0
80	05/86	933.3	933.3	0.0	0.0
Total ==>		175,198.0	174,264.7	0.0	

APPENDIX B

Everett Maintenance Facilities: MBTA; Boston, MA

Agency:	MBTA; Boston MA
Project Title:	Everett Maintenance Facilities
Type of Work:	Renovation of Main Repair Shop
Duration for Study:	45 months
No. of contracts:	2 (contract #'s M2CN08 and M2CN09)

I Summary of Accounts for All Contractors

Table 1: Status of Project Payments and Retainage for all Project Accounts

Period	Date	Billings from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	11/81	277,687	0	0	0
1	12/81	423,757	263,803	13,884	13,884
2	01/82	419,581	0	0	13,884
3	02/82	298,615	801,172	42,166	56,050
4	03/82	735,455	283,685	14,930	70,980
5	04/82	805,109	698,683	36,772	107,752
6	05/82	750,310	764,854	40,255	148,007
7	06/82	860,769	0	0	148,007
8	07/82	725,715	1,530,526	80,553	228,560
9	08/82	823,391	0	0	228,560
10	09/82	494,063	1,471,652	77,454	306,014
11	10/82	845,796	494,063	0	306,014
12	11/82	838,928	1,267,131	(48,420)	257,594
13	12/82	717,715	862,571	20,146	277,740
14	01/83	469,249	333,432	0	277,740
15	02/83	697,149	453,267	15,982	293,722
16	03/83	1,227,341	381,787	20,094	313,816
17	04/83	493,497	1,828,343	74,962	388,778
18	05/83	644,392	710,203	31,494	420,272
19	06/83	804,929	36,202	0	420,272
20	07/83	407,921	719,430	37,864	458,136
21	08/83	538,275	505,316	(49,260)	408,876
22	09/83	335,742	459,385	0	408,876
23	10/83	261,323	414,632	0	408,876
24	11/83	273,252	229,969	0	408,876
25	12/83	519,443	304,606	0	408,876

26	01/84	120,874	519,443	0	408,876
27	02/84	141,730	120,874	0	408,876
28	03/84	66,366	141,730	0	408,876
29	04/84	90,106	66,366	0	408,876
30	05/84	64,346	184,757	(83,709)	325,167
31	06/84	54,592	0	0	325,167
32	07/84	214,556	203,902	(90,000)	235,167
33	08/84	61,347	339,997	(70,000)	165,167
34	09/84	30,513	30,513	0	165,167
35	10/84	2,240	6,682	0	165,167
36	11/84	11,924	2,240	0	165,167
37	12/84	0	0	0	165,167
38	01/85	0	21,924	(20,000)	145,167
39	02/85	7,498	32,998	(17,000)	128,167
40	03/85	0	0	0	128,167
41	04/84	0	0	0	128,167
42	05/85	0	0	0	128,167
43	06/85	0	0	0	128,167
44	07/85	17,465	0	0	128,167
45	08/85	0	19,365	(1,900)	126,267
Total ==>		16,572,961	16,505,503	126,267	

Table 2: Status of Project Receipts

Period	Date	Total Receipts	Federal Share	Loacal Share	Cumulative Receipts
0	11/81	0	0	0	0
1	12/81	263,803	211,042	42,208	263,803
2	01/82	402,570	322,056	64,411	666,373
3	02/82	398,603	318,882	63,776	1,064,976
4	03/82	283,685	226,948	45,390	1,348,661
5	04/82	698,683	558,947	111,789	2,047,344
6	05/82	764,854	611,883	122,377	2,812,199
7	06/82	712,796	570,237	114,047	3,524,995
8	07/82	817,732	654,185	130,837	4,342,726
9	08/82	689,430	551,544	110,309	5,032,156
10	09/82	782,223	625,778	125,156	5,814,379
11	10/82	574,905	459,924	91,985	6,389,284
12	11/82	1,186,292	949,033	189,807	7,575,576
13	12/82	862,572	690,058	138,012	8,438,148
14	01/83	637,107	509,686	101,937	9,075,255
15	02/83	531,381	425,105	85,021	9,606,636
16	03/83	1,356,945	1,085,556	217,111	10,963,581
17	04/83	472,410	377,928	75,586	11,435,991
18	05/83	710,204	568,163	113,633	12,146,196
19	06/83	755,632	604,506	120,901	12,901,828
20	07/83	434,646	347,717	69,543	13,336,474
21	08/83	530,057	424,046	84,809	13,866,531
22	09/83	352,288	281,831	56,366	14,218,819
23	10/83	292,314	233,851	46,770	14,511,133
24	11/83	243,154	194,524	38,905	14,754,288
25	12/83	462,710	370,168	74,034	15,216,998
26	01/84	239,061	191,249	38,250	15,456,059
27	02/84	0	0	0	15,456,059
28	03/84	388,115	310,492	62,098	15,844,175
29	04/84	126,495	101,196	20,239	15,970,670
30	05/84	117,751	94,201	18,840	16,088,421
31	06/84	54,593	43,674	8,735	16,143,014
32	07/84	302,354	241,883	48,377	16,445,368
33	08/84	131,348	105,078	21,016	16,576,716
34	09/84	30,513	24,411	4,882	16,607,229
35	10/84	2,240	1,792	358	16,609,469
36	11/84	0	0	0	16,609,469
37	12/84	21,925	17,540	3,508	16,631,394
38	01/85	8,500	6,800	1,360	16,639,894
39	02/85	24,498	19,598	3,920	16,664,392
40	03/85	0	0	0	16,664,392
41	04/84	0	0	0	16,664,392
42	05/85	0	0	0	16,664,392
43	06/85	0	0	0	16,664,392
44	07/85	19,366	15,493	3,099	16,683,757
45	08/85	0	0	0	16,683,757
Total ==>		16,683,757	13,347,006	2,669,401	

Table 3: Status of Project Payments and Receipts

Period	Date	Total Receipts	Total Payments	Receipts less Payments	Cumulative Surplus or Deficit
0	11/81	0	0	0	0
1	12/81	263,803	263,803	0	0
2	01/82	402,570	0	402,570	402,570
3	02/82	398,603	801,172	(402,569)	1
4	03/82	283,685	283,685	0	1
5	04/82	698,683	698,683	0	1
6	05/82	764,854	764,854	0	2
7	06/82	712,796	0	712,796	712,798
8	07/82	817,732	1,530,526	(712,794)	3
9	08/82	689,430	0	689,430	689,433
10	09/82	782,223	1,471,652	(689,429)	4
11	10/82	574,905	494,063	80,842	80,846
12	11/82	1,186,292	1,267,131	(80,839)	7
13	12/82	862,572	862,571	1	8
14	01/83	637,107	333,432	303,675	303,683
15	02/83	531,381	453,267	78,114	381,797
16	03/83	1,356,945	381,787	975,158	1,356,955
17	04/83	472,410	1,828,343	(1,355,933)	1,022
18	05/83	710,204	710,203	1	1,024
19	06/83	755,632	36,202	719,430	720,454
20	07/83	434,646	719,430	(284,784)	435,670
21	08/83	530,057	505,316	24,741	460,411
22	09/83	352,288	459,385	(107,097)	353,314
23	10/83	292,314	414,632	(122,318)	230,996
24	11/83	243,154	229,969	13,185	244,182
25	12/83	462,710	304,606	158,104	402,286
26	01/84	239,061	519,443	(280,382)	121,904
27	02/84	0	120,874	(120,874)	1,030
28	03/84	388,115	141,730	246,385	247,416
29	04/84	126,495	66,366	60,129	307,545
30	05/84	117,751	184,757	(67,006)	240,539
31	06/84	54,593	0	54,593	295,132
32	07/84	302,354	203,902	98,452	393,584
33	08/84	131,348	339,997	(208,649)	184,935
34	09/84	30,513	30,513	0	184,935
35	10/84	2,240	6,682	(4,442)	180,493
36	11/84	0	2,240	(2,240)	178,253
37	12/84	21,925	0	21,925	200,178
38	01/85	8,500	21,924	(13,424)	186,754
39	02/85	24,498	32,998	(8,500)	178,254
40	03/85	0	0	0	178,254
41	04/84	0	0	0	178,254
42	05/85	0	0	0	178,254
43	06/85	0	0	0	178,254
44	07/85	19,366	0	19,366	197,619
45	08/85	0	19,365	(19,365)	178,254
Total ==>			16,505,503	178,254	

Table 4: Cumulative Project Payments and Receipts

Period	Date	Cumulative Billing from Contractors	Cumulative Receipts	Cumulative Payments	Unpaid Balance (Bill.-Pay.)	Cumulative Surplus (Rec.-Pay)
0	11/81	277,687		0	277,687	0
1	12/81	701,444	263,803	263,803	437,641	0
2	01/82	1,121,025	666,373	263,803	857,222	402,570
3	02/82	1,419,640	1,064,976	1,064,975	354,665	1
4	03/82	2,155,095	1,348,661	1,348,660	806,435	1
5	04/82	2,960,204	2,047,344	2,047,343	912,861	1
6	05/82	3,710,514	2,812,199	2,812,197	898,317	2
7	06/82	4,571,283	3,524,995	2,812,197	1,759,086	712,798
8	07/82	5,296,998	4,342,726	4,342,723	954,275	3
9	08/82	6,120,389	5,032,156	4,342,723	1,777,666	689,433
10	09/82	6,614,452	5,814,379	5,814,375	800,077	4
11	10/82	7,460,248	6,389,284	6,308,438	1,151,810	80,846
12	11/82	8,299,176	7,575,576	7,575,569	723,607	7
13	12/82	9,016,891	8,438,148	8,438,140	578,751	8
14	01/83	9,486,140	9,075,255	8,771,572	714,568	303,683
15	02/83	10,183,289	9,606,636	9,224,839	958,450	381,797
16	03/83	11,410,630	10,963,581	9,606,626	1,804,004	1,356,955
17	04/83	11,904,127	11,435,991	11,434,969	469,158	1,022
18	05/83	12,548,519	12,146,196	12,145,172	403,347	1,024
19	06/83	13,353,448	12,901,828	12,181,374	1,172,074	720,454
20	07/83	13,761,369	13,336,474	12,900,804	860,565	435,670
21	08/83	14,299,644	13,866,531	13,406,120	893,524	460,411
22	09/83	14,635,386	14,218,819	13,865,505	769,881	353,314
23	10/83	14,896,709	14,511,133	14,280,137	616,572	230,996
24	11/83	15,169,961	14,754,288	14,510,106	659,855	244,182
25	12/83	15,689,404	15,216,998	14,814,712	874,692	402,286
26	01/84	15,810,278	15,456,059	15,334,155	476,123	121,904
27	02/84	15,952,008	15,456,059	15,455,029	496,979	1,030
28	03/84	16,018,374	15,844,175	15,596,759	421,615	247,416
29	04/84	16,108,480	15,970,670	15,663,125	445,355	307,545
30	05/84	16,172,826	16,088,421	15,847,882	324,944	240,539
31	06/84	16,227,418	16,143,014	15,847,882	379,536	295,132
32	07/84	16,441,974	16,445,368	16,051,784	390,190	393,584
33	08/84	16,503,321	16,576,716	16,391,781	111,540	184,935
34	09/84	16,533,834	16,607,229	16,422,294	111,540	184,935
35	10/84	16,536,074	16,609,469	16,428,976	107,098	180,493
36	11/84	16,547,998	16,609,469	16,431,216	116,782	178,253
37	12/84	16,547,998	16,631,394	16,431,216	116,782	200,178
38	01/85	16,547,998	16,639,894	16,453,140	94,858	186,754
39	02/85	16,555,496	16,664,392	16,486,138	69,358	178,254
40	03/85	16,555,496	16,664,392	16,486,138	69,358	178,254
41	04/84	16,555,496	16,664,392	16,486,138	69,358	178,254
42	05/85	16,555,496	16,664,392	16,486,138	69,358	178,254
43	06/85	16,555,496	16,664,392	16,486,138	69,358	178,254
44	07/85	16,572,961	16,683,757	16,486,138	86,823	197,619
45	08/85	16,572,961	16,683,757	16,505,503	67,458	178,254

II Breakdown of Payments and Retainage by Contracts

Table 1: Account for Contract #: M2CN08

Period	Date	Billing from Contractor	Payment by Agency	Retainage or Release	Cumulative Retainage
11	10/82	275,537	0	0	0
12	11/82	359,139	616,031	32,421	32,421
13	12/82	384,283	382,782	20,146	52,567
14	01/83	319,656	0	0	52,567
15	02/83	401,881	303,674	15,982	68,549
16	03/83	1,117,554	381,787	20,094	88,643
17	04/83	381,707	1,424,299	74,962	163,605
18	05/83	608,190	598,413	31,494	195,099
19	06/83	757,294	0	0	195,099
20	07/83	337,250	719,430	37,864	232,963
21	08/83	459,385	387,010	(49,260)	183,703
22	09/83	273,398	459,385	0	183,703
23	10/83	229,969	273,398	0	183,703
24	11/83	211,800	229,969	0	183,703
25	12/83	401,257	211,800	0	183,703
26	01/84	120,874	401,257	0	183,703
27	02/84	141,730	120,874	0	183,703
28	03/84	60,283	141,730	0	183,703
29	04/84	36,702	60,283	0	183,703
30	05/84	64,346	184,757	(83,709)	99,994
31	06/84	54,592	0	0	99,994
32	07/84	208,650	54,592	0	99,994
33	08/84	35,130	313,780	(70,000)	29,994
34	09/84	30,513	30,513	0	29,994
35	10/84	2,240	6,682	0	29,994
36	11/84	11,924	2,240	0	29,994
37	12/84	0	0	0	29,994
38	01/85	0	21,924	(20,000)	9,994
39	02/85	6,753	23,253	(8,000)	1,994
40	03/85	0	0	0	1,994
41	04/84	0	0	0	1,994
42	05/85	0	0	0	1,994
43	06/85	0	0	0	1,994
44	07/85	17,465	0	0	1,994
45	08/85	0	19,365	(1,900)	94
Total ==>		7,309,502	7,369,228	94	

Table 2: Account for Contract #: M2CN09

Period	Date	Billing from Contractor	Payment by Agency	Retainage or Release	Cumulative Retainage
0	11/81	277,687	0	0	0
1	12/81	423,757	263,803	13,884	13,884
2	01/82	419,581	0	0	13,884
3	02/82	298,615	801,172	42,166	56,050
4	03/82	735,455	283,685	14,930	70,980
5	04/82	805,109	698,683	36,772	107,752
6	05/82	750,310	764,854	40,255	148,007
7	06/82	860,769	0	0	148,007
8	07/82	725,715	1,530,526	80,553	228,560
9	08/82	823,391	0	0	228,560
10	09/82	494,063	1,471,652	77,454	306,014
11	10/82	570,259	494,063	0	306,014
12	11/82	479,789	651,100	(80,841)	225,173
13	12/82	333,432	479,789	0	225,173
14	01/83	149,593	333,432	0	225,173
15	02/83	295,268	149,593	0	225,173
16	03/83	109,787	0	0	225,173
17	04/83	111,790	404,044	0	225,173
18	05/83	36,202	111,790	0	225,173
19	06/83	47,635	36,202	0	225,173
20	07/83	70,671	0	0	225,173
21	08/83	78,890	118,306	0	225,173
22	09/83	62,344	0	0	225,173
23	10/83	31,354	141,234	0	225,173
24	11/83	61,452	0	0	225,173
25	12/83	118,186	92,806	0	225,173
26	01/84	0	118,186	0	225,173
27	02/84	0	0	0	225,173
28	03/84	6,083	0	0	225,173
29	04/84	53,404	6,083	0	225,173
30	05/84	0	0	0	225,173
31	06/84	0	0	0	225,173
32	07/84	5,906	149,310	(90,000)	135,173
33	08/84	26,217	26,217	0	135,173
34	09/84	0	0	0	135,173
35	10/84	0	0	0	135,173
36	11/84	0	0	0	135,173
37	12/84	0	0	0	135,173
38	01/85	0	0	0	135,173
39	02/85	745	9,745	(9,000)	126,173
Total ==>		9,263,459	9,136,275	126,173	

III Breakdown of Receipts by Contracts

Table 1: Account for Contract #: M2CN08

Period	Date	Total Receipts	Federal Share	Local Share	Cumulative Receipts
11	10/82	0	0	0	0
12	11/82	616,032	492,826	123,206	616,032
13	12/82	382,783	306,226	76,557	998,815
14	01/83	303,675	242,940	60,735	1,302,489
15	02/83	381,787	305,430	76,357	1,684,276
16	03/83	1,061,677	849,342	212,335	2,745,953
17	04/83	362,623	290,098	72,525	3,108,576
18	05/83	598,414	478,731	119,683	3,706,990
19	06/83	719,430	575,544	143,886	4,426,420
20	07/83	387,010	309,608	77,402	4,813,431
21	08/83	459,385	367,508	91,877	5,272,816
22	09/83	273,398	218,718	54,680	5,546,214
23	10/83	229,970	183,976	45,994	5,776,184
24	11/83	211,800	169,440	42,360	5,987,985
25	12/83	401,258	321,006	80,252	6,389,242
26	01/84	120,874	96,699	24,175	6,510,116
27	02/84	0	0	0	6,510,116
28	03/84	202,013	161,611	40,403	6,712,130
29	04/84	120,412	96,330	24,082	6,832,542
30	05/84	64,347	51,478	12,869	6,896,889
31	06/84	54,593	43,674	10,919	6,951,482
32	07/84	208,650	166,920	41,730	7,160,132
33	08/84	105,131	84,105	21,026	7,265,263
34	09/84	30,513	24,411	6,103	7,295,776
35	10/84	2,240	1,792	448	7,298,016
36	11/84	0	0	0	7,298,016
37	12/84	21,925	17,540	4,385	7,319,941
38	01/85	8,500	6,800	1,700	7,328,441
39	02/85	14,753	11,802	2,951	7,343,194
40	03/85	0	0	0	7,343,194
41	04/85	0	0	0	7,343,194
42	05/85	0	0	0	7,343,194
43	06/85	0	0	0	7,343,194
44	07/85	19,366	15,493	3,873	7,362,559
Total ==>		7,362,559	5,890,047	1,472,512	

Table 2: Account for Contract #: M2CN09

Period	Date	Total Receipts	Federal Share	Local Share	Cumulative Receipts
0	11/81	0	0	0	0
1	12/81	263,803	211,042	52,761	263,803
2	01/82	402,570	322,056	80,514	666,373
3	02/82	398,603	318,882	79,721	1,064,976
4	03/82	283,685	226,948	56,737	1,348,661
5	04/82	698,683	558,947	139,737	2,047,344
6	05/82	764,854	611,883	152,971	2,812,199
7	06/82	712,796	570,237	142,559	3,524,995
8	07/82	817,732	654,185	163,546	4,342,726
9	08/82	689,430	551,544	137,886	5,032,156
10	09/82	782,223	625,778	156,445	5,814,379
11	10/82	574,905	459,924	114,981	6,389,284
12	11/82	570,260	456,208	114,052	6,959,544
13	12/82	479,790	383,832	95,958	7,439,333
14	01/83	333,433	266,746	66,687	7,772,766
15	02/83	149,594	119,675	29,919	7,922,360
16	03/83	295,268	236,215	59,054	8,217,628
17	04/83	109,787	87,830	21,957	8,327,415
18	05/83	111,790	89,432	22,358	8,439,205
19	06/83	36,202	28,962	7,240	8,475,408
20	07/83	47,636	38,109	9,527	8,523,043
21	08/83	70,672	56,538	14,134	8,593,715
22	09/83	78,890	63,112	15,778	8,672,605
23	10/83	62,344	49,875	12,469	8,734,949
24	11/83	31,354	25,083	6,271	8,766,303
25	12/83	61,453	49,162	12,291	8,827,756
26	01/84	118,187	94,549	23,637	8,945,943
27	02/84	0	0	0	8,945,943
28	03/84	186,102	148,882	37,220	9,132,045
29	04/84	6,083	4,867	1,217	9,138,128
30	05/84	53,404	42,723	10,681	9,191,533
31	06/84	0	0	0	9,191,533
32	07/84	93,704	74,963	18,741	9,285,236
33	08/84	26,217	20,974	5,243	9,311,453
34	09/84	0	0	0	9,311,453
35	10/84	0	0	0	9,311,453
36	11/84	0	0	0	9,311,453
37	12/84	0	0	0	9,311,453
38	01/85	0	0	0	9,311,453
39	02/85	9,745	7,796	1,949	9,321,198
Total ==>		9,321,198	7,456,959	1,864,240	

APPENDIX C

Resevoir Carhouse-yard-station: MBTA; Boston, MA

Agency:	MBTA; Boston, MA
Project Title:	Resevoir Carhouse-yard Station
Type of Work:	Yard Rehabilitation
Duration for Study:	45 months
No. of Contracts:	2 (contract #'s M2CN01 and M2CN04)

I Summary Accounts for All Contractors

Table 1: Status of Project Payments and Retainage

Period	Date	Billing from Contractor	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/82	872,000	0	0	0
1	10/82	248,237	886,300	46,647	46,647
2	11/82	403,554	241,096	12,692	59,339
3	12/82	691,539	439,033	23,106	82,445
4	01/83	653,630	660,267	34,750	117,195
5	02/83	318,090	632,915	33,310	150,505
6	03/83	675,625	233,790	12,304	162,809
7	04/83	671,005	642,111	30,324	193,133
8	05/83	957,354	80,360	0	193,133
9	06/83	802,774	1,456,606	74,101	267,234
10	07/83	1,009,271	757,256	37,705	304,939
11	08/83	686,893	920,003	48,421	353,360
12	09/83	527,614	715,462	(28,569)	324,791
13	10/83	405,071	516,287	0	324,791
14	11/83	176,516	416,398	0	324,791
15	12/83	386,086	176,516	0	324,791
16	01/84	224,869	386,086	0	324,791
17	02/84	178,910	224,869	0	324,791
18	03/84	136,267	178,910	0	324,791
19	04/84	423,506	360,067	(223,800)	100,991
20	05/84	322,268	423,506	0	100,991
21	06/84	162,763	322,268	0	100,991
22	07/84	64,015	162,763	0	100,991
23	08/84	12,929	0	0	100,991
24	09/84	12,929	122,905	(70,000)	30,991
25	10/84	44,692	0	0	30,991

26	11/84	3,848	25,858	0	30,991
27	12/84	3,847	44,692	0	30,991
28	01/85	0	0	0	30,991
29	02/85	0	7,695	0	30,991
30	03/85	3,041	0	0	30,991
31	04/85	6,858	0	0	30,991
32	05/85	0	28,014	(25,000)	5,991
33	06/85	0	0	0	5,991
34	07/85	0	0	0	5,991
35	08/85	0	6,858	0	5,991
36	09/85	0	0	0	5,991
37	10/85	0	0	0	5,991
38	11/85	0	11,110	0	5,991
39	12/85	7,159	0	0	5,991
40	01/86	0	0	0	5,991
41	02/86	0	0	0	5,991
42	03/86	2,000	0	0	5,991
43	04/86	0	2,000	0	5,991
44	05/86	0	7,159	(5,000)	991
45	06/86	0	0	0	991
Total ==>		11,095,180	11,089,162	991	

Table 2: Status of Project Receipts

Period	Date	Total Receipts	Federal Share	Local Share	Cumulative Receipts
0	09/82	0	0	0	0
1	10/82	927,901	742,320	185,580	927,901
2	11/82	250,534	200,427	50,107	1,178,435
3	12/82	455,915	364,732	91,183	1,634,350
4	01/83	688,592	550,874	137,718	2,322,942
5	02/83	659,170	527,336	131,834	2,982,112
6	03/83	242,639	194,111	48,528	3,224,751
7	04/83	666,436	533,149	133,287	3,891,187
8	05/83	685,414	548,331	137,083	4,576,601
9	06/83	925,656	740,525	185,131	5,502,256
10	07/83	795,003	636,003	159,001	6,297,260
11	08/83	1,008,044	806,435	201,609	7,305,304
12	09/83	675,844	540,675	135,169	7,981,148
13	10/83	516,288	413,030	103,258	8,497,436
14	11/83	416,399	333,119	83,280	8,913,835
15	12/83	176,517	141,214	35,303	9,090,351
16	01/84	386,087	308,869	77,217	9,476,438
17	02/84	224,870	179,896	44,974	9,701,308
18	03/84	178,911	143,129	35,782	9,880,219
19	04/84	136,267	109,014	27,253	10,016,486
20	05/84	423,506	338,805	84,701	10,439,992
21	06/84	322,268	257,815	64,454	10,762,260
22	07/84	162,764	130,211	32,553	10,925,024
23	08/84	52,906	42,324	10,581	10,977,930
24	09/84	0	0	0	10,977,930
25	10/84	25,858	20,687	5,172	11,003,788
26	11/84	0	0	0	11,003,788
27	12/84	44,692	35,754	8,938	11,048,480
28	01/85	7,695	6,156	1,539	11,056,175
29	02/85	0	0	0	11,056,175
30	03/85	0	0	0	11,056,175
31	04/85	3,014	2,411	603	11,059,189
32	05/85	0	0	0	11,059,189
33	06/85	0	0	0	11,059,189
34	07/85	0	0	0	11,059,189
35	08/85	6,858	5,486	1,372	11,066,047
36	09/85	0	0	0	11,066,047
37	10/85	11,111	8,889	2,222	11,077,158
38	11/85	0	0	0	11,077,158
39	12/85	0	0	0	11,077,158
40	01/86	0	0	0	11,077,158
41	02/86	0	0	0	11,077,158
42	03/86	2,000	1,600	400	11,079,158
43	04/86	2,159	1,727	432	11,081,317
44	05/86	0	0	0	11,081,317
45	06/86	0	0	0	11,081,317
Total ==>		11,081,317	8,865,054	2,216,263	

Table 3: Status of Project Payments and Receipts

Period	Date	Total Receipts	Total Payments	Receipts less Payments	Cumulative Surplus or Defecit
0	09/82	0	0	0	0
1	10/82	927,901	886,300	41,601	41,601
2	11/82	250,534	241,096	9,438	51,039
3	12/82	455,915	439,035	16,880	67,919
4	01/83	688,592	660,267	28,325	96,244
5	02/83	659,170	632,915	26,255	122,499
6	03/83	242,639	233,790	8,849	131,348
7	04/83	666,436	642,111	24,325	155,673
8	05/83	685,414	80,360	605,054	760,727
9	06/83	925,656	1,456,606	(530,950)	229,776
10	07/83	795,003	757,256	37,747	267,524
11	08/83	1,008,044	920,003	88,041	355,565
12	09/83	675,844	715,462	(39,618)	315,947
13	10/83	516,288	516,287	1	315,948
14	11/83	416,399	416,398	1	315,949
15	12/83	176,517	176,516	1	315,949
16	01/84	386,087	386,086	1	315,950
17	02/84	224,870	224,869	1	315,951
18	03/84	178,911	178,910	1	315,952
19	04/84	136,267	360,067	(223,800)	92,152
20	05/84	423,506	423,506	0	92,152
21	06/84	322,268	322,268	0	92,152
22	07/84	162,764	162,763	1	92,153
23	08/84	52,906	0	52,906	145,059
24	09/84	0	122,905	(122,905)	22,154
25	10/84	25,858	0	25,858	48,012
26	11/84	0	25,858	(25,858)	22,154
27	12/84	44,692	44,692	0	22,154
28	01/85	7,695	0	7,695	29,849
29	02/85	0	7,695	(7,695)	22,154
30	03/85	0	0	0	22,154
31	04/85	3,014	0	3,014	25,168
32	05/85	0	28,014	(28,014)	(2,846)
33	06/85	0	0	0	(2,846)
34	07/85	0	0	0	(2,846)
35	08/85	6,858	6,858	0	(2,846)
36	09/85	0	0	0	(2,846)
37	10/85	11,111	0	11,111	8,265
38	11/85	0	11,110	(11,110)	(2,845)
39	12/85	0	0	0	(2,845)
40	01/86	0	0	0	(2,845)
41	02/86	0	0	0	(2,845)
42	03/86	2,000	0	2,000	(845)
43	04/86	2,159	2,000	159	(686)
44	05/86	0	7,159	(7,159)	(7,845)
45	06/86	0	0	0	(7,845)
Total ==>		11,081,317	11,089,162	(7,845)	

Table 4: Cumulative Project Payments and Receipts

Period	Date	Cumulative Billing from Contractor	Cumulative Receipts	Cumulative Payments	Unpaid Balance (Bill.-Pay.)	Cumulative Surplus (Rec.-Pay.)
0	09/82	872,000	0	0	872,000	0
1	10/82	1,120,237	927,901	886,300	233,937	41,601
2	11/82	1,523,791	1,178,435	1,127,396	396,395	51,039
3	12/82	2,215,350	1,634,350	1,566,431	648,919	67,919
4	01/83	2,868,980	2,322,942	2,226,698	642,282	96,244
5	02/83	3,187,070	2,982,112	2,859,613	327,457	122,499
6	03/83	3,862,695	3,224,751	3,093,403	769,292	131,348
7	04/83	4,533,700	3,891,187	3,735,514	798,186	155,673
8	05/83	5,491,054	4,576,601	3,815,874	1,675,180	760,727
9	06/83	6,293,828	5,502,256	5,272,480	1,021,348	229,776
10	07/83	7,303,099	6,297,260	6,029,736	1,273,363	267,524
11	08/83	7,989,992	7,305,304	6,949,739	1,040,253	355,565
12	09/83	8,517,606	7,981,148	7,665,201	852,405	315,947
13	10/83	8,922,677	8,497,436	8,181,488	741,189	315,948
14	11/83	9,099,193	8,913,835	8,597,886	501,307	315,949
15	12/83	9,485,279	9,090,351	8,774,402	710,877	315,949
16	01/84	9,710,148	9,476,438	9,160,488	549,660	315,950
17	02/84	9,889,058	9,701,308	9,385,357	503,701	315,951
18	03/84	10,025,325	9,880,219	9,564,267	461,058	315,952
19	04/84	10,448,831	10,016,486	9,924,334	524,497	92,152
20	05/84	10,771,099	10,439,992	10,347,840	423,259	92,152
21	06/84	10,933,862	10,762,260	10,670,108	263,754	92,152
22	07/84	10,997,877	10,925,024	10,832,871	165,006	92,153
23	08/84	11,010,806	10,977,930	10,832,871	177,935	145,059
24	09/84	11,023,735	10,977,930	10,955,776	67,959	22,154
25	10/84	11,068,427	11,003,788	10,955,776	112,651	48,012
26	11/84	11,072,275	11,003,788	10,981,634	90,641	22,154
27	12/84	11,076,122	11,048,480	11,026,326	49,796	22,154
28	01/85	11,076,122	11,056,175	11,026,326	49,796	29,849
29	02/85	11,076,122	11,056,175	11,034,021	42,101	22,154
30	03/85	11,079,163	11,056,175	11,034,021	45,142	22,154
31	04/85	11,086,021	11,059,189	11,034,021	52,000	25,168
32	05/85	11,086,021	11,059,189	11,062,035	23,986	(2,846)
33	06/85	11,086,021	11,059,189	11,062,035	23,986	(2,846)
34	07/85	11,086,021	11,059,189	11,062,035	23,986	(2,846)
35	08/85	11,086,021	11,066,047	11,068,893	17,128	(2,846)
36	09/85	11,086,021	11,066,047	11,068,893	17,128	(2,846)
37	10/85	11,086,021	11,077,158	11,068,893	17,128	8,265
38	11/85	11,086,021	11,077,158	11,080,003	6,018	(2,845)
39	12/85	11,093,180	11,077,158	11,080,003	13,177	(2,845)
40	01/86	11,093,180	11,077,158	11,080,003	13,177	(2,845)
41	02/86	11,093,180	11,077,158	11,080,003	13,177	(2,845)
42	03/86	11,095,180	11,079,158	11,080,003	15,177	(845)
43	04/86	11,095,180	11,081,317	11,082,003	13,177	(686)
44	05/86	11,095,180	11,081,317	11,089,162	6,018	(7,845)
45	06/86	11,095,180	11,081,317	11,089,162	6,018	(7,845)

II Status of Payments and Retainage by Contractors

Table 1: Contract: M3CN01

Period	Date	Billing from Contractor	Payment by Agency	Retainage or Release	Cumulative Retainage
0	09/82	872,000	0	0	0
1	10/82	187,290	828,400	43,600	43,600
2	11/82	337,056	177,922	9,368	52,968
3	12/82	566,474	320,204	16,852	69,820
4	01/83	525,087	538,151	28,323	98,143
5	02/83	176,952	498,833	26,254	124,397
6	03/83	606,483	168,105	8,847	133,244
7	04/83	605,053	576,159	30,324	163,568
8	05/83	876,994	0	0	163,568
9	06/83	754,114	1,407,946	74,101	237,669
10	07/83	968,424	716,409	37,705	275,374
11	08/83	675,844	920,003	48,421	323,795
12	09/83	516,287	675,844	0	323,795
13	10/83	393,743	516,287	0	323,795
14	11/83	176,516	393,743	0	323,795
15	12/83	386,086	176,516	0	323,795
16	01/84	224,869	386,086	0	323,795
17	02/84	178,910	224,869	0	323,795
18	03/84	136,267	178,910	0	323,795
19	04/84	423,506	360,067	(223,800)	99,995
20	05/84	322,268	423,506	0	99,995
21	06/84	162,763	322,268	0	99,995
22	07/84	52,905	162,763	0	99,995
23	08/84	12,929	0	0	99,995
24	09/84	12,929	122,905	(70,000)	29,995
25	10/84	44,692	0	0	29,995
26	11/84	3,848	25,858	0	29,995
27	12/84	3,847	44,692	0	29,995
28	01/85	0	0	0	29,995
29	02/85	0	7,695	0	29,995
30	03/85	3,041	0	0	29,995
31	04/85	6,858	0	0	29,995
32	05/85	0	28,014	(25,000)	4,995
33	06/85	0	0	0	4,995
34	07/85	0	0	0	4,995
35	08/85	0	6,858	0	4,995
36	09/85	0	0	0	4,995
37	10/85	0	0	0	4,995
38	11/85	0	0	0	4,995
39	12/85	7,159	0	0	4,995
40	01/85	0	0	0	4,995
41	02/85	0	0	0	4,995
42	03/85	0	0	0	4,995
43	04/86	0	0	0	4,995
44	05/86	0	7,159	(5,000)	(5)
Total ==>		10,221,194	10,216,172	(5)	

Table 2: Contract #:M3CN04

Period	Date	Billing from Contractor	Payment from Agency	Retainage or Release	Cumulative Retainage
0	09/82	0	0	0	0
1	10/82	60,947	57,900	3,047	3,047
2	11/82	66,498	63,174	3,324	6,371
3	12/82	125,085	118,831	6,254	12,625
4	01/83	128,543	122,116	6,427	19,052
5	02/83	141,138	134,082	7,056	26,108
6	03/83	69,142	65,685	3,457	29,565
7	04/83	65,952	65,952	0	29,565
8	05/83	80,360	80,360	0	29,565
9	06/83	48,660	48,660	0	29,565
10	07/83	40,847	40,847	0	29,565
11	08/83	11,049	0	0	29,565
12	09/83	11,327	39,618	(28,569)	996
13	10/83	11,328	0	0	996
14	11/83	0	22,655	0	996
15	12/83	0	0	0	996
16	01/84	0	0	0	996
17	02/84	0	0	0	996
18	03/84	0	0	0	996
19	04/84	0	0	0	996
20	05/84	0	0	0	996
21	06/84	0	0	0	996
22	07/84	11,110	0	0	996
23	08/84	0	0	0	996
24	09/84	0	0	0	996
25	10/84	0	0	0	996
26	11/84	0	0	0	996
27	12/84	0	0	0	996
28	01/85	0	0	0	996
29	02/85	0	0	0	996
30	03/85	0	0	0	996
31	04/85	0	0	0	996
32	05/85	0	0	0	996
33	06/85	0	0	0	996
34	07/85	0	0	0	996
35	08/85	0	0	0	996
36	09/85	0	0	0	996
37	10/85	0	0	0	996
38	11/85	0	11,110	0	996
39	12/85	0	0	0	996
40	01/86	0	0	0	996
41	02/86	0	0	0	996
42	03/86	2,000	0	0	996
43	04/86	0	2,000	0	996
44	05/86	0	0	0	996
45	06/86	0	0	0	996
Total ==>		873,986	872,990	996	

III Breakdown of Receipts by Contracts

Table 1: Contract: M3CN01

Period	Date	Total Receipts	Federal Share	Local Share	Cumulative receipts
0	09/82	0	0	0	0
1	10/82	870,000	696,000	174,000	870,000
2	11/82	187,360	149,888	37,472	1,057,360
3	12/82	337,058	269,646	67,412	1,394,418
4	01/83	566,475	453,180	113,295	1,960,893
5	02/83	525,088	420,070	105,018	2,485,981
6	03/83	176,953	141,563	35,391	2,662,934
7	04/83	600,484	480,387	120,097	3,263,418
8	05/83	605,054	484,043	121,011	3,868,472
9	06/83	876,996	701,597	175,399	4,745,468
10	07/83	754,156	603,325	150,831	5,499,623
11	08/83	968,425	774,740	193,685	6,468,048
12	09/83	675,844	540,675	135,169	7,143,893
13	10/83	516,288	413,030	103,258	7,660,180
14	11/83	393,744	314,995	78,749	8,053,924
15	12/83	176,517	141,214	35,303	8,230,441
16	01/84	386,087	308,869	77,217	8,616,527
17	02/84	224,870	179,896	44,974	8,841,397
18	03/84	178,911	143,129	35,782	9,020,308
19	04/84	136,267	109,014	27,253	9,156,575
20	05/84	423,506	338,805	84,701	9,580,082
21	06/84	322,268	257,815	64,454	9,902,350
22	07/84	162,764	130,211	32,553	10,065,113
23	08/84	52,906	42,324	10,581	10,118,019
24	09/84	0	0	0	10,118,019
25	10/84	25,858	20,687	5,172	10,143,877
26	11/84	0	0	0	10,143,877
27	12/84	44,692	35,754	8,938	10,188,569
28	01/85	7,695	6,156	1,539	10,196,264
29	02/85	0	0	0	10,196,264
30	03/85	0	0	0	10,196,264
31	04/85	3,014	2,411	603	10,199,278
32	05/85	0	0	0	10,199,278
33	06/85	0	0	0	10,199,278
34	07/85	0	0	0	10,199,278
35	08/85	6,858	5,486	1,372	10,206,136
36	09/85	0	0	0	10,206,136
37	10/85	0	0	0	10,206,136
38	11/85	0	0	0	10,206,136
39	12/85	0	0	0	10,206,136
40	01/86	0	0	0	10,206,136
41	02/86	0	0	0	10,206,136
42	03/86	0	0	0	10,206,136
43	04/86	2,159	1,727	432	10,208,296
44	05/86	0	0	0	10,208,296
45	06/86	0	0	0	10,208,296
Total ==>		10,208,296	8,166,637	2,041,659	

Table 2: Contract: M3CN04

Period	Date	Total Receipts	Federal Share	Local Share	Cumulative Receipts
0	09/82	0	0	0	0
1	10/82	57,901	46,320	11,580	57,901
2	11/82	63,174	50,539	12,635	121,075
3	12/82	118,857	95,086	23,771	239,932
4	01/83	122,117	97,693	24,423	362,049
5	02/83	134,083	107,266	26,817	496,131
6	03/83	65,685	52,548	13,137	561,817
7	04/83	65,952	52,762	13,190	627,769
8	05/83	80,360	64,288	16,072	708,129
9	06/83	48,660	38,928	9,732	756,789
10	07/83	40,848	32,678	8,170	797,637
11	08/83	39,619	31,695	7,924	837,255
12	09/83	0	0	0	837,255
13	10/83	0	0	0	837,255
14	11/83	22,655	18,124	4,531	859,911
15	12/83	0	0	0	859,911
16	01/84	0	0	0	859,911
17	02/84	0	0	0	859,911
18	03/84	0	0	0	859,911
19	04/84	0	0	0	859,911
20	05/84	0	0	0	859,911
21	06/84	0	0	0	859,911
22	07/84	0	0	0	859,911
23	08/84	0	0	0	859,911
24	09/84	0	0	0	859,911
25	10/84	0	0	0	859,911
26	11/84	0	0	0	859,911
27	12/84	0	0	0	859,911
28	01/85	0	0	0	859,911
29	02/85	0	0	0	859,911
30	03/85	0	0	0	859,911
31	04/85	0	0	0	859,911
32	05/85	0	0	0	859,911
33	06/85	0	0	0	859,911
34	07/85	0	0	0	859,911
35	08/85	0	0	0	859,911
36	09/85	0	0	0	859,911
37	10/85	11,111	8,889	2,222	871,022
38	11/85	0	0	0	871,022
39	12/85	0	0	0	871,022
40	01/86	0	0	0	871,022
41	02/86	0	0	0	871,022
42	03/86	2,000	1,600	400	873,022
43	04/86	0	0	0	873,022
44	05/86	0	0	0	873,022
45	06/86	0	0	0	873,022
Total ==>		873,022	698,417	174,604	

AAPENDIX D

Northwest Bus Maintenance Facility: MTA; Baltimore, MD

Agency:	MTA; Baltimore, MD.
Project Title:	Northwest Bus Maintenance Facility
Type of Work:	Construction of New Facility
Duration for Study:	16 months
No. of Contracts:	Unknown

I Summary of Accounts for all Contractors

Table 1: Status of Project Payments and Retainage

Period	Date	Billing from Contractors	Payment by Agency	Retainage or Release	Cumulative Retainage
0	03/85	310,340	294,823	15,517	15,517
1	04/85	465,570	442,292	23,279	38,796
2	05/85	513,829	488,137	25,691	64,487
3	06/85	1,720,125	1,634,119	86,006	150,493
4	07/85	1,700,084	1,615,080	85,004	235,497
5	08/85	1,254,942	1,192,195	62,747	298,245
6	09/85	1,100,367	1,045,349	55,018	353,263
7	10/85	2,308,403	2,192,983	115,420	468,683
8	11/85	704,978	704,978	0	468,683
9	12/85	737,653	737,653	0	468,683
10	01/86	649,739	649,739	0	468,683
11	20/86	614,955	614,955	0	468,683
12	03/86	654,517	654,517	0	468,683
13	04/86	849,971	849,971	0	468,683
14	05/86	782,949	782,949	0	468,683
15	06/86	778,260	778,260	0	468,683
16	07/86	595,817	595,817	0	468,683
Total ==>		15,742,500	15,273,817	468,683	

Table 2: Status of Project Receipts

Period	Date	Total Receipts	Federal Share	Local Share	Cumulative Receipts
0	03/85	104,500	83,600	20,900	104,500
1	04/85	235,858	188,687	47,172	340,358
2	05/85	353,833	283,067	70,767	694,192
3	06/85	390,510	312,408	78,102	1,084,702
4	07/85	0	0	0	1,084,702
5	08/85	2,599,359	2,079,488	519,872	3,684,061
6	09/85	953,755	763,004	190,751	4,637,816
7	10/85	0	0	0	4,637,816
8	11/85	2,623,987	2,099,189	524,797	7,261,803
9	12/85	0	0	0	7,261,803
10	01/86	1,066,097	852,878	213,219	8,327,900
11	02/86	0	0	0	8,327,900
12	03/86	487,252	389,801	97,450	8,815,152
13	04/86	461,216	368,973	92,243	9,276,368
14	05/86	490,888	392,710	98,178	9,767,256
15	06/86	1,224,580	979,664	244,916	10,991,835
Total ==>		10,991,835	8,793,468	2,198,367	

Table 3: Status of Project Payments and Receipts

Period	Date	Total Receipts	Total Payments	Receipts less Payments	Cumulative Surplus or Defecit
0	03/85	104,500	104,500	0	0
1	04/85	235,858	235,858	0	0
2	05/85	353,833	353,833	0	0
3	06/85	390,510	390,510	0	0
4	07/85	0	0	0	0
5	08/85	2,599,359	2,599,359	0	0
6	09/85	953,755	953,755	0	0
7	10/85	0	0	0	0
8	11/85	2,623,987	2,623,987	0	0
9	12/85	0	0	0	0
10	01/86	1,066,097	1,066,097	0	0
11	02/86	0	0	0	0
12	03/86	487,252	487,252	0	0
13	04/86	461,216	461,216	0	0
14	05/86	490,888	490,888	0	0
15	06/86	1,224,580	1,224,580	0	0
Total ==>		10,991,835	10,991,835	0	0

Table 4: Cumulative Payments and Receipts

Period	Date	Cumulative Billing from Contractors	Cumulative Receipts	Cumulative Payments	Unpaid Balance (Exp.-Pay.)	Cumulative Surplus (Rec.-Pay.)
0	03/85	310,340	104,500	104,500	205,840	0
1	04/85	775,910	340,358	340,358	435,552	0
2	05/85	1,289,739	694,192	694,192	595,547	0
3	06/85	3,009,864	1,084,702	1,084,702	1,925,163	0
4	07/85	4,709,949	1,084,702	1,084,702	3,625,247	0
5	08/85	5,964,891	3,684,061	3,684,061	2,280,830	0
6	09/85	7,065,258	4,637,816	4,637,816	2,427,442	0
7	10/85	9,373,661	4,637,816	4,637,816	4,735,845	0
8	11/85	10,078,639	7,261,803	7,261,803	2,816,836	0
9	12/85	10,816,292	7,261,803	7,261,803	3,554,489	0
10	01/86	11,466,031	8,327,900	8,327,900	3,138,131	0
11	02/86	12,080,986	8,327,900	8,327,900	3,753,086	0
12	03/86	12,735,503	8,815,152	8,815,152	3,920,351	0
13	04/86	13,585,474	9,276,368	9,276,368	4,309,106	0
14	05/86	14,368,423	9,767,256	9,767,256	4,601,167	0
15	06/86	15,146,683	10,991,835	10,991,835	4,154,847	0
16	07/86	15,742,500	10,991,851	10,991,835	4,750,664	16

II Information for Individual Contractors - data unavailable