

Capital Budgeting for Tren Urbano Extensions

Executive Summary

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Research Objectives

The objective of this project is to perform cash flow analyses for the different stages of the Tren Urbano Project. The cash flow analysis of Phase I will provide a clearer idea of the actual financial condition of the Puerto Rico Highway and Transportation Authority (PRHTA). The analyses of the future extensions of the project will allow to explore different delivery alternatives for them, thus providing to PRHTA different choices at the time of selecting the way of delivering them.

Motivation

Financial feasibility is one of the most important aspects of an infrastructure project, especially public infrastructure. In recent years, governments have reduced the available funds for these kind of projects, creating a sense of keen competition among projects and agencies at the time of pursuing government funds. Thus, financial analyses have to be included in the planning stage of any project. These analyses provide a clear idea of the financial position of the agency, but they also provide an idea and may stimulate the use of private funding for projects, or parts of them.

The actual trends of moving towards combined delivery systems require extensive financial analyses. Not only they require analyses of capital expenses, but also cash flow analyses, due to the incorporation of financing, operations and maintenance costs in the way of selecting the most appropriate proposals.

The Tren Urbano Phase I is under construction. However, there are at least three new extensions that are in the planning process. Alignment corridors have been established for the extensions to Carolina, Old San Juan and Airport. These three projects can be analyzed using cash flow projections, to provide PRHTA with data that can be considered as part of the planning of their portfolio of capital projects.

Research Methodology

The first part of this research was performing a cost estimate of the Carolina, Airport and Old San Juan extensions. This estimate was based on the actual construction costs of Phase I, which are the best available numbers for the costs of transit construction in the San Juan Metropolitan Area. The unit costs for the different systems were used as the costs for the future extensions.

These costs will be used as the basis for the cash flow analyses of the projects. These cash flow analyses will be performed using a model called CHOICES. This model combines delivery methods and financing schemes to create cash flows from a government agency perspective. The model analyzes the actual portfolio of projects of the agency combining it with the projects under study, to provide cash flows under different situations and delivery alternatives.

An extensive literature review in the areas of cash flow analyses and private infrastructure funding will also be part of this project. The cash flow projections obtained from the model will then be analyzed to evaluate the feasibility of the projects under the studied delivery alternatives, and the conclusions will be reported to the Puerto Rico Highway and Transportation Authority.

Findings to date

The findings up to date include most of what the input for the model will be. The data includes the following:

- PRHTA Portfolio of capital projects
- PRHTA finance data
- Tren Urbano Extensions data

These items are discussed in the following sections of this report.

PRHTA Portfolio of Capital Projects

CHOICES includes a section in which a portfolio of the actual projects of the public agency is included. The purpose of these data set is to create a background of the agency, that allows to compare the future desired projects with the capacity, capability, and historical data of the agency.

In this case, a portfolio of the PRHTA capital program was created. In summary, the capital program from 1998-2002 can be summarized as follows:

Category	\$ (millions)
Islandwide Strategic Network	369
Regional Network	148
Congestion Management – Islandwide	86
Congestion Management – San Juan	406
ITS	62
Reconstruction and Repavement	75
Safety and Signage	24
Enhancement Projects	62
Others	412
Tren Urbano (Phase I)	1175.4

Table 1 PRHTA Portfolio of Projects (1998-2002)

These table shows the different kinds of projects in which the Authority is and will be involved in the near future. The importance of considering them is to have a global view of the construction activity and the of the kind of projects that are usually done by the agency. This information provides with a comparison basis , when dealing with projects of larger magnitude, as the case of Tren Urbano and its future extensions in the San Juan Metropolitan Area.

PRHTA Finance

The financial condition of the agency is an important variable to be considered at the moment of planning any future project. If the agency is not in a strong position, projects of large magnitudes cannot be built if they depend only on public finance. This financial condition is not only related to the available funds at this moment in time, but also include the different debts and receipts the Authority will have in the future. This information will provide a more realistic model of the financial condition at the time of creating the cash flows for the different alternatives.

The receipts include every revenue source that the agency has. PRHTA is an Authority with bond issuing capacity, and that is financially independent from the Commonwealth of Puerto Rico.

The fixed revenues include:

- Gasoline Tax - \$0.16/gallon
- Diesel Oil Tax - \$0.04/gallon
- Motor Vehicle License Fees (\$15/vehicle)
- Tolls
- Investments
- Petroleum Tax
- Tren Urbano fares

The available information provides the amount of these revenues since 1976. This data is used by CHOICES to create a trendline of the revenues, that can be used as an estimate of the PRHTA revenues in the future.

Other revenues include Federal Funds that are assigned to specific projects and bond issues. The information on the recent bond issues is the only missing data, up to this point, related to the input of the model. This information is also needed to include the debt service of the Authority in the model.

Tren Urbano Extensions

Tren Urbano has three extension that are being planned. These are the extensions to Carolina, Old San Juan and the International Airport. For the purposes of this research, each of them is being considered as a portfolio of projects. The objective of this consideration is to be able to have different delivery alternatives for each project and its components.

The first step on collecting this data was doing the cost estimate for each extension. Phase I was divided in different systems and unit costs were computed for each of them. The systems and the units are the following:

- Stations – Elevated, Below Grade and Underground (each)
- Guideway – Elevated, At Grade, Retained Cut, and Tunnel (\$/km)
- Vehicles (each)
- Train Control (\$/km)
- Communication (\$/km)
- Power Supply (\$/km)
- Trackwork (\$/km)
- O&M Preparation (\$/annual km traveled)
- Engineering and Construction Management (9.5% of total cost)
- Bond and Insurance (3% of total cost)
- Contingency Costs (11% of total cost)

This unit costs were used to make a cost estimate of the Minillas Extension. When compared with the actual PRHTA cost estimate, the percentage of difference was 6%. This is a low number considering that the estimates will be for conceptual designs, in which the margin of error can be large.

For each of the extensions, these costs were used, thus obtaining a cost estimate for each of the systems and for the whole project. These estimates are summarized in Table 2.

Stations	Carolina (\$)	Old San Juan (\$)	Airport (\$)
Elevated	118,856,817		66,031,565
Below Grade		25,057,620	8,352,540
Underground		50,371,523	
Guideway			
Elevated	200,472,899		127,573,663
At Grade		30,874,887	10,291,629
Underground		69,472,756	
Systems			
Vehicles	205,517,592	45,670,576	57,088,220
Train Control	72,681,041	26,429,469	52,858,939
Communication	8,981,054	3,265,838	6,531,676
Power Supply	29,980,483	10,901,994	21,803,988
Trackwork	36,177,744	13,155,543	26,311,087
O&M Preparation	64,132,393	23,335,678	46,711,355
Other Major Items			
Eng. And C.M.	91,498,042	37,075,567	52,598,291
Bond and Insurance	28,894,118	11,708,073	16,609,986
Contingency	105,945,101	42,929,604	60,903,284
O&M (annual)	25,683,093	9,353,246	18,706,492
TOTAL	963,137,286	390,269,130	553,666,224

Table 2 Estimated costs of Tren Urbano Extensions

This information will be used as the cost of each project in CHOICES. Additional information required by the model includes project duration and the delivery systems that are feasible with each project.

The model allows to have 18 different projects as part of the portfolio of new projects. Therefore, each station will be considered as a separate project, plus the other systems. This way, it will be easier to analyze the effects or private participation in the projects. Special attention will be given to stations that can be attractive to private participants or other public agencies that may want to get involved. These stations are Simon Madera, Plaza Carolina, Old San Juan, Capitolio Sur, and Airport (which may be the most clear case).

Work Plan for the remainder of the project

This research is set to finish in December 1998. The next steps include creating the cash flow analyses for the extensions with different delivery and financing alternatives. After these cash flows are created, they will be analyzed to see how the different alternatives affect the projects and thus, to provide PRHTA with the better alternatives, from this financial point of view. As stated before, special attention will be given to private participation in parts of the project, especially in the Airport Extension. A report with all the findings will be written for PRHTA.