社会開発調査部報告書

No. 22

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS & HIGHWAYS

Feasibility Study
on
The Rural Road Network Development Project

FINAL REPORT (Volume 10)

PROJECT EVALUATION
IN
THE PROVINCE OF ANTIQUE

OCTOBER, 1990

JAPAN INTERNATIONAL COOPERATION AGENCY

REPUBLIC OF THE PHILIPPINES

DEPARTMENT OF PUBLIC WORKS & HIGHWAYS

Feasibility Study

on

The Rural Road Network Development Project

FINAL REPORT (Volume I O)

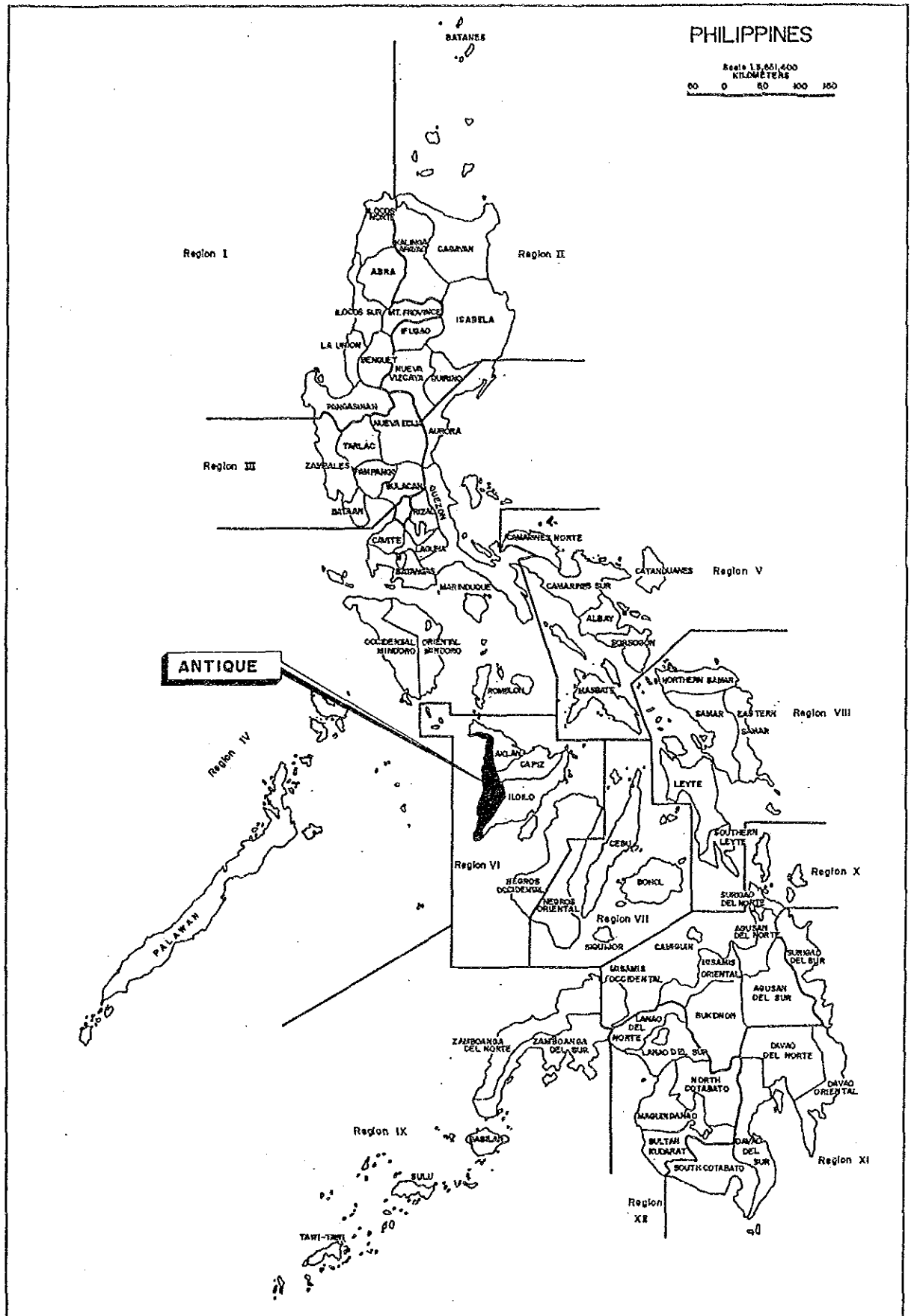
PROJECT EVALUATION

IN

THE PROVINCE OF ANTIQUE

OCTOBER, I 990

JAPAN INTERNATIONAL COOPERATION AGENCY



FEASIBILITY STUDY ON THE RURAL ROAD NETWORK DEVELOPMENT PROJECT	LOCATION MAP

VOLUME - 10
PROVINCE OF ANTIQUE

TABLE OF CONTENTS

CHAPTER 1
SOCIO-ECONOMIC PROFILE OF THE PROVINCE

1.1 GENERAL

The Province of Antique was selected as one of the Study Provinces which represents the province of the following characteristics:

- Economically less developed
- Average level in road development
- Topographically seaside mountainous

1.2 GEOGRAPHY AND TOPOGRAPHY

The province is located in the western part of Panay Island. The Province is narrow but stretching long in the north-south direction, and bounded on the east by Provinces of Iloilo, Capiz and Aklan and on the west by Cuyo East Pass.

Due to mountain ranges situated along the eastern boundary of the Province, topography is predominantly mountainous with very narrow plain along the west coast. The province is one of the typical seaside mountainous provinces.

Slope map of the province is shown in Figure 1.2-1.

1.3 POPULATION

The province is composed of seventeen (17) municipalities and the provincial capital is located at San Jose de Buenavista. There is one (1) island municipality namely, Municipality of Caluya which was excluded from the Study.

Population in 1990 is estimated at 433,000. The average annual population growth rate for the period of 10 years from 1980 to 1990 was estimated 2.3% which is slighly lower than the national average of 2.4%. Population density of the province in 1990 is 171.7 persons per square kilometer which is lower than the national average of 205 persons per sq. km.

Population, the average annual population growth rate and population density by municipality are presented in Table 1.3-1. Distribution of municipal towns together with their population is shown in Figure 1.3-1. Most municipal towns are located in the coastal low land.

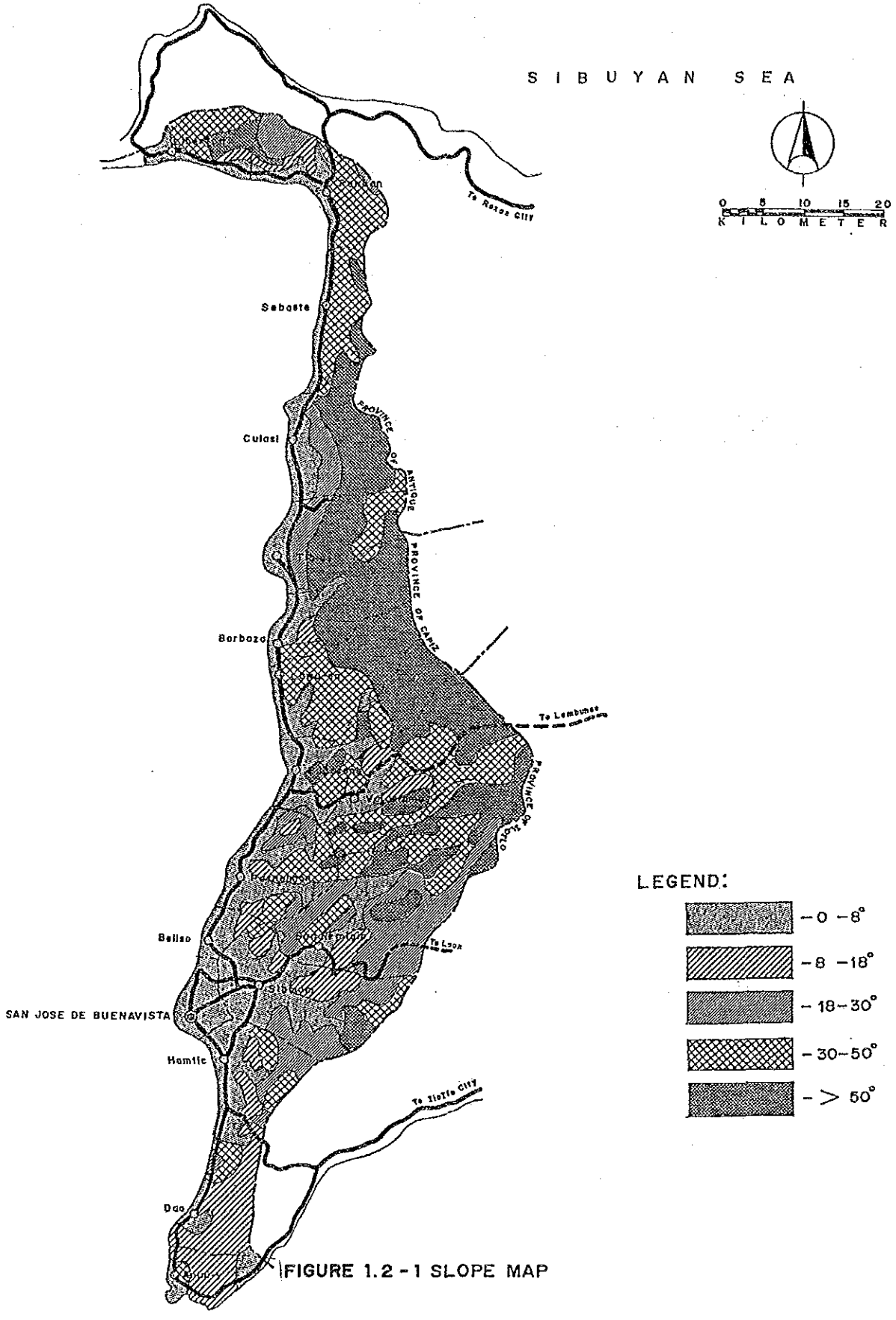


FIGURE 1.2 - 1 SLOPE MAP

Table 1.3-1

POPULATION, LAND AREA AND DENSITY (1990)
Province of Antique

	City/Municipality	Projected Population (1990)	Annual Growth Rate (%)	Land Area (km^2)	Density (p/km^2)
	1. San Jose de Buenavista	38,231	2.4	25.6	1,493.4
	2. Anini-y	17,027	2.4	55.2	308.5
	3. Barbaza	17,931	2.0	119.4	150.2
	4. Belison	10,896	2.4	37.5	290.6
	5. Bugasong	29,184	3.0	129.8	224.8
*	6. Caluya	14,918	1.0	116.8	127.7
	7. Culasi	31,084	1.9	192.2	161.7
	8. Dao	27,186	1.9	117.7	231.0
	9. Hamtic	36,779	2.6	139.6	263.5
	10. Lawa-an	23,729	2.4	207.8	114.2
	11. Libertad	12,173	2.1	76.0	160.2
	12. Pandan	25,764	2.4	137.0	188.1
	13. Patnongon	28,331	1.6	126.1	224.7
	14. San Remegio	24,263	2.4	264.9	91.6
	15. Sebaste	13,098	2.4	96.9	135.2
	16. Sibalom	44,417	2.3	246.7	180.0
	17. Tibiao	21,726	2.4	145.4	149.4
	18. Valderama	16,381	2.4	293.4	55.8
	T O T A L	433,118	2.3	2,522.0	171.7

Note: * - Island Municipality

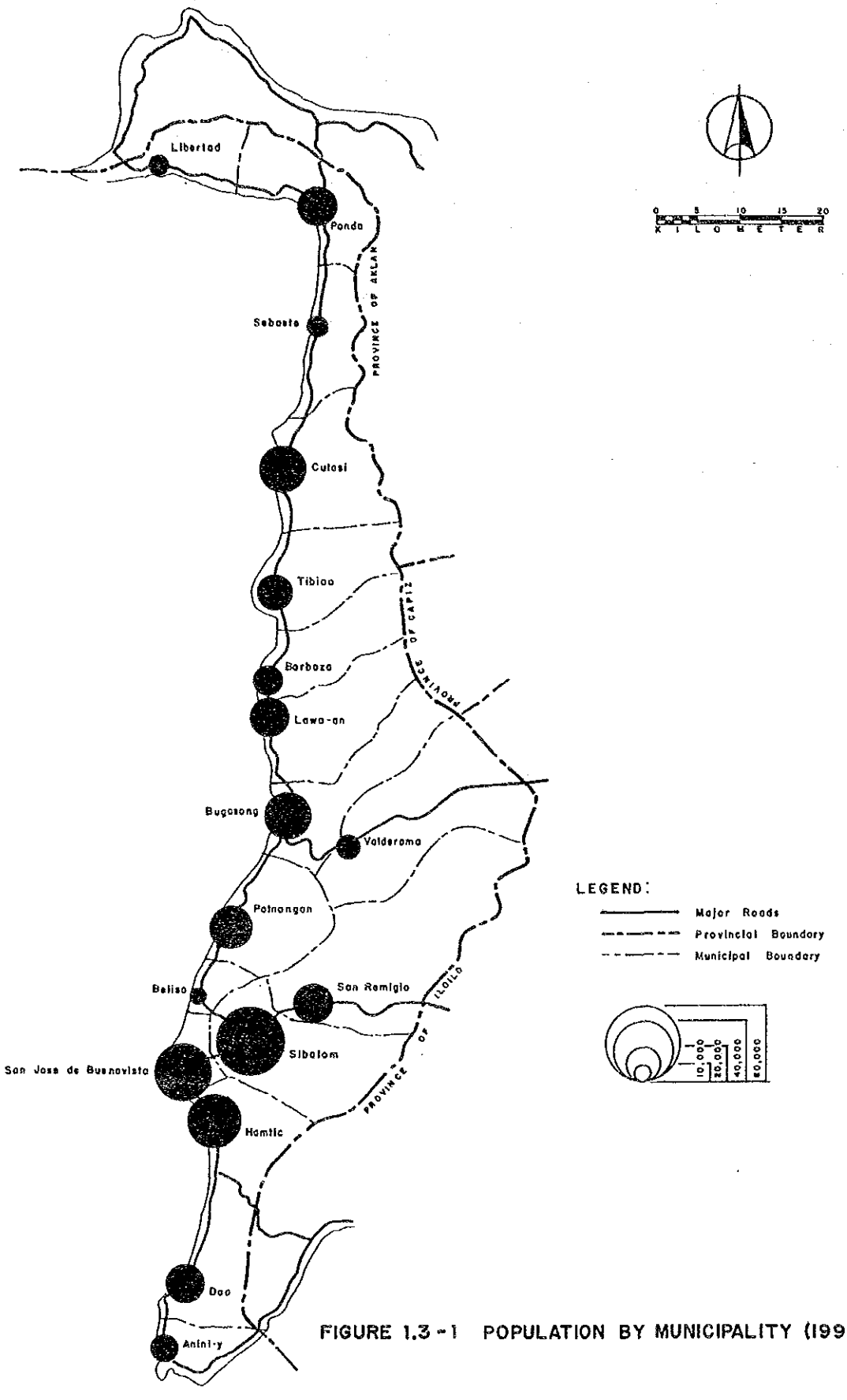


FIGURE 1.3-1 POPULATION BY MUNICIPALITY (1990)

1.4 SOCIO-ECONOMIC PROFILE

Table 1.4-1 shows major socio-economic data of the province in comparison with the national value.

Gross Regional Domestic Product which shows economic output of the province shares 0.5% of the total national output. In view of land area and population share of the province to the country, the province's economic output is in the lower level than the national average.

Per capita income of the province is much lower than the national average. Incidence of poverty is much higher than the national average. Unemployment and underemployment rates also show the higher level than the the national average. The province is one of the most depressed provinces in the country.

Agriculture is the predominant industry of the province and shares 68% in terms of number of workers.

Table 1.4-1
MAJOR SOCIO-ECONOMIC DATA OF PROVINCE OF ANTIQUE

	Antique (A)	Philippines (B)	(A)/(B)
1. Total Land Area (sq.km.)	2,552	300,000	0.009
2. Population in 1990 (1000 persons)	433	61,483	0.007
3. Population Density (persons/sq.km.)	172	205	0.84
4. GRDP (Million ₱ at 1000 prices)	3,216	623,051	0.005
5. Per Capita Income in 1985 (₱/person)	3,255	5,593	0.58
6. Number of Workers by Industrial Sector in 1980 (1000 persons)			
* Agricultural	66.5 (68%)	7,303 (51%)	0.009
* Industry	9.8 (10%)	2,177 (15%)	0.005
* Service	20.8 (21%)	4,552 (32%)	0.005
* Total 1/	98.3 (100%)	14,197 (100%)	0.007
7. Incidence of Poverty in 1985 (%)	80.1	59.3	-
8. Unemployment Rate in 1988 (%)	11.0	8.3	-
9. Underemployment Rate in 1988 (%)	13.2	11.6	-

Note: 1/ Includes other workers who cannot be classified as any one of three (3) sectors.

1.5 AGRICULTURAL LAND USE AND MAJOR CROPS

Antique has a total land area of 2,552 square kilometers, representing 0.9% of the total land area of the Philippines. Table 1.5-1 shows general land use of the province. About 42% of the province are occupied by agricultural land and about 11% by forest land.

Figure 1.5-1 illustrates the agricultural land use of the province. Table 1.5-2 shows major crops produced in the province. Five (5) major crops of the province are palay, coconut, corn, mango and banana.

Table 1.5-1
LAND USE OF ANTIQUE

Land Use	Area in sq.km.	%
Agricultural Land	1,079.4	42.8
Forest	267.3	10.6
Brush Land	300.1	11.9
Marsh/Swamp	5.1	0.2
Open Land	870.1	34.5
Total	2,522.0	100.0

Source: Socio-Economic Profile of Antique

Table 1.5-2
MAJOR CROPS OF PROVINCE OF ANTIQUE

Major Crops	Area Utilized (ha.)		Production (M.T.)	
	1985	1986	1985	1986
Palay	36,290	35,410	93,225	98,065
Coconut	-	17,940	-	15,834
Corn	3,240	4,760	1,220	1,700
Mango	2,315	2,363	807	1,182
Banana	937	1,089	9,192	9,573

Source: Bureau of Agricultural Statistics

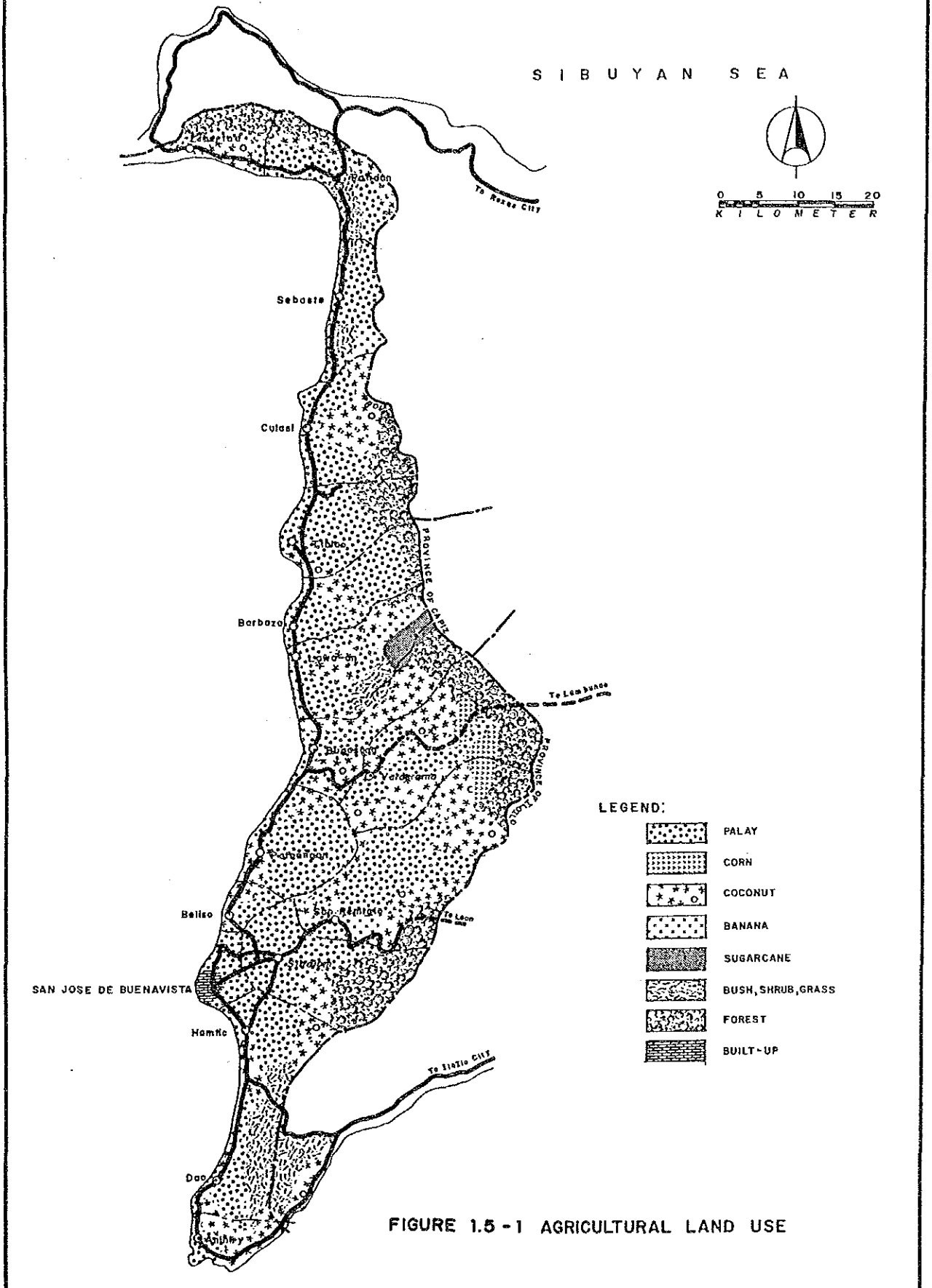


FIGURE 1.5 - 1 AGRICULTURAL LAND USE

CHAPTER 2
ROAD NETWORK OF THE PROVINCE

2.1 GENERAL

The province was classified as one of the provinces of which road network development represents the average level of the Philippines. In this Chapter, present level of road network development is assessed more in details, then general direction of the future road network development is established. Based on the said assessment and the functional road classification criteria, the major road network for the Province is proposed.

2.2 PRESENT LEVEL OF ROAD NETWORK DEVELOPMENT

Present level of the road network development level is assessed in terms of road extension (quantity of roads), surface type and conditions (quality of roads) and road network pattern.

2.2.1 Present Level of Road Development in terms of Road Extension

Antique has a total of 1,310.2 kms. of roads, comprising 362.8 kms. of National, 96.7 kms. of Provincial, 97.1 kms. of Municipal and 753.6 kms. of Barangay Roads in 1987.

Table 2.2-1 shows road density by class of road which is compared with national average. In comparison with the national average, road development level of the province in terms of road extension is summarized as follows:

National roads .....higher by 1.80 times
Provincial roads.....low at only 43%
Barangay roads.....higher by 1.14 times
All roads.....higher by 1.08 times

Although provincial roads are scarce, their function in this province is similar to feeder roads due to topographical characteristics. Therefore, provincial roads and barangay roads could be combined in order to evaluate development level of road extension. Thus, in terms of road extension, development level of this province is assessed to be in the standard level of the country.

2.2.2 Present level of Road development in terms of surface type and surface condition

The Study Team conducted an extensive field survey on the existing road conditions of which results are summarized in Table 2.2-2.

Present level of road development in terms of surface type and surface condition (quality of roads) could be summarized as follows:

National Roads

- About 20% of national roads in the Province are paved with PCC or bituminous surfaces, which level is lower than the national average of 46 %.
- About 70% of roads are maintained well and assessed in good/fair condition. most gravel roads are in poor condition.
- In terms of quality of roads, national roads in the Province are still sub-standard.

Provincial Roads

- Only 4% of provincial roads are paved with PCC or bituminous surfaces, which is far below the national average of 11%.
- About 62% of provincial roads were assessed in good/ fair condition
- Provincial roads are also in low level.

TABLE 2.2-1
EXISTING ROAD LENGTH AND ROAD DENSITY
Province of Antique

Road Class	Road Length In 1987 (kms.)	Road Density (L/ PA)		
		Antique	Philippines	Antique/Phils
National Rd.	362.8 (27.7)	0.3587	0.1994	1.80
Prov'l. Rd.	96.7 (7.4)	0.0956	0.2211	0.43
Sub-Total	459.5 (35.1)	0.4543	0.4205	1.08
City Rd.	- -	-	0.0304	-
Municipal Rd	97.1 (7.4)	0.0960	0.0981	0.98
Barangay Rd.	753.6 (57.5)	0.7450	0.6536	1.14
TOTAL	1,310.2(100.0)	1.2953	1.2026	1.08

*SOURCE: DPWH Infrastructure Atlas, 1989

TABLE 2.2-2
EXISTING SURFACE CONDITION (SURVEYED ROADS ONLY)
Province of Antique

Road Class	Pavement Type	Surface Condition 1/			% of Pavement Type 2/	
		Good/Fair	Bad/Very Bad	Total (%)	Antique	Phils.
National Road	PCC	21.6(100.0)	- -	21.6 (100.0)	6.6	23.6
	Bituminous	94.6 (97.5)	2.4 (2.5)	97.0 (100.0)	13.6	22.3
	Gravel	115.1 (54.0)	97.9 (46.0)	213.0 (100.0)	79.8	51.3
	Earth	- -	- -	- (100.0)	-	2.8
	Total:	231.3 (69.8)	100.3 (30.2)	331.6 (100.0)	100.0	100.0
Provincial Road	PCC	0.9(100.0)	- -	0.9 (100.0)	1.2	2.5
	Bituminous	4.0(100.0)	- -	4.0 (100.0)	3.0	8.9
	Gravel	42.9 (59.6)	29.1 (40.4)	72.0 (100.0)	95.8	70.6
	Earth	- -	- -	- (100.0)	-	18.0
	Total:	47.8 (62.2)	29.1 (37.8)	76.9 (100.0)	100.0	100.0
National and Provincial Road	PCC	22.5(100.0)	- -	22.5 (100.0)	5.5	12.5
	Bituminous	98.6 (97.6)	2.4 (2.4)	101.0 (100.0)	11.4	15.3
	Gravel	158.0 (55.4)	127.0 (44.6)	285.0 (100.0)	83.1	- 61.4
	Earth	- -	- -	- (100.0)	-	10.8
	Total:	279.1 (68.3)	129.4 (31.7)	408.5 (100.0)	100.0	100.0

SOURCE: 1/ Survey by Study Team in 1989
2/ DPWH Infrastructure Atlas, 1989

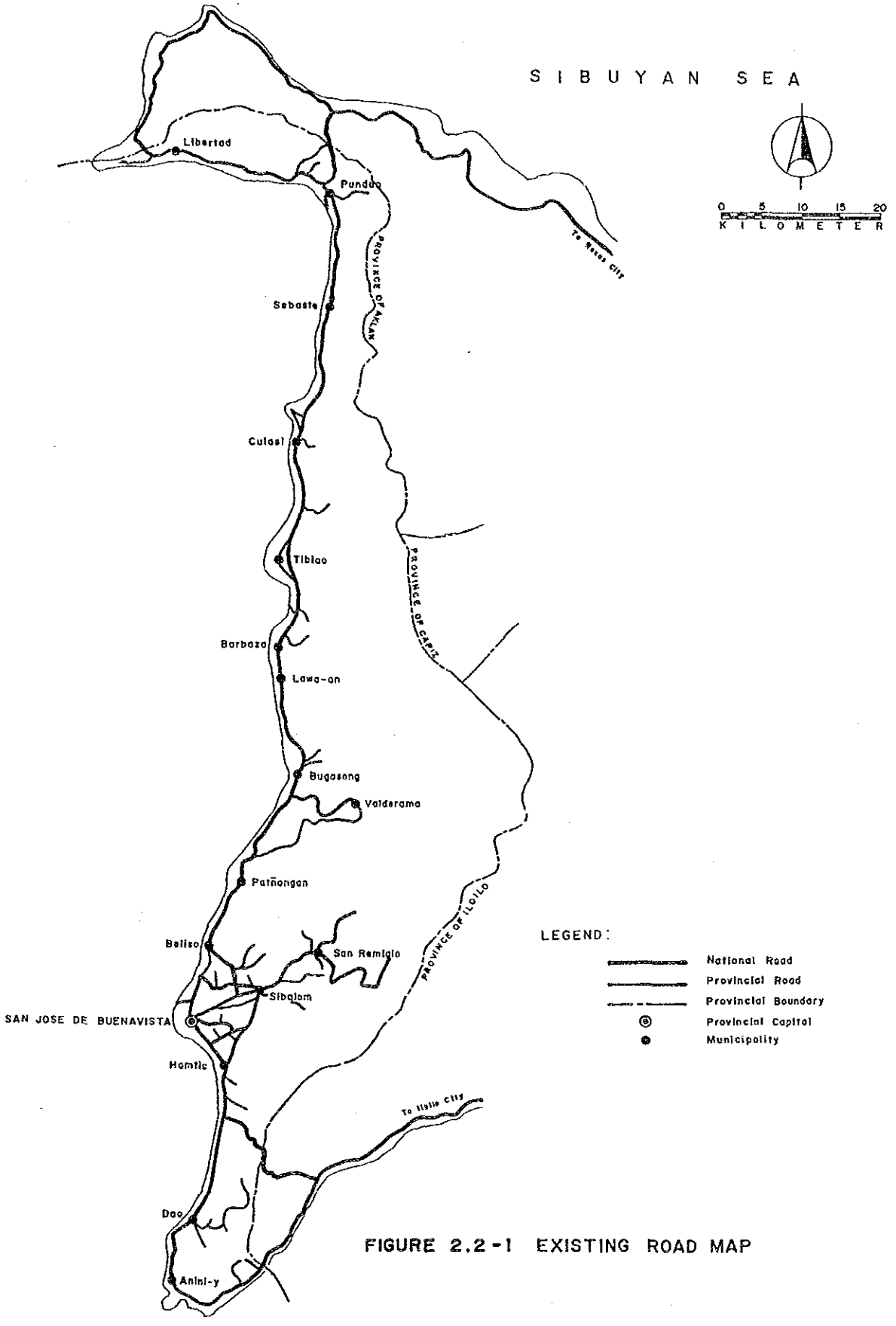


FIGURE 2.2-1 EXISTING ROAD MAP

2.2.3 Present Road Network Pattern

Present road network is presented in Figure 2.2-1, which shows all existing national and provincial roads. Present road network of the Province is assessed as follows:

- Comb type road network pattern is formed and axis of the network is the national road running along the west coast line.
- Accesses with adjacent provinces are provided only at the northern and southern tips of the Province.
- All the municipal towns are accessed by a national road.

2.3 GENERAL DIRECTION OF ROAD NETWORK DEVELOPMENT

Results of assessment of present road network development level are summarized as follows:

- In terms of road extension, development level of the province is in the standard level of the country.
- In terms of surface type and conditions, both national and provincial roads are still in low level, particularly type of pavement.
- Basic road network is formed.

Based on the above assessment, general direction of road network development of the Province will be as follows:

(1) First priority will be upgrading of pavement type of national roads.

(2) Second priority will be improvement of provincial and barangay roads.

(3) Due to topographical characteristics, roads are intersected by many rivers and most bridges over these rivers are still temporary bridges. Construction of permanent bridges along the national roads should be given priority.

(4) Due to topographical constraints, new links connecting neigbouring province will be difficult to justify.

2.4 PROPOSED MAJOR ROAD NETWORK

2.4.1 Procedure

To identify major roads, all existing roads are firstly classified in accordance with the functional road classification criteria which is shown in Table 2.4-1. Functional classification groups roads according to importance and quality of services they are intended to provide. Individual road links of similar importance and quality of services are organized into systems so that a road network in accordance with the hierarchy of functions can be planned and formed. They can be efficiently managed with consistent policies, design and operation.

After identification of existing major roads, necessity of additional new links is assessed. For example, if a certain municipal town has no access, a new major road is added to the existing major road network. Thus, the initial major road network is proposed and subjected to evaluation whether the proposed one is well-balanced or not. Evaluation is made by two (2) indicators as follows:

a) Network Value

$$Nv = \frac{L}{\sqrt{PA}}$$

Where: Nv = Network Value
L = Road length delineating a block
P = Population in a block
A = Land Area in a block
Block= Area delineated by major roads

b) Accessibility

Accessibility $AC = \sum pl$

Average Accessibility $A\ ave = \frac{\sum pl}{P}$

Where
p = Population of a Barangay
l = Distance from a barangay center to respective major road
P = Total population in a block

If indicators of some blocks show imbalanced value, additions or deletions of major road links are made until indicators show almost balanced values. After these adjustment, the major road network is finally proposed.

Table 2.4-1 Proposed Functional Road Classification Criteria for Rural Road Network

Functional Classification		General Definition	General Characteristics and Services Provided	Relationship with Administrative Classification				
				National Road	Provincial Road	City Road	Municipal Road	Barangay Road
Major Road	Primary Major Road	. Major inter-provincial roads. . Intra-provincial roads linking two (2) or more municipal towns to the Provincial Capital . Intra-provincial roads which form a skelton road network of a province	. Provides the highest level of service at the high speed for the long uninterrupted distance . Serves for long distance trips . Mobility is given the highest consideration	●				
	Secondary Major Road	. Roads linking municipal towns each other . Roads linking a municipal town to the Provincial Capital . Roads linking one (1) or more municipal towns to the primary major road network	. Provides high level of service . Serves for medium distance trips . Mobility is given high consideration	●	●	●		
Minor Road	Collector Road	. Roads linking secondary major roads each other or a primary road with a secondary road . Roads linking two (2) or more barangays to the municipal town or to the higher level network	. Provides rather low level of mobility . Serves for short distance trips . Collects traffic from feeder roads and connects them with major roads . Mobility and land access		●	●		●
	Feeder Road	. Roads linking one or more barangays centers to the higher level network . Roads linking farm areas to their respective barangay centers or to the higher level network	. Primarily provides access to abutting land with little or no through traffic . Serves for local traffic . Land access is given high			●		●
	S t r e e t	. Roads within built-up population centers (Poblacion) with essentially urban rather than rural rural functions	. Primarily provides access to abutting land in urban areas . Through traffic usage discouraged			●	●	

NOTE: Relationship between functional classification and administrative classification gives only general guideline, therefore, some national roads may be classified as minor roads, or some barangay roads may be classified as major roads.

2.4.2 Proposed Major Road Network

The major road network for the Province of Antique was proposed as shown in Figure 2.4-1. For establishing the major road network, the following were taken into consideration:

- Present network pattern of comb type was based to formulate the major road network.
- Due to topographical constraints, it is judged that it is still premature to construct another inter-provincial links, however, two (2) links which connect with Lambunao and Leon in Iloilo Province were included in the major road network for future development.
- One road which is currently barangay road located between Tibiao and Culasi was included in the major road network in order to formulate better balanced network.

Network value and accessibility of each block were computed to evaluate whether the proposed major road network is a balanced one. Based on these values, addition or deletion of road links was made and finally the major road network was proposed as shown in Figure 2.4-1.

Network value and accessibility of the proposed major road network are presented in Table 2.4-2.

Proposed major road network has a total length of 360.4 kms. and composed of the following roads:

National Road	354.4 kms.	(98% of total national roads)
Provincial Road	-	
Barangay Road	6.0 kms.	

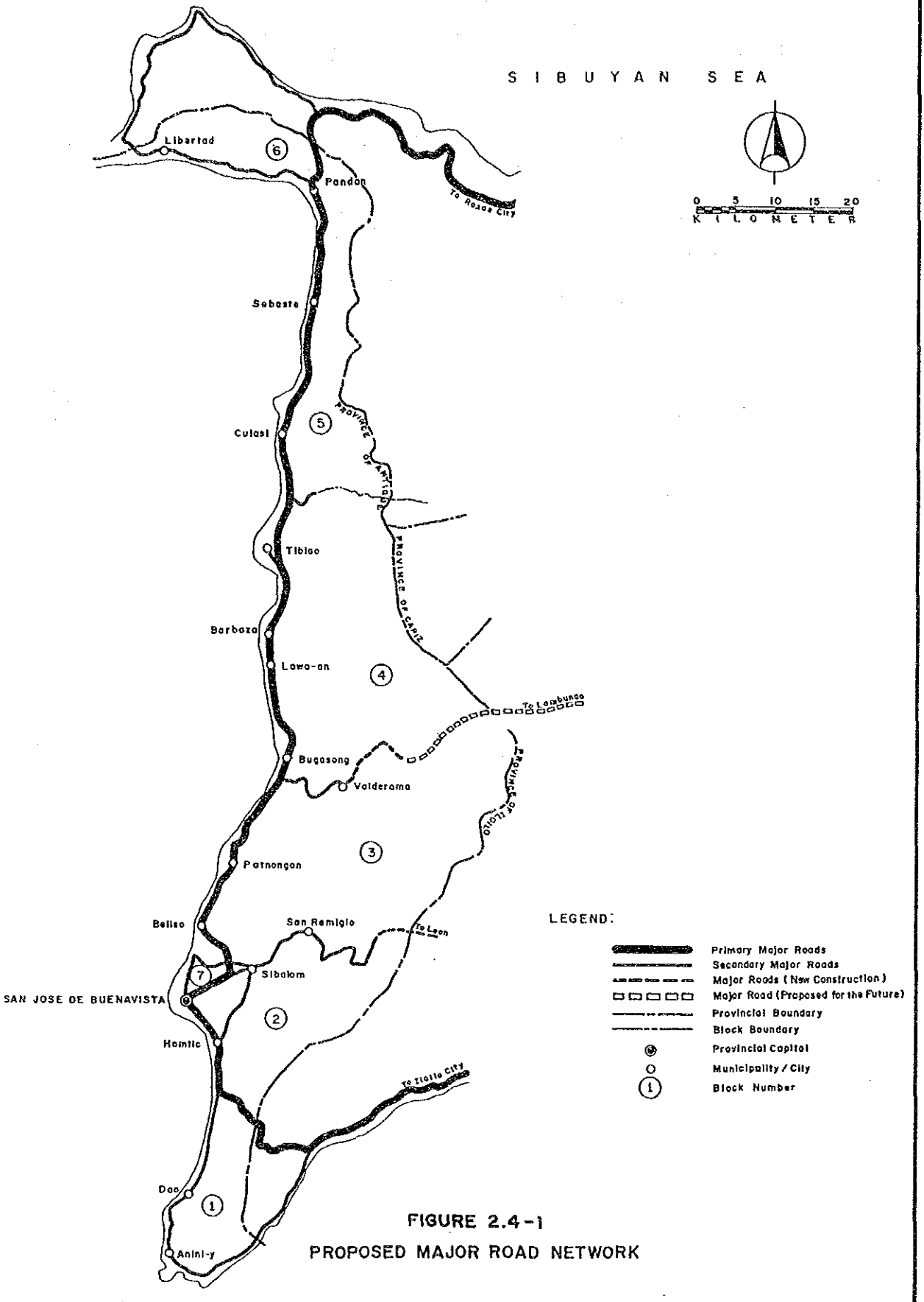


FIGURE 2.4-1
PROPOSED MAJOR ROAD NETWORK

Table 2.4-2

NETWORK VALUE/ACCESSIBILITY
Province of Antique

Block No.	Population (1990)	Land Area (km^2)	Road Length (km)	Network Value	Access (p.km)	Average Access. (km.)
1	47,712	192.85	54.1	0.564	64,379	1.349
2	72,235	434.66	73.8	0.416	130,469	1.806
3	78,139	737.53	131.4	0.547	170,371	2.180
4	84,677	556.73	61.2	0.282	157,544	1.861
5	46,556	353.63	58.9	0.459	48,728	1.047
6	18,730	161.23	35.5	0.646	13,144	0.702
7	29,232	39.38	16.1	0.475	17,563	0.601
Ave.	53,897	353.72	61.6	0.446	86,028	1.596

CHAPTER 3
TRAFFIC

3.1 TRAFFIC SURVEY RESULTS

Roadside traffic count survey was conducted on selected roads. Traffic counts were carried out on two (2) consecutive days for 12 hours from 6:00 AM to 6:00 PM each day. Traffic volume was counted by direction and by vehicle type every hour. The vehicle type was classified as follows:

- Car
- Jeep
- Van
- Jeepney
- Bus (mini bus & large bus)
- Truck (including trailer)
- Motor-tricycle
- Motorcycle
- Animal drawn
- Pedestrian
- Others

Figure 3.1-1 shows the location of traffic count stations. Traffic survey results are summarized in Table 3.1-1.

Survey results were converted to Average Daily Traffic (ADT) by using the hourly factors based on the data from the Nationwide Traffic Counts Program (NTCP). Considering other factors such as market days, harvest season, rainy season, etc., AADT were estimated by vehicle type.

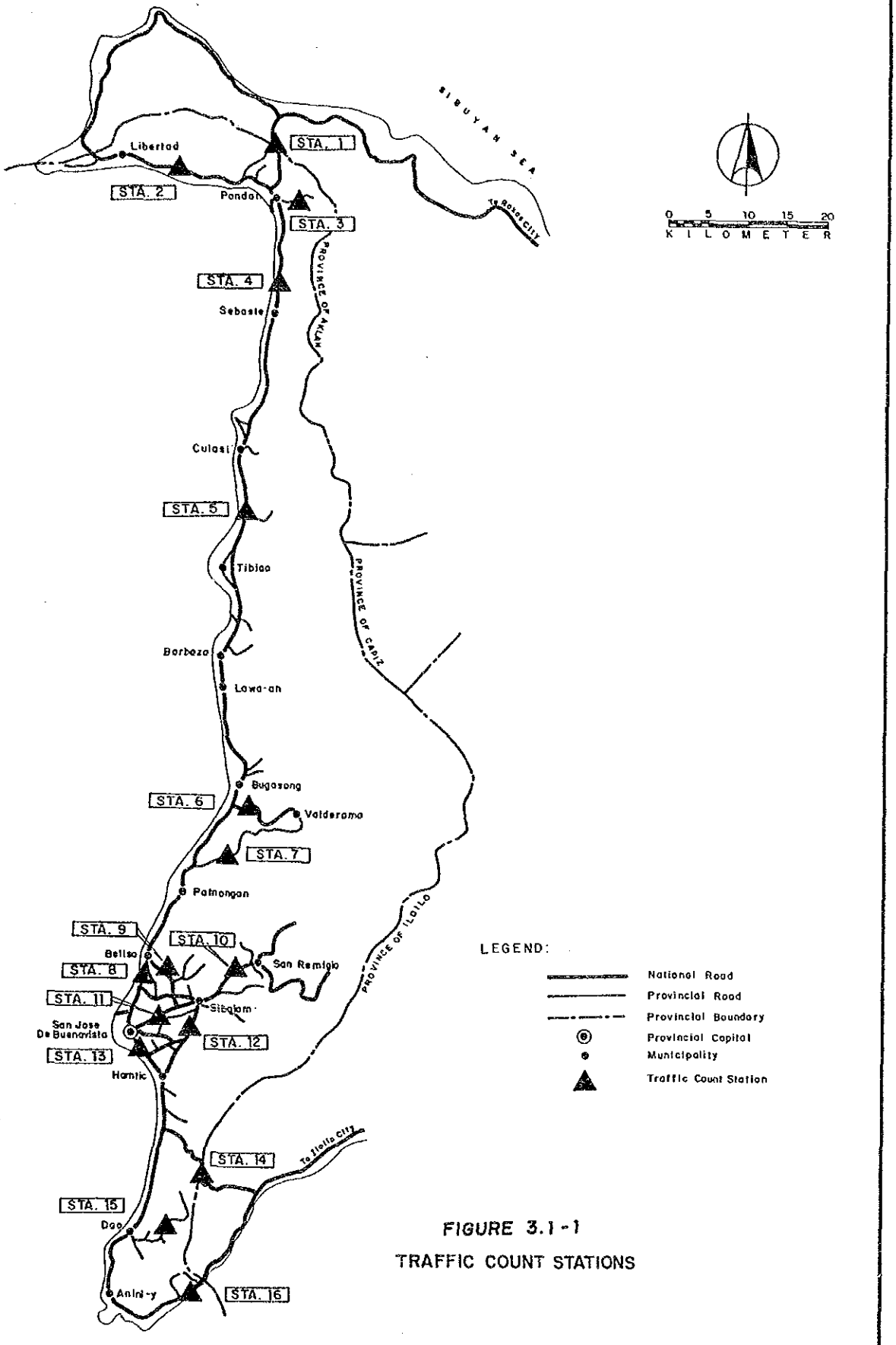


FIGURE 3.1-1

TRAFFIC COUNT STATIONS

TABLE 3.1-1 SUMMARY OF TRAFFIC SURVEY RESULTS
- ANTIQUE -

(ADT as of May, 1990)

Station No.	Car	Jeep	Pickup /Van	Jeepney	Bus	Truck	Sub-Total	Tri-cycle	Motor-cycle	Animal Drawn	Total
1	4	14	15	66	18	14	132	76	69	0	277
2	3	8	1	30	6	4	53	89	81	0	223
3	0	8	1	1	0	3	14	102	66	0	182
4	3	18	14	21	11	11	77	69	51	0	197
5	6	18	36	55	18	15	148	48	76	0	273
6	0	10	6	50	2	6	74	29	46	2	151
7	0	8	2	46	2	1	60	7	29	1	96
8	36	44	24	132	1	41	278	298	167	2	746
9	80	50	55	464	24	45	718	208	160	2	1088
10	2	28	1	230	1	13	276	41	100	0	417
11	79	97	242	854	51	131	1455	526	418	0	2399
12	8	20	20	31	0	46	125	176	62	0	363
13	104	118	198	230	66	86	802	1663	526	0	2991
14	48	39	84	57	65	68	361	1	11	1	374
15	2	5	11	8	7	3	36	136	34	3	210
16	1	16	10	1	17	6	50	39	19	0	107

Source: Traffic Survey by Study Team (May, 1990)

3.2 TRAFFIC ANALYSIS AND FORECAST: TRAFFIC PROJECTS.

3.2.1 Analysis of Present Traffic

1) General Procedure

Present traffic on each major road network was analyzed according to the procedure shown in Figure 3.2-1.

The analysis is divided into three major steps:

Step I : Analysis of Traffic Survey Results

The number of passengers and commodity tonnage were obtained from the results of the traffic survey. These data are, however, available only on the surveyed road links and used for calibration purposes for the traffic model described below.

Step II : Analysis by Traffic Model

Traffic generation and attraction, in terms of passengers and commodity tons, were estimated based on population and per capita traffic generation factors; traffic distribution (OD distribution) was estimated by the gravity model; then, OD distribution was assigned to the major road network expressed by the node and link system. In the analysis, since only traffic generation factors were unknown, assumed values were used in the first step.

Step III : Comparison of Both Figures

The number of passengers and commodity tonnage estimated by the traffic model were compared with those derived from the traffic survey. On the basis of the comparison, traffic generation factors were appropriately adjusted and the traffic model analysis was reiterated until the traffic model reflected the actual people and freight movements with a high accuracy.

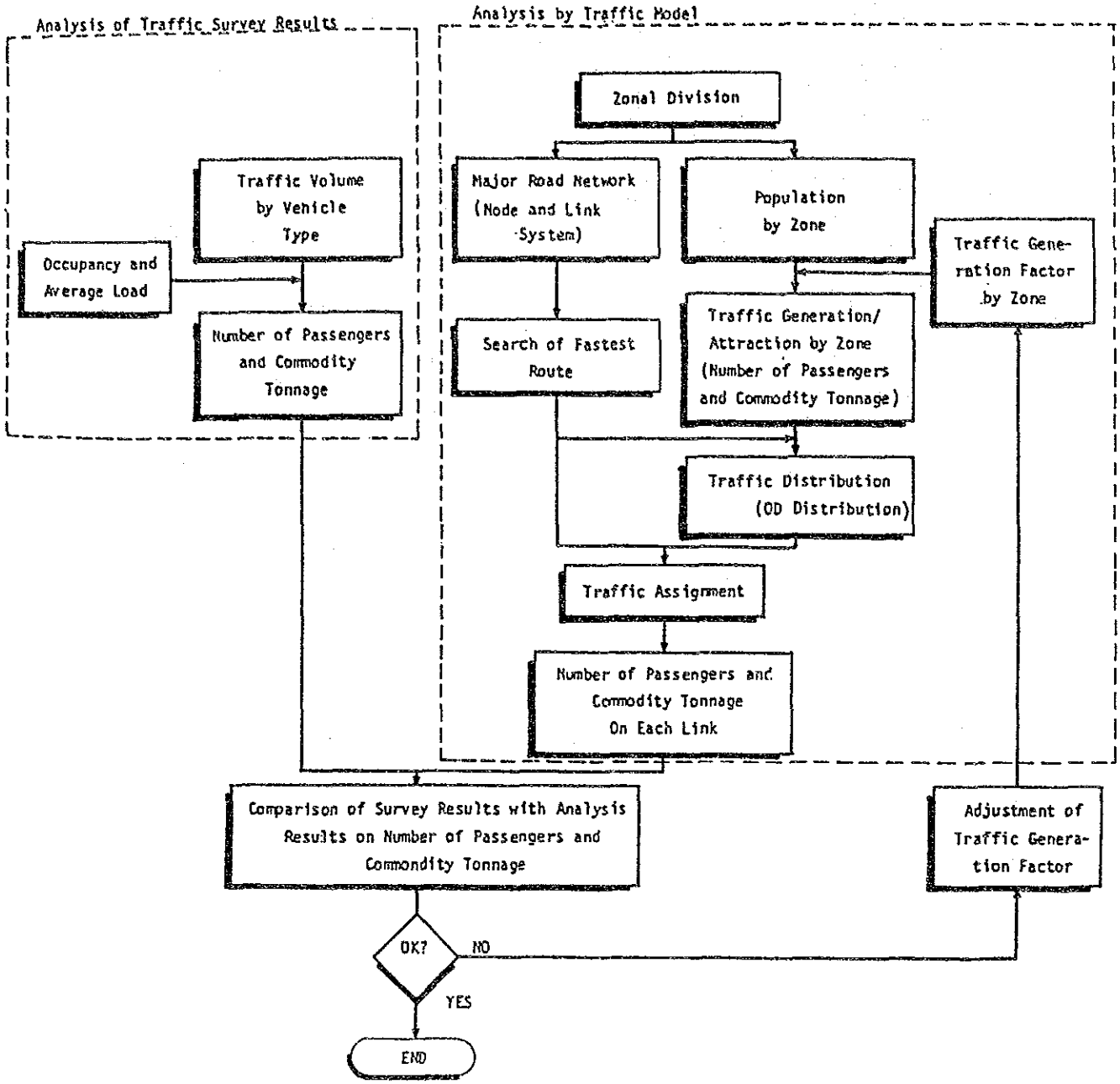


FIGURE 3.2-1
PROCEDURE OF ANALYSIS OF PRESENT TRAFFIC ON MAJOR ROAD NETWORK

2) Analysis of Traffic Survey Results

Traffic volume by vehicle type counted in the traffic survey was converted to number of passengers and commodity tonnage using the occupancy and average load shown in Table 3.2-1.

Table 3.2-1 OCCUPANCY AND AVERAGE LOAD
Province of Antique

	Average Number of Passenger per vehicle	Average Load (ton per vehicle)
Car/Taxi	3.40	1.00
Jeep	3.40	1.00
Van/Pickup	3.40	1.00
Jeepney	11.80	1.00
Bus	25.30	1.00
Truck	5.00	3.00
Motor-tricycle	2.90	0.30
Motorcycle	1.60	0.10
Animal Drawn	3.00	0.15

3) Analysis by Traffic Model

i) Zonal Division:
The province was divided into traffic zones corresponding to municipal divisions in principle.

ii) Major Road Network:
The major road network was expressed by a node and link system. Each link was given length and average speed according to the actual road condition. A node and link system of the Province is presented in Figure 3.2-2.

iii) Search for the Fastest Route:
The fastest route for each zone pair was calculated by Moore's Method.

iv) Traffic Generation Factor:
Per capita traffic generation factors (trip/person/day and ton/person/day) vary between zones even in the same province with many factors such as:

- Economic Activity
- Size of Population
- Distance from Provincial Capital
- Road Condition
- Other Physical Conditions

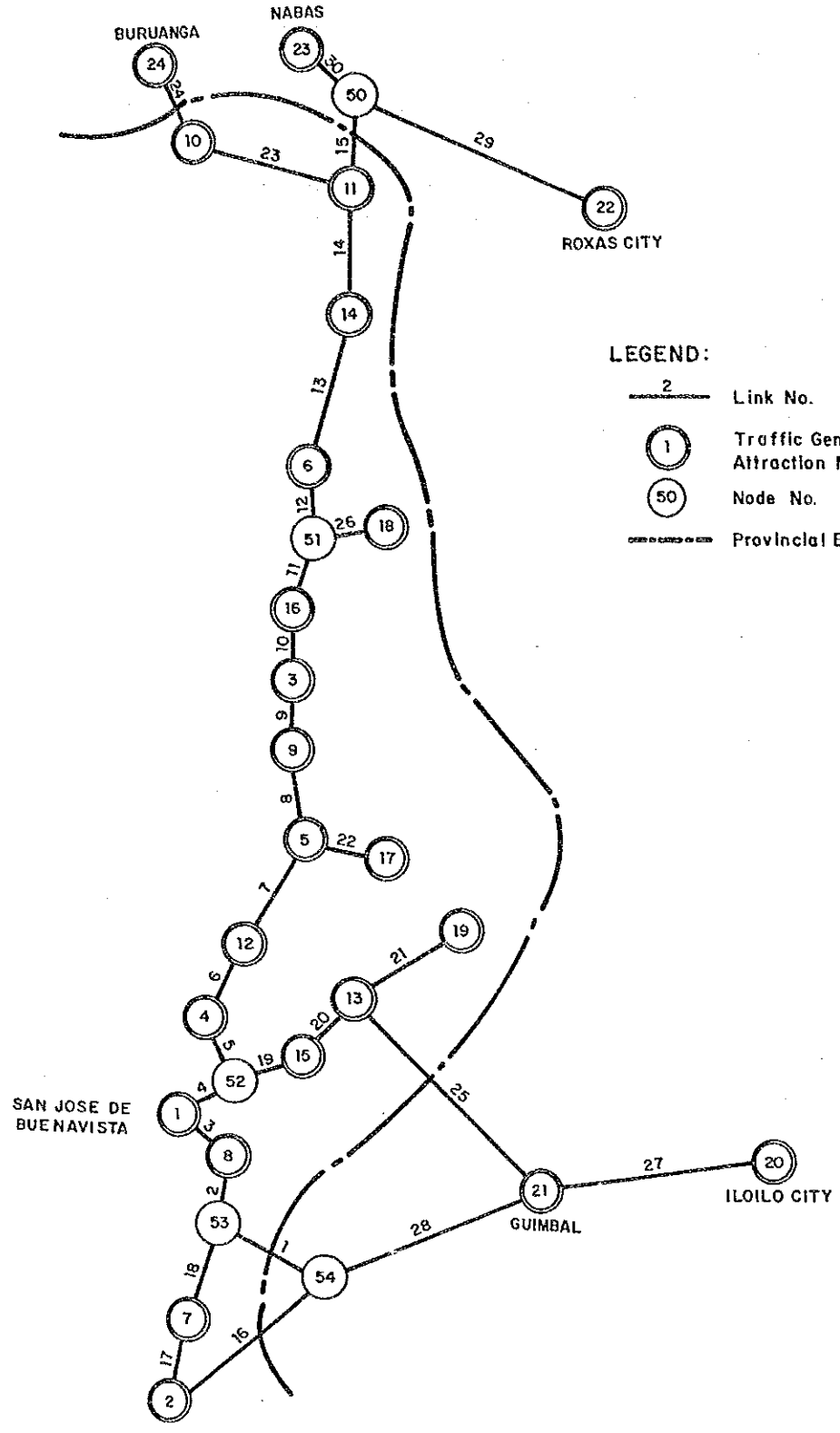


FIGURE 3.2-2 LINK / NODE SYSTEM
PROVINCE OF ANTIQUE

The generation factors which best illustrate the observed people and freight movement were estimated by the iterative method. The traffic generation factors thus estimated are summarized in Table 3.2-2.

TABLE 3.2-2 PER CAPITA TRAFFIC GENERATION FACTORS (MAJOR ROAD, 1990 W/O) Province of Antique

	Passenger Movement (trip/person/day)	Commodity (kg/person/day)
Range	0.014 - 0.147	3.3 - 16.4
Mean Value	0.071	8.2

v) Traffic Generation and Attraction by Zone:

Traffic generation and attraction were obtained in terms of passengers and commodity tonnage as the product by generation factors.

vi) Traffic Distribution:

Traffic distribution (OD distribution) was estimated by the gravity model:

$$Xij = k\frac{Gi.Aj}{tiJ^2}$$

Where, Xij = Traffic from zone i to zone j
k = Parameter
Gi = Traffic generation in zone i
Aj = Traffic attraction in zone j
tij = Travel time from zone i to zone j along the fastest route

OD distribution was adjusted so as to satisfy the following conditions by the Frator Method:

$$Gi = \sum_{j+1}^{n} Xij$$

$$Aj = \sum_{i+1}^{n} Xij$$

Where, n = Number of zones

vii) Traffic Assignment:

Each OD traffic was assigned to the major road network expressed by the node and link system on an all-or-nothing basis. Thus, the number of passengers and commodity tonnage for each link were calculated.

3.2.2 Traffic Forecast

Figure 3.2-3 illustrates the procedure of traffic forecast.

The traffic model prepared for the analysis of present traffic was basically used for forecasting future traffic on the major road network with the following additions/ modifications:

1) Major Road Network and Fastest Route Search

The node and link system for the "with" case was prepared by changing the characteristics of the links included under this feasibility study as well as the links committed to be improved.

The fastest route search was carried out both in the "w/o" and "with" case networks.

2) Traffic Generation/Attraction and Distribution

The future population was based on the NCSO 1980 Census of Population and Housing.

Per capita traffic generation factors in the "with" case were estimated referring to the generated transport demand/transport cost reduction elasticity shown in "Highway Planning Manual, Volume 3, MPWH" and also based on the results of the analysis of present traffic. For instance, a zone showing a small generation factor at present due to poor road conditions is expected to increase the factor to some extent by road improvement, and the degree of increase can be estimated referring to other zones in similar situations but with better road conditions.

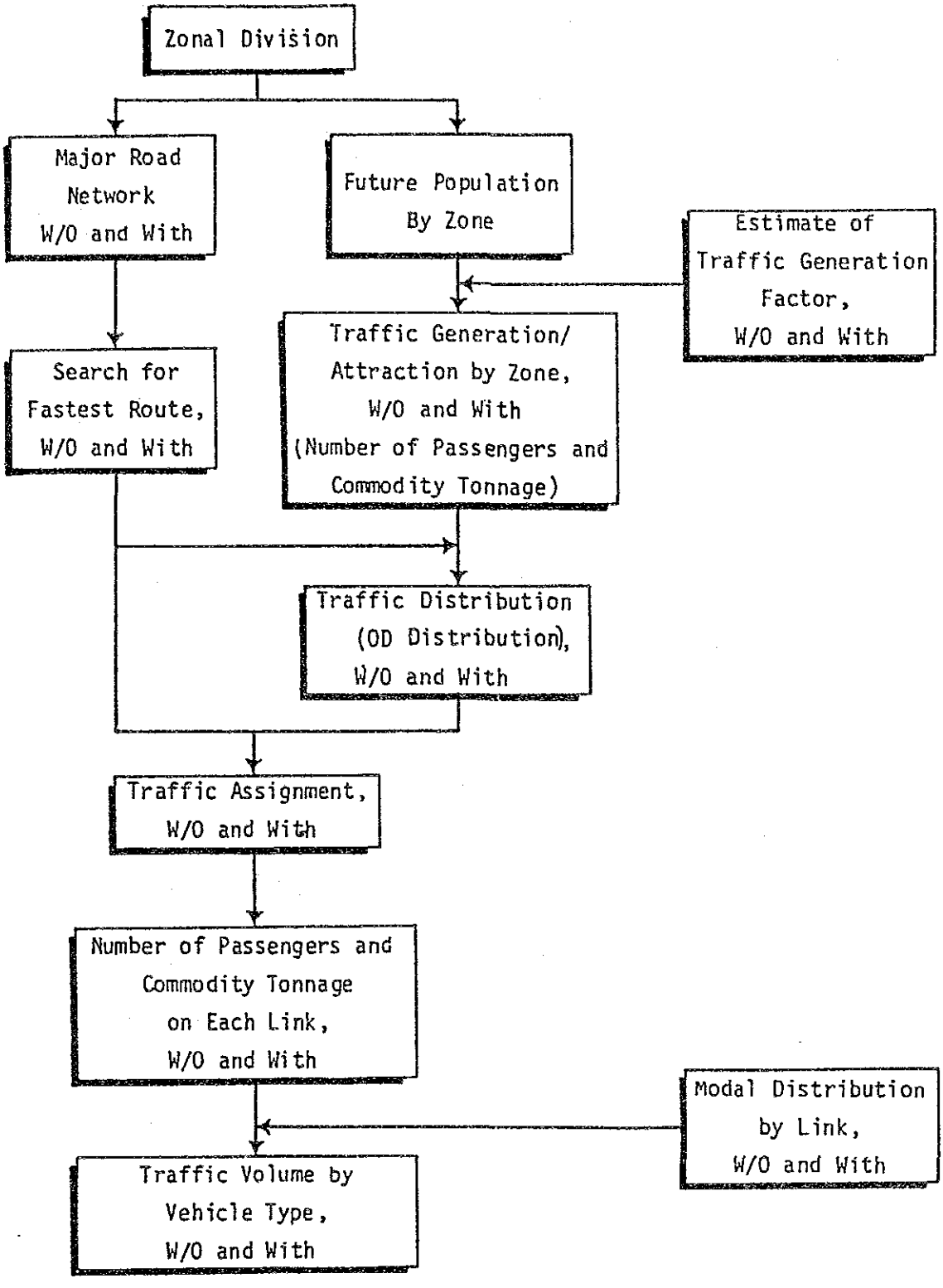


FIGURE 3.2-3
PROCEDURE OF FORECASTING TRAFFIC ON MAJOR ROAD NETWORK

The traffic generation factors thus estimated are summarized in Table 3.2-3.

TABLE 3.2-3 PER CAPITA TRAFFIC GENERATION FACTORS (MAJOR ROAD, 1990 WITH) Province of Antique

	Passenger Movement (trip/person/day)	Commodity (kg/person/day)
Range	0.014 - 0.147	3.3 - 16.4
Mean Value	0.073	8.4

The transition period, i.e., the period which will elapse after opening of the improved road before the full impact on generation will take place, was assumed to be three years.

Traffic distribution for the "with" case was estimated by the same method as used in the analysis of present traffic.

3) Traffic Assignment

The number of passengers and commodity tonnage on each link in the "with" case was estimated by assigning OD traffic to the major road network in the "with" case. They were converted to the number of vehicles using the modal distribution in the "with" case. Changes in modal distribution with changes in road condition were estimated reffering to the present distribution in other road links in a similar situation but in the road condition. The transition period of a complete change in modal distribution was assumed to be three years.

The traffic in the "with" case was broken down into following four categories for convenience of traffic benefit estimation:

Normal Traffic: Flow of passengers and freight which will occur even without road improvement. However, changes in the number of vehicles is possible due to changes in modal distribution.

Diverted Traffic-1: Traffic which diverts to a certain road from other routes as a consequence of road improvement. This is usually called simply diverted traffic.

Diverted Traffic-2: Traffic which changes destination as a consequence of road improvement but for the same trip purpose as in the "w/o" case. This is possible in the case of improvement of the access road to the nearest town which is at present barely accessible due to poor conditions. This traffic is called "Diverted Traffic-2" in this Study, distinguished from Diverted Traffic-1.

Generated Traffic: Increased traffic brought about by road improvement.

3.2.3 Estimated Present and Future Traffic

Estimated present and future traffic on the major road is illustrated in Figure 3.2-4 and Figure 3.2-5, respectively.

Estimated present and future movements of passengers and commodity by link are presented in Table 3.2-4, and estimated traffic volumes are presented in Table 3.2-5.

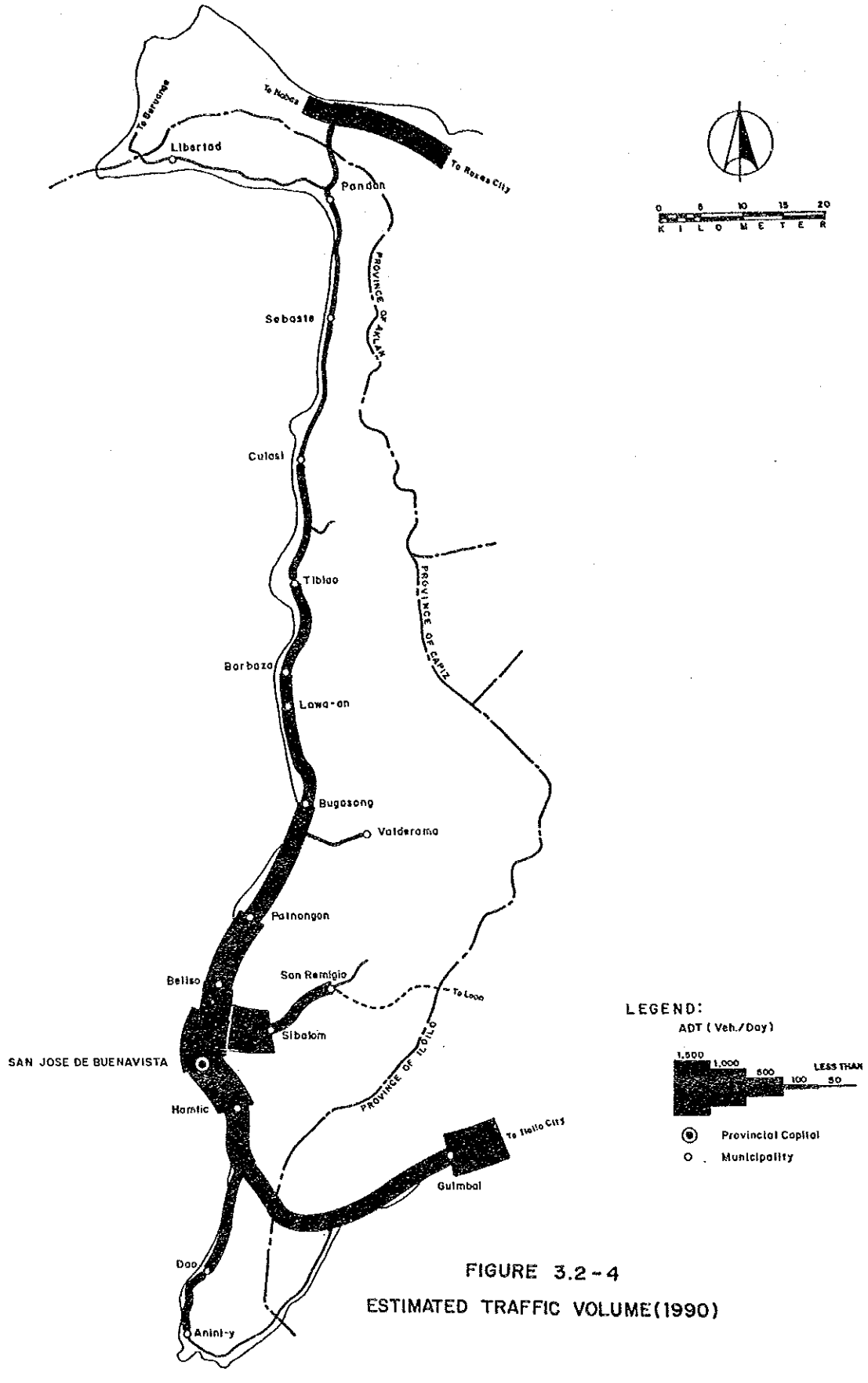


FIGURE 3.2-4

ESTIMATED TRAFFIC VOLUME(1990)

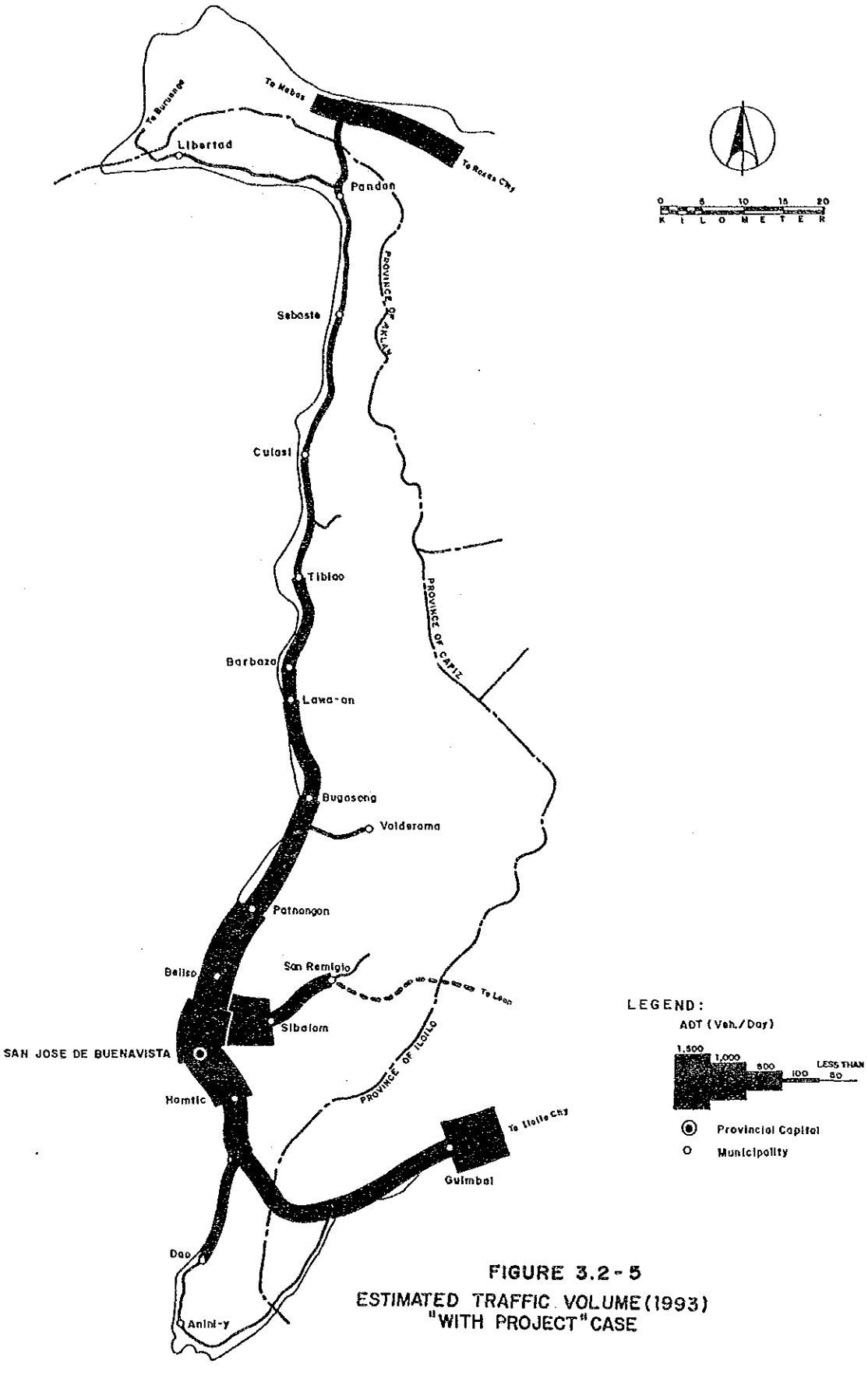


FIGURE 3.2-5
ESTIMATED TRAFFIC VOLUME (1993)
"WITH PROJECT" CASE

TRAFFIC PROJECTION ANTIQUE

TABLE 3.2 - 4 (1)

Movement of Passengers and Commodity

Link	Year	Number of Passengers					Commodity Tonnage				
		Normal	Diver-ted-1	Diver-ted-2	Gene-rated	Total	Normal	Diver-ted-1	Diver-ted-2	Gene-rated	Total
	1990	3912				3912	376.28				376.28
	1993	4565	-516	-61	-	3988	428.07	-49.64	-3.65	-	374.79
1	1997	5510	-636	-74	-	4899	508.50	-59.14	-4.36	-	445.00
	2007	9075	-1034	-118	-	7923	757.08	-88.52	-6.58	-	661.98
	2017	14195	-1621	-181	-	12393	1091.24	-127.97	-9.92	-	953.34
	1990	4739				4739	483.22				483.22
	1993	5543	-516	-58	41	5010	549.97	-49.64	-3.88	2.63	499.08
2	1997	6830	-636	-71	149	6272	653.66	-59.14	-4.65	9.20	599.07
	2007	11132	-1034	-115	226	10210	974.38	-88.52	-7.03	13.08	891.91
	2017	17538	-1621	-178	334	16073	1405.54	-127.97	-10.53	17.96	1285.00
	1990	5934				5934	630.41				630.41
	1993	6966	-516	-48	41	6442	719.85	-49.64	-3.47	2.63	669.37
3	1997	8628	-636	-60	149	8081	859.31	-59.14	-4.15	9.20	805.22
	2007	14232	-1034	-96	226	13328	1293.14	-88.52	-6.25	13.08	1211.45
	2017	22665	-1621	-150	334	21228	1879.09	-127.97	-9.34	17.96	1759.74
	1990	7623				7623	826.06				826.06
	1993	8939	-516	-49	41	8415	941.51	-49.64	-3.76	2.63	890.74
4	1997	11054	-636	-60	149	10506	1121.06	-59.14	-4.51	9.20	1066.61
	2007	18175	-1034	-99	226	17268	1677.35	-88.52	-6.83	13.08	1595.09
	2017	28875	-1621	-156	334	27431	2425.56	-127.97	-10.17	17.96	2305.38
	1990	4762				4762	514.87				514.87
	1993	5564	-	-60	41	5545	584.60	-	-5.21	2.63	582.02
5	1997	6850	-	-75	149	6924	692.77	-	-6.25	9.20	695.71
	2007	11167	-	-123	226	11270	1027.03	-	-9.53	13.08	1030.58
	2017	17643	-	-195	334	17781	1476.21	-	-14.21	17.96	1479.96
	1990	4548				4548	492.06				492.06
	1993	5295	-	-56	41	5281	556.63	-	-4.87	2.63	554.39
6	1997	6489	-	-69	149	6568	656.36	-	-5.87	9.20	659.70
	2007	10470	-	-115	226	10581	962.69	-	-9.01	13.08	966.76
	2017	16411	-	-184	334	16561	1372.24	-	-13.50	17.96	1376.70
	1990	2871				2871	308.04				308.04
	1993	3382	-	-62	41	3362	352.70	-	-5.99	2.63	349.33
7	1997	4211	-	-77	149	4283	422.60	-	-7.19	9.20	424.61
	2007	7028	-	-128	226	7127	641.52	-	-10.91	13.08	643.69
	2017	11307	-	-204	334	11437	939.20	-	-16.12	17.96	941.04
	1990	2067				2067	220.71				220.71
	1993	2435	-	-33	41	2444	252.61	-	-3.40	2.63	251.84
8	1997	3031	-	-40	149	3139	302.51	-	-4.04	9.20	307.67
	2007	5053	-	-66	226	5214	458.50	-	-6.02	13.08	465.56
	2017	8122	-	-104	334	8351	670.19	-	-8.85	17.96	679.30

TRAFFIC PROJECTION ANTIQUE

TABLE 3.2 - 4 (2)

Movement of Passengers and Commodity

Link	Year	Number of Passengers					Commodity Tonnage				
		Normal	Diverted-1	Diverted-2	Generated	Total	Normal	Diverted-1	Diverted-2	Generated	Total
9	1990	1970				1970	210.53				210.53
	1993	2309	-	-27	41	2324	239.69	-	-2.93	2.63	239.39
	1997	2855	-	-33	149	2971	285.00	-	-3.47	9.20	290.73
	2007	4691	-	-54	226	4863	425.13	-	-5.14	13.08	433.07
	2017	7449	-	-85	334	7698	613.48	-	-7.55	17.96	623.89
10	1990	1593				1593	167.51				167.51
	1993	1870	-	-25	41	1886	190.97	-	-2.80	2.63	190.79
	1997	2316	-	-31	149	2434	227.48	-	-3.31	9.20	233.37
	2007	3818	-	-51	226	3993	340.46	-	-4.89	13.08	348.64
	2017	6077	-	-80	334	6331	492.58	-	-7.18	17.96	503.36
11	1990	1144				1144	135.41				135.41
	1993	1339	-	-12	41	1369	153.81	-	-2.84	2.63	153.60
	1997	1653	-	-15	149	1787	182.31	-	-3.32	9.20	188.18
	2007	2704	-	-23	226	2907	270.18	-	-4.82	13.08	278.45
	2017	4278	-	-34	334	4578	387.92	-	-6.96	17.96	398.93
12	1990	1113				1113	133.92				133.92
	1993	1302	-	-9	41	1335	152.05	-	-2.32	2.63	152.36
	1997	1607	-	-11	149	1744	180.12	-	-2.72	9.20	186.61
	2007	2627	-	-17	226	2836	266.67	-	-3.93	13.08	275.82
	2017	4155	-	-25	334	4463	382.57	-	-5.69	17.96	394.84
13	1990	888				888	80.77				80.77
	1993	1040	-	24	41	1106	91.95	-	4.56	2.63	99.14
	1997	1285	-	30	149	1464	109.33	-	5.39	9.20	123.91
	2007	2108	-	49	226	2383	163.10	-	7.92	13.08	184.09
	2017	3343	-	77	334	3754	235.39	-	11.07	17.96	264.43
14	1990	935				935	80.93				80.93
	1993	1096	-	27	34	1157	92.24	-	5.00	2.63	99.87
	1997	1354	-	33	124	1512	109.83	-	5.93	9.20	124.96
	2007	2224	-	54	190	2469	164.33	-	8.78	13.08	186.19
	2017	3528	-	86	283	3898	237.64	-	12.37	17.96	267.97
15	1990	1389				1389	87.26				87.26
	1993	1629	-	10	-	1639	99.46	-	6.80	-	106.25
	1997	2014	-	12	-	2026	118.41	-	8.08	-	126.49
	2007	3309	-	20	-	3329	177.01	-	12.06	-	189.07
	2017	5252	-	32	-	5284	255.63	-	16.80	-	272.43
16	1990	400				400	38.14				38.14
	1993	472	-	-5	-	467	43.90	-	-.25	-	43.65
	1997	588	-	-6	-	582	52.96	-	-.29	-	52.67
	2007	979	-	-9	-	970	81.44	-	-.43	-	81.01
	2017	1566	-	-13	-	1552	120.24	-	-.63	-	119.61

TRAFFIC PROJECTION ANTIQUE

TABLE 3.2 - 4 (3)

Movement of Passengers and Commodity

Link	Year	Number of Passengers					Commodity Tonnage				
		Normal	Diverted-1	Diverted-2	Generated	Total	Normal	Diverted-1	Diverted-2	Generated	Total
17	1990	1354				1354	157.67				157.67
	1993	1591	-	5	105	1701	179.80	-	.25	12.23	192.27
	1997	1973	-	6	389	2368	214.19	-	.29	43.51	257.99
	2007	3269	-	9	642	3920	320.68	-	.43	64.56	385.66
	2017	5231	-	13	1024	6268	463.59	-	.64	92.79	557.02
18	1990	2149				2149	235.08				235.08
	1993	2500	-	-10	41	2531	265.74	-	-.82	2.63	267.55
	1997	3059	-	-12	149	3196	312.99	-	-.98	9.20	321.21
	2007	4917	-	-20	226	5124	457.38	-	-1.46	13.08	469.00
	2017	7675	-	-30	334	7979	649.19	-	-2.12	17.96	665.04
19	1990	6692				6692	744.54				744.54
	1993	7850	-516	-31	-	7302	848.42	-49.64	-3.28	-	795.51
	1997	9712	-636	-39	-	9037	1009.86	-59.14	-3.90	-	946.81
	2007	15985	-1034	-64	-	14887	1509.15	-88.52	-5.83	-	1414.80
	2017	25420	-1621	-103	-	23696	2179.10	-127.97	-8.35	-	2042.78
20	1990	1791				1791	199.69				199.69
	1993	2108	213	-80	-	2241	228.31	19.86	-7.28	-	240.89
	1997	2620	261	-98	-	2782	272.97	23.50	-8.70	-	287.77
	2007	4340	419	-161	-	4598	410.48	34.79	-13.04	-	432.23
	2017	6933	651	-253	-	7330	595.21	49.85	-18.85	-	626.21
21	1990	232				232	25.87				25.87
	1993	273	-	-	-	273	29.59	-	-	-	29.59
	1997	339	-	-	-	339	35.39	-	-	-	35.39
	2007	562	-	-	-	562	53.25	-	-	-	53.25
	2017	899	-	-	-	899	77.24	-	-	-	77.24
22	1990	482				482	53.90				53.90
	1993	567	-	-	-	567	61.57	-	-	-	61.57
	1997	704	-	-	-	704	73.53	-	-	-	73.53
	2007	1168	-	-	-	1168	110.68	-	-	-	110.67
	2017	1868	-	-	-	1868	160.69	-	-	-	160.69
23	1990	459				459	47.08				47.08
	1993	536	-	-16	21	540	53.48	-	-2.03	2.63	54.08
	1997	660	-	-20	75	715	63.39	-	-2.40	9.20	70.19
	2007	1075	-	-33	116	1158	93.87	-	-3.55	13.08	103.40
	2017	1695	-	-51	176	1819	134.61	-	-5.09	17.96	147.48
24	1990	195				195	21.72				21.72
	1993	228	-	-	8	235	24.60	-	-	.91	25.51
	1997	279	-	-	29	308	29.03	-	-	3.21	32.23
	2007	451	-	-	47	497	42.55	-	-	4.61	47.16
	2017	708	-	-	73	781	60.62	-	-	6.45	67.07

TRAFFIC PROJECTION ANTIQUE

TABLE 3.2 - 4 (4)

Movement of Passengers and Commodity

Link	Year	Number of Passengers					Commodity Tonnage				
		Normal	Diver-ted-1	Diver-ted-2	Gene-rated	Total	Normal	Diver-ted-1	Diver-ted-2	Gene-rated	Total
	1990	-				-	-				-
	1993	-	516	147	-	664	-	49.64	13.38	-	63.02
25	1997	-	636	182	-	818	-	59.14	15.94	-	75.08
	2007	-	1034	296	-	1330	-	88.52	23.75	-	112.27
	2017	-	1621	466	-	2087	-	127.97	34.05	-	162.03
	1990	85				85	9.53				9.53
	1993	100	-	-	-	100	10.82	-	-	-	10.82
26	1997	123	-	-	-	123	12.83	-	-	-	12.83
	2007	201	-	-	-	201	19.00	-	-	-	19.00
	2017	317	-	-	-	317	27.24	-	-	-	27.24
	1990	7989				7989	851.53				851.53
	1993	9368	-	-	-	9368	969.91	-	-.17	-	969.74
27	1997	11585	-	-	-	11585	1153.73	-	-.21	-	1153.52
	2007	19040	-	-	-	19040	1720.62	-	-.32	-	1720.31
	2017	30226	-	-	-	30226	2478.68	-	-1.52	-	2477.16
	1990	4312				4312	414.41				414.41
	1993	5036	-516	-66	-	4454	471.97	-49.64	-3.89	-	418.44
28	1997	6197	-636	-80	-	5481	561.46	-59.14	-4.65	-	497.67
	2007	10055	-1034	-127	-	8893	838.52	-88.52	-7.01	-	742.99
	2017	15760	-1621	-194	-	13945	1211.48	-127.97	-10.56	-	1072.95
	1990	3805				3805	459.60				459.60
	1993	4462	-	-	-	4462	523.51	-	.23	-	523.74
29	1997	5518	-	-	-	5518	622.74	-	.28	-	623.01
	2007	9068	-	1	-	9069	928.79	-	.41	-	929.20
	2017	14395	-	1	-	14396	1338.07	-	-.43	-	1337.64
	1990	2451				2451	421.88				421.88
	1993	2874	-	-	-	2874	480.53	-	-.22	-	480.30
30	1997	3554	-	-	-	3554	571.59	-	-.27	-	571.33
	2007	5842	-	-	-	5841	852.43	-	-.39	-	852.04
	2017	9274	-	-1	-	9273	1227.95	-	.41	-	1228.36

TRAFFIC PROJECTION ANTIQUE

TABLE 3.2 - 5 (1)

Traffic Volume

Link	Year	w/o									with							
		Car /Van	Jeep-ney	Bus	Tru-ck	Sub-Total	Tri-cycl	Mot. cycl	Ani-mal	Total	Car /Van	Jeep-ney	Bus	Tru-ck	Sub-Total	Tri-cycl	Mot. cycl	Ani-mal	Total
1	1990	232	86	108	79	504	-	20	-	523									
	1993	267	100	126	90	582	-	23	-	604	233	87	110	78	509	-	20	-	529
	1997	322	122	154	106	705	-	28	-	733	282	106	135	93	616	-	24	-	640
	2007	500	193	250	158	1102	-	45	-	1147	437	169	218	139	962	-	40	-	1002
	2017	753	297	390	228	1669	-	71	-	1740	658	260	341	200	1458	-	62	-	1520
2	1990	289	106	130	101	626	-	24	-	650									
	1993	334	123	152	115	724	-	28	-	752	302	111	138	104	655	-	25	-	680
	1997	403	150	188	137	878	-	34	-	912	370	138	173	125	805	-	31	-	837
	2007	628	239	306	204	1378	-	56	-	1434	576	219	281	187	1263	-	51	-	1314
	2017	949	370	482	294	2096	-	88	-	2183	868	339	442	269	1919	-	80	-	1999
3	1990	508	301	93	93	995	-	74	-	1069									
	1993	587	351	109	106	1154	-	87	-	1241	545	325	101	99	1070	-	81	-	1150
	1997	713	431	135	127	1406	-	108	-	1514	668	404	127	119	1317	-	101	-	1418
	2007	1122	697	223	191	2232	-	178	-	2410	1050	652	209	178	2090	-	167	-	2257
	2017	1707	1088	356	277	3427	-	283	-	3711	1598	1019	333	259	3210	-	265	-	3475
4	1990	365	740	44	115	1265	-	38	-	1303									
	1993	420	861	52	131	1463	-	45	-	1508	397	812	49	124	1381	-	42	-	1423
	1997	506	1053	64	156	1778	-	55	-	1834	481	1001	61	149	1691	-	53	-	1744
	2007	780	1685	105	234	2804	-	91	-	2895	742	1602	100	222	2665	-	86	-	2752
	2017	1166	2612	167	338	4283	-	144	-	4427	1108	2482	158	321	4069	-	137	-	4207
5	1990	220	523	24	65	832	-	15	-	847									
	1993	253	605	28	74	960	-	17	-	977	252	602	28	74	956	-	17	-	973
	1997	306	734	34	88	1161	-	21	-	1183	308	740	34	88	1171	-	22	-	1192
	2007	475	1156	56	130	1817	-	35	-	1852	478	1164	56	131	1830	-	35	-	1865
	2017	718	1769	88	187	2762	-	55	-	2817	721	1780	89	188	2778	-	56	-	2833
6	1990	210	500	23	62	795	-	14	-	809									
	1993	241	576	26	71	914	-	17	-	930	240	574	26	70	911	-	17	-	927
	1997	290	695	32	83	1100	-	20	-	1121	292	702	33	84	1110	-	21	-	1131
	2007	445	1084	52	122	1704	-	33	-	1736	449	1093	53	123	1717	-	33	-	1750
	2017	667	1645	82	174	2568	-	51	-	2620	672	1657	82	175	2586	-	52	-	2637
7	1990	132	314	14	39	500	-	9	-	509									
	1993	153	366	17	45	581	-	11	-	592	152	364	17	44	577	-	11	-	588
	1997	187	450	21	54	712	-	13	-	725	189	455	21	54	720	-	13	-	733
	2007	298	726	35	81	1140	-	22	-	1162	301	733	35	82	1151	-	22	-	1173
	2017	458	1131	56	119	1765	-	35	-	1800	462	1140	57	120	1778	-	36	-	1814
8	1990	95	226	10	28	359	-	6	-	366									
	1993	110	263	12	32	418	-	8	-	425	110	264	12	32	418	-	8	-	426
	1997	134	323	15	38	511	-	9	-	520	138	332	16	39	525	-	10	-	535
	2007	214	521	25	58	818	-	16	-	833	219	534	26	59	838	-	16	-	854
	2017	328	811	40	85	1264	-	25	-	1290	335	830	42	86	1293	-	26	-	1319

TRAFFIC PROJECTION ANTIQUE

TABLE 3.2 - 5 (2)

Traffic Volume

Link	Year	w/o									with							
		Car /Van	Jeep-ney	Bus	Tru-ck	Sub-Total	Tri-cycl	Mot. cycl	Ani-mal	Total	Car /Van	Jeep-ney	Bus	Tru-ck	Sub-Total	Tri-cycl	Mot. cycl	Ani-mal	Total
9	1990	90	215	10	27	342	-	6	-	349									
	1993	104	250	12	30	396	-	7	-	403	105	251	12	30	397	-	7	-	405
	1997	127	304	14	36	481	-	9	-	490	130	314	15	37	497	-	9	-	506
	2007	198	483	23	54	759	-	15	-	773	204	498	24	55	781	-	15	-	796
	2017	301	743	37	78	1159	-	23	-	1182	309	764	38	79	1190	-	24	-	1214
10	1990	73	173	8	21	275	-	5	-	280									
	1993	84	201	9	24	318	-	6	-	324	84	202	9	24	320	-	6	-	326
	1997	102	245	12	29	388	-	7	-	395	106	256	12	30	403	-	8	-	411
	2007	160	391	19	43	613	-	12	-	625	166	406	20	44	636	-	12	-	648
	2017	244	603	30	63	939	-	19	-	958	252	624	32	64	971	-	20	-	991
11	1990	75	66	21	19	181	-	9	-	190									
	1993	85	77	25	22	209	-	11	-	220	86	78	25	22	211	-	11	-	222
	1997	102	94	31	26	252	-	13	-	266	107	100	33	27	266	-	15	-	281
	2007	155	149	50	38	392	-	22	-	414	162	158	54	39	413	-	24	-	437
	2017	229	229	79	55	592	-	35	-	627	238	243	85	56	622	-	37	-	660
12	1990	74	65	21	19	178	-	9	-	187									
	1993	84	75	24	21	205	-	11	-	215	85	76	25	21	207	-	11	-	218
	1997	101	91	30	25	247	-	13	-	260	105	98	32	26	262	-	14	-	276
	2007	153	145	49	38	384	-	21	-	406	160	155	52	39	406	-	23	-	429
	2017	225	224	77	54	580	-	34	-	613	235	238	83	56	611	-	36	-	647
13	1990	51	34	20	14	119	-	9	-	128									
	1993	59	40	23	16	138	-	10	-	148	63	43	24	18	147	-	11	-	158
	1997	71	49	28	19	167	-	13	-	180	81	56	32	22	190	-	15	-	205
	2007	110	78	46	29	264	-	21	-	285	125	89	52	33	298	-	24	-	322
	2017	166	122	73	42	404	-	33	-	437	187	137	82	47	453	-	38	-	491
14	1990	52	36	21	14	123	-	9	-	132									
	1993	60	42	24	16	142	-	11	-	153	64	44	25	18	152	-	12	-	163
	1997	73	51	30	19	173	-	14	-	186	82	57	33	22	195	-	15	-	210
	2007	114	82	49	29	274	-	22	-	296	128	91	54	33	306	-	25	-	331
	2017	172	128	78	42	419	-	35	-	454	192	142	86	47	466	-	39	-	505
15	1990	38	82	24	15	158	-	10	-	167									
	1993	43	95	28	17	183	-	11	-	194	45	97	28	18	188	-	11	-	200
	1997	52	117	35	20	223	-	14	-	237	55	119	35	21	230	-	14	-	243
	2007	82	187	57	30	355	-	23	-	378	85	191	57	32	365	-	23	-	388
	2017	123	291	90	43	547	-	36	-	583	128	297	91	45	560	-	36	-	597
16	1990	27	4	13	6	50	-	2	-	52									
	1993	31	5	15	7	58	-	2	-	60	29	4	16	8	56	-	2	-	58
	1997	38	6	19	9	71	-	3	-	74	32	1	21	10	65	-	3	-	67
	2007	59	10	31	13	114	-	4	-	119	51	2	35	16	104	-	4	-	108
	2017	90	16	50	20	176	-	7	-	183	77	3	56	24	160	-	7	-	167

TRAFFIC PROJECTION ANTIQUE

TABLE 3.2 - 5 (3)

Traffic Volume

Link	Year	w/o									with								
		Car /Van	Jeep-ney	Bus	Tru-ck	Sub-Total	Tri-cycl	Mot. cycl	Ani-mal	Total	Car /Van	Jeep-ney	Bus	Tru-ck	Sub-Total	Tri-cycl	Mot. cycl	Ani-mal	Total
	1990	104	15	43	26	188	-	6	-	194									
	1993	120	17	51	30	218	-	7	-	225	121	14	57	34	226	-	7	-	233
17	1997	144	21	63	35	264	-	9	-	273	147	5	85	51	289	-	10	-	300
	2007	222	35	105	53	414	-	14	-	429	228	9	141	77	454	-	17	-	471
	2017	330	56	168	77	630	-	23	-	653	340	13	226	111	690	-	27	-	718
	1990	158	23	69	39	289	-	9	-	298									
	1993	180	27	80	44	331	-	11	-	342	172	20	84	47	324	-	11	-	335
18	1997	214	33	98	52	396	-	13	-	410	188	7	115	64	374	-	14	-	388
	2007	321	52	158	76	607	-	22	-	628	284	11	184	93	572	-	22	-	595
	2017	469	81	246	107	903	-	34	-	937	416	17	287	132	852	-	35	-	887
	1990	144	958	3	79	1184	-	33	-	1217									
	1993	166	1109	4	90	1369	-	39	-	1408	155	978	18	93	1244	-	37	-	1281
19	1997	200	1350	5	107	1662	-	49	-	1711	187	1051	58	132	1428	-	45	-	1473
	2007	311	2136	8	159	2615	-	80	-	2695	291	1664	96	197	2247	-	74	-	2322
	2017	468	3273	13	230	3984	-	127	-	4111	437	2552	153	284	3426	-	118	-	3545
	1990	39	256	.9	21	317	-	9	-	326									
	1993	45	298	1	24	368	-	11	-	378	47	298	6	28	379	-	11	-	391
20	1997	54	364	1	29	449	-	13	-	462	57	322	18	40	437	-	14	-	451
	2007	85	580	2	43	711	-	22	-	732	89	512	30	60	691	-	23	-	714
	2017	128	893	4	63	1087	-	35	-	1122	135	787	47	87	1056	-	37	-	1092
	1990	5	33	.1	3	41	-	1	-	42									
	1993	6	39	.1	3	48	-	1	-	49	6	36	.7	3	46	-	1	-	48
21	1997	7	47	.2	4	58	-	2	-	60	7	39	2	5	53	-	2	-	55
	2007	11	75	.3	6	92	-	3	-	95	11	63	4	7	85	-	3	-	88
	2017	17	116	.5	8	141	-	4	-	145	17	97	6	11	130	-	4	-	134
	1990	18	53	2	7	81	-	5	-	85									
	1993	21	62	2	8	94	-	6	-	99	21	58	3	9	91	-	6	-	97
22	1997	26	75	3	10	114	-	7	-	121	26	62	6	12	106	-	7	-	113
	2007	40	121	5	15	181	-	12	-	193	40	100	9	19	168	-	12	-	180
	2017	59	189	8	22	278	-	19	-	296	59	157	15	27	258	-	19	-	277
	1990	16	38	6	7	68	-	8	-	77									
	1993	19	44	7	8	79	-	10	-	89	19	42	8	9	78	-	10	-	88
23	1997	23	54	9	10	95	-	12	-	107	25	49	11	13	98	-	13	-	111
	2007	35	84	15	14	149	-	19	-	168	39	76	18	19	152	-	21	-	173
	2017	53	128	23	21	225	-	31	-	256	58	116	29	28	230	-	33	-	263
	1990	7	17	3	3	30	-	4	-	34									
	1993	8	19	3	4	35	-	4	-	39	9	19	3	4	35	-	4	-	40
24	1997	10	23	4	4	42	-	5	-	47	11	21	5	6	44	-	6	-	49
	2007	15	36	6	7	65	-	8	-	73	17	33	8	9	67	-	9	-	76
	2017	23	55	10	9	97	-	13	-	110	26	51	12	13	101	-	14	-	115

TRAFFIC PROJECTION ANTIQUE

TABLE 3.2 - 5 (4)

Traffic Volume

Link	Year	w/o									with								
		Car /Van	Jeep-ney	Bus	Tru-ck	Sub-Total	Tri-cycl	Mot. cycl	Ani-mal	Total	Car /Van	Jeep-ney	Bus	Tru-ck	Sub-Total	Tri-cycl	Mot. cycl	Ani-mal	Total
	1990	-	-	-	-	-	-	-	-	-									
	1993	-	-	-	-	-	-	-	-	-	13	85	1	7	106	-	3	-	110
25	1997	-	-	-	-	-	-	-	-	-	16	94	4	10	123	-	4	-	128
	2007	-	-	-	-	-	-	-	-	-	24	148	6	16	194	-	7	-	200
	2017	-	-	-	-	-	-	-	-	-	36	225	9	23	294	-	10	-	304
	1990	2	12	.0	1	15	-	.4	-	16									
	1993	2	14	.1	1	17	-	.5	-	18	2	13	.2	1	17	-	.5	-	18
26	1997	3	17	.1	1	21	-	.6	-	22	3	15	.5	2	20	-	.6	-	20
	2007	4	27	.1	2	33	-	1	-	34	4	23	.9	3	31	-	1	-	32
	2017	6	41	.2	3	50	-	2	-	51	6	35	1	4	46	-	2	-	48
	1990	381	643	86	142	1252	-	-	-	1252									
	1993	439	747	101	162	1449	-	-	-	1449	439	747	101	162	1449	-	-	-	1449
27	1997	531	914	125	192	1761	-	-	-	1761	531	914	125	192	1761	-	-	-	1761
	2007	824	1462	205	287	2778	-	-	-	2778	824	1462	205	287	2777	-	-	-	2777
	2017	1239	2264	325	413	4241	-	-	-	4241	1239	2263	325	413	4240	-	-	-	4240
	1990	139	156	110	96	502	-	-	-	502									
	1993	160	181	129	110	579	-	-	-	579	141	160	114	97	513	-	-	-	513
28	1997	193	221	159	130	703	-	-	-	703	171	195	140	116	622	-	-	-	622
	2007	298	350	258	195	1101	-	-	-	1101	264	310	228	173	975	-	-	-	975
	2017	447	538	404	281	1671	-	-	-	1671	396	477	357	249	1479	-	-	-	1479
	1990	208	219	69	85	582	-	-	-	582									
	1993	239	255	81	97	672	-	-	-	672	239	255	81	97	672	-	-	-	672
29	1997	288	312	101	115	816	-	-	-	816	288	312	101	115	816	-	-	-	816
	2007	445	499	166	172	1281	-	-	-	1281	445	499	166	172	1282	-	-	-	1282
	2017	665	772	263	248	1948	-	-	-	1948	665	772	263	248	1948	-	-	-	1948
	1990	207	170	32	78	486	-	-	-	486									
	1993	238	197	38	89	561	-	-	-	561	238	197	38	89	561	-	-	-	561
30	1997	287	241	47	105	680	-	-	-	680	287	241	47	105	680	-	-	-	680
	2007	443	386	77	157	1063	-	-	-	1063	443	386	77	157	1062	-	-	-	1062
	2017	662	597	122	226	1608	-	-	-	1608	662	597	122	226	1608	-	-	-	1608

3.3 TRAFFIC ANALYSIS AND FORECAST: DEVELOPMENT PROJECT

Traffic on development project roads was forecasted separately for passenger traffic, non-agricultural traffic and agricultural traffic. The number of passengers and commodity tonnage were estimated first, and then they were converted to the number of vehicles assuming modal distribution and occupancy/average load. Figure 3.3.-1 shows the schematic diagram of traffic forecast for development project.

3.3.1 Passenger Traffic and Non-Agricultural Traffic

The population residing within the road influence area, which is defined as the area from which local existing or potential traffic using the road derives, was obtained mainly from distribution of barangays shown in 1:50,000 topographical maps and the NCSO 1980 Census of Population and Housing, and supplemented by information obtained from barangay interviews. The population forecasts were prepared using the NCSO report.

The number of passengers and non-agricultural commodity tonnage were obtained as the product of population by the per capita generation factor. Table 3.3-1 shows the generation factors commodity used in the analysis, which was derived mainly based on the traffic survey and referring to previous studies. In the case of particular roads where the common values were deemed inapplicale, specific values were used.

TABLE 3.3-1 PER CAPITA TRAFFIC GENERATION FACTORS (MINOR ROAD) : Province of Antique

Existing Road Condition	Passenger Movement (trip/person/day)		Non-Agricultural Commodity (kg/person/day)	
	w/o	with	w/o	with
Paved/Gravel				
Good/Fair	0.06	0.06	2.0	2.0
Bad	0.05	0.055	1.6	1.8
Very Bad	0.04	0.055	0.6	1.0
Earth Road	0.015	0.03	0.5	1.0
Impassable to motoried vehicle	0.005	0.015	0.4	1.0

The modal distribution and the occupancy/average load used in the conversion to traffic volume by vehicle type were estimated individually for each road based on the road

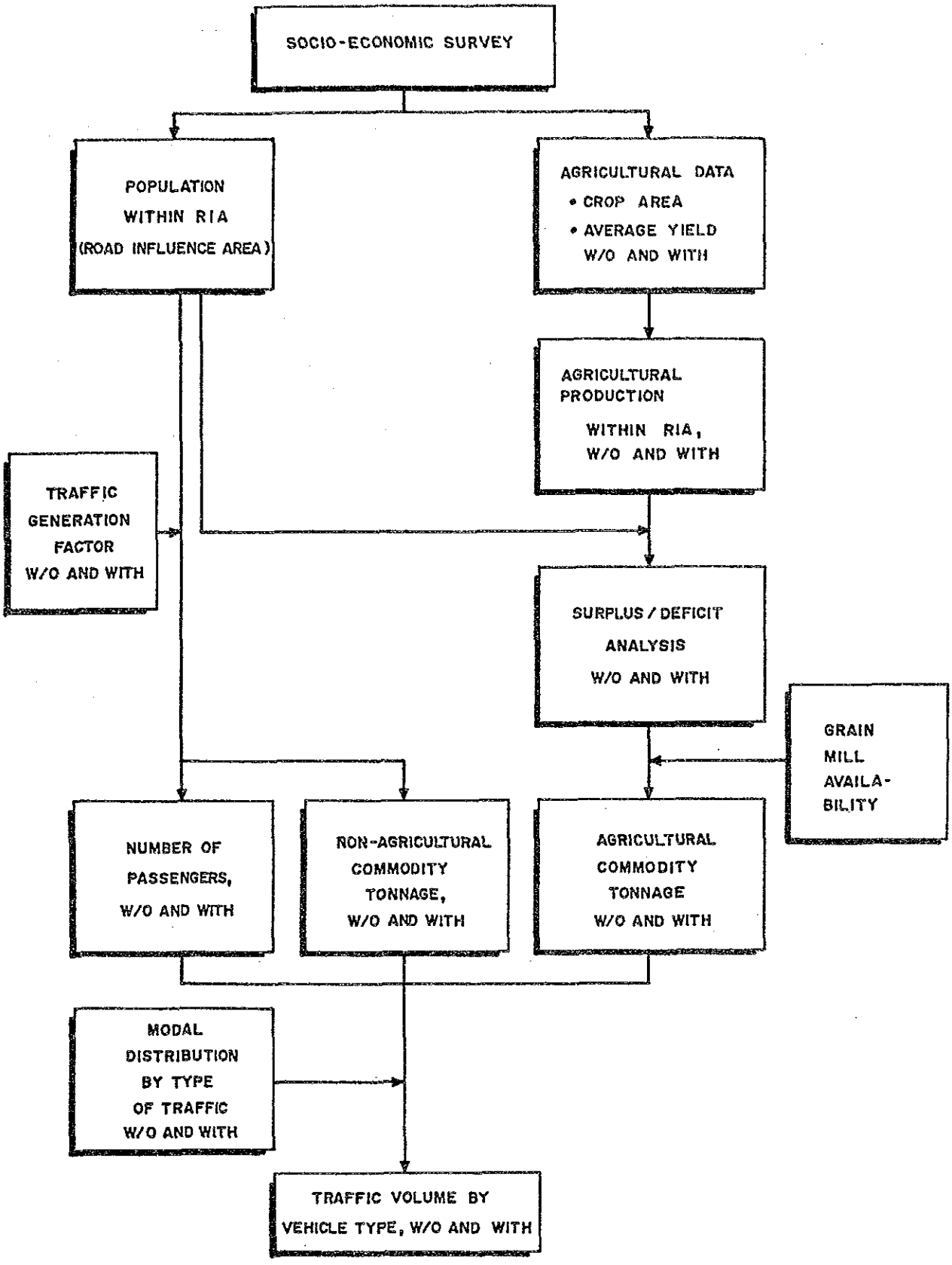


FIGURE 3.3-1
PROCEDURE OF TRAFFIC FORECAST FOR DEVELOPMENT PROJECTS

inventory survey and the traffic survey.

3.3.2 Agricultural Traffic

Agricultural commodity tonnage was estimated based on the agricultural production within the road influence area, taking into consideration i) home consuption and surplus/deficit and ii) availability of grain mill(s) in the road influence area, as regards food grain.

i) Home consumption of food grain was calculated as population times per capita grain consumption (assumed to be 130 kg in a milled form), and the surplus or deficit production was calculated based thereupon.

ii) In case of no mill in the road influence area, all net production is assumed to move out in the form of palay/unmilled corn. Milled grain products for home comsumption are then transported back. An eventual deficit moves into the road influence area in the form of milled products.

Provided one or more mills exist in the road influence area, the transport flows are assumed as follows:

- Home consumption remains in the road influence area (no transport movement assumed).
- Surplus production would be transported out, traditionally in the form of unmilled food grains.
- Deficit production would be moved into the road influence area in milled form.

Agricultural commodity tonnage was cnverted to number of vehicles using the modal distribution and average load, which were estimated individually for each road considering the transport circumstances.

3.3.3 Estimated Present and Future Traffic

Estimated present and future traffic is presented in Table 3.4-1 in the next Section.

3.4 SUMMARY OF TRAFFIC VOLUME ON STUDIED ROADS

Estimated present and future traffic volumes of the studied roads comprising of traffic and development projects are presented by each road project in Table 3.4-1.

TABLE 3.4 - 1 (1)

Traffic Volume by Vehicle Type ANTIQUE

Class of Road	Type of Impr't	Road Number	w/o										with									
			Car	Jeep-ney	Bus	Truck	Total	Tri-cycle	Motor cycle	Animal	Walk-ing	Boat	Car	Jeep-ney	Bus	Truck	Total	Tri-cycle	Motor cycle	Animal	Walk-ing	Boat
Primary Major	Rehab/Imp-1	N1-8	153	366	17	45	581	0	11	-	-	-	152	364	17	44	577	0	11	-	-	-
		N1-17	43	95	28	17	183	0	11	-	-	-	45	97	28	18	188	0	11	-	-	-
		N1-14	60	42	24	16	142	0	11	-	-	-	64	44	25	18	152	0	12	-	-	-
		N1-13	59	40	23	16	138	0	10	-	-	-	63	43	24	18	147	0	11	-	-	-
	Imp-2/Widen	N1-11	84	201	9	24	318	0	6	-	-	-	84	202	9	24	320	0	6	-	-	-
		NI-10	104	250	12	30	396	0	7	-	-	-	105	251	12	30	397	0	7	-	-	-
		N1-9	110	263	12	32	418	0	8	-	-	-	110	264	12	32	418	0	8	-	-	-
		N1-12	85	77	25	22	209	0	11	-	-	-	86	78	25	22	211	0	11	-	-	-
		N1-16	43	95	28	17	183	0	11	-	-	-	45	97	28	18	188	0	11	-	-	-
Second'y Major	Rehab/Imp-1	N9-1	166	1109	4	90	1369	0	39	-	-	-	155	978	18	93	1244	0	37	-	-	-
		N2-4	180	27	80	44	331	0	11	-	-	-	172	20	84	47	324	0	11	-	-	-
		N9-2	45	298	1	24	368	0	11	-	-	-	47	298	6	28	379	0	11	-	-	-
		N2-3	120	17	51	30	218	0	7	-	-	-	121	14	57	34	226	0	7	-	-	-
		N9-3	32	65	-	-	96	162	67	25	-	-	-	88	-	1	89	131	72	-	-	-
		N10	21	62	2	8	94	0	6	-	-	-	21	58	3	9	91	0	6	-	-	-
		N2-2	-	76	-	1	77	118	59	-	-	-	-	76	4	3	82	97	63	-	-	-
		N2-1	-	71	-	1	72	108	56	-	-	-	-	70	4	2	76	90	60	-	-	-
	Imp-2/Widen	N12-1	19	44	7	8	79	0	10	-	-	-	19	42	8	9	78	0	10	-	-	-
		N12-2	8	19	3	4	35	0	4	-	-	-	9	19	3	4	35	0	4	-	-	-
	New Const.	B16-3	-	-	-	-	-	-	-	82	57	-	-	8	-	-	8	19	7	17	6	-

TABLE 3.4 - 1 (2)

Traffic Volume by Vehicle Type ANTIQUE

Class of Road	Type of Impr't	Road Number	w/o										with									
			Car	Jeep-ney	Bus	Truck	Total	Tri-cycle	Motor cycle	Animal	Walking	Boat	Car	Jeep-ney	Bus	Truck	Total	Tri-cycle	Motor cycle	Animal	Walking	Boat
Minor (Nat'l/ Prov'l)	Rehab/ Imp-1	P10	-	-	-	-	-	59	-	50	100	-	-	13	-	-	13	37	13	20	64	-
		N7-2	-	24	-	1	25	42	17	14	27	-	-	27	1	1	29	33	17	-	-	-
		P23	-	25	-	-	25	62	-	105	138	-	11	35	-	-	46	91	23	27	-	-
		N7-1	-	21	-	1	22	33	10	16	16	-	-	23	1	2	26	28	11	-	-	-
		P17	-	18	-	-	18	53	-	52	154	-	11	26	-	1	38	66	24	-	-	-
		P9	-	3	-	-	3	10	-	10	30	-	2	4	-	-	7	10	5	2	15	-
		N7-3	-	26	-	1	27	38	10	21	17	-	-	27	1	2	30	32	10	-	-	-
		P16	-	3	-	-	3	23	-	14	49	-	-	5	-	-	5	17	6	4	30	-
		P34	-	4	-	-	4	11	-	14	29	-	2	6	-	-	8	15	5	4	-	-
		P13	-	9	-	-	9	32	15	18	70	-	-	14	-	0	15	36	16	-	25	-
		P21	-	10	-	-	10	31	9	17	7	-	-	12	-	1	13	13	5	-	-	-
		P11	-	11	-	0	12	26	-	8	73	-	6	14	-	1	20	21	12	-	39	-
		N8	-	28	-	1	28	46	17	17	28	-	-	30	1	2	33	37	17	-	-	-
		P20	-	14	-	1	15	29	-	11	70	-	5	16	-	1	22	23	11	-	35	-
		P33	-	11	-	-	11	30	-	44	74	-	-	20	-	-	20	36	12	11	-	-
		P22	-	4	-	-	4	13	-	7	39	-	3	6	-	-	10	16	7	2	-	-
		P31	-	8	-	-	8	24	-	23	70	-	5	12	-	-	17	30	11	6	-	-
		P14	-	10	-	-	10	29	10	17	48	-	-	13	-	0	14	33	10	-	16	-
	Imp-2/ Widen	N3	-	96	-	3	100	154	52	68	83	-	-	104	3	7	114	126	52	-	-	-
		P4-1	-	11	-	-	11	32	-	38	88	-	6	16	-	-	23	42	14	10	-	-
		P4-2	-	10	-	-	10	30	-	26	90	-	7	14	-	-	21	36	14	6	-	-
	New Const.	P36	-	-	-	-	-	-	-	19	5	-	-	1	-	-	1	3	1	8	1	-
		P32	-	-	-	-	-	-	-	61	61	-	-	6	-	-	6	14	9	26	7	-

TABLE 3.4 - 1 (3)

Traffic Volume by Vehicle Type ANTIQUE

Class of Road	Type of Impr't	Road Number	w/o										with									
			Car	Jeep-ney	Bus	Truck	Total	Tri-cycle	Motor cycle	Ani-mal	Walk-ing	Boat	Car	Jeep-ney	Bus	Truck	Total	Tri-cycle	Motor cycle	Ani-mal	Walk-ing	Boat
Minor (Baran-gay)	Rehab/ Imp-1	B09-1	-	8	-	-	8	26	-	19	64	-	-	12	-	0	13	24	11	5	18	-
		B13-1	-	-	-	-	-	37	-	28	33	-	-	7	-	-	7	16	5	12	7	-
	New Const.	B17-1	-	-	-	-	-	-	-	138	75	-	-	14	-	-	14	32	12	29	10	-
		B08-3	-	-	-	-	-	-	-	113	46	-	-	9	-	-	9	18	8	47	6	-
		B04-1	-	-	-	-	-	-	-	53	21	-	-	5	-	-	5	11	3	11	3	-
		B09-3	-	-	-	-	-	-	-	24	72	-	-	5	-	-	5	13	11	6	8	-

CHAPTER 4
PROJECT IDENTIFICATION AND SCREENING

4.1 PROJECT IDENTIFICATION

4.1.1 Field Surveys

Field survey was conducted by the Study Team to assess present condition of all major roads and some other typical minor roads (these are referred to as "Surveyed Roads").

Road projects (mostly minor roads) proposed by the local officials were also collected and road conditions of these roads were obtained by the interview survey (these are referred to as " Road Projects proposed by local officials").

Road projects surveyed by the Study Team and proposed by the local officials were combined and integrated, because some road projects were both surveyed by the Study Team and also proposed by the local officials, and a list of Studied Roads was prepared.

Summaries of "Surveyed Roads", "Road Projects proposed by Local officials "and" Studied Roads" are shown in Table 4.1-1.

TABLE 4.1-1 SUMMARY OF SURVEYED ROADS
Road Projects Proposed by Local Officials and Studied Roads
Province of Antique

	Road Class	National Roads	Prov'l/City Roads	Barangay Roads	Total
Surveyed Road	Major Rd.	291.2	-	-	291.2
	Minor Rd.	40.4	82.0	-	122.4
	Total	331.6	82.0	-	413.6
Rd. Proj. Proposed by Local Officials	Major Rd.	252.3	-	6.0	258.3
	Minor Rd.	47.6	106.6	279.0	433.2
	Total	299.9	106.6	285.0	691.5
Studied Road	Major Rd.	354.4	-	6.0	360.4
	Minor Rd.	49.9	109.6	279.0	435.5
	Total	404.3	106.6	285.0	795.9

4.1.2 Project Identification

1) Project Identification Criteria

Project identification criteria are shown in Table 4.1-2.

TABLE 4.1-2 PROJECT IDENTIFICATION CRITERIA

Item	Condition of Identification	
	Major Roads	Minor Roads
(1) Existing Links		
* Carriageway Width	Less than 6.0 meter	Less than 4.0 meters
* Pavement Type	Inferior to recommended type in the engineering Standards	Inferior to gravel
* Surface Condition	Bad or very bad 1/	Bad or very bad2/
(2) New Links	Impassable Abandoned Non-existing	
(3) Bridges	Ford crossing Spillway Timber bridge Bailey bridge	Ford crossing Spillway in structurally unsound condition Bailey bridge for AADT more than 300

Notes: 1/ Gravel road which is proposed for improvement by local officials shall be identified, even though surface condition is "fair".

2/ Gravel road of which surface condition is "fair" shall be identified, as the surface condition of gravel minor roads is easily deteriorated.

2) Identified Road Projects

All studied Roads, except those of the national primary roads and committed roads, were evaluated in accordance with the identification criteria. Road projects identified are summarized in Table 4.1-3.

TABLE 4.1-3 SUMMARY OF IDENTIFIED ROAD PROJECTS
Province of Antique

Road Class		National Road	Prov'l/City Road	Barangay Road	Total
Major Road	Length (kms.)	238.8	-	6.0	244.8
	(% to Studied Roads)	(67.7%)	-	(100%)	(68%)
Minor Road	Length (kms.)	27.9	101.1	269.0	398.0
	(% to Studied Roads)	(56%)	(95%)	(96%)	(91%)
Total	Length (kms.)	266.7	101.1	275.0	642.8
	(% to Studied Roads)	(66%)	(95%)	(96%)	(81%)

4.2 PROJECT SCREENING

4.2.1 Categorization

Road projects are categorized by the following factors in order to establish comprehensive prioritization criteria:

(1) Class of Roads

Major Roads	Minor Roads
* Primary major roads	*National/provincial/city roads
* Secondary major roads	* Barangay roads

(2) Urgency of work

Improvement criteria for roads and bridges are established as shown in Tables 4.2-1 and 4.2-2, respectively. Improvement works are classified into five (5) types as shown in Table 4.2-3. In view of the urgency of work to be implemented, the types of improvement are grouped into two (2) as follows:

Type A (Urgent Projects)

* Rehabilitation: Improvement of deteriorated road surface, but standard or superior class pavement, to acceptable condition.
* Improvement -1: Improvement of deteriorated road surface and substandard class pavement, to acceptable and standard pavement.
* New Construction: Construction of new road including re-construction of abandoned road.

Type B (Less Urgent Projects)

* Improvement -2: Upgrading of substandard pavement class to standard pavement class, though existing road surface condition is acceptable.
* Widening : Widening of roads with substandard carriageway width, other conditions meet engineering standards.

Note: Road projects which include only improvement of bridges are classified as "Rehabilitation".

(3) Economic Viability

Major Roads

Simplified economic evaluation is conducted for major roads. Internal Rate of Return (IRR) is calculated based on roughly estimated construction cost and traffic cost savings. Categorization is made as follows:

Improvment Type A:

* IRR of 7.5% or more
* IRR of less than 7.5%

Improvement Type B:

* IRR of 15% or more
* IRR of less than 15.0%

Minor Roads

Minor road Pre-evaluation Indicator (MPI) is developed based on Phase-1 Study results. Categorization of minor roads is made based on calculated MPI as follows:

* MPI of 7.5 or more
* MPI of less than 7.5

TABLE 4.2-1 IMPROVEMENT CRITERIA FOR ROAD

Road Class	Major Road		Minor Road	
	Standard/ Superior	Substandard	Standard/ Superior	Substandard
Good/Fair	No improvement or widening (widening)	Upgrading of pavement type (improvement-2)	No improvement	No improvement
Bad/Very bad	Improvement of surface condition (Rehabilitation)	Upgrading of pavement type (improvement-1)	Improvement surface condition (Rehabilitation)	Upgrading of pavement type (Improvement-1)
Abandoned/ Non-existing	Construction of new road (New Construction)			

Note: 1) In case of carriageway width less than 6.0 meters.

TABLE 4.2-2 IMPROVEMENT CRITERIA FOR BRIDGES

Existing Bridge Type	Proposed Improvement		
	Major Road	Minor Road	
Ford Crossing	2-lane permanent bridge	Carriageway width 4.0 m: 1-lane spillway Carriageway width 6.0 m: 2-lane spillway	
Spillway	2-lane permanent bridge	No improvement	
Timber Bridge	2-lane permanent bridge	AADT less than 200	1-lane permanent bridge
		AADT more than 200	2-lane permanent bridge
Bailey Brridge	2-lane permanent bridge	AADT less than 300	No improvement
		AADT more than 300	2-lane permannet bridge

Note: 1) Where the site condition is not favorable for a spillway, a permanent bridge should be planned in accordance with the criteria for a timber bridge.

2) When the existing spillway is structurally sound and traffic disturbance is estimated less, the existing one can be utilized. Under other conditions, a permanent bridge should be planned in accordance with the criteria for a timber bridge.

TABLE 4.2-3 TYPES OF IMPROVEMENT

Type	Existing Pavement Type	Existing Surface Condition	Proposed Improvement Work
Rehabilitation	Standard or superior	Bad/ very bad	Improvement of surface condition
Improvement-1	Substandard	Bad/ very bad	Upgrading of surface type
Improvement-2	Substandard	Good/Fair	Upgrading of surface type
Widening	Standard (carriageway is narrowed than standard)	Good/Fair	Widening of existing road
New Construction	Impassable/abandoned non-existing		Construction of new road

Note: Improvement-2 and widening are not applied to minor roads.

4.2.2 Prioritization and Selection Criteria

Prioritization and selection criteria of road projects for feasibility studies are established as shown in Tables 4.2-4 and 4.2-5.

TABLE 4.2-4 PRIORITIZATION AND SELECTION OF ROAD PROJECTS
- Major Roads -

Category	Road Class	Type of Improvement	IRR	Priority Criteria	Selection Criteria
1	Primary	A	7.5 ≦ IRR	MA-1	↑
2	Secondary	A	7.5 ≦ IRR	MA-1	
3	Primary	B	15.0 ≦ IRR	MA-2	To be selected for F/S
4	Secondary	B	15.0 ≦ IRR	MA-2	
5	Primary	A	IRR < 7.5	MA-2	
6	Secondary	A	IRR < 7.5	MA-2	
7	Primary	B	IRR <15.0	MA-3	
8	Secondary	B	IRR <15.0	MA-3	

TABLE 4.2-5 PRIORITIZATION AND SELECTION OF ROAD PROJECTS
- Minor Roads -

Category	Road Class	Type of Improvement	MPI	Priority Criteria	Selection Criteria
1	National/Provincial/ City	A	7.5 ≦ MPI	MI-1	↑
2	Barangay	A	7.5 ≦ MPI	MI-1	To be selected for F/S
3	National/Provincial/ City	A	MPI < 7.5	MI-2	
4	Barangay	A	MPI < 7.5	MI-2	

Note: Improvement Type A: Rehabilitation, Improvement-1, New Construction
Improvement Type B: Improvement-2, Widening

4.2.3 Priority of Identified Road Projects

Identified projects were evaluated and prioritized in accordance with criteria discussed and summarized in Tables 4.2-6 and 4.2-7.

TABLE 4.2-6 PRIORITY OF IDENTIFIED MAJOR ROADS
Province of Antique

Category	Road Class	Type of Improvement	IRR	Priority Group	Road Length	No. of Road Links
1	Primary	A	7.5 ≤ IRR	MA-1	37.8	3
2	Secondary	A	7.5 ≤ IRR	MA-1	29.9	3
3	Primary	B	15.0 ≤ IRR	MA-2	-	-
4	Secondary	B	15.0 ≤ IRR	MA-2	-	-
5	Primary	A	IRR<7.5	MA-2	77.8	6
6	Secondary	A	IRR<7.5	MA-2	99.3	8
7	Primary	B	IRR<15.0	MA-3	-	-
8	Secondary	B	IRR<15.0	MA-3	-	-
	Total				244.8	20

Table 4.2-7 PRIORITY OF IDENTIFIED MINOR ROADS
Province of Antique

Category	Road Class	Type of Improvement	MPI	Priority Group	Road Length	No. of Rd.Links
1	Nat'l/Provi/ City	A	7.5 ≤ MPI	MI-1	62.3	23
2	Barangay	A	7.5 ≤ MPI	MI-1	76.7	6
3	Nat'l/Provi/	A	MPI < 7.5	MI-2	66.7	19
4	Barangay	A	MPI < 7.5	MI-2	192.3	23
	Total				398.0	71

4.2.4 Selection of Road Projects For Feasibility Studies

In accordance with selection criteria discussed above, road projects under priority groups MA-1 and MA-2 for major roads and priority groups MI-1 for minor roads were initially selected, and these were plotted on 1:100,000 map to evaluate the following:

- Distribution of initially selected road projects (when these are concentrated in certain area, some minor roads were deleted, and where road projects are scarce, some minor roads were added.)

- Linkage of road projects
  (There is a case that a selected lower class road is connected with a higher class road, however, the latter is not selected due to lower priority. Such a case, a higher class road is also selected to maintain similar condition of road after implementation.)

After adjustment mentioned above, road projects were finally selected and summarized as follows:

Major Road	246.1 kms.	(20 projects)
Minor Road	153.9 kms.	(29 projects)
Total	400.0 kms.	(49 projects)

CHARTER 5
PROJECT EVALUATION

5.1 PRELIMINARY DESIGN AND COST ESTIMATE

5.1.1 Preliminary Design

1) Design Concept
There are two options in design concept for rural road improvement, as follows :

* Designing rural roads with optimum standards aimed at improving all aspects including horizontal and vertical alignments, which sometimes require massive earth works and is costly.

* Designing rural roads by basically concentrating on improving surface conditions, thus improving horizontal and vertical alignments is limited to the required minimum.

Rural roads are extensive in the number of road links as well as in length, and their present conditions are still at a poor level. Thus, requirements for rural road improvement are quite huge, while financial resources are limited. Under these circumstances, the Study Team placed priority on improving surface conditions of more roads. The preliminary design was undertaken in line with the concept of the second option.

2) Preliminary Design
On the basis of the findings of the road inventory survey, the type of improvement was determined for each subsection of road in accordance with the engineering standards and the improvement criteria.

Typical road sections for each type of improvement/rehabilitation are summarized as shown in Table 5.1-1.

Special considerations were given to steep gradient sections and flood section.

"PCC pavement for steep gradient section" was applied to sections with steep gradients where otherwise gravel surfacing might be applied, as a countermeasure against excessive gravel losses during heavy rains and impossibility for vehicles to climb. "Grade raising in flood area", was applied to sections located in flood areas.

Table 5.1-2 shows the proposed improvement for each road project subjected to the feasibility study.

TABLE 5.1-1 EXISTING CONDITION VS PROPOSED IMPROVEMENT/REHABILITATION

	Road Section	Existing Pavement		Proposed	Pavement Structure (cm)		
Type of Improvement	Type	Type	Condition	Pavement Type	Surface Course	Base	Subbase
Rehabilitation	1 - 1	PCC	Bad/Very Bad	PCC	20 - 23	-	10
	1 - 2	PCC	Bad/Very Bad	AC Overlay	5	-	-
	1 - 3	Bituminous	- do -	AC	5	20	10
	1 - 4	Bituminous	- do -	AC Overlay	5	-	-
	1 - 5	Bituminous	- do -	BMP/DBST	5.5/1.6	15	5
	1 - 6	Gravel	- do -	Gravel	15	-	10
Improvement - 1	2 - 1	Bituminous	Bad/Very Bad	PCC	20 - 23	-	10
	2 - 2	Gravel	- do -	PCC	20 - 23	-	20
	2 - 3	Gravel	- do -	AC	5	20	20
	2 - 4	Gravel	- do -	BMP/DBST	5.5/1.6	15	15
	2 - 5	Earth	Any Condition	PCC	20 - 23	-	20
	2 - 6	Earth	- do -	AC	5	20	20
	2 - 7	Earth	- do -	BMP/DBST	5.5/1.6	15	15
	2 - 8	Earth	- do -	Gravel	15	-	10
Improvement - 2	3 - 1	Bituminous	Good/fair	PCC	20 - 23	-	10
	3 - 2	Gravel	- do -	PCC	20 - 23	-	10
	3 - 3	Gravel	- do -	AC	5	20	10
	3 - 4	Gravel	- do -	BMP/DBST	5.5/1.6	15	5
Widening	4 - 1	PCC	Good/fair	Widening w/PCC	20 - 23	-	20
	4 - 2	Bituminous	- do -	Widening w/AC	5	20	20
	4 - 3	Bituminous	- do -	Widening w/BMP/DBST	5.5/1.6	15	15
	4 - 4	Gravel	- do -	Widening w/Gravel	15	-	10
New Construction	5 - 1	-	-	PCC	20 - 23	-	20
	5 - 2	-	-	AC	5	20	20
	5 - 3	-	-	BMP/DBST	5.5/1.6	15	15
	5 - 4	-	-	Gravel	15	-	10
Special Treatment	6	PCC pavement for steep gradient section					
	7	Grade raising in flood area					

TABLE 5.1 - 2 (1)

Summary of Proposed Improvement ANTIQUE

Primary Major

Type of Impr't	Road Number	Length (km)	1993 AADT w/o	1993 AADT with	Existing Condition L	Existing Condition Width	Existing Condition Type	Existing Condition Condition	Proposed Improvement	Proposed Bridge (Number/Total Length)	Cost (Million Peso) Road	Cost (Million Peso) Bridge	Cost (Million Peso) Total	IRR (%)
Rehab/ Imp-1	N1-8	18.7	581	577	18.7	6.0	BT	Good	-	1-lane Br (n= 2,L= 27m) 2-lane Br (n= 5,L=533m) 2-cell BC (n= 1,L= 6m)	.00	37.54	37.54	29.4 (T)
	N1-17	4.6	183	188	1.3 1.5 1.8	5.0-6.0 4.5 4.5-5.5	BT GRV GRV	Bad/V.Bad Bad Good/Fair	Rehab(6.0-BMP) Imp-1(6.0-BMP) Imp-2(6.0-BMP)		10.37	.00	10.37	6.7 (T)
	N1-14	15.4	142	152	.6 12.7 2.1	5.0 4.0-4.5 4.5	BT GRV GRV	Good Bad Good/Fair	Widen(6.0-BMP) Imp-1(6.0-BMP) Imp-2(6.0-BMP)	2-lane Br (n= 3,L= 96m)	28.76	7.71	36.48	6.3 (T)
	N1-13	20.6	138	147	1.3 15.6 3.7	5.0 4.0-5.5 4.5-5.5	BT GRV GRV	Good Bad Good	Widen(6.0-BMP) Imp-1(6.0-BMP) Imp-2(6.0-BMP)	2-lane Br (n= 4,L=170m) 2-cell BC (n= 1,L= 7m)	42.09	13.29	55.38	5.5 (T)
Imp-2/ Widen	N1-11	13.3	318	320	1.5 11.0 .8	5.0 4.5-6.0 5.5	BT GRV BT	Good Good Good	Widen(6.0-BMP) Imp-2(6.0-BMP) Widen(6.5-BMP)	1-lane Br (n= 2,L= 60m) 2-lane Br (n= 2,L=391m)	21.67	27.87	49.54	14.8 (T)
	N1-10	6.4	396	397	.5 5.6 .3	6.0 5.5 5.0	BT GRV BT	Good Good Good	- Imp-2(6.0-BMP) Widen(6.0-BMP)	1-lane Br (n= 2,L= 36m) 2-lane Br (n= 2,L= 46m) 2-cell BC (n= 1,L= 5m)	12.05	7.11	19.16	12.8 (T)
	N1-9	13.3	418	418	13.3	5.0	BT	Good	Widen(6.7-AC)	2-cell BC (n= 6,L= 34m)	15.39	4.28	19.67	11.9 (T)
	N1-12	17.7	209	211	.9 15.8 1.0	5.5 4.5-6.0 5.0	BT GRV BT	Good Good Good	Widen(6.5-BMP) Imp-2(6.0-BMP) Widen(6.0-BMP)	2-lane Br (n= 3,L= 53m) 1-cell BC (n= 1,L= 4m) 2-cell BC (n= 1,L= 6m)	29.91	5.84	35.75	7.7 (T)
	N1-16	5.7	183	188	5.0 .7	4.0-5.5 4.0	GRV GRV	Fair Bad	Imp-2(6.0-BMP) Imp-1(6.0-BMP)		12.72	.00	12.72	6.1 (T)

(T):Traffic Project
(D):Development Project

TABLE 5.1 - 2 (2)

Summary of Proposed Improvement ANTIQUE

Secondary Major

Type of Impr't	Road Number	Length (km)	1993 AADT w/o	1993 AADT with	Existing Condition L	Width	Type	Condition	Proposed Improvement	Proposed Bridge (Number/Total Length)	Cost (Million Peso) Road	Bridge	Total	IRR (%)
Rehab/ Imp-1	N9-1	3.3	1369	1244	3.3	6.0	BT	Bad/V.Bad	Imp-1(6.0-PCC)		9.22	.00	9.22	49.2 (T)
	N2-4	15.5	331	324	2.7	4.0-5.0	BT	Bad	Rehab(6.0-BMP)	2-lane Br (n= 5,L=162m)	26.38	12.63	39.01	17.5 (T)
					7.0	4.5-5.5	GRV	Bad	Imp-1(6.0-BMP)					
					5.8	5.0-6.0	GRV	Fair	Imp-2(6.0-BMP)					
	N9-2	11.2	368	379	.1	5.0	PCC	Good	Widen(6.0-PCC)	2-lane Br (n= 3,L= 50m)	20.59	4.57	25.16	10.9 (T)
					10.5	3.2-6.0	GRV	Bad	Imp-1(6.0-BMP)					
					.6	6.1	PCC	Good	-					
	N2-3	13.0	218	226	.3	4.0	BT	Bad	Rehab(6.0-BMP)	2-lane Br (n= 3,L= 68m)	28.00	5.75	33.75	10.8 (T)
					10.7	4.0-6.0	GRV	Bad	Imp-1(6.0-BMP)					
					2.0	5.0	GRV	Fair	Imp-2(6.0-BMP)					
	N9-3	7.4	96	89	.1	4.0	PCC	Good	Widen(6.0-PCC)	2-lane Br (n= 4,L=128m)	7.38	11.14	18.52	10.1 (D)
					7.3	3.3-4.5	GRV	Bad	Rehab(6.0-GRV)	2-cell BC (n= 2,L= 16m)				
	N10	14.2	94	91	13.7	3.3-4.5	GRV	Bad	Rehab(6.0-GRV)	2-lane Br (n=17,L=842m)	14.82	60.16	74.98	3.3 (T)
					.5	5.0	BT	Bad	Rehab(6.0-BMP)					
	N2-2	15.3	77	82	2.1	4.5	GRV	Fair	Widen(6.0-GRV)	2-lane Br (n=16,L=353m)	12.16	29.45	41.60	1.8 (D)
					12.5	4.0-6.0	GRV	Good/Bad	Rehab(6.0-GRV)					
					.7	5.0-6.0	BT	Bad	Rehab(6.0-BMP)					
	N2-1	15.3	72	76	14.3	4.0-6.0	GRV	Bad	Rehab(6.0-GRV)	2-lane Br (n=11,L=277m)	14.96	22.47	37.43	1.1 (D)
					1.0	6.0	PCC	Good	-					
Imp-2/ Widen	N12-1	22.7	79	78	15.0	4.0-5.0	GRV	Fair	Widen(6.0-GRV)		16.47	.00	16.47	1.8 (T)
					7.7	3.6-6.0	GRV	Fair/Bad	Rehab(6.0-GRV)					
	N12-2	6.5	35	35	3.9	4.0-4.5	GRV	Fair	Widen(6.0-GRV)		4.53	.00	4.53	.0 (T)
					2.6	3.2-4.0	GRV	Bad	Rehab(6.0-GRV)					
New Const.	B16-3	6.0	0	8	1.5	2.8	GRV	Bad	Rehab(6.0-GRV)	2-lane Br (n= 1,L=100m)	12.17	6.45	18.62	11.8 (D)
					4.5		None		New-C(6.0-GRV)					

(T):Traffic Project
(D):Development Project

TABLE 5.1 - 2 (3)

Summary of Proposed Improvement ANTIQUE

Minor(National/Provincial)

Type of Impr't	Road Number	Length (km)	1993 AADT w/o	1993 AADT with	Existing Condition L	Width	Type Condition	Proposed Improvement	Proposed Bridge (Number/Total Length)	Cost (Million Peso) Road	Bridge	Total	IRR (%)
Rehab/ Imp-1	P10	2.3	0	13	.8	4.5	GRV Fair	Widen(6.0-GRV)		1.50	.00	1.50	30.1 (D)
					1.5	4.0	GRV Bad	Rehab(6.0-GRV)					
	N7-2	1.9	25	29	1.9	5.5	GRV Bad	Rehab(6.0-GRV)		1.32	.00	1.32	22.7 (D)
	P23	7.5	25	46	7.5	4.0-6.0	GRV Bad	Rehab(6.0-GRV)	2-lane Br (n= 1,L= 24m)	6.97	1.87	8.85	22.3 (D)
	N7-1	3.3	22	26	2.7	6.0	GRV Bad	Rehab(6.0-GRV)		1.85	.00	1.85	21.0 (D)
					.6	6.2	PCC Good	-					
	P17	2.0	18	38	2.0	4.0	GRV Bad	Rehab(6.0-GRV)		1.79	.00	1.79	20.7 (D)
	P9	1.0	3	7	1.0	3.6	GRV Bad	Rehab(6.0-GRV)	2-lane Sp (n= 1,L= 6m)	.69	.11	.80	20.5 (D)
	N7-3	4.0	27	30	3.6	5.5	GRV Bad	Rehab(6.0-GRV)		3.09	.00	3.09	19.6 (D)
					.4	6.0	BT Bad	Rehab(6.0-BMP)					
	P16	1.2	3	5	.1	4.5	BT V.Bad	Rehab(6.0-BMP)		.91	.00	.91	12.6 (D)
					1.1	3.6	GRV Bad	Rehab(6.0-GRV)					
	P34	2.0	4	8	.9	4.0	GRV Fair	Widen(6.0-GRV)		2.09	.00	2.09	12.1 (D)
					1.1	4.0	GRV Bad	Rehab(6.0-GRV)					
	P13	1.3	9	15	1.3	3.6	GRV V.Bad	Rehab(6.0-GRV)		2.07	.00	2.07	12.1 (D)
	P21	2.8	10	13	1.9	4.5	GRV Bad	Rehab(6.0-GRV)	2-lane Br (n= 1,L= 12m)	2.90	1.30	4.20	11.9 (D)
					.9	3.5	BT V.Bad	Rehab(6.0-BMP)					
	P11	1.5	12	20	.4	4.0	GRV Fair	Widen(6.0-GRV)		1.22	.00	1.22	11.4 (D)
					1.1	3.2	GRV Bad	Rehab(6.0-GRV)					
	N8	7.6	28	33	7.6	4.0-5.0	GRV Bad	Rehab(6.0-GRV)		6.32	.00	6.32	10.8 (D)
	P20	2.9	15	22	2.9	2.8-3.4	GRV Bad	Rehab(6.0-GRV)	2-lane Br (n= 1,L= 13m)	2.39	1.35	3.74	9.7 (D)
	P33	8.1	11	20	1.4	4.0	GRV Fair	Widen(6.0-GRV)		10.56	.00	10.56	9.6 (D)
					6.7	2.4-3.2	GRV Bad	Rehab(6.0-GRV)					
	P22	1.9	4	10	1.9	3.2	GRV Bad/V.Bad	Rehab(6.0-GRV)	2-lane Sp (n= 2,L=170m)	4.66	3.09	7.75	8.0 (D)
	P31	2.8	8	17	2.8	4.0-5.0	GRV Bad	Rehab(6.0-GRV)		2.96	.00	2.96	7.9 (D)
	P14	2.4	10	14	2.4	5.6	GRV Bad	Rehab(6.0-GRV)		1.98	.00	1.98	7.4 (D)
Imp-2/ Widen	N3	11.9	100	114	5.3	5.0	GRV Good	Widen(6.0-GRV)	1-cell BC (n= 1,L= 3m)	7.19	.39	7.58	36.9 (D)
					2.0	5.0	BT Fair	Widen(6.0-BMP)					
					4.6	5.0	GRV Bad	Rehab(6.0-GRV)					
	P4-1	1.9	11	23	.7	4.0	GRV Bad	Rehab(6.0-GRV)		1.17	.00	1.17	31.2 (D)
					1.2	4.5	GRV Fair	Widen(6.0-GRV)					
	P4-2	2.0	10	21	.3	3.6	GRV Bad	Rehab(6.0-GRV)	2-lane Br (n= 1,L= 16m)	1.18	1.49	2.67	4.0 (D)
					1.7	4.5	GRV Fair	Widen(6.0-GRV)					
New Const.	P36	2.4	0	1	.4	2.4-5.0	GRV Bad	Rehab(6.0-GRV)	2-lane Sp (n= 1,L= 45m)	3.88	.82	4.70	12.7 (D)
					2.0		None	New-C(6.0-GRV)					
	P32	6.8	0	6	3.3	1.6-3.2	GRV Bad/Impas	Rehab(6.0-GRV)	2-lane Br (n= 1,L= 12m)	10.85	1.30	12.15	8.2 (D)
					3.5		None	New-C(6.0-GRV)					

(T):Traffic Project
(D):Development Project

TABLE 5.1 - 2 (4)

Summary of Proposed Improvement ANTIQUE

Minor(Barangay)

Type of Impr't	Road Number	Length (km)	1993 AADT w/o	1993 AADT with	Existing Condition L	Existing Condition Width	Existing Condition Type Condition	Proposed Improvement	Proposed Bridge (Number/Total Length)	Cost (Million Peso) Road	Cost (Million Peso) Bridge	Cost (Million Peso) Total	IRR (%)
Rehab/ Imp-1	B09-1	9.5	8	13	5.6 3.1 .8	3.6-4.0 2.4-3.6	GRV Bad/V.Bad EAR V.Bad/Impa None	Rehab(4.0-GRV) Imp-1(4.0-GRV) New-C(4.0-GRV)	1-lane Br (n= 2,L= 22m)	5.94	1.79	7.73	23.6 (D)
	B13-1	11.5	0	7	7.5 2.0 2.0	2.4-4.5 2.4	GRV Bad/V.Bad EAR Impas None	Rehab(4.0-GRV) Imp-1(4.0-GRV) New-C(4.0-GRV)	1-lane Br (n= 1,L= 36m) 1-lane Sp (n= 3,L= 48m)	7.19	2.63	9.82	17.9 (D)
New Const.	B17-1	21.7	0	14	3.7 18.0	2.9	GRV Bad None	Rehab(4.0-GRV) New-C(4.0-GRV)	1-lane Sp (n= 7,L=190m) 2-cell BC (n= 1,L= 10m)	13.15	3.03	16.19	23.8 (D)
	B08-3	10.7	0	9	2.0 8.7	1.6-3.6	GRV Bad None	Rehab(4.0-GRV) New-C(4.0-GRV)		7.27	.00	7.27	20.2 (D)
	B04-1	12.0	0	5	.4 2.6 9.0	3.4 2.0	GRV Bad EAR Impas None	Rehab(4.0-GRV) Imp-1(4.0-GRV) New-C(4.0-GRV)	1-lane Sp (n= 2,L= 45m)	7.11	.59	7.70	17.0 (D)
	B09-3	7.0	0	5	.3 2.3 4.4	3.3 3.4	BT Fair GRV V.Bad None	Widen(6.0-BMP) Rehab(4.0-GRV) New-C(4.0-GRV)	1-lane Sp (n= 1,L= 16m)	12.79	.21	13.00	12.9 (D)

(T):Traffic Project
(D):Development Project

5.1.2 Cost Estimate

1) Unit Cost

Unit prices for construction equipment, materials and labor were obtained from Associated Construction Equipment Lessors, Inc. (ACEL), the Price Monitoring Section of DPWH, market price survey by the Study Team and relevant studies. Based on the data collected, unit prices at April 1990 prices were developed. Exchange rates used were : P22.50 = US$1.00 = Y155.

Unit costs for major construction items are presented in Table 5.1-3.

2) Construction Cost Estimate

Based on the results of the road inventory survey and proposed type of improvement, the quantity of each construction item was computed for each road project. Then the constuction cost was estimated.
Table 5.1-4 presents estimated quantities and construction cost of each road project.

TABLE 5.1-3 UNIT COST OF MAJOR CONSTRUCTION ITEMS

Unit: Pesos at April 1990 Prices

Item No.	Description	Unit	Unit Price
100	Clearing nad Grubbing	sq.m.	2.10
102	Stripping	cu.m.	52.00
106	Roadway and Drainage Excavation	cu.m.	58.00
107	Borrow	cu.m.	110.00
108	Aggregate Subbase	cu.m.	225.00
118-1	Preparation Of Previously Constructed Road (Gravel)	sq.m.	7.00
118-2	Preparation Of Previously Constructed Road (Asphalt)	sq.m.	8.00
118-3	Preparation of Existing Pavement Surface (PCC)	sq.m.	22.50
118-4	Preparation of Existing Pavement Surface (AC)	sq.m.	17.00
200	Crushed Aggregate Base Course	cu.m.	305.00
300	Crushed Aggregate Surface Course	cu.m.	305.00
302	Bituminous Prime Coat	MT	11,100.00
303	Bituminous Tact Coat	MT	11,500.00
306	Bituminous Macadam Pavement	sq.m.	95.00
310	Bituminous Concrete Surface Course	MT	1,350.00
314	Double Bituminous Surface Treatment	sq.m.	45.00
316-1	PCC Pavement (t = 23cm)	sq.m.	320.00
316-2	PCC Pavement (t = 20cm)	sq.m.	280.00
316-3	PCC Pavement (t = 18cm)	sq.m.	250.00
413-1	RCPC (Ø 910mm)	sq.m.	1,550.00
413-2	Headwal T for RCPC (Ø 910mm)	set	2,900.00
500	Grouted Riprap	sq.m.	625.00
517	Side Ditch (Grouted Riprap)	m	360.00
Bridge Cost			
	2-lane Superstructure	m	43,500.00
	Abutment for 2-lane bridge	each	330,000.00
	Pier for 2-lane bridge	each	285,000.00
	1-lane Superstructure	m	32,000.00
	Abutment for 1-lane bridge	each	230,000.00
	Pier for 1-lane bridge	each	200,000.00
Reinforced Concrete Box Culvert			
	1-Cell RCBC	m	20,600.00
	2-Cell RCBC	m	36,000.00
	Wing wall and Apron for 1-Cell RCBC	set	132,000.00
	Wing wall and Apron for 2-Cell RCBC	set	155,000.00
Spillway			
	2-lane Spillway	m	16,500.00
	1-lane Spillway	m	12,000.00
Slope Protection Cost			
	Cut Slope Protection	m	23,000.00
	Embankment Slope Protection	m	25,000.00

TABLE 5.1 - 4 (1)

Quantity and Construction Cost ANTIQUE

	Unit	N1-8	N1-17	N1-14	N1-13	N1-11	N1-10	N1-9	N1-12	N1-16	N9-1	N2-4
Total Road Length	km	18.7	4.6	15.4	20.6	13.3	6.4	13.3	17.7	5.7	3.3	15.5
Improvement Length	km	.0	4.6	15.4	20.6	13.3	5.9	13.3	17.7	5.7	3.3	15.5
Proposed Pavement Type			6.0-BMP	6.0-BMP	6.0-BMP	6.0-BMP 6.5-BMP	6.0-BMP	6.7-AC	6.5-BMP 6.0-BMP	6.0-BMP	6.0-PCC	6.0-BMP
Quantity												
100 Clearing & Grubbing	m2	-	-	-	-	-	-	-	-	-	-	-
Stripping	m3	-	-	-	-	-	-	-	-	-	-	-
102 Roadway & Drainage Excavation	m3	-	17847	25868	66326	33789	22202	57856	29818	29360	5676	18862
104 Borrow	m3	-	-	-	7588	-	-	-	7925	-	-	-
200 Aggregate Subbase	m3	-	7701	35161	45482	22825	8957	17682	30880	10377	9636	28203
Preparation of Prev.Road(Grvl)	m2	-	17800	144850	164900	56700	30800	-	92000	26850	-	104190
Preparation of Prev.Road(Asph)	m2	-	7100	-	-	-	-	-	-	-	19800	11300
Preparation of Pave.Surf.(PCC)	m2	-	-	-	-	-	-	-	-	-	-	-
Preparation of Pave.Surf.(AC)	m2	-	-	-	-	-	-	-	-	-	-	-
202 Crushed Aggregate Base Course	m3	-	4604	15165	20019	11535	5588	5520	16361	5729	-	15857
300 Crushed Aggr. Surface Course	m3	-	-	-	-	-	-	-	-	-	-	-
301 Bituminous Prime Coat	M.T.	-	32	107	141	81	39	27	115	40	-	112
302 Bituminous Tack Coat	M.T.	-	-	-	-	-	-	-	-	-	-	-
305 Bituminous Macadam Pavement	m2	-	27000	88800	117100	67100	32700	-	95500	33600	-	93000
310 Bitum.Concrete Surface Course	M.T.	-	-	-	-	-	-	2487	-	-	-	-
304 Double Bitum.Surface Treatment	m2	-	-	-	-	-	-	-	-	-	-	-
311-1 PCC Pavement (t=23 cm)	m2	-	-	-	-	-	-	-	-	-	-	-
311-2 PCC Pavement (t=20 cm)	m2	-	-	-	-	-	-	-	-	-	19800	-
311-3 PCC Pavement (t=18 cm)	m2	-	600	600	-	1200	1200	-	1200	600	-	-
500 RCPC (dia.910mm)	m	-	135	451	609	370	173	216	512	165	105	465
Headwall for RCPC (dia.910mm)	Set	-	9	31	42	27	12	27	36	11	7	31
504 Grouted Riprap	m3	-	-	-	743	-	-	-	743	-	-	-
Side Ditch (Grouted Riprap)	m	-	4900	1500	5200	1300	4400	2500	-	4200	-	-
Slope Protection (Cut Slope)	m	-	-	-	-	-	-	-	-	-	-	-
Slope Protection (Embank't Sl)	m	-	-	-	-	-	-	-	-	-	-	-
2-lane Bridge,Superstructure	m	533	-	96	170	391	46	-	53	-	-	162
1-lane Bridge,Superstructure	m	27	-	-	-	60	36	-	-	-	-	-
2-lane Bridge,Abutment	Each	10	-	6	8	4	4	-	6	-	-	10
1-lane Bridge,Abutment	Each	4	-	-	-	4	4	-	-	-	-	-
2-lane Bridge,Pier	Each	19	-	3	5	14	1	-	-	-	-	4
1-lane Bridge,Pier	Each	-	-	-	-	1	1	-	-	-	-	-
2-lane Spillway	m	-	-	-	-	-	-	-	-	-	-	-
1-lane Spillway	m	-	-	-	-	-	-	-	-	-	-	-
1-cell RCBC	m	-	-	-	-	-	-	-	13	-	-	-
2-cell RCBC	m	9	-	-	13	-	12	82	13	-	-	-
Wingwall for 1-cell RCBC	Set	-	-	-	-	-	-	-	1	-	-	-
Wingwall for 2-cell RCBC	Set	1	-	-	1	-	1	6	1	-	-	-
Miscellaneous	l.s.	1	1	1	1	1	1	1	1	1	1	1
Road Construction Cost	M.p.	.00	10.37	28.76	42.09	21.67	12.05	15.39	29.91	12.72	9.22	26.38
Bridge Construction Cost	M.p.	37.54	.00	7.71	13.29	27.87	7.11	4.28	5.84	.00	.00	12.63
Total Construction Cost	M.p.	37.54	10.37	36.48	55.38	49.54	19.16	19.67	35.75	12.72	9.22	39.01
Road Construction Cost/Impr't km	M.p.	.00	2.25	1.87	2.04	1.63	2.04	1.16	1.69	2.23	2.79	1.70
Total Construction Cost/Total km	M.p.	2.01	2.25	2.37	2.69	3.72	2.99	1.48	2.02	2.23	2.79	2.52

TABLE 5.1 - 4 (2)

Quantity and Construction Cost ANTIQUE

	Unit	N9-2	N2-3	N9-3	N10	N2-2	N2-1	N12-1	N12-2	B16-3	P10	N7-2
Total Road Length	km	11.2	13.0	7.4	14.2	15.3	15.3	22.7	6.5	6.0	2.3	1.9
Improvement Length	km	10.6	13.0	7.4	14.2	15.3	14.3	22.7	6.5	6.0	2.3	1.9
Proposed Pavement Type		6.0-PCC 6.0-BMP	6.0-BMP	6.0-PCC 6.0-GRV	6.0-GRV 6.0-BMP	6.0-GRV 6.0-BMP	6.0-GRV	6.0-GRV	6.0-GRV	6.0-GRV	6.0-GRV	6.0-GRV
Quantity												
100 Clearing & Grubbing	m2	-	-	-	-	-	-	-	-	112500	-	-
Stripping	m3	-	-	-	-	-	-	-	-	12150	-	-
102 Roadway & Drainage Excavation	m3	16313	60989	34843	69876	21299	50105	49977	13090	68625	2157	1425
104 Borrow	m3	6741	-	2848	5636	5660	3589	7912	1732	10540	1124	1074
200 Aggregate Subbase	m3	21189	23163	4934	9839	7975	9438	8256	2675	3960	1158	1254
Preparation of Prev.Road(Grvl)	m2	98838	90600	41810	73060	84470	81120	108700	32190	9900	13500	12540
Preparation of Prev.Road(Asph)	m2	-	1200	-	2500	3900	-	-	-	-	-	-
Preparation of Pave.Surf.(PCC)	m2	-	-	-	-	-	-	-	-	-	-	-
Preparation of Pave.Surf.(AC)	m2	-	-	-	-	-	-	-	-	-	-	-
202 Crushed Aggregate Base Course	m3	10742	13094	-	512	716	-	-	-	-	-	-
300 Crushed Aggr. Surface Course	m3	-	-	6570	12276	12870	12546	20160	5850	5400	2070	1710
301 Bituminous Prime Coat	M.T.	76	92	-	4	5	-	-	-	-	-	-
302 Bituminous Tack Coat	M.T.	-	-	-	-	-	-	-	-	-	-	-
305 Bituminous Macadam Pavement	m2	63000	76800	-	3000	4200	-	-	-	-	-	-
310 Bitum.Concrete Surface Course	M.T.	-	-	-	-	-	-	-	-	-	-	-
304 Double Bitum.Surface Treatment	m2	-	-	-	-	-	-	-	-	-	-	-
311-1 PCC Pavement (t=23 cm)	m2	-	-	-	-	-	-	-	-	-	-	-
311-2 PCC Pavement (t=20 cm)	m2	100	-	200	-	-	-	-	-	-	-	-
311-3 PCC Pavement (t=18 cm)	m2	-	1200	-	360	1800	2160	1800	-	-	-	-
500 RCPC (dia.910mm)	m	315	390	225	420	465	435	675	195	345	75	60
Headwall for RCPC (dia.910mm)	Set	21	26	15	28	31	29	45	13	23	5	4
504 Grouted Riprap	m3	-	-	-	-	-	-	-	-	616	-	-
Side Ditch (Grouted Riprap)	m	1500	7700	1450	2800	2550	6900	2250	600	4050	-	-
Slope Protection (Cut Slope)	m	10	-	-	-	-	-	-	-	-	-	-
Slope Protection (Embank't Sl)	m	5	-	-	-	-	-	-	-	-	-	-
2-lane Bridge,Superstructure	m	50	68	128	842	353	277	-	-	100	-	-
1-lane Bridge,Superstructure	m	-	-	-	-	-	-	-	-	-	-	-
2-lane Bridge,Abutment	Each	6	6	8	34	32	22	-	-	2	-	-
1-lane Bridge,Abutment	Each	-	-	-	-	-	-	-	-	-	-	-
2-lane Bridge,Pier	Each	-	1	3	24	3	4	-	-	3	-	-
1-lane Bridge,Pier	Each	-	-	-	-	-	-	-	-	-	-	-
2-lane Spillway	m	-	-	-	-	-	-	-	-	-	-	-
1-lane Spillway	m	-	-	-	-	-	-	-	-	-	-	-
1-cell RCBC	m	-	-	-	-	-	-	-	-	-	-	-
2-cell RCBC	m	-	-	21	-	-	-	-	-	-	-	-
Wingwall for 1-cell RCBC	Set	-	-	-	-	-	-	-	-	-	-	-
Wingwall for 2-cell RCBC	Set	-	-	2	-	-	-	-	-	-	-	-
Miscellaneous	l.s.	1	1	1	1	1	1	1	1	1	1	1
Road Construction Cost	M.p.	20.59	28.00	7.38	14.82	12.16	14.96	16.47	4.53	12.17	1.50	1.32
Bridge Construction Cost	M.p.	4.57	5.75	11.14	60.16	29.45	22.47	.00	.00	6.45	.00	.00
Total Construction Cost	M.p.	25.16	33.75	18.52	74.98	41.60	37.43	16.47	4.53	18.62	1.50	1.32
Road Construction Cost/Impr't km	M.p.	1.94	2.15	1.00	1.04	.79	1.05	.73	.70	2.03	.65	.69
Total Construction Cost/Total km	M.p.	2.25	2.60	2.50	5.28	2.72	2.45	.73	.70	3.10	.65	.69

TABLE 5.1 - 4 (3)

Quantity and Construction Cost ANTIQUE

	Unit	P23	N7-1	P17	P9	N7-3	P16	P34	P13	P21	P11	N8
Total Road Length	km	7.5	3.3	2.0	1.0	4.0	1.2	2.0	1.3	2.8	1.5	7.6
Improvement Length	km	7.5	2.7	2.0	1.0	4.0	1.2	2.0	1.3	2.8	1.5	7.6
Proposed Pavement Type		6.0-GRV	6.0-GRV	6.0-GRV	6.0-GRV	6.0-GRV 6.0-BMP	6.0-BMP 6.0-GRV	6.0-GRV	6.0-GRV	6.0-GRV 6.0-BMP	6.0-GRV	6.0-GRV
Quantity												
100 Clearing & Grubbing	m2	-	-	-	-	-	-	-	-	-	-	-
Stripping	m3	-	-	-	-	-	-	-	-	-	-	-
102 Roadway & Drainage Excavation	m3	23850	2025	5550	750	3341	990	5960	975	3677	4061	17175
104 Borrow	m3	2496	1526	813	565	1534	622	533	5453	1050	615	3610
200 Aggregate Subbase	m3	4950	1782	1320	660	3014	890	960	858	2824	830	5016
Preparation of Prev.Road(Grvl)	m2	46690	17820	11820	6600	23760	7260	8330	8580	12360	7540	46670
Preparation of Prev.Road(Asph)	m2	-	-	-	-	2000	450	-	-	3150	-	-
Preparation of Pave.Surf.(PCC)	m2	-	-	-	-	-	-	-	-	-	-	-
Preparation of Pave.Surf.(AC)	m2	-	-	-	-	-	-	-	-	-	-	-
202 Crushed Aggregate Base Course	m3	-	-	-	-	409	102	-	-	921	-	-
300 Crushed Aggr. Surface Course	m3	6660	2430	1746	900	3240	990	1530	1170	1710	1350	6840
301 Bituminous Prime Coat	M.T.	-	-	-	-	3	1	-	-	6	-	-
302 Bituminous Tack Coat	M.T.	-	-	-	-	-	-	-	-	-	-	-
305 Bituminous Macadam Pavement	m2	-	-	-	-	2400	600	-	-	5400	-	-
310 Bitum.Concrete Surface Course	M.T.	-	-	-	-	-	-	-	-	-	-	-
304 Double Bitum.Surface Treatment	m2	-	-	-	-	-	-	-	-	-	-	-
311-1 PCC Pavement (t=23 cm)	m2	-	-	-	-	-	-	-	-	-	-	-
311-2 PCC Pavement (t=20 cm)	m2	-	-	-	-	-	-	-	-	-	-	-
311-3 PCC Pavement (t=18 cm)	m2	600	-	360	-	-	-	1800	-	-	-	-
500 RCPC (dia.910mm)	m	225	75	60	30	120	30	60	75	90	45	225
Headwall for RCPC (dia.910mm)	Set	15	5	4	2	8	2	4	5	6	3	15
504 Grouted Riprap	m3	-	-	-	-	-	-	-	770	-	-	-
Side Ditch (Grouted Riprap)	m	1850	-	300	-	-	-	550	-	50	200	1150
Slope Protection (Cut Slope)	m	-	-	-	-	-	-	-	-	-	-	-
Slope Protection (Embank't Sl)	m	-	-	-	-	-	-	-	-	-	-	-
2-lane Bridge,Superstructure	m	24	-	-	-	-	-	-	-	12	-	-
1-lane Bridge,Superstructure	m	-	-	-	-	-	-	-	-	-	-	-
2-lane Bridge,Abutment	Each	2	-	-	-	-	-	-	-	2	-	-
1-lane Bridge,Abutment	Each	-	-	-	-	-	-	-	-	-	-	-
2-lane Bridge,Pier	Each	-	-	-	-	-	-	-	-	-	-	-
1-lane Bridge,Pier	Each	-	-	-	-	-	-	-	-	-	-	-
2-lane Spillway	m	-	-	-	6	-	-	-	-	-	-	-
1-lane Spillway	m	-	-	-	-	-	-	-	-	-	-	-
1-cell RCBC	m	-	-	-	-	-	-	-	-	-	-	-
2-cell RCBC	m	-	-	-	-	-	-	-	-	-	-	-
Wingwall for 1-cell RCBC	Set	-	-	-	-	-	-	-	-	-	-	-
Wingwall for 2-cell RCBC	Set	-	-	-	-	-	-	-	-	-	-	-
Miscellaneous	l.s.	1	1	1	1	1	1	1	1	1	1	1
Road Construction Cost	M.p.	6.97	1.85	1.79	.69	3.09	.91	2.09	2.07	2.90	1.22	6.32
Bridge Construction Cost	M.p.	1.87	.00	.00	.11	.00	.00	.00	.00	1.30	.00	.00
Total Construction Cost	M.p.	8.85	1.85	1.79	.80	3.09	.91	2.09	2.07	4.20	1.22	6.32
Road Construction Cost/Impr't km	M.p.	.93	.69	.89	.69	.77	.76	1.04	1.59	1.04	.81	.83
Total Construction Cost/Total km	M.p.	1.18	.56	.89	.80	.77	.76	1.04	1.59	1.50	.81	.83

TABLE 5.1 - 4 (4)

Quantity and Construction Cost ANTIQUE

	Unit	P20	P33	P22	P31	P14	N3	P4-1	P4-2	P36	P32	B09-1
Total Road Length	km	2.9	8.1	1.9	2.8	2.4	11.9	1.9	2.0	2.4	6.8	9.5
Improvement Length	km	2.9	8.1	1.9	2.8	2.4	11.9	1.9	2.0	2.4	6.8	9.5
Proposed Pavement Type		6.0-GRV	6.0-GRV	6.0-GRV	6.0-GRV	6.0-GRV	6.0-GRV 6.0-BMP	6.0-GRV	6.0-GRV	6.0-GRV	6.0-GRV	4.0-GRV
Quantity												
100 Clearing & Grubbing	m2	-	-	-	-	-	-	-	-	44000	77000	8000
Stripping	m3	-	-	-	-	-	-	-	-	4800	8400	800
102 Roadway & Drainage Excavation	m3	2175	45832	2100	9702	1800	13772	2073	2418	21327	59750	12615
104 Borrow	m3	1489	1559	15964	567	2850	4368	810	756	2311	4571	3855
200 Aggregate Subbase	m3	1914	4786	1254	1848	1584	5378	714	555	1584	4488	4370
Preparation of Prev.Road(Grvl)	m2	19140	23460	12280	13540	15840	56860	10020	9630	1970	8890	35450
Preparation of Prev.Road(Asph)	m2	-	-	-	-	-	-	-	-	-	-	-
Preparation of Pave.Surf.(PCC)	m2	-	-	-	-	-	-	-	-	-	-	-
Preparation of Pave.Surf.(AC)	m2	-	-	-	-	-	-	-	-	-	-	-
202 Crushed Aggregate Base Course	m3	-	-	-	-	-	423	-	-	-	-	-
300 Crushed Aggr. Surface Course	m3	2520	6840	1710	2430	2160	8910	1710	1800	2160	6120	5556
301 Bituminous Prime Coat	M.T.	-	-	-	-	-	2	-	-	-	-	-
302 Bituminous Tack Coat	M.T.	-	-	-	-	-	-	-	-	-	-	-
305 Bituminous Macadam Pavement	m2	-	-	-	-	-	2000	-	-	-	-	-
310 Bitum.Concrete Surface Course	M.T.	-	-	-	-	-	-	-	-	-	-	-
304 Double Bitum.Surface Treatment	m2	-	-	-	-	-	-	-	-	-	-	-
311-1 PCC Pavement (t=23 cm)	m2	-	-	-	-	-	-	-	-	-	-	-
311-2 PCC Pavement (t=20 cm)	m2	-	-	-	-	-	-	-	-	-	-	-
311-3 PCC Pavement (t=18 cm)	m2	600	3000	-	600	-	-	-	-	-	-	960
500 RCPC (dia.910mm)	m	90	240	120	90	75	332	60	60	135	315	152
Headwall for RCPC (dia.910mm)	Set	6	16	8	6	5	24	4	4	9	21	19
504 Grouted Riprap	m3	-	-	1965	-	196	-	-	-	-	-	-
Side Ditch (Grouted Riprap)	m	-	4600	100	1400	-	-	-	-	1200	3400	-
Slope Protection (Cut Slope)	m	5	5	-	-	-	-	-	-	-	20	10
Slope Protection (Embank't Sl)	m	5	20	-	-	-	-	-	-	-	5	20
2-lane Bridge,Superstructure	m	13	-	-	-	-	-	-	16	-	12	-
1-lane Bridge,Superstructure	m	-	-	-	-	-	-	-	-	-	-	22
2-lane Bridge,Abutment	Each	2	-	-	-	-	-	-	2	-	2	-
1-lane Bridge,Abutment	Each	-	-	-	-	-	-	-	-	-	-	4
2-lane Bridge,Pier	Each	-	-	-	-	-	-	-	-	-	-	-
1-lane Bridge,Pier	Each	-	-	-	-	-	-	-	-	-	-	-
2-lane Spillway	m	-	-	170	-	-	-	-	-	45	-	-
1-lane Spillway	m	-	-	-	-	-	-	-	-	-	-	-
1-cell RCBC	m	-	-	-	-	-	11	-	-	-	-	-
2-cell RCBC	m	-	-	-	-	-	-	-	-	-	-	-
Wingwall for 1-cell RCBC	Set	-	-	-	-	-	1	-	-	-	-	-
Wingwall for 2-cell RCBC	Set	-	-	-	-	-	-	-	-	-	-	-
Miscellaneous	l.s.	1	1	1	1	1	1	1	1	1	1	1
Road Construction Cost	M.p.	2.39	10.56	4.66	2.96	1.98	7.19	1.17	1.18	3.88	10.85	5.94
Bridge Construction Cost	M.p.	1.35	.00	3.09	.00	.00	.39	.00	1.49	.82	1.30	1.79
Total Construction Cost	M.p.	3.74	10.56	7.75	2.96	1.98	7.58	1.17	2.67	4.70	12.15	7.73
Road Construction Cost/Impr't km	M.p.	.82	1.30	2.46	1.06	.82	.60	.62	.59	1.62	1.60	.63
Total Construction Cost/Total km	M.p.	1.29	1.30	4.08	1.06	.82	.64	.62	1.33	1.96	1.79	.81

TABLE 5.1 - 4 (5)

Quantity and Construction Cost ANTIQUE

	Unit	B13-1	B17-1	B08-3	B04-1	B09-3
Total Road Length	km	11.5	21.7	10.7	12.0	7.0
Improvement Length	km	11.5	21.7	10.7	12.0	7.0
Proposed Pavement Type		4.0-GRV	4.0-GRV	4.0-GRV	4.0-GRV	6.0-BMP 4.0-GRV
Quantity						
100 Clearing & Grubbing	m2	30000	209300	112500	102000	48800
Stripping	m3	3000	20930	11250	10200	4880
102 Roadway & Drainage Excavation	m3	21013	19443	15060	12075	5288
104 Borrow	m3	2961	16842	9288	8538	44542
200 Aggregate Subbase	m3	5290	9982	4922	5520	3276
Preparation of Prev.Road(Grvl)	m2	29230	16510	9200	6520	10580
Preparation of Prev.Road(Asph)	m2	-	-	-	-	-
Preparation of Pave.Surf.(PCC)	m2	-	-	-	-	-
Preparation of Pave.Surf.(AC)	m2	-	-	-	-	-
202 Crushed Aggregate Base Course	m3	-	-	-	-	140
300 Crushed Aggr. Surface Course	m3	6450	13020	6420	7200	4020
301 Bituminous Prime Coat	M.T.	-	-	-	-	1
302 Bituminous Tack Coat	M.T.	-	-	-	-	-
305 Bituminous Macadam Pavement	m2	-	-	-	-	810
310 Bitum.Concrete Surface Course	M.T.	-	-	-	-	-
304 Double Bitum.Surface Treatment	m2	-	-	-	-	-
311-1 PCC Pavement (t=23 cm)	m2	-	-	-	-	-
311-2 PCC Pavement (t=20 cm)	m2	-	-	-	-	-
311-3 PCC Pavement (t=18 cm)	m2	3000	-	-	-	-
500 RCPC (dia.910mm)	m	216	584	296	312	240
Headwall for RCPC (dia.910mm)	Set	27	73	37	39	30
504 Grouted Riprap	m3	-	-	308	-	5495
Side Ditch (Grouted Riprap)	m	-	-	-	-	-
Slope Protection (Cut Slope)	m	-	-	-	-	-
Slope Protection (Embank't Sl)	m	10	-	-	-	-
2-lane Bridge,Superstructure	m	-	-	-	-	-
1-lane Bridge,Superstructure	m	36	-	-	-	-
2-lane Bridge,Abutment	Each	-	-	-	-	-
1-lane Bridge,Abutment	Each	2	-	-	-	-
2-lane Bridge,Pier	Each	-	-	-	-	-
1-lane Bridge,Pier	Each	1	-	-	-	-
2-lane Spillway	m	-	-	-	-	-
1-lane Spillway	m	48	190	-	45	16
1-cell RCBC	m	-	-	-	-	-
2-cell RCBC	m	-	9	-	-	-
Wingwall for 1-cell RCBC	Set	-	-	-	-	-
Wingwall for 2-cell RCBC	Set	-	1	-	-	-
Miscellaneous	l.s.	1	1	1	1	1
Road Construction Cost	M.p.	7.19	13.15	7.27	7.11	12.79
Bridge Construction Cost	M.p.	2.63	3.03	.00	.59	.21
Total Construction Cost	M.p.	9.82	16.19	7.27	7.70	13.00
Road Construction Cost/Impr't km	M.p.	.63	.61	.68	.59	1.83
Total Construction Cost/Total km	M.p.	.85	.75	.68	.64	1.86

5.1.3 Summary of Preliminary Design

Results of preliminary design were summarized in Tables 5.1-5 and 5.1-6 for major and minor roads, respectively.

TABLE 5.1-5 SUMMARY OF PRELIMINARY DESIGN :
Province of Antique
- Major Roads -

	Type of Improvement			
	Rehabilitation/ Improvement - 1	Improvement-2/ Widening	New Construction	Total
Primary Major Roads				
1. No. of Links	4	5	-	9
2. Total Length (km)	59.3	56.4	-	115.7
3. Improvement Length (km)	40.6	55.9	-	96.5
4. Construction Cost (million P)	139.8	136.8	-	276.6
5. Const. Cost/Imp. Length (MP/km)	3.44	2.45	-	2.87
Secondary Major Roads				
1. No. of Links	8	2	1	11
2. Total Length (km)	95.2	29.2	6.0	130.4
3. Improvement Length (km)	93.6	29.2	6.0	128.8
4. Construction Cost (million P)	279.7	21.0	18.6	319.3
5. Const. Cost/Imp. Length (MP/km)	2.99	0.72	3.10	2.48
Major Roads Total				
1. No. of Links	12	7	1	20
2. Total Length (km)	154.5	85.6	6.0	246.1
3. Improvement Length (km)	134.2	85.1	6.0	225.3
4. Construction Cost (million P)	419.5	157.8	18.6	595.9
5. Const. Cost/Imp. Length (MP/km)	3.13	1.85	3.10	2.64

TABLE 5.1-6 SUMMARY OF PRELIMINARY DESIGN
Province of Antique
- Minor Roads -

	Type of Improvement		
	Rehabilitation/ Improvement-1&2/ Widening	New Construction	Total
Minor Roads (National/ Provincial/City)			
1. No. of Links	21	2	23
2. Total Length (km)	72.3	9.2	81.5
3. Improvement Length (km)	71.7	9.2	80.9
4. Construction Cost (million P)	74.4	16.8	91.2
5. Const. Cost/Imp. Length (MP/km)	1.04	1.83	1.13
Minor Roads (Barangay)			
1. No. of Links	2	4	6
2. Total Length (km)	21.0	51.4	72.4
3. Improvement Length (km)	21.0	51.4	72.4
4. Construction Cost (million P)	17.5	44.2	61.7
5. Const. Cost/Imp. Length (MP/km)	0.83	0.86	0.85
Minor Roads Total			
1. No. of Links	23	6	29
2. Total Length (km)	93.3	60.6	153.9
3. Improvement Length (km)	92.7	60.6	153.3
4. Construction Cost (million P)	91.9	61.0	152.9
5. Const. Cost/Imp. Length (MP/km)	0.99	1.01	1.00

5.2 ECONOMIC EVALUATION

5.2.1 Basic Assumptions

The commonly used cost-benefit analysis was applied under the following basic assumptions:

i) Analysis Period

1991 - Detailed design
1992 - Construction
1993 ↑
|
| -Project life (25 years)
|
2017 ↓

ii) Discount Rate: 15% pa

iii) Quantified Cost

Initial construction/improvement costs
Periodic maintenance costs

iv) Quantified Benefit

Traffic benefit
Development benefit (only for development projects)
Maintenance cost savings

The periodic maintenance costs, or rehabilitation costs, such as overlay, reconstruction and regravelling which will be needed after completion of the project to prolong the pavement life, were treated as project costs in this study, while the difference between routine maintenance costs and total maintenance costs in the "w/o" case was taken into account as a project benefit. In the case where the routine maintenance costs are higher than the "w/o" maintenance costs, the difference is considered as a negative benefit.

5.2.2 Economic Costs

1) Initial Construction/Improvement Costs

The construction costs discussed in Section 5.2.1 are the financial costs and do not include the costs for detailed design and construction supervision. In the cost-benefit analysis, the following economic cost was used:

Construction Cost	100%
-Tax	-15%
+Detailed Design Cost	4%
+Construction Supervision Cost	6%
Total Economic Cost	95%

In the cost-benefit stream, 4% for detailed design cost was assumed to be spent in 1991 and the remaining 91% in 1992.

2) Periodic Maintenance Costs

Periodic maintenance, or rehabilitation, will be necessary when the riding quality of a pavement decreases to a certain minimum level of acceptability. Table 5.2-1 shows the periodic maintenance assumed in this Study.

TABLE 5.2-1 PERIODIC MAINTENANCE COST ASSUMED IN THE ANALYSIS

Surface Type	Periodic Maintenance Work	Timing	Financial Cost 1) (million₱/Km)	Economic Cost
Gravel	10cm Regravelling	When thickness of gravel is reduced by 10cm, assuming 1.5cm loss annually from rainfall and 1.5cm loss every 100,000 vehicles (2-6 years)	4.0 m Gravel: ₱ 0.210 M 6.0 m Gravel: ₱ 0.320 M	85% of Cost
BMP	5.5cm BMP Overlay	When pavement serviceability decreases to 2.0, assuming 85,000 ESAL or 350,000 vehicle repetitions (4-10 years)	₱ 0.830 M	85% of Cost
AC	5 cm AC Overlay	When pavement serviceability decreases to 2.0, assuming 800,000 ESAL or 2,300,000 vehicle repetitions (8-20 years)	₱ 1.170 M	85% of Cost
PCC	5 cm AC Overlay	When pavement serviceability decreases to 2.0, assuming 2,000,000 ESAL or 5,700,000 vehicle repetitions (10-25 years)	₱ 1.200 M	85% of Cost

Note: 1) As of April 1990

5.2.3 Benefits

1) Traffic Benefits

a) Traffic Cost

Basic Traffic Costs

The basic traffic costs were provided by PMO-FS, as shown in Table 5.2-2.

TABLE 5.2-2 BASIC TRAFFIC COSTS EXCLUDING TAX (AS OF DECEMBER 1989)

	Running Cost (₱/km)	Fixed Cost (₱/hour)	Time Cost (₱/hour)
Car/Van	1.75	6.30	17.70
Jeepney	1.12	23.76	26.40
Bus	2.81	35.64	95.04
Truck	3.48	38.88	0
Motor-tricycle	0.36	8.76	4.98
Motorcycle	0.31	0.72	8.34

Actual Traffic Costs

The actual traffic costs were estimated according to the dl-system concerning running costs and the dt-system with regard to fixed and time costs. The dl-values and operating speed for different surface conditions are shown in Tables 5.2-3 and 5.2-4, respectively.

TABLE 5.2-3 DL-VALUES IN KM PER ACTUAL KM

Surface Type / Surface Condition	PCC/AC	BMP/DBST	Gravel	Earth
Good	0	0.14	0.29	-
Fair	0.17	0.38	0.60	-
Bad	0.43	0.65	0.87	1.20
Very Bad	0.89	1.04	1.20	1.56
Impassable	1.73	1.73	1.73	1.73

TABLE 5.2-4 OPERATING SPEED IN KM/HOUR

Surface Condition	Surface Type: PCC/AC OV	PCC/AC TR	PCC/AC MC	BMP/DBST OV	BMP/DBST TR	BMP/DBST MC	Gravel OV	Gravel TR	Gravel MC	Earth OV	Earth TR	Earth MC
Good	65	40	60	63	38	55	60	35	50	-	-	-
Fair	55	35	50	53	33	45	50	30	40	-	-	-
Bad	30	20	20	30	20	20	30	20	20	20	10	10
Very Bad	20	10	10	20	10	10	20	10	10	10	5	5
Impassable	10	5	5	10	5	5	10	5	5	10	5	5

Note: OV = Car/Jeepney/Bus/Truck
TR = Motor-tricycle
MC = Motorcycle

Traffic Costs of Other Transport Modes

In addition to the land-based motorized vehicles, the traffic costs of other modes were estimated as shown in Table 5.2-5.

TABLE 5.2-5 TRAFFIC COST OF OTHER MODES (COMMON TO ALL SURFACE TYPES AND CONDITIONS)

Mode	Traffic Cost in ₱/Km
Animal Drawn	4.0
Walking (head loading)	1.2
Banca Boat	2.25

b) Traffic Benefits in Traffic Projects

Traffic on the project roads wwas broken down into four categories: normal traffic, diverted traffic-1, diverted traffic-2 and generated traffic.

The traffic benefits were estimated as follows:

i) Normal Traffic : Difference in traffic costs between "w/o" and "with" cases. The change in traffic costs results not only from the improvement of surface type and condition but also from consequent change in modal distribution.

ii) Diverted Traffic-1 : Difference between traffic costs along the "w/o" route and those along the "with" route. Where diverted traffic passes through two or more project roads, the benefits were allocated to each road in proportion to length.

iii) Diverted Traffic-2 and Generated Traffic: Half of the difference in traffic costs between "w/o" and "with" cases. This is the commonly used approximation.

Traffic costs were calculated assuming the following surface conditions:

"W/O" Case : Present surface condition is maintained.
"With" Case: Gravel/BMP are maintained in a fair condition.
AC/PCC are maintained in a good condition

c) Traffic Benefits in Development Projects

No diverted traffic is expected in most development projects. The benefits from normal traffic generated traffic were estimated in the same way as used for the traffic projects paying attention to the following:

i) The travel distance considered in the benefit calculation is the distrance from the average gravity point of transport (gravity of population for passenger traffic and non-agricultural traffic and gravity of agricultural production for agricultural traffic) to the connecting point with a higher road.

ii) The benefit from generated agricultural traffic is not considered as a traffic benefit because it is included in the development benefit. Therefore, the generated traffic benefits are only from passenger traffic and non-agricultural traffic.

2) Development Benefits

Development benefits were assessed using the producer surplus approach, under the hypothesis that substantial road improvement which removes constraints on development will permit and encourage farmers to adopt modern agricultural techniques and inputs. The development benefit consists of the difference in the

net value of total production (farmgate value less production costs) between the "w/o" and "with" cases. Changes in the volume and value of agricultural production will be achieved by one or more of the following:

i) Increase in cultivated area
ii) Increase in yield
iii) Increase in intensity of land use through increasing the number of harvest or intercropping
iv) Changes in the type of crop

Using the data obtained from the socio-economic survey, development benefits were calculated from the following equation:

Benefit = PRODw(FGPw-CPw)-(FGPw-CPw/o)

where, PRODw = Production in metric tons, with
PRODw/o= Production in metric tons, w/o
FGPw = Farmgate price in pesos per metric ton, with
CPw = Production cost in pesos per metric ton, with
CPw/o = Production cost in pesos per metric ton, w/o

The increase in farmgate price resulting from reduction in traffic cost is not included in the development benefits, because it is considered a part of the traffic benefits.

Table 5.2-6 presents the summary of demographic and agricultural data.

TABLE 5.2 - 6 (1)

Summary of Demographic and Agricultural Data ANTIQUE

Class of Road	Type of Impr't	Road Number	Road Length (km)	1990 Population Total	1990 Population /km	1990 Crop Area (ha) Total	1990 Crop Area (ha) Major Crop	1993 AADT w/o	1993 AADT with	IRR (%)
Second'y Major	Rehab/ Imp-1	N9-3	7.4	18689	2526	1360	710(Palay) 450(Coco.) 200(Banan)	96	89	10.1
		N2-2	15.3	16328	1067	1430	690(Palay) 520(Coco.) 220(Banan)	77	82	1.8
		N2-1	15.3	15480	1012	1500	940(Palay) 370(Coco.) 190(Banan)	72	76	1.1
	New Const.	B16-3	6.0	2484	414	2410	1230(Coco.)1180(Palay)	0	8	11.8
Minor (Nat'l/ Prov'l)	Rehab/ Imp-1	P10	2.3	3470	1509	520	310(Palay) 140(Coco.) 70(Banan)	0	13	30.1
		N7-2	1.9	4711	2479	730	730(Palay)	25	29	22.7
		P23	7.5	5951	793	2880	1700(Palay)1180(Coco.)	25	46	22.3
		N7-1	3.3	2741	831	850	850(Palay)	22	26	21.0
		P17	2.0	6755	3378	520	310(Palay) 140(Coco.) 70(Banan)	18	38	20.7
		P9	1.0	1308	1308	180	100(Coco.) 80(Banan)	3	7	20.5
		N7-3	4.0	2885	721	1250	1150(Palay) 100(Coco.)	27	30	19.6
		P16	1.2	1732	1443	200	150(Palay) 50(Coco.)	3	5	12.6
		P34	2.0	1263	632	780	630(Corn) 150(Coco.)	4	8	12.1
		P13	1.3	4945	3804	350	280(Palay) 50(Coco.) 20(Banan)	9	15	12.1
		P21	2.8	1257	449	580	430(Palay) 150(Banan)	10	13	11.9
		P11	1.5	3164	2109	300	180(Palay) 120(Coco.)	12	20	11.4
		N8	7.6	4803	632	950	950(Palay)	28	33	10.8
		P20	2.9	2994	1032	550	420(Palay) 130(Banan)	15	22	9.7
		P33	8.1	3226	398	1690	1300(Palay) 350(Coco.) 40(Banan)	11	20	9.6
		P22	1.9	2121	1116	485	250(Palay) 235(Coco.)	4	10	8.0
		P31	2.8	3055	1091	330	230(Palay) 50(Coco.) 50(Banan)	8	17	7.9
		P14	2.4	2696	1123	300	300(Palay)	10	14	7.4
	Imp-2/ Widen	N3	11.9	11858	996	5990	4000(Palay)1760(Coco.) 230(Banan)	100	114	36.9
		P4-1	1.9	3153	1659	580	250(Banan) 180(Palay) 150(Coco.)	11	23	31.2
		P4-2	2.0	3228	1614	200	150(Coco.) 50(Palay)	10	21	4.0
	New Const.	P36	2.4	449	187	625	350(Coco.) 145(Banan) 130(Palay)	0	1	12.7
		P32	6.8	2638	388	1250	500(Coco.) 450(Palay) 300(Banan)	0	6	8.2
Minor (Baran- gay)	Rehab/ Imp-1	B09-1	9.5	4591	483	870	520(Coco.) 230(Vege.) 120(Palay)	8	13	23.6
		B13-1	11.5	1902	165	1700	700(Coco.) 490(Palay) 250(Corn) 230(Vege.) 30(Banan)	0	7	17.9
	New Const.	B17-1	21.7	6480	299	2190	980(Coco.) 800(Palay) 280(Corn) 130(Vege.)	0	14	23.8
		B08-3	10.7	3958	370	1990	1090(Palay) 790(Coco.) 110(Banan)	0	9	20.2
		B04-1	12.0	1741	145	1310	640(Coco.) 340(Corn) 180(Banan) 150(Palay)	0	5	17.0
		B09-3	7.0	3108	444	1020	740(Corn) 280(Vege.)	0	5	12.9

3) Maintenance Cost Savings

The difference in maintenance costs between the "w/o" and "with" cases is considered one of the benefits. Maintenance costs in the "w/o" case were estimated based on the current EMK system, while maintenance costs in the "with" case were estimated as shown in b) below. It is noted that periodic maintenance cost in the "with" case is not included in the calculation of maintenance cost savings, because it is treated as a part of project costs.

In the case where the routine maintenance costs in the "with" case are higher than the maintenance costs in the "w/o" case (especially in the case of new construction, the maintenance cost in the "w/o" case in zero), the difference is considered as a negative benefit).

a) Maintenance Cost in "w/o" Case

According to the current EMK system, the annual maintenance cost per km was estimated as basic maintenance cost of ₱17,143.00/km times the EMK factor as shown in Table 5.2-7.

TABLE 5.2-7
EMK FACTOR FOR DIFFERENT SURFACING AND AADT

Surface Type \ AADT	25	50	75	100	150	200	300	400
Earth	0.35	0.40	0.50					
Gravel	0.40	0.60	0.90	1.40	1.90	2.20	2.40	2.50	2.60

Surface Type \ AADT	400	600	1000	1500	2000	3000	5000	10000
Bituminous	1.10	1.55	2.10	2.50	2.60			
Gravel	0.50	0.60	0.80	0.85	0.90	0.95	1.00	1.05	1.10

b) Routine Maintenance Costs in "with" Case

The costs deemed necessary to maintain the improved roads in a fair condition were estimated as shown in Table 5.2-8.

TABLE 5.2-8
ESTIMATED ROUTINE MAINTENANCE COSTS

Surface Type	Operation	Annual Cost (peso/km)
Gravel	Vegetation Control	1,150
	Ditch Cleaning Grading Pothole Repair	4.0 m Gravel: 2,650 + 40 AADT 6.0 m Gravel: 3,000 + 45 AADT
	Total	4.0 m Gravel: 3,800 + 45 AADT 6.0 m Gravel: 4,150 + 45 AADT
BMP	Vegetation Control	1,150
	Ditch Cleaning	1,100
	Shoulder Repair	2,150
	Patching	8,000 + 7.5 AADT
	Regravelling Shoulder	8,600
	Total	21,000 + 7.5 AADT
AC	Vegetation Control	1,150
	Ditch Cleaning	1,100
	Shoulder Repair	2,150
	Crack and Joint Sealing	9,300
	Regravelling Shoulder	8,600
	Total	20,400
PCC	Vegetation Control	1,150
	Ditch Cleaning	1,100
	Shoulder Repair	2,150
	Crack and Joint Sealing	5,600
	Regravelling Shoulder	8,600
	Total	18,600

5.2.4 Economic Evaluation

Results of economic evaluation are summarized in Table 5.2-9 and illustrated in Figure 5.2-1. Results of economic evaluation of each project road is presented in Table 5.2-10.

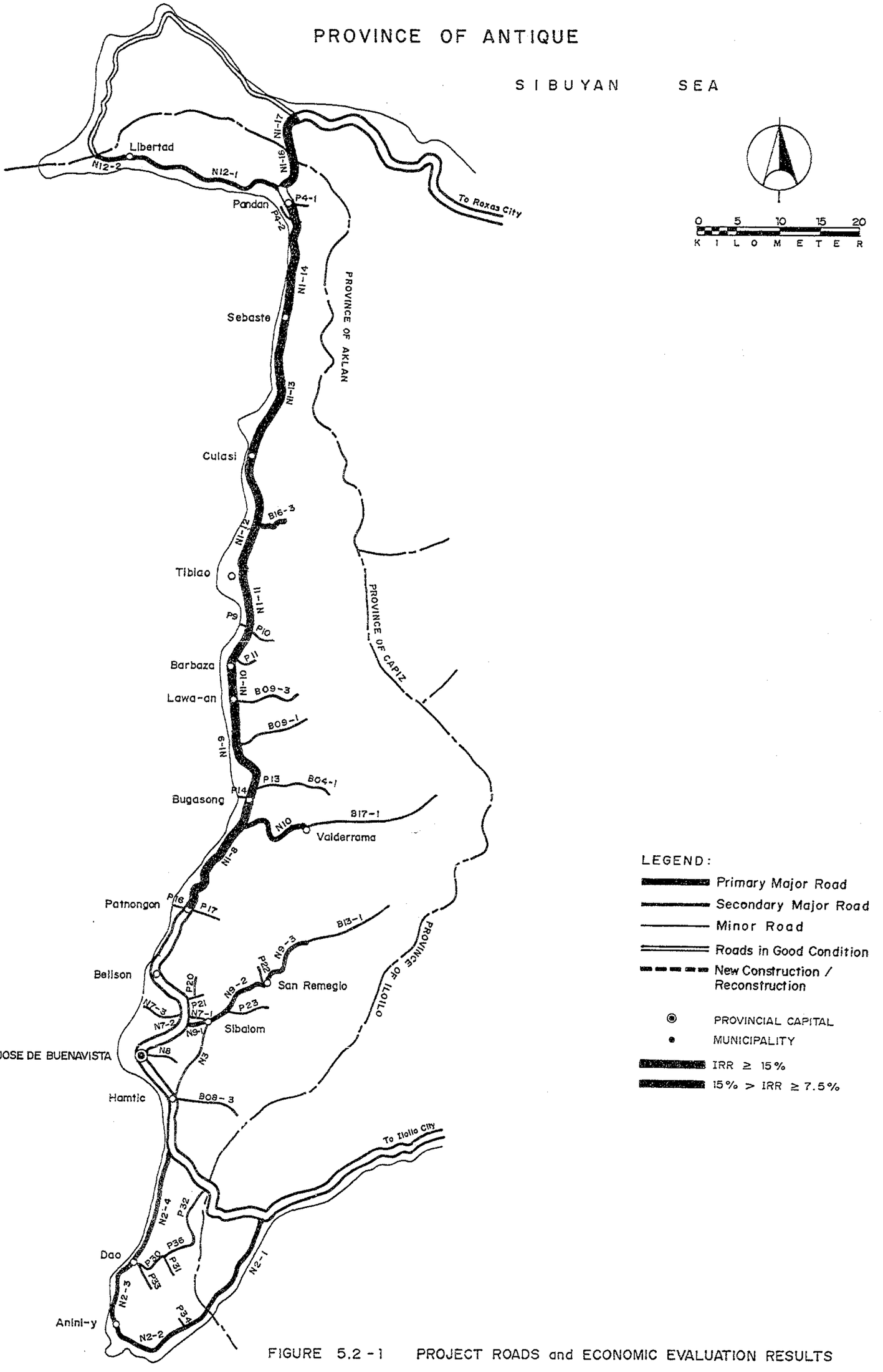


FIGURE 5.2 - 1 PROJECT ROADS and ECONOMIC EVALUATION RESULTS

TABLE 5.2 - 9 (1)

Road Length and Construction Cost ANTIQUE

Class of Road	Range of IRR	Rehabilitation/Improvement-1						Improvement-2/Widening						New Construction					
		No.	Total Length	Improv Length	Road Cost	Bridge Cost	Total Cost	No.	Total Length	Improv Length	Road Cost	Bridge Cost	Total Cost	No.	Total Length	Improv Length	Road Cost	Bridge Cost	Total Cost
Primary Major	15<	1	18.7	-	-	37.5	37.5	-	-	-	-	-	-	-	-	-	-	-	-
	10-15	-	-	-	-	-	-	3	33.0	32.5	49.1	39.3	88.4	-	-	-	-	-	-
	7.5-10	-	-	-	-	-	-	1	17.7	17.7	29.9	5.8	35.7	-	-	-	-	-	-
	<7.5	3	40.6	40.6	81.2	21.0	102.2	1	5.7	5.7	12.7	-	12.7	-	-	-	-	-	-
	Total	4	59.3	40.6	81.2	58.5	139.8	5	56.4	55.9	91.7	45.1	136.8	-	-	-	-	-	-
Second'y Major	15<	2	18.8	18.8	35.6	12.6	48.2	-	-	-	-	-	-	-	-	-	-	-	-
	10-15	3	31.6	31.0	56.0	21.5	77.4	-	-	-	-	-	-	1	6.0	6.0	12.2	6.5	18.6
	7.5-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<7.5	3	44.8	43.8	41.9	112.1	154.0	2	29.2	29.2	21.0	-	21.0	-	-	-	-	-	-
	Total	8	95.2	93.6	133.5	146.2	279.7	2	29.2	29.2	21.0	-	21.0	1	6.0	6.0	12.2	6.5	18.6
Minor (Nat'l/ Prov'l)	15<	7	22.0	21.4	17.2	2.0	19.2	2	13.8	13.8	8.4	.4	8.8	-	-	-	-	-	-
	10-15	6	16.4	16.4	15.5	1.3	16.8	-	-	-	-	-	-	1	2.4	2.4	3.9	.8	4.7
	7.5-10	4	15.7	15.7	20.6	4.4	25.0	-	-	-	-	-	-	1	6.8	6.8	10.9	1.3	12.2
	<7.5	1	2.4	2.4	2.0	-	2.0	1	2.0	2.0	1.2	1.5	2.7	-	-	-	-	-	-
	Total	18	56.5	55.9	55.2	7.7	63.0	3	15.8	15.8	9.5	1.9	11.4	2	9.2	9.2	14.7	2.1	16.8
Minor (Baran-gay)	15<	2	21.0	21.0	13.1	4.4	17.5	-	-	-	-	-	-	3	44.4	44.4	27.5	3.6	31.2
	10-15	-	-	-	-	-	-	-	-	-	-	-	-	1	7.0	7.0	12.8	.2	13.0
	7.5-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<7.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	2	21.0	21.0	13.1	4.4	17.5	-	-	-	-	-	-	4	51.4	51.4	40.3	3.8	44.2
Total	15<	12	80.5	61.2	65.9	56.6	122.5	2	13.8	13.8	8.4	.4	8.8	3	44.4	44.4	27.5	3.6	31.2
	10-15	9	48.0	47.4	71.5	22.8	94.2	3	33.0	32.5	49.1	39.3	88.4	3	15.4	15.4	28.8	7.5	35.3
	7.5-10	4	15.7	15.7	20.6	4.4	25.0	1	17.7	17.7	29.9	5.8	35.7	1	6.8	6.8	10.9	1.3	12.2
	<7.5	7	87.8	86.8	125.1	133.1	258.2	4	36.9	36.9	34.9	1.5	36.4	-	-	-	-	-	-
	Total	32	232.0	211.1	283.1	216.8	500.0	10	101.4	100.9	122.3	47.0	169.3	7	66.6	66.6	67.2	12.4	79.6

TABLE 5.2 - 9 (2)

Road Length and Construction Cost ANTIQUE

Class of Road	Range of IRR	Total					
		No.	Total Length	Improv Length	Road Cost	Bridge Cost	Total Cost
Primary Major	15<	1	18.7	-	-	37.5	37.5
	10-15	3	33.0	32.5	49.1	39.3	88.4
	7.5-10	1	17.7	17.7	29.9	5.8	35.7
	<7.5	4	46.3	46.3	93.9	21.0	114.9
	Total	9	115.7	96.5	173.0	103.6	276.6
Second'y Major	15<	2	18.8	18.8	35.6	12.6	48.2
	10-15	4	37.6	37.0	68.1	27.9	96.1
	7.5-10	-	-	-	-	-	-
	<7.5	5	74.0	73.0	62.9	112.1	175.0
	Total	11	130.4	128.8	166.7	152.6	319.3
Minor (Nat'l/ Prov'l)	15<	9	35.8	35.2	25.6	2.4	27.9
	10-15	7	18.8	18.8	19.4	2.1	21.5
	7.5-10	5	22.5	22.5	31.4	5.7	37.1
	<7.5	2	4.4	4.4	3.2	1.5	4.6
	Total	23	81.5	80.9	79.5	11.7	91.2
Minor (Baran-gay)	15<	5	65.4	65.4	40.7	8.0	48.7
	10-15	1	7.0	7.0	12.8	.2	13.0
	7.5-10	-	-	-	-	-	-
	<7.5	-	-	-	-	-	-
	Total	6	72.4	72.4	53.4	8.3	61.7
Total	15<	17	138.7	119.4	101.8	60.6	162.4
	10-15	15	96.4	95.3	149.4	69.5	218.9
	7.5-10	6	40.2	40.2	61.3	11.6	72.9
	<7.5	11	124.7	123.7	160.0	134.6	294.6
	Total	49	400.0	378.6	472.6	276.2	748.8

TABLE 5.2 - 10 (1)

Summary of Economic Analysis ANTIQUE

Cost/Benefit:1991-2017 Discounted Total

Class of Road	Type of Impr't	Road Number	1993 AADT w/o	1993 AADT with	Length (km) Total	Length (km) Improvement	Economic Cost (Mp/km) Construct.	Economic Cost (Mp/km) Period Maint.	Economic Cost (Mp/km) Total	Benefit (Mp/km) Normal	Diverted	Generated	Develop't	Maint sav'g	Benefit (Mp/km) Total	Econom. Indicator NPV (Mp)	B/C	IRR (%)
Primary Major	Rehab/ Imp-1	N1-8'	581	577	18.7	-	31.21	-	31.21	68.24	-	.30	-	-	68.54	37.3	2.2	29.4
		N1-17	183	188	4.6	4.6(6.0-BMP)	1.87	.23	2.10	1.07	-	.01	-	.04	1.12	-4.5	.5	6.7
		N1-14	142	152	15.4	15.4(6.0-BMP)	1.97	.18	2.15	.97	-	.06	-	.05	1.08	-16.5	.5	6.3
		N1-13	138	147	20.6	20.6(6.0-BMP)	2.23	.18	2.41	.99	-	.06	-	.05	1.10	-27.0	.5	5.5
	Imp-2/ Widen	N1-11	318	320	13.3	12.5(6.0-BMP) .8(6.5-BMP)	3.10	.49	3.58	3.40	-	.06	-	.06	3.51	-1.0	1.0	14.8
		N1-10	396	397	6.4	5.9(6.0-BMP)	2.70	.63	3.33	2.78	-	.04	-	.07	2.89	-2.6	.9	12.8
		N1-9	418	418	13.3	13.3(6.7-AC)	1.23	.04	1.27	.96	-	.01	-	.03	1.00	-3.6	.8	11.9
		N1-12	209	211	17.7	.9(6.5-BMP) 16.8(6.0-BMP)	1.68	.28	1.96	1.08	-	.03	-	.06	1.17	-13.9	.6	7.7
		N1-16	183	188	5.7	5.7(6.0-BMP)	1.85	.23	2.09	.97	-	.01	-	.07	1.05	-5.9	.5	6.1
Second'y Major	Rehab/ Imp-1	N9-1	1369	1244	3.3	3.3(6.0-PCC)	2.32	.06	2.38	9.05	-	-	-	.11	9.16	22.4	3.8	49.2
		N2-4	331	324	15.5	15.5(6.0-BMP)	2.09	.45	2.54	2.81	-	.05	-	.06	2.92	5.8	1.1	17.5
		N9-2	368	379	11.2	.1(6.0-PCC) 10.5(6.0-BMP)	1.97	.57	2.54	1.90	-	-	-	.07	1.97	-6.1	.8	10.9
		N2-3	218	226	13.0	13.0(6.0-BMP)	2.16	.30	2.45	1.61	-	.15	-	.07	1.83	-8.2	.7	10.8
		N9-3	96	89	7.4	.1(6.0-PCC) 7.3(6.0-GRV)	2.08	.24	2.32	.76	-	.06	.66	.10	1.58	-5.5	.7	10.1
		N10	94	91	14.2	13.7(6.0-GRV) .5(6.0-BMP)	4.39	.24	4.63	1.49	-	.00	-	.10	1.58	-43.2	.3	3.3
		N2-2	77	82	15.3	14.6(6.0-GRV) .7(6.0-BMP)	2.26	.24	2.50	.37	-	.03	.28	.08	.75	-26.7	.3	1.8
		N2-1	72	76	15.3	14.3(6.0-GRV)	2.18	.22	2.39	.31	-	.03	.26	.07	.67	-24.6	.3	1.1
	Imp-2/ Widen	N12-1	79	78	22.7	22.7(6.0-GRV)	.60	.22	.82	.29	-	.01	-	.09	.39	-9.7	.5	1.8
		N12-2	35	35	6.5	6.5(6.0-GRV)	.58	.18	.76	.13	-	.01	-	.02	.16	-3.9	.2	.0
	New Const.	B16-3	0	8	6.0	6.0(6.0-GRV)	2.58	.17	2.75	.64	-	.04	1.43	-.02	2.09	-4.0	.8	11.8

TABLE 5.2 - 10 (2)

Summary of Economic Analysis ANTIQUE

Cost/Benefit:1991-2017 Discounted Total

Class of Road	Type of Impr't	Road Number	1993 AADT w/o	1993 AADT with	Length (km) Total	Length (km) Improvement	Economic Cost (Mp/km) Construct.	Economic Cost (Mp/km) Period Maint.	Economic Cost (Mp/km) Total	Benefit (Mp/km) Normal	Diverted	Generated	Develop't	Maint sav'g	Benefit (Mp/km) Total	Econom. Indicator NPV (Mp)	B/C	IRR (%)
Minor (Nat'l/ Prov'l)	Rehab/ Imp-1	P10	0	13	2.3	2.3(6.0-GRV)	.54	.17	.72	.25	-	.01	1.44	.01	1.71	2.3	2.4	30.1
		N7-2	25	29	1.9	1.9(6.0-GRV)	.58	.18	.75	.13	-	.00	1.08	.02	1.23	.9	1.6	22.7
		P23	25	46	7.5	7.5(6.0-GRV)	.98	.19	1.17	.50	-	.02	1.33	.01	1.86	5.2	1.6	22.3
		N7-1	22	26	3.3	2.7(6.0-GRV)	.57	.17	.74	.19	-	.00	.88	.01	1.09	.9	1.5	21.0
		P17	18	38	2.0	2.0(6.0-GRV)	.74	.18	.92	.48	-	.01	.83	.00	1.32	.8	1.4	20.7
		P9	3	7	1.0	1.0(6.0-GRV)	.66	.17	.84	.11	-	.00	1.10	.01	1.22	.4	1.5	20.5
		N7-3	27	30	4.0	3.6(6.0-GRV) .4(6.0-BMP)	.64	.17	.81	.21	-	.00	.87	.01	1.10	1.1	1.3	19.6
		P16	3	5	1.2	.1(6.0-BMP) 1.1(6.0-GRV)	.63	.17	.81	.13	-	.00	.54	.01	.68	-.2	.8	12.6
		P34	4	8	2.0	2.0(6.0-GRV)	.87	.17	1.04	.11	-	.00	.70	.01	.82	-.4	.8	12.1
		P13	9	15	1.3	1.3(6.0-GRV)	1.32	.17	1.50	.23	-	.03	.90	.00	1.17	-.4	.8	12.1
		P21	10	13	2.8	1.9(6.0-GRV) .9(6.0-BMP)	1.25	.17	1.42	.22	-	.00	.87	.00	1.09	-.9	.8	11.9
		P11	12	20	1.5	1.5(6.0-GRV)	.67	.17	.85	.09	-	.01	.54	.00	.64	-.3	.8	11.4
		N8	28	33	7.6	7.6(6.0-GRV)	.69	.18	.87	.27	-	.00	.35	.02	.64	-1.7	.7	10.8
		P20	15	22	2.9	2.9(6.0-GRV)	1.07	.17	1.24	.17	-	.00	.62	.00	.79	-1.3	.6	9.7
		P33	11	20	8.1	8.1(6.0-GRV)	1.08	.17	1.26	.20	-	.01	.59	.00	.80	-3.7	.6	9.6
		P22	4	10	1.9	1.9(6.0-GRV)	3.39	.17	3.56	.82	-	.18	.90	.01	1.90	-3.2	.5	8.0
		P31	8	17	2.8	2.8(6.0-GRV)	.88	.17	1.05	.18	-	.00	.41	.00	.59	-1.3	.6	7.9
		P14	10	14	2.4	2.4(6.0-GRV)	.68	.17	.86	.12	-	.00	.35	.01	.48	-.9	.6	7.4
	Imp-2/ Widen	N3	100	114	11.9	9.9(6.0-GRV) 2.0(6.0-BMP)	.53	.24	.77	.44	-	.00	1.68	.07	2.20	17.0	2.9	36.9
		P4-1	11	23	1.9	1.9(6.0-GRV)	.51	.17	.69	.40	-	.00	1.24	.00	1.64	1.8	2.4	31.2
		P4-2	10	21	2.0	2.0(6.0-GRV)	1.11	.17	1.28	.23	-	.00	.26	.00	.49	-1.6	.4	4.0
	New Const.	P36	0	1	2.4	2.4(6.0-GRV)	1.63	.17	1.80	.20	-	.01	1.28	-.02	1.48	-.8	.8	12.7
		P32	0	6	6.8	6.8(6.0-GRV)	1.49	.17	1.66	.17	-	.01	.72	-.01	.89	-5.2	.5	8.2

TABLE 5.2 - 10 (3)

Summary of Economic Analysis ANTIQUE

Cost/Benefit:1991-2017 Discounted Total

Class of Road	Type of Impr't	Road Number	1993 AADT w/o	1993 AADT with	Length (km) Total	Length (km) Improvement	Economic Cost (Mp/km) Construct.	Economic Cost (Mp/km) Period Maint.	Economic Cost (Mp/km) Total	Benefit (Mp/km) Normal	Diverted	Generated	Develop't	Maint sav'g	Benefit (Mp/km) Total	Econom. Indicator NPV (Mp)	B/C	IRR (%)
Minor (Baran-	Rehab/ Imp-1	B09-1	8	13	9.5	9.5(4.0-GRV)	.68	.11	.79	.43	-	.07	.87	.00	1.37	5.5	1.7	23.6
		B13-1	0	7	11.5	11.5(4.0-GRV)	.71	.11	.82	.21	-	.02	.79	.00	1.02	2.2	1.2	17.9
gay)	New Const.	B17-1	0	14	21.7	21.7(4.0-GRV)	.62	.11	.73	.64	-	.08	.49	-.02	1.19	9.9	1.6	23.8
		B08-3	0	9	10.7	10.7(4.0-GRV)	.56	.11	.68	.41	-	.06	.49	-.02	.94	2.8	1.4	20.2
		B04-1	0	5	12.0	12.0(4.0-GRV)	.53	.11	.65	.23	-	.03	.49	-.02	.74	1.1	1.1	17.0
		B09-3	0	5	7.0	.3(6.0-BMP) 6.7(4.0-GRV)	1.54	.12	1.66	.21	-	.05	1.12	-.01	1.38	-2.0	.8	12.9