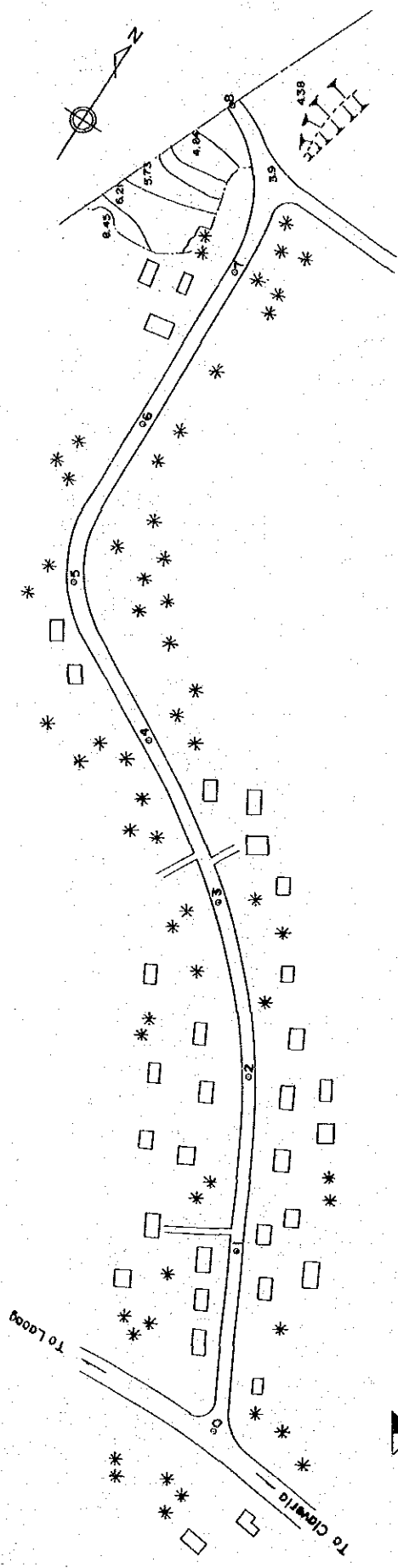


**PLAN AND PROFILE
(FEEDER ROADS)**

TAGAT ROAD (I)
 H=1:3500
 V=1:300



DL = 0.000

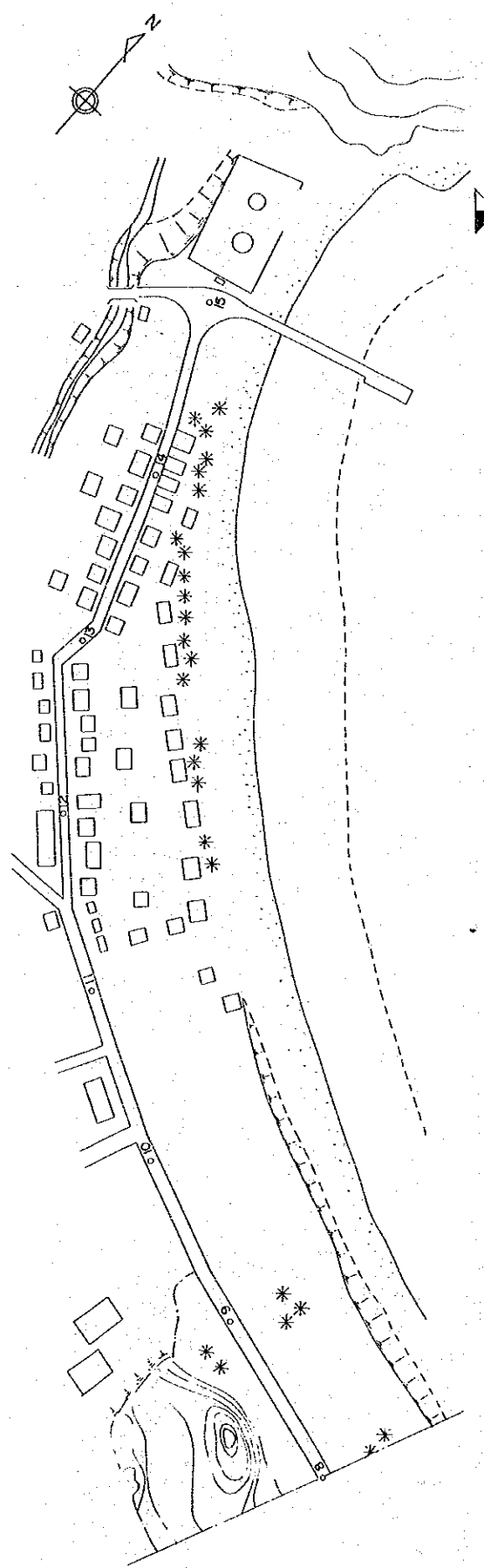
STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA.0	0	4.30	4.30	
STA.1	100	4.10	4.15	
STA.2	200	3.90	4.00	
STA.3	300	3.70	3.85	L=0.15% L=7/8000.00
STA.4	400	3.50	3.70	
STA.5	500	3.30	3.55	
STA.6	600	3.10	3.40	(3.40)
STA.7	700	3.00	3.40	
STA.8	800	3.20	3.40	

Level
 L = 3000.00

2 17

H=1:3500
V=1:300

TAGAT ROAD (II)



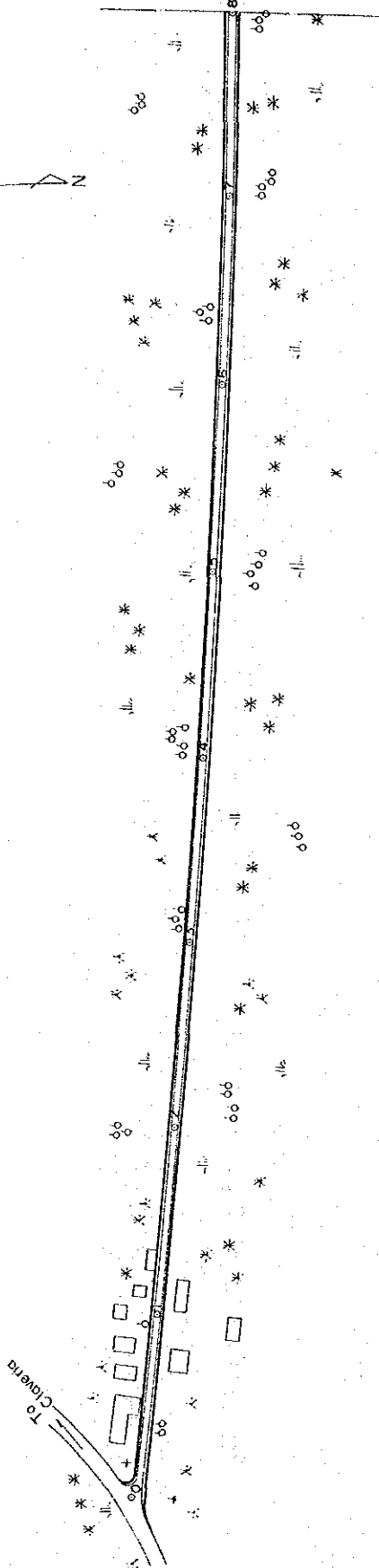
D.L. = 0M00

GRADE	PROPOSED HIGHT	GROUND HIGHT	DISTANCE	STATION
				STA 8 800
				3.20
				STA 9 900
				3.40
				+6000 960
				3.34 3.30
				(3.30)
				STA10 1000
				3.30 3.30
				STA11 1100
				3.30 3.30
				+55.00 1155
				3.30 3.30
				STA12 1200
				3.30 3.30
				STA13 1300
				3.30 3.30
				STA14 1400
				3.30 3.30
				STA15 1500
				3.35 3.30

Level
L = 540.00

CENTINELA P.T ROAD (I) H=1:3500 V=1:300

3 17



STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA 0	0	8.00	8.23	
STA 1	100	8.00	8.23	
STA 2	200	8.00	8.23	
STA 3	300	8.00	8.23	
STA 4	400	8.00	8.23	
STA 5	500	8.00	8.23	
STA 6	600	8.00	8.23	
STA 7	700	8.00	8.23	
STA 8	800	8.00	8.23	

STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA 0	0	8.00	8.23	
STA 1	100	8.00	8.23	
STA 2	200	8.00	8.23	
STA 3	300	8.00	8.23	
STA 4	400	8.00	8.23	
STA 5	500	8.00	8.23	
STA 6	600	8.00	8.23	
STA 7	700	8.00	8.23	
STA 8	800	8.00	8.23	

Level
L = 800.00

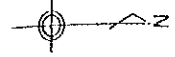
8.30

DL ±0.00

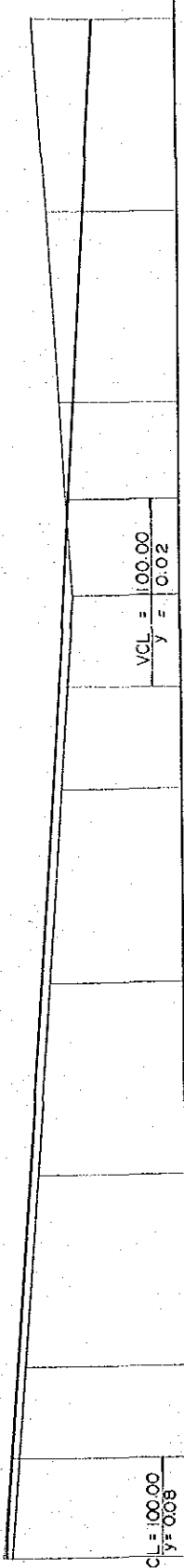
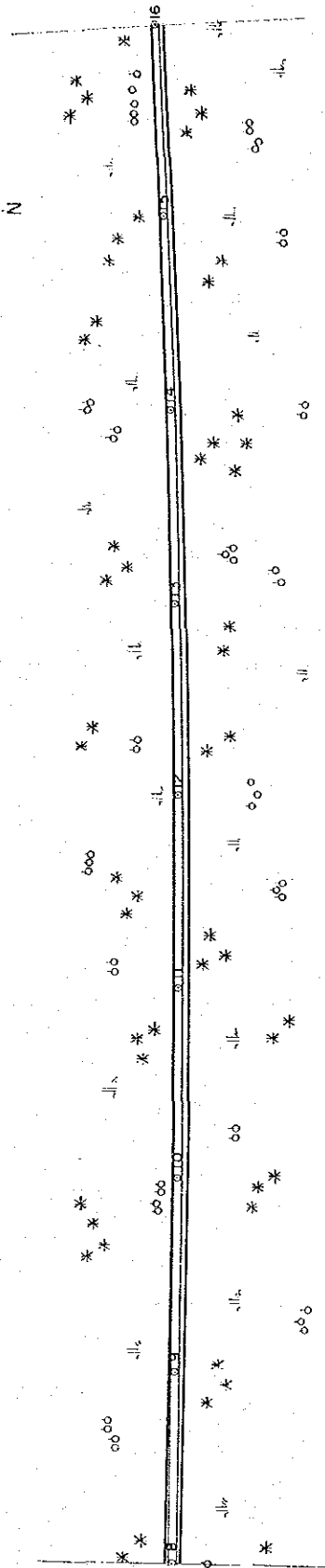
VCL=100.00
y=0.05

CENTINELA P.T ROAD (II)

4 17



H=1:3500
V=1:300



D.L. = ±0.000
VCL = 100.00
y = 0.02

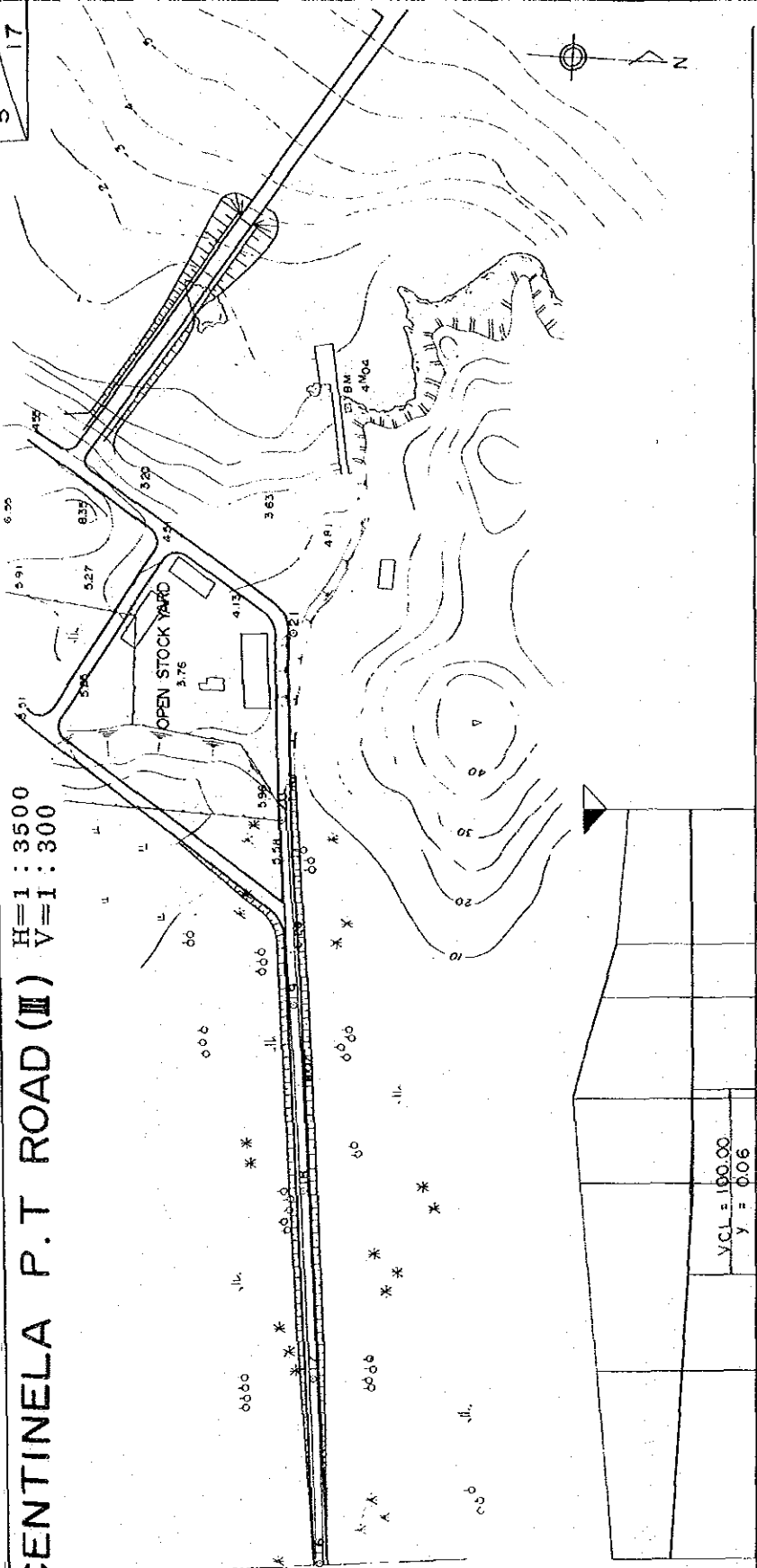
STATION	DISTANCE	GROUND HIGHT	PROPOSED HIGHT	GRADE
STA 8	800	8.00	8.23	8.30
+50.00	850	7.70	8.00	
-STA 9	900	7.40	7.70	
-STA10	1000	6.80	7.10	
-STA11	1100	6.30	6.50	
-STA12	1200	5.70	5.90	
+50.00	1250	5.35	5.60	
-STA13	1300	5.00	5.28	5.30
+50.00	1350	5.30	5.07	
-STA14	1400	5.60	4.84	
-STA15	1500	6.10	4.38	
-STA16	1600	6.50	3.92	

$i = 0.46\%$
 $L = 500.00$

$i = 0.6\%$
 $L = 500.00$

CENTINELA P.T ROAD (III)

H=1:3500
V=1:300



D.L. = ±0.000

V.C.I. = 100.00
y = 0.06

L = 0.46%
L = 500.00

Level
L = 300.00

3.00

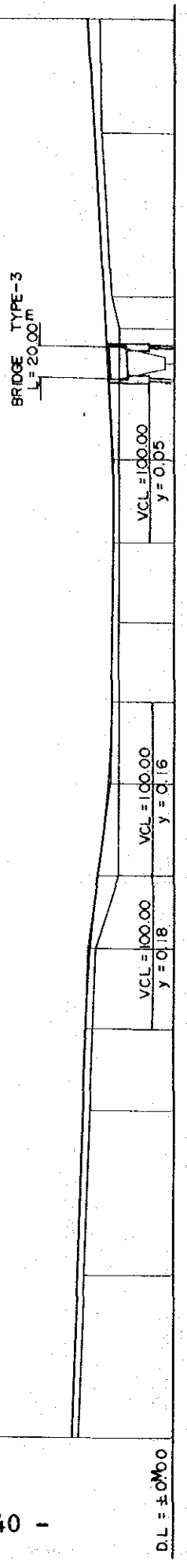
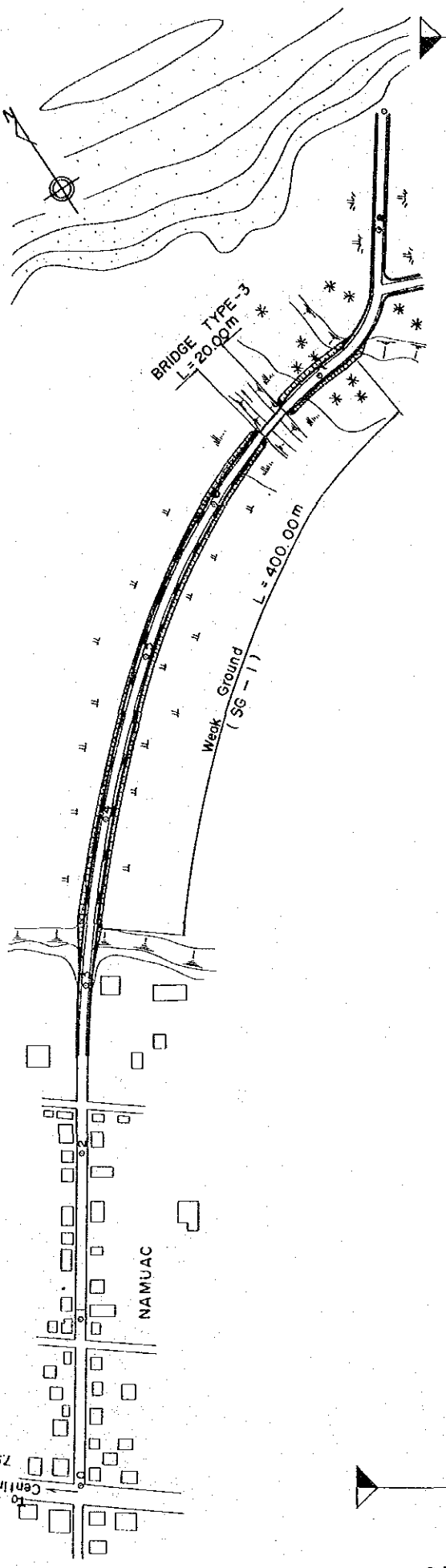
GRADE	PROPOSED HIGHT	GROUND HIGHT	DISTANCE	STATION
	3.92	6.50	1 600	STA16
	3.46	7.20	1 700	STA17
	3.23	1 750		150.00
	3.06	7.90	1 800	STA18
	3.00	8.10	1 850	150.00
	3.00	7.00	1 900	STA19
	3.00	6.30	1 930	130.00
	3.00	5.96	2 000	STA20

NAMUAC ROAD

H=1 : 3500
V=1 : 300

6 17

75km
Centinela Pt

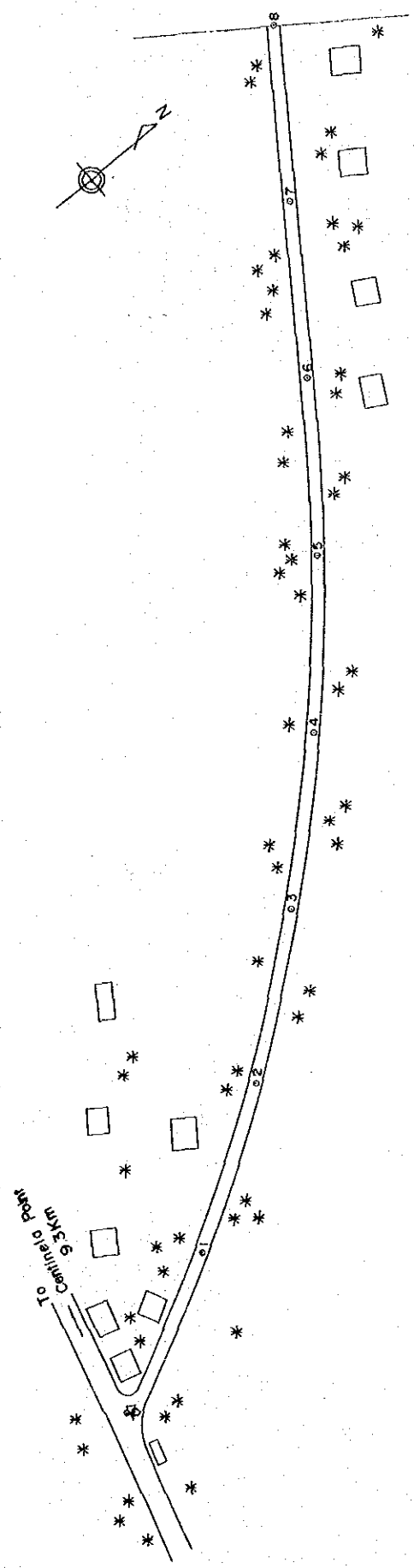


STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA 0	0	5.30	5.30	
STA 1	100	4.80	5.10	0.00% L=300.00 y=0.2%
STA 2	200	4.90	4.90	
STA 250	250	4.40	4.80	
STA 3	300	4.30	4.52	(4.70)
STA 350	350	3.20	4.08	0.00% L=100.00 y=0.24%
STA 4	400	3.20	3.62	(3.46)
STA 450	450	3.20	3.46	
STA 5	500	3.20	3.46	
STA 550	550	3.20	3.46	
STA 6	600	3.20	3.51	(3.46)
STA 650	650	3.66	3.70	
STA 680	680	3.20	3.78	
STA 7	700	3.50	3.86	
STA 750	750	3.80	4.10	
STA 8	800	4.00	4.26	
STA 870	870	4.00	4.54	0.4% L=270.00

NAGTANTAYAN ROAD (I)

H=1 : 3500
V=1 : 300

7 17



D.L. = ± 0'00

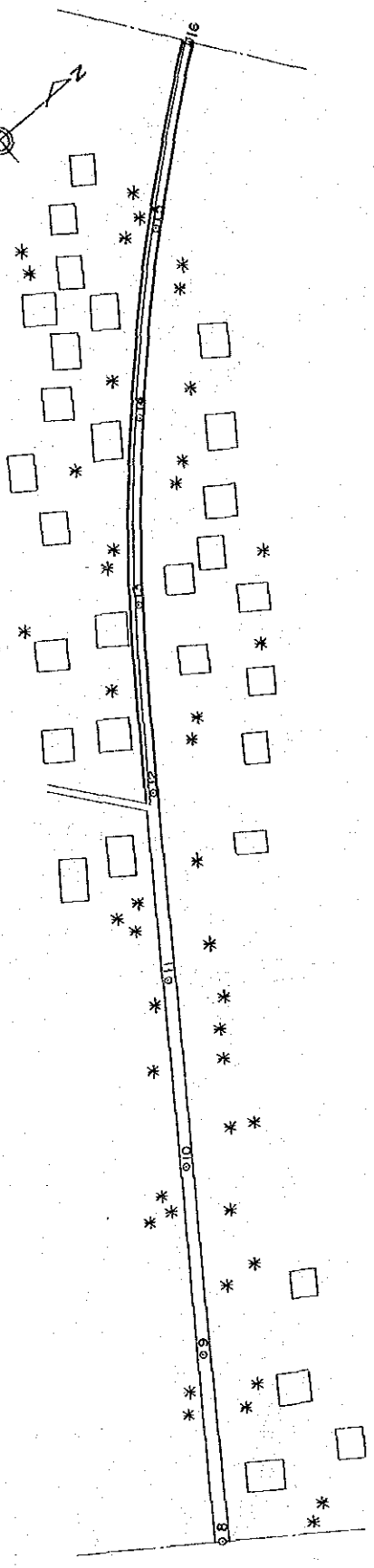
STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA. 0	0	5.00	5.30	
STA. 1	100	5.00	5.30	
STA. 2	200	5.00	5.30	
STA. 3	300	5.00	5.30	
STA. 4	400	5.00	5.30	
STA. 5	500	5.00	5.30	
STA. 6	600	5.00	5.30	
STA. 7	700	5.00	5.30	
STA. 8	800	5.00	5.30	

Level
L = 150000

8 17

NAGTANTAYAN ROAD (II)

H=1:3500
V=1:300



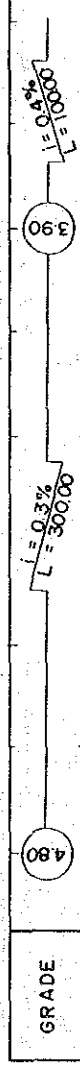
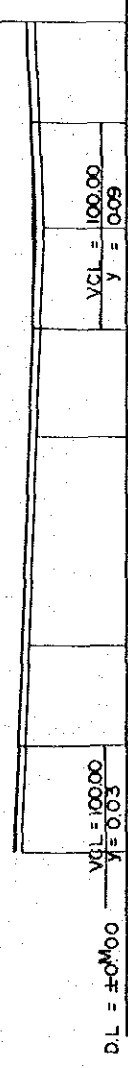
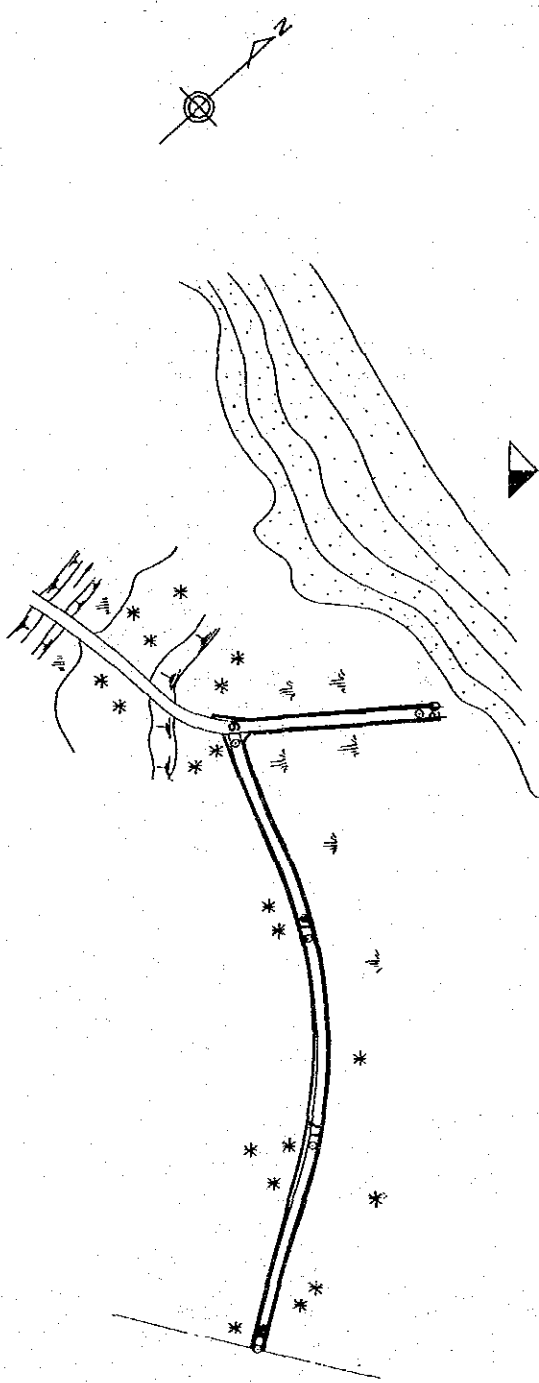
DL = ±0.00

VCL=100.00 y=0.06	VCL=100.00 y=0.03
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STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA 8	800	5.00	5.30	L=150000 L=2% L=10000
STA 9	900	5.00	5.30	
STA10	1000	5.00	5.30	
STA11	1100	5.00	5.30	
STA12	1200	5.00	5.30	
STA13	1300	5.00	5.30	
STA14	1400	5.00	5.30	
STA15	1500	5.00	5.24	(5.30)
STA16	1600	4.50	4.83	(4.80)

NAGTANTAYAN ROAD (III)

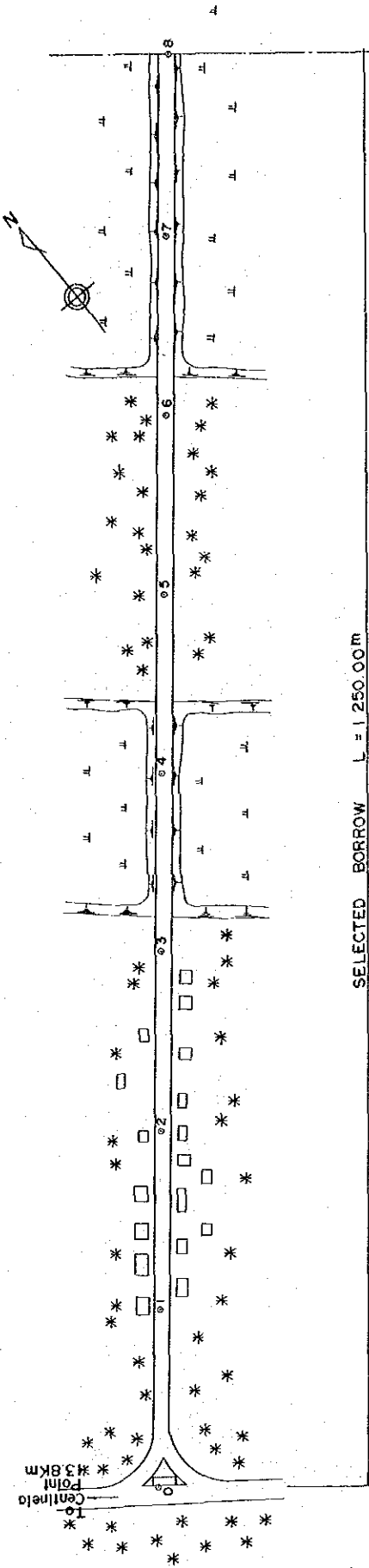
H=1 : 3500
V=1 : 300



GRADE	PROPOSED HIGHT	GROUND HIGHT	DISTANCE	STATION
(4.80)	4.50	4.83	4.50	STA.16 600
	4.35	4.65	4.20	+5000 650
	4.20	4.50	4.20	STA.17 700
	3.90	4.20	4.20	STA.18 800
	3.75	4.05	3.75	+5000 850
	3.60	3.99	3.60	STA.19 900
	3.80	3.80	4.10	+5000 950
	4.00	4.30	4.00	STA.20 2000

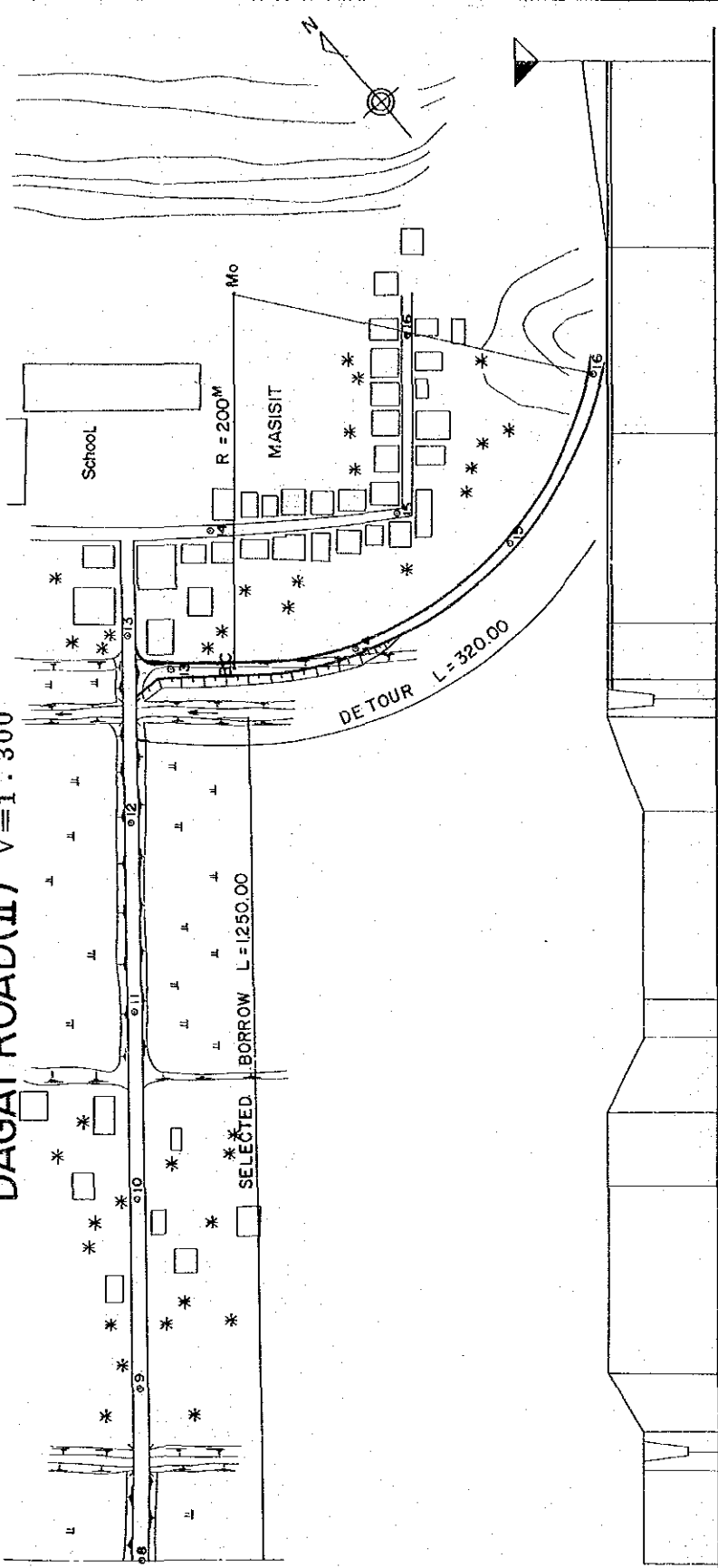
DAGAI ROAD(I)

H=1 : 3500
V=1 : 300



STATION	DISTANCE	GROUND HIGHT	PROPOSED HIGHT	GRADE
STA.0	0	5.00		
STA.1	100	5.00		
STA.2	200	5.00		
STA.3	300	5.00		
+4000	340	3.50		
STA.4	400	3.50		
+2000	420	3.50		
+6000	460	5.00		
STA.5	500	5.00		
STA.6	600	5.00		
+4000	640	3.50		
STA.7	700	3.50		
STA.8	800	3.50		

DAGAI ROAD(II)
 H=1:3500
 V=1:300



DL = ±0.000

STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA 8	800	3.50	3.50	
		+5000 850		
		+6000 860		
		+7000 870		
STA 9	900	5.00	5.00	
STA10	1000	5.00	5.00	
		+4000 1040		
		+8000 1080		
STA11	1100	3.50	3.50	
		+5000 1250		
		+6000 1260		
		+7000 1270		
STA13	1300	5.00	5.00	
STA14	1400	5.00	5.00	
STA15	1500	5.00	5.00	
STA16	1600	6.00	6.00	

Level
 L = 33000

SANCHEZ MIRA ROAD(I)

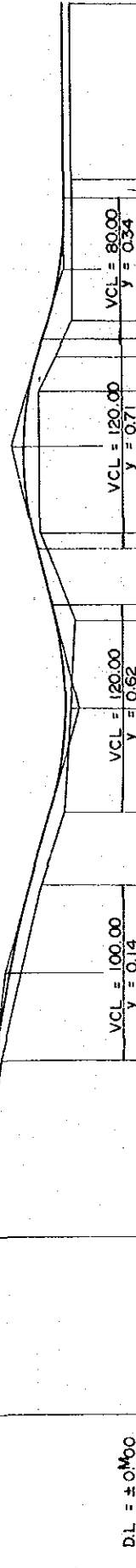
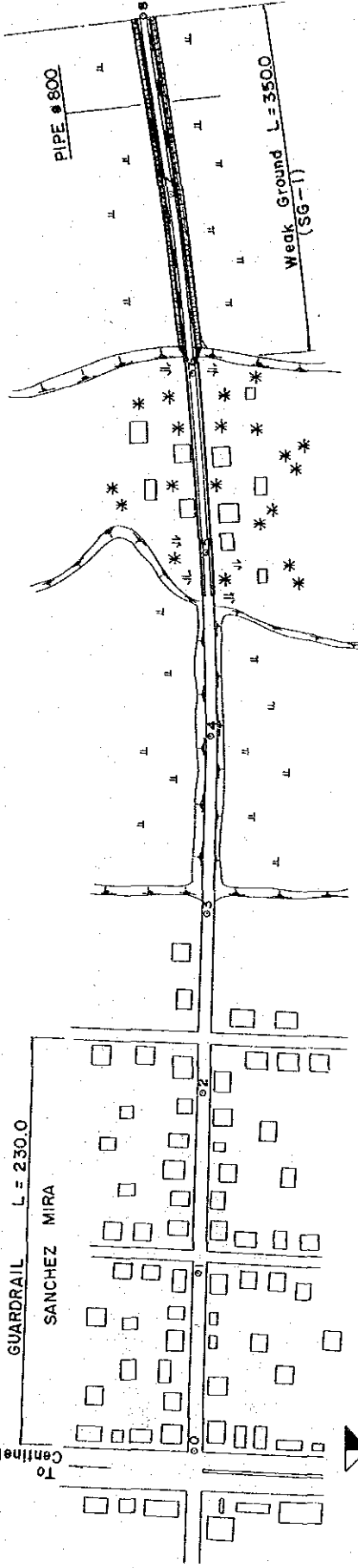
12 17

H=1 : 3500
V=1 : 300

To
Cantihela Point
16.0 Km

GUARDRAIL L = 230.0

SANCHEZ MIRA

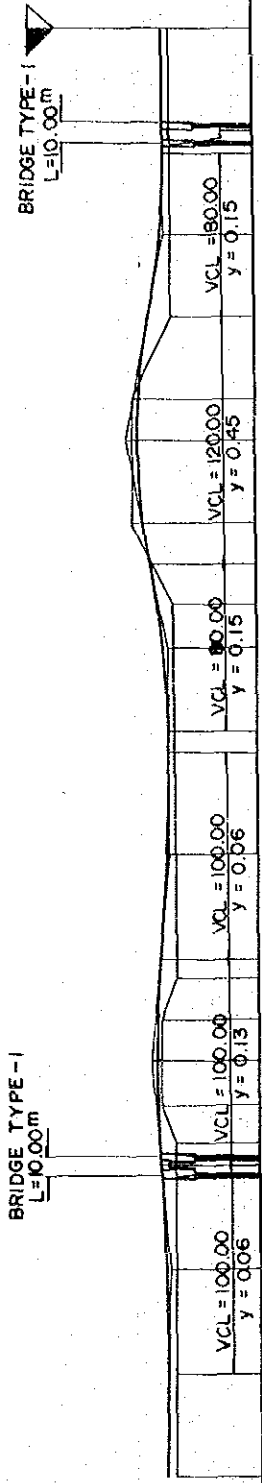
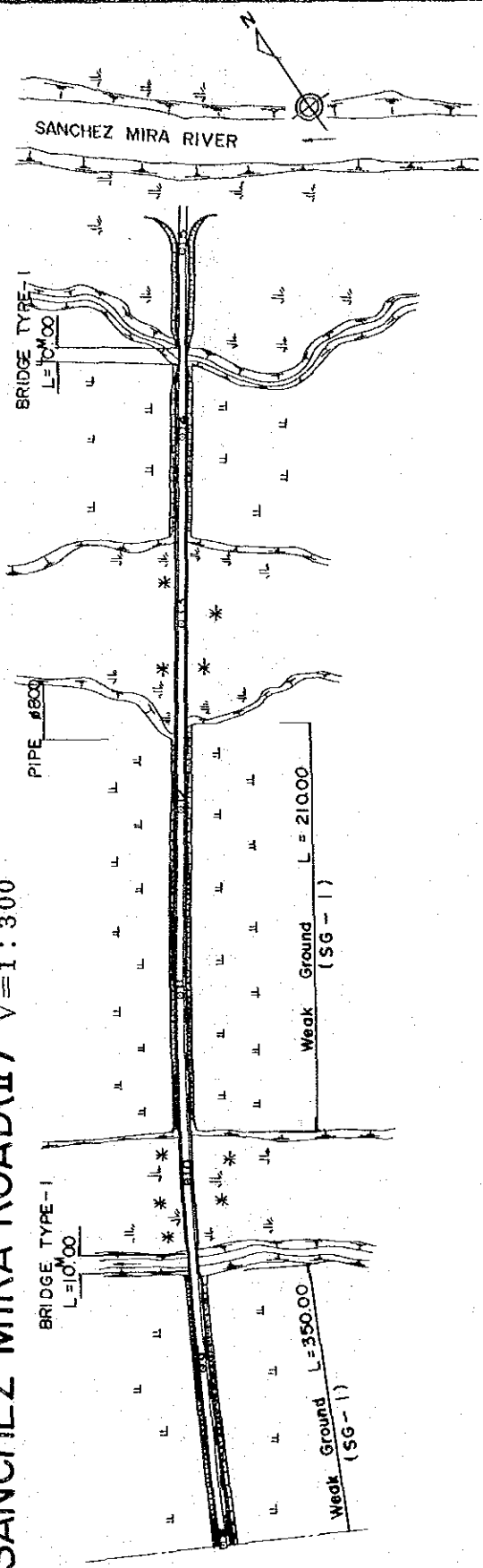


STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA0	0	9.00	9.20	L = 1.0% L = 25000
STA1	100	8.00	8.20	
STA2	200	7.00	7.20	L = 2.1% L = 15000
STA3	300	5.00	5.65	
STA4	400	3.70	4.17	L = 2.0% L = 15000
STA5	490	5.35	5.53	
STA6	600	4.30	5.16	L = 2.75% L = 10000
STA7	700	3.50	3.80	
STA8	800	3.50	3.80	Level L = 25000

D.L. = ± 0M00

SANCHEZ MIRA ROAD(II)

H=1:3500
V=1:300

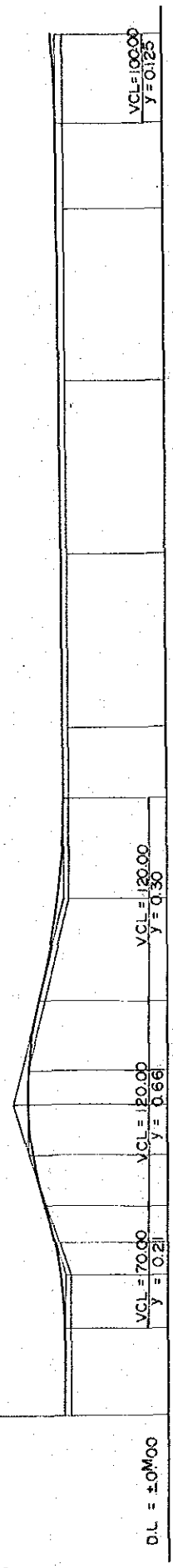
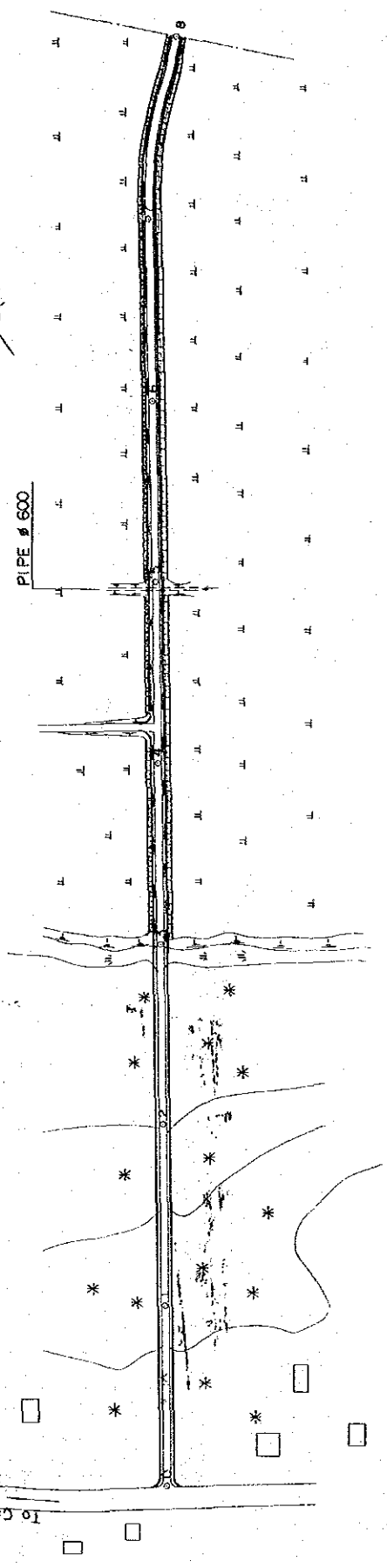
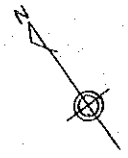


D.L. = ±0.00

STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA 8	800	3.50	3.80	(3.80)
STA 9	900	3.50	3.86	(3.80)
STA 10	1000	4.00	4.17	(4.30)
STA 11	1100	3.50	3.86	(3.80)
STA 12	1200	3.50	3.95	(3.80)
STA 13	1300	5.00	4.85	(5.30)
STA 14	1400	3.50	3.95	(3.80)
STA 15	1500	3.50	3.80	(3.80)

DAGUENAY ROAD(I)
 H=1:3500
 V=1:300

To Gentilelo
 Point
 20.2 Km

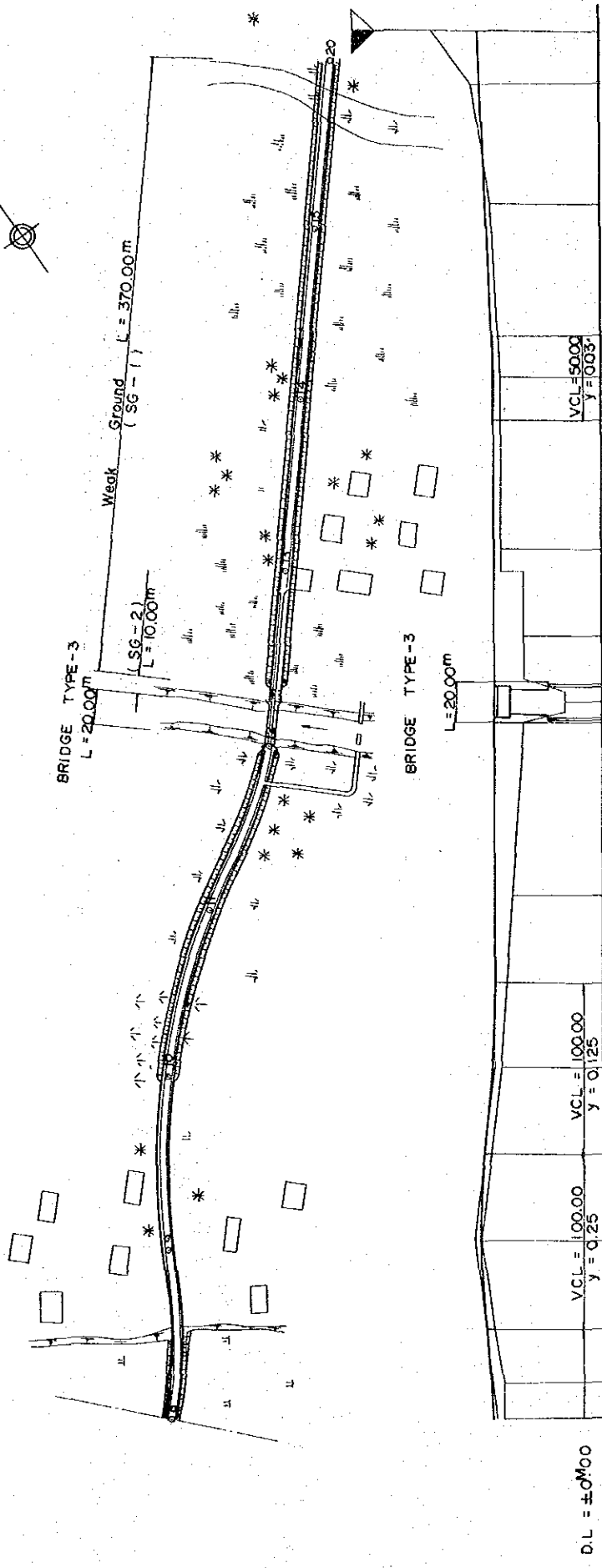


STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA. 0	0	5.00	5.30	Level L = 80.00
+5000	50	5.00	5.30	
STA. 1	100	5.50	5.60	Level L = 100.00 1.24%
+2000	120	6.00	6.14	
+5000	150	7.00	7.04	Level L = 100.00 1.24%
+18000	180	7.00	7.04	
STA. 2	200	7.00	6.89	Level L = 100.00 1.24%
+4000	240	6.50	6.50	
STA. 3	300	5.00	5.60	Level L = 500.00 1.20%
+6000	360	5.30	5.30	
STA. 4	400	5.00	5.30	Level L = 500.00
STA. 5	500	5.00	5.30	
STA. 6	600	5.00	5.30	Level L = 500.00
+5000	750	5.00	5.30	
STA. 8	800	5.00	5.18	5.30

DAGUENAY ROAD(II)

H=1:3500
V=1:300

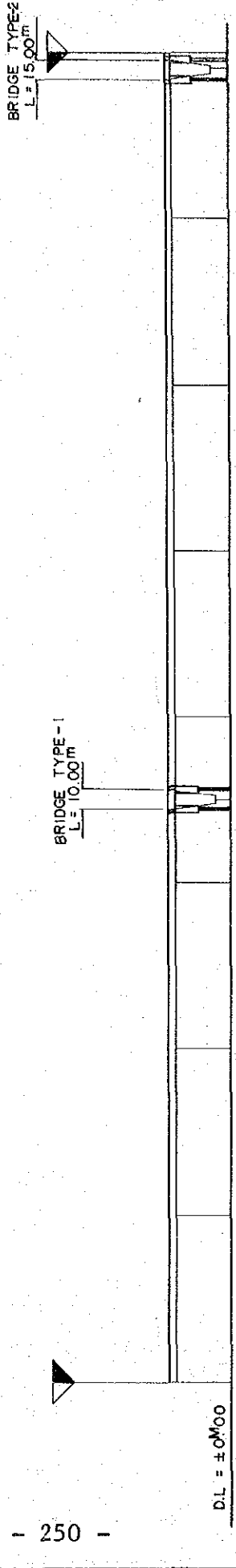
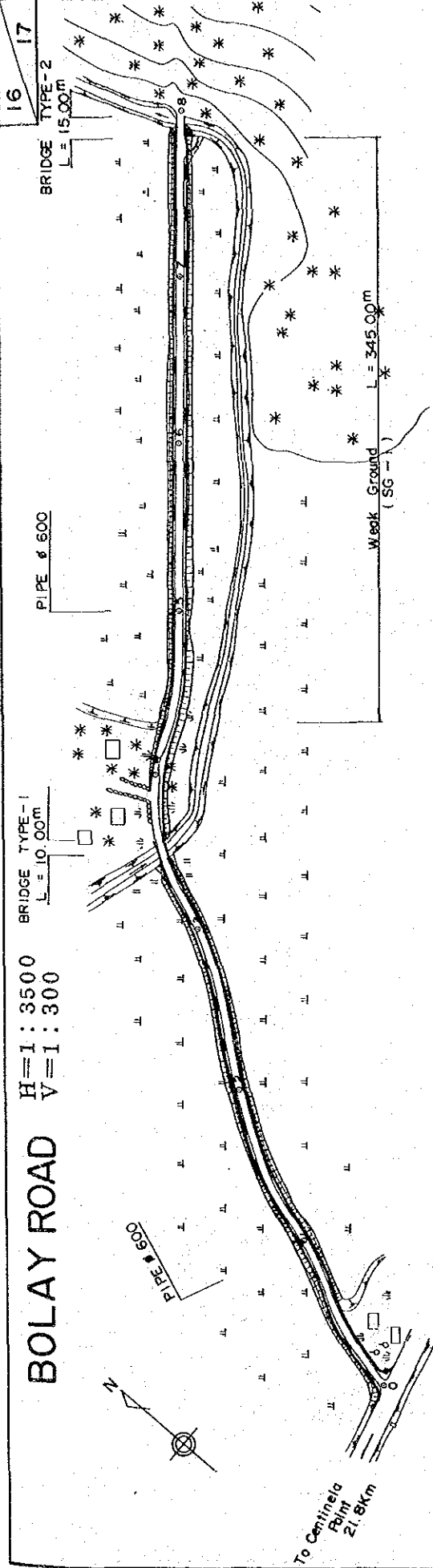
15 17



STATION	DISTANCE	GROUND HIGHT	PROPOSED HIGHT	GRADE
STA. 8	800	5.00	5.18	5.30
+5000	850	5.30	5.80	L=1.0% L=100.00
STA. 9	900	6.00	6.05	6.30
+5000	950	5.50	5.80	L=0.0% L=100.00
STA.10	1000	5.00	5.18	5.30
+5000	1050	4.75	5.30	L=0.5% L=200.00
STA.11	1100	4.50	5.30	
STA.12	1200	4.00	5.30	
+1500	1215	2.00	5.30	
+5000	1250	4.00	5.30	
STA.13	1300	5.00	5.30	
+75.00	1375	5.00	5.30	
STA.14	1400	5.00	5.33	
+25.00	1425	5.13	5.43	
STA.15	1500	5.50	5.80	
+170.00	1570	6.50	6.15	
STA.16	1600	8.00	6.30	

BOLAY ROAD

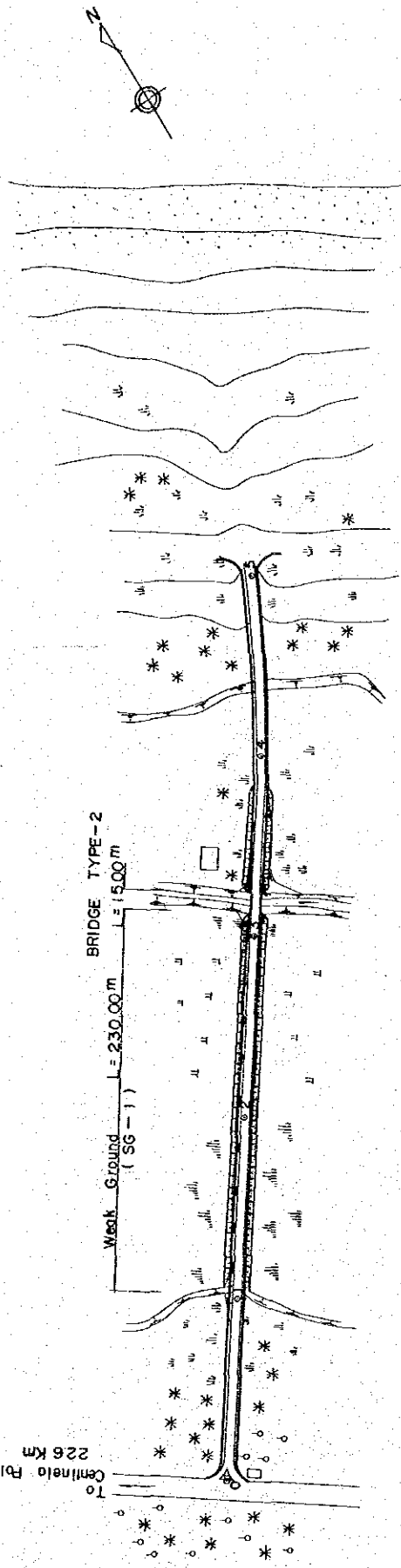
H=1:3500
V=1:300



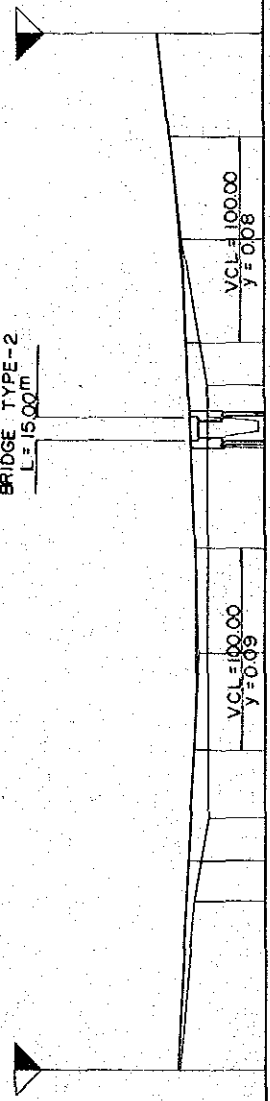
STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA 0	0	3.30	3.30	
STA 1	100	3.00	3.30	
STA 2	200	3.00	3.30	
STA 3	300	3.00	3.30	
+500.00	350	1.00	3.30	
STA 4	400	3.00	3.30	
STA 5	500	3.00	3.30	
STA 6	600	3.00	3.30	
STA 7	700	3.00	3.30	
STA 8	790	3.00	3.30	
+900.00	800	3.00	3.30	

PILIG ROAD
 H=1:3500
 V=1:300

To
 Cenilnelo Point
 2.26 Km



BRIDGE TYPE-2
 L = 15.00m



D.L. = ±0.00

STATION	DISTANCE	GROUND HEIGHT	PROPOSED HEIGHT	GRADE
STA. 0	0	3.50	3.50	
STA. 1	80	3.00	3.00	
STA. 1	100	2.80	3.85	0.35% L = 200.00
STA. 1	120	2.50	3.08	
STA. 1	150	2.50	2.98	
STA. 2	200	2.50	2.89	2.80
STA. 2	250	2.50	2.98	
STA. 3	300	2.50	3.15	
STA. 3	310	0.50	3.19	
STA. 3	330	2.50	3.26	
STA. 3	350	2.80	3.33	
STA. 4	400	3.50	3.58	3.50
STA. 4	450	4.00	4.00	
STA. 5	500	4.50	4.50	1.0% L = 100.00

CHAPTER 5

CHAPTER 5. SOCIO-ECONOMIC IMPACT ANALYSIS OF IRON SAND
DEVELOPMENT PROJECT, AND ECONOMIC APPRAISAL

Section 1. Procedure

The socio-economic impact analysis and economic appraisal of the project were carried out according to the following procedure, using the data gathered up from the government agencies and the findings and information obtained by reconnaissance in the study area.

1-1 Assignment of Study Area

The study area selected are classed in Region II (Cagayan Valley District), one of the administrative units in the Philippines.

Region II includes six provinces, Cagaya, Lalinga-Apaya, Isabels, Ifugao, Noeva Vizcaya and Quirino, and the study areas are within Cagayan Province.

As study area, the following five municipalities were singled out by piecing together the influence and topographic position of the iron sand development project and related infrastructural development projects and their relations to the existing socio-economic structure.

Study area: Ballesteros, Sanchez Mira, Pamplona, Abulug,
and Ballesteros

1-2 Outline of the Procedure

With emphasis placed on the digging-up of internalized problems of the existing socio-economic structure in the selected study area by analysis of collected data, major long-term development schemes imagined by the Philippine Government for Region II were taken stock of from the collected data and broken down among the selected study area in order to obtain a wide perspective of the future of the study area.

On the other hand, the impact of the iron sand development project and related infrastructural development projects was studied qualitatively and quantitatively in order to envisage how they play

their role in helping the study area out from the status quo into realization of future development schemes, for the purpose of weighing and assessing their impact and economic value.

1-3 Basic Data

The data used for impact analysis and economic appraisal were as enumerated below.

- (1) Socio-economic Profile, Region II (Cagayan Valley)
Neda Region II Office, 1976
- (2) Socio-economic Profile, Cagayan 1976
Provincial Development Staff
- (3) Socio-economic Profile, Sanchez Mira 1976
Municipal Development Staff
- (4) Perspective Plan for the Cagayan Valley Region 1978-2000
Neda Region II Office, November 1976
- (5) Five-Year (1978-1982) Plan of the Cagayan Valley Region
Neda Region II Technical Staff, 1977
- (6) Japan-Philippine Friendship Road, Phase II
DPH Manila Office
- (7) Development Digest, Cagayan Valley Region 1976
Neda Region II Office
- (8) Cagayan 1971 Census of Agriculture
Neda National Census and Statistic Office
- (9) Philippine Yearbook, 1975
Neda National Census and Statistic Office
- (10) 1972 National Economic Atlas
Republic of the Philippines

Section 2. Present Socio-economic Status of the Study Area

2-1 Socio-economic Structure of the Study Area

2-1-1 Socio-economic activities

(1) Population

1) Demography

The people living in Cagayan Province were about 640 thousand in 1975, or about 1.5 % of national total or about 33 % of the population in Region II.

These values were on the decline yearly as compared with 1960 and 1970.

The share of Cagayan Province in Region II has dropped nearly 4 % in the past 15 years, suggesting the relative backwardness of Cagayan Province to the other areas.

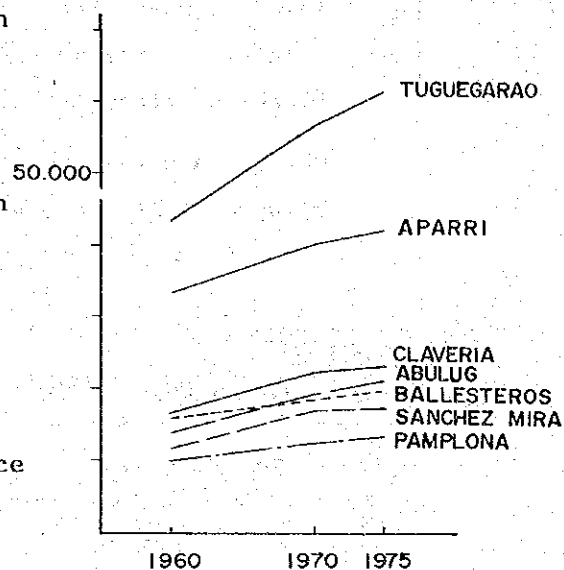
The total population of the five municipalities were 96,422 in 1975, accounting for 15.1 % of the total in Cagayan Province.

The population growth during the 1960-70 period was 30.5 % in Cagayan Province and 29.6 % in the five municipalities, and that during the 1970-75 period was a little sluggish 6.4 % in the five municipalities as against 9.8 % achieved by Cagayan Province as a whole.

All these evidently show a general tendency that people have been migrating to the cities, whether local or central.

This urban-minded migration of people has become increasingly conspicuous since 1970, draining the study area of people

Fig. 5-1 POPULATION
(HISTRICAL TREND)



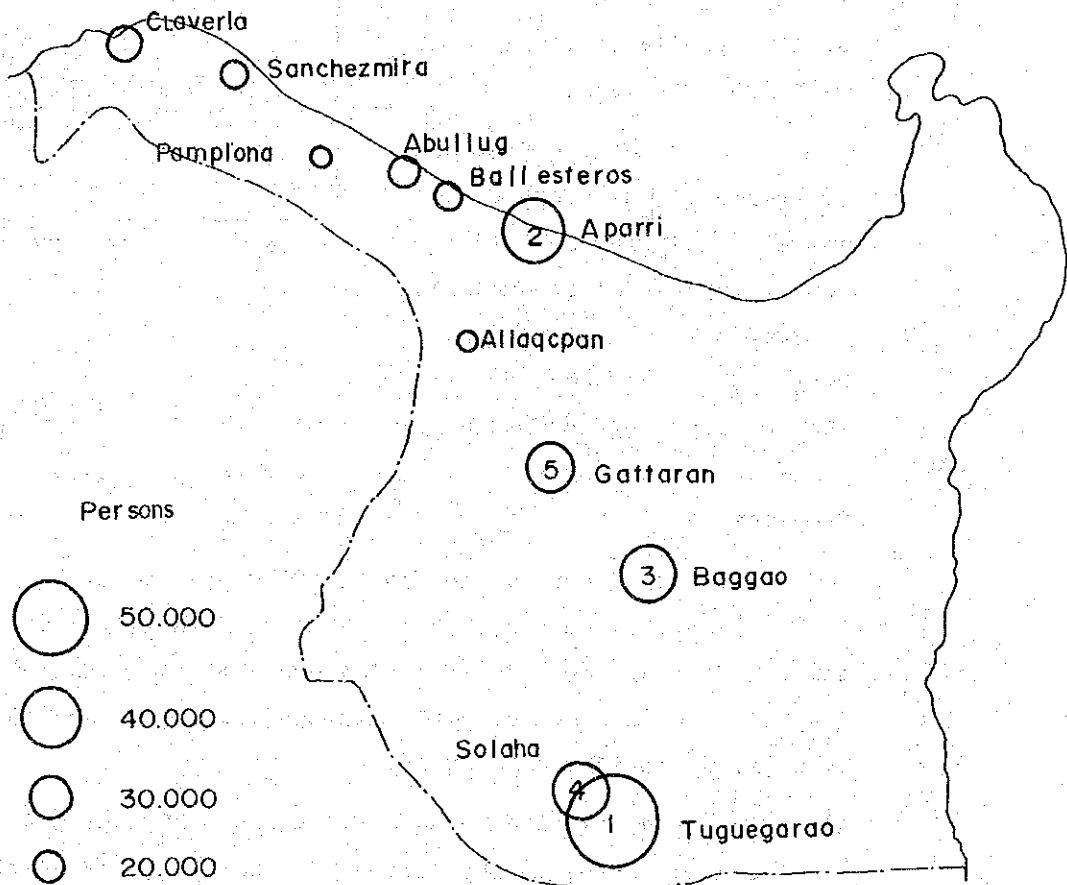
at an increasing rate.

On the other hand, each of the municipalities in the study area has a higher natural growth rate than the total growth rate, evincing population drain (social population decline) in the study area.

At present the rate of population decrease due to drift is lower than the rate of natural population increase, barely holding off the development of serious social problems (labor shortage, etc.)

Chances are that the study area will lose the population balance if left alone.

Fig. 5-2 POPULATION DISTRIBUTION



The number in circle shows the order of population share.

Table 5-1 Total Urban Population

	Total Population	Urban Population	%
CLAVERIA	23,856	5,320	22.3
SANCHEZ MIRA	17,035	3,748	22.0
PAMPLONA	14,366	1,006	7.0
ABULUG	20,261	2,330	11.5
BALLESTEROS	19,634	5,164	26.3
TOTAL	95,152	17,568	18.5

1970

Source : Socio-economic Profile, Cagayan

Fig. 5-3 NATURAL POPULATION GROWTH

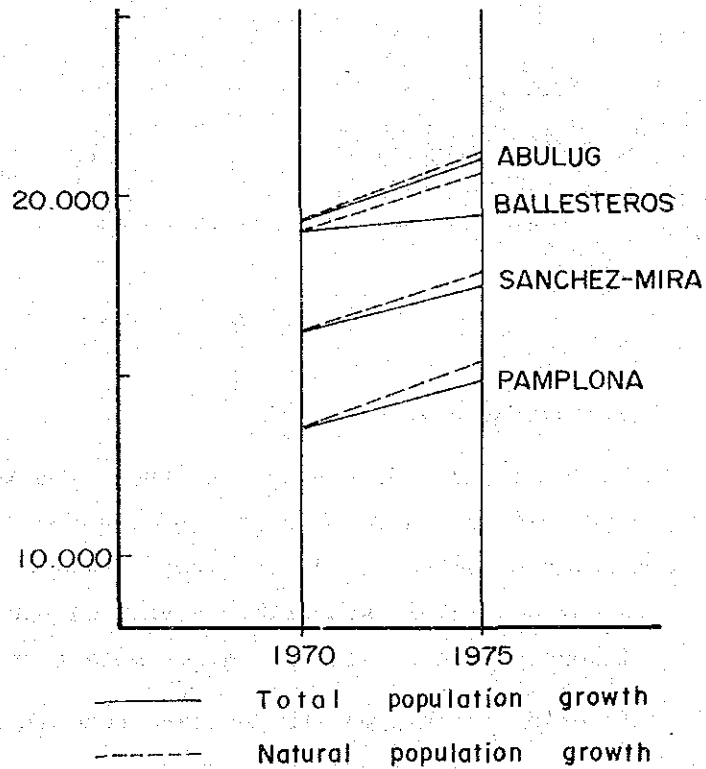


Table 5-2 Population

	1 9 6 0		1 9 7 0		1 9 7 5	
CAGAYAN	445,289		581,237		638,116	
TOTAL	69,935		90,612		96,422	
CLAVERIA	17,025		22,614		23,106	
SANCHEZ MIRA	12,315		16,182		17,639	
PAMPLONA	10,026		13,568		14,639	
ABULUG	14,458		19,206		21,066	
BALLESTEROS	16,111		19,042		19,653	
APARRI	33,424		40,307		42,243	

(x1000)

Region II	1,202.1		1,691.4		1,930.7	
Philippines	27,088.0		36,684.5		41,831.0	

Source : Socio-economic Profile, Cagayan

2) Employment status

The employment status in the study area is shown in Fig. 5-4 in contrast to that of Cagayan Region II in which they are included. As is clear from the figure, the study areas are mainly supported by agriculture with the primary industry workers accounting for more than 70 % of total.

In order to help understand the economic structure of the

Philippines, it will be worthwhile adding that its present employment structure is almost the same as that of Japan around 1950. (See Table 5-3)

Fig. 5-4 EMPLOYMENT STRUCTURE, 1970

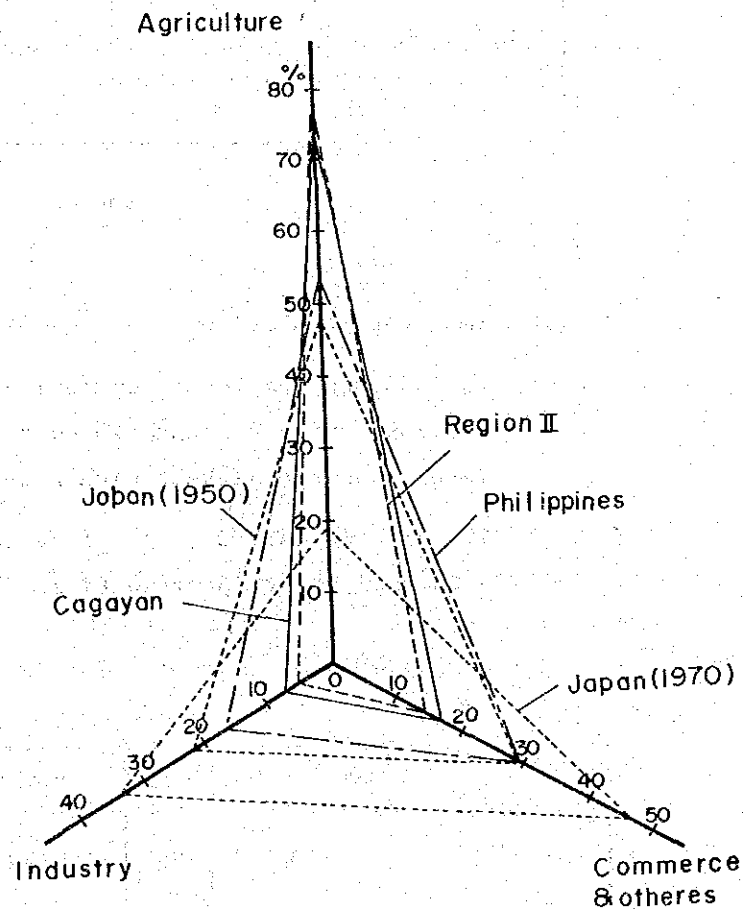


Table 5-3 Employment Structure

1970, %

	Primary industry	Secondary industry	Tertiary industry
CAGAYAN	74.3	8.3	17.4
Region II	77.8	6.8	15.4
Philippines	53.8	16.5	29.7
Japan (1950)	48.3	22.0	29.7

Source : Socio-economic Profile
Region II

3) Employed population

In 1970, the employed population in Cagayan Province were 189,759, while the unemployed ratio was above the national level, and the highest within Region II.

This is suggestive of the fact that Cagayan is less favored with employment opportunities.

Table 5-4 Labor Force by Employment

1970

	Total Labor Force		Employment		Unemployment	
		%		%		%
CAGAYAN	211,958	100.0	189,759	89.5	22,199	10.5
Region II	632,800	100.0	581,827	91.9	50,973	8.1
Philippines	1,230,024.5	100.0	1,135,832.6	92.3	94,210.9	7.7

Source : Socio-economic Profile, Region II

By age, labor force by majors at the ages of 20 to 29 is at a low level, while that by minors, 19 and under, and the aged, 60 and above, is high, eloquently speaking of labor drain from Cagayan.

Table 5-5 Labor Force by Ten-year Age Group

	1970, %						
Age	10-19	20-29	30-39	40-49	50-59	60-69	70-
CAGAYAN	21.9	24.3	21.8	14.2	9.5	5.8	2.4
Region II	22.4	25.5	20.8	14.2	9.9	5.1	2.1
Philippines	18.3	29.1	21.8	14.2	9.6	5.0	2.0

Source : Socio-economic Profile, Region II

Demographic pattern, employment structure and employed population above give an ample proof of backwardness in the five municipalities in terms of social structure.

It may not be wide of the mark that they are likened to the secluded hamlets in Japan in around 1950. (They are nothing like so good as the Japanese counterpart in the past so far as living is concerned, however.)

(2) Industrial development

1) Agriculture

Agriculture is ranked high among the industries in the study area, and the farming population is no less than 46 % of total. By municipality, Pamplona and Sanchez Mira are highly dependent on agriculture with more than 55 % of farming population each.

The cultivated land in farm per farming household in the

the five municipalities is 2.6 ha on the average as against 3.8 % in Cagayan. By municipality, Claveria is the lowest with 1.5 ha and its farming population is as low as 39.8 %, showing that it is comparatively less in dependency on agriculture. On the other hand, Ballesteros shows 3.8 ha, passing muster of the provincial average. (Table 5-6)

A 53.8 % majority of farming households are operating 1.0 to 3.0 ha, and the remainder 3.0 to 5.0 ha.

Table 5-6 Farms Number

	1971					
	A Number of Farms	B Total Farm Population	C Area (ha)	D Total Pop- ulation	B/D%	C/A ha
ABULUG	1,270	8,069	33585	19,206	42.0	2.6
BALLESTEROS	1,206	7,867	45563	19,042	41.3	3.8
CLAVERIA	1,471	8,991	21924	22,614	39.8	1.5
PAMPLONA	1,162	7,861	26666	13,568	57.9	2.3
SANCHEZ MIRA	1,581	8,903	45831	16,182	55.0	2.9
TOTAL	6,690	41,691	173569	90,612	46.0	2.6
CAGAYAN	53,389	327,742	2,027,311	5,812,37	56.4	3.8

Source : Census of Agriculture 1971

The farming is operated for the most part by owner farmers, owner-and-tenant farmers and tenant farmers. The tenant farmers usually share crops with their landowners.

Table 5-7 Size of Farm

1971

	Study Area		C A G A Y A N	
	($\bar{=}$)	%	($\bar{=}$)	%
~ 1.0	1,110	16.6	5,871	11.0
1.0 ~ 3.0	3,595	53.8	31,724	59.4
3.0 ~ 5.0	1,466	21.9	11,168	20.9
5.0 ~ 10.0	395	5.9	3,742	7.0
10.0 ~ 25.0	104	1.6	736	1.4
25.0 ~ 50.0	5	0.1	77	0.1
50.0 ~	8	0.1	71	0.1

Source : Census of Agriculture

In the study area, a 56.8 % majority were owner farmers, which, together with owner-and-tenant farmers, make more than 85 % as against all-Cagayan's values of 50 % for owner farmers and 30 % for tenant farmers, showing a high sustenance level in the areas.

Table 5-8 Tenure of Operator

1971

	STUDY AREA				CAGAYAN			
	FARMS		AREA (ha)		FARMS		AREA (ha)	
All Farms	6,690	100.0	17,356.9	100.0	53,389	100.0	202,731.1	100.0
Full Owner	3,802	56.8	10,246.5	59.0	25,556	47.9	81,422.9	40.2
Part Owner	1,878	28.1	4,557.7	26.3	12,553	23.5	37,516.6	18.5
Tenant	951	14.2	2,063.9	11.9	14,868	27.8	29,880.1	14.7
Manager	4	0.06	356.5	2.1	21	0.4	52,549.2	25.9
Others	55	0.8	132.5	0.8	391	7.3	1,362.3	0.07

Source : Census of Agriculture

In the study area, the agricultural produce amounted to about P12,660,000 in 1970, of which 77.6 % was accounted for by rice, 11.0 % by livestock and 9.1 % by fruit. On the other hand, all-Cagayan produce consisted of rice coming atop with no more than 53.8 %, livestock 24.0 %, corn 9.2 %, vegetable 8.7 %, fruit 4.4 %.

It is found that the study area is on a rice-cropping-oriented economy.

Geographically, the study area is far from the nearest consumer market, and are forced to choose rice and fruit which are easy to grow under natural conditions, preserve and process, rather than highly marketable, but perishable greens.

Table 5-9 Value of Production

	1970 (P)					
	Rice	Corn	Vegetable	Fruit	Livestock	TOTAL
ABULUG	2,417,294 (94.7)	2,016 (0.08)	8,343 (0.3)	65,071 (2.5)	59,187 (2.3)	2,551,911 (100.0)
BALLESTEROS	2,149,429 (83.4)	2,926 (0.1)	6,200 (0.2)	390,155 (15.1)	29,669 (1.2)	2,578,379 (100.0)
CLAVERIA	2,118,200 (74.9)	— (—)	161 (0.006)	204,317 (7.2)	503,734 (17.8)	2,826,412 (100.0)
PAMPLONA	729,701 (66.7)	19,000 (1.7)	18,042 (1.6)	166,310 (15.2)	161,601 (14.8)	1,094,654 (100.0)
SANCHEZ MIRA	2,403,870 (66.6)	197,204 (5.5)	41,129 (1.1)	325,789 (9.0)	640,993 (17.8)	3,608,985 (100.0)
TOTAL	9,818,494 (77.6)	221,146 (1.7)	73,875 (0.6)	1,151,642 (9.1)	1,395,184 (11.0)	12,660,341 (100.0)
CAGAYAN	55,931,580 (53.8)	9,601,664 (9.2)	9,009,823 (8.7)	4,530,109 (4.4)	24,927,427 (24.0)	104,000,603 (100.0)

Source : Census of Agriculture

2) Fishery

The study area have a long coastline fringing the South China Sea, and the fishing there carries a heavy weight with the primary industry. They operate inshore fishing with center around dragnet hauling. The fishing boats are mostly small and motor-less.

Other piscatory methods include and angling, which are practised on a small way, however.

The fishing bases are located spottedly over a wide range

along the coast, each forming a community. Aparri and Claveria, which are near the five municipalities, own a comparatively large number of fishing boats.

The catches in Cagayan Province in 1975 were 154,46 tons or P12,333,680, of which 10 % was consumed to meet the fishing families' own demand, 48 % within the Province and the remaining 42 % outside the Province.

The study area hold some one fifth of the aggregate length of all-Cagayan coastline and 479 fishing boats or 17.6 % of all-Cagayan total (2,727 as of 1976).

It is therefore surmised that the fishery output in the study area in 1975 may have been about 18 % of the total, or 2,200,000 pesos.

In Aparri, the catches are salted or dried into simple primary processed goods or sold as they are, and there are no highly processed goods such as frozen foods and canned foods.

3) Manufacturing

On a national total basis, Region II has a 4.3 % share in the number of factories and turns out 0.5 % in G.V.A. (gross value added), the lowest of all the regions.

Up until 1971, food industry registered nearly 80 % of G.V.A., the largest of all, followed by the wood processing industry.

In 1973, the food processing tumbled down, and the wood processing took the first place. G.V.A. from 1971 to 1973 showed subzero growth, accordingly.

Cagayan Province is the most manufacturing-intensive in Region II, accounting for 50.6 % (as of 1972) of the total number of factories. But, 97.5 % of the factories in Cagayan are classed among "Small" in statistics. (See Table 5-11).

Table 5-10 G.V.A. Manufacturing

1967 MF

	Region II			Philippines		
	1967	1971	1973	1967	1971	1973
Food	48.7 (51.8)	111.32 (78.8)	85.8 (20.6)	1,734.1 (28.8)	2,112.5 (27.5)	2,169.3 (26.1)
Beverages	17.9 (19.0)	6.09 (4.3)	3.25 (7.8)	633.9 (10.5)	365.8 (4.8)	326.4 (3.9)
Tabacco	1.2 (1.3)	2.91 (2.1)	1.53 (3.7)	579.0 (9.6)	404.2 (5.3)	335.6 (4.0)
Wearing Apparel	0.8 (0.9)	1.94 (1.4)	1.38 (3.3)	128.9 (2.1)	458.7 (6.0)	392.2 (4.7)
Wood	23.2 (24.7)	15.44 (10.9)	24.52 (58.9)	415.8 (6.9)	355.0 (4.6)	358.1 (4.3)
etc.	2.2 (4.0)	3.6 (3.5)	2.34 (5.7)	2,533.3 (42.1)	3,985.7 (51.8)	4,744.4 (57.0)
Total	94.0 (100.0)	141.3 (100.0)	41.6 (100.0)	6,025.0 (100.0)	7,681.9 (100.0)	8,326.0 (100.0)

Source : Socio-economic Profile, Region II

Plywood-making factories, sawmills, and other related factories gather around the five municipalities; Claveria and Pamplona have two comparatively large factories with 250 to 1,000 employes and small factories.

The bulk of the products is exported to Japan, the U.S.A., Europe and the U.S.S.R. from Claveria and Aparri as loading ports.

In the study area, there are no other types of industry to speak of.

Table 5-11 Number of Manufacturing Establishments

		Number of factories			Scale	
					Large	Small
Cagayan	1967	708	45.6%	%	18	690
	1972	1,537	50.6		19	1,518
Region II	1967	1,554	100.0	3.5	67	1,487
	1972	3,039	100.0	4.3	88	2,951
Philippines	1967	45,007		100.0	3,989	41,018
	1972	70,009		100.0	—	—

Source : Socio-economic Profile, Region II

As regards yearly business trend, every industry is precarious. In particular, none of the five top-ranking industries showed stable growth from 1967 to 1973.

Wood-processing industry shipments from the study area amounted to 12,754,000 pesos in 1976. (Shipments based on the achievements 16,112 tons in 1973)

4) Commerce

Tuguegarao forms the commercial center of Cagayan Province, and accounts for 20.6 % of the total number of commercial enterprises in Cagayan.

The commercial enterprises in the study area account for 15.6 % of the total in Cagayan. By type, the tertiary businesses lead the other. The banking, insurance and real estate businesses which are indispensable for complicated business operations are in the bottom, showing that the commercial activities in the study area are in the cradle.

By municipality, the wholesalers gather in Sanchez Mira, retailers in Ballesteros and Claveria, and purveyors of services in Claveria. In Abulug and Pamplona, the commercial

activities extended are nothing more or less than the good for minimum daily living.

Table 5-12 Inventory of Commercial Enterprises

	1976						
	Whole-sale	Retail	Services	Recreation	Bank & Finance	Insurance	Real Estate
Abulug	—	78 (10.8)	6 (3.0)	—	—	—	—
Ballesteros	4 (14.3)	175 (24.3)	112 (55.2)	1 (16.7)	1 (33.3)	—	—
Claveria	5 (17.9)	191 (26.5)	30 (14.8)	2 (33.3)	1 (33.3)	—	—
Pamplona	2 (7.1)	136 (18.9)	35 (17.2)	1 (16.7)	—	—	—
Sanchez Mira	17 (60.7)	140 (19.4)	20 (9.9)	2 (33.3)	1 (33.3)	—	—
TOTAL	28 (100.0)	720 (100.0)	203 (100.0)	6 (100.0)	3 (100.0)	—	—
Cagayan	164	4913	908	85	23	14	43

Source: Socio-economic Profile, Cagayan

(3) Traffic system

1) Outline of the traffic system

Cagayan Province is in the northern end of Luzon Island, and borders on the sea on the north and east and on the mountains on the southwest, having defied adamantly the communication with the rest of the Philippines until completion of National Road Route 5 according to the

Philippine Japan Highway Loan Project which runs north to south along Cagayan Valley to Metro Manila and of National Road Route 3 connecting Cagayan to Metro Manila by way of the west coast.

That section of National Road Route 3 which lies in Cagayan has not been improved is expected to join National Road Route 3 after completion of its improvement and the construction of Magapit Bridge.

Tuguegarao and Aparri have an airport each, and flight services are available every day between Tuguegarao and Manila and twice a week between Aparri and Manila.

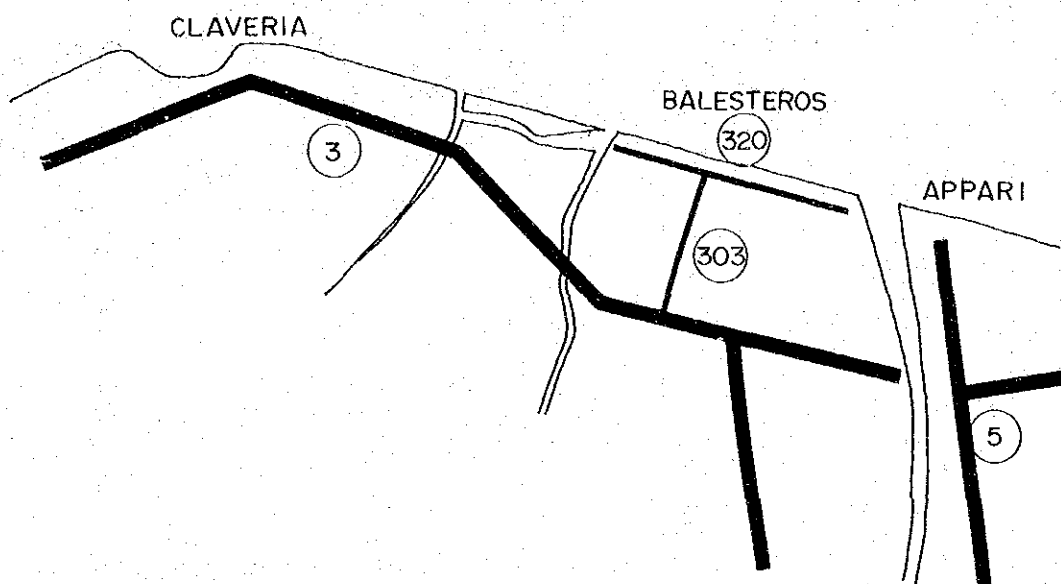
The study area are dismembered by the Cagayan River from the rest of Cagayan Province, and the only means to unite them is a ferryboat as no bridge crosses the Cagayan River.

There are three ferries whose operation is precarious and contingent on the weather and other conditions because of primitive facilities.

2) Road network

National Road Route 3 running eastward in the region is an arterial within the study area, and Provincial Road 303 running from Abulug and Ballesteros to Zitangnga where it joins National Road Route 3 is serving as a feeder.

Fig. 5-5 ROAD NETWORK



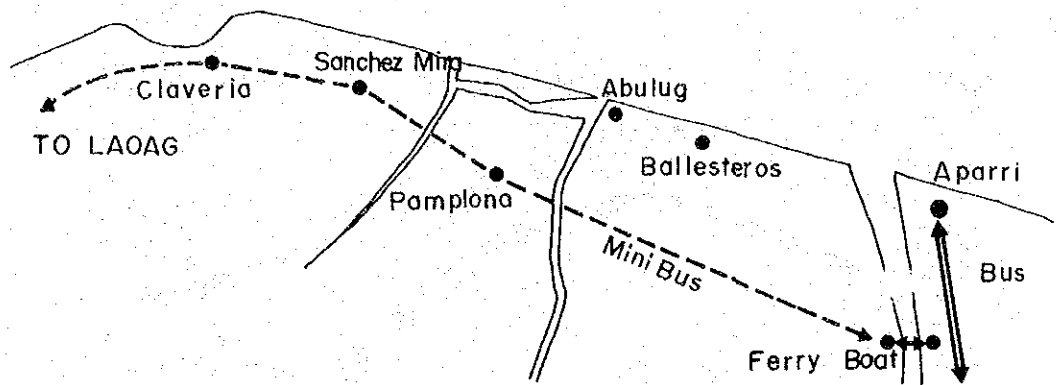
3) Transportation

The study area and their purlieus count mainly on a long-distance bus service on National Road Route 5 between Manila and Tuguegaroa with Aparri as a bus terminal.

Within the study areas, a mini-bus service is available on National Road Route 3 to connected Claveria and Aparri.

In addition, jeepneys, jeeps called Tri-star and modified motorcycles are playing a role of inter-city transportation.

It is reported that the overland transportation from the study area to Manila usually takes recourse to National Road Route 3 running along the west coast via Laoag because of meager ferry service.



2-1-2 Structure of living sphere

(1) Land use

The farmland and forests divide nearly equally 76.8 % of the total land in the study area, and the untapped land and residential quarters account for 12.1 % and 4.6 %, respectively. As compared with the land use in Cagayan Province, the forests carry less weight, and the farmland heavier weight.

By municipality, Abulug and Sanchez Mira each show the highest ratio of farmland in excess of 50 %.

On the other hand, Claveria and Pamplona show 20 % or so. Where the ratio of farmland is low, the ratio of forests is high, and vice versa.

There are no particular land use other than farmland and forests, except for commercial quarters seen in Claveria.

The urbanized part of the study area is only 4.74 % of total, while the untamed area reaches as much as about 10 %, making the study areas the center of agriculture.

Table 5-13 Land Area and Land Use

1976 (ha)

	Total	Cultivat- ed Land	Fish- ponds	Salt farms	Stock farms	Resi- dential quarters	Forests	Com- mercial quarters	Factories	Untapped area	Others
ABULUG	19,969	10,524	30	—	692	872	5,633	3	2	1,627	586
	100.0%	527	0.2	—	3.5	4.4	282	0.02	0.01	81	29
BALLESTEROS	12,510	5,349	92	—	515	809	3,285	4	5	2,076	375
	100.0%	428	0.7	—	4.1	6.5	263	0.03	0.04	166	30
CLAVERIA	19,480	4,648	12	—	500	946	10,000	20	55	2,417	882
	100.0%	239	0.06	—	2.6	4.9	51.3	0.1	0.3	124	4.5
PAMPLONA	17,176	4,839	7	—	134	601	8,546	4	18	2,218	809
	100.0%	282	0.04	—	0.8	3.5	498	0.02	0.01	129	47
SANCHEZ MIRA	17,290	8,968	29	25	—	727	4,639	4	4	2,151	743
	100.0%	519	0.2	0.1	—	4.2	268	0.02	0.02	124	43
Total	86,425	34,328	170	25	1,841	3,955	32,103	35	84	10,489	3,395
	100.0%	39.7	0.2	0.03	2.1	4.6	37.1	0.04	0.1	12.1	3.9
CAGAYAN	900,237	21,191.3	4,590	1,162	30,014	26,058	478,341	154	193	78,950	18,182
	100.0%	23.5	0.5	0.1	3.3	2.9	53.1	0.02	0.02	8.8	2.0

Source : Socio-economic Profile Cagayan

(2) Distribution of communities

In the study area, more than 80 % of population live in farming communities and only 18.5 % in the urban area.

Urban population is comparatively high in Ballesteros, Claveria and Sanchez Mira, but Pamplona shows only 7.0 %, no where near being called urban mass.

Aside from urban quarters, communities, each comprising 50 to 100 households stretching along the coast, are distributed.

Table 5-14 Urban Population

			1970
	Total Population	Population	Share %
Abulug	2 0,2 6 1	2,3 3 0	1 4.4
Ballesteros	1 9,6 3 4	5,1 6 4	2 6.3
Claveria	2 3,8 5 6	5,3 2 0	2 2.3
Pamplona	1 4,3 6 6	1,0 0 6	7.0
Sanchez Mira	1 7,0 3 5	3,7 4 8	2 2.0
TOTAL	9 5,1 5 2	1 7,5 6 8	1 8.5
Cagayan	6 1 2,1 4 8	8 7,8 8 2	1 4.4

Source : Socio-economic Profile Cagayan

2-2 Internalized Problems of Study area

The study area lie in the northern end of Luzon and are isolated by sea, river and mountains from the rest of the Philippines. Taken altogether, the internalized problems of the study areas may safely be said to have developed from this geographical restrictions.

As far as the agriculture, forestry and fishery are concerned, the study area have a high potential, but old-fashioned production techniques and unavailability of distributing routes make it hard to merchandize the products, marooning the study area from industrialization.

Another factor that has kept the study area behind modernization is insufficient industrial infrastructure. The study area show the highest enemployment ratio in Region II.

That employment opportunities are not enough to absorb the working population is tending to drain the study area of people. All these factors have combined to help the study area stay underdeveloped.

On the other hand, this industrial backwardness has brought about a logical consequence that the income level in the study area is overshadowed by that in the rest of the Philippines.

All this chain of causes and events has acted to stymie qualitative and quantitative socio-economic development and construction of public service facilities in the study area. All these ramified problems more or less apply to the entire Region II. In support of this, the "Perspective Plan for the Cagayan Valley Region, 1978 - 2000" points out the following internalized problems.

Overall poverty

Maldistribution of wealth

Low productivity and backwardness in commercialization of products

Table 5-15

	Unemployment Ratio	%
CAGAYAN	10.5	
Region II	8.1	
Philippines	7.7	

Source : Socio-economic Profile, Region II

Shortage of employment opportunities, and high unemployment ratio

Underdevelopment of social infrastructure

Section 3. Future Development Scheme and Outlook

The following is a summary of the future development scheme and the outlook of socio-economic development in the study area envisaged in "Perspective Plan for Cagayan Valley Region, 1978 - 2000" prepared by NEDA Region II Office of the National Economic Development Agency (NEDA) of the Philippine Government.

It is important in assessing the economics of the iron sand development project to make clear from the viewpoint of regional development whether said scheme and the iron sand development project are justifiable both in practicality and conformity to purposes and objectives.

3-1 Future Development Scheme in Cagayan Province

The future development scheme in Cagayan Province is illustrated in Fig. 5-6. It is imagined that Tuguegarao will remain the hub of Cagayan Province in the future, and that subcentral areas will be developed and connected with a road network to Tuguegarao.

At present, Aparri seems likely to become the center of the study area. When the Philippine-Japan Friendship Road (National Road Route 3) and Magapit Bridge are completed, the position of Tuguegarao as the hub of Cagayan will become all the heavier for them, and Manila will become more accessible both in time and distance.

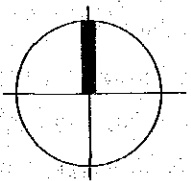
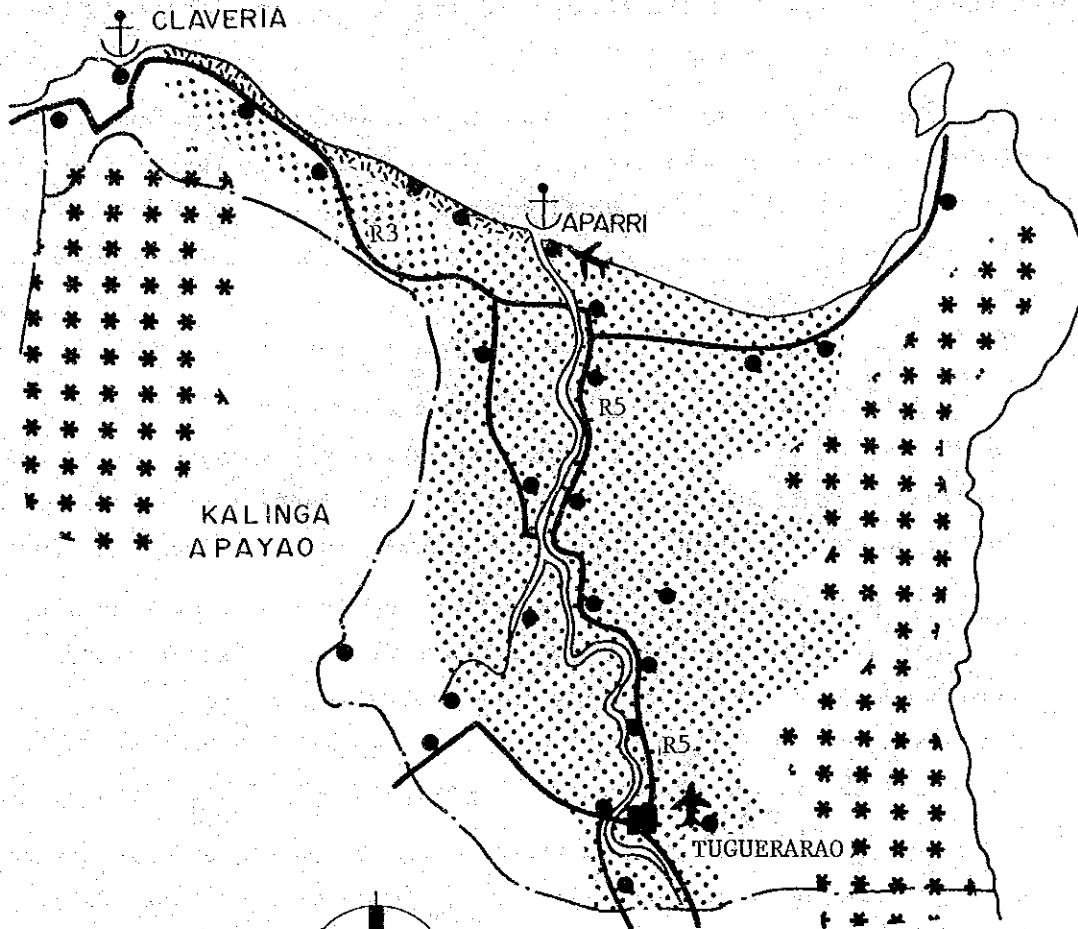
Aparri and Claveria are proposed as key ports, and production surpluses in the study area will be delivered from Claveria Port.

As regards the assignment of industrial activities, it is planned that the riparian areas of the Cagayan River and the study area (five municipalities) will undertake agricultural operations, the area near the east bank forestry operations, and the littoral area from Claveria and Aparri mining operations (iron sand development).

The forests in Kalinga Apayao are also considered an important source of supply to the wood processing industry in the study area.

In order to amplify the industrial and living infrastructures,

Fig. 5-6 CONCEPTS OF REGIONAL DEVELOPMENT, CAGAYAN



LEGEND

	AGRICULTURAL AREAS
	MINERAL AREAS MAGNETIC SAND
	FOREST LAND
	SEAPORT
	AIRPORT
	REGIONAL CENTER
	SETTLEMENT

roads (national and provincial roads), irrigation canals, city water supply, electric power supply, educational facilities, medical facilities, etc. are planned.

3-2 Future Outlook and Potential of Socio-economic Activities

3-2-1 Future trend in population growth

In Region II, the natural population growth is large, but the population drain is on the rise, particularly in the study area, making the total population growth sluggish. Considering the future development scheme for the study area, it is important to minimize population drain and develop the industrial and living infrastructures for the people, particularly as proper working force, to come stay in the study area.

3-2-2 Industrial development scheme and its possibilities

(1) Agriculture

Agricultural production in Region II centers on rice, and this tendency will continue in the future.

With a high potential for enlargement of cultivated land, the study area is planned to have additional paddy fields of 3,600 ha by 1981.

Table 5-16 Rice Cropland (ha)

	Present	Projection(1981)
CAGAYAN	1 0 5, 8 4 4	2 6, 9 0 0
TOTAL	2 2, 2 8 1	3, 6 0 0
ABULUG	7, 4 2 7	5 0 0
ABLESTEROS	4, 2 5 8	1, 0 0 0
GLAVERIA	3, 5 1 1	1 0 0
PAMPLONA	3, 9 5 2	1, 5 0 0
SANCHEZ - MIRA	3, 1 3 3	5 0 0

Source: Province of Cagayan Road Network Development Plan EY72 - EY81

A plan for improvement in fertility and in productivity by plant breeding has been pushed forward, and the production increase will be realized in the near future. It is projected that the annual average growth of rice production will be 7.3 % during the 1975-85 period and 2.3 % during the 1985-2000 period.

If these growth rates are achieved, the rice production in Cagayan will rise from 180,050 tons in 1975 to about 365,000 tons in 1985 and about 511,000 tons in 2000.

It is found from these projected values that the study area will assume the following values.

Table 5-17 Rice Production Targets

	(t)	
	1985	2000
CAGAYAN	3,65,000	511,000
TOTAL	62,600	87,700
ABULUG	15,500	21,700
BALLESTEROS	13,800	19,400
CLAVERIA	14,900	20,900
PAMPLONA	4,500	6,300
SANCHEZ MIRA	13,900	19,400

Source : Perspective Plan for the Cagayan Valley Region 1978 ~ 2000

In the study area, the rice production will be about 62,600 tons in 1985 and around 88,000 tons in 2000.

The current supply-demand relationship suggests that Cagayan Province will be able to deliver to outside regions about 115,000 tons in 1985 and 177,000 tons in 2000, and that the study area will yield a surplus of 21,000 tons in 1985 and 30,000 tons in 2000 to spare for outside regions.

Table 5-18 Rice Supply and Demand Forecast

		(t)	
		1985	2000
CAGAYAN	Available Supply	208,838	293,868
	Requirement	93,916	116,719
	Surplus	114,922	177,149
Study Area	Available Supply	35,724	50,348
	Requirement	14,920	20,310
	Surplus	20,809	30,038

Basis of computation

Available supply : Total production (Wastage + Feed + Seed)
Wastage : Total production x 3%
Feed : Total production x 6%
Seed : 44 kg/ha
Requirement : 117 kg/person

(2) Forestry and wood processing industry

Region II has 2,625,000 ha of public forest land, or 15 % of the national total of public forest land. Of it, only 80 % is used as a forestal source, and the remaining 20 % is left intact, or used as cropland or grazing yards.

Though large, the forest resources in Region II are required to be used in a planned way in harmony with natural environments and ecosystem. At present, the cutovers in need of afforestation in Region II are estimated at 114,000 ha.

Although the forest products are now exported in the form of stock materials, it is planned that exports in the form

of feedstocks of the forest products from Region II will be reduced to 25 % by 1987 and that by the year 2000, all the primary forest products will be processed within the region for exporting highly processed value-added products.

(3) Fishery

The South China Sea debouching in front of the study area is reported to have an ample reserve of mackerel, sardine, flounder, etc. But such species have not yet been fully exploited for want of transportation and storage facilities. This in turn has stood in the way of modernization of piscatory methods, fishing gears and fishing boats, leaving the study area behind the waves of industrialization.

It is therefore planned to nurture and develop the transportation system and distribution system for promotion of industrialization and effective use of natural resources.

(4) Manufacturing

In the study area, emphasis is placed on the utilization of natural resources, and it is planned to foster the wood-processing and food-processing industries.

New types of industry to strive are mining and manufacturing using iron sand deposited in the coastline in the study area. They are sure to have been ranked high among the long-term important projects, though their development scale (shipments, etc.) has not yet been revealed.

The wood-processing and food-processing industries in Region II are forecast to grow as shown in Table 5-19 next.

Table 5-19 G.V.A. in Manufacturing, Region II

	G.V.A. Million ₱			Annual Growth Rate (%)	
	1973	1987	2000	1973~1987	1987~2000
Food Processing	17.3	47.0	438.0	7.3	18.7
Wood Processing	50.1	120.0	1,022.0	6.4	17.9

Source: Perspective Plan for the Cagayan Valley Region 1978 ~ 2000

3-3 Principal Economic Development Schemes for Study Area (five municipalities)

Here the collected data are processed in order to scan how the principal development schemes for the study area will change in the process of realization of the plan and prospect envisaged by NEDA Region II Office, and this will serve as a preliminary work for economic appraisal of the iron sand development project in view of its impact on the achievement of target values declared by the Office.

Two target years are set for projection of the principal future economic developments in the study areas; one in the process of iron sand development project and the other thereafter.

It is expected that iron sand will be developed at an annual rate of about 600,000 tons from 1979.

It is therefore considered that the extraction of some 8.75 million tons reserved in Sectors 1, 3 and 4 will be completed around 1994 because of the reasons set forth later on.

Thus, the target year during the iron sand development is set at 1985 coming halfway between the beginning and the end and that

after iron sand development at 2000.

3-3-1 Projection of key economic indices

(1) Population

The annual average population growth in Cagayan was 2.7 % in 1960 to 1970 and 1.9 % in 1970 to 1975, showing a downward tendency in recent years. In the study area, it was 2.6 % in 1960 to 1970 and 1.3 % in 1970 to 1975, a little lower than in Cagayan as a whole, but following almost the same trend.

Table 5-20 Annual Growth Rate of Population

Area	Year	
	1960 ~ 1970	1970 ~ 1975
CAGAYAN	2.7	1.9
TOTAL	2.6	1.3
ABULUG	2.9	0.4
BALLESTEOS	1.7	0.6
OLAVERIA	2.9	0.4
PAMPLONA	3.1	2.0
SANCHEZ MIRA	2.8	1.7
APARRI	1.9	0.9

As against this population trend, the Perspective Plan for the Cagayan Valley Region, 1978 - 2000 prepared by NEDA Region II Office sees on supposition of socio-economic development that all-Cagayan annual average population growth rate will be 1.8 % during the 1975 - 2000 period

while that for the study area is set at a little higher 2.4 % compared with all-Cagayan value. It is surmised that the Office may have marked a point for the possibilities that the realization of the development scheme will gradually unfetter the study area from economic isolation.

Table 5-21 Population Projections (1975 ~ 2000)

	Actual	Projection (Man)		Annual Growth Rate (%)		
	1975	1985	2000	1975 -2000	1975 -1985	1985 -2000
CAGAYAN	638,116	802,700	997,600	1.8	2.3	1.5
TOTAL	96,421	127,518	173,591	2.4	2.8	2.1
ABULUG	21,066	27,665	38,139	2.4	2.8	2.2
BALLESTEROS	19,653	23,950	30,010	1.7	2.0	2.9
CLAVERIA	23,106	32,673	44,903	2.7	3.5	2.1
PAMPLONA	14,958	19,798	27,544	2.5	2.8	2.2
SANCHEZ MIRA	17,639	23,532	32,995	2.5	2.9	2.3
APARRI	42,243	52,066	66,477	1.8	2.1	1.6

Source: Perspective Plan for the Cagayan Valley Region (1978 ~ 2000) etc.

(2) Labor force

The ratio of labor force (working population/total population) in Cagayan was 38.3 % in 1975 or on the same level as with Region II.

According to the aforesaid perspective plan by NEDA, the future labor ratio is set at 42.2 % for 1985 and 51.7 % for 2000. Assuming that these values directly apply with the

study area, the labor force may be projected as follows.

Table 5-22 Labor Force Projections, 1975 ~ 2000

	Labor Force Rate (%)			Labor Force(man)		
	Actual	Projection		Actual	Projection	
	1975	1985	2000	1975	1985	2000
CAGAYAN	38.3	42.2	51.7	244,200	339,000	515,800
TOTAL	38.3	42.2	51.7	36,930	53,856	89,746
ABULUG	38.3	42.2	51.7	8,068	11,575	19,718
BALLESTEROS	38.3	42.2	51.7	7,527	10,107	15,515
CLAVERIA	38.3	42.2	51.7	8,850	13,788	23,215
PAMPLONA	38.3	42.2	51.7	5,729	8,355	14,240
SANCHEZ MIRA	38.3	42.2	51.7	6,756	9,931	17,058
APARRI	38.3	42.2	51.7	16,179	21,972	34,369

Notes : 1. Labor force ratio = Working population/Total population

2. Working population = Population of 15 years of age and up

(3) Employment structure

As already discussed, the employment in Cagayan is heavily dependent on the primary industry, to say nothing of the study area. The future sectoral employment structure is forecast in Table 5-23 which is derived by stochastically breaking down the primary industry employment ratios declared by NEDA Office among Region II, Cagayan and study area based on the current employment ratios, determining the tertiary industry employment ratios and finally estimating the secondary industry employment ratios:

Table 5-24 is the employed population estimated from the total population which has already been projected.

Table 5-23 Employment Sectoral Structure, 1970 ~ 2000

		Actual	Projection	
		1970	1985	2000
REGION II	Primary industry	79.6	61.7	36.6
	Secondary industry	7.0	16.5	33.7
	Tertiary industry	13.4	21.8	29.7
CAGAYAN	Primary industry	74.3	50.4	34.4
	Secondary industry	8.3	25.9	36.6
	Tertiary industry	17.4	23.7	29.0

Note: Employment structure in the study area is set just the same as in Cagayan.

Table 5-24 Employment, 1970 - 2000

	1970			1985			2000		
	I	II	III	I	II	III	I	II	III
CAGAYAN	148,638	16,537	34,828	170,856	87,801	80,343	177,435	188,783	149,582
TOTAL	23,159	2,587	5,424	27,140	13,949	12,764	30,873	32,847	26,026
ABULUG	4,908	548	1,149	5,884	3,024	2,767	6,783	7,217	5,718
BALLESTEROS	4,867	544	1,140	5,094	2,618	2,395	5,337	5,678	4,499
CLAVERIA	5,780	646	1,354	6,949	3,571	3,268	7,986	8,497	6,732
PAMPLONA	3,468	387	812	4,211	2,164	1,980	4,889	5,212	4,130
SANCHEZ MIRA	4,136	462	969	5,005	2,572	2,354	5,868	6,243	4,947
APARRI	10,302	1,151	2,413	11,074	5,691	5,207	11,823	12,579	9,967

Note: I : Primary industry II : Secondary industry
III : Tertiary industry

(4) Gross domestic product by sector

As regards the gross domestic product by sector, the perspective plan by NEDA Region II Office deals with Region II in the lump. It is assumed that per capita productivity is nearly constant irrespective of the type of industry in Region II, and the gross domestic product in Cagayan and the study area is estimated by multiplying per capita output for each industrial sector by the working population in that industrial sector and then summing up the products for all the industrial sectors. The results are as shown in Table 5-25.

Table 5-25 G.D.P.

Million ₱ (As of 1972)

	1985				2000			
	G.D.P.	I	II	III	G.D.P.	I	II	III
REGION II	3,691 (100.0)	1,698 (46.0)	844 (22.9)	1,149 (31.1)	19,096 (100.0)	4,304 (22.5)	7,352 (38.5)	7,440 (39.0)
CAGAYAN	1,311 (100.0)	458 (34.9)	439 (33.5)	414 (31.6)	6,283 (100.0)	1,329 (21.2)	2,573 (41.0)	2,381 (37.8)
SURVEYED AREA	209 (100.0)	73 (34.9)	70 (33.5)	66 (31.6)	1,068 (100.0)	226 (21.2)	437 (41.0)	405 (37.8)

Source : Perspective Plan for the Cagayan Valley Region, 1978 ~ 2000

Note : I : Primary industry II : Secondary industry III : Tertiary industry

Values parenthesized are percentages.

From Table 5-25, it is found that G.D.P. will follow a slow rate of growth till 1985, but will be stepped up at a rapid pace from 1985 to 2000 because Region II will benefit from socio-economic effects of the development scheme.

3-3-2 Status quo and future of the study area as viewed from key economic indices

The change in economic structure of the study area (five municipalities) from their present to future clarified in the foregoing survey and analysis is rendered by key economic indices as follows.

(1) Population

Present (1975)	:	96,400
Future (1985)	:	128,000
Future (2000)	:	174,000

(2) Labour force

Present (1975)	:	37,000 (38.4 %)
Future (1985)	:	54,000 (42.2 %)
Future (2000)	:	89,500 (51.4 %)

(The values parenthesized are the ratios to total population.)

(3) Employment structure

	Primary industry	Secondary industry	Tertiary industry
Present (1975)	74.3	8.3	17.4
Future (1985)	50.3	25.8	23.9
Future (2000)	34.4	36.7	28.9

(Values in percentages)

(4) Production by industrial sector

	Primary industry	Secondary industry	Tertiary industry
Present (1975)	26,000,000	15,000,000	-
Future (1985)	73,000,000	70,000,000	66,000,000
Future (2000)	226,000,000	437,000,000	405,000,000

(Values in pesos)

Note : Values for 1975 are also estimated, not actual

Section 4. Impact of the Iron Sand Development Project and Related Projects

4-1 Iron Sand Development Project

4-1-1. Reserves

The iron sand lodes are present in the coastline in front of the study area, and stretch over a distance of about 55 km from the west bank of the Cagayan River to the Pata River (in Claveria). The iron sand deposit is divided into 4 sectors for the convenience of development, and its total extractable reserves are estimated at 10,051,000 tons. According to the present road improvement project survey, however, it is found that the road improvement project costs will overshadow the proceeds from the iron sand development from No. 2 sector because of topographical conditions. For this reason, the iron sand development from No. 2 sector is counted out in the present survey. (See Table 5-26 below)

Table 5-26 Outline of Mines

Sector	No. of Mine	Range of Mine	Aggregate Length	Extractable Reserves
1	31	The west bank of the Cagayan River ~ The Abulugu River	19km	2,572,000 t
2	12	The Abulugu River ~ The Pamplona River	10	1,299,000
3	19	The Pamplona River ~ The Sanchez Mira River	14	1,419,000
4	16	The Sanchez Mira River ~ The Pata River	11.5	4,760,000
Total	78		54.5	10,051,000
Total excl. Sector 2	66		44.5	8,752,000

4-1-2. Mining period

The survey for the port and harbor development project has identified Claveria and Centinela as the best loading ports, and the iron sand development will be pushed forward in the order of No. 4 sector, No. 3 sector and No. 1 sector, starting from No. 4 sector.

Under the existing plan, the annual extraction is estimated at about 600,000 tons, and the mining period will be 8 years for No. 4 sector, 2.4 years for No. 3 sector and 4.3 years for No. 1 sector, or about 15 years in all. (See Fig. 4-1)

4-1-3. Economic impact of mining

By taking stock of the mining activities by INCO Mining Corporation at Leyte since 1971, it is inferred that the iron sand development project will bring about the following economic impact on the study area.

- (1) Required labor force : 700
- (2) Number of dependents : 3,300
- (3) Annual total of wages : ₱4,200,000
- (4) Shipment taxes (P per ton) : ₱6,000,000 per year

4-2 Infrastructural Development Projects

4-2-1. Port and harbor development project

It is planned to construct an iron sand loading berth at Centinela on the east of Claveria Bay in order to accommodate 30,000 DWT ore carriers. It is also planned to construct a general cargo handling berth (with a maximum capacity of 2,000 DWT) in the midst of the approach pier leading to the iron sand loading berth in order to serve the hinterland including the study area. For details of the port and harbor development project, refer to Chap. 3. Those factors of the project which have to do with this chapter are as follows.

- (1) Construction period : approx. 1 year (net 10 months)
- (2) Project costs : ₱53,980,000
- (3) Construction of a new overland and sea transportation system for the study area

4-2-2. Road improvement project

As regards the technical feasibility of the improvement of

roads necessary for transportation of iron sand by truck from coastal mining zone (which is divided into 4 sectors for extraction) to the berth at Centinela, Chapter 4 has been prepared. It has concluded that a new 14.29 km feeder road should be constructed.

Those factors specified in the road improvement project which are concerned with this chapter are as follows.

(1) Road improvement for No. 4 sector

Aggregate length required : 3.97 km (4 routes)
Construction period : approx. 1 year (The construction period will change depending on the construction method. Here, the route-by-route construction is supposed.)
Project costs : approx. ₱2,000,000
Scheduled completion : 1 year before start of iron sand development

(2) Road improvement for No. 3 sector

Aggregate length required : 2.90 km (3 routes)
Construction period : approx. 1 year
Project costs : approx. ₱2,200,000
Scheduled completion : 7th year after start of iron sand development at No. 4 sector

(3) Road improvement for No. 1 sector

Aggregate length required : 3.52 km
Construction period : approx. 3 months
Project costs : ₱560,000
Scheduled completion : 10th year after start of iron sand development

- (4) Construction work for feeder road (pier approach road and aggregate transportation road)

Aggregate length required : 3.90 km (2 routes)
Construction period : approx. 1 year
Project costs : approx. ₱1,280,000
Scheduled completion : 1 year before start of iron sand development

- (5) The feeder roads are planned to connect the coastline to National Road Route 3. They cross mainly rice fields and coconut fields, which may be more or less affected by heavy vehicular traffic during the period of iron sand development.

But, it should also be noted that they serve as service roads to the fishing communities along the coastline also as farm roads to the rice fields.

4-2-3. Economic impact of infrastructural development projects

- (1) Local portion of project costs

Of the costs for the infrastructural development projects, that part which will fall into the hands of local people is estimated as follows.

- 1) 10 % of the total cost of port and harbor development project (costs for quarrying, supply of materials such as logs, haulage, and wages): ₱5,400,000
- 2) Right-of-way costs, 100 %, and local materials costs (some 20 % of road project costs) for stones and logs, haulage and wages : ₱3,850,000

Namely, a total of ₱9,250,000 will be brought about into the money market of the study area as a result of the projects relating to the iron sand development project.

However, the project costs to be invested during 1 year before implementation of the iron sand development project will be about ₱8,100,000 which is the above total less the

local portion of the road improvement project costs for No. 3 and No. 4 sector.

- (2) Labor force necessary for the infrastructural development projects (1 year before start of the iron sand development project)
 - 1) The local portion of the port and harbor development project is estimated at P5,400,000 of which 30 % will be accounted for by the wages. Assuming that per capita wages are P450/month and that the construction period is 10 months, the labor force required will amount to 360 workers.
 - 2) The local portion of the road improvement project is estimated at P2,700,000 of which 30 % of that part obtained by subtracting the costs for rights-of-way will be accounted for by wages. Assuming that per capita wages are P450/month and that the construction period is 10 months, 150 workers will be necessiated as a labor force.

Namely, a new labor force demand for around 500 workers will be generated within the study area during 1 year before start of iron sand development project, and the total income by it will amount to about P2,300,000.

Section 5. Study of Cargo Volume and Traffic Volume to be Generated in the Future

It is evident that the construction of ports and harbors and amplification of roads within the study area by the infrastructural development projects relating to the iron sand development project will enhance the possibilities for the products to be increased for export from within the study area.

Although the development scheme for the study area prepared by NEDA Region II Office has taken this into account, no quantitative forecast is not made.

In this section, the non-iron sand cargo to be delivered from the study area is estimated roughly.

The pre-feasibility study report prepared by DPH concerning the Philippine-Japan Highway Loan Project, Phase II (National Road Route 3), covers the major roads within the study area with future traffic volume only. For this reason, the present traffic volume is estimated by inverse stochastic operation of the projected value in order to make it possible to compare the present and future numerically.

Although DPH's projection reflects the future development scheme imagined by NEDA Region II Office, it is considered to be in want of the traffic volume due to iron sand development which serves as local traffic in the study area. For this reason, this local traffic is estimated and superimposed over DPH's projection.

5-1. Projection of Outbound Cargo Volume to be Generated in Future

The staple products to be exported from the study area to the rest of the Philippines and to abroad in the future will include iron sand, rice, lumber and their processed goods.

As regards rice, the surplus discussed in 3-2-2. (1) will be exported to the rest of the Philippines (mainly the southern part of Luzon, including Manila). The rice exports are estimated at about 21,000 tons/year in 1985 and about 30,000 tons/year in 2000. From

the currently available data which are not so accurate to stand correct projection, it is presumed that the surplus rice may have exported about 7,000 tons/year in 1976.

As regards lumber and its processed goods, plywood has become the major item according to a recent Government policy.

At present, private businesses at Claveria Bay are exporting plywood alongside ship from the wooden piers.

The track records for the year 1973 show 16,112 tons/year, which if applied with the annual average growth rate for G.V.A. of wood-processed goods, will rise to about 33,500 tons/year in 1985 and to about 330,000 tons/year in 2000.

Table 5-27 Goods Transportation

	Number (t)				Annual Growth Rate (%)	
	1973	1976	1985	2000	1973 -1985	1985 -2000
Rice	—	7,000	21,000	30,000	—	2.5
Wood	16,112		33,500	330,000	6.3	16.5
Total	—		54,500	360,000	—	—

Source : Perspective Plan for the Cagayan Valley Region, 1978 - 2000 (NEDA Region II Office)

Namely, the deliveries of stable products from the study area will amount to 54,500 tons/year in 1985 and 360,000 tons/year in 2000.

The marine products and their processed goods are also expected to become promising exports, but are omitted because of no clues permitting stochastic analysis. The rice deliveries will be partly borne by truck. Wood-processed products are subject to international demand-supply conditions.

Assuming that all the deliveries go through Centinela Base to be constructed as a link of the iron sand development project, the cargo volume to be handled at that base will be as follows.

1985 : Estimated annual shiploads

Agricultural produce (rice)	:	$21,000 \times 0.7 \doteq 15,000$ tons
Forestry products (wood-processed goods)	:	$33,500 \times 0.9 \doteq 30,000$ tons
Iron sand	:	60,000 tons
Other cargoes	:	5,000 tons
TOTAL		650,000 tons

2000 : Estimated annual shiploads

Agricultural produce (rice)	:	$30,000 \times 0.7 \doteq 20,000$ tons
Forestry products (wood-processed goods)	:	$330,000 \times 0.9 \doteq 310,000$ tons
Other cargoes	:	50,000 tons
TOTAL		380,000 tons

Note : For the agricultural produce, it is assumed that 30 % will be borne by overland transportation. 90 % assigned to the forestry products is determined by making allowances for safety. The avalues for the year 2000 are determined in proportion to the growth rates of G.V.A. projected for Region II with 1985 values taken as a basis.

5-2 Present and Future Traffic Volume in the Study Area

In the pre-feasibility study report prepared by DPH for the Philippine-Japan Highway Loan Project (National Road Route 3), the future traffic volume for the years 1985 and 2000 on National Road Route 3 and Provincial Road Route 303 are projected for the study area, but the present traffic volume is left uncertain.

The present traffic volume in the study area is estimated as follows.

The growth of the future traffic from 1985 to 2000 is estimated at about 8.4 to 12.6 % per year.

Since this annual growth rate is nearly the same as the annual average growth rate of G.D.P. in the study area which is about 11.5 %, the future traffic volume is assumed to be nearly proportional to the growth of G.D.P.

Since G.D.P. growth from 1975 to 1985 in the study area is estimated at 7.7 %, the present traffic volume is estimated by inverse calculation of the 1985 value as follows.

Claveria - Sanchez Mira : 1,752 vehicles/day
(all types of vehicles)

Sanchez Mira - Junction between
National Road Route 3 and Pro-
vincial Road Route 303 : 1,694 vehicles/day
(all types of vehicles)

Ballesteros - Junction between
National Road Route 3 and
Provincial Road Route 303 : 994 vehicles/day
(all types of vehicles)

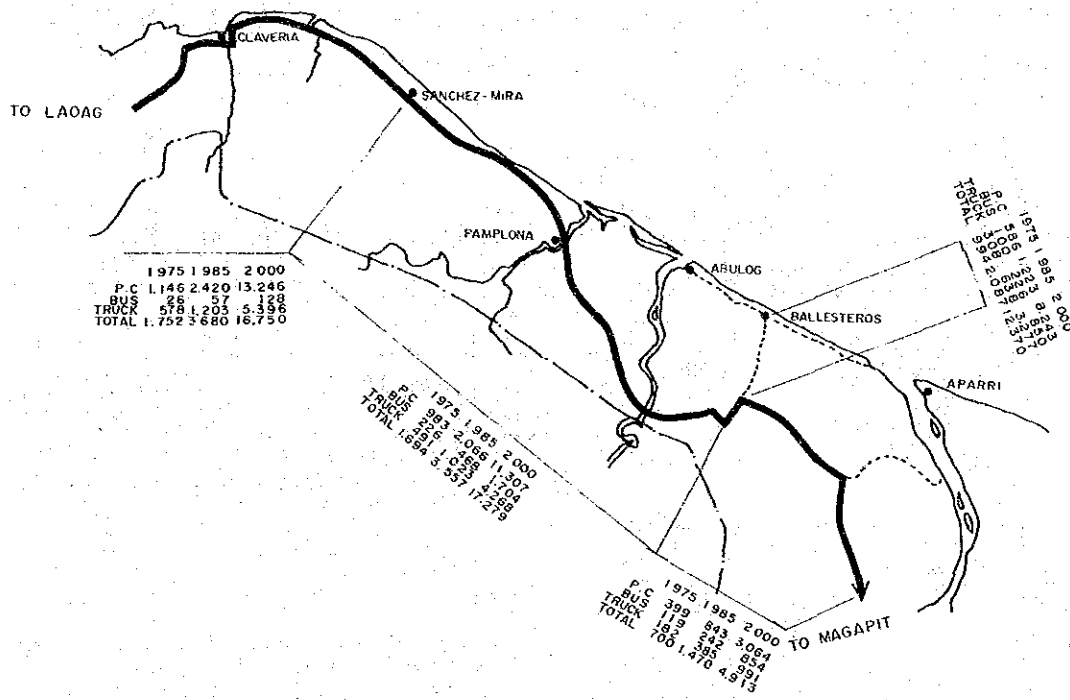
Junction between National
Road Route 3 and Provincial Road
Route 303 - Magadit : 700 vehicles/day
(all types of vehicles)

The present and future traffic volume are shown in Fig. 5-7. The traffic volume locally (within study area) generated by the iron sand development project is estimated at 250 iron sand carrier trucks per day on condition that the annual extraction is 600,000 tons; loading capacity of truck, 10 tons; and total number of trucking days, 240 days per year.

The round trip traffic volume to be generated within the study area is estimated to be twice as large, that is, 500 trucks/day.

It is therefore necessary to include the 500-trucks-per-day iron sand development traffic into the future traffic for the year 1985 when discussing the traffic volume on that section of National Road Route 3 which runs through the study area and the planned feeder roads within the study area.

Fig. 5-7 TRAFFIC VOLUME (Present and Future)



Section 6. Socio-economic Impact and Economic Appraisal of the Development Projects

For the purpose of studying what socio-economic impact the iron sand development project and its related projects will bring about on the study area, how they will cure the internalized problems in the study area and to what extent they will externalize the potential of the study area and contribute toward realization of the higher policy (NEDA Region II Perspective Plan), the whole events are judged in relation to lapse of time, that is, "before development", "during development" and "after development." Along with this, economic appraisal is made by some qualitative analysis of this time-dependent change.

6-1 Direct Development Impact

Direct Development Impact

		Before development (present) (1975)	During development (iron sand extraction) (1985)	After development (2000)	Effects
Impact of iron sand development project and its related projects	Ports and harbors	Wooden pier at Claveria Bay for private businesses for offshore delivery Annual shiploads: 1973 16,112 tons/year	Completion of berths at Centinela Berth for iron sand only: 30,000 DWT Berth for general cargo: 2,000 DWT (1 berth each) Annual cargo handling volume (estimate) Iron sand: 600,000 tons/year General cargo : 60,000 tons/year	Iron sand berth to be modified for use for general cargo Cargo handling capacity: 600,000 tons/year Annual cargo handling volume (estimate): General cargo mainly consisting of wood-processed goods, 360,000 tons/year	Centinela to become a cargo handling terminal along with Aparri, and to serve in cooperation with the road network as a stronghold to open Region II to the world.
	Roads	Greater part of arterials (National Road Route 3 and Provincial Roads Route 303 and Route 320) left unpaved; poor communication with the rest of the Philippines (ferry the only means); feeder roads left uncared for to embog vehicular traffic.	Arterials (National Road Route 3, and Provincial Roads 303 and 320) improved and Magapit Bridge completed to provide an easy access to the rest of the Philippines; new construction and improvement of feeder roads pushed forward to make feasible vehicular traffic.	Completion of arterials, local roads and feeder roads to form a network	Increased exchange with the rest of the Philippines to promote the economic development scheme and break up economic and cultural isolation; improved distribution of products to markets and promoted merchandization to push forward modernization of industry in the study area; and enhanced cultural and information exchange.
	Port, Harbors and Road Projects	Earned income of the study area (five municipalities) (estimate): ₱11,100,000	Port, harbor and road construction work Labor force required: 500 workers Local portion of work costs: ₱9,250,000 (of which ₱2,300,000 will be wages)		Construction of port, harbor and road to make easy the transportation of products and materials from, into and within the study area, to invigorate the industrial activities within the study area.
	Iron sand extraction		Annual extraction: 600,000 tons Mining period: 15 years Labor force : 700 workers Annual earned income: ₱4,200,000		Offer of new employment opportunities and contribution toward stabilized increase in income of the local people; development and promotion of related industry (automotive and machine industry, etc.)

As listed in the above table, the iron sand development project and its related projects, inter alia, port and harbor development and arterial road improvement (National Road Route 3, JPHL Project, Phase II), are considered to be of controlling importance in building up the foundation for the northern part (Cagayan Province) of Region II, including the study area. Also, the regional development scheme mapped out by NEDA Region II Office cannot do without these projects in its materialization. It is therefore understood that these projects have a paramount bearing on the study area, as envisaged in the higher development policy. Of the direct impact of the projects to be given to the study area, the short-term one which is made clear quantitatively to some extent is employment and income which may assume the following pattern.

Employment structure: -

Employed population at present including about 3,000 in the secondary industry	:	37,000 (as of 1975)
Labor force required for the infrastructural development projects	:	approx. 500
Labor force required by iron sand development project	:	approx. 700

As against about 3,000 in the secondary industry at present, 500 to 700 will be recruited for about 15 years from the start of the iron sand development project. This increase accounts for 12 to 23 % of the secondary industry working population at present, bringing about a sizable degree of impact.

Income (local people): -

Average income per person of the employed population at present	:	P300 (Source: Socio-economic Profile, Sanchez Mira, 1976)
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Total annual income at present : 37,000 x P300 = P11,100,000

Earned income from infrastructural
development projects : P2,300,000/year

Earned income from iron sand
development project (see Section 5): P4,200,000/year

Namely, the local people will enjoy 2,300,000 to 4,200,000 pesos a year for about 15 years after start of the projects in addition to the current level of about 11,000,000 pesos.

This increase of cash income corresponds to as much as 20 to 40 % of the current level, telling of the magnitude of the impact.

6-2 Multiplied Effects of Development

In addition to the direct impact stated above, the development projects will take shape in the multiplied form of socio-economic changes in the study area.

So that the study area can benefit most from these socio-economic changes resulting from the development projects, administrative, financial and other various measures should be extended in a harmonious way. Therefore, it is hard to figure out the multiplied effects right off, but presumably the development projects will induce the secondary effects on the various sectors of industry and the changes on the local living and natural environments, which in turn will have a great meaning in the future development scheme.

Multipled Effects on Industrial Activities, Living and Natural Environments

	Before development (present) (1975)	During development (iron sand mining) (1985)	After development (2000)	Effect
Impact on industrial activities	Agriculture Rice cropping 1975: Total output, 30,944 tons Intra-Philippine delivery, unknown Primary industry G.D.P.: ₱26,000,000	Rice cropping 1985: Total output, 62,600 tons Export from study area: 21,000 tons Primary industry G.D.P.: ₱73,000,000	Rice cropping 2000: Total output, 87,700 tons Export from study area: 30,000 tons Primary industry G.D.P.: ₱226,000,000	Construction of roads and ports and harbors to permit easy access to market, stabilize export of surpluses, increase the productivity and promote modernization of agricultural operations.
	Forestry and wood working industry Material wood (logs, etc.) Processed goods: Share unknown Shipments: 16,112 tons (as of 1973)	Material wood: 25 % Processed good: 75 % Shipments : 33,500 tons/year	Material wood: 0 Processed goods: 100 % Shipments: 331,000 tons/year	Construction of Centinela berth to stabilize export; reform of industry structure into one that can add high value to the products to contribute toward the improvement of local employment structure and income level.
	Fishery Rich resources, but primitive piscatory methods. No facilities for processing and preserving, and no merchandizing activities.	Promotion of capital investment in fishery because of increased possibilities for marketing	Increased accumulation of capital for modernization to answer international demand for effective use of resources. (Fishing ports may have to be amplified and rain-forced)	Nurture of basic requirements for industrial development, though introduction of modern industrial capital is a must.
	Manufacturing Nothing other than wood-processing industry because of isolation from market. Secondary industry G.D.P.: ₱15,000,000	Increased potential for location of new types of industry, such as automotive industry, its peripheral industries such as machine industry, etc. due to iron sand development Secondary industry G.D.P.: ₱70,000,000	Increased interaction between new types of industry to be established during the development of iron sand and other industries (agriculture, wood processing, fishery, construction, etc.) to promote modernization of industrial structure. Secondary industry G.D.P.: ₱437,000,000	First steps toward introduction of new types of industry into the study area, integration of new types of industry with the existing industry to promote the modernization of industrial structure.
Living environments	Construction Underdeveloped because of no particular demand to speak of.	Sudden rise in demand triggered by the construction work of ports, harbors and roads to serve a spur to the interests. Construction demand in the study area: ₱9,250,000 (First year of the iron sand development project: ₱8,100,000)	Construction enterprises which will be capitalized during the iron sand development project to play an important role in the public works, to increase the investment effects and to go a long way toward the modernization of the industry.	Increase in tax revenues in the study areas to promote the construction and amplification of social and living facilities to enhance the infrastructure for the industrial development.
	Transport Underdeveloped roads and poor ferry service across the Cagayan River to have hampered the flow of cargo into, out of, and within the study area. Traffic volume on arterials: 1,000 to 1,500 vehicles on daily average	Road construction and particularly the construction of Magapit Bridge to increase the demand for medium-and long-distance bus services; construction of the bridge to bring about a spiral increase in cargo transportation volume. Traffic volume on arterials: 3,000 vehicles on daily average.	Development and modernization of industry to increase both passenger and cargo traffic at an accelerated pace. Traffic volume on arterials: 15,000 vehicles on daily average.	Removal of bottleneck in traffic demand, and invigoration of industrial activities due to increased traffic volume of passengers and cargo.
Natural environments	Commercial Isolated economy and shortage of money supply to limit the commercial activities to transaction of daily necessities.	Stabilized growth of cash earnings by local people and active production activities to call for marketing of diversified commodities and thus modernize the commercial activities. Tertiary industry G.D.P.: ₱66,000,000	Enhanced promotion of modernization during the iron sand development Tertiary industry G.D.P.: ₱405,000,000	Promotion of the transition from closed to open economy (modern monetary economy) to modernize the commercial activities.
	Facilities relating to living No electric supply and no telecommunication facilities.	Developed transportation facilities to stimulate interaction with the rest of the Philippines, speeding up the supply of information and promoting the upgrading of culture. Traffic hazards and air pollution due to comings and goings are evil facets of development, and measures against them should be provided.	Accumulation of technology and culture due to invigoration of industrial activities; increased tax revenues and flourishing industrial activities to piece out cultural facilities.	Recency and accuracy of information, increased level of living and amplification of cultural facilities.
Living environments	Culture and Information Underdeveloped transportation to have limited the social interaction, denying the study area information and cultural evolution.	Partial coverage with electricity and communications; modernization of medical facilities, housing, etc.	Increased tax revenues and accumulated industrial capital to promote the amplification of living facilities.	Great steps toward amplification and modernization of utility systems, telecommunication equipment, medical services, housing, etc.
	Facilities relating to living Population density: 1.11 person/ha Traffic volume on arterials: 1,000 to 1,500 vehicles on daily average	Population density: 1.48 person/ha Traffic volume on arterials: 3,000 vehicles on daily average. Generation of a daily traffic of 500 large-sized trucks due to iron sand development.	Population density: 2.01 persons/ha Traffic volume on arterials: 15,000 vehicles on daily average	No evil effects on natural environments seen from the viewpoint of the level of population density, only if the depleted mines are conserved and restored with care; no problem either with respect to the large-sized truck traffic in view of the order of through traffic on the arterials only if attention is localized on the traffic problems of feeder roads.

6-3 Economic Appraisal

The iron sand development project and the infrastructural development projects will invigorate industrialization and assure the local people and industries alike of increased employment and business opportunities and of increased income. This in turn will stimulate the consumption and demand in the study area, promoting the development of tertiary industry.

Also, the local government will be able to rake in a great deal of tax revenues, amassing the sinews for treasury investment and loan into the development of industrial and living infrastructures to make steps toward regional industry development and upgrading of the living standard of local people. (Allocation of shipment taxes, P6,000,000/year, not clarified, however)

On the other hand, the development of and repletion of the transport system by the port, harbor and road construction projects will be highly conducive not only to the iron sand development, but also to the merchandization and distribution of local agricultural products, forestry products and other various processed goods, to stabilized flow of commodities into, from and within the study area. It will have persistent effects on the economic activities of the study areas even after iron sand development.

In support of this, it is derived from the projections declared in the regional development scheme prepared by NEDA Region II Office that the volume of cargo to be handled by Centinela will amount to 360,000 tons a year for the study area only even after the life of the iron sand development project. If the hinterland is counted in, the volume will be even more amplified.

To sum up, it may be safely said that the iron sand development project and its related infrastructural development projects will bring about far-reaching effects over the socio-economic development of the northern part of Region II including the study area on both short-term and long-term bases.

6-4 Matters to Heed in Development Activities, and Future Problems

As discussed in the foregoing, the iron sand development project and its related infrastructural development projects immeasurably large impact on the socio-economic development of the study areas.

It should be borne in mind however that the development principal must make every effort to conserve the precious environments and contribute toward the true development and growth of the local communities in promoting the projects.

