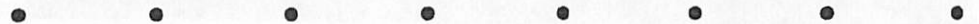


Cash Flow Requirements for Tren Urbano



Presented by:
Israel Almodovar



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Objectives

- ❖ Estimate the cash flow of Tren Urbano Phase I
 - ❖ Estimate the cost of future phases
 - ◆ Minillas
 - ◆ Airport
 - ◆ Old San Juan
 - ◆ Carolina
 - ❖ Estimate the cash flow of those extensions
 - ◆ Portfolio of Projects
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Cash Flow (Phase 1)

❖ Importance:

- ◆ Project Control
- ◆ Cost estimation for future projects
- ◆ Show required funds for different construction stages

❖ Cash Flow is going to be estimated from the total cost and schedule of each contract

- ◆ CHOICES

Future Phases Cost Estimate

- ❖ Use up to date construction cost information when possible
- ❖ Determine variables Phase I
- ❖ Use the determined variables to calculate costs per unit in Phase I
 - ◆ Cost/Km (elevated, tunnel, at grade)
 - ◆ Cost/station
 - ◆ Systems
- ❖ Apply the models developed for Phase I to the other phases

Future Phases Cash Flow

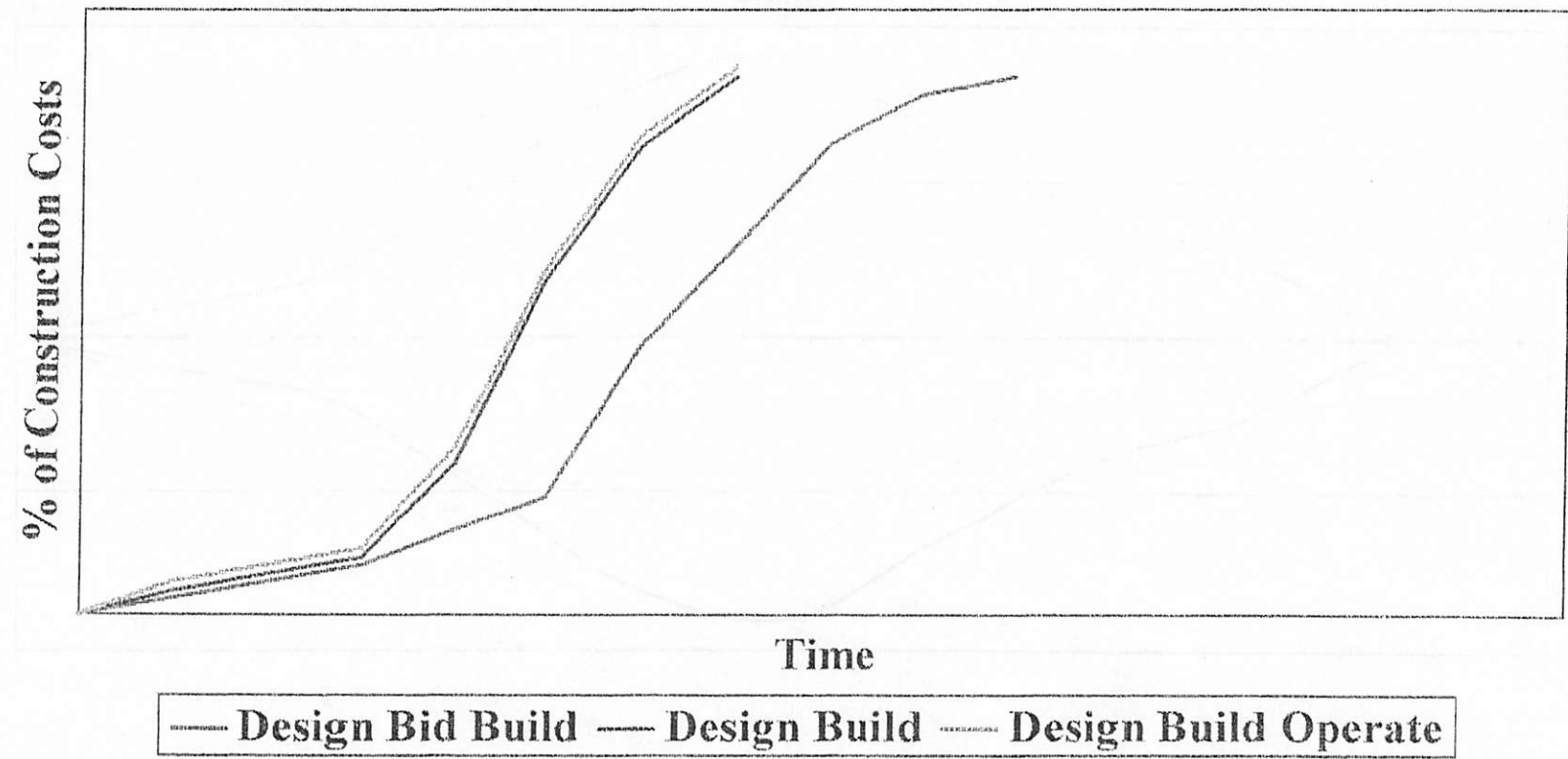
- ❖ After determining the cost of each phase, their cash flow will be estimated
 - ◆ CHOICES
 - ◆ The up to date construction information will provide an idea of the activities that were not effectively programmed
- ❖ The cash flow will provide the PRHTA the amount of money needed at certain stages of the construction
 - ◆ This have the advantage of providing to the PRHTA an idea of when to go seek for funds instead of looking for the total at the beginning of the projects

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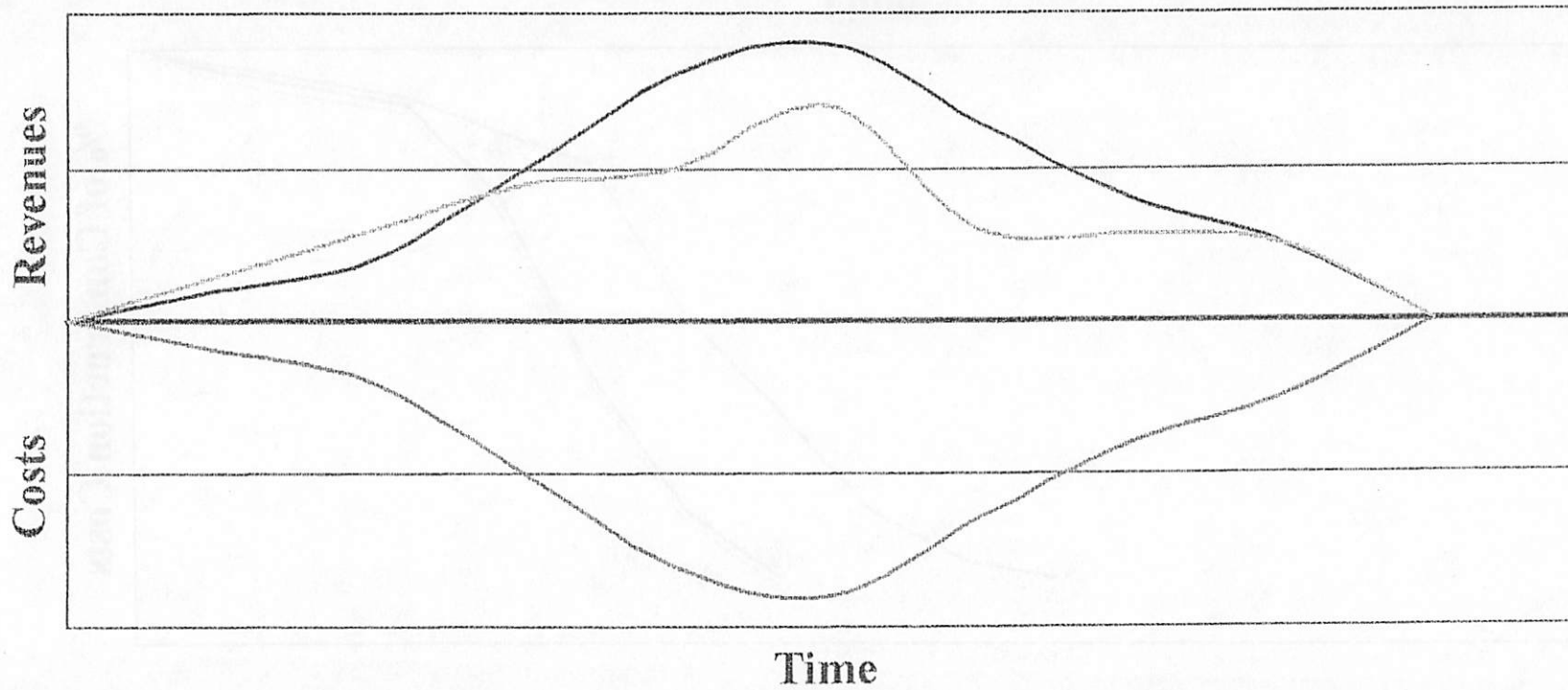
Future Phases Cash Flow

- ❖ Cash Flow will depend on the delivery methods
 - ❖ The optimal configuration can be determined using project delivery and finance alternatives as variables
 - ❖ PRHTA economic constraints are an important factor to take into account
 - ❖ Eliminate delivery alternatives that are not practical and recommend the use of one or more alternatives that appear feasible
 - ◆ Depends on revenue sources, and project size and complexity
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Cash Flow



CHOICES



— Costs — Required Funds — Available Funds

Future Phases Cash Flow

❖ Particular Scenarios

- ◆ Financing schemes
 - ◆ Revenue Sources
- ◆ Delivery systems
- ◆ Project division
 - ◆ Areas
 - ◆ Systems
- ◆ Time

❖ The goal is to determine the optimal scheme for future phases

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Work Program

- ❖ Cash Flow Phase I
 - ❖ Variable Determination
 - ❖ Cost Estimates
 - ◆ Minillas
 - ◆ Old San Juan, Airport, Carolina
 - ❖ Determine possible delivery systems and financing techniques
 - ❖ Portfolio of Cash Flows for extensions
 - ❖ Report with conclusions and recommendations
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Massachusetts Institute of Technology
Department of Civil and Environmental Engineering

Research Proposal:
Cash Flow Requirements for Phase I of Tren Urbano

Submitted to:
Tren Urbano Project

By
Israel Almodovar

October 1997

Background

Cash flow in a construction project refers to the income and outgo of cash during every stage of the process. Cash forecast is a schedule of the estimated cash receipts, estimated expenses and available balance in a periodic time frame.

Cash flow analyses and forecasts are important for both the contractor and the owner. The contractor needs to know when he is receiving or spending money to verify if he has the necessary balance. Errors in the cash forecasts can result in deep financial problems. For the owner, cash flow is as important as for the contractor. The owner needs to know when he has to disburse money to the contractor to know if he also has the necessary balance to pay for the services provided by the contractor.

Analyses of the flow in a project have many applications. One of these is project control. Comparing forecasted vs. actual cash flow is a good indicator of progress. Low up to date expenses may mean delays in construction, while high cash flow may mean that the project is ahead of schedule.

This kind of analysis is a great tool to perform cost estimations for future projects. If a project is similar to one that has already been constructed, the information gathered in

the first one may be useful for the development of the second one. Cost estimations and required balance by stage are some of the applications that may be given to the analysis.

The Tren Urbano Context

Tren Urbano is divided in seven different contracts. Cash flow analyses of each contract may be a useful tool for project control. A comparison between actual vs. up to date flow can determine the status of the project. This analysis has to be performed while construction is in progress to take the necessary corrective measures on time.

The analysis will be a good measure of success of the original forecasts. It can be used to determine the activities in which the forecasts were accurate and the ones that failed. Those activities that were not well forecasted can be used for developing better analyses for future projects, especially next Tren Urbano phases, due to their similarity with this project.

These analyses might also be helpful not only for Phase I, but for future phases too. First, knowing the actual costs of the activities, estimates can be performed for future projects. This may be important for determining which should be the next stage to be constructed. Feasibility of a future phase not only relies on technical information, but on the financial constraints the Puerto Rico Highway and Transportation Authority (PRHTA) have.

Being Tren Urbano funded by the federal government, as well as government of Puerto Rico, it is important to know when funds will be needed in these projects. Using the up to date information of Phase I, the PRHTA can develop a model for establishing the moment in which certain funds will be needed. This might be of great help in the

lobbying process, because the Agency will not have to seek the complete project funds at once, but can stage the process as the project develops.

Research Objectives

The objectives of this research are the following:

1. Perform a cash flow analysis of the Phase I of the Tren Urbano Project that compares the forecasted vs. up to date cost information
2. Identify the critical activities that require the majority of the funds and their stage in the process.
3. Identify the activities in which the forecasts failed and those were the forecasts were accurate to develop a more reliable forecast for future phases.
4. Apply the Phase I experience to future extensions to Old San Juan, Carolina, and the Airport
 - a) Perform a cost estimate for each phase to help in the planning of those stages. The estimates will be useful in determining the order construction for the extensions due to financial constraints.
 - b) Identify the stages in which funds will be needed to know exactly when they have to be available.

Work Program

1. Literature review

The literature review will include the following subjects:

- Cash flow analysis
- Cost estimating
- Construction Finance
- Tren Urbano Contracts
- Preliminary planning documents for future extensions

2. Cash Flow Analysis

Based on the gathered information, a cash flow analysis will be performed. The analysis will include the cash flow forecasts included in the contracts and the information about actual cash flow during construction.

3. Apply cash flow analysis to future phases

The cash flow analysis of Phase I will be used as a model to estimate the cost of extensions to Old San Juan, Carolina and the Airport. This information will be used to identify the construction stages in which funds will be needed.

4. Final Report

A final report will be presented. The report will include the recommendations and conclusions obtained in the research.