

社会開発協力部報告書

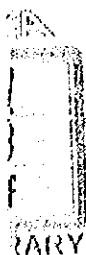
THE KINGDOM OF THAILAND
MINISTRY OF INTERIOR
DEPARTMENT OF TOWN AND COUNTRY PLANNING

CITY PLANNING MANUAL

THE STUDY ON
APPLIED TECHNOLOGY FOR
MAKING CITY PLAN

JANUARY 1989

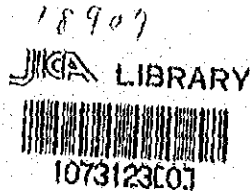
JAPAN INTERNATIONAL COOPERATION AGENCY



THE KINGDOM OF THAILAND
MINISTRY OF INTERIOR
DEPARTMENT OF TOWN AND COUNTRY PLANNING

CITY PLANNING MANUAL

VOLUME I INTEGRATED CITY PLANNING



**THE STUDY ON
APPLIED TECHNOLOGY FOR
MAKING CITY PLAN**

JANUARY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY



VOLUME I
INTEGRATED CITY PLANNING

(Table of Contents)

	<u>Page</u>
Detailed Table of Contents.....	(ii)
CHAPTER 1: Using the "City Planning Manual".....	1
CHAPTER 2: What is City Planning.....	3
CHAPTER 3: Outline of Sectorial Studies and Plans.....	14
CHAPTER 4: Programming and Evaluation of City Plan.....	33
APPENDIX: Standardization and Systematization of City Planning Basic Survey.....	A-1

DETAILED TABLE OF CONTENTS

	Page
Table of Contents.....	(i)
Detailed Table of Contents.....	(ii)
<u>CHAPTER 1: USING THE "CITY PLANNING MANUAL"</u>	1
1.1 Purposes of Manual.....	1
1.2 Composition of Manual.....	2
<u>CHAPTER 2: WHAT IS CITY PLANNING</u>	3
2.1 Meaning and Application of City Planning.....	3
2.1.1 Meaning of City Planning.....	3
2.1.2 Areas Subject to City Planning.....	3
2.2 Contents and Characteristics of City Plans.....	4
2.2.1 Contents of City Plans.....	4
2.2.2 Contents and Characteristics of Integrated Physical Plan.....	5
2.3 Procedures for Preparation of Integrated Physical Plan.....	6
2.3.1 General Procedures for Analysis and Planning.....	6
2.3.2 City Planning Area.....	7
2.3.3 Analysis of Existing Conditions.....	8
2.3.4 Projection of Future Conditions.....	9
2.3.5 Setting Up of Goals and Objectives.....	9
2.3.6 Setting Up Socio-Economic Framework.....	10
2.3.7 Establishment of Urban Policies and Future Urban Structure.....	11
2.4 Coordination with Higher-Ranking and Related Plans.....	12
2.5 Revision of City Plans.....	13
<u>CHAPTER 3: OUTLINE OF SECTORAL STUDIES AND PLANS</u>	14
3.1 Mapping.....	14
3.1.1 Fundamental Maps for City Plans.....	14
3.1.2 Mapping Procedures.....	15
3.1.3 Relationship with Other Sectoral Studies and Plans.....	16
3.2 Socio-Economic Analysis.....	18
3.2.1 Contents and Objectives of Socio-Economic Analysis.....	18
3.2.2 Analysis Procedures.....	19
3.2.3 Relationship with Other Sectoral Studies and Plans.....	21
3.2.4 Presentation of Analysis Results.....	21
3.3 Land Use Planning.....	22
3.3.1 Contents and Objectives of Land Use Plan.....	22
3.3.2 Planning Procedures.....	23
3.3.3 Relationship with Other Sectoral Studies and Plans.....	24
3.3.4 Presentation of Plan.....	25

3.4	Transport Planning.....	26
3.4.1	Contents and Objectives of Transport Plan.....	26
3.4.2	Transport Planning Process.....	26
3.4.3	Coordination with Related Sectors.....	28
3.4.4	Presentation of Plan.....	29
3.5	Urban Facility Planning.....	30
3.5.1	Contents and Objectives of Urban Facility Plan.....	30
3.5.2	Planning Procedures.....	31
3.5.3	Relationship with Other Sectoral Studies and Plans.....	31
3.5.4	Presentation of Plan.....	32
<u>CHAPTER 4: PROGRAMMING AND EVALUATION OF CITY PLAN.....</u>		33
4.1	Programming of Working Plan.....	33
4.1.1	Standard Assignment of Sectoral Works.....	33
4.1.2	Programming of Working Plan.....	34
4.2	Preparation of Development Investment Programme.....	35
4.2.1	Meaning of Development Investment Programme.....	35
4.2.2	Presentation of Development Investment Programme.....	36
4.3	Evaluation of City Plan.....	37
4.3.1	Evaluation of Comprehensive Plan.....	37
4.3.2	Evaluation of Projects.....	38
<u>APPENDIX: STANDARDIZATION AND SYSTEMATIZATION OF CITY PLANNING BASIC SURVEY IN THAILAND.....</u>		A-1

THE KINGDOM OF THAILAND
MINISTRY OF INTERIOR
DEPARTMENT OF TOWN AND COUNTRY PLANNING

CITY
PLANNING
MANUAL

VOLUME II MAPPING

THE STUDY ON
APPLIED TECHNOLOGY FOR
MAKING CITY PLAN

JANUARY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

VOLUME II

MAPPING

(Table of Contents)

	<u>Page</u>
Detailed Table of Contents.....	ii
Introduction.....	1
CHAPTER 1 : Fundamental Maps for City Planning.....	I-1
CHAPTER 2 : Mapping.....	II-1
CHAPTER 3 : Map Projection and Applied Technics for Maps.....	III-1

DETAILED TABLE OF CONTENTS

	<u>Page</u>
Table of Contents.....	i
Detailed Table of Contents.....	ii
List of Tables.....	iv
List of Figures.....	v
Introduction.....	1
Chapter 1 Basic Maps for City Planning.....	I-1
1.1 The Application of Maps for City Planning.....	I-1
1.2 Basic Map Components.....	I-4
1.3 Different Types of Maps.....	I-6
1.3.1 General Maps.....	I-6
1.3.1.1 Base Map.....	I-6
1.3.1.2 Vicinity Map.....	I-8
1.3.2 Thematic Maps.....	I-9
1.3.2.1 Topographic Map.....	I-9
1.3.2.2 Hydro-geologic Map.....	I-10
1.3.2.3 Slope Map.....	I-14
1.3.2.4 Soil Map.....	I-16
1.3.2.5 Flooding Hazard Map.....	I-17
1.3.2.6 Land Classification Map.....	I-18
1.3.2.7 Infrastructure Map.....	I-19
1.3.2.8 Cadastral Map.....	I-22
1.3.2.9 Land Values Map.....	I-22
1.3.2.10 Land Use Map.....	I-24
1.3.2.11 Development Constraint Map.....	I-31
1.3.2.12 Population Distribution Map.....	I-31
1.3.2.13 Population Density Map.....	I-33
1.3.3 Analytical Maps.....	I-33
1.3.3.1 Erosion Potential Map.....	I-33
1.3.3.2 Land Capability Classification Map.....	I-34
1.3.3.3 Soil Suitability Map.....	I-36
1.3.4 Digital Maps.....	I-38
1.3.4.1 General.....	I-38
1.3.4.2 Input Data.....	I-39
1.3.4.3 Output.....	I-40
1.3.5 Photomap.....	I-46
Chapter 2 Mapping.....	II-1
2.1 General.....	II-1
2.1.1 Scope of Work of Surveying.....	II-2
2.2 Control Survey.....	II-4
2.2.1 General.....	II-4
2.2.2 Control Survey with Traverses or Triangulation.....	II-5
2.3 Levelling.....	II-42
2.3.1 General.....	II-42
2.3.2 Adjustment by the Method of Least SQUARE.....	II-49

	Page
2.4 Topographical Mapping.....	II-64
2.4.1 General	II-64
2.4.2 Map Design.....	II-65
2.5 Photogrammetric Mapping.....	II-66
2.5.1 General.....	II-66
2.5.2 Ground Survey for Photogrammetry.....	II-70
2.5.3 Establishment of Air-Photo Signal.....	II-71
2.5.4 Aerial Photography.....	II-72
2.5.5 Pricking.....	II-74
2.5.6 Aero Triangulation (Phototriangulation).....	II-75
2.5.7 Mapping.....	II-89
2.6 Field Editing.....	II-98
2.6.1 General.....	II-98
2.6.2 Establishment of Control Points.....	II-99
2.6.3 Detailed Survey.....	II-99
2.7 Map Compilation.....	II-100
2.7.1 General.....	II-100
2.7.2 Map Contents.....	II-100
2.7.3 Names and Labels.....	II-101
2.7.4 Symbols.....	II-101
2.8 Drafting.....	II-106
2.9 Final Results.....	II-106
 Chapter 3 Map Projection and Applied Technics for Maps.....	 III-1
3.1 Transverse Mercator Projection.....	III-1
3.1.1 History and Features.....	III-1
3.1.2 Formulas for the Ellipsoidal Projection.....	III-7
3.2 Conformal Mapping (Transformation).....	III-15
3.3 Methods of Determining Area.....	III-19
3.3.1 General.....	III-19
3.3.2 Methods of Determining Area.....	III-19
3.3.3 Instruments.....	III-29
3.3.4 Measurement by Using the Digitizer.....	III-39
3.4 Digital Maps (Mapping).....	III-54

LIST OF TABLES

	<u>Page</u>
<u>Chapter 1:</u>	
Table 1-3.1 Availability of Ground Water.....	I-13
Table 1-3.2 Slope Classification.....	I-15
Table 1-3.3 Harazd Classification.....	I-17
Table 1-3.4 Classification of Land Capability.....	I-35
Table 1-3.5 Classification of Soil Suitability.....	I-36
<u>Chapter 2:</u>	
Table 2-2.1 Input Data for a Traverse Adjustment.....	II-16
Table 2-2.2 Observed Quantities of Traverse I-V.....	II-15
Table 2-2.3 Distance Weight for Angle Weight (=1).....	II-36
<u>Chapter 3:</u>	
Table 3-1.1 Coordinates System and Scale Factors at Origin (Japan).....	III-4
Table 3-1.2 Scale on Central Meridian and Scale Factors at the Longitudinal Difference.....	III-6
Table 3-3.1 Selection of Menu and its Function.....	III-43
Table 3-3.2 Comparison of Existing Method with Case Study Method (Lang Suan).....	III-53

LIST OF FIGURES

	Page
INTRODUCTION	
Fig. 1-1	General Image of Maps;.....2
Chapter 1:	
Fig. 1-3.1	Classification of Maps from The Planning Point of View.....I-7
Fig. 1-3.2	Topographical Map (1).....I-11
Fig. 1-3.3	Topographical Map (2).....I-12
Fig. 1-3.4	Traffic Volume Map at Chiang Mai.....I-21
Fig. 1-3.5	Isopleths of Land Values.....I-23
Fig. 1-3.6	Land Use Map (1).....I-26
Fig. 1-3.7	(Detailed) Land Use Map by Blocks in Central Manchester.....I-27
Fig. 1-3.8	Land Use Map (2).....I-28
Fig. 1-3.9	Social Classification Map.....I-29
Fig. 1-3.10	Urban Growth Map.....I-30
Fig. 1-3.11	The Computer Assisted Cartographic Data Processing System by GSI.....I-39
Fig. 1-3.12	Graphic Display Unit with Digitizer.....I-39
Fig. 1-3.13I-40
Fig. 1-3.14	Some Examples of Digital Map on CRT.....I-41
Fig. 1-3.15	Automatic Plotter.....I-42
Fig. 1-3.16	Sample Map of Registration of House and Land.....I-43
Fig. 1-3.17	Sample Map of Utility Information Under Road.....I-44
Fig. 1-3.18	Sample Gas Utility Map.....I-45
Fig. 1-3.19a	Standard SEG V. Rectifier.....I-46
Fig. 1-3.19b	Diagram SEG V. Rectifier.....I-46
Fig. 1-3.20	The Relief Displacement.....I-47
Fig. 1-3.21	Procedure of Making Orthophoto.....I-48
Fig. 1-3.22	Orthophoto Map with Contour and Index (Standard Style).....I-49
Chapter 2:	
Fig. 2-1.1	Procedure of Map-Making (Basic Map).....II-3
Fig. 2-2.1	Control Point Monuments.....II-8
Fig. 2-2.2a	Standard Form of Control Monument.....II-9
Fig. 2-2.2b	Standard Form of Control Monument.....II-10
Fig. 2-2.3	Traverse Net with Five Polygons.....II-16
Fig. 2-2.4	"arc to chord" Correction on the UTM Grid.....II-24
Fig. 2-2.5	Observed Angles (li) and Correction.....II-26
Fig. 2-2.6	Intersection of a Point C from Two Given Point A and B.....II-27
Fig. 2-2.7	Spherical Distance(s) and Plane Distance(s).....II-30
Fig. 2-2.8	Trilateration between A and B.....II-31
Fig. 2-3.1	Standard Form of Bench Mark.....II-45
Fig. 2-3.2	Two-PEG Test.....II-46
Fig. 2-3.3	Levelling Net with Point D and E Unknown.....II-53
Fig. 2-3.4	General Flow Chart for Solution of Levelling Net.....II-57

	<u>Page</u>
Fig. 2-5.1	General Flow Chart of the Procedure.....II-77
Fig. 2-5.2	Pug-4 Point Transfer Instrument (Courtesy, Wild Heerbrugg Instruments, Inc.).....II-79
Fig. 2-5.3	Stereo Point Transfer Instrument (at Department of Lands) (Courtesy, Wild Heerbrugg Instruments, Inc.).....II-79
Fig. 2-5.4	Monocomparator PK-1 with Ecomat 12 (Courtesy, Carl Zeiss, Oberkochen, West Germany).....II-80
Fig. 2-5.5	Two-Dimensional Linear Measuring System with Index Grating and Fixed Scales of PK-1 Monocomparator.....II-81
Fig. 2-5.6	Schematic Diagram of a Stereocomparator [The Measuring Marks are M' and M"; The Optical Paths shown in Broken Lines].....II-82
Fig. 2-5.7	Zeiss-Jena Stecometer (Courtesy, Jenoptik Jena G.m.b.H, East Germany).....II-83
Fig. 2-5.8	Analytical Plotter AP/C4 (Courtesy, OMI Corporation of America, N.Y.).....II-85
Fig. 2-5.9	System Diagram for Analytical Plotter AP/C4 (or C-100 Planicomp).....II-86
Fig. 2-5.10	Planicomp C100 (Courtesy, Carl Zeiss, Oberkochen, West Germany).....II-86
Fig. 2-5.11	Data Flow Chart of Analytical Plotter (Planicomp C-100).....II-87
Fig. 2-5.12	Expression of Map Contents.....II-93
Fig. 2-5.13	Expression of Map Contents.....II-94
Fig. 2-5.14	An Example of the Hachures.....II-96
Fig. 2-5.15	Contour Line.....II-97
Fig. 2-7.1a	Map Symbols (1).....II-102
Fig. 2-7.1b	Map Symbols (2).....II-103
Fig. 2-7.1c	Map Symbols (3).....II-104
Fig. 2-7.1d	Map Symbols (4).....II-105
 <u>Chapter 3:</u>	
Fig. 3-1.1	Transverse Cylindrical Projection.....III-1
Fig. 3-1.2	Transverse Mercator Projection (UTM).....III-2
Fig. 3-1.3	Comparison of Each 1 Map Zone.....III-5
Fig. 3-1.4	Computation for Transverse Mercator Projection.....III-9
Fig. 3-1.5	Footpoint Latitude and True Latitude.....III-10
Fig. 3-1.6	The Origin of a UTM Grid Zone.....III-11
Fig. 3-1.7	Map Index 1:50,000.....III-14
Fig. 3-2.1	Transformation.....III-15
Fig. 3-2.2	Transformation on Curved Surface.....III-16
Fig. 3-3.1	Area by Triangle (1).....III-19
Fig. 3-3.2	Area by Triangle (2).....III-20
Fig. 3-3.3	Area by Coordinates.....III-21
Fig. 3-3.4	Area by Double Meridian Distance.....III-23
Fig. 3-3.5III-24
Fig. 3-3.6	Measuring Area.....III-25
Fig. 3-3.7	Line Scanning Method.....III-26
Fig. 3-3.8	Image Scanner (Drum Type).....III-27
Fig. 3-3.9	The Gathering of Pixel Data.....III-27

	<u>Page</u>
Fig. 3-3.10 Auto-Digitizer Method.....	III-28
Fig. 3-3.11	III-31
Fig. 3-3.12 Outline of Cartographic Data Processing System.....	III-40
Fig. 3-3.13 Input-Output Devices.....	III-42
Fig. 3-3.14 Flow-Chart of Computations.....	III-47
Fig. 3-3.15 Flow-Chart of Data.....	III-48
Fig. 3-4.1 Planimetric Map.....	III-55
Fig. 3-4.2 Topographic Map.....	III-56

THE KINGDOM OF THAILAND
MINISTRY OF INTERIOR
DEPARTMENT OF TOWN AND COUNTRY PLANNING

CITY
PLANNING
MANUAL

VOLUME III SOCIO-ECONOMIC ANALYSIS

THE STUDY ON
APPLIED TECHNOLOGY FOR
MAKING CITY PLAN

JANUARY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

VOLUME III

SOCIO-ECONOMIC ANALYSIS

(Table of Contents)

	<u>Page</u>
Detailed Table of Contents.....	(ii)
PART I : ANALYSIS METHOD	
CHAPTER 1: Objectives of Socio-Economic Analysis.....	I- 1
CHAPTER 2: Analysis Procedures.....	I- 2
CHAPTER 3: Data Collection and Compilation.....	I- 3
CHAPTER 4: Analysis of Existing Conditions.....	I-18
CHAPTER 5: Projection of Future Conditions.....	I-22
CHAPTER 6: Setting up of Socio-Economic Framework.....	I-29
PART II : MANUAL OF DATABASE SYSTEM IN INCEPTION STAGE	
CHAPTER 1: Introduction.....	II- 1
CHAPTER 2: Concept of System.....	II- 2
CHAPTER 3: System Design.....	II- 4
CHAPTER 4: Operation Manual.....	II-54

DETAILED TABLE OF CONTENTS

	Page
Table of Contents.....	(i)
Detailed Table of Contents.....	(ii)
 <u>PART I : ANALYSIS METHOD</u>	
<u>CHAPTER 1: OBJECTIVES OF SOCIO-ECONOMIC ANALYSIS.....</u>	I- 1
<u>CHAPTER 2: ANALYSIS PROCEDURES.....</u>	I- 2
<u>CHAPTER 3: DATA COLLECTION AND COMPILATION.....</u>	I- 3
3.1 Population.....	I- 3
3.1.1 Data to be Collected.....	I- 3
3.1.2 Compilation Format.....	I- 3
3.2 Economic Activity.....	I- 7
3.2.1 Data to be Collected.....	I- 7
3.2.2 Compilation Format.....	I- 7
 <u>CHAPTER 4: ANALYSIS OF EXISTING CONDITIONS.....</u>	 I-18
4.1 Population.....	I-18
4.1.1 Population Growth Trend.....	I-18
4.1.2 Population Distribution/Density.....	I-18
4.1.3 Age-Sex Structure.....	I-18
4.1.4 Labor Force.....	I-18
4.1.5 Household Characteristics.....	I-19
4.1.6 Other Special Matters.....	I-19
4.2 Economic Activity.....	I-20
4.2.1 Age-Sex Structure of Employed Population.....	I-20
4.2.2 Employment by Sector.....	I-20
4.2.3 Employment Distribution.....	I-20
4.2.4 Situation of Commercial Activities.....	I-20
4.2.5 Situation of Industrial Activities.....	I-20
4.2.6 Special Economic Activity.....	I-20
4.2.7 Household Income.....	I-21
4.2.8 Economic Position and Role of the Area in Wider Area.....	I-21
 <u>CHAPTER 5: PROJECTION OF FUTURE CONDITION.....</u>	 I-22
5.1 Population.....	I-22
5.1.1 Total Population.....	I-22
5.1.2 Age-Sex Structure.....	I-24
5.1.3 Labor Force.....	I-25
5.1.4 Other Special Aspect.....	I-25
5.2 Economic Activity.....	I-26
5.2.1 Employment by Sector.....	I-26
5.2.2 Value Added by Sector.....	I-28
5.2.3 Special Economic Activity.....	I-28

THE KINGDOM OF THAILAND
MINISTRY OF INTERIOR
DEPARTMENT OF TOWN AND COUNTRY PLANNING

CITY
PLANNING
MANUAL

VOLUME IV LAND USE PLANNING

THE STUDY ON
APPLIED TECHNOLOGY FOR
MAKING CITY PLAN

JANUARY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

VOLUME IV
LAND USE PLANNING
(Table of Contents)

	<u>Page</u>
Detailed Table of Contents.....	(ii)
CHAPTER 1: Land Use Planning and Its Objectives.....	1
CHAPTER 2: Planning Procedures and Approaches.....	2
CHAPTER 3: Methodology.....	6
CHAPTER 4: Presentation.....	37
CHAPTER 5: Revision.....	39

DETAILED TABLE OF CONTENTS

	Page
Table of Contents.....	(i)
Detailed Table of Contents.....	(ii)
List of Tables.....	(iii)
List of Figures.....	(iv)
CHAPTER 1: <u>LAND USE PLANNING AND ITS OBJECTIVES</u>	1
CHAPTER 2: <u>PLANNING PROCEDURES AND APPROACHES</u>	2
CHAPTER 3: <u>METHODOLOGY</u>	6
3.1 Preparatory Work.....	6
3.1.1 Preparation for Survey.....	6
3.1.2 Basic Survey.....	6
3.2 Analysis and Evaluation.....	7
3.2.1 Items to be Analyzed.....	7
3.2.2 Analytical Methods.....	8
3.2.3 Results of Analysis.....	19
3.3 Land Demand Projection.....	25
3.3.1 Macro Approach.....	26
3.3.2 Micor Approach.....	26
3.3.3 Industrial Land.....	29
3.3.4 Agricultural Land.....	29
3.3.5 Recreation and Open Space.....	30
3.4 Land Use Planning.....	30
3.4.1 Setting Up of Goals and Objectives.....	30
3.4.2 Land Use Policy.....	31
3.4.3 Layout.....	32
3.4.4 Coordination with the Concerned Agencies.....	35
3.4.5 Compilation of the Draft Land Use Plan.....	35
CHAPTER 4: <u>PRESENTATION</u>	37
4.1 Planning Boundary.....	37
4.2 Draft Land Use Plan.....	37
4.3 Land Use Plan.....	38
CHAPTER 5: <u>REVISION</u>	39

LIST OF TABLES

Page

Chapter 3:

Table L-1	Survey Items and Physical Scope of Survey.....	6
Table L-2	Changes in Built Up Area.....	10
Table L-3	Inventory of Public Facilities.....	13
Table L-4	List of Urban Development Projects.....	14
Table L-5	Population Changes.....	14
Table L-6	List of Types of Natural Disaster and Types of Pollution Occurring in the Planning Area.....	16
Table L-7	List of Ruins and Cultural Assets.....	17
Table L-8	Per Capita Commercial Area Requirement.....	28
Table L-9	Density of Workers.....	29
Table L-10	Classification of Land Use Plan in DTCP.....	36

LIST OF FIGURES

	<u>Page</u>
<u>Chapter 1:</u>	
Fig. L-1 Planning Procedure.....	2
<u>Chapter 2:</u>	
Fig. L-2 Deductive Approach.....	3
Fig. L-3 Inductive Approach.....	4
Fig. L-4 Basic Planning Flow for Land Use.....	5
<u>Chapter 3:</u>	
Fig. L-5 Development of Urban Form.....	9
Fig. L-6 Dot Map.....	11
Fig. L-7 Density Map.....	11
Fig. L-8 Population Data in Mesh.....	12
Fig. L-9 Population Density Contour Map.....	12
Fig. L-10 Scheme of PSA Processing for Quantitative Area Analysis.....	20
Fig. L-11 Computer AID for Spatial Planning.....	21
Fig. L-12 Example of the Calculation of a Residential Development Potential Surface.....	22
Fig. L-13 PSA: Development Potential of Residential Area.....	23
Fig. L-14 Study Flow of Residential Land Demand.....	27
Fig. L-15 Study Flow of Industrial Development.....	34
<u>Chapter 5:</u>	
Fig. L-16 Revision of General Plan after 5 Year-Term of Enforcement.....	40

THE KINGDOM OF THAILAND
MINISTRY OF INTERIOR
DEPARTMENT OF TOWN AND COUNTRY PLANNING

CITY
PLANNING
MANUAL

VOLUME V TRANSPORT PLANNING

THE STUDY ON
APPLIED TECHNOLOGY FOR
MAKING CITY PLAN

JANUARY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

VOLUME V

TRANSPORT PLANNING MANUAL

(Table of Contents)

	<u>Page</u>
Detailed Table of Contents.....	(ii)
PART 1: Introduction.....	1-1
PART 2: Transport Planning Process.....	2-1
PART 3: Transport and Traffic Surveys.....	3-1
PART 4: Analysis of Existing System.....	4-1
PART 5: Transport Demand Analysis.....	5-1
PART 6: Alternative Approaches to Demand Analysis.....	6-1
PART 7: Plan Synthesis - Guidelines to Better Plan Designing.....	7-1
PART 8: Evaluation of Transport Plans.....	8-1
PART 9: Note on Plan Revision.....	9-1
REFERENCES.....	R-1
APPENDICES.....	A-1

DETAILED TABLE OF CONTENTS

	Page
Preface	
Table of Contents.....	(i)
Detailed Table of Contents.....	(ii)
List of Tables.....	(iii)
List of Figures.....	(viii)
PART 1: <u>INTRODUCTION</u>	1- 1
1.1 Use of This Manual.....	1- 1
1.2 Institutional Background to Transport Planning in Thai Cities..... <i>(transport planning as statutory planning / relevant authorities responsible for planning of urban transport systems in Thailand)</i>	1- 2
1.3 Definitions and Scope of Transport Planning as Dealt with in This Manual.....	1- 4
PART 2: <u>TRANSPORT PLANNING PROCESS</u>	2- 1
2.1 Transport Planning Process - Generalized Procedure.....	2- 1
2.2 Coordination with Related Sectors..... <i>(mapping sector/socio-economic sector/land use planning sector)</i>	2- 1
PART 3: <u>TRANSPORT AND TRAFFIC SURVEYS</u>	3- 1
3.1 Design of Field Survey.....	3- 1
3.2 Transport Systems Survey..... <i>(road inventory / public transport system / cycle and pedestrian routes)</i>	3- 4
3.3 Traffic Studies.....	3- 7
3.3.1 Traffic Volume and Composition..... <i>(time span for expressing traffic volume / type of traffic counts / counting techniques / when and how long should the traffic volume count be conducted)</i>	3- 7
3.3.2 Travel Time and Speed Survey..... <i>(purpose of travel time and speed survey / measuring method / traffic queue survey at intersections)</i>	3-12
3.4 O-D Surveys.....	3-17
3.4.1 Type of O-D Surveys..... <i>(person trip survey / vehicle O-D survey / commodity flow survey)</i>	3-17
3.4.2 Application Strategy of O-D Surveys..... <i>(zoning method / sampling design/ preparation and conduct of field survey)</i>	3-22
3.5 Other Related Information..... <i>(traffic congestion / accident statistics / passenger occupancy survey)</i>	3-26

PART 4: <u>ANALYSIS OF EXISTING SYSTEMS</u>	4- 1
4.1 Compilation and Analysis of Basic Data.....	4- 1
4.1.1 Compilation of Transport System Data.....	4- 1
4.1.2 Traffic Data Analyses.....	4- 1
<i>(traffic volume and composition / volume to capacity</i> <i>(V/C) ratio / traffic speed / functions of road /</i> <i>summarizing overall traffic problems)</i>	
4.1.3 Analysis of Travel Behaviours and Existing O-D Pattern.....	4- 8
<i>(modal split / trip rate / O-D patterns)</i>	
4.2 Identification of Existing Problems and Constraints.....	4-10
<i>(area-wide transport problems / problems by route /land use</i> <i>constraints)</i>	
4.3 Formulating Planning Strategy.....	4-12
<i>(Goals and Objectives)</i>	
PART 5: <u>TRANSPORT DEMAND ANALYSIS</u>	5- 1
5.1 Introduction.....	5- 1
<i>(modelling approach to transport demand analysis / resource</i> <i>requirements / which cities require modelling approach /</i> <i>alternative approaches)</i>	
5.2 Preliminary Analyses.....	5- 4
5.2.1 Construction of Present O-D Matrix.....	5- 4
<i>(types of traffic movement / definition of O-D</i> <i>matrix / O-D matrix and types of traffic movement /</i> <i>the summation of data collected through interview</i> <i>survey and cordon line survey / occupancy rates /</i> <i>expansion factors / construction of O-D matrices /</i> <i>matrix adjustment by screen-line survey)</i>	
5.2.2 Network Representation.....	5-11
<i>(traffic zones and zone centroids / link and node</i> <i>data/ Q/V curves)</i>	
5.2.3 Socio-Economic Framework.....	5-16
<i>(data source / projection of future level of socio-</i> <i>economic indices / spatial distribution over traffic</i> <i>zones / simple method of population and employment</i> <i>allocation)</i>	
5.3 Trip Generation.....	5-20
<i>(factors influencing trip generation)</i>	
5.3.1 Trip Rate Method.....	5-23
<i>(land use ratio method / person trip rate method)</i>	
5.3.2 Regression Analysis Method.....	5-25
<i>(theory and modelling process / example regression</i> <i>models)</i>	
5.4 Trip Distribution.....	5-27
5.4.1 Growth Factor Method.....	5-29
<i>(uniform factor method / average factor method /</i> <i>Detroit method / Fratar method)</i>	
5.4.2 Gravity Model.....	5-32
<i>(general form / example application of gravity</i> <i>model)</i>	

5.5	Modal Split Analysis.....	5-34
	<i>(factors affecting modal split / modal split approaches / diversion curve method / discrete choice modelling)</i>	
5.6	Traffic Assignment.....	5-35
PART 6: <u>ALTERNATIVE APPROACHES TO DEMAND ANALYSIS</u>.....		6- 1
6.1	Introduction.....	6- 1
6.2	Simplified Approaches to Demand Analysis.....	6- 1
	<i>(trend analysis / road density approach / simplification in O-D data collection / simplification in modelling)</i>	
6.3	Estimation of O-D Matrix Based on Traffic Counts.....	6- 5
	<i>(modelling / solution method)</i>	
6.4	Discrete Choice Modelling.....	6- 8
	<i>(random utility theory and discrete choice models / parameter estimation / modelling procedure / applications to transport demand analysis / questionnaire design / sample design)</i>	
PART 7: <u>PLAN SYNTHESIS - GUIDELINES TO BETTER PLAN DESIGNING</u>.....		7- 1
7.1	Introduction.....	7- 1
	<i>(elements of transport plan / transport development framework / land use constraints)</i>	
7.2	Road Network Design.....	7- 5
7.2.1	Urban Structure and Network Patterns.....	7- 5
	<i>(urban structure / local street network patterns)</i>	
7.2.2	Functions of Road.....	7- 8
	<i>(functions of road / design volume and capacity specification)</i>	
7.2.3	Road Density and Accessibility.....	7-11
7.3	Planning for Buses.....	7-13
	<i>(role of bus transport / bus route planning / related bus improvement measures)</i>	
7.4	Transport Terminals and Other Mode of Transport.....	7-15
	<i>(airport / bus and truck terminals / docks and harbours / railway system / pedestrian and cycle path)</i>	
7.5	Traffic Management Measures.....	7-16
PART 8: <u>EVALUATION OF TRANSPORT PLANS</u>.....		8- 1
8.1	Evaluation Process in Transport Planning.....	8- 1
8.2	Comprehensive Evaluation.....	8- 2
8.2.1	Evaluation Criteria.....	8- 2
8.2.2	Selection Method.....	8- 5
8.3	Economic Evaluation.....	8- 8
8.3.1	Purpose of Economic Evaluation.....	8- 8
8.3.2	Calculation of Cost and Benefit.....	8- 9
	<i>(estimation of the capital cost / vehicle operating costs / value of time / calculation of total benefit of a project / discount rate)</i>	

PART 9: NOTE ON PLAN REVISION	9- 1
9.1 Introduction.....	9- 1
9.2 Implication of Plan Revision.....	9- 1
9.3 Technical Aspects of Plan Revision.....	9- 2

REFERENCES	R- 1
-------------------------	------

APPENDICES

Appendix 1 Functions and Agency Responsibilities in BMA.....	A1-1
Appendix 2 List of Cities and Their Characteristic of General Plans.....	A2-1
Appendix 3 Transport Planning Tasks in the Preparation of General Plans.....	A3-1
Appendix 4 Functions and Capability of Traficom 241 Classification Recorder.....	A4-1
Appendix 5 Brief Explanation on Motors Transportation Planning Software.....	A5-1
Appendix 6 General Classification of Road Type in Thailand.....	A6-1
Appendix 7 Standard Cross Sections Used in General Plan.....	A7-1
Appendix 8 DOH Road Standard Cross Section.....	A8-1
Appendix 9 System Characteristics of Urban Transport Modes.....	A9-1

LIST OF TABLES

		Page
<u>Part 3:</u>		
Table 3-1	List of Data Required for Transport Planning, and Their Sources.....	3- 2
Table 3-2	Three Types of City and Their Characteristics Concerning Transport Related Data Collection.....	3- 3
Table 3-3	Guideline for Application of O-D Surveys to City Types.....	3- 3
Table 3-4	Guideline for Application of O-D Surveys to Different Planning Situations.....	3-22
Table 3-5	Population Size and Sampling Rate - Japanese Example.....	3-24
<u>Part 4:</u>		
Table 4-1	Example of Traffic Composition Summary Table.....	4- 4
Table 4-2	Volume to Capacity Ratio - A Measure of Service Level.....	4- 3
Table 4-3	Hourly Fluctuation of Traffic Volume - Collected by Automatic Counter.....	4- 6
Table 4-4	Trip Rates from BTS and SES.....	4-10
Table 4-5	Urban Land Uses and Their Relation to Transport Systems.....	4-12
Table 4-6	An Example List of Social Values Concerning Urban Land Use and Transport System.....	4-14
Table 4-7	Transport Users' Interests.....	4-15
<u>Part 5:</u>		
Table 5-1	Manpower Requirement for Quantitative Transport Demand Analysis - Case for Chiang Mai.....	5- 3
Table 5-2	Manpower Requirement for Quantitative Approach by City Size - An Estimation.....	5- 3
Table 5-3	O-D Matrix Representation.....	5- 5
Table 5-4	Source of Survey Data in the Integration of O-D Matrices.....	5- 6
Table 5-5	Types of O-D Surveys and Their Relation to The Construction of O-D Matrix.....	5- 7
Table 5-6	Average Occupancy Rate.....	5- 8
Table 5-7	Coefficient of Passenger Car Units (PCU).....	5-10
Table 5-8	Example of Link Data Set.....	5-13
Table 5-9	Example of Q/V Classification Used in the Traffic Assignment in Chiang Mai.....	5-15
Table 5-10	Example of Trip Generation and Attraction Rates by Land Use Activities (Japanese Example).....	5-24
Table 5-11	Example of Trip Generation Model.....	5-26
Table 5-12	Concept of Trip Distribution.....	5-27
Table 5-13	Example of Gravity Parameters Used in a JICA Study....	5-33

Part 6:

Table 6-1	Example of DOH Growth Rate Based on Historic Data.....	6- 3
-----------	--	------

Part 7:

Table 7-1	Standard Cross-Section by ADT.....	7- 2
Table 7-2	Recommended Cross-Section Dimension for Different Land Uses.....	7- 3
Table 7-3	Hierarchy of Roads Considered in General Plan.....	7- 9
Table 7-4	Trends of K-Factors and AADT (Japanese Example - 1980).....	7-11
Table 7-5	Road Density of Arterial Roads (with more than 4 lanes).....	7-12
Table 7-6	Street Spacing Guidelines in Tokyo.....	7-12
Table 7-7	Related Bus Improvement Measures.....	7-14

Part 8:

Table 8-1	Example of Evaluation Criteria for Comprehensive Transport Plans.....	8- 3
Table 8-2	V/C Ratio and Level of Service.....	8- 4
Table 8-3	Automobile Fuel Consumption as Affected by Speed and Gradient.....	8- 4
Table 8-4	Traffic Accident Rates Based on Sydney Area Transportation Study (1974).....	8- 5
Table 8-5	Vehicle Operating Cost by Vehicle Type.....	8-10
Table 8-6	Assumptions Made for Each Vehicle Type in VOC Calculation.....	8-11
Table 8-7	Assumed Annual Distances by Journey Speed.....	8-11
Table 8-8	Wages of Vehicle Drivers.....	8-12
Table 8-9	Time Value for Business Trips.....	8-13
Table 8-10	The Notion of Cost and Benefit and Project Life.....	8-14

LIST OF FIGURES

	<u>Page</u>
<u>Part 2:</u>	
Fig. 2-1 Transport Planning Process in the Formulation of General Plan.....	2- 2
<u>Part 3:</u>	
Fig. 3-1 Public Transport System Survey Form.....	3- 5
Fig. 3-2 Bus/Coach Time Schedule Survey Form.....	3- 6
Fig. 3-3 The Installation of Tube and Loop Detection.....	3-10
Fig. 3-4 Traffic Counter with Vehicle - Classification Capability.....	3-10
Fig. 3-5 Classification Manual Traffic Country Form.....	3-13
Fig. 3-6 Turning Movement Survey Summary Sheet (Three Leg Case).....	3-14
Fig. 3-7 Travel Time and Delays Study.....	3-16
Fig. 3-8 An Example of Time and Speed Diagram Along Major Street.....	3-15
Fig. 3-9 Example of Home-to-Home Trip Behaviour.....	3-17
Fig. 3-10 Person Trip Questionnaire.....	3-18
Fig. 3-11 Cordon O-D Survey Questionnaire.....	3-20
Fig. 3-12 Licence Plate Survey Field Sheet.....	3-21
Fig. 3-13 Accident Record Survey Sheet.....	3-27
Fig. 3-14 Occupancy Rate Survey Field Sheet.....	3-29
<u>Part 4:</u>	
Fig. 4-1 Cross Section Point of Road.....	4- 2
Fig. 4-2 Road Cross Section at Various Section Points.....	4- 2
Fig. 4-3 Right of Way, Road Width & Traffic Lane.....	4- 2
Fig. 4-4 Traffic Composition Diagram Station 17 (Moonmuang Road).....	4- 4
Fig. 4-5 Peak-Hour Traffic Volume and Location of Traffic Count Points.....	4- 5
Fig. 4-6 Hourly Fluctuation of Traffic Volume Station I (Route No. 101).....	4- 6
Fig. 4-7 Tabulation of Modal Split by Trip Purposes.....	4- 8
Fig. 4-8 Change of Public Transport Passengers in Sydney, 1900-77.....	4- 9
Fig. 4-9 Sample Diagram Showing Spatial Distribution of Transport Demand by using O-D Survey Result (The Diagram was Drawn by X-Y Plotter at DTGP).....	4-11
Fig. 4-10 Example of Drawing of Macro-Traffic Movement That Can Be Produced by Using Number-Plate Survey Data.....	4-11
Fig. 4-11 Land Use Constraints for Transport System Development; Example of Output from Potential Surface Analysis (PSA).....	4-13

Part 5:

Fig. 5-1	Types of Traffic Movement in Relation to Study Area.....	5- 4
Fig. 5-2	Process of Constructing Present O.D. Matrix.....	5-12
Fig. 5-3	Traffic Assignment Network Example (Chiang Mai).....	5-14
Fig. 5-4	Q/V Curve in Network Analysis.....	5-13
Fig. 5-5	Volume-Speed Relation.....	5-16
Fig. 5-6	Population Growth Under Different Scenarios.....	5-18
Fig. 5-7	Relationship between Income and Car-Owing Households.....	5-19
Fig. 5-8	Future Land Use Plan (2007) (Chiang Mai City: Case Study I).....	5-21
Fig. 5-9	Traffic Zones in Chiang Mai.....	5-22
Fig. 5-10	Process of Overcoming Practical Problems in Trip Generation Forecast.....	5-28
Fig. 5-11	Test of Gravity Relation.....	5-33
Fig. 5-12	Diversion Curves of Public and Private Transport Modes.....	5-36
Fig. 5-13	Diversion Curves of Railroads and Buses.....	5-36
Fig. 5-14	Diagrammatic Network Showing the Shortest Route.....	5-37
Fig. 5-15	Graphic Presentation of Traffic Assignment Result (Chiang Mai).....	5-40

Part 6:

Fig. 6-1	Example Questionnaire for Discrete Choice Modelling Applied to Model Choice.....	6-14
----------	--	------

Part 7:

Fig. 7-1	Example of Grid Network (Khon Kaen).....	7- 6
Fig. 7-2	Example of Linear Development (Nakhon Si Thammarat).....	7- 6
Fig. 7-3	Example of Network Development (Grid in City Center and Ring & Radial for outer area - Chiang Mai).....	7- 7
Fig. 7-4	Road Hierarchy and Functions.....	7- 8
Fig. 7-5	Concept of Road Hierarchy and Function.....	7- 9
Fig. 7-6	Ordering of Hourly Traffic Volume (Japanese Example).....	7-10
Fig. 7-7	Process of Bus Route Planning.....	7-13
Fig. 7-8	Cycle Path based on Road Act, Japan.....	7-16

Part 8:

Fig. 8-1	Evaluation Process and its Relation to Social Values.....	8- 1
Fig. 8-2	Type of Value Function.....	8- 7
Fig. 8-3	The Use of Hierarchy to Determine the Relative Importance Weights between Evaluation Criteria.....	8- 8

Part 9:

Fig. 9-1	Process of Plan Revision (Minor or No Change in Planning Boundary).....	9- 2
Fig. 9-2	Process of Plan Revision (Major Change in Planning Boundary).....	9- 4

THE KINGDOM OF THAILAND
MINISTRY OF INTERIOR
DEPARTMENT OF TOWN AND COUNTRY PLANNING

CITY
PLANNING
MANUAL

VOLUME VI URBAN FACILITY PLANNING

THE STUDY ON
APPLIED TECHNOLOGY FOR
MAKING CITY PLAN

JANUARY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

VOLUME VI

URBAN FACILITIES PLANNING

(Table of Contents)

	<u>Page</u>
Detailed Table of Contents.....	(ii)
PART I : PROCEDURES AND GUIDELINES	
CHAPTER 1: Planning Procedures.....	I- 1
CHAPTER 2: Urban Utilities.....	I- 7
CHAPTER 3: Park and Recreation Area.....	I-26
CHAPTER 4: Social Service Facilities and Others.....	I-29
PART II : TECHNICAL REFERENCE	
CHAPTER 1: Drainage/Sewerage.....	II- 1
CHAPTER 2: Water Supply.....	II-19
CHAPTER 3: Electricity.....	II-24
CHAPTER 4: Telecommunications.....	II-27
CHAPTER 5: Solid Waste.....	II-28
CHAPTER 6: Slaughterhouse.....	II-37
CHAPTER 7: Fire Fighting.....	II-38
CHAPTER 8: Park and Recreation Area.....	II-39
CHAPTER 9: Authorities and Related Laws/ Regulations of Urban Facilities.....	II-56
APPENDIX : Sewer Design Programme MLSD.....	A- 1

DETAILED TABLE OF CONTENTS

	Page
Table of Contents.....	(i)
Detailed Table of Contents.....	(ii)
List of Tables.....	(iv)
List of Figures.....	(v)
 <u>PART I PROCEDURES AND GUIDELINES</u>	
<u>CHAPTER 1: PLANNING PROCEDURES.....</u>	I- 1
1.1 Urban Utility Planning Procedure.....	I- 1
1.2 Park and Recreation Area Planning Procedure.....	I- 2
1.3 Coordination with Related Sectors.....	I- 3
1.4 Planning Approach.....	I- 5
 <u>CHAPTER 2: URBAN UTILITIES.....</u>	 I- 7
2.1 Drainage/Sewerage/Flood Control.....	I- 7
2.2 Water Supply.....	I-15
2.3 Electricity.....	I-17
2.4 Telecommunications.....	I-19
2.5 Solid Waste.....	I-20
2.6 Slaughterhouse.....	I-22
2.7 Fire Fighting.....	I-24
2.8 Other Facilities.....	I-25
 <u>CHAPTER 3: PARK AND RECREATION AREA.....</u>	 I-26
3.1 Role of Park and Recreation Area.....	I-26
3.2 Size of Park and Recreation Area.....	I-26
3.3 Location.....	I-26
3.4 Classification.....	I-26
3.5 Facility.....	I-27
3.6 Planning.....	I-27
 <u>CHAPTER 4: SOCIAL SERVICE FACILITIES AND OTHERS.....</u>	 I-29
4.1 Classification of Social Service Facilities.....	I-29
4.2 Data Collection.....	I-29
4.3 Education Facilities.....	I-30
4.4 Public Health/Medical Facilities.....	I-31
4.5 Cultural Facilities.....	I-31
4.6 Government Officer.....	I-33
4.7 Religions Facilities.....	I-33
4.8 Market.....	I-33
4.9 Truck Terminal.....	I-34
4.10 Other Facilities.....	I-34

PART II TECHNICAL REFERENCE

<u>CHAPTER 1: DRAINAGE/SEWERAGE</u>	II- 1
1.1 General.....	II- 1
1.2 Design Procedure.....	II- 2
<u>CHAPTER 2: WATER SUPPLY</u>	II-19
2.1 Production and Transmission System.....	II-19
2.2 Drinking Water Quality.....	II-19
<u>CHAPTER 3: ELECTRICITY</u>	II-24
3.1 Electric Power System.....	II-24
3.2 Demand Forecast.....	II-25
<u>CHAPTER 4: TELECOMMUNICATIONS</u>	II-27
<u>CHAPTER 5: SOLID WASTE</u>	II-28
5.1 Classification of Solid Waste.....	II-28
5.2 Amount and Quality of Waste.....	II-29
5.3 Method of Transfer.....	II-33
5.4 Method of Final Disposal.....	II-33
5.5 Sanitary Landfill.....	II-33
5.6 Incineration.....	II-35
5.7 Composting.....	II-35
5.8 Glossary.....	II-35
<u>CHAPTER 6: SLAUGHTERHOUSE</u>	II-37
6.1 Guidelines of Location.....	II-37
6.2 Operation.....	II-37
<u>CHAPTER 7: FIRE FIGHTING</u>	II-38
7.1 Location of Fire Station.....	II-38
7.2 City Planning Measures for Fire Prevention.....	II-38
<u>CHAPTER 8: PARK AND RECREATION AREA</u>	II-39
8.1 Example of Standards and Classification.....	II-39
8.2 Offices/Authorities Concerned.....	II-41
8.3 Check Points for Planning.....	II-45
8.4 Size of Sports Facilities.....	II-48
8.5 Example of Parks.....	II-49
8.6 Standards Prepared by Specific Planning Division.....	II-55
<u>CHAPTER 9: AUTHORITIES AND RELATED LAWS/REGULATIONS OF URBAN FACILITIES</u>	II-56
<u>APPENDIX : SEWER DESIGN PROGRAMME MLSD</u>	A- 1

LIST OF TABLES

	<i>Page</i>
<u>Part I:</u>	
Table 2-1 Run-Off Coefficient, "C".....	I-10
Table 2-2 Return Period Selection.....	I-10
Table 2-3 Classification of Land Use and Flood Tolerance.....	I-14
<u>Part II:</u>	
Table U-1 Roughness Coefficient, "n".....	II- 7
Table U-2 Surface Water Quality Classification and Standard.....	II-12
Table U-3a Domestic Efficient Guideline.....	II-16
<u>Chapter 2:</u>	
Table U-4a Drinking Water Standard of MWA and PWA.....	II-17
Table U-4b Standard for Water Source, DOH.....	II-21
Table U-4c Chemical Property.....	II-22
Table U-4d Microbiological Property.....	II-23
Table U-4e Poisonous Solids.....	II-23
<u>Chapter 3:</u>	
Table U-5 Electric Power System.....	II-24
Table U-6a MEA (BMA and the Neighbouring Province of Nonthaburi and Samut Prakan).....	II-25
Table U-6b PEA (All of the Country Except of MEA's Service Area.....	II-26
Table U-7 Comparison of the Solid Waste Characteristics Obtained in the Study of AIT.....	II-32
<u>Chapter 8:</u>	
Table P-1 Guideline for Park and Recreation Area.....	II-43
Table P-2 Standard for Parks.....	II-44
<u>Appendix:</u>	
Table SD-1 Water Level Statistics at Khleng Ban Mai Water Gate.....	A- 8
Table SD-2 Output of Area Measurement.....	A-16
Table SD-3 Calculation Sheet (To Input Data for MLSD Programme).....	A-17

LIST OF FIGURES

	<u>Page</u>
 <u>PART I</u>	
<u>Chapter 1:</u>	
Fig. 1-1 Work Flow.....	I- 4
 <u>Chapter 2:</u>	
Fig. 2-1 Rainfall Intensity - Duration Frequency Curves.....	I-11
 <u>PART II</u>	
<u>Chapter 1:</u>	
Fig. U-1 Flow of Drainage/Sewerage System.....	II- 1
Fig. U-2 Design of Piping.....	II- 8
Fig. U-3 Design of Pump Station.....	II-10
Fig. U-4 Design of Sewage Treatment Plan.....	II-15
Fig. U-4b Example of Drainage Design.....	II-18
 <u>Chapter 2:</u>	
Fig. U-5 Example of Water Treatment Process.....	II-20
 <u>Chapter 5:</u>	
Fig. U-6 Amount of Solid Waste Per Capacity Per Day.....	II-30
 <u>Chapter 8:</u>	
Fig. P-1 Classification of Comprehensive Open Space.....	II-42
Fig. P-2 Playground.....	II-50
Fig. P-3 Playground, Perspective.....	II-51
Fig. P-4 Playground 2.....	II-52
Fig. P-5 Saranrom Park (25 Rais).....	II-53
Fig. P-6 Phra Nakhon Park (50 Rais).....	II-54
Fig. P-7 Jatujak Park (190 Rais).....	II-54
Fig. P-8 Lum Pi Ni Park (360 Rais).....	II-53
 <u>Appendix:</u>	
Fig. SD-1 Structure of Programme MLSD.....	A- 1
Fig. SD-2 Command Chart.....	A- 2
Fig. SD-3 Topographic Map.....	A- 4
Fig. SD-4 Elevation of Major Roads.....	A- 5
Fig. SD-5 Existing Drainage System.....	A- 6
Fig. SD-6 Existing Drainage System of Photaram.....	A- 7
Fig. SD-7 Rainfall Intensity - Duration Frequency Curves.....	A- 9
Fig. SD-8 Future Land Use Plan (Photaram Case Study II).....	A-10
Fig. SD-9 Divide Drainage Zone.....	A-11

Fig. SD-10	Layout of Sewer Lines and Catchment Area.....	A-12
Fig. SD-11	Layout Pipes and Flow Direction.....	A-13
Fig. SD-12	Assign Node Number.....	A-14
Fig. SD-13	Allocation of Catchment Area.....	A-15
Fig. SD-14	Screen of "1. Design Pipes".....	A-21
Fig. SD-16	Menu of HYDRAULIC Command.....	A-24
Fig. SD-16.1	Screen of Hydraulic Design.....	A-25
Fig. SD-17	Menu of SIZE Command.....	A-26
Fig. SD-18	Display of DRAFT.....	A-28
Fig. SD-19	Screen of 2.....	A-29
Fig. SD-20	The Result from Printer.....	A-31

THE KINGDOM OF THAILAND
MINISTRY OF INTERIOR
DEPARTMENT OF TOWN AND COUNTRY PLANNING

CITY
PLANNING
MANUAL

VOLUME VII DATABASE MANAGEMENT SYSTEM

THE STUDY ON
APPLIED TECHNOLOGY FOR
MAKING CITY PLAN

JANUARY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

VOLUME VII

DATA BASE MANagements SYSTEM

(Table of Contents)

	<u>Page</u>
Detailed Table of Contents.....	(ii)
CHAPTER 1: Introduction.....	1-1
CHAPTER 2: Purpose of DBMS in City Planning.....	2-1
CHAPTER 3: Concept of DBMS in City Planning.....	3-1
CHAPTER 4: System Design (Software).....	4-1
CHAPTER 5: Computer System Development (Hardware).....	5-1
APPENDIX.....	A-1

DETAILED TABLE OF CONTENTS

	Page
Table of Contents.....	(i)
Detailed Table of Contents.....	(ii)
List of Tables.....	(iv)
List of Figures.....	(v)
<u>CHAPTER 1: INTRODUCTION.....</u>	1- 1
<u>CHAPTER 2: PURPOSE OF DBMS IN CITY PLANNING.....</u>	2- 1
<u>CHAPTER 3: CONCEPT OF DBMS IN CITY PLANNING.....</u>	3- 1
3.1 Standard City Planning Procedure.....	3- 1
3.2 Concept of DBMS.....	3- 2
3.2.1 Concept of DBMS.....	3- 2
3.2.2 The File Concept.....	3- 3
3.2.3 The Data Base Management.....	3- 5
<u>CHAPTER 4: SYSTEM DESIGN (SOFTWARE).....</u>	4- 1
4.1 Organization of Software System.....	4- 1
4.2 Definition of System Functions.....	4- 2
4.2.1 Mapping System.....	4- 4
4.2.2 Basic Tabulation Programmes.....	4- 5
4.2.3 Analytical Applications.....	4- 6
4.2.4 Socio-Economic Simulator.....	4- 7
4.2.5 Land Use Simulator.....	4- 9
4.2.6 Transportation Simulator.....	4-11
4.2.7 Facility Simulator.....	4-13
4.3 Input/Output Data Items.....	4-14
4.3.1 Data Processing Procedure.....	4-14
4.3.2 Specification of Data Item.....	4-15
4.4 Code Design.....	4-15
4.4.1 Reasons for Using Code.....	4-15
4.4.2 Choosing Defective Code.....	4-15
4.4.3 Selecting Items for Coding.....	4-19
4.4.4 Combining Codes.....	4-19
4.4.5 Analyzing Items for Coding.....	4-19
4.4.6 Code Diagram Preparation.....	4-20
4.4.7 Preparing Code Establishment Standards.....	4-21
4.4.8 Definition of Code Design.....	4-22
4.5 File Design.....	4-30
4.5.1 File Design.....	4-30
4.5.2 File Types.....	4-30
4.5.3 File Design.....	4-31
4.5.4 Organizing the Data.....	4-31
4.5.5 Deciding File Format.....	4-32

4.6	Data Base Management Package.....	4-36
4.6.1	Data Base Management on Micro Computer.....	4-36
4.6.2	Data Base Management on Online-System.....	4-38
4.7	Programme Specification.....	4-41
4.7.1	Mapping System.....	4-41
4.7.2	Basic Tabulation Programmes.....	4-48
4.7.3	Analytical Applications.....	4-51
4.7.4	Socio-Economic Simulator.....	4-64
4.7.5	Land Use Simulator.....	4-70
4.7.6	Transportation Simulator.....	4-72
<u>CHAPTER 5: COMPUTER SYSTEM DEVELOPMENT</u>		5- 1
5.1	Outline of Computer System Development.....	5- 1
5.2	Inceptive Stage.....	5- 3
5.3	Proposal of Innovative Stage (On-Line Processing).....	5- 7
5.4	Proposal of Full Scale Development Stage (Future System).....	5- 8
<u>APPENDIX-1: COMPUTER SYSTEM CONFIGURATION</u>		A- 1
<u>APPENDIX-2: SOFTWARE SYSTEM CONFIGURATION</u>		A- 9
<u>APPENDIX-3: EXPRESSION OF INFORMATION</u>		A-19
<u>APPENDIX-4: SYSTEM DEVELOPMENT</u>		A-22

LIST OF TABLES

	<u>Page</u>
<u>Chapter 4:</u>	
Table 4.4.1 Code Table for Household Survey.....	4-23
Table 4.4.2 Code Table for Identification (Location and Survey Area).....	4-25
Table 4.4.3 Code Table for Commercial Survey.....	4-27
Table 4.4.4 Code Table for Industrial Survey.....	4-29
Table 4.7.1 Scope of Analysis.....	4-68
<u>Appendix-4</u>	
Table A.4.1 Summary of System Development.....	A-23
Table A.4.2 Example - Department Codes.....	A-25
Table A.4.3 Group Classification Code.....	A-25
Table A.4.4 Mnemonic Code.....	A-26
Table A.4.5 Decimal Code.....	A-26
Table A.4.6 Example - Iron Plate Codes.....	A-27
Table A.4.7 Example - Station Codes.....	A-27
Table A.4.8 Cryptic Code.....	A-28

LIST OF FIGURES

	<i>Page</i>
<u>Chapter 3:</u>	
Fig. 3.1.1	Standard City Planning Procedure..... 3- 1
Fig. 3.2.1	Outline of System for Making City Plan..... 3- 2
Fig. 3.2.2	Concept of Data Base System..... 3- 3
Fig. 3.2.3	File Concept..... 3- 4
Fig. 3.2.4	The Data Base Concept..... 3- 5
 <u>Chapter 4:</u>	
Fig. 4.1.1	Basic Organization of Software System for the Proposed DBMS..... 4- 1
Fig. 4.2.1	Structure of Data Base Management System..... 4- 3
Fig. 4.2.2	Mapping System..... 4- 4
Fig. 4.2.3	System of Basic Tabulation Programmes..... 4- 5
Fig. 4.2.4	Example System of Analytical Applications..... 4- 6
Fig. 4.2.5	Structure of Socio-Economic System..... 4- 8
Fig. 4.2.6	Land Use Simulator..... 4-10
Fig. 4.2.7	Transportation O-D System..... 4-11
Fig. 4.2.8	Transportation Simulator..... 4-12
Fig. 4.2.9	Flow of Drainage and Sewerage System..... 4-13
Fig. 4.3.1	Structure of Data Processing..... 4-16
Fig. 4.3.2	Item Specification..... 4-17
Fig. 4.4.1	Item Survey Form..... 4-18
Fig. 4.4.2	Code Structure Definition..... 4-18
Fig. 4.4.3	Combining Codes..... 4-19
Fig. 4.4.4	Analyzing Items for Coding..... 4-20
Fig. 4.4.5	Code Design..... 4-21
Fig. 4.5.1	File Design..... 4-30
Fig. 4.5.2	Organizing the Data..... 4-32
Fig. 4.5.3	Household File..... 4-33
Fig. 4.5.4	Commercial File..... 4-34
Fig. 4.5.5	Industrial File..... 4-35
Fig. 4.6.1	Introduction to dBASE III PLUS..... 4-36
Fig. 4.6.2	Example of Data Stored in Tabular Format..... 4-39
Fig. 4.6.3	Concept of Online Data Base..... 4-40
Fig. 4.7.1	Mapping System..... 4-43
Fig. 4.7.2	Digital Mapping..... 4-45
Fig. 4.7.2.1	Digital Mapping..... 4-46
Fig. 4.7.3	Mapping System..... 4-47
Fig. 4.7.4	Input Information Procedure Output Information..... 4-49
Fig. 4.7.5	Structure of R & A Data Processing System..... 4-50
Fig. 4.7.6	Standard Unit..... 4-66
Fig. 4.7.7	Structure of Socio-Economic System..... 4-69
Fig. 4.7.8	Land Use Simulator..... 4-71
Fig. 4.7.9	Demand Models..... 4-74
Fig. 4.7.10	Matrix Models..... 4-75
Fig. 4.7.11	Private Transport Models..... 4-76
Fig. 4.7.12	Public Transport Models..... 4-77

	<u>Page</u>
<u>Chapter 5:</u>	
Fig. 5.1.1	Processing Forms..... 5- 1
Fig. 5.1.2	Advancement of Data Base Management System..... 5- 2
Fig. 5.2.1	File-Oriented Programming Before Data Base (Inceptive Stage)..... 5- 3
Fig. 5.2.2	Batch Processing by Micro Computer (Inceptive Stage)..... 5- 5
Fig. 5.2.3	Stand Along System..... 5- 6
Fig. 5.3.1	The Data Base Management System (Innovative Stage)..... 5- 7
Fig. 5.3.2	Remote Batch Processing (Innovative Stage)..... 5- 9
Fig. 5.3.3	An Example of Hardware System Configuration..... 5-10
Fig. 5.4.1	Future System (Full Scale Development Stage)..... 5-12
<u>Appendix-1:</u>	
Fig. A.1.1	Computer System Devices..... A- 2
Fig. A.1.2	Data Processing..... A- 3
Fig. A.1.3	Hardware Basic Configuration and Functions..... A- 5
Fig. A.1.4	On-Line Real Time Processing..... A- 6
Fig. A.1.5	Real-Time Processing..... A- 7
Fig. A.1.6	On-Line Real Time Processing..... A- 8
Fig. A.1.7	Time Sharing Processing..... A- 8
<u>Appendix-2:</u>	
Fig. A.2.1	Roles of OS..... A-10
Fig. A.2.2	Structure of OS..... A-10
Fig. A.2.3	Command Processing..... A-11
Fig. A.2.4	16-Bits OS..... A-12
Fig. A.2.5	The Roles of MS-DOS..... A-13
Fig. A.2.6	Assembly Language..... A-15
Fig. A.2.7	High-Level Languages..... A-15
Fig. A.2.8	Programme Translation..... A-16
Fig. A.2.9	Interpreter..... A-17
<u>Appendix-3:</u>	
Fig. A.3.1	Bits and Bytes (EBCDIC Code)..... A-19
Fig. A.3.2	Decimal Notation..... A-20
Fig. A.3.3	Binary Notation..... A-21
<u>Appendix-4:</u>	
Fig. A.4.1	The Purpose of System Development..... A-22
Fig. A.4.2	System Development..... A-22
Fig. A.4.3	Sequential Code..... A-24

THE KINGDOM OF THAILAND
MINISTRY OF INTERIOR
DEPARTMENT OF TOWN AND COUNTRY PLANNING

CITY
PLANNING
MANUAL

VOLUME VIII LAND READJUSTMENT

THE STUDY ON
APPLIED TECHNOLOGY FOR
MAKING CITY PLAN

JANUARY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

VOLUME VIII
LAND READJUSTMENT
(Table of Contents)

	<u>Page</u>
Detailed Table of Contents.....	(ii)
CHAPTER1: Implementing Procedure of Land Readjustment in Japan.....	1-1
CHAPTER2: Preparation of Development Plan.....	2-1
CHAPTER3: Preparation of Action Plan.....	3-1
APPENDIX.....	A1-1
CHAPTER4: Land Evaluation.....	4-1
APPENDIXES.....	A2-1
CHAPTER 5: Replotting Design.....	5-1
APPENDIXES.....	A5-1

DETAILED TABLE OF CONTENTS

	Page
Table of Contents.....	(i)
Detailed Table of Contents.....	(ii)
List of Tables.....	(iv)
List of Figures.....	(v)
CHAPTER 1: <u>IMPLEMENTING PROCEDURE OF LAND READJUSTMENT</u> <u>IN JAPAN.</u>	1-1
CHAPTER 2: <u>PREPARATION OF DEVELOPMENT PLAN.</u>	2-1
CHAPTER 3: <u>PREPARATION OF ACTION PLAN</u>	3-1
3.1 Study Procedure.....	3-1
3.2 Study Items and Contents.....	3-1
3.2.1 Boundary of Project Area.....	3-1
3.2.2 Existing Condition.....	3-3
3.2.3 Land Readjustment Design.....	3-3
3.2.4 Financial Plan.....	3-4
APPENDIX-1 <u>FORMAT FOR PREPARATION OF ACTION PLAN.</u>	A1-1
CHAPTER 4: <u>LAND EVALUATION</u>	4-1
4.1 Concept of Land Evaluation.....	4-1
4.2 Land Evaluation for Land Readjustment Projects.....	4-2
4.2.1 Purpose.....	4-2
4.2.2 Conditions.....	4-3
4.2.3 Methods of Land Evaluation.....	4-4
4.3 Necessary Data for Land Evaluation.....	4-5
4.3.1 Surveys on Land Evaluation.....	4-5
4.3.2 Preparation of Data for Evaluation.....	4-6
4.3.3 Formation of Standard for Land Evaluation.....	4-7
4.4 Calculation of Street Value.....	4-9
4.4.1 Street Value and Street Value Index.....	4-9
4.4.2 Method of Setting Up Street Value.....	4-9
4.4.3 Calculation of Street Value.....	4-10
4.5 Lot Evaluation.....	4-11
4.6 Evaluation of Block.....	4-12
4.6.1 Purposes.....	4-12
4.6.2 Method of Block Evaluation.....	4-12
4.6.3 OutPut of Block Evaluation.....	4-12
4.7 Roles of Evaluator.....	4-13
APPENDIX-2 <u>EXAMPLE OF STANDARDS FOR LAND EVALUATION.</u>	A2-1
APPENDIX-3 <u>EXAMPLE OF GUIDELINES FOR CALCULATION STREET VALUE.</u>	A3-1
APPENDIX-4 <u>EXAMPLE OF GUIDELINES FOR CALCULATION LOT LAND VALUE.</u>	A4-1

CHAPTER 5: <u>REPLOTTING DESIGN</u>	5-1
5.1 Purposes.....	5-1
5.2 Method of Replotting Design.....	5-1
5.2.1 Location of Replot.....	5-1
5.2.2 Area of Replot.....	5-3
a. Evaluation Replotting Calculation Method.....	5-4
b. Areal Replotting Design Method.....	5-5
c. Combined Replotting Calculation Method.....	5-6
5.3 Standard for Replotting Design.....	5-8
5.4 First Lines of Replotting Design.....	5-10
5.5 Replotting Design.....	5-11
5.5.1 Basic Data for Replotting Design.....	5-11
5.5.2 Putting Lots into Block.....	5-12
APPENDIX-5 <u>EXAMPLE OF STANDARDS FOR REPLOTTING DESIGN</u>	A5-1
APPENDIX-6 <u>EXAMPLE OF GUIDELINES FOR REPLOTTING DESIGN</u>	A6-1

LIST OF TABLES

	<u>Page</u>
<u>Appendix-1:</u>	
Table 1 Land Use before and after the Project.....	A1-3
Table 2 List of Public Work.....	A1-4
Table 3 List of Expenditure.....	A1-5
Table 4 Land Value.....	A1-6
Table 5 Reserved Land.....	A1-7
Table 6 Revenue.....	A1-8
Table 7 Contribution Area/Ratio.....	A1-9
Table 8 Cash Flow.....	A1-10
 <u>Appendix-2:</u>	
Table 1-1 t Value.....	A2-12
Table 1-2 x Value.....	A2-13
Table 1-3 S, R, N, M Value.....	A2-14
Table 1-4 u Value.....	A2-15
Table 1-5 Po, Qo, Value.....	A2-16
Table 1-6 y Value.....	A2-16
Table 2-1 Additional Vantage Ratio by Side Street.....	A2-17
Table 2-2 Additional Vantage Ratio by Back Street.....	A2-17
Table 2-3(1) Depth Successive Decrease Ratio (%).....	A2-18
Table 2-3(2) Revised Depth Successive Decrease Ratio.....	A2-19
Table 2-4 Frontage Successive Decrease Ratio.....	A2-20
Table 2-5 Huge Depth Decrease Ratio.....	A2-20
Table 2-6 Irregular Angle Decrease Ratio.....	A2-20
Table 2-7 Different Ground Level Decrease Ratio.....	A2-21
Table 2-8 Standard Share of Right.....	A2-21
 <u>Appendix-3:</u>	
Format - 1 Calculation of Street Coefficient before and after the Development.....	A3-14
Format - 2 Calculation of Accessibility Coefficient before and after the Development.....	A3-15
Format - 3 Calculation of Land Coefficient before and after the Development.....	A3-16
Format - 4 Calculation of Street Value Index before and after the Development.....	A3-17
Format - 5 Final Adjustment for Street Value Index before and after the Development.....	A3-18
 <u>Appendix-4:</u>	
Table 1 Report on Land Evaluation.....	A4-20
Table 2 Report on Land Evaluation.....	A4-20
 <u>Appendix-6:</u>	
Table - 1 Basic Reference Data for Replotting Design.....	A6-6
Table - 2 Individual Lot Data.....	A6-7
Table - 3 Replotting Calculation Table By Block.....	A6-8
Table - 4 Preliminary Replotting by Block.....	A6-9
Table - 5 Calculation of Replotting Design (Example).....	A6-10

LIST OF FIGURES

Page

Chapter 1:

Fig. 1-1 Land Readjustment Procedure Stipulated..... 1-2

Chapter 3:

Fig. 3-1 Action Plan..... 3-2

THE KINGDOM OF THAILAND
MINISTRY OF INTERIOR
DEPARTMENT OF TOWN AND COUNTRY PLANNING

CITY
PLANNING
MANUAL

VOLUME IX DISTRICT PLANNING

THE STUDY ON
APPLIED TECHNOLOGY FOR
MAKING CITY PLAN

JANUARY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

VOLUME IX
DISTRICT PLANNING
(Table of Contents)

	Page
Detailed Table of Contents.....	(ii)
INTRODUCTION.....	1
PART I : DISTRICT PLANNING SYSTEM IN JAPAN	
CHAPTER 1: Establishment of District Planning System.....	1- 1
CHAPTER 2: Outline of the District Planning System.....	1- 3
CHAPTER 3: Control Measures Applied in District Planning Area.....	1- 4
CHAPTER 4: Planning Method.....	1- 5
CHAPTER 5: Participation of the Residents.....	1-10
PART II : APPLICATION OF DISTRICT PLAN IN THAILAND	
CHAPTER 1: General View.....	II- 1
CHAPTER 2: Application of the District Plan.....	II- 4
CHAPTER 3: Considerable Evaluation Factor for Land Owners and Tenants.....	II-16
CHAPTER 4: Future Prospects of District Planning in Thailand.....	II-19
APPENDICES	

DETAILED TABLE OF CONTENTS

	Page
Table of Contents.....	(i)
Detailed Table of Contents.....	(ii)
<u>INTRODUCTION</u>	1
 <u>PART I DISTRICT PLANNING SYSTEM IN JAPAN</u>	
<u>CHAPTER 1: ESTABLISHMENT OF DISTRICT PLANNING SYSTEM</u>	I- 1
1.1 Background of the District Planning System.....	I- 1
1.2 Requirements and Objectives.....	I- 2
<u>CHAPTER 2: OUTLINE OF THE DISTRICT PLANNING SYSTEM</u>	I- 3
2.1 Role of District Plan.....	I- 3
2.2 Area for District Plan.....	I- 3
<u>CHAPTER 3: CONTROL MEASURES APPLIED IN DISTRICT PLANNING AREA</u>	I- 4
3.1 Notification and Guidance.....	I- 4
3.2 District Planning and Development Permit.....	I- 4
3.3 Transfer of the Control Measures of District Plan to the Building Code.....	I- 4
3.4 Development of District Facilities.....	I- 4
<u>CHAPTER 4: PLANNING METHOD</u>	I- 5
4.1 Base of the Formulation of District Plan.....	I- 5
4.1.1 Contents of the District Plan.....	I- 5
4.1.2 Goal of the District Plan.....	I- 6
4.2 Planning Procedure for Formulation of District Plan.....	I- 6
4.2.1 Work Process of Planning.....	I- 6
4.2.2 Standard Planning Process.....	I- 6
4.3 Planning Organization.....	I- 6
4.3.1 Preparation of Planning.....	I- 6
4.3.2 Plan Formulation.....	I- 8
4.3.3 Implementation Body.....	I- 8
4.3.4 City Planning Board.....	I- 9
4.3.5 Relation of Prefectural and National Government.....	I- 9
<u>CHAPTER 5: PARTICIPATION OF THE RESIDENTS</u>	I-10
5.1 Significance of Participation.....	I-10
5.2 Provision for the Participation of the Residents.....	I-10
5.3 Form of Participation of the Residents.....	I-10

PART II APPLICATION OF DISTRICT PLAN IN THAILAND

<u>CHAPTER 1: GENERAL VIEW</u>	II- 1
1.1 Background.....	II- 1
1.2 Present Situation of Control System for Urban Development.....	II- 2
<u>CHAPTER 2: APPLICATION OF THE DISTRICT PLAN</u>	II- 4
2.1 Objective of District Plan.....	II- 4
2.2 Application of the District Plan in Thailand.....	II- 4
2.3 Proposed Planning Procedure.....	II- 5
2.3.1 Stage 1 : Preparation.....	II- 6
2.3.2 Stage 2 : Planning Process.....	II- 7
2.3.3 Stage 3 : Implementation Process.....	II-14
<u>CHAPTER 3: CONSIDERABLE EVALUATION FACTOR FOR THE DISTRICT PLANNING</u>	II-16
3.1 Advantage and Disadvantage for Land Owners and Tenants.....	II-16
3.2 Interest by the Residents.....	II-17
3.3 Consensus for the Development Objectives.....	II-17
3.4 Others.....	II-18
<u>CHAPTER 4: FUTURE PROSPECTS OF DISTRICT PLANNING IN THAILAND</u>	II-19
4.1 Institutional.....	II-19
4.1.1 Promotion of the District Plan.....	II-19
4.1.2 Generalization of the District Planning Method.....	II-19
4.1.3 Establishment of the Standard for Implementation.....	II-19
4.1.4 Cooperation with other Concerning Authorities.....	II-20
4.1.5 Advance to the Localization.....	II-20
4.1.6 Securing the Consensus.....	II-20
4.2 Pomotion Measures.....	II-20
4.2.1 Taxation.....	II-21
4.2.2 Financial.....	II-21
4.2.3 Social Benefit.....	II-21
4.2.4 Legal Benefit.....	II-21
4.3 Implementation of the District Plan.....	II-21
4.3.1 The measures to be Implemented by the Current Urban Control System.....	II-21
4.3.2 The measures to be Implemented by the Specific Plan.....	II-22
4.4 Recommendations.....	II-24
<u>APPENDICES</u>	
Appendix 1 Classification of Land Use Plan in DTCP.....	A- 1
Appendix 2 Research Survey Sheet.....	A- 2
Appendix 3 Existing Urban Control Measures (By-Laws).....	A- 4
Appendix 4 Procedure of Permission (By-Laws).....	A- 9
Appendix 5 Basic knowledge of District Planning in Japan.....	A-15

JICA

