

points along the Ylang-Ylang River. The levels of BOD, phosphate and total coliform are higher than the national standards of water quality criteria at two stations of Imus River and Ylang-Ylang River located in Dasmariñas, which are polluted by domestic sewage from households.

Table 2.2.11 Results of the Water Quality Survey (2005)

Items	Unit	Imus River			Ylang-Ylang River			Water Quality Criteria*	Japanese river water quality criteria Class C
		St 1	St 2	St 3	St 1	St 2	St 3		
Temperature (on-site)	°C	28.8	27.6	22.9	28.0	25.8	24.9	(a)	-
pH	-	7.8	7.6	7.6	7.6	7.7	6.6	6.5-8.5	6.5-8.5
BOD	mg/l	9.7	10.3	5.3	3.3	8.0	1.0	7(10)	5
DO	mg/l	5.3	4.1	6.7	4.9	2.2	5.5	5.0	5
Ammonia	mg/l	0.33	0.44	0.55	0.68	0.81	0.01	-	-
Phosphate(as Ortho)	mg/l	0.68	1.76	0.97	1.06	1.11	0.36	0.4	-
Total Dissolved Solids	mg/l	33,133	415	342	23,071	426	257	-	-
Total Solids	mg/l	33,176	434	360	23,113	459	282	-	-
Total Suspended Solids	mg/l	42	19	17	43	33	26	(b)	50
Color	PCU	50	52	27	25	23	11	(c)	-
Oil and Grease	mg/l	4	5	5	4	7	5	2	-
Total Coliform	MPN/100ml	2.E+04	5.E+05	3.E+04	1.E+05	7.E+05	1.E+05	5.E+03	-
Fecal Coliform	MPN/100ml	1.E+04	9.E+04	2.E+04	9.E+04	7.E+05	6.E+04	-	-

Note: Observed values are averages from 3 sampling periods (a.m, p.m and evening)

- No data

* The numerical limits are yearly average values.

(a) The allowable temperature increase over the average ambient temperature for each month. This rise shall be based on the average of the maximum daily temperature reading recorded at the site but upstream of the mixing zone over a period of one (1) month.

(b) Not more than 30 mg/l increase

(c) No abnormal discoloration from unnatural values

Source: JICA Study Team

2.3 Socio-economic Profile

2.3.1 Population

Population growth rate in CALA area is high in the national and regional context as shown in Table 2.3.1. The past trend and the present profile of population in CALA are shown in Table 2.3.2. The population of the Study Area and the Analysis Area accounts for 3.08 million and 4.00 million, respectively. The annual growth rates of population of the Study Area and Analysis Area during 1990-2000 were 5.36% and 5.17%, respectively. The CALA area has experienced a sharp increase in its population with annual average growth rate during the period from 1990 to 1995

with 6.46% for Cavite and 3.32% for Laguna and continued with the same strength from 1995 to 2000 with 5.45% for Cavite and 4.08% for Laguna.

The rapid increase of population in CALA between 1980 and 2000 can be largely attributed to the following:

- Proximity to Metro Manila;
- Squatter relocation program of Metro Manila;
- Development of affordable middle-income housing;
- The 50-kilometer radius ban policy of Metro Manila on industries, discouraging further industrial activity within Metro Manila and promoting the industrial dispersal strategy;
- Intensive middle-income residential development; and
- Rapid industrialization brought about by the promotion of the CALABARZON growth area.

Table 2.3.1 Annual Growth Rate of Population in National and Regional Context (%)

	1970-1980	1980-1990	1990-1995	1995-2000
Philippines	2.75	2.35	2.32	2.32
NCR	4.10	2.98	3.30	1.06
Cavite Province	4.02	4.10	6.46	5.45
Laguna Province	3.35	3.48	3.32	4.08
Rizal Province	6.10	5.81	5.67	5.79
Southern Tagalog (Region IV)	3.22	3.05	3.53	3.72

Source: National Statistics Office (NSO)

Looking into the breakdown by cities, however, there are trend changes and differences among cities. The centrally located cities in NCR, such as Makati City and Manila City, already slowed down in 1980s, and some cities changed into the trend of gradual decrease in 1990s. The population in the cities located in the northern and southern peripheral area of NCR continued to keep rapid increase trend (annually 7-8%, even more than 10%) during such decades. However, from the latter half of 1990s, such cities as Las Piñas and Muntinlupa have begun to slow down (1-3% annually, even negative growth in some cities).

Based on the annual average growth rates by municipality/city of CALA from 1990 to 1995 and from 1995 to 2000 in Cavite, three municipalities, namely Imus, Dasmariñas, and Bacoor, recorded the highest annual average population growth rates. These three municipalities also account for the three largest shares in population increase. Fourth was Silang.

In terms of population size in 2000, the same municipalities had the largest shares. The population of Dasmariñas was 262,406; Bacoor has 250,821 and Imus has 177,408. The population sizes in these municipalities amounted to 42% of total population in Cavite.

Table 2.3.2 Population in CALA (1990-2000)

City/Municipality		1990 Total Population	1995 Total Population	2000 Total Population	AAGR 1990-2000 (%)	Land Area (sq. km.)	Population Density (pax/ha)
CAVITE PROVINCE		1,152,575	1,610,324	2,063,161	7.90	1,427.1	14.5
District 1	Cavite City	91,629	92,641	99,367	0.84	11.83	84.0
	Bacoor	159,693	250,821	305,699	9.14	52.40	58.3
	Kawit	47,755	56,993	62,751	3.14	13.40	46.8
	Novelita	20,405	27,306	31,959	5.66	5.41	59.1
	Rosario	45,407	54,086	73,665	6.22	5.67	129.9
District 2	Trece Martires City	15,685	20,451	41,653	16.55	47.90	8.7
	Carmona	28,242	35,686	47,856	6.94	30.92	15.5
	Dasmariñas	136,585	262,406	379,520	17.78	82.34	46.1
	Gen. Mariano Alvarez	65,962	86,824	112,446	7.04	9.38	119.9
	General Trias	52,895	66,837	107,691	10.35	117.68	9.2
	Imus	92,140	177,408	195,482	11.21	97.01	20.2
	Tanza	61,779	77,839	110,517	7.88	96.30	11.5
District 3	Tagaytay City	23,743	29,419	45,287	9.07	66.15	6.9
	Alfonso	28,947	34,613	39,674	3.70	64.60	6.1
	Amadeo	21,025	22,728	25,737	2.24	47.90	5.4
	Gen. E. Aguinaldo	10,953	11,893	14,323	3.07	51.03	2.8
	Indang	39,289	42,765	51,281	3.05	89.20	5.8
	Magallanes	12,557	17,115	18,090	4.40	78.60	2.3
	Maragondon	22,817	25,828	31,227	3.68	165.49	1.9
	Mendez	17,649	20,321	22,937	2.99	16.67	13.8
	Naic	51,631	58,046	72,683	4.07	86.00	8.5
	Silang	93,807	124,062	156,137	6.64	156.41	10.0
Ternate	11,981	14,236	17,179	4.33	43.50	4.0	
LAGUNA PROVINCE		1,370,267	1,631,082	1,965,872	4.34	1,759.5	11.2
Dist. 1	Biñan	134,564	160,206	201,186	4.95	43.50	46.3
	San Pedro	156,519	189,333	231,403	4.78	22.6	102.4
	Santa Rosa	94,719	138,257	185,633	9.59	39.10	47.5
Dist. 2	Bay	32,528	37,563	43,762	3.45	46.90	9.3
	Cabuyao	66,973	77,302	106,630	5.92	84.60	12.6
	Calamba	173,445	218,951	281,146	6.21	144.80	19.4
	Los Baños	66,124	71,683	82,027	2.40	56.5	14.5
District 3	San Pablo City	161,624	183,757	207,927	2.86	214.00	9.7
	Alaminos	27,414	31,442	36,120	3.17	54.70	6.6
	Calauan	32,735	36,677	43,284	3.22	66.40	6.5
	Liliw	21,915	24,434	27,537	2.56	39.1	7.0
	Nagcarlan	37,696	43,679	48,727	2.92	78.1	6.2
	Rizal	9,501	11,537	13,006	3.68	27.9	4.7
	Victoria	21,846	25,424	29,765	3.62	33.1	9.0
District 4	Cavinti	15,132	16,157	19,494	2.88	70.40	2.8
	Famy	7,929	9,661	10,419	3.14	19.4	5.4
	Kalayaan	13,115	16,955	19,580	4.92	46.6	4.2
	Luisiana	14,240	16,269	17,109	2.01	63.8	2.7
	Lumban	19,777	21,996	25,936	3.11	96.8	2.7
	Mabitac	11,442	13,309	15,097	3.19	73.3	2.1
	Magdalena	13,449	15,927	18,976	4.11	34.4	5.5
	Majayjay	15,873	18,989	22,153	3.95	69.4	3.2
	Paete	20,577	21,809	23,011	1.18	32.4	7.1
	Pagsanjan	25,027	28,999	32,622	3.03	26.4	12.4
	Pakil	13,439	15,663	18,021	3.40	13.0	13.9
	Pangil	15,215	17,664	20,698	3.60	23.0	9.0
	Pila	27,474	31,251	37,427	3.62	31.2	12.0
	Santa Cruz	76,614	86,978	92,694	2.09	38.6	24.0
	Santa Maria	20,524	22,296	24,574	1.97	128.4	1.9
Siniloan	22,760	26,914	29,902	3.13	41.1	7.3	
METRO MANILA		7,948,392	9,454,040	9,932,560	2.49	636.00	156.2
	City of Las Piñas	297,102	413,086	472,780	5.91	41.50	113.9
	City of Muntinlupa	278,411	399,846	379,310	3.62	46.70	81.2
The Study Area		1,828,440	2,553,877	3,082,105	5.36	958.07	32.17
The Analysis Area		2,418,754	3,278,988	4,003,276	5.17	1,900.33	21.07

Source: National Statistics Office (NSO)

Unlike Cavite where population increase was concentrated in the three largest municipalities, Laguna shows a less concentrated profile. In terms of population increase, San Pedro and Biñan were among the five local government units that posted the highest.

Table 2.3.3 shows the study area's population in relation to those of the nation, the region and sub-regional areas. As to population distribution, gross density in CALA increased tremendously from 7.9 persons per hectare in 1990 to 12.6 persons per hectare in 2000. As such, gross densities have scaled up 1/3 of the cities/municipalities to more than 50 persons per hectare.

Figure 2.3.1 illustrates that approximately 65% of the total CALA population in 2000 were concentrated in areas that are immediately adjacent south of Metro Manila, i.e., Bacoor, Imus, Dasmariñas, and Silang of Cavite as well as San Pedro to Calamba of Laguna.

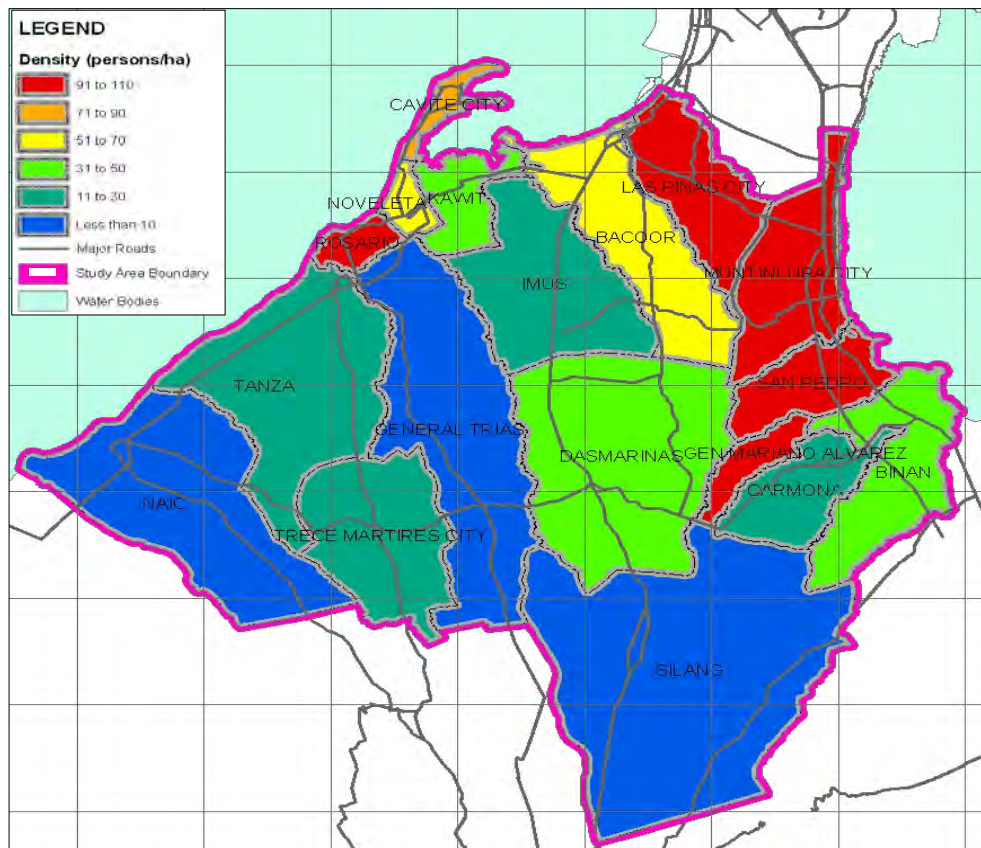
In terms of number of households, there are 837,268 households in the Analysis Area. Average household size is 4.9 members.

Table 2.3.3 CALA in the National, Regional and Sub-Regional Context

	Land Area (sq. km.)	Population			Average Annual Growth Rates (%)		Population Density (persons/ha)		
		1990	1995	2000	1990-1995	1990-2000	1990	1995	2000
PHILIPPINES	300,000	60,703,206	68,614,162	76,498,735	2.48	2.60	2.0	2.3	2.5
METRO MANILA	636	7,948,392	9,454,040	9,932,560	3.53	2.49	125.0	148.7	156.2
REGION IV	46,924	8,263,099	9,943,096	11,793,655	3.77	4.27	1.8	2.1	2.5
% to Philippines	16	14	14	15					
CALABARZON	16,000	6,349,452	7,750,204	9,124,554	4.07	4.72	4.0	4.8	5.7
% to Region IV	34	75	76	77					
CALA	3,186.6	2,522,766	3,241,406	4,029,033	5.14	5.97	7.9	10.2	12.6
% to Region IV	7	31	33	40					
CAVITE Province	1,427.1	1,152,534	1,610,324	2,063,161	6.92	7.90	8.1	11.3	14.4
% to Region IV	3	14	16						
LAGUNA Province	1,759.5	1,370,232	1,631,082	1,965,872	3.55	4.33	7.8	9.3	11.2
% to Region IV	4	17	16						

Sources: 2000 Census Population of NSO, and Calculations from PFP and Phil Statistical Yearbook 2003

Figure 2.3.1 Population Concentration in the Study Area (2000)



Source: National Statistics Office (NSO)

Table 2.3.4 Distribution of Municipalities/Cities in CALA by Density and Annual Average Growth Rates (1990 and 2000)

Density (persons/ha.)	1999-2000 Annual Average Growth Rates (%)			
	< 2.5	2.6-3.5	3.6-5.0	> 5.1
Less than 10			Naic	Gen. Trias, Silang
11 to 30	Los Baños			Carmona, Trece Martires, Imus, Cabuyao, Tanza, Calamba
31 to 50		Kawit	Biñan	Dasmariñas, Sta. Rosa
51 to 70				Bacoor, Noveleta
71 to 90	Cavite City			
91 to 110				Las Piñas, Muntinlupa, Rosario, Gen. M. Alvarez

2.3.2 Employment

The past trend and the present profile of employment (at work place) in CALA are shown in Tables 2.3.5 and 2.3.6. In short, the service sector has been creating the largest number of employment in CALA, with the industry sector as second and the agriculture sector has the smallest number, and is also losing its share in total employment. In contrast, employment in the agricultural sector, with the smallest share, has been holding constant employment for the past decade for both the Cavite and Laguna Provinces.

Table 2.3.5 Employed Persons at Work Place by Type of Industry in Cavite and Key Towns (in 000 persons)

Area		Year							
		1995	1996	1997	1998	1999	2000	2001	2002
CAVITE	Total	446	446	510	506	634	635	690	708
	agriculture	55	55	92	80	61	55	76	65
	industry	159	159	160	158	204	212	197	219
	service	232	232	257	268	369	368	417	425
Total for Key LGUS ^{1/}	Total			140	142	288	281	309	336
	agriculture			8	6	12	9	14	10
	industry			46	43	83	98	88	96
	service			87	94	193	175	207	230
Other CAVITE	Total			369	363	346	354	381	371
	agriculture			84	74	48	45	62	54
	industry			114	115	122	114	108	122
	service			171	174	175	194	211	195

1/ Key LGUs included Bacoor, Dasmariñas, and Imus
Source: NSO and PFFPs

Table 2.3.6 Employed Persons at Work Place by Type of Industry in Laguna and Key Towns (in 000 persons)

Area		Year							
		1995	1996	1997	1998	1999	2000	2001	2002
LAGUNA	Total	539	560	591	620	689	700	745	750
	agriculture	93	99	103	73	81	92	111	104
	industry	186	198	188	222	251	223	223	225
	service	259	263	299	325	356	385	411	420
Total for Key LGUS ^{1/}	Total			253	267	305	311	332	341
	agriculture			19	18	16	20	21	23
	industry			90	100	131	112	113	114
	service			145	150	159	179	199	205
Biñan	Total			52	53	68	68	72	75
	agriculture			2	1	1	1	2	1
	industry			21	28	40	35	32	29
	service			29	24	27	32	38	45
San Pedro	Total			59	62	76	77	88	92
	agriculture			3	2	1	-	2	2
	industry			19	23	34	24	26	29
	service			37	38	41	53	60	61
Other Laguna	Total			338	353	383	390	412	408
	agriculture			86	56	65	72	90	81
	industry			96	122	120	111	110	112
	service			154	175	198	207	212	215

1/ Key LGUs included Biñan, Sta. Rosa, and San Pedro
Source: NSO and PFFPs

The total number of employed workers (i.e. for the primary/agriculture, secondary/industry and tertiary/service sectors) for year 2000 by city/municipality in the Analysis Area is shown in Table 2.3.7. For transport planning, employment is classified “at residence” and “at workplace.” Employment “at residence” is the recording of employed persons in the city/municipality or based on where they live (i.e., home address) while “at workplace” is based on the municipality where they actually work (i.e., work address).

Table 2.3.7 Employment “At Workplace” and “At Residence”, 2000

City/Municipality	Employment “At Residence”	Employment “At Workplace”
NCR	284,037	260,827
Muntinlupa City	128,134	122,139
Las Piñas City	149,282	132,211
Cavite	610,607	525,516
Bacoor	94,488	69,905
Imus	62,231	49,353
Cavite City	28,667	32,873
Kawit	18,352	14,833
Noveleta	9,478	5,150
Rosario	22,148	37,689
General Trias	34,979	28,439
Tanza	29,281	23,073
Trece Martires City	12,529	11,108
Naic	19,116	15,807
Dasmariñas	107,766	85,705
Silang	43,826	36,747
Tagaytay City	12,683	13,879
Amadeo	8,490	6,792
Indang	15,527	11,802
Mendez Nunez	6,945	7,139
Alfonso	11,630	10,425
General Emilio Aguinaldo	3,857	3,426
Magallanes	4,708	3,857
Maragondon	8,335	6,776
Ternate	4,780	4,233
Gen. Mariano Alvarez	34,294	25,433
Carmona	16,537	21,070
Laguna	351,018	332,995
San Pedro	72,438	54,009
Biñan	70,598	67,033
Santa Rosa	66,265	69,835
Cabuyao	32,445	41,911
Calamba	84,818	74,138
Los Baños	24,454	26,068
Total Study Area	1,245,662	1,119,338

Source: NSO and PFPs

2.3.3 Enrollment

Similar to employment, enrollment is also classified into “at residence” and “at school place”. “At residence” enrollment population refers to the number of persons residing in a city/municipality that are actually enrolled. “At school place” enrollment population refers to the number of persons enrolled in schools located within the municipality / city.

School participation rates refer to the proportions of the possible school-age population that are attending school. In Region IV, participation rates in the elementary and secondary levels improved from 82% in SY 1993-1994 to 95% in SY 2000-2001 and from 44% in SY 1993-1994 to 68% in SY 2000-2001, respectively. For the tertiary level, the national participation rate, according to CHED, was 33.0% in SY 2000-2001 from that in SY 1994-1995, 22.3%.

Table 2.3.8 Enrollment Population

Province and Municipality	School Enrollment at Residence, 2000				School Enrollment at School Place, 2000			
	Primary	Secondary	Higher	Total	Primary	Secondary	Higher	Total
National Capital Region	146,826	71,988	38,769	257,593	146,826	71,998	22,542	241,366
Las Piñas	81,466	39,947	21,511	142,924	77,662	39,947	19,249	140,662
Muntinlupa City	65,360	32,051	17,258	114,669	65,360	32,051	3,294	100,705
Cavite								
Alfonso	6,617	2,801	1,260	10,678	6,617	2,801	0	9,418
Amadeo	4,293	1,817	6,927	62,927	4,293	1,817	0	6,110
Bacoor	52,676	25,831	13,909	92,416	52,676	25,831	2,418	80,925
Carmona	8,122	3,629	1,754	13,505	8,122	3,629	2,092	13,843
Cavite City	16,994	7,966	4,082	29,042	16,994	7,966	3,569	28,529
Dasmariñas	64,416	28,785	13,913	107,114	64,416	28,785	23,432	116,633
General Emilio Aguinaldo	2,389	1,011	455	3,855	2,389	1,011	0	3,400
General Trias	18,278	8,167	3,947	30,392	18,278	8,167	0	26,445
Imus	33,431	15,670	8,030	57,135	33,431	15,670	1,134	50,235
Indang	8,704	3,889	1,880	14,473	8,704	3,889	5,981	18,574
Kawit	10,731	5,031	2,578	18,340	10,731	5,031	0	15,762
Magallanes	3,017	1,277	574	4,686	3,017	1,277	0	4,294
Maragondon	5,208	2,205	992	8,405	5,208	2,205	1,460	8,873
Mendez (Mendez – Nuñez)	3,825	1,619	728	6,172	3,825	1,619	0	5,444
Naic	12,335	5,512	2,664	20,511	12,335	5,512	1,534	19,381
Noveleta	5,465	2,562	1,312	9,339	5,465	2,562	0	8,027
Rosario	12,598	5,906	3,026	21,530	12,598	5,906	1,669	20,173
Silang	26,500	11,841	5,723	44,064	26,500	11,841	5,605	43,946
Tagaytay City	7,554	3,197	1,439	12,172	7,554	3,197	577	11,328
Tanza	19,493	8,710	4,209	32,412	19,493	8,710	0	28,203
Ternate	2,865	1,213	545	4,623	2,865	1,213	287	4,365
Trece Martires City	7,069	3,159	1,527	11,755	7,069	3,159	0	10,228
Gen. Mariano Alvarez	19,085	8,528	4,122	31,735	19,085	8,528	1,926	29,539
Sub-total	351,665	160,326	79,486	591,281	351,665	160,326	51,683	563,674
Laguna								
Biñan	34,147	15,259	7,375	56,781	34,147	15,259	11,743	61,149
Cabuyao	18,097	8,087	39,08	30,092	18,097	8,087	2,078	28,262
Calamba	65,146	29,111	14,071	108,328	65,146	29,111	11,221	105,478
San Pedro	39,574	18,552	9,506	67,632	39,574	18,552	7,164	65,290
Santa Rosa	31,507	14,079	6804	52,390	31,507	14,079	702	46,288
Los Baños	13,682	5,792	2,606	22,080	13,682	5,792	2,323	21,797
Sub-total	202,153	90,880	44,270	337,303	202,153	90,880	35,231	328,264
Grand Total	700,644	323,204	162,525	1,186,177	700,644	323,204	109,456	1,133,304

Source: NSO and PFFPs

When participation rates are applied to the respective estimated school-age populations, enrollment population “at residence” can be estimated. This population is further classified into “pupil” (elementary) and “student” (secondary and tertiary) population.

For the enrollment “at school place,” this can be obtained from the Department of Education. Specifically, these are the enrollment figures of each school located within a city/municipality.

2.3.4 Economic and Industrial Characteristics

The economic and industrial characteristics of the study area are substantially reflected in the Provincial Physical Framework Plans (PPFP) of the subject provinces and as well as documented in past studies (i.e., JICA-CALABARZON Master Plan, WB-CALA Urban Development and Environmental Management, and the JICA Cavite Busway Project). In the PPFP of Cavite, it has been recorded that the increase in the number of establishments in the industry and services sectors run parallel with the fast pace of economic development in the province which began to take off since the 1990s. Laguna, likewise, is experiencing an influx of industrial firms in their area.

The industry sector is contributing the largest share in the GDP of CALA. While the service sector has the largest number of employment, its GDP contribution is smaller than the industry sector due to considerably lower labor productivity. The agriculture sector has the smallest contribution to GDP. In Laguna, the agriculture sector has a higher profile, reflecting the fact that eastern part of the province basically depends upon agriculture. Trends of GDP basically follow those of employment by sector.

(a) Agriculture in CALA

The agricultural sector can be viewed in basically two perspectives; one is as the productive sector where agro-climatic and market conditions for crops are the key factors for farmers to decide where and what to produce, and the other is as the source of land for new urban developments as well as source of labor for the non-agricultural sectors.

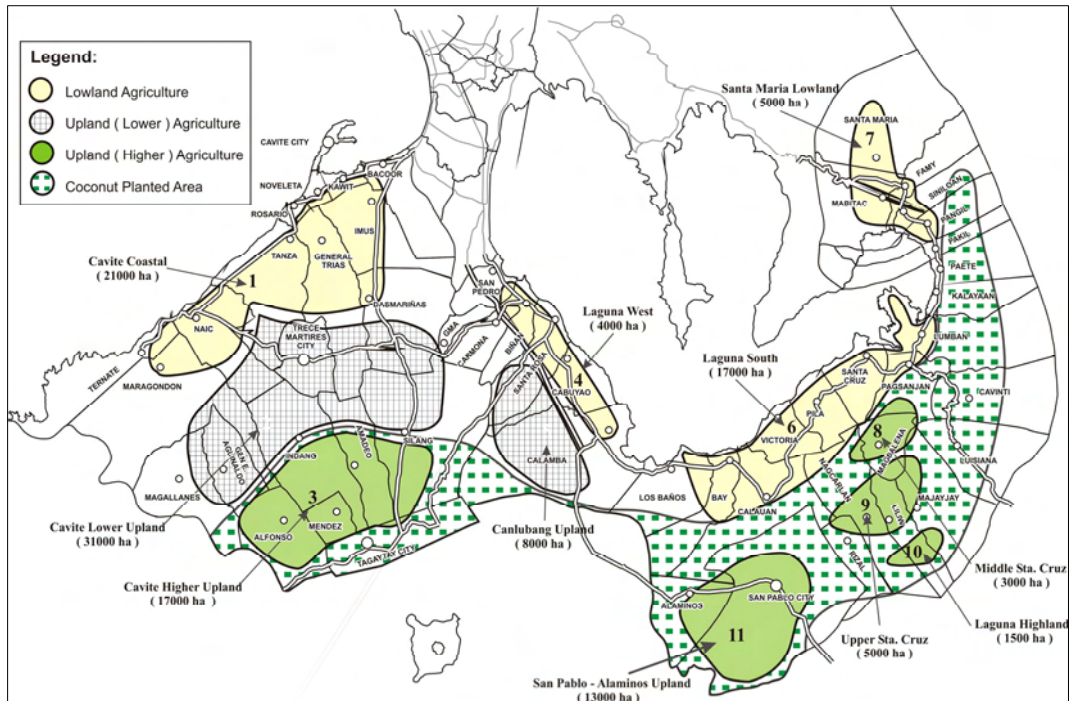
The CALA area can be divided into 11 distinct major agricultural areas¹ based on agro-climatic and land conditions. In addition to these 11 areas, the coconut planted area, which is a wide spread area at the foothills and upland places where intensive cultivation is not suitable, is also generally delineated. Of the 11 major agricultural areas in CALA, 3 are found in Cavite and 8 in Laguna.

(b) Manufacturing in CALA

Figure 2.3.3 shows the location of industrial estates in the study area and Table 2.3.10 gives the profile of these industries. Expectedly, employment is concentrated in municipalities that host major industrial estates

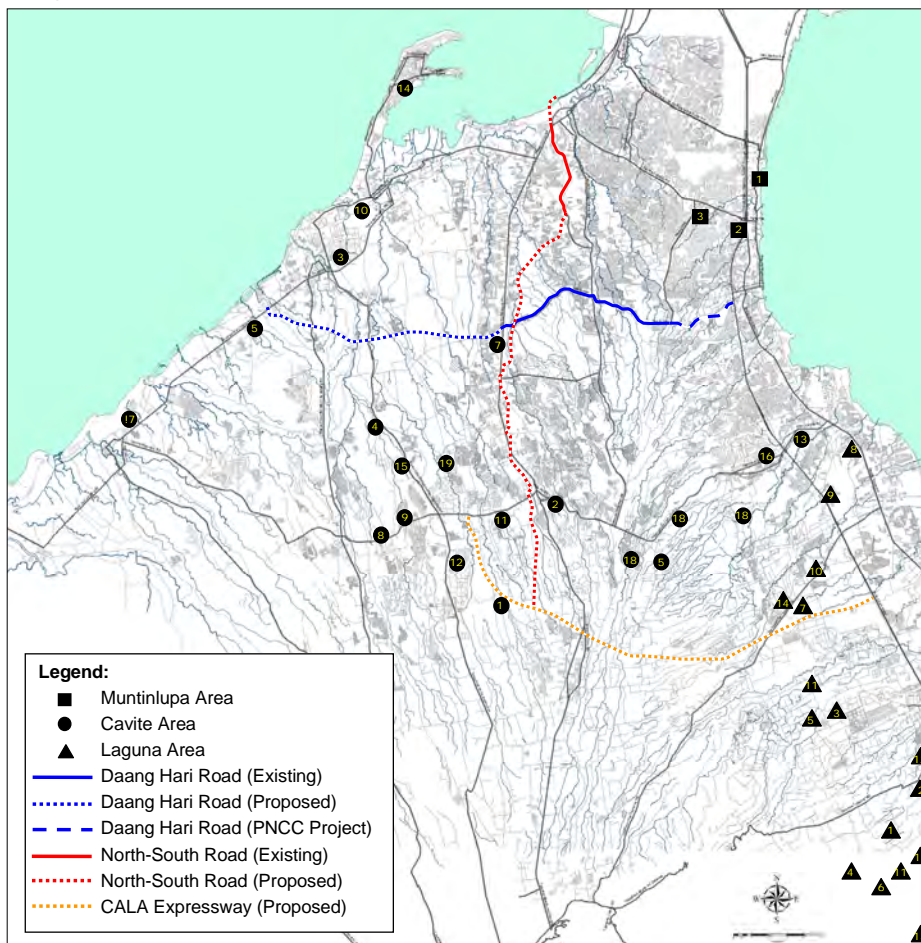
¹ These agricultural zones and basic descriptions are adopted from delineation made in "CALABARZON Master Plan, 1991".

Figure 2.3.2 Agricultural Areas by Agro-climatic Conditions for CALA



Source: PEZA

Figure 2.3.3 Location of Industrial Estates in the Study Area, 2005



Source: Philippine Economic Zone Authority (PEZA) www.peza.gov.ph and Study Team.

Table 2.3.9 List of Industrial Estates in the Study Area

Cavite Area				
Code	Name	Location	Area (ha)	Preferred Industries
1	Best World Technopark	Batas, Silang, Cavite	145.06	Electronics and Semiconductors
2	Cambridge Intelligent Park	Malinta, Dasmariñas, Cavite	86.00	Light to medium scale, non-pollutive industries.
3	Cavite Economic Zone	Rosario, Cavite	278.51	Existing Industries: Tobacco Products, Wearing Apparels, Leather Products, Wood and Wood Products, Plastic, Rubber and Glass Products, Fabricated Metal, Office Computing Machinery, Electrical Machines, Food Industries, Clocks and Watch Parts, Packaging of Airline and Hotel Supplies, Fiberglass Products
4	Cavite Eco-Industrial Estate	Pasong Kawayan II, Gen. Trias, Cavite	104.95	Light to medium scale, non-pollutive industries.
5	Cavite Productivity & Economic Zone	Sahud-ulan, Tanza, Cavite	116.22	Electronic Products, Electrical Machinery, Semi-conductors
6	Daiichi Industrial Park	Maguyam, Silang, Cavite	55.02	Existing: Moulds, Plastic Products, Plastic Injection and parts for Audio Components and other Electronic Equipment Fabrication of Precision Molding Dye, Design of Equipment for Automation and Energy Conservation
7	EMI Special Economic Zone	Brgy. Anabu II, Imus, Cavite	26.68	Light-scale Industries
8	Fil – Estate Industrial Park	Trece Martires City and Tanza, Cavite	80.62	Electronics, Garments, Food Processing, Leather Products, Metal Fabrication, Toys, Gifts and House wares
9	Filinvest Technology Park – Cavite	Hugo Perez, Trece Martirez, Cavite	86.00	Light- to medium-scale, non-pollutive industries.
10	Filoil Special Economic Zone	Rosario, Cavite	50.32	Light- to medium-scale, non-pollutive industries
11	First Cavite Industrial Estate	Langkaan, Dasmariñas, Cavite	59.78	Existing: Garments, Tents, Metal Stamping Parts, Printed Circuit Boards, Dyed Yams, Lead Frames, Molds and Die-Cast Metal Products and Screws, Magnetic Floppy Discs, Aluminum Products, Polyethelene Foams into Lid and Tray, Bags and Luggages, Automated Machine and Machine Parts, Various Grating Steel Products.
12	Gateway Business Park I	Javalera, Gen. Trias, Cavite	62.92	Light- to medium-scale, non-pollutive industries
12	Gateway Business Park II	Javalera, Gen. Trias, Cavite	18.72	Light- to medium-scale, non-pollutive industries
12	Gateway Business Park III	Javalera, Gen. Trias, Cavite	0.61	Light- to medium-scale, non-pollutive industries
13	Goldenmile Business Park	Governor's Drive, Brgy. Maduya, Carmona, Cavite	37.48	Light- to medium-scale, non-pollutive industries.
14	Marcelo IPG Industrial and Aqua Farming Park	Bacoor Bay, Cavite City	136.00	Light- to medium-scale industries.

Code	Name	Location	Area (ha)	Preferred Industries
15	PEC Industrial Park	Barrio Buenavista, Batas, Gen. Trias, Cavite	177.00	Garments, Textiles, Semiconductors, Food Processing, Pharmaceuticals
16	People's Technology Complex	Maduya, Carmona, Cavite	52.99	Processed Food, Metal Products, Electronics, Garments, Gifts, Toys, Housewares
17	Petroleum Industry Economic Zone	Brgy. Munting Mapino, Naic, Cavite	15.00	Petroleum-based Industries
18	Sterling Technopark Special Economic Zone	Maguyam, Silang, Cavite and Bancal and Lantic, Carmona, Cavite	100.00	Light- to medium-scale, non-pollutive industries.
19	Taipan Gold Industrial Park	Defuego & San Francisco, Gen. Trias, Cavite	100.00	Electronics, Electrical Products, Transportation Equipment and Parts, Wearing Apparels

Source: Philippine Economic Zone Authority

Laguna Area

Code	Name	Location	Area (ha)	Preferred Industries
1	Allegis IT Park	Carmelray Industrial Park II, Brgy. Tulo, Calamba, Laguna	5.701	IT Software Developers and Related Industries
2	Calamba Premier International Park	Batino, Parian & Barandal, Calamba, Laguna	65.63	Light- to medium-scale, non-pollutive industries.
3	Carmelray Industrial Park	Canlubang, Calamba, Laguna	50.75	Chemical and chemical products, precision instruments, transport and auto parts, electronics, semi-conductors, plastic products, metal products, precision tools packing and packaging materials.
4	Carmelray Industrial Park II	Punta & Tulo Calamba, Laguna	148.73	Existing Ind.: Electronics and Semi-conductors
5	Carmelray International Business Park	Canlubang, Calamba, Laguna	40.00	IT Service Industries
6	Filinvest Technology Park – Calamba	Punta & Burol-Bubuyan, Calamba, Laguna	51.07	Light-scale, non-polluting industries.
7	Greenfield Automotive Park	Don Jose, Sta. Rosa, Laguna	50.01	Automotive Manufacturing
8	Greenfield Industrial Center Economic Zone	Brgy. Bungahan and Mamplasan, Biñan, Laguna	44.35	Pharmaceuticals Industries
9	Laguna International Industrial Park	Ganado & Mamplasan, Biñan, Laguna	34.88	Garments, Fabrics Electronics, Semiconductors, Plastic and other Packaging Materials, Molds and Tools, Auto Parts and Vehicle Accessories, Optical Lenses, Lighting Systems and Luminaries, Medical Supplies
10	Laguna Technopark I	Biñan, Laguna	75.19	Dies, Molds, Standard IC, Plastic Injection, Flex Printed Circuit, Copper Foil, Synthetic, Natural, Precious and Semi-precious gemstones, computer parts and various automobile parts, gaseous and liquid nitrogen and special gases.

Code	Name	Location	Area (ha)	Preferred Industries
10	Laguna Technopark II	Biñan, Laguna	67.74	-
10	Laguna Technopark III	Biñan, Laguna	96.39	-
10	Laguna Technopark IV	Biñan, Laguna	50.63	Automobile Assembly, Automotive Parts, Consumer Electronics/Appliance
11	Light Industry & Science Park I	Diezmo, Cabuyao, Laguna	69.06	Electronics, Semiconductors, Automotive and Motorcycle Parts, Wearing Apparels, Fashion Accessories
11	Light Industry & Science Park II	Real & La Mesa, Calamba, Laguna	66.71	Thermoforming Trays, Flexible Circuit Board, Rewritable CD Drive, Mechanical Loader Assembly, Hi-focus Asymmetrical Digital Subscriber Line, Pressed Metal Parts for Terminal Printers and Micro-printers, Main Board Printers, plastic injected gears, paperboard and various filing systems, Base and Blocks for Computer Hard Disk Drives, Multi-layer capacitor, Assembly Planner, Various Pumps, CPU and other Miscellaneous Cards
11	Light Industry & Science Park (Expansion)	Real & La Mesa, Calamba, Laguna	3.01	-
12	Prince Cabuyao Special Economic Zone	Banlic, Cabuyao, Laguna	25.45	-
13	Southwoods Ecocentrum Tourism Estate	Halang, Biñan, Laguna	76.00	Tourism and Cultural Related Activities
14	Toyota Sta. Rosa (Laguna) Special Economic Zone	Pulong Sta. Cruz, Sta. Rosa, Laguna	29.00	Automotive Parts
15	YTMI Realty Special Economic Zone	Brgy. Makiling, Calamba, Laguna	20.66	Automotive Wiring Harness

Source: Philippine Economic Zone Authority

Muntinlupa Area

Code	Name	Location	Area (ha)	Preferred Industries
1	Amkor Technology Special Economic Zone	East Service Rd. South Super Highway, Cupang, Muntinlupa City	14.08	Semiconductors and Test Strip
2	Northgate Cyber Zone	Filinvest Corporate City, Alabang Muntinlupa City	18.71	Software Development, Computer System Testing, Software Maintenance
3	IT Building	1207 Acacia Ave., Madrigal Business Park, Brgy. Ayala Alabang, Muntinlupa City	1,246sq m. land area 11,977 sq m. gross floor area	IT Services

Source: Philippine Economic Zone Authority

2.3.5 Poverty

The issue of poverty is strongly related to income trend of families in any area. Manifestation of poverty can then be viewed in other social aspects as housing, education, health, nutrition, accessibility, and so on. For this section, poverty is related to dwelling areas as it can be imposed as a social consideration for road projects. Income trend for the study area is based on the data taken from the

Family Income and Expenditures Survey periodically conducted by the National Statistics Office with the latest data available being for year 2000.

Nominal income of the Philippines has grown very rapidly, but real income has dropped from 1994 to 2000 due to rapid inflation. Despite this situation, Region IV has succeeded to maintain its income level but a sharp drop is noted for NCR. Even though a large number of commuters from Region IV to NCR may suffer from a reduction of income, the fact that the income level of Region IV made a growth may suggest the existence of steady growth of industries of the region.

(a) Family Income Characteristics of the Study Area

For areas outside Metro Manila, Cavite and Laguna posted the second and the third highest average family income, respectively among all provinces. Especially the average income of municipalities adjacent to Metro Manila is almost at the same level as NCR.

In Region IV, Cavite has shown a steady growth of income with Dasmariñas and Imus recording very high increases in 1997-2000, while Laguna did not realize an increase in the real income. Such a clear difference between provinces may occur with the introduction or increase in more industries in the area.

Table 2.3.10 Trend of Annual Average Family Income of Study Areas (at current price)

	1991	1994	1997	2000
Muntinlupa City	NA	NA	202,266	238,038
Las Piñas	NA	NA	276,875	384,341
Cavite	85,416	115,915	163,660	196,401
Bacoor	NA	NA	189,286	225,218
Dasmariñas	NA	NA	137,756	191,347
Imus	NA	NA	171,808	231,208
Other Cavite	NA	NA	157,765	189,173
Laguna	87,030	109,184	157,765	189,173
Biñan	NA	NA	181,523	213,809
Calamba	NA	NA	174,234	211,459
San Pedro	NA	NA	198,321	224,026
San Pablo City	77,579	109,416	148,332	153,862

Source: National Statistics Office, 2000.

Table 2.3.11 Percentage Increase in Average Annual Family Income in the Provinces and Selected Municipalities (1994-2000)

	at current price (%)	at 1994 price (%)
Cavite	20.0	0.8
Bacoor	19.0	0.0
Dasmariñas	43.5	16.7
Imus	34.6	13.0
Other Cavite	12.9	-5.2
Laguna	19.9	-7.0
Biñan	17.8	-8.6
Calamba	21.4	-5.8
San Pedro	13.0	-12.4
San Pablo City	3.7	-19.5

Source: National Statistics Office, 2000.

(b) Distribution of Poor Families

Compared with the GINI² coefficients of the Philippines which show a high degree of income inequality, that of the study areas is low especially for Cavite and Laguna. However, the GINI coefficient of Cavite became slightly higher from 1994 to 2000 while other regions became lower.

Table 2.3.12 GINI Coefficients in 1997 and 2000

Area	1997	2000
NCR	0.4625	0.4462
Region IV	0.4257	0.4231
Cavite	0.3405	0.3554
Laguna	0.3962	0.3792
Philippines	0.4881	0.4814

Source: 2004 Philippine Statistical Yearbook

Looking into the income class distribution, the income class of P100,000-P249,999 compose more than half of the total families in the study area while the Philippines is at about 32% of total families.

Table 2.3.13 Income Distribution in 2000 (%)

Income Class	Philippines	NCR	Cavite	Laguna
Under 10,000	0.002	-	-	-
10,000- 19,999	2.15	0.05	0.57	0.78
20,000- 29,999	5.48	0.10	0.12	0.50
30,000- 39,999	7.67	0.27	0.92	0.56
40,000- 49,999	9.09	0.64	2.88	4.91
50,000- 59,999	7.83	1.11	1.29	3.86
60,000- 79,999	12.99	4.27	11.17	12.00
80,000- 99,999	9.80	7.79	9.45	11.72
100,000-149,999	15.92	20.32	27.87	20.65
150,000-249,999	15.60	29.48	28.27	26.66
250,000-499,999	10.01	24.38	13.63	14.92
500,000 & over	3.22	11.59	3.73	3.43

Source: 2004 Philippine Statistical Yearbook

² Is a measure of the inequality in income distribution with limits 0 for perfect equality and 1 for perfect inequality.

(c) Poverty Ratio

By and large, the ratio of poor families in the study area is low if compared with that of the Philippines which is 34.2% according to the National Statistical Coordination Board. It is probably because of the high income level of the study area. But there is no clear relationship between the income level and the poverty ratio among municipalities of the study area. In the period of 1997 to 2000, the improvement of poverty ratio has not been observed. Even though Cavite has shown a steady growth in economy, the ratio of poor families has increased and economic inequality worsened while Laguna has improved its poverty indices even under a slower economy growth. This may be due to the manner of properly distributing the gains of rapid economic growth within a short period.

Table 2.3.14 Annual Per Capita Poverty Thresholds and Ratio of Poor Family

	1997		2000	
	Poverty Thresholds	Poverty Incidence (%)	Poverty Thresholds	Poverty Incidence (%)
NCR	13,201	4.8	15,678	5.7
Region IV	11,461	22.8	13,414	20.8
Cavite	13,114	8.0	14,965	10.0
Laguna	11,670	12.3	13,226	8.6

Source: National Statistics and Coordination Board (NSCB), 1997 and 2000.

Table 2.3.15 Estimated Ratio of Poor Families by Municipalities (2000)

	Ratio of Poor Families (%)
Las Piñas	1.0
Muntinlupa	7.6
Bacoor	3.8
Dasmariñas	13.4
Imus	8.5
Biñan	5.5
Calamba	7.2
San Pedro	9.5
San Pablo City	2.0

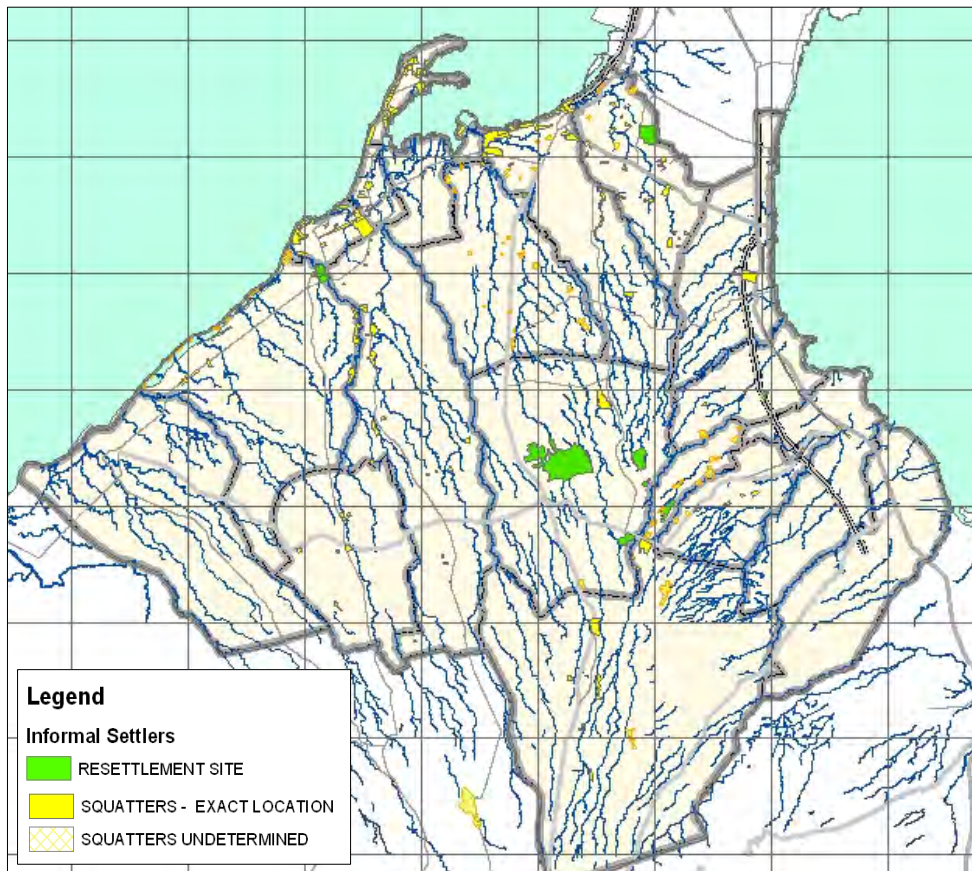
Note: The ratio is estimated on the assumption that income level of poor family is under 15,000 pesos due to the limitation of data source. There is a possibility that most of estimated results is slightly below the accurate ratio.

Source: National Statistics Coordination Board (NSCB), 2000.

(d) Informal Settlers

Comparatively, a large number of informal settlers are observed mostly at the municipalities and cities of NCR or of its vicinities and fishing zones like Cavite City. The ratio of informal settlers to the population, however, is lower than Metro Manila in these areas. For the CALA area, the location of the informal settlers has been identified to be along the coastal areas, abandoned railway lines, huge idle properties, and river banks (Figure 2.3.4).

Figure 2.3.4 Location of Informal Settlements in the Study Area, 2005



Source: LGUs in the Study Area and National Housing Authority

Generally, poverty and informal settlement is closely related and the following tendency is observed in this region:

- (1) At heavily urbanized areas, the number of informal settlers sometimes exceeds that of poor people, which suggests that informal settlers are not always poor.
- (2) Fishing zones have more informal settlers than that of agricultural zones. It may be one of the reason for the few number of informal settlers in agricultural area that the land should be rather strictly managed for the agro-production while in fishing village management of land is often not only difficult but also unimportant, but it could be the major reason that the productivity of fishery industry is lower than that of agriculture.

Adding most significantly to the demand of providing adequate and decent shelter to the growing population is the problem of relocating the displaced informal dwellers from environmentally critical areas, danger zones as well as from areas designated for priority development and infrastructure projects. To meet the housing demand, the Province of Cavite established resettlement sites which have been utilized for both the province and Metro Manila's site for resettlement. Two of the sites have been built by the Public Estates Authority while the rests have been administered by the National Housing Authority (Table 2.3.17).

Table 2.3.16 Number of Informal Settlers and Ratio of Poor People, 2000

	Population	No. of Squatters	Ratio of Squatters (%)	Ratio of the poor (%)
Las Piñas	472,780	21,480	4.5	1.0
Muntinlupa	379,310	34,750	9.2	7.6
Bacoor	305,699	28,941	9.5	3.8
Carmona	47,856	237	0.05	-
Cavite City	99,367	16,007	16.1	-
Dasmariñas	379,520	8,968	2.4	13.4
Gen. Trias	107,691	985	0.1	-
Imus	195,482	2,644	1.4	8.5
Kawit	62,751	7,889	12.6	-
Naic	72,683	N.A.	-	-
Noveleta	31,595	912	2.9	-
Rosario	73,665	14,382	19.5	-
Silang	156,137	761	0.5	-
T. Martires City	41,653	1,006	2.4	-
Gen.M.Alvarez	112,446	3,723	3.3	-
Biñan	201,186	2,703	1.3	5.5
Cabuyao	106,630	2,072	1.9	-
Calamba	281,146	N.A.	-	72
Los Baños	82,027	N.A.	-	-
San Pedro	231,403	8,396	3.6	0.5
Santa Rosa	185,633	N.A.	-	-

Source: No. of Squatters is from National Statistics Office (except Dasmariñas) and No. of Squatters in Dasmariñas is from National Housing Authority.

Table 2.3.17 Resettlement Sites, 2005

Location/Project	No of units
Cavite	
GMA Resettlement Project	11,058 (Lots only)
Victoria Reyes Property, Dasmariñas	2,646 (Lots only)
Area D-3 Phase 1-11 Bautista, Dasmariñas	3,733
Dasmariñas, Bagong Bayan	21,547
Bulihan Military Housing	2,398
Bulihan Sites and Services Project, Silang	5,233
NHA Pag-ibig Teachers, GMA	599
Sunny Brooke 1-2 Gen Trias	300
Country Meadows Gen Trias	500
Laguna	
San Pedro Resettlement Project - Laguna	8,000*

* Estimated based on household population of subject barangays.

Source: National Housing Authority

2.4 Transportation

2.4.1 Transport Network and Facilities

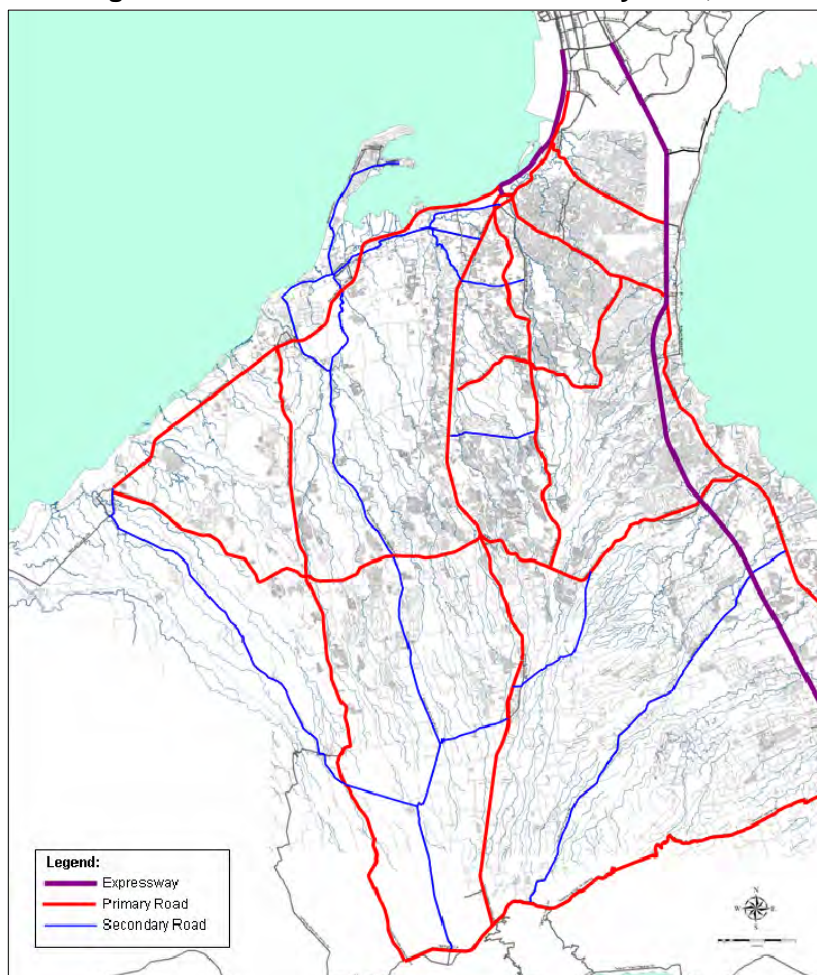
The transport network of the CALA area is predominantly of the roadways and highways and to a limited degree, of the rail and port/ferry. Present rail facilities are limited to the PNR service area (south line) running along the western and

southern portions of the Laguna lakeshore. A railway line used to service the Cavite coastal areas but that has long been abandoned.

Road Network. The road network of the CALA area is composed primarily of paved two-lane roads, with the main corridors forming the basic road network structure (see Figure 2.4.1). This road network structure, however, is heavily oriented towards Metro Manila, particularly for the immediately adjoining areas. These corridors also link to other areas south of the CALA area, but are still structured in such a way as to link these outer areas with Metro Manila, through the CALA sub-region. The only major road corridor serving local road trips is Governor's Drive, an east-west concrete-paved road cutting across the mid-section of Cavite province, and linking them with the Manila South Road along the western shore of Laguna de Bay.

Roads are administratively classified as national, provincial, city/municipal, and barangay. National roads form most of the main corridors and fall under the administrative responsibility of the DPWH. Tables 2.4.1 to 2.4.4 present the available inventory for national roads within the different engineering offices in the provinces of Cavite and Laguna taken from the Maintenance Section of the DPWH Region IV-A Office while Table 2.4.5 lists the roads by city/municipality as inventoried by the various local government units in the study area.

Figure 2.4.1 Road Network of the Study Area, 2005



Source: DPWH

Table 2.4.1 Inventory of National Roads, Cavite Engineering Office, 2005

(Excluding roads in Corregidor Island)	Limits		Pavement Type				
	From (km post)	To (km post)	Concrete	Asphalt	Gravel	Earth	Total
Zapote – Salawag – Salitran Road	km 15.308	km 32.800	3.672	13.820			17.492
Pala-pala Diversion Road	km 34.135	km 34.860	0.725				0.725
Cavite – Batangas Road	km 17.512	km 53.994	1.226	35.256			36.482
Cavite – Batangas Road Extension	km 65.244	km 72.017		6.773			6.773
Dasmariñas – Carmona Road	km 34.709	km 50.328	12.650	2.969			15.619
Caylabne – Puerto Azul Road	km 60.420	km 68.430		8.010			8.010
Naic Diversion Road	km 45.880	km 47.512	0.207	1.425			1.632
Naic – Maragondon – Ternate – Caylabne Road	km 48.213	km 72.540	8.090	16.237			24.327
Carmona Diversion Road	km 46.215	km 48.888	2.673				2.673
Tagaytay – Ulat – Laguna Bdry Road	km 60.980	km 72.670	11.690				11.690
Silang Bypass Road	km 40.987	km 44.934		3.947			3.947
Noveleta Diversion Road	km 24.993	km 26.301	0.244	1.064			1.308
Noveleta – Naic – Tagaytay Road	km 26.596	km 76.352	7.152	42.604			49.756
Tanza Diversion Road	km 32.410	km 33.382	0.864	0.108			0.972
Zapote – Cavite Road	km 14.846	km 29.378	11.400	3.132			14.532
Total			60.593	135.345			195.938

Source: Department of Public Works and Highways Region IV-A, Maintenance Division

Table 2.4.2 Inventory of National Roads, Cavite City Engineering Office, 2005

Cavite City Engineering Office	Limits		Pavement Type				
	From (km post)	To (km post)	Concrete	Asphalt	Gravel	Earth	Total
Manila – Cavite Road	km 29.376	km 34.708	4.898	0.432			5.330
Dra. Salamanca Road	km 33.848	km 34.954	1.106				1.106
M. Gregorio Road	km 34.739	km 35.719	0.980				0.980
J. Felipe Blvd.	km 31.898	km 33.913	2.015				2.015
Parkway I	km 34.280	km 35.045	0.316	0.449			0.765
Parkway II	km 34.570	km 35.145	0.424	0.151			0.575
Total			9.739	1.032			10.771

Source: Department of Public Works and Highways Region IV-A, Maintenance Division

Table 2.4.3 Inventory of National Roads, Trece Martires City Engineering Office, 2005

Trece Martires City Engineering Office	Limits		Pavement Type				
	From (km post)	To (km post)	Concrete	Asphalt	Gravel	Earth	Total
Tanza – Trece Martires – Indang Road	km 32.700	km 57.311	18.781	5.830			24.611
Dasmariñas – Trece Martires – Naic Rd	km 33.614	km 56.367	22.753				22.753
Total			41.534	5.830			47.364

Source: Department of Public Works and Highways Region IV-A, Maintenance Division

**Table 2.4.4 Inventory of National Roads, Laguna Sub-District Engineering Office
First and Second Congressional Districts, 2005**

Laguna Sub-districts (1 & 2)	Limits		Pavement Type				
	From (km post)	To (km post)	Concrete	Asphalt	Gravel	Earth	Total
MSR: San Pedro – Calamba Section	km 28.740	km 53.320		24.580			24.580
MSR – Maharlika Hwy (Calamba – Sto. Tomas Road)	km 51.000	km 56.710		5.710			5.710
Mayapa – Canlubang - Cadre Road	km 49.000	km 51.740	1.800	0.940			2.740
Santa Rosa – Cavite Boundary Road	km 39.050	km 49.440	9.170	1.220			10.390
Biñan – Cavite Boundary Road	km 34.118	km 35.728	0.800	0.810			1.610
Mt. Makiling Ecological Garden Road	km 60.040	km 65.860		5.820			5.820
Rizal Shrine	km 51.140	km 52.810	1.420	0.250			1.670
CSCF Jct Road- Bay-Calamba Pob. Rd	km 66.060	km 68.560	2.500				2.500
Makiling Park Road	km 62.760	km 67.260	1.180	3.320			4.500
Calamba – Sta. Cruz – Famy Road	km 50.960	km 69.690	12.770	5.960			18.730
Calamba – Tagaytay Road	km 50.266	km 71.006	12.234		8.506		20.740
Total			41.874	48.610	8.506		98.990

Source: Department of Public Works and Highways Region IV-A, Maintenance Division

Table 2.4.5 Inventory of Roads by Administration in the Study Area, 2005

Study Area	Road Length (km)					Total
	National	Provincial	Municipal	City	Barangay	
NCR						
LAS PIÑAS CITY	17.75	-	-	46.14	41.24	105.13
MUNTINLUPA CITY	30.48	-	-	-	48.06	78.54
CAVITE						
BACOR	8.95	20.43	2.93		16.87	49.18
CARMONA	9.60	-	-	-	27.88	37.48
CAVITE CITY	-	-	-	62.24	-	62.24
DASMARINAS	33.46	14.95	84.86	-	20.61	153.88
GENERAL TRIAS	29.11	15.85	4.59	-	65.35	114.90
IMUS	8.02	46.80	15.35	-	9.21	79.38
KAWIT	10.70	2.30	0.81	-	18.43	32.24
NAIC	30.60	3.90	3.82	-	10.37	48.69
NOVELETA	6.32	5.30	1.57	-	6.91	20.10
ROSARIO	4.08	-	8.85	-	11.03	23.96
SILANG	28.85	54.16	9.12	-	99.90	192.03
TANZA	28.50	14.50	4.91	-	20.58	68.49
TRECE MARTIRES CITY	13.99			10.60	51.46	76.05
GEN. MARIANO ALVAREZ	11.70	-	-	-	110.72	122.42
LAGUNA						
BINAN	-	-	-	-	-	-
SAN PEDRO	6.98	26.36	3.94		26.36	63.64
SANTA ROSA	22.65	10.42	20.01		1.67	54.75
Total	301.74	214.97	160.76	118.98	586.65	1,383.09

Source: LGUs

Rail Network. Rail transport facilities for the CALA sub-region are provided by the Philippine National Railways (PNR), which operates commuter rail service between Metro Manila and Calamba, as well as long-distance passenger and freight service between Metro Manila and the Bicol region, covering a distance of about 480 kilometers.

The railway alignment traverses the western portion of the Laguna lakeshore, through San Pedro, Biñan, Santa Rosa, Cabuyao, and Calamba. The track structure is composed of twin Cape Gauge (42 inches or 1067mm) tracks between Tayuman Station (km 0) in central Manila and Sucat Station in Parañaque. The system continues southward with a single Cape gauge track south of Sucat to the Bicol region, through Laguna and Quezon provinces.

The track system has been recently rehabilitated under the Main Line South Revitalization Project, with ODA funding support.

Pedestrian Facilities. In most of the urban areas of CALA, pedestrian facilities, particularly sidewalks, are acutely inadequate. Roadways are only favoring vehicular movement. As such, it is expected that any pedestrian traffic in the area would spill over onto the roads or carriageway to the detriment of the safety of both motorists and pedestrians.

2.4.2 Road Traffic

(1) Vehicle Registration

Table 2.4.6 shows the number of registered vehicles by municipality and Table 2.4.7 illustrates the annual growth rate from 2000 to 2003. The utility vehicles make up a large share of total vehicles (43%); however, the number of vehicles of cars and SUVs and motorcycles are noted to be increasing rapidly.

Table 2.4.6 Number of Registered Vehicles by Municipality (2003)

	Cars	Utility Vehicle	SUV	Trucks	Buses	MC/TC	Trailers	Total
Las Piñas	23,756	24,375	2,321	1,505	4	13,739	198	65,898
Muntinlupa	20,359	22,626	3,771	1,606	37	7,012	77	55,488
NCR	44,115	47,001	6,092	3,111	41	20,751	275	121,386
Imus	12,965	32,899	845	1,829	355	20,965	124	69,982
Cavite City	5,315	13,779	264	736	1,104	14,077	46	35,321
Tagaytay Ext.	3,988	13,939	204	599	139	4,781	18	23,668
<i>Cavite Province</i>	<i>22,268</i>	<i>60,617</i>	<i>1,313</i>	<i>3,164</i>	<i>1,598</i>	<i>39,823</i>	<i>188</i>	<i>128,971</i>
Cabuyao	13,292	29,260	855	2,901	337	22,557	204	69,406
San Pablo	5,546	17,926	335	1,656	846	11,309	70	37,688
Sta. Cruz	3,400	13,919	22	867	58	13,653	19	31,938
<i>Laguna Province</i>	<i>22,238</i>	<i>61,105</i>	<i>1,212</i>	<i>5,424</i>	<i>1,241</i>	<i>47,519</i>	<i>293</i>	<i>139,032</i>
Total CALA	88,621	168,723	8,617	11,699	2,880	108,093	756	389,389

Source: Land Transport Office

Table 2.4.7 Growth Rate of Registered Vehicles by Municipality (%: 2000-2003)

	Cars + SUV	Utility Vehicle	Trucks	Buses	MC/TC	Trailers	Total
Las Piñas	3.3	0.0	-1.3	-12.6	21.0	8.5	4.6
Muntinlupa	6.0	8.8	1.8	-11.3	1.7	-14.5	6.3
NCR	4.5	3.9	0.2	-11.4	12.9	-0.4	5.4
Imus	5.8	-1.5	-1.7	-2.4	12.3	-8.7	3.4
Cavite City	6.1	1.7	-0.3	9.9	6.3	-10.0	4.3
Tagaytay Ext.	25.8	16.0	13.0	-2.1	11.0	4.0	16.1
Cavite Province	8.6	2.4	0.9	5.5	9.9	-8.1	5.6
Cabuyao	2.0	-1.4	-10.7	16.3	-1.8	-14.0	-1.3
San Pablo	-1.2	-4.7	-5.6	-12.7	18.5	-10.9	0.7
Sta. Cruz	9.7	12.1	2.5	26.0	19.4	3.8	14.4
Laguna Province	2.1	0.0	-7.5	-6.4	7.2	-12.5	2.1
Total CALA	4.8	1.9	-3.5	-0.6	9.2	-7.6	4.2

Source: Calculations based on LTO Statistics

(2) Traffic Volume

According to MMUTIS, in 1996, the ratio of employees in the secondary industries is comparatively high at 28.7%. High ratio areas of secondary industries are distributed along east-west belt in the south of the study area as Noveleta, Rosario, General Trias (44.5%), Tanza, Trece Martires City, Dasmariñas, Gen. Mariano Alvarez, Carmona (54.4%) and Biñan. On the tertiary industries, the ratio in the north of study area is higher than 70% as Bacoor, Imus, Cavite City, Las Piñas, Muntinlupa, and San Pedro. The distribution ratio reflects the present land use and urbanization level of the area. In the future, there will be higher intensity in urbanization mix and this will correspondingly produce new traffic demands.

About 37.0% of workers' trips commute to Metro Manila from CALA study area and 14.5% inflow from Metro Manila. On school trips, 14.3% are outbound to Metro Manila and 3.4% are inbound to CALA. The dependency on Metro Manila is stronger especially in the higher income group. This is evident with 10% of trips made by the less than P3,000 income group, 27% of P3,000-P,9,999 group and 46% of more than P10,000 group (MMUTIS person trip results).

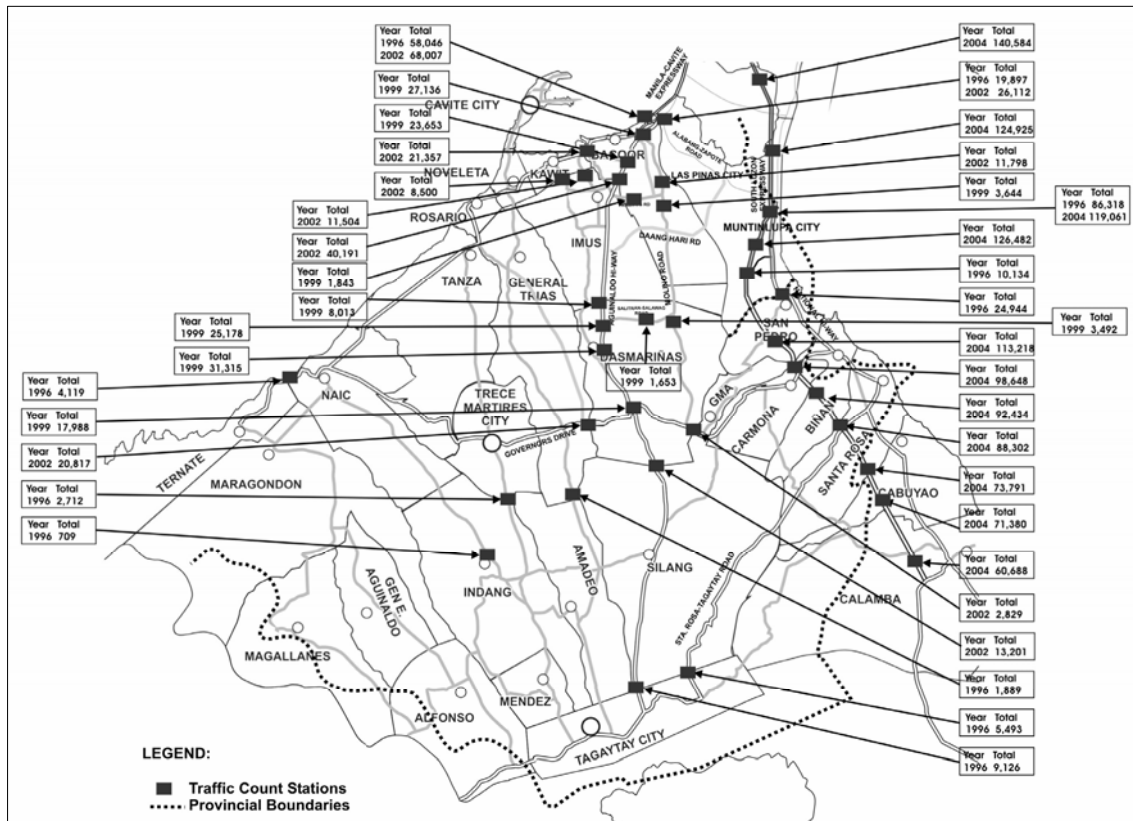
As a result, trips on north boundary are estimated to account for 21% of generated trips from the study area in year 2005 by the Cavite Busway Project conducted in 2002. Intra trips are estimated to be 72% and trips on south boundary are 7%. However, it is examined to be slightly different with the calibration done for 2005 in this study.

Most trucks in this area run between manufacturing companies and Manila Bay port or airports, and among industrial estates. Small variable parts are carried to airports. Upon completion of the container terminal, Batangas port is expected to be the main destination for trucks especially if convenience and accessibility is assured.

In the study area, traffic volumes have been surveyed at some locations. They have been noted to increase year by year at all locations with varying growth ratios

by location. At the northern boundary of the study area, the increase in ratio of traffic volume is not so high; however, the congestion becomes serious because the volume is approaching to the limit of road capacity at peak hours.

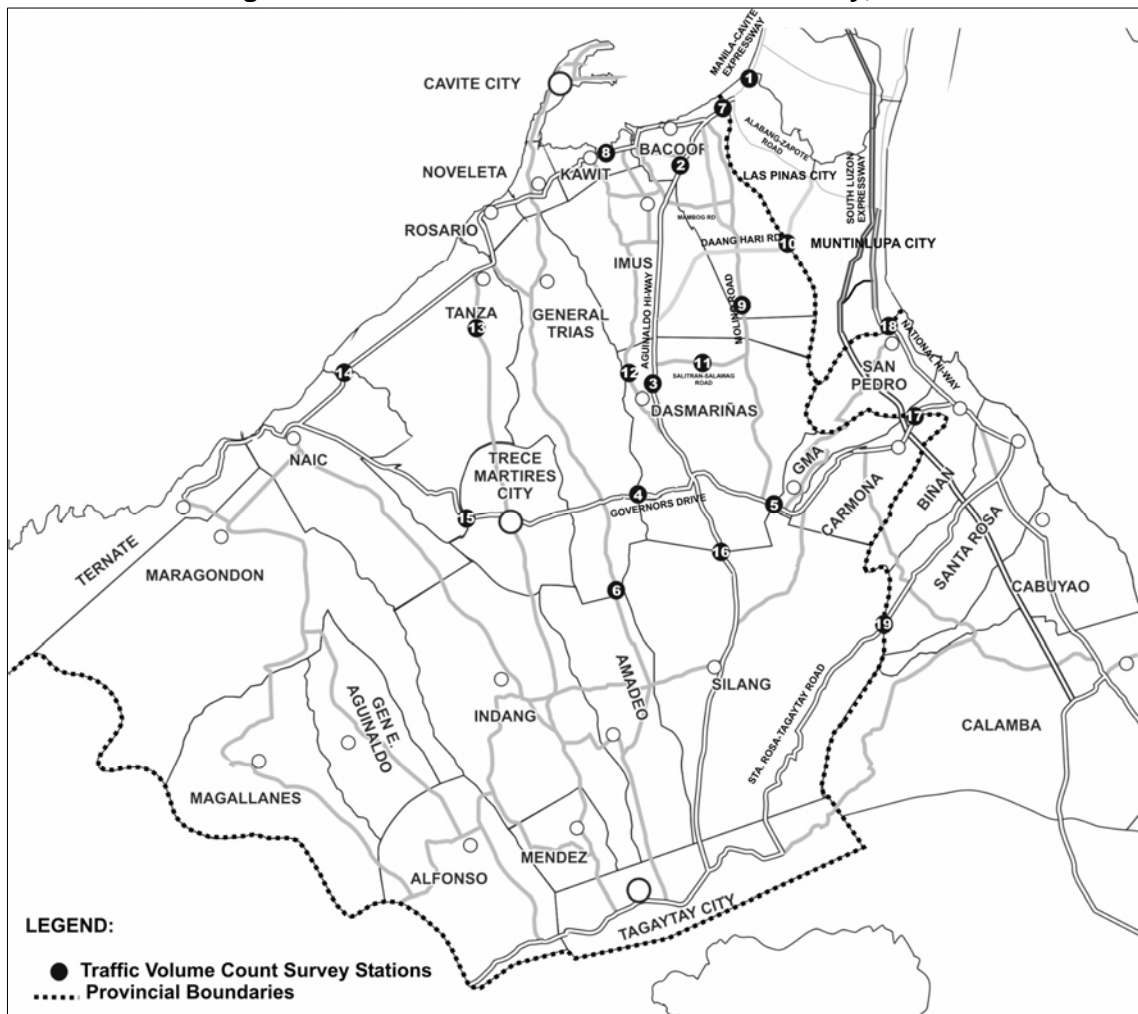
Figure 2.4.2 Traffic Count Stations in Past Studies



Source: MMUTIS, Cavite Busway Study and Others

In this study, traffic counts surveys at road sides are carried out at 19 locations. Traffic volumes are surveyed for 24 hours at 5 locations and 16 hours at 14 locations. The survey locations are shown in Figure 2.4.3.

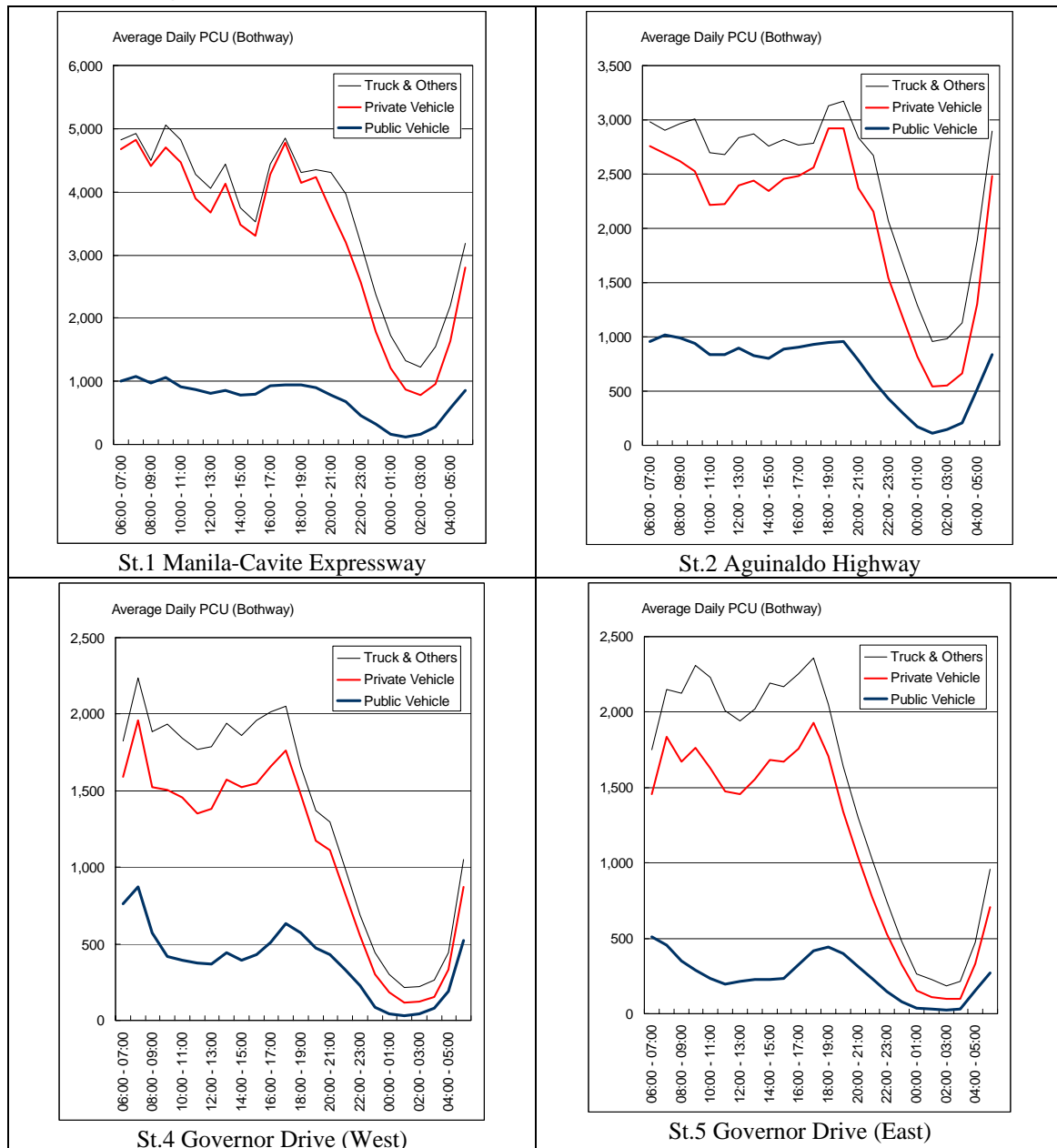
Figure 2.4.3 Traffic Count Stations in this Study, 2005



Source: JICA Study Team

Total traffic volumes fluctuate from highest counts during peak hours to lowest traffic counts at midnight. In this area, generally two peaks are noted (i.e., in the morning and in the evening). At some locations, traffic fluctuations have three peaks and more. The increase in traffic count ratios of 24 hours over 16 hours are about 16% by car and utility vehicles, 19% by minibus, 22% by jeepney and 62% by truck and trailer.

Figure 2.4.4 Daily Traffic Fluctuations Typical Survey Stations, 2005



Source: JICA Study Team

Traffic volumes at each cross section on the South Luzon Expressway can be calculated based on incoming reports from the various interchanges. Table 2.4.8 shows the most recent average daily traffic volumes by vehicle base (not PCU). The volumes at the north of Alabang reach more than 140 thousand.

Table 2.4.8 Average Daily Traffic Volume at Cross Section on South Luzon Expressway (2004/11/9 Tue – 2004/11/11 Thr)

Between		Class 1	Class 2	Class 3	Total
Northern Part (Skyway, Nichols, C5, Merville)	Bicutan	126,839	22,323	5,208	154,370
Bicutan	Sucacat	113,693	22,032	4,859	140,584
Sucacat	Alabang	97,950	22,112	4,863	124,925
Alabang	Filinvest	92,820	20,201	6,040	119,061
Filinvest	Susana	98,748	21,695	6,039	126,482
Susana	Southwoods	87,900	19,354	5,964	113,218
Southwoods	Carmona	74,189	18,628	5,831	98,648
Carmona	Mamplasan	68,344	18,383	5,707	92,434
Mamplasan	Santa Rosa	64,734	17,835	5,733	88,302
Santa Rosa	Cabuyao	52,858	16,198	4,735	73,791
Cabuyao	Silangan	51,542	15,671	4,167	71,380
Silangan	Calamba	43,919	13,303	3,466	60,688

Source: PNCC

During the conduct of the traffic count surveys, some vehicles were sampled for occupancy survey. Number of the occupants in sampled vehicle was counted by a surveyor's quick glance and the average number of occupants by vehicle type is summed up in each survey location.

In general, the number of occupants shows decreasing tendency proportionate to the increase of number of vehicles. The result of comparison between MMUTIS in 1996 and CALA in 2005 shows the same trend. The rapidly decreasing average number of occupants by standard bus may be caused by the increase of bus operation frequencies or bus routes. Slight increases by motorcycle and car may be caused by errors in survey or popularization of car ownership in middle income group.

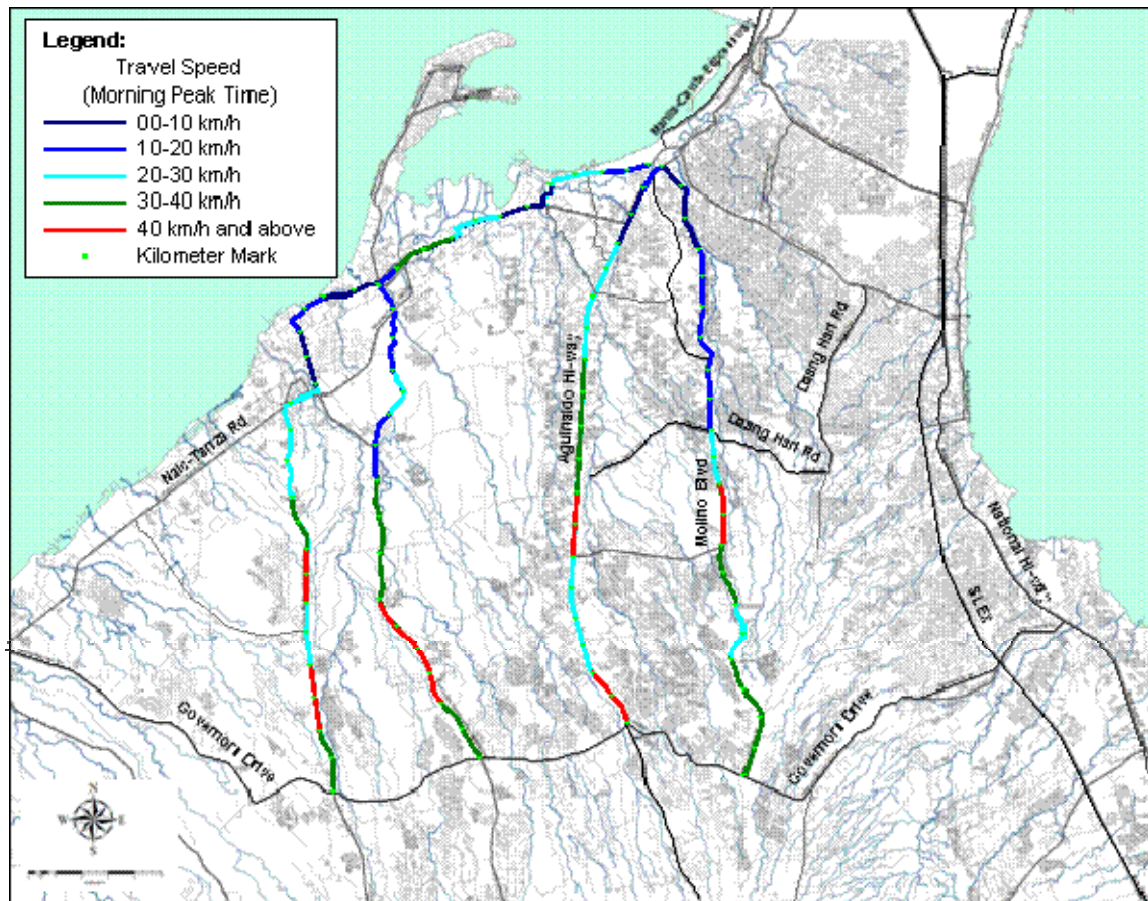
Table 2.4.9 Average Occupancy by Vehicle Type

	Motorcycle	Tricycle	Jeepney	Minibus	Standard Bus
MMUTIS in 1996	1.12	2.64	14.98	28.96	50.62
Cavite Busway in 2002			Public = 14.80		
CALA 2005	1.34	2.25	9.70	13.10	24.36
	Taxi / HOV Taxi	Car / Jeep	Utility Vehicle	Truck / Trailer	Others
MMUTIS in 1996	3.33	1.75	3.12	2.07	1.36
Cavite Busway in 2002	Private = 2.67			Truck = 2.50	
CALA 2005	2.95	1.78	3.02	2.33	1.04

(3) Travel Speed

Figure 2.4.5 and Table 2.4.10 show the results of the travel speed survey conducted by the study team. It comparatively shows vehicular high speeds in the study area with few numbers of stops during the survey period. However, the ratio of stopping time is high, particularly at Aguinaldo Highway and Governor's Drive.

Figure 2.4.5 Result of Travel Speed Survey, 2005



Source: JICA Study Team

Table 2.4.10 Result of Travel Speed Survey, 2005

Route Name	Direction		Length (km)	Mode of Transport	Average Travel Speed (km/h)				Ave. No. of Stops (times/km)				Average Ratio of Stopping Time (%)			
	From	To			AM	Off	PM	Total	AM	Off	PM	Total	AM	Off	PM	Total
Zapote - Silang (Aguinaldo Highway)	Silang	Zapote	29.0	Car	26.48	27.06	26.60	26.71	0.44	0.13	0.55	0.37	14.88	19.89	31.75	22.17
				Truck	27.64	27.37	25.74	26.92	1.51	1.27	1.58	1.45	26.65	15.33	32.70	24.89
				Jeepney	23.39	23.28	23.35	23.34	1.59	1.87	1.89	1.79	33.98	34.65	26.82	31.82
				Bus	26.91	26.81	26.82	26.85	1.45	1.51	1.44	1.47	29.21	22.35	23.78	25.11
Zapote - Silang	Zapote	Silang	29.0	Car	26.86	26.93	26.57	26.79	0.97	0.56	0.77	0.77	25.23	7.91	12.67	15.27
				Truck	24.56	24.71	24.63	24.65	0.98	0.86	1.22	1.02	30.64	23.48	20.91	25.01
				Jeepney	23.38	23.06	23.53	23.32	1.15	1.19	1.06	1.13	29.88	17.01	19.90	22.26
				Bus	26.00	26.71	25.61	26.11	0.94	1.10	1.14	1.06	33.40	29.76	29.74	30.97
Binan - Binan (Governors Drive)	Binan	Naic	46.3	Car	36.29	45.17	33.20	38.22	0.26	0.56	0.77	0.53	24.44	4.77	18.38	15.86
				Truck	34.69	40.33	33.12	36.05	0.55	0.41	0.56	0.51	23.13	12.76	18.54	18.14
				Jeepney	34.87	35.52	34.86	35.09	0.95	0.90	0.93	0.93	14.06	12.14	39.92	22.04
				Bus	34.69	40.33	33.12	36.05	0.55	0.41	0.56	0.51	23.13	12.76	18.54	18.14
Binan - Binan (Governors Drive)	Binan	Naic	20.7	Car	34.94	44.84	32.76	37.51	0.55	0.21	0.61	0.46	23.46	6.50	23.85	17.94
				Truck	34.44	42.66	32.15	36.42	0.52	0.35	0.54	0.47	21.93	12.81	26.05	20.26
				Jeepney	37.67	36.40	35.41	36.49	0.42	0.34	0.36	0.37	27.54	20.13	18.53	22.07
				Bus	34.94	44.84	32.76	37.51	0.55	0.21	0.61	0.46	23.46	6.50	23.85	17.94
Bacoor - Governors Drive (Molino Road)	Bacoor	Governors Drive	46.3	Car	24.11	21.90	21.80	22.60	0.58	0.42	0.42	0.47	12.20	9.57	6.26	9.35
				Truck	21.51	21.66	20.04	21.07	0.58	0.42	0.42	0.47	14.16	9.51	5.81	9.82
				Jeepney	22.93	19.99	20.55	21.16	1.26	1.26	1.26	1.26	18.78	16.45	19.92	18.38
				Car	25.32	25.50	23.14	24.65	0.48	0.34	0.37	0.40	6.87	7.57	7.00	7.15
Aguinaldo Highway - Molino Road (Salawag - Salitran Road)	Salawag	Salitran	4.1	Truck	24.59	25.51	21.05	23.72	0.48	0.34	0.37	0.40	7.90	7.42	6.37	7.23
				Jeepney	22.25	16.52	16.64	18.47	0.97	0.97	0.97	0.97	34.23	22.93	21.95	26.37
				Car	34.96	35.98	34.89	35.28	0.61	0.41	0.54	0.52	4.81	3.53	3.37	3.90
				Truck	32.61	32.91	32.61	32.71	0.95	0.88	0.82	0.88	5.67	5.22	5.17	5.35
Aguinaldo Highway - Governor's Drive (Tirona Highway)	Aguinaldo Highway	Governor's Drive	28.8	Jeepney	31.20	31.45	30.66	31.11	1.02	1.16	1.09	1.09	5.48	7.65	6.89	6.67
				Car	36.61	37.55	36.42	36.86	0.54	0.34	0.34	0.41	2.99	2.04	2.03	2.35
				Truck	34.32	36.17	34.82	35.10	0.48	0.27	0.41	0.39	2.93	1.64	2.05	2.21
				Jeepney	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calamba - Batangas Port Area	Governor's Drive	Aguinaldo Highway	28.8	Car	21.94	23.54	22.32	22.60	1.45	1.23	1.55	1.41	16.17	17.55	12.38	15.36
				Bus	19.37	26.11	21.16	22.21	1.81	1.60	1.68	1.69	21.05	13.52	10.21	14.93
				Truck	34.62	35.71	32.80	34.40	0.66	0.63	0.88	0.72	6.34	7.40	8.40	7.38
				Car	24.49	23.49	22.89	23.62	1.33	1.24	1.56	1.38	15.43	13.37	20.69	16.50
Calamba - Batangas Port Area	Batangas Port Area	Calamba	54.7	Bus	23.42	23.03	21.78	22.74	1.59	1.40	1.62	1.54	18.67	14.64	10.53	14.62
				Truck	35.07	36.44	34.23	35.25	0.78	0.58	0.81	0.72	7.41	7.09	16.26	10.26
				Car	48.55	50.61	47.12	48.76	0.19	0.15	0.16	0.17	2.14	2.28	0.67	1.69
				Bus	42.48	42.56	41.94	42.33	0.22	0.28	0.27	0.26	2.10	2.91	2.48	2.50
Calamba - Batangas Port Area	Calamba	Batangas Port Area	54.7	Truck	47.61	52.62	53.68	51.30	0.36	0.19	0.34	0.29	4.96	1.85	3.91	3.57
				Car	44.78	48.08	38.29	43.72	0.19	0.18	0.29	0.22	2.56	2.78	2.58	2.64
				Bus	43.09	42.86	43.10	43.02	0.30	0.37	0.34	0.32	3.82	5.27	31.69	13.59
				Truck	47.72	45.83	43.74	45.76	0.16	0.13	0.32	0.20	1.83	1.26	30.90	11.33
Manila Port Area - Calamba (Via South Luzon Tollway)	Manila Port Area	Calamba	46.4 ***	Car	44.82	51.29	50.38	48.83	0.65	0.43	0.31	0.46	9.82	8.58	7.50	8.63
				Bus	51.18	57.26	58.56	55.67	0.45	0.32	0.37	0.33	6.85	8.21	9.63	8.20
				Truck	48.40	51.75	50.63	50.33	0.37	0.29	0.33	0.33	4.81	4.77	5.77	5.12
				Car	50.99	61.94	42.92	51.95	0.36	0.33	0.57	0.42	12.87	11.27	12.55	12.23
Manila Port Area - Calamba (Via South Luzon Tollway)	Manila Port Area	Calamba	46.4 ***	Bus	53.14	55.44	45.47	51.35	0.32	0.27	0.75	0.45	7.24	6.09	42.03	18.45
				Truck	51.79	54.63	45.22	50.55	0.28	0.14	0.54	0.32	5.67	4.34	8.83	6.28
				Truck	51.79	54.63	45.22	50.55	0.28	0.14	0.54	0.32	5.67	4.34	8.83	6.28
				Truck	51.79	54.63	45.22	50.55	0.28	0.14	0.54	0.32	5.67	4.34	8.83	6.28

* - Survey trip distance from Calamba to Poblacion Jct. To Batangas City Port Area, where bus and truck traffic take a different route.

** - Survey trip distance from Calamba to Taft Avenue, Manila, where buses take Taft Ave. to/from Lawton area.

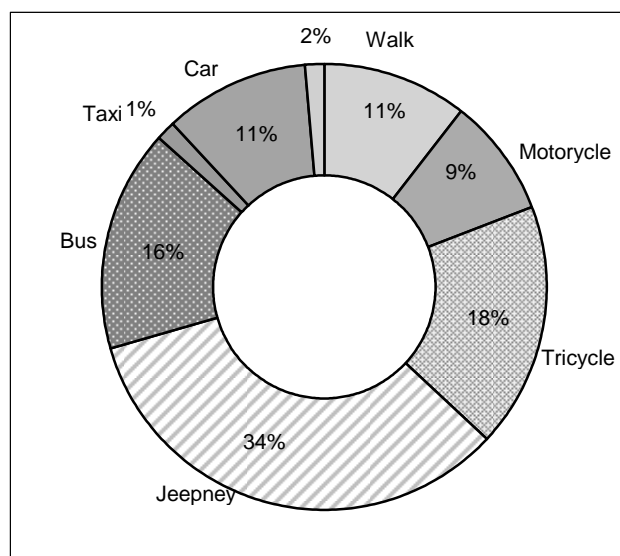
*** - Survey trip distance from Calamba to Intersection of Quirino Highway and Osmena Highway, where trucks take a right turn towards Plaza Dilaw.

2.4.3 Public Transport System in the Study Area

(1) General Condition

The public transport still has a predominant modal share in the CALA region, accounting for more than 70% of total motorized trips, in spite of the rapid growth of private vehicle uses in the region. The current public transport services in the region are mainly provided by road-based transport modes (i.e. buses, jeepneys, taxi, tricycle, etc.). According to the resident interview survey (RIS) conducted during February-March 2005, jeepney, tricycle and buses are the main public transport modes in CALA region (Figure 2.4.6).

Figure 2.4.6 Modal Choice in Work Trips in the Study Area

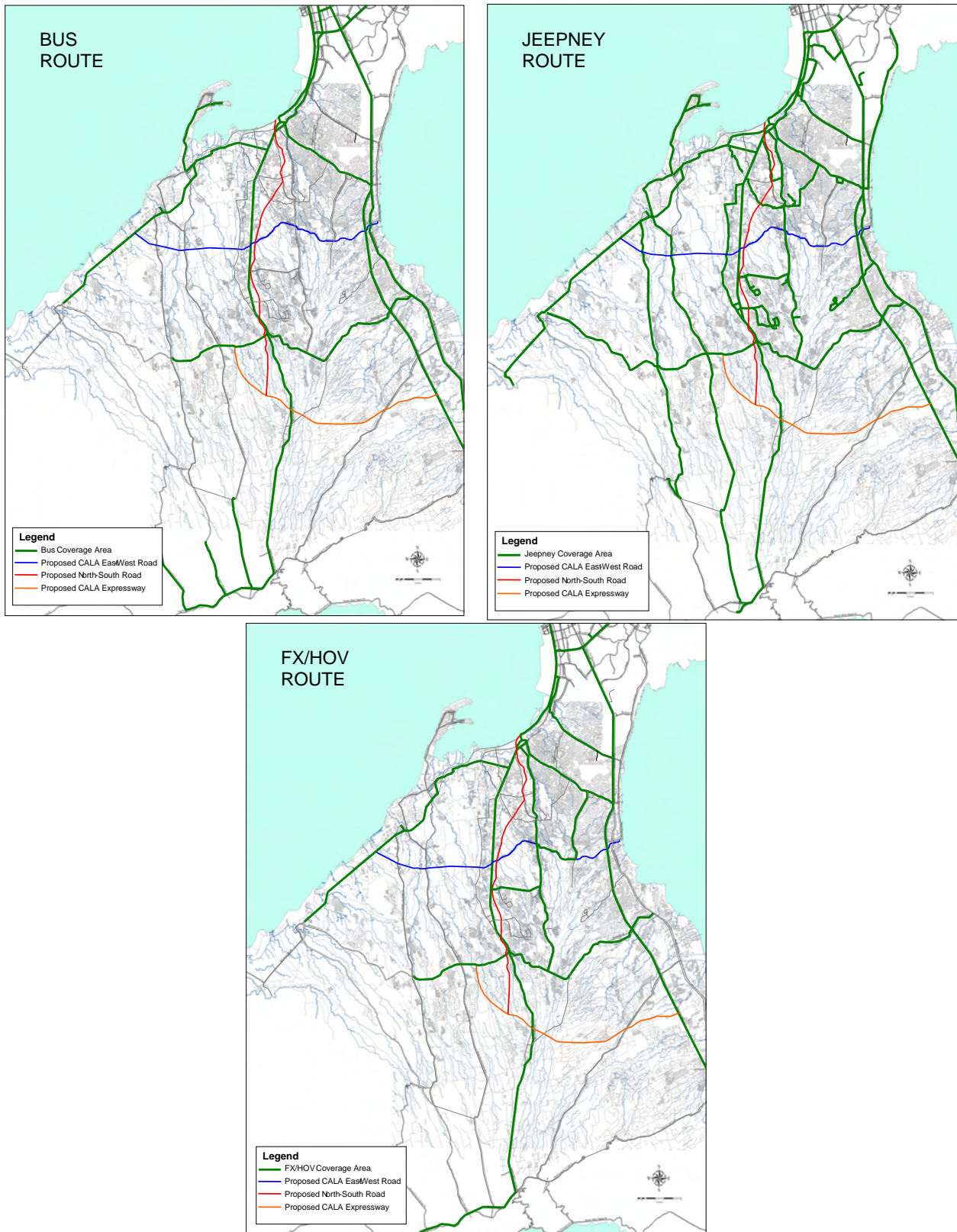


Source: JICA Study Team

Bus service is provided on most of the arterial and secondary roads as shown in Figure 2.4.7. Bus routes are concentrated on those roads converging onto Metro Manila. Expectedly, almost all the bus routes originating from CALA area terminate at prominent terminals in Metro Manila such as Baclaran, Alabang, Lawton, among others.

Jeepney services are provided in almost the same roads as the bus services. The only difference is the higher service frequency of the former, particularly on the arterials such as Aguinaldo Highway, Coastal Road and Governor's Drive. On the other hand, taxis, including High Occupancy Vehicle (HOV), is not commonly used in CALA area except for the adjacent area of Metro Manila, from where particularly considerable number of Tamaraw FX (shuttle van services) is operated to central Manila for commuting services.

Figure 2.4.7 Public Transport Coverage in CALA Region



Source: JICA Study Team