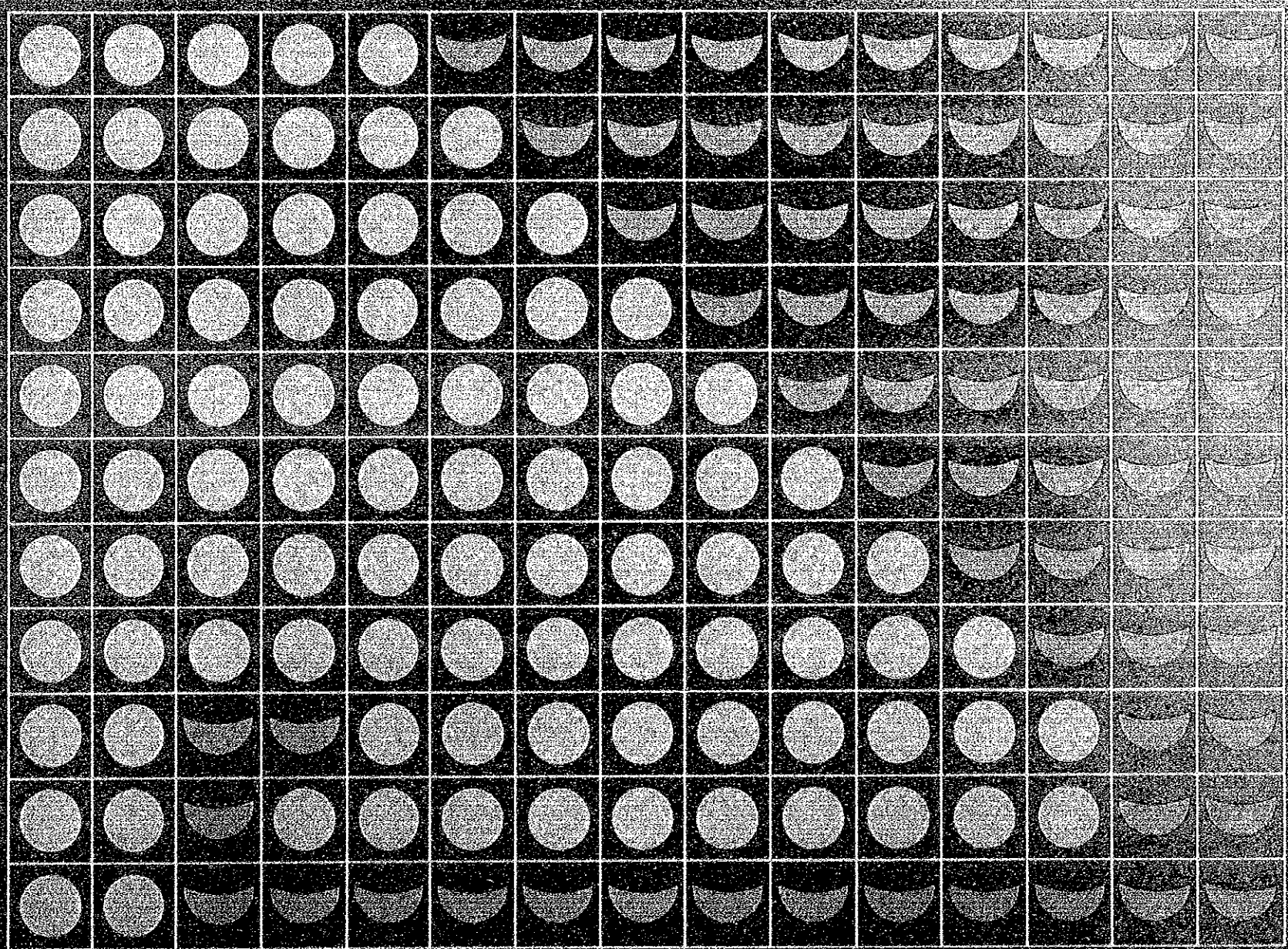


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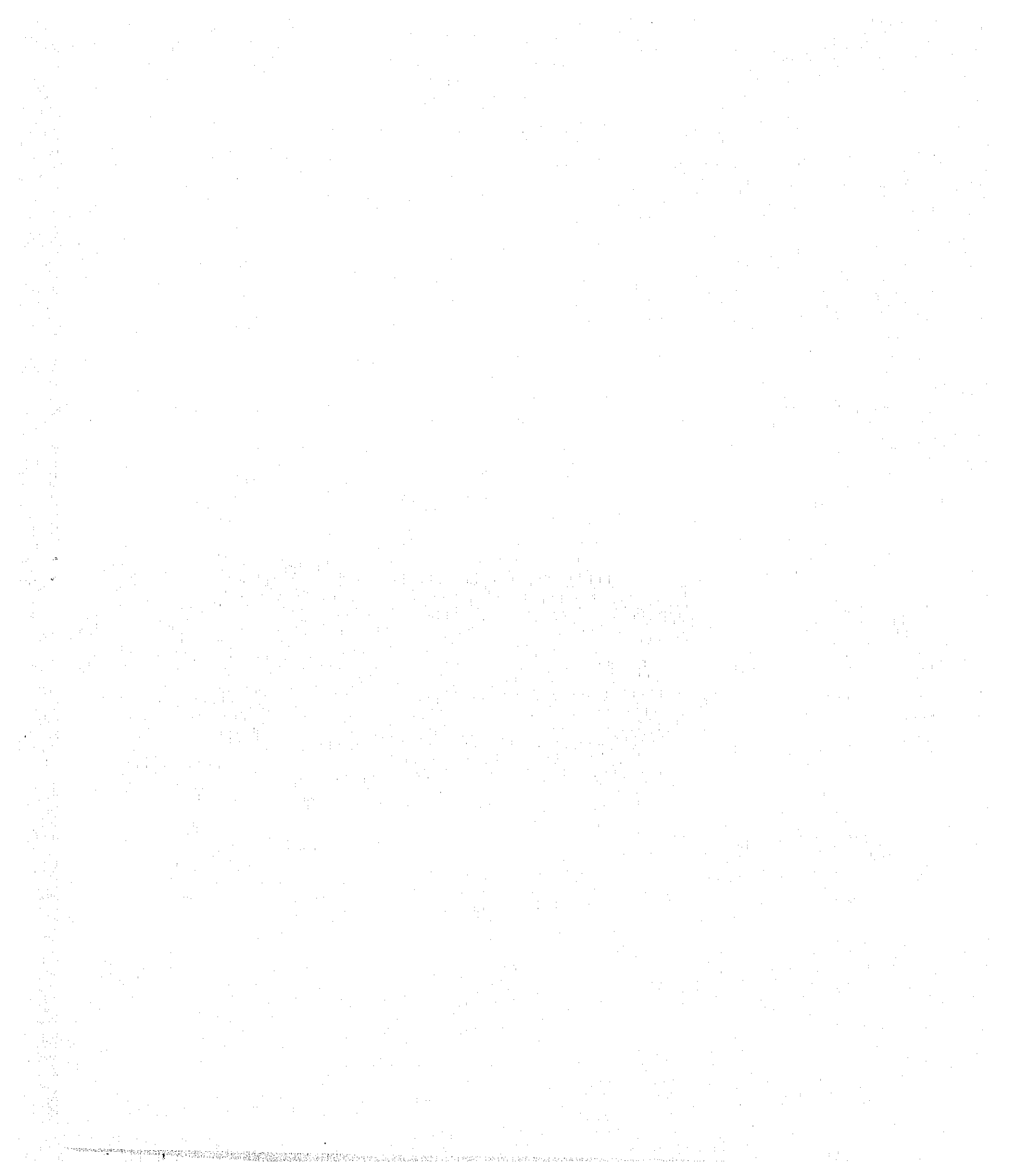
MASTER plan study of THE INFANTA-REAL AREA URBAN DEVELOPMENT PROJECT final report



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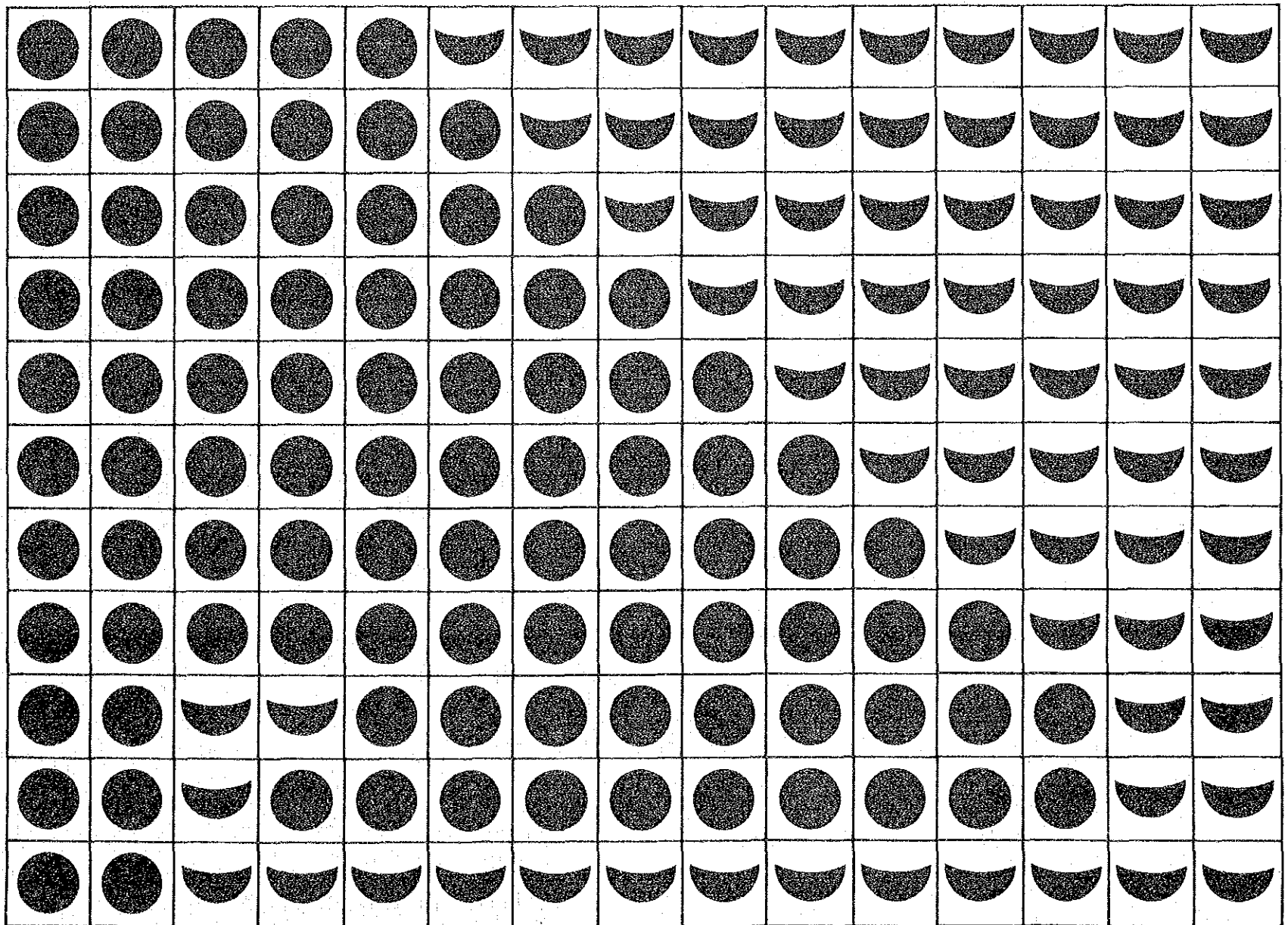


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THE GOVERNMENT OF
THE REPUBLIC OF THE PHILIPPINES

MASTER plan study of THE INFANTA-REAL AREA URBAN DEVELOPMENT PROJECT

final report



JAPAN INTERNATIONAL COOPERATION AGENCY

MARCH, 1985

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PREFACE

In response to the request of the Government of the Republic of the Philippines, the Government of Japan decided to conduct a study on the Master Plan of the Infanta-Real Area Urban Development and entrusted the study to the Japan International Cooperation Agency (JICA). The JICA sent to the Philippines a study team headed by Mr. Hajime Tanaka from 1 August 1983 to 30 January 1985.

The team exchanged views on the Project with the officials concerned of the Government of the Republic of the Philippines and conducted a field survey in the Infanta-Real Area.

After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Republic of the Philippines for their close cooperation extended to the team.

March, 1985



Keisuke Arita
President
Japan International Cooperation Agency

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ABBREVIATION

AAC	Annual Allowable Cut
AADT	Average Annual Daily Traffic
BAEXT	Bureau of Agricultural Extension
BAT	Bureau of Air Transportation
BFAR	Bureau of Fisheries and Aquatic Resources
BHS	Barangay Health Station
BOL	Bureau of Land
BUTEL	Bureau of Telecommunications
EIRR	Economic Internal Rate of Return
EPZ	Export Processing Zone
FIDC	Fishery Industry Development Council
FIRR	Financial Internal Rate of Return
FRP	Fiber Reinforced Plastic
GCLA	Greater Central Luzon Area
GRDP	Gross Regional Domestic Product
HSDC	Human Settlements Development Corporation
HSRC	Human Settlements Regulatory Commission
ICT	International Container Terminal
ILIPSCO	Infanta Lighting and Power Cooperative
IPTS	Inter-Provincial Telephone System
IRM	Infanta Real Module
IRR	Internal Rate of Return
JICA	Japan International Cooperation Agency
LWUA	Local Water and Utilities Administration
MHS	Ministry of Human Settlements
MLGCD	Ministry of Local Government and Community Development
MMA	Metropolitan Manila Area
MNR	Ministry of Natural Resources
MOTC	Ministry of Transportation and Communications
MPWH	Ministry of Public Works and Highways
MWSS	Metropolitan Waterworks and Sewerage System
NACIDA	National Cottage Industries Development Authority
NAS-NEDA	National Accounts Staff, National Economic and Development Authority
NCSSO	National Census and Statistics Office
NEA	National Electrification Administration
NEDA	National Economic Development Authority
NEPC	National Environmental Protection Council
NIA	National Irrigation Administration
NPC	National Power Corporation
NWRC	National Water Resources Council
PAGASA	Philippine Atmospheric Geophysical and Astronomical Service Administration
PCA	Philippine Coconut Authority
PFMA	Philippine Fish Market Authority
PICOP	Paper Industries Corporation of the Philippines
PLDT	Philippine Long Distance Telephone Company
PPA	Philippine Port Authority
PT & T	Philippine Telephone & Telegram Co.
QUEZELCO	Quezon Electric Cooperative
RCPI	Radio Communication of the Philippines
RHU	Rural Health Unit
RWDC	Rural Waterworks Development Corporation
SEAFDEC	South East Asia Fishery Development Center
WD	Water District

INTRODUCTION

1. STUDY BACKGROUND

The Infanta-Real area is located 80 km directly east of Metro Manila and faces the Pacific Ocean. Despite the mountainous characteristics of the east coast of Luzon Island, the area comprises 13,000 hectares of flat and fertile land. Adding to this is a good natural harbor which makes the area a potential development base in the east coast region.

Metro Manila, facing Manila Bay to the west with a hilly area to the east and vast flat lands in the north-south direction, has developed in a concentrated north-south linear form, while the development in the eastern direction has just started recently.

Development in the eastern direction has been examined by two compound strategies.

Namely the first strategy calls for initiation of development starting from the undeveloped area in MMA's proximity (Lungsod Silangan Development) and moving eastward. This is called the West to East Development Strategy. The second strategy involves development of a coastal base located 80 km away from MMA (Infanta-Real Module, to be abbreviated IRM, hereafter) and functioning as a countermagnet against MMA. At the same time an expressway is to be developed to link the two "magnets" and development will proceed along the regional linkage. This is called the East to West Development Strategy.

The basic policy of the West to East Development Strategy has already been formulated by the Philippine government and actual development is already under way. Since development is taking place in proximity to MMA, justification and definition of the basic direction of development seem relatively easy.

On the other hand, although IRM has considerable development potential today it continues to be considered only a small distribution base of agricultural product with a population of 40,000. Furthermore, its development seems hindered by the Sierra Madre Mountains lying between Manila and IRM, which make access between the two nodes very difficult.

As a result, the East to West Development Strategy is confronting some serious difficulties relating not only to the creating of a development base but also to construction of a proper linkage between the base and Metropolitan Manila.

2. STUDY PURPOSE

The purpose of this study is to identify the details of the strategy which calls for creation of a development base according to the East to West Development Strategy. The study clarifies these details in two different approaches, namely the basic objectives and the actual development procedure.

The basic objectives of development can be summarized as follows.

Due to the fact that its potential is limited to fishery and agro-forestry resources, IRM shall be developed centering on processing and distribution of those products. Moreover, its population size should rapidly reach at least 100,000 in order to function as a core city in the region.

The development procedure may be summarized as described below.

In order to rapidly develop a small local town with a population of 40,000 into a core city of the region, publicly funded projects should be implemented in a concentrated manner during the initial phase, thus giving the local economy momentum to take off. However, since there generally exist certain inter-relations and linkages among all component projects of said development, cause and effect, backward and forward linkage, order of implementation, etc. should be clarified first; then project implementation shall be initiated from the most essential components. Taking such inter-relationships among the projects into consideration, the projects shall be arranged based on annual time sequence.

Then after adjusting the arrangement so that public investment is more or less equally distributed, the total planning period up to the year 2000 shall be divided properly and the projects shall be illustrated according to such periods.

3. COMPOSITION OF MASTER PLAN

The Master Plan consists of four major components, namely the Industrial Development Plan, Social Development Plan, Transportation Plan and Land Use Plan.

The growth of IRM from the local town (Population of 44,000 in 1983) into a core urban center in the region (Population of 100,000 by 1992 and 150,000 by 2000) shall demand sufficient employment opportunities based on proper industrial development. Thus, the development potential of each sector such as Agro-forestry, fishery and aqua-culture, manufacturing, tourism and commerce, has been assessed and the development plans were formulated.

In line with the planned increase of population (also aiming at improvement in the level of social services), social capital investment should be carried out. At the same time development of public utilities shall be required for the newly developed industries.

Provision of social services such as medical, educational and administrative services through out the east coast region shall also be examined to permit IRM to function as the regional urban center. Based on the above viewpoints, the Social Development Plan was formulated.

The creation of the coastal base in the east coast region shall require both the development of a land transport linkage of expressway standard directly connecting MMA and development of a port which shall become a marine transport node linking various coastal points and islands in the region. In addition to these outer transport linkages, transport facilities development inside IRM shall also be carried out in order to cope with the expected transition from the present tricycle society to the future automobile society. Likewise, the development of various modes of public transport should be implemented for the increase in trips between IRM and Manila, IRM and the east coast region, and for internal trips within IRM. The Transportation Plan was formulated considering these points.

The Land Use Plan was defined in order to accommodate these plans efficiently into a limited area (13,000 ha) without disorder of the present land use in terms of space as well as time.

4. PLANNING AREA

The planning area extends over the three municipalities of Infanta, Real and General Nakar and has a total land area of 13,000 hectares (Fig. 1).

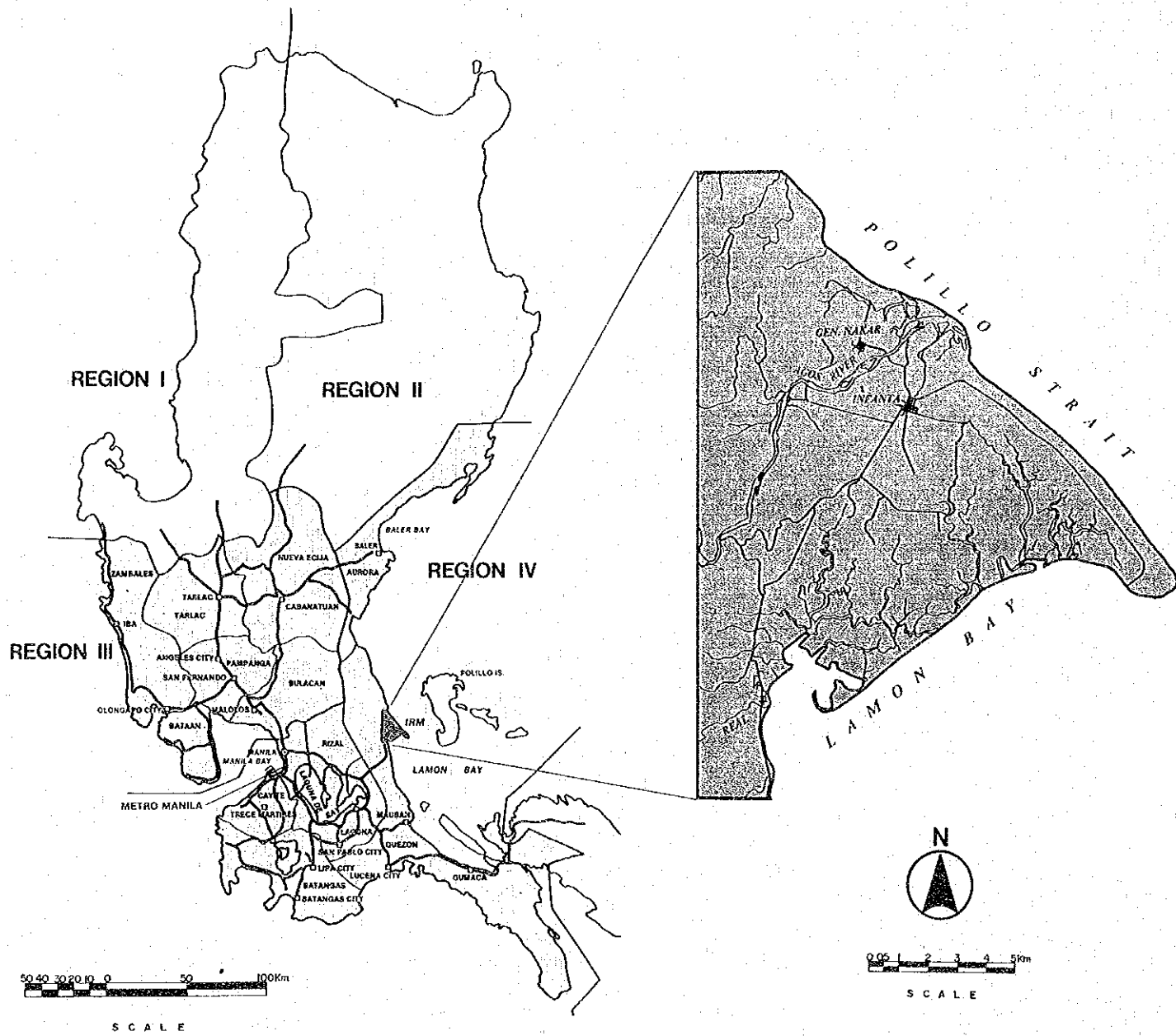


FIG.1 LOCATION OF INFANTA-REAL AREA

5. STUDY ORGANIZATION

The Japan International Cooperation Agency (JICA) has formed a study team for the Master Plan Study of the Infanta Real Area Urban Development Project (the JICA Study Team hereafter) and sent them to the Republic of the Philippines to conduct said study. At the same time JICA organized an advisory committee in Japan and entrusted the committee

with supervision of the study activities. The Philippine Government assigned the Human Settlement Development Corporation (HSDC) as a counterpart agency and formed a Steering Committee headed by Dr. Jose Conrado Benitez, Deputy Minister of the Ministry of Human Settlements (MHS). Under the committee, the Inter-Agency Committee and Counterpart Team were also formed in order to establish a system which could provide the study team with necessary advice, evaluations, cooperation and so on at respective levels of administration and on technical matters.

The members and names of their agencies are listed in the following table.

Table 1 STUDY ORGANIZATION

JICA ADVISORY COMMITTEE

<i>Chairman Takashi Inoue</i>	<i>City Planning Association of Japan</i>
<i>Hiroshi Yokoyama</i>	<i>Ministry of Construction</i>
<i>Katsutoshi Okawa *</i>	<i>Ministry of Construction (Aichi Pref.)</i>
<i>Hirohide Konami</i>	<i>Ministry of Construction</i>
<i>Toshio Nagasawa *</i>	<i>-do-</i>
<i>Katsuhiko Nagase</i>	<i>Housing and Urban Development Corporation</i>

JICA STUDY TEAM

<i>Hajime Tanaka</i>	<i>Leader</i>
<i>Kenji Tanaka</i>	<i>Coordinator, Land Use Planner</i>
<i>Toshiro Hamada</i>	<i>Regional Planner</i>
<i>Iwane Mizuno</i>	<i>Urban Development Planner</i>
<i>Yoshimasa Ishii</i>	<i>Transport Planner</i>
<i>Masayoshi Iwasaki</i>	<i>Urban Facilities Planner</i>
<i>Tadashi Matsuno</i>	<i>Agricultural Specialist</i>
<i>Mitsutake Miyamura</i>	<i>Fishery Specialist</i>
<i>Hayao Teshima</i>	<i>Industrial and Economic Analyst</i>
<i>Hikomichi Kono</i>	<i>Port Specialist</i>
<i>Takenori Kikuchi</i>	<i>Tourism Specialist</i>
<i>Masatoshi Baba</i>	<i>Urban Designer</i>
<i>Toshio Kurokawa</i>	<i>Financial Analyst</i>
<i>Toshiaki Horii</i>	<i>Systems Analyst</i>
<i>Yukihiko Mizushima</i>	<i>Environmental Analyst</i>

STEERING COMMITTEE

<i>Chairman Jose Conrado Benitez</i>	<i>MHS/HSDC</i>
<i>Vice-</i>	
<i>Chairman Eduardo A. Morato, Jr.</i>	<i>HSDC</i>
<i>Eduardo G. Corpuz</i>	<i>NEDA</i>
<i>Teodoro Encarnacion</i>	<i>MPWH</i>
<i>Ernesto Mendiola</i>	<i>HSRC</i>
<i>Encarnacion Raralio</i>	<i>MHS</i>
<i>Cesar Marquez</i>	<i>HSRC</i>
<i>Virgilio L. Chico, Jr.</i>	<i>HSDC</i>

INTER-AGENCY COMMITTEE

<i>Chairman Virgilio L. Chico, Jr.</i>	<i>HSDC</i>
<i>Chairman Hajime Tanaka</i>	<i>JICA-Study Team</i>
<i>Vice-</i>	
<i>Chairman Gloria R. Aligada</i>	<i>HSDC</i>
<i>Aureo A. Mercado</i>	<i>Infanta</i>
<i>Antonio R. Azcarraga</i>	<i>Real</i>
<i>Mariano R. Portales</i>	<i>General Nakar</i>
<i>Daisy Año</i>	<i>NEDA</i>
<i>Rebecca Garsuta</i>	<i>MPWH</i>
<i>Edilberto Martinez</i>	<i>HSRC</i>
<i>Sydacious Panoy</i>	<i>Bu. of Lands</i>
<i>Rosario Labaro</i>	<i>MNR</i>
<i>Angela Toledo</i>	<i>MNR</i>
<i>Reynaldo Alcances</i>	<i>NEPC</i>
<i>Ruperto de la Cruz</i>	<i>NPC</i>
<i>Alfredo Espino</i>	<i>LWUA</i>
<i>Cielito Establicida</i>	<i>LWUA</i>
<i>Francisco Sales</i>	<i>MPWH, Reg. IV</i>
<i>Humberto Amoranto</i>	<i>NEDA, Reg. IV</i>

COUNTERPART TEAM (HSDC)

<i>Gloria R. Aligada</i>	<i>Program Manager</i>
<i>Leandro XM Vilorio, Jr.</i>	<i>Asst. to Prog. Manager</i>
<i>Macario V. Flores</i>	<i>Market Analyst</i>
<i>Wilfredo B. Perea</i>	<i>Economic Researcher</i>
<i>Herminia Azor</i>	<i>Economic Researcher</i>
<i>Antonio Jardiniano</i>	<i>Hydrologist</i>

* Predecessor (Present Status)

SUMMARY

1. THE GREATER REGION AND IRM

1.1 Physical Location of GCLA and IRM

In recognition of its extreme economic importance to the nation, the six (6) provinces of Region III and the five (5) provinces of Region IV within the radius of 100 km of MMA have been designated the "Greater Central Luzon Area" — GCLA. IRM is located within this radius, 80 km from MMA, and directly faces the Pacific Ocean.

1.2 Regional Structure of GCLA

1.2.1 GCLA in the Nation

The GCLA's share of the nation's total in population and Gross Domestic Product has been increasing during the past decade (1970-1980), and is expected to maintain or accelerate this trend through the foreseeable future (NCSO). As such, the GCLA may be expected to maintain population and production in excess of its proportionate share, and is considered as serving a major function in the economy of the Philippines.

1.2.2 Regional Distribution Trends within GCLA

The contiguous areas to MMA, due to their proximity to the capital, have a higher degree of development priority when compared with other regions in the nation.

Although population and production continue to be concentrated in MMA, the rate of increase has been great in the contiguous areas, thereby, their relative importance in the economy of the nation has grown substantially.

1.2.3 Topography and Natural Conditions

The GCLA is divided by the Sierra Madre range running in a north-south direction. The western half of the GCLA is a plain centered in MMA, and the eastern half is a mountainous region formed by the above mountain range. This topographic characteristic of the GCLA has substantially affected its geographical distribution of population and industry.

1.2.4 Population and Social Conditions

Population Distribution

The geographical distribution of population in the GCLA is characterized by a high concentration in MMA (38.3%) with spillovers absorbed by the contiguous areas (Bataan, Bulacan, Laguna and Rizal). These are concentrated along the central plain with sparse population along the east coast. In terms of urban concentration, cities having population of more than 50,000 are concentrated heavily in the north and south areas nearest MMA. While such cities become more sparsely distributed as the distance to MMA increases, it is in these more distant areas that the regional base cities with populations over 100,000 begin to appear.

Household Income

Household incomes are higher in the provinces adjoining MMA, and lower in Quezon, which is on the outer fringe of the GCLA. Quezon Province not only tends to lag in income as a whole, but is also characterized by a sharp disparity in income within its eastern and western coastal areas.

Urbanization Trends

Urbanization is centered on MMA with an urban population rate exceeding 50%. In contrast, the areas lying within 50 and 100 km from MMA have urbanization rates under 30% with a few exceptions.

1.2.5 Economy and Industry

Gross Regional Domestic Product

GCLA has increased its share of the GNP from 51.0% in 1971 to 53.0% in 1981. While the share of the GCLA's GRDP occupied by MMA (actual figure) decreased from 59.3% in 1971 to 58.4% in 1981, the share of the adjacent Region IV increased from 23.6% in 1971 to 25.3% in 1981 in terms of urban industries. Region IV's share in the GCLA has increased from 15.8% in 1971 to 20.1% in 1981, thus, indicating an increased distribution within the GCLA.

Structure of Local Industry

The composition of gainful workers by major industry group shows that the provinces within GCLA fall into 3 types: Agriculture-based provinces (where agricultural workers exceed 50% of the total) in Quezon and other provinces on the perimeter of GCLA; Commerce and services-based provinces (where workers engaged in commerce and services exceed 50% of the total) which are concentrated in MMA, the center of the GCLA; and Multi-industrial-based provinces (including a combination of primary, secondary and tertiary industries) lie midway (50 km radius) between these two regions that have a compound industrial make-up which includes not only agriculture, but also industry and commerce.

Agricultural Land Use Distribution

To the west of the Sierra Madre lies the low lying extensive agricultural lands primarily used for rice cultivation and the hilly agricultural lands used for production of fruit trees, coffee, bananas, etc. In contrast, coconut plantations are extensively formed in Quezon Province, to the east coast (as far as IRM), and forest land concentrate in the east of the Sierra Madre mountain range. The area to the east of Manila, unlike the above mentioned agricultural lands, consists of expansive hilly grasslands which at present remain unutilized.

Marine Development

Although the GCLA has two coast lines, the Pacific to the east and the South China Sea to the west, marine fish landings are concentrated along the west coast. In contrast, development of the Pacific marine areas off the eastern coast of Luzon is lagging due to the long transport route to Manila and lack of good harbors and roads to permit landing and transport to Manila.

Mineral Resources Development

Mineral shipments are distributed in a half-moon configuration centered on MMA. The mineral resources being developed in the GCLA consist almost entirely of construction materials such as cement, crushed stone and gravel, the market of which is mostly in MMA.

Geographical Distribution of Manufacturing Establishments

Manufacturing establishments are concentrated in the areas to the north and south of MMA primarily owing to spillover from the capital. However, such concentrations end at a radius of approximately 50 km (30 km in the case of the area to the east of MMA). On the other hand, manufacturing activities beyond the 50 km radius of MMA are distributed sporadically in major urban centers such as Lucena, Batangas, and San Fernando.

Geographical Distribution of Commercial and Service Establishments

The same geographic distribution pattern is found for commercial and service-related establishments. Concentrated in the base cities within 50 km radius of MMA, establishments may also be found along the axial routes beyond 50 km. These base cities are functioning as follows: service bases for the area's agriculture; as relay cities tying the areas with Manila; and as port cities such as Batangas tying the areas with other island regions.

1.2.6 Transportation System

The skeletal framework of the Luzon transportation system consists of

the following two parts: roads interconnecting the major regions of the island itself; and ports handling marine traffic generated by domestic transport between the nation's various islands.

Trunk Road System

The Manila North Road to the north and the Manila South Road to the south of MMA form the axis of the capital's expansive transport system (including 4-lane expressway within a radius of 50 km from MMA) connecting the major urban centers of the GCLA.

The traffic flow patterns for this region are based on connections to Manila. However, in the southern section, trips from Batangas to nearby cities (e.g., in Laguna Province) are relatively high in frequency.

Ports

Manila Port is one of the Philippines' most representative ports for foreign trade, and serves as an important base for domestic cargo transport. Here, cargoes are delivered from all points (handling 45% of national total) and sent to overseas destinations.

In the southern part of the region, secondary ports such as Batangas Port are developed due to the fact that all the other island regions are situated south of Luzon. The function of Batangas Port is to serve as a cargo distribution base and a processing base for gravel and cement materials unloaded here from neighboring production areas, after which they are exported.

On the other hand, there are no ports on the east coast which could compare to those first described. Here, ports serving only local functions include Baler (Aurora Province), Real (Quezon), and Mauban (Quezon). The main items which they handle are lumber, coconuts, and marine products. Real is also the home port for regular ferry services to nearby Polillo Island.

1.2.7 Public Utilities and Social Service Facilities

Water

The GCLA's surface water basins to the west of Sierra Madre are divided into the Pampanga River and the Laguna de Bay basin systems. The Pampanga River system provides abundant water resources for the grainbelt in the central plain. The Laguna de Bay system and ground water support the agriculture and industries along the lake's coasts. MMA, which has the largest water demand by far, lies sandwiched between the above mentioned two water systems, and relies primarily on surface water from the Sierra Madre (Marikina and Angat River Systems), and ground water. The supply-demand situation has been growing increasingly strained in recent years leading to the commencement of water resources development on the eastern side of the Sierra Madre (Agos River Basin).

Electricity

Luzon's transmission trunk line network (Luzon Power Grid System) is

formed along an axis of 230 KV transmission lines running north-south of the entire length of the island, thereby, serving the population and industry concentrated in the central plain. This network comprises 3 basic systems as follows: the northern system relying mainly on hydroelectric power; the southern system relying on geothermal power; and the central system (Manila) relying on petrothermal power.

Telecommunications

Four independent micro-wave transmission systems exist in the GCLA, however, only the western urban centers have telephone service.

Educational Facilities

The GCLA has elementary and secondary schools nearly in corresponding proportions to the population. Cities with population below 80,000 have 1 to 2 colleges; those with population in excess of 100,000 generally have 3 to 5 colleges.

Medical Facilities

With the exception of MMA, the average municipalities in the GCLA have 1 hospital for every 25,000 to 50,000 inhabitants. The level of medical facilities improves sharply in cities with a population of over 100,000.

1.2.8 Growth Corridor and Regional Structure

Growth Corridor

An axis of integrated development, extending to the north and south of MMA, or growth corridor has been developed in the GCLA starting at MMA and passing through relay cities and regional nuclei which serve, respectively, as relay bases with Manila, and as regional centers of highly urbanized areas (within 50km radius of MMA). They also serve inland rural areas (mainly agricultural lands and forests) situated along the axis tied functionally and spatially with MMA, and ends at the coastal base cities which serve as nodes in the marine transport system. These corridors are integrated and supported by the various infrastructure/utilities (roads, water, power, telecommunications, etc.).

Regional Structure of GCLA

The GCLA has been structured by the above mentioned growth corridor extending to the north and south of MMA, thus, creating an intensive and effective socio-economic environment centering on the west area of the Sierra Madre. However, viewing the GCLA as a whole, one could notice a large disparity between the western and eastern sides of the mountain range, thus, presenting a regional development issue to be resolved.

1.3 Eastern Development and Restructuring of GCLA

IRM urban development is considered a part of the regional development of the area east of Manila. Within the current regional structure of the GCLA, this eastern development has the following goal interrelated with those of the GCLA:

1.3.1 Development Goals

The eastern half of the GCLA, by the physical obstruction presented by the Sierra Madre and Laguna de Bay, has been left outside the north-south corridor described earlier. As long as the present regional structure is permitted to continue, it shall lead to an increasing broader gap between the western and eastern regions. The first goal of eastern development is, therefore, to correct the east-west gap through a well planned development of the eastern region.

Sufficient development has not been carried out in the areas stretching from the eastern port of Manila to the east coast. Land and natural resources are left idle in spite of the proximity of this region to Manila. Thus, the promotion of the development of these natural resources may serve not only to correct regional gap, but also to strengthen and stabilize the socio-economic condition of the capital region.

Population and industries still continue to concentrate in MMA, seriously exacerbating urban problems, while the spillover from the capital in expanding outward leads to confusion in land use, collapse of productive farmlands, destruction of the environment, and other problems in the areas peripheral to the capital. Accordingly, the goal of eastern development must be to minimize the urban problems of MMA, and the western region through the development of the east coast region and regions east of Manila. Thus, these regions may be made to absorb population and industries in a well planned manner to properly distribute these elements within the GCLA.

1.3.2 Restructuring of GCLA along the Eastern Corridor

In order to achieve these goals restructuring of the present regional structure, which emphasizes the development of the western half of the region, shall be necessary. This creation of a powerful development axis integrating the attractions of population and industries to the eastern region, is itself a way of restructuring the GCLA in order to achieve a more balanced regional development.

1.4 The Eastern Corridor and IRM

1.4.1 Eastern Corridor

"Eastern corridor", a framework which runs horizontally across Luzon and the GCLA and connects the east and west coasts, shall be a development

axis which powerfully consolidates the following mutually related types of development:

(a) Enhance distribution of population and industries in the capital region by attracting to the eastern region of the GCLA development concentrated in MMA, and the western part of Rizal Province, where development potential is high;

(b) Construction of a base for the development of the east coast region, and the comprehensive development of the east coast region around this base; and

(c) Development of natural resources such as the hilly regions of the Sierra Madre range which are now idle, despite their extreme proximity to MMA, and active application of such resources to the socio-economy of MMA.

1.4.2 IRM as Base of Development on East Coast

The eastern corridor, as the growth corridor mentioned earlier, shall start in MMA passing through the region of intensified urban development attracted from MMA, through the major cities of inland Rizal Province, and continues to the coastal development based on the east coast.

IRM, which shall act as the base for development of the eastern coast, shall lie at the center of the east coast region closest to a transportation link with MMA. It shall lie directly on the aforementioned east corridor, and shall be developed as part of the comprehensive development of the GCLA and eastern region via this axis. In this respect, IRM shall be the only selected urban center in the east coast.

An evaluation of IRM in terms of its fitness as an urban base for the east coast is as follows:

(a) The inland service area of IRM, in terms of travel time if improved, shall cover MMA and the area within a 30 km radius of the capital in approximately 3 hours, thus, making IRM the most advantageous city for a concentrated base of transport from the east coast to GCLA. In terms of marine transport: IRM's direct coastal sphere includes the Polillo Islands, one of the major points of development on the east coast; IRM would be able to have a proper share of duties with other secondary ports on the east coast such as Aparri and Legaspi; and from nearly any point in the east coast region, the time required to reach IRM is less than that needed to reach Manila. This shall permit IRM to share part of the functions currently served by Manila Port.

(b) Because IRM lies at the geographical center of the east coast, agro-forestry and marine resources developed on the east coast can be collected, and can promote industrialization based on these resources. In addition, IRM lies well within the direct economic sphere of Manila, thus, enabling IRM to develop urban industries, and an urban structure.

(c) The southern part of the east coast region of the GCLA lies within a 50 km radius from Lucena, the provincial capital. On the other hand, the east coast region centered on IRM does not encompass any urban base within a 50 km radius. Therefore, the formation of a regional life center at IRM, to provide all types of urban services, can have the greatest effectiveness in raising the living standards of the inhabitants of the east coast regions.

1.4.3 IRM in the Greater Regional Framework

IRM shall become the "base city of the east coast development" which shall be developed ahead as the final point on the eastern corridor axis from Manila. It shall also provide various kinds of urban services in its development which shall be formed starting from Manila and along the axis.

This base city of the east coast development shall serve as the base for natural resources development and distribution, and as an urban center for human settlement.

IRM shall function as the concentrated base for development of such resources, and shall also provide all types of services necessary in carrying out such development.

It shall also serve as a distribution base where such products can be collected for transport to the markets.

To achieve this status, IRM must function not only as a base of natural resources development and distribution as outlined above, but must also have economic and social foundations as a city capable of promoting urban industries which are based on these other functions, thus, enabling IRM to form an urban settlement equivalent with the urban bases in the west coast region in terms of its size and living standards.

Furthermore, IRM must have the role to function as a center of regional life by providing medical, educational, and cultural services required to raise the living standards of the residents of the entire east coast region which is currently quite low.

2. PRESENT STATUS AND DEVELOPMENT POTENTIALS OF IRM

2.1 Existing Conditions of IRM

2.1.1 Planning Area and Three Municipalities

An area of 15,270 hectares covering most of the flat and populated parts of the three municipalities, i.e., Infanta, Real, and General Nakar has been designated as the planning area of the IRM's integrated urban development. This represents only 7.5% of the total area, but 77% of the total population of the said three municipalities are residing here and constitutes its socio-economic work force.

2.1.2 Topography

IRM is an area of land mostly composed of alluvial plains protruding from the Sierra Madre which lie along the east coast of Luzon. Most of the area is flat land, though the western part are the foothills of the mountain range. The low lying land is composed of the peninsular sandbar. The southern parts are the central plain and the swamp areas.

2.1.3 Social Characteristics

IRM has an estimated population of 44,423, and an estimated total of 7859 households (1983). Its age composition indicates that the minor population (under 15) is smaller and the working population is larger than the national average. The social movement shows that Infanta has been the most dynamic of the three, both attracting immigrants and supplying emigrants to Manila and other external areas.

The IRM average annual household income is 8,400 Pesos (1983) with the average of Real being the highest at 10,800 Pesos. By industrial origin, agriculture represents 44.2% of the total area's income, social services 29.5% and the remaining 26.3% fishery represents only 5.2% of the total.

Of the total population, 20% are employed, 28% are students and 48% are currently unemployed. A total of 11,549 people are at work in IRM. A high agricultural reliance of IRM is indicated by the fact that the primary employment represents roughly 60% of this total, while the secondary employment approximately 10%, and the tertiary about 30%.

The farmers' ratio to the working population in General Nakar is at 70.5% and Real at 18%. In contrast, the fishermen's ratio in Real is 31% indicating an industrial characteristic of a fishery town, while Infanta being an agricultural town with its farmer's ratio exceeding 50% of the total workers.

2.1.4 Industrial Characteristics

The major industry in IRM is agriculture. Discussed in this section are agricultural activities and business establishments.

Agriculture

The total number of farming households in IRM is estimated at 3,529 (1983) due to the following: the majority totalling 67.3% exclusively belong to rice growing households; the second most important crop is coconut, but households exclusively growing coconuts represent only 3.8% of total farming households; and those growing both rice and coconut represent 24.6% indicating that rice growers are also growing coconuts on the side. Those growing both generally show a high household shipment value of crops.

Average rice yield is at 2,375 kilograms per hectare and at 1,690 kilograms per rice growing household per year. Average income from rice is 5,300 pesos per household per year. Coconut growing households have an average of 1.46 hectares, an average yield of 4,000 to 5,000 shells per year, and an average income of 7,400 pesos per year.

Business Establishments

A total of 589 business establishments are registered in IRM, the majority totalling 56.4% are in sales/commerce, followed by transport/communications at 29.2%. The two together representing about 86% of the total while manufacturing represents only 8.7% of the total.

The 589 establishments employ a total of 1,297 persons (including family workers), sales/commerce and transport/communications have a combined share of roughly three-quarters of the 1,297, while the secondary industries (mining and manufacturing) have a share of an appreciable 16%.

Most of the 589 business establishments are very small in size as indicated by the average of 2.2 workers per establishment. Those in mining/manufacturing and finance show larger averages while those in transport/communications show the smallest average of 1.3 workers per establishment.

2.1.5 Land Use Characteristics

Most of the planning area is covered by natural and agricultural land use which can be classified as follows:

- (a) An expanse swamp area on the south of Infanta is usually submerged, and is generally covered with natural vegetation such as mangroves and nipas. Fish ponds have been opened in the part of the swamp area;
- (b) A peninsula with sandbars extending to Dinahican has sandy beaches and is partially covered with paddy fields and root vegetable farms, but mostly coconut forests;
- (c) The plains of Infanta and General Nakar represent a great majority of agricultural activities mainly extensive paddy fields partially combined with coconut forests; and
- (d) The hills on the western edge of IRM have developed forests by the hills.

With these natural and agricultural land uses as its hinterland, an urbanized area is formed in each municipality as follows:

- (a) Infanta - developed as a distribution base in the Infanta Plains. The commercial land use is formed along the Bantilan River while urbanization extends along some radial roads starting from the poblacion. Some institutional buildings such as schools are situated on a perimeter of the poblacion. The road ratio is at 12.2%.
- (b) Real - Commercial and institutional facilities are located along the Infanta Road while the fishermen's houses are built along the coastal line. The road ratio is at 12.2%.
- (c) General Nakar - disconnected from the arterial transport line, the Infanta Road. No clear urban land use exists.

Ratio of primary industrial workers (agriculture, fishery and forestry) to the working population of each urbanized areas is at 18% in Infanta, 43% in Real and 42% in General Nakar indicating that both Real and General Nakar can be categorized as a primary settlement for farmers and fishermen.

2.1.6 Transport Facilities

Traffic Flow Characteristics

The major (64%) passenger flow to and from IRM is Manila followed by Rizal and Laguna Province. The single major purpose for travel to outside areas, except home and others, is shopping which accounts for 22.8% of total trips. This is also true with trips between Polillo Islands and Manila or Infanta. Thus, long distance trips to and from IRM are important for the acquisition of daily necessities.

Goods flowing to and from IRM can be classified into primary and industrial products (wood carvings, furniture, etc.) which are carried out of IRM, and commercial merchandises which are carried into the area. Most of the goods carried out of IRM are bound for Manila (more than 80%) and some are for Laguna and Rizal Province.

Modal Transport Characteristics

Tricycles, which account for 71% of the total vehicles registered (294 vehicles in 1983), are the major means of transportation in IRM.

Public mode of transport share trips by travel distance as follows: tricycles accommodate trips within IRM; jeepneys meet trip demands between IRM and neighboring cities; and long trips to and from Manila are made by bus. Goods transport is shared 50-50 between trucks and buses.

Transport Facilities

Metro Manila-Famy Road (National Road 21) and Infanta Road connect Metro Manila, Rizal Province, and IRM.

The section between Manila and Famy is a concrete paved two-lane road, but it is yet to be developed into a gravel road with a road width of about seven meters between Famy and Infanta (Infanta Road). Thus, the necessary travel time between EDSA in Manila and Famy is only two hours while the total travel time between Manila and Infanta is four to four and a half hours.

Infanta Road passes IRM through Real and connects to Infanta constituting the spine of the urban road network. The feeder roads emanate from this spine toward the swamp area, the coast line, or the Agos River to form the entire road network. The central urban areas of the three municipalities are developed with a grid of streets, but most of which have a width of about 4.0 meters only.

IRM has six ports. One in Real called Real Port, four in Infanta, and one in General Nakar. Port Real is equipped with berths, but their total extension is only about 27 meters and is almost dilapidated. Of the four ports in Infanta, Dinahican and Libjo are on the sea but Silangan and Langgas are on a creek and, therefore, cannot be accessed during low tides.

2.1.7 Public Utilities

Water Supply

Despite the availability of abundant surface water from the Agos and other sources, most of the water systems operating in IRM depend on ground water sources (the surface water being used for irrigation).

50% of the households in Real are served by spring-fed water supply systems, while General Nakar relies heavily on springs, and Infanta on pumped ground water.

Electric Power

Luzon Grid is the source of power supplied to IRM through a 69 KV transmission cable. The electrification rate in IRM is 43.8% in 1983. Its distribution network has been developed to cover nearly all of the flat part of IRM leaving only the swamp and the remote areas of General Nakar.

Communication

There is only one radio-telephone equipment and radio station in Infanta, while a telegraph office and a post office are located in each poblacion.

2.1.8 Social Service Facilities

Educational Facilities

There are two nurseries in IRM, 22 elementary schools (all public), nine high schools (3 are private), and one public college.

With the generally high level of educational facilities found, literacy rate of IRM is about 95%. Yet, many IRM youths (one out of every 4.5 households) seek the opportunity of better education in Manila, suggesting that the quality of the college which exists in IRM is inadequate for some ambitious youths.

Medical Facilities

Medical and health facilities located in IRM consists of one hospital, rural health units (RHU), barangay health stations (BHS), clinics, and nutrition centers. A total of 41 beds are available.

In IRM, the obligatory rural health unit is located in each of the three municipalities. Barangay health stations supplement RHU by offering daily routine medical care.

2.2 Development Potential

2.2.1 Sectoral Development Potential

Agriculture

In terms of area, coconut groves rank first among the agricultural lands at 3,250 ha, followed by rice-cultivating lands at 2,819 ha, and all other crops with a cumulative area of 375 ha. While expansion of usable agricultural land area itself cannot be expected, the following development potentials are recognized:

(a) Coconut production volumes per unit area are presently declining, and the PCA is now undertaking all types of experiments and measures aimed at raising productivity. Through the adoption of the results of these experiments and research, an increase in production volume per unit area can realistically be anticipated.

(b) The Agos River irrigation system of the NIA is responsible for transforming the Infanta Plain into a major rice-producing area (1,021 ha). Through the improvement of these irrigation facilities and more efficient water control in addition to the enhancement of agricultural technological capability resulting from the Masagana 99 Plan, i.e., intensive agriculture, fertilization, use of agricultural chemicals, etc., an increase in production per unit area can well be expected.

Fishing Industry

Fishing industry potential seen in the region may be divided into the following three areas:

(a) Regional fishing industry

Development potential for members of the fishing industry of the region, including Polillo Island.

Although the fishing industry at present is extremely small scale, there is a strong potential for a dramatic development to be achieved through change over from the use of "banca" fishing vessels, improvement in fishing methods, etc., in addition to conventional fishing methods, extended rope, tuna fishing and pole-and-line fishing of 30 kg class yellowfin and bigeye tuna.

(b) Creation of Fishing Base

Development of fishing on the premise of development of the fishing industry in the Pacific offshore area. Through the introduction of round haul nets without "payawus", there is a strong potential for rapid development of a fishing industry (sardines, horse mackerel, mackerel, bonito, tuna) in the Pacific waters off the northern coast. Owing to the lack of an appropriate fishing base in this area, there is a potential for development of this region as a base for the development of the fishing industry as described above.

(c) Activation of culture industry

Development potential for culture industry in the swamp zone. In view of its natural conditions, the mangrove swamp zone is well suited for artificial culture. Thus, there is a high potential for development of this zone as an intensive shrimp cultivation ground.

Manufacturing Industries

Although there is almost no manufacturing industry of consequence presently existing in the region, the following two potentials are recognized: attraction of private investment if necessary improvements are made to

the infrastructure; and location of manufacturing industries of high importance to the national economy.

Industries which have high potential for development in the region are those which depend on the development of agro-forestry and marine resources. The following describes those industries with the highest potential:

(a) Marine Product Processing Industry. In view of the high potential for development of marine resources (5,000 tons of shrimp per year, 80,000 tons of tuna, sardines, etc., per year), there is a strong potential for the creation of a marine products processing industry.

(b) Coconut Oil Extraction Industry. In view of the high volume of coconut production in the three municipalities and Polillo Island (41,628 tons/year copra base), there is a strong potential for development of a coconut oil extraction industry.

Among other industries which may be located here in line with the Philippine government policies, there is a high potential for the paper/pulp industry to achieve the following: as an industry to replace imports to prevent a gap in supply and demand; and as a central industry to the region with a capacity to employ numerous workers.

Tourism

In view of its proximity to MMA and its enormous latent demand, the region with its sandy beaches and other natural attractions is judged to have a high potential for tourist development in spite of the presence of certain disadvantages (e.g., high humidity).

In carrying out development of the tourism industry, measures shall be necessary in order to achieve development of comprehensive facilities, establish broad regional ties, secure a high level of quality, create ties with other industries (e.g., the fishing industry), and realize the potential demand. If these measures are successfully implemented, an annual demand of 53,000 overnight visitors, and 93,000 day visitors can be expected. (This corresponds to approximately a 40% increase over current figures for Puerto Azul).

Tertiary Industries

As urban development proceeds, the potential development of tertiary industries in the region is recognized in the following fields:

(a) Development of distribution industry functions - To accommodate the needs of the aforementioned fishing, agro-forestry, and marine product processing industries, there is a high potential for the attraction of the following industries as a part of the port: transport and warehouse industry (all types of transport companies, and refrigerator and freezer warehouse industries), wholesale markets, all types of repair industries, service industries, financial and insurance industries, etc.

(b) Development of High Level Commercial and Service Industries - In view of the increase of household income in the planning district,

the density of 150,000 inhabitants, and the influx into the broader region in general, there exists a sound potential for the creation of high-level commercial and service industries such as commercial shops, and entertainment facilities.

2.2.2 Potential and Restriction of Infrastructure Improvement

The industrial development potential described in the last section, in all cases, assume the necessary improvement of the local infrastructure. The potential for development of this infrastructure shall be discussed.

Road

The arterial road extending to the east of Manila called the Manila East Road has considerably been improved. Branching from this artery in Infanta Road would improve the section between Infanta and Famy, and shall enable the following: round trip passenger travel to Manila in one day; and round trip truck transport to Manila in half a day. Thus, this improvement shall satisfy a basic prerequisite for realizing the industrial potential, and enable IRM to be the development base for the east coast region.

Ports

IRM lies in close proximity to Manila, and is situated at the center of the east coast region. It has a high potential as the center of marine transport in the region with the major function of being a fishing port, and a commercial port for the east coast.

Judging from the aforementioned industrial development potentials, fish landing of 65,000 tons per year is estimated for the fishing port and agricultural products (mainly coconuts) at 27,000 tons per year, industrial products (mainly lumber) at 50,000 tons per year, and other commodities (general merchandises for Polillo Islands and other east coast areas) at 30,000 tons per year. A total handling of 107,000 tons per year is estimated for the commercial port.

Water

The Sierra Madre mountain range adjacent to the planning area is home to the Agos and numerous other river systems which offer high potential for development of local water resources.

On the other hand, the available ground water in the area has been estimated by NWRC at 1.72 m³/sec. Thus, the development of water resources for IRM may have both possibilities.

Power

A realistic option for the power supply of IRM seem to rely on the existing system connected with the Luzon Grid and, at the same time, to the development of local power sources to supplement the former.

The existing system can supply as much as 25 MW. Adding 5 MW of a mini-hydro power plant, which is still being planned, shall create no major problems in obtaining an adequate supply of electricity for the time being. In the future, the area may continue to depend on the Luzon Grid (which shall also be enhanced through its connection with the northern hydroelectric, southern geothermal and central nuclear energy systems via extra high voltage transmission lines) in order to meet the demand, expanding in accordance to the existing facilities.

Consequently, the Marcos Highway scheme which connects IRM directly with Manila has been postponed. However, it is necessary to note that construction of a high-grade expressway (or improvement of existing roads into a high grade highway) shall still remain to be the most important prerequisite of the industrial development and, ultimately, of the IRM urban development.

2.2.3 Basic Prerequisites of IRM Urban Development

Based on the preceeding discussions of both industrial potential and infrastructure improvement, it has been clarified that among other infrastructure improvements, provision of an access connecting IRM directly with Manila shall be the most important factor of this urban development.

As such, the IRM urban development has always been proposed in combination with the construction of an expressway connecting IRM with Manila, the Marikina Infanta Road (the Marcos Highway).

While financial and technical problems of constructing in the mountainous section (the Sierra Madre range) of the said highway arose, yet the industrial potential has been clarified, and the conclusion was that the existing Manila East Road together with the improved Infanta Road can initially function as a sufficient access, and possibly meet the conditions of IRM's industrial development.

3. PLANNING GOALS AND DEVELOPMENT POLICIES

3.1 Appropriate Urban Image

The ultimate goals inherent in IRM Urban development are as follows: integrate the urban formation with the promotion of local industries; and construct a "model urban center for the agro-forestry and marine product industries" which shall become a model of new local urban development in the Philippines for the 21st century.

This new urban center shall embrace at its hinterland, the northern part of the east coast region of Luzon including Polillo Islands and the off shore Pacific waters, and shall become a nodal point for the distribution of people, goods, money, and information among its hinterlands, MMA, and the world.

The model urban center for the agro-forestry and marine product industries shall share the role which, at present, the cities of Lucena and Batangas play in the west coast region of Southern Luzon, and shall simultaneously hold the characteristics of both cities.

3.2 Development Policies and Procedures

In order to form a new urban center in the area to be developed, the following steps shall be taken:

(a) On the basis of the area's development potential and geographic advantage, economic and/or social projects shall be undertaken to encourage concentration of people into the area;

(b) A Network of transport and telecommunication shall be developed which in turn shall promote the development of related industries; and

(c) Corresponding to the increase of population, urban land and facilities development shall be promoted.

Taking the above steps into consideration, the most realistic and strategic development policy shall be to initially form a complex of agro-fishery processing and distribution center while developing the area's abundant tourism resources; and during the course of this urban development, to seek other possibilities for industrial development.

The outline of the urban development, assuming realization of the said "model urban center for agro-forestry and marine product industries" in the year 2000, shall be as follows: first, to improve the basic conditions of urban development by the end of the current Five-Year National Development Plan (1987); second, to establish the core of a self sufficient urban center in the next Five Year Development Plan (1988-1992); and finally, to advance various functions of the urban center during the period thereafter up to the year 2000.

4. DEFINITION OF THE SOCIO-ECONOMIC FRAMEWORK

4.1. Target Population

The planning target population of IRM shall, based on the examination of population size of existing urban centers, at least exceed 100,000 persons in order to become an urban center in the east coast region, and this center shall also necessarily grow faster than the pace of the existing urban centers.

The population of 100,000 persons shall be reached by 1992 during the Take-Off Period, thereby, reducing the size difference with other urban centers from the current figures of one half to two thirds of their population size. Having this sufficient population size is also necessary to support its advanced urban facilities.

The target population in the year 2000 shall be 150,000 persons. With this population size, slightly greater than that of Batangas City at present, an integration, in terms of industrial structure, and stability as an urban center, shall be attained.

4.2 Future Population of Gainful Workers

The ratio of working population against the total productive population (15 years old and above) shall remain as it is at present. The industrial composition of the working population shall be determined based on the balance of economic infrastructure for the model urban center for agro-

forestry and marine industries. The area's basic industry (the primary and secondary industries), and the tertiary industry shall share the working population roughly in halves. Likewise, the primary and secondary industries shall have the same balance within the basic industry.

Accordingly, the ratio of the industrial composition among the working population in the year 2000 shall be set to the primary at 26%, the secondary at 25%, and the tertiary at 49%.

4.3 Planned Target GRDP

The present GRDP per capita of IRM is estimated at about 3,900 pesos which accounts for less than 40% of the Region IV average of 10,200 pesos.

To achieve the self-sufficient city of 100,000 population by the year 1992, relatively high income producing employment opportunities shall be created, thereby, avoiding the outflux of the population and promoting population concentration into the area.

The target GRDP per capita for the year 1992 shall be set at 11,200 pesos which is also the estimated GRDP per capita of the Quezon Province in 1992. The target is aimed at attaining for the IRM, the position of an urban center with an average income level in northern Quezon.

The GRDP per capita after 1992 shall increase in parallel with Quezon's average and shall reach 16,000 pesos in the year 2000.

5. STRUCTURE PLAN

5.1 Basic Policies for Development, Improvement, and Preservation

5.1.1 Evaluation of Land and Transportation Conditions

The land transportation conditions of IRM have been evaluated from the following three points of view: agricultural development (soil, slope, water, drainage, and the scale of the existing accumulation and future expansion); urban development (ground condition, slope, drainage, transportation conditions, and urban facility service conditions); and environmental preservation (topography, vegetations and landscape).

Based on this evaluation, respective development potentials have been recognized in the following areas: agricultural development- the plains of Infanta and General Nakar; urban development- areas along Infanta Road; and environmental preservation- the coastal lines, swamp areas and hilly part of IRM.

5.1.2 Urban Development Patterns

The following three alternative urban development patterns have been studied: Even Growth Center; Concentrated Growth Center; and Dispersed Growth.

The pros and cons of these three basic patterns can be summarized as follows:

(a) Even Growth Center Pattern is desirable in terms of balanced development/distribution among the three municipalities. However, a considerable rebuilding of each central district shall be needed at an early stage which shall place an excessive burden on the existing poblacions of Real and General Nakar.

(b) Concentrated Growth Center Pattern is preferable in terms of strengthening of the urban economy of advanced urbanization, and also of effective infrastructure. But the disparity of urban development shall become greater among the three municipalities while problems of full-scale reconstruction of Infanta Poblacion, and the dilapidation of productive agricultural land can be foreseen.

(c) Dispersed Growth Pattern is preferred in terms of its flexibility in industrial location, and of alleviating the burden on the existing built-up areas. However, difficulty in creating a cohesive built-up area, unordered and scattered destruction of natural and productive lands, and inefficiency and confusion in infrastructure development can be apprehended.

Based on the above discussion, the following urban development patterns have been selected:

(a) The existing built-up areas can neither function as a receptacle of population and industry nor as a core of new urban development. Therefore, land for the future population and industries shall be developed by constructing a new urban area along the Infanta Road, the suitable area for urban development, which shall exclude the productive agricultural lands of Infanta and General Nakar.

(b) Major urban functions shall be concentrated in several spots where transportation and other development conditions seem most preferable, thus, facilitating industrial location and, at the same time, avoiding the uncontrolled dispersion of the urbanized area.

These nodal spots shall be developed in accordance with the physical and economic potential of each municipality to maintain the present equilibrium among the three.

5.1.3 Basic Development/Preservation Policy

In view of the land transportation conditions and the urban development pattern, the following basic policies for development, improvement, and preservation have been formulated:

(a) The plains of Infanta and General Nakar shall be developed/preserved as an agricultural area.

(b) Urban development shall be actively promoted in areas along Infanta Road other than those of (a) above; and

(c) The coastal swamp and hilly areas shall be preserved while utilizing natural resources to the extent of not damaging the natural environment.

5.2 Definition of Future Urban Structure

5.2.1 Basic Policies and Targets

A new urban structure to meet the needs of a population of 150,000 was considered and defined as follows:

(a) Formation Appropriate to the Natural Surroundings - As stated in the "Definition of the Socio-Economic Framework", urban development in IRM is based on integrated agro-forestry and fishery industrial development. Therefore, it shall be carried out in harmony with the preservation of the natural environment. Also for the purpose of disaster prevention, the urban structure of IRM must conform to the program aimed at preserving the natural surroundings of the area.

(b) Formation Which Consolidates and Integrates the Regional Society - The planning area is administratively divided into three municipalities and, as a result, spotted development shall take place in the area. Therefore, the urban structure which integrates these different communities into one solid urban center as IRM shall be needed.

(c) Formation which Systematizes Development - The urban structure shall be systematized in order to appropriately respond to spatial as well as sequential progress of the urban development.

5.2.2 Comprehensive Basic Composition

The basic composition of this urban structure are as follows:

(a) The inter-regional transport axis which connects the east coast region and the region to the west of the Sierra Madre, and centers on Manila shall pass through Real Port.

(b) Within the area being planned, three municipal sub-centers, and one regional center should be formed. An urban transportation axis should be established joining these various sub-centers and center in order to form the main framework of the urban structure of the area.

(c) Along the line which connects the inter-regional transport axis and the regional center, a belt should be formed which contains a concentration of intensive industrial and urban facilities in order to serve as the axis of urban development in the region.

(d) The overall natural environment of the planning area shall be maintained through the establishment of four environmental preservation zones (hill zone, General Nakar-Infanta-Real plain zone, coastal zone, swamp zone) in which natural resource development shall be undertaken with full consideration given to preservation of the natural environment.

5.2.3 Basic Land Use Structure

To realize the above basic composition, the land use structure shall be formed using the following spatial system as the framework:

(a) Social Spatial System - The basic human settlement hierarchy starting from barangay through barangay districts, municipalities, the three municipalities combined, and to the east coast region shall be stratified, thereby, strengthening the social integration at each level.

(b) Natural Spatial System - In principle, the four natural environment preservation zones described above are earmarked for natural land use.

Urban land use has been restricted, taking the above social spatial system into consideration, to the central area of the existing three municipalities, the regional center, and the axis of urban development as follows:

(i) The built-up areas of the existing three municipalities shall be designated as centers of the respective municipalities, thus, functioning as sub-centers of IRM;

(ii) The regional center shall be designated as the center of the three municipalities and, at the same time, as center of the east coast region.

(iii) The major urban development shall be restricted to the area along Infanta Road in order not to harm the natural spatial system. The area along Infanta Road lies between the regional center and the inter-regional transport axis, and has a high potential for development. This area shall be classified for major urban industries, urban services, and residences.

5.2.4 Basic Structure of Industrial Layout

The progress of industrial development shall call for the following industrial layout:

(a) Natural Resources Development and Development of Related Industries - Outside the planning area, development of a fishing industry and coconut production shall be undertaken. Then the following industries shall be developed utilizing the respective potentials: the intensive agriculture centering on rice production in the plains of Infanta and General Nakar; the intensive culturing in the swamp area; the resort and recreational development along the coastal lines; and the forestry development (for pulp material) and the hill resort development in the hilly area.

(b) Development of Distribution and Processing Industries to Add Value and to Ensure Smooth Development of Natural Resources Development - In addition to building up the distribution industry to handle the collection and shipment of fish catches from the Pacific, and agricultural products from the east coast regions, processing industries for these products shall be developed in the urban area along Infanta Road in parallel with the development of the port.

(c) Development of Urban Service Industries - Responding to the population increase, daily service industries shall be developed in the regional center, in addition to those in the existing central urban areas. Service industries relating to business establishments shall be developed in conjunction with the above distribution and processing bases.

5.2.5 Basic Structure of the Transportation System

Manila East Road together with Infanta Road (Famy to IRM) shall develop an east west axis of the GCLA. Adding to the development of the easter corridor axis, a port for the east consisting of fishing and domestic marine transport shall form the inter-regional transport system for both land and sea transportation.

Three urban arteries extending radially from the regional center toward the central district of the three municipalities form the axis of urban road transportation, and the feeder routes shall be added to serve the coastal, swamp, and hilly areas, thereby, comprising the urban transportation network for the entire IRM.

5.2.6 Fundamental Layout of Urban Facilities

Public Utilities

The water supply system shall include five divisions within the planning area in accordance with urban development distributions. Water resource development shall be carried out centering on ground water, however, at the later stage a system based on the Agos River water resource shall be constructed.

Regarding electric power supply, the transmission and distribution systems within the area are both nearly completed. These systems form the base of the power supply system for IRM. However, as demand in the area expands in the future, development of local power through mini-hydro electric power plants, etc., improvement in transmission and distribution facilities for Luzon grid shall be carried out.

As for communications, during the early stages of planning, simple telex and telephone facilities shall be built. However, by the year 2000, plans call for the formation of a comprehensive telex and telephone network having one central exchange office and three sub-exchanges which, together, can cover the entire urban center and the main development bases.

Social Service Facilities

Social service facilities serve extremely important functions for the municipalities in integrating and connecting it to the regional, urban, and agricultural societies. The basic layout shall be as follows:

(a) The regional center offering the high-level services shall be located at the center of the region. From this center, social services of all kinds shall be provided to the residents of the planning district and, based around this center, the integration and connection of the three municipalities shall be planned.

(b) Expansion of social service facilities shall be carried out within the existing centers of the three municipalities. This shall aim to unify the municipal communities through provision of everyday conveniences based on the traditional customs of the residents.

(c) Fundamental facilities which are required for close affinity with the residents shall be provided at the barangay centers, and strengthening of the basic social group shall be carried out at the barangay level.

6. FORMULATION OF MASTER PLAN

6.1 Urban Development Plan

6.1.1 Basic Policies of Urban Development

The formulation of an urban development plan, the physical aspect of urban development, is based on the following: urban growth policy which includes three planning periods as follows: Basic Preparation Period; Take-Off Period; and Advancement Period; and a spatial structure policy which describes the basic spatial layout centered on the urban growth centers, the distribution district, and the regional center.

6.1.2 Land Use Plan

The land use policies focus on the following: intensive and proper utilization of productive agricultural lands, and natural preservation lands; and compound and specialized land utilization in accordance with the usage and development of periods.

The basic schemes of the land use plan are as follows:

Urban Land Use

(a) **Regional Center Development** - Commercial and business districts, social service districts, and high grade residential areas representing IRM shall be constructed as a center of the east coast region.

(b) **Central District Development of Three Municipalities** - Urban areas of compound usage of commercial, residential and light industry shall be developed in the existing central districts.

(c) **Infanta-Real Urban Belt Development** - A medium-density residential area, as a receptacle for the population increase caused by the industrial development, shall be developed along Infanta Road.

(d) **Distribution Center District Development** - The area accommodating distribution related services, transport, financing, real estate, and retail service industries shall be developed in harmony with the fishing and commercial ports development, serving as the area's transport node.

(e) **Agro-Fishery Processing District Development** - An industrial area centered on processing of agro-fishery products collected from the entire east coast region shall be developed near the distribution center district.

Land Use for Natural Preservation

The land use for natural preservation are based on the following: preservation of green areas for the complete preservation of natural environment; productive land for intensive agricultural and fishery activities; environmental preservation areas where development shall take place to a certain extent in harmony with the natural environment; and facilities development area where spot intensive facilities development shall be carried out.

In view of the above development schemes, the land use plan is formulated.

(a) **Residential Land Use** - General residential area (Infanta 20,000 persons, Real 10,000 persons, General Nakar 5,000 persons) shall be developed in the existing urban areas of the three municipalities while a medium density residential area (30,000 persons) along Infanta Road and a low-density residential area (21,000 persons) in the regional center shall be constructed.

(b) **Industrial Land Use** - Industries shall be located in the central district of the three municipalities in a semi-industrial zone (the distribution center district), and in the exclusive industrial zone (the agro-fishery processing area). The working population in each zone is estimated at 500, 270, and 2,400 persons respectively.

(c) **Commercial Land Use** - Neighborhood commercial area, district commercial area in the central districts of the three municipalities, port-related distribution commercial zone in the distribution center district, and central commercial area at the regional center shall be respectively developed.

(d) **Institutional Land Use** - In the residential land use, 15% of which is allotted for institutional land use, 15% for road, and 5% for green/open space. Allotment is based on the social service facility standards in the Philippines. A land of about 200 hectares shall be secured for the regional center where a provincial hospital, university, nature center, etc., shall be accommodated.

In order to realize the above described urban land use, 714 hectares in 1992, and 1,444 hectares in year 2000 shall be necessary.

(e) **Preservation Zones** - The following shall be designated preservation zones: central preservation buffer zone (200m width along the coast), swamp preservation zone (100 to 200 m width on boundary with agricultural land use and 500 m width along the coast), hill area preservation zone (200 to 300 m width of slopes on the edge of the plains), and Agos River bank (100 to 200 m width).

(f) Productive Land - The Infanta and General Nakar plains for rice production, swamp area of 1,500 hectares for prawn culture ponds, and the hilly land for forestation shall be designated as productive land.

(g) Environmental Preservation Area - The following shall be designated as Environmental Preservation Areas: coastal recreation zone along the beach areas of Infanta and General Nakar; hill recreation zone in General Nakar hill area; and scenic district within the regional center.

(h) Coastal Park Facilities District - In coordination with the resort area, Dinahican Marine Research Park district, and Public Beach Resort district shall be designated on the coastal beach of Infanta.

Urban Area Development Plan

The IRM urban development process shall depend on a scheme of urban core development which shall be developed initially, and expanded ultimately to realize the future land use. The two urban cores shall be constructed during different development periods as follows: a core urban area which shall initiate the IRM development at an early stage; and the ultimate urban core which shall enable the realization of the proposed structure of a new urban center.

These cores shall accommodate various urban functions in a comprehensive and integrated manner. The former core shall be developed including such leading development elements as ports, distribution and processing industries, residences, related commercial and service industries, and public facilities during the initial stage of the development (next five to six years). After its development, the latter core as a part of the regional center, shall emerge functioning as the central element of the new urban structure.

Major Districts Development Scheme

(a) Urban Core - Focusing on the distribution center district, the first phase of medium-density residential development along the Infanta Road, and also the first phase of the processing industrial district shall be developed in an integrated manner. This core shall be composed of a port facility block, a distribution/transport block, a light industry/warehouse block, commercial/business block, residential block, and the above medium density residential and processing industry blocks.

(b) Marine Research Park - Accommodations, research, outdoor recreation and berthing facilities shall be developed.

(c) Regional Center - The center shall consist of an education/culture zone, medical zone, administrative zone, and commercial/business zone, in addition to the central park and sports facilities.

6.1.3 Transportation Plan

Road Transport Plan

Two alternatives of developing the inter-regional transport axis; namely, the construction of a new highway, and improvement of the existing route have been studied.

Based on an evaluation of future traffic demand (6,200 vehicles per day in 1992, and 9,600 vehicles in 2000) and construction cost, improvement of the existing road has been proven the most economical and realistic alternative.

The improvement of the existing Infanta Road shall be carried out based on the same design standard as Manila East Road (paved two lane in all sections).

The urban road network is aimed at improving the urban trunk roads to satisfy the everyday transportation needs of the regional centers, and the industrial transportation needs of the region concentrated along the Infanta Road between Real and Infanta. The network is also to include feeder roads to the coastal, swamp, and other districts which are located away from this trunk road. In the central district of Infanta, in particular, it shall be necessary to convert the existing street network to one which can accommodate automobile traffic, and also to eliminate through-traffic. A loop road shall also be constructed in order to cope with the expansion of the central district traffic.

Public Transportation Plan

The following have been planned for public transportation used by the local residents: expanded bus route service and improvement of the Infanta bus terminal in order to cope with expansion of transportation links with Manila and other areas outside the district; and improvement of jeepney transport service as a fundamental means of public transportation within the district in order to cope with expanded everyday activity (commuting to work and school, shopping, etc.) among the inhabitants of the district.

Port Plan

With the aim of developing a direct transport route for distributing goods from the Pacific coastal area to Manila, the following port development plans shall be executed in Lamon Bay:

(a) Fishing Port Quay Development Plan

In order to permit landing of 65,000 tons of fish catches as outlined in the ocean fishing operation plan which forms part of the industrial promotion and development plan described in Section 6.2, fishing port quay facilities shall be developed to accommodate ships in the 40-ton class. The length of the quay wall shall be 500 m. This quay shall be considered as one of the key facilities of the fishing base plan outlined in Section 6.2.

(b) Distribution Port Quay Development Plan - As a base of coastal shipping in the east coast region, a quay with a quay wall of 250 m in length (2 cargo ship berths \approx 200 m; 1 ferry berth \approx 50 m) to accommodate 1,500-ton class cargo ships and 50-ton class ferries shall be constructed to handle 107,000 tons of cargo (agricultural products 27,000 tons; industrial goods 50,000 tons; distribution goods and everyday commodities 30,000 tons), and 230,000 persons in ferry traffic at Polillo Island every year.

In addition to these key ports, unloading facilities shall be constructed at major transport nodes such as Dinahican, Silangan, and Langgas for banca transport on the coast, marine recreation transport, and transport of goods cultivated in the swamp zone.

6.1.4 Public Utilities Plan

Water Supply Plan

Centered on the various dispersed development bases, water districts shall be established each having its own water supply system.

Water for agricultural use shall consist of surface water (primarily the Agos River). Water for urban utilization shall be acquired through development of ground water within or around the above-mentioned water supply districts.

To deal with the quantitative and qualitative expansion in water demand, water shall be taken from the Agos River. Following treatment at a central purification facility, it shall be distributed to each district through a comprehensive network, the first phase of which is included in this plan.

In order to realize the above described water supply system, the following development and improvement plans shall be executed:

(a) District Water Supply System Improvement Plan - A feasibility study on water use in each district shall be undertaken. Based on the results of this study, district water supply systems shall be developed which primarily use ground water to meet a total urban water demand of 1.48 m³/sec by the year 2000 (Infanta water supply districts I, II, III, Real water supply district, and General Nakar water supply district).

(b) Integrated Urban Water Supply System Development Plan - In order to satisfy water demand after the year 2000, construction shall be undertaken on the Agos River water intake, storage, distribution, and water purification facilities. In addition, an urban water distribution trunk system connecting these facilities to the various district water supply systems shall be developed. During the first phase of the plan, the intake and purification facilities shall be constructed.

Power Supply Plan

During the first phase of the plan, electric power (Total demand: 30 MW) shall be supplied from the Caliraya Substation (25 MW power supply to Infanta), and the Real mini-hydroelectric power plant (5 MW). During the second phase, power (total demand: 65 MW) shall be supplied from the Dolores Substation based on the premise that the link by ultra high voltage transmission lines with the southern and central systems of the Luzon Grid shall have been completed.

Based on the above, increase in power demand and the plan for securing adequate power sources, the following plans are to be implemented:

(a) Real Mini-Hydroelectric Power Plant Plan - Using local surface water resources, a stable supply of power shall be sought to meet the power demand (5 MW) of the agricultural and marine product processing industries, which shall commence at the early stage.

(b) Plan to Increase Power Transmission and Transformer Capacity - In order to obtain a large power supply from the Luzon Grid (60 MW from the Dolores Substation), the existing 69 KV transmission lines shall be replaced by 115 KV lines, and the capacity of the Infanta Substation shall be sharply expanded.

(c) Regional Power Distribution Network Development Plan - In pace with the increase in regional power demand and the emergence of new demand, the capacity of the substations shall be increased in stages, new power distribution trunk lines shall be installed, and high-voltage power shall be made available within specified areas.

Telecommunication Facilities Plan

The following telex and telephone network facilities plans shall be promoted, and is aimed at the formation of the following: a telephone network with one central exchange office and three branch offices; and a telex communications network, both designed to handle the needs of all central districts and major bases for development.

(a) Telephone Facilities Development Plan - A comprehensive telephone network shall be formed consisting of one central exchange office located in the regional center and branch offices located in each central district. To meet the needs of the first phase of the project centered on Real Port, a small capacity exchange office shall be initially constructed.

(b) Telex Facilities Improvement Plan - Telex offices shall be created in the main districts of the planning area (regional center, Real urban belt, central district of Infanta, central district of General Nakar).

Drainage Facilities Improvement Plan

Separated water drainage facilities shall be constructed in the urban area. However, during the first half of the planning period, drainage shall be handled within each prepared land area or private estate.

(a) Rainwater Drainage System Improvement Plan - Within the urban areas, measures shall be taken to improve major rivers by constructing rainwater trunk drains. Rainwater from each development district and the existing urban areas shall be drained off through these routes.

(b) Public Sewer System Development Plan - In order to make the switch from primary treatment to high-level central treatment of sewage, separated public sewer systems shall be laid and water treatment plants shall be constructed.

Solid Waste Disposal Plan

In the middle stages of the planning period, a solid waste disposal site shall be constructed to accommodate general waste collected from all urban areas. Treatment of industrial waste shall be the responsibility of each industrial body, under new environmental standards which shall be enacted.

6.2 Industrial Promotion and Development Plan

6.2.1 Agriculture

The following development plan is to be promoted in accordance with the fundamental policy which seeks to maintain self-sufficiency in rice supply and raise productivity in the coconut industry, which is a major product of the planning area, in order to maintain and raise the level of life of the agricultural workers.

(a) **Rice Productivity Improvement Program** - Through improvement and expansion of the Agos River irrigation system and greater adoption of new agricultural technologies, rice productivity shall be raised to 4,950 kg/ha by 1992 and 10,000 kg/ha by the year 2000. Under this plan, the annual rice harvest shall reach 23,600 MT by the year 2000.

(b) **Coconut Productivity Improvement Program** - Although approximately 1,000 ha of coconut groves are to be lost through urban development and conversion to rice cultivation, intensive replanting and the introduction of new varieties of coconut trees shall be carried out in the remaining concentrated coconut groves (estate) in the planning area. Estimated copra harvest for the three municipalities and Polillo Island amounts to 93,000 MT.

(c) **Vegetable and Livestock Productivity Improvement Program** - In planning for a future population of 150,000, plans shall be implemented to increase production in the vegetable, fruit, and livestock industries.

6.2.2 Fishery

Through modernization of the small regional fishing industry and resources of the Pacific offshore areas, and promotion of artificial cultivation, the following development plans are to be implemented in accordance with the fundamental policy aimed at raising the marine products industry to one of the leading industries in the region:

(a) **Plan to Promote the Sea Surface Fishing Industry** - In order to promote the development of fishery industry, the following shall be implemented: survey of the marine resources in the Pacific offshore areas (test operation of multi-purpose fishing research vessels— 100 ton, 5 ton, 3 ton class); plan to train and educate leaders of the regional fishing industry (fishing industry training center plan); and marine resources research plan (bonito and tuna resources research center).

(b) **Sea Surface Fishing Operation Plan** - Two plans are to be executed as follows: regional fishing operations plan involving conversion to new types of fishing vessels (annual estimated catch of 12,000 tons with 5-ton and 3-ton class vessels); and commercial fishing operations plan involving introduction of commercial fishing vessels (annual estimated catch of 7,000 tons with 40-ton class vessels).

(c) **Fishing Base Development Plan** - In order to achieve successful operation, catch and distribution plans for fishing vessels as outlined above, fishing port base facilities (unloading docks, open-air storage areas, net drying areas, fuel and water supply depots, slipways, ice plants, fish markets) shall be developed. In addition, the marine products distribu-

tion industry (wholesale and retail markets, refrigerated and deep-freeze warehouses, etc.), and related service industries (repair facilities for nets, rigging, engines, etc.), shall also be promoted.

(d) **Prawn Culture Promotion Plan** - A marine brackish culture center shall be constructed to engage in testing and research related to prawn culture, production of shrimp fry, supply to culture ponds, and instruction in culture methods.

(e) **Prawn Culture Project Plan** - In a 1,500 hectare area within the swamp zone, a prawn culture project shall be carried out in the form of a cooperative (annual production is 5,000 tons). In addition, pen and cage culture projects shall also be undertaken.

6.2.3 Manufacturing Industries

In order to develop local processing industries for the primary products developed under the east coast region coconut production promotion plan, fishing development project, etc., the following developmental plans shall be promoted:

(a) **Agricultural Product Processing Industry Development Plan** - A coconut oil extraction industry (60,700 tons by the year 2000) shall be developed to process coconuts produced in the three municipalities and Polillo Island. The potential also exists for developing an activated charcoal plant as a related industry. This proposal shall be given further consideration.

(b) **Marine Products Processing Industry Development Plan** - Using the prawn shipped from the above described culture ponds and the catches of tuna and other fish from the Pacific waters, a commercial prawn processing plant (3,000 tons/year), and canning plant (32,000 tons/year) shall be created.

(c) **Paper and Pulp Industry Development Plan** - Together with the advancement of forestry in the east coast region, the construction of full line paper mill shall be taken into consideration.

6.2.4 Tourism

The following developmental plans shall be promoted in accordance with a policy aimed at developing tourist resort areas in the east coast region relatively close to Manila in order to serve as one important stimulus to the development of the regional economy.

(a) **Coast and Hill Zones Development Plan** - Lodging facilities (cottages, etc.) and outdoor sports facilities shall be created in the natural environment of the east coast (Infanta, General Nakar), and hills (General Nakar). A resort center shall also be constructed in General Nakar.

(b) **Marine Research Park Development Plan** - As part of the tourism policy, a marine research park development project shall be promoted at Dinahican aimed at attracting visitors from overseas. The project shall include marine-related research (e.g., a marine resources research laboratory), academic and cultural facilities, high-quality lodging facilities, and marine and outdoor sports facilities.

(c) **Public Beach Recreation Center Development Plan** - In the

coastal area of Infanta, a project shall be promoted to develop a recreation center consisting of the following: a beach-type leisure center (sea world); and an amusement center (shopping, seafood restaurants, sports facilities, game fishing).

6.2.5 Other Commercial and Service Industries

The following developmental plans shall be implemented in order to develop commercial and service industries to satisfy the increasingly advanced and diversified needs of local residents, and to develop tertiary industries related to distribution operations.

(a) **Regional Center Commercial District Promotion and Development Plan** - When the local population reaches 100,000 to 150,000, a commercial center shall be constructed to attract stores, entertainment facilities, supermarkets, etc.

(b) **Distribution and Related Industries Promotion and Development Plan** - Around the fishing and commercial port of Real, the following industries shall be promoted and developed: cargo and passenger transport industry, financial and insurance industry, real estate, tourism (fishing, fish markets, local crafts, etc.), sales and service industries for port employees (lodging facilities, restaurants, stores selling everyday commodities, consumer services, entertainment facilities).

6.3 Social Services Improvement Plan

6.3.1 Educational Facilities Development Plan

For the purpose of manpower development in the region, the following improvement plans shall be implemented based on three fundamental policies: comprehensive education in the elementary through higher education levels; education to be able to keep pace with rapid population increases; and education of a special nature.

(a) **Elementary and Secondary Educational Facilities Expansion Plan** - Because elementary school facilities shall become an urgent problem as urban population rapidly increases, positive steps shall be taken to prepare for this situation (14 new elementary schools, and 6 new secondary schools by the year 2000 shall be constructed).

(b) **Higher Education Facilities Improvement Plan** - In order to expand the existing Infanta Community College (to be located in the regional center), it shall gradually be converted from a college specializing in one subject to a university of a comprehensive nature.

(c) **Plan to Create Educational Facilities with a Special Nature** - In order to promote the area as an agricultural and fisheries urban center in reflection of its local characteristics, agricultural and fisheries departments shall be created at the comprehensive university through a tie up with the fisheries research organization of the University of the Philippines. In addition to these higher education facilities, agricultural and fishery educational facilities and training facilities shall also be developed at the secondary school level to raise personnel capable of contributing to the regional industries.

6.3.2 Health Medical Facilities Development Plan

In order to secure both private and public comprehensive regional medical care systems, the following facilities improvement plans shall be implemented:

(a) **Public Medical Service System Improvement Plan** - A tertiary care Regional Hospital shall be constructed with the capacity to meet the medical needs of the entire east coast region. The hospital shall provide all types of medical care services as required throughout the planning area. However, to provide minor medical services in each district, barangay health stations shall be created throughout the area. During the first phase of the planning period, the existing provincial hospital shall be urgently expanded in order to function as a central hospital for the region. When the population reaches 100,000, the above regional hospital shall be constructed to provide all types of medical services.

(b) **Private Medical Services Promotion Plan** - Because private medical facilities may potentially be created as urbanization proceeds and the population increases, such facilities shall be promoted to provide medical services and, likewise, fill the gap between the above public barangay health stations and the central hospital.

6.3.3 Cultural and Recreational Facilities Development Plan

Cultural and recreational facilities are two of the most important elements in attracting an urban population. In order to develop IRM into a model urban center, a cultural gap with Manila must not be allowed to develop.

In developing these facilities, a network shall be planned which makes maximum effective use of the facilities of other sectors (especially educational facilities). These cultural and recreational activities shall stimulate active participation by all citizens.

The major points of the cultural and recreational facilities improvement plan are as follows:

(a) **Plan to Develop the Central Regional Library as a Cultural Information Center** - A Central Regional Library shall be developed in the regional center to serve as a center not only for literary information but as a center for cultural information of a regional, national, and international nature.

(b) **Cultural Center Construction Plan** - An integral part of the above central library is a Cultural Center which shall be constructed, and shall introduce international cultural activities (theatrical performances, music, art, etc.), develop the regional culture, offer adult education, hold lectures, etc.

(c) **Parks and Ports Facilities Improvement Plan** - As a part of the network of facilities of the cultural and educational centers, barangay playgrounds shall be created as everyday sports facilities. In addition, a comprehensive sports center, where all types of public sporting events can be held, shall be constructed in the regional center to serve as a central sports facility for the entire east coast region.

6.3.4 Administrative Service Facilities Development Plan

In addition to the facilities described, all types of administrative service facilities necessary for the operation of a model urban center (administrative offices, disaster prevention and police services, postal services, social welfare services) shall be developed. The following major facilities are planned:

- (a) **Barangay District Center Plan** - For the purpose of providing effective social services at the community level, a Barangay District Center shall be created within each basic living area. Each center shall jointly provide facilities such as medical service facilities, group meeting facilities, athletic facilities, etc.
- (b) **Regional Administrative Center Construction Plan** - Owing to the current lack of administrative functions within each local body, all administrative services are presently handled through the central government according to separate departments. In order to coordinate such services and to integrate the urban development of IRM as a project in urban development in the local area, a Regional Administrative Center shall be constructed within the regional center. This center shall also include local judicial court facilities having jurisdiction over the various municipal courts.
- (c) **Integrated Disaster Prevention and Protection Center Construction Plan** - To meet the needs of the densely populated urban region, a Disaster Prevention and Protection Center shall be built in the regional center to protect the local citizens against all forms of disaster. This center shall include an integrated police and fire protection headquarters which shall supervise all police and fire fighting functions in the districts (three municipalities).
- (d) **Central Post Office Construction Plan** - A Central Post Office with jurisdiction over the district level post offices shall be created in the regional center to provide efficient and speedy postal services in and outside IRM.
- (e) **Comprehensive Regional Social Welfare Services Center Construction Plan** - A Social Welfare Services Center shall be constructed in the regional center to provide all types of social services together with education, health and medical services to socially disadvantaged persons living in the east coast region.

6.4 Phase Development Program

Three distinct but continuous phases shall be necessary to achieve the ultimate image of the master plan as follows: formation of an urban core which has a compact socio-economic base, and shall trigger a chain of continuous development; the promotion, based on the above core, of an autonomous growth to encourage urban concentration; and inducement of advanced urban functions, based on this concentration, to serve as an urban center for the east coast region.

Consequently, the entire planning period shall be subdivided into the following three development periods: Base Preparation Period (1985 to 1988); Take-Off Period (1989 to 1992); and Advancement Period (1993 to 2000). The first period shall be designated to prepare and meet the conditions for the base preparation of the urban core. The second period shall be in phases to form the urban core, thereby, promoting an

autonomous urban growth (an urban center with a population of 100,000). A foundation shall be laid for this urban center to grow into the center of the east coast region with a population of 150,000 during the Third Period.

The major activities of each period are further explained as follows:

6.4.1 Base Preparation Period

- (a) Development of interregional transport facilities (direct road access and port), an essential prerequisite for IRM development shall be carried out to enable the development of distribution facilities, and the construction of the marine research park (the first phase of tourism development) to commence.
- (b) Preparation for the natural resources development, the major element of IRM regional development shall take place (marine resources development research, construction of marine and brackish culture center for the culture industry). Initially, prawn culture shall start at an early stage to coordinate with the development of processing industries during the second period.
- (c) Based on the above conditions, a receptacle of urban activities in the form of urbanized land with appropriate transportation services and public utilities shall be developed (urban core of about 100 hectares).

6.4.2 Take-Off Period

- (a) A socio-economic urban core shall be formed during the early stage of this period mainly consisting of the processing and distribution industries;
- (b) Production of primary industrial products shall be expanded due to the full scale development of prawn culturing, commencement of surface water fishing, and increase of coconut production, thus, the necessity for strengthening of distribution industries and the full scale operation of agro-fishery processing;
- (c) Resort development shall commence to expand tourism development in the preceding period, thereby, leading to the construction of a public recreation center; and

(d) These industrial developments shall cause a drastic increase of urban population in IRM. In order to cope with this, the following are required: a new core urban area at the regional center shall be nurtured to effect the transformation of the urban structure; and the preceding development of necessary transportation and public utilities shall be maintained to support the partial expansion of the urban development.

6.4.3 Advancement Period

- (a) Upon the growth of 100,000 urban population and industrial

concentration, development of urban service industry shall be promoted, and introduction of large scale manufacturing industries shall be examined. At the same time, an intensive and advanced development of commercial industry shall be carried out for IRM to function as the center of the east coast region.

(b) Responding to the needs of the dense urban areas with a population of 150,000, an integration of the transportation network shall improve the mobility of urban activities and public utilities which service the increasing and changing demand in terms of both quality and quantity.

6.5 Master Plan Proposals

Based on the framework of the structure plan of Chapter 5, a master plan of IRM urban development has been proposed elaborating and integrating the sector wise and sequential aspects of the development as seen in this chapter. As such, 124 development and improvement projects have been proposed as the structural elements of the said master plan.

The basic composition of the IRM development which embraces the above projects are as follows: construction of an urban core based on port development shall be carried out; a new urban core at the regional center shall be developed; and finally, on the center of this core urban area, the structure of an urban center with a population of 150,000 shall be established.

6.6 City Planning System in IRM Urban Development

Most of the urban land development is carried out by the private sector in the Philippines, basically conforming to government plan and control systems such as development permit, zoning ordinances, subdivision and condominium regulations, etc.

However, within a specially designated area, HSDC has been vested authority to formulate development plans and implement projects, thus, enabling a government body (centered on HSDC) to develop and construct urban land on its initiation.

MHS, lead agency of HSDC in general, formulates land use plans, zoning ordinances, and land management policies such as joint venture, land expropriation, land readjustment, etc. with the President's approval.

An initial area for development designated by The Office of the President under the so called Bagong Lipunan Sites has been designated as the Lungsod Silangan Townsite considering its importance in the development framework of MMA, and the boundary of which should be scheduled to include IRM.

Therefore, it is most probable that HSDC shall take the initiative in carrying out the planning as well as the implementation activities.

In order to achieve the proposed land use delineated in the master plan, a combined or coordinated activity of private and public sectors shall be necessary in such a manner, for example, as to let the public sector take a lead in implementing urban land development projects while at the same time inducing and regulating private sector participation.

The reluctance of the private sector to invest in the high cost of land development can be foreseen as the difficulty in the development of the distribution/industrial district. The high cost of land development is a result of land reclamation along the coast which had to be made to avoid considerable impact on the environment if development was otherwise made. Thus, it should be developed as publicly initiated urban land development projects, whereas the development of prime land along Infanta Road shall be carried out with considerable private sector participation controlled by development regulations to achieve the proposed land use of the master plan.

As part of the development regulations, the designated urbanization area, foreseen to be urbanized in the next ten years (713.8 ha) shall absorb all urban land use within that period (the area shall be expanded after ten years).

Land use zoning shall be applied within this area though the proposed land use of the master plan only indicates the predominant use of each district. Thus, it shall be required that the detailed land use shall be specified after elaborating on the development plan of each district.

Furthermore, such a detailed development plan shall also be necessary for the proposed Urban Core Development which has a possibility of creating unfavorable situations with different land uses adjacent each other during the early stages of IRM development.

7. EVALUATION

7.1 An Overall Evaluation

The impact on the regional development of the 124 projects proposed by the master plan has been evaluated as a whole using a regional system dynamics model.

The following are the results of the evaluation:

7.1.1 Population

As estimated, population shall reach 96,000 in 1992 and 158,000 by 2000, clearing the heights of population framework set in Chapter 4. Cumulative population inflow shall total 88,000 persons during the entire planning period increasing rapidly until 1992 then shall gradually decrease. On the other hand, natural increases shall not enlarge so much due to the rapidly decreasing birth rate and the cumulative figures during the same period shall total 26,000 persons only.

7.1.2 Population at Work

Working population in the primary industrial sector shall increase considerably by 1992 based on the information of production structure. Thereafter, it shall grow very slowly because of the improving labor productivity.

The number of workers in the secondary industrial sector shall be largely affected by the influx of construction workers who are necessary for the project implementation. The total working population in the sector is estimated to drastically swell from 1000 in 1983 to 17,000 in 1992 after which it shall gradually decrease, and ultimately, maintain the level of 11,000 in the year 2000.

Likewise, the number of workers in the tertiary sector shall increase smoothly up to the year 1994, but its growth shall level off thereafter due to the increasing labor productivity of this sector.

7.1.3 GRDP

GRDP shall grow continuously along a moderate curve throughout the entire planning period from 170 million pesos in 1983 to 1,100 million pesos in 1992 in 1992, and finally at 2,000 million pesos in 2000.

Per capita GRDP shall top out in 1992 after its rapid increase from 3,900 pesos in 1983 to 11,500 pesos but shall likewise slow down after this period.

Percentage share of project construction in the total GRDP shall account for as much as 20% contributing considerably to the total GRDP during the early stages of the implementation.

Although its relative share shall decrease as the development expands in the later period, the project construction shall definitely plan an important role for the taking-off of the regional economy.

7.1.4 Finance

The projects of utility development such as power and water supply of urban land development, and the port development are assumed to break even in terms of their financial balance; collecting the utility charge, and rental fee. Thus, subject to the financial analysis, some projects are to be excluded.

A deficit annual balance shall be experienced during the first three years after which, however, the balance shall turn to profit, affecting cumulative deficits. A surplus balance shall result in the fifteenth year.

This indicates that if necessary conditions are satisfied for the financially sound operation of those excluded projects, the IRM urban development can be managed under proper administration, and shall not place any financial burden on the local government.

To the base case, the following sensitivity analyses have been conducted: impact caused by the changes of external conditions; and effect of project implementation.

(a) Changes of External Conditions: Growth rate of external economy fluctuates by 2 points; increase of construction cost by 20 to 40%; decrease of fish catch by 50%; and rice and coconut productivities level off from 1992.

(b) Effect of Project Implementation: Effect without implementing Prawn Culture Project; effect without implementing Coconut Oil Mill Project; effect without implementing Canning Factory Project; effect without implementing Ice Plant Project; effect without implementing Prawn Processing Project; effect without implementing Paper Pulp Factory Project; and effect without implementing Tourism Development Project.

According to the results, the greatest impact to be caused by the change of external conditions is the decrease of fish catch. However, this change shall cause population and GRDP in 2000 to decrease only by 8% from the base case, and shall lower the financial internal rate of return by only 1.9% points and, thus, shall not alter the basic scenario of the base case.

As for the effect of project implementation, the most critical impact shall be derived from suspending the prawn culture project which shall result in 70% population size and 63% GDRP total of the base case in 2000, and lower the financial internal rate of return to a 9% level. This definitely implies the importance of the project in the IRM development.

7.2 Evaluation of Priority Projects

The following priority project packages have been selected for systematic and efficient facility development while taking urgency and interrelation of proposed projects into consideration: Real Port Development Projects Package (including Infanta Road); Urban Land Development Projects Package; Prawn Culture Projects Package; and Tourism Development Projects Package.

Of these packages, only Real Port Development Projects Package has been evaluated by both financial (the fishing port only) and economic analyses. The rest of the packages have only been analyzed financially.

7.2.1 Real Port Development Project Package

The result of economic analysis indicate a very high economic internal rate of return of about 41% for the package. In addition, the sensitivity analysis implies that even though the construction cost is doubled and the benefit decreased by 40%, the internal rate of return shall still show a 19% figure, thus, proving that the package has a very high resiliency in its economic feasibility.

Economic analysis of its road portion shows internal rate of return of only 27% implying the high priority for facilities development.

On the other hand, the result of financial analysis of the port portion of the package disclose less than 6% internal rate of return at which a difficulty in its operation can be foreseen.

However, in view of the aforementioned positive economic impact of this package, these port development projects should be implemented by taking necessary measures such as subsidiary allocation and tax exemptions.

7.2.2 Urban Land Development Projects

Rent (house and land) and sales prices of the developed land, and of facilities shall be largely affected by the level of loan interest, and land development/housing construction cost.

Based on the estimated loan interest and land development, housing construction costs, average sales price of developed land has been determined at a price level from 400 pesos/m², and average rent of facilities ranging from 20 to 60 pesos/m²/month. However, it shall be necessary to set the rents and sales price at the minimum level of the respective ranges above considering both the case of the existing EPZ's and estimated income levels of IRM in the future. This shall become feasible by carrying out the following measures:

- (a) Price setting responding to affordability and forbearance of land and facility users;
- (b) Procurement of soft term loans with interest levels of less than 8%;
- (c) Minimizing land development and facilities construction cost; and
- (d) Introduction of escalating rent system.

7.2.3 Prawn Culture Projects Package

The result of financial analyses indicate a very high internal rate of return of more than 50% for this package. In addition, even though the doubled construction cost and 80% benefit are assumed, the internal rate of return shall still be maintained as much as 35%.

As such, this package shall be concluded financially sound, provided that unit scale price and total production maintain more than 80% of the base case, and that no large increase in construction cost shall take place.

7.2.4 Tourism Development Project Package

A financial internal rate of return is calculated at 18% for the package implying that it shall not become so profitable for the private sector to implement with loans from commercial banks.

However, the package shall involve a promotional activity critical to the implementation of this package. An effort to attract potential day time as well as overnight tourists of middle income level and above from MMA shall be also essential for the implementation of this package.

8. CONCLUSION AND PROPOSALS

8.1 Study Result and Conclusions

The necessity of the Lungsod Silangan Development, termed Eastern Corridor Development in this study, and the importance of IRM's urban development to create a coastal growth center are discussed in Chapter 1.

Its future population size, as center of the east coast region, has been determined in comparison with the existing urban centers to be 100,000 for the immediate future and ultimately to become 150,000 in the year 2000 (Chapter 3).

Although IRM has a considerable potential in fishery and prawn culture industries, it is at present and as illustrated in Chapter 2, a small-scale agricultural distribution base on the east coast of Luzon Island.

In order to construct a regional urban center in such an undeveloped area, a well-prepared scenario, based on which a considerable amount of investment by the government, shall be required.

IRM urban development has its emphasis, as discussed in Chapter 6, on achieving a model urban center for the agro-forestry and marine product industries in the Philippines. The development is phased into the following three (3) periods: Base Preparation Period (1985-1988), Take-off Period (1989-1992), and Advancement Period (1993-2000).

Fishery resources development shall begin initially and in parallel with this development, the fishery processing industry shall be promoted at the same time as basic distribution facilities such as cold storage, ice plant, fish market, warehouse, etc., shall be constructed. The facilities development shall be implemented by phase, ultimately enabling IRM to function as the distribution base of the east coast region.

The urban development plan initially aims at absorbing increased population and industrial activities by specific spot developments on the existing urban framework. The transition to a new urban structure shall begin in the Take-Off Period, and the firm structure shall be established by the year 2000.

Specifically for transportation, the IRM's role as the coastal distribution base shall require an urgent improvement/development of the interregional transport facilities (Infanta Road and Real Port). Then starting from the Take-off Period, a systematization of urban road network shall be carried out. Likewise, public utilities shall initially serve for the spot developments and their service shall be expanded later from the Take-off Period to an integrated system of public utilities in IRM.

The total investment cost (estimated in Chapter 6 at 1984 prices) of the IRM urban development are as follows:

(i)	Base Preparation Period	2,906 million pesos
(ii)	Take-Off Period	3,919 million pesos
(iii)	Advancement Period	5,459 million pesos
	Total	12,284 million pesos

This amount is considered by no means small, although tracing the general process of transformation across the dichotomy from rural to an urban center and its required amount of projects (the content of projects are described in the project list at the end of Chapter 6), the size of investment

estimated above could be easily justified.

Therefore, it is not the total investment cost that should be examined but whether the investment can be paid off profitably or not in the long term, and how to procure the necessary project fund to evaluate the former aspect. This investment is originally not only for the vitalization of the economy and urbanization of IRM alone, but also for the vitalization of the regional economy of the east coast region as a whole.

However, it is very difficult to measure the development's impact on the vitalization of the entire regional economy. Accordingly, the former aspect has been examined by comparing the total investment cost with total tax revenue derived from the IRM economy which shall be expanded on the basis of the investment. The result of this examination indicated that the total urban management shall have a financial internal rate of return of 20.5% assuming an escalation rate of 15%. It is also shown that even though the total fish catch, the output of fishing industry which contains the most indefinite factors among the industrial development of IRM is decreased by 50%, a financial internal rate of return can still be maintained at 18.6%.

Considering these facts, the urban development which this master plan is aiming to accomplish shall have a satisfactory economic feasibility even when it is limited within IRM itself. Furthermore, its effect to vitalize the economy of the east coast region by transforming IRM into a self-contained regional center should insure the urgent implementation of this master plan and should ultimately alleviate the regional disparity of Luzon Island.

To clarify a required process of project initiation, urgent and essential projects for the realization of the master plan, called priority projects, have been identified for examination of their feasibility.

Infanta Road Improvement and Real Port Development Projects Package, the most essential group of projects that enhance the IRM's role as the coastal urban base, has an economic internal rate of return of 41% whereas, the Urban Land Development Project Package implies, on the basis of sales price on developed land and buildings and their rent, determined in comparison with existing Export Processing Zone Projects, a financial internal rate of return of 8%, prawn culture project package with a rate of 54%, and Tourism Development Package with a rate of 18%.

Based on these figures, the following conclusions have been derived:

- (i) Infanta Road Improvement and Real Port Development Projects Package has by itself, a sufficient level of economic feasibility, therefore, should be implemented with highest priority by the public sector.
- (ii) Urban Land Development Project Package, although in the Philippines is a kind of project in which private investment and initiative are generally involved, indicated a low rate of 8%, thus, should be implemented by the public sector, restricting its project component and land area to a necessary but minimal level.

(iii) Prawn Culture Project Package has a sufficient level of financial feasibility and therefore, shall be implemented by the private sector.

(iv) Tourism Development Project Package has a low rate of 18% in the master plan indicating a difficulty of implementation by the present sector. Therefore, it shall be subdivided into smaller components so that it can be implemented by the private sector successively, starting from the most profitable sub-component.

The inter-relations and mutual causes and effects among the projects are clarified by means of the multi-level directed graph illustrated in Fig. 7.2.1 (Chapter 7: Evaluation).

According to this graph it is apparent that basic infrastructural development such as Infanta Road improvement, existing Real Port improvement, and new Real Port construction should be implemented with first priority.

On the other hand, with respect to economic impact on regional development (7.1 An Overall Evaluation of Chapter 7), the contribution of the prawn culture project shall mark as much as 30% in terms of population and 37% in terms of GRDP (decrease without said project by the year 2000). In addition, the contribution of tourism development shall be 14% both in terms of population and GRDP (by the year 2000).

Based on the above discussion, the following shall be selected as priority project packages and their internal rates of return were calculated respectively as shown below:

- | | |
|---|-----------------------|
| (i) Real Port and Infanta Road Improvement Project Package: | 6%(FIRR)
41%(EIRR) |
| (ii) Real Urban Land Development Project Package: | 8%(FIRR) |
| (iii) Prawn Culture Project Package: | 54%(FIRR) |
| (iv) Tourism Development Project Package: | 18%(FIRR) |

8.2 Proposals

In order to implement projects (i) Real Port Development and Infanta Road Improvement Project Package; and (ii) Urban Land Development Project Package: as the Master Plan recommended, 1.4 billion pesos shall be required. This amount (even though it can be guaranteed to be paid off ultimately) shall be an excessive expenditure in the present Philippine economy.

Therefore, the phasing and partial implementation of these priority project packages shall be proposed taking financial feasibility into consideration. The proposal is illustrated in Fig. 8.2.1 and Table 8.2.1. The basic policy of the phasing is: firstly, that the urgent need for transportation services of at least local standard shall be satisfied through the improvement of existing facilities (Infanta Road and Real Port); secondly, that a minimal but essential level of new port development shall be commenced; and finally, based on this that full-scale land development shall be implemented.

The above proposals emphasize infrastructural development; however, in addition, industrial development shall be similarly essential. Namely, (i) inducement of private capital into the essential sectors of development such as agro-forestry, fishery, aqua-culture and tourism; (ii) resource studies as prerequisite to the above; (iii) implementation of prototype and pilot projects; (iv) establishment of distribution / marketing systems for production materials (including juvenile prawns, etc) and products shall necessarily be carried out in line with infrastructural development.

Furthermore, to provide an effective and efficient entity for the smooth implementation of proposed developments and projects within IRM and other contiguous areas, the establishment of a Development Authority is proposed.

