

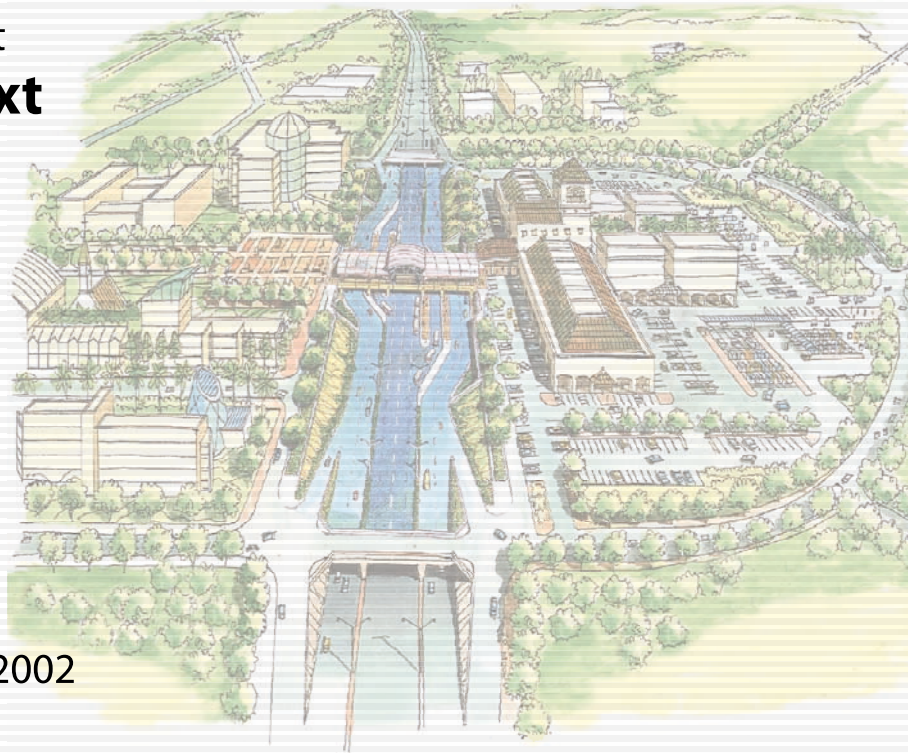
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

No.

NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY,
THE REPUBLIC OF THE PHILIPPINES

The Feasibility Study of the Proposed Cavite Busway System

Final Report
Main Text



November 2002

ALMEC Corporation
Pacific Consultants International

SSF

JR

02-154

Exchange Rate Used

PHP 1 = JP ¥ 2.34

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY,
THE REPUBLIC OF THE PHILIPPINES

The Feasibility Study of the Proposed
Cavite Busway System

Final Report
Main Text

November 2002

ALMEC Corporation
Pacific Consultants International

PREFACE

In response to the request from the Government of the Republic of the Philippines, the Government of Japan decided to conduct the Feasibility Study of the Proposed Cavite Busway System and entrusted the study to the Japan International Cooperation Agency (JICA).


JICA selected and dispatched a study team headed by Mr. Takashi Shoyama of ALMEC Corporation and consist of ALMEC Corporation and Pacific Consultants International to the Philippines from November 2001 to September 2002. In addition, JICA set up an advisory committee headed by Mr. Takashi Ariyasu, Urban Development Corporation between November 2001 and September 2002, which examined the study from specialist and technical points of view.

The team held discussions with the officials concerned of the Government of the Philipines and conducted field surveys, a series of transportation/traffic analyses, transportation demand forecast and planning of the Cavite Busway Systems. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the improvement of public transportation in Cavite Area and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Philippines for their close cooperation extended to the study team.

November 2002



Takao Kawakami
President
Japan International Cooperation Agency

November 2002

Mr. Takao Kawakami
President
Japan International Cooperation Agency

Letter of Transmittal

Dear Sir,

We are pleased to formally submit herewith the final report of “The Feasibility Study of the Proposed Cavite Busway System”.

This report compiles the results of the study which was undertaken both in the Philippines and Japan, from November 2001 to September 2002 by the study team, organized jointly by ALMEC Corporation & Pacific Consultants International.

We owed a lot to many people for the accomplishment of this report. First, we would like to express our sincere appreciation to all those who extended their kind assistance and cooperation to the study team, in particular, the National Economic and Development Authority.

We also acknowledge the officials of your agency, the JICA Advisory Committee and the Embassy of Japan in the Philippines for their valuable advice and cooperation given to us throughout the course of the study.

We wish the report would contribute to Cavite’s public transportation development in the near future.

Very truly yours,



Takashi Shoyama
Team Leader,
The Study Team for the Feasibility Study
of the Proposed Cavite Busway System

TABLE OF CONTENTS

	Page
1. INTRODUCTION	1-1
1.1 Study Background.....	1-1
1.2 Objectives	1-1
1.3 Study Area	1-2
1.4 Study Methodology	1-3
1.5 Major Meetings/Seminars/Workshops Held during the Study.....	1-4
1.6 Study Organization.....	1-6
2. REVIEW OF THE BUSWAY DEVELOPMENT PLAN AND REGIONAL FRAMEWORK	2-1
2.1 Review of the Cavite-Laguna (CALA) Transport Study.....	2-1
2.2 Regional Framework and Socio-Economic Conditions	2-5
2.3 Provincial Urban Structure and Municipal Structure Plans	2-9
3. PRESENT SITUATION ON THE BUSWAY CORRIDOR	3-1
3.1 Natural Condition	3-1
3.2 Road and Road Transport System.....	3-13
3.3 Physical/Social Constraints on Busway Corridor	3-25
4. DEMAND FORECAST	4-1
4.1 Methodology.....	4-1
4.2 Future Demand Forecasts.....	4-6
4.3 Other Planning Issues.....	4-18
5. ANALYSIS OF THE ALTERNATIVE PLANS AND CORRIDOR DEVELOPMENT CONCEPT	5-1
5.1 Major Planning Issues of the Cavite Busway System	5-1
5.2 Examination of the Busway Cross-sections	5-4
5.3 Examination of Alternative Alignments and Terminal Locations	5-9
5.4 Terminals and Bus Stops Development.....	5-27
5.5 Secondary Road Network and Busway Feeder System	5-40
5.6 Busway Corridor Development Strategies	5-50
6. ENGINEERING STUDY	6-1
6.1 Design Standard	6-1
6.2 Design Criteria.....	6-1
6.3 Description of the Proposed Busway Alignment	6-8
6.4 Construction and Maintenance Planning.....	6-12
7. COST ESTIMATION, INVESTMENT SCHEDULE AND ECONOMIC ANALYSIS	7-1
7.1 Composition of Project Cost.....	7-1
7.2 Unit Cost Analysis	7-3
7.3 Project Cost Estimation.....	7-6

7.4	Investment Schedule	7-9
7.5	Economic Analysis.....	7-10
8.	BUS OPERATION PLANNING	8-1
8.1	Framework of Busway Operation.....	8-1
8.2	Bus Operation and Management.....	8-6
8.3	Financial Analysis of Bus Company.....	8-12
9.	SOCIAL DIMENSIONS.....	9-1
9.1	Public Consultations and Participation	9-1
9.2	Summary of Social Impacts	9-4
9.3	Overview of Socioeconomic Information	9-6
9.4	Dimensions of Land Acquisition and Resettlement.....	9-9
9.5	Special Arrangement for ROW Acquisition.....	9-14
10.	ENVIRONMENTAL EXAMINATIONS	10-1
10.1	Legal Framework of Environmental Protection in the Philippines.....	10-1
10.2	Environmental Findings on the Proposed Busway Corridor	10-6
10.3	Issues and Measures for Environmental Considerations.....	10-12
10.4	Environmental Monitoring Survey	10-19
10.5	Environmental Impact Evaluations.....	10-26
11.	CONCLUSION AND RECOMMENDATIONS.....	11-1
11.1	Conclusion	11-1
11.2	Recommendations.....	11-4

LIST OF FIGURES

Figure 1.1	Study Area of Past Studies.....	1-2
Figure 1.2	Study Area	1-2
Figure 1.3	Study Framework.....	1-3
Figure 1.4	Study Organization	1-6
Figure 2.1	CALA Transport Network Proposed in the CALA Transport Study	2-1
Figure 2.2	Cavite Busway Alignment Options	2-4
Figure 2.3	Population Projection for CALA	2-7
Figure 2.4	Industrial Areas in CALA (based on CALABARZON Masterplan)	2-8
Figure 2.5	Hierarchy of Urban Centers, Cavite PFP	2-11
Figure 2.6	Urban Center Hierarchy (CALA Study).....	2-12
Figure 2.7	Proposed Land Use of Bacoor, Imus and Dasmariñas.....	2-17
Figure 2.8	Institutional Framework for Urban Planning: The Strategic CLUP Process.....	2-21

Figure 3.1	Satellite Image	3-2
Figure 3.2	Major Watersheds	3-3
Figure 3.3	Topography	3-4
Figure 3.4	Geology	3-5
Figure 3.5	Existing Borehole Data.....	3-6
Figure 3.6	Average Monthly Maximum 24-hr Rainfall during 1975 to 2000 at Sangley Point, Cavite	3-8
Figure 3.7	Rainfall Intensity-Duration-Frequency Curve for Sangley Point, Cavite.....	3-8
Figure 3.8	Nature of Rivers	3-9
Figure 3.9	Flood Prone Areas in the Municipality of Bacoor	3-10
Figure 3.10	Water Resources Map for the Province of Cavite	3-11
Figure 3.11	Existing Road Network in the Study Area	3-14
Figure 3.12	Number of Road Lanes	3-15
Figure 3.13	Road Surface Type	3-15
Figure 3.14	Existing Road Conditions	3-16
Figure 3.15	Location of Traffic Count Stations	3-17
Figure 3.16	Average Travel Speed of Bus	3-19
Figure 3.17	Average Travel Speed of Jeepney.....	3-19
Figure 3.18	Average Travel Speed of Car.....	3-19
Figure 3.19	Bus Traffic Flow	3-20
Figure 3.20	Jeepney Traffic Flow.....	3-20
Figure 3.21	Number of Owned Buses by Fleet Type	3-21
Figure 3.22	Number of Owned Buses by Fleet Age.....	3-21
Figure 3.23	Physical/Social Constraints in the Study Area	3-26
Figure 3.24	Existing Land Use in Bacoor, Imus and Dasmariñas	3-28
Figure 3.25	Major Land Use Features.....	3-29
Figure 3.26	Electrical Power Grid Network in the Study Area.....	3-32
Figure 4.1	Framework for the Demand Forecast	4-1
Figure 4.2	Zoning for this Study	4-3
Figure 4.3	Transport Network.....	4-4
Figure 4.4	Scatter Plots of Observed and Estimated Traffic Volume (PCU), 2002	4-5
Figure 4.5	Passenger Volume on Busway	4-8
Figure 4.6	Road Traffic Demand in the Study Area	4-12
Figure 5.1	Major Planning Issues on the Alignment Study.....	5-4
Figure 5.2	Busway Cross-section Alternatives.....	5-6
Figure 5.3	Proposed Typical Cross-section for the Busway.....	5-6
Figure 5.4	Proposed Road Function on the Busway Corridor	5-8
Figure 5.5	Proposed Cross-section for Ordinary Traffic Function	5-9
Figure 5.6	Alternative Alignments in Bacoor	5-10
Figure 5.7	Alternative Alignments in Imus.....	5-10
Figure 5.8	Alternative Alignments in Dasmariñas	5-10
Figure 5.9	Development Concept of Alternative Alignment along Aguinaldo Highway.....	5-13
Figure 5.10	Alternative Alignments for Coastal Road Access.....	5-14

Figure 5.11	Alternative Alignments for Coastal Road Access	5-15
Figure 5.12	Proposed Cross-section Alternatives for Coastal Road Access	5-15
Figure 5.13	Alternative Locations for the Southern Terminal.....	5-16
Figure 5.14	Alternative One-Way System to Alleviate Traffic Congestion in Bacoor .	5-24
Figure 5.15	Alternative One-Way System to Alleviate Traffic Congestion in Bacoor (2005)	5-25
Figure 5.16	Alternative Locations of Southern Terminal and Future Land Use.....	5-26
Figure 5.17	Proposed Feeder Access at Southern Terminal by Alternative Terminal Location	5-26
Figure 5.18	Bus Stop Spacing along the Busway	5-29
Figure 5.19	Busway Passenger Demand by Bus Terminal and by Bus Stop in Year 2015	5-30
Figure 5.20	Conceptual Design of Bus Terminals	5-31
Figure 5.21	Conceptual Design of Bus Stops (BS-1).....	5-32
Figure 5.22	Conceptual Design of Bus Stops (BS-2 and 3).....	5-33
Figure 5.23	Typical Lay-out Plan for Bus Stops.....	5-38
Figure 5.24	Sketch Layout for Typical Bus Stops	5-39
Figure 5.25	Sketch Layout of Typical Bus Stop Area	5-39
Figure 5.26	Schematic Road Network in Urban Areas	5-40
Figure 5.27	Typical Cross-section for Secondary Road	5-41
Figure 5.28	Proposed Secondary and Feeder Road Network in the Study Area.....	5-42
Figure 5.29	Public Transport Feeder System along the Busway Corridor	5-44
Figure 5.30	Park-and-Bus Ride and Kiss-and-Bus Ride.....	5-45
Figure 5.31	Location of the Proposed Intersections	5-48
Figure 5.32	Typical At-Grade Intersection Design	5-48
Figure 5.33	Proposed Traffic Circulation System for Busway Related Roads in Bacoor, Imus and Dasmariñas	5-49
Figure 5.34	Busway Corridor, Curitiba, Brazil	5-50
Figure 5.35	Busway Terminal, Curitiba, Brazil	5-50
Figure 5.36	Land Use Development Concept.....	5-51
Figure 5.37	Terminal Area Development/Redevelopment Concept.....	5-54
Figure 5.38	New Type of Mode Interchange with Town Center.....	5-54
Figure 5.39	Multi-Modal Interchange in the Newly Developed Urban Subcenter	5-54
Figure 5.40	Land Acquisition Phasing and Development Pattern.....	5-56
Figure 5.41	Pre-emption Area in LR Project Area	5-57
Figure 5.42	Land Readjustment Layout Plan.....	5-58
Figure 5.43	Financial Scheme for the CBPC	5-59
Figure 6.1	Construction Methods during Transition	6-4
	from Busway to Rail-Based System	
Figure 6.2	Live Load by AASHTO.....	6-5
Figure 6.3	Train Loading by LRT-1	6-5
Figure 6.4	Guide in Span Length Selection for Structures.....	6-7
Figure 7.1	Project Cost Components.....	7-1

Figure 9.1	Various Activities and Associated Work Flow with Land Acquisition Program.....	9-15
Figure 10.1	EIS Preparation and Submission	10-4
Figure 10.2	EIS Scoping Process	10-7
Figure 10.3	Initial Environmental Appraisal Map of the Busway Corridor	10-11
Figure 10.4	Impact Identification Flow by Phases	10-14
Figure 10.5	Air Quality and Noise Level Monitoring Locations.....	10-21
Figure 10.6	NO ₂ and TSP Monitoring Results	10-24
Figure 10.7	Monitoring Results of Noise Level Survey	10-25
Figure 10.8	Noise Level and Traffic Volume.....	10-26
Figure 10.9	Speed Related Emission Factor- NO _x and TSP	10-28
Figure 10.10	Summary of Emission Amount of CO, CO ₂ , NO _x , HC and TSP.....	10-29
Figure 10.11	Result of NO ₂ Simulation.....	10-31

LIST OF TABLES

Table 1.1	Major Activities Conducted (November 2001-August 2002)	1-4
Table 2.1	Priority Transport Projects Identified in the CALA Transport Study	2-2
Table 2.2	Estimated GDP for Cavite by Type of Industry	2-5
Table 2.3	Population Growth Rate of Cavite Province	2-6
Table 2.4	Population in Cavite	2-7
Table 2.5	Industrial Estates in the Study Area	2-9
Table 2.6	Categories of Urban Centers in Cavite	2-11
Table 2.7	Proposed Land Use Zones, Bacoor	2-14
Table 2.8	Land Use Distribution, Imus	2-15
Table 2.9	Land Use Distribution, Dasmariñas.....	2-18
Table 2.10	Land Suitability per City/Municipality (Proportion of Land Suitable for Urban Development)	2-19
Table 3.1	Topographic Features of the Landscape	3-4
Table 3.2	Traffic Volume on Major Roads, 2002.....	3-17
Table 3.3	Average Passenger Occupancy on Major Roads	3-18
Table 3.4	Range of Purchase Price by Fleet Type	3-22
Table 3.5	Average Number of Personnel and Working Days/Hours	3-22
Table 3.6	Average Personnel Compensation	3-22
Table 3.7	Operational Indices of Bus Operators	3-23
Table 3.8	Opinions on LRT/Busway.....	3-23
Table 3.9	Opinions on Paliparan-Bacoor Expressway	3-24
Table 3.10	Opinions on Clean Air	3-24
Table 3.11	Opinions on Ticketing System.....	3-24
Table 3.12	General Land Use of Cavite	3-25
Table 3.13	Electrical Power Facilities in the Study Area	3-31

Table 4.1	Updated Input Data.....	4-2
Table 4.2	Time Value.....	4-4
Table 4.3	Comparisons between Observed and Estimated Traffic Volume, 2002	4-5
Table 4.4	Traffic Assignment Cases	4-6
Table 4.5	Busway Demand Summary	4-7
Table 4.6	Number of Boarding/Alighting Passengers at each Bus Station/Stop	4-7
Table 4.7	Results of Demand Forecast	4-10
Table 4.8	Traffic Volumes of Public Transport at Aguinaldo and Molino	4-17
Table 4.9	Busway Demand by Fare Level.....	4-18
Table 4.10	Results of Demand Forecast (sensitivity of existence of LRT1 extension)	4-19
Table 5.1	Description of Alternative Alignments in Bacoor.....	5-11
Table 5.2	Description of Alternative Alignments in Imus	5-12
Table 5.3	Description of Alternative Alignments in Dasmariñas	5-12
Table 5.4	Alternative Locations for the Coastal Road Access	5-14
Table 5.5	Alternative Locations for the Southern Terminal.....	5-16
Table 5.6	Summary of Evaluation and Selection Process in Bacoor.....	5-18
Table 5.7	Summary of Evaluation and Selection Process in Imus	5-19
Table 5.8	Summary of Evaluation and Selection Process in Dasmariñas Segment 1	5-20
Table 5.9	Summary of Evaluation and Selection Process in Dasmariñas Segment 2	5-21
Table 5.10	Comparison of the Alternative Alignment for Coastal Road Access.....	5-22
Table 5.11	Comparative Evaluation of the Alternatives for Coastal Road Access....	5-23
Table 5.12	Comparative Evaluation of the Southern Terminal Alternatives	5-27
Table 5.13	Summary of Proposed Bus Terminals and Bus Stops by Type.....	5-37
Table 5.14	Guideline for the Selection of Intersection Type	5-46
Table 6.1	Design Standards for the Busway	6-2
Table 6.2	Geometric Design for Crossing Road	6-3
Table 6.3	Comparative Table of Shear and Moment between AASHTO and LRT Loading.....	6-6
Table 6.4	Traffic Control Signs, Delineators and Warning Lights	6-16
Table 7.1	Land Acquisition and Compensation Cost.....	7-2
Table 7.2	Hourly Rental Rate of Main Equipment	7-4
Table 7.3	Labor Cost in Cavite (Area 4)	7-5
Table 7.4	Summary of Labor Cost in Cavite	7-5
Table 7.5	Costs of Major Materials	7-5
Table 7.6	Total Project Cost	7-7
Table 7.7	Busway Project Cost by Section (Municipality Boundary)	7-8
Table 7.8	Project Cost for Coastal Road Access.....	7-8
Table 7.9	Investment Schedule and Annual Composition of Amount.....	7-9
Table 7.10	Annual Investment Amount by Project Component	7-9
Table 7.11	Maintenance Cost of Busway Project	7-10
Table 7.12	Financial and Economic Cost by Project Component.....	7-12

Table 7.13	Unit VOC by Public and Private Mode as of 2002	7-12
Table 7.14	Unit TTC by Public and Private Mode as of 2002	7-13
Table 7.15	Economic Benefit in Benchmark Years.....	7-13
Table 7.16	Cash Flow of Economic Cost and Benefit.....	7-14
Table 7.17	Sensitivity Analysis by Changing Cost and Benefit.....	7-15
Table 8.1	Difference of Number of Transfer whether “Through Bus” or not.....	8-3
Table 8.2	Summary of Evaluation of the Five Types of Operation.....	8-4
Table 8.3	Requirements for the CBS Operators and Operation	8-5
Table 8.4	Summary of Operation	8-5
Table 8.5	Required Number of Buses during Peak Hour.....	8-6
Table 8.6	Total Number of Required Buses for the Busway	8-6
Table 8.7	Buses by Time Zone	8-7
Table 8.8	Examples from Other Countries.....	8-8
Table 8.9	Potential Express Service User.....	8-9
Table 8.10	Bus Dimension	8-10
Table 8.11	Alighting/Boarding Time and Required Minimum Number of Bus Booth.....	8-11
Table 8.12	Metro Manila Consumer Price Index (1990-2000)	8-12
Table 8.13	MMCPI Estimates	8-13
Table 8.14	Fares between Representative Stations (2005, 2010, 2015).....	8-14
Table 8.15	Passenger Traffic Demand	8-14
Table 8.16	Forecast Revenues	8-15
Table 8.17	Gain from Sales of Buses	8-15
Table 8.18	Unit Operation Costs.....	8-16
Table 8.19	Loan Condition	8-18
Table 8.20	Operating Expenses.....	8-19
Table 8.21	Other Annual Expenses	8-19
Table 8.22	FIRR, S/C, NPV	8-21
Table 8.23	Sensitivity Analysis.....	8-22
Table 8.24	Balance Sheet Pro-forma.....	8-23
Table 8.25	Income Statement Pro-forma	8-24
Table 8.26	Cashflow Statement Pro-forma	8-25
Table 8.27	Financial Indicators Pro-forma	8-26
Table 9.1	Schedule of Consultative Activities	9-2
Table 9.2	Community Participation Process for the CBS Project	9-3
Table 9.3	Population Data, 2000.....	9-5
Table 9.4	Categories of Project Affected Families	9-7
Table 9.5	Highlights of Socio-economic Survey Results.....	9-7
Table 9.6	Land Requirement for ROW.....	9-9
Table 9.7	Scale of Affected Structures and Households.....	9-10
Table 9.8	Cost of Land.....	9-10
Table 9.9	Land Requirement and Resettlement Cost.....	9-13
Table 9.10	ROW Acquisition Methods	9-14

Table 10.1	Environmental Legislations in the Philippines.....	10-2
Table 10.2	Matrix of Environmental Factors and Impacts by Proposed Sections.....	10-10
Table 10.3	Screening of Proposed Busway Project	10-15
Table 10.4	Scoping of Proposed Busway Project.....	10-16
Table 10.5	Matrix for Scoping Classified by Project Phase	10-17
Table 10.6	Environmental Factors for Further Study	10-18
Table 10.7	Measurement Conditions of Air Quality Monitoring.....	10-19
Table 10.8	Detail Explanation of Sampling Locations.....	10-21
Table 10.9	Summary of Ambient Air Quality Monitoring	10-22
Table 10.10	National Ambient Air Quality Guideline Values	10-23
Table 10.11	National Ambient Air Quality Standards	10-23
Table 10.12	Summary of Noise Level in dB(A).....	10-25
Table 10.13	DENR Standards for Noise in General Areas	10-25
Table 10.14	Evaluation Cases.....	10-27
Table 10.15	Improvement Ratio of Emission Amount Comparison between With and Without Cases in Each Target Year.....	10-30
Table 10.16	Results of Noise Simulation	10-32
Table 10.17	Comparisons between Human Audition and Ambient Noise Levels	10-33
Table 10.18	Other Predicted Impacts and Evaluation	10-34
Table 10.19	Summary of Environmental Impact Evaluation.....	10-35
Table 10.20	Average Travel Speed of Road Network.....	10-36
Table 10.21	TSP Ambient Air Quality 2001.....	10-37
Table 10.22	Emissions Benefits of Replacing Conventional Diesel with CNG in Buses.....	10-38

LIST OF ACRONYMS AND ABBREVIATIONS

AASHTO	American Association State Highway and Transportation Office
A/C	Air Conditioned
ACEL	Associated Construction Equipment Lessors, Inc.
ADB	Asian Development Bank
ADZ	Agricultural Development Zone
APC	Asset Participation Certificate
BCDA	Bases Conversion and Development Authority
BOI	Board of Investments
BOT	Built Operate Transfer
CA	Commonwealth Act
CALA	Cavite-Laguna
CALABARZON	Cavite-Laguna-Batangas-Rizal-Quezon
CBD	Central Business District
CBPC	Cavite Busway Public Corporation
CBS	Cavite Busway System
CBR	California Bearing Ratio
CDC	City Development Council
CDP	Comprehensive Development Plan
CDZ	Coastal Development Zone
CENRO	Community Environment and Natural Resources Office
CLUDEMS	Cavite-Laguna Urban Development and Environmental Management Study
CLUP	Comprehensive Land Use Plan
COA	Commission on Audit
CMP	Community Mortgage Program
CNG	Compressed Natural Gas
CPC	Certificate of Public Convenience
CPDO	City Planning Development Office
CO	Contractor Overheads
DAO	Department Administrative Order
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DBM	Department of Budget and Management
DC	Direct Cost
DENR	Department of Environment and Natural Resources
DILG	Department of the Interior and Local Government
DO	Department Order
DOTC	Department of Transportation and Communications
DPWH	Department of Public Works and Highways
ECA	Environmentally Critical Area
ECC	Environmental Compliance Certificate
ECP	Environmentally Critical Project
EDZ	Ecological Development Zone
EIA	Environmental Impact Assessment
EIAPO	Environmental Impact Assessment Project Office
EIRR	Economic Internal Rate of Return
EIS	Environmental Impact Study
EMB	Environmental and Management Bureau
EO	Executive Order
ERA	Environmental Risk Assessment
FGDs	Focused Group Discussions
FIRR	Financial Internal Rate of Return
FPA	Fertilizer Pesticide Authority

GOJ	Government of Japan
GOP	Government of the Philippines
GDP	Gross Domestic Product
GVA	Gross Value Added
ICC	Investment Coordination Committee
IDC	Indirect Cost
IDF	Intensity-Duration-Frequency
IEE	Initial Environmental Examination
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
KIIs	Key Informants Interviews
HLURB	Housing and Land Use Regulatory Board
HOV	High Occupancy Vehicle
LDCs	Local Development Councils
LGUs	Local Government Units
LIZ	Light Industrial Zone
LRT	Light Rail Transit
LRTA	Light Rail Transit Authority
LTFRB	Land Transportation and Franchising Board
MERALCO	Manila Electric Company
MMCPPI	Metro Manila Consumer Price Index
MMDA	Metro Manila Development Authority
MRTC	Metro Manila Transit Corporation
MMUTIS	Metro Manila Urban Transportation Integration Study
MOA	Memorandum of Agreement
MPDOs	Municipal Planning and Development Offices
NAAD	Network of Areas for Agricultural Development
NAMRIA	National Mapping and Resource Information Authority
NEDA	National Economic and Development Authority
NGO	Nongovernmental Organization
NGAs	National Government Agencies
NIPAS	National Integrated Protected Areas System
NPAA	Network of Protected Agricultural Areas
NPC	National Power Corporation
NPV	Net Present Value
NSO	National Statistics Office
NOx	Nitrogen oxides
OD	Origin Destination
ODA	Official Development Assistance
PAGASA	Philippine Atmospheric Geophysical and Astronomical Services Administration
PAPs	Project Affected Persons
PCU	Passenger Car Unit
PD	Presidential Decree
PE	Project Evaluation
PEA	Public Estates Authority
PENRO	Provincial Environment and Natural Resources Office
PHIVOLCS-USGS	Philippine Institute of Volcanology and Seismology-United States Geological Service
PNR	Philippine National Railway
PNOC	Philippine National Oil Company
PPFP	Provincial Physical Framework Plan
PPP	Private-Public-Partnership
PUD	Planning Unit Development
RA	Republic Act
RIC	Resettlement Implementation Committee

RAP	Resettlement Action Plan
RDC	Regional Development Council
ROW	Right of Way
ROWA	Right of Way Acquisition
S/C	Sales-Cost
SLEX	South Luzon Expressway
SSS	Social Security System
SCF	Standard Conversion Factor
TRB	Toll Regulatory Board
TODA	Association of Tricycle Operators and Drivers Association
TSP	Total Suspended Particulates
TLV	Threshold Level Value
TCT	Transfer Certificate Title
UCZ	Urban Core Zone
UDHA	Urban Development and Housing Act
UEZ	Urban Expansion Zone
UP-NCTS	UP National Center for Transportation Studies
VOCM	Vehicle Operating Cost Model