Final Report of the Commission for the Study of Alternatives to the Panama Canal

Volume XVIII

Analysis of Impact Upon Panama

1993

A COMPONENT STUDY FOR THE STUDY OF THE ALTERNATIVES TO THE PANAMA CANAL

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FINAL REPORT

Comisión de Estudio
de las Alternativas
al Canal de Panamá
CENTRO DE INFORMACION

COMPONENT STUDY

ANALYSIS OF IMPACTS UPON PANAMA

Comisión de Estudio
de las Alternativas
al Canal de Panamá
CENTRO DE INFORMACION

VOLUME I

COMISION DE ESTUDIO
DE LAS ALTERNATIVAS
AL CANAL DE PANAMA
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SUBMITTED BY:

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COMPONENT STUDY IMPACT UPON PANAMA

FINAL REPORT

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I. INTRODUCTION

1.0 GENERAL

1.0.1 This analysis of impacts which the construction of a Sea-Level Canal or an additional High-Rise Lock Canal is expected to have on Panama is one of a series of study components undertaken for the Commission for the Study of Alternatives to the Panama Canal (CAS).

1.0.2 Booz•Allen & Hamilton Inc. and its associated firms were given notice to proceed with this study component on March 19, 1993.

1.1 OBJECTIVES

The principal objectives of the Analysis of Impact Upon Panama, Component Study, were to qualify and to quantify, to the extent possible, probable effects and impacts of the two prescreened canal alternative projects on Panama and the project region as well as the complement appropriate data and information for the Economic Analysis.

1.2 SCOPE OF STUDY

1.2.1 The scope of the Study Component concerning the impact of these alternatives includes several fields that could be affected, and were selected by CAS, in July 1992 for further study. These fields are:

- Economic.
- Sociocultural, Political and Population.
- Environmental and Geographic.
- Infrastructure.

- Consequences for Panama from the Financial Aspect of the Alternatives and from their Impact on Users.

1.2.1.1 This study required very extensive analyses of various aspects of the foreseeable effects of the construction and the operation of one of the Canal alternatives. The study also required analysis of human settlements in relation to project implementation (the construction and operation of an alternative). In doing so, it was necessary to review the available data sources including studies by the Government of Panama, Universities, PCC and other relevant authorities.

1.2.2 Collection of Data and Information

All the necessary data and information as well as the results of prior studies, as available, Present Situation of Panama, Background Biological Inventory and Biological Inventory, Financing Scheme, Financial Analyses and Management Arrangements, Economic Analysis, Environmental Analysis, and Impact upon Users, were used as well as results of other studies conducted in Panama and the Canal region. Out of these, data and information capable of defining impacts on Panama and the project region during both construction and operation were reviewed and analyzed.

1.2.3 Identification of Impacts Upon Panama During construction

Data and information collected in regard to impacts during construction and operation, was categorized into direct/indirect impacts on the project region and direct/indirect impacts on the Panama during construction.

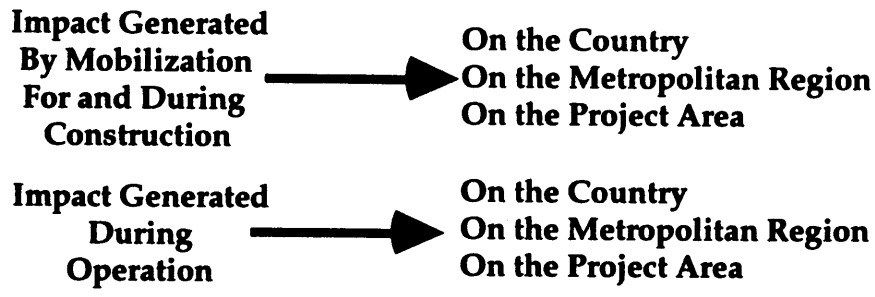
1.2.4 Direct effects were quantitatively analyzed as far as the available data allows. Care was taken, however, to avoid the double counting of effects, particularly when distinguishing national and regional benefits.

Indirect effects were considered important, especially due to the fact that such major infrastructure projects have large and long-lasting influences. In particular, regional development, if successfully induced with increased economic activity and enhanced land and property value, may make the project successful not only economically but also financially.

1.2.5 Scope Definition

Identification of the impact of each alternative refers to the construction phase and the operation phase as indicated in the Terms of Reference.

FIGURE I-1



1.2.6 The alternatives selected by CAS for further study both assume continued operation of the existing Canal with the Gaillard Cut widening completed. The alternatives are:

1) High-Rise Lock Canal with a capacity for vessels of up to 150,000-200,000 DWT. In this option, the new facilities would generally follow the alignment of the existing Canal, with new larger locks to be constructed adjacent to the existing locks, and a wider, deeper channel to accommodate larger vessels.

2) The Single-Lane Sea-Level Canal following Route 10 with a capacity for vessels of up to 250,000 DWT. This option calls for the excavation and construction of a new waterway across the isthmus of Panama, roughly parallel to the existing Canal and approximately 16 kilometers to the west.

1.3 INPUT OBTAINED FROM OTHER CAS COMPONENT STUDIES

1.3.1 Engineering and cost estimates of the alternatives were provided by Yachiyo Engineering Co., Ltd.

1.3.2 Annual financial cash flow basis was provided by Stone & Webster and TAMS Consultants Inc.

1.3.3 Financing Scheme, Financial Analysis, and Management Arrangements were obtained from Nathan Associates Inc.

1.3.4 Environmental Impact, Mitigation Recommendations, Recommendations for Further Studies, and Final Draft Report were provided by Dames & Moore.

1.4 DEFINITIONS

1.4.1 General Definitions

1.4.1.1 Impact: For the purposes of this study, the term "impact" is defined as any factor affecting the balance of an established system. In the interest of conceptual clarity and precision, the nouns "effects" and "consequences" have been used instead of "impact", and the verb "to affect" has replaced "to impact" where it seemed more appropriate.

1.4.1.2 Short-Term Impact: An impact occurring in the construction phase of either alternative and having immediate consequences of sufficient importance is considered a short-term impact.

1.4.1.3 Long-Term Impact: An impact occurring in either the construction or the operational phase and having consequences in the operation phase of the alternative is considered a long-term impact.

1.4.1.4 Discrete Impact: An impact subject to either quantitative or qualitative methodological assessments.

1.4.1.5 Discriminatory Impacts: Impact having consequences of importance for the purposes of choosing one Canal alternative over the other.

1.4.1.6 Direct Impacts: Are those impacts having a direct cause-effect relation.

1.4.1.7 Indirect Impact: Is an impact in which the cause-effect relation is derived. For example, if A causes B and B causes C, then, assuming no other intervening factor, C is an indirect impact of A.

1.4.2 Definition of Impact Areas:

1.4.2.1 In accordance with the terms of reference, the entire country will be considered as impact area in the broadest sense.

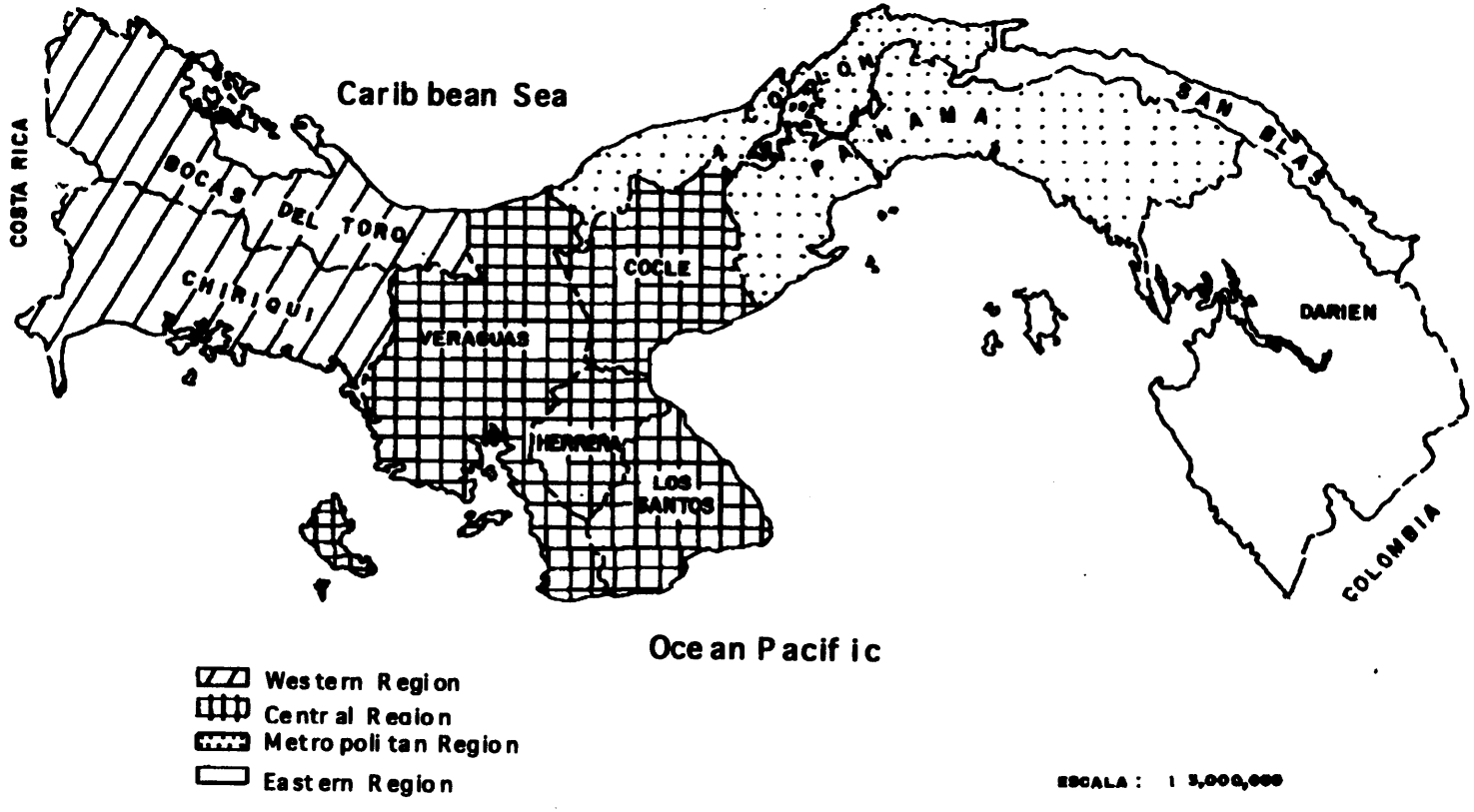
1.4.2.2 With regard to the project region, a study encompassing a division comprising the Metropolitan Region and the project area is essential. This is based on the fact that the project area is part of the Metropolitan Region which, according to the census definition, includes the provinces of Panama and Colon.

- **The Metropolitan Region**

The Metropolitan Region is one of four planning regions in Panama. It encompasses the provinces of Panama and Colon. In 1990, it included 119 districts and more than one-half of the total population of the country. (For reference on Panama's planning regions, see Map I-1.)

MAP I-1

PANAMA'S PLANNING REGIONS



- **Project Area**

More than 400 town sites were located in the Canal watershed in 1990. The definition of the project area to be adopted differs according to the two study alternatives. The Study Commission has determined that the project area includes one kilometer from the center line of either Canal alternative and all watershed supporting construction and operation facilities for either effort. This would provide a right-of-way strip on each side and a comfortable buffer parallel to it.

- **Interoceanic Region**

In 1993, the National Assembly passed a law establishing the Interoceanic Region. This region is slightly larger than the Metropolitan Region. Because many statistics have been developed for the Interoceanic Region, it is important to define it as that area which includes all of the old "Canal Zone," the Canal watershed area (including Gatun Lake, Madden Lake, Alajuela Lake, Miraflores Lake), and, in addition, the urban areas and surrounding rural environs. This definition is taken from the FUNDAVICO research effort for the United Nations.[1]

1.5 GENERAL METHODOLOGY

The general methodology followed in the study of impacts, in the many varied and diverse fields, used a dual analysis thrust.

1.5.1 One thrust was to develop, within specific disciplines, a particular look at the probable impacts in the fields outlined by the scope of the study. The general approach was to conduct research on existing documentation, to interface with the other study component contractors, review their inception and interim reports, develop initial findings using subject matter experts, identify the probable discrete impacts, and analyze those impacts to determine their scope and magnitude. The specific methodology within each discipline is outlined in the section dealing with the subject.

1.5.2 The second thrust was the use of the System Dynamics Model as a support tool. As the impacts were categorized, the interrelationships between variables in each of the different study areas were

[1] FUNDAVICO- Estudio de Temas Prioritarios en la Región Metropolitana de Panamá, 1990, MIPPE/CENDOP.

discussed. The model supplied additional support for conclusions and assessments. Using both the Subject Matter Expert's methodology, together with the trends and output of the model, the most important impacts for evaluation and discrimination purposes were produced. The output from the System Dynamics Model is included in the discussion of impacts for each area. Additional information concerning the System Dynamics Model development, variables and input is contained in Appendix B.

II. ECONOMIC IMPACT

2.0 INTRODUCTION

2.0.1 Purpose

The purpose of this component of the study is to determine the nature of the effect that expenditures in the construction and operation of different alternatives will have on the local economy, and to quantify it whenever possible. Impacts on the national economy and the project area have been calculated and then set down in terms of the domestic income generation of each canal alternative.

2.0.2 Definitions

2.0.2.1 The Concept of "Economic Impact": It is important to emphasize the concept of "economic impact" in the context of the present study. Income, generated in a specific activity or sector from construction and operation expenses, does not provide a complete picture of economic benefits from a society's point of view. Income accrued to a sector in which taxation, price controls, tariffs or other economic distortions affect market prices may not reflect the increase in national welfare that the concept of "economic benefit" attempts to measure. Consequently, increases in domestic income have been considered as "positive direct impacts" of the project.

2.0.2.2 "Positive indirect impacts" are defined as new income generated in the Panamanian economy as a result of the increase in expenditure produced by the Canal alternative.

2.0.2.3 Economic benefits for this project were calculated by the Yachiyo Engineering Co. (YEC) as transportation cost savings for Canal users.[1]

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[1] The Study of Alternatives to the Panama Canal, MRI, May 1993, pages 14-56.

• Project costs, also presented by the Mitsubishi Research Institute but calculated by Yachiyo, are the economic values of tangible resources used in project. [2]

• The benefits for Canal users were calculated, but with costs to be borne by productive factors in Panama.[3]

2.0.2.4 "Project Costs": From an economic point of view, project costs are the use of local resources that exact an opportunity cost for the Panamanian society. For this reason, the use of these resources in the construction and operation of either Canal alternative will divert them from other domestic economic activities. The loss in productivity caused by the displacement of resources from one economic activity to another from the point of view of the domestic economy is the economic cost of the project. This will be so even if such costs are compensated through monetary payments. Payments for the use of a resource are not economic costs. The use of the resource itself is the tangible economic cost.

2.0.2.5 "Project Benefits": It is assumed that a project is economically feasible if economic costs are less than the economic benefits which it will generate. It must be emphasized that the beneficiaries of a project will not necessarily have to compensate those who are bearing the costs. Compensation issues have further considerations than the traditional cost-benefit analysis, and ought to incorporate distribution considerations. The work by the Mitsubishi Research Institute should be extended to explore the topic of distribution of net income derived from both projects with their respective variables.

Nevertheless, in undertaking a project -- specifically, one that has a relative large size for the domestic economy, as is the case for either alternative -- economic costs are not limited to income of production factors, raw materials, and the final goods used by the project.

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[2] Mitsubishi Research Institute, Inc., "The Study of Alternatives to the Panama Canal" Component Study: Economic Analysis and Impact on Users," Interim Report, May 1993.

[3] Interim Report "Financing Scheme, Financial Analysis and Management Arrangements Component Study" by Nathan Associates, Inc. , et al, May 10, 1993.

2.0.2.6 "Direct Economic Impact:" The increase in local expenditure for Panamanian production factors, such as labor, capital and land, and income increases for local firms providing goods and services to the project, are defined as direct impacts on the domestic economy.

2.0.3 Present Economic Structure[4]

2.0.3.1 One of the two types of economies, in which the Panamanian productive sectors are divided, generates a high proportion of the country's income, and is known as the "service economy." This economy has a high international competitiveness mainly due to the geographical position, the Canal, and institutional development initiated and founded on the monetary system established in 1904, based on the free circulation of the US$ (dollar) as legal tender. Other elements that define this institutional aspect include the legislation concerning corporations and stock companies, the tax system, based on the application of a territorial concept of taxation of income, the re-exportation activity through the Colon Free Zone, the Panamanian registry of vessels, and bank legislation which has permitted the development of the most important banking system in Latin America. In comparison with other regional economies which obtain earnings by exporting agricultural goods, mining or manufacturing products, for the Panamanian economy it is comparatively much easier to obtain earnings through export of services amounting to nearly a third of the GNP.

2.0.3.2 On the other hand, there are Panamanian manufacturing and agricultural activities principally aimed at the domestic market. These sectors depend on tariff protections or quota barriers and tax incentives, and are subject to extensive regulations, tutelage patents and government discretion. Most of these activities are not internationally competitive, largely due to the high cost of public services, the limited domestic market, and state regulations and intervention.

2.0.3.3 The protection which Panama provides to agriculture and industry has been feasible due to income provided by the service sector. This sector generates enough earnings to allow easy importation of raw materials and capital. Unlike the typical Latin American case, importers do not have to stand in line at a Central Bank waiting for weeks or months before obtaining the necessary funds to import. However, the service sector pays relatively high salaries and exerts an upward pressure on salaries in other sectors. Given the obstacles that limit high productivity, this has a

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[4] Guillermo O. Chapman Jr.; Conditions for Investment in Panama; Annual Conference of Business Executives, 1993.

negative effect on the economy's capacity to compete. It must be noted that, although wages are high in regional terms, physical productivity is not.

2.0.3.4 At the same time, the service sector may be strengthened through the elimination of distortions introduced into the economy by state regulation in certain key services. In turn, excessive protection of agriculture, industry and the labor sector among others tends to limit the capacity to increase earnings in the international market.

2.0.3.5 The Panamanian economy's capacity to compete may be enhanced by, among other, these specific changes:

- A better trained labor force.

- Bureaucratic streamlining in handling the requirements of economic activities to avoid the exercise of discretional powers, and greater reliance on market forces when the necessary conditions exist.

- High tariffs and limited offer underline the need for revision in key public services, such as electricity, telephones, water, ports, passenger, cargo, sea transportation, land transportation and infrastructure.

- Labor legislation should include more incentives for production. By making production less costly, job creation will be more stable and abundant.

- A comprehensive effort is in order with a view to capturing foreign markets.

- More freedom and proper incentives for foreigners entering certain activities would be beneficial.

2.0.3.6 It is important to understand that the Panamanian economic structure includes a combination of institutions and laws that has made it competitive in the export of services, and has allowed it to exploit comparative advantages stemming from the country's geographical position. These activities generate an abundance of foreign earnings. The other key aspect is a tradition of

agricultural and industrial protectionism added to state intervention in different ways that affect the economy. This structure seems to impose a slower pace in efforts at modernization.

2.0.4 Merits and Limits of the Structure

2.0.4.1 The advantages or merits of the present structure are derived from the above. One important advantage is the ease with which earnings are generated as a result of few restrictions to import (imports of goods and services account for about 28% of the GNP). The magnitude and variety of imports are effective indicators of a relatively high standard of living.

2.0.4.2 The abundance of foreign earnings also permits Panama to maintain a monetary system in which the determination of the money supply is not controlled by national authorities. This explains the virtual absence of inflation, although variations in international prices are reflected in internal price indexes. Lack of inflation means that the population is free from one of the most destabilizing forces usually at work in the region, and the tendency in national financial savings to accumulate inside the country will continue as long as the local financial system pays competitive interest rates. Only in an extremely negative political environment, such as during the 1987-1989 crisis, has there been a flight of national capital. Funds returned to the country when the situation became normal again in 1990.

The above advantages have facilitated the creation of a modern comprehensive banking system serving national requirements and international demands.

2.0.4.3 The service sector has made the development of a modern and sophisticated atmosphere of highly productive businesses possible, with important spillover effects in commerce, real estate, professional services and tourism.

2.0.4.4 One of the main effects of Panama's current economic structure is that more than half of the population is below the poverty line, with monthly incomes falling short of the cost of basic needs in terms of food, shelter, clothing and education.

2.0.4.5 The same conclusions about the economic structure may be reached when analyzing the trend of the GDP over the last decades, particularly the slower growth rate. This is a consequence of a

slow growth in exports and investment, which at the same time partly explain the increasing lack of competitive capacity of the economy.

2.0.5 Implications of this Structure

2.0.5.1 A successful economic reform program in Panama beginning before the year 2000 would entail an important reduction in poverty and unemployment, an improvement in general income levels and an increase in productivity.

2.0.5.2 The impact of each alternative of expansion of the Panama Canal -- as measured by the projected increase in the GDP -- will depend on whether or not a process of either partial or total modernization will have taken place by the beginning of construction of the chosen alternative.

- If the current economic structure remains unaltered by the first decade of the new century, the rate of growth of GDP is projected to be in the 3%-4% range. (This projection is based on the level of overall productivity of the national economy.)

- The level of unemployment is projected to be very high, around 20% of the labor force.

However, barring a social upheaval induced by the deterioration of standards of living for the poorest, it is concluded that the construction of a new canal expansion sometime between 2005 and 2010 will reinforce the structure of the national economy based upon "exports of services." From a purely quantitative point of view, a project of a given magnitude shall have a larger impact on GDP, as the economy on which the calculation is based is taken to be smaller, measured in terms of real production.

The impact of the Canal alternatives on the level of employment also depends on assumptions about the state of the economy at the time of construction and during the operation. The larger the increase in productivity of the labor force between 1990 (the base year for calculation) and the initiation of Canal works, particularly in those sectors more benefited by the increase in demand due to the project, the smaller will the unemployment be, but the number of new jobs created will also be smaller.

The key issue in projections of productivity is the differentiation of changes in the productivity of one factor, labor in this case, and changes in the productivity of the economy as a whole.

Employment projections emphasized labor productivity and were based on the assumption that the level of labor productivity (in 1990 dollars) will remain the same for the next twenty years. Labor productivity is measured as the result of dividing value added by total employment. Value added is defined as payment to local factors: labor, capital, and land plus indirect taxation.

Labor productivity is not the same in every sector of the economy, because the capital-labor ratio is different in each, and the amount of capital per worker is a key determining factor of labor productivity. Overall output-labor ratios (OLR) were used in this document, rather than ratios by sector.

It is the contention of the study that the information about intersectorial OLR's is incomplete at least during the last ten years, due to poor accounting of both output and jobs in some sectors, particularly in agriculture and services.

2.0.5.3 The most important implication of the present economic structure before 2010 will be the persistence of a dual society: few rich families and a high number of poor families. In addition, the construction of a Canal expansion may create the sense that the project may finally solve the economic problems for most of the population, which will not be so.

A reduction in existing economic distortions and, consequently, a liberalization and modernization of the economy will enable the construction and operation of the Canal to create a larger impact on incomes than it would if the existing economic structure remains unchanged.

No efforts were undertaken to estimate impacts on production and income in the second scenario. The main reason is that the input-output matrix used to estimate those impacts was constructed using historic production coefficients, namely, values which incorporate the elements of distortion mentioned above.

A new input-output matrix --with altogether new coefficients-- would have been required to calculate impacts on a different scenario, namely one in which the structure of production would reflect the comparative advantages of the country.

The construction of such a new matrix is beyond the scope of the present study.

2.0.5.4 If changes in the productive structure of the country take place before the year 2000, project initiation will not have negative effects on the new structure. On the contrary, it should be expected to reinforce the modernized structure, creating new sources of investment and employment, helping to reduce poverty and increasing available resources.

2.0.6 Background

2.0.6.1 Direct monetary impacts are present in two different phases of the project. Those having immediate effects occur during the construction period, eight years in the case of the High-Rise Lock Canal alternative, and ten years in the case of the Single-Lane Sea Level Canal. The effects of long term impacts appear during the operation of the chosen alternative. To analyze these impacts, we have established long-term impacts over a period of forty years of operation of either alternative.

It should be noted that in either alternative, benefits of the project consisting of savings for the users probably will not have a direct impact on the Panamanian economy, in terms of higher income during the construction period. Impacts during construction come from the payment of construction costs in national territory. In the long-term perspective, that is during the operation of either alternative, impacts are more directly related to the benefits of the project, because the higher income for the Panamanian economy in this period is closely related to the tolls that could possibly be charged to Canal users. These tolls depend on benefits received by the users, as it is proposed in the model by Nathan Associates, Inc.[5]

2.0.6.2 During the construction period, income received by domestic factors from direct payments for the use of those factors and inputs are reflected later in higher local spending. This means that the

[5] Nathan Associates Inc., "Financial Scheme, Financial Analysis and Management Arrangements Component Study, Interim Report, May 10, 1993.

initial income turns into spending and income for other individuals in the economy who are not necessarily those affected by the impact in the beginning. This additional income will be felt in the economy with a "multiplier" effect generated from spending during the construction period, and is called a short-term indirect impact.

2.0.6.3 Additional income trickled down into the economy due to spending during the operation period of either alternative will be referred to as long-term indirect impact.

2.0.6.4. Indirect benefits due to the expansion of infrastructure relate to the fact that benefits from better schooling and health are not restricted to direct beneficiaries only, and affect the society as a whole. Social rates of return on investment in human capital are usually higher than private rates of return.

With investments in road improvements, the case is similar. For example, if better roads are built to provide for transportation to construction sites, those roads may benefit other users. Benefits from road improvement investments are mainly reductions in transportation time.

2.0.6.5 In relation to the creation of new opportunities in the export of services referred to above, it is important to think of the new Canal expansion -- whether by High-Rise Lock or by a Sea Level Canal -- as strengthening Panama's historic comparative advantage in the international transportation business.
Export services in Panama consist mainly of : Canal revenues, bank transfers from abroad, the Colon Free Zone's gross revenues from re-exportation, expenditures by U.S. military personnel and other U.S. agencies in the local economy; income from the Transisthmian Oil Pipeline, and other minor incomes in the corporate sector and in tourism.

The calculations that follow show that during the operation of either Canal expansion alternative, revenues accruing to the Panamanian economy will increase. Therefore, some exports of services will also increase. Whether that increment shall compensate for reductions in other exports of services depends on changes in the world economy and on decisions of the U.S. Government.

The expected increases in export of services tend to reinforce the current structure of the economy, based on the development of the tertiary sector. That structure -- based on highly

competitive services existing along highly protected agriculture and industry -- has led to uneven income distribution.

2.0.7 Impacts of the Alternatives on Panama's Competitiveness

2.0.7.1 Analysis of potential effects of the alternatives on national competitiveness will begin with a description of the present economical structure in terms of its institutions, its organization, laws and customs. Then the merits and limitations of the structure and its capacity to satisfy national modernization requirements are examined, and lastly the changes which would be induced in the economy at the beginning of the construction for each alternative will be dealt with.

2.1 ASSUMPTIONS

2.1.1 The continuation of a globalization process of world economies during the first half of the next century is not only an implicit assumption in the demand estimates for Canal services, but also in the price and cost structure as presented in other studies. For this study, this assumption is important because it confirms the need to insert the Panamanian economy in an integrated world economy as a way to promote domestic welfare.

2.1.2 Technology for the construction of either alternative will not change due to changing factors and inputs of relative prices. This means that the alternatives will be accomplished with the mixture of resources suggested in the Yachiyo Engineering project, although it should be stated that costs estimates could not be equally accurate in both the High-Rise Lock Canal and the Sea Level Canal alternatives due to the difficult topography of Route 10 and the experimental nature of infrastructure requirements.

2.1.3 The procurement system will be open, not discriminatory implying that construction and financing costs will be the lowest possible, due to project requirements.

2.1.4 The financial surplus of the Panama Canal Authority will not be taxed by the Central Government.

2.1.5 The Panamanian economic structure will not suffer positive external shocks (discovery of resources or spontaneous capital inflows) nor negative external shocks (important natural disasters or a sudden loss in the demand for major export goods).

2.2 METHODOLOGY

2.2.1 Short-Term Direct Impacts: The estimates of direct impacts in the short term are calculated using increases in domestic monetary income generated by expenditures in the construction of each alternative, as follows:

2.2.1.1 Different costs of engineering items, administration, incidental expenses and otherwise will refer to data provided in the study of Yachiyo Engineering Co.[6] for the case of the High-Rise Lock Canal. Two different options are considered for the Sea Level Canal. All three options were calculated.

2.2.1.2 Percentages for each item will be calculated as these correspond to payments to local production factors, intermediate domestic purchases, or purchases to foreigners.

2.2.1.3 Domestic income produced by construction spending will be estimated for each year during the construction period. The study will use the cost data used by MRI on the local component as basic estimate. However, an independent cost itemization is presented in an alternative set of figures.

2.2.1.4 The current value of domestic income will be calculated in year 2010 dollars for each alternative, and for each case in each alternative, this is to say, for five different cases. An expanded input-output matrix of indirect coefficients will be used.

The first three steps were rigorously calculated by MRI.[7] The Booz•Allen & Hamilton estimates have been compared with these three steps and any significant difference are explained.

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[6]The Yachiyo Engineering Co. Ltd, Final Report, Engineering and Cost Estimates, April 1993.
[7]The Mitsubishi Research Institute, Op. Cit. Pages 110-117.

2.2.2 Short-Term Indirect Impacts: Estimates on short-term indirect impacts will be approached as follows:

2.2.2.1 A final demand vector is provided. This is the result -- slightly modified -- of short-term direct impacts calculation as mentioned above.

2.2.2.2 This vector is multiplied by a basic input-output matrix of the domestic economy as prepared by CADESCA in 1992.

2.2.2.3 Various interactions of the model have been performed to find the effect of successive spending rounds on domestic income, as these are generated by the construction of the project.

2.2.2.4 The results of each alternative will be compared. Since the matrix used will be the same for each Canal widening case, indirect effects calculated in this way are directly proportional to short-term direct impacts.

2.2.3 Long-term direct impacts occurring during the operation of either of the Canal alternative will depend on four major elements:

2.2.3.1 The nature of the entity in charge of administrating the Canal when the construction phase is complete, and tolls and other services incomes begin. We have presumed that the type of administration managing the construction and operation of the new alternative will be similar to the one in charge of the Canal administration starting in the year 2000.

2.2.3.2 The tolls policy as established by the aforementioned Canal entity. This policy is determined by the particular conditions of the maritime transit market and by the international commitment signed on this matter between the Republic of Panama and other nations.

2.2.3.3 The amount and origin of operations and maintenance costs for the widening of each canal alternative; and

2.2.3.4 The financing scheme of construction costs for either of the Canal alternatives.

2.2.4 The Administering Entity

The agency administrating the new Panama Canal will be in charge of establishing, receiving and distributing income generated by the transit of vessels and other commercial activities developed as a consequence of vessels flow.

The Nathan Associates study concludes that, regardless of the alternative, basic principles of administrative efficiency provide the rationale for the creation of only one entity to be in charge of the Canal's operations.[8]

The evaluation performed in that study recommends the establishment of a Panama Canal Authority (PCA), similar to the Panama Canal Commission operating the current canal. This similarity will help to accomplish an effective transition from the current model to the new one. In the future, we will not rule out the idea that the Panama Canal Authority may turn out to be a Specific Purpose Corporation (SPC) similar to the one currently operating the Transisthmian Pipeline under the name of Petroterminal de Panama, S.A.

Due to the latter, the two alternatives discarded were: operation by a Panamanian public entity and operation by a private company.[9]

The creation of a Panama Canal Authority, in the analysis of the economic impact over the domestic economy, provides total financing autonomy to the agency. Income transfers towards the domestic economy coming from tolls and other Canal complementary activities will not be decided by short-term national treasury needs. They will depend on the policies adopted by an independent and autonomous Board of Directors.

An important criterion to evaluate the new administrative structure was the need to isolate it from Panamanian politics. The Panama Canal Authority will require a new law, or even better, a constitutional reform to guarantee its autonomy.[10]

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[8]Nathan & Associates, Op. Cit. Pages 5-21.
[9]Op. Cit. Pages 5-30.
[10]Chapman, Guillermo: Lecture in INDESA, March 1993.

Another criterion was the ability to accomplish strategic planning objectives for the mid- and long-term periods in a very competitive and complex market. This ability could be accomplished only through operative and financing autonomy and complete control over the use of financial resources gained by the agency.

Calculations required to provide an estimate on the direct economic impacts on Panama during the operation of either Canal alternative will assume that the agency in charge of the administration will be a Panama Canal Authority, under the jurisdiction of the Government of the Republic of Panama, with total administrative and financial autonomy.

2.2.5 Toll Policies

A toll policy definition is important to determine the amount and growth rate of monetary income which the Panama Canal Authority will receive each year.

Tolls can be established in two general ways: as a percentage of the consumer surplus, that is, from Canal users' savings, or as a value determined by operations and maintenance costs of Canal facilities. The first approach is the "benefits" approach, which assumes some monopolistic discrimination capacity from the operator's side. The second is the "costs" approach in which the operator is restrained by the need to obtain a financial profit rate proportional to costs, including the possibility of a zero profit rate.

The Nathan Associates study analyzes the optimum toll policy for the new Canal system under the assumption that tolls should maximize the agency's income subject to a minimum detriment to current Canal transits, taking users' payment capacity into consideration, as well as the agency's ability to collect tolls.[11]

Table 3-20 in page 3-45 of the Nathan Associates study shows a summary of the toll rates structure which will be used by this study. It will be used to calculate monetary direct impacts to the domestic economy during the operation of either alternative. These rates are measured in 1990 prices, and they

[11]Op. Cit. Pages 2-6.

range between $2.75 per ton for loaded large-size refrigerated vessels (more than 20,000 tons), and $4.02 per ton for vessels other than general cargo, refrigerated vessels or vehicle carriers.

2.2.6 Operation and Maintenance Costs

The greater the costs of maintenance and operation of a given alternative for widening the canal, the greater the payment to local production factors will be, as well as the amount of intermediate goods purchases made in the domestic market, if other circumstances remain unchanged.

Estimates of local spending in the operation and maintenance period are calculated on the basis of the April version of the Yachiyo Engineering Co. study and the results from the Nathan Associates study, which were also drawn from the same source. Differences arising among these two data sources are a consequence of the difference in the degree of detail in estimating cost items.

Tables containing the information to be used for the calculation of this impact are the following, as taken from the Nathan Associates study:

Table 6-10 High-Rise Lock Canal for vessels with 150,000 DWT.

Table 6-16 High-Rise Lock Canal for vessels with 200,000 DWT.

Table 6-22 Sea Level Canal (Case A). Other cases show the same values in operation and maintenance costs.

Maintenance and operation costs are lower in the third set of locks case in comparison to those of the sea level canal, and they become lower as the maximum size of vessels decreases.

2.2.7 Financial Scheme

Economic project benefits do not depend on the way the costs are financed. Nevertheless, the extent of the economic impacts is influenced by the project's financial arrangements.

If all financial resources are provided by the project promoters as capital not subject to paying dividends, the toll income and income from other sources will all go to the Panama Canal Authority. On the contrary, if the investment is completely financed by foreign loans, the Panama Canal Authority's ability to spend in Panama will be reduced as a consequence of the debt service.

Nathan Associates, Inc. recommends in its report an "Optimum Financial Scheme" consisting of nine sources of foreign funds in the mid- and long terms. Under this optimum scheme, some of the financial resources coming from tolls and other sources of income will have to be allocated to debt service payment. Such payments (interest and capital amortization) reduce the agency's cash flow, and consequently, its potential spending in national territory.[12]

2.2.7.1 Direct impacts during the operation are calculated according to the following method:

Based on annual data measured in 1990 dollars in maintenance and operations costs, toll income, and optimum financial scheme for each alternative, the direct economic impacts during the operation of the Canal were calculated, assuming that the given Canal is to be under the administration of a Panama Canal Authority.

- Payments for production factors (work and capital), purchase of goods, services and inputs within the Panama's economic system have been established as percentages of annual operation and maintenance costs.

- The income amount from the Panama Canal Authority to be used in payments to the Panamanian government has been determined.

- The financial surplus is calculated by subtracting payments for production factors and total purchases (domestic and foreign) from the agency's total income. During a period of 10 years for the High-Rise Lock Canal alternative and 15 years for the Sea Level Canal alternative, Panama will have to provide financial resources to the project's cash flow due to the project's capitalization. These resources would not be taken out from the domestic budget, but from Panama Canal Authority reserves accumulated as a result of financing surplus from previous years. This capitalization

[12]Op. Cit., Page 7-1.

process affects the amount of national treasury income, envisaged to be lower during contribution periods, but greater when "dividends" are paid.[13]

- We have presented alternative possible scenarios for the distribution of these financial surpluses, based on whether they become government's resources or not.

- The annual monetary income flow during the operation of either alternative -- already calculated -- have been discounted to year 2010 value, using a wide range of intermediate discount rates.

- This year 2010 values in either alternatives have been compared to determine which will produce the greatest direct monetary impact during the operation period.

2.2.7.2 Calculation of long-term indirect monetary impacts was based on the income multiplier in the same input-output matrix used in the case of short-term indirect impacts. Using a matrix with technical coefficients calculated ten years before is an important methodological restriction. This restriction is also true for the 1990 CADESCA input-output matrix for demand flows generated beyond the year 2010. Caution ought to be applied when considering the outcome of indirect impacts in the short and in the long term.

Impacts concerning infrastructure have been qualitatively analyzed. The section dealing with these impacts lists and quantifies increases in infrastructure supply for each alternative. In the section dealing with impacts on population, requirements in social services for either alternative have been listed for the construction and operation periods .

In the economic impact analysis, the analysis has been taken one step further to investigate possible effects of these investments over domestic growth, productive employment, industrial and agricultural development and exports of goods and services. This has been done in the most likely scenario of the public services during the first years of the Twenty-first Century. The new needs have been incorporated into the general picture. Answers to the following questions have been attempted:

- What would the relative importance of the new supplies be within the domestic wealth?

[13]Ibid., Tables 2-10 and 2-11.

- Which are the most important economic and financial limitations to the ability to generate these new services?

- What changes should be produced in order to surmount these limitations?

2.2.7.3 The analysis of impacts on domestic competitiveness has gone into whether these alternatives will or will not change historical bases of domestic development. The economic structure has been defined as a group of "institutions" (organizations, laws and customs)[14] which created a growth and employment scheme in the country during the last decade. The merits and limitations of such a structure are evaluated, and its ability to satisfy domestic modernization requirements in the following two decades has been discussed.

The final result is an analysis of possible implications of each alternative over these "institutions," that is, over the economy's ability to become more efficient and competitive in the global market, without any need for protection, subsidies, preferential intervention and other distortions.

2.3 IDENTIFICATION AND ANALYSIS OF ECONOMIC IMPACTS

(All charts referred to in this section are found at the end of the section.)

2.3.1 Direct Impacts during Construction

2.3.1.1 The alternatives require different periods of time. The administrative organization, the excavation proper, and setting-up of the complementary facilities of new locks parallel to the present canal would take ten (10) years, while a new Sea Level Canal would take fifteen (15) years approximately. Total costs would vary between one option and the other. Chart No. V-1-5 of the Mitsubishi Research Institute report compiles these costs.

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[14]An updated definition of "economic institutions" can be found in Ostrom, Feeny and Pitch, "Institutional Analysis and Development: Rethinking the Terms of Choice" in Rethinking Institutional Analysis and Development, edited by the authors, CINDE, 1992.

2.3.1.2 During the construction stage, goods and services are acquired in the local market, labor and equipment are obtained locally, personnel and materials are transported, camps and houses are built, and physical assets are installed in national territory. This activity causes impacts on income and expenses and on the production structure of the local economy, such as would not have been felt otherwise.

2.3.1.3 The Mitsubishi Research Institute calculated the direct monetary impact on the national economy as follows:

- Local costs generated in the construction according to type and category of costs.
- The impact of this cost on local production using direct and indirect coefficient vectors of a input-output matrix was determined.
- The increase in employment during construction was established.

2.3.1.4 The present analysis considers the direct impacts envisaged by the Mitsubishi Research Institute to be valid. However, in the Appendix at the end of this section, a new inimical direct cost calculation is presented according to cost category. The same Appendix contains a brief discussion of the differences found between MRI estimates and those of this analysis.

2.3.2 Indirect Impacts During Construction Period

The demand for goods and services generated by the project is distributed among the various production sectors unevenly. This effect was measured under Direct Impacts.

This increase in production induced by the greater initial demand determines a demand for other products, goods, imports and labor among other things. That is to say, value-added goods are required from other sectors but an increased value added is produced. These effects are called indirect impacts during the construction. (Strictly speaking, indirect impact calculations include direct impacts).

2.3.2.1 This calculation was arrived at in the following manner:

- The project cost to the national economy was estimated year by year.

- The repercussion of this cost on production levels was estimated for the various sectors of the economy: agriculture, agroindustry, manufacturing, construction, commerce, services and finance.

- The result of such repercussions on these costs was consolidated in a sectorial demand vector, which was applied to an expanded input-output matrix. This matrix developed by CADESCA included not only the technical coefficients for intersectorial demands, but was also amplified to take in importation coefficients, payment for four labor categories, dividends on capital, and indirect taxes. The structure of this matrix appears in Chart II-A-35.

2.3.2.2 The expanded matrix used is in the order of 25 to 12. The sectorial demand vector is in the order of 12. The final vector is of 25. The results of the distribution of demands and factorial incomes for each alternative appear in Chart II-A-8. The direct demands coincide with the results presented by the Mitsubishi Research Institute in Tables V-1-6, V-1-7 and V-1-8 of the Interim Report. At the same time, the so-called cost repercussions coincide with the figures of this report, except for small differences due to calculation precision.

2.3.2.3 The indirect impacts on income emphasize the functional distribution of income according to the factors involved: labor, capital and the public sector. Total import requirements and intermediate purchases generated by the production sector were also calculated and appear in Chart II-A-9.

2.3.3 Payments to the Government of Panama in Royalties

Chart II-A-13 to II-A-17 show cash income estimates for each alternative for the period 2020 to 2060. Government income is calculated at 10% of total income, in tolls as well as other activities. This is the percentage which the National Government has obtained during the last 5-year period, and was used by Nathan Associates in their financial calculations. Column (2) in each Table presents the hypothetical figures of Government income should it continue to operate the present canal by itself exclusively. Column (4) calculates programmed income for each new alternative and Column (5) the annual difference between the two magnitudes, valued at 1990 prices.

2.3.4 Dividends Payable to the Government

2.3.4.1 In order to be able to structure the optimum financial scheme, Nathan Associates recommend that the Panamanian Government capitalize a sum -- depending on the option studied-- which will be considered as its patrimonial participation in the project.

2.3.4.2 This investments would not come from the national budget for the corresponding years, but would be assigned from funds accumulated by the Panama Canal Authority. However, dividends accrued by such patrimonial investments would be received by the Government, in the case of the High-Rise Lock option. The option of the Sea Level Canal would not pay any such dividends to the Government, although its patrimonial investment would be required.

2.3.4.3 Charts II-A-15 and II-A-16 in column (3) show dividends received by the Government in the High-Rise Lock option. These values were taken from the financial structure suggested by Nathan Associates. Note that the Sea Level Canal option, in any of its variants, would not produce dividends for the Panamanian shareholder.

2.3.4.4 The final results in relation to Panama's income are very sensitive to this dividend value. For that reason, the present value has been excluded from the income under two mutually exclusive scenarios, depending on whether or not dividends are paid to the Panamanian Government.

2.3.5 Total Income to the Country during the Operation of the Canal

2.3.5.1 Charts II-A-15 to II-A-19 show calculations of net income for the country and its probable distribution in the public and private sectors for each alternative. The first two refer to the High-Rise Lock Canal and the last three refer to the Sea Level Canal.

2.3.5.2 In order to obtain a single figure for the monetary impact, incomes for the country during the operation of each alternative were calculated in year 2010 values. Chart II-A-27 reflects these conclusions.

2.3.6 Calculations of Direct Impacts During Operation for the Different Alternatives

2.3.6.1 Charts II-A-21 to II-A-23 show the effect of local expenditure on internal production during the operation of each alternative. For the Sea Level Canal only Case A was selected, since the difference with the rest of the cases is minimal.

- In these tables income for the country includes the amount of dividends paid to the Government as estimated for the High-Rise Lock option.

2.3.6.2 Tables III-A-24 and III-A-25 show the same exercise without dividend incomes. The Sea Level Canal is the same in both overviews, since it would not produce such dividends.

2.3.7 Calculation of Indirect Monetary Impacts During the Canal Operations

2.3.7.1 During each year of operation of the Canal beyond year 2010, certain money resources will reach Panama as a result of services exportation, which for a long time has been one of the most important sources of currency for Panama.

2.3.7.2 The impact which this flow is to have on other production sectors can be calculated by applying the additional demand generated from this activity to the national production structure, calculated in a similar manner as for the construction period.

2.3.7.3 There are several differences between the construction phase and the operation phase.

- Impact time is different. While construction takes 10 to 12 years for the lesser project High-Rise Lock Canal and fifteen for the Sea Level Canal, the impact of the operation on the national economy will be felt for forty years.

- The amounts are different. While during the construction period between US$74 million and US$82 million will be generated per year, in terms of initial demand per year, the operation will generate an average of US$100 million.

- The sector where impacts are to be felt first during the expansion of the present canal is that of construction, whereas the export services sector will begin to feel the impact, during the operation period. Intermediate demands structures and indirect repercussions are totally different as derived from the input-output matrix presented in Chart II-A-35.

2.3.7.4 Chart II-A-33 compiles the results of applying the input-output expanded matrix to the new demand created by the Canal operation in the different alternatives. Chart II-A-34 shows the direct and indirect effects of the operation of each alternative on the real projected GNP, total employment, imports and payment to agents.

2.4 CONCLUSIONS AND FINDINGS

2.4.1 In terms of overall costs, total investment may fluctuate between US$7.4 billion (for the 150,000 DWT High-Rise Lock); US$8.5 billion (for the 200,000 DWT High-Rise Lock); and US$12.7 billion for the least expensive option of the Sea Level Canal. These figures are in 1990 prices, and the costs do not include necessary expansions beyond 2060.

The construction period is expected to last between 10 years (High-Rise Lock Canal) to 15 years (Sea Level Canal). During that period, direct expenditures in local factors and goods may vary according to the chosen alternative: US$844.5 million (High-Rise Lock for 150,000 DWT); US$945.7 million (High-Rise Lock for 200,000 DWT) or US$1,086 million (Sea Level Canal - Option A). These are direct monetary impacts attributable to the construction activity itself.

The largest direct impact occurs in the Sea Level Canal option, which represents 28.6% more total expenditure than the 150,000 DWT High-Rise Lock Canal and 14.8% more than the High-Rise Lock for 200,000 DWT.

2.4.2 The difference between total direct investment in construction for each option and total expenditure in the local economy generated during the construction phase may be explained by the intensity in the use of capital in the construction process. Fixed capital (machinery, equipment) is not produced by the local economy and should be acquired abroad.

Ratios of expenditure in the local market to total investment in the projects (from Mitsubishi Research Institute estimates) are:

TABLE II-1

Alternative	Coefficient
High-Rise Lock (150,000 DWT)	11.4%
High-Rise Lock (200,000 DWT)	11.1%
Sea Level Canal (A)	8.5%

Same ratios calculated for this report are:

TABLE II-2

Alternative	Coefficient
High-Rise Lock (150,000 DWT)	8.1%
High-Rise Lock (200,000 DWT)	10.4%
Sea Level Canal (A)	9.5%

2.4.3 Expenditure in the local economy during the construction period will be reflected in a higher demand for goods and services. This new demand is totally or partially satisfied with Panamanian resources. Payments to these resources represent income to the national economy.

These are defined as indirect impacts during construction and must be added to the above-mentioned direct impacts. Total impacts on the economy are (in 1990 millions):

TABLE II-3

	High-Rise Lock (150,000 DWT)	High-Rise Lock (200,000 DWT)	Sea Level Canal
Value Added	708.1	792.9	911.1
Intermediate Purchases	809.3	906.3	1,041.3
Impact on GDP (annual average)	0.95%	1.06%	0.81%

No great impact on the value added of the economy during the construction period is to be expected, even assuming a moderate growth scenario for the national economy.

There are two reasons for this conclusion: the quantitative explanation is that the average annual increase in value added (US$ 70 million for High-Rise Lock Canal 150,000; US$ 79 million for the High Rise 200,000; and US$ 60.7 million for the Sea Level Canal), must be compared with a real GDP (at 1990 prices) of around US $7,100 million by the time construction of either alternative would initiate. This estimate is based on an average real growth rate of 3.5% per annum between 1993 and the year when construction begins.

This impact has been quantified taking into consideration the construction schedule, which starts peaking around the fourth or fifth year and slows down towards the end of construction.

In relation to the qualitative explanation, it has been assumed (and evidence tends to support this assumption) that the industrial structure of the national economy will not change in reaction to the construction of either alternative, because of institutional rigidities (tariff protection, labor code) or because firms are not willing to undertake irreversible investments in order to satisfy temporary increases in demand.

2.4.4 Direct impacts on the economy during operation of the new alternative (long-term direct impacts) occur as a result of the transfer of income from Canal users to the local economy through the Panama Canal Authority. These transfers depend on: (a) tolls received; (b) other service income; (c) local portion of maintenance and operating costs; and (d) royalty payments to the Panamanian Government.

These impacts were calculated for a forty-year period (2020-2060) using 1990 prices and were reduced to a single figure by discounting the series to year 2020 at different discount rates. For the sake of simplification, the direct monetary impacts during operation (at 6% discount rate) are shown below (in 1990 millions):

TABLE II-4

Alternative	Direct Impact
High-Rise Lock (150,000 DWT)	1,392.6
High-Rise Lock (200,000 DWT)	1,354.5
Sea Level Canal (A)	1,605.6
Sea Level Canal (B)	1,508.1
Sea Level Canal (C)	1,585.6

Sea Level Canal alternatives show the largest direct impact, 15.3% larger than the High-Rise Lock for 200,000 DWT vessels.

2.4.5 Indirect impacts during operation occur when direct expenditures trickle down to the local economy in terms of induced income. Total impacts (direct plus indirect) are:

TABLE II-5

	High-Rise Lock (150,000 DWT)	High-Rise Lock (200,000 DWT)	Sea Level Canal
Value Added	3,819.8	3,635.4	4,174.6
Intermediate Purchases	2,030.7	1,932.4	2,219.3
Impact Upon GDP (annual average increase)	1.3%	1.2%	1.4%

Impacts of the different alternatives on national growth are very similar. It is not possible to choose one option over others solely on the basis of this indicator of economic activity.

2.4.6 Total employment (direct plus indirect) generated by the different options during construction and operation are:

TABLE II-6

Alternative	Employment During Construction	Annual Employment During Operation
High-Rise Lock (150,000 DWT)	95,760	12,853
High-Rise Lock (200,000 DWT)	107,236	12,233
Sea Level Canal (A)	140,828	14,046

This calculation has taken into consideration average real productivity per worker in each sector of the economy in 1990. It is assumed that this productivity will remain stable during construction and operation.

The assumption of constant real productivity is important for the calculation of job creation potential. But real labor productivity may change in time in different directions: (a) a sustained reduction in average productivity of 1% per annum -- the trend of the past two decades --; or (b) an increase in productivity originated in structural adjustments in the national economy. The results are

very sensitive to changes in labor productivity. During construction, the average number of total jobs created (and sustained) will be 9,576 (High-Rise Lock for 150,000 DWT); 10,723 (High-Rise Lock for 200,000 DWT) and 9,388 (Sea Level Canal). In all cases, more jobs are created in the construction sector, followed by the manufacturing industry. Once construction ends, these jobs are lost.

Total jobs created during the operation compensate any surplus jobs lost after the construction. These jobs during operation, however, are concentrated in high-paid activities like services and government.

The unemployment rate around 2020 may be reduced by 2% if the economy continues to expand at a low pace (3.5% per year). With a more vigorous growth (7.0% per year) the unemployment rate may decrease by 5.1% due to the operation of the new Canal expansion.

These calculations assume that the rate of labor force participation does not increase with new job opportunities. It is likely that the expectation of new job creation will give rise to a higher labor supply. In that case, positive impacts on the unemployment rate will be lower than calculated.

2.4.7 The following should be considered in the light of the fact that, in all likelihood, the structure of the national economy will not change because of the construction and operation of a new Canal alternative. Export of services will increase, compensating a foreseeable loss of income from other services such as: the Oil Pipeline and U.S. military personnel. The Oil Pipeline tends to reduce its participation in the local economy because of a reduced supply of Alaskan oil combined with a higher demand in the west coast of the United States. Expenditures of U.S. military personnel in Panama shall decrease if a personnel reduction takes place as a result of the 1977 Canal Treaties or a decision of the U.S. Government, or both.

Inflow of monetary resources may tend to sustain the current structure of the national economy with its high dependency on services based on geographical location of the country, currency and other reasons.

Only if local authorities decide to introduce and sustain structural adjustments in the Panamanian economy, could these new resources be distributed on a broader basis in society.

APPENDIX

ECONOMIC CHARTS

ANALISIS OF IMPACTS ON PANAMA

ECONOMIC MODEL METHODOLOGY

1. A Description of the Steps that were followed to study the impacts on the economy

A. Fundamental Concepts

An important project like the one analyzed in this report -- the enlargement of the Panama Canal -- can have a twofold impact on the country's economy: on its performance and on its structure.

The performance of an economy is usually measured by its contribution to increasing the nation's wealth, namely the creation of value added. The Gross National Product is the measure used in this analysis.

A project improves the performance of the economy if its execution increases GDP with respect to a reference situation, that is to say, a scenario in which the project was not carried out.

Estimates of the GDP are not the only yardstick that can be used to measure the performance of an economy, as it relates to the execution of a project, since all projects are aimed at increasing the national value added, at least in the short-term. Other measures of performance are: total employment generated by the new investment; increase in the potential productivity of the economy through expansion of physical or social infrastructure; or improvement in the relative distribution of income or wealth.

When assessing the impact of the project on the performance of the economy, only the following will be considered: increase in GDP resulting from construction and operation of the project and increase in the total of new jobs created.

The impacts of the project on the economic structure of Panama are more difficult to measure and are subject to hypothesis that cannot be verified with the available information.

"Economic structure" is defined as the elements of an economy that remain relatively unchanged -- both during booms and recessions --, despite changes in the international arena or fluctuations in national production.

The structure of an economy can be examined by looking at the sectors of production that have promoted national development for a long period of time, and by investigating the causes of that behavior. Several explanations can be found to explain the existence of a specific economic structure in a country: available natural resources, geographical position, and characteristics of labor. However, development economists agree on placing more importance on public policies than in the supply of resources to explain the economy's structure and performance.

Government policies establish the institutions on which the interrelationship between economic agents is based and these institutions affect the distribution of resources in an economy.

Panama's economic structure has been determined by government policies that have strengthened the competitiveness of service exports. These sectors are not subject to heavy burdens; they are relatively open to domestic and foreign competition; or they are beneficiaries of a "location monopoly." In some cases, a preferential labor system is applied to them.

Exportation of services includes: the Panama Canal and its related operations, the Colon Free Zone, the Transisthmian Pipeline, banking services, legal services for the creation of corporations, registration of vessels, and tourism. They have made up approximately 60% of the GDP in the last two decades, and more than 75% of foreign currency generation for the current account of the trade balance.

Another feature of Panama's economic structure has been the establishment of public policies aimed at totally or partially isolating foreign competition from the sectors responsible for producing goods -- agriculture, livestock, agroindustry, and the manufacturing industry.

The tools employed for this purpose have been: tariffs, import quotas, and previous import permits. Currently, maximum tariffs range between 40% and 50%. There are still import quotas on certain agricultural products, import prohibitions, and differences between tariffs on processed goods, equipment and machinery and tariffs on final products.

Domestic prices of tradeable goods in foreign markets are higher than international prices for similar products -- except in the event of contraband. This reduces internal consumption and produces a distribution of resources that benefits protected sectors and adversely affects sectors with a potential for exporting goods.

Another feature of Panama's economic structure has been the design of government policies aimed at granting monopolistic income to the production of nontradeable goods and services, such as electric power, telecomunications, land transportation, and maritime transportation.

Legal "de facto" monopolies granted to the production of certain intermediate supply goods, including fuel, are added to the latter non-tradeable goods.

B. Instruments for Measuring Impact

1. Options

To measure the effect of a project on GDP and employment, two methods -- both of which have virtues and defects -- can be used.

The first one is the sectorial econometric model that has the real GDP of the country as a dependent variable. A test of this nature requires a great effort of statistical calculation and, unfortunately, it is not available at this time.

A second method is by way of an input-output matrix which gathers different intersectorial relationships and allows the calculation of the impact on production and the value added of changes in the global final demand. This method also requires a great deal of calculation. Luckily, SELA and CADESCA have recently presented Central American region researchers a version -- a tentative version like all those of this kind -- very useful for atempting an approximation of the calculation of value added and employment that which an increase in final demand can achieve.

2. The Use of Input-Output Matrix

(1) Final demand is estimated during the construction phase since, it stems from this sector, and during the operation phase, it derives from "service exports". This value has been called "direct impact."

(2) Using the direct and indirect requirement matrix by production unit, the total production by sector is obtained. This is in line with estimated demand during the construction and operation periods.

(3) Production values by sector are used to estimate import requirements for intermediate supply goods.

(4) These same production values are applied to value added coefficients in order to determine the distribution of production value between payments for production factors (value added) and purchases from other sectors (intermediate purchases). These values have been called "indirect impact."

The input-output matrix prepared by the Food Security Program (PFSA), CADESCA, and the European Economic Comunity has served as basis for estimating impacts on production and employment.

Multiplied values of intermediate demand and value added can be generated by succesive matrix iterations, obtaining higher values than those presented here.

Only the first round of impacts is shown here because of two reasons:

1. From the standpoint of the selection of one alternative over the other, the exercise of producing additional iterations would not affect the differential impacts of one in comparison to the other.

2. The exercise would be more meaningful in the case of an analysis of impact during operation than during construction. This stems from the fact that any positive "multiplier" effect on GDP during construction becomes an effect of opposite sign when the project ends.

3. As it will be concluded in the end, different iterations can affect the quantification of the possible performance of the economy in the presence of the project, but they will not affect conclusions concerning the structure of the national economy.

3. Definitions of the Input-Output Matrix

In the numerical graphs presented in the annex, the same definitions that were used by the authors of the input-output matrix have been used. Following, a sumary of these definitions is presented:

(a) Sectors of Activity.

-Agroexport:
Bananas, shrimp, sugar, and highlands coffee.

-Grains agriculture:

Rice, corn, bean, sorghum produced by mechanical means.

-Other agriculture products:
Vegetables, tubers (cassava, potato), fruits (orange, papayas), and lowlands coffee.

-Livestock:
Livestock. Egg, milk, and cheese production.

-Agroindustries:

Preparation of food products and beverages. Preparation of tobacco products.

-Other industries:

The remaining manufacturing industry, which includes construction materials and metalworks.

-Construction:
Construction of housing and commercial outlets.

-Commerce:
It includes retail and wholesale sales. It does not include restaurants or hotels.

-Financial Establishments:
It includes banks with general license, financial institutions, and insurance companies.

-Mercantile Services:

This category includes: restaurants and hotels; real estate; lottery and casinos; telecommunications and the Pipeline.

-Non-Mercantile Services:

It includes: Central Government, Social Security Fund, and the University of Panama.

(b) Value Added:

Different income categories have been used for workers and property owners. These categories are:

H1: Those who own capital and derive a remuneration directly or indirectly from it. When they work, they do so in relation to the fixed capital they own: land, productive material, etc.

Their level of remuneration allows them to continue accumulating and/or having a level of income similar to highest professional incomes in developed countries.

H2: Includes families whose incomes range from medium to high levels, but without a capacity for significant accumulation.

Their incomes depend on the local economic activity, wages or self-earned income, including owners of small businesses or farms. They have professional stability, a secure income, social independency and they do not know poverty, despite the fact that a large part of them earn a very limited income, such as public employees and officials holding stable jobs and working for companies that pay good wages.

H3 and H4: They are the families that have no hopes about the future, H3 families live in urban areas, while H4 families reside in rural areas. It includes all those families living under conditions of poverty.

4. Restrictions of the Method Employed

(a) The use of an input-output matrix assumes that the production coefficients will remain fixed in each sector, and that consequently there will not be technological replacement due to wear and tear or due to changes in the relative prices of inputs and factors.

This is a methodology drawback that can be overcome. The basic matrix of technical coefficients, A, can be modified by pre-multiplying it by a matrix of changes in the composition of the gross value of production sector, R, and post-multiplying it by a matrix of changes in the sector production structure, S.

This has not been done in this Analysis and consequently, its results are subject to this limitation.

(b) By definition, the use of an input-output matrix establishes that the structure of the economy will not be altered by carrying out the project. In this regard, one of the asumptions presented in the work -- the unchangibility of the national economic structure until construction begins - is consistent with the method of estimation employed.

However, it can be argued tha such an assumption is not valid after the project begins, and therefore, the use of a matrix with fixed coefficients is not appropriate.

It is assumed, nevertheless, that the increase in the final demand during the operation of the project wil be inserted in the economy through exports, namely the sector that has traditionally originated the most significant financial revenues for the country.

In adition, the recommendations about the most apropriate administrative organization to handle the future Canal, suggest that a truly autonomous state agency should be created and that it should be patterned after -- mutatis mutandis -- the current Panama Canal Commission. The revenues of the current Canal obtained by Panama have come from the Panama Canal Commission and are considered as export. Therefore, it does not appear as an important limitation to consider that the revenue from the operation of the Canal will be originated by the "service-export" sector.

Concerning the impact of the construction alternatives on the structure of the economy, historical evidence suggests that physical macro-projects investment -- as demonstrated by the 1981-1983 period -- tend to increase GDP but do not permanently change the relative importance of the sectors, nor the basic economic institutions. This evidence is consistent with the results obtained in the investigation.

II. Recent Data on the Performance and Structure of the National Economy.

CHARTs Number II-A-1 and II-A-2 show the recent distribution of aggregate supply and demand and the composition of GNP by branch of activity. The CHARTs show the importance of exports -- particularly services -- as part of the global demand and the large relative weight of the service sector within the GDP.

CHARTs No. II-A-3 and II-A-4 shows breakdown of service export by categories of production. It is concluded that the activities related to transportation -- Canal, Colon Free Zone and the Pipeline -- represent nearly 60% of the generation of foreign currency. Tourism income related to the latter activities should be added to this percentage.

CHART No.II-A-5 shows a breakdown of goods exported during the last decade. The importance of bananas and shrimp -- activities with a comparative advantage-- is stressed. They have made up more than 50% of the goods exported.

CHART No.II-A-6 is aimed at highlighting the relative importance of manufacturing sub-sectors. The most dynamic sectors have been the production of petroleum by-products, non-metal mineral products -- cement -- and a basic metal industry -- directed at the production of construction materials.

CHART No.II-A-7 portrays a schematic vision of the recent labor situation, highlighting the high -- but stable unemployment rate, coexisting with high growth rates. The reason for this phenomenon is the low global productivity of the economy in the last two decades.

CHART II A-1

PANAMA: AGGREGATE SUPPLY AND DEMAND
1991-1992
(IN MILLIONS DOLLARS AND PERCENTAGE)

	1991	1992	%
DEMAND COMPONENTS	*7.211*	*8.164*	*13.2*
EXPORTS OF GOODS AND SERVICES	1,662	1,879	13.1
GOODS	425	606	42.6
SERVICES	1,237	1,273	2.9
Colon Free Zone	521	625	19.9
Canal	365	359	-1.6
Tourism	274	289	5.6
Transportation	77	57	-26.0
GROSS NATIONAL INVESTMENT	1.002	1.414	41.1
-Construction	421	680	61.6
-Fixed Investment	505	654	29.5
-Changes in Inventories	76	80	5.3
CONSUMPTION	4,547	4,87O	7.1
SUPPLY COMPONENTS	*7,200*	*8,164*	*13.2*
GROSS DOMESTIC PRODUCT (current prices)	5,075	5,583	10.0
IMPORTS OF GOODS AND SERVICES	2,206	2,581	17.0
GROWTH RATE OF REAL GDP	9.3	8.0	

Source: Contraloria General de la Republica and forecast of INDESA

CHART II -A-2

GROSS DOMESTIC PRODUCT 1991-1992
(IN MILLIONS OF 1970 US DOLLARS)

PRODUCTION SECTORS	1991 (P)	1992 (P)	Var. %
PRIMARY SECTOR	**223.9**	**236.7**	**5.7**
Agriculture	123.4	129.9	5.3
Livestock	87.4	92.5	5.8
Forestry	5.8	6.2	6.9
Fisheries	7.3	8.1	11.0
MINING	**3.3**	**4.3**	**30.3**
MANUFACTURING INDUSTRY	**188.5**	**202.8**	**7.6**
PUBLIC UTILITIES	**81.0**	**86.2**	**6.4**
Energy	69.5	74.0	6.5
Water	11.5	12.2	6.1
CONSTRUCTION	**72.7**	**117.5**	**61.6**
COMMERCE	**241.2**	**259.1**	**7.4**
Wholesale	88.1	94.0	6.7
Retail	116.1	124.3	7.1
Restaurants and Hotels	37.0	40.8	10.3
TRANSPORTATION, WAREHOUSING			
AND COMMUNICATIONS	**523.3**	**549.2**	**4.9**
Transportation	109.2	117.2	7.3
Communications	31.8	33.7	60.0
Colon Free Zone	128.9	161.0	24.9
Oil Pipeline	51.0	38.3	-24.9
Panama Canal Commission	202.4	199.0	-1.7

CONTINUATION OF CHART II-A-2

GROSS DOMESTIC PRODUCT 1991-1992
(IN MILLIONS OF 1970 US DOLLARS)

FINANCIAL SECTOR		**297.3**	**322.2**	**8.4**
Banking		60.3	72.0	19.4
Other Lending Institutions		22.4	26.9	20.1
Insurance		11.6	13.6	17.2
Real Estate		10.6	12.3	16.0
Imputed Housing Ownership		154.0	154.6	0.4
Other Services		38.4	42.8	11.5
SOCIAL AND PERSONAL SERVICES		**175.3**	**189.0**	**7.8**
MINUS: Banking Sector Adjustment		74.5	87.8	17.9
INDUSTRIAL SUB-SECTOR		**1,732.0**	**1,879.2**	**8.5**
PUBLIC SECTOR VALUE ADDED		**250.1**	**259.1**	**3.6**
PAID HOUSEKEEPPING		**24.0**	**26.7**	**11.3**
PLUS: Import Duties		29.5	33.7	14.2
GROSS DOMESTIC PRODUCT		**2,035.6**	**2,198.7**	**8.0**

Source: Contraloria General de la Republica

CHART II-A-3

STRUCTURE OF EXPORTS OF GOODS AND SERVICES
(In percentages)
(Average from1980 to 1992)

MERCHANDISE EXPORTS	23
TRANSPORTATION (Including the Canal)	31
SALES TO THE US DEPARTMENT OF DEFENSE	8
COLON FREE ZONE	22
TOURISM	14
OTHER EXPORTS OF SERVICES	2
TOTAL	100

Source: INDESA, based on official statistics.

CHART II-A-4

EXPORTS OF GOODS AND SERVICES. YEARS: 1980, 1987, 1989, 1990 AND 1991 (IN MILLION OF US DOLLARS)

	1980	1987	1989	1990 (P)	1991(E)
1. EXPORTS OF GOODS	**579.6**	**518.9**	**429.6**	**532.8**	**544.8**
Registered Exports, f.o.b.	412.5	440.6	356.6	440.8	452.1
Registered Reexports, f.o.b.	0.0	21.1	20.9	18.9	18.8
Export taxes	12.6	12.3	0.1	13.1	16.2
Exports of coconuts	1.4	1.9	1.4	1.3	1.3
Bunkers to vessels and planes	151.5	39.7	47.7	56.6	53.5
Ship chandling	1.7	3.4	3.0	2.2	2.9
2. TRANSPORTATION	**352.2**	**610.7**	**525.4**	**547.4**	**573.8**
Oil Pipeline	0.0	165.5	88.8	83.0	74.5
Air Tickets	27.0	26.1	16.9	15.8	11.0
Airport Revenues	4.2	9.0	12.3	7.9	10.2
Canal Tolls	286.5	329.9	329.8	355.6	374.6
Othe Canal Income	34.5	67.5	69.4	77.6	95.3
Income from maritime Services	0.0	12.7	8.1	7.4	8.1

CONTINUATION OF CHART II-A-4

EXPORTS OF GOODS AND SERVICES. YEARS: 1980, 1987, 1989, 1990 AND 1991 (IN MILLION OF US DOLLARS)

3. INSURANCE	21.4	2.5	4.5	2.1	2.2
4. SALES TO THE US DEPARTMENT OF DEFENSE	70.0	100.5	100.1	134.5	145.0
5. NET REEXPORTS FROM THE COLON FREE ZONE	308.4	342.9	355.4	462.9	589.9
6. COMMISSIONS, FEES AND RELATED INCOME	263.0	90.0	89.0	38.6	35.4
7. TOURISM	219.8	265.9	235.5	243.1	271.4
TOTAL:	1,814.5	1,913.5	1,739.5	1,961.4	2,162.6

NOTES:
(P) Preliminary Figures
(E) Estimated Figures
SOURCE: INDESA BASED ON GOVERMENT FIGURES

CHART II-A-5

EXPORTS OF GOODS
IN MILLIONS OF US DOLLARS

	1980	1987	1989	1990	1991
TOTAL EXPORTS OF GOODS	412.5	440.6	356.6	440.8	452.1
BUNKERING	81.8	0.0	0.4	0.5	1.2
BANANAS	120.7	187.3	195.4	212.8	196.5
SHRIMPS	43.7	65.0	50.4	44.4	50.4
SUGAR	65.8	17.0	1.2	36.8	24.4
FISHMEAL	14.8	7.4	8.1	4.2	6.0
COFFEE	10.4	17.9	8.2	13.8	13.0
GARMENT	10.4	15.9	12.6	15.9	20.1
OTHERS	64.8	130.1	80.3	112.4	140.4

Source: Encuestas especiales, Estadísticas, y Censo de la Contraría General. de la República.

CHART II-A-6

INDEX OF THE MANUFACTURING PRODUCTION
JANUARY-SEPTEMBER 1991-1992
PRODUCTION INDEX (1981=100)

PRODUCTION SECTORS	1991	1992	VAR. %
Aggregate Index	106.6	117.6	10.3
Foodstuff, Beverages and Tobacco	110.3	116.0	5.1
Textiles, Garment and Leather	103.7	114.9	10.8
Wood and Furnitures	68.5	78.1	14.0
Paper and derivates; Printing	101.2	108.9	7.6
Oil Refining and other Chemical Industries	122.8	153.9	25.3
Non-Metalic Minerals, including Cement	88.5	105.9	19.7
Basic metal industries	89.3	105.4	18.0
Machinery and Equipment	103.9	110.2	6.1
Other Manufacturing industries	95.9	90.8	-5.3

Source: General Comptroller Office

CHART II-A-7

LABOR MARKET SITUATION: 1991-1992
(THOUSANDS)

	1992	1993
POPULATION 15 YEARS AND OLDER	1,538.3	1,580.8
LABOR FORCE	920.5	945.3
PARTICIPATION RATE (%)	59.8	59.8
EMPLOYED	795.1	819.0
UNEMPLOYED	125.4	126.4
UNEMPLOYMENT RATE (%)	13.6	13.4

SOURCE: CONTRALORIA GENERAL FOR 1992; INDESA PROJECTIONS, 1993.

CHART II-A-8

IMPACT DISTRIBUTION BY SECTOR DURING CONSTRUCTION (IN THOUSANDS OF 1990 DOLLARS)

	High-Rise Lock for 150,000 DWT Vessels		High-Rise Lock for 200,000 DWT Vessels		Sea Level Canal	
SECTORS	INDUCED DEMAND	IMPACTS	INDUCED DEMAND	IMPACTS	INDUCED DEMAND	IMPACTS
AGROEXPORTS	507.00	355.64	567.00	0,398.25	652.00	457.59
GRAINS PRODUCTION	253.00	367.36	284.00	0,411.41	326.00	472.70
CATTLE	1,013.00	888.39	1,135.00	0,994.85	1,304.00	1,143.06
OTHER PRODUCTS OF AGRICULTURE	2,449.00	2,411.17	2,743.00	2,700.08	3,151.00	3,102.37
AGROINDUSTRY	2,871.00	2,291.08	3,215.00	2,565.71	3,694.00	2,947.97
INDUSTRY	260,702.00	260,445.85	291,940.00	291,652.76	335,437.00	335,107.65
CONSTRUCTION	844,516.00	0.00	945,707.00	0.00	1,086,613.00	0.00
COMMERCE	111,983.00	111,522.51	125,401.00	124,885.39	144,085.00	143,492.61
COMMERCIAL SERVICES	47,546.00	132,831.82	53,243.00	148,748.08	61,176.00	170,910.53
NON-COMMERCIAL SERVICES	47,546.00	0.00	53,243.00	0.00	61,176.00	0.00
EXPORTATION SERVICES	47,546.00	0.00	53,243.00	0.00	61,176.00	0.00
FINANCE SERVICES	150,746.00	153,808.06	168,809.00	172,237.69	193,960.00	197,900.13
TOTAL DOMESTIC INPUT	**1,517,678.00**	**664,921.88**	**1,699,530.00**	**744,594.23**	**1,952,750.00**	**855,534.61**
AGRICULTURAL IMPORTS		825.61		0,924.54		1,062.29
IMPORT. OF DURABLE GOODS		6,865.96		7,688.63		8,834.21
OTHER IMPORTS		136,711.24		153,092.36		175,902.14
TOTAL IMPORTS		**144,402.81**		**161,705.53**		**185,798.64**
VALUE ADDED		**708,094.75**		**792,940.72**		**911,084.09**

CONTINUATION OF CHART II-A-8

IMPACT DISTRIBUTION BY SECTOR DURING CONSTRUCTION (IN THOUSANDS OF 1990 DOLLARS)

WAGES		**333,955.89**		**373,971.05**		**429,690.78**
WAGES -TYPE H1		31,305.50		35,056.59		40,279.82
WAGES -TYPE H2		225,292.95		252,287.78		289,877.45
WAGES -TYPE H3		76,862.71		86,072.53		98,896.88
WAGES -TYPE H4		494.72		0,554.15		636.63
PROFITS		**308,135.22**		**345,057.35**		**396,468.49**
PROFITS -H1		12,852.28		14,392.40		16,536.72
PROFITS -H2		10,696.68		11,978.77		13,763.25
PROFITS -H3		24,533.81		27,473.49		31,566.91
PROFITS -H4		745.83		0,835.52		959.75
CORPORATE PROFITS		258,665.23		289,658.93		332,816.60
ADMINISTRATION PROFITS		641.40		0,718.25		825.26
OTHER INDIRECT TAXES		42,541.51		47,638.89		54,736.82
IMPORT DUTIES		23,462.13		26,273.41		30,188.00
TOTAL	**1,517,678.00**	**1,517,419.45**	**1,699,530.00**	**1,699,240.50**	**1,952,750.00**	**1,952,417.30**

Note: Differences are due to rounding

CHART II-A-9

EFFECTS OF CONSTRUCTION EXPENSES ON ECONOMIC VARIABLES (IN THOUSANDS OF 1990 DOLLARS)

	High-Rise Lock 150,000 DWT Vessels	High-Rise Lock 200,000 DWT Vessels	Sea Level Canal Case A
Wages	333,956	373,971	429,691
Profits	307,494	344,339	395,643
Government	66,645	74,631	85,750
Imports	144,403	161,706	185,799
Value Added	708,095	792,941	911,084
Intermediate Purchases	809,325	906,300	1,041,333
Average Annual Value Added	70.8	79.3	60.7
Effects on GDP (%)	9.5	10.6	8.1
Generation of New Employment	95,760	107,236	140,828

CHART II-A-10

ESTIMATED COSTS OF MAINTENANCE AND OPERATIONS FOR THE YEAR 2020 CURRENT CANAL AND CANAL ALTERNATIVES (IN MILLIONS OF 1990 DOLLARS)

Cost Item	Status Quo	Income to Panama	High-Rise Lock 150,000 DWT Vessels	Income to Panama	High-Rise Lock 200,000 DWT Vessels	Income to Panama	Sea Level Canal Case A	Income to Panama	Sea Level Canal Case B	Income to Panama	Sea Level Canal Case C	Income to Panama
Canal Maintenance Dams and Drainage	29.5	3.2	35.4	3.9	38.3	4.2	53.1	5.8	53.1	5.8	53.1	5.8
Navigation Services and Control	102.6	15.4	118.4	17.8	118.4	17.8	149.9	22.5	149.9	22.5	149.9	22.5
Lock Operation	62.8	3.1	86.9	4.3	91.8	4.6	77.3	3.9	67.6	3.4	82.1	4.1
General Repairs Engineering Services and Maintenance	30.0	25.5	43.8	37.2	43.8	37.2	34.6	29.4	34.6	29.4	34.6	29.4
Materials and Transport	19.8	2.0	27.7	2.8	27.7	2.8	29.7	3.0	29.7	3.0	29.7	3.0
Public Utilities	29.9	29.9	35.9	35.9	35.9	35.9	38.9	38.9	38.9	38.9	38.9	38.9
General Administration	77.7	69.9	93.2	83.9	93.2	83.9	101.0	90.9	101.0	90.9	101.0	90.9
Depreciation	25.3	0.0	31.5	0.0	32.0	0.0	34.6	0.0	34.0	0.0	34.9	0.0
Protection	12.7	3.2	15.2	3.8	15.2	3.8	16.5	4.1	16.5	4.1	16.5	4.1
Interest on Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	30.9	15.5	37.1	18.6	37.1	18.6	40.2	20.1	40.2	20.1	40.2	20.1
TOTAL	**421.2**	**167.7**	**525.1**	**208.2**	**533.4**	**208.8**	**575.8**	**218.6**	**565.5**	**218.1**	**580.9**	**218.8**

Note: Estimations by Booz• Allen and Hamilton, Inc.

CHART II-A-11

ESTIMATED COSTS OF MAINTENANCE AND OPERATIONS THE YEAR 2060 CURRENT CANAL AND CANAL ALTERNATIVES (IN MILLIONS OF 1990 DOLLARS)

Cost Item	Status Quo	Income to Panama	High-Rise Lock 150,000 DWT Vessels	Income to Panama	High-Rise Lock 200,000 DWT Vessels	Income to Panama	Sea Level Canal Case A	Income to Panama	Sea Level Canal Case B	Income to Panama	Sea Level Canal Case C	Income to Panama
Canal Maintenance Dams and Drainage	29.5	3.2	38.3	4.2	41.3	4.5	53.1	5.8	53.1	5.8	53.1	5.8
Navigation Services and Control	126.3	18.9	157.9	23.7	157.9	23.7	189.4	28.4	189.4	28.4	189.4	28.4
Lock Operation	77.3	3.9	111.1	5.6	115.9	5.8	96.6	4.8	87.0	4.4	101.4	5.1
General Repairs Engineering Services and Maintenance	36.9	31.4	55.4	47.1	55.4	47.1	46.1	39.2	46.1	39.2	46.1	39.2
Materials and Transport	19.8	2.0	35.7	3.6	35.7	3.6	37.6	3.8	37.6	3.8	37.6	3.8
Utilities	29.9	29.9	38.9	38.9	38.9	38.9	41.8	41.8	41.8	41.8	41.8	41.8
General Administration	77.7	69.9	101.0	90.9	101.0	90.9	108.8	97.9	108.8	97.9	108.8	97.9
Depreciation	28.2	0.0	38.0	0.0	38.0	0.0	40.6	0.0	39.9	0.0	40.9	0.0
Protection	12.7	3.2	16.5	4.1	16.5	4.1	17.8	4.5	17.8	4.5	17.8	4.5
Interest on Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	30.9	15.5	40.2	20.1	40.2	20.1	43.2	21.6	43.2	21.6	43.2	21.6
TOTAL	**469.2**	**177.9**	**633.0**	**238.2**	**640.8**	**238.7**	**675.0**	**247.8**	**664.7**	**247.4**	**680.1**	**248.1**

CHART II-A-12

ESTIMATED COST OF MAINTENANCE AND OPERATIONS HIGH-RISE LOCK CANAL FOR 150,000 DWT VESSELS PANAMA CANAL AUTHORITY AND OPTIMAL TOLLS SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Operation Year	Maintenance and Operation Costs for the Status Quo (1)	Maintenance and Operation Costs for the High-Rise Lock Canal(2)	Difference (3)	Income to Panama (4)
2020	421.2	525.1	103.9	41.1
2021	422.3	527.8	105.5	41.8
2022	422.9	530.5	107.6	42.6
2023	423.4	533.2	109.8	43.5
2024	424.0	535.9	111.9	44.3
2025	424.5	538.6	114.1	45.2
2026	425.1	541.3	116.2	46.0
2027	425.6	544.0	118.4	46.9
2028	426.2	546.7	120.5	47.7
2029	426.7	549.4	122.7	48.6
2030	427.3	552.1	124.8	49.4
2031	427.9	554.8	126.9	50.3
2032	428.4	557.5	129.1	51.1
2033	429.0	560.2	131.2	52.0
2034	429.5	562.9	133.4	52.8
2035	430.1	565.6	135.5	53.7
2036	430.6	568.3	137.7	54.5
2037	431.2	571.0	139.8	55.4
2038	431.8	573.7	141.9	56.2
2039	432.3	576.4	144.1	57.1
2040	432.9	579.1	146.2	57.9
2041	433.5	581.7	148.2	58.7
2042	434.0	584.4	150.4	59.6

CONTINUATION OF CHART II-A-12

ESTIMATED COSTS OF MAINTENANCE AND OPERATIONS HIGH-RISE LOCK CANAL FOR 150,000 DWT VESSELS PANAMA CANAL AUTHORITY AND OPTIMAL TOLLS SYSTEM (IN MILLIONS OF 1990 DOLLARS)

2043	434.6	587.1	152.5	60.4
2044	435.1	589.8	154.7	61.2
2045	435.7	592.5	156.8	62.1
2046	436.3	595.2	158.9	62.9
2047	436.8	597.9	161.1	63.8
2048	437.4	600.6	163.2	64.6
2049	438.0	603.3	165.3	65.5
2050	438.6	606.0	167.4	66.3
2051	439.1	608.7	169.6	67.2
2052	439.7	611.4	171.7	68.0
2053	440.3	614.1	173.8	68.8
2054	440.8	616.8	176.0	69.7
2055	441.4	619.5	178.1	70.5
2056	442.0	622.2	180.2	71.4
2057	442.6	624.9	182.3	72.2
2058	443.1	627.6	184.5	73.0
2059	443.7	630.3	186.6	73.9
2060	469.2	633.0	163.8	64.9

(1) Projections Based on Nathan Associates Data
(2) Nathan Associates, Chart No.6-10
(3) Difference between (1) and (2)
(4) See Charts No. II-A-1 ,II-A-10 and II-A-11

CHART II-A-13

ESTIMATED COSTS OF MAINTENANCE AND OPERATIONS HIGH-RISE LOCK CANAL FOR 200,000 DWT VESSELS PANAMA CANAL AUTHORITY AND OPTIMAL TOLLS SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Operation Year	Maintenance and Operation Costs for the Status Quo (1)	Maintenance and Operation Costs for the High-Rise Lock Canal(2)	Difference (3)	Income to Panama (4)
2020	421.2	533.4	112.2	43.8
2021	422.3	536.1	113.8	44.4
2022	423.5	538.8	115.3	45.0
2023	424.6	541.5	116.9	45.6
2024	425.8	544.2	118.4	46.2
2025	426.9	546.9	120.0	46.8
2026	428.1	549.6	121.5	47.4
2027	429.2	552.3	123.1	48.0
2028	430.4	555.0	124.6	48.6
2029	431.5	557.7	126.2	49.2
2030	432.7	560.4	127.7	49.8
2031	433.9	563.1	129.2	50.4
2032	435.1	565.8	130.7	51.0
2033	436.2	568.5	132.3	51.6
2034	437.4	571.2	133.8	52.2
2035	438.6	573.9	135.3	52.8
2036	439.8	576.6	136.8	53.4
2037	441.0	579.3	138.3	54.0
2038	442.1	582.0	139.9	54.5
2039	443.3	584.7	141.4	55.1
2040	444.5	587.4	142.9	55.7
2041	445.7	590.0	144.3	56.3
2042	446.9	592.7	145.8	56.8

CONTINUATION OF CHART II-A-13

ESTIMATED COSTS OF MAINTENANCE AND OPERATIONS HIGH-RISE LOCK CANAL FOR 200,000 DWT VESSELS PANAMA CANAL AUTHORITY AND OPTIMAL TOLLS SYSTEM (IN MILLIONS OF 1990 DOLLARS)

2043	448.1	595.4	147.3	57.4
2044	449.4	598.1	148.7	58.0
2045	450.6	600.8	150.2	58.6
2046	451.8	603.5	151.7	59.2
2047	453.0	606.2	153.2	59.7
2048	454.2	608.9	154.7	60.3
2049	455.5	611.6	156.1	60.9
2050	456.7	614.3	157.6	61.5
2051	457.9	617.0	159.1	62.0
2052	459.2	619.7	160.5	62.6
2053	460.4	622.4	162.0	63.2
2054	461.6	625.1	163.5	63.7
2055	462.9	627.8	164.9	64.3
2056	464.1	630.5	166.4	64.9
2057	465.4	633.2	167.8	65.4
2058	466.6	635.9	169.3	66.0
2059	467.9	638.6	170.7	66.6
2060	469.2	641.3	172.1	67.1

(1) Projections Based on Nathan Associates Data
(2) Nathan Associates, Chart No.6-16
(3) Difference between (1) and (2)
(4) See Charts No. II-A-1 ,II-A-10 and II-A-11

CHART II-A-14

ESTIMATED COSTS OF MAINTENANCE AND OPERATIONS
SEA LEVEL CANAL CASE A
PANAMA CANAL AUTHORITY AND OPTIMAL TOLLS SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

Operation Year	Maintenance and Operation Costs for the Status Quo(1)	Maintenance and Operation Costs for the Sea Level Canal(2)	Difference (3)	Income to Panama (4)
2020	421.2	575.8	154.6	58.7
2021	422.3	577.4	155.1	58.9
2022	422.9	579.1	156.2	59.4
2023	423.4	580.7	157.3	59.8
2024	424.0	582.4	158.4	60.2
2025	424.5	584.0	159.5	60.6
2026	425.1	585.6	160.5	61.0
2027	425.6	587.3	161.7	61.4
2028	426.2	588.9	162.7	61.8
2029	426.7	590.5	163.8	62.2
2030	427.3	592.2	164.9	62.7
2031	427.9	593.8	165.9	63.1
2032	428.4	595.5	167.1	63.5
2033	429.0	597.1	168.1	63.9
2034	429.5	598.7	169.2	64.3
2035	430.1	600.4	170.3	64.7
2036	430.6	602.0	171.4	65.1
2037	431.2	603.6	172.4	65.5
2038	431.8	605.3	173.5	65.9
2039	432.3	606.9	174.6	66.3
2040	432.9	608.6	175.7	66.8
2041	433.5	610.2	176.7	67.2
2042	434.0	611.8	177.8	67.6

CONTINUATION OF CHART II-A-14

ESTIMATED COSTS OF MAINTENANCE AND OPERATIONS
SEA LEVEL CANAL CASE A
PANAMA CANAL AUTHORITY AND OPTIMAL TOLLS SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

2043	434.6	613.5	178.9	68.0
2044	435.1	615.1	180.0	68.4
2045	435.7	616.7	181.0	68.8
2046	436.3	618.4	182.1	69.2
2047	436.8	620.0	183.2	69.6
2048	437.4	621.7	184.3	70.0
2049	438.0	623.3	185.3	70.4
2050	438.6	624.9	186.3	70.8
2051	439.1	626.6	187.5	71.2
2052	439.7	628.2	188.5	71.6
2053	440.3	629.8	189.5	72.0
2054	440.8	631.5	190.7	72.5
2055	441.4	633.1	191.7	72.8
2056	442.0	634.8	192.8	73.3
2057	442.6	636.4	193.8	73.7
2058	443.1	638.0	194.9	74.0
2059	443.7	639.7	196.0	74.5
2060	469.2	641.3	172.1	65.4

(1) Projections Based on Nathan Associates Data
(2) Nathan Associates, Chart No.6-22
(3) Difference between (1) and (2)
(4) See Charts No. II-A-1 ,II-A-10 and II-A-11

CHART II-A-15

ESTIMATED COSTS OF MAINTENANCE AND OPERATIONS
SEA LEVEL CANAL CASE B
PANAMA CANAL AUTHORITY AND OPTIMAL TOLLS SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

Operation Year	Maintenance and Operation Costs for the Status Quo(1)	Maintenance and Operation Costs for the Sea Level Canal(2)	Difference (3)	Income to Panama (4)
2020	421.2	564.3	143.1	55.1
2021	422.3	565.9	143.5	55.3
2022	423.5	567.5	144.0	55.5
2023	424.6	569.1	144.5	55.6
2024	425.8	570.8	145.0	55.8
2025	426.9	572.3	145.4	56.0
2026	428.1	573.9	145.8	56.1
2027	429.2	575.6	146.3	56.3
2028	430.4	577.1	146.7	56.5
2029	431.5	578.7	147.1	56.7
2030	432.7	580.4	147.6	56.8
2031	433.9	581.9	148.0	57.0
2032	435.1	583.6	148.5	57.2
2033	436.2	585.2	148.9	57.3
2034	437.4	586.7	149.3	57.5
2035	438.6	588.4	149.8	57.7
2036	439.8	590.0	150.2	57.8
2037	441.0	591.5	150.6	58.0
2038	442.1	593.2	151.0	58.2
2039	443.3	594.8	151.4	58.3
2040	444.5	596.4	151.9	58.5
2041	445.7	598.0	152.3	58.6
2042	446.9	599.6	152.6	58.8
2043	448.1	601.2	153.1	58.9

CONTINUATION OF CHART II-A-15

ESTIMATED COSTS OF MAINTENANCE AND OPERATIONS
SEA LEVEL CANAL CASE B
PANAMA CANAL AUTHORITY AND OPTIMAL TOLLS SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

2044	449.4	602.8	153.4	59.1
2045	450.6	604.4	153.8	59.2
2046	451.8	606.0	154.2	59.4
2047	453.0	607.6	154.6	59.5
2048	454.2	609.3	155.0	59.7
2049	455.5	610.8	155.4	59.8
2050	456.7	612.4	155.7	60.0
2051	457.9	614.1	156.1	60.1
2052	459.2	615.6	156.5	60.2
2053	460.4	617.2	156.8	60.4
2054	461.6	618.9	157.2	60.5
2055	462.9	620.4	157.6	60.7
2056	464.1	622.1	158.0	60.8
2057	465.4	623.7	158.3	60.9
2058	466.6	625.2	158.6	61.1
2059	467.9	626.9	159.0	61.2
2060	469.2	628.5	159.3	61.3

(1) Projections Based on Nathan Associates Data
(2) Nathan Associates, Chart No.6-22
(3) Difference between (1) and (2)
(4) See Charts No. II-A-1 ,II-A-10 and II-A-11

CHART II-A-16

ESTIMATED COSTS OF MAINTENANCE AND OPERATIONS
SEA LEVEL CANAL CASE C
PANAMA CANAL AUTHORITY AND OPTIMAL TOLLS SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

Operation Year	Maintenance and Operation Costs for the Status Quo(1)	Maintenance and Operation Costs for the Sea Level Canal(2)	Difference (3)	Income to Panama (4)
2020	421.2	580.9	159.7	60.0
2021	422.3	582.5	160.1	60.2
2022	423.5	584.2	160.7	60.4
2023	424.6	585.8	161.2	60.6
2024	425.8	587.5	161.8	60.8
2025	426.9	589.1	162.2	61.0
2026	428.1	590.8	162.7	61.2
2027	429.2	592.5	163.2	61.4
2028	430.4	594.1	163.7	61.6
2029	431.5	595.7	164.2	61.7
2030	432.7	597.4	164.7	61.9
2031	433.9	599.0	165.1	62.1
2032	435.1	600.7	165.7	62.3
2033	436.2	602.4	166.1	62.5
2034	437.4	604.0	166.6	62.6
2035	438.6	605.7	167.1	62.8
2036	439.8	607.3	167.5	63.0
2037	441.0	608.9	168.0	63.2
2038	442.1	610.6	168.5	63.3
2039	443.3	612.2	168.9	63.5
2040	444.5	614.0	169.4	63.7
2041	445.7	615.6	169.8	63.9
2042	446.9	617.2	170.2	64.0

CONTINUATION OF CHART II-A-16

ESTIMATED COSTS OF MAINTENANCE AND OPERATIONS
SEA LEVEL CANAL CASE C
PANAMA CANAL AUTHORITY AND OPTIMAL TOLLS SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

2043	448.1	618.9	170.8	64.2
2044	449.4	620.5	171.2	64.4
2045	450.6	622.1	171.6	64.5
2046	451.8	623.8	172.1	64.7
2047	453.0	625.5	172.4	64.8
2048	454.2	627.2	172.9	65.0
2049	455.5	628.8	173.3	65.2
2050	456.7	630.4	173.7	65.3
2051	457.9	632.1	174.2	65.5
2052	459.2	633.7	174.6	65.6
2053	460.4	635.3	174.9	65.8
2054	461.6	637.1	175.4	66.0
2055	462.9	638.7	175.8	66.1
2056	464.1	640.4	176.3	66.3
2057	465.4	642.0	176.6	66.4
2058	466.6	643.6	177.0	66.5
2059	467.9	645.3	177.4	66.7
2060	469.2	646.9	177.8	66.8

(1) Projections Based on Nathan Associates Data.
(2) Nathan Associates, Chart No.6-22.
(3) Difference between (1) and (2).
(4) See Charts No. II-A-1 ,II-A-1and II-A-11

CHART II-A-17

ROYALTY PAYMENTS TO THE GOVERNMENT OF PANAMA HIGH-RISE LOCK CANAL FOR 150,000 DWT VESSELS PANAMA CANAL AUTHORITY AND OPTIMAL TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Year of Operation	Total Income w/ Status Quo (1)	Government Income (2)	Total Income w/ High-Rise Lock Canal(3)	Government Income (4)	Difference (5)
2020	1001.1	100.1	1,236.6	123.7	23.6
2021	1000.7	100.1	1,249.7	125.0	24.9
2022	1000.5	100.1	1,262.7	126.3	26.2
2023	1000.6	100.1	1,275.9	127.6	27.5
2024	1000.4	100.0	1,289.0	128.9	28.9
2025	1000.3	100.0	1,302.2	130.2	30.2
2026	1000.2	100.0	1,315.4	131.5	31.5
2027	1000.2	100.0	1,328.7	132.9	32.8
2028	1000.1	100.0	1,342.0	134.2	34.2
2029	1000.0	100.0	1,355.3	135.5	35.5
2030	1000.0	100.0	1,368.7	136.9	36.9
2031	999.9	100.0	1,382.1	138.2	38.2
2032	999.9	100.0	1,395.6	139.6	39.6
2033	999.7	100.0	1,409.0	140.9	40.9
2034	999.8	100.0	1,422.6	142.3	42.3
2035	999.6	100.0	1,436.1	143.6	43.7
2036	999.6	100.0	1,449.7	145.0	45.0
2037	999.6	100.0	1,463.4	146.3	46.4
2038	999.5	99.9	1,477.1	147.7	47.8
2039	999.4	99.9	1,490.8	149.1	49.1
2040	999.4	99.9	1,504.6	150.5	50.5
2041	999.3	99.9	1,518.4	151.8	51.9
2042	999.3	99.9	1,532.3	153.2	53.3

CONTINUATION CHART II-A-17

ROYALTY PAYMENTS TO THE GOVERNMENT OF PANAMA
HIGH RISE LOCK CANAL FOR 150,000 DWT VESSELS
PANAMA CANAL AUTHORITY AND OPTIMAL TOLL SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

2043	999.2	99.9	1,546.2	154.6	54.7
2044	999.1	99.9	1,560.1	156.0	56.1
2045	999.1	99.9	1,574.1	157.4	57.5
2046	999.1	99.9	1,588.2	158.8	58.9
2047	999.0	99.9	1,602.3	160.2	60.3
2048	998.9	99.9	1,616.4	161.6	61.7
2049	998.9	99.9	1,630.6	163.1	63.2
2050	998.8	99.9	1,644.8	164.5	64.6
2051	998.8	99.9	1,659.1	165.9	66.0
2052	998.8	99.9	1,673.5	167.4	67.5
2053	998.7	99.9	1,687.9	168.8	68.9
2054	998.6	99.9	1,702.3	170.2	70.4
2055	998.7	99.9	1,716.9	171.7	71.8
2056	998.6	99.9	1,731.4	173.1	73.3
2057	998.5	99.9	1,746.0	174.6	74.7
2058	998.5	99.9	1,760.7	176.1	76.2
2059	998.5	99.9	1,775.5	177.6	77.7
2060	998.5	99.8	1,790.3	179.0	79.2

(1) Forecasts based on Chart No.6-10 of Nathan Associates
(2) 10% of Column (1)
(3) Nathan Associates, Charts No.6- 10
(4) 10% of Column (3)
(5) Difference between Columns (2) y (4)

CHART II-A-18

ROYALTY PAYMENTS TO THE GOVERNMENT OF PANAMA HIGH RISE LOCK CANAL FOR 200,000 DWT VESSELS PANAMA CANAL AUTHORITY AND OPTIMAL TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Year of Operation	Total Income w/ Status Quo (1)	Government Income (2)	Total Income w/ High-Rise Lock Canal(3)	Government Income (4)	Difference (5)
2020	1001.1	100.1	1,236.6	123.7	23.6
2021	998.6	99.9	1,247.1	124.7	22.4
2022	998.5	99.8	1,257.6	125.8	25.9
2023	998.6	99.9	1,268.3	126.8	27.0
2024	998.6	999	1,279.1	127.9	28.0
2025	998.6	99.9	1,289.9	129.0	29.1
2026	998.6	99.9	1,300.9	130.1	30.2
2027	998.6	99.9	1,312.0	131.2	31.3
2028	998.6	99.9	1,323.1	132.3	32.5
2029	998.7	99.9	1,334.4	133.4	33.6
2030	998.7	99.9	1,345.8	134.6	34.7
2031	998.7	99.9	1,357.3	135.7	35.9
2032	998.7	99.9	1,368.9	136.9	37.0
2033	998.7	99.9	1,380.6	138.1	38.2
2034	998.7	99.9	1,392.4	139.2	39.4
2035	998.7	99.9	1,404.3	140.4	40.6
2036	998.7	99.9	1,416.3	141.6	41.8
2037	998.7	99.9	1,428.5	142.9	43.0
2038	998.7	99.9	1,440.7	144.1	44.2
2039	998.7	99.9	1,453.1	145.3	45.4
2040	998.7	99.9	1,465.6	146.6	46.7
2041	998.7	99.9	1,478.2	147.8	47.9
2042	998.7	99.9	1,490.9	149.1	49.2

CONTINUATION OF CHART II-A-18

ROYALTY PAYMENTS TO THE GOVERNMENT OF PANAMA HIGH RISE LOCK CANAL FOR 200,000 DWT VESSELS PANAMA CANAL AUTHORITY AND OPTIMAL TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

2043	998.7	99.9	1,503.7	150.4	50.5
2044	998.8	99.9	1,516.7	151.7	51.8
2045	998.8	99.9	1,529.8	153.0	53.1
2046	998.7	99.9	1,543.0	154.3	54.4
2047	998.7	99.9	1,556.3	155.6	55.8
2048	998.8	99.9	1,569.8	157.0	57.1
2049	998.8	99.9	1,583.4	158.3	58.5
2050	998.8	99.9	1,597.1	159.7	59.8
2051	998.8	99.9	1,611.0	161.1	61.2
2052	998.8	99.9	1,625.0	162.5	62.6
2053	998.8	99.9	1,639.1	163.9	64.0
2054	998.8	99.9	1,653.3	165.3	65.5
2055	998.8	99.9	1,667.7	166.8	66.9
2056	998.8	99.9	1,682.2	168.2	68.3
2057	998.9	99.9	1,696.9	169.7	69.8
2058	998.8	99.9	1,711.7	171.2	71.3
2059	998.9	99.9	1,726.7	172.7	72.8
2060	1051.0	105.1	1,832.7	183.3	78.2

(1) Forecasts based on Chart No.6-10 of Nathan Associates
(2) 10% of Column (1)
(3) Nathan Associates, Charts No.6-
(4) 10% of Column (3)
(5) Difference between Columns (2) y

CHART II-A-19

ROYALTY PAYMENTS TO THE GOVERNMENT OF PANAMA
SEA LEVEL CANAL CASE A
PANAMA CANAL AUTHORITY AND OPTIMAL TOLL SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

Year of Operation	Total Income w/ Status Quo (1)	Government Income (2)	Total Income w/ High-Rise Lock Canal(3)	Government Income (4)	Difference (5)
2020	1001.1	100.1	1,274.6	127.5	27.4
2021	998.6	99.9	1,285.4	128.5	28.7
2022	998.5	99.8	1,296.2	129.6	29.8
2023	998.6	99.9	1,307.2	130.7	30.9
2024	998.5	99.8	1,318.2	131.8	32.0
2025	998.6	99.9	1,329.4	132.9	33.1
2026	998.6	99.9	1,340.7	134.1	34.2
2027	998.5	99.9	1,352.0	135.2	35.3
2028	998.6	99.9	1,363.5	136.4	36.5
2029	998.6	99.9	1,375.1	137.5	37.6
2030	998.6	99.9	1,386.8	138.7	38.8
2031	998.6	99.9	1,398.6	139.9	40.0
2032	998.6	99.9	1,410.5	141.1	41.2
2033	998.6	99.9	1,422.5	142.3	42.4
2034	998.6	99.9	1,434.6	143.5	43.6
2035	998.7	99.9	1,446.9	144.7	44.8
2036	998.6	99.9	1,459.2	145.9	46.1
2037	998.7	99.9	1,471.7	147.2	47.3
2038	998.7	99.9	1,484.3	148.4	48.6
2039	998.7	99.9	1,497.0	149.7	49.8
2040	998.7	99.9	1,509.8	151.0	51.1
2041	998.7	99.9	1,522.7	152.3	52.4
2042	998.7	99.9	1,535.8	153.6	53.7

CONTINUATION OF CHART II-A-19

ROYALTY PAYMENTS TO THE GOVERNMENT OF PANAMA
SEA LEVEL CANAL CASE A
PANAMA CANAL AUTHORITY AND OPTIMAL TOLL SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

2043	998.7	99.9	1,549.0	154.9	55.0
2044	998.7	99.9	1,562.3	156.2	56.4
2045	998.7	99.9	1,575.7	157.6	57.7
2046	998.7	99.9	1,589.3	158.9	59.1
2047	998.7	99.9	1,603.0	160.3	60.4
2048	998.7	99.9	1,616.8	161.7	61.8
2049	998.7	99.9	1,630.7	163.1	63.2
2050	998.8	99.9	1,644.8	164.5	64.6
2051	998.7	99.9	1,659.0	165.9	66.0
2052	998.8	99.9	1,673.4	167.3	67.5
2053	998.8	99.9	1,687.9	168.8	68.9
2054	998.8	99.9	1,702.5	170.3	70.4
2055	998.7	99.9	1,717.2	171.7	71.8
2056	998.8	99.9	1,732.1	173.2	73.3
2057	998.8	99.9	1,747.2	174.7	74.8
2058	998.8	99.9	1,762.4	176.2	76.4
2059	998.8	99.9	1,777.7	177.8	77.9
2060	1030.1	103.0	1,849.3	184.9	81.9

(1) Forecasts based on Chart No.6-10 of Nathan Associates
(2) 10% of Column (1)
(3) Nathan Associates, Charts No.6-
(4) 10% of Column (3)
(5) Difference between Columns (2) y

CHART II-A-20

ROYALTY PAYMENTS TO THE GOVERNMENT OF PANAMA
SEA LEVEL CANAL CASE B
PANAMA CANAL AUTHORITY AND OPTIMAL TOLL SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

Year of Operation	Total Income w/ Status Quo (1)	Government Income (2)	Total Income w/ High-Rise Lock Canal(3)	Government Income (4)	Difference (5)
2020	1001.1	100.1	1,274.6	127.5	27.4
2021	998.6	99.9	1,285.4	128.5	28.7
2022	998.5	99.8	1,296.2	129.6	29.8
2023	998.6	99.9	1,307.2	130.7	30.9
2024	998.5	99.8	1,318.2	131.8	32.0
2025	998.6	99.9	1,329.4	132.9	33.1
2026	998.6	99.9	1,340.7	134.1	34.2
2027	998.5	99.9	1,352.0	135.2	35.3
2028	998.6	99.9	1,363.5	136.4	36.5
2029	998.6	99.9	1,375.1	137.5	37.6
2030	998.6	99.9	1,386.8	138.7	38.8
2031	998.6	99.9	1,398.6	139.9	40.0
2032	998.6	99.9	1,410.5	141.1	41.2
2033	998.6	99.9	1,422.5	142.3	42.4
2034	998.6	99.9	1,434.6	143.5	43.6
2035	998.7	99.9	1,446.9	144.7	44.8
2036	998.6	99.9	1,459.2	145.9	46.1
2037	998.7	99.9	1,471.7	147.2	47.3
2038	998.7	99.9	1,484.3	148.4	48.6
2039	998.7	99.9	1,497.0	149.7	49.8
2040	998.7	99.9	1,509.8	151.0	51.1
2041	998.7	99.9	1,522.7	152.3	52.4

CONTINUATION OF CHART II-A-20

ROYALTY PAYMENTS TO THE GOVERNMENT OF PANAMA
SEA LEVEL CANAL CASE B
PANAMA CANAL AUTHORITY AND OPTIMAL TOLL SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

2042	998.7	99.9	1,535.8	153.6	53.7
2043	998.7	99.9	1,549.0	154.9	55.0
2044	998.7	99.9	1,562.3	156.2	56.4
2045	998.7	99.9	1,575.7	157.6	57.7
2046	998.7	99.9	1,589.3	158.9	59.1
2047	998.7	99.9	1,603.0	160.3	60.4
2048	998.7	99.9	1,616.8	161.7	61.8
2049	998.7	99.9	1,630.7	163.1	63.2
2050	998.8	99.9	1,644.8	164.5	64.6
2051	998.7	99.9	1,659.0	165.9	66.0
2052	998.8	99.9	1,673.4	167.3	67.5
2053	998.8	99.9	1,687.9	168.8	68.9
2054	998.8	99.9	1,702.5	170.3	70.4
2055	998.7	99.9	1,717.2	171.7	71.8
2056	998.8	99.9	1,732.1	173.2	73.3
2057	998.8	99.9	1,747.2	174.7	74.8
2058	998.8	99.9	1,762.4	176.2	76.4
2059	998.8	99.9	1,777.7	177.8	77.9
2060	1030.1	103.0	1,849.3	184.9	81.9

(1) Forecasts based on Chart No.6-10 of Nathan Associates
(2) 10% of Column (1)
(3) Nathan Associates, Charts No.6-
(4) 10% of Column (3)
(5) Difference between Columns (2) y

CHART II-A-21

ROYALTY PAYMENTS TO THE GOVERNMENT OF PANAMA
SEA LEVEL CANAL CASE C
PANAMA CANAL AUTHORITY AND OPTIMAL TOLL SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

Year of Operation	Total Income w/ Status Quo (1)	Government Income (2)	Total Income w/ High-Rise Lock Canal(3)	Government Income (4)	Difference (5)
2020	1001.1	100.1	1,274.6	127.5	27.4
2021	998.6	99.9	1,285.4	128.5	28.7
2022	998.5	99.8	1,296.2	129.6	29.8
2023	998.6	99.9	1,307.2	130.7	30.9
2024	998.5	99.8	1,318.2	131.8	32.0
2025	998.6	99.9	1,329.4	132.9	33.1
2026	998.6	99.9	1,340.7	134.1	34.2
2027	998.5	99.9	1,352.0	135.2	35.3
2028	998.6	99.9	1,363.5	136.4	36.5
2029	998.6	99.9	1,375.1	137.5	37.6
2030	998.6	99.9	1,386.8	138.7	38.8
2031	998.6	99.9	1,398.6	139.9	40.0
2032	998.6	99.9	1,410.5	141.1	41.2
2033	998.6	99.9	1,422.5	142.3	42.4
2034	998.6	99.9	1,434.6	143.5	43.6
2035	998.7	99.9	1,446.9	144.7	44.8
2036	998.6	99.9	1,471.2	145.9	46.1
2037	998.7	99.9	1,417.1	147.2	47.3
2038	998.7	99.9	1,484.3	148.4	48.6
2039	998.7	99.9	1,497.0	149.7	49.8
2040	998.7	99.9	1,509.8	151.0	51.1

CONTINUATION OF CHART II-A-21

ROYALTY PAYMENTS TO THE GOVERNMENT OF PANAMA
SEA LEVEL CANAL CASE C
PANAMA CANAL AUTHORITY AND OPTIMAL TOLL SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

2041	998.7	99.8	1,522.7	152.3	52.4
2042	998.7	99.8	1,535.8	153.6	53.7
2043	998.7	99.9	1,549.0	154.9	55.0
2044	998.7	99.9	1,562.3	156.2	56.4
2045	998.7	99.9	1,575.7	157.6	57.7
2046	998.7	99.9	1,589.3	158.9	59.1
2047	998.7	99.9	1,603.0	160.3	60.4
2048	998.7	99.9	1,616.8	161.7	61.8
2049	998.7	99.9	1,630.7	163.1	63.2
2050	998.8	99.9	1,644.8	164.5	64.6
2051	998.7	99.9	1,659.0	165.9	66.0
2052	998.8	99.9	1,673.4	167.3	67.5
2053	998.8	99.9	1,687.9	168.8	68.9
2054	998.8	99.9	1,702.5	170.3	70.4
2055	998.7	99.9	1,717.2	171.7	71.8
2056	998.8	99.9	1,732.1	173.2	73.3
2057	998.8	99.9	1,747.2	174.7	74.8
2058	998.8	99.9	1,762.4	176.2	76.4
2059	998.8	99.9	1,777.7	177.8	77.9
2060	1030.1	103.0	1,849.3	184.9	81.9

(1) Forecasts based on Chart No.6-10 of Nathan Associates
(2) 10% of Column (1)
(3) Nathan Associates, Charts No.6-
(4) 10% of Column (3)
(5) Difference between Columns (2) y

CHART II-A-22

SUMMARY OF INCOME FOR PANAMA DURING OPERATION OF THE HIGH-RISE LOCK CANAL FOR 150,000 DWT VESSELS PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Years	Operation and Maintenance Costs Borne by Panama (1)	Royalty Paid to the Government (2)	GOP Dividends (3)	Total Income to the Economy(4)	Income Distribution	
					To Government (5)	% (6)
2020	41.1	23.6	0.0	64.7	23.6	36.4%
2021	41.8	24.9	0.0	66.7	24.9	37.4%
2022	42.6	26.2	0.0	68.8	26.2	38.1%
2023	43.5	27.5	0.0	71.0	27.5	38.8%
2024	44.3	28.9	0.0	73.2	28.9	39.4%
2025	45.2	30.2	1,315.7	1,391.0	1,345.9	96.8%
2026	46.0	31.5	175.3	252.8	206.8	81.8%
2027	46.9	32.8	198.8	278.5	231.6	83.2%
2028	47.7	34.2	272.1	354.0	306.3	86.5%
2029	48.6	35.5	348.9	433.0	384.4	88.8%
2030	49.4	36.9	409.5	495.8	446.4	90.0%
2031	50.3	38.2	468.6	557.1	506.8	91.0%
2032	51.1	39.6	513.5	604.2	553.1	91.5%
2033	52.0	40.9	563.6	656.5	604.5	92.1%
2034	52.8	42.3	611.3	706.4	653.6	92.5%
2035	53.7	43.7	658.2	755.5	701.9	92.9%
2036	54.5	45.0	703.5	803.0	748.5	93.2%
2037	55.4	46.4	739.7	841.4	786.1	93.4%
2038	56.2	47.8	765.8	869.8	813.6	93.5%
2039	57.1	49.1	786.2	892.4	835.3	93.6%
2040	57.9	50.5	795.9	904.3	846.4	93.6%
2041	58.7	51.9	805.6	916.2	857.5	93.6%

CONTINUATION OF CHART II-A-22

SUMMARY OF INCOME FOR PANAMA DURING OPERATION OF THE HIGH-RISE LOCK CANAL FOR 150,000 DWT VESSELS PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

2042		59.6		53.3		815.4		928.2		868.7		93.6%	
2043		60.4		54.7		825.2		940.3		879.9		93.6%	
2044		61.2		56.1		835.1		952.4		891.2		93.6%	
2045		62.1		57.5		845.0		964.6		902.5		93.6%	
2046		62.9		58.9		854.9		976.7		913.8		93.6%	
2047		63.8		60.3		864.9		989.0		925.2		93.6%	
2048		64.6		61.7		875.0		1,001.4		936.7		93.5%	
2049		65.5		63.2		885.0		1,013.6		948.2		93.5%	
2050		66.3		64.6		895.2		1,026.1		959.8		93.5%	
2051		67.2		66.0		905.3		1,038.5		971.3		93.5%	
2052		68.0		67.5		915.6		1,051.1		983.1		93.5%	
2053		68.8		68.9		925.8		1,063.6		994.7		93.5%	
2054		69.7		70.4		936.1		1,076.1		1,006.5		93.5%	
2055		70.5		71.8		946.5		1,088.8		1,018.3		93.5%	
2056		71.4		73.3		956.9		1,101.5		1,030.2		93.5%	
2057		72.2		74.7		967.4		1,114.3		1,042.1		93.5%	
2058		73.0		76.2		977.9		1,127.2		1,054.1		93.5%	
2059		73.9		77.7		988.4		1,140.0		1,066.1		93.5%	
2060		64.9		79.2		999.1		1,143.1		1,078.3		94.3%	

(1) Chart II-A-12
(2) Chart II-A-17
(3) Based on Nathan and Associates Estimates
(4) = 1+2+3

CHART II-A-23

SUMMARY OF INCOME FOR PANAMA DURING OPERATION OF THE HIGH-RISE LOCK CANAL FOR 200,000 DWT VESSELS PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Year	Operation and Maintenance Costs Borne by Panama(1)	Royalty Paid to the Government (2)	GOP Dividends (3)	Total Income to the Economy (4)	Income Distribution	
					To Government (5)	% (6)
2020	43.8	23.6	0.0	67.3	23.6	35.0%
2021	44.4	24.8	0.0	69.2	24.8	35.9%
2022	45.0	25.9	0.0	70.9	25.9	36.5%
2023	45.6	27.0	0.0	72.5	27.0	37.2%
2024	46.2	28.0	0.0	74.2	28.0	37.8%
2025	46.8	29.1	0.0	75.9	29.1	38.4%
2026	47.4	30.2	0.0	77.6	30.2	38.9%
2027	48.0	31.3	0.0	79.3	31.3	39.5%
2028	48.6	32.5	0.0	81.0	32.5	40.0%
2029	49.2	33.6	0.0	82.8	33.6	40.6%
2030	49.8	34.7	0.0	84.5	34.7	41.1%
2031	50.4	35.9	0.0	86.3	35.9	41.6%
2032	51.0	37.0	640.6	728.6	677.6	93.0%
2033	51.6	38.2	535.6	625.8	573.8	91.8%
2034	52.2	39.4	582.0	673.5	621.4	92.3%
2035	52.8	40.6	627.6	720.9	668.2	92.7%
2036	53.4	41.8	670.0	765.1	711.8	93.0%
2037	54.0	43.0	703.8	800.7	746.8	93.3%
2038	54.5	44.2	729.1	827.8	773.3	93.4%

CONTINUATION OF CHART II-A-23

SUMMARY OF INCOME FOR PANAMA DURING OPERATION OF THE HIGH-RISE LOCK CANAL FOR 200,000 DWT VESSELS PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

	2039		55.1		45.4		744.0		844.6		789.4		93.5%	
	2040		55.7		46.7		752.5		854.		799.2		93.5%	
	2041		56.3		47.9		761.1		865.3		809.0		93.5%	
	2042		56.8		49.2		769.9		876.0		819.1		93.5%	
	2043		57.4		50.5		778.8		886.7		829.3		93.5%	
	2044		58.0		51.8		787.7		897.5		839.5		93.5%	
	2045		58.6		53.1		796.8		908.5		849.9		93.6%	
	2046		59.2		54.4		806.0		919.6		860.4		93.6%	
	2047		59.7		55.8		815.3		930.8		871.1		93.6%	
	2048		60.3		57.1		824.7		942.1		881.8		93.6%	
	2049		60.9		58.5		834.3		953.7		892.8		93.6%	
	2050		61.5		59.8		843.9		965.2		903.7		93.6%	
	2051		62.0		61.2		853.7		977.0		914.9		93.6%	
	2052		62.6		62.6		863.6		988.8		926.2		93.7%	
	2053		63.2		64.0		873.6		1,000.8		937.6		93.7%	
	2054		63.7		65.5		883.7		1,012.9		949.2		93.7%	
	2055		64.3		66.9		894.0		1,025.2		960.9		93.7%	
	2056		64.9		68.3		904.3		1,037.5		972.6		93.7%	
	2057		65.4		69.8		914.8		1,050.0		984.6		93.8%	
	2058		66.0		71.3		925.5		1,062.8		996.8		93.8%	
	2059		66.6		72.8		936.2		1,075.5		1,009.0		93.8%	
	2060		67.1		78.2		1,028.6		1,173.9		1,106.8		94.3%	

(1)Chart II-A-13
(2) Chart II-A-18
(3) Based on Nathan and Associates Estimates
(4)=1+2+3+

CHART II-A-24

SUMMARY OF INCOME FOR PANAMA DURING OPERATION OF THE SEA LEVEL CANAL CASE A PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Years	Operation and Maintenance Costs Borne by Panama (1)	Royalty Paid to the Government (2)	GOP Dividends (3)	Total Income to the Economy (4)	Income Distribution	
					To Government (5)	% (6)
2020	58.7	27.4	86.1	31.8%	23.6	35.0%
2021	58.9	28.7	87.6	32.7%	24.8	35.9%
2022	59.4	29.8	89.1	33.4%	25.9	36.5%
2023	59.8	30.9	90.6	34.1%	27.0	37.2%
2024	60.2	32.0	92.2	34.7%	28.0	37.8%
2025	60.6	33.1	93.7	35.3%	29.1	38.4%
2026	61.0	34.2	95.2	35.9%	30.2	38.9%
2027	61.4	35.3	96.8	36.5%	31.3	39.5%
2028	61.8	36.5	98.3	37.1%	32.5	40.0%
2029	62.2	37.6	99.9	37.7%	33.6	40.6%
2030	62.7	38.8	101.5	38.3%	34.7	41.1%
2031	63.1	40.0	103.1	38.8%	35.9	41.6%
2032	63.5	41.2	104.7	39.3%	677.6	93.0%
2033	63.9	42.4	106.3	39.9%	573.8	91.8%
2034	64.3	43.6	107.9	40.4%	621.4	92.3%
2035	64.7	44.8	109.5	40.9%	668.2	92.7%
2036	65.1	46.1	111.2	41.4%	711.8	93.0%
2037	65.5	47.3	112.8	41.9%	746.8	93.3%

CONTINUATION OF CHART II-A-24

SUMMARY OF INCOME FOR PANAMA DURING OPERATION OF THE SEA LEVEL CANAL CASE A PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

	2038		65.9		48.6		114.5		42.4%		773.3		93.4%	
	2039		66.3		49.8		116.2		42.9%		789.4		93.5%	
	2040		66.8		51.1		117.9		43.4%		799.2		93.5%	
	2041		67.2		52.4		119.6		43.8%		809.0		93.5%	
	2042		67.6		53.7		121.3		44.3%		819.1		93.5%	
	2043		68.0		55.0		123.0		44.7%		829.3		93.5%	
	2044		68.4		56.4		124.7		45.2%		839.5		93.5%	
	2045		68.8		57.7		126.5		45.6%		849.9		93.6%	
	2046		69.2		59.1		128.3		46.0%		860.4		93.6%	
	2047		69.6		60.4		130.0		46.5%		871.1		93.6%	
	2048		70.0		61.8		131.8		46.9%		881.8		93.6%	
	2049		70.4		63.2		133.6		47.3%		892.8		93.6%	
	2050		70.8		64.6		135.4		47.7%		903.7		93.6%	
	2051		71.2		66.0		137.3		48.1%		914.9		93.6%	
	2052		71.6		67.5		139.1		48.5%		926.2		93.7%	
	2053		72.0		68.9		140.9		48.9%		937.6		93.7%	
	2054		72.5		70.4		142.8		49.3%		949.2		93.7%	
	2055		72.8		71.8		144.7		49.7%		960.9		93.7%	
	2056		73.3		73.3		146.6		50.0%		972.6		93.7%	
	2057		73.7		74.8		148.5		50.4%		984.6		93.8%	
	2058		74.0		76.4		150.4		50.8%		996.8		93.8%	
	2059		74.5		77.9		152.4		51.1%		1,009.0		93.8%	
	2060		65.4		81.9		147.3		55.6%		1,106.8		94.3%	

(1)Chart II-A-14
(2) Chart II-A-19
(3) Based on Nathan and Associates Estimates
(4)=1+2+3+

CHART II-A-25

SUMMARY OF INCOME FOR PANAMA DURING OPERATION OF THE SEA LEVEL CANAL CASE B PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Years	Operation and Maintenance Costs Borne by Panama (1)	Royalty Paid to the Government (2)	GOP Dividends (3)	Total Income to the Economy (4)	Income Distribution	
					To Government (5)	% (6)
2020	55.1	27.4	82.4	33.2%	23.6	35.0%
2021	55.3	28.7	83.9	34.2%	24.8	35.9%
2022	55.5	29.8	85.2	34.9%	25.9	36.5%
2023	55.6	30.9	86.5	35.7%	27.0	37.2%
2024	55.8	32.0	87.8	36.4%	28.0	37.8%
2025	56.0	33.1	89.1	37.1%	29.1	38.4%
2026	56.1	34.2	90.3	37.9%	30.2	38.9%
2027	56.3	35.3	91.7	38.6%	31.3	39.5%
2028	56.5	36.5	93.0	39.2%	32.5	40.0%
2029	56.7	37.6	94.3	39.9%	33.6	40.6%
2030	56.8	38.8	95.7	40.6%	34.7	41.1%
2031	57.0	40.0	97.0	41.2%	35.9	41.6%
2032	57.2	41.2	98.4	41.9%	677.6	93.0%
2033	57.3	42.4	99.7	42.5%	573.8	91.8%
2034	57.5	43.6	101.1	43.1%	621.4	92.3%
2035	57.7	44.8	102.5	43.7%	668.2	92.7%
2036	57.8	46.1	103.9	44.3%	711.8	93.0%
2037	58.0	47.3	105.3	44.9%	746.8	93.3%
2038	58.2	48.6	106.7	45.5%	773.3	93.4%
2039	58.3	49.8	108.1	46.1%	789.4	93.5%
2040	58.5	51.1	109.6	46.6%	799.2	93.5%

CONTINUATION OF CHART II-A-25

SUMMARY OF INCOME FOR PANAMA DURING OPERATION OF THE SEA LEVEL CANAL CASE B PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

	2041		58.6		52.4		111.0		47.2%		809.0		93.5%	
	2042		58.8		53.7		112.5		47.8%		819.1		93.5%	
	2043		58.9		55.0		114.0		48.3%		829.3		93.5%	
	2044		59.1		56.4		115.4		48.8%		839.5		93.5%	
	2045		59.2		57.7		116.9		49.4%		849.9		93.6%	
	2046		59.4		59.1		118.4		49.9%		860.4		93.6%	
	2047		59.5		60.4		119.9		50.4%		871.1		93.6%	
	2048		59.7		61.8		121.5		50.9%		881.8		93.6%	
	2049		59.8		63.2		123.0		51.4%		892.8		93.6%	
	2050		60.0		64.6		124.5		51.9%		903.7		93.6%	
	2051		60.1		66.0		126.1		52.3%		914.9		93.6%	
	2052		60.2		67.5		127.7		52.8%		926.2		93.7%	
	2053		60.4		68.9		129.3		53.3%		937.6		93.7%	
	2054		60.5		70.4		130.9		53.8%		949.2		93.7%	
	2055		60.7		71.8		132.5		54.2%		960.9		93.7%	
	2056		60.8		73.3		134.1		54.7%		972.6		93.7%	
	2057		60.9		74.8		135.8		55.1%		984.6		93.8%	
	2058		61.1		76.4		137.4		55.6%		996.8		93.8%	
	2059		61.2		77.9		139.1		56.0%		1,009.0		93.8%	
	2060		61.3		81.9		143.2		57.2%		1,106.8		94.3%	

(1)Chart II-A-15
(2) Chart II-A-20
(3) Based on Nathan and Associates Estimates
(4)=1+2+3+

CHART II-A-26

SUMMARY OF INCOME FOR PANAMA DURING OPERATION OF THE SEA LEVEL CANAL CASE C PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Years	Operation and Maintenance Costs Borne by Panama (1)	Royalty Paid to the Government (2)	GOP Dividends (3)	Total Income to the Economy (4)	Income Distribution	
					To Government (5)	% (6)
2020	60.0	27.4	87.4	31.3%	23.6	35.0%
2021	60.2	28.7	88.0	32.3%	24.8	35.9%
2022	60.4	29.8	90.2	33.0%	25.9	36.5%
2023	60.6	30.9	91.5	33.7%	27.0	37.2%
2024	60.8	32.0	92.8	34.5%	28.0	37.8%
2025	61.0	33.1	94.1	35.2%	29.1	38.4%
2026	61.2	34.2	95.4	35.9%	30.2	38.9%
2027	61.4	35.3	96.7	36.5%	31.3	39.5%
2028	61.6	36.5	98.0	37.2%	32.5	40.0%
2029	61.7	37.6	99.4	37.9%	33.6	40.6%
2030	61.9	38.8	100.7	38.5%	34.7	41.1%
2031	62.1	40.0	102.1	39.2%	35.9	41.6%
2032	62.3	41.2	103.5	39.8%	677.6	93.0%
2033	62.5	42.4	104.8	40.4%	573.8	91.8%
2034	62.6	43.6	106.2	41.0%	621.4	92.3%
2035	62.8	44.8	107.6	41.6%	668.2	92.7%
2036	63.0	46.1	109.0	42.2%	711.8	93.0%
2037	63.2	47.3	110.4	42.8%	746.8	93.3%
2038	63.3	48.6	111.9	43.4%	773.3	93.4%
2039	63.5	49.8	113.3	44.0%	789.4	93.5%
2040	63.7	51.1	114.8	44.5%	799.2	93.5%

CONTINUATION OF CHART II-A-26

SUMMARY OF INCOME FOR PANAMA DURING OPERATION OF THE SEA LEVEL CANAL CASE C PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

	2041		63.9		52.4		116.3		45.1%		809.0		93.5%	
	2042		64.0		53.7		117.7		45.6%		819.1		93.5%	
	2043		64.2		55.0		119.2		46.2%		829.3		93.5%	
	2044		64.4		56.4		120.7		46.7%		839.5		93.5%	
	2045		64.5		57.7		122.2		47.2%		849.9		93.6%	
	2046		64.7		59.1		123.7		47.7%		860.4		93.6%	
	2047		64.8		60.4		125.3		48.2%		871.1		93.6%	
	2048		65.0		61.8		126.8		48.7%		881.8		93.6%	
	2049		65.2		63.2		128.4		49.2%		892.8		93.6%	
	2050		65.3		64.6		129.9		49.7%		903.7		93.6%	
	2051		65.5		66.0		131.5		50.2%		914.9		93.6%	
	2052		65.6		67.5		133.1		50.7%		926.2		93.7%	
	2053		65.8		68.9		134.7		51.2%		937.6		93.7%	
	2054		66.0		70.4		136.3		51.6%		949.2		93.7%	
	2055		66.1		71.8		137.9		52.1%		960.9		93.7%	
	2056		66.3		73.3		139.6		52.5%		972.6		93.7%	
	2057		66.4		74.8		141.2		53.0%		984.6		93.8%	
	2058		66.5		76.4		142.9		53.4%		996.8		93.8%	
	2059		66.7		77.9		144.6		53.9%		1,009.0		93.8%	
	2060		66.8		81.9		148.8		55.1%		1,106.8		94.3%	

(1)Chart II-A-16
(2) Chart II-A-21
(3) Based on Nathan and Associates Estimates
(4)=1+2+3+

CHART II-A-27

INCOME TO PANAMA AT PRESENT VALUE DURING THE OPERATION OF THE DIFFERENT CANAL ALTERNATIVES PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Discount Rate	High-Rise Lock Canal (with dividends)		High-Rise Lock Canal (without dividends)		Sea Level Canal		
	150,000 DWT Vessels	200,000 DWT Vessels	50,000 DWT Vessel	200,000 DWT Vessels	A	B	C
4%	12,658.1	9,943.8	1,936.3	1,869.3	2,193.6	2,054.6	2,157.6
6%	8,597.8	6,386.9	1,392.6	1,354.5	1,605.6	1,508.1	1,585.6
8%	6,103.9	4,266.6	1,052.0	1,030.6	1,232.8	1,160.9	1,221.9

CHART II-A-28

DIRECT IMPACTS DURING OPERATION OF THE HIGH-RISE LOCK CANAL FOR 150,000 DWT VESSELS
(ASSUMING DIVIDEND PAYMENTS)
PANAMA CANAL AUTHORITY AND OPTIMUN TOLL SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

Years	Agriculture	Grains Production	Cattle	Other Agriculture	Agro-industry	Industry	Commerce	Business Services	Export Services	Finances Services
Coefficients	0.0005	0.0003	0.0007	0.0019	0.0029	0.0511	0.0234	0.1283	1.0000	0.1070
2020	0.0	0.0	0.0	0.1	0.2	3.3	1.5	8.3	64.7	6.9
2021	0.0	0.0	0.0	0.1	0.2	3.4	1.6	8.6	66.7	7.1
2022	0.0	0.0	0.0	0.1	0.2	3.5	1.6	8.8	68.8	7.4
2023	0.0	0.0	0.0	0.1	0.2	3.6	1.7	9.1	71.0	7.6
2024	0.0	0.0	0.1	0.1	0.2	3.7	1.7	9.4	73.2	7.8
2025	0.7	0.4	1.0	2.6	4.0	71.1	32.6	178.5	1,391.1	148.8
2026	0.1	0.1	0.2	0.5	0.7	12.9	5.9	32.4	252.8	27.1
2027	0.1	0.1	0.2	0.5	0.8	14.2	6.5	35.7	278.5	29.8
2028	0.2	0.1	0.2	0.7	1.0	18.1	8.3	45.4	354.0	37.9
2029	0.2	0.1	0.3	0.8	1.3	22.1	10.1	55.6	433.0	46.3
2030	0.2	0.1	0.3	0.9	1.4	25.3	11.6	63.6	495.8	53.0
2031	0.3	0.2	0.4	1.1	1.6	28.5	13.0	71.5	557.1	59.6
2032	0.3	0.2	0.4	1.1	1.8	30.9	14.1	77.5	604.2	64.6
2033	0.3	0.2	0.5	1.2	1.9	33.5	15.4	84.2	656.5	70.2
2034	0.4	0.2	0.5	1.3	2.0	36.1	16.5	90.6	706.4	75.6
2035	0.4	0.2	0.5	1.4	2.2	38.6	17.7	96.9	755.5	80.8
2036	0.4	0.2	0.6	1.5	2.3	41.0	18.8	103.0	803.0	85.9
2037	0.4	0.3	0.6	1.6	2.4	43.0	19.7	108.0	841.4	90.0
2038	0.4	0.3	0.6	1.7	2.5	44.4	20.4	111.6	869.8	93.1
2039	0.4	0.3	0.6	1.7	2.6	45.6	20.9	114.5	892.4	95.5
2040	0.5	0.3	0.6	1.7	2.6	46.2	21.2	116.0	904.3	96.8

CONTINUATION OF CHART II-A-28

DIRECT IMPACTS DURING OPERATIONS OF THE HIGH-RISE LOCK CANAL FOR 150,000 DWT VESSELS (ASSUMING DIVIDEND PAYMENTS) PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

2041	0.5	0.3	0.6	1.7	2.7	46.8	21.4	117.6	916.2	98.0
2042	0.5	0.3	0.6	1.8	2.7	47.4	21.7	119.1	928.3	99.3
2043	0.5	0.3	0.7	1.8	2.7	48.0	22.0	120.6	940.3	100.6
2044	0.5	0.3	0.7	1.8	2.8	48.7	22.3	122.2	952.4	101.9
2045	0.5	0.3	0.7	1.8	2.8	49.3	22.6	123.8	964.6	103.2
2046	0.5	0.3	0.7	1.9	2.8	49.9	22.9	125.3	976.7	104.5
2047	0.5	0.3	0.7	1.9	2.9	50.5	23.1	126.9	989.0	105.8
2048	0.5	0.3	0.7	1.9	2.9	51.2	23.4	128.5	1,001.4	107.1
2049	0.5	0.3	0.7	1.9	2.9	51.8	23.7	130.0	1,013.6	108.5
2050	0.5	0.3	0.7	1.9	3.0	52.4	24.0	131.6	1,026.1	109.8
2051	0.5	0.3	0.7	2.0	3.0	53.1	24.3	133.2	1,038.5	111.1
2052	0.5	0.3	0.7	2.0	3.0	53.7	24.6	134.9	1,051.1	112.5
2053	0.5	0.3	0.7	2.0	3.1	54.3	24.9	136.5	1,063.6	113.8
2054	0.5	0.3	0.8	2.0	3.1	55.0	25.2	138.1	1,076.1	115.1
2055	0.5	0.3	0.8	2.1	3.2	55.6	25.5	139.7	1,088.8	116.5
2056	0.6	0.3	0.8	2.1	3.2	56.3	25.8	141.3	1,101.5	117.9
2057	0.6	0.3	0.8	2.1	3.2	56.9	26.1	143.0	1,114.4	119.2
2058	0.6	0.3	0.8	2.1	3.3	57.6	26.4	144.6	1,127.2	120.6
2059	0.6	0.3	0.8	2.2	3.3	58.3	26.7	146.3	1,140.0	122.0
2060	0.6	0.3	0.8	2.2	3.3	58.4	26.7	146.7	1,143.1	122.3
TOTAL	**15.9**	**9.5**	**22.3**	**60.4**	**92.2**	**1,624.6**	**744.0**	**4,079.1**	**31,793.2**	**3,401.9**

CHART II-A-29

DIRECT IMPACTS DURING OPERATIONS OF THE HIGH-RISE LOCK CANAL FOR 200,000 DWT VESSELS (ASSUMING DIVIDEND PAYMENTS) PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Years	Agriculture	Grains Production	Cattle	Other Agriculture	Agro-industry	Industry	Commerce	Business Services	Export Services	Finances Services
Coefficients	0.0005	0.0003	0.0007	0.0019	0.0029	0.0511	0.0234	0.1283	1.0000	0.1070
2020	0.0	0.0	0.0	0.1	0.2	3.4	1.6	8.6	67.3	7.2
2021	0.0	0.0	0.0	0.1	0.2	3.5	1.6	8.9	69.2	7.4
2022	0.0	0.0	0.0	0.1	0.2	3.6	1.7	9.1	70.9	7.6
2023	0.0	0.0	0.1	0.1	0.2	3.7	1.7	9.3	72.6	7.8
2024	0.0	0.0	0.1	0.1	0.2	3.8	1.7	9.5	74.2	7.9
2025	0.0	0.0	0.1	0.1	0.2	3.9	1.8	9.7	75.9	8.1
2026	0.0	0.0	0.1	0.1	0.2	4.0	1.8	10.0	77.6	8.3
2027	0.0	0.0	0.1	0.2	0.2	4.1	1.9	10.2	79.3	8.5
2028	0.0	0.0	0.1	0.2	0.2	4.1	1.9	10.4	81.1	8.7
2029	0.0	0.0	0.1	0.2	0.2	4.2	1.9	10.6	82.8	8.9
2030	0.0	0.0	0.1	0.2	0.2	4.3	2.0	10.8	84.5	9.0
2031	0.0	0.0	0.1	0.2	0.3	4.4	2.0	11.1	86.3	9.2
2032	0.4	0.2	0.5	1.4	2.1	37.2	17.0	93.5	728.6	78.0
2033	0.3	0.2	0.4	1.2	1.8	32.0	14.6	80.2	625.4	66.9
2034	0.3	0.2	0.5	1.3	2.0	34.4	15.8	86.4	673.6	72.1
2035	0.4	0.2	0.5	1.4	2.1	36.8	16.9	92.5	720.9	77.1
2036	0.4	0.2	0.5	1.5	2.2	39.1	17.9	98.2	765.1	81.9
2037	0.4	0.2	0.6	1.5	2.3	40.9	18.7	102.7	800.7	85.7
2038	0.4	0.2	0.6	1.6	2.4	42.3	19.4	106.2	827.8	88.6
2039	0.4	0.3	0.6	1.6	2.4	43.2	19.8	108.4	844.6	90.4
2040	0.4	0.3	0.6	1.6	2.5	43.7	20.0	109.7	854.9	91.5

CONTINUATION OF CHART II-A-29

DIRECT IMPACTS DURING OPERATIONS OF THE HIGH-RISE LOCK CANAL FOR 200,000 DWT VESSELS (ASSUMING DIVIDEND PAYMENTS) PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

2041	0.4	0.3	0.6	1.6	2.5	44.2	20.2	111.0	865.3	92.6
2042	0.4	0.3	0.6	1.7	2.5	44.8	20.5	112.4	876.0	93.7
2043	0.4	0.3	0.6	1.7	2.6	45.3	20.7	113.8	886.7	94.9
2044	0.4	0.3	0.6	1.7	2.6	45.9	21.0	115.1	897.5	96.0
2045	0.5	0.3	0.6	1.7	2.6	46.4	21.3	116.6	908.5	97.2
2046	0.5	0.3	0.6	1.7	2.7	47.0	21.5	118.0	919.6	98.4
2047	0.5	0.3	0.7	1.8	2.7	47.6	21.8	119.4	930.8	99.6
2048	0.5	0.3	0.7	1.8	2.7	48.1	22.0	120.9	942.1	100.8
2049	0.5	0.3	0.7	1.8	2.8	48.7	22.3	122.4	953.7	102.0
2050	0.5	0.3	0.7	1.8	2.8	49.3	22.6	123.8	965.2	103.3
2051	0.5	0.3	0.7	1.9	2.8	49.9	22.9	125.3	977.0	104.5
2052	0.5	0.3	0.7	1.9	2.9	50.5	23.1	126.9	988.8	105.8
2053	0.5	0.3	0.7	1.9	2.9	51.1	23.4	128.4	1,000.8	107.1
2054	0.5	0.3	0.7	1.9	2.9	51.8	23.7	130.0	1,012.9	108.4
2055	0.5	0.3	0.7	1.9	3.0	52.4	24.0	131.5	1,025.2	109.7
2056	0.5	0.3	0.7	2.0	3.0	53.0	24.3	133.1	1,037.5	111.0
2057	0.5	0.3	0.7	2.0	3.0	53.7	24.6	134.7	1,050.1	112.4
2058	0.5	0.3	0.7	2.0	3.1	54.3	24.9	136.4	1,062.8	113.7
2059	0.5	0.3	0.8	2.0	3.1	55.0	25.2	138.0	1,075.6	115.1
2060	0.6	0.4	0.8	2.2	3.4	60.0	27.5	150.6	1,173.9	125.6
TOTAL	13.7	8.2	19.1	51.9	79.2	1,395.7	639.1	3,504.3	27,313.3	2,922.5

CHART II-A-30

DIRECT IMPACTS DURING OPERATION OF THE SEA LEVEL CANAL CASE A (ASSUMING DIVIDEND PAYMENTS) PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Years	Agriculture	Grains Production	Cattle	Other Agriculture	Agro-industry	Industry	Commerce	Business Services	Export Services	Finances Services
Coefficients	0.0005	0.0003	0.0007	0.0019	0.0029	0.0511	0.0234	0.1283	1.0000	0.1070
2020	0.04	0.03	0.06	0.16	0.25	4.40	2.01	11.05	86.10	9.21
2021	0.04	0.03	0.06	0.17	0.25	4.48	2.05	11.24	87.60	9.37
2022	0.04	0.03	0.06	0.17	0.26	4.55	2.09	11.44	89.13	9.54
2023	0.05	0.03	0.06	0.17	0.26	4.63	2.12	11.63	90.62	9.70
2024	0.05	0.03	0.06	0.18	0.27	4.71	2.16	11.82	92.16	9.86
2025	0.05	0.03	0.07	0.18	0.27	4.79	2.19	12.02	93.67	10.02
2026	0.05	0.03	0.07	0.18	0.28	4.86	2.23	12.21	95.20	10.19
2027	0.05	0.03	0.07	0.18	0.28	4.95	2.26	12.42	96.78	10.35
2028	0.05	0.03	0.07	0.19	0.29	5.02	2.30	12.61	98.32	10.52
2029	0.05	0.03	0.07	0.19	0.29	5.10	2.34	12.81	99.87	10.69
2030	0.05	0.03	0.07	0.19	0.29	5.19	2.37	13.02	101.48	10.86
2031	0.05	0.03	0.07	0.20	0.30	5.27	2.41	13.22	103.05	11.03
2032	0.05	0.03	0.07	0.20	0.30	5.35	2.45	13.43	104.68	11.20
2033	0.05	0.03	0.07	0.20	0.31	5.43	2.49	13.64	106.28	11.37
2034	0.05	0.03	0.08	0.20	0.31	5.51	2.52	13.84	107.88	11.54
2035	0.05	0.03	0.08	0.21	0.32	5.60	2.56	14.05	109.54	11.72
2036	0.06	0.03	0.08	0.21	0.32	5.68	2.60	14.26	111.17	11.90
2037	0.06	0.03	0.08	0.21	0.33	5.76	2.64	14.47	112.81	12.07
2038	0.06	0.03	0.08	0.22	0.33	5.85	2.68	14.69	114.50	12.25
2039	0.06	0.03	0.08	0.22	0.34	5.94	2.72	14.90	116.17	12.43
2040	0.06	0.04	0.08	0.22	0.34	6.02	2.76	15.12	117.88	12.61

CONTINUATION OF CHART II-A-30

DIRECT IMPACTS DURING OPERATION OF THE SEA LEVEL CANAL CASE A (ASSUMING DIVIDEND PAYMENTS) PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

2041	0.06	0.04	0.08	0.23	0.35	6.11	2.80	15.34	119.57	12.79
2042	0.06	0.04	0.08	0.23	0.35	6.20	2.84	15.56	121.27	12.98
2043	0.06	0.04	0.09	0.23	0.36	6.29	2.88	15.78	123.02	13.16
2044	0.06	0.04	0.09	0.24	0.36	6.37	2.92	16.00	124.74	13.35
2045	0.06	0.04	0.09	0.24	0.37	6.46	2.96	16.23	126.48	13.53
2046	0.06	0.04	0.09	0.24	0.37	6.55	3.00	16.46	128.26	13.72
2047	0.07	0.04	0.09	0.25	0.38	6.64	3.04	16.68	130.02	13.91
2048	0.07	0.04	0.09	0.25	0.38	6.74	3.08	16.91	131.84	14.11
2049	0.07	0.04	0.09	0.25	0.39	6.83	3.13	17.14	133.62	14.30
2050	0.07	0.04	0.09	0.26	0.39	6.92	3.17	17.37	135.42	14.49
2051	0.07	0.04	0.10	0.26	0.40	7.01	3.21	17.61	137.27	14.69
2052	0.07	0.04	0.10	0.26	0.40	7.11	3.25	17.85	139.09	14.88
2053	0.07	0.04	0.10	0.27	0.41	7.20	3.30	18.08	140.94	15.08
2054	0.07	0.04	0.10	0.27	0.41	7.30	3.34	18.32	142.83	15.28
2055	0.07	0.04	0.10	0.27	0.42	7.39	3.39	18.56	144.69	15.48
2056	0.07	0.04	0.10	0.28	0.43	7.49	3.43	18.81	146.60	15.69
2057	0.07	0.04	0.10	0.28	0.43	7.59	3.47	19.05	148.50	15.89
2058	0.08	0.05	0.11	0.29	0.44	7.69	3.52	19.30	150.41	16.09
2059	0.08	0.05	0.11	0.29	0.44	7.79	3.57	19.55	152.37	16.30
2060	0.07	0.04	0.10	0.28	0.43	7.53	3.45	18.90	147.32	15.76
TOTAL	**2.43**	**1.46**	**3.40**	**9.23**	**14.09**	**248.30**	**113.70**	**623.43**	**4,859.13**	**519.93**

CHART II-A-31
DIRECT IMPACTS DURING OPERATION OF THE SEA LEVEL CANAL CASE B
(ASSUMING DIVIDEND PAYMENTS)
PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

Years	Agriculture	Grains Production	Cattle	Other Agriculture	Agro-industry	Industry	Commerce	Business Services	Export Services	Finances Services
Coefficients	0.0005	0.0003	0.0007	0.0019	0.0029	0.0511	0.0234	0.1283	1.0000	0.1070
2020	0.0	0.0	0.0	0.1	0.2	3.3	1.5	8.3	64.7	6.9
2021	0.0	0.0	0.0	0.1	0.2	3.4	1.6	8.6	66.7	7.1
2022	0.0	0.0	0.0	0.1	0.2	3.5	1.6	8.8	68.8	7.4
2023	0.0	0.0	0.0	0.1	0.2	3.6	1.7	9.1	71.0	7.6
2024	0.0	0.0	0.1	0.1	0.2	3.7	1.7	9.4	73.2	7.8
2025	0.0	0.0	0.1	0.1	0.2	3.9	1.8	9.7	75.4	8.1
2026	0.0	0.0	0.1	0.1	0.2	4.0	1.8	9.9	77.5	8.3
2027	0.0	0.0	0.1	0.2	0.2	4.1	1.9	10.2	79.7	8.5
2028	0.0	0.0	0.1	0.2	0.2	4.2	1.9	10.5	81.9	8.8
2029	0.0	0.0	0.1	0.2	0.2	4.3	2.0	10.8	84.1	9.0
2030	0.0	0.0	0.1	0.2	0.3	4.4	2.0	11.1	86.3	9.2
2031	0.0	0.0	0.1	0.2	0.3	4.5	2.1	11.4	88.5	9.5
2032	0.0	0.0	0.1	0.2	0.3	4.6	2.1	11.6	90.7	9.7
2033	0.0	0.0	0.1	0.2	0.3	4.7	2.2	11.9	92.9	9.9
2034	0.0	0.0	0.1	0.2	0.3	4.9	2.2	12.2	95.1	10.2
2035	0.0	0.0	0.1	0.2	0.3	5.0	2.3	12.5	97.3	10.4
2036	0.0	0.0	0.1	0.2	0.3	5.1	2.3	12.8	99.5	10.6
2037	0.1	0.0	0.1	0.2	0.3	5.2	2.4	13.1	101.7	10.9
2038	0.1	0.0	0.1	0.2	0.3	5.3	2.4	13.3	104.0	11.1
2039	0.1	0.0	0.1	0.2	0.3	5.4	2.5	13.6	106.2	11.4
2040	0.1	0.0	0.1	0.2	0.3	5.5	2.5	13.9	108.4	11.6

CONTINUATION OF CHART II-A-31

DIRECT IMPACTS DURING OPERATION OF THE SEA LEVEL CANAL CASE B
(ASSUMING DIVIDEND PAYMENTS)
PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

2041	0.1	0.0	0.1	0.2	0.3	5.7	2.6	14.2	110.6	11.8
2042	0.1	0.0	0.1	0.2	0.3	5.8	2.6	14.5	112.9	12.1
2043	0.1	0.0	0.1	0.2	0.3	5.9	2.7	14.8	115.1	12.3
2044	0.1	0.0	0.1	0.2	0.3	6.0	2.7	15.1	117.3	12.6
2045	0.1	0.0	0.1	0.2	0.3	6.1	2.8	15.3	119.6	12.8
2046	0.1	0.0	0.1	0.2	0.4	6.2	2.9	15.6	121.8	13.0
2047	0.1	0.0	0.1	0.2	0.4	6.3	2.9	15.9	124.1	13.3
2048	0.1	0.0	0.1	0.2	0.4	6.5	3.0	16.2	126.4	13.5
2049	0.1	0.0	0.1	0.2	0.4	6.6	3.0	16.5	128.6	13.8
2050	0.1	0.0	0.1	0.2	0.4	6.7	3.1	16.8	130.9	14.0
2051	0.1	0.0	0.1	0.3	0.4	6.8	3.1	17.1	133.2	14.3
2052	0.1	0.0	0.1	0.3	0.4	6.9	3.2	17.4	135.5	14.5
2053	0.1	0.0	0.1	0.3	0.4	7.0	3.2	17.7	137.8	14.7
2054	0.1	0.0	0.1	0.3	0.4	7.2	3.3	18.0	140.0	15.0
2055	0.1	0.0	0.1	0.3	0.4	7.3	3.3	18.3	142.3	15.2
2056	0.1	0.0	0.1	0.3	0.4	7.4	3.4	18.6	144.6	15.5
2057	0.1	0.0	0.1	0.3	0.4	7.5	3.4	18.9	147.0	15.7
2058	0.1	0.0	0.1	0.3	0.4	7.6	3.5	19.2	149.3	16.0
2059	0.1	0.0	0.1	0.3	0.4	7.7	3.5	19.4	151.6	16.2
2060	0.1	0.0	0.1	0.3	0.4	7.4	3.4	18.5	144.0	15.4
TOTAL	2.2	1.3	3.1	8.4	12.9	227.2	104.0	570.5	4,446.3	475.8

CHART II-A-32

DIRECT IMPACTS DURING OPERATION OF THE SEA LEVEL CANAL CASE C (ASSUMING DIVIDEND PAYMENTS) PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM (IN MILLIONS OF 1990 DOLLARS)

Years	Agriculture	Grains Production	Cattle	Other Agriculture	Agro-industry	Industry	Commerce	Business Services	Export Services	Finances Services
Coefficients	0.0005	0.0003	0.0007	0.0019	0.0029	0.0511	0.0234	0.1283	1.0000	0.1070
2020	0.03	0.02	0.05	0.13	0.20	3.44	1.58	8.64	67.31	7.20
2021	0.03	0.02	0.05	0.13	0.20	3.54	1.62	8.88	69.22	7.41
2022	0.04	0.02	0.05	0.13	0.21	3.62	1.66	9.09	70.88	7.58
2023	0.04	0.02	0.05	0.14	0.21	3.71	1.70	9.31	72.55	7.76
2024	0.04	0.02	0.05	0.14	0.22	3.79	1.74	9.52	74.24	7.94
2025	0.04	0.02	0.05	0.14	0.22	3.88	1.78	9.74	75.93	8.12
2026	0.04	0.02	0.05	0.15	0.23	3.97	1.82	9.96	77.62	8.31
2027	0.04	0.02	0.06	0.15	0.23	4.05	1.86	10.18	79.33	8.49
2028	0.04	0.02	0.06	0.15	0.24	4.14	1.90	10.40	81.05	8.67
2029	0.04	0.02	0.06	0.16	0.24	4.23	1.94	10.62	82.77	8.86
2030	0.04	0.03	0.06	0.16	0.25	4.32	1.98	10.84	84.51	9.04
2031	0.04	0.03	0.06	0.16	0.25	4.41	2.02	11.07	86.26	9.23
2032	0.04	0.03	0.06	0.17	0.26	4.50	2.06	11.29	88.02	9.42
2033	0.04	0.03	0.06	0.17	0.26	4.59	2.10	11.52	89.78	9.61
2034	0.05	0.03	0.06	0.17	0.27	4.68	2.14	11.75	91.55	9.80
2035	0.05	0.03	0.07	0.18	0.27	4.77	2.18	11.98	93.34	9.99
2036	0.05	0.03	0.07	0.18	0.28	4.86	2.23	12.20	95.13	10.18
2037	0.05	0.03	0.07	0.18	0.28	4.95	2.27	12.44	96.93	10.37
2038	0.05	0.03	0.07	0.19	0.29	5.05	2.31	12.67	98.75	10.57
2039	0.05	0.03	0.07	0.19	0.29	5.14	2.35	12.90	100.57	10.76
2040	0.05	0.03	0.07	0.19	0.30	5.23	2.40	13.14	102.40	10.96

CONTINUATION OF CHART II-A-32

DIRECT IMPACTS DURING OPERATION OF THE SEA LEVEL CANAL CASE C
(ASSUMING DIVIDEND PAYMENTS)
PANAMA CANAL AUTHORITY AND OPTIMUM TOLL SYSTEM
(IN MILLIONS OF 1990 DOLLARS)

2041	0.05	0.03	0.07	0.20	0.30	5.33	2.44	13.37	104.21	11.15
2042	0.05	0.03	0.07	0.20	0.31	5.42	2.48	13.61	106.07	11.35
2043	0.05	0.03	0.08	0.21	0.31	5.52	2.53	13.85	107.93	11.55
2044	0.05	0.03	0.08	0.21	0.32	5.61	2.57	14.09	109.80	11.75
2045	0.06	0.03	0.08	0.21	0.32	5.71	2.61	14.33	111.69	11.95
2046	0.06	0.03	0.08	0.22	0.33	5.80	2.66	14.57	113.59	12.15
2047	0.06	0.03	0.08	0.22	0.33	5.90	2.70	14.82	115.50	12.36
2048	0.06	0.04	0.08	0.22	0.34	6.00	2.75	15.07	117.42	12.56
2049	0.06	0.04	0.08	0.23	0.35	6.10	2.79	15.31	119.36	12.77
2050	0.06	0.04	0.08	0.23	0.35	6.20	2.84	15.56	121.30	12.98
2051	0.06	0.04	0.09	0.23	0.36	6.30	2.88	15.81	123.26	13.19
2052	0.06	0.04	0.09	0.24	0.36	6.40	2.93	16.07	125.23	13.40
2053	0.06	0.04	0.09	0.24	0.37	6.50	2.98	16.32	127.21	13.61
2054	0.06	0.04	0.09	0.25	0.37	6.60	3.02	16.58	129.20	13.82
2055	0.07	0.04	0.09	0.25	0.38	6.70	3.07	16.83	131.20	14.04
2056	0.07	0.04	0.09	0.25	0.39	6.81	3.12	17.09	133.22	14.25
2057	0.07	0.04	0.09	0.26	0.39	6.91	3.16	17.35	135.25	14.47
2058	0.07	0.04	0.10	0.26	0.40	7.02	3.21	17.62	137.30	14.69
2059	0.07	0.04	0.10	0.26	0.40	7.12	3.26	17.88	139.35	14.91
2060	0.07	0.04	0.10	0.28	0.42	7.42	3.40	18.64	145.30	15.55
TOTAL	**2.12**	**1.27**	**2.96**	**8.04**	**12.27**	**216.23**	**99.02**	**542.91**	**4,231.55**	**452.78**

CHART II-A-33

IMPACTS DURING CANAL OPERATION
(IN MILLIONS OF 1990 DOLLARS)

	Hig -Rise LockCanal for 150,000 DWT Vessels(With Dividends)		High-Rise LockCanal for 150,000 DWT Vessels(Without Dividends)		High-Rise LockCanal for 200,000 DWT Vessels(With Dividends)		High-Rise Lock Canal for 200,000 DWT Vessels(Without Dividends)		Sea Level Canal Case A	
	Direct Demand	Impacts	Direct Demand	Impacts	Direct Demand	Impacts	Direct Demand	Impacts	Direct Demand	Impacts
AGROEXPORTS	15.9	15.2	2.2	2.1	13.7	13.0	2.12	2.0	2.43	2.3
GRAINS PRODUCTION	9.5	9.1	1.3	1.3	8.2	7.8	1.27	1.20	1.46	1.4
CATTLE	22.3	18.9	3.1	2.6	19.1	16.2	2.96	2.5	3.4	2.9
OTHER PRODUCTS OF AGRICULTURE	60.4	59.1	8.4	8.3	51.9	50.8	8.04	7.9	9.23	9.0
AGROINDUSTRY	92.2	92.9	12.9	13.0	79.2	79.8	12.27	12.4	14.09	14.2
INDUSTRY	1,624.6	1,629.9	227.2	227.9	1,395.7	1,401.0	216.23	216.9	248.3	249.1
CONSTRUCTION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COMMERCE	744	743.6	104	104.0	693.1	639.0	99.02	99.0	113.7	113.6
COMMERCIAL SERVICES	4,079.1	4,077.0	570.5	570.2	3,504.3	3511.3	542.91	542.6	623.43	623.1
NON COMMERCIAL SERVICES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EXPORTATION SERVICES	31,793.2	0.0	4,446.3	0.0	27,313.3	0.0	4,231.55	0.0	4,859.13	0.0
FINANCE	3,401.9	3,402.8	475.8	475.9	2922.5	2,930.6	452.78	452.9	519.93	520.1
AGRICULTURAL IMPORTS		25.8		3.6		22.2		3.4		3.9
IMPORT. OF DURABLE GOODS		1,142.0		159.7		981.2		152.0		174.5
OTHER IMPORTS		3,304.5		462.1		2,839.1		439.8		505.0
WAGES TYPE H1		2,940.9		411.3		2,528.9		391.4		449.5
WAGES TYPE H2		8,012.6		1,120.6		6,891.7		1,066.4		1,224.6

CONTINUATION OF CHART II-A-33

IMPACTS DURING CANAL OPERATION
(IN MILLIONS OF 1990 DOLLARS)

WAGES TYPE H3		641.8		89.7		556.0		85.4		98.1
WAGES TYPE H4		12.6		1.74		10.8		1.7		1.9
PROFITS H1		371.7		51.9		323.6		49.5		56.8
PROFITS H2		132.4		18.5		115.5		17.6		20.2
OTHER INDIRECT TAXES		3,088.4		431.9		2,656.4		411.1		472.0
IMPORTS DUTIES		96.7		13.5		87.5		12.9		14.8
TOTAL		**41,834.7**		**5,850.5**		**35,993.8**		**5,568.0**		**6,393.8**

CHART II-A-34

EFFECT OF OPERATION EXPENSES ON ECONOMIC VARIABLES IN MILLIONS DOLLARS

	High-Rise Lock Canal for 150,000 DWT Vessels		High-Rise Lock Canal for 200,000 DWT Vessels		Sea Level Canal Case A
	With Dividends	Without Dividends	With Dividends	Without Dividends	
Wages	11,607.8	1,623.4	9,987.4	1,544.9	1,774.1
Profits	12,521.1	1,751.0	10,770.7	1,666.7	1,913.7
Government	3,185.2	445.4	2,743.9	424.0	486.8
Value Added	27,314.0	3,819.8	23,502.0	3,635.6	4,174.6
Imports	4,472.3	625.4	3,842.8	595.2	1,073.6
Intermediate Purchases	14,520.7	2,030.7	12,491.8	1,932.4	2,219.3
Average Annual Value Added	682.9	95.5	587.6	90.9	104.4
Effects on GDP	9.1%	1.3%	7.9%	1.2%	1.4%
Annual Additional Employment		12,853		12,233	14,046

CHART II-A-35

EXPANDED MATRIX OF DIRECT TECHNICAL COEFFICIENTS

	Production			Other Products		Industry		Services				
	Agro-exports	Grains	Cattle	Agri-culture	Agro-industry	Manu-facture	Construc-tion	Commercial	No Commercial	Business	Export	Finances
AGROEXPORTS	0	0	0.00498	0	0.09744	0	0	0	0.00149	0	0	0
GRAINS PRODUCTION	0	0.03704	0.00995	0	0.07564	0	0	0	0.00037	0.00238	0	0
CATTLE	0	0.01235	0	0.00763	0.11025	0.00126	0	0	0.00149	0.00317	0	0
OTHER PRODUCTS OF AGRICULTURE	0.01356	0	0.00498	0.01527	0.00385	0.00756	0	0	0.00298	0.00397	0.00104	0
AGROINDUSTRY	0.00678	0	0.17910	0	0.04359	0.00378	0	0	0.01117	0.00873	0.00104	0
INDUSTRY	0.16949	0.02469	0.00498	0.01527	0.03590	0.12846	0.25880	0.01370	0.03239	0.02063	0.03838	0.01511
CONSTRUCTION	0	0	0	0	0	0	0	0	0	0	0	0
COMMERCE	0.02712	0.02469	0.04975	0.06107	0.07051	0.11335	0.091550	0.00340	0.02159	0.01984	0.01349	0.00824
COMMERCIAL SERVICES	0.07797	0.08642	0.00498	0.03053	0.04487	0.10705	0.02113	0.16360	0.22375	0.18413	0.05705	0.30769
NON-COMMERCIAL SERVICES	0	0	0	0	0	0	0	0	0	0	0	0
EXPORTATION SERVICES	0	0	0	0	0	0	0	0	0	0	0	0
FINANCE SERVICES	0.02373	0.06173	0.04975	0.02290	0.01154	0.04786	0.11620	0.13500	0.02457	0.03095	0.08299	0.14148
AGRICULTURAL IMPORTS	0	0	0	0	0.08205	0	0	0	0.00447	0.00794	0	0
IMPORT. OF DURABLE GOODS	0.02034	0	0	0	0.00385	0.01008	0	0.00230	0.00856	0.04048	0.03423	0
OTHER IMPORTS	0.06441	0.13580	0.03483	0.02290	0..10000	0.30730	0.05282	0.00340	0.02792	0.03016	0.08091	0.03022
WAGES -TYPE H1	0.01356	0	0.02488	0	0.00769	0.02015	0	0.04460	0.08563	0.14206	0.07469	0.04396
WAGES -TYPE H2	0.29831	0.04938	0.06965	0	0.08333	0.12469	0.14261	0.15100	0.13105	0.42143	0.21162	0.12363
WAGES -TYPE H3	0	0	0	0	0.03974	0.04912	0.05458	0.08580	0.03239	0.07063	0.00934	0.01923
WAGES -TYPE H4	0.08475	0.11111	0.10448	0.12977	0	0	0	0	0	0	0	0

CONTINUATION OF CHART II-A-35

EXPANDED MATRIX OF DIRECT TECHNICAL COEFFICIENTS

PROFITS -H1	0.03390	0.06173	0.13930	0.06870	0	0	0	0.0801	0.07446	0	0	0
PROFITS -H2	0.02034	0.14815	0.19900	0.34351	0.00128	0.00252	0.00528	0.032	0.01899	0	0	0
PROFITS -H3	0	0	0	0	0.00256	0.00378	0.02465	0.0229	0.00335	0	0	0
PROFITS -H4	0	0.22222	0.03483	0.26718	0	0	0	0	0	0	0	0
CORPORATE PROFITS	0.06780	0	0.06965	0	0.06282	0.03275	0.20423	0.1224	0.26992	0	0.31120	0.23901
ADMINISTRATION PROFITS	0	0	0	0	0	0	0	0	0	0.01349	0	0
OTHER INDIRECT TAXES	0.07119	0.01235	0.01493	0.00763	0.02179	0.02771	0.01585	0.0584	0.02345	0	0.08402	0.06731
IMPORT DUTIES	0.00678	0.01235	0	0.00763	0.01258	0.01259	0.01232	0.0812	0	0	0	0.00412

III. SOCIO-CULTURAL IMPACT AND IMPACT ON POPULATION

3.0 INTRODUCTION

3.0.1 Guiding Criteria. The socio-cultural, population and political fields of analysis for this report were initially analyzed separately, but common criteria were used to support hypotheses concerning the future of the population, social behavior and Panama's political system in the context of construction and operation of either of the Canal alternatives.

3.0.1.1 A historical analysis of the trends leading to the present situation of the Panamanian population is an important basis for judgment.

3.0.1.2 Strictly demographic variables (population, fertility, mortality, spatial distribution, migration) do not acquire their full meaning in an analysis of behavior, unless they are interrelated with socio-cultural and political variables so as to provide a meaningful social-demographic analysis.

3.0.1.3 The historical analysis becomes important as the basis for understanding the present sociopolitical situation. It provides the foundation for assuming what may happen in the first three decades of the next century. Using these criteria, it is possible to characterize the present situation of the country's population, and to provide logical hypotheses in respect of changes that will take place on account of the choice of one alternative.

3.0.2 Assumptions

3.0.2.1 The following hypotheses have been used in discussing the impacts that will occur during construction.

There will be an increase in population growth in the Metropolitan Region in anticipation of the start of the construction phase of either alternative (mobilization for construction) and during that phase.

This hypothesis is supported by historical and present trends:

- More than half of the country's population is concentrated in the provinces of Panama and Colon.

- The province of Panama is the most attractive to domestic and foreign migrants.

- The Metropolitan Region (especially the province of Panama) has the most active economy in the country.

3.0.2.2 An increase of population in the Metropolitan Region will directly affect the following:

- Public services.
- Labor structure (particularly in the cities).
- Administration of justice and public safety.
- Levels of urban poverty.
- Number of spontaneous settlements.
- Additional pressure upon rural lands in the Metropolitan Region.
- Unemployment and the informal labor market.

3.0.2.3 Economic activity generated by the construction of one of the Canal alternatives, and additional economic activity in the Metropolitan Region will attract even more national and foreign migrants than the figures shown by present trends.

3.0.2.4 An increment in foreign migratory population may have an impact on the feeling of belonging to a common national identity depending on the numbers and on the diversity of ethnic origin attracted.

3.0.3 Methodology

In order to understand the complexity of present and the importance of future population impacts with an increasing pressure on the Metropolitan Region, and, more particularly, in order to

analyze what the impacts on Panama will be from each of the proposed alternatives, an encompassing vision should be applied when analyzing social, demographic, cultural, political and economic impacts.

3.0.3.1 The methodology used to determine the impacts of construction and operation of either Canal alternative on the population and on the Panamanian society was based on:

3.0.3.1.1 Collection of data and available information, as well as new discussion with subject matter experts concerning results obtained from other studies on trends of population growth, with the various socio-cultural and political aspects.

3.0.3.1.2 The calculation of projections of population for the country, the Metropolitan Region and the project's area. To obtain population estimates for the Metropolitan Region's districts and wards up to the year 2030 the following methodology was followed:

- Census data collection for the years 1960, 1970, 1980 and 1990, by province, district and ward in the Metropolitan Region.

- Calculation of growth rates between censuses during the 1960-1990 period. (See Table III-A-1 in the Appendix to this Section.)

- Calculation of the relative importance of each ward in respect of its district, and that of districts in respect of their province in the Metropolitan Region. 1960-1990 census (See Table III-A-2 in the Appendix to this Section.)

- Analyses of their respective population behavior trends in comparison to their recent relative importance in the Metropolitan Region. (See Table III-A-3 in the Appendix to this Section.)

- Study of socioeconomic indicators available (See Table III-A-4 in the Appendix to this Section.)

- Calculation of relative importance[1] of estimates for the years 2000 to 2030 on ward level in respect of the respective districts according to behavior observed through the 1980-1990 period. (See Table III-A-5 in the Appendix to this Section.)

- Calculation of estimates for years 2000-2030 by applying growth rates during the 1980-1990 period. (See Table III-A-6 in the Appendix to this Section.)

- Comparison of charts showing trends in each district by province and in the Metropolitan Region, and by ward in districts expected to be most affected by Canal works, with a similar correlation between districts and province, and with the Metropolitan Region. (See Charts III-A-7 through III-A-12 in the Appendix to this Section.)

3.0.3.1.3 Determination of impacts of the two Canal alternatives, based on historical trends, existing data and projections for the future.

3.0.3.1.4 Identification of archeological and historic sites in order to facilitate relocation on those to be affected by construction processes. (See Table III-A-13 in the Appendix to this Section and Recommended Further Studies, Section IX.)

3.1 CURRENT SOCIO-CULTURAL INFRASTRUCTURE AND DYNAMICS OF THE POPULATION

Since early in the 1950s, the majority of Panama's population has been concentrated in the Metropolitan Region. The 1980 Census showed that during the 1980s, more than half of the population of the country was to concentrate in the Metropolitan Region, with a high degree of dispersion of rural population in the provinces of the interior of the country. This is the result of a continuous migratory flow into the Metropolitan Region. Studies show that this flow appears to originate in response to greater access to public services and employment, besides the usual urban lures.

During the 1980-1990 period between censuses, an increase was observed in urban population. This increase is associated to countryside-city migration that started as a movement from rural localities to the provincial capitals, and from there onto the Metropolitan Region.

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[1] Relative Importance: Proportion of population living in each ward in respect of its district.

The 1990 census also shows that the only provinces with a positive migratory net balance during the preceding decade were Panama, Bocas del Toro and Darien. The Darien, because of its agricultural and timber potential. Bocas del Toro growth results from economic activity generated by the oil pipeline and by the construction of a road to connect this province with that of Chiriquí.

In the 1985-1990 period, the international migratory balance was negative, meaning that more people left the country than were admitted into Panama. The age group between 15 and 24 showed the most negative balance, however, this has to do with youth in large numbers studying abroad.[2]

The Metropolitan Area includes the districts of Arraijan, La Chorrera, Panama, San Miguelito and Colon. These districts include 1,120,365 individuals, 48.1% of the total population of the country and 90.3% of the Metropolitan Region's population. (See Map I-1 for a map of the Metropolitan Region)

Regarding the direction of migratory flows, the Metropolitan Region has urban-urban, rural-urban, rural-rural and, to a lesser extent, urban-rural movement. In 1990, the Metropolitan Region included 53.2% of the total population of the country, 76.0% of the urban population and 27.0% of the rural population.

The population of the Metropolitan Region is found in 16 districts (11 in Panama and 5 in Colon); 138 wards (98 in Panama, 40 in Colon); and 2042 localities (1282 in Panama, 760 in Colon). Figure III-1 provides a breakdown of the Metropolitan Region by wards and localities.

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[2] Boletín Especial, Projections of Total Population in the country by sex and age group from 1990 to 2025. (Panamanian Statistics,) April 1993.

FIGURE III-1

LOCALITIES OF THE METROPOLITAN REGION, BY PROVINCE, DISTRICT, AND WARD: FROM PANAMA'S 1990 POPULATION AND HOUSING CENSUS

Province and Districts	Ward	Localities
COLON	**40**	**760**
COLON	14	224
CHAGRES	7	158
DONOSO	6	277
PORTOBELO	5	53
SANTA ISABEL	8	48
PANAMA	**98**	**1282**
ARRAIJAN	6	74
BALBOA	6	28
CAPIRA	12	193
CHAME	11	83
CHEPO	6	284
CHIMAN	3	49
LA CHORRERA	18	148
PANAMA	19	229
SAN CARLOS	9	190
SAN MIGUELITO	5	*
TABOGA	3	4

* 1990 census data does not separate San Miguelito by localities.

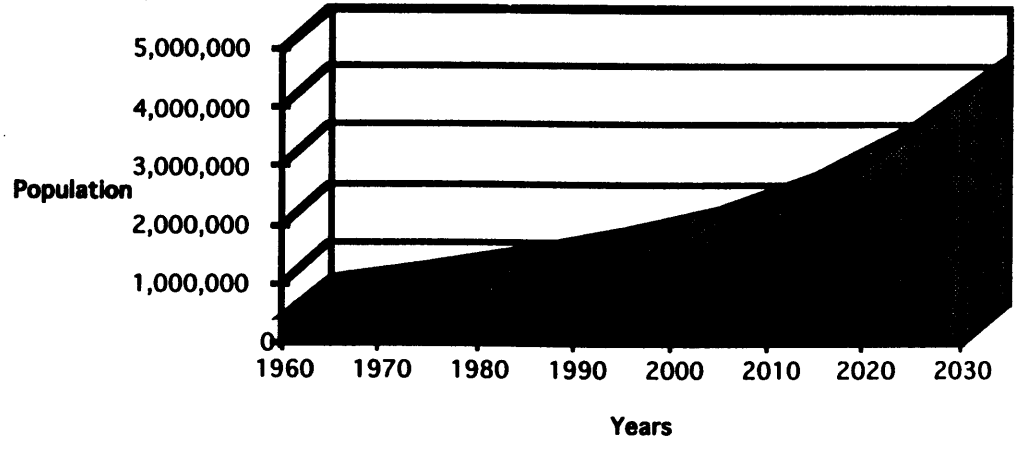
- It is important to note that urbanization is a relevant trend in the Metropolitan Region. According to official projections of population, without taking into consideration impacts caused by the construction of the

canal, the population may double within the next 30 years and the urban proportion may be higher than in 1990. [3] (See the colored maps on the next page for population trends and projections 1980 to 2020.)

- Another noteworthy fact is that, out of 307 nation wide spontaneous settlements registered by the Ministry of Housing for January 1993, 68.4% are concentrated in the Metropolitan Region. Furthermore, 35% of all spontaneous settlements in the country are located in the Province of Panama, including 82.0% of all families with marginal income.

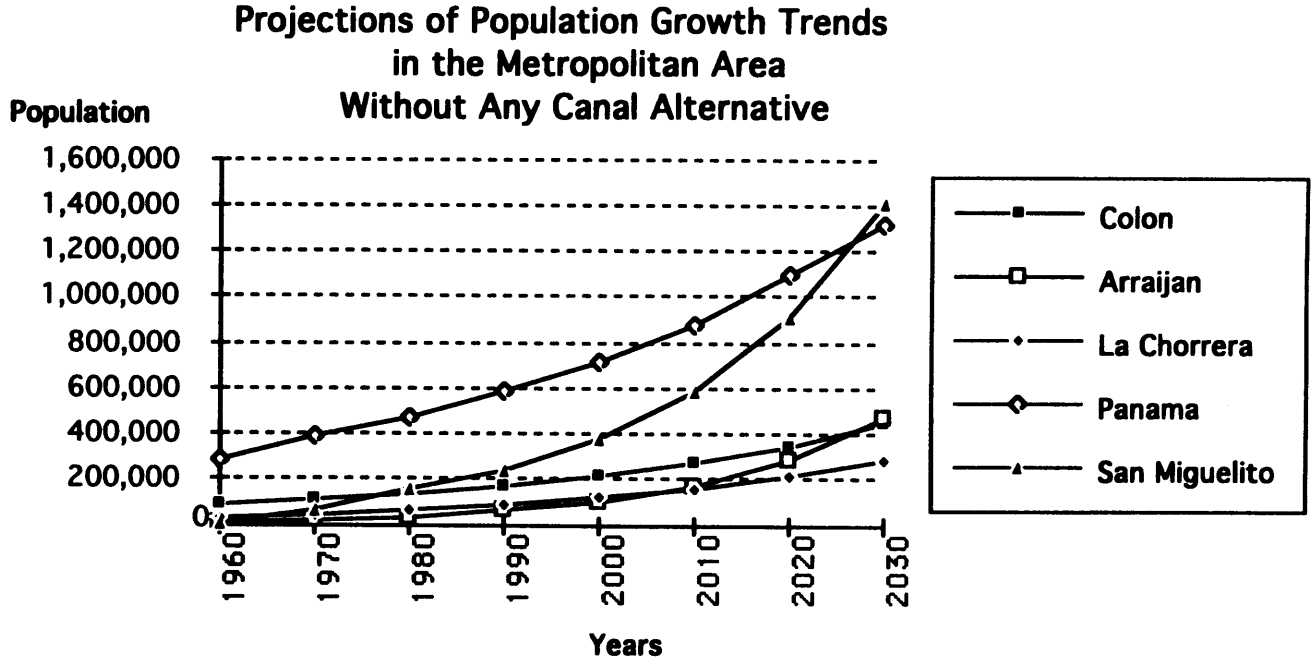
The figures below show population trends in the Metropolitan Region. Figure III-2 shows overall growth in the Region. Figure III-3 shows the historical growth and growth projections in the Metropolitan Area within the Region. Figure III-4 shows projections of cumulative growth in districts of the Metropolitan Area.

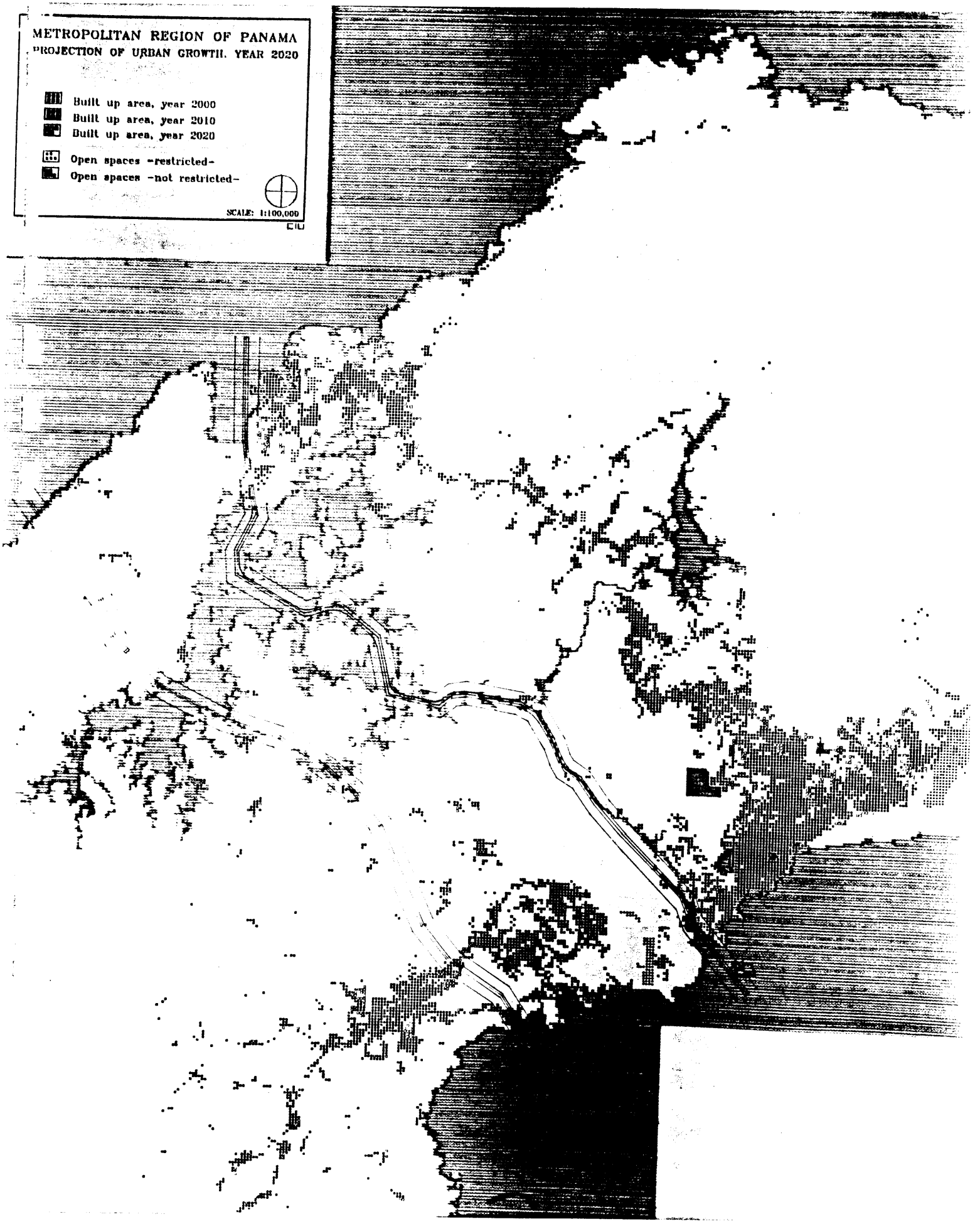
FIGURE III-2
Projections of Population Growth in the Metropolitan Region Without Any Canal Alternative



[3] Proyecciones de Población. Dirección de Estadística y Censo.

FIGURE III-3


Projections of Population Growth Trends
in the Metropolitan Area
Without Any Canal Alternative
Population
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1960
1970
1980
1990
2000
2010
2020
2030
Years
Colon
Arraijan
La Chorrera
Panama
San Miguelito


METROPOLITAN REGION OF PANAMA
PROJECTION OF URBAN GROWTH. YEAR 2020
Built up area, year 2000
Built up area, year 2010
Built up area, year 2020
Open spaces -restricted-
Open spaces -not restricted-
SCALE: 1:100,000

METROPOLITAN REGION OF PANAMA
ROJECTION OF URBAN GROWTH. YEAR 2000

Built up area, year 1980
Built up area, year 1990
Built up area, year 2000

Open spaces -restricted-
Open spaces -not restricted-

SCALE: 1:100,000

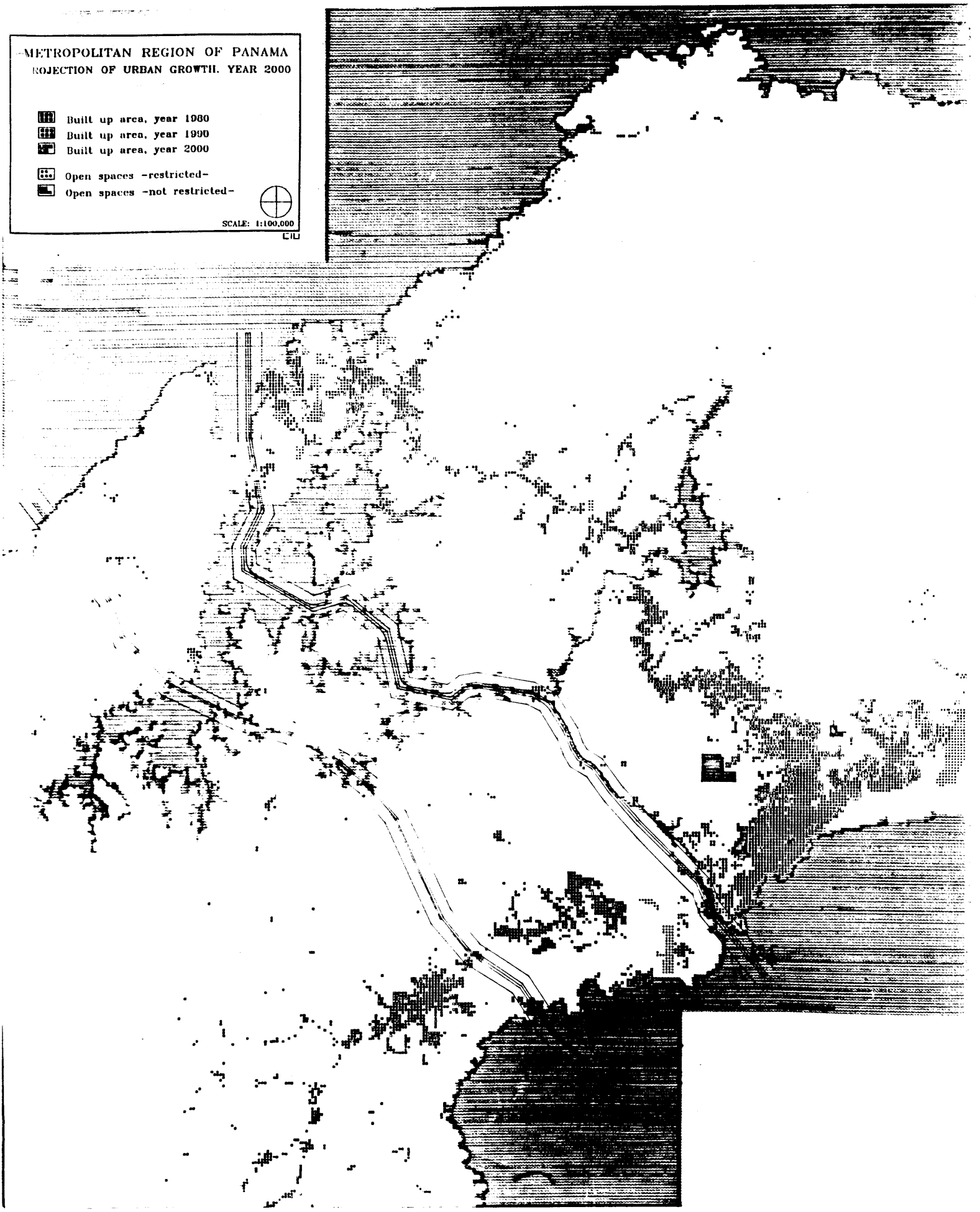


FIGURE III-4

Projections of Cumulative Population Growth of the Metropolitan Area Without Any Canal Alternative

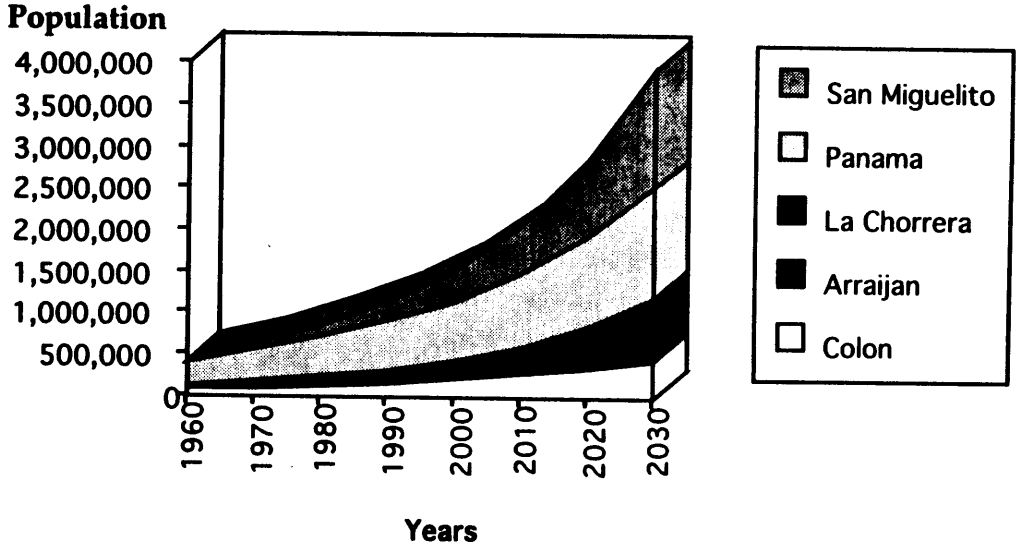
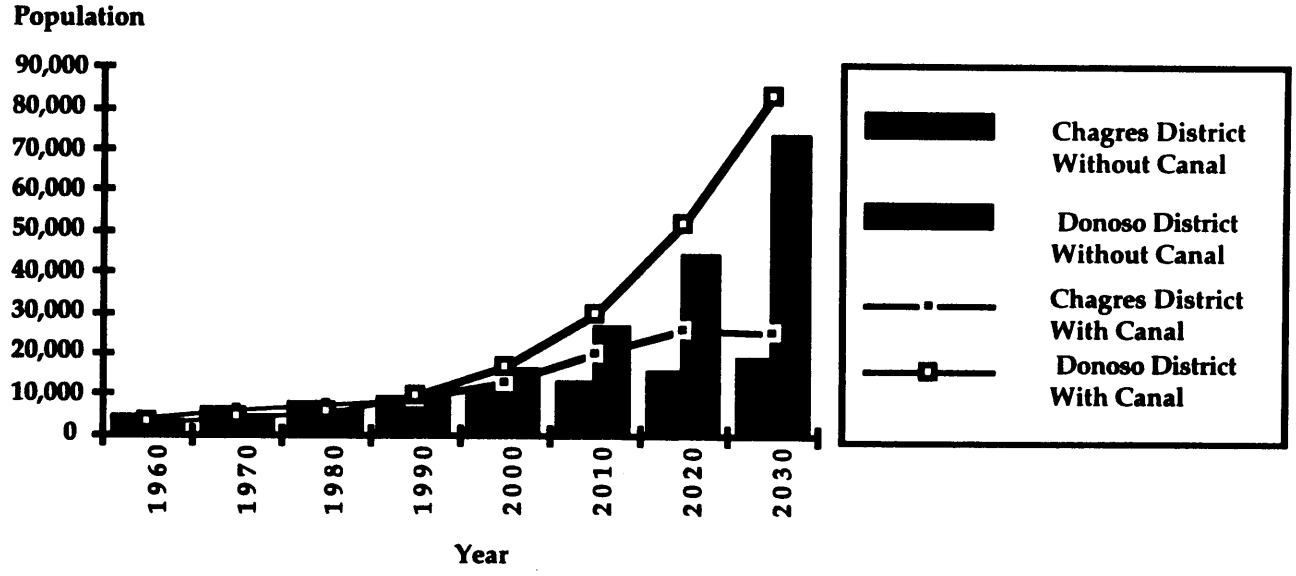


Figure III-5 demonstrates an example of population growth projections in districts affected by a chosen alternative. Population growth trends in this example are given for two districts in the Atlantic side, which will be subjected to direct impacts by the Sea Level Canal construction and operation. Similar graphs for the districts impacted by either or both Canal alternatives are included in the Appendix to this Section. (See charts 7 and 8 for information on the impact of the districts of the Metropolitan Region as they are impacted by the Sea Level Canal alternative with 2 scenarios of 10 percent and a 25 percent increase over current projections.)

FIGURE III-5

Population Increase Forecasts in the Districts of Chagres and Donoso with the Sea Level Canal



As a reference point for impacts, it is most important to keep at hand the data concerning projections in population for the canal construction period. Population estimates made for this report, based on tendencies observed, suggest that the Metropolitan Region will reach a total population of 1,654,415 by the year 2000, and 3,046,502 by the year 2030. Figure III-6 summarizes the population estimates for the Metropolitan Region.

FIGURE III-6

POPULATION ESTIMATES FOR THE METROPOLITAN REGION BY PROVINCE AND DISTRICT ASSUMING NO CANAL CONSTRUCTION : YEARS 2000, 2010 AND 2020.

Province and District	2000	2010	2020
Metropolitan Region	1,654,415	2,227,400	3,046,502
Province of Colon	212,675	270,443	346,605
District of Colon	175,471	218,512	272,110
Chagres	10,954	13,036	15,514
Portobelo	6,858	7,946	9,205
Sta. Isabel	3,471	4,496	5,824
Donoso	15,921	26,453	43,952
Province of Panama	1,441,740	1,956,997	2,699,897
District of Arraijan	102,869	171,096	284,572
Capira	37,119	48,680	63,843
Chame	18,673	23,012	28,359
Chepo	41,438	58,915	83,764
La Chorrera	120,352	161,334	216,272
Panama	719,809	878,612	1,076,939
San Carlos	14,830	17,676	21,067
San Miguelito	377,120	585,205	908,107
Taboga	2,191	2,653	3,212
Chiman	4,764	7,404	11,506
Balboa	2,575	2,410	2,256

Source: Prepared by the Population Specialist for Booz•Allen & Hamilton Inc., 1993

3.1.2 Ethnic composition

3.1.2.1 *Immigrants:* Historically, Panama has attracted people from all over the world. This ethnic multiplicity is more noticeable in Panama and Colon, the two larger cities of the Metropolitan Region. Although peoples of different cultural and geographical origin may share some traits, there are some very strong differences among various groups. Some ethnic communities in Panama (Chinese, Jewish, Hindu, etc.) are well defined. These groups are also defined by the type of economic activity they usually engage in.[4]

3.1.2.2 *Indigenous:* According to available data, it is possible to describe the indigenous population of the country. According to the 1990 Census there are five groups of Indians in Panama (Kuna, Guaymi, Teribe, Bokota and the Choco group - Embera and Waunana) who account for 194,269 individuals or 8.3% of the total population. They are located in all provinces of the country, but they tend to concentrate in specific Indian regions (Comarcas).

Even though the Constitution and other pertinent legislation protects the indigenous population and their land, their growth in numbers has caused great pressure on their land. Because of this, the native population has felt the need for more land. This has been one of the main pressures inducing them to move to other areas of the country to seek employment and a better life. With increased levels of education, especially among the young, who move into urban areas to continue higher education or to join the labor force, there will be an increasing expectation of quality of life.

The Metropolitan Region has a native population in both its rural and urban zones. In 1990, this region held 10.0% of the total native population. This figure does not include the San Blas (comarca) region in the Province of Colon. Outside of the comarca, there are 2,684 Indians living in this province in 420 housing units, the majority of which (86%) are located in the District of Colon. (See Figure III-7) [5]

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[4] There is no official procedure to quantify the population of these ethnic groups, since the majority are Panamanian citizens by naturalization or birth.

[5] In the volume on Populated Regions of the 1990 Statistics, there is no breakdown of native population in the Colon province by wards or localities. It is presented only on a district level.

FIGURE III-7

NATIVE (INDIAN) POPULATION LIVING IN THE METROPOLITAN REGION BY PROVINCE AND DISTRICT ACCORDING TO NUMBER OF LOCALITIES. 1990 POPULATION AND HOUSING CENSUS.

PROVINCE, DISTRICT	NUMBER OF LOCALITIES	NUMBER. OF DWELLINGS	INDIGENOUS POPULATION
COLON [6]		**420**	**2684**
COLON		360	2421
CHAGRES		15	55
DONOSO		4	19
PORTOBELO		21	95
SANTA ISABEL		20	94
PANAMA	**321**	**2740**	**16840**
ARRAIJAN	28	285	1858
BALBOA	6	31	87
CAPIRA	15	11	63
CHAME	10	4	21
CHEPO	82	434	2682
CHIMAN	16	79	465
LA CHORRERA	30	63	335
PANAMA	123	1413	8665
SAN CARLOS	10	8	34
SAN MIGUELITO	21	411	2629
TABOGA	1	1	1

It is important to take into account the native population now existing in the Metropolitan Region. Although they are identified by census as rural farmers, they have their own specific peculiarities which highlight their relative disadvantage in comparison with the rest of the population. For example, data shows that the indigenous groups have the lowest levels of education. In 1990, the country had a 10.7% illiteracy level: 3.6% in the urban population, 19.7% in the rural

[6] The volume on localities in the 1990 Census does not separate the native population in Colon or in San Miguelito by township or place. It is presented only on a district level.

population and 44.3% in the Indian population. However, indigenous groups living in rural areas have a 47.7% illiteracy, as compared to those living in urban areas who have 20.3% illiteracy.

According to the 1990 Census, the native population in the Province of Panama is located in 11 districts. The Districts of Arraijan, La Chorrera, Panama and San Miguelito account for 79.3% of the total native population in the province of Panama.

As far as settlements of native population in the Province of Panama are concerned, the most highly populated, consists of 927 people living in 133 indian dwellings, around the ward of Veracruz, in the District of Arraijan. It should be noted that 61.0% of the total native population in the District of Panama is located in Panama City.[7]

3.1.2.3 *Internal Migration*: Some studies conducted indicate that internal migrants (rural-urban) usually take their poverty along with them from the countryside to the cities. Lower levels of education, and the lack of any training as tradesmen or artisans hinders and restricts their incorporation into the labor market under the same conditions granted to urban inhabitants.[8] This disadvantage has heretofore continued through successive generations.

3.1.3 Present Social Infrastructure Situation.

The following data shown in Figures III-8 through III-11 afford a clearer picture of the present situation of the social infrastructure of the Metropolitan Region, and is intended to assist in foreseeing which changes will be required on account of the increase in population.

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[7] In 1990 Panama City comprised the following wards: San Felipe, El Chorrillo, Santa Ana, La Exposición o Calidonia, Curundú, Betania, Bella Vista, Pueblo Nuevo, San Francisco, Parque Lefevre, Río Abajo, Juan Diaz and Pedregal.

[8] Programa Regional de Empleo para América Latina y el Caribe (PREALC). Urban Poverty and Labor Market in Central America and Panama. 1991

3.1.3.1 *Housing*

FIGURE III-8

PRIVATE DWELLINGS OCCUPIED IN PANAMA AND PERCENTAGE OF CHANGE FROM 1980 TO 1990 METROPOLITAN REGION AND THE REST OF THE COUNTRY

TOTALS	NO. DWELLINGS (1990)	% CHANGE FROM 1980 TO 1990
COUNTRY TOTAL	524,284	38.7
METROPOLITAN REGION	291,568 (55.6%)	41.2
COLON	39,867	29.6
PANAMA	251,701	43.3
REST OF THE COUNTRY	232,716 (44.4%)	35.6

Source: Statistics Department, "Panama en Cifras", 1991.

FIGURE III-9

SOME PANAMANIAN HOUSING CHARACTERISTICS, METROPOLITAN REGION AND THE REST OF THE COUNTRY (1990 STATISTICS)

CHARACTERISTICS	TOTAL	COLON	PANAMA	REST OF COUNTRY
WITH RUNNING WATER	438,994	35,027 (7.9%)	239,613 (54.6%)	164,354 (37.4%)
INDOOR TOILET	461,794	36,420 (7.9%)	242,399 (52.5%)	182,975 (39.6%)
DIRT FLOOR	96,990	3,337 (3.4%)	17,938 (18.5%)	75,715 (78.1%)
ELECTRICITY	381,676	32,025 (8.4%)	223,214 (58.5%)	126,437 (33.1%)

Source: Statistics Department. "Panama en Cifras", 1991.

As may be observed in the table above, the Metropolitan Region has 55.6% of all dwellings. The increase between 1980 and 1990 was higher in the Metropolitan area than elsewhere. It can be noted that within the Metropolitan Region 62.6% of dwellings have running water, 60.4% have indoor toilet, 66.9% have electricity and 21.9% of the dwellings have dirt floors.

3.1.3.2 *Households by Income*

FIGURE III-10

INDIVIDUAL HOUSEHOLDS BY AVERAGE MONTHLY INCOME (1990 STATISTICS)

	HOUSE HOLD	AVERAGE MONTHLY INCOME
COUNTRY TOTAL	526,456	244.6
COLON	40,084	263.4
PANAMA	253,316	381.4

Source: Statistics Department. "Panama en Cifras", 1991.

In Figure III-10, the average monthly income is higher in the provinces of Panama and Colon than that of the total country. This would seem to attract immigrants. However, within Panama the internal differences are great, where there are districts and wards where average income is higher than the above averages. For example, in San Miguelito it is $401.10 per month, in Jose Domingo Espinar it is $579.00 and in the lowest, Belisario Porras, it is $249.50.

3.1.3.3 *Health Institutions in the Republic of Panama (1990)*

FIGURE III-11

HEALTH INSTITUTIONS IN THE REPUBLIC OF PANAMA, 1990

	TOTALS	MEDICAL CENTERS AND HOSPITALS	HEALTH CENTERS AND MAJOR CLINICS	SMALL CLINICS
COUNTRY TOTAL	669	55	181	433
COLON	71	5	15	51
PANAMA	150	20	62	68
CITY OF COLON	7	3	4	0
PANAMA CITY	36	14	22	0
REST OF COUNTRY	448	30 (54.6%)	104 (54.5%)	314 (72.8%)

Source: Statistics Department. "Panama en Cifras", 1991.

The above table shows the Metropolitan Region having 45.4% of all integrated medical centers and hospitals, and 42.5% of the health centers and major clinics. Within that percentage, Panama City and Colon City have 84% of the medical centers and hospitals and 33.8% of the health centers and major clinics.

These figures do not highlight that the Metropolitan Region has 74.1% of the nation's doctors, (80.1% of whom are in the cities of Panama and Colon); 70.5% of the dentists; 73.0% of the nurses (83.4% of whom are in the cities of Panama and Colon); and 61.7% of the hospital beds (87.3% of which are in the cities of Panama and Colon).

3.1.3.4 *Education*

In most areas of social infrastructure it is evident that the Metropolitan Region has the advantage in 1990. The average education level (aggregate years of schooling) nationwide is 6.7, while in the province of Colon it is 7.1, and in the province of Panama it was 8.0. As can be noted in Figure III-12, the area of education is one in which the Metropolitan Region is ahead of the rest of the country

FIGURE III-12

SCHOOLS, ROOMS, MATRICULATION AND TEACHERS, FOR THE REPUBLIC OF PANAMA AND FOR METROPOLITAN REGION, 1992

LEVEL AND PROVINCE	SCHOOLS	ROOMS	REGISTRATION	TEACHERS	TEACHER / PUPIL RATIO
TOTAL	**3,923**	**19,414**	**589,772**	**25,435**	**23.2**
INITIAL	854	1,783	37,464	1,581	
PRIMARY	2,718	12,659	352,595	13,751	
MIDDLE	351	4,972	199,713	10,103	
COLON	**272**	**1,390**	**47,849**	**1,823**	**26.25**
INITIAL	73	91	3,115	113	
PRIMARY	174	875	28,402	967	
MIDDLE	25	424	16,332	743	
PANAMA	**1,122**	**7,912**	**271,839**	**11,425**	**23.8**
INITIAL	397	1,068	21,987	909	
PRIMARY	569	4,325	142,384	5,212	
MIDDLE	156	2,519	107,468	5,304	

Source: Ministry of Education, Statistics Department.

3.1.4 Economic Activity and Employment in the Metropolitan Region

3.1.4.1 According to a study conducted by PREALC in Panama, 60.0% of the population is classified as poor.[9] It is considered that 75.0% of the population in rural areas is poor, and that 61.4% of the poor of the country are located in rural zones. Nevertheless, the magnitude of urban poverty is significant.

[9] Programa Regional de Empleo para América Latina y el Caribe (PREALC). Urban Poverty and Labor Market in Central America and Panama. 1991

The PREALC study shows that the informal urban sector[10] of the economy includes:

- 24.4% of the urban laid-off and 22.5% of the urban employed.
- 29.2% of the urban laid-off needy and 57.3% of urban indigents employed.
- 24.3% of the urban laid-off poor and 33.3% of urban poor employed.
- 65.0% of urban indigents are employed in the informal sector.

These numbers are significant insofar as that percentage of internal migrants, without the skills to join the formal labor market, will enter into the informal economy. At the same time as this informal urban sector becomes saturated, it will be less capable of providing the minimum requirements of survival for migrants and their families.[11]

The 1991 Home Survey (preliminary numbers) shows that the PEA (economic active population) for 1989-1991 grew by 36,000, 67.0% of the increase corresponds to the Metropolitan Region. During the same period, as the numbers of migrants grew, the PEA in the Republic went from 58.0% to 57.0%; from 59.0% to 58.0% in the Metropolitan Region and from 57.0% to 56.0% in the rest of the country. This reduction tends to compound the problems of the internal migrant.

3.1.4.2 According to the *Statistic and Census Department* data, collected to prepare the Directory of Business Economic Activities, the Metropolitan Region has 60.0% of the total businesses of the country. Panama City includes approximately half the businesses. These are concentrated in manufacture, transportation, warehousing, communications, financial intermediary, construction and other services. 87.0% of the construction business is concentrated in the Metropolitan Region.

3.1.4.3 The 1990 Home Survey also showed that 77.0% of the total urban area unemployed live in the Metropolitan Region. This figure does not reflect the percentages of under employed, nor does it reflect the informal urban sector.

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[10] The informal sector of the economy consists of activities carried out by individuals on their own, generally by people in very low income brackets who pay no taxes.

[11] Concerning the counting of migrants, if a person has been in an area for two census counts, he/she is no longer considered a migrant.

3.1.4.4 As to domestic migration and the informal market, the PREALC study shows that for the rural migrant, commercial activities - peddlers - are the easiest alternative for quick access to jobs. Peddling foodstuffs, such as grain and vegetables, is an activity familiar for the rural migrant, end enables him to have a better income than what he had in the interior. However, informal market merchants, although better off than the landless rural poor, are not free from problems, and tend to become a substantial part of the urban poor. The lack of job opportunities for new workers, as well as for migrant workers, accounts for an expansion of informal urban sector occupations, thereby increasing the number of unprotected and underpaid jobs. Yet, the most relevant fact about this migration is that many migrants have no means of sustenance for themselves or their families in the country. Their arrival in the cities enlarges temporary housing neighborhoods and increases urban poverty. But this, in turn, does not make rural poverty decrease, since it is not due to low per capita income in absolute terms, but to an unequal distribution which allows 17.5% of all per capita income for distribution among 40% of the population.

3.1.4.5 Regarding social pathologies, official figures show that in 1991, Panama Province jails had 46.7% of the national total, and Colon Province 9.9%. Out of 10,750 criminals processed in 1990, 64.1% were in the Metropolitan Region, 61% of which were in the cities of Panama and Colon. A study shows that in the districts of Panama and San Miguelito there are at least two (2) weekly cases of rape.[12]

3.1.4.6 The Metropolitan Region is deeply contradictory. Although it is the most advanced and modern and thus promotes expectations for migrants as a result of its overpopulation it has the highest rate of unemployment, under employment and poverty.

3.1.5 Interrelation Between Population, Socio-cultural and Political Variables

3.1.5.1 Demographic variables have significant socio-cultural and political connotation.

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[12] Perez, Amelia de, The First Approach To A Diagnosis Of The Problem Of Sexual Assaults Against Women. editorial Perez & Perez, CEDEM, Panama, 1991.

- Fertility and mortality become socio-cultural variables when they refer to ethnic groups, age groups (i.e. adolescent mothers), groups according to area of residence (urban, rural), and educational levels. They also become political variables insofar as they may affect the sociopolitical system.

- Internal migration is a decisive component of population distribution in the Metropolitan Region. Internal migration becomes a socio-cultural variable when relating the characteristics of the migrant population, place of origin and destination, sex and age, if migrating alone or with family, marital status, and educational level.

- A classification of provinces as losers or recipients of population has some social, economic and political interest, particularly if the migrants are of working age or if the movement of population can be related to the availability of social infrastructure. The results of migration are a potential shortage of labor in the population of the losing provinces and a potential excess of supply in the recipient provinces. This situation is charged with potential impacts and pressure on the political system.

- Foreign migration has been a determinant variable in the history of Panama's Canal and the Metropolitan Region. It becomes a socio-cultural and political variable insofar as it can affect the rise and/or consolidation of a perception of common links and customs and shared aspirations within the specific lifestyle and the idiosyncrasies that merge in a national identity.

- Spatial distribution is the result of migratory processes and becomes a socio-cultural and political variable insofar as high rates of concentration of population exist in the Metropolitan Region. This situation puts both the basic services and the formal and informal labor markets under pressure, and it also gives rise to a new social pathology.

3.2 IDENTIFICATION AND ANALYSIS OF SOCIO-CULTURAL AND POPULATION IMPACTS.

3.2.1 Identification of Impacts

3.2.1.1 The following areas were studied in order to facilitate the identification of impacts.

FIGURE III-13

IDENTIFICATION OF IMPACT AREAS IN BOTH ALTERNATIVES

POPULATION	SOCIO-CULTURAL
1. Magnitude • In the Metropolitan Region. •• Province/district/ward. •• Populated sites. 2. Growth trends 1960-2030. 3. Fertility and mortality trends by province. 4. Migration. 5. Relocation.	1. Pressure of the population on basic services. 2. Internal and foreign migration socio-cultural effects. 3. Relocation. 4. Economic-social effects of migration into the Metropolitan Region (inflation, informal labor market, poverty). 5. Archeological and historical sites 6. Loss of labor force in provinces losing population.

FIGURE III-14
IDENTIFICATION OF IMPACT AREAS DURING CONSTRUCTION

POPULATION	SOCIO-CULTURAL
1. Migration. • Acceleration of the rate of increase in the population of the Metropolitan Region. •• Native immigration. •• Foreign immigration. •• Depopulation of the countryside. 2. Relocation.	1. Migration (origin, destination, characteristics of migrants). • Effects on the interior due the increment of domestic migration. • Foreign migration: characteristics of migrants. • Availability of basic services (water, power, housing, transportation, schools, etc.). • Situation of poverty in the Metropolitan Region. • Effects of migration on national identity. • Increases in social pathologies. • Inflation. • Increment of immigration of Central American rural workers 2. Relocation (human group and place of destination). 3. Inflation in the Metropolitan Region (higher cost of living, higher land value, higher cost for basic services and entertainment). 4. Camps and Villages in the Project area: • A return to the gold roll-silver roll system?. 5. Is the provision of post offices, supermarket, churches and schools in keeping with Panamanian legislation over these matters?

FIGURE III-15

IDENTIFICATION OF IMPACT AREAS DURING THE OPERATION

POPULATION	SOCIO-CULTURAL
1. Magnitude and increase in population. • Migratory trends.	1. Socio-cultural pressure on the Metropolitan Region population.
2. Population who will attempt to stay in or close to the former construction villages.	2. Socio-cultural pressure on the rest of the country.
3. Demographic situation in the countryside.	3. The possible existence of another Canal Zone.
	4. Clearly understood and applied repatriation policies.
	5. Oversupply of labor and underemployment in or near construction areas.
	6. Residual population in or near construction villages.

3.2.1.2 The announcement of activities for the construction of the canal has the potential to trigger strong domestic and external migration into the Metropolitan Region. The planning for the announcement and the manner of the announcement will drive, at least initially, the magnitude of the migration. In any event, the anticipated work will affect migratory trends and will cause an increase in population higher than would normally be projected. As a result, there will be increased pressure on housing, public services (water, power, schools, health, etc.), the social security system, and the administration of justice, all of which must be provided or guaranteed by the Panamanian Government. This will further stress the urban labor market and the economic system.

3.2.1.3 The anticipation of increased property values and the concurrent speculation in the value of land, especially in areas surrounding the project area and construction camps will create additional problems for migrants and for the general population. The problems created by this foreseen increase in the value of land has the potential to create indirect political and socio-cultural problems, as the migrants see that their possibilities of finding affordable housing can be expected to decrease.

3.2.1.4 Both alternatives will generate an accelerated flow of domestic and foreign migrants immediately after the announcement of construction works. Growth in the Metropolitan Region will exceed present projections, which do not taken the construction of a Canal alternative into account. The magnitude of impacts arising from the High-Rise Locks Canal will be smaller.

3.2.1.5 The expression "camp and villages" can be construed to imply that workers and staff will enjoy very different conditions. This recalls the gold roll and silver roll aspects of the construction of the present Canal, which might have a negative impact due to popular sensitivity to any possible reinstatement of a "Canal Zone". The Yachiyo Economic Cost Estimate (ECE) Report proposes that the villages continue to be housing areas during the operation phase. The permanence of the villages and camps, unless they are constructed with the concept of post construction utilization by the Canal Authority as maintenance or industrial areas, can create problems similar to those created by the original "Canal Zone." Many of the camps used in the original Canal construction became slums afterwards, while the villages became homes of the more privileged.

3.2.1.6 The problem of relocation of the population differs significantly with the two alternatives. The magnitude of impacts caused by the Sea Level Canal alternative will be significantly greater.

3.2.1.7 An increase in spontaneous settlements and/or their population is an expected impact both upon the announcement and during the construction of either alternative. Incursion on government and or private lands, by domestic or foreign migrants coming to the Metropolitan Region and to the Project Area in search of new opportunities and employment, is another expected impact. The above phenomena apply to either of the alternatives, but can be predicted to be higher in the case of Sea Level Canal because of the 1) longer construction period, 2) higher capital investment, and, 3) increased number of employees. In both cases, the supply of labor will be higher than the demand

estimated. The need for select qualified labor will not necessarily coincide with the oversupply created by migratory flows or collateral formal activities generated by the construction works.

- This will result in some indirect impacts such as greater demand for basic services (water, power, education, transportation, health, sanitation and security) which will exert pressure on the government to respond, and will create a more acute imbalance in the spatial distribution of the country's population.

- Also, the increased pressure caused by the unemployed population concentrated in the Metropolitan Region will give rise to other indirect negative impacts such as homelessness, more unemployment, more underemployment, increased drug abuse, prostitution, early pregnancies, crime and violence. Either alternative will cause an increase level of impact beyond normal projections.

3.2.1.8 A direct socio-cultural impact for either alternative will be a decrease in job openings, during the operation of the canal since the number of workers needed will not be as many as for the construction phase. This is primarily because the skills required for operations will be different for construction except those needed for on-going maintenance, such as dredging. This will have indirect political and economic impacts. The level of expectations for jobs will rise and the pressure on the government to provide alternative work will be significant. This will be especially true in the case of the Sea Level Canal, where the construction phase work force will be stationed in a region where the Government of Panama will have less social or technical infrastructure. For this reason, Panama should not elect to accept the labor camps and the facilities proposed by the ECE Report as permanent. If this decision is made, the Government of Panama may not find it as difficult to re-orient the excess of labor onto other activities or to return laborers to their place of origin.

3.2.1.9 It is foreseen that deaths due to violent causes will be higher than present trends [13] because of the increase in population and the greater stress on police security capabilities in the Metropolitan Region. This will have a negative social impact.

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[13] At present the first cause of death in Panama, is "due to violent causes". See: Estadísticas Vitales, Dirección de Estadística y Censo.

3.2.1.10 In respect of the fertility component in the country, and in the Metropolitan Region where the fertility rate is the lowest, trends indicate that it will continue to diminish. Estimates in the Province of Panama for the year 2,000 envisage two (2) children for every woman and no more than three (3) in the Province of Colon. If large contingents of Panamanian migrants move into the Metropolitan Region from rural areas where fertility is higher, and adopt the patterns of the Metropolitan Region, then fertility could be expected to be lower than estimated.

- It is very important to stress that, based on available forecasted lower mortality and fertility rates, there will be modifications in population structure (by sex and age). It is also expected that the population of active age will increase in relative importance, and by the year 2000, more than 60% of the total population will be ready to enter the labor market. If foreign migration is added to this, more pressure will be placed on the labor market and there will be an oversupply of labor. Unemployment and underemployment will be higher because either of the alternatives will cause migratory flow into Panama and into the Metropolitan Region. This will be a social impact and cost of either alternative.

- The following table presents basic demographic indicators presents birth and death rates by year in the Country, in the Metropolitan Region, as well as in Panama and Colon:

FIGURE III-16

GROSS DEMOGRAPHIC RATES IN THE REPUBLIC OF PANAMA, AND IN THE PROVINCES OF PANAMA AND COLON. YEAR 1980-2000 (PER 1000 INHABITANTS)

5-YEAR PERIOD	NATURAL GROWTH	BIRTHS	DEATHS	DOMESTIC/ FOREIGN MIGRATION (NET)
Republic of Panama:				
1980-1985	22.62	28.01	5.38	-0.96
1985-1990	21.52	26.68	5.16	-0.86
1990-1995	19.68	24.96	5.28	-1.11
1995-2000	17.39	22.51	5.12	-1.01
2000-2005	15.24	20.34	5.09	-0.94
2005-2010	13.43	18.65	5.22	-0.88
2010-2015	11.86	17.30	5.45	-0.83
2015-2020	10.30	16.14	5.84	-0.79
2020-2025	8.71	15.08	6.37	-0.75
Province of Panama:				
1980-1985	21.46	25.53	4.07	4.37
1985-1990	20.37	24.49	4.12	4.00
1990-1995	18.46	22.78	4.32	4.41
1995-2000	15.95	20.47	4.52	4.82
Province of Colon:				
1980-1985	22.13	28.90	6.77	-3.47
1985-1990	20.86	27.21	6.35	-2.87
1990-1995	19.44	25.60	6.16	-2.15
1995-2000	17.87	23.86	5.99	-0.81

Source: Special Bulletin of the Department of Statistics and Census, Panama 1993. Projected Total Population for the Republic of Panama: 1990-2025. Prepared by Population Specialist Booz•Allen & Hamilton.

3.2.1.11 For the construction stage of the Sea Level Canal alternative the first population areas to be directly affected by the works along the construction line includes 43 town sites with a total population of over 12,000 inhabitants living in over 3,200 dwellings (see Figure III-17.)

FIGURE III-17

LOCALITIES DIRECTLY AFFECTED IN AREAS ALONG THE CONSTRUCTION LINE OF THE SEA LEVEL CANAL

PROVINCE AND DISTRICT	WARDS	TOWN SITES	NUMBER OF HOUSES	POPULATION
PROVINCE OF COLON				
COLON	1	4	367	1,430
CHAGRES	4	12	812	2,284
DONOSO	1	1	7	23
SUB-TOTAL	**6**	**17**	**1,186**	**3,737**
PROVINCE OF PANAMA				
ARRAIJAN	4	4	677	2,936
LA CHORRERA	8	21	1,377	5,447
PANAMA	1	1	16	45
SUB-TOTAL	**13**	**26**	**2,080**	**8,428**
TOTAL	**19**	**43**	**3,266**	**12,165**

Source: Special Bulletin of the Department of Statistics and Census, Panama 1990, Volume I, Populated Sites and Maps. Prepared for Booz, Allen & Hamilton.

FIGURE III-18

LOCALITIES DIRECTLY AFFECTED IN AREAS ALONG THE CONSTRUCTION LINE OF THE SEA LEVEL CANAL

PROVINCE AND DISTRICT	WARD	TOWN SITE	NUMBER OF DWELLINGS	MIXED POPULATION	INDIGENOUS POPULATION
Province of Colon:					
Colon					1
	Escobal	Escobal	367	1,430	1
	Escobal	Isla La Esperanza*	**	**	**
	Escobal	Isla Los Negros*	**	**	**
	Escobal	Punta Ramón*	**	**	**
Chagres			812	2,284	4
	Achiote	Achiote	110	339	0
	Chagres	Brazo Seco	9	36	0
	Chagres	Caño Quebrado	14	39	0
	Chagres	El Bracito	5	31	0
	Chagres	Lagartero	4	14	0
	Cabecera	Nuevo Chagres	198	270	2
	Chagres	Palmas Bellas	222	688	1
	Chagres	Piña	105	305	0
	Chagres	Pueblo Nuevo	83	348	1
	Chagres	Punta Anibal*	**	**	**
	Chagres	Punta Grande/ Las Malvinas	**	**	**
			25	55	0
	El Guabo	Plátano	37	159	0
Donoso			7	23	0
	El Guasimo	Escobal	7	23	0
SUB-TOTAL			1,186	3,737	5

* Non-Indigenous
** No Available data

(Table Continued)

FIGURE III-18 CONTINUED

PROVINCE AND DISTRICT	WARD	TOWN SITE	NUMBER OF DWELLINGS	MIXED POPULATION	INDIGENOUS POPULATION
Province of Panama:					
Arraijan			677	2,936	18
	Arraiján	San José	392	1,596	18
	J.D.A.	El Bernardino	61	220	0
	Nuevo Emperador	Huile	22	81	0
	Santa Clara	Santa Clara	222	1,039	0
La Chorrera			1,377	5,447	8
	Amador	Bajo Island *	**	**	**
	Amador	Lagarterita	40	134	0
	Amador	Las Pavas	63	247	0
	Amador	Los Hules Abajo	106	443	0
	Amador	Quebrada Chico	49	162	0
	Barrio Colón	El Limón	213	867	0
	El Arado	El Lirio	116	415	3
	El Arado	La Celestina	17	61	0
	El Arado	El Limón	15	51	0
	El Arado	Santa Cruz	49	194	5
	El Arado	Loma Alta	71	242	0
	El Arado	Los Monteros	8	36	0
	Feuillet	Santa Cruz	23	74	0
	Herrera	La Cocobola	10	23	0
	La Represa	Alto del Jobo	67	223	0
	La Represa	Cerro Cañito	22	56	0
	La Represa	La Laguna	47	187	0
	La Represa	Calabacito	7	25	0
	Mendoza	Mendoza	102	390	0
	P. Caimito	P. Caimito	367	449	0
	P. Caimito	Q. Rodeo	56	168	0
Panama			16	45	0
	Ancón	Lagarterita	16	45	0
SUB-TOTAL			2,141	8,428	26
TOTALS			3,327	12,165	31

** No Available data.

Source: Populated Areas; Amplified from 1990 Statistics of the Republic of Panama. General Accounting Offices. Metropolitan districts with Canal alternatives considered. Prepared by Booz•Allen & Hamilton Inc.

3.2.1.12 It is worth noting that the Yachiyo ECE Report, in Part IV, Section I, Chapter II (pages IV.1.11.3) contains a list of localities (21) and the number of dwellings (135) which will require relocation on account of the works on the Sea Level Canal. The same Report describes several islands and localities which will disappear because of the dams (page IV.17.2). The number of dwellings does not coincide with official figures in the 1990 Census.

3.2.1.13 Available figures for the High-Rise Lock Canal alternative, suggest that about 20 town sites will be seriously affected by construction works, according to 1990 census data. It is estimated that some 7,000 people in 2,000 dwellings live in these town localities. This does not include U.S. personnel stationed in military bases, nor those who live in areas under U.S. military control, although some of these areas would be affected by the High-Rise Locks alternative. Details of the places most likely to be affected by the High-Rise Lock alternative are in Figure III-19.

3.2.1.14 Population data in Yachiyo ECE Draft Final Report refers basically to density, and points out that, with the exceptions of urban areas in Panama City, the corridor between Tocumen and La Chorrera and the district of Colon, population density is generally low.[14] (See Table II.1.5-1 of the Yachiyo ECE Report). The ECE Report does not take into consideration the number of towns that could be directly impacted and require relocation.

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[14] Yachiyo Engineering Co., Preliminary Engineering and Cost Estimates. Final Report. April 1993.

FIGURE III-19

POPULATED AREAS DIRECTLY AFFECTED ALONG THE CONSTRUCTION LINE OF THE HIGH RISE LOCK ALTERNATIVE

PROVINCE AND DISTRICT	WARDS	POPULATED AREAS	NUMBER OF HOUSING	TOTAL	MIXED POPULATION	INDIGENOUS POPULATION
Colon			**564**	**1,898**	**1,867**	**31**
Colon	Cristobal	Fort Davis				
		Fort Gullick				
		Fort Sherman				
		Gamboa	194	496	468	28
		B. Colorado Island				
		Brujas Island				
		Juan Gallegos Island				
		Tigres Island				
		Margarita	370	1,402	1,399	3
		Rainbow City				
		Randolph				
Panama			1,427	5,293	5,136	157
Panama	Ancon	Balboa	581	2,182	2,174	8
		Balboa High	48	144	144	0
		Cocoli				
		Diablo Height				
		Fort Amador				
		Fort Clayton	1	2	2	0
		La Boca	107	392	392	0
		Los Rios	172	668	658	10
		Paraiso	299	1,095	987	108
		Pedro Miguel	219	810	779	31
Totals			**1,991**	**7,191**	**7,003**	**188**

Source: -Populated Areas; Amplified from 1990 Statistics of the Republic of Panama. General Accounting Offices. Metropolitan districts with Canal Alternatives considered. Prepared by Booz•Allen & Hamilton Inc.

3.2.2 Listing of Population and Socio-cultural Impacts

3.2.2.1 *Direct Impacts*

- Moving town sites and their inhabitants from project areas.
- Relocation of population in selected areas outside of project areas.
- Creation of selective jobs by the investments in widening the Canal during construction and operation.
- Loss of economic activities in dislodged areas.
- Increase in domestic and foreign migration flows into the Metropolitan Region.
- Increase in spontaneous settlements
- Increase in the labor supply in the Metropolitan Region
- Increase in activities in the informal sector of the economy, and unemployment and underemployment of unskilled labor.
- Increase in government revenues due to construction activities.
- Increase in morbidity and mortality due to causes related to the construction.

3.2.2.2 *Indirect Impacts*

- Increase in pressure for social infrastructure services
- Increase in the demands for basic services in areas receiving dislodged population.
- Possible destruction of historical and archeological sites.
- Adaptation of economic activities for dislodged and relocated population.
- Changes in the lifestyle of relocated people.
- Increase in the labor supply due to domestic and foreign migrants, and due also changes foreseen in the estimated relative increase in population of working age.
- Increase in population concentration in the Province of Panama.
- Increase in mortality risks due to violence.
- Increase in drug abuse, early pregnancies, prostitution and homelessness.
- Increase in land speculation and in number of squatters.
- Decrease in fertility among migrants due to low birth patterns in the Metropolitan Region, and easier access to pertinent information and to public services.
- Increase in the use of lands for urbanization in reverted areas close to the project.

- Decrease in the national food supply due to a decrease in agricultural activity in rural regions of the country due to the expected increase in domestic migration flows into the Metropolitan Region.
- Decrease in the labor supply for agriculture in areas other than the Metropolitan Region.

3.3 CONCLUSIONS

Direct Socio-cultural and Population Impacts

3.3.1 Anticipation and upgrading of large investments in either alternative will create an accelerated flow of domestic and foreign migrants to the Metropolitan Region. The growth of the Metropolitan Region will exceed present forecasts. Anticipation of development in or near the project areas of the Sea Level Canal alternative will directly impact the migration flows to that area which is less capable of providing for such an increase. It will also create an increase in local needs for imported food. Impacts stemming from the High-Rise Lock alternative will be of a smaller magnitude.

3.3.2 An increase in spontaneous settlements and/or population growth are expected impacts both during the mobilization for, and the construction of, either alternative. In both cases, the supply of labor will be higher than the demand estimated for either canal alternative. The need for selective qualified labor will not necessarily coincide with the oversupply created by migratory flows, or collateral formal activities generated by construction works.

Indirect Socio-cultural and Population Impacts

3.3.3 Announcement of canal construction for either of the two canal alternatives will further increase the tendency of Panama's population to concentrate in the Metropolitan Region. This will have the indirect impact of increasing unemployment and underemployment especially in the unskilled labor categories.

3.3.4 During the construction period the provision for and the use of the workers camps and the housing areas for the staff could create negative indirect impacts. Conscious efforts by the Government will be required to organize and to manage these housing camps and villages in order to avoid the negative impacts experienced during and after the original Canal work. The larger number of workers

for a longer period of time in the Sea Level Canal alternative, and the increased number of villages and camps to accommodate these workers, makes the impact of this alternative more significant.

3.3.5 The Yachiyo ECE Report proposes that the villages continue to be housing areas during the operation phase. The permanence of the camps, unless they are constructed with the concept of post construction utilization by the Canal Authority as maintenance or industrial areas, can create problems similar to those created by the original "Canal Zone." Many of the camps used in the original Canal construction became slums afterwards, while the villages became homes of the more privileged. Larger number of workers for longer periods of time in the Sea Level Canal alternative, and the greater number of villages and areas to accommodate these workers, portends a more significant negative impact from that alternative.

3.3.6 The incursion on government or private lands by domestic or foreign migrants, while at the same time anticipation and speculation in land potentially will inflate values, could also be an indirect negative socio-cultural impact. These situations may arise in the case of either of the alternatives, but can be predicted to be greater in the case of Sea Level Canal.

3.3.7 Social infrastructure and public services in the Metropolitan Region absorb a large part of Panama's financial, technical and professional resources. Both alternatives will require additional resources, which, if priority is given to those services, will be detrimental to the rest of the country. This impact is anticipated to be more significant with the Sea Level Canal.

3.3.8 The permanence of the villages after the construction period, unless they are constructed with a view to facilitating post construction utilization by the Canal Authority as maintenance or as industrial areas, will be a reminder of the Canal Zone days, which in turn, will entail a negative impact on the national conscience. This is much more significant in the case of the Sea Level Canal, because there is no history of such separation in the areas, and because existing accommodations in the Metropolitan Region could be used during construction of the High-Rise Lock Canal alternative, especially if the phased construction concept is utilized.

3.3.9 The Sea Level Canal alternative will have greater population and socio-cultural impacts on Panama (in all socio-cultural aspects under consideration).

APPENDIX

SOCIOCULTURAL AND POPULATION CHARTS

ANALYSIS OF IMPACTS UPON PANAMA

CHART III-A- 1
METROPOLITAN REGION POPULATION BY DISTRICT, WARD AND GROWTH RATE AMONG CENSUS : 1960; 1970; 1980 AND 1990

PROVINCE	INHABITANTS				GROWTH RATES		
DISTRICT							
WARD	1960	1970	1980	1990	60-70	70-80	80-90
REGION TOTAL	**457,725**	**686,250**	**942,933**	**1,240,421**	**0.041**	**0.032**	**0.028**
COLON PROVINCE	**85,332**	**109,605**	**133,833**	**168,294**	**0.025**	**0.020**	**0.023**
COLON DISTRICT	**73,547**	**95,421**	**113,153**	**140,908**	**0.026**	**0.017**	**0.022**
Barrio Norte	59,598	36,072	32,321	30,385	(0.049)	(0.011)	(0.006)
Barrio Sur	0	31,623	27,519	24,269	*	(0.014)	(0.012)
Buena Vista	2,219	4,054	5,190	7,547	0.062	0.025	0.038
Cativá	2,389	3,387	10,870	19,101	0.036	0.124	0.058
Ciricito	1,273	1,551	1,753	2,108	0.020	0.012	0.019
Cristóbal	0	0	3,874	15,178	**	**	0.146
Escobal	1,200	1,849	1,807	1,964	0.044	(0.002)	0.008
Limón	1,170	1,916	2,700	3,209	0.051	0.035	0.017
Nva. Providencia	376	446	703	1,253	0.017	0.047	0.059
Puerto Pilón	2,085	4,295	8,460	10,241	0.075	0.070	0.019
Sabanitas	0	3,671	9,924	13,729	*	0.105	0.033
Salamanca	823	1,691	1,733	2,675	0.075	0.002	0.044
San Juan	2,077	4,351	5,839	8,716	0.077	0.030	0.041
Santa Rosa	337	515	460	533	0.043	(0.011)	0.015

CONTINUATION OF CHART III-A- 1
METROPOLITAN REGION POPULATION BY DISTRICT, WARD AND GROWTH RATE AMONG CENSUS : 1960; 1970; 1980 AND 1990

	1960	1970	1980	1990	60-70	70-80	80-90
CHAGRES DISTRICT	**4,206**	**6,063**	**7,735**	**9,205**	**0.037**	**0.025**	**0.018**
Chagres	360	349	304	327	(0.003)	(0.014)	0.007
Achiote	259	460	699	755	0.059	0.043	0.008
El Guabo	0	720	909	1,191	*	0.024	0.027
La Encantada	876	1,430	1,963	2,532	0.050	0.032	0.026
Palmas Bellas	1,460	1,279	1,430	1,628	(0.013)	0.011	0.013
Piña	402	492	678	687	0.020	0.033	0.001
Salud	849	1,333	1,752	2,085	0.046	0.028	0.018
PORTOBELO DISTRICT	**1,779**	**1,545**	**5,110**	**5,920**	**(0.014)**	**0.127**	**0.015**
Portobelo	753	623	2,774	3,058	(0.019)	0.161	0.010
Cacique	0	135	164	225	*	0.020	0.032
Garrote	270	84	453	591	(0.110)	0.184	0.027
Isla Grande	306	248	521	626	(0.021)	0.077	0.019
María Chiquita	450	455	1,198	1,420	0.001	0.102	0.017
SANTA ISABEL DISTRICT	**2,595**	**2,044**	**2,068**	**2,679**	**(0.024)**	**0.001**	**0.026**
Palenque	265	249	194	281	(0.006)	(0.025)	0.038
Guango	193	194	102	159	0.001	(0.062)	0.045
Miramar	153	132	98	88	(0.015)	(0.029)	(0.011)
Nombre de Dios	605	424	734	1,028	(0.035)	0.056	0.034
Palmira	401	255	268	313	(0.044)	0.005	0.016
Playa Chiquita	144	142	125	184	(0.001)	(0.013)	0.039
Santa Isabel	452	336	251	230	(0.029)	(0.029)	(0.009)
Viento Frío	382	312	296	396	(0.020)	(0.005)	0.000

CONTINUATION OF CHART III-A- 1
METROPOLITAN REGION POPULATION BY DISTRICT, WARD AND GROWTH RATE AMONG CENSUS : 1960; 1970; 1980 AND 1990

	1960	1970	1980	1990	60-70	70-80	80-90
DONOSO DISTRICT	**3,205**	**4,532**	**5,767**	**9,582**	**0.035**	**0.024**	**0.052**
Donoso	1,573	1,076	1,192	2,218	(0.037)	0.010	0.064
Coclé del Norte	799	1,350	949	2,377	0.054	(0.035)	0.096
El Guásimo	0	1,040	1,196	1,992	*	0.014	0.052
Gobea	305	360	522	610	0.017	0.038	0.016
Río Indio	528	706	800	963	0.029	0.013	0.019
San José del Gral.	0	0	1,108	1,422	* *	* *	0.025
PANAMA PROVINCE	**372,393**	**576,645**	**809,100**	**1,072,127**	**0.045**	**0.034**	**0.029**
ARRAIJAN DISTRICT	**11,128**	**19,347**	**37,186**	**61,849**	**0.057**	**0.068**	**0.052**
Arraiján	5,791	8,432	16,272	24,665	0.038	0.068	0.042
Juan D. Arosemena	2,166	3,440	8,525	13,418	0.047	0.095	0.046
Nuevo Emperador	2,198	1,688	1,926	2,319	(0.026)	0.013	0.019
Santa Clara	0	1,109	1,169	1,422	*	0.005	0.020
Veracruz	973	2,358	5,287	8,224	0.093	0.084	0.045
Vista Alegre	0	2,320	4,007	11,801	*	0.056	0.114

CONTINUATION OF CHART III-A- 1
METROPOLITAN REGION POPULATION BY DISTRICT, WARD AND GROWTH RATE AMONG CENSUS : 1960; 1970; 1980 AND 1990

	1960	1970	1980	1990	60-70	70-80	80-90
CAPIRA DISTRICT	**12,744**	**17,289**	**21,581**	**28,303**	**0.031**	**0.022**	**0.027**
Capira	1,602	2,175	3,074	3,606	0.031	0.035	0.016
Caimito	608	707	736	1,319	0.015	0.004	0.060
Campana	769	947	1,117	1,363	0.021	0.017	0.020
Cermeño	653	966	1,316	1,511	0.040	0.031	0.014
Cirí de los Sotos	1,010	1,443	1,886	2,202	0.036	0.027	0.016
Cirí Grande	1,807	2,400	2,887	4,138	0.029	0.019	0.037
El Cacao	1,780	2,101	2,438	4,042	0.017	0.015	0.052
La Trinidad	1,049	1,718	1,626	2,160	0.051	(0.005)	0.029
Las Ollas Arriba	372	594	682	803	0.048	0.014	0.016
Lídice	1,941	2,616	3,352	3,840	0.030	0.025	0.014
Villa Carmen	388	524	640	956	0.031	0.020	0.041
Villa Rosario	765	1,098	1,827	2,363	0.037	0.052	0.026
CHAME DISTRICT	**8,063**	**9,961**	**12,295**	**15,152**	**0.021**	**0.021**	**0.021**
Chame	988	1,241	1,384	1,822	0.023	0.011	0.028
Bejuco	2,571	3,277	3,003	3,643	0.025	(0.009)	0.020
Buenos Aires	976	1,204	1,281	1,435	0.021	0.006	0.011
Cabuya	977	958	1,068	1,206	(0.002)	0.011	0.012
Chicá	302	363	479	610	0.019	0.028	0.024
El Libano	191	154	160	177	(0.021)	0.004	0.010
Las Lajas	0	914	1,436	1,602	*	0.046	0.011
Nueva Gorgona	1,153	874	1,424	1,980	(0.027)	0.050	0.034
Punta Chame	187	180	267	294	(0.004)	0.040	0.010
Sajalices	0	0	975	1,301	**	**	0.029
Sorá	718	796	818	1,082	0.010	0.003	0.028

CONTINUATION OF CHART III-A- 1
METROPOLITAN REGION POPULATION BY DISTRICT, WARD AND GROWTH RATE AMONG CENSUS : 1960; 1970; 1980 AND 1990

	1960	1970	1980	1990	60-70	70-80	80-90
CHEPO DISTRICT	**6,484**	**14,469**	**20,499**	**29,145**	**0.084**	**0.035**	**0.036**
Chepo	3,362	7,432	6,835	8,971	0.083	(0.008)	0.028
Cañita	0	1,112	1,404	1,721	*	0.024	0.021
Chepillo	335	283	278	254	(0.017)	(0.002)	(0.009)
El Llano	2,436	4,174	6,906	12,393	0.055	0.052	0.060
Las Margaritas	0	0	3,275	3,852	* *	* *	0.016
Sta Cruz de Chinina	351	1,468	1,801	1,954	0.154	0.021	0.008
LA CHORRERA DISTRICT	**26,317**	**45,269**	**66,974**	**89,780**	**0.056**	**0.040**	**0.030**
Barrio Balboa	14,218	14,144	21,106	23,698	(0.001)	0.041	0.012
Barrio Colón	0	12,295	16,460	20,746	*	0.030	0.023
Amador	1,043	1,445	1,622	1,925	0.033	0.012	0.017
Arosemena	352	395	498	340	0.012	0.023	(0.037)
El Arado	1,002	1,360	1,574	1,696	0.031	0.015	0.007
El Coco	789	1,550	2,917	7,767	0.070	0.065	0.103
Feullet	479	740	971	1,372	0.044	0.028	0.035
Guadalupe	1,270	3,776	10,905	18,015	0.115	0.112	0.051
Herrera	871	1,026	686	715	0.017	(0.039)	0.004
Hurtado	697	841	764	703	0.019	(0.010)	(0.008)
Iturralde	623	634	595	792	0.002	(0.006)	0.029
La Represa	625	790	731	650	0.024	(0.008)	(0.012)
Los Díaz	818	1,065	927	858	0.027	(0.014)	(0.008)
Mendoza	928	1,217	1,120	851	0.027	(0.008)	(0.027)
Obaldía	597	565	471	559	(0.005)	(0.018)	0.017
Playa Leona	738	1,249	2,378	4,279	0.054	0.067	0.061
Puerto Caimito	460	1,102	2,233	3,623	0.091	0.073	0.050
Santa Rita	807	1,075	1,016	1,191	0.029	(0.006)	0.016

CONTINUATION OF CHART III-A- 1
METROPOLITAN REGION POPULATION BY DISTRICT, WARD AND GROWTH RATE AMONG CENSUS : 1960; 1970; 1980 AND 1990

	1960	1970	1980	1990	60-70	70-80	80-90
PANAMA DISTRICT	**281,384**	**386,627**	**477,107**	**584,803**	**0.032**	**0.021**	**0.021**
Bella Vista	15,681	26,659	28,136	24,986	0.055	0.005	(0.012)
Bethania	15,758	37,271	43,981	46,611	0.090	0.017	0.006
Curundú	0	0	16,947	17,933	* *	* *	0.006
El Chorrillo	29,502	27,834	25,145	20,488	(0.006)	(0.010)	(0.020)
Juan Díaz	7,736	24,719	51,944	73,809	0.123	0.077	0.036
Calidonia	53,794	57,628	28,602	23,974	0.007	(0.068)	(0.017)
Parque Lefevre	18,540	31,165	34,128	38,163	0.053	0.009	0.011
Pedregal	7,249	14,536	32,731	40,896	0.072	0.085	0.023
Pueblo Nuevo	17,070	19,376	21,105	21,289	0.013	0.009	0.001
Río Abajo	20,973	27,353	31,989	33,155	0.027	0.016	0.004
San Felipe	13,276	14,145	11,696	10,282	0.006	(0.019)	(0.013)
San Francisco	25,242	35,995	34,962	34,262	0.036	(0.003)	(0.002)
Santa Ana	35,644	32,023	27,806	27,657	(0.011)	(0.014)	(0.001)
Ancón	0	0	6,401	11,518	* *	* *	0.061
Chilibre	7,659	12,847	18,168	27,135	0.053	0.035	0.041
Las Cumbres	6,906	13,238	31,495	56,547	0.067	0.091	0.060
Pacora	4,266	4,120	8,184	26,587	(0.003)	0.071	0.125
San Martín	0	1,548	1,925	2,479	*	0.022	0.026
Tocumen	2,088	6,170	21,762	47,032	0.114	0.134	0.080

CONTINUATION OF CHART III-A-1
METROPOLITAN REGION POPULATION BY DISTRICT, WARD AND GROWTH RATE AMONG CENSUS : 1960; 1970; 1980 AND 1990

	1960	1970	1980	1990	60-70	70-80	80-90
SAN CARLOS DISTRICT	**7,289**	**9,108**	**10,440**	**12,443**	**0.023**	**0.014**	**0.018**
San Carlos	1,133	1,408	1,666	2,029	0.022	0.017	0.020
El Espino	1,430	1,080	1,234	1,200	(0.028)	0.013	(0.003)
El Higo	1,251	1,494	1,673	1,920	0.018	0.011	0.014
Guayabito	433	515	426	443	0.017	(0.019)	0.004
La Ermita	671	794	884	1,097	0.017	0.011	0.022
La Laguna	754	760	789	778	0.001	0.004	(0.001)
Las Uvas	0	736	845	1,170	*	0.014	0.033
Los Llanitos	1,177	1,627	1,930	2,370	0.033	0.017	0.021
San José	440	694	993	1,436	0.047	0.036	0.038
SAN MIGUELITO DISTRICT	**12,975**	**68,400**	**156,611**	**243,025**	**0.181**	**0.086**	**0.045**
Amelia D. de Icaza	12,975	68,400	24,103	33,901	0.181	(0.099)	0.035
Belisario Porras	0	0	80,012	119,400	**	**	0.041
José D. Espinar	0	0	23,351	58,745	**	**	0.097
Mateo Iturralde	0	0	12,237	13,662	**	**	0.011
Victoriano Lorenzo	0	0	16,908	17,317	**	**	0.002
TABOGA DISTRICT	**1,879**	**1,741**	**1,495**	**1,810**	**(0.008)**	**(0.015)**	**0.019**
Taboga	928	908	1,003	1,199	(0.002)	0.010	0.018
Otoque Occidente	478	276	93	210	(0.053)	(0.103)	0.085
Otoque Oriente	473	557	399	401	0.016	(0.033)	0.001

CONTINUATION OF CHART III-A- 1
METROPOLITAN REGION POPULATION BY DISTRICT, WARD AND GROWTH RATE AMONG CENSUS : 1960; 1970; 1980 AND 1990

	1960	1970	1980	1990	60-70	70-80	80-90
CHIMAN DISTRICT	**1,258**	**1,678**	**1,973**	**3,066**	**0.029**	**0.016**	**0.045**
Chimán	690	962	1,356	2,221	0.034	0.035	0.051
Brujas	274	400	373	568	0.039	(0.007)	0.043
Gonzalo Vásquez	294	316	244	277	0.007	(0.026)	0.013
BALBOA DISTRICT	**2,872**	**2,756**	**2,939**	**2,751**	**(0.004)**	**0.006**	**(0.007)**
Balboa	1,778	1,418	1,104	1,179	(0.022)	(0.025)	0.007
La Ensenada	166	129	100	97	(0.025)	(0.025)	(0.003)
La Esmeralda	452	327	380	446	(0.032)	0.015	0.016
La Guinea	0	310	313	245	*	0.001	(0.024)
Pedro González	321	356	424	440	0.010	0.018	0.004
Saboga	155	216	618	344	0.034	0.111	(0.057)

NOTE: * INDICATES WARDS CREATED IN THE 1960 DECADE
** INDICATES WARDS CREATED IN THE 1970 DECADE
SOURCE: CENSUS DATA ON POPULATION AND HOUSING 1960; 1970; 1980; AND 1990.
DIRECCION DE ESTADISTICA Y CENSO DE LA CONTRALORIA GENERAL DE LA REPUBLICA.
CHARTS PRODUCED BY BOOZ •ALLEN AND HAMILTON

CHART III-A- 2
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: 1960 - 1990 CENSUS

PROVINCE	INHABITANTS				RELATIVE SIGNIFICANCE			
DISTRICT								
WARD	1960	1970	1980	1990	1960	1970	1980	1990
REGION TOTAL	457,725	686,250	942,933	1,240,421				
COLON PROVINCE	85,332	109,605	133,833	168,294				
COLON DISTRICT	73,547	95,421	113,153	140,908	100.00	100.00	100.00	100.00
Barrio Norte	59,598	36,072	32,321	30,385	81.03	37.80	28.56	21.56
Barrio Sur	0	31,623	27,519	24,269	0.00	33.14	24.32	17.22
Buena Vista	2,219	4,054	5,190	7,547	3.02	4.25	4.59	5.36
Cativá	2,389	3,387	10,870	19,101	3.25	3.55	9.61	13.56
Ciricito	1,273	1,551	1,753	2,108	1.73	1.63	1.55	1.50
Cristóbal	0	0	3,874	15,178	0.00	0.00	3.42	10.77
Escobal	1,200	1,849	1,807	1,964	1.63	1.94	1.60	1.39
Limón	1,170	1,916	2,700	3,209	1.59	2.01	2.39	2.28
Nva. Providencia	376	446	703	1,253	0.51	0.47	0.62	0.89
Puerto Pilón	2,085	4,295	8,460	10,241	2.83	4.50	7.48	7.27
Sabanitas	0	3,671	9,924	13,729	0.00	3.85	8.77	9.74
Salamanca	823	1,691	1,733	2,675	1.12	1.77	1.53	1.90
San Juan	2,077	4,351	5,839	8,716	2.82	4.56	5.16	6.19
Santa Rosa	337	515	460	533	0.46	0.54	0.41	0.38

CONTINUATION OF CHART III-A- 2
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: 1960 - 1990 CENSUS

	1960	1970	1980	1990	1960	1970	1980	1990
CHAGRES DISTRICT	**4,206**	**6,063**	**7,735**	**9,205**	**100.00**	**100.00**	**100.00**	**100.00**
Chagres	360	349	304	327	8.56	5.76	3.93	3.55
Achiote	259	460	699	755	6.16	7.59	9.04	8.20
El Guabo	0	720	909	1,191	0.00	11.88	11.75	12.94
La Encantada	876	1,430	1,963	2,532	20.83	23.59	25.38	27.51
Palmas Bellas	1,460	1,279	1,430	1,628	34.71	21.10	18.49	17.69
Piña	402	492	678	687	9.56	8.11	8.77	7.46
Salud	849	1,333	1,752	2,085	20.19	21.99	22.65	22.65
PORTOBELO DISTRICT	**1,779**	**1,545**	**5,110**	**5,920**	**100.00**	**100.00**	**100.00**	**100.00**
Portobelo	753	623	2,774	3,058	42.33	40.32	54.29	51.66
Cacique	0	135	164	225	0.00	8.74	3.21	3.80
Garrote	270	84	453	591	15.18	5.44	8.86	9.98
Isla Grande	306	248	521	626	17.20	16.05	10.20	10.57
María Chiquita	450	455	1,198	1,420	25.30	29.45	23.44	23.99
SANTA ISABEL DISTRICT	**2,595**	**2,044**	**2,068**	**2,679**	**100.00**	**100.00**	**100.00**	**100.00**
Palenque	265	249	194	281	10.21	12.18	9.38	10.49
Guango	193	194	102	159	7.44	9.49	4.93	5.94
Miramar	153	132	98	88	5.90	6.46	4.74	3.28
Nombre de Dios	605	424	734	1,028	23.31	20.74	35.49	38.37
Palmira	401	255	268	313	15.45	12.48	12.96	11.68
Playa Chiquita	144	142	125	184	5.55	6.95	6.04	6.87
Santa Isabel	452	336	251	230	17.42	16.44	12.14	8.59
Viento Frío	382	312	296	396	14.72	15.26	14.31	14.78

CONTINUATION OF CHART III-A- 2
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: 1960 - 1990 CENSUS

	1960	1970	1980	1990	1960	1970	1980	1990
DONOSO DISTRICT	**3,205**	**4,532**	**5,767**	**9,582**	**100.00**	**100.00**	**100.00**	**100.00**
Donoso	1,573	1,076	1,192	2,218	49.08	23.74	20.67	23.15
Coclé del Norte	799	1,350	949	2,377	24.93	29.79	16.46	24.81
El Guásimo	0	1,040	1,196	1,992	0.00	22.95	20.74	20.79
Gobea	305	360	522	610	9.52	7.94	9.05	6.37
Río Indio	528	706	800	963	16.47	15.58	13.87	10.05
San José del Gral.	0	0	1,108	1,422	0.00	0.00	19.21	14.84
PANAMA PROVINCE	**372,393**	**576,645**	**809,100**	**1,072,127**				
ARRAIJAN DISTRICT	**11,128**	**19,347**	**37,186**	**61,849**	**100.00**	**100.00**	**100.00**	**100.00**
Arraiján	5,791	8,432	16,272	24,665	52.04	43.58	43.76	39.88
Juan D. Arosemena	2,166	3,440	8,525	13,418	19.46	17.78	22.93	21.69
Nuevo Emperador	2,198	1,688	1,926	2,319	19.75	8.72	5.18	3.75
Santa Clara	0	1,109	1,169	1,422	0.00	5.73	3.14	2.30
Veracruz	973	2,358	5,287	8,224	8.74	12.19	14.22	13.30
Vista Alegre	0	2,320	4,007	11,801	0.00	11.99	10.78	19.08

CONTINUATION OF CHART III-A- 2
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: 1960 - 1990 CENSUS

	1960	1970	1980	1990	1960	1970	1980	1990
CAPIRA DISTRICT	**12,744**	**17,289**	**21,581**	**28,303**	**100.00**	**100.00**	**100.00**	**100.00**
Capira	1,602	2,175	3,074	3,606	12.57	12.58	14.24	12.74
Caimito	608	707	736	1,319	4.77	4.09	3.41	4.66
Campana	769	947	1,117	1,363	6.03	5.48	5.18	4.82
Cermeño	653	966	1,316	1,511	5.12	5.59	6.10	5.34
Cirí de los Sotos	1,010	1,443	1,886	2,202	7.93	8.35	8.74	7.78
Cirí Grande	1,807	2,400	2,887	4,138	14.18	13.88	13.38	14.62
El Cacao	1,780	2,101	2,438	4,042	13.97	12.15	11.30	14.28
La Trinidad	1,049	1,718	1,626	2,160	8.23	9.94	7.53	7.63
Las Ollas Arriba	372	594	682	803	2.92	3.44	3.16	2.84
Lídice	1,941	2,616	3,352	3,840	15.23	15.13	15.53	13.57
Villa Carmen	388	524	640	956	3.04	3.03	2.97	3.38
Villa Rosario	765	1,098	1,827	2,363	6.00	6.35	8.47	8.35
CHAME DISTRICT	**8,063**	**9,961**	**12,295**	**15,152**	**100.00**	**100.00**	**100.00**	**100.00**
Chame	988	1,241	1,384	1,822	12.25	12.46	11.26	12.02
Bejuco	2,571	3,277	3,003	3,643	31.89	32.90	24.42	24.04
Buenos Aires	976	1,204	1,281	1,435	12.10	12.09	10.42	9.47
Cabuya	977	958	1,068	1,206	12.12	9.62	8.69	7.96
Chicá	302	363	479	610	3.75	3.64	3.90	4.03
El Libano	191	154	160	177	2.37	1.55	1.30	1.17
Las Lajas	0	914	1,436	1,602	0.00	9.18	11.68	10.57
Nueva Gorgona	1,153	874	1,424	1,980	14.30	8.77	11.58	13.07
Punta Chame	187	180	267	294	2.32	1.81	2.17	1.94
Sajalices	0	0	975	1,301	0.00	0.00	7.93	8.59
Sorá	718	796	818	1,082	8.90	7.99	6.65	7.14

CONTINUATION OF CHART III-A- 2
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: 1960 - 1990 CENSUS

	1960	1970	1980	1990	1960	1970	1980	1990
CHEPO DISTRICT	**6,484**	**14,469**	**20,499**	**29,145**	**100.00**	**100.00**	**100.00**	**100.00**
Chepo	3,362	7,432	6,835	8,971	51.85	51.36	33.34	30.78
Cañita	0	1,112	1,404	1,721	0.00	7.69	6.85	5.90
Chepillo	335	283	278	254	5.17	1.96	1.36	0.87
El Llano	2,436	4,174	6,906	12,393	37.57	28.85	33.69	42.52
Las Margaritas	0	0	3,275	3,852	0.00	0.00	15.98	13.22
Sta Cruz de Chinina	351	1,468	1,801	1,954	5.41	10.15	8.79	6.70
LA CHORRERA DISTRICT	**26,317**	**45,269**	**66,974**	**89,780**	**100.00**	**100.00**	**100.00**	**100.00**
Barrio Balboa	14,218	14,144	21,106	23,698	54.03	31.24	31.51	26.40
Barrio Colón	0	12,295	16,460	20,746	0.00	27.16	24.58	23.11
Amador	1,043	1,445	1,622	1,925	3.96	3.19	2.42	2.14
Arosemena	352	395	498	340	1.34	0.87	0.74	0.38
El Arado	1,002	1,360	1,574	1,696	3.81	3.00	2.35	1.89
El Coco	789	1,550	2,917	7,767	3.00	3.42	4.36	8.65
Feullet	479	740	971	1,372	1.82	1.63	1.45	1.53
Guadalupe	1,270	3,776	10,905	18,015	4.83	8.34	16.28	20.07
Herrera	871	1,026	686	715	3.31	2.27	1.02	0.80
Hurtado	697	841	764	703	2.65	1.86	1.14	0.78
Iturralde	623	634	595	792	2.37	1.40	0.89	0.88
La Represa	625	790	731	650	2.37	1.75	1.09	0.72
Los Díaz	818	1,065	927	858	3.11	2.35	1.38	0.96
Mendoza	928	1,217	1,120	851	3.53	2.69	1.67	0.95
Obaldía	597	565	471	559	2.27	1.25	0.70	0.62
Playa Leona	738	1,249	2,378	4,279	2.80	2.76	3.55	4.77
Puerto Caimito	460	1,102	2,233	3,623	1.75	2.43	3.33	4.04
Santa Rita	807	1,075	1,016	1,191	3.07	2.37	1.52	1.33

CONTINUATION OF CHART III-A- 2
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: 1960 - 1990 CENSUS

	1960	1970	1980	1990	1960	1970	1980	1990
PANAMA DISTRICT	**281,384**	**386,627**	**477,107**	**584,803**	**100.00**	**100.00**	**100.00**	**100.00**
Bella Vista	15,681	26,659	28,136	24,986	5.57	6.90	5.90	4.27
Bethania	15,758	37,271	43,981	46,611	5.60	9.64	9.22	7.97
Curundú	0	0	16,947	17,933	0.00	0.00	3.55	3.07
El Chorrillo	29,502	27,834	25,145	20,488	10.48	7.20	5.27	3.50
Juan Díaz	7,736	24,719	51,944	73,809	2.75	6.39	10.89	12.62
Calidonia	53,794	57,628	28,602	23,974	19.12	14.91	5.99	4.10
Parque Lefevre	18,540	31,165	34,128	38,163	6.59	8.06	7.15	6.53
Pedregal	7,249	14,536	32,731	40,896	2.58	3.76	6.86	6.99
Pueblo Nuevo	17,070	19,376	21,105	21,289	6.07	5.01	4.42	3.64
Río Abajo	20,973	27,353	31,989	33,155	7.45	7.07	6.70	5.67
San Felipe	13,276	14,145	11,696	10,282	4.72	3.66	2.45	1.76
San Francisco	25,242	35,995	34,962	34,262	8.97	9.31	7.33	5.86
Santa Ana	35,644	32,023	27,806	27,657	12.67	8.28	5.83	4.73
Ancón	0	0	6,401	11,518	0.00	0.00	1.34	1.97
Chilibre	7,659	12,847	18,168	27,135	2.72	3.32	3.81	4.64
Las Cumbres	6,906	13,238	31,495	56,547	2.45	3.42	6.60	9.67
Pacora	4,266	4,120	8,184	26,587	1.52	1.07	1.72	4.55
San Martín	0	1,548	1,925	2,479	0.00	0.40	0.40	0.42
Tocumen	2,088	6,170	21,762	47,032	0.74	1.60	4.56	8.04

CONTINUATION OF CHART III-A- 2
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: 1960 - 1990 CENSUS

	1960	1970	1980	1990	1960	1970	1980	1990
SAN CARLOS DISTRICT	**7,289**	**9,108**	**10,440**	**12,443**	**100.00**	**100.00**	**100.00**	**100.00**
San Carlos	1,133	1,408	1,666	2,029	15.54	15.46	15.96	16.31
El Espino	1,430	1,080	1,234	1,200	19.62	11.86	11.82	9.64
El Higo	1,251	1,494	1,673	1,920	17.16	16.40	16.02	15.43
Guayabito	433	515	426	443	5.94	5.65	4.08	3.56
La Ermita	671	794	884	1,097	9.21	8.72	8.47	8.82
La Laguna	754	760	789	778	10.34	8.34	7.56	6.25
Las Uvas	0	736	845	1,170	0.00	8.08	8.09	9.40
Los Llanitos	1,177	1,627	1,930	2,370	16.15	17.86	18.49	19.05
San José	440	694	993	1,436	6.04	7.62	9.51	11.54
SAN MIGUELITO DISTRICT	**12,975**	**68,400**	**156,611**	**243,025**	**100.00**	**100.00**	**100.00**	**100.00**
Amelia D. de Icaza	12,975	68,400	24,103	33,901	100.00	100.00	15.39	13.95
Belisario Porras	0	0	80,012	119,400	*	*	51.09	49.13
José D. Espinar	0	0	23,351	58,745	*	*	14.91	24.17
Mateo Iturralde	0	0	12,237	13,662	*	*	7.81	5.62
Victoriano Lorenzo	0	0	16,908	17,317	*	*	10.80	7.13
TABOGA DISTRICT	**1,879**	**1,741**	**1,495**	**1,810**	**100.00**	**100.00**	**100.00**	**100.00**
Taboga	928	908	1,003	1,199	49.39	52.15	67.09	66.24
Otoque Occidente	478	276	93	210	25.44	15.85	6.22	11.60
Otoque Oriente	473	557	399	401	25.17	31.99	26.69	22.15

CONTINUATION OF CHART III-A- 2
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: 1960 - 1990 CENSUS

	1960	1970	1980	1990	1960	1970	1980	1990
CHIMAN DISTRICT	**1,258**	**1,678**	**1,973**	**3,066**	**100.00**	**100.00**	**100.00**	**100.00**
Chimán	690	962	1,356	2,221	54.85	57.33	68.73	72.44
Brujas	274	400	373	568	21.78	23.84	18.91	18.53
Gonzalo Vásquez	294	316	244	277	23.37	18.83	12.37	9.03
BALBOA DISTRICT	**2,872**	**2,756**	**2,939**	**2,751**	**100.00**	**100.00**	**100.00**	**100.00**
Balboa	1,778	1,418	1,104	1,179	61.91	51.45	37.56	42.86
La Ensenada	166	129	100	97	5.78	4.68	3.40	3.53
La Esmeralda	452	327	380	446	15.74	11.87	12.93	16.21
La Guinea	0	310	313	245	0.00	11.25	10.65	8.91
Pedro González	321	356	424	440	11.18	12.92	14.43	15.99
Saboga	155	216	618	344	5.40	7.84	21.03	12.50

NOTE: * INDICATES WARDS CREATED IN THE 1960 DECADE
** INDICATES WARDS CREATED IN THE 1970 DECADE
SOURCE: CENSUS DATA ON POPULATION AND HOUSING 1960; 1970; 1980; AND 1990.
DIRECCION DE ESTADISTICA Y CENSO DE LA CONTRALORIA GENERAL DE LA REPUBLICA.
CHARTS PRODUCED BY BOOZ •ALLEN AND HAMILTON

CHART III-A- 3
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION DISTRICTS
VIS A VIS PROVINCES: 1960 - 1990 CENSUS

PROVINCE	INHABITANTS				RELATIVE SIGNIFICANCE				PERCENTAGE CHANGE		
DISTRICT											
	1960	1970	1980	1990	1960	1970	1980	1990	60-70	70-80	80-90
REGION TOTAL	**457,725**	**686,250**	**942,933**	**1,240,421**							
COLON PROVINCE	**85,332**	**109,605**	**133,833**	**168,294**	100.00	100.00	100.00	100.00			
COLON DISTRICT	73,547	95,421	113,153	140,908	86.19	87.06	84.55	83.73	1.01	-2.88	-0.97
CHAGRES DISTRICT	4,206	6,063	7,735	9,205	4.93	5.53	5.78	5.47	12.23	4.48	-5.36
PORTOBELODISTRICT	1,779	1,545	5,110	5,920	2.08	1.41	3.82	3.52	-32.39	170.87	-7.87
SANTA ISABEL DISTRICT	2,595	2,044	2,068	2,679	3.04	1.86	1.55	1.59	-38.68	-17.14	3.02
DONOSO DISTRICT	3,205	4,532	5,767	9,582	3.76	4.13	4.31	5.69	10.09	4.21	32.13

CONTINUATION OF CHART III-A- 3
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION DISTRICTS
VIS A VIS PROVINCES: 1960 - 1990 CENSUS

	1960	1970	1980	1990	1960	1970	1980	1990	60-70	70-80	80-90
PANAMA PROVINCE	372,393	576,645	809,100	1,072,127	100.00	100.00	100.00	100.00			
ARRAIJAN DISTRICT	11,128	19,347	37,186	61,849	2.99	3.36	4.60	12.28	36.98	25.52	
CAPIRA DISTRICT	12,744	17,289	21,581	28,303	3.42	3.00	2.67	2.64	-12.39	-11.04	-1.03
CHAME DISTRICT	8,063	9,961	12,295	15,152	2.17	1.73	1.52	1.41	-20.22	-12.03	-7.00
CHEPO DISTRICT	6,484	14,469	20,499	29,145	1.74	2.51	2.53	2.72	44.11	.97	7.30
LA CHORRERA DISTRICT	26,317	45,269	66,974	89,780	7.07	7.85	8.28	8.37	11.09	5.44	1..16
PANAMA DISTRICT	281,384	386,627	477,107	584,803	75.56	67.05	58.97	54.55	-11.27	-12.05	-1.50
SAN CARLOS DISTRICT	7,289	9,108	10,440	12,443	1.96	1.58	1.29	1.16	-19.30	-18.31	8.63
SAN MIGUELITO DISTRICT	12,975	68,400	156,611	243,025	3.48	11.86	19.36	22.67	240.44	63.18	17.11
TABOGA DISTRICT	1,879	1,741	1,495	1,810	0.50	0.30	0.18	0.17	-40.16	38.80	8.63
CHIMAN DISTRICT	1,258	1,678	1,973	3,066	0.34	0.29	0.24	0.29	13.86	16.20	17.27
BALBOA DISTRICT	2,872	2,756	2,939	2,751	0.77	0.48	0.36	0.26	38.03	24.00	29.36

NOTE: * INDICATES WARDS CREATED IN THE 1960 DECADE
** INDICATES WARDS CREATED IN THE 1970 DECADE
SOURCE: CENSUS DATA ON POPULATION AND HOUSING 1960; 1970; 1980; AND 1990.
DIRECCION DE ESTADISTICA Y CENSO DE LA CONTRALORIA GENERAL DE LA REPUBLICA.
CHARTS PRODUCED BY BOOZ •ALLEN AND HAMILTON

CHART III -A-4

SOCIAL INDICATORS FOR THE PROVINCES OF PANAMA AND COLON BY DISTRICT AND WARD

Province Distritct and Ward	Population per Km^2 1990 /	Inhabitants Year 1990	Professional Assistance to Births Year 1990	Malnourishment Total Pob. Year 1988 %	Iliteracy 10 years of age and up 1990 %	Home Monthly Median Income(in B/.)Year 1990 /
Country Total	2,329,329	30.8	86.3	24.4	10.7	244.6
Colon Province	168,294	34.4	89.3	__	5.7	263.4
Colon District	140,908	93.7	97.4	15..2	4.1	312.0
Colon City	**54,654**	**8,846.2**	**99.9**	__	—	—
Barrio Norte	30,385	27,622.7	—	8.5	1.8	294.2
Barrio Sur	24,269	13,482.8	—	7.7	2.7	297.3
Rest of the District	**86,254**	**57.4**	**95.2**	—	—	—
Buena Vista	7,547	65.9	94.3	26.6	10.3	213.3
Cativá	19,101	909.6	98.7	16.1	3.8	393.7
Ciricito	2,108	30.8	48.1	25.2	11.5	86.7
Cristóbal	15,178	20.8	99.7	20.3	2.6	266.7
Escobal	1,964	20.8	78.9	30.6	9.2	124.2
Limón	2,700	42.1	94.5	24.8	7.4	225.8
Nueva Providencia	703	61.7	94.6	8.2	6.4	213.5
Puerto Pilón	8,460	101.8	97.0	12.9	3.8	377.5
Sabanitas	9,924	1,002.1	99.2	22.5	3.2	451.2
Salamanca	1,733	13.6	88.2	32.4	16.8	100.4
San Juan	5,839	209.0	98.3	16.7	7.2	233.7
Santa Rosa	460	20.8	100.0	25.0	10.9	246.4

CONTINUATION OF CHART III- A-4
SOCIAL INDICATORS FOR THE PROVINCES OF PANAMA AND COLON BY DISTRICT AND WARD

Province Distritct and Ward	Population per Km^2 1990 /	Inhabitants Year 1990	Professional Assistance to Births Year 1990	Malnourishment Total Pob. Year 1988 %	Iliteracy 10 years of age and up 1990 %	Home Monthly Median Income(in B/.)Year 1990 /
Chagres	**9,205**	**20.7**	**53.1**	**33.6**	**12.1**	**82.9**
Cabecera	327	48.8	60.0	34.6	7.5	187.5
Achiote	755	19.9	72.2	13.6	14.5	76.6
El Guabo	1,191	22.1	38.2	24.5	10.1	67.3
La Encantada	2,532	18.7	15.3	44.3	13.7	71.0
Palmas Bellas	1,628	21.7	85.2	25.4	10.3	98.3
Piña	687	21.8	90.9	29.2	14.4	93.2
Salud	2,085	19.9	47.2	40.5	11.9	85.0
Donoso	**9,582**	**5.3**	**31.6**	**42.3**	**19.9**	**64.6**
Cabecera	2,218	7.1	47.8	39.8	15.2	71.6
Coclé del Norte	2,377	2.5	20.3	43.0	26.1	58.8
El Guásimo	1,992	7.0	12.1	64.9	21.8	56.8
Gobea	610	12.5	33.3	12.8	16.6	82.4
Río Indio	963	27.4	47.6	15.0	11.8	85.5
San José del Gral	1,422	7.1	65.7	32.4	22.3	63.6
Portobelo	**5,920**	**15.0**	**88.5**	**21.3**	**13.0**	**166.1**
Cabecera	3,058	12.6	100.0	20.7	11.5	181.1
Cacique	225	20.6	60.0	42.9	9.6	92.7
Garrote	591	23.7	81.8	18.2	21.5	94.8
Isla Grande	626	22.5	83.3	0.0	16.5	134.1
María Chiquita	1,420	16.2	83.3	66.7	11.7	211.4
Santa Isabel	**2,679**	**3.7**	**76.1**	**14.9**	**11.4**	**84.5**
Cabecera	281	4.1	88.9	16.7	8.8	94.6
Cuango	159	4.0	0.0	—	14.2	79.2
Miramar	88	7.9	100.0	—	10.1	131.3
Nombre de Dios	1,028	7.0	92.9	7.9	10.6	94.6
Palmira	313	1.8	11.1	75.0	16.4	66.3
Playa Chiquita	184	1.5	66.7	10.0	10.6	86.0
Santa Isabel	230	1.7	33.3	30.0	15.8	73.9
Viento Frio	396	11.9	80.0	7.7	8.8	77.0

CONTINUATION OF CHART III- A-4
SOCIAL INDICATORS FOR THE PROVINCES OF PANAMA AND COLON BY DISTRICT AND WARD

Province Distritct and Ward	Population per Km^2 1990 /	Inhabitants Year 1990	Professional Assistance to Births Year 1990	Malnourishment Total Pob. Year 1988 %	literacy 10 years of age and up 1990 %	Home Monthly Median Income(in B/.)Year 1990 /
Panama Province	**1,072,127**	**90.2**	**96.9**	—	**4.3**	**381.4**
Panama District	**584,803**	**228.4**	**99.6**	**10.6**	**3.3**	**454.0**
Panama City	**413,505**	**3,882.7**	**99.9**	—	—	—
San Felipe	10,282	20,564.0	100.0	7.1	1.7	240.3
El Chorrillo	20,488	51,220.0	100.0	6.8	2.6	261.7
Santa Ana	27,657	21,274.6	100.0	7.1	3.0	373.8
Calidonia	23,974	14,983.8	100.0	6.3	2.8	434.6
Curundú	17,933	16,302.7	100.0	13.4	6.8	232.1
Betania	46,611	5,419.9	100.0	5.6	0.9	1,040.2
Bella Vista	24,986	4,899.2	100.0	—	1.1	1,272.4
Pueblo Nuevo	21,289	3,670.5	100.0	8.9	1.7	587.4
San Francisco	34,262	6,118.2	100.0	4.2	1.4	843.4
Parque Lefevre	38,163	6,155.3	99.9	5.3	2.1	621.1
Río Abajo	33,155	5,262.7	100.0	4.6	2.2	254.1
Juan Díaz	73,809	2,073.3	100.0	6.8	1.6	691.7
Pedregal	40,896	1,440.0	99.7	9.8	3.8	326.5
Rest of the District	**171,298**	**69.8**	**98.8**	—	—	—
Ancón	11,518	17.3	100.0	5.4	4.7	594.0
Chilibre	27,135	27.7	96.6	17.3	8.3	220.7
Las Cumbres	56,547	533.5	99.6	13.8	5.0	302.4
Pacora	26,587	55.5	97.8	17.5	8.4	209.5
San Martín	2,479	18.5	98.0	11.1	11.7	154.4
Tocumen	47,032	509.0	99.7	14.8	5.5	266.2

CONTINUATION OF CHART III- A-4
SOCIAL INDICATORS FOR THE PROVINCES OF PANAMA AND COLON BY DISTRICT AND WARD

Province Distritct and Ward	Population per Km^2 1990 /	Inhabitants Year 1990	Professional Assistance to Births Year 1990	Malnourishment Total Pob. Year 1988 %	literacy 10 years of age and up 1990 %	Home Monthly Median Income(in B/.)Year 1990 /
Arraiján	**61,849**	**363.6**	**99.2**	**16.6**	**4.9**	**342.6**
Cabecera	24,665	461.9	99.0	14.7	6.0	306.0
Juan D.Arosemena	13,418	277.8	99.6	12.8	3.0	414.2
Nuevo Emperador	2,319	95.0	96.6	14.1	7.0	181.9
Santa Clara	1,422	89.4	92.0	32.1	6.9	205.2
Veracruz	8,224	595.9	100.0	22.6	6.6	280.5
Vista Alegre	11,801	825.2	100.0	17.0	2.8	459.1
Balboa	**2,751**	**6.9**	**51.5**	**5.0**	**6.7**	**78.9**
Cabecera	1,179	4.6	47.1	–	9.6	73.1
La Ensenada	97	16.7	100.0	0.0	6.8	58.9
La Esmeralda	446	10.7	100.0	0.0	7.5	61.0
La Guinea	245	8.5	—	—	3.5	80.8
Pedro González	440	7.3	100.0	6.9	5.0	66.7
Saboga	344	42.5	—	8.3	1.4	231.3
Capira	**28,303**	**30.3**	**53.0**	**32.9**	**12.0**	**92.9**
Cabecera	3,606	78.1	97.8	14.9	8.6	220.6
Caimito	1,319	30.5	68.6	18.9	9.6	71.4
Campana	1,363	18.5	87.2	45.5	5.9	131.3
Cermeño	1,511	16.4	90.3	27.3	16.8	106.6
Cirí de los Sotos	2,202	22.8	13.8	36.9	15.5	67.3
Cirí Grande	4,138	17.8	14.5	53.6	16.6	60.1
El Cacao	4,042	29.7	23.6	47.8	17.9	61.3
La Trinidad	2,160	19.6	32.4	50.7	17.7	59.3
Las Ollas Arriba	803	31.7	94.7	28.6	6.6	151.7
Lídice	3,840	86.5	89.8	19.6	7.2	159.9
Villa Carmen	956	151.7	96.4	11.8	6.1	262.9
Villa Rosario	2,363	95.3	96.0	11.1	8.1	211.9

CONTINUATION OF CHART III- A-4
SOCIAL INDICATORS FOR THE PROVINCES OF PANAMA AND COLON BY DISTRICT AND WARD

Province Districtct and Ward	Population per Km^2 1990 /	Inhabitants Year 1990	Professional Assistance to Births Year 1990	Malnourishment Total Pob. Year 1988 %	literacy 10 years of age and up 1990 %	Home Monthly Median Income(in B/.)Year 1990 /
Chame	**15,152**	**42.9**	**87.3**	**21.7**	**6.3**	**153.3**
Cabecera	1,822	61.1	100.0	11.4	4.0	268.1
Bejuco	3,643	66.5	98.9	17.6	5.9	197.7
Buenos Aires	1,435	36.1	50.0	27.0	8.7	82.4
Cabuya	1,206	28.4	92.9	22.7	4.5	92.6
Chicá	610	35.1	75.0	20.0	6.4	141.0
El Líbano	177	6.3	100.0	0.0	5.8	190.1
Las Lajas	1,602	121.4	100.0	4.3	4.6	167.6
Nueva Gorgona	1,980	104.8	89.7	23.3	6.8	143.0
Punta Chame	294	18.8	100.0	0.0	4.9	208.4
Sajalices	1,301	57.8	100.0	40.0	10.6	138.9
Sorá	1,082	15.4	43.8	33.3	7.8	85.7
Chepo	**29,145**	**5.4**	**84.3**	**23.2**	**19.5**	**118.4**
Cabecera	8,971	20.2	93.0	10.1	11.2	195.5
Cañita	1,721	4.1	90.8	18.9	16.7	156.1
Chepillo	254	195.4	40.0	—	8.7	50.0
El Llano	12,393	3.2	77.4	30.5	26.6	91.8
Las Margaritas	3,852	14.8	96.3	20.7	16.3	119.5
Santa C.deChinina	1,954	5.6	58.5	34.0	25.6	71.7
Chimán	**3,066**	**3.0**	**36.1**	**42.0**	**24.0**	**84.2**
Cabecera	2,221	2.9	61.5	39.0	27.5	79.2
Brujas	558	2.4	28.6	22.6	12.2	183.7
Gonzalo Vásquez	277	7.0	25.0	76.9	22.4	67.6
La Chorrera	**89,780**	**130.5**	**96.8**	**10.6**	**5.5**	**285.3**
La Chorrera Cit y	**44,444**	**1,899.3**	**99.7**	—	—	—
Barrio Balboa	23,698	2,925.7	—	5.8	3.3	365.9
Barrio Colón	20,746	1,355.9	—	10.7	3.7	413.4

CONTINUATION OF CHART III- A-4
SOCIAL INDICATORS FOR THE PROVINCES OF PANAMA AND COLON BY DISTRICT AND WARD

Province Districtct and Ward	Population per Km^2 1990 /	Inhabitants Year 1990	Professional Assistance to Births Year 1990	Malnourishment Total Pob. Year 1988 %	literacy 10 years of age and up 1990 %	Home Monthly Median Income(in B/.)Year 1990 /
Rest of the District	**45,336**	**68.2**	**94.3**	—	—	—
Amador	1,925	29.4	69.2	38.5	12.7	86.2
Arosemena	340	10.7	57.2	20.0	14.7	70.4
El Arado	1,696	28.0	93.9	15.6	10.5	153.0
El Coco	7,767	532.0	99.0	8.5	5.3	257.3
Feuillet	1,372	69.3	95.4	—	11.5	193.3
Guadalupe	18,015	735.3	98.9	8.5	5.3	250.9
Herrera	715	8.3	100.0	37.5	9.5	106.3
Hurtado	703	15.2	100.0	23.8	13.1	93.7
Iturralde	792	12.1	55.6	7.1	12.4	109.4
La Represa	650	21.5	85.7	10.0	13.0	89.1
Los Díaz	858	29.3	89.5	—	11.6	97.9
Mendoza	851	27.8	87.0	20.0	7.5	123.1
Obaldía	559	15.8	50.0	33.3	15.3	80.9
Playa Leona	4,279	79.1	96.7	10.2	10.6	192.3
Puerto Caimito	3,623	115.4	100.0	13.5	8.1	234.9
Santa Rita	1,191	36.6	80.0	22.2	13.1	167.4
San Carlos	**12,443**	**36.9**	**84.5**	**26.5**	**7.3**	**115.1**
Cabecera	2,029	69.2	100.0	8.9	3.8	214.1
El Espino	1,200	34.7	84.6	20.5	7.0	151.1
El Higo	1,920	44.2	84.4	28.6	5.0	95.8
Guayabito	443	12.4	81.8	36.4	11.7	70.8
La Ermita	1,097	33.0	76.5	18.8	5.9	119.8
La Laguna	778	14.5	53.8	33.3	11.6	66.2
Las Uvas	1,170	63.6	88.9	20.6	6.5	134.3
Los Llanitos	2,370	37.8	73.9	53.7	9.6	67.3
San José	1,436	55.4	81.2	22.2	9.9	180.5

CONTINUATION OF CHART III- A-4
SOCIAL INDICATORS FOR THE PROVINCES OF PANAMA AND COLON BY DISTRICT AND WARD

Province Distritct and Ward	Population per Km^2 1990 /	Inhabitants Year 1990	Professional Assistance to Births Year 1990	Malnourishment Total Pob. Year 1988 %	literacy- 10 years of age and up 1990 %	Home Monthly Median Income(in B/.)Year 1990 /
San Miguelito	**243,025**	**4860.5**	**99.9**	**10.5**	**3.3**	**401.1**
Amelia D. de Icaza	33,901	8921.3	100.0	9.1	3.4	379.1
Bel. Porras	119,400	5970.0	99.8	12.0	3.9	249.5
José D. Espinar	58,745	2521.2	100.0	7.9	2.2	575.9
Mateo Iturralde	13,662	12420.0	100.0	7.9	2.5	515.9
Victoriano Lorenzo	17,317	9620.6	99.7	6.5	2.9	435.9
Taboga	**1,810**	**150.8**	**100.0**	**9.4**	**1.2**	**216.6**
Cabecera	1,199	141.1	100.0	9.1	0.7	212.5
Otoque Occidente	210	2100.0	100.0	—	2.2	168.8
Otoque Oriente	401	117.9	100.0	10.0	2.0	240.6

a_/: Excludes civil and military population residing in U.S. military bases in the provinces of Colon and Panama.
b_/: Includes births in health centers and births assisted in houses by a professional in health services.
c_/: Percentage Distribution of school age children -- 6 to 9 years old -- as included in the Third National Census for Height by level of nourishment status Health Ministry and Education Ministry, Panamá, 1988.
d_/: Based on the National Census on Population and Housing Mayo de 1990.

Source: Contraloría General de la República, Dirección de Estadística y Censo, "Resultados Finales Básicos de las provincias de Panamá y Colón", 1991 y Tabulados Especiales.

CHART III-A-5
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS VIS A VIS DISTRICTS: FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	FORECAST POPULATION				
PROVINCE					RELATIVE SIGNIFICANCE
DISTRICT					PERIOD
WARD	2000	2010	2020	2030	2000-2030
REGION TOTAL	1,607,298	2,037,293	2,464,010	2,958,560	
COLON PROVINCE	212,675	270,443	346,605	448,553	
COLON DISTRICT	175,471	218,512	272,110	338,855	100.00
Barrio Norte	28,567	35,574	44,300	55,166	16.28
Barrio Sur	21,407	26,658	33,197	41,340	12.20
Buena Vista	10,967	13,657	17,007	21,178	6.25
Cativá	33,620	41,867	52,136	64,925	19.16
Ciricito	2,527	3,147	3,918	4,880	1.44
Cristóbal	21,092	26,265	32,708	40,730	12.02
Escobal	2,141	2,666	3,320	4,134	1.22
Limón	3,808	4,742	5,905	7,353	2.17
Nva. Providencia	2,228	2,775	3,456	4,303	1.27
Puerto Pilón	12,388	15,427	19,211	23,923	7.06
Sabanitas	18,986	23,643	29,442	36,664	10.82
Salamanca	4,124	5,135	6,395	7,963	2.35
San Juan	13,002	16,192	20,163	25,109	7.41
Santa Rosa	614	765	952	1,186	0.35

CONTINUATION OF CHART III-A-5
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	2000	2010	2020	2030	2000-2030
CHAGRES DISTRICT	**10,954**	**13,036**	**15,514**	**18,462**	**100.00**
Chagres	352	418	498	593	3.21
Achiote	815	970	1,154	1,374	7.44
El Guabo	1,561	1,858	2,211	2,631	14.25
La Encantada	3,196	3,804	4,527	5,387	29.18
Palmas Bellas	1,853	2,206	2,625	3,124	16.92
Piña	696	828	985	1,172	6.35
Salud	2,481	2,953	3,514	4,182	22.65
PORTOBELO DISTRICT	**6,858**	**7,946**	**9,205**	**10,664**	**100.00**
Portobelo	3,343	3,874	4,487	5,199	48.75
Cacique	309	358	414	480	4.50
Garrote	771	893	1,035	1,199	11.24
Isla Grande	752	872	1,010	1,170	10.97
María Chiquita	1,683	1,950	2,259	2,617	24.54
SANTA ISABEL DISTRICT	**3,471**	**4,496**	**5,824**	**7,545**	**100.00**
Palenque	407	527	683	885	11.73
Guango	248	321	416	539	7.14
Miramar	79	103	133	172	2.28
Nombre de Dios	1,360	1,762	2,282	2,956	39.18
Palmira	365	473	613	794	10.53
Playa Chiquita	271	351	454	589	7.80
Santa Isabel	211	273	354	458	6.07
Viento frio	530	687	889	1,152	15.27

CONTINUATION OF CHART III-A-5
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	2000	2010	2020	2030	2000-2030
DONOSO DISTRICT	**15,921**	**26,453**	**43,952**	**73,027**	**100.00**
Donoso	3,776	6,275	10,425	17,322	23.72
Coclé del Norte	5,429	9,020	14,988	24,902	34.10
El Guásimo	3,019	5,015	8,333	13,846	18.96
Gobea	713	1,185	1,969	3,272	4.48
Río Indio	1,159	1,926	3,200	5,316	7.28
San José del Gral.	1,825	3,032	5,037	8,369	11.46
PANAMA PROVINCE	**1,394,623**	**1,766,850**	**2,117,405**	**2,510,007**	
ARRAIJAN DISTRICT	**102,869**	**155,226**	**218,961**	**294,265**	**100.00**
Arraiján	34,297	51,752	73,002	98,108	33.34
Juan D. Arosemena	19,473	29,384	41,449	55,704	18.93
Nuevo Emperador	2,788	4,207	5,934	7,975	2.71
Santa Clara	1,728	2,608	3,679	4,944	1.68
Veracruz	12,797	19,310	27,239	36,607	12.44
Vista Alegre	31,787	47,965	67,659	90,928	30.90

CONTINUATION OF CHART III-A-5
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	2000	2010	2020	2030	2000-2030
CAPIRA DISTRICT	**12,744**	**48,680**	**63,843**	**83,729**	**100.00**
Capira	1,602	5,550	7,278	9,545	11.40
Caimito	608	3,101	4,067	5,334	6.37
Campana	769	2,181	2,860	3,751	4.48
Cermeño	653	2,273	2,981	3,910	4.67
Cirí de los Sotos	1,010	3,374	4,424	5,802	6.93
Cirí Grande	1,807	7,779	10,202	13,380	15.98
El Cacao	1,780	7,769	10,189	13,363	15.96
La Trinidad	1,049	3,763	4,935	6,472	7.73
Las Ollas Arriba	372	1,241	1,628	2,135	2.55
Lídice	1,941	5,769	7,565	9,922	11.85
Villa Carmen	388	1,874	2,458	3,224	3.85
Villa Rosario	765	4,006	5,254	6,891	8.23
CHAME DISTRICT	**8,063**	**23,012**	**28,359**	**34,949**	**100.00**
Chame	988	2,957	3,644	4,491	12.85
Bejuco	2,571	5,302	6,534	8,052	23.04
Buenos Aires	976	1,981	2,442	0	8.61
Cabuya	977	1,678	2,067	2,548	7.29
Chicá	302	957	1,180	1,454	4.16
El Libano	191	242	298	367	1.05
Las Lajas	0	2,202	2,714	3,345	9.57
Nueva Gorgona	1,153	3,392	4,180	5,151	14.74
Punta Chame	187	398	491	605	1.73
Sajalices	0	2,140	2,637	3,250	9.30
Sorá	718	1,763	2,172	2,677	7.66

CONTINUATION OF CHART III-A-5
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	2000	2010	2020	2030	2000-2030
CHEPO DISTRICT	**41,438**	**51,010**	**62,793**	**77,298**	**100.00**
Chepo	11,777	14,497	17,846	21,968	28.42
Cañita	2,109	2,596	3,196	3,934	5.09
Chepillo	232	286	352	433	0.56
El Llano	20,669	25,444	31,321	38,556	49.88
Las Margaritas	4,529	5,575	6,863	8,449	10.93
Sta Cruz de Chinina	2,122	2,612	3,215	3,958	5.12
LA CHORRERA DISTRICT	**120,352**	**154,061**	**187,799**	**228,926**	**100.00**
Barrio Balboa	24,203	30,982	37,766	46,037	20.11
Barrio Colón	23,938	30,643	37,353	45,533	19.89
Amador	2,287	2,927	3,568	4,350	1.90
Arosemena	229	293	357	435	0.19
El Arado	1,829	2,342	2,855	3,480	1.52
El Coco	18,835	24,111	29,391	35,827	15.65
Feullet	1,938	2,480	3,024	3,686	1.61
Guadalupe	26,983	34,540	42,105	51,325	22.42
Herrera	746	955	1,164	1,419	0.62
Hurtado	650	832	1,014	1,236	0.54
Iturralde	1,059	1,356	1,653	2,015	0.88
La Represa	578	739	901	1,099	0.48
Los Díaz	794	1,017	1,239	1,511	0.66
Mendoza	650	832	1,014	1,236	0.54
Obaldía	662	847	1,033	1,259	0.55
Playa Leona	7,703	9,860	12,019	14,651	6.40
Puerto Caimito	5,873	7,518	9,165	11,172	4.88
Santa Rita	1,396	1,787	2,178	2,656	1.16

CONTINUATION OF CHART III-A- 5
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	2000	2010	2020	2030	2000-2030
PANAMA DISTRICT	**716,809**	**848,424**	**955,912**	**1,077,019**	**100.00**
Bella Vista	22,221	26,301	29,633	33,388	3.10
Bethania	49,388	58,456	65,862	74,207	6.89
Curundú	18,995	22,483	25,332	28,541	2.65
El Chorrillo	16,702	19,768	22,273	25,095	2.33
Juan Díaz	79,853	94,514	106,489	119,980	11.14
Calidonia	20,071	23,756	26,766	30,157	2.80
Parque Lefevre	42,650	50,481	56,877	64,083	5.95
Pedregal	51,108	60,493	68,157	76,791	7.13
Pueblo Nuevo	21,504	25,453	28,677	32,311	3.00
Río Abajo	34,335	40,640	45,788	51,589	4.79
San Felipe	9,032	10,690	12,044	13,570	1.26
San Francisco	33,547	39,706	44,737	50,404	4.68
Santa Ana	27,525	32,579	36,707	41,358	3.84
Ancón	20,716	24,519	27,626	31,126	2.89
Chilibre	40,500	47,936	54,009	60,852	5.65
Las Cumbres	79,279	93,836	105,724	119,118	11.06
Pacora	67,022	79,328	89,378	100,701	9.35
San Martín	3,226	3,818	4,302	4,847	0.45
Tocumen	79,136	93,666	105,533	118,903	11.04

CONTINUATION OF CHART III-A-5
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	2000	2010	2020	2030	2000-2030
SAN CARLOS DISTRICT	**14,830**	**17,676**	**21,067**	**25,109**	**100.00**
San Carlos	2,471	2,945	3,510	4,183	16.66
El Espino	1,167	1,391	1,658	1,976	7.87
El Higo	2,204	2,627	3,131	3,731	14.86
Guayabito	461	550	655	781	3.11
La Ermita	1,361	1,623	1,934	2,305	9.18
La Laguna	767	914	1,089	1,298	5.17
Las Uvas	1,619	1,930	2,301	2,742	10.92
Los Llanitos	2,704	3,222	3,841	4,577	18.23
San José	2,076	2,475	2,949	3,515	14.00
SAN MIGUELITO DISTRICT	**333,003**	**456,294**	**561,697**	**664,832**	**100.00**
Amelia D. de Icaza	42,092	57,676	70,999	84,035	12.64
Belisario Porras	140,727	192,830	237,373	280,958	42.26
José D. Espinar	121,080	165,908	204,233	241,733	36.36
Mateo Iturralde	13,453	18,434	22,693	26,859	4.04
Victoriano Lorenzo	15,651	21,446	26,400	31,247	4.70
TABOGA DISTRICT	**2,191**	**2,653**	**3,212**	**3,889**	**100.00**
Taboga	1,324	1,603	1,940	2,349	60.41
Otoque Occidente	464	562	681	824	21.20
Otoque Oriente	403	488	591	715	18.39

CONTINUATION OF CHART III-A-5
RELATIVE SIGNIFICANCE OF METROPOLITAN REGION WARDS
VIS A VIS DISTRICTS: FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	2000	2010	2020	2030	2000-2030
CHIMAN DISTRICT	**4,764**	**7,404**	**11,506**	**17,879**	**100.00**
Chimán	3,585	5,572	8,658	13,454	75.25
Brujas	865	1,344	2,088	3,245	18.15
Gonzalo Vásquez	314	489	759	1,180	6.60
BALBOA DISTRICT	**2,575**	**2,410**	**2,256**	**2,112**	**100.00**
Balboa	1,130	1,058	990	927	43.90
La Ensenada	94	88	82	77	3.65
La Esmeralda	511	478	447	419	19.83
La Guinea	192	180	168	157	7.45
Pedro González	457	427	400	374	17.73
Saboga	192	179	168	157	7.44

NOTE: * INDICATES WARDS CREATED IN THE 1960 DECADE
** INDICATES WARDS CREATED IN THE 1970 DECADE
SOURCE: CENSUS DATA ON POPULATION AND HOUSING 1960; 1970; 1980; AND 1990.
DIRECCION DE ESTADISTICA Y CENSO DE LA CONTRALORIA GENERAL DE LA REPUBLICA.
CHARTS PRODUCED BY BOOZ •ALLEN AND HAMILTON

CHART III-A-6
METROPOLITAN REGION POPULATION BY PROVINCE , DISTRICT AND WARD
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

PROVINCE	INHABITANTS							
WARD								
	1960	1970	1980	1990	2000	2010	2020	2030
REGION TOTAL	**457,725**	**686,250**	**942,933**	**1,240,421**	**1,607,298**	**2,037,293**	**2,464,010**	**2,958,560**
COLON PROVINCE	**85,332**	**109,605**	**133,833**	**168,294**	**212,675**	**270,443**	**346,605**	**448,553**
COLON DISTRICT	**73,547**	**95,421**	**113,153**	**140,908**	**175,471**	**218,512**	**272,110**	**338,855**
Barrio Norte	59,598	36,072	32,321	30,385	28,567	35,574	44,300	55,166
Barrio Sur	0	31,623	27,519	24,269	21,407	26,658	33,197	41,340
Buena Vista	2,219	4,054	5,190	7,547	10,967	13,657	17,007	21,178
Cativá	2,389	3,387	10,870	19,101	33,620	41,867	52,136	64,925
Ciricito	1,273	1,551	1,753	2,108	2,527	3,147	3,918	4,880
Cristóbal	0	0	3,874	15,178	21,092	26,265	32,708	40,730
Escobal	1,200	1,849	1,807	1,964	2,141	2,666	3,320	4,134
Limón	1,170	1,916	2,700	3,209	3,808	4,742	5,905	7,353
Nva. Providencia	376	446	703	1,253	2,228	2,775	3,456	4,303
Puerto Pilón	2,085	4,295	8,460	10,241	12,388	15,427	19,211	23,923
Sabanitas	0	3,671	9,924	13,729	18,986	23,643	29,442	36,664
Salamanca	823	1,691	1,733	2,675	4,124	5,135	6,395	7,963
San Juan	2,077	4,351	5,839	8,716	13,002	16,192	20,163	25,109
Santa Rosa	337	515	460	533	614	765	952	1,186

CONTINUATION OF CHART III-A-6
METROPOLITAN REGION POPULATION BY PROVINCE , DISTRICT AND WARD
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	1960	1970	1980	1990	2000	2010	2020	2030
CHAGRES DISTRICT	**4,206**	**6,063**	**7,735**	**9,205**	**10,954**	**13,036**	**15,514**	**18,462**
Chagres	360	349	304	327	352	418	498	593
Achiote	259	460	699	755	815	970	1,154	1,374
El Guabo	0	720	909	1,191	1,561	1,858	2,211	2,631
La Encantada	876	1,430	1,963	2,532	3,196	3,804	4,527	5,387
Palmas Bellas	1,460	1,279	1,430	1,628	1,853	2,206	2,625	3,124
Piña	402	492	678	687	696	828	985	1,172
Salud	849	1,333	1,752	2,085	2,481	2,953	3,514	4,182
PORTOBELO DISTRICT	**1,779**	**1,545**	**5,110**	**5,920**	**6,858**	**7,946**	**9,205**	**10,664**
Portobelo	753	623	2,774	3,058	3,343	3,874	4,487	5,199
Cacique	0	135	164	225	309	358	414	480
Garrote	270	84	453	591	771	893	1,035	1,199
Isla Grande	306	248	521	626	752	872	1,010	1,170
María Chiquita	450	455	1,198	1,420	1,683	1,950	2,259	2,617
SANTA ISABEL DISTRICT	**2,595**	**2,044**	**2,068**	**2,679**	**3,471**	**4,496**	**5,824**	**7,545**
Palenque	265	249	194	281	407	527	683	885
Guango	193	194	102	159	248	321	416	539
Miramar	153	132	98	88	79	103	133	172
Nombre de Dios	605	424	734	1,028	1,360	1,762	2,282	2,956
Palmira	401	255	268	313	365	473	613	794
Playa Chiquita	144	142	125	184	271	351	454	589
Santa Isabel	452	336	251	230	211	273	354	458
Viento Frío	382	312	296	396	530	687	889	1,152

CONTINUATION OF CHART III-A-6
METROPOLITAN REGION POPULATION BY PROVINCE , DISTRICT AND WARD
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	1960	1970	1980	1990	2000	2010	2020	2030
DONOSO DISTRICT	**3,205**	**4,532**	**5,767**	**9,582**	**15,921**	**26,453**	**43,952**	**73,027**
Donoso	1,573	1,076	1,192	2,218	3,776	6,275	10,425	17,322
Coclé del Norte	799	1,350	949	2,377	5,429	9,020	14,988	24,902
El Guásimo	0	1,040	1,196	1,992	3,019	5,015	8,333	13,846
Gobea	305	360	522	610	713	1,185	1,969	3,272
Río Indio	528	706	800	963	1,159	1,926	3,200	5,316
San José del Gral.	0	0	1,108	1,422	1,825	3,032	5,037	8,369
PANAMA PROVINCE	**372,393**	**576,645**	**809,100**	**1,072,127**	**1,394,623**	**1,766,850**	**2,117,405**	**2,510,007**
DISTRICT ARRAIJAN	**11,128**	**19,347**	**37,186**	**61,849**	**102,869**	**155,226**	**218,961**	**294,265**
Arraiján	5,791	8,432	16,272	24,665	34,297	51,752	73,002	98,108
Juan D. Arosemena	2,166	3,440	8,525	13,418	19,473	29,384	41,449	55,704
Nuevo Emperador	2,198	1,688	1,926	2,319	2,788	4,207	5,934	7,975
Santa Clara	0	1,109	1,169	1,422	1,728	2,608	3,679	4,944
Veracruz	973	2,358	5,287	8,224	12,797	19,310	27,239	36,607
Vista Alegre	0	2,320	4,007	11,801	31,787	47,965	67,659	90,928

CONTINUATION OF CHART III-A-6
METROPOLITAN REGION POPULATION BY PROVINCE , DISTRICT AND WARD
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	1960	1970	1980	1990	2000	2010	2020	2030
CAPIRA DISTRICT	**12,744**	**17,289**	**21,581**	**28,303**	**37,119**	**48,680**	**63,843**	**83,729**
Capira	1,602	2,175	3,074	3,606	4,232	5,550	7,278	9,545
Caimito	608	707	736	1,319	2,364	3,101	4,067	5,334
Campana	769	947	1,117	1,363	1,663	2,181	2,860	3,751
Cermeño	653	966	1,316	1,511	1,733	2,273	2,981	3,910
Cirí de los Sotos	1,010	1,443	1,886	2,202	2,572	3,374	4,424	5,802
Cirí Grande	1,807	2,400	2,887	4,138	5,932	7,779	10,202	13,380
El Cacao	1,780	2,101	2,438	4,042	5,924	7,769	10,189	13,363
La Trinidad	1,049	1,718	1,626	2,160	2,869	3,763	4,935	6,472
Las Ollas Arriba	372	594	682	803	947	1,241	1,628	2,135
Lídice	1,941	2,616	3,352	3,840	4,399	5,769	7,565	9,922
Villa Carmen	388	524	640	956	1,429	1,874	2,458	3,224
Villa Rosario	765	1,098	1,827	2,363	3,055	4,006	5,254	6,891
CHAME DISTRICT	**8,063**	**9,961**	**12,295**	**15,152**	**18,673**	**23,012**	**28,359**	**34,949**
Chame	988	1,241	1,384	1,822	2,399	2,957	3,644	4,491
Bejuco	2,571	3,277	3,003	3,643	4,302	5,302	6,534	8,052
Buenos Aires	976	1,204	1,281	1,435	1,608	1,981	2,442	0
Cabuya	977	958	1,068	1,206	1,361	1,678	2,067	2,548
Chicá	302	363	479	610	777	957	1,180	1,454
El Libano	191	154	160	177	196	242	298	367
Las Lajas	0	914	1,436	1,602	1,787	2,202	2,714	3,345
Nueva Gorgona	1,153	874	1,424	1,980	2,752	3,392	4,180	5,151
Punta Chame	187	180	267	294	323	398	491	605
Sajalices	0	0	975	1,301	1,737	2,140	2,637	3,250
Sorá	718	796	818	1,082	1,430	1,763	2,172	2,677

CONTINUATION OF CHART III-A-6
METROPOLITAN REGION POPULATION BY PROVINCE , DISTRICT AND WARD
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	1960	1970	1980	1990	2000	2010	2020	2030
CHEPO DISTRICT	**6,484**	**14,469**	**20,499**	**29,145**	**41,438**	**51,010**	**62,793**	**77,298**
Chepo	3,362	7,432	6,835	8,971	11,777	14,497	17,846	21,968
Cañita	0	1,112	1,404	1,721	2,109	2,596	3,196	3,934
Chepillo	335	283	278	254	232	286	352	433
El Llano	2,436	4,174	6,906	12,393	20,669	25,444	31,321	38,556
Las Margaritas	0	0	3,275	3,852	4,529	5,575	6,863	8,449
Sta Cruz de Chinina	351	1,468	1,801	1,954	2,122	2,612	3,215	3,958
LA CHORRERA DISTRICT	**26,317**	**45,269**	**66,974**	**89,780**	**120,352**	**154,061**	**187,799**	**228,926**
Barrio Balboa	14,218	14,144	21,106	23,698	24,203	30,982	37,766	46,037
Barrio Colón	0	12,295	16,460	20,746	23,938	30,643	37,353	45,533
Amador	1,043	1,445	1,622	1,925	2,287	2,927	3,568	4,350
Arosemena	352	395	498	340	229	293	357	435
El Arado	1,002	1,360	1,574	1,696	1,829	2,342	2,855	3,480
El Coco	789	1,550	2,917	7,767	18,835	24,111	29,391	35,827
Feullet	479	740	971	1,372	1,938	2,480	3,024	3,686
Guadalupe	1,270	3,776	10,905	18,015	26,983	34,540	42,105	51,325
Herrera	871	1,026	686	715	746	955	1,164	1,419
Hurtado	697	841	764	703	650	832	1,014	1,236
Iturralde	623	634	595	792	1,059	1,356	1,653	2,015
La Represa	625	790	731	650	578	739	901	1,099
Los Díaz	818	1,065	927	858	794	1,017	1,239	1,511
Mendoza	928	1,217	1,120	851	650	832	1,014	1,236
Obaldía	597	565	471	559	662	847	1,033	1,259
Playa Leona	738	1,249	2,378	4,279	7,703	9,860	12,019	14,651
Puerto Caimito	460	1,102	2,233	3,623	5,873	7,518	9,165	11,172
Santa Rita	807	1,075	1,016	1,191	1,396	1,787	2,178	2,656

CONTINUATION OF CHART III-A-6
METROPOLITAN REGION POPULATION BY PROVINCE , DISTRICT AND WARD
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	1960	1970	1980	1990	2000	2010	2020	2030
PANAMA DISTRICT	**281,384**	**386,627**	**477,107**	**584,803**	**716,809**	**848,424**	**955,912**	**1,077,019**
Bella Vista	15,681	26,659	28,136	24,986	22,221	26,301	29,633	33,388
Bethania	15,758	37,271	43,981	46,611	49,388	58,456	65,862	74,207
Curundú	0	0	16,947	17,933	18,995	22,483	25,332	28,541
El Chorrillo	29,502	27,834	25,145	20,488	16,702	19,768	22,273	25,095
Juan Díaz	7,736	24,719	51,944	73,809	79,853	94,514	106,489	119,980
Calidonia	53,794	57,628	28,602	23,974	20,071	23,756	26,766	30,157
Parque Lefevre	18,540	31,165	34,128	38,163	42,650	50,481	56,877	64,083
Pedregal	7,249	14,536	32,731	40,896	51,108	60,493	68,157	76,791
Pueblo Nuevo	17,070	19,376	21,105	21,289	21,504	25,453	28,677	32,311
Río Abajo	20,973	27,353	31,989	33,155	34,335	40,640	45,788	51,589
San Felipe	13,276	14,145	11,696	10,282	9,032	10,690	12,044	13,570
San Francisco	25,242	35,995	34,962	34,262	33,547	39,706	44,737	50,404
Santa Ana	35,644	32,023	27,806	27,657	27,525	32,579	36,707	41,358
Ancón	0	0	6,401	11,518	20,716	24,519	27,626	31,126
Chilibre	7,659	12,847	18,168	27,135	40,500	47,936	54,009	60,852
Las Cumbres	6,906	13,238	31,495	56,547	79,279	93,836	105,724	119,118
Pacora	4,266	4,120	8,184	26,587	67,022	79,328	89,378	100,701
San Martín	0	1,548	1,925	2,479	3,226	3,818	4,302	4,847
Tocumen	2,088	6,170	21,762	47,032	79,136	93,666	105,533	118,903

CONTINUATION OF CHART III-A-6
METROPOLITAN REGION POPULATION BY PROVINCE , DISTRICT AND WARD
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	1960	1970	1980	1990	2000	2010	2020	2030
SAN CARLOS DISTRICT	**7,289**	**9,108**	**10,440**	**12,443**	**14,830**	**17,676**	**21,067**	**25,109**
San Carlos	1,133	1,408	1,666	2,029	2,471	2,945	3,510	4,183
El Espino	1,430	1,080	1,234	1,200	1,167	1,391	1,658	1,976
El Higo	1,251	1,494	1,673	1,920	2,204	2,627	3,131	3,731
Guayabito	433	515	426	443	461	550	655	781
La Ermita	671	794	884	1,097	1,361	1,623	1,934	2,305
La Laguna	754	760	789	778	767	914	1,089	1,298
Las Uvas	0	736	845	1,170	1,619	1,930	2,301	2,742
Los Llanitos	1,177	1,627	1,930	2,370	2,704	3,222	3,841	4,577
San José	440	694	993	1,436	2,076	2,475	2,949	3,515
SAN MIGUELITO DISTRICT	**12,975**	**68,400**	**156,611**	**243,025**	**333,003**	**456,294**	**561,697**	**664,832**
Amelia D. de Icaza	12,975	68,400	24,103	33,901	42,092	57,676	70,999	84,035
Belisario Porras	0	0	80,012	119,400	140,727	192,830	237,373	280,958
José D. Espinar	0	0	23,351	58,745	121,080	165,908	204,233	241,733
Mateo Iturralde	0	0	12,237	13,662	13,453	18,434	22,693	26,859
Victoriano Lorenzo	0	0	16,908	17,317	15,651	21,446	26,400	31,247
TABOGA DISTRICT	**1,879**	**1,741**	**1,495**	**1,810**	**2,191**	**2,653**	**3,212**	**3,889**
Taboga	928	908	1,003	1,199	1,324	1,603	1,940	2,349
Otoque Occidente	478	276	93	210	464	562	681	824
Otoque Oriente	473	557	399	401	403	488	591	715

CONTINUATION OF CHART III-A-6
METROPOLITAN REGION POPULATION BY PROVINCE , DISTRICT AND WARD
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030

	1960	1970	1980	1990	2000	2010	2020	2030
CHIMAN DISTRICT	**1,258**	**1,678**	**1,973**	**3,066**	**4,764**	**7,404**	**11,506**	**17,879**
Chimán	690	962	1,356	2,221	3,585	5,572	8,658	13,454
Brujas	274	400	373	568	865	1,344	2,088	3,245
Gonzalo Vásquez	294	316	244	277	314	489	759	1,180
BALBOA DISTRICT	**2,872**	**2,756**	**2,939**	**2,751**	**2,575**	**2,410**	**2,256**	**2,112**
Balboa	1,778	1,418	1,104	1,179	1,130	1,058	990	927
La Ensenada	166	129	100	97	94	88	82	77
La Esmeralda	452	327	380	446	511	478	447	419
La Guinea	0	310	313	245	192	180	168	157
Pedro González	321	356	424	440	457	427	400	374
Saboga	155	216	618	344	192	179	168	157

NOTE: * INDICATES WARDS CREATED IN THE 1960 DECADE
** INDICATES WARDS CREATED IN THE 1970 DECADE
SOURCE: CENSUS DATA ON POPULATION AND HOUSING 1960; 1970; 1980; AND 1990.
DIRECCION DE ESTADISTICA Y CENSO DE LA CONTRALORIA GENERAL DE LA REPUBLICA.
CHARTS PRODUCED BY BOOZ •ALLEN AND HAMILTON

CHART III-A-7

METROPOLITAN REGION POPULATION BY PROVINCE, AND DISTRICT
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030
LOW GROWTH RATE SCENARIO(10% OVER TREND) FOR SEA LEVEL CANAL

PROVINCE / DISTRICT	INHABITANTS							
	1960	1970	1980	1990	2000	2010	2020	2030
REGION TOTAL	457,725	686,250	942,933	1,240,421	1,761,593	2,233,320	2,702,068	3,245,857
COLON PROVINCE	85,332	109,605	133,833	168,294	231,814	295,106	379,568	493,252
COLON DISTRICT	73,547	95,421	113,153	140,908	194,018	241,608	300,872	374,672
CHAGRES DISTRICT	4,206	6,063	7,735	9,205	8,564	9,649	11,483	13,665
PORTOBELODISTRICT	1,779	1,545	5,110	5,920	6,858	7,946	9,205	10,664
SANTA ISABEL DISTRICT	2,595	2,044	2,068	2,679	3,471	4,496	5,824	7,545
DONOSO DISTRICT	3,205	4,532	5,767	9,582	18,903	31,408	52,185	86,706

CONTINUATION OF CHART III-A-7
METROPOLITAN REGION POPULATION BY PROVINCE , AND DISTRICT
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030
LOW GROWTH RATE SCENARIO(10% OVER TREND) FOR SEA LEVEL CANAL

	1960	1970	1980	1990	2000	2010	2020	2030
PANAMA PROVINCE	**372,393**	**576,645**	**809,100**	**1,072,127**	**1,529,779**	**1,938,214**	**2,322,500**	**2,752,605**
ARRAIJAN DISTRICT	11,128	19,347	37,186	61,849	113,155	170,746	240,854	323,688
CAPIRA DISTRICT	12,744	17,289	21,581	28,303	40,830	53,548	70,227	92,101
CHAME DISTRICT	8,063	9,961	12,295	15,152	18,673	23,012	28,359	34,949
CHEPO DISTRICT	6,484	14,469	20,499	29,145	45,580	56,109	69,070	85,025
LA CHORRERA DISTRICT	26,317	45,269	66,974	89,780	9 132,390	169,470	206,583	251,824
PANAMA DISTRICT	281,384	386,627	477,107	584,803	788,490	933,267	1,051,504	1,184,721
SAN CARLOS DISTRICT	7,289	9,108	10,440	12,443	14,830	17,676	21,067	25,109
SAN MIGUELITO DISTRICT	12,975	68,400	156,611	243,025	366,300	501,919	617,862	731,309
TABOGA DISTRICT	1,879	1,741	1,495	1,810	2,191	2,653	3,212	3,889
CHIMAN DISTRICT	1,258	1,678	1,973	3,066	4,764	7,404	11,506	17,879
BALBOA DISTRICT	2,872	2,756	2,939	2,751	2,575	2,410	2,256	2,112

NOTE: * INDICATES WARDS CREATED IN THE 1960 DECADE
** INDICATES WARDS CREATED IN THE 1970 DECADE
SOURCE: CENSUS DATA ON POPULATION AND HOUSING 1960; 1970; 1980; AND 1990.
DIRECCION DE ESTADISTICA Y CENSO DE LA CONTRALORIA GENERAL DE LA REPUBLICA.
CHARTS PRODUCED BY BOOZ •ALLEN AND HAMILTON

CHART III-A-8
METROPOLITAN REGION POPULATION BY PROVINCE AND DISTRICT
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030
HIGH GROWTH RATE SCENARIO (25% 0VER TREND) FOR SEA LEVEL CANAL

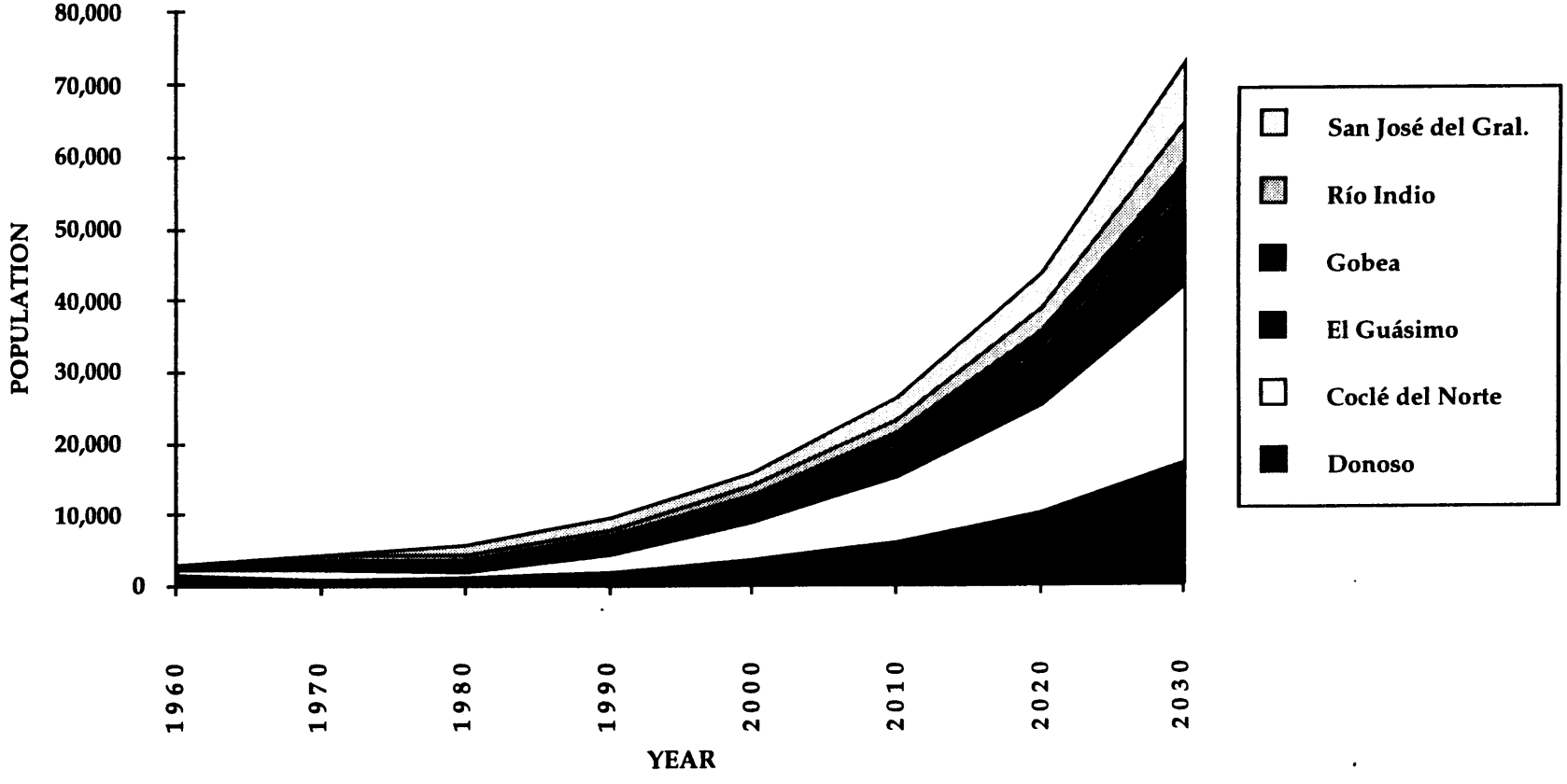
PROVINCE	INHABITANTS							
DISTRICT								
	1960	1970	1980	1990	2000	2010	2020	2030
REGION TOTAL	457,725	686,250	942,933	1,240,421	1,993,017	2,527,098	3,057,114	3,671,547
COLON PROVINCE	85,332	109,605	133,833	168,294	260,493	331,818	426,942	555,000
COLON DISTRICT	73,547	95,421	113,153	140,908	220,300	274,337	341,628	425,425
CHAGRES DISTRICT	4,206	6,063	7,735	9,205	8,564	9,649	11,483	13,665
PORTOBELODISTRICT	1,779	1,545	5,110	5,920	6,858	7,946	9,205	10,664
SANTA ISABEL DISTRICT	2,595	2,044	2,068	2,679	3,471	4,496	5,824	7,545
DONOSO DISTRICT	3,205	4,532	5,767	9,582	21,300	35,390	58,802	97,701

CONTINUATION OF CHART III-A-8
METROPOLITAN REGION POPULATION BY PROVINCE AND DISTRICT
CENSUS: 1960, 1970, 1980 Y 1990 AND FORECAST FOR THE YEARS 2000, 2010, 2020 AND 2030
HIGH GROWTH RATE SCENARIO (25% 0VER TREND) FOR SEA LEVEL CANAL

	1960	1970	1980	1990	2000	2010	2020	2030
PANAMA PROVINCE	**372,393**	**576,645**	**809,100**	**1,072,127**	**1,732,524**	**2,195,281**	**2,630,172**	**3,116,547**
ARRAIJAN DISTRICT	11,128	19,347	37,186	61,849	128,600	194,052	273,730	367,870
CAPIRA DISTRICT	12,744	17,289	21,581	28,303	46,400	60,853	79,807	104,665
CHAME DISTRICT	8,063	9,961	12,295	15,152	18,673	23,012	28,359	34,949
CHEPO DISTRICT	6,484	14,469	20,499	29,145	51,800	63,766	78,495	96,628
LA CHORRERA DISTRICT	26,317	45,269	66,974	89,780	150,440	192,576	234,749	286,158
PANAMA DISTRICT	281,384	386,627	477,107	584,803	896,000	1,060,517	1,194,876	1,346,256
SAN CARLOS DISTRICT	7,289	9,108	10,440	12,443	14,830	17,676	21,067	25,109
SAN MIGUELITO DISTRICT	12,975	68,400	156,611	243,025	416,250	570,363	702,116	831,033
TABOGA DISTRICT	1,879	1,741	1,495	1,810	2,191	2,653	3,212	3,889
CHIMAN DISTRICT	1,258	1,678	1,973	3,066	4,764	7,404	11,506	17,879
BALBOA DISTRICT	2,872	2,756	2,939	2,751	2,575	2,410	2,256	2,112

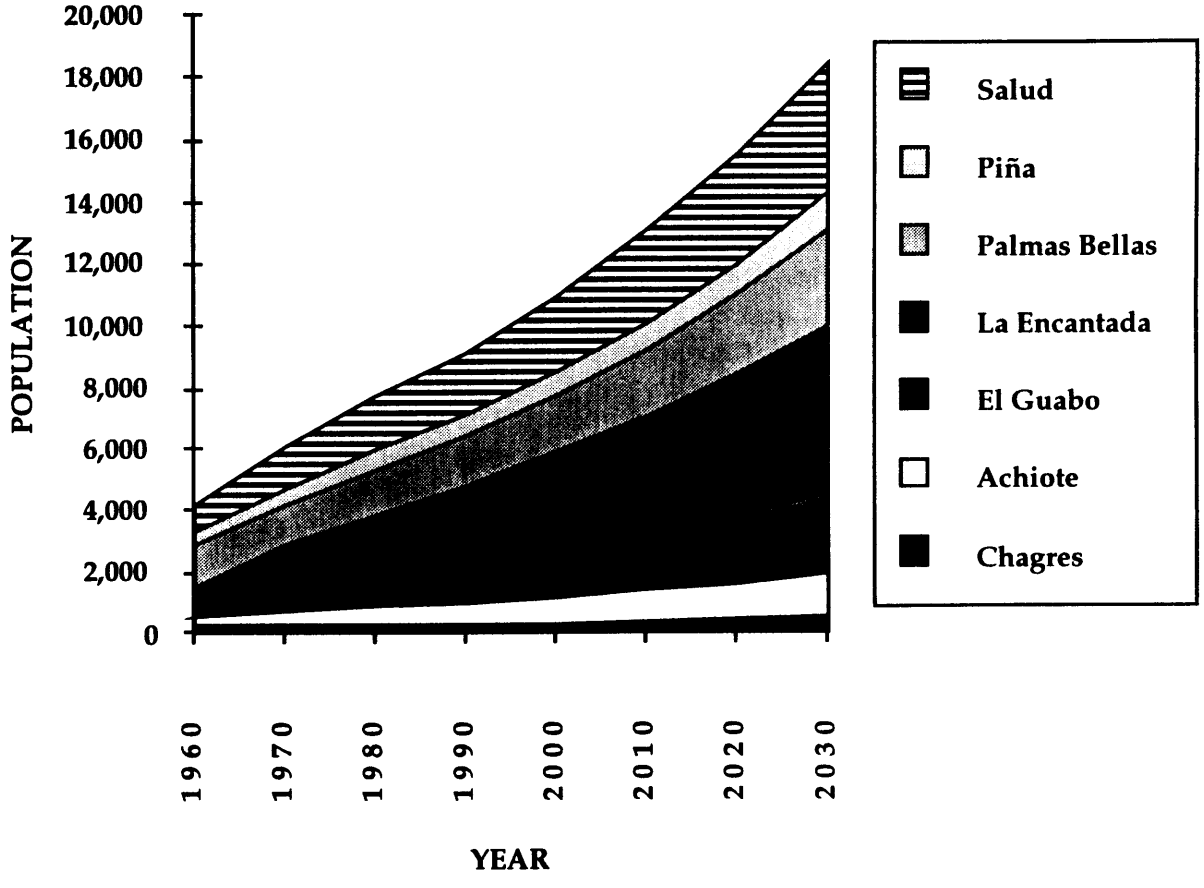
NOTE: * INDICATES WARDS CREATED IN THE 1960 DECADE
** INDICATES WARDS CREATED IN THE 1970 DECADE
SOURCE: CENSUS DATA ON POPULATION AND HOUSING 1960; 1970; 1980; AND 1990.
DIRECCION DE ESTADISTICA Y CENSO DE LA CONTRALORIA GENERAL DE LA REPUBLICA.
CHARTS PRODUCED BY BOOZ •ALLEN AND HAMILTON

CHART III-A-9
POPULATION BREAKDOWN BY WARDS
IN THE DONOSO DISTRICT: YEARS 1960-2030
(DISTRICT IMPACTED BY THE SEA LEVEL CANAL ALTERNATIVE)



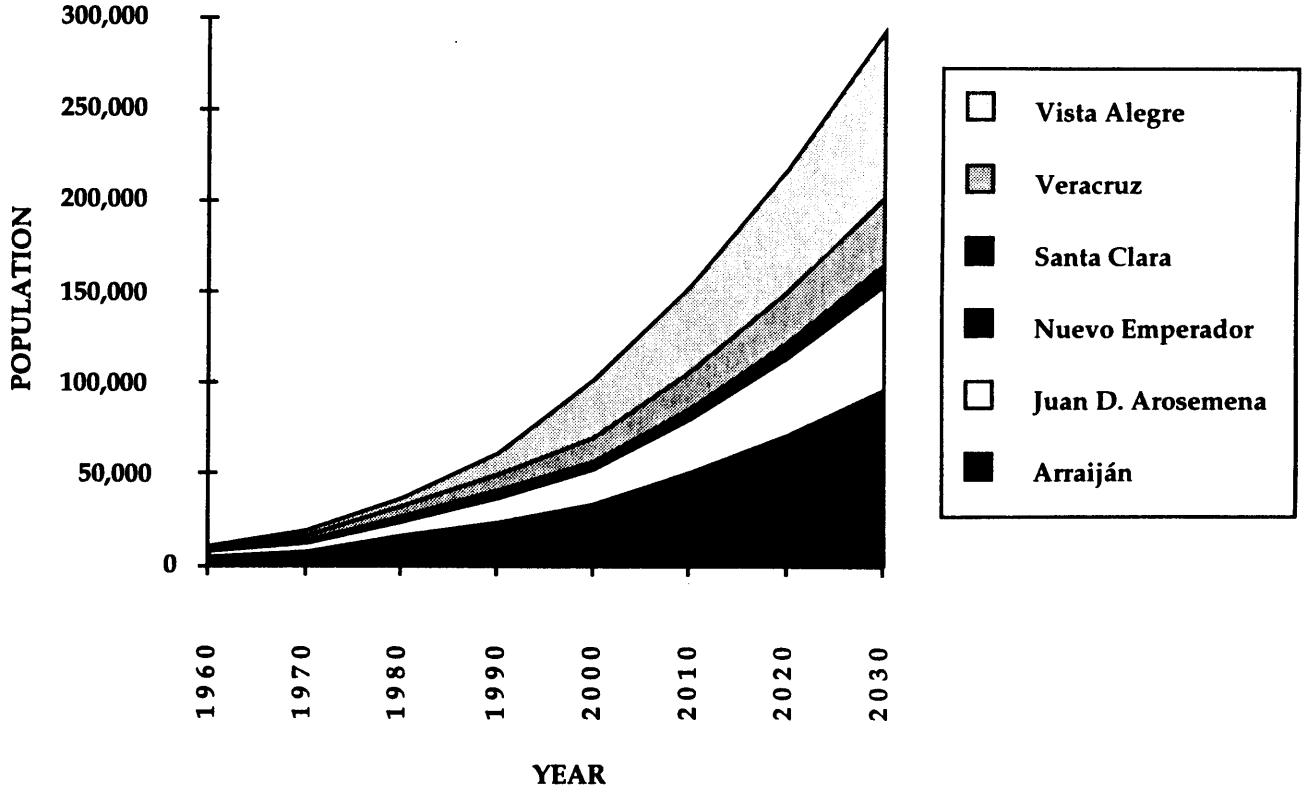
SOURCE: CENSOS NACIONALES DE POBLACION Y VIVIENDA: 1960-1990.
PROJECTIONS FOR BOOZ•ALLEN AND HAMILTON FOR THE YEARS 2000 TO 2030.

CHART III-A-10
POPULATION BREAKDOWN BY WARDS
IN THE CHAGRES DISTRICT: YEARS 1960-2030
(DISTRICT IMPACTED BY THE SEA LEVEL CANAL ALTERNATIVE)



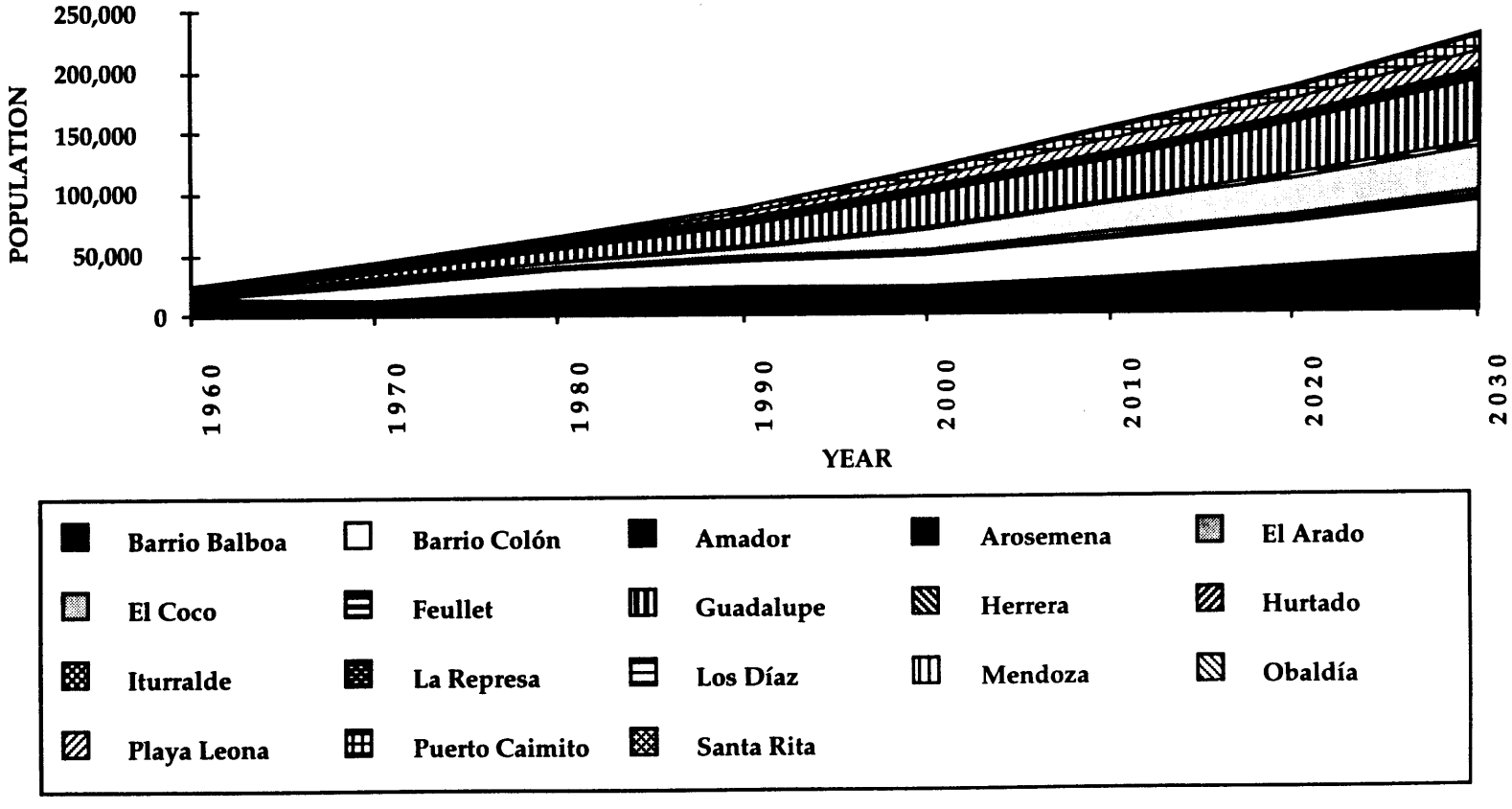
SOURCE: CENSOS NACIONALES DE POBLACION Y VIVIENDA: 1960-1990.
PROJECTIONS FOR BOOZ•ALLEN AND HAMILTON FOR THE YEARS 2000 TO 2030.

CHART III-A-11
POPULATION BREAKDOWN BY WARDS
IN THE ARRAIJAN DISTRICT: YEARS 1960-2030
(DISTRICT IMPACTED BY THE SEA LEVEL CANAL ALTERNATIVE)



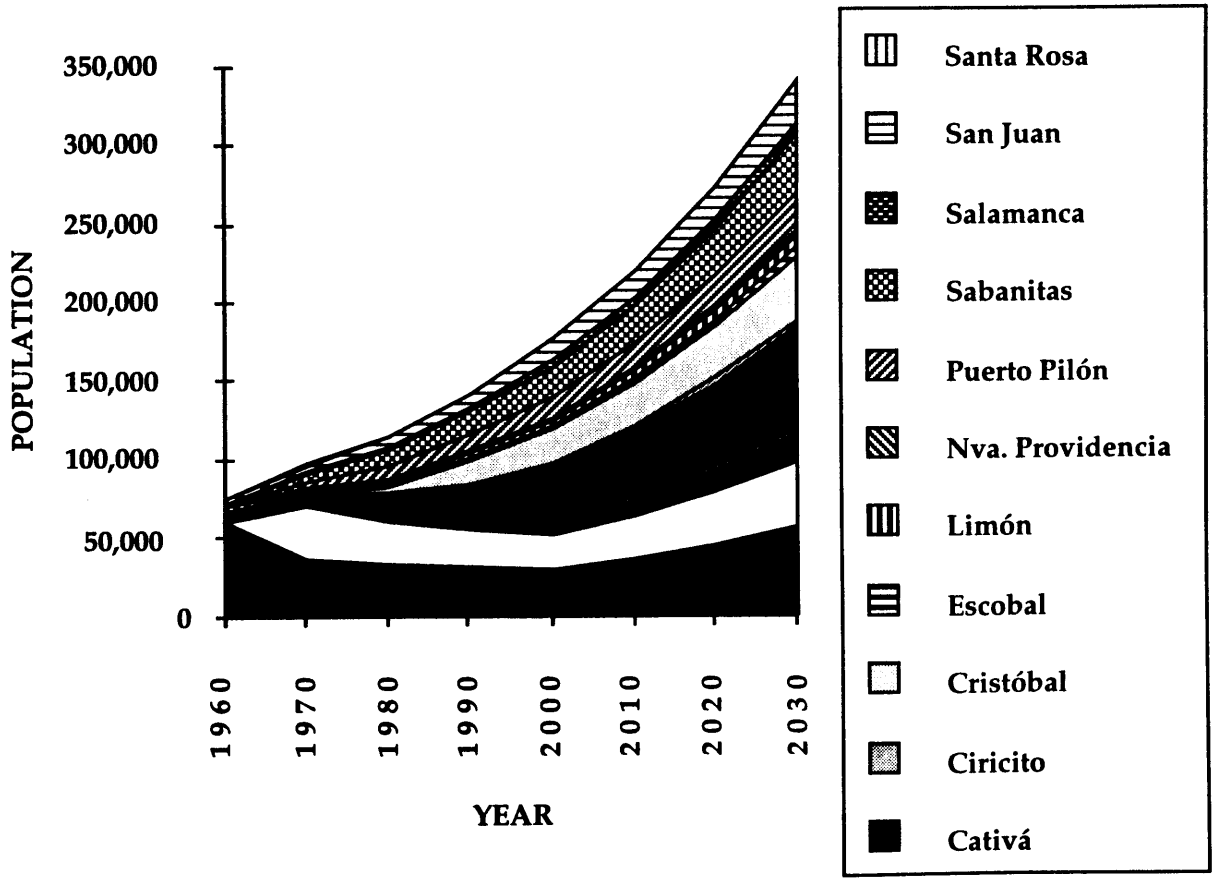
SOURCE: CENSOS NACIONALES DE POBLACION Y VIVIENDA: 1960-1990.
PROJECTIONS FOR BOOZ•ALLEN AND HAMILTON FOR THE YEARS 2000 TO 2030.

CHART III-A-12
POPULATION BREAKDOWN BY WARDS
IN THE LA CHORRERA DISTRICT: YEARS 1960-2030
(DISTRICT IMPACTED BY THE SEA LEVEL CANAL ALTERNATIVE)



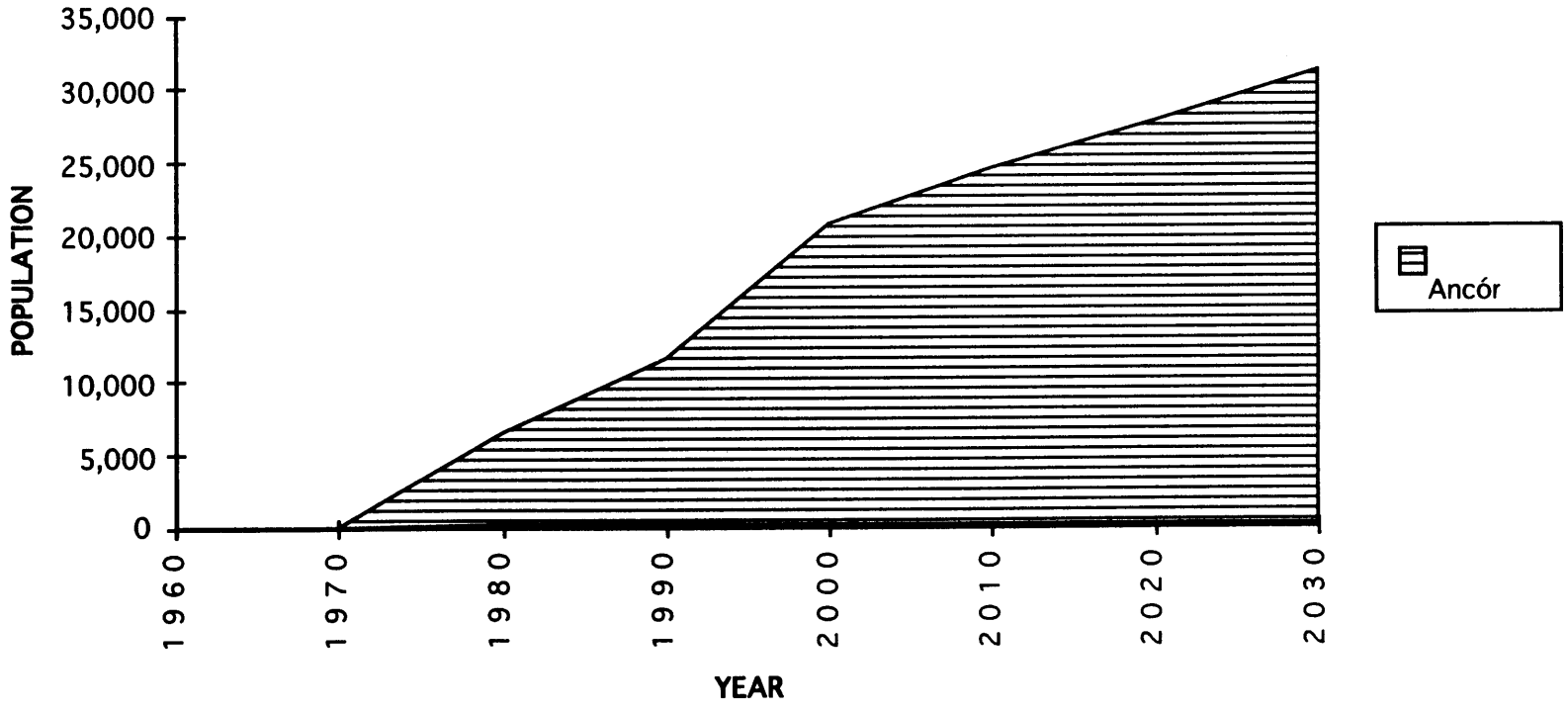
SOURCE: CENSOS NACIONALES DE POBLACION Y VIVIENDA: 1960-1990.
PROJECTIONS FOR BOOZ•ALLEN AND HAMILTON FOR THE YEARS 2000 TO 2030.

CHART III-A-13
POPULATION BREAKDOWN BY WARDS
IN THE LA COLON DISTRICT: YEARS 1960-2030
(DISTRICT IMPACTED BY THE HIGH RISE LOCK CANAL ALTERNATIVE)



SOURCE: CENSOS NACIONALES DE POBLACION Y VIVIENDA: 1960-1990.
PROJECTIONS FOR BOOZ•ALLEN AND HAMILTON FOR THE YEARS 2000 TO 2030.

CHART III-A-14
POPULATION BREAKDOWN BY WARDS
IN THE LA PANAMA DISTRICT -ANCON WARDS YEARS 1960-2030
(WARD IMPACTED BY THE HIGH RISE LOCK CANAL ALTERNATIVE)



SOURCE: CENSOS NACIONALES DE POBLACION Y VIVIENDA: 1960-1990.
PROJECTIONS FOR BOOZ•ALLEN AND HAMILTON FOR THE YEARS 2000 TO 2030.

CHART IIII-A-15
IDENTIFICATION OF ARCHEOLOGICAL AND HISTORICAL SITES

Historic Monuments Inventory

Binational Working Group

Historic Monuments Subcommitte Binational Working Group Report On Achievements And Actions Accomplished Before The Entry Into Force Of The Panama Canal Treaty Of 1977. Historic Monuments Subcommitte Binational Working Group Report

CATEGORIES:

I. MOVABLE PROPERTY

A) Work of arts - murals, litographies, paintings, sculptures, charcoal drawings, etc.

B) Historic collections- documents, maps, objects.

C) Archaeological collections- collections of various cultural inheritance.

D) Bibliographical collections- publications of importance for its being related or having relation to Panama.

E) Scientific collection of any type.

CONTINUATION OF CHART IIII-A-15
IDENTIFICATION OF ARCHEOLOGICAL AND HISTORICAL SITES

II. REAL ESTATE

A) Historic monuments

B) Simbolic or Memorial monuments

C) Archaelogical sites

D) Historical sites

E) Engineering works of variable categories.

MEMORIAL MONUMENTS

Description		Location
1.	Memorial at Thatcher Ferry Bridge	Bridge of the Americas
2.	Shaler Plaza	Ancon
3.	Stevens Circle	Balboa
4.	Fastlich Memorial	Balboa
5.	George Totten Plaque	Balboa Heights
6.	Sam Whyte Plaque	Pedro Miguel
7.	War Memorial	Paraiso
8.	French Cemetery	Paraiso
9.	Memorial Park and Monument to George Green	Alajuela Highway
10.	Colonial Cannon	Alajuela Highway
11.	Mount Hope Cemetery	Mount Hope
12.	West Indian Construction Workers	Rainbow City
13.	Pair of Colonial Anchors	Cristobal Port

CONTINUATION OF CHART IIII-A-15
IDENTIFICATION OF ARCHEOLOGICAL AND HISTORICAL SITES

HISTORIC MONUMENTS

1.	Fort San Lorenzo el Real (declared National Monument by Law 61 of Dec. 31, 1908)	Atlantic Side

ENGINEERING WORKS

1.	Dump Car #24	Balboa Heights
2.	Dump Car #418	Balboa Heights
3.	Dump Car #5066	Balboa Heights
4.	Locks Towing Locomotive #645	Balboa Heights
5.	Crane #64	Balboa Heights

HISTORICAL SITES OR OF HISTORIC INTEREST

1.	Buell Battery	Naos Island
2.	Burnside Battery	Naos Island
3.	Parke Battery	Naos Island
4.	Railway No. 8	Culebra Island
5.	Newton Battery	Perico Island
6.	Warren Battery	Flamenco Island
7.	Carr Battery	Flamenco Island
8.	Merrit Battery	Flamenco Island
9.	Prince Battery	Flamenco Island
10.	Ancon Hill	Ancon
11.	Curundu Colonial Bridge	Culebra Island

CONTINUATION OF CHART IIII-A-15
IDENTIFICATION OF ARCHEOLOGICAL AND HISTORICAL SITES

12.	Cruces Trail	Venta Cruces-Panama
13.	Webbs Battery	Margarita Island
14.	Weed Battery	Margarita Island
15.	Tidball Battery	Margarita Island
16.	Zalinsky Battery	Margarita Island
17.	Railway No. 1	Margarita Island
18.	San Lorenzo El Real	Atlantic Side
19.	Venta Chagres	Atlantic Side
20.	Camino Real	Nombre de Dios-Panama
21.	Fuerte de la Punta	Mouth of the Chagres
22.	Colonial Ruins	Limits between Panama and Fort Clayton

ARCHAELOGICAL SITES

1.	Palo Seco	Fort Kobbe
2.	Palo Seco Tower	Fort Kobbe
3.	Trench 1	Ancon
4.	Trench 2	Ancon
5.	Trench 3	Ancon
6.	Guinea Point	Fort Kobbe
7.	Butter Island	Alajuela Lake
8.	Macapale Island	Alajuela Lake
9.	Garrapata Island	Alajuela Lake
10.	Chagres Camp	Alajuela Lake
11.	Farfan Beach	Fort Kobbe

CONTINUATION OF CHART IIII-A-15
IDENTIFICATION OF ARCHEOLOGICAL AND HISTORICAL SITES

MEMORIAL MONUMENTS

Canal Operating Areas:

1.	W.C. Gorgas Plaque	Ancon
2.	Goethals Memorial	Balboa Heights
3.	Stone (Administration Bldg.)	Balboa Heights
4.	Plaque-Roosevelt Quote (Adm. Building)	Balboa Heights
5.	Stamps (Adm. Bldg.)	Balboa Heights
6.	Bust of Theodore Roosevelt (Adm. Bldg.)	Balboa Heights
7.	Bust of Ferdinand de Lesseps (Adm. Bldg.)	Balboa Heights
8.	Memorial Plaque to Gaillard	Contractor's Hill
9.	Theodore Roosevelt Centennial Trees	Balboa

HISTORICAL MONUMENTS

1.	Stone Base (Railroad Bridge-XIX Century-1855)	Miraflores

ENGINEERING WORKS

1.	Locomotive No. 672	Miraflores
2.	Dump Car No. 5055	Contractor's Hill
3.	Dump Car No. 419	Contractor's Hill
4.	Dump Car W/N	Contractor's Hill
5.	Locomotive No. 644	Gatun

CONTINUATION OF CHART IIII-A-15
IDENTIFICATION OF ARCHEOLOGICAL AND HISTORICAL SITES

Areas of military coordination:

1.	Mandinga 1	Mandinga River
2.	Mandinga 2	Mandinga River
3.	Mandinga 3	Mandinga River
4.	Mandinga 4	Mandinga River
5.	Mandinga 5	Mandinga River
6.	Mandinga 6	Mandinga River
7.	Chagres 1	Fort Sherman
8.	Chagres 2	Fort Sherman
9.	Chagres 3	Fort Sherman
10.	Chagres 5	Fort Sherman
11.	Customs	Atlantic Side

CONTINUATION OF CHART IIII-A-15
IDENTIFICATION OF ARCHEOLOGICAL AND HISTORICAL SITES

HISTORICAL SITES

1.	Contractor's Hill	Contractor's Hill
2.	Pueblo de Cruces	Venta Cruces-Panama
3.	French Canal	Cristobal

ARCHAEOLOGICAL SITES

1.	Ranger Control 7	Mandinga River
2.	Ranger Control 8	Mandinga River

ARCHAEOLOGICAL AND HISTORICAL SITES

Defense Sites-

1.	Kobbe Beach 1	Fort Kobbe
2.	Kobbe Beach 2	Fort Kobbe
3.	Kobbe 3	Fort Kobbe
4.	Kobbe 4	Fort Kobbe
5.	Venado Beach 2	Fort Kobbe
6.	Chagres 4	Fort Sherman
7.	Venado Beach	Fort Kobbe