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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

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CHAPTER 1

USING THE "CITY PLANNING MANUAL"

CHAPTER 1

USING THE "CITY PLANNING MANUAL"

1.1 Purposes of Manual

> This "City Planning Manual" shows the procedures and technical references for making city plans. The manual does not cover all the ways to deal with special conditions of a planning area or district. Therefore, it is aimed that the user will apply the most useful parts of the manual after grasping sufficiently the special characteristics of each planning area or district.

(Explanations)

City Planning in Thailand is based on the Town Planning Act, B.E. 2518. According to the provisions of the Act, DTCP prepares General Plans and Specific Plans, and authorizes them. For the preparation and making of a Legal Plan, the procedure is divided into two parts, i.e. technical planning part and legal part.

This manual is aimed not to show the procedures of making a legal town plan, but to assist the researcher and the planner with technical methods of making city plans in general. It is expected, however, for the government officer to make good use of this manual as a technical reference book for making, checking up on or revising a legal town plan.

The technical level shown in this manual is focused on a standard level from the standpoint of the preparation of a Integrated Physical Plan which provides necessary and sufficient land, transport facilities and other urban facilities accommodating future demand projected at the target year.

For the preparation of an integrated physical plan, various sectoral studies and plans should be made and coordinated, based on the appropriate data and the scientific methods of analysis and planning. These works require substantial manpower, time and cost. Under the actual constraints of these resources, some standardized data base and planning method should be established.

Main objectives of this manual are as follows:

a. Quantification of planning method;
b. Establishment of methodology for determining city planning area;
c. Suggestion for setting up goals and objectives;
d. Clarification of coordination points among sectoral planners and with other responsible bodies;
e. Establishment of city planning basic data base;
f. Establishment of planning standards; and finally
g. Establishment of scientific city planning methods and procedures.

1.2 Composition of Manual

The manual is composed of the following 8 volumes:

Volume I	Integrated City Planning
Volume II	Mapping
Volume III	Socio-Economic Analysis
Volume IV	Land Use Planning
Volume V	Transport Planning
Volume VI	Urban Facility Planning
Volume VII	Data Base Management System
Volume VIII	Land Readjustment
Volume IX	District Planning

(Explanations)

Volume I discusses mainly the items related to city planning on the whole. The contents of this volume are as follows:

(1) What is City Planning (Chapter 2)
(2) Outline and Interrelationship of Sectoral Studies and Plans (Chapter 3)
(3) Programming and Evaluation of City Plan (Chapter 4)

Five volumes from Volume II to VI take up main sectoral works for the preparation of an integrated physical plan. Each volume contains at least the following items:

(1) Contents and Objectives
(2) Technical References according to Working Procedure
(3) Interrelationship with Other Sectors
(4) Presentation Format

Volume VII is a guideline to develop and operate a database management system for city planning.

Volume VIII and IX show examples of the technical aspect of new development and controlling measures.

CHAPTER 2

WHAT IS CITY PLANNING

CHAPTER 2

WHAT IS CITY PLANNING

2.1 Meaning and Application of City Planning

2.1.1 Meaning of City Planning

> City planning is a planning technology, science and policy related mainly to such physical factors of a city as land, buildings and urban facilities, in prospect of future changes, intending that the daily life of citizens and various socio-economic activities can be carried out comfortably, effectively and safely.

(Explanations)

For the development and improvement of a local area (eg. municipality area), a number of different types of plan apart from the city plan can be prepared, for example, an economic development plan or a social development plan. Compared to these plans, a city plan is rather a physical plan but includes a consideration of the social and economic aspects of the city.

As the present legal definition of city planning, Section 4 of the Town Planning Act, B.E. 2518 provides that "town planning means the preparation, making and implementation of a General Plan and a Specific Plan in the area of a town and related areas, or in the country in order to build or develop a new town or a part thereof or to replace a damaged town or a part thereof for the purpose of providing or improving sanitation, amenity and convenience, of improving economy, social affair, and environment of preserving a place and an object of interest of value in the field of art, architecture, history or antiquity, or of preserving natural resources, landscape of beauty or natural interest."

2.1.2 Areas Subject to City Planning

> Areas where city planning is required are such areas as shown below according to the urbanization problems and urban policies:
>
> (1) Metropolitan areas where population growth and economic development are remarkable and some action must be taken for securing the living and production environment.
>
> (2) Regional, provincial or local cities which should be improved, developed and conserved as appropriate urban centers for daily life of inhabitants and socio-economic activities in the influence areas.
>
> (3) Development project areas where no urban section is found at present but some specific development project is planned from the strategic viewpoint of national, regional or local development.

(Explanations)

Taking the strategic target areas for the urban and specific area development of the Sixth Plan into account, the hierarchical order of urban areas in Thailand can be conceptualized as follows:

(1) National Capital Region
BMA and 5 provinces

(2) Regional Cities
Regional City ----- 11 cities
Regional Growth Center ----- 13 cities

(3) Provincial Capital ----- 43 cities

(4) Municipality ----- 49 cities

(5) Sanitary District ----- about 800 districts

The urban areas and their vicinities above the municipal level should be subject to city planning. Sanitary districts which are considered to grow up to the municipal level within about 10 years are also subject to city planning.

2.2 Contents and Characteristics of City Plans

2.2.1 Contents of City Plans

The city plans are composed of an integrated physical plan and, if necessary and possible, district control plans and urban development projects.

(Explanations)

General speaking, city plans consist of an integrated physical plan which covers all of the planning area and some specified district plans and urban development projects.

The integrated physical plan is called a Master Plan, a General Plan or a Comprehensive Plan. According to the existing city planning system in Thailand, "General Plan" defined by Section 4 of the Town Planning Act, B.E. 2518 has characteristics of the integrated plan. In order to avoid confusing technical and legal terms, "Integrated Physical Plan" is used in this manual.

A district control plan shows special proposed controlling devices for a specific area from the standpoint of environment protection. An urban development project defined as a city planning project is a strategic one intending to realize an orderly urban area provided with necessary infrastructure. Both of these district control plan and development project should be supported by implementation measures.

"Specific Plan" defined by the above mentioned Act plays a role of formulating these plans and projects.

2.2.2 Contents and Characteristics of Integrated Physical Plan

The contents of an integrated physical plan are as follows:

(1) Land use plan
   a. Location plan for urban areas and conservation areas
   b. Land use plan for urban areas

(2) Transport facility plan
   a. Road/street network plan
   b. Location plan for road-related facilities
   c. Plans for other transport facilities

(3) Other urban facility plan
   a. Plan for parks and open spaces
   b. Sewage/drainage plan
   c. Location plan for key facilities

The target year of an integrated physical plan is set at about 20 years in the future and the intermediate target year at 10 years in the future.

The scale for presentation of the plan is from 1:10,000 to 1:25,000 according to the size of the planning area.

(Explanations)

The land use plan is the most fundamental plan which shows the limitation of urban areas in the target year based on the projected space requirement and designated land use, i.e. residential, commercial, industrial, etc. in urban areas.

The main subject of the transport facility plan is the road/street network plan which includes plans for main arterial roads, arterial roads, auxiliary arterial roads, and if necessary, pedestrian ways and bicycle paths. Road-related facilities include plazas, parking areas, terminals, etc. and other transport facilities include railroad, monorail, etc.

The important subjects of other urban facility plan are parks and open spaces and sewage/drainage works which are closely related to the land use plan and the road/street network plan. Key facilities include markets, schools, etc.

2.3 Procedures for Preparation of Integrated Physical Plan

2.3.1 General Procedures for Analysis and Planning

The outline of analysis and planning procedures for the preparation of an integrated physical plan is as shown below:

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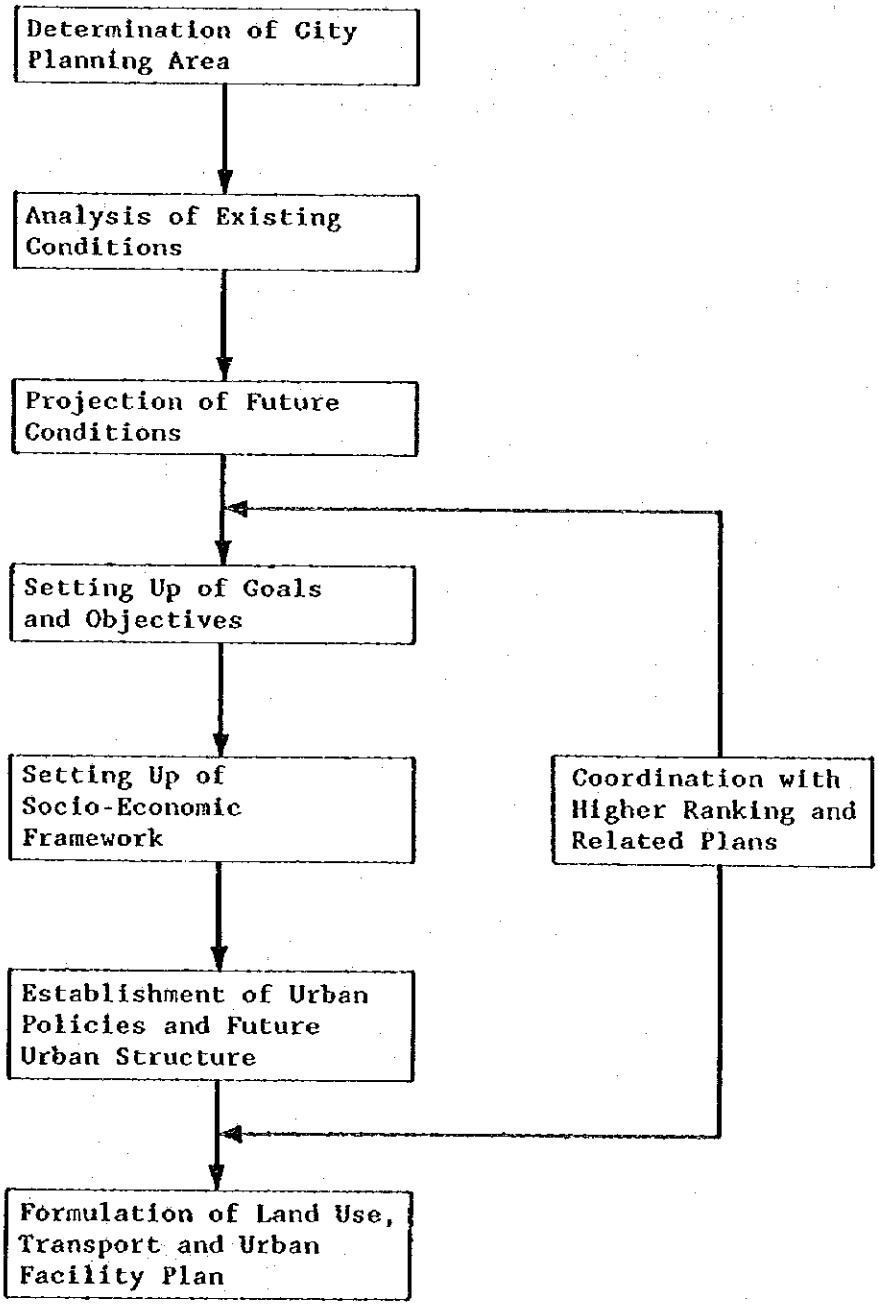


(Explanations)

The plan making starts with the determination of the city planning area. When a revision of city plan is required, the existing city planning area can be changed in conformity with the recent urbanization tendency.

After the city planning area is determined, the data collection and the map revision are conducted. According to the present system of DTCP, the Research & Analysis Div. and the Mapping Div. start their works at the same time. The Research & Analysis Div. collects socio-economic data and the Mapping Div. prepares general maps and gathers physical data. The Research & Analysis Div. makes analysis of existing socio-economic conditions and forecasts future population, labor force and number of students. Land use planners in the Comprehensive Planning Div. analyzes physical conditions like land use, building use and public service facilities. Engineers in the Engineering Div. conduct data collection and analyses related to traffic volumes and urban utilities.

The procedures from "Setting Up of Goals and Objectives" to "Formulation of Land Use, Transport and Urban Facility Plan" should be the joint work of planners.

2.3.2 City Planning Area

A city planning area is determined in accordance with the following criteria:

1. An area including a core urban area and its surroundings for which integrated improvement, development and conservation as a unified urban area are required in view of natural and social conditions as well as existing situation and changes of population, land use and traffic volume.

2. An area which has not yet urban sections but will be formed into a new urban area as a residential city, an industrial city or another type of city.

(Explanations)

A city planning area is determined freely from administrative boundaries taking account of the real state of urbanization and future plans.

"The area for which integrated improvement, development and conservation as a unified urban area are required" is determined by studying the following items:

(1) Existing land use and its changes;
(2) Population distribution and its changes;
(3) Agricultural land and open spaces subject to conservation;
(4) Topographical conditions and river system which characterize the area and sometimes function as area division factors;
(5) Daily living sphere formed by commuting, going to school or shopping;
(6) Provision of transport facilities; and
(7) Historical, cultural or administrative unity.

For these studies relevant data are indispensable. However, under the present situation of DTCP it is rather difficult to gather enough data before determining a city planning area. In many cases, the available data are only national census population of municipality area (every 10 years), registered population by administrative unit (every year) and a tax map of municipality area (usually outdated). The planner cannot help determining a provisional boundary by reconnaissance of the area and discussions with local officers or related agencies. After collecting data and analyzing item, the planner can determine the final boundary of the city planning area.

The important thing is to keep these data and analysis results in order to utilize them when the revision of the city plan is required.

2.3.3 Analysis of Existing Conditions

(Purposes of Analysis)

Analysis of existing conditions has two aims, one is to identify the problems and the planning subjects by analyzing the planning area and the other is to obtain basic informations for future projections by analyzing the past changes of various indices.

(Data for Analysis)

Data to be collected are classified as follows:

(1) Maps
(2) Socio-Economic Conditions
(3) Land Use
(4) Traffic Volume and Transport Facilities
(5) Other Urban Facilities

Mapping - Data Collection - Analysis

(Explanations)

The problems and the planning subjects might be identified from the viewpoints of safety, amenity, convenience and special aspects corresponding to the requisite of the planning area. These special aspects include, for example, position and role of the city in the province or the nation, socio-economic meaning or cultural features of the city.

The analyses of the past changes are related to total population, working population by sector, population distribution, expansion tendency of urban areas and other necessary indices.

Detailed information about data to be collected is shown in each sectoral volume of this manual.

2.3.4 Projection of Future Conditions

(Purposes of Future Projection)

The future projection has two aims, one is to grasp a future image based on the past trend of changes and identify the deteriorating and newly generated problems, the other is to lay a basis for setting up the planning framework.

(Items of Projections)

The future projection contains: a) total population; b) total working population by sector; c) total employment by sector; d) extension pattern of urban areas; and e) other additional items depending on the characteristics of the planning area and the planning methodology.

(Target Year)

The target year of the projection is set up at about 20 years in the future and the intermediate target year at 10 years in the future.

(Explanations)

The first task is to clarify a future situation using numerical and graphical methods of the planning area when no planning measures are taken. Some existing problems would become more severe and some new problems would occur. These problems as well as existing ones should be listed. The planning framework can be set up as a different level from the projection result, but the difference would be limited to the possible extent of realization when some planning measures are taken.

"Other additional items of projection" include, for example, number of households, number of students, gross regional product, household income, vehicle ownership, inundation areas, etc.

2.3.5 Setting Up of Goals and Objectives

Setting up of goals and objectives of a city means to establish a desirable future image of the city and to identify the planning subjects for its achievement. This work should be based on the considerations for the socio-economic functions of the city and the course of solving the existing and future problems.

(Explanations)

The future image of a city might be established from the following viewpoints:

(1) Position and role of the city in the province or the nation;
(2) Main economic activity;
(3) Special social meaning; and
(4) Special natural characteristics.

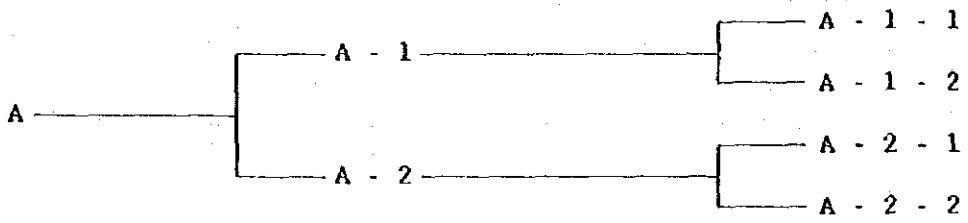
For example, a regional core city, an industrial complex city, a tourism city, a science and technology city, etc.

The planning subjects are, for example, as follows:

(1) Strengthening of the functions as the provincial capital;
(2) Promotion of industrial activities;
(3) Conservation of historical valuable zones;
(4) Protection of flood; and
(5) Lowering of growth rate of population.

These planning subjects are recommended to be categorized and arranged to a hierarchical table as shown below:

(Future Image) (Basic Planning Subjects) (Planning Subjects)



2.3.6 Setting Up of Socio-Economic Framework

Taking the goals and objectives into consideration and revising the results of future projections, the main socio-economic indices in the target years are settled as a planning framework.

In other words, the framework is a quantitative expression of the goals and objectives.

The items of the planning framework depend on the characteristics of the planning area and the planning methodology, but generally consist of the followings:

(1) Total population;
(2) Population by sex and age group;
(3) Number of household; and
(4) Total employment by sector.

(Explanations)

From the standpoint of land use planning, transport planning and urban facility planning, total population and employment by sector are the most basic data. Population by sex and age group is used for estimating labor force and school age population. Number of households is a basic item of information for the estimation of housing demand.

For determining the socio-economic framework, following aspects, for example should be studied and determined as quantitative target levels:

For determining the total population

a. Land use constraints (Upper limit population).
b. Possibility of urban infrastructure provision (Sustainable population in accordance with the investment pace for urban infrastructure).
c. City size which makes possible to realize a multi-functioned regional center (ex. population of 200,000).

For determining the sex-age structure

a. Level of net migration of youth age population.
b. Target of family planning (Birth rate).
c. Social welfare, social safety level (Death rate, survival rate).

For determining the number of household

a. Composition of household types (average family size).
b. Housing projects (assumed or planned number of household in the projects).

For determining the total employment by sector

a. Level of unemployment rate.
b. Attracting labor force from outside of the planning area (the ratio of employment generated in the planning area to the employed population living in the area).
c. Production scale or number of employment of leading industry (ex. target employment of planned industrial estate).
d. Policy for agricultural activity (target agricultural employment).

Future gross regional production by sector (GRP) is desirable to be projected in cases as shown below:

(1) Future employment by sector should be calculated in close connection with gross regional product and labor productivity by sector.

(2) Industrial development is a main planning object of the city.

(3) Cargo movement is an important factor for transportation plan.

2.3.7 Establishment of Urban Policies and Future Urban Structure

Urban policies include setting up of the target level of improvement, development and conservation. Based on the urban policies, an outline of urban form and skeleton of urban infrastructure is drawn up as a general guideline for land use, transport and urban facility planning.

The rough areas of planned urbanized area and of urbanization control area are to be presented at this stage. The distribution of urban cores and main development projects with rough quantitative sizes is also to be shown.

(Explanations)

The target level is described as much as possible quantitatively for the following basic policies:

(1) Scale of future urban areas;
(2) Policy for the location of future urban areas and conservation areas;
(3) Policy for urban development and redevelopment;
(4) Policy for development of transport system;
(5) Policy for conservation of natural environment and for development of public open spaces;
(6) Policy for improvement of drainage and sewerage system and rivers; and
(7) Policy for development of other urban facilities.

Other items are included depending upon the features of the city planning area concerned.

For formulating the above-mentioned policies, the restrictive conditions for land use should be considered as shown below:

(1) Meteorological condition;
(2) Topographical condition;
(3) Catchment area division; and
(4) Agricultural aptitude.

Taking the socio-economic framework into consideration, the planned urbanized area is expressed quantitatively. The sizes and distributions of urban cores and key projects should be determined.

2.4 Coordination with Higher-Ranking and Related Plans

A city plan should be in conformity with higher-ranking plans such as the regional development plan or the national urban policies and also should be coordinated with various related plans and projects such as agricultural development plan, urban utility plans formulated by respective implementing bodies.

(Explanations)

In the present situation of Thailand, a comprehensive plan (a General Plan) should reflect the urban policy of the National Economic and Social Development Plan (5 Years Plan) and should be coordinate with the sectorial development plans and projects. Also the following laws and regulations should be considered:

a. Building Control Act, B.E. 2522
b. Act Regulating Construction in an Area where a Fire has occurred B.E. 2476
c. Land Development Act, B.E. 2526
d. Public Health Act, B.E. 2484

e. Factory Act, B.E. 2512
f. Act Conserving Canals and Water Ways, B.E. 2446
g. Act on Historical Places, Antiques, Objects, Art Objects and National Museum, B.E. 2504
h. National Park Act, B.E. 2504
i. Act for the Expropriation of Immovable Properties, B.E. 2497
j. Act for the Cleanliness and Orderliness of the Country, B.E. 2503
k. Control of Burial Place and Crematorium Act, B.E. 2481
l. Enhancement and Conservation of National Environment Quality Act, B.E. 2518 and Amendment B.E. 2521
m. Announcement of the Revolution Party No. 295 (Public Highway), B.E. 2515
n. Announcement of the Revolution Party No. 286 (Land Allocation), B.E. 2519

2.5 Revision of City Plans

As recent changes in community life are very rapid, city plans are required to be revised periodically. Timing of the revision is generally every 5 years.

Matters for revision are from the boundary of city planning area to detailed designations of land use or planned width of a road.

(Explanations)

In the present system of city planning in Thailand, a General Plan should be revised quinquennially.

In the same way as a new General Plan is prepared, the revision work starts with the determination of the boundary of the city planning area.

The planning procedure for a revised comprehensive plan is almost the same as the one for a new plan. Depending on the change of situation, the extent of revision is affected greatly.

For revising a legal plan, it is very important to establish a persuasive standard for the change of the existing designation.

Motives for a revision other than the periodical ones are as follows:

a. When a new urban policy is established;

b. When some big projects are planned and they need a change of the existing comprehensive plan;

c. When the existing law related to city planning is revised; and

d. When urbanization is rapid beyond expectation.

CHAPTER 3

OUTLINE OF SECTORIAL STUDIES AND PLANS

3.1 Mapping

3.1.1 Fundamental Maps for City Plans

Maps used in city planning are classified into 3 types, i.e.

a. General Maps;
b. Thematic Maps; and
c. Analytical Maps.

General Maps consist of the base map of the planning area and the vicinity map.

Various thematic maps are to be prepared depending on the features of the planning area and the planning methodology, but the fundamental one is the land use map.

Analytical maps contain the land capability classification map and the soil suitability map.

The scale of maps is from 1:3,000 to 1:25,000 depending on the size of the planning area and the type of maps.

(Explanations)

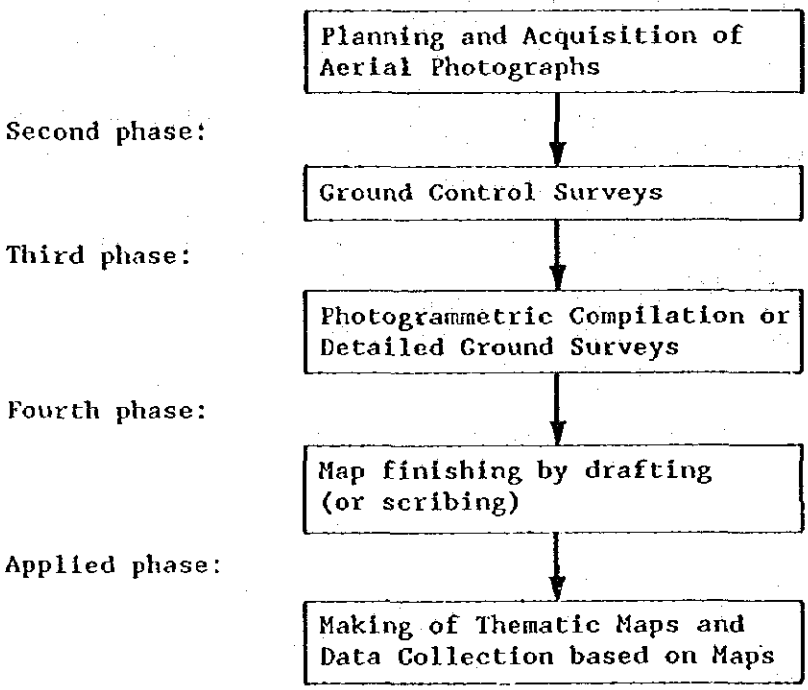
The base map of the planning area is the most fundamental map for city planning. In the existing system of DTCP, the Mapping Div. prepares the detailed maps at the scale of 1:4,000. Generally speaking it is rarely possible to obtain an up-to-date general map for a planning area. Therefore, the first work is to prepare the base map by revising the out-of-date map. The method of the revision is described in Volume II.

The Mapping Div. prepares the following thematic maps:

a. Building-use map 1:4,000
b. Land use map 1:10,000
c. Government land map 1:10,000
d. Administrative boundary and place name map 1:10,000

3.1.2 Mapping Procedure

Photogrammetry, the science of making reliable measurements from aerial photographs is the basis for preparing virtually all topographic map today. Maps of small land areas, are still best prepared by ground survey methods; but the efficiency and economy of photogrammetry dictates its use in mapping areas of any appreciable size. The mapping procedure usually consists of four distinct phases and applied phase.



(Explanations)

First phase: This phase is crucial to the success of a mapping project even though it is usually a small percentage of the total mapping cost. The photographs must be taken with a calibrated precision mapping camera and must meet the specifications for scale, overlap, tilt, time of day and other requirements.

Second phase: To compile an accurate topographic map, the aerial photographs must be related to established horizontal and vertical datum. Ground surveys are performed to establish coordinate positions and elevations for selected ground features clearly visible and identifiable on the aerial photographs. The surveys should start from horizontal and vertical monuments established by State agencies and should be tied into the national network (RTSD).

Third phase: Ground survey points and additional supplemental control point such as pass-points established by the process of aerial triangulation are plotted on the base map sheets. The pass points are

used for controlling individual stereo-models formed from the aerial photographs. This process accurately correlates the aerial photographs to base map.

Fourth phase: Most map sheets today are prepared by scribing or ink drafting procedures. Unless many copies are needed, the final product is a set of black-line positives on polyester sheets which are suitable for making inexpensive paper prints by a diazo process.

Applied phase: This phase is divided into two activities. The first is the production of a thematic map designed to provide information on a single topic or group of topics such as land use, geology and population. The second is data collection and data analysis of spatial information based on maps, aerial photographs and related information.

3.1.3 Relationship with Other Sectoral Studies and Plan

Maps of an urban area can serve many purposes as follows:

(1) Municipal programmes;
(2) Planning;
(3) Traffic Engineering;
(4) Highway and Street Engineering;
(5) Water Supply, Storm and Sanitary Sewer Engineering;
(6) Utilities Location and Management;
(7) Parks and Recreation;
(8) Emergency Services; and
(9) Others.

(Explanations)

1) Municipal Programmes

Communities have a wide variety of agencies and organizations that use maps. Moreover, a wide variety of programmes affecting the community require the support of adequate maps to be effective. Funds for the programmes may come from local, state sources or a combination of sources. A set of community maps that are properly designed can satisfy all these needs, and they can be produced at far less cost than would be incurred if each map-using agency or programme tried to satisfy its own needs without reference to other community interests.

2) Planning

Planning is carried out at many levels and by many offices such as country planning, city planning, redevelopment planning, community development planning, regional planning, etc. Comprehensive planning requires interrelating local details with areawide systems, it would be impractical to recommend a single map scale to meet the needs of all planners. For studies where topography is important, as in engineering improvements and extensive public land projects, a topographic map with contours at appropriate intervals provides a good base for information.

3) Traffic Engineering

For generalized studies, information on traffic flow, accidents, street widths, street jogs, street grades, and grade separations can be presented on the area maps. Traffic engineers concerned with corridors, expressways, signalization, offstreet parking, and street widenings throughout a metropolitan area need a detailed map.

4) Highway and Street Engineering

A map is convenient for master plan transportation studies. All significant ground detail and the precise location and depth of all underground utilities should be shown on the maps. Since the exact mapping of utilities can be expensive, a practical method for preliminary location is to show all utilities in the area from recorded information only. Thus, the highway street engineer will have the approximate location of all utilities for his preliminary work. Later, when the specific alignment of a particular transportation corridor or a highway interchange has been determined, the horizontal and vertical positions of the utility lines can be surveyed precisely in the limited area to be affected.

5) Water Supply, Storm and Sanitary Sewer Engineering

Maps required by a municipal water-supply office are important particularly with regard to scale and contour interval. For storm and sanitary sewer engineering, a topographic map will provide the information vital to a project. One significant additional factor, however, is that in designing a storm drainage system, a much larger watershed area must be considered to make allowance for all runoff that can affect the system. The proper disposal of storm water usually requires downstream terrain information and therefore larger areas of topographic map coverage.

6) Utilities Location and Management

Both municipal and private utility companies or departments are prime users of area wide maps, and often private utility companies are willing to financially support coordinated mapping programmes for common areas of interest.

Utility companies require high accuracy in the base maps, and some detailed fieldwork is usually needed to produce an adequate map with the individual utility lines shown in their proper horizontal and vertical positions.

7) Parks and Recreation

Map requirements for parks and recreational purposes are usually met by a combination of small-scale area-wide maps and specific site maps with contours.

8) Emergency Services

Police and fire department need maps showing all street and address-numbering systems.

9) Others

Tax assessment and collection are a national responsibility in some localities. The assessor's office has a coordinated set of maps of the entire country. The maps may vary widely in scale, age, accuracy, reliability, and content; but they should be considered in designing a new set of maps of the community since they may contain much usable data.

The city surveyor's office benefits greatly from a set of accurate topographic maps. The city surveyor's office, which is usually responsible for a wide variety of field surveys for many purposes, often finds that work is substantially reduced by the availability of accurate maps.

3.2 Socio-Economic Analysis

3.2.1 Contents and Objectives of Socio-Economic Analysis

The socio-economic analysis for a city planning area consists of the following items:

(1) Population;
(2) Economic activity;
(3) Land conditions;
(4) Building conditions;
(5) Urban facilities;
(6) Environment;
(7) Disasters; and
(8) Future projections.

The results of analysis are handed over to the land use, transport and urban facility planners.

(Explanations)

Basic items of analysis for a city planning area should be selected as the standard ones. Examples of sub-items for each above enumerated item are shown below:

1) Population
- a. Total population
- b. Natural increase and migration
- c. Population distribution
- d. Number of household
- e. Population by sex and age group

2) Economic activity
- a. Number of establishments and persons engaged in industry
- b. Number of establishments and persons engaged in commerce
- c. Number of establishments and persons engaged in other economic activities

d. Value of manufacturing equipment
e. Value of sales
f. Working population by sector by living place
g. Working population by sector by working place

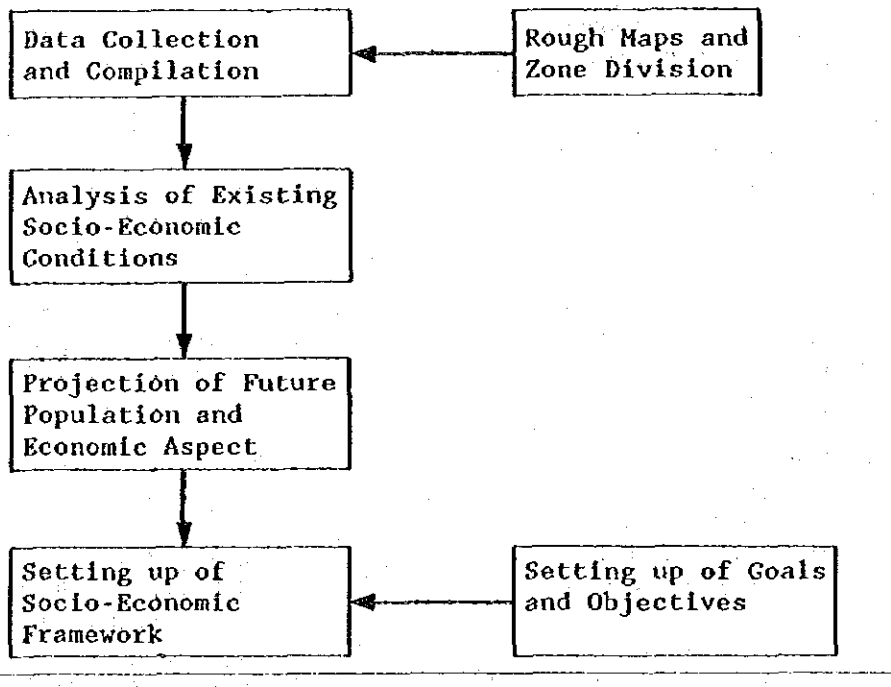
3) *Land conditions*
a. Existing land use
b. Urbanization trend
c. Development projects
d. Distribution of government land
e. Topography
f. Vegetation
g. Legal regulations
h. Landscape survey

4) *Building conditions*
a. Existing building use
b. Housing conditions
c. Building coverage, building floor area

5) *Urban facilities*
a. Road/plaza
b. Railroad/

3.2.2 Analysis Procedures

The socio-economic analysis is made along the following procedure flow chart.



(Explanations)

Data collection is made from the following sources:

a. Field Survey in the Planning Area
b. Municipal or Provincial Office
c. National Statistical Office

In the present situation of Thailand, almost all of socio-economic data should be gathered through field survey.

Collected data should be stored and compiled according to the standardized format.

Analysis of existing conditions is focused on the following aspects:

a. Physical features
- a-1 Historical sketch of the city
- a-2 Characteristics of settlements
- a-3 Urbanization

b. Population
- b-1 Changes of total population
  - b-1-1 Migration
  - b-1-2 Natural increase
- b-2 Age-Sex structure of population
- b-3 Population distribution
- b-4 Population density
- b-5 Household characteristics
- b-6 Other characteristics like literacy, educational level, religion or race

c. Economic conditions
- c-1 Labor force structure
- c-2 Industrial establishments and employment
- c-3 Commercial establishments and employment
- c-4 Special economic activity of the city
- c-5 Agricultural activity
- c-6 Household income

d. Identification of problems
- d-1 Environmental problems from the viewpoint of safety, amenity and convenience
- d-2 Planning subjects relating to the position and role of the city in the wider area
- d-3 Planning subjects relating to the specific features of the city

Projections of future population and economic aspects are made at first according to the past trend of changes.

Projection items contain:
a) total population;
b) total working population by sector; and
c) total employment by sector.

And also, in same cases, number of household, number of students or gross regional product are projected.

Reflecting the settled goals and objectives, a socio-economic framework is determined by revising the levels of projected future figures.

3.2.3 Relationship with Other Sectoral Studies and Plans

For a socio-economic analyst, some fundamental maps showing general information about the planning area are required. The main outputs of the analysis to other sectors are as follows:

1) Existing zonal indices to planning sectors.
2) Future projection results and framework to planning sectors.

(Explanations)

1) Fundamental maps

Examples of fundamental maps are:
a. base map
b. vicinity map
c. land use map

2) Existing zonal indices

For example, the followings are to be delivered:
a. existing population by zone (if possible, past trend)
b. existing employment by zone (if possible, past trend)
c. number of households by zone (if possible, past trend)
d. number of persons engaged in key facilities

3) Future projection results and framework

a. total population
b. total employment by sector
c. total number of student

3.2.4 Presentation of Analysis Results

Analysis results are put together into a research report. The report explains the socio-economic conditions of the planning area referring to already stated items.

As many tables and figures as possible are to be included for easier understanding.

In order to clarify the reliability, accuracy and limit of the analysis, the method of data collection should be explained.

Recommendations and suggestions for land use, transport and other urban facility planning should be presented as concretely as possible.

(Explanations)

The contents of a research report, for example, are as follows:

Introduction

Chapter 1 Method of Data Collection
Chapter 2 Physical Features of the Planning Area
Chapter 3 Social Conditions of the Planning Area
Chapter 4 Economic Conditions of the Planning Area
Chapter 5 Existing Problems
Chapter 6 Future Projections of Socio-Economic Conditions
Chapter 7 Goals and Objectives
Chapter 8 Socio-Economic Framework
Chapter 9 Recommendations for City Planning

3.3 Land Use Planning

3.3.1 Contents and Objectives of Land Use Plan

The land use plan is basically concerned with the location, intensity and amount of land development required for the various space-using functions of city life. The land use planning deals with residential, commercial, industrial, institutional, recreational and other activities found in the planning area.

Land use planning objectives are determined by an interplay of socio-economic and public interest considerations.

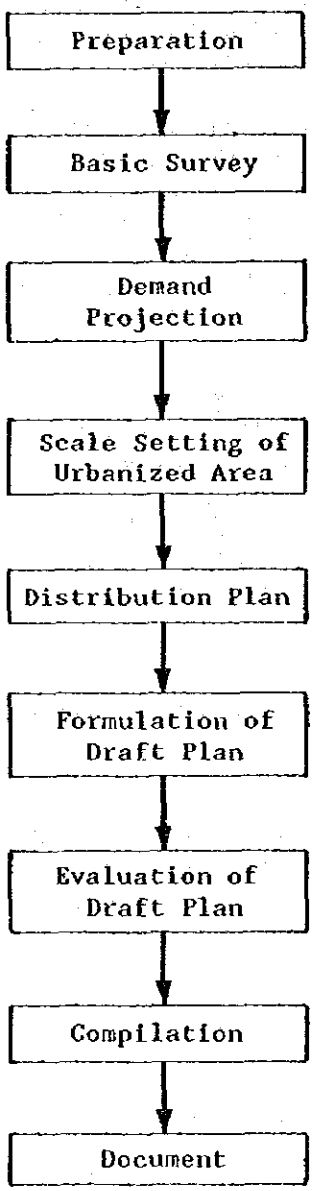
(Explanations)

The land use planning is concerned with the proper allocation of land areas for the above-mentioned urban uses based on soil suitabilities, prescribed space standards and various other land allocation criteria such as site and accessibility standards and land use compatibility considerations. Detailed informations are described in Volume IV.

Economic determinants for land use planning objectives usually include land value and development costs. Social values and behavior patterns also play an important role in urban land use objectives. Public interest determinants, on the other hand, pertain to those planning considerations concerned with public purposes or serving the greatest good and are more concretely defined. These include: considerations of 1) health, 2) safety, 3) economy, 4) convenience and 5) amenity. More detailed descriptions and technical standards are shown in Volume IV.

3.3.2 Planning Procedures

The land use planning procedures are summarized as shown below:



(Explanations)

After setting the planning boundary, a number of basic studies on the socio-economic, physical and environmental aspects of the community within the planning area need to be carried out, the depth of which usually depends on the complexity of its socio-economic and physical structures and availability of the necessary data information thereof.

Main tasks corresponding to the planning procedure are shown in the following table.

3.3.3 Relationship with Other Sectoral Studies and Plans

A land use planner receives from and gives to other sectors the following materials and informations during the planning process:

To receive:

1) Fundamental maps
2) Socio-Economic data and analysis results

To give:

3) Zonal indices for transport planning
4) Allocation policies of urban facilities

(Explanations)

1) Fundamental maps

Examples of fundamental maps are:
- a. base map
- b. vicinity map
- c. land use map
- d. building use map

2) Socio-economic data and analysis results

At least the followings are to be obtained:
- a. existing population by zone
- b. existing employment by zone
- c. future total population
- d. future total employment

3) Zonal indices for transport planning

Depending on the methodology of transport planning, various kinds of indices are required. Basic informations, however, are:
- a. future population by zone
- b. future employment by zone

4) Allocation policies of urban facilities

Main facilities especially related to land use play are as follow:
- a. Parks and open spaces
- b. Sewage/drainage
- c. Large scale facilities like university, hospital, wholesale center, etc.

3.3.4 Presentation of Plan

The land use plan should be presented on a map showing the location, layout and boundaries of planned land uses by major use categories.

It should be accompanied by documents and their summary which contain the explanations about planning objectives, planning standards used, summary tables of areas for planned land uses and possible implementation measures.

(Explanations)

The categories and color codes to be used in a land use plan map may be comprised of the followings:

a. residential	yellow
b. commercial	red
.	
.	
.	
.	
.	
.	
.	

Areas for planned land uses should be presented in a table as shown below:

Land Use Categories	Hectares	% of Total Land Area
Residential		
Commercial		
.		
.		
.		
.		
.		
Total		

3.4 Transport Planning

3.4.1 Contents and Objectives of Transport Plan

A transport plan consists of specifications of the following aspects: highway network, public transport network and transport terminals such as bus/coach terminal and railway station. They collectively provide physical communication channels between urban land use activities.

Transport planning objectives are determined based on the analysis of existing transport problems and future transport demand.

(Explanations)

Transport planning is concerned with the supply of physical communication channels between different land use activities in the urban area. Physical movement of people and goods are performed by passenger car, buses, trucks, trains; walking and cycling are also important means of transport. All of these movements i.e. traffic are channeled into the street and highway network, and the public transport network, which form an integrated transport network in the urban area.

Transport problems arise where transport demand exceeds transport capacity. This implies that one of the major aims of a transport plan is the supply of sufficient capacity to accommodate the transport demand, so that smooth traffic flow on the transport network is secured, to provide and to accessibility and mobility to people and goods in the urban area. Supply of transport facility, however, involves substantial amount of public expenditure. Thus, efficiency of the planned networks need to be secured. Transportion also incurs "external diseconomies" known as air pollution due to exhaust gases, and noise and vibration pollution as well as traffic accidents. For these reasons transport plans should be evaluated to minimize these adverse impacts the urban environment.

3.4.2 Transport Planning Process

Transport planning process, in general, consists of the following five steps:

1. Data Collection;
2. Analysis;
3. Forecast;
4. Plan Design; and
5. Plan Evaluation.

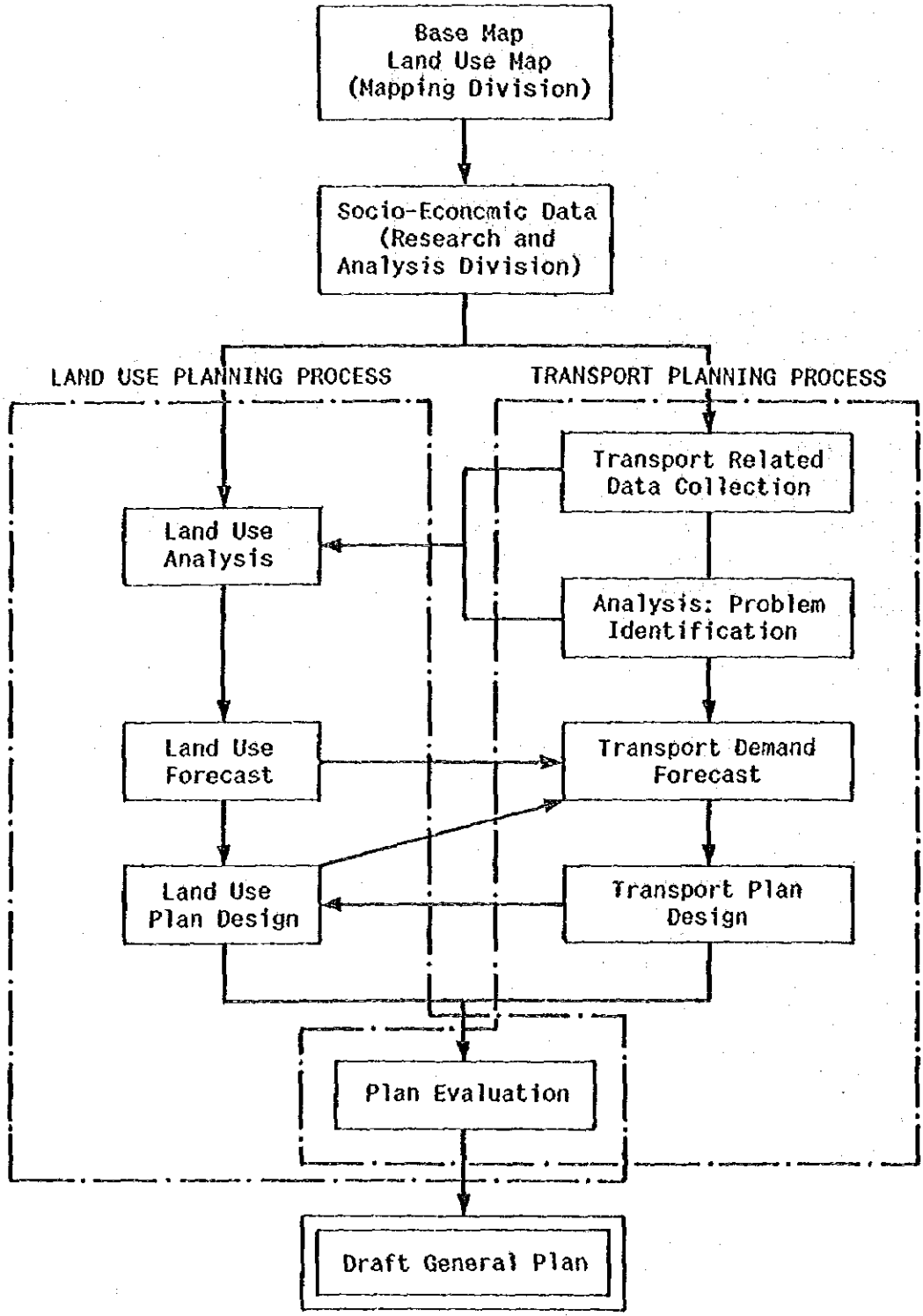


FIG. 1-1 TRANSPORT PLANNING PROCESS IN THE PREPARATION OF GENERAL PLAN

(Explanations)

At the data collection stage, necessary data for planning, for example, socio-economic indices, topographic data, existing condition of transport systems and land use, among many others are collected through field survey. Certain data are collected from local authorities and other governmental organizations.

The collected data are, then used to analyze the existing situation of the city, and to identify problems which need to be dealt with in the course of plan designing. The planning strategies (policies) are formulated based on the result of these analyses.

Physical Plan for a city in Comprehensive Planning, usually looks ahead for twenty years. Target population and expected levels of activities are provided as a framework to the transport systems planning. The future transport demand is forecasted by using this framework. The methods of transport demand forecast should preferably be based on a quantitative approach by the use of computers, but simplified methods may be applied in certain cases.

At the plan design process, the transport planner considers a variety of factors to prescribe the transport system so that the transport problems identified at the earlier stage may be overcome and the expected future transport demand may be accommodated. The coordination with the land use planners is of particular importance at this stage in order to balance transport supply and demand, and to provide the transport system to guide the urban development into preferable directions.

The plan design is made in parallel with plan evaluation. A set of evaluation indices are determined and the adequacy of the generated plan is tested against these indices. The best plan is, then, put forward as a draft general plan for the transport system.

3.4.3 Coordination with Related Sectors

Transport planning sector closely coordinate with mapping, socio-economic and land use planning sectors.

(Explanations)

Mapping Sector

Basic maps shown below are obtained from mapping sector.

a. Base map
b. Existing land use map
c.

Socio-Economic Sector

Transport planning requires a great deal of data in the areas of socio-economic and transport. Of which transport related data are collected within the transport planning sector (see Volume.....) but socio-economic sector provides socio-economic data. Main items of required socio-economic data are listed as follows:

a. Area wide population and employment (existing, future)
b. Zonal distribution of population and employment (existing, future)
c. Other socio-economic indices by zone (existing and future)

Land Use Planning Sector

Transport system essentially caters for land use activities, but the transport plan can influence the way land use is actually developed. In other words, they interact with each other. Then, it is imperative that these two systems are planned at the same level, and this requires the transport planner to closely coordinate with the land use planner. The information provided from the land use planning sector can be listed as follows:

a. Existing land use plan
b. Future land use plan
c. Existing and future land use activity levels (quantitative)
d. Land use constraints showing the area where certain transport systems may not be developed.

Transport planning sector in turn feeds back the planned transport system to land use planning level to check the consistency between the two systems.

3.4.4 Presentation of Plan

Transport plan is expressed in both map format and associated documentation. Map shows the location and dimension of transport network and related facilities. Documentation substantiates the proposed plan by showing base data and their analysis, demand forecasting result and plan evaluation result.

(Explanations)

Transport plan in map format shows the highway network of the following classification:

a. Rural Highways
b. Urban Highways
   - Primary Distributors
   - District Distributors
   - Local Distributors
   - Access Roads

It also shows the location and the dimension of:

a. Bus/coach terminals
b. Railway network and station
c. Airport

Documentation should contain the following items:

a. Basic statistics of existing traffic and transport condition
b. Identified problem
c. Planning strategy
d. Forecasted demand
e. Alternative plans
f. Evaluation results

The details of the plan specification are found in Volume V.

3.5 Urban Facility Planning

3.5.1 Contents and Objectives of Urban Facility Plan

> The urban facilities other than transport facilities determined as city planning facilities consist of parks and open spaces, sewage/drainage work and other key facilities.
>
> Planning objectives of these facilities are to secure a good urban life from the viewpoints of a) health, b) safety, c) amenity, and d) convenience.

(Explanations)

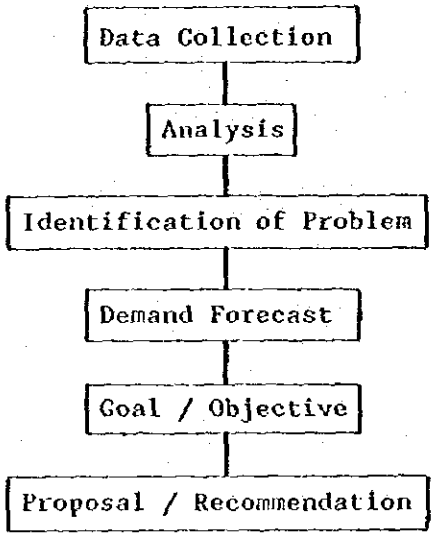
There are various urban facilities, for example, parks and open spaces, urban utilities like sewage/drainage works, water supply, electricity, gas, tele-communications and solid waste disposal, and public service facilities like school, hospital, post office, police station, fire station, public market, slaughter house etc.

Each urban facility is managed by the authorities or bureau concerned. However each implementation plan has not been based on the integrated future land use plan, so discordination, confusion or inconvenience occurs.

The Comprehensive Plan should be formulated, studying the present condition and program of each facility. In the Comprehensive Plan, recommendation for provision of the necessary facilities which should support the land use plan shall be made and if each implementation plan of the facilities does not coordinate with one another which will possibly cause inconvenience, suggestions for that correction should be presented.

3.5.2 Planning Procedures

The urban facility planning procedures are summarized as shown below:



(Explanations)

The planning begin with data collection and study of present conditions. The related problems should be identified. Future demand or requirement of major facilities should be forecasted. Then the goals/objectives should be set. Finally recommendations or suggestions will be made.

3.5.3 Relationship with Other Sectorial Studies and Plans

An urban facility planner receives from and gives to other sectors the following materials and informations during the planning process:

To receive:

1) Fundamental maps
2) Socio-economic data and analysis results
3) Land use plan
4) Transportation plan

To give:

5) Future (major) requirement and restriction of facilities (to land use and transportation planning sectors)

(Explanations)

1) Fundamental maps and 2) Socio-economic data and analysis results should be given at the beginning of the planning.

3) Land use plan and 4) Transportation plan would be received in the course of planning.

5) Future major requirement and restrictions of facilities will include the following if necessary,

a. Flood control restriction to land use.

b. Influence of plan of drainage/sewerage to roads and land use.

c. Requirement of large facilities such as parks sewage treatment plant to land use.

d. Restriction of provide utilities/facilities to support land use plan.

3.5.4 Presentation of Plan

The urban facility plan would be presented in description, figures, tables and drawings including present conditions, requirement/restriction, goals/objectives and recommendation/ suggestions.

(Explanations)

The urban facility plan will consist of the following:

1) Utilities
   a. Drainage/sewerage/flood control
   b. Water supply
   c. Solid waste management
   d. Slaughterhouse
   e. Electricity
   f. Tele-communications
   g. Others (Gas etc.)

2) Parks and recreational facilities

3) Other facilities
   a. Educational facilities
   b. Public health facilities
   c. Others

CHAPTER 4

PROGRAMMING AND EVALUATION OF CITY PLAN

CHAPTER 4

PROGRAMMING AND EVALUATION OF CITY PLAN

4.1 Programming of Working Plan

4.1.1 Standard Assignment of Sectoral Works

For making a city plan, substantial manpower and time are required with a working schedule in accordance with the planning procedure.

These requirements vary depending on such factors as:

1) size of the planning area,
2) planning methodology,
3) availability of accumulated data, or
4) progress of computerization.

A standard volume of sectoral works should be established for effective and high-quality planning according to the above-mentioned factors.

(Explanations)

According to the present DTCP system, standard sectoral work volume by size of planning is as shown below:

Sectoral Work	Size of Planning Area			Remarks
	Small Man.day	Medium Man.day	Large Man.day	
1. Mapping	1,350	1,775	1,880	
2. Data Collection	720	1,160	2,040	including specially recruited persons for field survey
3. Socio-Economic Analysis	450	450	450	
4. Land Use Planning	504	632	832	
5. Transport Planning	1,185	1,400	1,575	including data collection
6. Urban Facility Planning	495	630	765	
Total	4,704	6,047	7,542	

To improve the quality of the planning, some sectoral works may require more man days, for example, mapping which requires careful procedures to obtain accurate and detailed informations, and land use planning whose contents and depth of study vary according to the size of planning area.

By introducing a computer system, some sectoral works, for example, socio-economic analysis can reduce the time spent on basic data compilation and allocate more time to carrying out a deeper analysis.

4.1.2 Programming of Working Plan

> A planning body should prepare a plan making programme considering its budget, human resources, planning procedure, priority of the planning area and other required factors.

(Explanations)

Present DTCP system is as follows:

Categorization of DTCP Planning

Planning in DTCP has been categorized into 3 types:

1. 5-Year Plan for long-term planning.
2. Annual Plan for short-term planning.
3. Periodic Plan for action planning.

Criterial for the Formulation of DTCP Planning

In the formulation of DTCP Plans, several factors have to be brought up for mutual discussion and deliberation so as to determine compatibility of the plan with a real situation and its feasibility.

Various factors needed for the plan formulation are:

- Government Policy
- National Economic and Social Development Plan
- Ministry of Interior's Policy
- Ministry of Interior's Plan
- DTCP's Policy
- Nature and Type of City Plan to be Prepared
- Budget Allocation
- Man Power
- Priorities of Planning Areas
- Local Needs and Agencies Concerned
- Etc.

The method of formulation of DTCP's Plan has to be taken up and carried out in the following manners and steps:

1. 5-Year Plan is to be prepared for long-term situation in accordance with the National Economic and Social Development Plan and in compatibility with the Master Plan of the Ministry of Interior, whreby consideration has to be given to factors involved as earlier touched upon.

2. Annual Plan is to be prepared for short-term situation based on the 5-Year Plan broken up into annual operations in harmony with the Action Plan of the Ministry of Interior in conjunction with a realistic consideration of factors involved.

3. Periodic Plan is to be prepared as DTCP's Action Plan for actual operation by following the Annual Plan directives and giving consideration to factors involved as mentioned earlier.

4.2 Preparation of Development Investment Programme

4.2.1 Meaning of Development Investment Programme

> A development investment programme is a package of interrelated projects within a definite area of action and oriented towards a common objective.
>
> Projects are the specific activities within a programme with specific objectives to meet.
>
> These programmes and projects are to be arranged based on the short-term and long-term needs and investments possibilities.

(Explanations)

Any city plan is incomplete and ineffective if it lacks a scheme for implementation.

One of the most important tools for implementing a city plan is the development investment programme (DIP).

The DIP is prepared following the steps shown below:

a. Formulation of development policies on the DIP.
b. Determination of the amount that may be spent for the DIP.
c. Adoption of definite financial policy, considering the implementing agencies for the included projects.
d. Fitting of the DIP to the investment programmes of each implementing agency and the anticipated revenue of the local government.
e. Adoption and execution of capital budget.

The DIP is prepared for 20 years with a more specific year-by-year schedule for the first 5 years.

The criteria for prioritizing projects are as follows:

a. The project should satisfy immediate needs of a larger portion of the inhabitants of the planning area.

b. The project should be within the financial capability of the related implementing agencies.

4.2.2 Presentation of Development Investment Programme

The development investment programme is prepared for 20 years with a more specific year-by-year schedule for the first 5 years.

The presentation of DIP includes:

1) programme title,
2) description,
3) estimated cost,
4) funding source,
5) schedule of implementation,
6) implementation agency, and
7) other specific matters.

(Explanations)

The important thing is to estimate the investment costs and to find funding sources. The planner or a specific working group coordinates with various related authorities for formulating an investment programme.

As for the next five years, a year-by-year investment schedule as precisely as possible studying the probable government budget and obtainable finance resources.

The format of presentation, for example, is as shown below:

Programme/Project Title	Description	Estimated Cost	Funding Source	Schedule of Implementation	Implementing Agency	Remarks
Programme A						
project A-1						
A-2						
A-3						
Progamme B						
project B-1						
B-2						
B-3						

(in million baht)

	1988	1989	1990	1991	1992	1993-1997	1998-2002	2003-2007	Total Amount
Programme A									
project A-1									
A-2									
A-3									
Progamme B									
project B-1									
B-2									
B-3									
Total									

4.3 Evaluation of City Plan

4.3.1 Evaluation of Comprehensive Plan

A comprehensive plan should be evaluated periodically and, if necessary, should be revised in accordance with the actual situations and changing tendencies.

Evaluation of a comprehensive plan is made for each aspect of land use, transport and other urban facility plans.

(Explanations)

The evaluation of comprehensive plan is regarded as a necessary process in preparing for the revision of the plan which will strengthen the plan effectiveness.

The process in evaluation of the comprehensive plan is divided into 2 phases: 1) to investigate the progress of the plan implementation by the local administration, in order to give the recommendation, comment and alternative, after the plan's first year enactment; and 2) to evaluate the plan's accomplishment after three(3) years of the enactment in preparation for the plan revival after five(5) years.

Examples of evaluation items for sectoral plans are as follows:

a. Land use plan

- Boundary of urbanized area
  to evaluate the trend and direction of urban growth

- Land use mixture
  to examine and evaluate the characteristics of the various types of land use pertaining to the plan area and to observe their changes.

- Land use intensity
  to examine and evaluate the changing trend of land use intensity compared to the designated intensity for various land use categories in the comprehensive plan.

b. Transport plan

- Traffic congestion
  to evaluate the transportation network system planned in the comprehensive plan, by examining its effects on the alleviation of traffic congestion.

- Traffic accident
  to evaluate the plan by examining the decrease in traffic accidents.

c. Urban facility plan

- Demand/supply comparison
  to evaluate the plan by examining to what extent the needs for urban facilities planned by sectoral agencies has been met.

- Urbanization trend and facility supply
  to check the urbanization trend and implementing direction of urban facilities, in order to get the effective and appropriate supply of urban facilities.

4.3.2 Evaluation of Projects

Evaluation of a project is divided into 3 phases:
1) feasibility study of the project before preparing the DIP,
2) accomplishment of the project during the construction period,
3) the results in resolving problems after the project has been completed.

The feasibility study is made from two aspects:
1) economic feasibility and/or
2) financial feasibility

The accomplishment of the project is measured by the ratio of the invested amount to the scheduled investment up until the present time and by the ratio of the completed physical quantity to the scheduled quantity up until the present time.

The problem-solving effects are measured by the extent to which previously identified problems have been solved by the project.

(Explanations)

The feasibility study depends on the characteristics of the project. An economic analysis is made for such projects as a necessary public facility for which the benefit can be estimated in terms of its economic value. A few types of project, for example road projects, can be evaluated by established methods. However, economic analysis is difficult for many projects, because methods of estimating their benefits in terms of economic value are not yet established. A financial analysis is made for such projects and is expected in principle to cover its investment cost by its own revenue. This analysis aims to determine the financial feasibility of the project itself.

Economic evaluation is made by calculating evaluation indicators like 1) B/C ratio, 2) Net present value, and 3) Economic internal rate of return.

Financial evaluation is made by preparing three types of financial statements of the implementing body like 1) Profit/loss statement, 2) Cash flow statement, and 3) Balance sheet. Discount cash flow analysis similar to the one used for economic analysis is also used for financial analysis.

The evaluation of accomplishment is made by comparing the executed results with the investment schedule. The accomplishment rate is expressed in percentage. The accomplishment rate based on the amount of money is more easily calculated than the one based on physical quantity, but the former has a weak point that the influence of inflation tends to create an over-evaluation compared to the real physical attainment.

The problem solving effects are, for example, the reductions in traffic congestion, traffic accidents or environmental indicators for a road project.

APPENDIX:

STANDARDIZATION AND SYSTEMATIZATION OF CITY PLANNING BASIC SURVEY IN THAILAND

APPENDIX:

STANDARDIZATION AND SYSTEMATIZATION OF CITY PLANNING BASIC SURVEY IN THAILAND

1. Purposes

The city planning basic survey is aimed to grasp firmly the present conditions of city planning area by collecting and compiling as many data as possible relating to the existing status and urbanization trend of the city, in order to carry out properly the preparation of the city plan and its implementation. The survey results are also used as the basic data for the future projection of urbanization, for the proper administrative guidance and for the enforcement and revision of the city plan.

For the standardization of city planning and the development of city planning data base, it is required to establish standard survey items and compilation formats, although some variations are permitted according to the size and characteristics of the city.

Here is demonstrated a draft list of standard survey items that DTCP uses as the internal specifications of the survey or as the specifications of a ministerial order when in future the local government carries out the survey.

2. Survey Items

The survey items are classified into two categories; one is a group of survey items which should be examined in every planning area (A Survey) and the other is of optional items (B Survey). The reason is that the required survey items vary with the size and characteristics of the city. The B Survey is desirably carried out for a regional center city with a population of about 200,000 persons and over.

LIST OF CITY PLANNING BASIC SURVEY ITEMS

A Survey	B Survey
1. Population 1) Population Size (1) Total Population and Increase (2) Natural Increase and Migration 2) Population Distribution (1) Population by Zone (2) Population Density by Zone 3) Population Composition (1) Population by Sex and Age Group (2) Population by Labor Force Status (3) Employed Population by Industry (4) Employed Population by Occupation	2) Population Distribution (1) Employed Population by Sector by Living Zone (2) Employed Population by Sector by Working Zone (3) Students and Pupils by Level by Living Zone (4) Students and Pupils by Level by Schooling Zone
2. Economic Activity 1) Number of Establishment and Persons Engaged by Industry (1) No. of Establishment and Persons Engaged by Industrial Type (2) No. of Establishment and Persons Engaged by Commercial Type (3) No. of Public Facilities and Persons Engaged by Type 2) Activity Distribution (1) No. of Establishment and Persons Engaged by Sector, by Zone 3) Tourism Resources (1) Resource Distribution (2) Accommodation Facilities and Use	2) Activity Distribution (1) No. of Establishment and Persons Engaged by Type, by Zone (2) Street Vendor 3) Tourism Resources (1) Accommodation Facilities by Zone
3. Household and Dwelling Unit 1) Number of Household (1) Number of Household by Type (2) Number of Household by Household Member 2) Household Distribution (1) Number of Household by Zone	1) Number of Household (1) Number of Household by Income Group 2) Household Distribution (1) Number of Household by Income Group by Zone 3) Dwelling Unit (1) Number of Household by Type of Building (2) Number of Household by Tenure of Dwelling (3) Number of Household by Income Group, by Tenure of Dwelling
4. Land Use and Land Conditions 1) Topographical Conditions (1) Topography and Water System 2) Land Use (1) Actual Land Use Map (2) Area by Use by Zone (3) Expansion of Urbanized Area (4) Agricultural Land and Forest (5) Governmental Land 3) Disaster and Public Nuisance (1) Flood Area Distribution (2) Fired Area Distribution 4) Urban Development (1) Urban Development 5) Regulation Application (1) Regulation Application (2) Achievement of Projects authorized by legal system	2) Land Use (1) Vacant Lot 3) Disaster and Public Nuisance (1) Public Nuisance
5. Land Price	5. Land Price 1) Land Price Distribution

A Survey	B Survey
6. Building 1) Actual Building Use (1) Actual Building Use Map 2) Building Construction (1) Number of Building Construction by Use (2) Building Construction Distribution Map	1) Actual Building Use (1) Number of Buildings by Use by Zone 2) Building Construction (1) Number of Building Construction by Use by Zone, with Building Area 3) Building Conditions (1) Building Coverage by Zone (2) Floor Area Ratio by Zone (3) Number of Building by Structure Type
7. Urban Facility 1) Location of Urban Facilities (1) Transportation Network Map (2) Urban Utility Map (3) Public Service Facility Map 2) Utilization of Urban Facilities (1) Number of Students and Pupils by School (2) Number of Beds and Occupation Rate by Hospital	1) Location of Urban Facilities (1) Achievement of Planned Road (2) Achievement of Other Planned Urban Facilities
8. Traffic Volume 1) Traffic Volume on Main Roads 2) Vehicle Ownership	8. Traffic Volume 1) OD Table
9. History of the City and Landscape 1) History of the City (1) Summary of City Formation (2) Chronological Table of City Planning and Urban Development 2) Distribution of Landscape Points and Cultural Properties (1) Distribution Map of Landscape Points (2) Distribution Map of Cultural Properties	

A SURVEY

Survey Item			Table/Map	Area of Survey	Unit of Compilation/ Installation	Survey Interval	Data Source
1. Population	1) Population Size	(1) Total Population and Increase	Table	Aggregate of Administrative Units including Planning Area (hereinafter referred to as A.A.U.)	Administrative Unit	Annually	Population Registration
		(2) Natural Increase and Migration	Table	A.A.U.	Administrative Unit	Annually	Population Registration
	2) Population Distribution	(1) Population by Zone	Table	Planning Area	Zone	5 years (every revision year)	Field Survey
		(2) Population Density by Zone	Table and Map	Planning Area	Zone	5 years	Field Survey
	3) Population Composition	(1) Population by Sex and Age-Group	Table	Planning Area	Planning Area	5 years	Field Survey
		(2) Population by Labor Force Status	Table	Planning Area	Planning Area	5 years	Field Survey
		(3) Employed Population by Industry	Table	Planning Area	Planning Area	5 years	Field Survey
		(4) Employed Population by Occupation	Table	Planning Area	Planning Area	5 years	Field Survey
2. Economic and Social Activity	1) Number of Establishment and Persons Engaged by Activity	(1) No. of Establishment and Persons Engaged by Industrial Type	Table	Planning Area	Planning Area	5 years	Field Survey
		(2) No. of Establishment and Persons Engaged by Commercial Type	Table	Planning Area	Planning Area	5 years	Field Survey
		(3) No. of Social Service Establishment and Persons Engaged by Type	Table	Planning Area	Planning Area	5 years	Field Survey
	2) Activity Distribution	(1) No. of Establishment and Persons Engaged by Sector, by Zone	Table	Planning Area	Zone	5 years	Field Survey

Survey Item			Table/Map	Area of Survey	Unit of Compilation/ Installation	Survey Interval	Data Source
	3) Tourism Resources	(1) Resource Distribution	Table and Map	Planning Area	Location, Type of Resource	5 years	Field Survey, TAT Data
		(2) Accommodation Facilities and Use	Table	Planning Area	Planning Area	5 years	Field Survey, TAT Data
3. Household and Dwelling Unit	1) Number of Household	(1) No. of Household by Type	Table	Planning Area	Planning Area	5 years	Field Survey
		(2) No. of Household by Household Member	Table	Planning Area	Planning Area	5 years	Field Survey
	2) Household Distribution	(1) No. of Household by Zone	Table	Planning Area	Zone	5 years	Field Survey
4. Land Use and Land Conditions	1) Topographical Conditions	(1) Topography and Water System	Map	Planning Area	Topographical Classification and Basin		
	2) Land Use	(1) Actual Land Use Map	Map	Planning Area	Land Use Category	5 years	Field Survey
		(2) Area by Use by Zone	Table	Planning Area	Zone	5 years	Field Survey
		(3) Expansion of Urbanized Area	Map and Table	Planning Area	Urbanized Area	5 years	Field Survey
		(4) Agricultural Land and Forest	Map and Table	Planning Area	Classification of Agricultural Land and Forest	5 years	Field Survey, Local Data
		(5) Governmental Land	Map and Table	Planning Area	Location	5 years	Field Survey, Data of Each Level of Government

A SURVEY

Survey Item			Table/Map	Area of Survey	Unit of Compilation/ Installation	Survey Interval	Data Source
	3) Disaster and Public Nuisance	(1) Flood Area Distribution	Map	Planning Area	Location	5 years	Field Survey, Local Data
		(2) Fired Area Distribution	Table and Map	Urbanized Area	Location	5 years	Field Survey, Local Data
	4) Urban Development	(1) Urban Development	Table and Map	Planning Area	Location	5 years	Field Survey, Local Data
	5) Regulation Application	(1) Regulation Application	Table and Map	Planning Area	Use Zone and Other Regulation Category	5 years	Governmental Data
		(2) Achievement of Projects Authorized by Legal System	Table and Map	Planning Area	Project	5 years	Governmental Data
6. Building (5. Land Price is included only in B Survey)	1) Actual Building Use	(1) Actual Building Use Map	Map	Planning Area	Building Use Category	5 years	Field Survey
	2) Building Construction	(1) No. of Building Construction by Use	Table	Planning Area	Zone	5 years	Building Permission Data
		(2) Building Construction Distribution Map	Map	Planning Area	Location	5 years	Building Permission Data
7. Urban Facility	1) Location of Urban Facilities	(1) Transportation Network Map	Map	Planning Area	Category of Road and Other Transport Facilities	5 years	Governmental Data
		(2) Urban Utility Map	Map	Planning Area	Category of Urban Utility	5 years	Data of Responsible Bodies
		(3) Public Service Facility Map	Map	Planning Area	Category of Facility Location	5 years	Data of Responsible Bodies

A SURVEY

Survey Item			Table/Map	Area of Survey	Unit of Compilation/ Installation	Survey Interval	Data Source
	2) Utilization of Urban Facilities	(1) Number of Students and Pupils by School	Table	Planning Area	Zone	5 years	Data of School
		(2) Number of Beds and Occupation Rate by Hospital	Table	Planning Area	Planning Area	5 years	Data of Hospital
8. Traffic Volume	1) Traffic Volume on Main Roads	(1) Traffic Volume on Main Roads	Table and Map	Planning Area	Main Road	5 years	Field Survey
	2) Vehicle Ownership	(1) Vehicle Ownership	Table	A.A.U.	Administrative Unit	Annually	Vehicle Registration
9. History of the City and Landscape	1) History of the City	(1) Summary of City Formation	Table and Map	A.A.U.	Administrative Unit		History of the City
		(2) Chronological Table of City Planning and Urban Development	Table	A.A.U.	Administrative Unit		Governmental Data
	2) Distribution of Landscape Points and Cultural Properties	(1) Distribution Map of Landscape Points	Map	Planning Area	Location		Field Survey
		(2) Distribution Map of Cultural Properties	Map	Planning Area	Location		Governmental Data

B SURVEY

Survey Item			Table/Map	Area of Survey	Unit of Compilation/ Installation	Survey Interval	Data Source
1. Population	2) Population Distribution	(1) Employed Population by Sector by Living Zone	Table	Planning Area	Zone	5 years	Field Survey
		(2) Employed Population by Sector by Working Zone	Table	Planning Area	Zone	5 years	Field Survey
		(3) Students and Pupils by Level by Living Zone	Table	Planning Area	Zone	5 years	Field Survey
		(4) Students and Pupils by Level by Schooling Zone	Table	Planning Area	Zone	5 years	Field Survey
2. Economic and Social Activity	2) Activity Distribution	(1) No. of Establishment and Persons Engaged by Type by Zone	Table	Planning Area	Zone	5 years	Field Survey
		(2) Street Vendor	Table	Urbanized Area	Location	5 years	Field Survey
	3) Tourism Resources	(1) Accommodation Facilities by Zone	Table	Planning Area	Zone	5 years	Field Survey, TAT Data
3. Household and Dwelling Unit	1) Number of Household	(1) No. of Household by Income Group	Table	Planning Area	Planning Area	5 years	Field Survey
	2) Household Distribution	(1) No. of Household by Income Group by Zone	Table	Planning Area	Zone	5 years	Field Survey
	3) Dwelling Unit	(1) No. of Household by Type of Building	Table	Planning Area	Planning Area	5 years	Field Survey
		(2) No. of Household by Tenure of Dwelling	Table	Planning Area	Planning Area	5 years	Field Survey
		(3) No. of Household by Income Group by Tenure of Dwelling	Table	Planning Area	Planning Area	5 years	Field Survey

B SURVEY

Survey Item			Table/Map	Area of Survey	Unit of Compilation/ Installation	Survey Interval	Data Source
4. Land Use and Land Conditions	2) Land Use	(1) Vacant Lot	Map and Table	Urbanized Area	Location	5 years	Field Survey
	3) Disaster and Public Nuisance	(1) Public Nuisance	Table and Map	Planning Area	Location, Category	5 years	Field Survey
5. Land Price	1) Land Price Distribution	(1) Land Price Distribution	Table and Map	Planning Area	Survey Point	5 years	Governmental Data, Sales Examples
6. Building	1) Actual Building Use	(1) No. of Building Use by Zone	Table	Planning Area	Zone	5 years	Field Survey
	2) Building Construction	(1) No. of Building Construction by Use by Zone, with Building Area	Table	Planning Area	Zone	5 years	Building Permission Data
	3) Building Conditions	(1) Building Coverage by Zone	Table	Urbanized Area	Zone	5 years	Field Survey
		(2) Floor Area Ratio by Zone	Table	Urbanized Area	Zone	5 years	Field Survey
		(3) No. of Building by Structure Type	Table	Urbanized Area	Urbanized Area	5 years	Field Survey
7. Urban Facility	1) Location of Urban Facilities	(1) Achievement of Other Planned Road	Map and Table	Planning Area	Project	5 years	Governmental Data
		(2) Achievement of Other Planned Urban Facilities	Map and Table	Planning Area	Project	5 years	Governmental Data
8. Traffic Volume	3) O-D Table	(1) O-D Table	Table	Planning Area	Zone	5 years	Field Survey

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