





JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY,
THE REPUBLIC OF THE PHILIPPINES

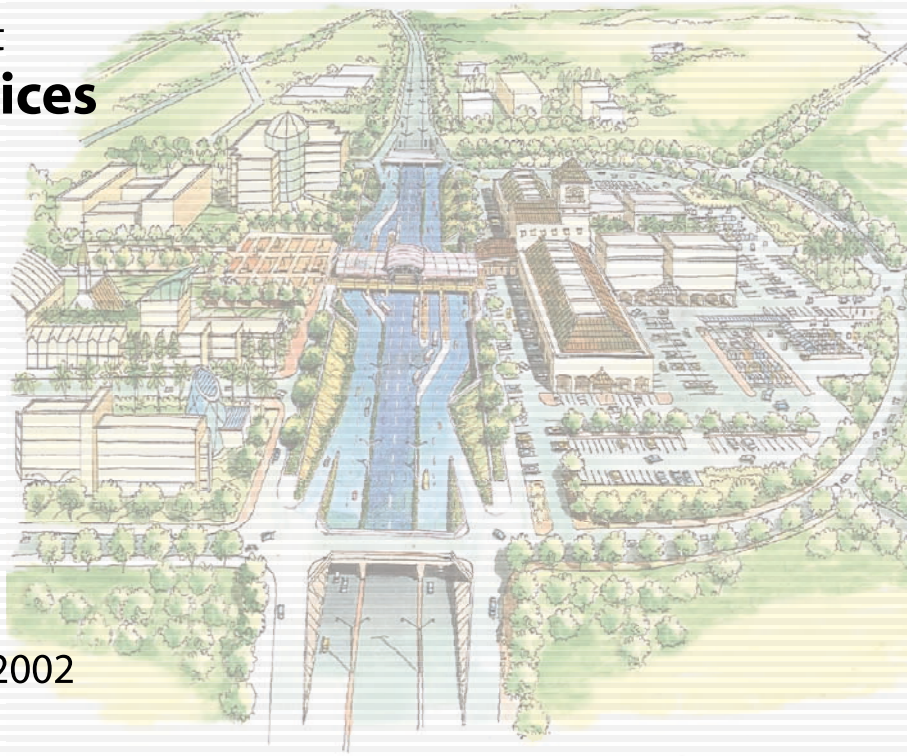
No.

The Feasibility Study of the Proposed

Cavite Busway System

Final Report

Appendices



November 2002

ALMEC Corporation

Pacific Consultants International

SSF
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PHP 1 ＝ JP ¥ 2.34

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ANNEX A

NATURAL CONDITIONS

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ANNEX A1: DETAILED GEOLOGICAL DESCRIPTION

Detailed descriptions of the geological sequence in the area of the One Asia property is given below, placed in sequence with the oldest structures first.

(1) Taal Caldera Pyroclastic Deposits

These rocks are composed of ignimbrites (welded tuffs and pyroclastic flows) containing abundant lava materials (basaltic cinders, fragments of lava flows, bread-crust bombs, basalt and andesite fragments) ranging in size from a few decimetres to one metre. The matrix is composed of both fine ash and sand- to pebble-sized pyroclastics and is also basaltic in composition. Due to the high amount of basalts contained by the rocks, the outcrops appear dark in colour, seen as dark grey to black on fresh surfaces.

These rocks were formed by catastrophic eruptions at the Taal Lake area, which caused a region-wide disruption, leaving behind the large depression on which the present Taal Lake formed. The high temperature of deposition of the caldera-forming rocks caused these to be highly welded, resulting in the very hard, well-indurated outcrops observed in the area. These rocks are considered as the oldest in the area dating from a few hundred thousand years ago. These rocks are found in the eastern part of the One Asia site, along the channels and riverbed of Pasong Buaya Creek.

Since these rocks are produced by massive volcanic activity, their spatial distribution is widespread, and would likely covers tens of kilometres around Taal Lake. The actual thickness of the deposit is unknown, but may extend from tens to hundreds of metres below the ground. The other parts of the project site may also have this rock as its substrate at depth.

(2) The Massive Post-Caldera Pyroclastic Flows

These rocks are composed of ash-rich pyroclastic flows, containing occasional basaltic bombs of a few centimetres in diameter. The rocks appear as tan to light brown in colour, and generally appear massive with no recognisable texture except for the inclusion of bombs and other rocks. Some parts of the massive material show local inter-depositional erosion followed by channel-fill deposition of coarse sand pyroclasts. The sand-sized pyroclasts show minor sorting, with some thin, draping ash deposits characteristic of explosive surges. Minor cross bedding structures are also observed.

The massive pyroclastic flows are related to the volcanism that followed the caldera-formation. The large amount of brown ash indicates possible involvement of lake water that caused phreatic explosions to accompany the pyroclastic flows. The rocks show good indurations, even for the sand-rich sections, indicating both welding and possible cementation from post-deposition hydrothermal activity.

These rocks are found in the southern end of the One Asia property, being exposed near the excavations and natural channels of Kaybubutong Creek. The outcrops show prominent cliffs near the roads, being able to sustain vertical faces created by river erosion and quarries. The age of the massive pyroclastic flows are in the order of tens of thousands of years old, associated with the volcanism that enlarged the proto-Taal Lake into its present form.

(3) Thick-bedded Tuff

Found adjacent to the massive pyroclastic rocks is a unit composed of thick-bedded tuff, occurring in the middle portions of the One Asia property. The thick-bedded tuff appear tan to light brown in colour, and are distinctly bedded, each bed ranging in thickness from a few decimetres to a few meters thick. The beds are composed of fine ash and sand-sized pyroclastic materials. The beds appear near horizontal in attitude, although some units show minor dips towards the north and northwest.

Some of the ash shows sandy grainy texture of well-rounded particles which break down upon crushing with the fingers. These are accretionary lappili and were created when the eruptions produced electrically-charged particles that form globules and fall on the ground as clustered ash. In many of the outcrops, the tuff beds contain coarser grains of both black basaltic scoria and white dacitic pumice. This mixed nature of the ash particles indicate that some to the beds were products of synchronous eruptions of both Taal Volcano (which produced the dark basaltic ash) and Laguna de Bay (which produced the white dacitic particles).

In the southern part of the One Asia property, the thick-bedded tuff appears to directly overlie the massive pyroclastic units. In some outcrops in the eastern part, the massive pyroclastics seem to inter-finger with the tuff.

The thick-bedded tuff may attain a total thickness of a few tens of meters. Its age may be from a few tens of thousands of years old to a few thousand years, and is related to the late stage of formation of Taal Lake.

(4) Thin Bedded Tuff

The northern part of the One Asia site is underlain by thin-bedded tuff composed of tan to light brown ash deposits. The beds range in thickness from a few centimetres to about 30 centimetres. The tuff beds are composed of very fine ash, containing occasional ash-sized particles, usually in their lower sections. Some units are composed of well-sorted sand-sized particles of andesitic ash that form porous but indurated layers without any fine grains. The ash deposits appear to have formed in sub-aerial conditions on a broad and very flat plain. The fine layers of ash are well preserved and no turbulence or ripples were observed. No evidence of marine or lacustrine environment was also observed. In most of the outcrops, the layers are interrupted by dark brown, easily erodible clayey horizons, possibly representing periods when the ash was subjected to weathering, leading to the formation of the soil-like deposits. The soil-like layers are in direct contact with the flat surfaces of the tuff, however, suggesting that the soil-like materials are deposited, rather than derived by weathering of older ash materials.

The age of the thin-bedded ash deposits is probably a few thousand years old, and the uppermost units will likely be correlated to the historical eruptions of Taal. The total thickness of the deposit is unknown, and may extend to a few tens of metres underground. The lowermost sections of this thin-bedded unit are possibly distal counterparts of the thick-bedded units found in the middle part of the One Asia property.

(5) Unconsolidated Alluvium

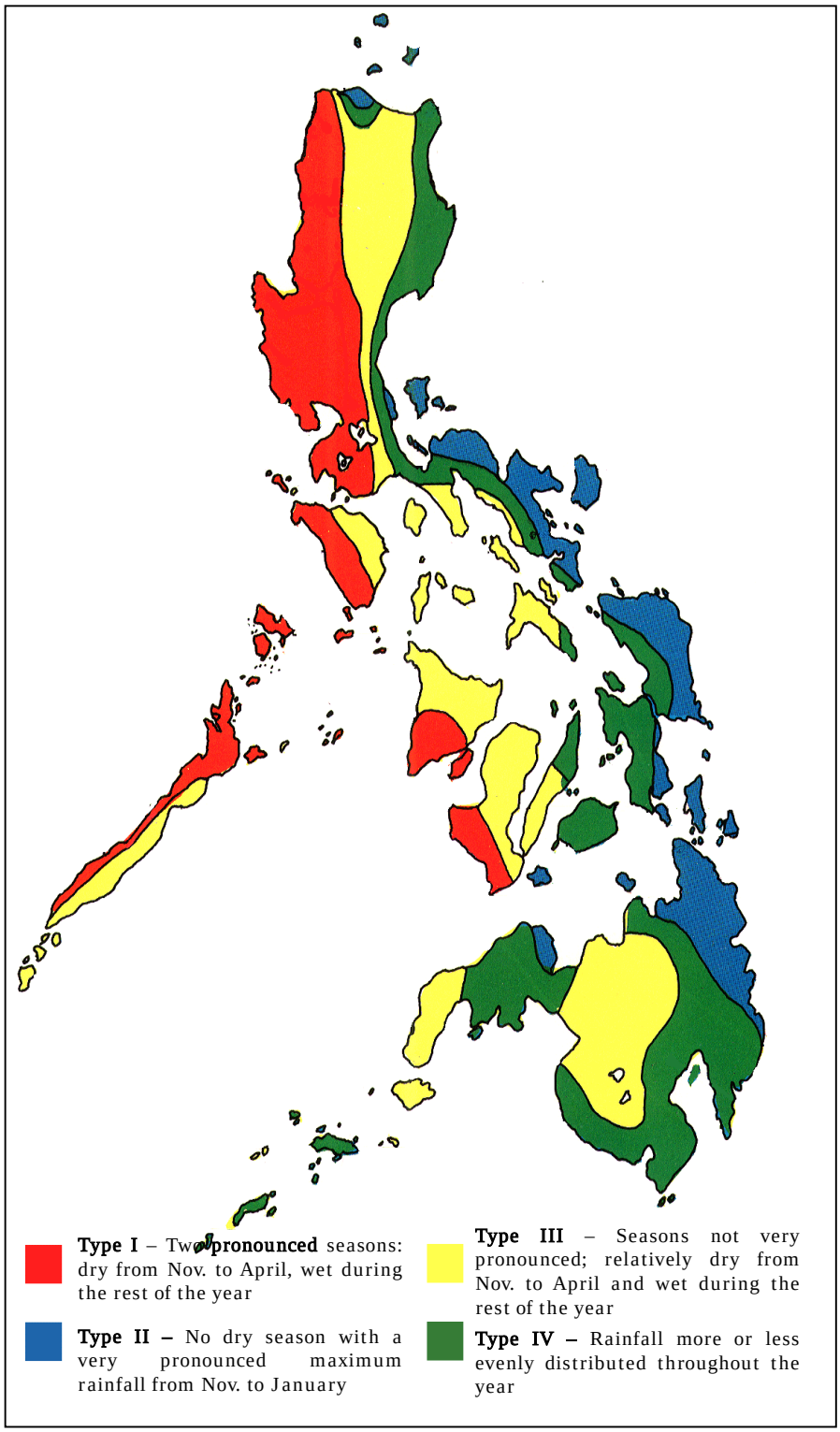
The youngest rock unit is the unconsolidated alluvial deposit. The superficial deposits in the area are products of the in-situ weathering of the pyroclastic materials. This consists of clay, silt and sand that mantle the pyroclastic rocks in the area. Alluvial materials consisting of variable proportions of sand, silt, clay, gravel and occasional boulders, which are products of erosion and sedimentation, are found along the creeks and rivers traversing the area and in the alluvial plain along the coast.

(6) Geology – Structure

As shown on the geological map included in the main report, a NE-SW and SE-NW fault system is found in the study area. Laguna de Bay and Marikina valley were formed by these faults forming large-scale “tectonic graben”. The Marikina and East Zambales faults are reported to be active and have the potential to cause earthquakes in the Metro Manila area.

ANNEX A2: CLIMATIC MAP OF THE PHILIPPINES

Figure A2-1



Source: PAGASA

Table A3-1 Monthly 24 hr Maximum Rainfall Data (mm) at NAIA (MIA), Pasay City

STATION: NAIA (MIA), PASAY CITY
PERIOD: 1961- 2000

Latitude: 14.1N
Longitude: 121.1E
Elevation: 21m

Year	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Annual		
	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Month	day	Rain
1961	0.5	19	2	4	1.8	14	9.1	30	56.4	25	225.3	27	67.8	12	142.4	28	88.9	21	129.5	8	59.2	22	3.6	4	JUN	27	225.3
1962	2	6	0	0	1.3	10	19.8	3	24.4	22	45	23	146.8	23	49.5	22	166.1	4	5.1	17	34	22	0.5	1	SEP	4	166.1
1963	0.3	14	0.3	20	0	0	0.8	9	2.6	28	69.1	27	49	22	84.9	13	119.1	9	24.2	16	7.6	25	50	13	SEP	9	119.1
1964	4.6	25	2.8	26	1.3	1	7.1	28	12.2	27	277.9	29	160	17	51.9	25	88.1	29	38.9	6	41.9	20	51	14	JUN	29	277.9
1965	1	23	0.3	27	1.3	25	11.7	14	52.2	27	41.7	24	65.3	26	58.9	29	36.6	16	19.8	2	36.1	6	11.6	16	JUL	26	65.3
1966	11.3	27	5.8	24	0	0	1	8	90.2	19	29.2	19	44.7	15	48.3	31	145.3	5	15.5	20	94	20	47.8	27	SEP	5	145.3
1967	13.7	14	6.1	28	0.5	3	1	17	31.5	31	92	1	52.1	21	64.8	14	58.2	17	43	13	100.4	4	7	2	NOV	4	100.4
1968	3.8	28	0	0	1.8	9	0	0	5.6	31	45.5	29	114.5	23	76.8	13	65.6	23	45	15	10.4	20	0	0	JUL	23	114.5
1969	0.3	8	0	0	5.6	18	0.2	25	6.4	28	22.4	10	65.7	26	81.4	6	41.6	20	59.4	6	31.3	18	21.1	11	AUG	6	81.4
1970	55.3	3	0.8	25	1.4	26	0	0	40.6	13	38	7	101.4	14	81.5	31	198.5	3	104	13	45.5	1	30	14	SEP	3	198.5
1971	2	16	0.5	1	35.5	12	12.5	25	21	12	119	15	52.5	20	45	8	24.8	26	109	12	66.5	14	-2	-2	JUN	15	119
1972	-2	-2	-2	-2	16.7	18	0	0	51.6	13	143.5	25	472.4	20	127.6	1	33	17	11.7	1	18.3	5	14.6	13	JUL	20	472.4
1973	0.5	28	0	0	2.3	29	0.3	16	12.7	27	46.2	19	61	26	93.4	18	48.3	17	129	15	118.6	21	29	4	OCT	15	129
1974	0	0	0.5	25	7.4	4	0.5	30	49.6	25	118	9	97.1	9	144.1	17	15.2	24	75.5	16	100	1	49.6	15	AUG	17	144.1
1975	4.3	29	0	0	0.5	28	40.1	24	3.8	30	48.2	22	22.9	29	104.4	9	71.4	17	218.3	18	73.4	1	42.3	19	OCT	18	218.3
1976	2.8	10	0	0	7.4	20	0	0	177.8	19	48.5	25	73.4	23	256	10	85.4	13	25.6	24	17	26	14.7	5	AUG	10	256
1977	10.9	9	7.1	14	6.1	3	0	0	38.9	25	44	15	101.3	17	199	19	197.2	11	30.5	15	121.7	14	17.6	1	AUG	19	199
1978	0	0	0	0	0	0	5.3	20	41.7	21	35.7	21	83.3	12	115.9	13	79	26	274.5	9	37.1	12	9.8	28	OCT	9	274.5
1979	0	0	0.8	19	0	0	34.3	16	66	14	24.9	4	41.1	28	104	14	94.8	16	22.2	1	16.1	14	0	0	AUG	14	104
1980	0	0	0	0	24.1	25	0	0	32.5	25	28.2	24	75.6	25	31.8	9	87	15	78.5	28	78.4	4	7	15	SEP	15	87
1981	1	28	3	27	0	0	3.3	23	20	31	69.8	13	73.8	17	76.4	6	68.2	25	46	2	65.2	24	33.4	26	AUG	6	76.4
1982	0	0	0	0	0.1	28	50	17	6.6	19	28.2	24	69.4	22	41.2	24	52	16	10.2	7	22.6	12	14.2	27	JUL	22	69.4
1983	9.7	14	0	0	0	0	0	0	10	18	22.6	7	44.2	25	65.4	14	51.1	26	68.7	10	22.2	18	2	13	OCT	10	68.7
1984	3	23	5.2	6	3.5	6	1.5	20	12.8	9	93.2	22	39.8	31	79.8	7	49	18	51	20	10	26	3.6	2	JUN	22	93.2
1985	0	0	2.8	3	0	0	13.8	23	4	6	316.8	27	121.4	5	41	10	47	30	105.7	18	5.2	2	12	12	JUN	27	316.8
1986	0	0	2.4	4	0	0	19.2	7	31.3	17	23	20	130.8	9	92.2	25	125	2	321.4	5	66.5	7	34	22	OCT	5	321.4
1987	3.8	8	0	0	0	0	0	0	6	20	73.6	7	36.4	26	103	18	82.9	1	52.4	14	49.9	25	57.7	4	AUG	18	103
1988	13.4	16	1.8	15	0	0	15.8	9	69.6	31	82.8	3	49.3	28	62.2	8	30.2	29	158.2	24	57	3	0	0	OCT	24	158.2

Table A3-1 Monthly 24 hr Maximum Rainfall Data (mm) at NAIA (MIA), Pasay City (Continued)

Year	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Annual		
	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Month	day	Rain
1989	12	18	16.4	27	7	15	0	0	102	17	31.9	6	38.5	27	55	6	27.1	12	90.2	4	15.3	21	1	19	MAY	17	102
1990	2.4	26	0	0	13.4	8	0	0	60.2	27	61.4	21	77.1	28	280.2	24	148.8	1	55.2	19	51	13	21	15	AUG	24	280.2
1991	2.2	15	4	18	9.8	14	15.5	21	9.5	19	14	15	79.3	26	130.8	19	84	14	8	3	42.2	16	5	28	AUG	19	130.8
1992	3	7	1	21	0	0	63	4	22	31	23.7	7	122	20	101.5	20	88	20	191	25	95	11	6	3	OCT	25	191
1993	0	0	0	0	0	0	3	17	1	25	26.2	3	0	20	0	25	0	25	0	0	0	0	0	0	JUN	3	26.2
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	DEC	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	11	117	30	88	24	108.5	3	30.1	23	SEP	30	117
1996	10.1	29	0	0	3.5	1	8.1	3	26	26	21	25	92	29	38.5	3	65	17	13.5	30	28	26	3	17	JUL	29	92
1997	3	5	3.5	13	0	0	0	0	200	26	46	20	51.5	6	60.5	4	8.5	29	14	15	11	4	1	4	MAY	26	200
1998	4.5	27	0	0	1	25	1.5	5	12.5	28	20	24	8.5	23	69.5	5	0	0	0	0	20.8	22	71.4	11	DEC	11	71.4
1999	3.8	12	0.6	20	14.8	28	6.6	26	0	0	30	29	55.8	5	97.4	3	44.2	19	83.6	16	0	0	0	0	AUG	3	97.4
2000	4.2	21	0	0	0	0	15.6	19	0	0	0	0	0	0	0	0	0	30	0	31	0	0	0	0	APR	19	15.6
Max.	55.3	3	16.4	27	35.5	12	63	4	200	26	316.8	27	472.4	20	280.2	24	198.5	3	321.4	5	121.7	14	71.4	11	JUL	20	472.4
Year	1970		1989		1971		1992		1997		1985		1972		1990		1970		1986		1977		1998		19	72	

**Note: -2 means data is missing

Source: Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)

Table A3-2 Monthly 24 hr Maximum Rainfall Data (mm) at Ambulong, Batangas

STATION: AMBULONG, BATANGAS
PERIOD: 1961- 2000

Latitude: 14.5N
Longitude: 121.3E
Elevation: 10m

Year	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Annual		
	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Month	day	Rain
1961	2.6	21	3.4	25	23.4	6	5.4	17	59.9	17	301.5	27	57.9	17	88.1	29	96.5	21	85.9	8	122.7	22	18.8	4	JUN	27	301.5
1962	2.3	6	2	8	1.5	1	34.3	18	21.3	30	32.3	1	114	23	78.5	7	270.8	5	21.8	14	73.4	6	16.3	26	SEP	5	270.8
1963	1.5	31	2	6	26.9	23	0.8	11	23.6	27	39.6	4	48.8	15	32.8	13	84.3	9	28.5	3	9.4	3	38.1	12	SEP	9	84.3
1964	1.1	4	13.5	26	2	28	3.6	29	17.3	4	233	29	60	14	46.2	21	80	29	50.6	7	42.2	28	48.3	14	JUN	29	233
1965	2.5	20	2.5	27	1.3	8	15.8	24	26.7	25	39.9	13	44	26	40.4	28	90.7	8	60.5	5	21.6	10	14.2	6	SEP	8	90.7
1966	4.1	27	7.4	24	33.8	31	8.4	16	70.5	18	59.2	22	37.7	22	55.9	4	127	7	9.7	19	93	20	125.8	27	SEP	7	127
1967	32.3	20	20	27	18.8	5	14	18	19.8	16	74.7	26	44.5	29	104.1	11	61.5	21	28.4	29	202.5	4	6.8	2	NOV	4	202.5
1968	1.5	3	0	0	2.8	9	42.2	28	45	22	48.8	3	40.2	23	59.2	7	57.5	28	60.3	15	22.4	20	18.1	9	OCT	15	60.3
1969	2.8	8	0	0	11.6	13	17.5	1	16.8	18	38.6	19	80.3	26	35.3	6	37.4	12	32.3	20	26.7	25	50.5	21	JUL	26	80.3
1970	16.3	3	3	6	7.1	26	45.2	29	19.6	26	35.9	22	55.7	12	40.2	31	135.6	2	175.6	13	64.8	1	23.6	14	OCT	13	175.6
1971	1.6	28	2.8	15	28.4	11	7.7	28	58.2	26	141.5	15	76.3	19	20.1	9	24.1	18	121.4	4	45.4	18	141.5	9	DEC	9	141.5
1972	27.2	30	0	0	4.6	13	46.7	9	37.6	24	43.9	25	188.3	20	82.1	1	28	21	24.6	26	55.6	5	31.2	13	JUL	20	188.3
1973	4.3	29	0	0	0.8	28	5.4	14	33.8	15	81.3	13	46.7	11	62.8	22	34.6	1	77.6	15	112.3	21	44.5	4	NOV	21	112.3
1974	2.3	21	2.8	26	12.2	4	3	25	13	12	112.6	10	59.6	20	149.9	17	18	14	152	16	87.1	1	61	15	OCT	16	152
1975	10.4	24	1.3	12	6.1	8	27.2	24	15.5	30	-2	-2	49	31	75.7	7	97.8	5	55.4	18	65.3	2	56.4	25	SEP	5	97.8
1976	2.5	13	2.8	6	25.7	20	0	0	499.2	21	58.4	25	21.8	23	113.3	17	62.7	13	50.3	21	30.2	21	47	5	MAY	21	499.2
1977	9.9	9	3.6	26	5.8	21	1.8	23	52.8	25	48.3	25	83.4	17	71.6	19	129	11	31.5	6	114.8	14	2.1	18	SEP	11	129
1978	2.1	9	0.8	27	0.3	16	17.6	20	20.3	31	32	18	44.2	5	134.4	14	132	27	155.2	9	30.9	12	7	4	OCT	9	155.2
1979	0.8	20	0.5	13	0	0	38.4	16	117.8	14	34.2	15	39.2	4	194.9	15	115	19	44.4	1	22	14	41	22	AUG	15	194.9
1980	10	17	2.3	13	60.6	24	20.6	7	10	11	89	19	122.2	25	72.1	25	52.6	20	135.2	28	64.2	4	15.1	16	OCT	28	135.2
1981	0.4	28	3.5	27	0.2	30	16.4	20	25	30	48.6	28	98.1	13	51.4	6	165.6	20	28.8	21	55.6	7	64	26	SEP	20	165.6
1982	3.6	7	2.4	18	23.6	30	43	15	9	19	42	21	61.2	15	67.2	3	204	9	21.2	8	10.4	9	60.3	13	SEP	9	204
1983	6.2	3	0	0	0.2	5	0	0	22.6	18	26	20	196.6	15	25.8	14	49.4	26	43.6	27	3.8	18	0	0	JUL	15	196.6
1984	15	23	17.8	6	7.6	7	27.2	16	40.2	3	70	30	34.8	5	32.8	14	28.4	23	140.2	21	39.4	26	10.4	3	OCT	21	140.2
1985	0.4	6	2	4	3.4	15	25.8	11	22.6	5	242.6	27	124.6	5	47	3	67.6	28	99.2	20	44.8	17	23.6	2	JUN	27	242.6
1986	4.2	26	14.8	3	0.6	1	5	7	25.6	24	72	18	108.8	9	68.2	24	185.4	2	144.2	5	107.4	7	46.2	22	SEP	2	185.4
1987	9.4	7	0	0	1	21	4	1	15.2	24	40	7	39.2	4	78.8	18	62.4	6	39.4	5	76.8	25	37	3	AUG	18	78.8
1988	72.2	16	4.2	26	2	8	25.8	11	22.4	31	42	19	39	29	39.6	16	37.8	27	129.4	24	88	3	4.8	27	OCT	24	129.4

Table A3-2 Monthly 24 hr Maximum Rainfall Data (mm) at Ambulong, Batangas (Continued)

Year	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Annual		
	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Month	day	Rain
1989	9	11	20.2	26	44.8	15	36.2	25	131.4	17	72.8	6	89.4	21	54	6	65.2	10	122	10	16.4	21	3.6	18	MAY	17	131.4
1990	3.8	25	0	0	20.8	8	1	15	38	20	65.8	14	111	25	283.6	24	74.4	1	91	13	98.2	13	15.1	15	AUG	24	283.6
1991	3.6	15	4.8	1	18.6	14	10	19	39.1	13	56.5	14	154.2	9	111.5	17	39.4	17	22	20	65.6	16	28.5	10	JUL	9	154.2
1992	2	7	4.4	21	0	0	10.8	5	12.2	15	32	12	155	20	95.6	17	51.8	20	48.2	25	88.6	11	18.5	18	JUL	20	155
1993	5.1	28	0	0	4	22	4.2	13	0.5	23	84.3	26	118	8	155.2	9	35.9	27	43.4	24	43.3	1	92.8	5	AUG	9	155.2
1994	8.9	25	0	0	1	25	37	5	17.4	12	64.9	22	119	25	61.5	31	95.5	16	106.8	21	4	20	60.9	22	JUL	25	119
1995	7.5	9	25.7	3	0	0	2	30	11	26	75.7	2	41.1	28	75.8	29	119.6	30	52.2	7	277.2	3	44.8	14	NOV	3	277.2
1996	0	0	1.5	29	11.5	1	57	23	55	26	8.5	30	197.3	25	44.9	1	64.4	4	25	24	80.2	26	9.1	17	JUL	25	197.3
1997	0.5	13	14.1	15	4.8	3	17.5	22	87.5	26	72.2	8	31.5	22	209.3	18	42.5	22	18.4	3	13.5	16	6.1	4	AUG	18	209.3
1998	33.5	27	0	0	0	0	1	26	43.6	26	42.6	4	24.5	5	70	1	118.7	18	135.2	23	15.5	2	53.6	9	OCT	23	135.2
1999	8.6	13	7	22	47.8	30	49.6	13	27.6	23	68.4	15	64.9	24	114.5	3	61	11	150.7	16	33.4	2	63.3	7	OCT	16	150.7
2000	13.4	21	45.4	7	26.4	2	23.2	6	49.8	3	26.7	20	77.8	7	57.2	4	75.2	9	183.2	28	66.4	2	50.1	26	OCT	28	183.2
Max	72.2	16	45.4	7	60.6	24	57	23	499.2	21	301.5	27	197.3	25	283.6	24	270.8	5	183.2	28	277.2	3	141.5	9	MAY	21	499.2
Year	1988		2000		1980		1996		1976		1961		1996		1990		1962		2000		1995		1971		19	76	

**Note: -2 means data is missing

Source: Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)

Table A3-3 Monthly 24 hr Maximum Rainfall Data (mm) at Sangley Point, Cavite

STATION: SANGLEY POINT, CAVITE
PERIOD: 1971- 2000

Latitude: 14.0N
Longitude: 120.5E
Elevation: 3m

Year	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec		Annual		
	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Rain	day	Month	day	Rain
1974	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	17.1	24	60.6	17	106.4	1	39.7	15	NOV	1	106.4
1975	5.1	25	0	0	0	0	53.9	24	7.5	23	40.1	30	18.2	29	44.6	10	27	13	56.6	12	26.4	2	34	25	OCT	12	56.6
1976	6.9	10	0	0	0	0	0	0	124.6	26	52.6	14	83.3	23	185.7	10	130.6	13	10.2	31	2.1	25	7.4	18	AUG	10	185.7
1977	94	12	1.5	15	0.8	12	0	0	13.5	17	37.4	28	77.4	17	235.8	19	134.1	11	15.3	15	142.4	14	11.2	1	AUG	19	235.8
1978	0	0	5.8	17	0	0	4.3	20	66	31	63.2	23	53.5	20	157.1	12	45.4	17	150.7	9	5	10	13.8	28	AUG	12	157.1
1979	0	0	-2	-2	-2	-2	24.4	26	-2	-2	-2	-2	63.6	30	238.8	14	54.6	16	19.3	2	18	14	0	0	AUG	14	238.8
1980	0	0	0	0	34.3	25	0	0	73	25	26	20	95.5	25	23.5	15	42.3	12	58.6	28	82.8	4	-2	-2	JUL	25	95.5
1981	0	0	1.8	27	0	0	0	0	8.1	31	87.3	14	128.8	17	91.4	6	61.4	25	22.6	2	87.6	24	27.1	26	JUL	17	128.8
1982	0	0	0	0	1	28	0.4	12	15	23	39.2	24	54.1	15	48.9	27	62.2	9	12.4	7	1.8	9	18.6	27	SEP	9	62.2
1983	21.8	14	6.8	17	0	0	0	0	0	0	36	5	101.7	15	82.3	15	96.4	25	59.2	10	5.3	18	0.7	13	JUL	15	101.7
1984	7.2	19	13.2	6	4.8	6	19	28	25.4	29	99.4	22	45.5	5	91.5	12	24	2	93.3	30	9.3	26	3.6	2	JUN	22	99.4
1985	0.1	1	1.6	25	3.2	15	12.7	23	6.6	30	172.4	27	120.8	5	34.4	10	29.8	10	70	2	17.2	22	17.8	5	JUN	27	172.4
1986	0.4	4	8.6	4	0.2	1	18.8	7	15.8	25	20.8	23	121.4	9	102.8	25	119.5	2	260.7	5	44.5	7	42.3	22	OCT	5	260.7
1987	0.8	8	0	0	0	0	1.5	18	23.3	3	90.4	7	60	10	102.3	18	94.5	1	63.6	14	27.2	25	59.8	4	AUG	18	102.3
1988	36.6	16	1.6	15	1.3	8	25.2	9	49	30	107.8	2	93.2	29	40.1	8	21.2	29	108.1	24	71.4	3	0.8	29	OCT	24	108.1
1989	16.1	18	7.1	24	6.4	30	0.8	15	119	4	43	6	60.1	17	83.7	19	63.3	11	65	11	16.2	21	1	19	MAY	4	119
1990	1.8	11	0	0	4.7	8	8.4	13	34.3	19	79.1	21	115.6	27	307.8	24	180	1	31.5	13	51.7	13	44.2	15	AUG	24	307.8
1991	4.3	15	1.9	2	12.1	14	9	21	5	19	67.7	14	106.2	26	176.5	21	60.6	14	13.5	4	36.3	16	3.2	11	AUG	21	176.5
1992	13.3	7	0	0	0	0	0.8	22	16	31	64.1	30	131.8	20	142.8	20	129	20	160.4	25	72.3	11	2	1	OCT	25	160.4
1993	1.7	13	0	0	0	0	8.3	17	10.8	25	168	25	99.5	29	109	9	66.2	5	58.2	4	80	1	32	6	JUN	25	168
1994	9	26	0	0	5.2	25	23.8	5	40.4	16	119.4	22	118	18	103	2	41	12	40	21	5	27	68	19	JUN	22	119.4
1995	3	9	16.4	4	0	0	0.6	4	69.2	28	50.5	2	81	28	230.9	29	160	3	53.3	7	33.6	3	35.6	23	AUG	29	230.9
1996	6.4	29	3	19	6.1	1	22.7	11	20.4	16	44.4	20	106.3	29	32.8	13	104.2	17	19.2	24	46.6	6	5	17	JUL	29	106.3
1997	7.2	5	17.6	13	2	3	7.8	22	237.1	26	54.5	20	42.8	6	272	18	34.8	18	18.6	29	2.6	16	0.2	7	AUG	18	272
1998	5	27	0	0	2.6	25	0.6	5	70.8	28	45.8	14	18.6	30	55	8	141.2	18	131.4	23	35.4	22	89	11	SEP	18	141.2
1999	3.7	18	5.8	20	22.8	6	21.2	13	29.2	29	68	30	68	7	156	2	84.2	11	182.3	16	17.6	3	56	11	OCT	16	182.3
2000	18.8	21	23	5	13.2	6	26.4	24	59.8	16	77	4	178.6	7	58.6	5	75.4	10	193.2	28	171.2	2	33.6	1	OCT	28	193.2
Max.	94	12	23	5	34.3	25	53.9	24	237.1	26	172.4	27	178.6	7	307.8	24	180	1	260.7	5	171.2	2	89	11	AUG	24	307.8
Year	1977		2000		1980		1975		1997		1985		2000		1990		1990		1986		2000		1998		19	90	

**Note: -2 means data is missing

Source: Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)

Table A3-4 Rainfall Intensity – Duration - Frequency Data at Sangley Point, Cavite

Computed Extreme values (in mm) of Precipitation

Return	Time														
Period	5 min	10 min	15 min	20 min	30 min	45 min	60 min	80 min	100 min	120 min	150 min	3 hr	6 hr	12 hr	24 hr
2	11.0	17.7	22.9	26.3	31.8	37.4	41.3	48.1	53.7	58.6	65.0	71.4	93.1	117.1	135.8
5	16.8	26.9	34.6	39.7	48.8	58.4	65.0	76.4	86.5	94.6	105.1	114.3	151.2	185.9	217.5
10	20.6	33.0	42.4	48.6	60.1	72.3	80.8	95.1	108.2	118.4	131.7	142.7	189.6	231.5	271.7
15	22.8	36.4	46.8	53.6	66.4	80.2	89.7	105.7	120.5	131.8	146.7	158.8	211.3	257.3	302.2
20	24.3	38.8	49.9	57.1	70.9	85.7	95.9	113.1	129.0	141.2	157.1	170.0	226.5	275.3	323.6
25	25.5	40.7	52.2	59.8	74.3	89.9	100.7	118.8	135.7	148.4	165.2	178.7	238.1	289.1	340.0
50	29.1	46.4	59.5	68.2	84.9	102.9	115.4	136.4	156.0	170.7	190.1	205.3	274.2	331.9	390.8
100	32.6	52.1	66.8	76.5	95.3	115.9	130.1	153.8	176.2	192.9	214.8	231.8	309.9	374.3	441.1

Equivalent Average Intensity (in mm/hr) of Computed Extreme Values

Return	Time														
Period	5 min	10 min	15 min	20 min	30 min	45 min	60 min	80 min	100 min	120 min	150 min	3 hr	6 hr	12 hr	24 hr
2	132.0	106.2	91.6	78.9	63.6	49.9	41.3	36.1	32.2	29.3	26.0	23.8	15.5	9.8	5.7
5	201.6	161.4	138.4	119.1	97.6	77.9	65.0	57.3	51.9	47.3	42.0	38.1	25.2	15.5	9.1
10	247.2	198.0	169.6	145.8	120.2	96.4	80.8	71.3	64.9	59.2	52.7	47.6	31.6	19.3	11.3
15	273.6	218.4	187.2	160.8	132.8	106.9	89.7	79.3	72.3	65.9	58.7	52.9	35.2	21.4	12.6
20	291.6	232.8	199.6	171.3	141.8	114.3	95.9	84.8	77.4	70.6	62.8	56.7	37.8	22.9	13.5
25	306.0	244.2	208.8	179.4	148.6	119.9	100.7	89.1	81.4	74.2	66.1	59.6	39.7	24.1	14.2
50	349.2	278.4	238.0	204.6	169.8	137.2	115.4	102.3	93.6	85.3	76.0	68.4	45.7	27.7	16.3
100	391.2	312.6	267.2	229.5	190.6	154.5	130.1	115.4	105.7	96.5	85.9	77.3	51.6	31.2	18.4

ANNEX A4 : CALCULATIONS OF DISCHARGE AND WATER LEVEL AT PROPOSED BRIDGES/CULVERTS

Imus River and Zapote River are the major watersheds in the project area as shown in the Figure (See Topograhy). Imus river that has a catchment area of 112.6 km^2 rises to an altitude of over 600m whereas Zapote river of 56.4 km^2 catchment area reaches to over 160m. The proposed alignment options traverse across these rivers and river tributaries at several locations. The design discharges at these locations are estimated and are then used to calculate the design water depths and design river widths.

Discharge data or water depths of these rivers are not available, as they are minor rivers in which gauging stations have not yet been established. Therefore, rational formula was applied as a general equation for estimating the flood discharge of an area.

Rational Formula is as follows.

$$Q = C I A/3.6$$

Where: Q = Peak discharge (m^3/s)

I = Intensity of rainfall for a duration equal to the time of concentration (mm/hr)

A = Drainage area or catchment area contributing to storm flow (km^2)

C = Run-off coefficient depending on catchment characteristics

Run-off coefficient 'C'

Coefficient C can be estimated referring the following standard tables.

Table A4-1. Runoff Coefficients from Civil Engineer's Handbook - P N Khanna

Land Use	Runoff Coefficient
Steep Bare Rock	0.90
Rock Steep but wooded	0.80
Plateaus Lightly Covered, Ordinary Ground Bare	0.70
Densely built up areas of cities with metalled roads and paths	0.7-0.9
Residential Areas not densely built up with metalled roads	0.5-0.7
Residential Areas not densely built up with unmetalled roads	0.2-0.5
Clayey Soils Stiff and Bare	0.6
Clayey Soils Lightly Covered	0.5
Loam Lightly Cultivated or Covered	0.4
Loam Largely Cultivated	0.3
Suburbs with Gardens Lawns and Macadamized Roads	0.3
Sandy Soil Light Growth	0.2

Table A4-2. Runoff Coefficients from Hydrology for Engineers

(Lynsley, Kohler and Paulhus)

	Runoff Coefficient
Flat Residential, 30% Impervious Area	0.40
Moderately Steep Residential, 50% Impervious	0.65
Built Up Area, 70% Impervious	0.80
Flat Cultivated Land, Open Sandy Soil	0.20
Rolling Cultivated Land, Clay Loam Soil	0.50
Hilly Land, Forested, Clay Loam Soil	0.50

Table A4-3. Runoff Coefficients from Hydraulic Manual of the Japanese Society of Civil Engineers

	Runoff Coefficient	Remarks
Pavement or Slope	0.85	0.70-1.00
Mountainous (Rapid)	0.80	0.75-0.90
Mountainous (Gentle)	0.75	0.70-0.80
Hilly Land or Wooded Are	0.60	0.50-0.75
Cultivated Flat Land	0.50	0.45-0.60
Inundated Paddy Field	0.75	0.70-0.80
Urbanized Area	0.75	0.60-0.90
Forest Area	0.30	0.20-0.40
Mountainous River Basin	0.80	0.756-0.85
Small Flat River Basin	0.60	0.456-0.75
Large Flat River Basin	0.60	0.50-0.75
Park & Cemetery	0.20	0.10-0.25

In estimation of run-off coefficient for computation of design discharge, future development in the project area is also taken into account. Runoff coefficient used is 0.6 in the analysis.

Time of Concentration (Tc)

Tc for a catchment is the time taken for a drop of water to reach from the hydrologically most remote point of the catchment to the point of inlet without undue delay. The average velocity of flow in the natural watercourse is estimated based on the gradient of the stream as given in Table A4-4.

Table A4-4. Approximate Average Velocities in ft/s of Runoff Flow

Description of water course	Slope in percent			
	0 - 3	4 - 7	8 - 11	12 -
Unconcentrated				
Woodlands	0 - 1.5	1.5 - 2.5	2.5 - 3.25	3.25 -
Pastures	0 - 2.5	2.5 - 3.5	3.5 - 4.25	4.25 -
Cultivated	0 - 3.0	3.0 - 4.5	4.5 - 5.5	5.5 -
Pavements	0 - 8.5	8.5 - 13.5	13.5 - 17	17 -
Concentrated				
Natural channel not well defined	0 - 2	2 - 4	4 - 7	7 -

Source: Drainage Manual, Texas Highway Department

Tc is calculated as given below:

$$Tc = \frac{L}{V} + 15 \text{ minutes}$$

Where L is the length of the longest watercourse in meters

V is the average velocity as determined earlier in meters/sec

15 minutes is added as additional time required for a drop of water in overland flow to travel in the flat surface before it reaches a defined watercourse. Design discharges for 25 year, 50 year and 100 year return periods at proposed bridge locations shown in Figure 4 are given below.

Table A4-5. Design Discharges at Bridge Locations

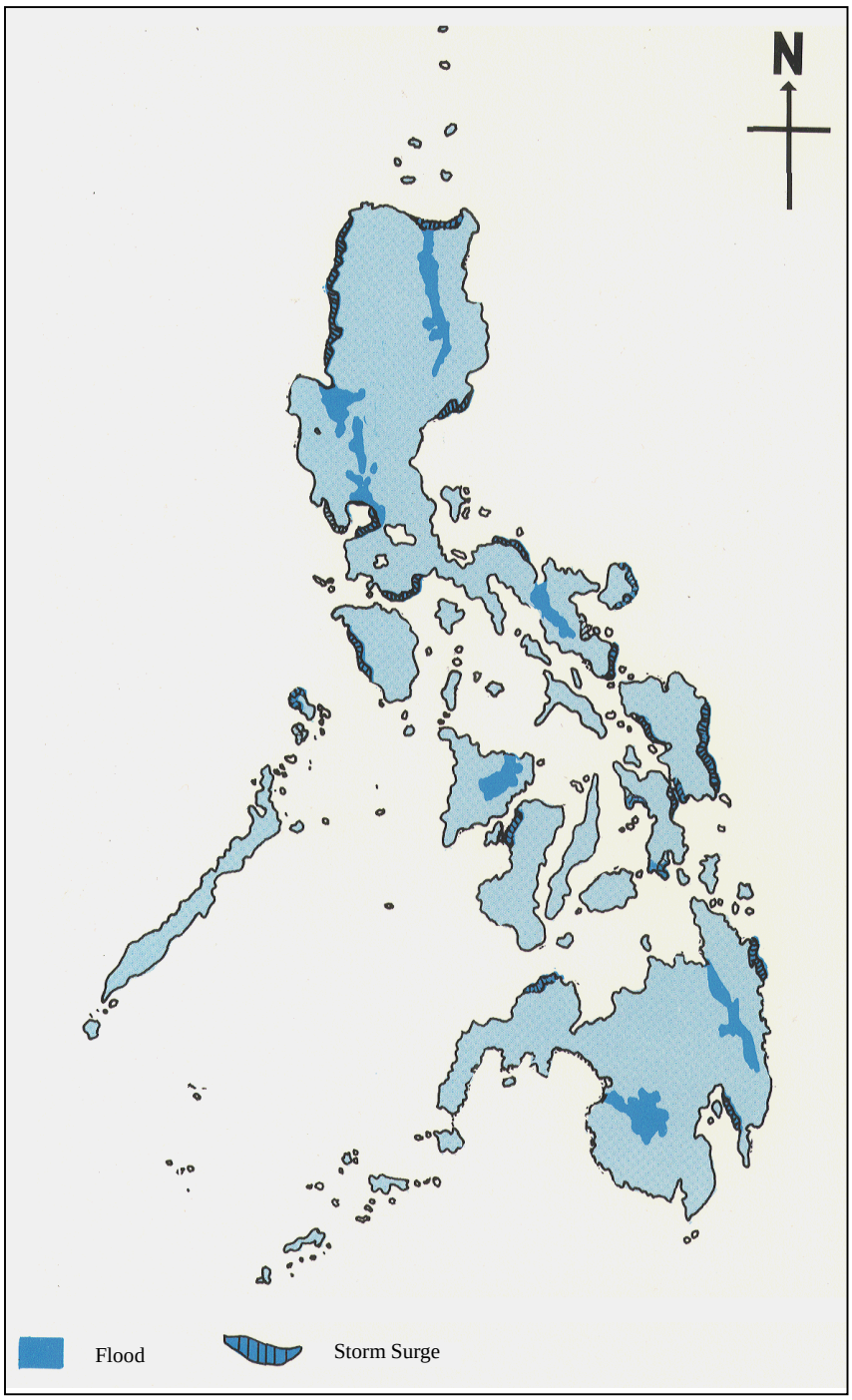
Station No.	River Name	Catchment Area (km^2)	Waterway Length (km)	Elevation Difference (m)	Design Discharge (Return Period)		
					(25 year) (m^3/s)	(50 year) (m^3/s)	(100 year) (m^3/s)
1	Imus - tributary	10.73	10.52	51	25.4	29.2	33.0
1a	Zapote	56.14	19.83	170	154.9+30*	177.9+30*	200.6+30*
1b	Zapote	53.22	17.76	166	147.8+30*	169.7+30*	191.4+30*
2	Zapote - tributary	2.32	4.13	23	13.0	14.9	16.9
3	Imus - tributary	1.15	2.05	15	11.0	12.7	14.3
4	Imus - tributary	3.07	4.35	33	19.6	22.6	25.5
5	Imus - tributary	0.69	2.25	18	6.6	7.6	8.6
6	Imus	8.53	9.75	90	35.0	40.7	45.3
7	Imus - tributary	0.72	1.46	13	8.8	10.1	11.5
8	Imus - tributary	0.74	1.52	16	9.6	11.0	12.5
9	Imus - tributary	1.44	2.14	27	17.4	20.0	22.7
10	Imus - tributary (Baluctot river)	5.92	6.51	85	41.1+20**	47.3+20**	53.4+20**
11	Imus	39.75	28.53	550	135.5	155.7	175.5
12	Imus - tributary	3.3	4.54	87	34.0	39.0	44.1

Note: * $30m^3/s$ or ** 20m3/s is added as base flow of river

Manning's formula is used to calculate design water depth. A return period of 50 year is applied for bridge designs. Design river width together with design water depths are tabulated in the main report. However, at most of these locations, lengths of bridges mainly depend on topography as waterways are passing through valleys.

ANNEX A5 : FLOOD PRONE AREAS IN THE PHILIPPINES

Figure A5-1. Flood and Storm Surge Prone Areas in the Philippines



Source: PAGASA

ANNEX A6 : CALCULATION OF FLOOD LEVELS IN BACOOR

According to the flood information gathered from local residents, the area prone to flooding along each alignment option selected for the study is confined to the area surrounding Bacoor/Zapote. Flood elevation at Bacoor city is about 2.0 m MSL during the typhoon periods. However, flood level reached up to 2.8m MSL during the flood occurred in November 2000 due to heavy rain and high tide combined with a large-scale typhoon.

The area close to the Tomas Mascardo bridge of Imus river was also slightly inundated during the same flood event. According to the residents, it was due to the flow obstruction at a bridge located downstream of Imus river and also due to the openings of reservoir gates. However, in general, it is not a flooding area. Flood and Storm Surge Prone Areas in the Philippines also confirms that project area is within the no flooding zone except for the area close to the Municipality of Bacoor.

HEC-RAS (Hydrologic Engineering Center – River Analysis System) one dimension hydrodynamic model developed by US Army Corps of Engineers was applied to simulate the peak flood flow under steady flow conditions.

Present river discharge at Alido Bridge of Zapote River was estimated at 30 m^3/s by applying the Manning's formula. Runoff discharge is 178 m^3/s for a 50 year return period flood. Therefore, maximum discharge would be 208 m^3/s. Water surface elevation is assumed as 0m MSL since the river section is close to the sea.

For the flow simulation, applied conditions are as follows:

Design discharge: 250 m^3/s

Manning roughness coefficients;

River flow: 0.04

Flood Plain: 0.30

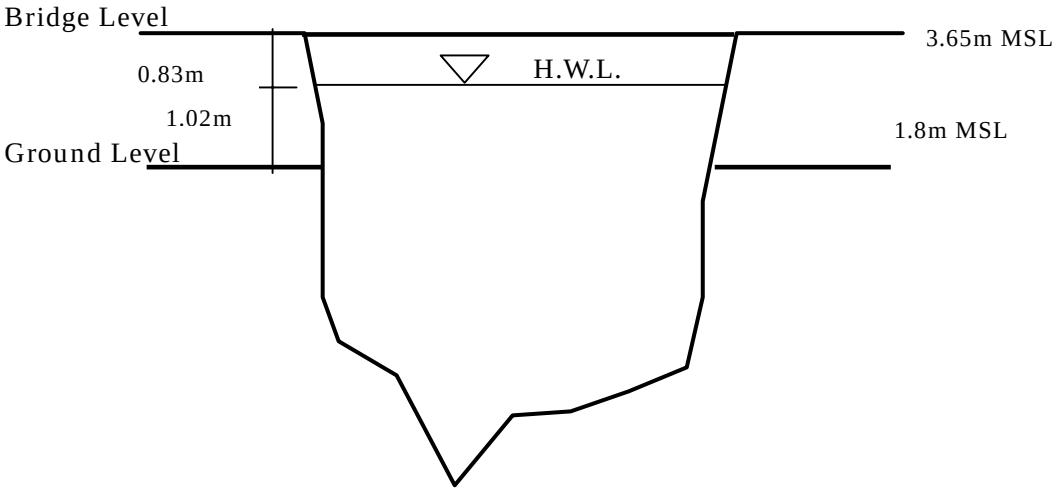
Downstream water level: 1.90m MSL (50 year return period Tide Level)

Slope: 1/2000

River cross-section: (refer to figure next page)

Average flood plain width: 1500 m

Figure A6-1. High Water Level (H.W.L) at Alido Bridge of Zapote River



According to the simulation results, high water elevation is 2.82 m

ANNEX A7 : TIDAL DATA

Manila Tide Station is the nearest tide station to the project area and is located at coordinates 140 35'North and 1200 58' East. Tide and Current Tables in Philippines, 2002 published by the Coast and Geodetic Survey Department, maximum tide height of Cavite harbor (14^0 35'N, 120^0 58' E) is 0.09m below that in Manila Tide Station. Therefore, tide level along Manila bay in Cavite can be referred to Manila tide levels with an addition of –0.09m.

Mean sea level (MSL) is 0.478m above the mean lower low water (MLLW) as established by the Bureau of Coast and Geodetic Surveys (BCGS) of the Philippines based on 19 years (1951-1969) of continuous tide observations. The observed annual maximum tide levels for 55 years (1946-2000) at Manila Tide Station are shown in Table A7-1.

Table A7-1. Observed Annual Maximum Tide Levels at Manila Tide Station

Year	Date	Elevation (m)
1946	06, 11, 24 Sep	1.27
1947	20 Jun	1.63
1948	01 Sep	1.63
1949	12, 15, 27, 28, 29 Jun	1.33
1950	27 Jul	1.57
1951	16, 17 Aug	1.63
1952	11 Jun	1.57
1953	28, 29 Jun	1.60
1954	01 Jul, 10 Dec	1.45
1955	19 Jul	1.45
1956	10 Jun	1.45
1957	29 Jun	1.36
1958	17 Jul	1.33
1959	05, 18 Aug	1.33
1960	07 Aug	1.60
1961	29 Jul	1.48
1962	01 Aug	1.57
1963	21 Jul	1.48
1964	07 Aug	1.82
1965	14, 28 Jul	1.57
1966	15 Aug	1.60
1967	19 Jul, 19 Aug	1.60
1968	25, 26 Jul	1.69
1969	30 Jun	1.60
1970	17 Aug	1.72
1971	11 Oct	1.72
1972	12 Jul	1.91
1973	15 Oct	1.79

Year	Date	Elevation (m)
1974	20 Jul	1.91
1975	07 Aug	1.47
1976	29, 30 Jun	1.85
1977	18 Jul	1.76
1978	12 Oct	1.79
1979	09 Aug	1.75
1980	26, 28 Aug	1.67
1981	04 Jul, 01 Aug	1.82
1982	24 Jun	1.91
1983	11 Aug	1.71
1984	27, 29 Aug	2.09
1985	22 Jun	2.12
1986	09 Jul	2.01
1987	12, 13 Jul	1.95
1988	30 Jul	1.98
1989	05 Jun	1.95
1990	24, 25 Jun	1.94
1991	25 Oct	1.95
1992	29 Aug	1.95
1993	06 Oct	1.99
1994	23 Jun, 10 Jul	2.00
1995	01 Oct	2.03
1996	31 Jul	2.19
1997	18 Aug	2.04
1998	09 Aug	1.91
1999	22 Apr	2.15
2000	04 Jul	2.25

Source: NAMRIA and DENR

Note: Elevations are referred to MLLW

Results of the frequency analysis of observed annual maximum water levels at Manila tide station are given in Table A7-2. For the frequency analysis, Extreme Value Type I [Gumbel] was adopted.

Table A7-2. Frequency Analysis of Observed Annual Maximum Tide Levels at Manila Tide Station

Return Period	Tide Level (m)	
	Mean Lower Law Water	Mean Sea Level
5	1.92	1.44
10	2.07	1.59
25	2.25	1.77
50	2.38	1.90

ANNEX A8 : MARINE CONDITIONS IN MANILA BAY

The marine environment in Manila Bay has been studied with respect to the proposed extension of the Coast Road. The 1990 Feasibility Study contains extensive information, as summarised below:

1. Temperature – a 1984-1985 monitoring study showed water temperature ranged from 28-33 deg C. Temperatures gradually decrease towards the mouth of the bay.

2. Salinity – Surface salinity values ranged between 34 to 35 PSU for shallower portions of the bay. During periods of significant river discharge n rainy season, this decreased to 24 PSU or lower in the mouths of major rivers.

3. pH – pH was generally nearly neutral, from 6.8 to 8.5 which is within the acceptable range of 6.8 to 8.5 for Class SC water favourable for growth of fish and other marine life.

4. Dissolved (DO) – levels ranged from a low of 3.0mg/l at the bottom of waters to as high as 8.5 mg/l at the surface. Normal C.C. concentrations averaged 6.6 in a 1985 sampling. The oxygen depletion at the bottom could be the result of active decomposition processes. The higher value at the surface is symptomatic of the photosynthetic activity of plankton and algae in the Bay.

5. Sediment Characteristics – sediment is soft and fine in texture, and clayey or muddy, greyish in colour and sometimes with traces of hydrogen sulphide. These sediment characteristics together with the low D.O. (<4mg/l) at the bottom of the Bay may have caused the disappearance of benthic communities in Manila Bay except for a few crabs and worms. The relatively rich accumulation of various waste materials especially organic wastes is evident in most sampling stations. The sedimentation rate in Manila Bay using Caesium 137 was calculated at 4.3cm/year for Bacoor using 1945 as a reference year. The high sedimentation rate in Bacoor is probably due to the intense land use in the area and the geometry of Bacoor Bay, which is shielded by the Cavite Peninsula. This rate is considered fairly high compared with the sedimentation rate of other basins in Luzon which are around 2cm/year.

6. Plankton – Plankton displacement volumes ranged from 0.46ml/cu.m to 2.5ml/cu.m with average biomass of 0.89ml.cu.m. Higher volumes are found near the coastal areas where pollution sources are located. Highest volumes were found in Bacoor Bay and off the mouth of the Pampanga River.

7. Phytoplankton – The bulk of phytoplankton in Manila Bay is made up to diatoms and dinflaggelates. The coastal areas of the Manila and Paranaque areas are very rich in phytoplankton. The number of phytoplankton in 1985 ranged from 5,940

cells/cu. m. to 3,282,300 cells/cu. m.

8. Zooplankton – Observations in 1984 showed that zooplankton population tended to concentrate at the northern and eastern parts of the Bay. Density averaged 3,584 individuals/cu. m. with a range of 184 to 9300.

9. Benthic Fauna – is dominated by a few species. The salty mud with low D.O. and traces of black sulphide mud allow the survival of creatures adapted to this environment. It is largely made up of burrowing, deposit feeding in faunal species. Crabs were the most abundant group in terms of numbers and biomass.

10. Trace metals in indicator fish – residue levels of mercury, cadmium, zinc, copper and pesticides were not considered to have reached a hazardous level at the time of the quoted report. Current patterns suggested however that discharge from the Pasig River is carried towards the Bacoor area, including contamination from industrial and municipal waste dumping.

11. Bathing water quality: Observations in 1982-1985 showed that from the mouth of the Pasig River to the Punta Grande Beach resort in Cavite, bathing waters did not meet the NPCC criteria for coliform organisms.

ANNEX B

TRANSPORT AND TRAFFIC SURVEYS

ANNEX B: TRANSPORT AND TRAFFIC SURVEYS

1. Objectives of the Surveys

A number of transport and traffic surveys were conducted in the study. Those surveys aimed to grasp the present transport conditions in the Cavite area where the proposed busway system is introduced and update the origin-destination matrices and other planning parameters based on those used in MMUTIS (Metro Manila Urban Integration Study, JICA 1999). For this purpose, the following eight kinds of transport and traffic surveys were conducted:

1) Roadside Traffic Count Survey
2) Roadside OD Interview Survey
3) Intersection Traffic Count Survey
4) Axle Load Survey
5) Travel Time Survey
6) Public Transport Route / Service Frequency Survey
7) Survey on Stated Preference to the Proposed Busway System
8) Bus Operator Interview Survey

2. Objectives of the Surveys

The outline of the transport surveys is summarized in the Table B-1.

3. Scope of the Surveys

3.1 Roadside Traffic Count Survey

(1) Survey Methodology: The survey was divided into two types: a) vehicular traffic count and b) vehicle occupancy survey. The former counted the hourly traffic volume by vehicle type and by direction. The vehicle types were classified into 15 categories as follows:

1) Pedicab	2) Bicycle	3) Motorcycle
4) Tricycle	5) Jeepney	6) Mini-Bus
7) Standard Bus	8) Taxi	9) HOV Taxi
10) Car/Jeep	11) School/Company/Tourist Bus	12) Utility Vehicle
13) Truck	14) Trailer	15) Others

Table B-1 Outline of Transport and Traffic Surveys

Survey	Objectives	Coverage	Method
1. Roadside Traffic Count Survey	• Vehicular and passenger traffic volume on major roads	• 15 stations on major roads	• Traffic count (vehicles) • Vehicle occupancy count (sampled vehicle) • 16 or 24 hours (2 days)
2. Roadside OD Interview Survey	• Trip characteristics of the residents outside the Study Area	• 8 stations (selected from the stations of Roadside Traffic Count Survey)	• Roadside direct interview with driver and passengers • 16 or 24 hours (2 days)
3. Intersection Traffic Count Survey	• Vehicular traffic volume by turning direction	• 15 intersections of major roads • 2 time periods of am/pm peak	• Traffic count (vehicles) • 3 hours by time period (2 days)
4. Axle Load Survey	• Axle load conditions on major road sections	• 2 stations on Aguinaldo Highway	• Measurement by special equipment • 16 hours (2 days)
5. Travel Time Survey	• Travel time of major routes (including routes connecting with Metro Manila)	• 10 routes • Car, bus, jeepney and shuttle service • 3 time periods of am/pm peak and inter-peak	• Floating car method • 3 round trips by time period by vehicle type • 2 days
6. Public Transport Route / Service Frequency Survey	• List of public transport routes • Service frequency by route	• Routes being operated in the Study Area • Bus, jeepney and tricycle	• Data collection from LTFRB and analysis • Frequency count at major terminals (18 hours)
7. Survey on Stated Preference to the Proposed Busway System	• Willingness-to-use of the proposed busway system	• Users of bus, jeepney and car (500 samples each)	• Direct interview with users of each mode • 16 hours
8. Bus Operator Interview Survey	• Operational, financial characteristics of bus operators	• 30 sampled bus companies operating in the Study Area	• Direct interview with representatives of bus companies

The latter was a sample survey to record the seating capacity and the number of passengers on board by vehicle type. The result was expanded against the counted traffic volume to obtain information on passenger traffic volume. The sample rate was determined based on the traffic volume by vehicle type. The number of vehicles to be observed was determined at least one per minute for buses and two per minute for other vehicles or all vehicles when traffic volume is very small.

(2) Survey Stations

There are 15 stations for this survey as shown in Table B-1 and Figure B-1. Eight (8) stations are located on major roads crossing the boundary of three municipalities of Bacoor, Imus and Dasmarinas and seven (7) stations are located on major roads inside three municipalities.

(3) Survey Durations

A 24-hour survey was conducted at five (5) stations, while 16-hour survey at 10 stations. Both surveys were stared from 6:00 a.m. and conducted continuously for two (2) days.

3.2 Roadside OD Interview Survey

(1) Survey Methodology

This survey was conducted at same stations as the Roadside Traffic Count Survey. The survey was carried out by stopping vehicles at the stations. The items such as origin and destination places of trip, trip purpose, number of passenger on board and seating capacity were interviewed.

Three different survey forms were used depending on the type of vehicle: a) drivers of private mode such as car and trucks, b) drivers of public mode such as bus, jeepney and c) passengers of public mode. The same vehicle classification as the Roadside Traffic Count Survey was used.

It was desirable that vehicles as many as possible are interviewed. However, the supervisor at site carefully determined the sample rate of this survey that the survey itself does not create the queue at the survey station.

(2) Survey Stations

There are eight (8) stations for this survey as shown in Table B-1 and Figure B-1. These are located on the major roads crossing the boundary of the municipalities of Bacoor, Imus and Dasmarinas.

(3) Survey Durations

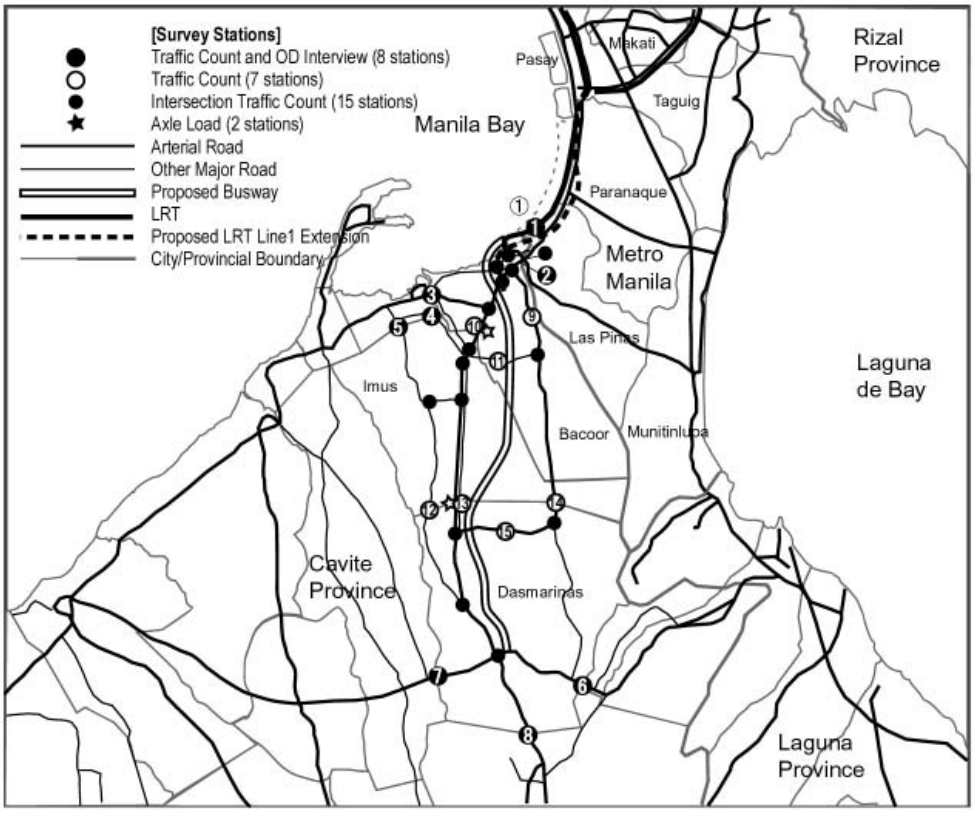
A 24-hour survey was conducted at three (3) stations, while 16-hour survey at five (5) stations. Both surveys were stared from 6:00 a.m. and conducted continuously for two (2) days. The survey was conducted in parallel to the Roadside Traffic Count Survey.

Table B-2 List of Stations for Roadside Traffic Count/OD Interview Surveys

No.	Survey Station (Boundary)	Survey Duration			Survey Duration
		Traffic Count	Vehicle Occupancy	Roadside OD Interview	
1	Coastal Road (Bacoor-MM)	24 hours	24 hours	24 hours	2 days
2	Quirino Avenue (Bacoor-MM)	24 hours	24 hours	24 hours	2 days
3	Binakayan (Bacoor-Kawit)	16 hours	16 hours	16 hours	2 days
4	Provincial Road (Imus-Kawit)	16 hours	16 hours	16 hours	2 days
5	Provincial Road (Imus-Kawit)	16 hours	16 hours	16 hours	2 days
6	Governor's Drive (Dasmarinas-GMA)	16 hours	16 hours	16 hours	2 days
7	Governor's Drive (Dasmarinas-Gen.Trias)	16 hours	16 hours	16 hours	2 days
8	Aguinaldo Highway (Dasmarinas-Silang)	24 hours	24 hours	24 hours	2 days
9	Molino Road (Bacoor)	16 hours	16 hours	-	2 days
10	Aguinaldo Highway (Bacoor-Imus)	24 hours	24 hours	-	2 days
11	Provincial Road (Bacoor-Imus)	16 hours	16 hours	-	2 days
12	Provincial Road (Dasmarinas-Imus)	16 hours	16 hours	-	2 days
13	Aguinaldo Highway (Dasmarinas-Imus)	24 hours	24 hours	-	2 days
14	Molino Road (Dasmarinas-Imus)	16 hours	16 hours	-	2 days
15	East-West Road (Dasmarinas)	16 hours	16 hours	-	2 days

Figure B-1 Location of Survey Stations

(Roadside Traffic Count/Roadside OD Interview/Intersection Traffic Count/Axle Load)



3.3 Intersection Traffic Count Survey

(1) Survey Methodology

Vehicular traffic was counted at intersections by vehicle type and by direction of traffic flow. Traffic volume was recorded every 15 minutes. The vehicles were classified into 15 types as follows:

1) Pedicab	2) Bicycle	3) Motorcycle
4) Tricycle	5) Jeepney	6) Mini-Bus
7) Standard Bus	8) Taxi	9) HOV Taxi
10) Car/Jeep	11) School/Company/Tourist Bus	12) Utility Vehicle
13) Truck	14) Trailer	15) Others

The possible directions of traffic flow were identified for each intersection prior to the survey using a sketch of intersection. For example, there are 12 directions for four-legs intersection. Sequential numbers were allocated to these directions and the survey was conducted based on this numbering.

(2) Survey Stations

There are 15 stations for this survey as shown in Figure B-1.

Table B-3 List of Intersection Traffic Count Survey Stations

No.	Intersection	
	Road Name	Road Name
1	Talaba Road	Real (Maliksi)
2	Real	Alabang-Zapote Road
3	Coastal Road	Talaba Road
4	Aguinaldo Highway	Talaba Road
5	Aguinaldo Highway	Tirona Highway
6	Aguinaldo Highway	Tanzang Luna I/Nuevo Avenue
7	Aguinaldo Highway	Anabu I/Bucandula
8	Aguinaldo Highway	Salitran-Salawag Road
9	Aguinaldo Highway	Mangubat/Congressional East
10	Aguinaldo Highway	Camarino Avenue
11	Aguinaldo Highway	Governor Drive (North)
12	Aguinaldo Highway	Governor Drive (South)
13	Molino Road	Salitran-Salawag Road
14	Molino Road	Mambog-Bayanan Road
15	Bayang-Luma Road	Gen. F. Yengco

(3) Survey Durations

The survey was conducted for three (3) hours in each time period of morning (06:00-09:00) and evening peak hours (17:00-20:00) continuously for two (2) days.

3.4 Axle Load Survey

(1) Survey Methodology

This survey was carried out by stopping vehicles at stations. Weights of each axle (one-side wheel only) were measured for a sample vehicle by using special equipment called "Loadometer". Other information such as vehicle type, number of axles, loading capacity, load factors and type of loaded cargoes were recorded in the survey form. The survey was conducted at same stations as the Road Traffic Count Survey in order to expand the sampled date. The sample rate was determined by the supervisor at site that the survey itself does not create the queue at the station.

(2) Survey Stations

There are two (2) stations for this survey as shown in Figure B-1.

(3) Survey Durations

The survey was conducted for 16 hours starting from 6:00 a.m. continuously for two (2) days.

3.5 Travel Time Survey

(1) Survey Methodology

The survey was conducted by the "floating car method" which requires the survey vehicle to keep the same position in the traffic flow; i.e. if the survey vehicle is overtaken by other vehicles, it should overtake the same number of vehicles. The modes of transport taken for this survey were: a) Car, 2) Bus, 3) Jeepney and 4) HOV Taxi.

(2) Survey Routes

Ten routes were selected for this survey as shown in Table B-2 and Figure B-2.

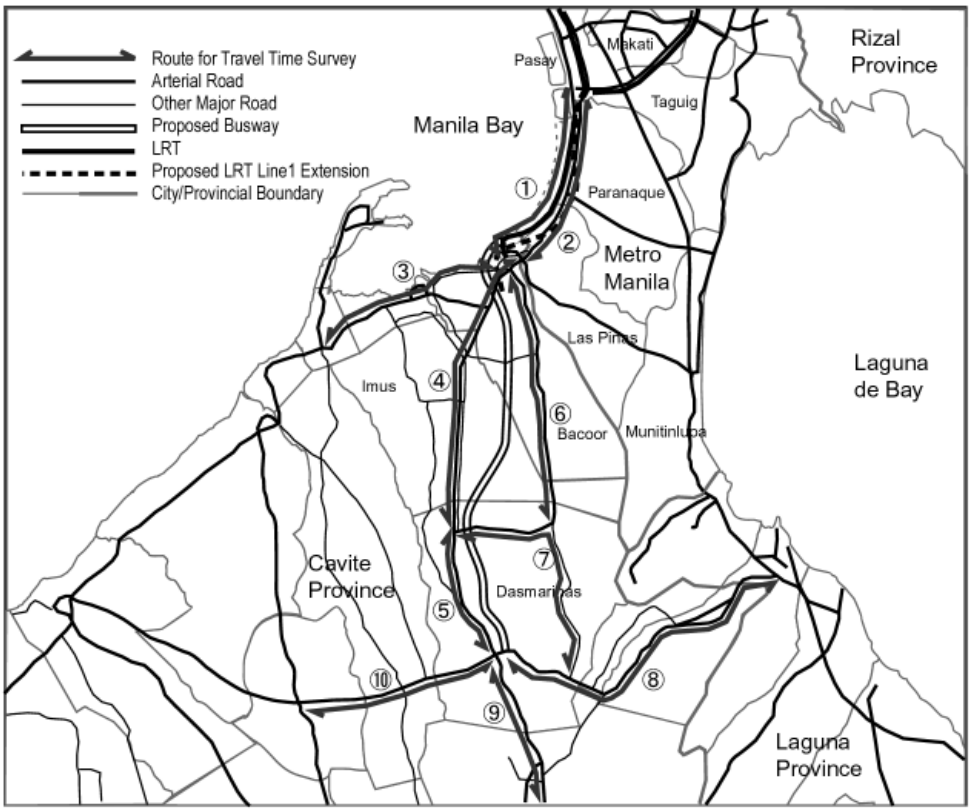
(3) Survey Durations

The survey was conducted for the following three time periods continuously for two (2) days. Three or more samples (round trips) were taken for each of the selected routes in each time periods of; a) morning peak hours (06:00-09:00), b) inter-peak hours (12:00-15:00) and c) evening peak hours (17:00-20:00).

Table B-4 List of Routes for Travel Time Survey

No.	Route Description		
	Road Name	Starting Point	End Point
1	Coastal Road	EDSA	Zapote
2	Quirino Avenue	EDSA	Zapote
3	Road to Cavite City	Zapote	Noveleta
4	Aguinaldo Highway (1)	Zapote	East-West Road
5	Aguinaldo Highway (1)	East-West Road	Governor's Drive
6	Molino Road	Zapote	East-West Road
7	East-West Road/Molino Road	Aguinaldo Highway	Governor's Drive
8	Governor's Drive (1)	Carmona	Aguinaldo Highway
9	Governor's Drive (2)	Aguinaldo Highway	Trece Matires
10	Aguinaldo Highway (3)	Governor's Drive	Silang

Figure B-2 Location of Routes for Travel Time Survey



3.6 Public Transport Route/Frequency Survey

(1) Survey Methodology

The survey was divided into two types:

a) Preparation of route lists of bus, jeepney and tricycle with information of route description, route length, number of operating vehicles etc: the information of registered public transport routes was collected from DOTC/LTFRB and its list was prepared.

b) Service frequency survey for major routes of public transportation: the actual service frequency of the selected major routes at the terminal was surveyed. In this survey, vehicle type and occupancy were also investigated.

(2) Survey Stations

The major terminals of each mode of transport were set for this survey to covers the selected routes of public transport mode.

(3) Survey Durations

The survey was conducted at the terminals on one weekday for 18 hours starting from 5:00 a.m.

3.7 Survey on Stated Preference to the Proposed Busway System

(1) Survey Methodology

The survey aimed at determining the present trip makers in the Study area their willingness to use the proposed busway. For this, direct interview with passengers of public transport such as bus and jeepney and car users was conducted based on the questionnaire forms prepared by the Study Team in discussion with the counterpart agencies. The sampling was conducted through the survey. A total of 500 samples of each mode of transport were required from each survey station.

(2) Survey Stations

The interview with passengers of bus and jeepney was conducted at the major terminals of each mode, while interview of car users was at gasoline stations along Aguinaldo Highway.

(3) Survey Durations

The survey was conducted at stations on one weekday for 16 hours starting from 6:00 a.m.

3.8 Bus Operator Interview Survey

(1) Survey Methodology

Interviewers visited the selected bus operators to interview with right person such as operating and/or financial managers as respondents of this survey. Interview was conducted based on the questionnaire form prepared by JICA Study Team.

(2) Survey Coverage

30 bus operators were selected from the operator list obtained from DOTC/LTFRB. In the step of selection, the criteria were set in terms of the number of operating buses.

3.9 Survey Forms

The respective forms used for each survey are attached to this appendix.

4. Initial Survey Results

In this section, some supplemental outputs and results of the transport and traffic surveys are presented, since major important outputs are already incorporated in the main text of this report.

4.1 Traffic Volume on Major Roads

Figure B-3 Hourly Variation of Traffic Volume (Station No.1, Coastal Road)

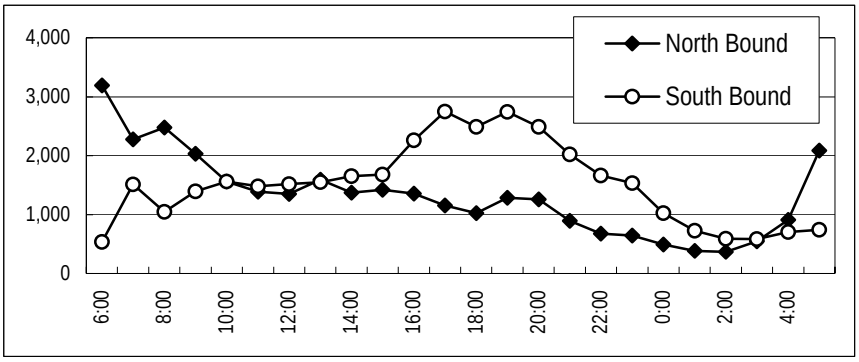


Figure B-4 Hourly Variation of Traffic Volume (Station No.2 Quirino Avenue)

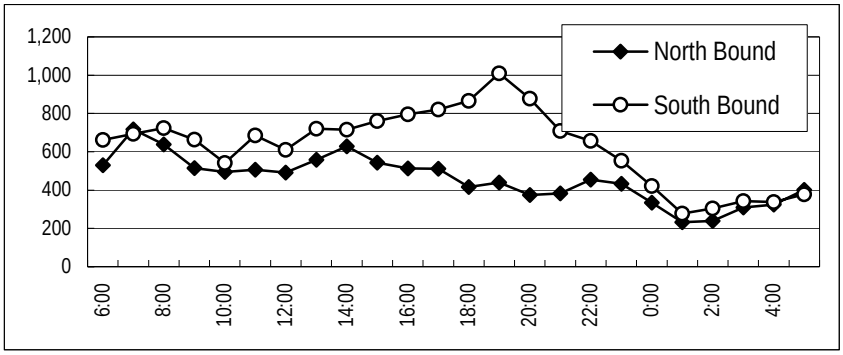


Figure B-5 Hourly Variation of Traffic Volume (Station No.8 Aguinaldo Highway)

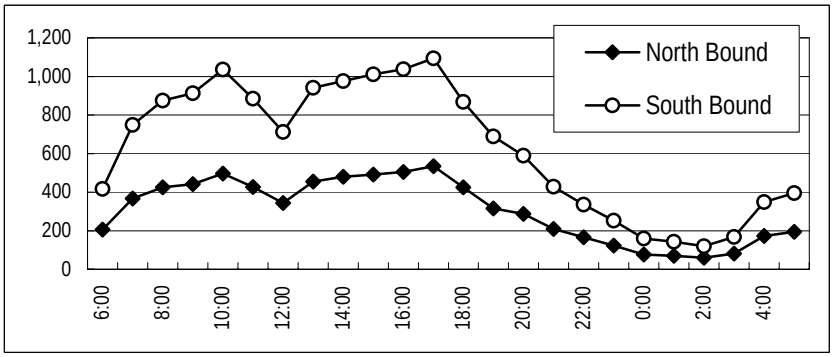
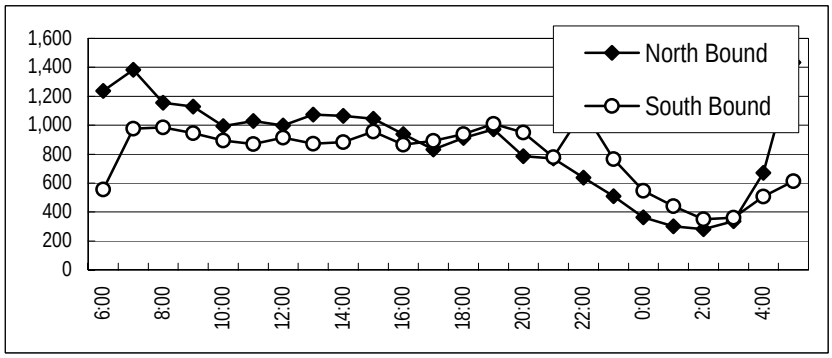


Figure B-6 Hourly Variation of Traffic Volume (Station No.10 Aguinaldo Highway)



4.2 Traffic Volume at Major Intersections

Figure B-7 Intersection Traffic Volume (Station No.1)

Talaba Road – Real (Maliksi)

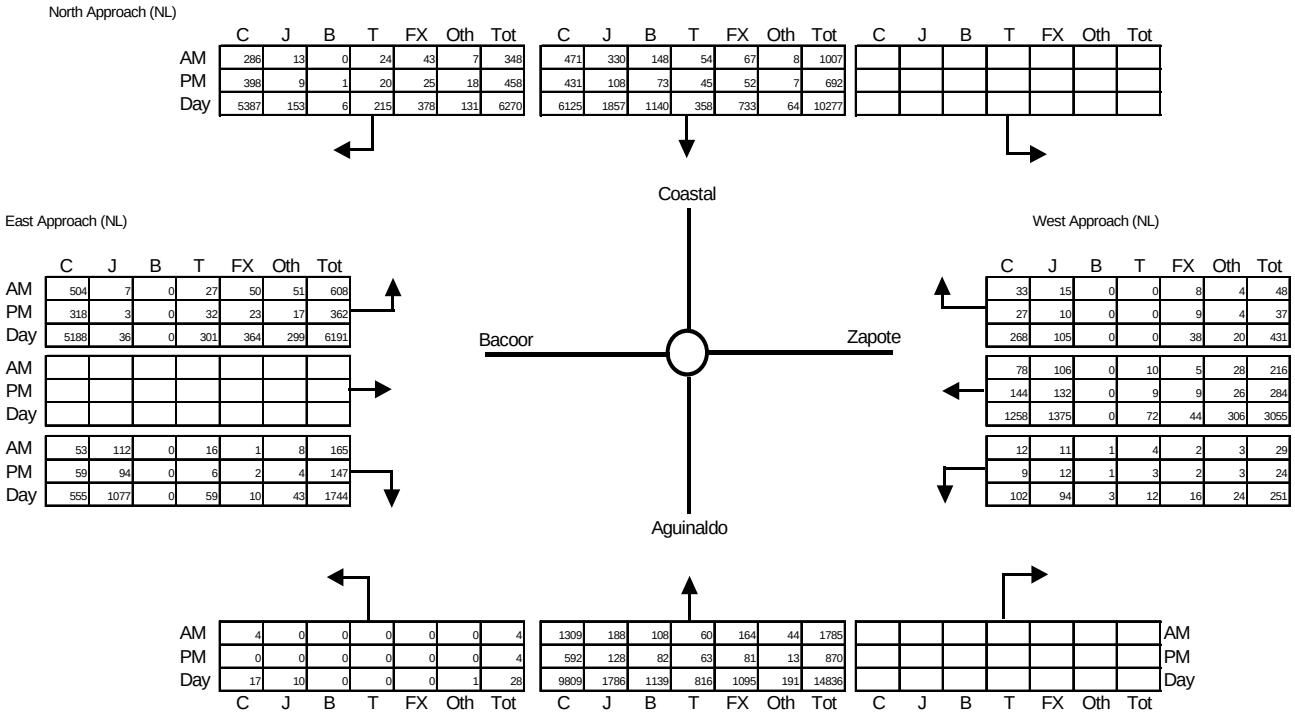


Figure B-8 Intersection Traffic Volume (Station No.5)

Aguinaldo Highway-Tirona Highway

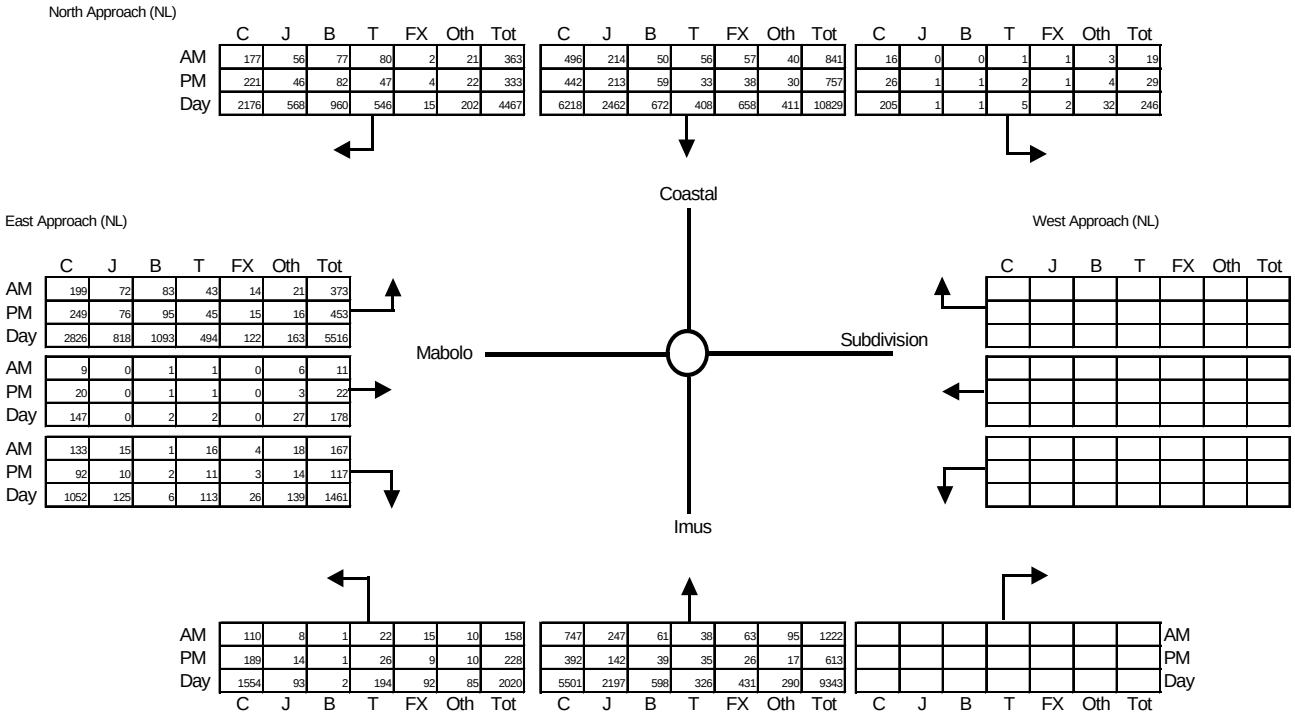


Figure B-9 Intersection Traffic Volume (Station No.7)

Aguinaldo Highway-Anabu I/Bucandula

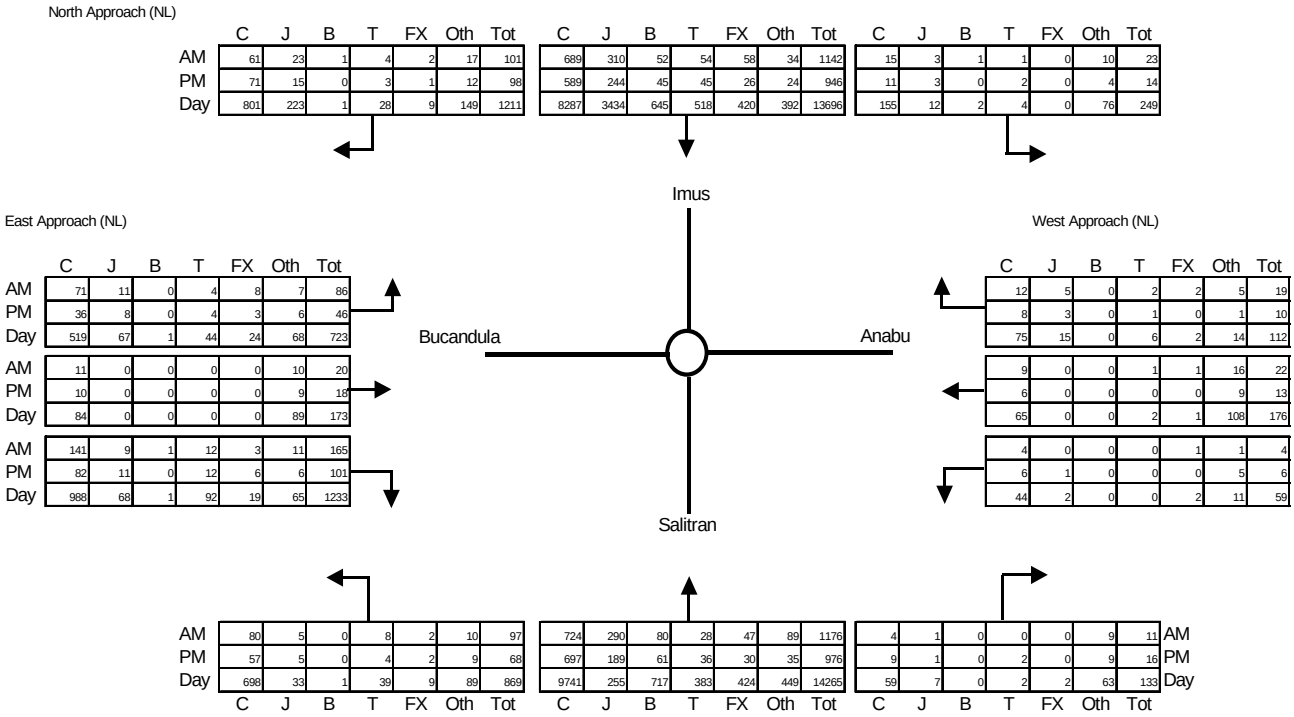


Figure B-10 Intersection Traffic Volume (Station No.8)

Aguinaldo Highway-Salitran-Salawag Road

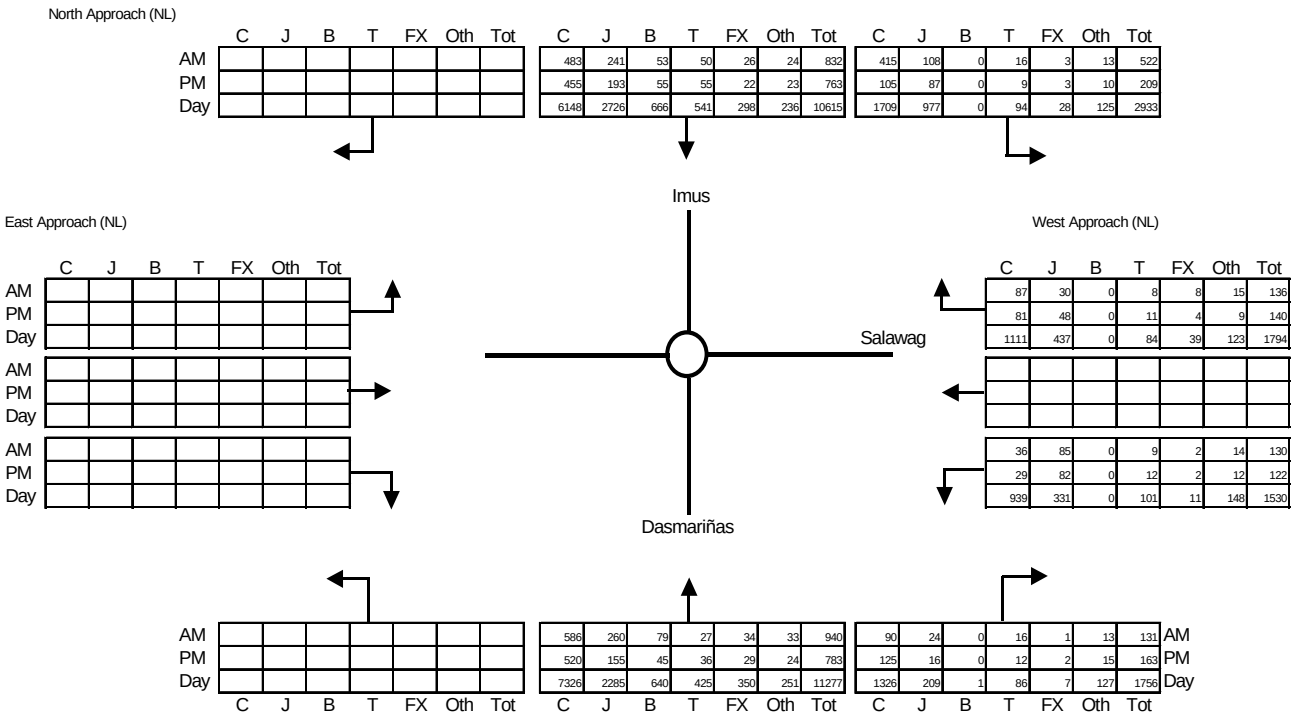


Figure B-11 Intersection Traffic Volume (Station No.10)

Aguinaldo Highway-Camarino Avenue

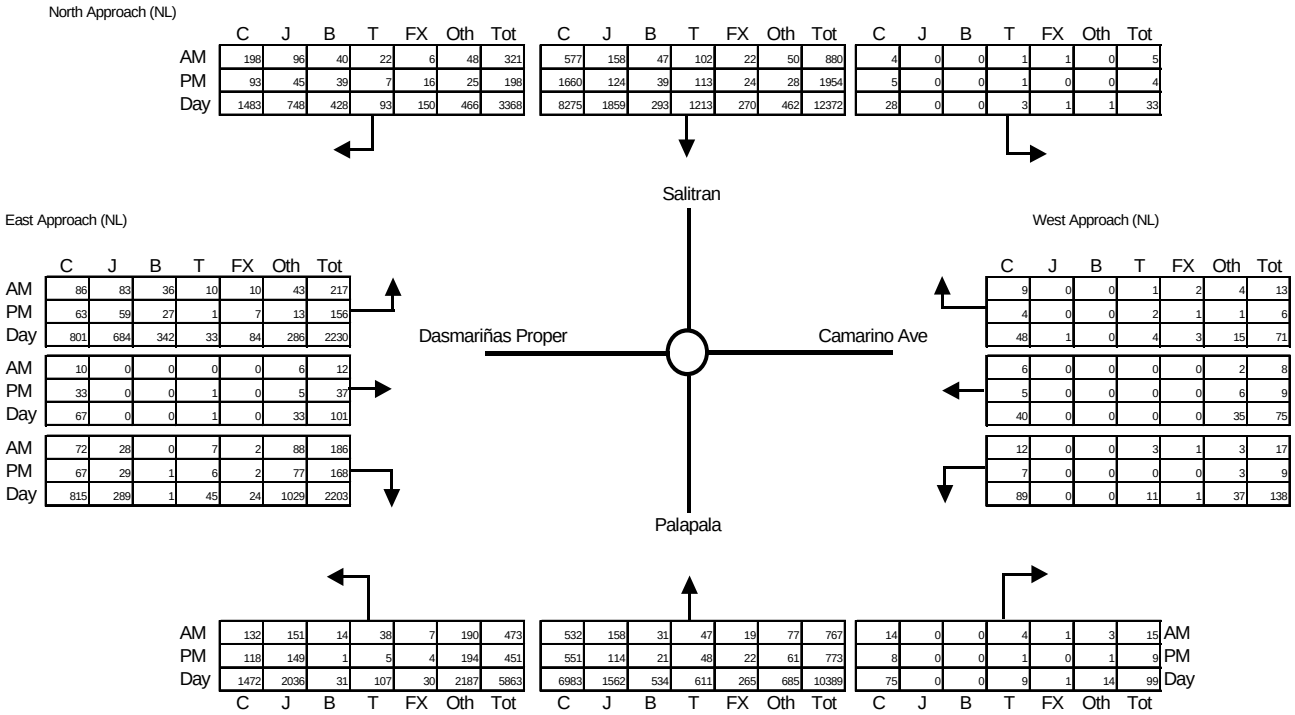
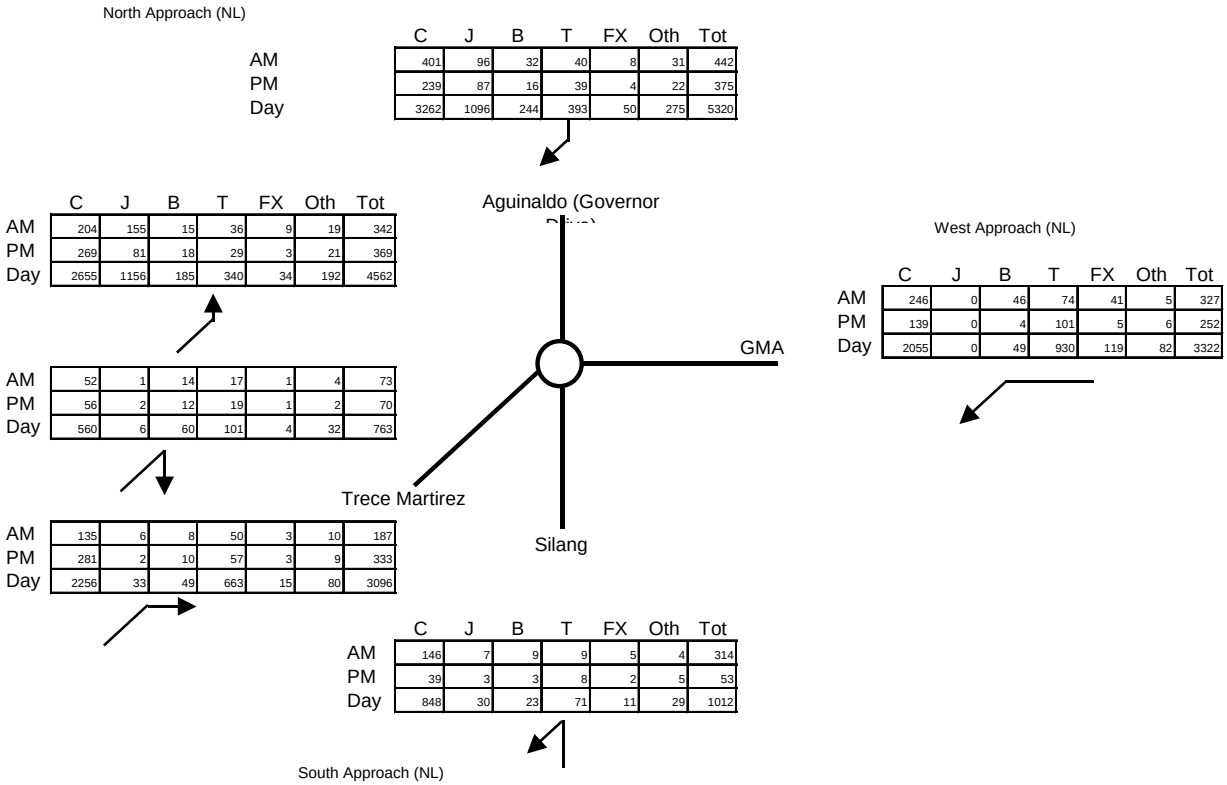


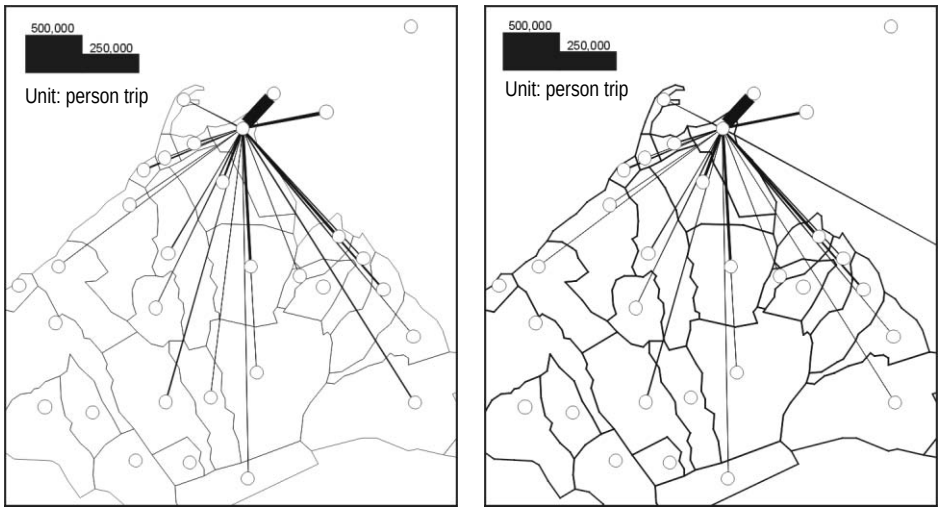
Figure B-12 Intersection Traffic Volume (Station No.11)

Aguinaldo Highway-Governor Drive (North)



4.3 Generation and Attraction of Trips to/from the Zones in the Study Area

Figure B-13 Distribution of Trips Generated/Attracted in Bacoor Municipality

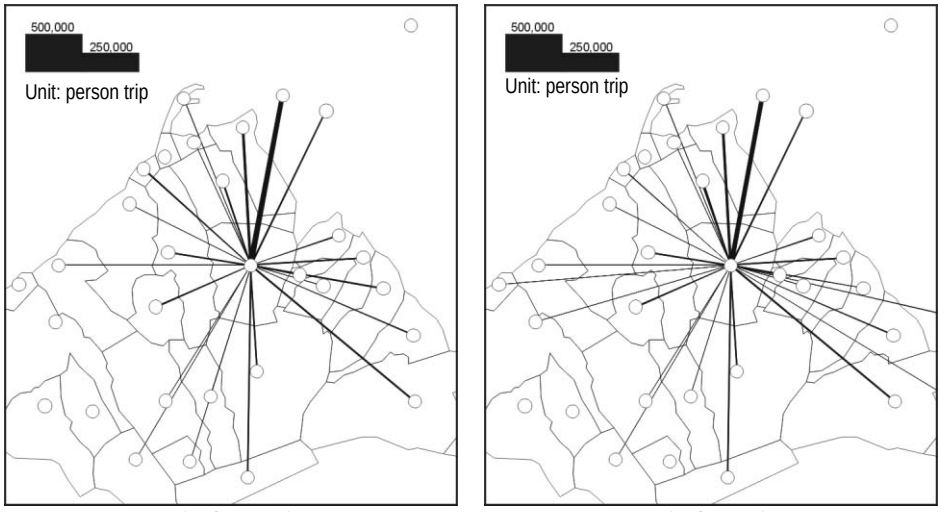


Trip Generation *Trip Attraction*

Figure B-14 Distribution of Trips Generated/Attracted in Imus Municipality

Trip Generation *Trip Attraction*

Figure B-15 Distribution of Trips Generated/Attracted in Dasmarinas Municipality

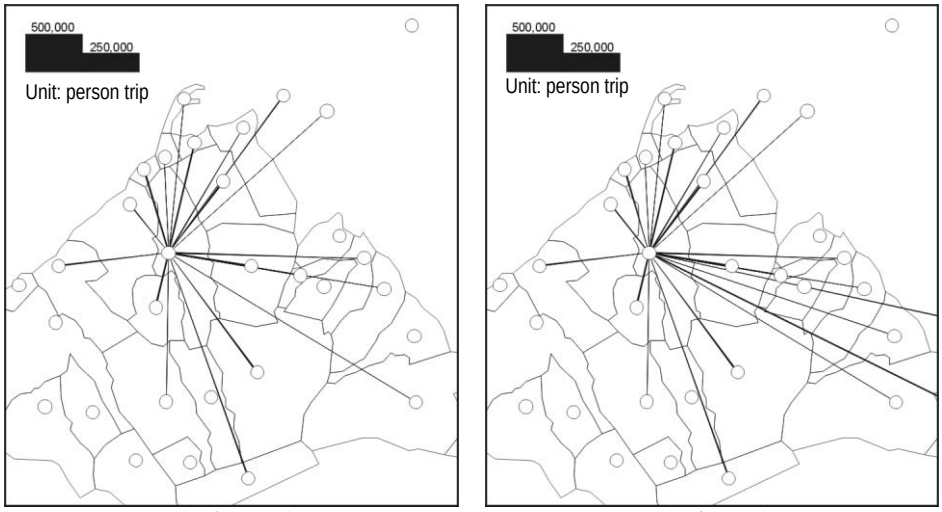


Trip Generation *Trip Attraction*

Figure B-16 Distribution of Trips Generated/Attracted in Silang Municipality

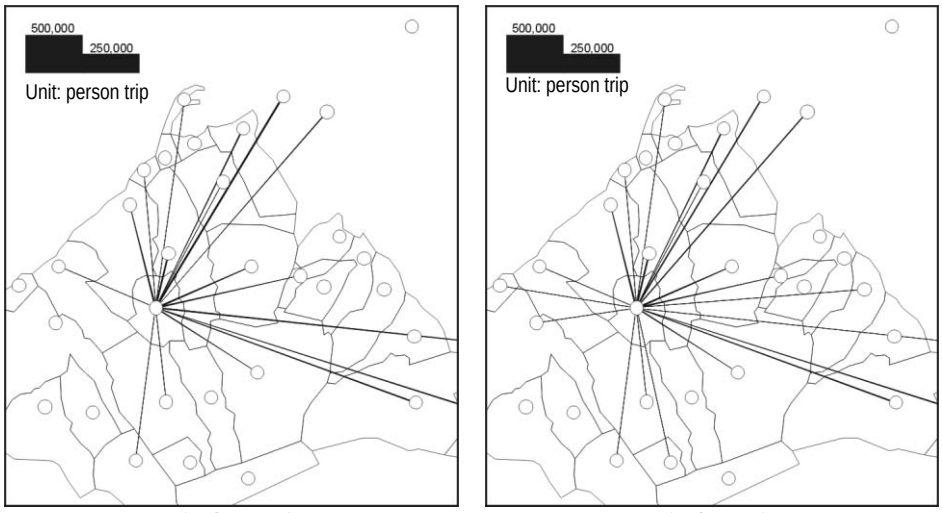
Trip Generation *Trip Attraction*

Figure B-17 Distribution of Trips Generated/Attracted in General Trias Municipality



Trip Generation *Trip Attraction*

Figure B-18 Distribution of Trips Generated/Attracted in Trece Martires City



Trip Generation *Trip Attraction*

4.4 List of Public Transport Routes

Table B-5 List of Bus Routes Operating in the Busway Municipalities

Bus Type	Route Name	via (1)	via (2)	via (3)
Routes operating on Aguinaldo Highway				
ORD	Alfonso - Pasay	Tagaytay	Silang	
ORD	Amadeo - Pasay	Silang	Tagaytay	
AC	Calatagan - Pasay			
AC	Dasmarinas - Ayala	DBBF	DLU	Imus
AC	GMA - Ayala	Dasmarinas	Carmona	
AC	Indang - Baclaran	Trece Martirez	Dasmarinas	Imus
AC/ORD	Indang - Lawton	Pala-pala	Imus	
AC/ORD	Indang - Pasay	Dasmarinas	Trece Martirez	
ORD	Indang - Baclaran	Trece Martirez	Coastal Rd.	
ORD	Mendez - Pasay	Silang	Tagaytay	
AC/ORD	Nasugbu - Pasay	Coastal Rd		
AC	Silang - Lawton	Taft	Roxas Blvd	Coastal Rd
AC	Silang - Vito Cruz	Imus	Dasmarinas	Palapala
AC	Tagaytay - Pasay	Mendez	Silang	
AC	Tagaytay - Pasay	Coastal Rd		
Routes operating on Tirona Highway and Highway 25				
Mini Bus	Cavite City - Baclaran	Noveleta	Tirona Highway	
ORD	Cavite City - Baclaran	Binakayan	Noveleta	
AC	Cavite City - Baguio			
AC	Cavite City - Lawton	SM Bacoor		
ORD	Cavite City - Lawton	Noveleta	Tirona Hi-way	Taft
AC	Cavite City - Olongapo			
Mini Bus	Cavite City - Zapote	Noveleta	Tirona Highway	SM Bacoor
ORD	Cavite City - Zapote	Real	Aguinaldo Hw	Niog
ORD	Magallanes - Baclaran			
Mini Bus	Maragundon - Baclaran	Naic	Kawit	
Mini Bus	Naic - Baclaran	Salinas	SM Bacoor	
ORD	Naic - Baclaran	Tanza		
AC	Naic - Vito Cruz	Gahak		
ORD	Ternate - Lawton	Bacoor	Naic	Roxas Blvd

Table B-6 List of Jeepney Routes Operating in the Busway Municipalities

Route Name	via (1)	via (2)	via (3)
Routes to Metro Manila			
Dasmarinas - Baclaran	Coastal Rd.	Quirino Ave.	Salitran
Dasmarinas - Baclaran	Pag-asa	Coastal Rd	Quirino Ave.
Dasmarinas - Baclaran	DBB-C	Coastal Rd	
Dasmarinas - Baclaran	Imus		
DBB Resettlement - Baclaran	DBB	Coastal Rd	
Imus - Baclaran	Coastal Rd.		
Paliparan - Baclaran	Coastal Rd.	Niog	
Routes with the Study Area Including Surrounding Municipalities			
Bacoor - Zapote	Zapote		
Bacoor - Zapote	Kabila		
Binakayan (Kawit) - Zapote	Quirino Ave.		
Dasmarinas - Zapote	Bacoor		
Dasmarinas - Zapote	Imus		
GMA - Zapote	Dasmarinas		
Paliparan - Zapote	Molino Rd.	Camella Homes	
Paliparan - Zapote	Mary Homes		
Paliparan - Zapote	Salawag		
Silang - Dasmarinas			
Silang - Imus	Dasmarinas		
Silang - Zapote	Dasmarinas		
Tagaytay - Zapote	Silang		
Talon - Molino	Paliparan	Pag-asa	
Trece Martires - Dasmarinas	Palapala		
Trece Martires - Imus	Dasmarinas		

4.5 Profile of Bus Operators

Table B-7 List of Bus Companies Operating the Routes on Aguinaldo Highway

No.	Company Name	Route Served	No. of Units Assigned	Total No. of Units Assigned
1	Alfonso Liners	Alfonso Tagaytay	28 1	29
2	Baes Express	Amadeo Indang via Tagaytay Indang via Trece Martires Silang	1 1 15 2	19
3	Blessed Grace	Indang via Trece Martires Trece Martires	14 1	15
4	BLTB	Balayan Calatagan Nasugbu	8 5 12	25
5	California Bus Line	GMA Palapala	5 1	6
6	Cely Rosa Express	Alfonso Dasmarinas Indang via Tagaytay Indang via Trece Martires Mendez Tagaytay	1 1 3 2 13 5	25
7	Crow	Mendez Nasugbu	17 22	39
8	Dimaranan Liner	Mendez Tagaytay	1 1	2
9	Divine Mercy Liner	Mendez	2	2
10	Donna Lyn Line	Mendez Tagaytay	1 1	2
11	Donna May Line	Indang via Trece Martires	2	2
12	Ferdinand Liner	Alfonso Indang via Trece Martires Palapala Silang	2 19 1 1	23
13	GSIS Trans	Alfonso Dasmarinas Indang via Tagaytay Indang via Trece Martires Mendez Silang Tagaytay Trece Martires	49 1 1 2 2 1 6 1	63
14	Jaiko	Mendez	4	4
15	Kay and Jeff	Indang via Trece Martires Tagaytay	1 1	2

Table B-7 List of Bus Companies Operating the Routes on Aguinaldo Highway *(Continued)*

No.	Company Name	Route Served	No. of Units Assigned	Total No. of Units Assigned
16	Lorna Express	Amadeo Indang via Trece Martires Mendez Silang Tagaytay	8 3 6 3 7	27
17	Magic Touch	Dasmarinas Indang via Trece Martires Palapala Silang	2 1 33 1	37
18	Maria Leonora	Alfonso	6	6
19	Ortillo Liner	Indang via Trece Martires Silang Trece Martires	8 2 2	12
20	Rhine	Dasmarinas	3	3
21	Rodriguez	Dasmarinas Mendez Silang	1 1 11	13
22	Saulog	Dasmarinas GMA Imus Tagaytay	5 21 1 5	32
23	St. Anthony	Palapala Silang	1 8	9
24	Vergara Line	Dasmarinas Mendez Palapala Silang	2 2 2 34	40
25	VM Trans	Silang Tagaytay	1 1	2
Total			439	439

SURVEY FORM 1: Roadside Traffic Count Survey

		Traffic Volume Count Field Sheet

Station Code	Station Name	Checker
Survey Date	Location	Encoder
Weather	Direction	
Recorder / Enumerator	From (place)	Filename
Field Supervisor	To (place)	Sheet of

Time Period							
From	To						

SURVEY FORM 2: Roadside Vehicle Occupancy Survey

		Passenger Occupancy Field Survey Form

Station Code	Station Name	Checker
Survey Date	Location	Coder
Weather	Direction	Encoder
Recorder	From (place)	Filename
Field Supervisor	To (place)	Sheet of

Time	**Mode**	**Pax**	**Cap**	**Time**	**Mode**	**Pax**	**Cap**	**Time**	**Mode**	**Pax**	**Cap**

SURVEY FORM 3-a: OD Interview Survey (Private Mode Drivers)

OD INTERVIEW SURVEY (for Private Mode Drivers)

Station No.: _____ Station Name: _____
Direction: From _____ To _____
Date: _____ Weather: _____
Supervisor: _____ Surveyor: _____

	1	2	3	4	5
1. Survey Time					
2. Vehicle Type 1) Bicycle 2) Motorcycle 3) Car/Jeep 4) Utility Vehicle 5) Truck 6) Trailer					
3. Origin Street / Barangay / City / Municipality					
4. Destination Street / Barangay / City / Municipality					
5. Trip Purpose 1) To Home 2) To Work 3) To School 4) Private 5) Business 6) Others					
6. No. of Passengers on Board (incl. driver)					
7. Seating Capacity					
8. Residence Municipality					

SURVEY FORM 3-b: OD Interview Survey (Public Mode Drivers)

OD INTERVIEW SURVEY (for Public Mode Drivers)

Station No.: _____ Station Name: _____
Direction: From _____ To _____
Date: _____ Weather: _____
Supervisor: _____ Surveyor: _____

	1	2	3	4	5
1. Survey Time					
2. Plate No.					
3. Vehicle Type 1) Pedicab 2) Tricycle 3) Jeepney 4) Taxi 5) HOV Taxi 6) Mini Bus 7) Standard Bus 8) School/Company/ Tourist Bus					
4. Route Origin Fill out origin place If not fix: 999					
5. Route Destination Fill out origin place If not fix: 999					
6. No. of Passengers on Board (incl. driver)					
7. Seating Capacity					

SURVEY FORM 3-c: OD Interview Survey (Public Mode Passengers)

OD INTERVIEW SURVEY (for Public Mode Passengers)

Station No.: _____ Station Name: _____
Direction: From _____ To _____
Date: _____ Weather: _____
Supervisor: _____ Surveyor: _____

	1	2	3	4	5
1. Survey Time					
2. Plate No.					
3. Vehicle Type 1) Pedicab 2) Tricycle 3) Jeepney 4) Taxi 5) HOV Taxi 6) Mini Bus 7) Standard Bus 8) School/Company/ Tourist Bus					
4. Origin Street/Barangay/ City/Municipality					
5. Destination Street/Barangay/ City/Municipality					
6. Trip Purpose 1) To Home 2) To Work 3) To School 4) Private 5) Business 6) Others					
7. Residence Municipality					

SURVEY FORM 4: Intersection Traffic Count Survey

INTERSECTION TRAFFIC COUNT SURVEY

Station No: _____ Date: _____
Station Name: _____ Weather: _____
Supervisor: _____ Surveyor: _____

Inflow Direction		Survey Time	AM / PM __:__ - AM / PM

Vehicle Type	Outflow Direction:	Total	Outflow Direction:	Total	Outflow Direction:	Total
1.						
2.						
3.						
4.						
5.						
6.						

SURVEY FORM 5: Axle Load Survey

AXLE LOAD SURVEY

Station No.: _____ Station Name: _____
Direction: From _____ To _____
Date: _____ Weather: _____
Supervisor: _____ Surveyor: _____

Survey Time	Vehicle Type	No. of Axles	Weight of Each Axle (one wheel, kg)				Loading Capacity (tons)	Load Factor (%)	Type of Loaded Cargo
			1st	2nd	3rd	4th			

SURVEY FORM 6: Travel Speed Survey

Journey Time Survey
Field Sheet

Project		Survey Date	Recorder
Route Code		Run Number	Sheet of
Route Name		Start Time	Checker Encoder
Direction		Weather	Filename

T - General Congestion
PED - Pedestrians Crossing
BP - Buses / **JP** - Jeepneys (un)loading
S - Traffic Signal **SS** - Stop Sign
PK - Parked Vehicles
LT - Left Turning Vehicles
A - Traffic Accident
O - Others (specify)

Station Name / Intersection / Landmark	Kilometer Reading	Passing Time	Delay 1			Delay 2			Delay 3			Delay 4		
			Stop	Re-Start	Cause	Stop	Re-Start	Cause	Stop	Re-Start	Cause	Stop	Re-Start	Cause

SURVEY FORM 7: PT Service Frequency Survey

Public Transport Service Frequency Field Sheet	Station Name			
	Station Location			
	Survey Date			
	Direction	Checker	Coder	Sheet of
	Recorder	Encoder	Filename	

Mode	Route / Destination (via) / Line / Company	License Plate	Case Number / Body Number	Pax on Board	Arr/Dep	Time Recorded

SURVEY FORM 8-a: Stated Preference Survey (Car User)

STATED PREFERENCE SURVEY (For Car Users)

Station Name: _____ Date: _____
Surveyor: _____ Time: _____

1. Gender: 1.__ Male 2.__ Female

2. Age: 1. __ 19 and less 2.__ 20-39 3.__ 40-59 4.__ 60 and over

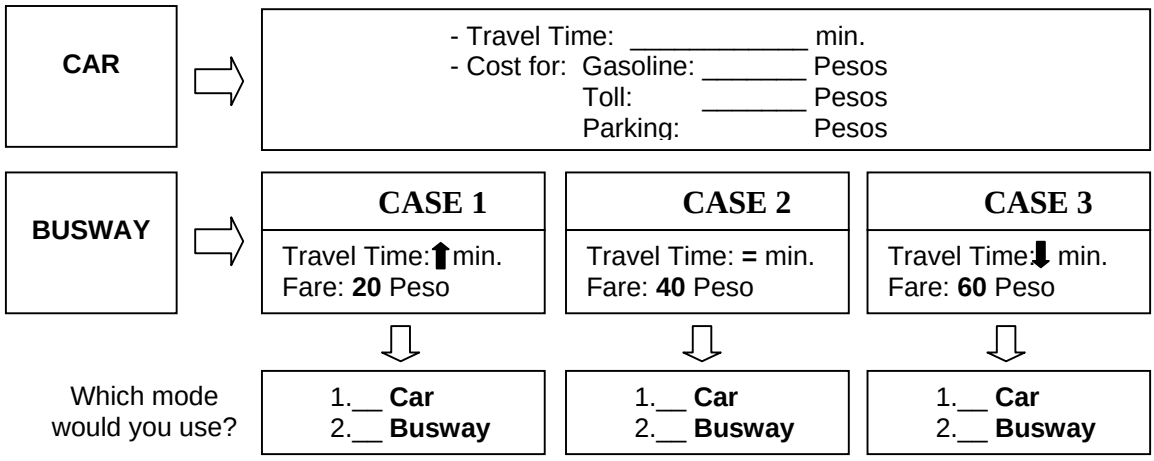
3. Trip Purpose: 1.__ To home 2.__ To work 3.__ To school 4.__ Business 5.__ Private
If 1, what is the purpose at origin: _____

4. Origin Place: Building: _____, No:_____, St:_____,
Bgy._____, Muni._____

5. Final Destination: Building: _____, No:_____, St:_____,
Bgy._____, Muni._____

6. Ownership 1) Is this car owned by you or your family? 1.__ Yes 2.__ No
2) If YES, mostly used by yourself? 1.__ Yes 2.__ No

7. Assuming **New Busway System** is available in parallel with Aguinaldo Highway from Dasmarinas to Bacoor to connect with Metro Manila via Coastal Road, would you use it instead of a car?



Distance (km)	*Fuel Cost (Pesos)*
5	15
10	30
15	45
20	60
25	75
30	90
35	105
40	120

Note:

⬇: reduce 15 minutes when travel time by car is more than 30 minutes or reduce to half (0.5 times) when travel time by car is less than 30 minutes

= : same travel time by car

⬆: increase 15 minutes when travel time by car is more than 30 minutes or increase half (1.5 times) when travel time by car is less than 30 minutes

SURVEY FORM 8-b: Stated Preference Survey (PT Passengers)

STATED PREFERENCE SURVEY (For PT Passengers)

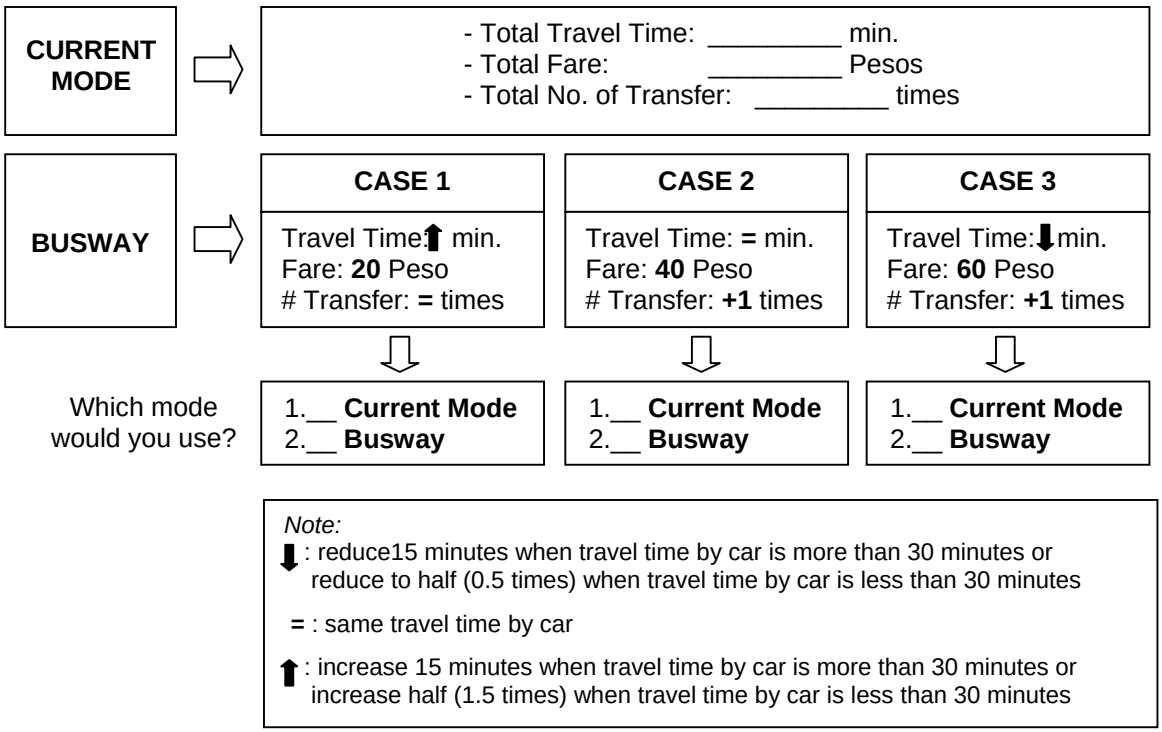
Terminal Name: _____ Date: _____

Surveyor: _____ Time: _____

Route Name: _____ via _____

Current Mode: 1. Standard Bus:___ Aircon ___ Non-Aircon
2. Mini Bus: ___ Aircon ___ Non-Aircon
3. Jeepney: ___

1. Gender: 1.__ Male 2.__ Female
2. Age: 1. __ 19 and less 2.__ 20-39 3.__ 40-59 4.__ 60 and over
3. Trip Purpose: 1.__ To home 2.__ To work 3.__ To school 4.__ Business 5.__ Private
   If 1, what is the purpose at origin: _____
4. Origin Place (current mode) Terminal: _____, No:_____, St:_____, Bgy._____, Muni._____
5. Final Destination: (current mode) Terminal: _____, No:_____, St:_____, Bgy._____, Muni._____
6. Estimated Travel Time: Current Mode: _____ minutes Whole Trip: _____ minutes
7. Fare for current mode: Current Mode: _____ Pesos Whole Trip: _____ Pesos
8. No. of Transfers: _____ Times
9. Assuming **New Busway System** is available in parallel with Aguinaldo Highway from Dasmarinas to Bacoor to connect with Metro Manila via Coastal Road, would you use it instead of the current mode which you use now?



Note:
⬇ : reduce15 minutes when travel time by car is more than 30 minutes or reduce to half (0.5 times) when travel time by car is less than 30 minutes

= : same travel time by car

⬆ : increase 15 minutes when travel time by car is more than 30 minutes or increase half (1.5 times) when travel time by car is less than 30 minutes

SURVEY FORM 9: Bus Operator Interview Survey

Bus Operator Interview Survey

Interview Date: _____
Interviewer: _____

A. General Information

1. Name of Bus Operator / Bus Company _____
2. Name and Position of Respondent: _____
3. Company Address: _____
4. Telephone Number(s): _____
5. Fax Number: _____

B. Fleet Operational Information

1. Date / Year company operation started: _____
2. Fleet Size

	Standard Regular Bus	Aircon Bus	Mini Bus
Total number of buses owned			
Total number of operational buses			
Number of buses with radio			
Number of buses without radio			
Number of Franchised units			
Average seating capacity			

3. Fleet Operations:

Please indicate the number of buses per year of operation (end of year data)

No. of years in operation	1 or less	2	3	4	5	6	7	8	9	10 or over
Regular										
Aircon										
Minibus										
Total										

4. Fleet Age: Please indicate the number of buses per age group.

Age of Buses	1 or less	2	3	4	5	6	7	8	9	10 or over
Regular										
Aircon										
Minibus										
Total										

5. Bus Supplier Information

5a. Where / from whom do you buy your buses? _____
Local suppliers or imported? _____
Are your buses mostly brand new or second-hand? _____

6. Fleet Acquisition

6a. Do you / did you get financing in your fleet acquisition? _____
6b. Is your financing though: (check applicable)

Suppliers credit

Banks

Other modes (please specify) _____

None

6c. What was the purchase price you paid for your most recent unit?

Brand new: P_____

Second hand: P _____

7. Routes Operated: Please list all the routes your company operates on.

Name of Route	One-way length (km)	Round Trips per day	Number of buses			Dead run length (one-way, km)
			Regular	Aircon	Minibus	
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						

Please use separate sheet if necessary.

8. Accident Data: Number of accidents / incidents in the past seven (7) years.

Year	1995	1996	1997	1998	1999	2000	2001
Fatal							
Non-fatal							
Total							

9. Other Operational Information

Number of operating hours per day		
	Time start	
	Time end	
	Average dwelling time at end points / terminals	
Number of operating days per week		
Average number of passengers per trip (passenger load factor)		
Total bus-km per month (average for 2001)		
Total fuel consumption, in liters per month (ave. for 2001)		
Frequency of cleaning per week		
Frequency of preventive maintenance per week		
# of crimes aboard per month		
# of traffic violations per month		
# of breakdowns/abandoned service per month		
# of complaints from passengers per month		
# of memos/disciplinary actions on crew per month		
Total # of seats for elderly & handicapped per bus		
Labor disruption (# of days since start operation)		

D. Manpower Information

1. Number of personnel

Manpower	Number of Personnel	Working days per week	Working hours per day
Drivers			
Conductors			
Inspectors & Dispatchers			
Service & Supply Workers			
Finance & Administrative Personnel			
Executives & Managers			

2. Personnel compensation

Manpower	Basic wage or Salary	Fringe Benefit	Commission	Total (P/Month)
Drivers				
Conductors				
Inspectors & Dispatchers				
Service & Supply Workers				
Finance & Administrative Personnel				
Executives & Managers				

3. Financial Information

Could you please provide us with the following, which will be treated in the strictest confidence:

- Company Balance Sheet for the year 2000
- Company Financial Reports for 2000 and 1999

E. Opinions

1. **LRT / Busway.** If an LRT (or a busway) system is built by the government along Bacoor - Imus - Dasmariñas corridor, will it pose a competition to your operations? Yes No

1a. If Yes, will you modify your service (e.g., apply for a change in route or termination, modify schedule, reduce frequency, etc.).

2. **Who will operate?** Would you prefer government or private sector to run or operate the LRT/busway system along the Bacoor - Imus - Dasmariñas corridor?

Government Private Sector

If private sector:

2a. Will you bid for the right or concession to operate such a system? Yes No

2b. Will you bid alone or join in a consortium with other operators? Yes No

2c. Will you be:

willing to invest in the vehicle fleet? or lease the vehicles from government?

2d. Should the rights to operate the new system be given to only one operator?

Yes, only one operator. No, several operators.

2e. Assuming you won the rights to operate the new system, will you agree to a competitor running similar service on the same route? Yes No

3. **Palapala-Bacoor Expressway.** If an expressway is built along the Bacoor - Imus - Dasmariñas corridor, will you run your buses on this road and pay toll? Yes No

3a. How much are you willing to pay for toll fee, if it is available today? _____

3b. Will you still enter the expressway if your buses are prohibited from stopping (either to load/unload passengers) along the entire route? Yes No

3b. If buses make limited stops at designated areas? Yes No

3a. Will you use the expressway only if there is a reduction in journey time of _____ minutes

4. **Clean Air.** If government orders buses to convert to alternative clean-burning fuel other than diesel (e.g., LNG), will you comply? Yes No

4a. Under what conditions will you do so?

Phased over 5 years?

Replace only buses older than _____ years?

With soft loan from government?

LNG price should be cheaper than diesel? By how much percent? _____

Will not convert

4b. If you are against it, why?

5. **Ticketing System.** Will you join a common ticketing system where passengers can buy stored value tickets and use the same on any bus or LRT line? Yes No

5a. The corresponding amounts earned by a particular operator will be credited electronically to your account?

If yes, under what terms and conditions_____

If No, why not?

ANNEX C

THE FEASIBILITY STUDY FOR THE CAVITE BUSWAY SYSTEM PROJECT WORKSHOPS

ANNEX C : THE FEASIBILITY STUDY FOR THE CAVITE BUSWAY SYSTEM PROJECT WORKSHOPS

1 INTRODUCTION

1.1 Background and Rationale

The Feasibility Study of the Proposed Cavite Busway System has been proposed to address the pressing need for an effective public transport system for the Province of Cavite. It is the offshoot of two previous major studies, (1) the Metro Manila Urban Transportation Integration Study in 1999 and (2) the Cavite-Laguna Urban Development and Environmental Management Project in 2000. The Study intends to examine the feasibility of the proposed busway system on the corridor running parallel to Aguinaldo Highway within the municipalities of Bacoor, Imus and Dasmariñas.

Recognizing the critical role of consensus building among various stakeholders in the conduct of the Study, a series of workshops and seminars have been designed as an integral part of the Study's framework. Each milestone workshop/seminar is originally tailored with one local government unit (LGU) plenary workshop involving broad-based stakeholders and three successive individual LGU workshops (one per municipality covering Bacoor, Imus and Dasmariñas). The stakeholder consultations/workshops intended for the Study duration have been successfully conducted. The first LGU plenary workshop was held at the early stage of the Study on December 13, 2001 at Kalipayan Resort in Dasmariñas, Cavite while the second and third LGU plenary workshops were held on March 1, 2002 and May 29, 2002, respectively at the Heritage Hotel in Pasay City, Metro Manila. The last LGU workshop was held solely for the Resettlement Action Plan on August 29, 2002 in Bacoor, Cavite. The successive individual workshops for the three LGUs, on the other hand, were conducted in a manner that they also provided the venue for several training-cum-workshops for key counterpart staff of the Study and other relevant municipal stakeholders. These individual workshops were intermittently conducted throughout the Study based on the availability of the counterpart staff, other stakeholders and Study experts.

1.2 Objectives

The objectives of the first LGU plenary workshop were as follows:

1) To obtain inputs for the refinement of the following study issues: (a) need for incorporation of busway in regional framework plan and LGU plan; (b) alignment options for busway; (c) associated urban development; (d) right-of-way acquisition; (d) practical mechanism to ensure busway routes and integrated development; and (e) other issues.

2) To identify required working committees from the local government units and other concerned agencies towards building consensus/support for the project.

The objective of the second plenary workshop was to share the progress of the Study as well as its preliminary findings/output with the end view of getting feedback or input on some planning issues. The third LGU plenary workshop, on the other hand, was honed on exploring a doable arrangement for preempting the acquisition of the CBS ROW prior to project implementation. This is expected to hasten realization of the busway in view of the mounting traffic congestion experienced on major roads, particularly Aguinaldo Highway, of the province.

The fourth and last LGU workshop was held with the main objective of acquiring the resettlement requirements of the affected informal dwellers within the busway right-of-way for the formulation of a Resettlement Action Plan. Inasmuch as there are informal dwellers in the municipalities of Bacoor and Dasmariñas, the workshop was only possible for Bacoor. A private-sector-initiated relocation activity in Dasmariñas made it difficult to pursue any discussion with affected informal dwellers in the area. There are no informal dwellers in the Municipality of Imus.

2 ACTIVITIES OF THE WORKSHOPS

2.1 Program and Participation

All workshops were basically geared towards enhancing project appreciation and encouraging participation from the stakeholders. The programs of activities of the LGU plenary workshops are presented in Tables C-1 to C-4.

Getting people to attend the workshops is one thing and getting them to stay throughout the entire session and participate is another. As such, the main departure of the workshop program from usual workshops is that it was intentionally designed to be short and concise (i.e., half day session) and with the participation of the key stakeholders while succeeding individual workshops tackled broader participation at the municipality level.

Table C-1 First LGU Plenary Workshop Program of Activities

MOVING THE CAVITE BUSWAY SYSTEM INTO HIGH GEAR
(Inception Report)
December 13, 2001 @ Kalipayan Resort Inc., Dasmariñas, Cavite

12:00 – 1:00 pm	Registration of Participants (Lunch to be served)	
1:00 – 1:30	OPENING CEREMONIES	**Ms. Liberty Abellon** *Project Coordinator, NEDA Region IV*
	Welcome Address	**Mr. Godofredo Galano** *Director, DPWH-BOT*
	PRESENTATIONS	
1:30 – 1:45	"The Cavite Structure Plan"	**Dr. Geronimo Manahan** *Landuse/Town Planner, JICA Study Team*
1:45 – 2:00	"Overview on the CALA Project"	**Mr. Chris Pablo** *Project Manager, NEDA-CALA PMO*
2:00– 2:30	"A Suburban Mass Transit: The Busway"	**Dr. Tetsuji Masujima** *Transport Analyst, JICA Study Team*
2:30 – 3:00	"Requirements of the Cavite Busway System F/S"	**Mr. Michimasa Takagi** *Deputy Team Leader, JICA Study Team*
3:00 – 3:15	Coffee Break	
3:15 – 4:15	Group Discussion on Project Issues (Break-out Session)	
4:15 – 4:45	Presentation on the Results of Discussions	
4:45 – 5:15	Open Forum	
5:15- 5:30	Summary and Next Step	**Mr. Chris Pablo** *Project Manager, NEDA-CALA PMO*
5:30 – 5:40	Closing Remarks	**Hon. Ayong S. Maliksi** *Governor, Province of Cavite*

Table C-2 Second LGU Plenary Workshop Program of Activities

THE CAVITE BUSWAY SYSTEM
(Progress Report)
March 1, 2002 @ Heritage Hotel, Pasay City, Metro Manila

12:00 – 13:00	Registration of Participants (Lunch to be served)	
13:00 – 13:30	Welcome Address	**Dir. Oskar D. Balbastro** *NEDA Region IV*
13:30 – 14:30	Presentation of the Progress Report	**JICA Study Team**
14:30 – 16:15	Open Forum and Discussion of Project Issues • Route alignment • Busway Operations (Snacks at 15:30)	**Mr. Chris Pablo** Moderator *Project Manager, NEDA-CALA PMO*
16:15 – 16:30	Summary and Next Steps	
16:30 – 16:45	Closing Remarks	**Hon. Ayong S. Maliksi** *Governor, Province of Cavite*

Table C-3 Third LGU Plenary Workshop Program of Activities

THE CAVITE BUSWAY SYSTEM (Plenary Workshop on the Project Board) May 29, 2002 @ Heritage Hotel, Pasay City, Metro Manila		
12:00 – 13:00	Registration of Participants (Lunch to be served)	
13:00 – 13:30	Progress of the Study	**Mr. Chris Pablo** *Project Manager, NEDA-CALA PMO*
13:30 – 14:30	• Presentation on the Elements of the Project Board • Results of the Discussions with the municipal leaders of Bacoor, Imus, Dasmarinas and with the private sector (One Asia).	**Mr. Rene Santiago** JICA Study Team Member *PFI*
14:30 – 16:15	Open Forum and Discussions	**Mr. Chris Pablo** Moderator *Project Manager, NEDA-CALA PMO*
16:15 – 16:30	Succeeding Activities of the Study on the Busway Right-of-Way and the Project Board Agreement	

From the control list of 82 invitees, the first workshop had 52 attendees while the second and third workshops had 59 and 33 attendees, respectively. Table C-5 gives the affiliation breakdown of the participants. The national government agencies represented were the Department of Public Works and Highways (DPWH), Department of Transportation and Communications (DOTC), Light Rail Transit Authority (LRTA), National Economic and Development Authority (NEDA), Department of Interior and Local Government (DILG), Department of Social Welfare and Development (DSWD), National Center for Transportation Studies of the University of the Philippines (UP-NCTS), and the Metro Manila Development Authority (MMDA). For the local government units, there were representatives from the provincial government of Cavite as well as the municipal governments of Bacoor, Imus and Dasmariñas. Representatives from large land-holding entities in the study area as well as business interest groups represented the private sector.

Table C-4 Fourth LGU Workshop Program of Activities

THE CAVITE BUSWAY SYSTEM (RAP- Community Participation in Busway Implementation) August 29, 2002 @ Municipal Hall of Bacoor, Cavite		
13:00 – 13:30	Registration of Participants	
13:30 – 14:00	Welcome Speech and Introduction of Study Team Members and Counterpart Staff	**Ms. Beulah Pallana** Moderator *JICA Study Team Member*
13:30 – 14:30	Project Appreciation Presentation: The Busway Project	**Ms. Lynn Sison** *JICA Study Team Member*
14:30 – 15:15	Group Break-out Discussions	Facilitators: Engr. Jess Francisco, *MPDO* Ms. Julie Lucea , *MPDC* Ms. Crispina Maravilla, *MDSWD* Ms. Lynn Sison, *Study Team Member* Ms. Beulah Pallana, *Study Team Member* Ms. Wini Villanueva, *Study Support Staff*
15:15 – 15:30	Coffee Break	
15:30 – 16:00	Group Presentation of Discussion Results	
16:00 – 16:30	Open Forum	
16:30 – 16:45	Summary	**Ms. Beulah Pallana** Moderator

For the fourth LGU workshop, about 30% of 191 (i.e., 59) identified affected families of Line B option of the busway alignment were invited to participate. A total of 51 affected informal dwellers attended the workshop.

Table C-5 List of Attendees for the Plenary Workshops

Agencies/Sectors Represented	No. of Participants / Workshop			
	First	Second	Third	Fourth
Local Government Units (Provincial and Municipal)	24	24	17	4
National Government Agencies	11	15	4	-
Private Sector	4	8	4	-
Affected Dwellers	-	-	-	51
Study Team Member and Staff	13	12	8	3
Total	52	59	33	58

2.2 Presentations

1) First Plenary Workshop

A succession of short technical presentations was made after the opening ceremonies of the workshop, as follows

(a) The Cavite Structure Plan - is a presentation of the growth and changes in the Province of Cavite in terms of land use developments. It also presents public and private developments currently pursued or planned in the province.

(b) Overview on the CALA Project – outlines past and present initiatives taken by the Cavite-Laguna Project Management Office of NEDA for the urban and

transport development of Cavite and Laguna. Likewise, the status of actions by the same project office and relevant offices were presented.

(c) A Suburban Mass Transit: The Busway – presents the existing and future transport conditions of Cavite and brings to view the necessity for a public transport corridor development in the area. Options for a new suburban transit system in Cavite were presented based on the various mass transit experiences worldwide.

(d) Requirements of the Cavite Busway System Feasibility Study - familiarizes the participants with the ongoing Study in terms of the objectives, coverage and stages, and framework. It then cues in the participants to the planning issues that need to be addressed on regional planning, busway system, project implementation and consensus formulation.

To further enhance appreciation of the project, a video on the busway system of Curitiba, Brazil was shown during registration period of participants.

2) Second Plenary Workshop

The Study background, objectives, framework, and progress of the Study (as of February 2002) were presented followed by the sharing of the preliminary findings/output of the Study, as follows:

(a) Results of the Demand Forecast - is a presentation of the demand forecast for years 2002, 2005, 2010 and 2015 taking into account the "with" and "without" busway scenarios for the proposed busway, service road, Aguinaldo Highway, Molino Road and the three municipalities of the Study area. Both scenarios dealt with various options as to the number of road lanes tested. Initial Study findings reveal that: (i) busway is more efficient than ordinary road for public transport service, (ii) a 4-lane busway road plus 4-lane service road seems ideal but given the topography and land use of the area, the maximum right-of-way suggested is 30 meters.

(b) Alignment Options – is the presentation and explanation of the major planning issues regarding the alignment basically tackling the alignment options in the critical areas of Bacoor, Imus and Dasmariñas. Recommended alignments were set forth for the Bacoor section, Molino Road section, Citta Italia section, One Asia section, electric power substation section, and the southern terminal point. Likewise, the number, location, and type of the terminals and bus stops were discussed.

(c) A Concept of Feeder Public Transport – presents the requirement of secondary roads as feeder roads to the busway. Likewise, the role of other public transport modes as feeder service is presented.

(d) Financial Options for the Cavite Busway System - presents the options in the allocation of financial burden between the government and the private sector for the project in terms of construction of the road and the operation of the system; familiarizes the participants with the ongoing Study in terms of the objectives, coverage and stages and framework. It then cues in the participants to the planning issues that need to be addressed on regional planning, busway system, project implementation, and consensus formulation.

3) Third Plenary Workshop

More focused on the formation of a Project Board body, presentations made in this workshop were the various elements that would be incorporated in the agreement to be drawn up between the DPWH and the Cavite group of stakeholders, namely: (1) Provincial Government of Cavite, (2) Municipal Government of Bacoor, (3) Municipal Government of Imus, (4) Municipal Government of Dasmariñas, (5) One Asia Development Corporation, (6) Cavite Council for Economic Development, and (7) other party deemed appropriate by the group.

4) Fourth Workshop

This last workshop made presentations to the affected families covered by the anticipated resettlement plan based on the identified busway alignment. The presentation was intended to basically increase appreciation and cooperation for the implementation of the busway project. It showed the present socio-economic and transport situation of Cavite, a description of the Study and its major findings and the recommended busway system and identified alignment.

2.3 Speeches

1) First Plenary Workshop

A welcome speech was delivered by Director Godofredo Galano of DPWH-BOT. He basically extended a warm welcome to all the participants and gave a brief on how the busway project came about. He then urged all the participants to give their reactions/suggestions/recommendations for consideration in the Study.

During the closing remarks, Honorable Ayong Maliksi, Governor of the Province of Cavite, thanked the NEDA Region IV and DPWH for guiding and facilitating the project as well as all other partners in the government and private sector for participating in the workshop. He stressed that the development of the public transport system is one of Cavite's priority projects and that he was glad there is

some light in the realization of the busway project. By his way of concluding, he expressed his hope that the project will be on the ground soon.

2) Second Plenary Workshop

Director Oskar Balbastro of the NEDA Regional Office welcomed all the participants to the secondary plenary workshop. He then explained that the workshop is only one of the series of consultations that will follow closely the course of the Study as part of the transparency feature of the project. He stressed the need for their response and insights on how the new concept of public transportation (the busway system) should work for the province of Cavite and the need for a public-private collaboration for the success of the project.

As with the first workshop, the Governor of Cavite, Honorable Ayong Maliksi, delivered the closing remarks. He emphasized the importance of the busway for the development of the province and further expressed that the Provincial Government is fully supporting the project. He informed the workshop participants that his office held a meeting with One Asia (one of the affected property owners) and that their support has been assured. Coordination meetings were also held with the LRT Line 1 Extension contractors (SNC Lavalin of Canada) for good timing of project implementation. Similar meetings will be conducted in the future with other affected project entities. In closing, he thanked all the participants for attending as well as extended his gratitude to JICA, NEDA, DPWH, and other agencies for their support.

3) Third Plenary Workshop

Mr. Christopher Pablo, Project Manager of the CALA Project Management Office under NEDA, welcomed all the proposed members for the Project Board, the project team members from the national government agencies and the JICA Study Team members to the workshop. He briefly stated that individual consultations were already conducted with leaders of the three busway LGUs and that the plenary workshop is being held to hopefully arrive at a consensus on the elements of the Project Board.

Honorable Ayong Maliksi brought the workshop to a close stating his appreciation of the efforts of the project team and the coordination of the LGUs concerned. He viewed the progress of the Study as favorable.

4) Fourth Workshop

Engr. Jesus Francisco, Planning Officer of the Bacoor Municipal Government, welcomed all the participants to the workshop and encouraged them to give their inputs for a workable Relocation Action Plan. Their cooperation for the

implementation of the busway was likewise requested for the benefit of the entire municipality and province.

2.4 Break-out Session of the First Plenary Workshop

One of the main differences in the conduct of the workshops is that the first workshop had break-out group discussions while the succeeding workshops maintained a plenary discussion format. As such, this section only explains how the group discussion session of the first workshop was undertaken.

The workshop secretariat pre-grouped the participants into three working groups to discuss the planning issues on ROW acquisition, alignment for the busway and cost-sharing schemes for the implementation of the project.

The mechanics employed for the group discussion was as follows:

1. The workshop participants were divided into three discussion groups. Each group was asked to discuss the following project requirements:

   Group 1: Role of stakeholders in right-of-way acquisition
   Group 2: Alignment of busway route
   Group 3: Cost sharing schemes

2. The objective of the exercise is to address project issues initially identified at the start of the feasibility study. The following Study team members were assigned to guide the workshop break-out session. The expected outputs of the discussion were as follows:

   Group 1: Facilitator – Ms. Beulah Pallana
   Co-facilitator – Mr. Akitoshi Iio
   Scriber – Ms. Nanette Abilay

   Expected Output of Discussion: Identified activities, output, lead agency and time frame for ROW acquisition.

   Group 2: Facilitator – Mr. Dojie Manahan
   Co-facilitators – Mr. Paterson, Dr. Masujima, Mr. Ric Yuzon
   Scriber – Ms. Lynn Sison

   Expected Output of Discussion: Control Points for consideration in refining the alignment

   Group 3: Facilitator – Mr. Rene Santiago
   Co-facilitator – Mr. Michimasa Takagi
   Scriber – Dr. Ian Espada

   Expected Output of Discussion: Workable schemes for cost sharing on land acquisition and busway structure/operation.

3. The workshop groups were only given approximately 45 minutes to discuss their respective project issues. At the beginning of the session, it was recommended that the chairperson be identified. Then, the group facilitator took notes at the flip chart or white board as well as assisted the chairperson in moderating the discussions.

4. Upon closing the group discussion, the chairperson gave a brief summary of discussions and consensus reached by the group.

5. The facilitator and scriber prepared presentation materials of the group's conclusion which were then presented to the plenary.

6. All worksheets and discussion notes of the respective groups were submitted to the workshop facilitators.

3 HIGHLIGHTS OF THE GROUP DISCUSSIONS IN THE FIRST PLENARY WORKSHOP

3.1 Discussion on Right-of-Way Acquisition

The group was informed that a Task Force on ROW Acquisition will be created for the project by virtue of a (still to be issued) Department Order from the DPWH. It will be headed by the DPWH IV-A as chair and Cavite Provincial Governor as co-chair with the mayors of the municipalities of Bacoor, Imus and Dasmariñas and representatives from other concerned line agencies as members.

In the discussion of proposed activities towards ROW acquisition, several issues were identified as follows:

a. Political will of LGUs in implementing the ROWA is critical.

b. Time-frame/duration for identified activities such as tagging and census, physical inventory, etc., shall depend on the magnitude of affected households/ landowners and structures. DSWD representative reiterated that the level of social acceptability of the project is critical for the completion of all related activities.

c. The following activities were outlined in relation to ROW and resettlement for the Study:

   - Inventory of lands to properly identify location and physical characteristics of would-be affected lands/landowners. The LGUs, specifically the Municipal Assessors, Municipal Engineers, Municipal Planners, and the Provincial Engineer, shall take the lead in coordination with the Study Team and the DPWH.

   - Once the alignment has been finalized, a physical inventory/survey of structures shall be conducted.

- Initial listing of affected structures, landowners and formal and informal dwellers shall be drawn up in coordination with concerned agencies and focal persons in the LGUs (DPWH, Brgy. Captains, etc.)
- Dialogues with affected landowners/property owners shall be conducted through consultations and FGDs. The LGUs shall take the lead in this undertaking with the coordination of the Study Team.
- The Study Team, in coordination with the LGUs, shall prepare a resettlement plan.
- An agreement shall be drawn up and signed between and among LGUs and concerned national government agencies (NGAs). The agreement shall focus on the following: 1) cost-sharing, 2) resettlement and 3) protection of busway ROW through strict control of development by the LGUs.

3.2 Discussion on the Alignment for the Busway

The objective of the group discussion is basically to get inputs from the participants on which alignment option the Study team could consider for refinement in the Study. The expected output of the discussion is the identification of control points in each municipality that would be of valuable consideration in fixing the alignment for the busway. There were maps distributed to the participants for project familiarization, which were on the general alignment and the specific areas or three sections with difficulties. Likewise, a schematic drawing was distributed showing related issues to the busway system.

Discussion ensued on the specific areas with difficulties in fixing the alignment in the municipalities of Bacoor, Imus and Dasmariñas as follows:

(1) Bacoor

- Two alignments were presented to the group on the Bacoor area basically connecting with the Coastal Road. One is an elevated option along the LRT route and the other is an at-grade option further west of Bacoor crossing Aguinaldo Highway and connecting with the Niog area. Based on these two alignments, the western most connection of the busway in Bacoor would be favorable in terms of its distance from the existing intersections.
- It was suggested that the St. Dominic Flyover, which is essentially the LRT 1 alignment, be considered for the connection of the busway to the coastal road. Likewise, and alignment using an ordinary road in St. Michael Subdivision can also be considered as it crosses Aguinaldo Highway at-grade and connects to the Niog Area.
- An elevated option passing along the same route as the LRT 1 would be easier to implement as resettlement requirements is reduced. However, the cost of the structure is expected to be higher.

(2) Imus

- The question on how to bring the busway alignment from the Molino Road at Bacoor to the One Asia property in Imus was addressed to the participants. It should be mentioned that One Asia is a large land holding realty company which has signified willingness to accommodate the busway in its area. There was no clear option given but the only consideration discussed was to avoid the Citta Italia Subdivision, a high-end residential area on the boundary of Bacoor and Imus.
- The MPDC has signified that they will investigate the conditions of the residential subdivisions in the area shown on the map to determine a workable alignment.

(3) Dasmariñas

- There are two possible alignments identified in Dasmariñas. One is the western alignment crossing the Aguinaldo Highway and traversing the westside of the Pala-Pala intersection (or C1). The other alignment traverses the east side of the highway (or C2). Both alignment options avoid the NAPOCOR power substation on Aguinaldo Highway.
- The disadvantages of the western alignment or C1 were identified to be the sloping terrain, the resettlement of squatters and constraints on land for the terminal area.
- The group was informed that the Municipal Hall of Dasmariñas will be relocated on the northwest corner of the property owned by Solar Resources Inc. This in effect makes the western alignment beneficial for the new office site of the municipal government. A short section of road, which was the old Aguinaldo route, was given to Solar Resources in exchange for the new municipal government office site. Efforts by Solar to relocated squatters on this section are still in progress. The idea of widening Aguinaldo Highway at this route was brought up. This would, in effect, be favorable in terms of avoiding the difficult terrain of the western alignment option.
- The representative of Solar Resources offered locating the terminal of the busway at their property behind the Metrogate Subdivision.
- Additional information that surfaced were as follows:
    - Robinson's Inc. plans to develop their 4.5 property on the south side of the C1 terminal option of the busway. The layout plans of Robinson's development will be provided by the municipal planner to the Study team. Talks with Robinson's included a possible grade separation at the junction of Pala-Pala on a shared cost basis.
    - SM intends to develop their 8-hectare land on the northeast side of Pala-Pala.

The participants were informed by Director Galano of DPWH that the cost for constructing the busway with service roads will be done by DPWH. However, in fixing the alignment, the LGUs should consider the possibility of shouldering 50% of the acquisition cost for the right-of-way.

In the wrap-up discussion, a summary was made on what the group has identified as the control points to consider in fixing the alignment as follows:

(1) Bacoor: The alignment should link up with the Niog area and the Coastal Road.

(2) Imus: The high-end residential area of Citta Italia should be avoided.

(3) Dasmariñas: The alignment should not be anywhere near the NPC power substation; the busway should be linked up with the Pala-pala interchange area; and there is a constraint on land for the terminal area at Pala-pala.

3.3 Discussion on the Cost Sharing Schemes for the Project

The group discussed the following major project concerns:

(1) Possible Scheme

The cost sharing of the Busway System based on project components are as follows:

- *Busway facilities:*

Maintenance	:	LGU or the Private Sector
Structures	:	National Government (DPWH) if with service road
	:	LGU if there is no service road
Flyovers	:	DPWH
Passenger Facilities and Stations	:	Private sector

- *Right-of-Way:*

  Landowners (e.g. One Asia indicated its intention to provide the ROW)
  LGU
  National government } Sharing of lands to be procured. (50:50 ?)

It was indicated that there were already lands acquired by DPWH for roads, which can be used for the Busway.

(2) Support from the Local Government Units (LGUs)

There was concern that the LGUs may not be able to afford its share of the costs, thus schemes on how the LGUs can provide its share of the ROW acquisition costs were discussed. One alternative mentioned is the provision of tax credits to affected landowners for ROW acquisition. At this point, the LGUs were requested to look into other possible schemes and discuss these with the Study team at a later time.

Another support required from the LGUs is the protection of the right-of-way once identified and fixed. This was discussed to be in terms of development controls on land use as well as guarding against illegal encroachment or informal settlers.

(3) Landowners contribution

It was suggested that landowners share in the cost of the project. Potential schemes proposed are as follows: (a) sharing in the cost of structures that fall within their land and (b) sharing with the government profits accrued through increased land values and the amount of which will be used for ROW acquisition. The LGUs were urged to discuss other possible contributions with each affected landowners in their area.

(4) Others

It was suggested that a surcharge on top of the fare could be imposed to pay for ROW. It was confirmed that the cost for resettlement is part of the project cost.

It was later agreed upon that the project would proceed on the basis that there is a service road, thereby confirming the involvement of DPWH in the project.

4 HIGHLIGHTS OF THE DISCUSSIONS IN THE SECOND PLENARY WORKSHOP

Discussions took place in an open forum manner and the topics tackled are as follows:

(1) Bacoor Alignment Options

The planning manager of LRTA, Ms. Vangie Razon, informed the participants that the LRT Line 1 Extension is anticipated to be fully operational by year 2005. Financial closure of the project, which is executed by SNC Lavalin of Canada, will be completed end of 2002 and then civil works will immediately start with the line extending from Baclaran to Niog area of Bacoor. With this information, the Study team noted that such timing is favorable for the busway project as the other alignment option of connecting to the coastal road will no longer be pursued. The alignment then to follow is at-grade starting from the Niog area with some consideration for future conversion to higher public transport mode or the rail mode.

Another issue presented for discussion was the option of widening the road section in Bacoor as against the earlier recommendation of building a new road on the western side of the municipality. The MPDC of Bacoor, Engr. Jess Francisco, informed the participants that the matter will be taken up during the Municipal Council meeting (Municipal Councilors Meeting) on March 6, 2002, which is a day

after the Steering Committee of the Project will meet. It was presented, however, that the widening of the road section is an easier option. .

(2) Dasmariñas Alignment Options

There are basically two options considered for the alignment in Dasmariñas. The first would affect a power substation (the front or back area) while the second would entail a crossing over to the western side of Aguinaldo Highway unto the private property of Solar Properties, Inc. Inasmuch as the property owner is open for discussion on how to accommodate the project, there is still the problem of relocating some informal settlers on their property. There is already a court decision on demolition works but no action has been taken yet. Another problem is the relocation of informal settlers on an old road (government property) in the same vicinity. The MPDC of Dasmariñas, Engr. Moises Menguito, informed the participants that discussion with the authorities of the power substation and Robinson's Property Inc. (land behind the substation) has not been undertaken yet for the first option. It is preferred that a final alignment be made before any representation to affected parties be made.

(3) Secondary Feeder Roads

This is a relatively new issue, which deals with the connectivity of the busway with the road network of the province. It would mean that the local governments would essentially look into the possibility of acquiring new roads or identifying which existing roads to use to feed into the busway system. The LGUs were requested to provide feedback to the Study team on the feasibility of making the recommended feeder roads to the bus stops or identify any problems that may be encountered.

(4) ROW Acquisition

Three options for ROW acquisition were presented. The one recommended is the formation of a Project Board between One Asia, the Provincial Government, DPWH, the anchor parties. In response to this, Ms. Chiqui Tronco of One Asia Properties indicated that they have already discussed the option of land donation to support the project. In fact, their conceptual land use plan already shows how they would prefer the busway to enter their property. Once the alignment has been fixed, the LGUs will be asked to protect the ROW from other developments to occur.

(5) Others

The issue on the manner of forecasting demand was raised. It was explained that the modal shift from private to public mode was not assumed in the demand forecasting, which makes the forecast a little on the conservative side. But within the public transport demand, with the use of the Transit Assignment, the modal shift was simulated automatically by the software. If demand is large enough to

support both the busway and LRT in the future, then the LRT can be constructed on the busway corridor and the busway can still be continuously operated.

On the issue of applying land readjustment for the busway project, this will be tackled in Stage 2 of the Study. A land readjustment expert will undertake such investigation.

5 HIGHLIGHTS OF THE DISCUSSIONS IN THE THIRD PLENARY WORKSHOP

The following concerns were discussed in an open forum manner:

(1) Composition of the PROJECT BOARD

There are seven identified parties to the Project Board – the DPWH, Provincial Government of Cavite, Municipalities of Bacoor, Imus, and Dasmariñas, One Asia, and Cavite Council for Economic Development. One Asia, a private developer in the busway study area, was identified as an anchor key player to move ROW acquisition ahead. The Governor of the Province of Cavite suggested that an invitation be given to former Prime Minister Cesar Virata or other members of the Cavite Council for Economic Development to join the Project Board.

(2) Responsibilities of the Project Board Members

A working paper will be drafted to outline the responsibilities and commitments of each member as a guide. The asset participation is really the second stage where it depends on the Project Board if they want to proceed with that or end up with some other option.

(3) Land Valuation for the ROW

The Provincial Assessor stated that there is a process of determining the fair market value of the properties to be affected by the construction of the LRT Line extension, not only for the land but also for the improvements and all the buildings to be affected. A Committee was created for this task, in addition to the Provincial Appraiser Committee. The Provincial Appraiser Committee, under Executive Order 326, is only composed of the Provincial Assessor, as the Chairman, the Provincial Engineer and the Provincial Treasurer as Members. In the LRT Line 1 extension case, there will be assistance from the District Engineer and the Municipal Assessor of Bacoor where the project will be constructed. There are three bases in determining the just compensation: (1) the zonal value as determined by the BIR, (2) the declaration as finding of the assessor and (3) the actual selling price.

The same process above can be employed for the busway project. It was explained that there will be an inventory/survey of the affected assets, for both land and

structures, on the month of June. The assistance of the Provincial Assessor's Office will then be sought in terms of providing TCTs, etc.

6 HIGHLIGHTS OF THE DISCUSSIONS IN THE FOURTH WORKSHOP

The participants were grouped accordingly to cover the six risks and rehabilitation tasks that come with the resettlement issue of the busway project. Each group was made to discuss only one of six risks and their corresponding rehabilitation, to wit:

a) Loss of Land to Land-based Restoration;
b) Loss of Homes to House Reconstruction;
c) Loss of Job and Income to Self-employment or Re-employment;
d) Loss of Community Assets and Structures to Re-establishment of the Same;
e) Education Disruption to Continuing Education; and
f) Food Security to Adequate Nutrition and Better Health Care.

The affected families have basically agreed to be relocated to give way to the busway project as long as their requirements are seriously taken into consideration. The basic items for incorporation in the Resettlement Action Plan (RAP) were stressed as follows:

a) Provision of an appropriate relocation site within the same municipality or near their present dwelling place;
b) Replacement cost of houses should enable affected families to build the same structures at the relocation site;
c) Assistance from relevant agencies for the provision of jobs and livelihood for those economically displaced;
d) Priority accommodation of students at schools in the relocation site;
e) Strengthening of civic groups and cooperatives and provision of social welfare/ health services;
f) Replacement of affected community assets and structures;
g) Provision of utilities and communication facilities at the relocation site; and
h) Assistance in transferring to the relocation sites (i.e., transport of belongings, rebuilding, etc.)

7 SUMMARY AND NEXT STEP

7.1 First Plenary Workshop

A summary of the outcome of the group discussions as well as the plenary discussions is as follows:

- One important output of this Study is an agreement between the Study team, national government and the local government units regarding the alignment of the busway.

- There will also be an agreement regarding the sharing of the cost of the ROW between the national government and the LGUs as well as between the LGUs and affected private property owners. Likewise, an agreement for the LGUs to control development on the identified alignment of the project will be worked out.
- It was agreed that a project committee will be created with DPWH and Province of Cavite taking the lead. This will be chaired by the DPWH and co-chaired by the Governor of Cavite. The members are the three mayors, provincial land assessor office, DENR, NEDA, DOTC, and MMDA. The role of the committee is to deal with the right-of-way issues, facilitate the determination of the final alignment, facilitate coordination with the LGUs, etc. The intention is to have preliminary discussions and resolutions on major concerns on how to acquire right-of-way but no action to be taken until funds are available.
- It has been agreed that the project includes the service road, which will function as a secondary road. Therefore, the Study team will prepare a conceptual plan on how to develop the busway with service road. The busway should be configured in a way to accommodate the LRT in the future since it will be converted into an LRT when demand calls for it. The LRT Line 1 extension is planned to terminate at Niog and it will be extended later on when the busway is no longer capable to serve the demand. The service road should also be enough to serve the surrounding areas and that it be a catalyst for urbanization and expansion of the busway corridor.
- There was an agreement for the LGUs to come up with counter proposals on how to deal with the cost sharing for the ROW.

Therefore, based on these discussions, the next steps of the Study are as follows: (1) further consultations will be conducted with the LGUs as well as key land owners for possible participation in the project; (2) upon the availability of required maps and other information, an inventory of assets will be done as well as the environmental and social survey will be conducted for the formulation of an acquisition and resettlement plan and (3) there will be further focus group discussions on the key issues of the Study starting January 2002.

7.2 Second Plenary Workshop

The following summarizes the outcome of the second plenary workshop:

- On the alignment options, the LGU representatives from Bacoor and Dasmariñas will provide feedback to the Study team at a later date to confirm decisions on options presented. For Bacoor, the result of the SB meeting will be made available after March 6, 2002 on whether the LGU would prefer to widen an existing road or construct a new one. For Dasmariñas, it was agreed that work will be done closely with Solar Properties on the problem of relocation of

informal settlers. Meetings with the authorities of the power substation and the Robinson's Property still have to be set up to explore possibilities of the other alignment option traversing either the front or back area of the power substation along Aguinaldo Highway.

- Once alignment has been decided upon, the LGUs are asked to protect the ROW from further development. Inasmuch as the option of forming a Project Board (between property owner, provincial government and DPWH) was recommended, One Asia Properties indicated the mode of donation for the ROW in their property.
- The secondary feeder roads system for the busway will be examined further by the LGUs in terms of their feasibility for implementation.

The following are the succeeding project activities after the second workshop: (1) Steering Committee Meeting on March 5, 2002 with the expectation of some guidance and decision on the planning issues presented; (2) Further discussions with the LGUs on the secondary feeder roads and (3) Once the alignment has been decided upon, DPWH (headed by Director Agustin) and NEDA will convene the ROWA Task Force to plan on how to start moving on the acquisition of the ROW. It should be noted that the Governor of Cavite and the mayors of Bacoor, Imus and Dasmariñas are members of this Task Force.

7.3 Third Plenary Workshop

The participants were informed of the following activities in relation to the subject of the Project Board:

- A working paper will be drafted to outline management and operational schemes of the Project Board organization;
- A memorandum of agreement (MOA) towards the formation of the Project Board will then be drafted, deliberated upon and finalized; and
- Signing of the MOA will then follow.

The signing of the MOA (agreement to form a Project Board) will be the basis of succeeding meetings -- that the parties commit themselves to discuss further details of the Project Board. Although not within the Terms of Reference (TOR) of the Study, the Study Team has agreed to draw up a draft Project Board Agreement as a starting point for the identified Project Board members.

7.4 Fourth Plenary Workshop

The participants of the workshop were the affected families of the busway right-of-way in the municipality of Bacoor. They have agreed in principle to cooperate in

relocation but with specific demands, which are incorporated in the formulated Resettlement Action Plan

The participants were informed that a final seminar will be held in just a few weeks to present the Draft Final Report of the Study. Suggestions made by the affected families in the Resettlement Action Plan will be presented in this seminar. This plan will be submitted to the Right-of-Way Task Force, which was already organized, for the eventual implementation of the busway project. It was mentioned that the project is not expected to be implemented overnight but would take a few more years (i.e., possibly ranging between five to eight years). As such, it was strongly stated that no improvements or other structures be made in the area as a survey was already made (as of June-July 2002) to determine the extent of structures affected and the cost for resettlement.