# **CHAPTER 4**

# **TRAFFIC STUDY**

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# 4.1 PRESENT TRAFFIC CONDITION

# 4.1.1 Type of Surveys Carried Out

A number of surveys were carried out to better understand the characteristics of the study area as well as to get the opinion of stakeholders on the proposed expressway (see **Table 4.1.1-1** including World Bank Survey). Each survey is discussed separately in the succeeding section. Likewise, survey results of previous JICA-assisted study like the "The Study of Master plan on High Standard Highway Network Development" were utilized for this study like traffic volume. Similarly, the traffic count data of on-going WB-assisted study entitled Cavite-Laguna Tollway Project was also reflected in the report to have a holistic appreciation of entire stretch of the expressway.

	Number of Samples			
Survey Type	ЛСА	World Bank (SMEC)		
(a) Travel Speed Survey	5	-		
(b) Car's Willingness to Pay (WTP) Survey	1,126	-		
(c) FX Willingness to Pay (WTP) Survey	161	-		
(d) Interview Survey to Truck Company	20	-		
(e) Interview Survey to Bus Company	11	-		
(f) Interview Survey to Manufacturing Company	18	-		
(g) Manual Traffic Count Survey (including OD survey)	-	24		
(h) Roadside Interview Survey	-	9		
(i) Axle Load Survey	-	2		

TABLE 4.1.1-1 TYPE OF SURVEYS CARRIED OUT

# 4.1.2 Traffic Volume

**Figure 4.1.2-1** shows the traffic volumes of the road network in Cavite area and some portions of Laguna province. The number denotes vehicles. The following were observed regarding the captured traffic volume:

- Traffic volume at the section of SLEX inside Metro Manila is extremely high compared to the sections outside of Metro Manila indicating that there are high numbers of vehicles using the expressway having their OD within Metro Manila.
- There is also a very high volume of vehicle between Metro Manila and coastal towns of Cavite which is served by the Manila-Cavite Expressway. These towns along with other towns within the periphery of Metro Manila are functioning as residing place of workers in the capital.
- Likewise, traffic volume at the trunk roads like Aguinaldo Highway and Governor's Drive is also high especially at the sections of these roads passing urban areas like in Dasmarinas city and Gen. M. Alvarez, and Carmona. Through traffic and local traffic like jeepneys and tricycles merges at this road section.



Note: JICA data is AADT; WB data is average of 2-day 24 hrs count; motorcycles and bicycles were not included FIGURE 4.1.2-1 TRAFFIC VOLUME

# 4.1.3 Hourly Variation of Traffic Volume

The following were observed hourly traffic fluctuation in the following routes:

# **SLEX**

- The highest number of vehicles was recorded between 16:00 to 17:00 and the direction was going inside Metro Manila. Generally, there was no big difference of volume of vehicles from 6:00 to 22:00 (traffic volume was constantly almost 6,000 vehicles).
- However, for the section of SLEX outside of Metro Manila peak hours follow the usual trend. That is 7:00 to 8:00 in the morning and 16:00 to 17:00 in the afternoon.



Unit: Vehicle/Hour

FIGURE 4.1.3-1 HOURLY VARIATION OF TRAFFIC AT SLEX (SUCAT – BICUTAN SECTION) Unit: Vehicle/Hour



FIGURE 4.1.3-2 HOURLY VARIATION OF TRAFFIC AT SLEX (NEAR CARMONA INTERCHANGE)

## Aguinaldo Highway

• Peak hour was observed at 11;00 to 12:00 and significant volume of traffic was also observed during morning peak hour at 7:00 to 8:00. Traffic drastically declined from 21:00 onwards. This road is a major highway connecting medium towns in Cavite to Metro Manila. These towns serve as residential places of most people having their work in the capital.

Unit: Vehicle/Hour



FIGURE 4.1.3-3 HOURLY VARIATION OF TRAFFIC AT AGUINALDO HIGHWAY (BET. TIRONA HIGHWAY & BUHAY NA TUBIG ST.)



FIGURE 4.1.3-4 HOURLY VARIATION OF TRAFFIC AT AGUINALDO HIGHWAY (BET. IMUS AND DASMARINAS)

#### Molina – Paliparan Road

• This road branched out from Aguinaldo Highway at Bacoor and runs parallel until it reaches Governor's Drive. Like users of Aguinaldo Highway, traffic in this road will have an option of using the CALAX expressway if constructed in future. During the peak hour in the morning, vehicles entering Metro Manila is higher that those moving in opposite direction. Perhaps these traffics are commuters catching their work in the morning. The movement of traffic is then reverse in the afternoon where most of the traffic is leaving the capital.



FIGURE 4.1.3-5 HOURLY VARIATION OF TRAFFIC AT MOLINA-PALIPARAN ROAD (MOLINO BLVD. AT BRGY. MAMBOG IV, BACOOR (NORTH OF PALICO DAANAN ST.)



FIGURE 4.1.3-6 HOURLY VARIATION OF TRAFFIC AT MOLINA-PALIPARAN ROAD (AFTER DAANG HARI.)

# Governor's Drive

• This road is carrying heavy traffic which is more than one thousand per hour during peak hour in the morning and afternoon. Number of vehicles in both directions is almost equal where outgoing traffic is believed to be heading to Metro Manila and incoming traffic are workers of several manufacturing companies in the area.



FIGURE 4.1.3-7 HOURLY VARIATION OF TRAFFIC AT GENERAL TRIAS (BETWEEN ANTERO SORIANO HIGHWAY & GOV. FERRER ST.)



FIGURE 4.1.3-8 HOURLY VARIATION OF TRAFFIC AT CRISANTO DE LOS REYES AVE. (BRGY. BUENAVISTA III, GENERAL TRIAS, NORTH OF GOVERNOR'S DRIVE)

# Gen. Trias Drive and Pag-asa Street (near Governor's Drive)

• Users of this road will also benefit to the services provided by the CALAX expressway. Volume of vehicles is close to 800 per hour during peak hour and reduces to almost 450 during off peak. At the other end of the road, the volume of traffic significantly decreases and peak hour volume is merely about 430 per hour.



Unit: Vehicle/Hour

FIGURE 4.1.3-9 HOURLY VARIATION OF TRAFFIC AT CARMONA - TRECE MARTIREZ ROAD



FIGURE 4.1.3-10 HOURLY VARIATION OF GOVERNOR'S DRIVE AT BRGY. PALIPARAN I, DASMARIÑAS (WEST OF PALIPARAN ROAD)

# 4.1.4 Traffic Composition

- The volume of vehicles at Bicutan section of the expressway is very high. Cars continued to be the main users of SLEX and the number of trucks using the expressway to deliver their cargoes on time is noticeable. Note that tricycle and motorcycles were recorded at Calamba section since the survey station was positioned after the exit.
- Traffic composition at Aguinaldo Highway shows typical mixing of different transport mode in the road network of the country when a national road passes urban center. Combined number of Jeepneys, motorbikes, and tricycles are more than half of the total traffic. Traffic congestion in this area is very heavy.
- At Governor's Drive, car has the highest share followed by tricycle/motorcycle. Share of truck is also significant due to the presence of several manufacturing companies.
- At the coastal road which connects coastal tows of Cavite to Metro Manila, since the two survey stations were position at the urban center, share of tricycle and motorcycle are almost the same as share of cars. Tricycles and motorcycles entering the main road are observed almost every part of the country which disrupts the smooth flow of traffic.
- At the Sta. Rosa Tagaytay Road, share of trucks is significant (over 3,000) and this is because of the presence of manufacturing companies in the area.







FIGURE 4.1.4-2 TRAFFIC COMPOSITION AT AGUINALDO HIGHWAY













# 4.1.5 Travel Speed Survey

The travel time of selected routes are depicted in **Figure 4.1.5-1**. General observation appears that serious traffic congestion is experienced while the national road is passing a city center or the area has substantial number of economic zones and industrial parks. Congestion is also experienced when a road is about to merge with another important road. **Table 4.1.5-1** presented the causes of traffic congestion in each route.



FIGURE 4.1.5-1 (1) TRAVEL SPEED OF MAJOR CORRIDORS IN THE SOUTH OF METRO MANILA (MORNING PEAK HOURS)



FIGURE 4.1.5-1 (2) TRAVEL SPEED OF MAJOR CORRIDORS IN THE SOUTH OF METRO MANILA (AFTERNOON PEAK HOURS)

# TABLE 4.1.5-1 TRAVEL SPEED ROUTES AND OBSERVED CAUSES OF TRAFFIC<br/>CONGESTION

	Afternoon Peak Hours
	• This route supports many economic zones located in middle and eastern part of Cavite province as well as
Route 1	<ul> <li>important corridors for commuters from the municipalities of Kawit, Noveleta, Rosario, Tanza, Gen. Trias, and Amadeo. Substantial number of working force in Metro Manila has their residence in these municipalities thus they have a daily movement between Cavite and Metro Manila. Traffic volume in this road section reaches over 17,000 vehicles per day (cars 63%, trucks 18%, jeepneys 10% and buses 9%).</li> <li>Motorists moving in the direction of Cavite are experiencing heavy congestion in the following sections: Evangelista bridge to Aguinaldo, and Gen. Antonio (Jct. Gen. Trias Drive/A. Bonifacio) to Gov. Ferrer (Open Canal). Travel speed in these two sections is merely 15 km/hr and 16 km/hr respectively. This road is common road for commuters for several municipalities in the coastal area of Cavite province. Thus motorists moving in both directions are experiencing heavy congestion starts at Bagong Kalsada until they reached Anterio Soriano Highway (Gen. Trias area). This can be attributed to significant number of mini-buses and jeepneys that are loading and unloading passengers often without properly parking their vehicles to roadside to avoid diverting function.</li> </ul>
Route 2	<ul> <li>disruption of traffic.</li> <li>This route is a major corridor that serves over 27,000 vehicles per day (between Imus and Dasmarinas section) and a critical link to Metro Manila for commuters from Imus municipality, Dasmarinas city, Silang municipality and Tagaytay city. Likewise, this is also a vital highway for locators in the economic zones for delivery of their cargoes to international ports and airports of Manila. Number of trucks passing this road reaches to about 3,000 per day in 2009 which represents 10% of the total traffic. Private car however still dominates the road network with a total share of 58%. Similar to municipalities mentioned in Route 1, these municipalities are also hosting substantial number of people commuting daily to Metro Manila to attend their work.</li> <li>Bottleneck sections for motorists in the direction of Metro Manila are particularly serious from Daang Hari to Palico-Daanan. Heavy traffic is experienced again from Pacific Avenue to NAIA Road of Roxas Boulevard.</li> <li>For motorists going in the direction of Cavite, traffic congestion starts at Alabang Zapote Road and this slow movement of vehicles continues until reaching Dasmarinas City all the way to the junction of Aguinaldo – Pala-pala Road. This particular time saw heavy movement of commuters (employees and students) who have their work in Metro Manila but have their residence in Cavite area.</li> </ul>
Route 3	<ul> <li>This route is supporting significant number of economic zones and traversing several medium-sized cities, large shopping malls and universities. This route is also classified as east-west lateral arterial road by the DPWH which indicates that the road is an important backbone of the country's transportation network. Traffic volume reaches over 14,000 (between Carmona and Gen. M. Alvarez) and share of cars is 53% and share of trucks' reaches as high as 19%. As mentioned, this high volume of trucks is servicing economic zones in the area.</li> <li>Motorists moving in the direction of SLEX have to endure heavy traffic congestion particularly at Gen. M. Alvarez municipality proper where travel speed is just 15km/hr. This speed is further reduced to merely 7 km/hr from Carmona until entrance to SLEX.</li> <li>For traffic moving in opposite direction, the congested section is G. M. Alvarez municipality to Dasmarinas city. Perhaps there is a significant number of people working at economic zones located in the said municipality but have their residence in Dasmarinas city.</li> </ul>
Route 4	<ul> <li>This route serves as alterative to Aguinaldo Highway for motorists going to Tagaytay city and vice versa. Motorists from Metro Manila travels using SLEX depart at Sta. Roxa exit and moves south-west all the way to Tagaytay city.</li> <li>This route is still generally free from traffic congestion except at the section after exiting from the expressway to Nuvali road. This area is populated by industrial parks and some universities have their campus here. Traffic volume in this road reaches over 15,000 vehicles of which 22% are trucks and 70% are cars.</li> </ul>
Route 5	<ul> <li>This route, an expressway, is the main backbone of cities and industries in the south of Metro Manila. Congestion is only experienced at the section of Skyway (direction of south) which is due to high volume of vehicles entering the expressway at same time after office hour. Motorists departing Metro Manila have to endure severe traffic congestion at the off-ramp that connects Skyway and SLEX. Note that this survey was carried out in May 5, 2011 and during this time, Phase 2 of Skyway which offer seamless connection to SLEX has yet to open.</li> <li>The green color with signifies slow travel speed (30-40 km/hr) for motorist traveling south is due to presence of toll both at Canlubang.</li> </ul>

# 4.1.6 Willingness to Pay Survey for Use of CALAX (Private Car User)

**Figure 4.1.6-1** shows the hypothetical questions and different routes considered in asking the car user's respondents.



# Expressway Projects in Mega Manila Region in the Republic of the Philippines



wı	LLINGNESS TO PAY SURV	/EY (FORM 2)		FO	R STUDY PURPOSE ONLY	
	Sample ID No:		Date (m	nonth/day)		
General Info.	Location: Aguinaldo High Aguinaldo High Along Governor Sta. Rosa-Tagay SLEX Service Ar	way (Dasmarinas City) way (Silang) r's Drive ytay Road ea	Time	L		
	1-Sex		<b>2-Age</b> 1)20-29	2)30-39 3)40-4	49	
sonal Information	3-Occupation 1- Admin. 2- Professiona 7- Craftman 8- Production 13- Jobless 14- Other (spe 4-Monthly Income (Pesos)	I 3- Tech./assist. 9- Unskilled ecify):	4- Clerk 4- Clerk 10- Student	5)>60 5- Sale/Services 11- House wife	6- Farmer/fisher 12- Retired	
Pe	1) None         4) 10,000           2) Under 5,000         5) 15,000           3) 5,000-9,999         6) 20,000	- 14,999 7) - 19,999 8) - 29,999 9)	40,000-39,999 60,000-99,999	11) 150,000	) and above	
ition	5- Trip OD Where did you start this trip? <i>(City/Municipality)</i>			[_]		
Informa	Where do you end this trip? (City/Municipality)					
Trip	6- Trip purpose 1.Work 4.Selling/E 2.Education 5.Meeting/ 3.Home 6.Return tu	Delivering /business o work place	7.Shopping/Eating 8.Sending/ Fetching 9.Recreation	10.Medical t 11.Social 12.Other	reatment	
	Hypothetical Question The government is planning to constru of goods. Like other expressways in th	uct the Cavite-Laguna Ex	pressway (CALA Express nt will be collected to use	way) to increase p the expressway.	eople's mobility and transport	
	If CALAX is built, will you use	it for your travel?	$\frown$			
	7 - From A to D [Ordinary ro	ad = 95 min]	Time Saved is			
	1) Yes → How much you	ssway = 35 min] u are willing to pay?	about 60 min!	Cause of	-+-	
	2) No, I will take ordinary roa	ad				
	8 - From B to A [Ordinary ros	ad = 30 min]	Time Saved is	AL IT	SLEX	
Pay	$[CALA Expressway = 15 min] about 15 min! 1) Yes \rightarrow How much you are willing to pay?a) 20 b) 40 c) 60$					
s to	2) No, I will take ordinary roa	ad			N/AF	
lnes	9 - From B to D [Ordinary ro	ad = 65 min]	ime Saved is	TRECE	Durad	
Willing	1) Yes $\longrightarrow$ How much you a) 40 b) 60	u are willing to pay? 0 c) 100	bout 45 min!	Annuas -	SLANG	
	2) No, I will take ordinary roa	ad		1 - A - C	1 - Alt - war As	
	1) Yes How much you a) 20 b) 40	ad = 25 minj ssway = 10 minj u are willing to pay? 0 c) 60	Time Saved is about 15 min!	Tagayya	Here -	
	2) No, I will take ordinary roa	ad				
	11 - From C to D [Ordinary ro	ad = 40 min]	Time Saved is			
	[CALA Expre 1) Yes → How much you a) 20 b) 40	u are willing to pay? 0 c) 100	about 30 min!			
	2) No, I will take ordinary roa	ad	That's All Thank Va	u Vory Much f	or Your Cooperation	
			ιπαι σ Μπ. ΠΠατικ ΤΟ			



# • Sample Distribution

Distribution of samples is shown in the Table 4.1.6-1 and illustrated in Figure 4.1.6-2.

Survey Station/Location	Sample	Share (%)
1. Aguinaldo Highway (Dasmarinas City)	120	10.7%
2. Aguinaldo Highway (Silang)	212	18.8%
3. Along Governor's Drive	244	21.7%
4. Sta. Rosa-Tagaytay Road	50	4.4%
5. SLEX Service Area	500	44.4%
Total	1,126	100.0%

TABLE 4.1.6-1 SAMPLE DISTRIBUTION



Note: the same color denotes data were combined and analyzed together

# FIGURE 4.1.6-2 SURVEY LOCATIONS FOR WILLINGNESS-TO-PAY SURVEY

# • Sex Distribution



Most of the car users captured in the survey are composed of male (86.2%) and the remaining 13.8% are female.



# • Age Distribution

For age distribution, more than half of the respondents (66.9%) are between the age range of 30 to 49.



FIGURE 4.1.6-4 AGE DISTRIBUTION

#### • Occupation Distribution

For occupation of the captured respondents, most of them are engaged in professional work (22.0%) and sale/services (19.1%). Other notable professions by the respondents are technical/assistant and administration.



# FIGURE 4.1.6-5 OCCUPATION DISTRIBUTION

#### • Income Distribution

For monthly income, notable income brackets which the respondents belong are: 10,000-14,999 (25.9%) and 15,000-19,999 (20.5%). Note that respondents which declared 'none' or lack of income are normally students or housewives.



Number of sample = 1,126

# FIGURE 4.1.6-6 MONTHLY INCOME DISTRIBUTION

#### • Trip Purpose

For trip distribution, trips with substantial share are: recreation (17.4%), social (17.1%), going home (14.6%), selling/delivering (13.1%) and meeting/business (12.1%).



# FIGURE 4.1.6-7 TRIP PURPOSE DISTRIBUTION

#### • Trip OD Distribution

Major origins of trips at Station 1 (Aguinaldo Highway (Dasmarinas City)) are: 19% from Metro Manila, 18% from Bacoor, 13% from Cavite City. Other towns in Cavite Province with notable share are: Tagaytay (6%), Noveleta (5%), Trece Martires (4%), Silang (3%), and Rosario (3%).

For destination, major destinations are municipalities in Batangas and Laguna (24%), and municipalities of Cavite Province such as Silang (15%), and Tagaytay (14%). Other municipalities in Cavite Province with high share are: Bacoor (9%), Trece Martires (8%) Kawit (6%), Novelet (6%), Cavite City (5%), and Maragondon (3%).





Number of sample = 212 FIGURE 4.1.6-10 ORIGIN OF TRIPS AT STATION NO. 2



Number of sample = 244 FIGURE 4.1.6-12 ORIGIN OF TRIPS AT STATION NO. 3



Number of sample = 50

# FIGURE 4.1.6-14 ORIGIN OF TRIPS AT STATION NO. 4



Number of sample = 212

# FIGURE 4.1.6-11 DESTINATION OF TRIPS AT STATION NO. 2



Number of sample = 244

FIGURE 4.1.6-13 DESTINATION OF TRIPS AT STATION NO. 3



Number of sample = 50

# FIGURE 4.1.6-15 DESTINATION OF TRIPS AT STATION NO. 4





Number of sample = 500

# FIGURE 4.1.6-16 ORIGIN OF TRIPS AT STATION NO. 5

# FIGURE 4.1.6-17 DESTINATION OF TRIPS AT STATION NO. 5

## • Will they Use CALA Expressway or Not

The map in **Figure 4.1.6-18** shows the imaginary alignment of CALA expressway. Based on the travel time survey carried out by the Study Team, during peak hour, it would take around 90 to 100 minutes to cross A to D using ordinary road. Likewise, using CALA expressway, the same route can be crossed by more or less 37 minutes. It was assume then that at least the time save brought by the expressway is more or less 60 minutes. The car user individuals were then given with the following scenarios:

	Route Scenario	Time Save (min)	Use expressway or not?	If yes, how much willing to pay?
a.	From A to D	60		
b.	From B to A	15		
c.	From B to D	45		
d.	From C to B	15		
e.	From C to D	30		

#### TABLE 4.1.6-2 ROUTE SCENARIOS AND AMOUNT OF WILLINGNESS-TO-PAY



FIGURE 4.1.6-18 ROUTE SCENARIOS

The responses of car user individuals are presented from **Table 4.1.6-3** to **Table 4.1.6-7**. All motorist interviewed at Dasmarinas section of Aguinaldo Highway expressed their desire to use CALA expressway in all its route scenarios. Perhaps this is due to perceived benefits (faster travel speed) that the motorist can get from the expressway. It should be noted that arterial roads (Aguinaldo Highway and Governor's Drive) supporting the area is heavily congested.

Boute Sconorio Time Save Will Use CALA?						How much willing to pay?				
1	Koute Scenario	(min)	Yes (%)	No (%)	How much winning to pay :		b pay:			
2	From A to D	60	100	0	P 60	P 120	P 200			
а.	FIOIII A to D	00	100	0	(98.3%)	(1.7%)	(0%)			
h	From B to A	15	100	<b>100</b> 0	0	P 20	P 40	P 60		
0.	FIOIII D to A	15			(98.3%)	(1.7%)	(0%)			
0	From B to D	15	100	100	0	P 40	P 60	P 100		
С.	FIOIII D to D				100	100	100	0	(98.3%)	(1.7%)
d	Enome C to D	15	100	0	P 20	P 40	P 60			
u.	FIOIII C to D	15	100	0	(98.3%)	(1.7%)	(0%)			
	From C to D	30	100	0	P 20	P 40	P 100			
e.	FIOIII C to D	50	100	0	(98.1%)	(1.9%)	(0%)			

TABLE 4.1.6-3 RESPONSE FROM AGUINALDO HIGHWAY (DASMARINAS) (Sample size = 120)

The same is true for motorists interviewed at Silang section of Aguinaldo Highway. A very high shift to expressway is expected as shown in the table below. The low rate of shift (A to D and B to D) as compared to the rest might have something to do with the usefulness of the route. Most of the respondents are heading to Tagaytay and Silang so perhaps sections A to D and B to D is not that useful to some of them.

Pouto Sconario	Time Save	Will Us	Will Use CALA?		How much willing to pay?	
Koute Scenario	(min)	Yes (%)	No (%)	How much whing to pay:		o pay:
a From A to D	60	74 5	25.5	P 60	P 120	P 200
a. FIOIII A to D	00	74.5	74.3 23.3	(98.1%)	(1.9%)	(0%)
h Erom D to A	15	<b>Q1 1</b>	19.0	P 20	P 40	P 60
$\mathbf{U}.  \mathbf{\Gamma} \mathbf{I} \mathbf{U} \mathbf{I} \mathbf{I} \mathbf{U} \mathbf{A}$	15	81.1	1.1 18.9	(97.7%)	(2.3%)	(0%)
a From P to D	45	75.0	25.0	P 40	P 60	P 100
$\mathbf{C}.  \mathbf{F} = \mathbf{I} \mathbf{O} \mathbf{D}$	43	75.0 23	23.0	(95.0%)	(5.0%)	(0%)
d From C to D	15	07 7	10.2	P 20	P 40	P 60
d. From C to B	15	8/./	12.5	(96.8%)	(3.2%)	(0%)
a From C to D	20	<u> 94 4</u>	15.6	P 20	P 40	P 100
e. From C to D	50	04.4	13.0	(92.2%)	(7.2%)	(0.6%)

 

 TABLE 4.1.6-4 RESPONSE FROM AGUINALDO HIGHWAY (SILANG) (Sample size = 212)

For respondents captured along the Governor's Drive, most of them also revealed their willingness to use the CALA expressway if constructed in future. Dominant amount of fee they are willing to pay are the following: 60 pesos for A to D section; 20 pesos for B to A section; 40 pesos for B to D section; 20 pesos for C to B section and 20 pesos for C to D section.

 TABLE 4.1.6-5 RESPONSE FROM ALONG GOVERNOR'S DRIVE

 (Sample size = 244)

Douto Sconorio	Time Save	Will Use	Will Use CALA?		How much willing to pay?	
Koute Scenario	(min)	Yes (%)	No (%)	How much willing to pay:		o pay:
a From A to D	60	80.3	10.7	P 60	P 120	P 200
a. FIOIII A to D	00	00.5	19.7	(96.4%)	(3.6%)	(0%)
h From P to A	15	70.5	20.5	P 20	P 40	P 60
D. FIOIII D to A	15	19.5	20.3	(92.8%)	(7.2%)	(0%)
a From P to D	45	99 5	11.5	P 40	P 60	P 100
c. FIOII B to D	45	00.3	<b>66.5</b> 11.5	(95.4%)	(4.6%)	(0%)
d From C to P	15	80.7	10.2	P 20	P 40	P 60
u. FIOIII C to B	15	00.7	19.5	(94.4%)	(5.6%)	(0%)
a From C to D	20	067	2.2	P 20	P 40	P 100
	50	90.7	5.5	(90.7%)	(8.9%)	(0.6%)

All respondents at the Sta. Rosa – Tagaytay Road station expressed their intention to use CALA expressway if built in future. The dominant toll fee price is the same as that recorded in respondents captured along Governor's Drive.

(Sample size = 50)									
1	Douto Sconorio	Time Save	Will Use CALA?		How much willing to pay?				
1	Noute Scenario	(min)	Yes (%)	) No (%)		nuch whing to pay:			
	From A to D	60	100	0	P 60	P 120	P 200		
a.	FIOIII A to D	00	100	100 0	(100.0%)	(0.0%)	(0%)		
h	From D to A	15	100	100	100	0	P 20	P 40	P 60
υ.	FIOIII D to A	15		100 0	(84.0%)	(14.0%)	(0%)		
0	From P to D	45	100	0	P 40	P 60	P 100		
C.		-5	100	100	100	0	(96.0%)	(4.0%)	(0%)
4	From C to P	15	100	0	P 20	P 40	P 60		
u.	FIOIII C to B	15	100	0	(84.0%)	(14.0%)	(2.0%)		
	Enorm C to D	20	100	0	P 20	P 40	P 100		
e.	From C to D	30	100	100 0	(84.0%)	(16.0%)	(0.6%)		

 TABLE 4.1.6-6 RESPONSE FROM STA. ROSA – TAGAYTAY ROAD

 (Sample size = 50)

Respondents captured from the service area of SLEX have negative inclination to use CALA expressway except for the C to D section. Perhaps, one of the reasons for their unwillingness to use the CALA expressway is due to presence of SLEX which already served the areas of their interest. Likewise, C to D section can be used to reach Tagaytay after branching out from SLEX. So this can be an area of interest to them which could not be served by SLEX.

 TABLE 4.1.6-7
 RESPONSE FROM SLEX SERVICE AREA

 (Sample size = 500)

(2 ······ F-······ · · · · · · · · · · · ·							
	Douto Soonaria	Time Save	Will Use	e CALA?	Howm	ah willing t	. nov9
	Koute Scenario	(min)	Yes (%) No (%)		помш	ich whing u	o pay:
0	From A to D	60	0.2	00.8	P 60	P 120	P 200
а.	FIOIII A to D	00	0.2	<b>99.0</b>	(100.0%)	(0.0%)	(0%)
h	From P to A	15	0.6	00.4	P 20	P 40	P 60
υ.	FIOIII D to A	15	0.0	99.4	(66.7%)	(33.3%)	(0%)
	From D to D	15	50	04.2	P 40	P 60	P 100
C.	FIOIII D to D	43	5.0	94.2	(89.7%)	(10.3%)	(0%)
4	From C to P	15	0	100	P 20	P 40	P 60
u.	FIOIII C 10 D	15	0	100	(0%)	(0%)	(0%)
	From C to D	20	70.6	20.4	P 20	P 40	P 100
e.	FIOIII C 10 D	50	79.0	20.4	(58.5%)	(39.9%)	(1.5%)

# Willingness to Pay (FX Operator)

If CALA Expressway is realized in the future, one of transport groups that will benefits from the new facility is the FX operators. Most of these FX cars are plying routes between Metro Manila and neighboring municipalities such as Dasmarinas, Silang and others. Figure below shows the hypothetical questions and different routes considered in asking the respondents.



# Expressway Projects in Mega Manila Region in the Republic of the Philippines



wı	LINGNESS TO PAY SURVEY - FOR FX DRIVERS (FORM 5) FOR STUDY PURPOSE ONLY
ral	Sample ID No: Date (month/day)
èene Info	
9	
_	1-Male 2-Female 2-Female 2-Age 1)20-29 2)30-39 3)40-49
atior	3-Monthly Income (Pesos)
rma	1) None 4) 10,000 - 14,999 7) 30,000-39,999 10) 100,000-149,000
Info	2) Under 5,000 5) 15,000 - 19,999 8) 40,000-59,999 11) 150,000 and above
onal	3) 5,000-9,999 6) 20,000 - 29,999 9) 60,000-99,9999
erso	4-Trip Frequency 5-Currently, which expressway do you use?
ď	1) 1 to 2 4) 4 1) Coastal Expressway 3) I don't use expressway
	2) 3 5) 5 of more 2) SLEX 4) My fould is not served by expressival
ion	6- Trip OD
mat	Write the location of parking terminal?
nfor	(City/Municipality)
'ip I	Where is your end trip?
Ē	(City/Municipality)
	Hypothetical Question
	The government is planning to construct the Cavite-Laguna Expressway (CALA Expressway) to increase people's mobility and transport of goods. Like other expressways in the country, certain amount will be collected to use the expressway.
	If CALAX is built, will you use it for your travel?
	7 - From A to D [Ordinary road = 95 min] Time Saved is
	[CALA Expressway = 35 min] about 60 min!
	1) Yes → How much you are willing to pay?
	a) 60 b) 120 c) 200
	2) No, 1 Will take ordinary road = 30 min]
	[CALA Expressway = 15 min] Time Saved is about 15 min]
٨	1) Yes → How much you are willing to pay?
Pa	a) 20 b) 40 c) 60
ss to	2) No, I will take ordinary road
gnes	9 - From B to D [Ordinary road = 65 min]
illinę	1) Yes $\rightarrow$ How much you are willing to pay?
Ν	a) 40 b) 60 c) 100
	2) No, I will take ordinary road
	10 - From C to B [Ordinary road = 25 min]
	[CALA Expressway = 10 min] about 15 min!
	a) 20 b) 40 c) 60
	2) No, I will take ordinary road
	11 - From C to D [Ordinary road = 40 min]
	[CALA Expressway = 10 min] about 30 min!
	1) Yes → How much you are willing to pay?
	a) 20 b) 40 c) 100 2) No I will take ordinary road
	2/ NO, 1 Will take Ordinary Todu That's All Thank You Very Much for Your Cooperation

FIGURE 4.1.6-19 WILLINGNESS-TO-PAY QUESTIONNAIRE

# • Sample Distribution

The sample size per survey location is presented in Table 4.1.6-8.

Survey Station (Terminal)	Sample	Share (%)
Festival Mall (Alabang)	44	27.3%
Star Mall (Alabang)	36	22.4%
Metro Point (EDSA)	20	12.4%
Taft Ave.	20	12.4%
Baclaran	41	25.5%
Total	161	100.0%

TABLE 4.1.6-8 SAMPLE SIZE PER SURVEY LOCATION

# • Age Distribution

For age distribution of driver respondents, having the highest share are belong to age bracket of 30-39 (43.5%) and 40-49 (38.5%).





# • Monthly Income Distribution

For monthly income, 27% of the respondents have monthly income between 25,000 to 19,999 pesos. It is noted that there are substantial number of respondents whose income range from 5,000 to 14,999 pesos. Their total share is about 57%.



• Trip Frequency

For trip frequency, more than half of the respondents stated that they have 1 to 2 trips a day. Some drivers however managed to have 3 to 4 trips a day which might be due to short distance nature of their routes. (See **Figure 4.1.6-22**)



• Expressway in Use

**Table 4.1.6-9** shows that most of the captured respondents revealed that they are plying through South Luzon Expressway (SLEX) and followed by drivers using the Manila-Cavite Coastal Expressway. Likewise, 2.5% respondents stated that despite the presence of expressway in their route, they prefer not to use the expressway.

Expressway	Sample	Share (%)
Coastal Expressway	43	26.7%
SLEX	102	63.4%
I don't use expressway	4	2.5%
My route is not served by expressway	12	7.5%
Total	161	100.0%

## • Trip Origin – Destination (Trip Routes)

For routes served by these FX operators, half of the respondents are plying the Manila-Cabuyao (Laguna province). Next having the highest share are drivers serving the Manila-Dasmarinas (Cavite province) route. The remaining drivers served the Manila-Naic route (Cavite province), and Manila-Lemery (Batangas province). (See Figure 4.1.6-23)



Number of sample = 161

#### FIGURE 4.1.6-23 TRIP OD

#### • Willingness-to-pay and Amount willing to pay

The same procedure carried out with car user's interview survey was applied for FX operator's willingness-to-pay survey. The FX drivers were then given with the following scenarios:

Route Scenario	Time Save (min)	Use expressway or not?	If yes, how much willing to pay?
a. From A to D	60		
b. From B to A	15		
c. From B to D	45		
d. From C to B	15		
e. From C to D	30		

TABLE 4.1.6-10 ROUTE SCENARIOS AND AMOUNT OF WILLINGNESS-TO-PAY



**FIGURE 4.1.6-24 ROUTE SCENARIOS** 

The response of FX drivers is presented from Figure 4.1.6-25 to Figure 4.1.6-34. All 161 FX operators signified their intention to use the CALA expressway if this will be built in future. Pressed for their reasons for their willingness to use the tolled expressway, most of them believed that using expressway would increase their income by means of increased number of trips. It should be noted that currently, most of them are having just 1 to 2 trips a day.

Will they Use CALA Expressway for A to D travel? Time Save is about 60 minutes.



# WHO WILL USE AND NOT USE THE EXPRESSWAY



Will they Use CALAX Expressway for B to A travel? Time Save is about 15 minutes.



FIGURE 4.1.6-27 SHARE OF THOSE WHO WILL USE AND NOT USE THE **EXPRESSWAY** 

#### FIGURE 4.1.6-28 AMOUNT WILLING TO PAY

Will they Use CALAX Expressway for B to D travel? Time Save is about 45 minutes.



WHO WILL USE AND NOT USE

THE EXPRESSWAY

FIGURE 4.1.6-29 SHARE OF THOSE FIGURE 4.1.6-30 AMOUNT WILLING TO PAY

# • Will they Use CALAX Expressway for C to B? Time Save is about 15 minutes.



FIGURE 4.1.6-31 SHARE OF THOSE WHO WILL USE AND NOT USE THE EXPRESSWAY



• Will they Use CALAX Expressway for C to D travel? Time Save is about 30 minutes.



Number of sample = 161

FIGURE 4.1.6-33 SHARE OF THOSE WHO WILL USE AND NOT USE THE EXPRESSWAY *Number of sample = 161* 

# FIGURE 4.1.6-34 AMOUNT WILLING TO PAY

# 4.1.7 Willingness to Pay Survey for Use of CALAX (Bus Operators)

# a. How many buses you owned? (Q5)

The number of bus owned and used for operation by the ten (10) bus companies interviewed is presented in **Table 4.1.7-1**. The total number of bus used by theses ten (10) bus companies is 1,013 bus unit or an average of 101 buses per company. Taking into account the share of each type of bus, 60% are composed of two-seater air-conditioned bus and this followed by others (2x3 bus which means five seats in one row all together) with share of 28.7%. Ordinary busy has a share of 10.3% and mini-bus with merely 0.2%.

Bus Type	BC 1	BC 2	BC 3	BC 4	BC 5	BC 6	BC 7	BC 8	BC 9	BC 10	Total
Mini-bus								2			2
Ordinary bus			54			50					104
Air-conditioned bus (single-seater)											
Air-conditioned bus (two-seater)	200			150		120				146	616
Others (2x3)		86	12		38		20	35	100		291
Total	200	86	66	150	38	170	20	37	100	146	1,013

TABLE 4.1.7-1 NUMBER OF BUS OWNED BY BUS COMPANIES

*Note: BC* = *Bus Company* 

## b. Do you allow your two-seater bus drivers to use expressways? (Q7)

Most of the managers of bus companies interviewed revealed that they allowed their drivers to use expressway during their trip. Only 10% of interviewed managers said that they don't allow their drivers to use the expressway.



No. of sample = 10

# FIGURE 4.1.7-1 BUS MANAGERS RESPONSE IF THEY ALLOW OR NOT THEIR BUS DRIVERS TO USE AN EXPRESSWAY

#### c. Willingness-to-pay Survey Results (Part III)

- (A to D) Most of the respondents (80%) will not shift to expressway from A to D. Only 20% will allow their drivers to use the expressway. All of the interviewed managers that would allow their bus drivers to use expressway revealed that they are willing to pay 200 pesos.

- (B to A) The percentage of those willing to use the expressway rose to 30% for B to A section. This section covers Manila Dasmarinas. Preferred amount of toll fee they are willing to pay is 60 pesos.
- (B to D) This section generally covers Dasmarinas Tres Martires Silang area, the percentage of those willing to use expressway for fee is still 30%. All of them expressed their readiness to pay 60 pesos as toll fee.
- (C to B) This section covers Silang Dasmarinas and the number of willing to use the expressway is still 30%. The preferred toll fee amount of those who expressed their willingness to use the expressway is 60 pesos.
- (C to D) This section is from Silang area to SLEX and the number of willing to use the expressway increases to 40%. All of them expressed 80 pesos as preferred amount of toll fee.



EXPRESSWAY

By observing bus routes captured in the survey, it seems that one of the reasons why some bus operators are not inclined to use CALAX expressway is because it is not serving their routes (e.g. buses plying Manila – Laguna route and Manila – Batangas route are using SLEX). Another reason of their rejection of expressway use is they want to continue their practice of picking up/discharging passengers along the highways which they could not do so in an expressway. See **Table 4.1.7-2** for percentage share of willing to use the expressway and amount they are willing to pay.

The C to D section of CALAX serves the attractive route of Manila-Tagaytay by linking Aguinaldo Highway to SLEX thus bypassing congested portion of highway in Dasmarinas City, Imus Municipality, Bacoor City all the way to Quirino Avenue in Manila. Tagaytay is a top tourist attraction of the country and known for beautiful landscape and cooler climate but suffering from poor access provided by the Aguinaldo Highway. This might be the main reason of high number of bus operators willing to use expressway from C to D section even if toll fee is as high as 80 pesos (4 out of 10 bus operators).

Route	Time Save	Toll Fee							
Scenario	(min)	Amount (P)	Share	Amount (P)	Share	Amount (P)	Share		
A to D	60	200	100%	250	0%	300	0%		
B to A	15	60	100%	80	0%	100	0%		
B to D	45	60	100%	80	0%	100	0%		
C to B	15	60	100%	80	0%	100	0%		
C to D	30	80	100%	100	0%	150	0%		

TABLE 4.1.7-2 AMOUNT OF FEE THEY ARE WILLING TO PAY

# d. Perceived Benefits by Bus Managers from CALAX (Q14)

If the expressway is constructed in the future, managers of bus companies were asked if what kind of benefits that this new infrastructure can bring to their business. Most managers believed that the new expressway would increase the frequency of their buses (36.4), open up new market (36.4%), reduction of operation cost (18.2%). Some believed that it would help in reduction of accident (4.5%) as well it would somehow contribute to increase their income (4.5%). (See **Figure 4.1.7-4**)



No. of sample = 10

# FIGURE 4.1.7-4 PERCEIVED BENEFITS BY BUS OPERATORS FROM CALAX

*e. Problems Encountered by Bus Company in their daily operations. (Q15)* Interviewed operation managers of ten (10) bus companies reveal the following as the problems they encountered:

- Traffic congestion mentioned by the 10 bus managers as serious problem which affect their operations
- Problem with law enforcers this relates to corrupt practices of some personnel of the government agencies like MMDA, LTO, etc.
- Fuel price hike
- Traffic accidents

#### f. Comments and Suggestions to Improve Business Operation of Bus Industry. (Q16)

The following were the comments and suggestions expressed by the interviewed bus managers' which could help improve their operation.

- Improve road infrastructure by construction of more roads and widening of existing roads
- Improve traffic management system to improve traffic condition
- Reduce toll fee
- Give special discount for frequent expressway users
- Lower fuel cost

## 4.1.8 Willingness to Pay Survey for Use of CALAX (Truck Operators)

#### a. How many vehicles used for operation? (Q5)

The average number of trucks owned by each company is about 13 trucks. Likewise, average number of trucks rented by each company is about 3 trucks. In total, each company is utilizing 16 trucks for their operation.

For type of trucks used by these companies (owned), the dominant types are: 3-axle trucks (29%), 2-axle trucks, and other type of vehicles (e.g. vans, pick-up, canter). For trucks leased by these companies, more than half is composed of pick-up.



# b. Do you allow your drivers to use expressways? (Q6)

When the truck company managers were asked if they allow their drivers to use expressway in their trips, 74% revealed that they allow them. The remaining 26% said that they don't allow their bus drivers to use expressway. For the issue of toll fee, all interviewed managers said that their company is the one shouldering the toll fee.



# FIGURE 4.1.8-3 YES OR NO



# c. Willingness-to-pay Survey Results?

- (A to D) This section covers the entire section of CALA Expressway. The number of truck managers which would allow their drivers to use the expressway reaches 75%. All of the truck managers pointed out that the amount they are willing to pay is 200 pesos.
- (B to A) The share of willing to use expressway is still the same at 75%. Most of them are willing to pay 60 pesos (93%) while some are willing to pay 80 pesos (7%)
- (B to D) The number of willing to use the expressway is very high at 85%. Most of them are willing to pay 60 pesos (94%) and the remaining 6% is willing to pay as high as 100 pesos.
- (C to B) This section covers Silang Dasmarinas and the number of willing to use the expressway is 65%. All of them expressed their readiness to pay 60 pesos as toll fee.
- (C to D) This section is from Silang area to SLEX and the number of willing to use the expressway increases to 85%. Most of the truck managers (94%) revealed that they are willing to pay 80 pesos and the remaining 6% are willing to pay 100 pesos.





# FIGURE 4.1.8-6 WILLING TO USE CALA EXPRESSWAY

IADLL	4.1.8-1 AMO	UNI OF FE	E INEI	AKE WILL	ang r	U PAI
Route	Time Save			Toll Fe	e	
Scenario	(min)	A	Chara	A	Chasse	A

Route	Time Save	Toll Fee						
Scenario	(min)	Amount (P)	Share	Amount (P)	Share	Amount (P)	Share	
A to D	60	200	100%	250	0%	300	0%	
B to A	15	60	93%	80	7%	100	0%	
B to D	45	60	94%	80	0%	100	6%	
C to B	15	60	100%	80	0%	100	0%	
C to D	30	80	94%	100	6%	150	0%	

#### d. Benefits from Expressway? (Q14)

Truck managers were asked if what kind of benefits CALA Expressway can bring to their business. Most managers believed that it would help them to deliver their cargo on time (18.7%) and they can realize faster delivery of cargo (18.7%). They also expect reduction of operation cost (14.0%) as well as increase in frequency of trips (14%). Other expected benefits derived from the construction of expressway are: reduction of accident (12.1%), increase of income (12.1%) and minimize damage to cargoes (10.3%).


# FIGURE 4.1.8-7 PERCEIVED BENEFITS BY TRUCK OPERATORS FROM CALAX

# e. Problems Encountered in their operations? (Q15)

The common problems mentioned by the twenty (20) managers of trucking companies are:

- Heavy traffic congestion particularly access roads to ports and along R-10
- Truck ban
- Road repair
- Traffic accident mainly due to flat tire
- Harassment of MMDA/LTO personnel in a hope of receiving money
- Complains from customers due to delay of delivery
- High toll fees
- Robbery and hold-up particularly at Parola area of MICP (Manila International Container Port)
- Increase in transport operation (increase of gas, oil, salary for overtime, etc)

# f. Comments that could improve their business operations? (Q15)

The most following were comments made by the managers of trucking companies:

- Privatize traffic management to improve traffic flow
- Add lights along busy roads
- Proper planning of exit/entrance of trucks at MICT and South Harbor.
- Government should issue a policy to ask all municipalities to stop collecting annual fees to all truckers
- Extend x-ray time of loaded containers from 8pm to 6am instead of 8pm to 12 midnight at international port.
- Lower toll fee
- Improve road network to have more alternative routes
- Try to reduce traffic congestion
- Increase road widening
- Construction of more roads, enforcement of road regulations and laws, honest law enforcement personnel, improve road signage and its visibility to drivers and reasonable toll fees.
- Improve port facility

### 4.1.9 Willingness to Pay Survey for Use of CALAX (Manufacturing Companies)

#### a. Are you willing to shoulder the toll fee of Expressway?(Q7)

The eighteen (18) manufacturing companies interviewed revealed that they are willing to shoulder the toll fee if this can help their cargoes to arrive faster. (See **Figure 4.1.9-1**) This willingness fee by the company managers to pay expressway toll fee demonstrates their growing concern for delayed delivery of their cargoes which essentially affect their business operations.





# FIGURE 4.1.9-1 PERCENTAGE OF WILLING AND NOT WILLING TO SHOULDER TOLL FEE

# b. Benefits from CALAX (Q8)

For the benefits they are hoping to get after the construction of expressway, these are: faster delivery of cargoes (39%), increase access to source of materials (26%), transport cost reduction (20%) and minimize damage on their cargoes (15%).



FIGURE 4.1.9-2 PERCEIVED BENEFITS BY MANUFACTURING COMPANIES FROM CALAX

# c. Plans after construction of CALA Expressway (Q9)

The plans after the construction of CALA expressway revealed by interviewed officials of manufacturing companies are:

- We will meet with the forwarders to discuss the merit and demerit of using the new constructed expressway.
- We will meet with the forwarders/trucking companies regarding the possibility of additional cost/charges for the use of expressway.
- We are going to use the expressway in finding new market or find new client in Cavite area.
- We will instruct our drivers to take this expressway to avoid delay in deliveries.
- We will reduce our inventory stock level
- We will negotiate delivery cost with forwarders/trucking companies
- If travel time decrease because of the use of expressway, we will request supplier to decrease delivery charges on raw materials

# d. Problems Encountered by Manufacturing Companies (Q10)

The problems mentioned by the officials of manufacturing companies are:

- Delayed/late delivery due to traffic congestion even at expressways
- Road repair works affect delivery of our products and sometimes even our staff arrival to work were delayed.
- Abrupt increase of toll fee in the expressway
- Increase of price of raw material and fuel which causes increase of our production output
- Tight delivery schedule due to tight schedule of our production operation and urgency to produce the products ordered to us by the client.

# e. Comments by Manufacturing Companies (Q11)

The following were comments made by officials of manufacturing companies:

- Improve traffic enforcement along ordinary and national roads
- This expressway project will help all the investors since it will improve the delivery of cargoes on time and would provide easy access to our material suppliers.
- We will support construction of new expressway.
- It would be better if road construction/repair will be done during night time, and make it sure that the workers will not leave the "repaired portion" in unsafe condition.
- Possibly improve and/or expand fiscal incentives to export oriented companies.

# f. Summary of Transportation Routes of Manufacturing Companies

Out of eighteen (18) manufacturing companies interviewed in Cavite province (10 Japanese affiliated-companies and 8 partly foreign-owned companies), thirteen (13) companies are located in an area where they can be served by CALA expressway (the other five answered "not use CALA Expressway" because they are located along the coastal towns of Cavite and some are located close enough to SLEX). All these 13 companies expressed their readiness to utilize the CALAX if it is constructed in future. On the other hand, two companies close to SLEX will continue to use this expressway while the three companies in coastal towns of Cavite will continue to use local roads and Manila-Cavite expressway. Below is the discussion on each company that will utilize CALAX. See **Figure 4.1.9-3** for the summary of

their transportation routes.

## 1. Manufacturing Company A (Japanese Company)

Location: Dasmarinas, CaviteProducts: Producers of aluminum extrusion and hardware for Al & PVC Frames

- Raw materials (aluminum frames and plastic injection parts) come from foreign countries. These materials are unloaded via ports in Manila.
- From ports in Manila, these will be brought to the factory in Dasmarinas via SLEX then Governor's Drive.
- Transportation time from ports in Manila to factory is around 4 to 5 hours.
- Production outputs (extrusion and hardware) are then sent abroad via ports of Manila.
- Transportation time from factory to Manila ports in Manila is about 4 to 5 hours.
- If CLLEX is constructed, the company is planning to use it to avoid heavy traffic congestion along Governor's Drive and to reduce transportation time.

# 2. Manufacturing Company B (Japanese Company)

Location: General Trias, Cavite

Products: Producers of Connector Parts, Plastic Molding Parts, LED, Tool Parts, Lead frames

- The company is delivering their outputs in Paranaque, Rosario (Cavite), Binan (Cavite), and Lipa (Bantangas).
- From factory (Gen. Trias) to Paranaque, route is Aguinaldo Highway which is very congested and it takes them about two (2) hours to reach destination. If CALAX is constructed in the future, they intend to use the expressway to achieve fast delivery.
- From factory (Gen. Trias) to Binan (Laguna), they are using the Governor's Drive road until they reached Binan. *If CALAX is constructed in the future, they intend to use the expressway to achieve fast delivery.*
- From factory (Gen. Trias) to Lipa, route is Governor's Drive, then follow the SLEX until Lipa City. If CALAX is constructed in the future, they intend to use the expressway instead of Governor's Drive to achieve fast delivery.

# 3. Manufacturing Company C (Japanese Company)

Location: Dasmarinas, Cavite

- Products: Producers of Fabricated Structures, Fabricated Transtainer Crane, Fabricated Engine Room Facility, Fabricated Wind Mill
- Steel materials are brought from different parts of Metro Manila to their factory in Dasmarinas, Cavite.
- They use SLEX and then take Governor's Drive until reaching the factory in Dasmarinas. It usually takes them three (3) hours.
- Finished products are brought back to different parts of Metro Manila using Governor's Drive and SLEX.
- If CALAX is constructed in the future, they intend to use the expressway in getting raw materials and delivering finished products to achieve fast delivery.

# 4. Manufacturing Company D (Japanese Company)

Location:	Rosario, Cavite
Products:	Producers of plastic parts for car audio, automotive, weighing scale and Plastic
	protectors for wire harness

- Raw materials come from Binan (Laguna), Cabuyao (Laguna), and Velenzuela (Metro Manila). Currently, they are using C5 and Cavite Coastal Road to get supplies from Velenzuela. For supplies from Binan and Cabuyao, they are using Governor's Drive until they reached Rosario.
- If CALAX is constructed in the future, they intend to use the expressway instead of heavy congested Governor's Drive to achieve fast delivery.

# 5. Manufacturing Company E (Japanese Company)

Location: Dasmarinas, Cavite

Products: Producers of various plastic parts for car accessories; panel meter, visor upper, remote controls

- Some materials use for different products like paint are bought from Metro Manila and brought to the factory via SLEX and Governor's Drive. Transportation time is about three (3) hours.
- Finished products are then brought to Sta. Rosa (Laguna) via Governor's Drive and SLEX. Transportation time is about one (1) hour and thirty (30) minutes.
- If CALAX is constructed in the future, they intend to use the expressway instead of Governor's Drive to achieve fast delivery.

# 6. Manufacturing Company F (Japanese Company)

Location: Dasmarinas, Cavite Products: Producers of Evaporator & Parts, Aluminum & copper ribes

- Raw materials (aluminum) come from foreign countries via ports of Manila. Raw materials are brought from Manila to factory in Dasmarinas via SLEX and Governor's Drive and it takes 2 to 3 hours to transport the materials.
- Finished products (evaporator) are brought back to port via the same route while other is brought to a factory located in Rizal Province.
- If CALAX is constructed in the future, they intend to use the expressway to avoid Governor's Drive which is heavily congested.

# 7. Manufacturing Company G (Japanese Company)

Location: Dasmarinas, Cavite Products: Producers of fuel pump parts, tank covers, gear blanks, pipes

- Pipes come from foreign countries via ports of Manila. From port, this is transported to the factory in Dasmarinas via Aguinaldo Highway which takes almost three (3) hours.
- Finished products are then transported to factory houses for final packaging located in Sto. Tomas (Batangas), Calamba (Laguna), and Carmona Cavite.
- If CALAX is constructed in the future, they intend to use the expressway to avoid Governor's Drive which is heavily congested.

# 8. Manufacturing Company H (Japanese Company)

Location: Dasmarinas, Cavite Products: Producers of Halogen Lamps, Xenon Lamps, UV Lamps

- Raw materials arrived at NAIA and MICP. These will be brought to company factory in Dasmarinas via SLEX and Governor's Drive which would take them about two (2) hours.
- Finished products (Halogen lamps and Xenon lamps) are then sent back for export via NAIA and MICP using the same route.
- If CALAX is constructed in the future, they intend to use the expressway to realize shortest route and to avoid Governor's Drive which is heavily congested.

#### 9. Manufacturing Company I (Foreign-Owned Company)

Location: Rosario, Cavite Products: Producers of S/S Fittings, S/S Flanges, S/S Pipes, S/S Carbon

- Raw materials arrived at Manila port are transported to the factory via regular route (Osmena Highway Cavite Coastal Road).
- Finished products are then ship-out of the country via Manila port and using the same transportation route.
- Their route does not require the use of CALAX however they intend to use NAIAX and NLEX-SLEX connector if constructed in the future. These two expressways are useful to their route from Manila port to factory in Rosario.

## 10. Manufacturing Company J (Foreign-Owned Company)

Location: Dasmarinas, CaviteProducts: Producers of air pumps and parts, electric magnet

- Raw materials come from Binan (Laguna) and Sto. Tomas (Batangas). Route is via SLEX and Governor's Drive.
- Finished products are ship-out abroad for export via Manila port. Route is Governor's Drive then SLEX until they reach Manila port.
- If CALAX is constructed, this company is planning to use this expressway in getting their raw materials from Sto. Tomas (Batangas) and in bringing their finished products to Manila port.

# 11. Manufacturing Company K (Foreign-Owned Company)

Location: Rosario, Cavite Products: Producers of Wires and Cables

- Raw materials come from foreign countries. These materials are unloaded via ports in Manila.
- From ports in Manila, these will be brought to the factory in Dasmarinas via Cavite Coastal Road.
- Finished products are brought to Sta. Rosa via Governor's Drive and transportation time is around two (2) hours.
- If CALAX is constructed, they intend to use the expressway in bringing their finished products to Sta. Rosa (Laguna).

# 12. Manufacturing Company L (Foreign-Owned Company)

Location: Dasmarinas, Cavite Products: Producers of assorted industrial fasteners

- Raw materials come Rosario (Cavite) and transported to factory in Dasmarinas via ordinary road which takes them about three (3) hours. Finished products are brought to three (3) locations: Lipa (Batangas), Sta. Rosa (Cavite) and Rosario (Cavite).
- If CALAX is constructed, they will utilize it especially in transporting their finished products to avoid delay.

# 13. Manufacturing Company M (Foreign-Owned Company)

Location: General Trias, Cavite Products: Producers of automobile parts

- Raw materials come from Sta. Rosa (Cavite) and brought to the factory in Gen. Trias via SLEX and Governor's Drive. Transportation time is about one (1) hour.
- Finished products are sent back to Sta. Rosa via the same route.
- If CALAX is constructed, they will utilize it in getting their supply from Sta. Rosa and in bringing back their finished products to Sta. Rosa.



FIGURE 4.1.9-3 ROUTES PATTERN OF MANUFACTURING INDUSTRY IN CALAX

# 4.2 FUTURE TRAFFIC DEMAND

# 4.2.1 Approach

To estimate the traffic volumes on CALAX, traffic demand forecast was conducted. **Figure 4.2.1-1** shows the traffic forecast procedure.

# (1) Present Traffic Assignment

Based on year 2009 OD tables prepared by the Study of Master Plan on High Standard Highway Network Development (herein HSH Study), present OD table was updated as year 2011. Traffic assignment was conducted using the updated present OD table and present

network then validation was conducted the traffic count data and assigned traffic volume on each link.

## (2) Future Traffic Assignment

After validation of present OD table, future traffic demand was forecasted. Future traffic assignment was conducted using future OD table and future road network (with CALAX case and without CALAX case) considering toll fare conversion to time.



FIGURE 4.2.1-1 FORECAST OF TRAFFIC VOLUMES ON ROAD NETWORK

In this Study, the zoning system comprised of Region IV-A (Cavite, Laguna, Rizal, Batangas, etc.), NCR (Metro Manila). The zoning system is modified as divided zoning in the Study Area (Cavite and Laguna Provinces) using that of the HSH Study. The total zoning number is 206 zones,

# presented in Figure 4.2.1-2 to -4 and Table 4.2.1-1(1) to (3).

1         Cory of Math. 1 - Barray 20         2           2         Cory of Math. 3 - Barray 20         2           3         Cory of Math. 3 - Barray 20         2           3         Cory of Math. 3 - Barray 20         2           4         Cory of Math. 3 - Barray 20         2           5         Cory of Math. 5 - Barray 40         1           6         Cory of Math. 5 - Barray 40         1           7         Cory of Math. 5 - Barray 40         1           9         Cory of Math. 1 - Barray 50         1           1         Cory of Math. 1 - Barray 50         1           1         Cory of Math. 1 - Barray 50         1           1         Cory of Math. 1 - Barray 50         1           2         David Cin. 2 - Barray 50         1           3         Particle Cory of Math. 9 - Barray 50         1           4         Ory of Math. 9 - Barray 60         1         1           2         Particle Cory - Barray 60         1         1           3         Particle Cory - Barray 60         1         1           4         Math. 1 - Barray 60         1         1           5         Particle Cory - Barray 60         1         1 <td< th=""><th>Small Zone</th><th>Barangay</th><th>Medium Zone</th><th>City/Municipality</th><th>Large Zone</th><th>Province</th><th>Region</th></td<>	Small Zone	Barangay	Medium Zone	City/Municipality	Large Zone	Province	Region
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1	City of Manila 1 - Barangay 20					
3         Cuy of Math. 3- Resurges 375           4         Cuy of Math. 2- Sing 376           5         Chy of Math. 2- Sing 376           5         Chy of Math. 2- Sing 376           7         Chy of Math. 2- Sing 376           8         Chy of Math. 2- Sing 376           9         Chy of Math. 3- Sing 376           9         Chy of Chy of Sing 3676           9         C	2	City of Manila 2 - Barangay 105					
$ \frac{1}{3} = (c_{2} c_{2} d_{2} d_{3} + c_{3} $	3	City of Manila 3 - Barangay 375					
$ \frac{3}{3} = (0 \text{ yr } M \text{ and } 5 - 6 \text{ wave } 0 \text{ wave } 10 \text{ wave } 1 \text{ wave } 10  wa$	4	City of Manila 4 - Barangay 48					
1         Ciry d Maih 9         Gray d Maih 10         Gray	5	City of Manila 5 - San Nicolas					
str. of Vard Maih 9 - Barange 21	7	City of Manila 6 - Billondo					
9         City of Maniki DSam Magel         1         City of Maniki DSam Magel         1           10         City of Maniki DSam Magel         1         City of Maniki         1           11         City of Maniki DSam Magel         1         City of Maniki         1           11         City of Maniki DSam Magel         1         City of Maniki         1           12         City of Maniki DSam Magel         1         City of Maniki         1           13         City of Maniki DSam Magel         1         City of Maniki DSam Magel         1           14         City of Maniki DSam Magel         1         2         Pasy City DSam Magel         2           14         City of Maniki DSam Magel         2         Pasy City DSam Magel         2         Pasy City DSam Magel         3           15         City of Maniki DSam Magel         2         Pasy City DSam Magel         3         Parabagel City         3           16         City of Makel City DSam Magel         3         Parabagel City         4         Makel City           16         Databage City DSam Magel         4         Makel City         4         Makel City           17         Makel City DSam Magel         4         Makel City	8	City of Manila 8 - Quiapo					
0         Cry of Mails         1         Cry of Mails           11         Cry of Mails         1         Cry of Mails           12         Cry of Mails         1         Cry of Mails           13         Cry of Mails         1         Cry of Mails           14         Cry of Mails         1         Cry of Mails           15         Cry of Mails         1         Cry of Mails           16         Cry of Mails         1         Cry of Mails           17         Cry of Mails         1         State           18         Cry of Mails         1         State           19         Pray (Cry 1         Brancing Cry 1         Brancing Cry 1         Brancing Cry 1           20         Pray (Cry 1         Brancing Cry 1         Brancing Cry 1         Brancing Cry 1           21         Pray (Cry 1         Brancing Cry 1         Brancing Cry 1         Brancing Cry 1           23         Prancing Cry 1         Brancing Cry 1         Brancing Cry 1         Brancing Cry 1           23         Prancing Cry 1         Brancing Cry 1         Brancing Cry 1         Brancing Cry 1           24         Makar Cry 1         Makar Cry 1         Makar Cry 1         Brancin 1           <	9	City of Manila 9 - Barangay 413					
11         City of Main 1: Brangey 570           12         City of Main 1: Proton           13         City of Main 1: Proton           14         City of Main 1: Proton           15         City of Main 1: Proton           16         City of Main 1: Proton           16         City of Main 1: Proton           16         City of Main 1: Proton           17         City of Main 1: Proton           18         City of Main 1: Proton           19         City of Main 1: Proton           10         City of Main 1: Proton           11         City of Main 1: Proton           12         Pase City 1: Proton           13         Pase City 1: Proton           14         Paraloge City 1: Main 1: Proton           15         Paraloge City 1: Main 1: Proton           16         Paraloge City 1: Main 1: Proton           17         Main City 7: Proton           18         Paraloge City 1: Main 1: Proton           19         Paraloge City 1: Main 1: Proton           10         Paraloge City 1: Main 1: Proton           11         Main City 7: Proton           12         Main City 7: Proton           13         Paraloge City 1: Proton           14<	10	City of Manila 10 - San Miguel	1	City of Manila			
12       City of Maila 12-Branzay 40         13       City of Maila 12-Branzay 40         14       City of Maila 12-Branzay 40         15       City of Maila 12-Branzay 40         16       City of Maila 12-Branzay 40         16       City of Maila 12-Branzay 40         17       City of Maila 12-Branzay 40         18       City of Maila 12-Branzay 40         21       Deas City 1-Branzay 40         22       Passy City 1-Branzay 40         23       Paratoge City 1-Branzay 40         24       Pass City 1-Branzay 40         25       Pass City 1-Branzay 40         26       Paratoge City 1-Branzay 40         27       Pass City 1-Branzay 40         28       Paratoge City 1-Branzay 40         39       Paratoge City 1-Branzay 40         40       Paratoge City 1-Branzay 40         51       Paratoge City 1-Branzay 40         62       Paratoge City 1-Branzay 40         70       Matala City 1-Branzay 40         71       Paratoge City 1-Branzay 40         72       Matala City 1-Branzay 40         73       Paratoge City 1-Branzay 40         74       Paratoge City 1-Branzay 40         75       Tapigi	11	City of Manila 11 - Barangay 570					
13         Civer Main 1: Jona Acces           14         Civer Main 1: Jona Acces           16         Civer Main 1: Jona Acces           17         Civer Main 1: Jona Acces           18         Civer Main 1: Jona Acces           19         Civer Main 1: Jona Acces           10         Civer Main 1: Jona Acces           18         Civer Main 1: Jona Acces           20         Pass Ch 1: Buinney 1: Jona Acces           21         Pass Ch 1: Buinney 1: Jona Acces           22         Passy Ch 1: Buinney 1: Jona Base           23         Pass Ch 1: Buinney 1: Jona Base           24         Pass Ch 1: Buinney 1: Jona Base           25         Parintige Civer J: Jona Base           26         Parintige Civer J: Jona Base           27         Maint Civer J: Jona Base           28         Parintige Civer J: Jona Base           29         Parintige Civer J: Jona Base           20         Parintige Civer J: Jona Base           21         Maint Civer Acces           22         Parintige Civer J: Jona Base           23         Jana Hale J: Jona Base           24         Maint Civer Acces           25         Maint Civer Acces           26         Maint Civer Acces <td>12</td> <td>City of Manila 12 - Barangay 450</td> <td></td> <td></td> <td></td> <td></td> <td></td>	12	City of Manila 12 - Barangay 450					
1         City of Manik 1: Filoson, Printing           2         City of Manik 1: Filoson, Printing           3         City of Manik 1: Filoson, Printing           3         City of Manik 1: Filoson, Printing           3         Prainsgoe City 1: Banago, Printing           4         Prainsgoe City 1: Banago, Printing           4         Matain City 1: Banago, Printing           5         Taminggoe City 1: Banago, Printing           6         Prainsgoe City 1: Banago, Printing           7         Matain City 1: Banago, Printing           8         Banago, Printing           9         Matain City 1: Banago, Printing	13	City of Manila 13 - Port Area					
is         Cryst Wanii, is - Sun Ann.           is         Cryst Manii, 19. Fondana.           is         Paratogo Cryst. Isanago. 70.           is <td>14</td> <td>City of Manila 14 - Intranturos, Erinita</td> <td></td> <td></td> <td></td> <td></td> <td></td>	14	City of Manila 14 - Intranturos, Erinita					
17         Cry of Muchi B. Sum Ann	15	City of Manila 16 - Malate					
18         Cy of Munik 19. Faudation           30         Pasy City 1. Brangy 64           31         Pasy City 1. Brangy 64           22         Pasy City 1. Brangy 64           23         Pasy City 1. Brangy 64           24         Pasy City 1. Brangy 64           25         Pasy City 1. Brangy 76           26         Pasy City 1. Brangy 76           27         Pasy City 1. Brangy 76           28         Paratage City 1. Dan Broom           29         Past City 2. Brangy 76           20         Paratage City 1. Brangy 76           21         Paratage City 1. Brangy 76           22         Paratage City 1. Brangy 76           23         Paratage City 1. Brangy 76           24         Paratage City 1. Brangy 76           25         Paratage City 1. Brangy 76           26         Paratage City 1. Brangy 76           27         Malati City 7. Magines:           28         Malati City 7. Stange 100           31         Malati City 7. Stange 100           32         Stan Dranio           33         Malati City 7. Stange 100           34         Malati City 7. Stange 100           35         Tappig           36         Malati	17	City of Manila 17 - Santa Ana					
19         Cry of Manh 19 - Parkacan           21         Pauxy Cry - 1 Samago 162           21         Pauxy Cry - 1 Samago 173           22         Pauxy Cry - 1 Samago 173           23         Pauxy Cry - 1 Samago 173           24         Pauxy Cry - 1 Samago 173           25         Pauxy Cry - 1 Samago 174           26         Pauxy Cry - 1 Samago 174           27         Pauxy Cry - 1 Samago 174           28         Pauxy Cry - 1 Samago 174           29         Pauxy Cry - 1 Samago 174           20         Pauxy Cry - 1 Samago 174           21         Malatic Cry - 1 Samago 174           22         Pauxy Cry - 1 Samago 174           23         Malatic Cry - 1 Samago 174           24         Malatic Cry - 1 Samago 174           25         Samago 174           26         Pauxy Cry - 1 Samago 174           27         Samago 174           28         Malatic Cry - 1 Samago 174           29         Pauxy Cry - 1 Samago 174           29         Pauxy Cry - 1 Samago 174           20         Malatic Cry - 1 Samago 174           21         Malatic Cry - 1 Samago 174           23         Samago 174           24         Malatic	18	City of Manila 18 - Barangay 601					
33         Pasy City 1: Brange 46         2           21         Pasy City 1: Brange 46         2           22         Pasy City 1: Brange 46         2           23         Pasy City 1: Brange 46         2           24         Pasy City 1: Brange 46         2           25         Paralage City 1: Base 40         3           26         Paralage City 1: Base 40         3           27         Paralage City 1: Base 40         3           28         Paralage City 1: Base 40         3           29         Paralage City 1: Base 40         3           20         Paralage City 1: Base 40         4           30         Paralage City 1: Base 40         4           31         Matai City 1: Paralage City 1: Base 40         4           32         Matai City 1: Paralage City 1: Paral	19	City of Manila 19 - Pandacan					
1         Fuscy Chy 2 - Brainago 133         2         Pauty Cky           2         Pauty Cky         Pauty Cky         Pauty Cky           3         Pauty Cky         Pauty Cky         Pauty Cky	20	Pasay City 1 - Barangay 46					
2         Factor City 4: Branger 1:         2         Factor City 4: Branger 2:           23         Paratinger City 1: Dan Busse         3         Factor 2:           23         Paratinger City 1: Dan Busse         3         Paratinger City 2: Surv Male, Cine Wilage           34         Paratinger City 1: Dan Busse         3         Paratinger City 2: Surv Male, Cine Wilage           35         Paratinger City 1: Bangel 1: Medica City 4: Bit Reserves         3         Paratinger City 1: Bangel 1: Medica City 4: Bit Reserves           36         Malati City 2: Data         3         Malati City 2: Data         3           37         Malati City 1: Bangel 1: Medica Bit Reserves         4         Malati City 1: Bangel 1: Medica Bit Reserves           38         Malati City 1: Angelines         9         4         Malati City 1: Bangel 1: Medica Bit Reserves           39         Malati City 2: Open Bit Restan         5         Tagging         1         Malati City 2: Diver Bit Restan           31         Malati City 2: Open Bit Restan         5         Tagging         1         Malati City 2: Diver Bit Restan           33         Tagging 1: Wester Restan         5         Tagging         1         Malati City 2: Diver Bit Restan           34         Tagging 1: Wester Restan         5         Tagging 2: Plantickinger City 1	21	Pasay City 2 - Barangay 132 Pasay City 2 - Parangay 182	2	Pasay City			
9         Pausy Cry 5 - Bandmay 76           23         Paudinge Cry 1 - Da Boso 6           34         Paudinge Cry 2 - Survey Maky, San Murits De Perret           36         Paudinge Cry 2 - Survey Maky, San Murits De Perret           37         Paudinge Cry 3 - San Ixáon           38         Paudinge Cry 4 - San Ixáon           39         Paudinge Cry 5 - San Ixáon           30         Paudinge Cry 5 - San Ixáon           31         Paudinge Cry 5 - San Ixáon           32         Malati Cry 1 - Banghal, San Lorezno           31         Malati Cry 6 - Band Perrot           31         Malati Cry 7 - Manghales           32         Malati Cry 7 - Banghal, San Lorezno           33         Malati Cry 7 - Banghal, San Lorezno           34         Malati Cry 7 - Banghal, San Lorezno           35         Mandahyong Cry 1 - Vakoixon           36         Mandahyong Cry 2 - Naraki Kai Carenda           37         Mandahyong Cry 1 - Vakoixon           38         Mandahyong Cry 1 - Vakoixon           39         Mandahyong Cry 1 - Vakoixon           30         Mandahyong Cry 1 - Vakoixon           31         Malati Cry 1 - Banghan Manay           32         Mandahyong Cry 1 - Vakoixon           33	22	Pasay City 4 - Barangay 1	. 2	i asay Cuy			
23         Paralage Co. 1: Don Boso           23         Paralage Co. 2: San Valkey, San Marin De Porrer           34         Paralage Co. 2: San Valkey, San Marin De Porrer           35         Paralage Co. 2: San Valkey, San Marin De Porrer           36         Paralage Co. 2: San Valkey, San Marin De Porrer           36         Paralage Co. 2: San Valkey, San Marin De Porrer           37         Malati Co. 2: San Valkey, San Marin De Porrer           38         Malati Co. 2: San Valkey, San Marin De Porrer           39         Paralage Co. 4: San Drainke           30         Malati Co. 2: Comptone Co. San Drainke           31         Malati Co. 2: Comptone Co. 4: San Drainke           32         Malati Co. 7: Magalines           33         Tagging           34         Malati Cor, 7: Magalines           35         Maradaloyeng Cor 1: Orazina Co. 4: San Drainke           36         Mandaloyeng Cor 2: Physics           37         Mandaloyeng Cor 2: Physics           38         Tagging           37         Mandaloyeng Cor 2: Physics           38         Maradaloyeng Cor 2: Physics           39         Maradaloyeng Cor 2: Physics           39         Maradaloyeng Cor 2: Physics           39         Physic (Cr) 1: Sannat Naraoy	82	Pasay City 5 - Barangay 76					
25         Paranage Cry 2: Sustain         3           84         Paranage Cry 2: Sustain         3           86         Paranage Cry 2: Sustain         3           86         Paranage Cry 2: Sustain         3           92         Paranage Cry 2: Sustain         3           92         Paranage Cry 2: Sustain         3           92         Paranage Cry 2: Sustain         3           93         Paranage Cry 2: Sustain         3           94         Malani Cry 1: Fungkal Sus Lorenco         3           93         Malani Cry 2: Fulsman         4           93         Malani Cry 3: Guadage Vie Do         3           93         Malani Cry 4: Guadage Vie Do         4           94         Malani Cry 3: Fulswith         5           93         Malani Cry 4: Guadage Vie Do         5           93         Mandalitycog Cr 4: Purakinge Lover Rivitan         5           94         Mandalitycog Cry 3: Marway         6           93         Mandalitycog Cry 4: Purakyan         6           94         Mandalitycog Cry 4: Purakyan         7           95         Mandalitycog Cry 4: Purakyan         7           96         San Juan         San Juan	23	Parañaque City 1 - Don Bosco			1		
84.         Paningue Chy 2.         Sam Valey, Sam Marin De Paret         3         Paningue Chy 4.         3           85.         Paningue Chy 4.         Bernauge Chy 4.         Bernauge Chy 4.         Bernauge Chy 4.         Bernauge Chy 6.         Sam Marin Chy 7.           86.         Paningue Chy 7.         Sam Locan         Paningue Chy 7.         Sam Marin Chy 7.         Paningue Chy 7.         Paningue Chy 7.         Sam Marin Chy 7.         Paningue Chy 7. </td <td>25</td> <td>Paranaque City 2 - Baclaran</td> <td></td> <td> </td> <td> </td> <td></td> <td></td>	25	Paranaque City 2 - Baclaran					
88         Parnage Cry - March Green Vilge         3         Parnage Cry           86         Parnage Cry - San Iskto         3         Parnage Cry           97         Parnage Cry - San Iskto         4           87         Parnage Cry - San Iskto         4           88         Matan Cry - Fanglad. San Leeron         7           98         San Taging 2 - Upper Bostan         5         Taging           98         Taging 2 - Upper Bostan         5         Taging         1           98         Matalyong Cry - V. Septement         5         Taging         1           98         Matalyong Cry - V. Septement         5         Taging         1           99         Matalyong Cry - V. Septement         5         Taging         1           91         Matalyong Cry - V. Septement         5         Taging         1           92         Matalyong Cry - V. Septement         5         Taging         1           93         Matalyong Cry - V. Septement         5         San Juan         5	84	Parañaque City 2 - Sun Valley, San Martin De Porres	_				
80.         prantagic Cyt - 8. ht lotters           92.         Prantagic Cyt - 8. ht lotters           93.         Prantagic Cyt - 8. ht lotters           94.         Prantagic Cyt - 8. ht lotters           95.         Madai Coy - 1. htught Latters           97.         Madai Coy - 1. htught Latters           98.         Madai Coy - 1. htught Latters           99.         Madai Coy - 1. htught Latters           91.         Madai Coy - 1. htught Latters           92.         Madai Coy - 1. htught Latters           93.         Madai Coy - 1. htught Latters           94.         Madai Coy - 1. htught Latters           95.         Madai Norg Coy - 1. Pachesian           96.         Mandahyong Chy - Pachesian           97.         Mandahyong Chy - Pachesian           98.         Paters           99.         Mandahyong Chy - Pachesian           90.         Mandahyong Chy - Pachesian           91.         Mandahyong Chy - Pachesian           92.         Mandahyong Chy - Pachesian           93.         Madai Chy - Jack wack Cerealish           94.         San Jaan           94.         Madai Chy - Jack wack Cerealish           94.         Macachyong Chy - Pachesian	85	Parañaque City 3 - Marcelo Green Village	3	Parañaque City			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	86	Parañaque City 5 - San Isidro					
23         Malaur Cry 1. Burghal San Lorenzo           23         Malaur Cry 2. Johnnyn           24         Malaur Cry 4. Condwige Vrigo           25         Malaur Cry 4. Condwige Vrigo           26         Malaur Cry 4. Condwige Vrigo           27         Malaur Cry 4. Condwige Vrigo           28         Malaur Cry 5. Bei Ar           20         Malaur Cry 5. Bei Ar           21         Malaur Cry 5. Bei Ar           22         Stata An           23         Stata An           24         Malaur Cry 7. Magalance           25         Stata An           26         San Juan           27         Malaurong Cry 4. Panoka Macon Cry 4. Panoka Wack Corenhilk           28         Manduryong Cry 4. Panoka Wack Corenhilk           29         Manduryong Cry 4. Panoka Wack Corenhilk           30         Pasig Cry 1. Pothecon           31         Tagain           32         San Juan           33         Pasig Cry 1. Pothecon           34         Out Pasig Cry 2. Santolau         7           37         Maska Cry 4. Panoghutan         6           38         Pasig Cry 2. Santolau         7           30         Pasis Cry 2. Santolau         <	92	Parañaque City 6 - San Dionisio					
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	26	Makati City 1 - Bangkal, San Lorenzo					
28         Makati Cip 4 - Canadong Weipo         4         Makati Cip 5 - Bel Ar         1           30         Makati Cip 4 - Sanadhage Weipo         -         -         -         -           31         Makati Cip 4 - Sanadhage Weipo         -	27	Makati City 2 - Palanan					
29.     Makati City - Cauchinge Viep     4     Makati City - Cauchinge Viep       30.     Makati City - S. Rual, Pennho     4     Makati City - S. Rual, Pennho       31.     Makati City - S. Rual, Pennho     7       32.     Sunta Ana     7       33.     Taguig 2 - Upper Bixutan     5       35.     Mandathyong City 1 - Pethicinu     6       36.     Mandathyong City 2 - Phirrishv     7       37.     Mandathyong City 2 - Phirrishv     6       38.     Pasity City 1 - Restore Phirrishv     5       39.     Mandathyong City 2 - Phirrishv     6       40.     San Juan 1 - West Cranze     San Juan       41.     San Juan 1 - West Cranze     San Juan       42.     Quezon City 1 - Pasity City 1 - Sannohan     7       70.     Pasity City 1 - Sannohan     7       71.     Pasity City 2 - Sannohan     7       72.     Quezon City 1 - Bayang City 1 - Mantatih     7       43.     Quezon City 1 - Bayang Cithonan     7       44.     Quezon City 1 - Sanna Cithonan     7       70.     Pasity City 1 - Sanna Cithonan     7       80.     Quezon City 1 - Canzen     8       41.     Quezon City 1 - Canzen     8       42.     Quezon City 1 - Canzen City 1 - Canzen     <	28	Makati City 3 - Olympia					
30       Mklati Cry 5. Bel Ar         31       Mklati Cry 6. F. Rizq Perubo         34       Mklati Cry 6. T. Magilanes         32       Stafa An         33       Taggig 1. Wigstern Bixtan         34       Mklati Cry 7. Magilanes         35       Taggig 2. Utyper Bixtan         36       Taggig 2. Utyper Bixtan         36       Makalayong Cry 2. Polinview         37       Markalayong Cry 2. Polinview         38       Makalayong Cry 2. Polinview         39       Markalayong Cry 2. Polinview         31       Mketo Manila         40       San Juan 1. West Crome         41       San Juan 1. West Crome         42       Operan Cry 1. Stanton         78       Pasig Cry 2. Santo Domingo (Matalabi)         44       Operan Cry 1. Stanton Domingo (Matalabi)         45       Operan Cry 1. Stanton Domingo (Matalabi)         46       Operan Cry 4. Bayong Pagasa         47       Operan Cry 5. Finada         48       Operan Cry 5. Finada         49       Operan Cry 6. Palaba, Di Mone         40       Operan Cry 6. Palaba, Di Mone         41       Operan Cry 6. Palaba, Di Mone         42       Operan Cry 1. Stantong Gran     <	29	Makati City 4 - Guadalupe Viejo	4	Makati City			
34       Mikath City - Hang Incense         33       Taging 1- Western Rivetan       5         33       Taging 2- Upper Bextuan       5         34       Mikath City - Hang Interest       5         38       Taging 2- Upper Bextuan       5         38       Taging 2- Upper Bextuan       5         36       Markahyong Cry 1- Poblecion       6         36       Markahyong Cry 2- Divinéw       6         37       Markahyong Cry 1- Wesk-wark Greenhik       6         40       San Juan 1- West Crane       6         38       Pasig Cry 1- Stanth Damayang Lagin       7         39       Markahyong Cry 1- Wesk-wark Greenhik       6         41       San Juan 1- West Crane       7         79       Pasig Cry 2- Santolan       7         70       Pasig Cry 2- Santolan       7         71       Pasig Cry 2- Santolan       7         72       Pasig Cry 2- Santolan       7         74       Quezon Cry 1- Fashen Damayang Lagin       7         43       Quezon Cry 1- Sangandan       8         44       Quezon Cry 10- Kanisa Cast Weski       8         50       Quezon Cry 10- Kanisa Cast Weski       9         51	30	Makati City 5 - Bel-Air					
22     Sinita Ana     Pateros       33     Tagúig 1- Westorn Bixtana     5     Tagúig       34     Taguig 2- Unper Bouna     5     Taguig       35     Mandahyong Ciy 2- Painricew     7       37     Mandahyong Ciy 2- Painricew     6       38     Taguig (Ty 2- Painricew     6       39     Mandahyong Ciy 2- Painricew     6       30     Mandahyong Ciy 2- Natuway     6       41     San Juan 1- West Cranze     5       42     San Juan 1- West Cranze     7       79     Pasig Ciy 1- Ugong     7       79     Pasig Ciy 2- Santal Locia     7       80     Pasig Ciy 2- Santal Locia     7       80     Pasig Ciy 2- Santal Locia     7       90     Pasig Ciy 2- Santal Locia     7       41     Quezon Ciy 3- Basis, Sangandana     4       42     Quezon Ciy 5 - Painsiden     7       43     Quezon Ciy 5 - Painsiden     8       44     Quezon Ciy 5 - Painsiden     8       45     Quezon Ciy 5 - Painsiden     8       46     Quezon Ciy 7 - Tantang Painsa     8       47     Quezon Ciy 6 - Painto, Deningo (Matalhabh)     8       48     Quezon Ciy 1- Santa Lovid Metain     8       50     Quezon C	31	Makati City 7 Magallanes					
33         Traging 1. "Vestern Bicutan         5         Taguig         1         Metro Manila         NCR           81         Taguig 2. Upper Bicutan         5         Taguig         1         Metro Manila         NCR           36         Mandaloyong Cy 1. Pohicieu         5         Taguig         1         Metro Manila         NCR           36         Mandaloyong Cy 2. Phinieu         6         1         Mandaloyong Cy 3. Mauway         6           30         Mandaloyong Cy 3. Mauway         6         5         Taguig (Ey 2. Samto Anila Mahoyong Cy 3. Mauway         6           41         San Juan 1. West Crame         6         San Juan         7         Pasig Cy 1. Ugong         7           78         Pasig Cy 2. Santo Lucia         7         Pasig Ci 2. Santo Lucia         7         Pasig Ci 2. Santo Domingo (Matalahih)           42         Quezon City 0 Stanta Lucia         7         Pasig Ci 2. Santo Domingo (Matalahih)         7         Pasig Ci 2. Santo Domingo (Matalahih)         7         Pasig Ci 2. Santo Domingo (Matalahih)         7           43         Quezon City 0 Stanta Lucia         8         Quezon City 0 Santa Sengardana         8         Quezon City 0 Santa Sengardana           44         Quezon City 0 Song Tam         7         Auto An	32	Santa Ana		Pateros			
8.1         Taguig         5         Taguig         1         Metholynamical         NCK           35         Mandalyong Cky         1         Poblicion         1         Metholynamical         NCK           36         Mandalyong Cky         1         Poblicion         1         Mandalyong Cky         1         Metholynamical         NCK           37         Mandalyong Cky         2         Mandalyong Cky         3         Mandalyong Cky         4         Mandalyong Cky <td>33</td> <td>Taguig 1 - Western Bicutan</td> <td></td> <td></td> <td>1,</td> <td>Matua Manila</td> <td>NCR</td>	33	Taguig 1 - Western Bicutan			1,	Matua Manila	NCR
83     Taging 3 - Signal Vilkge, Lower Bicutan       36     Mandahyong City 2 - Polacion       36     Mandahyong City 3 - Manway       37     Mandahyong City 2 - Wate-wack Greenhilk       40     San Juan 1 - West Crame       41     San Juan 2 - Corzane de Jesus       38     Pasig City 1 - Ugong       7     Pasig City 3 - Santa Lucia       70     Pasig City 1 - Santah       71     Pasig City 4 - Pangbuhatan       42     Quezon City 1 - Fatabon, Damayang Lagi       43     Quezon City 2 - Santo Domingo (Matalahb)       44     Quezon City 4 - Bagong Pag-asa       45     Quezon City 4 - Bagong Pag-asa       46     Quezon City 5 - Panghahan, (TrinomaSM West)       47     Quezon City 6 - Pandsk, Del Monte       48     Quezon City 6 - Pandsk, Del Monte       49     Quezon City 1 - Up, Campus       50     Quezon City 1 - Sang Tamo       51     Quezon City 1 - Sang Tamo       52     Quezon City 1 - Sang Tamo       54     Quezon City 1 - Sang Tamo       55     Quezon City 1 - Sang Tamo       56     Quezon City 1 - Sang Tamo       57     Quezon City 1 - Sang Tamo       58     Kaloskan City (North) 2 - Barnayy 178       59     Kaloskan City (North) 2 - Barnayy 171       59	81	Taguig 2 - Upper Bicutan	5 Taguig	1	Metro Mania	NCR	
33     Mandahyong City 1 - Poblacion       36     Mandahyong City 2 - Planixew       37     Mandahyong City 3 - Manway       39     Mandahyong City 3 - Manway       40     San Juan 1 - West Crane       41     San Juan 1 - West Crane       38     Pasig City 1 - Gyong       78     Pasig City 2 - Santohn       79     Pasig City 2 - Santohn       71     Pasig City 2 - Santohn       72     Pasig City 2 - Santohn       73     Pasig City 3 - Santa Lucin       74     Quezon City 1 - Tatabon, Damuyang Lagi       43     Quezon City 2 - Bayang Pag-asa       44     Quezon City 1 - Tatabon, Damuyang Lagi       43     Quezon City 3 - Bayang Pag-asa       44     Quezon City 7 - Bayang Pag-asa       45     Quezon City 7 - Bayang Pag-asa       46     Quezon City 7 - Bayang Pag-asa       47     Quezon City 1 - Ramsing       48     Quezon City 1 - Ramsing       49     Quezon City 1 - Ramsing       50     Quezon City 1 - Sansan Hilk       51     Quezon City 1 - Sansan Hilk       52     Quezon City 1 - Pansong Loyok Heights       71     Quezon City 1 - Sansan Filk       55     Quezon City 1 - Sansan Filk       56     Quezon City 1 - Sansan Filk       57     <	83	Taguig 3 - Signal Village, Lower Bicutan					
36     Mandahyong Ciry 2- Planvew     Mandahyong Ciry 3- Manway     6       37     Mandahyong Ciry 4- Wack-wack Greenhils     6       40     San Juan 1- West Crame     San Juan       38     Pasig Ciry 1 - Ugang     7       78     Pesig Ciry 2- Santolan     7       79     Pesig Ciry 3- Santa Lucia     7       80     Pasig Ciry 3- Santa Lucia     7       41     Queron Ciry 1 - Tatalon, Damayang Lagi     7       42     Queron Ciry 1 - Tatalon, Damayang Lagi     7       43     Queron Ciry 4 - Bagong Pag-asa     7       44     Queron Ciry 4 - Bagong Pag-asa     7       45     Queron Ciry 4 - Bagong Pag-asa     7       46     Queron Ciry 4 - Bagong Pag-asa     7       47     Queron Ciry 4 - Bagong Pag-asa     7       48     Queron Ciry 4 - Bagong Pag-asa     7       49     Queron Ciry 1 - U.P. Campas     8       51     Queron Ciry 1 - Senog Tamo     7       52     Queron Ciry 1 - Senog Tamo     7       54     Queron Ciry 1 - Senog Tamo     8       55     Queron Ciry 1 - Senog Tamo     7       54     Queron Ciry 1 - Senog Tamo     7       55     Queron Ciry 1 - Senog Tamo     7       56     Queron Ciry 1 - Senog Tamo <td>35</td> <td>Mandaluyong City 1 - Poblacion</td> <td></td> <td></td> <td></td> <td></td>	35	Mandaluyong City 1 - Poblacion					
30         Mindalayong City 3 - Wack-wack Greenhills         6           40         San Juan 1 - West Crame         San Juan           38         Pasig City 1 - Ugong         San Juan           38         Pasig City 1 - Ugong         Failed City 1 - Ugong           70         Pasig City 2 - Santolan         7           70         Pasig City 3 - Santol Domingo (Matalahi)         7           42         Quezon City 2 - Santol Domingo (Matalahi)         7           43         Quezon City 3 - Bagong Pag-asa         7           44         Quezon City 4 - Bagong Pag-asa         7           45         Quezon City 4 - Bagong Pag-asa         7           46         Quezon City 7 - Kamuning         9           47         Quezon City 7 - Kamuning         9           48         Quezon City 7 - Santosan Hills         8           51         Quezon City 1 - Pasong Tamo         8           52         Quezon City 1 - Pasong Tamo         9           53         Quezon City 1 - Pasong Tamo         9           54         Quezon City 1 - Pasong Tamo         9           53         Quezon City 1 - Pasong Tamo         9           61         Quezon City 1 - Pasong Tamo         9           57	36	Mandaluyong City 2 - Plainview		Mandaluyong City			
20     Finite Product Network Contract       40     San Juan I - West Crane       41     San Juan I - West Crane       38     Pasig City 1 - Ugong       78     Pasig City 2 - Santolan       79     Pasig City 2 - Santolan       42     Quezon City 2 - Santoboningo (Matalabib)       44     Quezon City 3 - Baesa, Sangandaan       45     Quezon City 4 - Bagong Pag-asa       46     Quezon City 4 - Bagong Pag-asa       47     Quezon City 4 - Bagong Pag-asa       48     Quezon City 7 - Camp Aguinaldo       49     Quezon City 8 - E. Rodriguez, Crame       90     Quezon City 1 - U.P. Campus       51     Quezon City 1 - D.P. Campus       52     Quezon City 1 - D.P. Campus       53     Quezon City 1 - Bansan Hilk       54     Quezon City 1 - Banson Tamo       55     Quezon City 1 - Banson Tamo       57     Quezon City 10 - Pansol, Loyoh Heights       77     Quezon City 10 - Pansol, Loyoh Heights	30	Mandaluyong City 4 - Wack-wack Greenhilk	6				
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38     Pasig City 1- Ugong       78     Pasig City 2- Santolan       79     Pasig City 3- Santa Lucia       80     Pasig City 4 - Pinaghuhatan       42     Quezon City 2 - Santo Domingo (Matalahib)       43     Quezon City 3 - Baesa, Sangandaan       44     Quezon City 3 - Baesa, Sangandaan       45     Quezon City 5 - Pinyahan, (Trinoma/SM West)       47     Quezon City 5 - Pinyahan, (Trinoma/SM West)       47     Quezon City 7 - Kanuning       48     Quezon City 7 - Kanuning       49     Quezon City 7 - Kanuning       50     Quezon City 1 - U.P., Campus       51     Quezon City 1 - Vangaya       52     Quezon City 11 - U.P., Campus       53     Quezon City 13 - Bansan Hilk       55     Quezon City 13 - Payatas       57     Quezon City 15 - Payatas       57     Quezon City 15 - Payatas       57     Quezon City 16 - North Fairview       61     Quezon City 10 - Parsol, Loyola Heights       77     Quezon City 10 - Parsol, Parangu 178       58     Kalookan City (North) 1 - Barangay 178       59     Kalookan City (North) 1 - Barangay 171       64     Valenzael City 2 - Mainta       65     Valenzaela City 3 - Malinta       66     Valenzaela City 3 - Malinta       66 <td< td=""><td>41</td><td>San Juan 2 - Corazon de Jesus</td><td></td><td>San Juan</td><td></td><td></td><td></td></td<>	41	San Juan 2 - Corazon de Jesus		San Juan			
78Pasig City 2 - Santolan7Pasig City79Pasig City 3 - Santa Lucia7Pasig City80Pasig City 1 - Tratalon, Darmayang Lagi7Pasig City43Quezon City 2 - Santo Dorningo (Matahhb)4Quezon City 3 - Bacsa, Sangandaan44Quezon City 3 - Bacsa, Sangandaan7Pasig City47Quezon City 4 - Bagong Pag-asa7Pasig City48Quezon City 7 - Kamuning9Quezon City 7 - Kamuning49Quezon City 7 - Kamuning9Quezon City 9 - Camp Aguinaklo50Quezon City 10 - Kamias (East/West)8951Quezon City 12 - Pasong Tamo853Quezon City 13 - Batasa Hilk954Quezon City 13 - Batasa Hilk955Quezon City 16 - North Fairview961Quezon City 17 - Greater Lagro, Novalches Proper962Quezon City 19 - Pansol, Loyola Heights977Quezon City 10 - Worth 2 - Barangay 178958Kabokan City (North) 2 - Barangay 176964Vakenzaela City 3 - Malana1071Vakenzaela City 5 - Manlus	38	Pasig City 1 - Ugong					
79     Pasig City 3 - Santa Lacia     9       80     Pasig City 4 - Imaghdhatan       42     Quezon City 1 - Tatalon, Damayang Lagi       43     Quezon City 2 - Santo Domingo (Matalahib)       44     Quezon City 4 - Baeong Pag-asa       45     Quezon City 5 - Pinyahan, (Triroma/SM West)       47     Quezon City 7 - Rainki, Del Monte       48     Quezon City 7 - Kamuning       49     Quezon City 7 - Kamuning       49     Quezon City 10 - Kamias (East/West)       50     Quezon City 10 - Kamias (East/West)       51     Quezon City 12 - Pasong Tamo       53     Quezon City 13 - Batasan Hilk       55     Quezon City 14 - Commowealth       56     Quezon City 15 - Payatas       57     Quezon City 16 - North Fairview       61     Quezon City 18 - Tandang Sora       77     Quezon City 18 - Tandang Sora       78     Kabokan City (North) 2 - Barangay 178       59     Kabokan City (North) 2 - Barangay 171       64     Yalenzela City 2 - Canumay,Mayaan       64     Yalenzela City 2 - Canumay,Mayaan       65     Valenzela City 2 - Canumay,Mayaan       64     Yalenzela City 2 - Canumay,Mayaan       65     Valenzela City 2 - Canumay,Mayaan       66     Valenzela City 3 - Malinta       71     Yalenzela	78	Pasig City 2 - Santolan	7	Pasig City			
80       Prasg Cry 4 - Prangbuntatin         42       Quezon City 1 - Tatadon, Damayang Lagi         43       Quezon City 2 - Santo Domingo (Matalahib)         44       Quezon City 3 - Bases, Sangandaan         45       Quezon City 4 - Bagong Pag-asa         46       Quezon City 6 - Palok, Del Monte         47       Quezon City 6 - Palok, Del Monte         48       Quezon City 7 - Kamuning         49       Quezon City 7 - Kamuning         50       Quezon City 1 - Kamias (EastWest)         51       Quezon City 1 - Kamias (EastWest)         52       Quezon City 1 - Santasan Hilk         55       Quezon City 1 - Santasan Hilk         56       Quezon City 1 - Commoweath         56       Quezon City 1 - Greater Lagro, Novaliches Proper         61       Quezon City 1 - Greater Lagro, Novaliches Proper         62       Quezon City 1 - Bransol, Loyola Heights         77       Quezon City 1 - Bransol, Loyola Heights         77       Quezon City 1 - Brangay 178         58       Kalookan City (North) 2 - Barangay 171         61       Valenzuela City 2 - Camunay Maysan         63       Valenzuela City 2 - Camunayang Vi76         64       Valenzuela City 2 - Camunay Maysan         65       Valen	79	Pasig City 3 - Santa Lucia					
43     Quezon City 2. Sando Domingo (Matalahib)       44     Quezon City 3. Baesa, Sangandaan       45     Quezon City 4. Bagong Pag-asa       46     Quezon City 6. Pahok, Del Monte       48     Quezon City 7. Kamuning       49     Quezon City 9. E. Rodriguez, Crame       50     Quezon City 9. Camp Aguinaklo       51     Quezon City 10. V. Kamisa (EastWest)       52     Quezon City 11. U.P. Campos       53     Quezon City 12. Pasong Tamo       54     Quezon City 13. Batasan Hilk       55     Quezon City 16. North Fairview       61     Quezon City 17. Greater Lagro, Novalkches Proper       62     Quezon City 19. Panoel, Loyola Heights       77     Quezon City 0. White Plains, Libis (Eastwood)       58     Kalookan City (North) 1. Barangay 176       60     Kalookan City 2. Cammagy, Maysan       63     Valenzuela City 2. Cammagy, Maysan       64     Valenzuela City 2. Cammagy, Maysan       65     Valenzuela City 2. Cammagy, Maysan       65     Valenzuela City 2. Mandas	80 42	r asig City 4 - Pillagounatan Ouezon City 1 - Tatalon Damayang Lagi			1		
44     Quezon Ciy 3 - Baesa, Sangandaan       45     Quezon Ciy 4 - Bagong Pag-asa       46     Quezon Ciy 5 - Pinyahan, (Trinoma/SM West)       47     Quezon Ciy 7 - Palok, Del Monte       48     Quezon Ciy 7 - Kamuning       49     Quezon Ciy 7 - Kamuning       49     Quezon Ciy 7 - Camp Aguinaldo       51     Quezon Ciy 10 - Kamias (East/West)       52     Quezon Ciy 12 - Pasong Tamo       53     Quezon Ciy 12 - Pasong Tamo       54     Quezon Ciy 13 - Batasan Hilk       55     Quezon Ciy 18 - Payatas       56     Quezon Ciy 18 - Payatas       57     Quezon Ciy 19 - Parsol, Loyola Heights       77     Quezon Ciy 19 - Parsol, Loyola Heights       77     Quezon Ciy 19 - Parsol, Loyola Heights       77     Quezon Ciy 19 - Barangay 176       60     Kalookan Ciy (North) 2 - Barangay 171       63     Valenzuela Ciy 2 - Cammay, Maysan       64     Valenzuela Ciy 2 - Cammay, Maysan       65     Valenzuela Ciy 2 - Cammay, Maysan       65     Valenzuela Ciy 2 - Cammay, Maysan       66     Valenzuela Ciy 5 - Marulas	43	Quezon City 2 - Santo Domingo (Matalahib)	•				
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46Quezon City 5 - Pinyahan, (Trinoma/SM West)47Quezon City 6 - Palkok, Del Monte48Quezon City 7 - Kamuning49Quezon City 8 - E. Rodriguez, Crame50Quezon City 9 - Camp Aguinaklo51Quezon City 11 - U.P. Campus52Quezon City 11 - U.P. Campus53Quezon City 12 - Pasong Tamo54Quezon City 13 - Batasan Hilk55Quezon City 15 - Payatas57Quezon City 16 - North Fairview61Quezon City 18 - Tandang Sora77Quezon City 18 - Tanadag Sora77Quezon City (North) - Barangay 1769Kalookan City (North) - Barangay 17660Kalookan City (North) - Barangay 17663Valenzuela City 3 - Barangay 17664Valenzuela City 3 - Malinta65Valenzuela City 3 - Malinta66Valenzuela City 4 - Malanday71Valenzuela City 4 - Malanday71Valenzuela City 4 - Malanday	45	Quezon City 4 - Bagong Pag-asa					
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49Quezon City 7 - Kamuning49Quezon City 7 - Kamuning50Quezon City 9 - Camp Aguinaldo51Quezon City 10 - Kamias (East/West)52Quezon City 11 - U.P. Campus53Quezon City 13 - Batasan Hilk55Quezon City 13 - Batasan Hilk55Quezon City 14 - Commonwealth56Quezon City 15 - Payatas57Quezon City 17 - Greater Lagro, Novaliches Proper61Quezon City 18 - Tandang Sora75Quezon City 19 - Pansol, Loyola Heights77Quezon City 10 - North Fairview61Quezon City 00 - White Phins, Libis (Eastwood)78Kalookan City (North) 1 - Barangay 17859Kalookan City (North) 2 - Barangay 17660Kalookan City (North) 3 - Barangay 17161Valenzuela City 12 - Camunay, Maysan62Valenzuela City 10 - Using79Valenzuela City 10 - Mainta70Valenzuela City 10 - Narulas	47	Quezon City 6 - Paltok, Del Monte					
50Quezon City 0L. Khangker, Chink50Quezon City 10Kamias (East/West)851Quezon City 11U.P. Campus52Quezon City 12Pasong Tamo54Quezon City 13Batasan Hilk55Quezon City 14Commonwealth56Quezon City 15Payatas57Quezon City 15Payatas61Quezon City 17Greater Lagro, Novaliches Proper62Quezon City 19Panadago Tamagay 17877Quezon City 19Panangay 17859Kalookan City (North) 1Barangay 17663Valenzuela City 1Ugong64Valenzuela City 2Canumay, Maysan65Valenzuela City 3Malinta66Valenzuela City 4Malnday71Valenzuela City 4Malnday72Valenzuela City 4Malnday	48 40	Quezon City 8 - E. Rodriguez Crame					
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54       Quezon City 13 - Batasan Hilk         55       Quezon City 14 - Commonwealth         56       Quezon City 15 - Payatas         57       Quezon City 16 - North Fairview         61       Quezon City 17 - Greater Lagro, Novaliches Proper         62       Quezon City 18 - Tandang Sora         75       Quezon City 19 - Pansol, Loyola Heights         77       Quezon City 00 - White Plains, Libis (Eastwood)         58       Kalookan City (North) 1 - Barangay 178         59       Kalookan City (North) 2 - Barangay 176         60       Kalookan City (North) 3 - Barangay 171         63       Valenzuela City 1 - Ugong         64       Valenzuela City 2 - Canumay, Maysan         65       Valenzuela City 4 - Malanday         71       Valenzuela City 4 - Malanday         71       Valenzuela City 5 - Marulas	53	Quezon City 12 - Pasong Tamo	l				
52       Quezon City 14 - Commonwealth         56       Quezon City 15 - Payatas         57       Quezon City 16 - North Fairview         61       Quezon City 17 - Greater Lagro, Novaliches Proper         62       Quezon City 18 - Tandang Sora         75       Quezon City 19 - Pansol, Loyola Heights         77       Quezon City 20 - White Plains, Libis (Eastwood)         58       Kalookan City (North) 1 - Barangay 178         59       Kalookan City (North) 2 - Barangay 176         60       Kalookan City (North) 3 - Barangay 171         63       Valenzuela City 1 - Ugong         64       Valenzuela City 2 - Canumay, Maysan         65       Valenzuela City 4 - Malnday         71       Valenzuela City 4 - Malnday         71       Valenzuela City 5 - Marulas	54	Quezon City 13 - Batasan Hills					
50       Quezon City 15 - Fayatas         57       Quezon City 16 - North Fairview         61       Quezon City 17 - Greater Lagro, Novaliches Proper         62       Quezon City 19 - Pansol, Loyola Heights         75       Quezon City 20 - White Phains, Libis (Eastwood)         58       Kalookan City (North) 1 - Barangay 178         59       Kalookan City (North) 2 - Barangay 176         60       Kalookan City (North) 3 - Barangay 171         63       Valenzuela City 1 - Ugong         64       Valenzuela City 2 - Canumay, Maysan         65       Valenzuela City 2 - Mainta         66       Valenzuela City 4 - Malanday         71       Valenzuela City 5 - Marulas	55	Quezon City 14 - Commonwealth					
61       Quezon City 17 - Greater Lagro, Novaliches Proper         62       Quezon City 18 - Tandang Sora         75       Quezon City 19 - Pansol, Loyola Heights         77       Quezon City 20 - White Plains, Libis (Eastwood)         58       Kalookan City (North) 1 - Barangay 178         59       Kalookan City (North) 2 - Barangay 176       9         60       Kalookan City (North) 3 - Barangay 171       9         63       Valenzuela City 1 - Ugong       10         64       Valenzuela City 2 - Canumay, Maysan       10         65       Valenzuela City 3 - Malinta       10         71       Valenzuela City 5 - Marulas       10	50 57	Quezon City 15 - Payatas					
62       Quezon City 18 - Tandang Sora         75       Quezon City 19 - Pansol, Loyola Heights         77       Quezon City 20 - White Plains, Libis (Eastwood)         58       Kalookan City (North) 1 - Barangay 178         59       Kalookan City (North) 2 - Barangay 176       9         60       Kalookan City (North) 3 - Barangay 171       9         63       Valenzuela City 1 - Ugong       10         64       Valenzuela City 2 - Canumay, Maysan       10         65       Valenzuela City 3 - Malinta       10         71       Valenzuela City 4 - Malnday         71       Valenzuela City 5 - Marulas	61	Quezon City 17 - Greater Lagro. Novaliches Proper	ŀ				
75     Quezon City 19 - Pansol, Loyola Heights       77     Quezon City 20 - White Plains, Libis (Eastwood)       58     Kalookan City (North) 1 - Barangay 178       59     Kalookan City (North) 2 - Barangay 176       60     Kalookan City (North) 3 - Barangay 171       63     Valenzuela City 1 - Ugong       64     Valenzuela City 2 - Canumay, Maysan       65     Valenzuela City 2 - Malinta       66     Valenzuela City 4 - Malnday       71     Valenzuela City 4 - Malnday	62	Quezon City 18 - Tandang Sora					
77     Quezon City 20 - White Plains, Libis (Eastwood)       58     Kalookan City (North) 1 - Barangay 178       59     Kalookan City (North) 2 - Barangay 176       60     Kalookan City (North) 3 - Barangay 171       63     Valenzuela City 1 - Ugong       64     Valenzuela City 2 - Canumay, Maysan       65     Valenzuela City 3 - Malinta       66     Valenzuela City 4 - Malanday       71     Valenzuela City 5 - Marulas	75	Quezon City 19 - Pansol, Loyola Heights	Ì				
58     Kalookan City (North) 1 - Barangay 178     9       59     Kalookan City (North) 2 - Barangay 176     9       60     Kalookan City (North) 3 - Barangay 171     9       63     Valenzuela City 1 - Ugong     9       64     Valenzuela City 2 - Canumay, Maysan     10       65     Valenzuela City 4 - Malanday     10       71     Valenzuela City 5 - Marulas     10	77	Quezon City 20 - White Plains, Libis (Eastwood)					
59     Kalookan City (North) 2 - Barangay 176     9     Kalookan City (North)       60     Kalookan City (North) 3 - Barangay 171     9     Kalookan City (North)       63     Valenzuela City 1 - Ugong     9     Kalookan City (North)       64     Valenzuela City 2 - Canumay, Maysan     10     Valenzuela City       65     Valenzuela City 3 - Malinta     10     Valenzuela City       66     Valenzuela City 4 - Malanday     10     Valenzuela City	58	Kalookan City (North) 1 - Barangay 178					
00     Kanowan Cuy (North) 5 - Barangay 1/1       63     Valenzuela City 1 - Ugong       64     Valenzuela City 2 - Canumay, Maysan       65     Valenzuela City 3 - Malinta       66     Valenzuela City 4 - Malanday       71     Valenzuela City 5 - Marulas	59	Kalookan City (North) 2 - Barangay 176	9	Kalookan City (North)			
65     Valenzuela City 2 - Canumay, Maysan       65     Valenzuela City 3 - Malinta       66     Valenzuela City 4 - Malanday       71     Valenzuela City 5 - Marulas	60	Nationan Ulty (North) 5 - Barangay 1/1			1		
65     Valenzuela City 3 - Malinta     10       66     Valenzuela City 4 - Malanday     10       71     Valenzuela City 5 - Marulas     10	64	Valenzuela City 2 - Canumav Maysan					
66     Valenzuela City 4 - Malanday       71     Valenzuela City 5 - Marulas	65	Valenzuela City 2 - Califanay, Waysan	10	Valenzuela City			
71 Valenzuela City 5 - Marulas	66	Valenzuela City 4 - Malanday	[				
	71	Valenzuela City 5 - Marulas					

# TABLE 4.2.1-1 (1) TRAFFIC ZONING SYSTEM

Small Zone	Barangay	Medium Zone	City/Municipality	Large Zone	Province	Region
67	Malabon 1 - Concepcion		Malabon			
70	Malabon 2 - Potrero		Malaboli			
68	Navotas - North Bay Blvd South	11	Navotas			
69 72	Kalookan City (South) 1 - Barangay 12		Kalookan City (South)			
72	Kalookan City (South) 2 - Barangay 152 Kalookan City (South) 3 - Barangay 120		Kalookali City (Souli)			
74	Marikina City 1 - Concepcion Uno, Parang					
76	Marikina City 2 - Malanday		Marikina City	1	Metro Manila	NCR
87	Muntinlupa City 1 - Sucat	12				
88	Muntinlupa City 2 - Alabang		Muntinlupa City			
89	Muntinlupa City 3 - Putatan					
90	Las Pinas City I - Almanza (Uno, Dos)	12	Las Pinas City			
91	Las Pinas City 2 - B.F. International village	15	Las r mas City			
97	Maliksi, Habay, Salinas		BACOOR			
98	Aniban, San Nicolas					
99	P.F Espiritu, Mambog					
100	Molino					
101	Poblacion		IMUS			
102	Alapan	14				
103	Anabu I-C to I-G II-A					
104			CAVITE CITY			
106	Tabon I, Sta Isabel		KAWIT			
107	Marulas, Toclong					
108			NOVELETA			
109			ROSARIO			
110	Tejero, Pinagtipunan		GENERAL TRIAS			
111	Pasong Camachile II, Tapia					
112	Biclatan	15				
115	Amava		TANZA			
115	Halayhay, Sahud Ulan			2	CAVITE	
116	Tres Cruses, Punta					
118	Molino, Palangue 3		NAIC			
119	Malainen Luma, Palangue 1 & 2	16				
147			GENERAL EMILIO AGUINALDO			
117	San Ametin I. Luzuiminda II		DASMARIÑAS			
120	Paliparan II & III. Salawag	17	DASMARINAS			
122	Langkaan I, Sampaloc					
123	Litlit, Tabuan, Malaking Tatyao		SILANG			
124	Maguyam, Carmen, Iba, Tibig					
125	Munting Ilog, Ihican, Putting Kahoy					
126	Tartaria, Pooc II, Pulong Bunga					
12/	Balubad, Balite I, Ulat	18	CEN MADIANO ALVADEZ			
129			CARMONA			Region IV-A
148			AMADEO			
149			ALFONSO			
150			TAGAYTAY CITY			
128			SAN PEDRO			
131	San Francisco (Halang)		BINAN			
132	Canlalay, Sto Tomas (Calabuso)					
135	Malamig, Mamplasan	19				
135	Balibago		CITY OF SANTA ROSA			
136	Pulong Sta Cruz, Malitlit					
137	Don Jose					
138	Sto Domingo					
139	Sala, Banaybanay		CABUYAO			
140	Diezmo Dittland Casila					
141	rituand, Casile Managong Mayana Prinza		CITY OF CALAMBA			
142	Halang, Turbina, Tulo, Makiling	20	CITI OF CALAMBA			
144	Kay-Anlog, Barandal, Palo Alto, Burol			3	LAGUNA	
145	Canlubang					
146			BAY			
151			SANTA MARIA			
152		21	MABITAC			
153						
154		22	CAVINTI			
135		~~	LILIW			
157		23	PAGSANJAN			
158			ALAMINOS			
159	Del Remedio		SAN PABLO CITY			
160	Santisimo Rosario	24				
161	San Francisco					
162	Santo Angel		1	1	1	

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Small Zone	Barangay	Medium Zone	City/Municipality	Large Zone	Province	Region
163			BALAYAN			
164		25	AGONCILLO	†		
165			LAUREL	1		
166			CITY OF TANAUAN	1		
167			SANTO TOMAS	t		
168			BALETE	t		
174	Marauov	26		t		
175	Antipolo Del Norte					
176	Loglod		LIPA CITY			
177	San Jose			4	BATANGAS	
169	binyose		CLIENCA			
173		27	ALITAGTAG	ł		
170			PADRE GARCIA	1		
170		28	SAN IIJAN	ł		
172		20	LOPO	+		Region IV-A
172	Santa Pita Karsada		LOBO	1		
170	Guled Itees					
1/9		29	BATANGAS CITY (Capital)			
180	Discourse					
101	Pinamucan		CENED AL NAKAD			
182		30	ULICDAN	+	OUEZON	
185			LUCBAN	+		
184		21		ł		
189		51	LUCENA CITY (Capital)	-		
190			AGDANGAN	5	QUEZON	
185			SARIAYA	ł		
186		32	CANDELARIA	+		
18/			DOLORES	ł		
188			SAN ANTONIO			
95				6	BULACAN	
96				7	RIZAL	
191				8	BATAAN	
192				9	PAMPANGA	Region III
193				10	TARLAC	Region III
194		33		11	ZAMBALES	
195		55		12	NUEVA ECIJA	
196				13	AURORA	
197				14	PANGASINAN	Region I
198				15		CAR, Region I
199				16	ALL PROVINCE	Region IV-B
200				17	ALL PROVINCE	Region V
201	Port Terminal	34	City of Manila			0
202	Ninov Aquino International Airport Terminal 1			1		
202	Ninov Aquino International Airport Terminal 2					
205	Ninov Aquino International Airport Terminal 2	35	Pasay City	1	Metro Manila	NCR
204	Demostic Terminal	55	asay Cuy			
205	Concert Terminal					
200	Cargo Terminal				l	

# TABLE 4.2.1-1 (3) TRAFFIC ZONING SYSTEM



FIGURE 4.2.1-2 ZONING MAP – METRO MANILA



FIGURE 4.2.1-3 ZONING MAP – CALA



FIGURE 4.2.1-4 ZONING MAP – MEGA MANILA

# 4.2.2 Future Socio-economic Framework

The future socio-economic indicators were formulated by the Study of Master Plan on High Standard Highway Network Development (herein HSH Study) based on the past trend.

In the study area, most of the lands have been acquired by big private investors and these lands will be converted from agri-land to industrial, commercial, and residential development. Though many private investors have a large development plan, detailed target socio-economic indicators of all development plans were confidential.

Based on the projected socio-economic indicators by the HSH Study, future socio-economic framework was revised considering the current development direction and the mature of each private developer in the Study Area by JICA Study Team.

The socio-economic profile is summarized below.

# (1) **Population Projection**

The population of the Study Area is revised based on the acquired private developer's plan and land use plan.

**Figure 4.2.2-1** shows the summary of future annual growth rate of the Study Area, NCR and Philippines. As same as projected population of HSH study, the growth rate of the Study Area is much higher than national growth rate.

Average growth rate in the Study Area is 3.60% from year 2011 to year 2020 and 2.70% from year 2021 to year 2030.

**Table 4.2.2-1** shows the revised population projection considering the development Area. Projected population of each zone is the sum up of projected population by HSH and development population at new private development project. Development areas in Laguna section are located in Silang (Zn.123, 124 and 125), Carmona (Zn.130), Binan (Zn.133, 134) Santa Rosa (Zn, 136,137 and 138), Cabyao (Zn.140 and 141) and Calamba (Zn.144 and 145). Since these zones will be converted from agriculture land, vacant area to residential area, the growth rate of population become high.

**Figure 4.2.2-2** shows the bar chart of zone base population and **Figure 4.2.2-3** shows the population density. Traffic zones adjacent to Metro Manila and passing along SLEx will become high population density (pink or red color) in the future shown in **Figure 4.2.2-3**.



Note: Philippines and NCR Population projection by HSH Study

# FIGURE 4.2.2-1 GROWTH RATE OF POPULATION PROJECTION



FIGURE 4.2.2-2 PROJECTED POPULATION IN THE STUDY AREA Source: JICA Study Team





Source: JICA Study Team

				Year	2007	Year	· 2020	Year	2030	AAG	R(%)	
Zone	Province	City/Municipality	AREA (km2)	Population	Dnstv(Pop/km2)	Population	Dnstv(Pop/km2)	Population	Dnstv(Pop/km2)	07-20	21-30	Remarks
97	Cavite	BACOOR	14.79	116,573	7,884	205,207	13,879	285,241	19,291	4.4%	3.3%	
98	Cavite	BACOOR	7.84	118,486	15,117	152,806	19,495	177,128	22,598	2.0%	1.5%	
99	Cavite	BACOOR	5.74	59,982	10,443	87,686	15,266	109,345	19.037	3.0%	2.2%	
100	Cavite	BACOOR	20.22	146,156	7,227	273,559	13,526	394,163	19,489	4.9%	3.7%	
101	Cavite	IMUS	12.98	112.061	8,632	168,598	12,986	207,959	16.018	3.2%	2.1%	
102	Cavite	IMUS	13.88	31,143	2,244	43.810	3,157	52,197	3,761	2.7%	1.8%	
103	Cavite	IMUS	13.55	68,995	5,090	97.059	7,160	115,639	8,531	2.7%	1.8%	
104	Cavite	IMUS	16.14	40,959	2,538	61.624	3,819	76.010	4,710	3.2%	2.1%	
105	Cavite	CAVITE CITY	15.73	111.000	7,058	130,203	8,279	144,153	9,167	1.2%	1.0%	
106	Cavite	KAWIT	4.98	33,316	6,696	42,552	8,553	49,325	9,914	1.9%	1.5%	
107	Cavite	KAWIT	3.38	43,089	12,741	55,034	16,273	63,794	18,863	1.9%	1.5%	
108	Cavite	NOVELETA	6.53	43.000	6,585	53,604	8,209	61,569	9,429	1.7%	1.4%	
109	Cavite	ROSARIO	5.22	104.000	19,939	108,988	20,895	112,275	21,525	0.4%	0.3%	
110	Cavite	GENERAL TRIAS	16.75	53,000	3,164	84.042	5.018	111,669	6,667	3.6%	2.9%	
111	Cavite	GENERAL TRIAS	29.95	90,000	3,005	155.090	5,178	204,218	6,819	4.3%	2.8%	
112	Cavite	GENERAL TRIAS	20.05	81.631	4,072	130,994	6,534	167,863	8,374	3.7%	2.5%	
113	Cavite	GENERAL TRIAS	19.86	21,581	1.087	34.631	1,744	44,378	2,234	3.7%	2.5%	
114	Cavite	TANZA	22.59	107.000	4,737	163,702	7,248	204,137	9.038	3.3%	2.2%	
115	Cavite	TANZA	11.58	33,000	2,850	50,488	4,360	62,958	5,437	3.3%	2.2%	
116	Cavite	TANZA	36.34	61,000	1,679	91,119	2,507	109,558	3,015	3.1%	1.9%	
117	Cavite	TRECE MARTIRES CITY	44.79	115,000	2,567	175,941	3,928	211,546	4,723	3.3%	1.9%	
118	Cavite	NAIC	49.71	84,000	1,690	105,993	2,132	118,434	2,382	1.8%	1.1%	
119	Cavite	NAIC	29.00	10,000	345	11,170	385	12,254	423	0.9%	0.9%	
120	Cavite	DASMARIÑAS	30.08	354,000	11,768	502,803	16,715	613,443	20,393	2.7%	2.0%	
121	Cavite	DASMARIÑAS	30.60	173,000	5,654	390,364	12,758	593,468	19,395	6.5%	4.3%	
122	Cavite	DASMARIÑAS	23.27	116,000	4,985	313,281	13,464	476,278	20,469	7.9%	4.3%	
123	Cavite	SILANG	43.00	51,125	1,189	75,791	1,763	97,855	2,276	4.1%	2.6%	New Dev.
124	Cavite	SILANG	24.84	82,459	3,320	115,329	4,643	143,686	5,785	3.3%	2.2%	New Dev.
125	Cavite	SILANG	14.96	14,400	963	29,451	1,969	44,139	2,951	8.5%	4.1%	New Dev.
126	Cavite	SILANG	38.02	23,456	617	29,597	779	34,308	902	1.8%	1.5%	
127	Cavite	SILANG	33.56	28,385	846	35,817	1,067	41,518	1,237	1.8%	1.5%	
128	Laguna	SAN PEDRO	21.69	295,000	13,599	367,747	16,953	408,925	18,851	1.7%	1.1%	
129	Cavite	GEN. MARIANO ALVAREZ	9.38	148,000	15,770	174,666	18,612	192,492	20,511	1.3%	1.0%	
130	Cavite	CARMONA	22.01	78,000	3,543	171,764	7,803	250,913	11,399	7.2%	3.9%	New Dev.
131	Laguna	BIÑAN	9.50	32,250	3,395	45,368	4,776	54,458	5,733	2.7%	1.8%	
132	Laguna	BIÑAN	15.67	182,981	11,677	257,408	16,427	308,983	19,718	2.7%	1.8%	
133	Laguna	BIÑAN	11.57	38,178	3,299	67,408	5,824	95,914	8,287	5.3%	3.6%	New Dev.
134	Laguna	BIÑAN	7.49	9,326	1,246	28,821	3,850	49,595	6,625	11.8%	5.6%	New Dev.
135	Laguna	CITY OF SANTA ROSA	17.83	212,992	11,945	314,369	17,630	372,354	20,882	3.0%	1.7%	
136	Laguna	CITY OF SANTA ROSA	6.68	37,153	5,566	87,384	13,091	125,928	18,865	7.8%	3.7%	New Dev.
137	Laguna	CITY OF SANTA ROSA	9.40	14,181	1,509	55,079	5,862	98,028	10,432	13.6%	5.9%	New Dev.
138	Laguna	CITY OF SANTA ROSA	13.71	2,617	191	36,300	2,648	104,834	7,648	21.8%	11.2%	New Dev.
139	Laguna	CABUYAO	30.55	199,505	6,531	424,748	13,905	588,662	19,272	6.0%	3.3%	
140	Laguna	CABUYAO	8.53	2,689	315	18,349	2,151	38,352	4,496	19.6%	7.7%	New Dev.
141	Laguna	CABUYAO	6.58	3,182	484	26,247	3,988	67,695	10,287	20.5%	9.9%	New Dev.
142	Laguna	CITY OF CALAMBA	26.53	191,877	7,232	266,693	10,051	317,092	11,951	2.6%	1.7%	
143	Laguna	CITY OF CALAMBA	38.57	76,000	1,971	105,634	2,739	125,596	3,256	2.6%	1.7%	
144	Laguna	CITY OF CALAMBA	23.88	20,859	874	40,764	1,707	68,468	2,867	7.2%	5.3%	New Dev.
145	Laguna	CITY OF CALAMBA	41.65	71,545	1,718	116,347	2,794	168,334	4,042	4.5%	3.8%	New Dev.
	Cavite		691.31	2,753,797	3,983	4,322,765	6,253	5,583,915	8,077	3.5%	2.6%	
	Laguna		289.82	1,390,335	4,797	2,258,666	7,793	2,993,218	10,328	3.8%	2.9%	
	Total		981.12	4,144,132	4,224	6,581,431	6,708	8,577,133	8,742	3.6%	2.7%	1

# TABLE 4.2.2-1 FUTURE POPULATION AND DENSITY IN THE STUDY AREA

Note: JICA Study Team Projection

# (2) **Employment projection**

The employment at job site was selected as an index to reflect traffic generation/attraction. The number of projected employment is made by HSH Study based on the Establishment survey, the development direction and land use plan.

 Table 4.2.2-2 shows the projected employment of medium zoning.

Zana Ma	Drovince	City/Musi	Year 2	2011	Year 2	2020	Year 2030		
Zone No.	Province	City/Multi	Pop.	Emp.	Pop.	Emp.	Pop.	Emp.	
1	Metro Manila	City of Manila	1,696,568	662,783	1,768,429	847,423	1,795,133	1,023,071	
2	Metro Manila	Pasay City	427,128	271,814	481,003	353,601	526,086	434,253	
3	Metro Manila	Parañaque City	617,200	69,146	779,475	97,545	927,115	132,484	
4	Metro Manila	Makati City, Pateros	613,873	1,205,531	717,448	1,542,431	809,932	1,879,800	
5	Metro Manila	Taguig	679,650	190,287	825,000	225,573	911,295	257,608	
6	Metro Manila	Mandaluyong City, San Juan	451,480	131,737	496,787	148,756	543,634	150,885	
7	Metro Manila	Pasig City	675,137	569,123	795,315	731,588	869,859	897,947	
8	Metro Manila	Quezon City	2,977,457	926,459	3,700,693	1,182,734	4,190,059	1,435,243	
9	Metro Manila	Kalookan City (North)	872,103	80,181	1,037,000	91,448	1,053,250	95,683	
10	Metro Manila	Valenzuela City	619,277	110,977	741,380	140,221	818,928	184,006	
11	Metro Manila	Kalookan City (South), Malal	1,241,004	205,707	1,399,903	225,573	1,452,520	234,055	
12	Metro Manila	Marikina City, Muntinlupa C	943,572	329,496	1,107,189	426,760	1,294,399	544,656	
13	Metro Manila	Las Pinas City	569,051	68,404	657,884	91,448	748,586	110,403	
14	CAVITE	CAVITE CITY	1,041,246	326,073	1,371,741	441,040	1,736,523	528,730	
15	CAVITE	TANZA	817,269	364,641	1,345,429	493,206	1,945,158	724,176	
16	CAVITE	GENERAL EMILIO AGUIN	200,587	33,893	235,735	45,843	268,974	43,204	
17	CAVITE	TRECE MARTIRES CITY	774,063	210,370	1,206,448	284,542	1,683,189	349,744	
18	CAVITE	TAGAYTAY CITY	734,687	233,744	971,976	316,157	1,221,049	411,463	
19	LAGUNA	CITY OF SANTA ROSA	925,375	475,080	1,259,883	643,723	1,619,018	845,741	
20	LAGUNA	CITY OF CALAMBA	885,506	633,953	1,259,885	862,119	1,674,247	1,136,105	
Metro Manila		12,383,499	4,821,646	14,507,506	6,105,101	15,940,797	7,380,093		
Study Area(Cavite Zn 14-18)		3,567,852	1,168,721	5,131,329	1,580,787	6,854,894	2,057,317		
Study Area(Laguna Zn 19-20)		1,810,881	1,109,033	2,519,768	1,505,842	3,293,265	1,981,845		
	Total		17,762,232	7,099,400	22,158,603	9,191,730	26,088,956	11,419,256	

TABLE 4.2.2-2 PROJECTED POPULATION AND EMPLOYMENT BY MEDIUM ZONE

Source: HSH 2009 and JICA Study Team's Projection

# 4.2.3 Present and Future OD Matrix

Present OD matrix was revised as Year 2011based on 2009 OD matrix. Traffic assignment model was validated using this present OD matrix (see section 4.2.5 Assignment Validation).

In order to formulate the future OD table, traffic demand forecast was conducted by applying the revised future socio economic indicators.

# (1) Future OD Estimation Approach

The future OD Matrix was prepared by the following steps/procedure as shown in Figure 4.2.3-1.

- Trip Generation and Attraction the prediction of trips produced and attracted to each zone;
- Trip Distribution the prediction of origin-destination flows, the linking of trip ends predicted by trip generation;
- Modal Split the estimation of percentages of trip flows made by each transportation mode in the model.



FIGURE 4.2.3-1 FUTURE OD MATRIX ESTIMATION PROCEDURE

#### (2) Modeling and Forecasting Tools

In all steps of travel model calibrations and demand forecast, JICA STRADA system was employed. JICA STRADA is a software tool for planning, managing, and analyzing of transportation systems. The software provides a set of tools for traffic demand modeling as well as capabilities for presentation graphics and transportation models. Modeling and forecasting in trip generation, trip distribution and traffic assignment was computed by JICA STRADA system.

## (3) Traffic Demand Forecast Modeling

#### 1) Trip Generation and Attraction Model

The objective of trip generation and attraction model is to forecast the number of trips that will start and arrive in each traffic zone within the study area. The linear regression models were adopted. The model parameters are shown in **Table 4.2.3-1** and **Table 4.2.3-2** and Dummy variables are shown in **Table 4.2.3-3** using population and employment in year 2011 shown in **Table 4.2.3-4** 

Gi = ai \* X1i + bi \* X2i + ci \* Di + CAj = aj \* X1j + bj \* X2j + cj \* Dj + C

Where,

Gi – Trip Generation in zone *i* A*j* – Trip Attraction in zone *j* X1*i*, X2*j* – Attributes in zone *i*, *j*  Di, Dj – Dummy Variables ai, aj, bi,bj – Coefficients C – Constant

# TABLE4.2.3-1 GENERATION/ATTRACTION MODELS (PASSENGER TRIPS)

		Attr	ibutes	Dummy		<b>R<sup>2</sup> Multiple</b>
Model Type	Subject Area	Population	Employment	Variable	Constant	Correlation Coefficient
Trip	Metro Manila (MM)	1.932	0.884	-913,810	-229,565	0.978
Generation	Cavite, Laguna	0.824	0.436	-224,857	-170,251	0.983
Trip	Metro Manila (MM)	1.836	0.866	-757,777	-255,323	0.974
Attraction	Cavite, Laguna	0.806	0.460	-227,532	-156,667	0.980

Source: JICA Study Team

#### TABLE 4.2.3-2 GENERATION/ATTRACTION MODELS (CARGO MOVEMENT)

		Attr	ibutes	Dummy		<b>R<sup>2</sup> Multiple</b>
Model Type	Subject Area	Population	Employment	Variable	Constant	Correlation Coefficient
Trip	Metro Manila (MM)	-	0.247	193,903	13,438	0.959
Generation	Cavite, Laguna	-	0.109	-13,186	388	0.987
Trip	Metro Manila (MM)	-	0.229	198,082	20,161	0.948
Attraction	Cavite, Laguna	-	0.130	-13,177	-3,415	0.990

Source: JICA Study Team

Medium Zone No.	Province	City, Municipality	Generation for Passenger	Attraction for Passenger	Generation for Cargo	Attraction for Cargo
1		City of Manila	2	2	1	1
2		Pasay City	0	0	0	0
3		Parañaque City	0	0	0	0
4		Makati City,Pateros	0	0	-1	-1
5		Taguig	0	0	0	0
6		Mandaluyong City, San Juan	0	-1	0	0
7	Metro	Pasig City	1	1	-0.5	-0.5
8	Manila	Quezon City	0	0	1	1
9		Kalookan City (N)	1	1	0	0
10		Valenzuela City		0	0	0
11		Kalookan (S),Malabon, Navotas	1	1	0.5	0.5
12		Marikina City, Muntinlupa City		0	0	0
13		Las Pinas City	0	0	0	0
14		Bacoor	0	0	1	1
15	Covito	Tanza	1	1	1	1
16	Cavile	NAIC	0	0	0	0
17		Dasmarinas	0	0	0	0
18		Silang	0	0	0	0
19	Laguna	Binan	-1	-1	-1	-1
20	Laguilla	Calamba	0	0	0	0

TABLE 4.2.3-3 DUMMY VARIABLE OF GENERATION/ATTRACTION MODEL

Source: JICA Study Team

## TABLE 4.2.3-4 PRESENT POPULATION AND EMPLOYMENT FOR G/A MODEL

Medium Zone No.	Province	City/Muni	2011 Population	2011 Employment
1		City of Manila	1,696,568	662,783
2		Pasay City	427,128	271,814
3		Parañaque City	617,200	69,146
4		Makati City,Pateros	613,873	1,205,531
5		Taguig	679,650	190,287
6		Mandaluyong City, San Juan	451,480	131,737
7	NCR(Metro	Pasig City	675,137	569,123
8	Manila)	Quezon City	2,977,457	926,459
9		Kalookan City (North)	872,103	80,181
10		Valenzuela City	619,277	110,977
11		Kalookan City (South) Malabon ,Navotas	1,241,004	205,707
12		Marikina City, Muntinlupa	943,572	329,496
13		Las Pinas City	569,051	68,404
14		Bacoor	1,097,917	326,073
15		Tanza	776,065	364,641
16	Cavite	NAIC	197,406	33,893
17		Dasmarinas	707,998	210,370
18		Silang	733,320	233,744
19	Loguno	Binan	918,694	475,080
20	Laguna	Calamba	900,772	633,953

Source: JICA Study Team

**Figure 4.2.3-2** shows the verification results between observed (present OD trips) and estimated trips for passenger trips and cargo movement.

# 2) Forecasting Trip Distribution Model

Trip distribution is the second major step in the traffic demand modeling process. Trip production (the first major step) provided methodology for estimating trip generations and attractions within each zone. Trip distribution is the process that links the generations and attractions with each zone.

The distribution model was applied using the present pattern to estimate the future trip distribution.



Figure 4.2.3-3 shows the desire line in the Study Area.

FIGURE 4.2.3-2 VERIFICATION OF TRIP GENERATION AND ATTRACTION MODEL



Source: JICA Study Team

# 3) Modal Split Model

**Figure 4.2.3-4** shows the procedure of Modal Split Model. Modal Split Model was applied as the same model as HSH Project.



Source: JICA HSH Study

#### FIGURE 4.2.3-4 STRUCTURE OF MODAL SPLIT MODEL

# a) Private Car Split Model

**Table 4.2.3-5** shows that the number of vehicle registration and annual rate in Region IV-A and other area. Annual growth rate in Region IV-A is higher than that in other regions. JICA Study Team assumed that this trend will keep in the future, because there are not yet public transport plan such as new railway project in the Study Area and new residential family who living the development area are relative rich. They will own the private car for commuting, shopping and so on.

Based on the above assumption, the number of private car trips was projected shown in **Table 4.2.3-6**.

Number of public transport passenger was estimated by subtracting number of private car passenger from all passengers (see **Table 4.2.3-7**).

# TABLE 4.2.3-5 VEHICLE REGISTRATION OF CAR AND SPORT UTILITYVEHICLE (Y2006-Y2009)

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				u	nii: venicie
	Y2006	Y2007	Y2008	Y2009	AAGR
Region IV-A (Cavite,Laguna)	98,811	100,807	105,007	109,894	3.7%
NCR and Region III	630,813	615,812	629,947	687,516	3.0%
Courses LTO	•				

Source: LTO

	Present	Estimated Data Assumed Growth Ra			
Area	Y2011	Y2020 Y2030		AAGR	
	1,000 Person Trip	1,000 PT	1,000 PT	'11-20	'21-30
	(a)	$(b=a^{*}(1+d)^{10})$	$(c=b^{*}(1+e)^{10})$	(d)	(e)
Cavite	903	1,302	1,950	3.7%	4.1%
Laguna	504	725	1,085	3.7%	4.1%
Others	10,598	14,238	18,267	3.0%	2.5%
Total	12,005	16,265	21,302		

#### TABLE 4.2.3-6 ESTIMATED NUMBER OF PRIVATE CAR TRIP

# TABLE 4.2.3-7 ESTIMATED NUMBER OF PRIVATE CAR AND PUBLIC TRANSPORT TRIP

	Vehicle Type	Y2011		Y2020(E	stimated)	Y2030(Estimated)	
		1,000 PT	Share	1,000 PT	Share	1,000 PT	Share
Cavite	Total(a)	3,355	100%	4,635	100%	6,389	100%
	Private Car(b)	903	27%	1,302	28%	1,950	31%
	Public T(a-b)	2,452	73%	3,333	72%	4,439	69%
Laguna	Total(a)	1,898	100%	2,617	100%	3,614	100%
	Private Car(b)	504	27%	725	28%	1,085	30%
	Public T(a-b)	1,394	73%	1,892	72%	2,529	70%
Total incl. MM	Total(a)	34,722	100%	43,944	100%	53,274	100%
	Private Car(b)	10,598	31%	14,238	32%	18,267	34%
	Public T(a-b)	24,124	69%	29,706	68%	35,008	66%

Source: JICA Team

#### b) Public Transport Split Model

The modal split between bus and Jeepny was estimated by using the relationship between zone i and zone j in distance calculated on the basis of Present OD matrix. **Figure 4.2.3-5** shows the modal share of Jeepny to the public transport trips.



Source: JICA HSH Study (2010); Note: Year 2009, Roadside OD Survey Result.

# FIGURE 4.2.3-5 MODAL SHARES OF JEEPNEY TRIPS TO TOTAL PUBLIC TRANSPORT TRIPS

## c) Convert from Passenger, Cargo Movement to Vehicle

The vehicle trips are estimated by converting passenger trips and cargo movement into equivalent number of vehicle traffic. Conversion rate is presented in **Table 4.2.3-8**.

Vehicle Type	Conversion Rate
Private Car	3.5 person/vehicle
Jeepney	9.3 person/vehicle
Bus	30.8 person/vehicle
Truck	4,008 kg/vehicle

 TABLE 4.2.3-8 CONVERSION RATE

Source: JICA HSH Study (2010)

# 4) Future Vehicle OD Trips

As shown in **Table 4.2.3-9**, the total vehicle trips in the Study Area (Cavite and Laguna) by applying average passenger occupancy and loading weight are estimated to be 1.52 million trips per day in 2030, which will be two times of current demand. Among them, the growth rate of car trips will be high; therefore, the modal share of car to the total vehicle will increase from 53% at present to 57% in 2030 shown in **Figure 4.2.3-6**.

	V-h:-l-	Y2	011	Y2	020	Y20	030	Increased	l Ratio
Area	Type	Trips	Share	Trips	Share	Trips	Share		
	Type	1000 veh/day	%	1000 veh/day	%	1000 veh/day	%	20/11	30/11
	Car	258	54%	372	55%	557	58%	1.44	2.16
	Jeepny	151	32%	216	32%	272	29%	1.43	1.80
Cavite	Bus	34	7%	43	6%	62	7%	1.26	1.82
	Truck	33	7%	46	7%	62	7%	1.39	1.88
	Total	476	100%	677	100%	953	100%	1.42	2.00
	Car	144	50%	207	51%	310	55%	1.44	2.15
	Jeepny	87	30%	124	31%	156	27%	1.43	1.79
Laguna	Bus	19	7%	24	6%	35	6%	1.26	1.84
	Truck	36	13%	50	12%	67	12%	1.39	1.86
	Total	286	100%	405	100%	568	100%	1.42	1.99
	Car	3028	55%	4068	57%	5219	59%	1.34	1.72
Total including Metro Manila and other areas	Jeepny	1468	27%	1896	26%	2211	25%	1.29	1.51
	Bus	340	6%	392	5%	469	5%	1.15	1.38
	Truck	654	12%	807	11%	974	11%	1.23	1.49
	Total	5490	100%	7163	100%	8873	100%	1.30	1.62

**TABLE 4.2.3-9 TOTAL VEHICLE TRIPS** 



FIGURE 4.2.3-6 MODAL SHARES IN 2011, 2020 AND 2030(VEHICLE BASE)

# 4.2.4 Traffic Assignment Model

The traffic assignment procedure allocates vehicle traffic into individual road links. This step uses as input the matrix of flows (vehicles) that indicate the volume of traffic between origin and destination pairs.

# 1) Assignment Method

There are many assignment techniques that can be used to estimate traffic volume ranging from manual methods to complex iterative procedures by computer programs. In this study, the capacity restraint assignment which is the most straightforward for use in network models was applied. This assignment technique is based on the speed – flow relationship. Flowchart of the applied methodology is presented in **Figure 4.2.4-1**.

In this assignment technique, and by calculating the required travel time for each link according to its travel speed and road conditions, the program determines the fastest routes between each origin and destination by evaluating the consuming time on links, and assigns the trips between the given origin and destination. As congestion increases until a certain level, alternative routes are introduced to handle the unassigned traffic. Zone-to-zone routing is built, which is the fastest path from each zone to any other, and all trips are assigned to these optimum routes.

Regarding tolled expressway, travel time adds the sum up of travel time conversion from toll fee (= toll fee divided by time evaluation value) and time calculation from travel speed.

Since the link-travel time varies with the traffic volume of vehicles using that link, which can be explained as a degree of link congestion, the OD tables are divided to apply an iteration procedure on ten stages. At each iteration, and depending upon the current link loadings, the flows are divided between all the shortest routes generated and a new travel time is computed for the average assigned link flow at each pass. The iteration continues to re-estimate the speed on that links considering the assigned traffic on links, and to produce alternative routes so that more accurate allocation can be achieved. The accumulated assigned traffic volume from each OD pair on the links composes the total assigned traffic volumes per direction for the network. JICA STRADA is used to estimate traffic volumes.



FIGURE 4.2.4-1 TRAFFIC ASSIGNMENT PROCEDURE

# 2) Speed Flow Relationship

The speed-flow relationship used in the traffic assignment procedure is shown in **Figure 4.2.4-2**. When the traffic volumes are over the maximum capacity 0.3\*Qmax, it is assumed that vehicle speed drastically reduces. The basic free flow and capacity is shown in **Table 4.2.4-1**.



FIGURE 4.2.4-2 SPEED – FLOW RELATIONSHIP

<b>A</b> 1						
QV Type	Pavement	Road Class	Topography	Lane	Vmax	Qmax
1				4	100	80,000
2			Dlain	3	100	60,000
3		Inter-Urban	Fiaili	2	80	40,000
4	Expressway	Expressway		1	70	20,000
5		Mountaina	2	70	28,000	
6			wiountains	1	60	10,500
7		Intro Linhon		3	80	60,000
8		Intra-Urban Expressway	Plain 2	2	60-80	40,000
9				1	60	15,000
10		Dlain	4	40	60,000	
11	Paved	Interstate Highway	1 14111	2	30	18,000
12			Highway Mountains	4	30	42,000
13				2	25	12,600
14				10	60	120,000
15		Urbon		8	60	96,000
16		Artorial	Mountains	6	50	72,000
17		Alterial		4	40	48,000
18				2	30	14,400
19			Dlain	4	40	40,000
20		Local	Flaill	2	30	12,000
21			Mountains	2	30	8,400
22	Unnoved		Plain	2	20	6,000
23	Unpaved		Mountains	2	10	4,200

# TABLE 4.2.4-1 FREE SPEED AND CAPACITY BY ROAD TYPE

# 3) Passenger Car Unit

**Table 4.2.4-2** shows the Passenger Car Unit (PCU) used in vehicle traffic conversion. This value is the same used by the DPWH.

Vehicle Type	Passenger Car Unit
Passenger Car	1.0
Jeepney	1.5
Bus	2.2
Truck	2.5

## 4) Time Evaluation Value

An important input for the demand forecast is the trip maker's time value. This time value is the basis for a trip maker to decide whether to use toll expressway or not. The time values were derived from MMUEN (JICA, The Development of the Public –Private Partnership Technique for the Metro Manila Urban Expressway Network) survey results. Though MMUEN data is based on the Metro Manila and surrounding area, Time Evaluation Value in Region IV-A is lower than that of MMUEN. Based on the rate of GRDP per capita (GRDP per capita of Region IV-A / that of NCR and Region IV-A = 61,473 peso / 96,505 peso = 0.637), Time Evaluation Value in Region IV-A was set.

Supposing time value in the future will increase in accordance with inflation rate of 4.0% per year, the figures in **Table 4.2.4-3** will be the time value.

					Unit: Peso/nour
Area	MMUEN (Metro Manila and surrounding Area)		Region IV-A	(Study Area)	
Year	Y2009	Y2009	Y2011	Y2020	Y2030
	( a )	(b=a*0.637)	$(c=b*1.05^2)$	$(d=c*1.04^{10})$	$(e=d*1.04^{10})$
Car	331.4	211.1	232.7	331.3	490.3
Jeepney	465.9	296.8	327.2	465.7	689.4
Bus	1,524.2	970.9	1,070.4	1,523.6	2,255.2
Truck	873.2	556.2	613.2	872.8	1,292.0

# TABLE 4.2.4-3 TIME EVALUATION VALUE BY VEHICLE TYPE Unit: Dec from

# 4.2.5 Assignment Validation

The procedure of model validation entails two steps: first, the present OD matrix is assigned on an existing network. Second, the assigned traffic volume is compared with the result of the traffic count surveys at each corresponding location. This verification aims to check the accuracy of both the current OD matrix and an existing network model representing the existing transport situation.

**Table 4.2.5-1** presents traffic volumes generated from traffic assignment and observed traffic (traffic count survey). **Figure 4.2.5-2** shows the result of comparison between the assigned traffic volumes and observed traffic volume. This comparison between observed traffic count and assigned traffic flow at individual sites is done via the Mean Absolute Difference (MAD)<sup>1</sup> Ratio. For daily traffic counts, the value of the MAD ratio is 0.21 which is considered to reflect a good calibration. By all indicators the assignment has accurately replicated year 2011.

TABLE 4.2.5-1 COMPARISON OF OBSERVED (SURVEY DATA) AND ASSIGNED
TRAFFIC VOLUME
Unit. Vohiale/d

				Unit: veni	cie/day
Road Name	Location	Observed Traffic Volume	Assigned Traffic Volume	Difference	Rate
Quirino Ave.	Zapote, Las Piñas	29,951	26,917	3,034	11%
Aguinaldo Highway	Talaba VI, Bacoor	52,404	47,078	5,326	11%
Molino Blvd.	Mambog IV, Bacoor	28,628	27,559	1,069	4%
Aguinaldo Highway	Real I, Bacoor	24,697	25,776	-1,079	-4%
Cavite Expressway	Bacao II, General Trias	10,948	13,235	-2,288	-17%
Antero Soriano Highway	Samala-Marquez, Kawit	14,192	11,635	2,557	22%
General Trias Drive	Tejero, General Trias	10,130	12,111	-1,981	-16%
Tanza - Trece Martires Road	Sanja Mayor, Tanza	7,275	8,504	-1,229	-14%
Open Canal Road	Malagasang II, Imus	6,041	7,555	-1,515	-20%
Aguinaldo Highway	Anabo II-E, Imus	26,514	24,462	2,051	8%
Daang Hari Road	Pinagbuklod, Imus	16,830	14,497	2,333	16%
Molino Road	Almanza Dos, Las Piñas	20,307	19,350	957	5%
Daang Hari Road	Brgy Molino I, Bacoor	22,475	19,077	3,398	18%
SLEX	Petron & Caltex Stations	95,215	98,165	-2,950	-3%
Manila South Road	Tunasan, Muntinlupa	27,650	29,432	-1,782	-6%
Governor's Drive	Mabuhay, Carmona	19,059	20,418	-1,359	-7%
Sta. Rosa - Tagaytay Road	Sto. Domingo, St. Rosa	12,881	13,409	-528	-4%
Paliparan Road	Paliparan I, Dasmariñas	9,340	12,043	-2,703	-22%
Governor's Drive	Paliparan I, Dasmariñas	19,965	17,253	2,712	16%
Aguinaldo Highway	Biga II, Silang	14,796	15,186	-390	-3%
Governor's Drive	San Francisco, General Trias	20,973	22,770	-1,797	-8%
Andres Bonifacio St.	San Francisco, General Trias	9,494	11,549	-2,055	-18%
Crisanto De Los Reyes Ave.	Buenavista III, General Trias	5,970	8,815	-2,845	-32%
Crisanto De Los Reyes Ave.	Biclatan, General Trias	8,040	10,424	-2,384	-23%

<sup>&</sup>lt;sup>1</sup> MAD Ratio is defined by the following formula: MAD Ratio =  $\frac{\sum_{n=1}^{n} \frac{Count - assignment}{assignment}}{n}$  where n is the number of observations.

Road Name	Location	Observed Traffic Volume	Assigned Traffic Volume	Difference	Rate
Governor's Drive	Sabang, Naic	2,388	3,319	-932	-28%
Antero Soriano Highway	Lambingan, Tanza	6,402	6,670	-268	-4%
Τα	522,561	527,209	-4,648	-1%	



FIGURE 4.2.5-1 COMPARED OBSERVED TRAFFIC VOLUME AND ASSIGNED TRAFFIC VOLUME



FIGURE 4.2.5-2 COMPARED OBSERVED TRAFFIC VOLUME AND ASSIGNED TRAFFIC VOLUME AT SCREEN-LINE



FIGURE 4.2.5-3 MAP OF OBSERVED TRAFFIC VOLUME AND ASSIGNED TRAFFIC VOLUME

# 4.2.6 Toll Rate vs. Revenue

In order to set the proper toll rate of CALAX, the traffic volume and the amount of revenue are estimated by traffic assignment model. **Figure 4.2.6-1** shows the result of traffic assignment of toll rate in year 2011.

- In case of toll free, total traffic volume to enter CALAX is 69,316 vehicles/day
- The toll rate for getting higher revenue is about **4 to 15** Peso/km and the amount of revenue is about 3.7 and 4.2 million Peso/day. Although maximum amount of revenue is 10 peso case, traffic volume to enter CALAX is only 19,819 vehicle /day which is about 30% of toll free case.
- The desirable toll rate for attractive to motorist and higher revenue is **4.0 Peso/km**. Total traffic volume to enter CALAX is 41,567 vehicle/day (60% of toll free case). This toll rate is the almost same as that of Manila Cavite Toll Expressway (herein CAVITEX) phase-1 and it is cheaper than that of other new present expressways such as CAVITEX Phase-2 and Skyway Phase-2 (see **Table 4.2.6-1**). Most motorists may still accept the 4.0 peso/km in year 2011.




(Peso/km)							
		Class 1	Class 2	Class 3			
Toll Road		Car,	Light	Heavy	Domonica		
		Jeep,	Ligni Trusch	Truck,	Kemarks		
		Pick-up Truck T	Trailer				
Metro Manila	Elevated Phase 1	6.84	13.68	20.53	Skyway/Buendia - Bicutan (9.50 km)		
	Elevated Phase 2	11.92	23.84	35.76	Alabang - Bicutan (6.88 km)		
Skyway (MINIS)	At grade	7.85	15.70	23.56	Magallanes - Alabang (13.50 km)		
North Luzon Express	sway (NLEX)	2.38	5.92	7.08			
South Luzon Express	sway (SLEX)	3.02	6.04	9.10			
Manila Cavite Toll	Phase 1	3.33	6.82	9.85	R-1 Extension to Bacoor (6.6 km)		
Expressway	Phase 2	8.96	17.92	26.87	Bacoor Bay to Kawit (6.475 km)		
Southern Tagalog Arterial Road (STAR)		1.43	2.86	4.26			
Subic-Clark-Tarlac E	Expressway (SCTEX)	2.68	5.36	8.04			

# TABLE 4.2.6-1 PRESENT TOLL RATE

Source: TRB, 2011 May

Toll rate is assumed as 8% adjustment as every two years since 4peso/km in year 2011.

# TABLE 4.2.6-2 ASSUMED TOLL RATE OF CALAX

Unit: Peso /km

			O III CI
	Class-1	Class-2	Class-3
Year 2011	4.0	8.0	12.0
Year 2017	5.0	10.0	15.0
Year 2020	5.4	10.8	16.2
Year 2030	7.9	15.8	23.7

Source JICA Study Team

### 4.2.7 Traffic Assignment Result

Traffic assignment was conducted as following two cases.

# Case-1 Cavite section and Laguna section Construction Case

Case-2 Laguna section only Construction Case

#### 1) Case-1 CALAX (Cavite Section and Laguna Section)

#### a) Total Traffic Efficiency

Table 4.2.7-1 shows the traffic assignment of without CALAX case and with case.

Year	Case	Total Travel Time (PCU*br)	Total Vehicle Km (PCU*km)	Average Travel Speed
2017	With			
2017	vv Itti	908,836	20,086,464	28.2
	W/O	983,977	$25,\!890,\!328$	26.3
	With-W/O	-75,141	-303,864	1.8
2020	With	1,084,733	29,186,268	26.9
	W/O	1,194,959	29,559,040	24.7
	With-W/O	-110,226	-372,772	2.2
2030	With	1,620,295	37,741,397	23.3
	W/O	1,779,212	37,236,284	20.9
	With-W/O	-158,917	505,114	2.4

#### TABLE 4.2.7-1 TRAFFIC INDICATORS OF W/O CALAX (CAVITE AND LAGUNA SECTION) CASE AND WITH CASE

Source JICA Study Team

Note: PCU: Passenger Car Unit

- Total travel time will decrease if CALAX was constructed. The difference of total travel time is 75,141 hours/day in year 2017 which much traffic time can be saved by CALAX.
- If CALAX was constructed, many motorists may use this expressway even though their trips become longer. Total PCU\*km of with case in year 2030 will be higher than that of without case.

# b) Traffic Assignment

Figure 4.2.7-1 to 4.2.7-3 shows the estimated traffic volume of CALAX Laguna section.

• The highest traffic volume interchange section is between Sta.Rosa-Tagaytay IC and Laguna Blvd. IC, which number of traffic are 25,943 (vehicle/day) in year 2017, 32,567 (vehicle/day) in year 2020 and 50,847 (vehicle/day) in year 2030.

**Figure 4.2.7-4 to 4.2.7-6** shows the traffic assignment result with CALAX and **Figure 4.2.7-7 to 4.2.7-9** shows the difference of traffic volume with case and without case.

• If CALAX is constructed, traffic volume of major arterial road will decrease excluding CAVITEX shown in **Figure 4.2.7-7** to **4.2.7-9**.

 Table 4.2.7-2 shows the total traffic volume to enter CALAX Laguna section and total vehicle km of CALAX Laguna Section.

• The number of traffic using CALAX Laguna section is estimated as 37,916 in year 2017, 47,128 in year2020 and 80,625 in year 2030.

	CAVILE & LAGUNA SECTION)								
Year	Total T	Total Traffic Enter to CALAX Laguna				Total vehicle*km(Laguna Section only)			
	Section (Veh/day)								
	Class1	Class2	Class3	Total	Class1	Class2	Class3	Total	
2017	24,792	8,769	4,355	37,916	253,047	102,418	56,064	411,529	
2018	27,110	9,164	4,467	40,742	277,104	107,085	57,545	441,734	
2019	29,646	9,578	4,582	43,806	303,449	111,965	59,064	474,478	
2020	32,418	10,010	4,700	47,128	332,298	117,067	60,624	509,990	
2021	34,507	10,372	4,801	49,680	348,818	120,839	62,277	531,934	
2022	36,730	10,747	4,905	52,382	366,159	124,732	63,975	554,866	
2023	39,097	11,135	5,011	55,243	384,362	128,751	65,718	578,832	
2024	41,616	11,537	5,120	58,272	403,470	132,899	67,510	603,880	
2025	44,297	11,953	5,230	61,481	423,528	137,181	69,350	630,060	
2026	47,152	12,385	5,344	64,880	444,583	141,601	71,241	657,426	
2027	50,190	12,832	5,459	68,482	466,685	146,164	73,183	686,032	
2028	53,424	13,296	5,577	72,297	489,886	150,873	75,178	715,937	
2029	56,866	13,776	5,698	76,340	514,240	155,734	77,227	747,201	
2030	60,530	14,274	5,821	80,625	539,804	160,752	79,332	779,889	

TABLE 4.2.7-2 TOTAL TRAFFIC VOLUME AND TOTAL VEHICLE KM(CASE: WITH
CAVITE & LAGUNA SECTION)

Note: With Cavite and Laguna Section Case. The figure is shown only traffic volume of Laguna Section.



# CASE-1(CAVITE AND LAGUNA SECTION CONTRUCTION CASE)

FIGURE 4.2.7-1 TRAFFIC PROJECTION (YEAR 2017) OF CALAX LAGUNA SECTION (CASE-1)



# CASE-1(CAVITE AND LAGUNA SECTION CONTRUCTION CASE)

FIGURE 4.2.7-2 TRAFFIC PROJECTION (YEAR 2020) OF CALAX LAGUNA SECTION (CASE-1)



# CASE-1(CAVITE AND LAGUNA SECTION CONTRUCTION CASE)

FIGURE 4.2.7-3 TRAFFIC PROJECTION (YEAR 2030) OF CALAX LAGUNA SECTION (CASE-1)



FIGURE 4.2.7-4 RESULT OF TRAFFIC ASSIGNMENT IN YEAR 2017 (CASE-1)



FIGURE 4.2.7-5 RESULT OF TRAFFIC ASSIGNMENT IN YEAR 2020 (CASE-1)



FIGURE 4.2.7-6 RESULT OF TRAFFIC ASSIGNMENT IN YEAR 2030 (CASE-1)



FIGURE 4.2.7-7 COMPARISON OF WITH CASE AND WITHOUT (CAVITE AND LAGUNA SECTION) CASE IN YEAR 2017



FIGURE 4.2.7-8 COMPARISON OF WITH CASE AND WITHOUT (CAVITE AND LAGUNA SECTION)



FIGURE 4.2.7-9 COMPARISON OF WITH CASE AND WITHOUT (CAVITE AND LAGUNA SECTION)

## 2) Case-2 CALAX (Laguna Section only)

#### a) Total Traffic Efficiency

 Table 4.2.7-3 shows the traffic assignment of without CALAX case and with case.

<b>TABLE 4.2.7-3</b>	TRAFFIC INDICATORS	OF W/O	CASE AND	WITH LAGUNA	<b>SECTION</b>

CASE						
Year	Case	Total Travel Time	Total Vehicle Km	Average Travel Speed		
		(PCU*hr)	(PCU*km)	(km/hr)		
2017	With	942,372	25,379,915	26.9		
	W/O	983,977	25,890,328	26.3		
	With-W/O	-41,604	-510,413	0.6		
2020	With	1,137,266	28,922,060	25.4		
	W/O	1,194,959	29,559,040	24.7		
	With-W/O	-57,692	-636,980	0.7		
2030	With	1,701,499	37,260,027	21.9		
	W/O	1,779,212	37,236,284	20.9		
	With-W/O	-77,713	23,743	1.0		

Source JICA Study Team

Note: PCU: Passenger Car Unit

• Total travel time will decrease if CALAX Laguna section was constructed. The difference of total travel time is 41,604 hours/day in year 2017 which much traffic time can be saved by CALAX.

#### 2) Traffic Assignment

Figure 4.2.7-10 to 4.2.7-12 shows the estimated traffic volume of CALAX Laguna section.

• The highest traffic volume interchange section is between Sta.Rosa-Tagaytay IC and Laguna Blvd. IC, which number of traffic are 27,743 (vehicle/day) in year 2017, 35,240 (vehicle/day) in year 2020 and 52,799 (vehicle/day) in year 2030.

**Figure 4.2.7-13 to 4.2.7-15** shows the traffic assignment result with CALAX and **Figure 4.2.7-7 to 4.2.7-12** shows the difference of traffic volume with case and without case.

 Table 4.2.7-4 shows the total traffic volume to enter CALAX Laguna section and total vehicle km of CALAX Laguna Section.

Year	Total Traff	Total Traffic Enter to CALAX Laguna Section				Total vehicle*km(Laguna Section only)			
	(Veh/day)								
	Class1	Class2	Class3	Total	Class1	Class2	Class3	Total	
2017	24,600	9,945	4,837	39,382	250,738	120,376	62,914	434,028	
2018	27,039	10,427	4,952	42,418	277,249	127,378	64,403	469,030	
2019	29,720	10,933	5,070	45,723	306,563	134,786	65,927	507,277	
2020	32,666	11,463	5,191	49,320	338,976	142,626	67,488	549,090	
2021	34,640	11,779	5,255	51,674	354,258	145,858	68,746	568,862	
2022	36,734	12,105	5,319	54,158	370,229	149,163	70,028	589,420	
2023	38,954	12,439	5,385	56,777	386,920	152,543	71,334	610,797	
2024	41,308	12,782	5,451	59,541	404,363	156,000	72,664	633,027	
2025	43,804	13,135	5,518	62,457	422,593	159,535	74,020	656,147	
2026	46,452	13,497	5,586	65,535	441,644	163,150	75,400	680,194	
2027	49,259	13,870	5,654	68,784	461,554	166,847	76,806	705,207	
2028	52,236	14,253	5,724	72,213	482,362	170,628	78,238	731,228	
2029	55,393	14,646	5,794	75,834	504,108	174,494	79,698	758,300	
2030	58,741	15,051	5,865	79,657	526,835	178,448	81,184	786,467	

# TABLE 4.2.7-4 TOTAL TRAFFIC VOLUME AND TOTAL VEHICLE KM CASE-2( LAGUNA SECTION CONSTRUCTION)

# CASE-2(LAGUNA SECTION CASE)



FIGURE 4.2.7-10 TRAFFIC PROJECTION (YEAR 2017) OF CALAX LAGUNA SECTION,

# CASE-2(LAGUNA SECTION CASE)



FIGURE 4.2.7-11 TRAFFIC PROJECTION (YEAR 2020) OF CALAX LAGUNA SECTION

# CASE-2(LAGUNA SECTION CASE)



FIGURE 4.2.7-12 TRAFFIC PROJECTION (YEAR 2030) OF CALAX LAGUNA SECTION



FIGURE 4.2.7-13 RESULT OF TRAFFIC ASSIGNMENT IN YEAR 2017 (CASE-2)



FIGURE 4.2.7-14 RESULT OF TRAFFIC ASSIGNMENT IN YEAR 2020 (CASE-2)



FIGURE 4.2.7-15 RESULT OF TRAFFIC ASSIGNMENT IN YEAR 2030 (CASE-2)

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FIGURE 4.2.7-16 COMPARISON OF WITH CASE AND WITHOUT (LAGUNA SECTION) CASE-2 IN YEAR 2017



FIGURE 4.2.7-17 COMPARISON OF WITH CASE AND WITHOUT (LAGUNA SECTION) CASE-2 IN YEAR 2020



FIGURE 4.2.7-18 COMPARISON OF WITH CASE AND WITHOUT (LAGUNA SECTION)

CASE-2 IN YEAR 2030

# 4.2.8 Level of Service (LOS) Analysis

Definition of Level of Service (LOS) by Highway Capacity Manual (HCM) 2000 of USA for the 2-lane highway and for the multi-lane highway is shown in **Table 4.2.8-1**.

LOS A	Free-flow operations. Free-flow speeds prevail. Vehicles are almost completely
	unimpeded in their ability to maneuver within the traffic stream.
LOS B	Reasonably free flow. Free-flow speeds are maintained. The ability to maneuver
	within the traffic stream is only slightly restricted, and the general level of physical
	and psychological comfort provided to drivers is still high.
LOS C	Flow with speeds at or near the Free Flow Speed of the freeway. Freedom to
	maneuver within the traffic stream is noticeably restricted, and lane changes require
	more care and vigilance on the part of the driver.
LOS D	The level at which speeds begin to decline slightly with increasing flows and
	density begins to increase somewhat more quickly. Freedom to maneuver within the
	traffic stream is more noticeably limited, and the driver experiences reduced
	physical and psychological comfort levels.
LOS E	Operation at capacity. Operations at this level are volatile, because there are
	virtually no usable gaps in the traffic stream. Vehicles are closely spaced leaving
	little room to maneuver within the traffic stream at speeds that still exceed 80 km/h.
	Maneuverability within the traffic stream is extremely limited, and the level of
	physical and psychological comfort afforded the driver is poor
LOS F	Breakdowns in vehicular flow. Such conditions generally exist within queues
	forming behind breakdown points. Breakdowns occur for a number of reasons:
	• Traffic incidents can cause a temporary reduction in the capacity of a short
	segment, so that the number of vehicles arriving at the point is greater than the
	number of vehicles that can move through it.
	• Points of recurring congestion, such as merge or weaving segments and lane
	drops, experience very high demand in which the number of vehicles arriving is
	greater than the number of vehicles discharged.
	• In forecasting situations, the projected peak-hour (or other) flow rate can
	exceed the estimated capacity of the location.

TABLE 4.2.8-1 DEFINITION OF LOS FOR MULTI-LANE HIGHWAY

Source: HCM 2000



Source: HCM 2000



## **Appropriate Level of Service by AASHTO**

A Policy on Geometric Design of Highways and Streets, 2004 (AASHTO) suggests the appropriate level of service for each functional class of road as follows;

	Approp	ppriate level of service for specified combinations of					
Functional class	area and terrain type						
		Rural Urban and					
	Rural level	Rural rolling mountainous suburb					
Freeway	В	В	С	С			
Arterial	В	В	С	С			
Collector	С	С	D	D			
Local	D	D	D	D			

#### TABLE 4.2.8-2 GUIDELINES FOR SELECTION OF DESIGN LEVEL OF SERVICE

Source: A Policy on Geometric Design of Highways and Streets, 2004, AASHTO

According to the above guidelines, expressways are recommended that LOS be "B" or "C", however, the guideline seems to be aiming quite high LOS. LOS may be lowered by one rank, say from "B" to "C".

#### Service Traffic Volume of four-lane CALAX

In accordance with HCM formula, the service traffic volume of four-lane CALAX was estimated as shown in **Table 4.2.8-3**. Estimated traffic volume and LOS is shown in **Table 4.2.8-4**. The LOS of the 4-lane CALAX at the opening year will be "B", and it will be "D" in year 2030. The widening to a 6-lane expressway should be made before LOS reaches to "E". In consideration of some allowance, Laguna Section of CALAX will not need to be widened for 15 years.

LOS	Service volume for LOS			
LOS	Veh/Hour (4-lane)	Veh/Day (4-lane)		
А	Less than 1,050	Less than 21,875		
В	Less than 1,660	Less than 34,583		
С	Less than 2,410	Less than 50,208		
D	Less than 3,140	Less than 65,416		
Е	Less than 3,500	Less than 72,916		
F	More than 3,500	More than 72,916		

TABLE 4.2.8-3 SERVICE TRAFFIC VOLUME OF FOUR-LANE CALAX

Consultant's estimate based on Highway Capacity Manual 2000 (HCM2000)

Note: Assumptions: Rural Area, 23 percent truck and bus; free flow speed; 100km/hr.

Year	Daily Traffic Assignment (Veh./day) (both directions) (a)	Daily Traffic Assignment (Veh./day) (one direction) (b = a * 0.6)	Peak Hour Traffic Volume (Veh./hour) (one direction) (c = b * 0.08)	LOS	Volume/Capacity Ratio
2017	25,943	15,566	1,245		0.36
2018	27,986	16,792	1,343		0.38
2019	30,190	18,114	1,449	В	0.41
2020	32,567	19,540	1,563		0.45
2021	34,168	20,501	1,640		0.47
2022	35,847	21,508	1,721	С	0.49
2023	37,609	22,565	1,805		0.52
2024	39,457	23,674	1,894		0.54
2025	41,397	24,838	1,987		0.57
2026	43,431	26,059	2,085		0.60
2027	45,566	27,339	2,187		0.62
2028	47,805	28,683	2,295		0.66
2029	50,155	30,093	2,407		0.69
2030	52,620	31,572	2,526	D	0.72

# TABLE 4.2.8-4 ESTIMATED 4-LANE CALAX TRAFFIC VOLUME(STA. ROSA TAGAYTAY ROAD IC – LAGUNA BLVD IC SECTION)

Assumptions: 60/40 directional split, Peak hour rate : 8 percent

#### 4.2.9 Influence Degree of Traffic for Not Implemented of each section

The influence degree of CALAX traffic was studied in case of another section was not implemented. The summary of total traffic of CALAX is shown in **Table 4.2.9-1** and **Table 4.2.9-2**.

Unit: vehicle-km/day

				-	
	Both Sections Implemented			Only Cavite	Only Laguna
	Cavita	Laguna	Total	Section	Section
	Cavile	Laguna		Implemented	Implemented
Y2017	654,252	411,529	1 065 791	600,464	434,028
	(1.00)	(1.00)	1,005,781	(0.92)	(1.05)
Y2020	895,855	509,990	1 405 944	822,988	549,090
	(1.00)	(1.00)	1,403,844	(0.92)	(1.08)
Y2030	1,288,037	779,889	2.067.026	1,221,862	786,467
	(1.00)	(1.00)	2,007,920	(0.95)	(1.01)

TABLE 4.2.9-1 TOTAL VEHICLE-KM OF CALAX

#### TABLE 4.2.9-2 THE NUMBER OF TRAFFIC ENTER TO CALAX

			U	nit: vehicle/day
	Both Sections Implemented		Only Cavite	Only Laguna
	Cavita	Laguna	Section	Section
	Cavite	Laguna	Implemented	Implemented
Y2017	49,259	37,916	46,845	39,382
	(1.00)	(1.00)	(0.95)	(1.04)
Y2020	66,433	47,178	66,140	49,320
	(1.00)	(1.00)	(0.99)	(1.05)
Y2030	90,784	80,625	87,693	79,657
	(1.00)	(1.00)	(0.97)	(0.99)

- Generally traffic of Cavite section will decrease if the construction of Laguna section were not implemented. The maximum decrease rate is 8% (= 600,462 / 654,252 in year2017).
- Traffic of Laguna section will increase if Cavite section were not constructed. Since many traffic from/to Manila and Tagaytay will use Laguna section if Cavite section was not constructed, traffic in only Laguna section implemented case will higher than that in both sections implemented case. Figure 4.2.9-1 illustrated the traffic route information using Laguna section (Laguna Blvd IC ~ Techno Park IC). To compare with both-section implemented case, traffic in only Laguna section increase especially from/to Manila using SLEX.



FIGURE 4.2.9-1 COMPARISON TRAFFIC TRAVELING CALAX LAGUNA SECTION (YEAR 2017)

# **CHAPTER 5**

# REVIEW OF THE 2006 FS AND ALIGNMENT STUDY

# CHAPTER 5 REVIEW OF THE 2006 FS AND ALIGNMENT STUDY

# 5.1 NECESSITY OF THE PROJECT

CALAX is needed from the following viewpoints;

#### (1) Traffic Congestion of National Roads in Cavite and Laguna Provinces

Both Cavite and Laguna Provinces are neighboring provinces of Metro Manila. The two provinces are rapidly urbanizing to accommodate spilled over population from Metro Manila. Population growth rates of the two provinces are quite high (4.76% per annum in the Cavite Province and 3.34% per annum in the Laguna Province from 2000 to 2007. Economic activities, particularly manufacturing industry, are also quite active. Thus, two provinces are within socio-economic activities of Metro Manila.

In spite of rapid urbanization, the road network development was not so significant, only widening of Aguinaldo Highway and Governor's Drive to a 4-lane road was made and a portion of DaangHari Road was constructed in the last 20 years. Road network development was lagged behind the rapid urbanization. There are several Provincial Roads, however, that are still 2-lane roads.

Insufficient road network development is now resulting in traffic congestions of national roads and most of provincial roads.

High capacity roads which allows fast, safe, comfortable and reliable means of transport is highly needed in the areas to reduce traffic congestions in Cavite and Laguna Provinces.

#### (2) Economic and Social Activities in the Two Provinces

Many economic zones/industrial estates have already been operated and will be further developed in two provinces by making advantages of proximity to Metro Manila. The two provinces are now the center of manufacturing industry in the Philippines contributing to economic development of the country and generation of a lot of job opportunities.

Many universities and high schools have been transferred or established in the area, such as the Technological University of the Philippines and De La Salle in Dasmariñas, Cavite; Adventist University of the Philippines in Silang, Cavite; University of Sto. Tomas in Sta. Rosa, Laguna, etc.

Various real estate companies (land developers) are developing commercial areas and residential areas in the project areas. They have already acquired lands and some areas have been developed and have been sold out or are selling lands/lots they developed. It is expected that their lands will be sold out within 10 to 15 years and will be fully urbanized.

Above development will stimulate economic and social activities in the two provinces, thus transport network to support such economic and social activities is definitely needed.

#### (3) Urbanization

As mentioned in (2) above, urbanization of the area is lead by the private sector, particularly by land developers. With the lack of land development master plan by the Government, and

developers only plan within their own properties and transport access to/from their properties is only made to the existing roads and/or existing expressway.

Sound urbanization should be guided/lead by the proper road network. National road network in the area of Laguna section is quite scarce, thus CALAX is needed to be planned to guide/lead sound urbanization of the area.

#### (4) Lack of Public Roads

The area of Laguna section lacks public roads which are only Aguinaldo Highway, Governor's Drive and Sta. Rosa – Tagaytay Road. Instead, there are many private roads developed by land developers, most of which are not open to the general public and only these cars allowed by the land owners can pass. Thus, the development of public roads which can be used by the general public is needed.

#### (5) Expressway Network

There are two expressways in Cavite and Laguna Provinces, namely SLEX and CAVITEX, however they are functioning individually and the expressway network is not formed yet. If something happens and traffic of an expressway becomes interrupted, travelers have no other choice but to select/use the congested road.

#### 5.2 REVIEW OF THE 2006 FS

#### 1) **Proposed Alignment by the 2006 FS**

CALAX was studied in the JICA-assisted Feasibility Study and Implementation Support on the CALA East-West National Project.

The alignment recommended by the 2006 FS is shown in Figure 5.2-1.

The recommended alignment starts at Eton/Greenfield Interchange (IC) of SLEX and goes westwards crossing Sta. Rosa – Tagaytay Road and reaches to Aguinaldo Highway. From there, it goes north-east direction and ends at Governor's Drive.

#### 2) Objection to the Proposed Alignment by the Land Developers

Many land developers such as Eton Properties Philippines, Inc., Greenfield Development Corporation, University of Sto. Tomas, etc., purchased the lands in the corridor from SLEX and Sta. Rosa – Tagaytay Road.

DPWH undertook the stakeholders meeting in 2006 and 2007 in order to realize the project, however, most land developers did not agree to the proposed alignment because their land development plan is severely affected. Thus, DPWH suspended the further actions for implementation.

Thus, the proposed alignment is required to be re-studied.

#### 3) Engineering Concept

CALAX was planned as a national road and not as an access-controlled expressway, thus no toll facilities were planned, although grade separations at intersections with major roads were planned.

#### 4) Comparison with Proposed Alignment vs. 2006 FS Alignment

As mentioned above, since fast urbanization are developing in this area, project of 2006 FS alignment was suspended. A green dot line shown in **Figure 5.2-1** is proposed alignment by this Study. Instead of connect ETON/Greenfield Interchange, this alignment connect with Mamplasan IC. As this proposed alignment use existing private road (ROW=60m, 6.2km) for avoid residential area and existing buildings, expressway structure will become viaduct. Construction cost of proposed alignment may be much higher than that of 2006 FS alignment.



FIGURE 5.2-1 CALAX ALIGNMENT RECOMMENDED BY THE 2006 FS