

6. L/R Master Plan Study

6.1 Planning Issues and Conditions

The main task in the L/R master plan study is to make project formation of the L/R. The planning criteria for the appropriate L/R project formation is *"the higher level of infrastructure improvement and at the same time the lower contribution rate"*, and in short how to attain the balance between the two conflicting factors. From this point of view the following planning issues are raised in light of the analytical outcome of the study for the concept/master plan of the planning area (300 ha), including the project area.

(1) Return of the Development Profits

The contribution rate for the private lands is likely to be higher due to the following conditions of the project area.

- 1) The lands for public uses such as expressways and mass transit systems, occupies a considerably large portion of the project area. In turn, private lands become relatively small, thus raising the contribution ratio for the private lands.
- 2) There is scarcely any existing public lands except for a small amount of public land used for Rama IX Road and Khlongs. Thus, public works have to start from modest circumstances.

Even under these conditions, contribution rates were purposefully set around 30% for moderation, which worked as a control indicator for the L/R planning and designing in the course of the master plan study of the planning area. This takes into consideration the social acceptance of the Thai people including the landowners over the first L/R project where higher contributions would be difficult to obtain.

The analytical result of the master plan study where the L/R design and calculation of the contribution rate were conducted over the planning area, reveals that the calculated contribution rate of 4% for the reserved land is only equivalent to 17.7% of the maximum allowable reserve land.

This implies that the development profit measured in the area of maximum allowable reserve land is not fully returned to the project with the profit value of the remaining 82.3% of the reserve land being distributed to the hands of landowners.

If the L/R project strictly follows the principle and rule of full return of development profit or in other words, neither decreases nor increases of total private land value before and after the project implementation, all the maximum allowable reserve land should be disposed for more infrastructure development. This will result in higher standards of infrastructure improvement as well as a higher contribution ratio for the private lands (in this case with the maximum allowable reserve land being fully disposed for the project, the combined contribution ratio will jump to 40 - 50% from about 30%).

The following two (2) subjects for examination are drawn from the findings of the master plan in the previous study.

- 1) According to the L/R rule of "*return of development profit*", the higher standard of public facility improvement or the higher contribution ratio than those planned in the master plan for the planning area, seems to be allowable.
- 2) It is also true that the higher the contribution ratio, the more difficult social acceptance to gain or obtain an L/R project implementation.

In relation to these study subjects, economic and social analysis of the L/R project proposed were carried out. In the former analysis, shares of development profits between the landowners and public (government) were examined to reach the conclusion of proper return of development profits, and in the latter, social acceptance was investigated based on the result of the opinion poll survey addressed to the landowners in the project area.

(2) L/R Design and Contribution Ratio

Basic ideas underlying the L/R design made in the master plan study over the planning area are summarized in the following two (2) items:

- 1) Emphasis was placed on CBD development as a whole in the planning area of 300 ha where more resources including land resources are allotted to the arterial roads essential to the CBD construction distributors serving each parcel of land.
- 2) With a view to constructing a modern CBD, a super block system is applied so as to create large urban spaces where large scale buildings can be developed.

The design devices as stated before are to contribute to a lessening of the contribution ratio to around 30%. (If the super block system is not applied with more distributors and access roads serving each small lots added, the contribution rate would be to somewhere more than 40%).

Given the limit of the contribution rate, if any, the L/R project where mainly the arterial roads are constructed can be implemented in the course of the progressive development of an L/R system application (it is reported that mainly the arterial roads with super block system were developed in the early stage of the Korean L/R project development history. And the two staged development of arterial roads and access roads is studied in the NESDB L/R project study.)

However problems inherent in the super block system for the L/R project are raised as follows:

- 1) Special measures and devices such as collective replotting and joint replotting shall be needed for replotting of small and medium sized parcels of lands.
- 2) When small and medium sized parcels of lands are to be replotted in the super block, the following special measures could be necessary to give direct access roads to the parcels.

- a. Another L/R project within the super block
- b. Designation of no building zone and lines for access road
- c. Others

Although in the L/R design for the project area, principally the super block system shall be applied, aiming at construction of a modern CBD, adjustment must be made in the blocking system and road network, taking into consideration such factors as landownership, contribution rate, arterial road alignment, space architecture, et cetera.

It is also considered that since this first L/R project is expected to be a model which shall be replicated for all of Thailand, a standardized replotting method rather than the special devices stated above is recommendable in the project area.

(3) Appropriate Cost Sharing between Public (Government) and Private (Landowners)

Because the New CBD developed through the L/R project is of great use for the socio-economic development of Bangkok, and city planning and formation of high quality/valuable national property, it should be admitted that the L/R project is beneficial not only to the landowners participating, but also the society of Bangkok and the Thai nation. This is a key point which distinguishes the L/R project from the subdivision project.

More specifically, the New CBD arterial road proposed in the planning area will be effective in mitigating traffic congestion on the existing BMA arterial road around the project area. In this manner, the roads constructed in the project area are useful not only to the landowners, but also the public.

From this point of view it is claimed that an appropriate cost sharing system between the public (government) and the private (the landowner) must be established. (If all the cost of the L/R project is put on the landowners in terms of land contribution, it may be socially unfair in city planning and development).

This is a rationale for having a government subsidizing or sharing system properly proposed in the L/R system.

As presented in the master plan, a higher level of infrastructure will be required to create an excellent CBD. However, putting all of the cost for the development on landowners will cause landowners to oppose the L/R implementation.

6.2 L/R Design

6.2.1 Design Policy

The L/R design is defined as a design of "land with services" or "design of services" (public utilities), in an integrated manner to create lands for human activities through an L/R design. The functional systems proposed in the concept plan are to be organized into facilities and equipment which will be constructed in the L/R project.

(1) Base Line with Flexibility

It is not uncommon that an L/R design is based on the design conditions and project implementation conditions which have been officially or unofficially determined through the administrative and social coordinating processes involving government agencies in charge of city planning, public utilities, etc., and the landowners and other concerned parties to the project.

1) Administrative Coordinating Process

Before starting an L/R design agreement or determination must be made regarding such items as a) concept plan, land use plan; b) project implementation system (ex. government or landowners association implementation, or the other); c) government subsidy system; and d) implementation condition of infrastructure.

These conditions are likely to be decided in advance coordination/negotiation with concerned authorities during the gestation period of the L/R project.

2) Social Coordinating Process

An L/R project's government plan/design cannot be forced on landowners. Also, landowners cannot behave solely for their own self interests. These conflicting positions must be settled through the social coordinating process to facilitate an effective agreement on which an L/R design is elaborated.

It may be said that an L/R design cannot proceed without such a coordinating process as stated above for the actual project implementation. In countries like Japan, where a considerable number of L/R projects have already been implemented, past experiences of project implementation indicate the results of the coordinating process are more or less predictable so that they can be taken into advance consideration in the designing of an L/R.

In such countries as stated above, an L/R design and its conditions have already been standardized to some extent. This also helped to increase the reliability of the L/R design for project implementation.

In this study, an L/R design must be conducted without definite social/administrative conditions and design standards as stated above. The basic policies of the L/R design to be executed in this situation are set as follow:

1) Experimental Study of an L/R Design

Through an experimental study, systems, specifications, standards for an L/R design in Thailand shall be examined.

2) **Basic Line and Flexibility of L/R Design**

An L/R can be flexible in response to the circumferential conditions of project implementation. In the same manner, an L/R design must be conceptualized as flexible.

First, the base line of the L/R design must be established. This is deemed to be an essential part of the L/R design which should remain as a constant during any change of circumstances.

In the direction of the base line, the L/R should be flexibly designed so as to be responsive to the social/administrative coordinating process stated before.

3) **Rationalized Design with Appropriate Design Standards**

In Thailand there has not been established planning and design standards/criteria for urban facility improvement except for those in a subdivision control system.

It is apparent that the level of infrastructure to be improved in the planning area is set much higher than that in the existing built-up area, (where the landowners normally develop/use their lands without serious concerns for infrastructure services except for traffic congestion).

Under these circumstances it seems difficult to get consent for higher levels of infrastructure improvement in the project area of the landowners who are accustomed to existing levels and are requested to pay higher costs for improvements.

Even if higher standards of urban facility improvement generally in the Bangkok Metropolitan Area are set, there has not been any financial basis for the government to implement the standards.

In the situation stated above, it may be feared that an L/R project with much higher standard of urban facility improvement would impede the general application of the L/R in Thailand. In accordance with the progressive development of the L/R system in Thailand, an L/R design and its standards also must be progressively improved.

(2) **Coordination and Consistency in L/R Design**

Special attention must be paid to the coordination and consistency between the factors as follows:

- 1) Between the development/land use plan and infrastructure designing
- 2) Among the components of infrastructure
- 3) Between on-site and off-site infrastructure

6.2.2 L/R Design

(1) Lot/Block Design

The lot/block design is to determine the appropriate size, shape and location of lots and block encompassed by roads, in consideration of land use, space design, image of urban environment, building development, replotting, road network. This is also related to the amount of public lands planned and contribution ratio which is one of the determinant of project feasibility.

1) Basic Unit

Land Use

Size and shape of blocks must be designed to be efficient enough to accommodate densely concentrated urban activities - commercial/business activities. It is also advisable to take up a super block system so as to create urban space complex undivided into each lot or small blocks by roads.

2) Image of Urban Environment and Land Space

A positive image of the urban environment of the CBD is an important factor which influences property values. Design and alignment of blocks must be carefully made in consideration of appropriate and aesthetic landscape of the CBD.

3) Building Development

Highrise building is one measure to provide efficient/effective use of urban space in the CBD, and to create open space in the lot and blocks.

It is reported that the floor areas of so-called large scale buildings constructed recently in Bangkok range from 20,000 - 30,000 m².

To accommodate those large scale buildings, the size of lots for buildings should be as large as 2,500 - 3,750 m² with the ratio of floor area to lot area being 800%. Accordingly blocks should accommodate the lots with the size of 50 m x (50 - 80 m).

4) The existing landownership (replotting)

The size of the existing landownership in the project area is summarized as follows:

Table 3.4.6-Lot Size

	Lot Area
Unsubdivided lot	10,000 - 20,000 m ²
Subdivided lot	1,500 - 2,000 m ²

Lots with the size of about 70% of the lot area listed above due to the contribution shall be replotted.

5) Basic Unit

Three (3) different basic units are prepared for block design. This is shown in **Figure 3.4.21**.

- a. Minimum unit of 50 m x 75 m for a large scale building (undivided lots)
- b. Minimum unit of 40 m x 50 m for subdivided lot
- c. Minimum unit of zone x 40 m for subdivided lot

(2) Road Design

1) Road Alignment

Alignment and design of roads proposed in this road network system in the concept plan are elaborated on the topographic map in the scale of 1/1000.

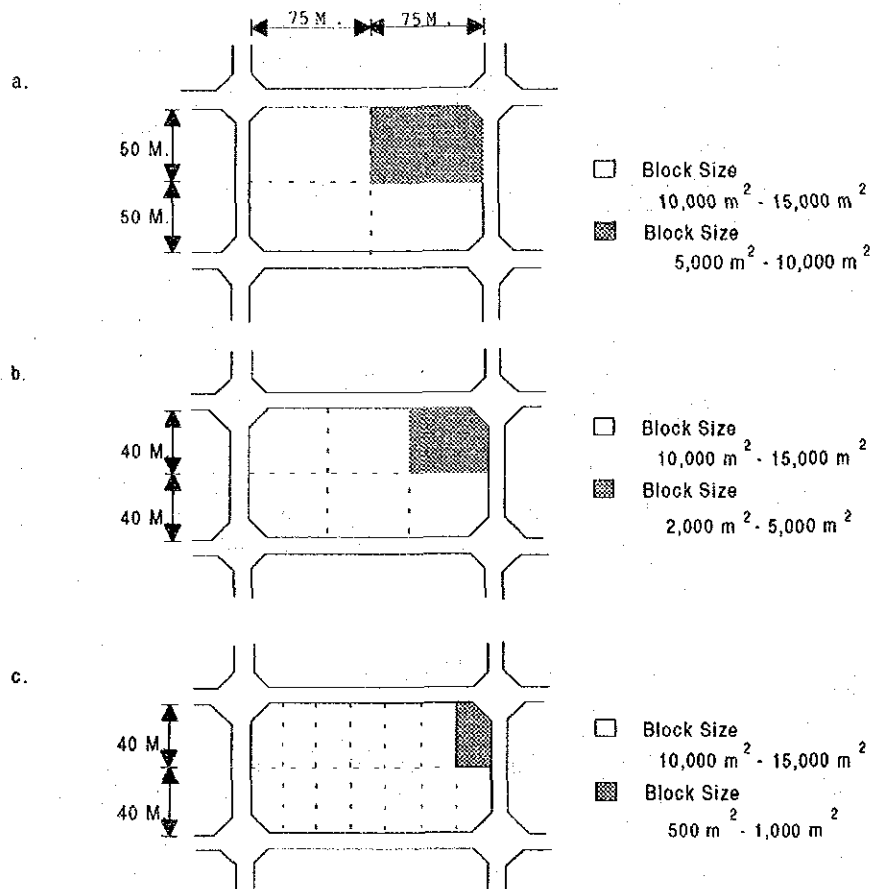
Attention was paid to the following design points.

- a. Road alignment that considers efficient utilization and appropriate shape of block.
- b. Road alignment to avert the existing buildings and physical obstacles.
- c. Special attention to the cross point with Royal City Avenue and connection to Rama IX and Thanon New Phetchaburi.

Table 3.4.7-Road Hierarchy

Road Hierarchy	Width
1. CBD Arterial Road	30 m
2. District Road	20 m
3. Major Distribution Road	16 m/18 m
4. Minor Distribution Road	12 m
5. Access Road	10 m

Figure 3.4.21-Basic Unit



2) Width and Section of Road

The roads with the following width are designed in accordance with the hierarchy of roads set in the concept plan. Sections are shown in **Figure 3.4.22**. Such section is designed in accordance with the DTCP standard.

The CBD arterial road in the office district shall be developed as a symbol road with a promenade for pedestrians. Main distribution roads of 18 m width are placed under the sky train route along Royal City Avenue by providing a 2 m wide center belt for the Skytrain pear. A setback of 3 m in the CBD arterial road and 2.5 m for other roads is proposed.

3) Road Design

The road design plan is shown in **Figure 3.4.23**. The standard for the road intersection and detailed plan of some road intersections are shown in **Figure 3.4.24** and **Figure 3.4.25**.

The existing 20 m wide road located in Zone 3 which has been made in a subdivision by a private real estate company is utilized as it is as a district road.

A road connecting Royal City Avenue to Thanon New Phetchaburi passing under a railway is expected to be built by Royal City Avenue. Consequently, it will become a part of a major distribution road in Zone 3.

In Zone 2, two access roads are connected to Royal City Avenue at the entrance of an underground parking building. It is also utilized as a pedestrian way for connecting Zone 2 and Zone 3.

The roads and bridges designed in the L/R project area are summarized in **Table 3.4.8.**

Table 3.4.8-Summary of Road Plan

Name of Road	Width (m)	Length (m)	Bridge (unit)
CBD Arterial Road	30	780	0
District Road	20	1821	3
Major Distribution Road	18	436	0
Major Distribution Road	16	1555	0
Minor Distribution Road	12	3398	3
Access Road	10	4333	1
Total		12,323	7

Note: The above road length includes the length of bridge

(3) Park and Green Design

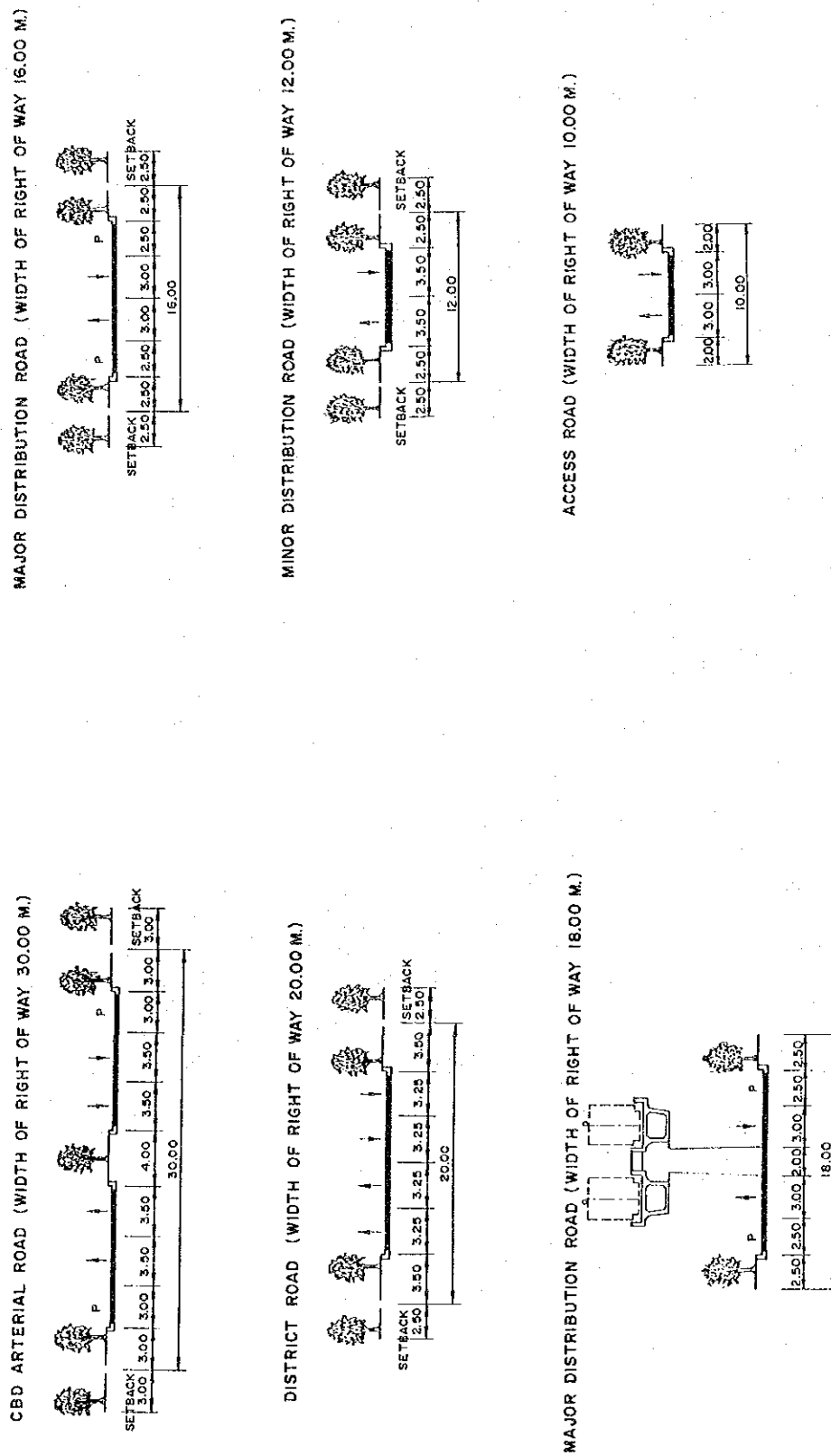
The summary of design of park and green system proposed in the concept plan is given in **Table 3.4.9.**

Table 3.4.9-Park and Green

Park	Area (m ²)	Standards of Facilities
1. Pedestrian Park	11,458 (total)	plaza, gate, cascade, planting, playground, parking, utilities, lighting
2. CBD Park	15,431	plaza, stage, walkway, playground, lighting, planting, parking, utilities
3. Khlong Green Park	26,501	walkway, planting, lighting, utilities

The basic lay out of the parks as designed above are shown as **Figure 3.4.26 - 3.4.28.**

Figure 3.4.22-Standard Section of Roads



STANDARD SECTION OF ROADS

Figure 3.4.23-Road Plan

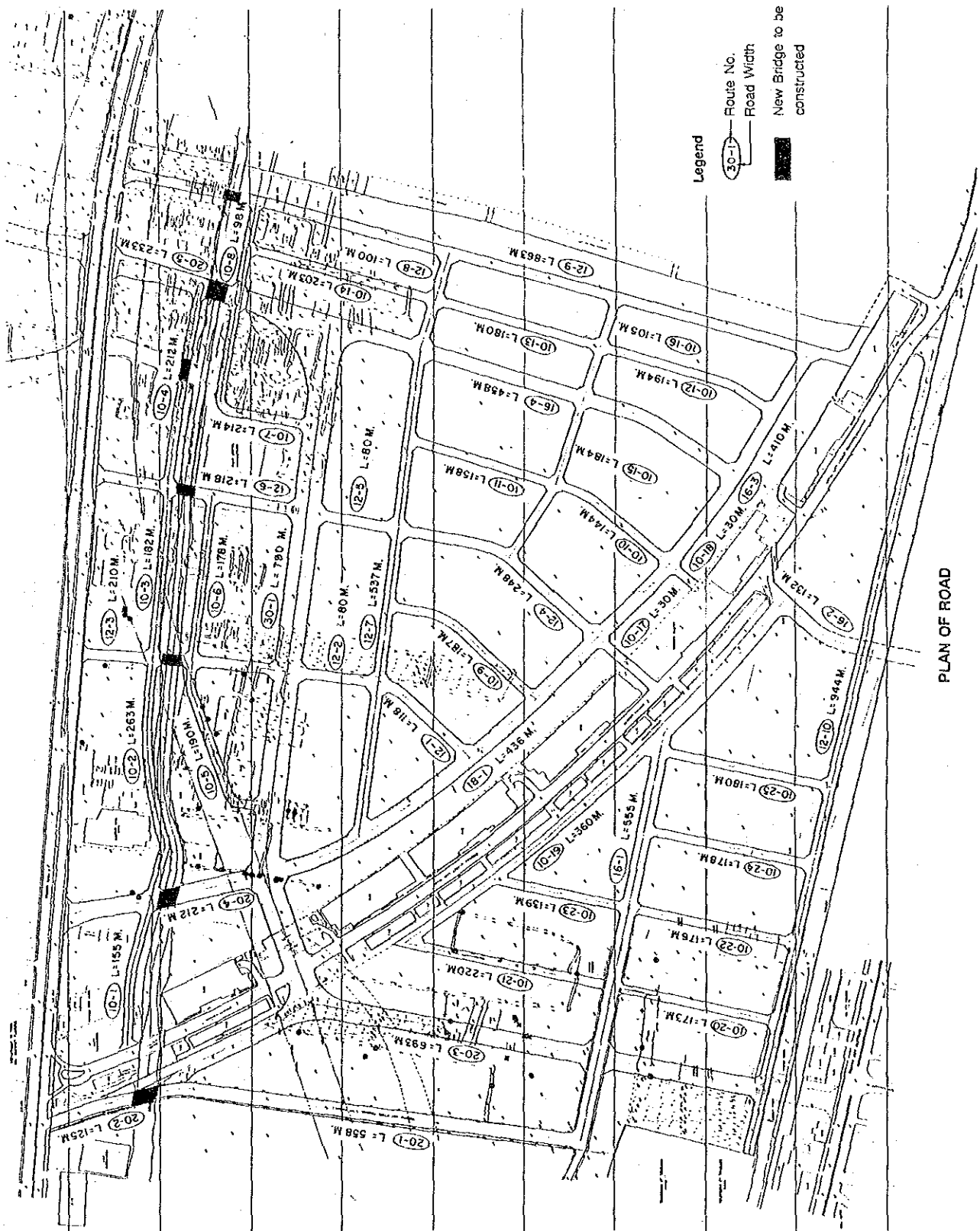
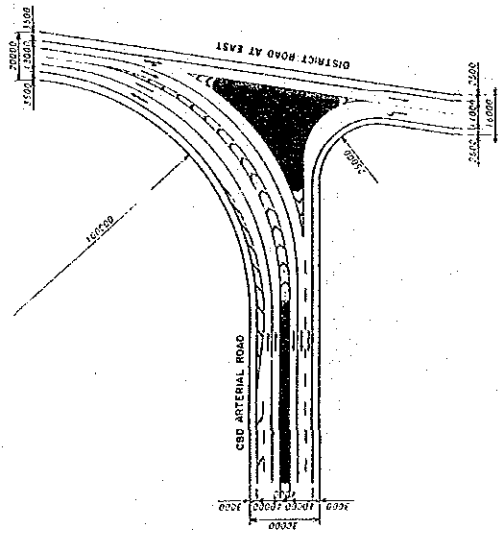
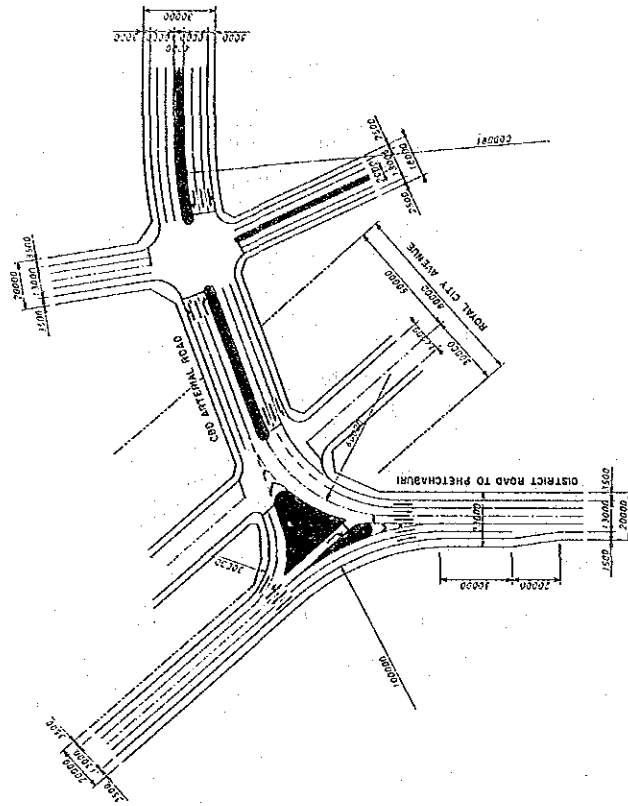
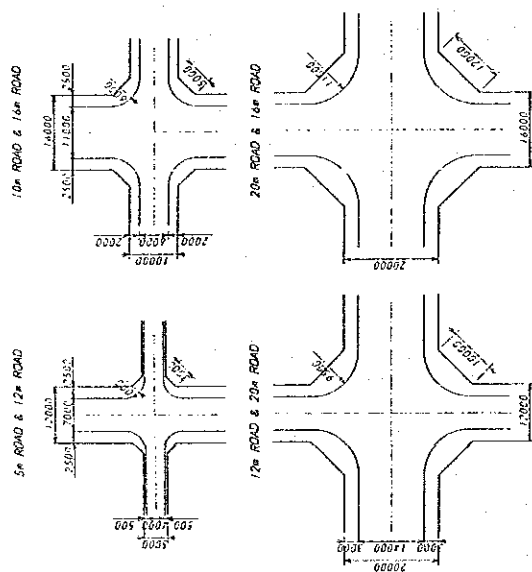


Figure 3.4.24-Standard of Road Intersection

Figure 3.4.25-Road Intersection Plan



PLAN OF ROAD INTERSECTION



STANDARD OF ROAD INTERSECTION

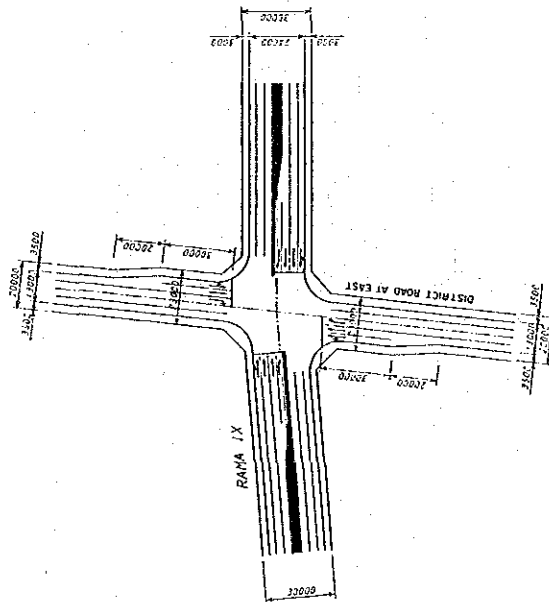


Figure 3.4.26-Pedestrian Park

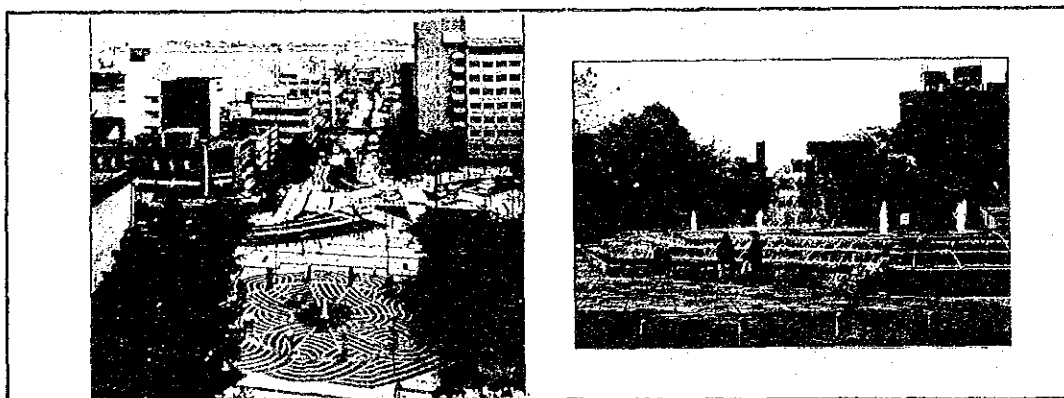
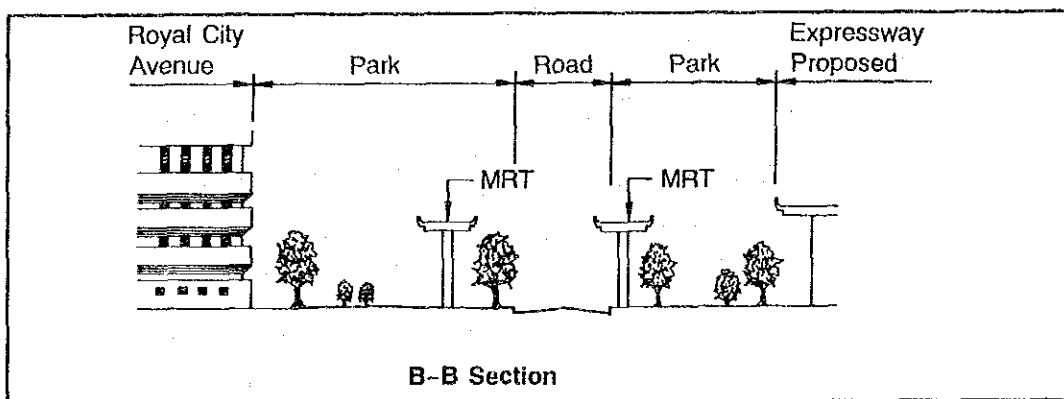
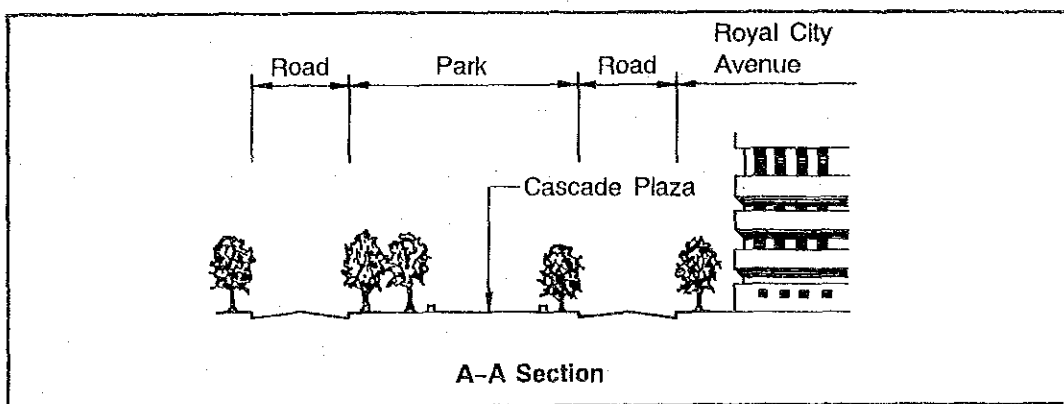
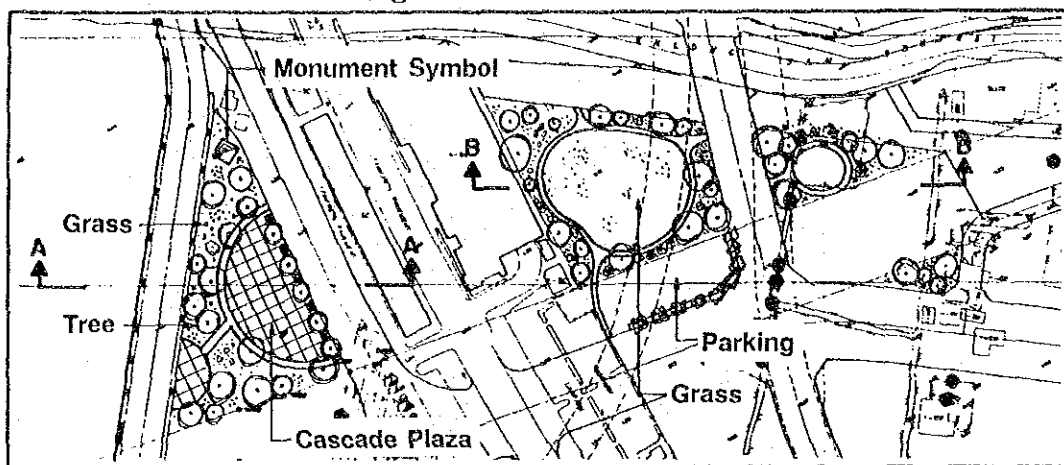


Figure 3.4.27-CBD Park

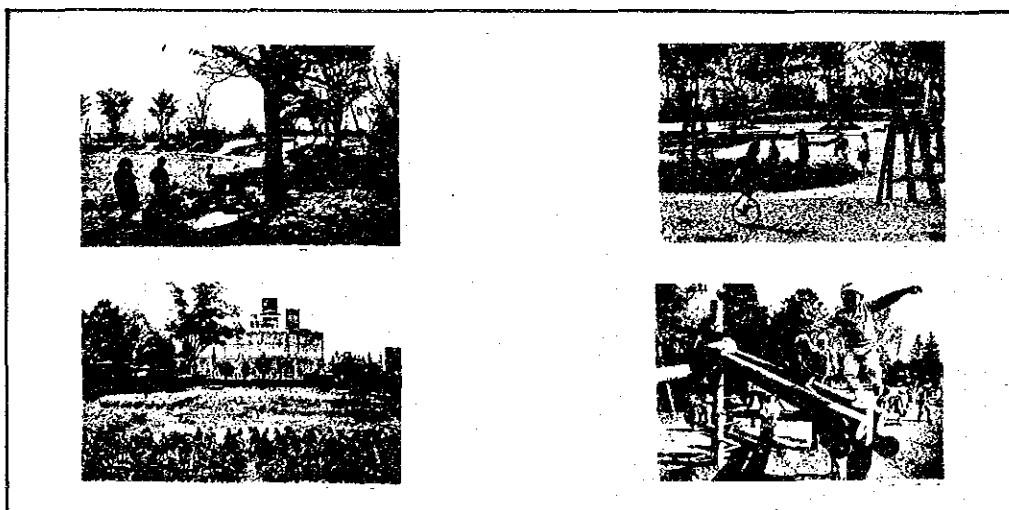
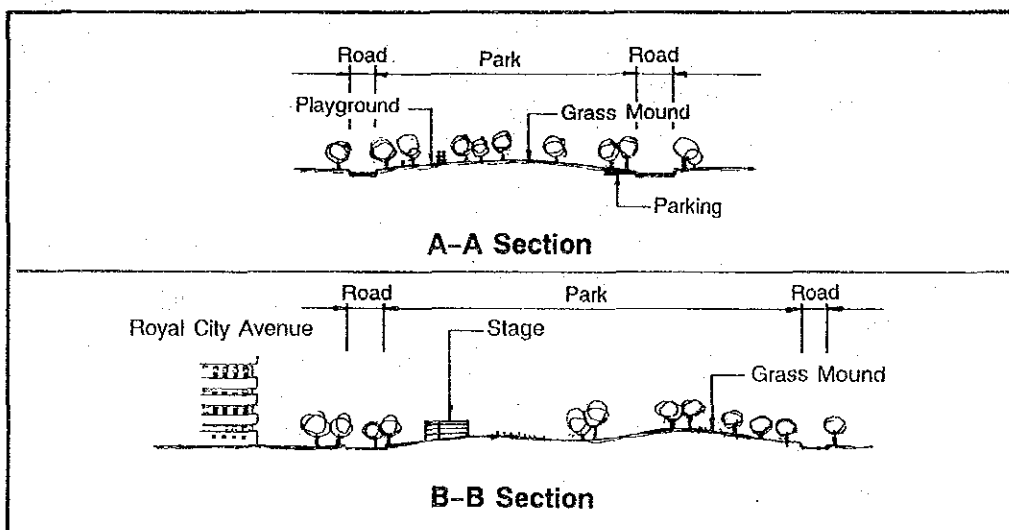
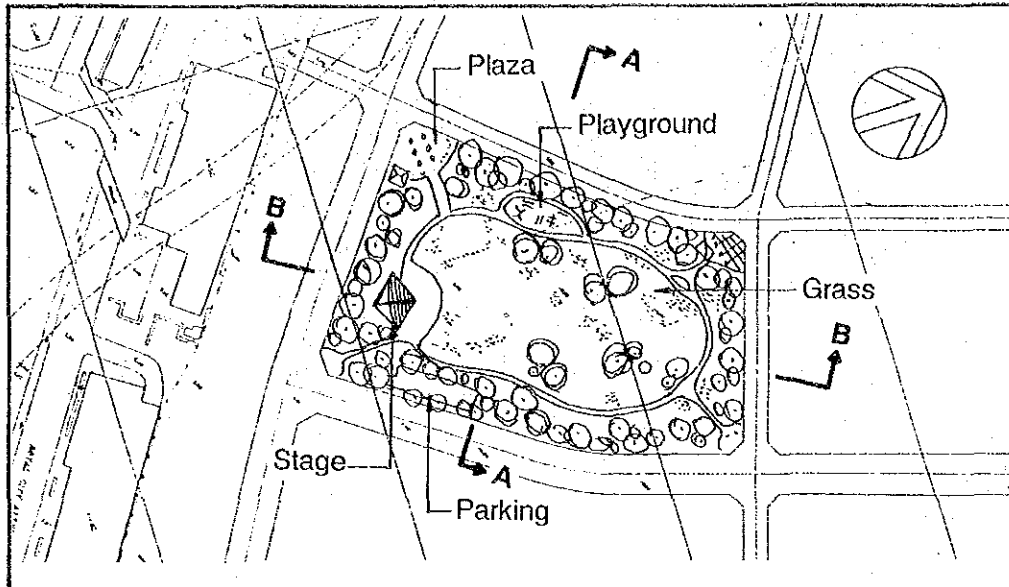
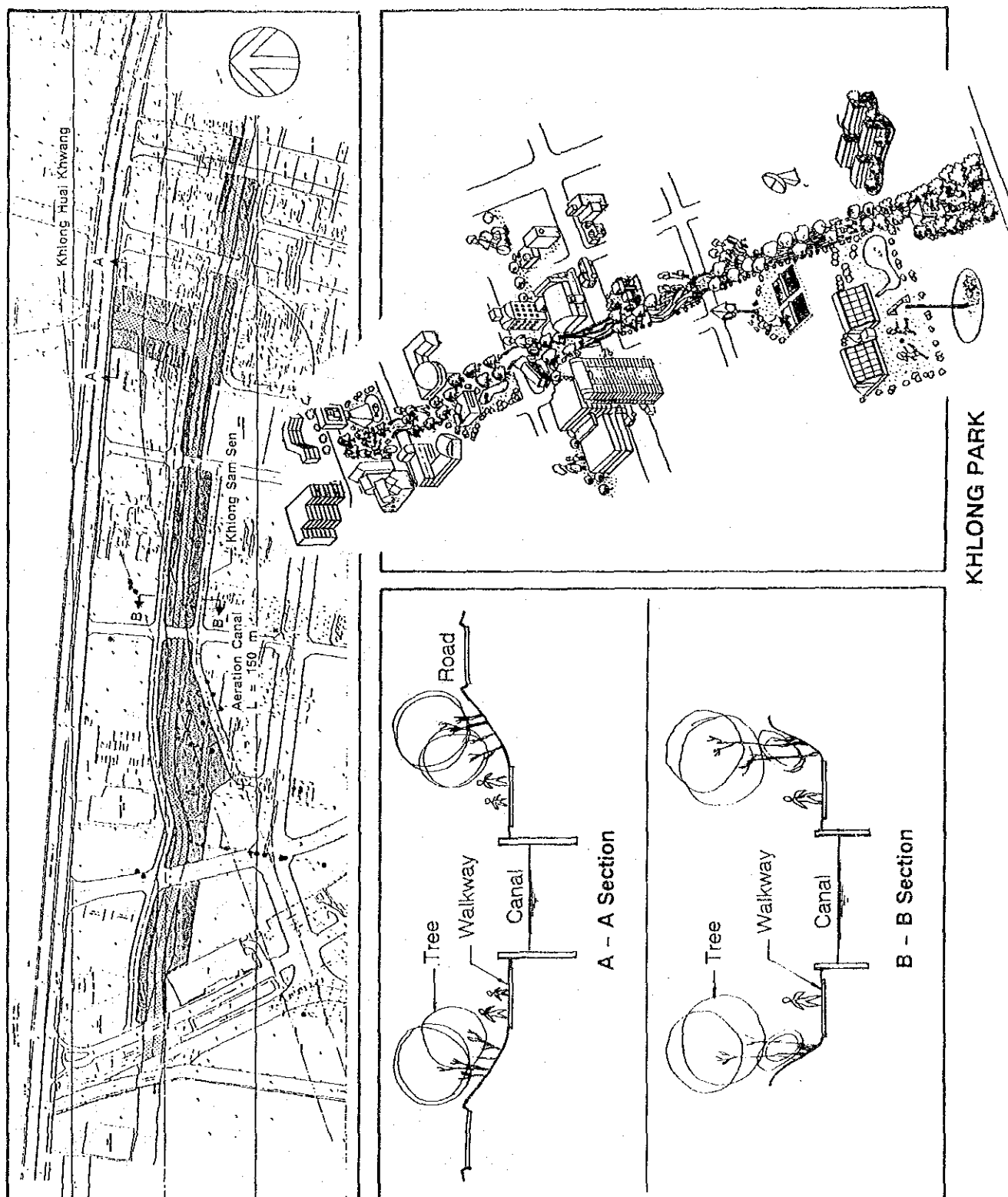


Figure 3.4.28-Khlong Green Park



(4) Drainage and Flood Protection

1) Rain Water Retention Volume and Area

Figure 3.4.29 shows the map of improved Khlong, open space and an aeration canal of the project area. The retention volume and area provided in the project area is summarized in Table 3.4.10.

Table 3.4.10-Retention Volume and Area

Location	Retention Area (ha)	Retention Volume (m ³)
1. Improved khlongs	1.68	23,500
2. Open space along khlong	2.65	26,500
3. Drainage pipes	-	6,400
Total	4.33 (5.05%)	56,400 (657 m ³ /ha)

The above volume and area surpasses the criteria set in the concept plan.

2) Khlong Improvement

The width, length and area of improved Khlong are summarized in Table 3.4.11.

Table 3.4.11-Summary of Improved Khlong

Name of Khlong	Width (m)	Length (m)	Area (m ²)
Khlong Sam Sen	20	60	1,200
	20/15	80	1,374
	15	140	2,100
	13	787	10,231
Khlong Huai Khwang	20	15	300
	18	87	1,623
Total		1,169	16,828

Figure 3.4.30 shows a profile of Khlong Sam Sen, and Figure 3.4.31 shows a standard section of improved Khlong and open space.

3) Drainage Network

Drainage pipe is installed on both sides of the road for collecting rain water from the road and building lots at manholes provided at certain intervals. Drainage pipe design, Manning's formula and rain water intensity for a 2-year frequency is used as given in Table 3.4.11.

Figure 3.4.32 shows flow direction of drainage pipeline installed in the project area. Drainage pipeline construction work is summarized in Table 3.4.12.

Figure 3.4.29-Map of Flood Protection System

Figure 3.4.30-Profile Plan of Khlong Sam Sen

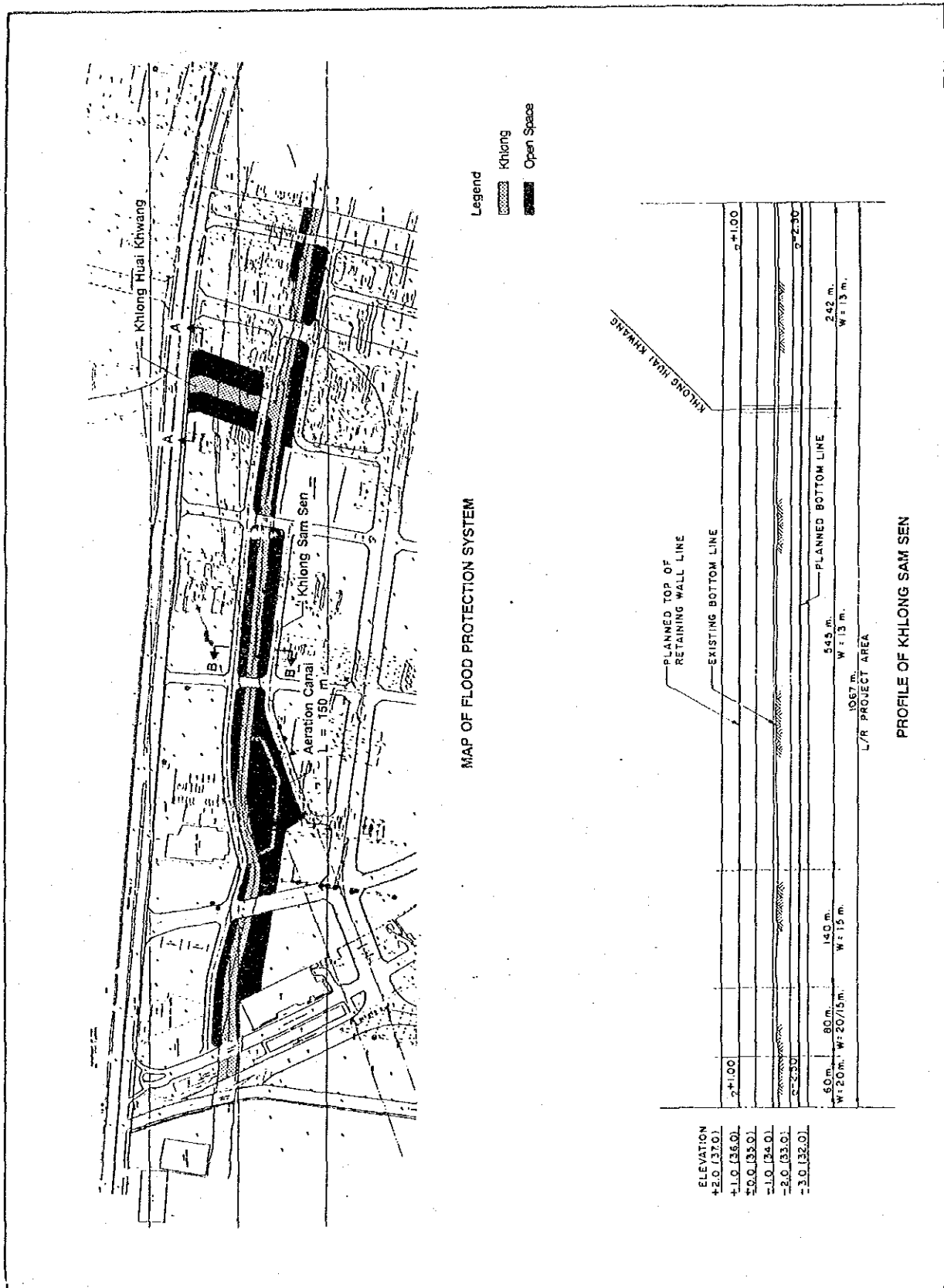


Figure 3.4.31-Standard Section of Improved Khlong and Open Space

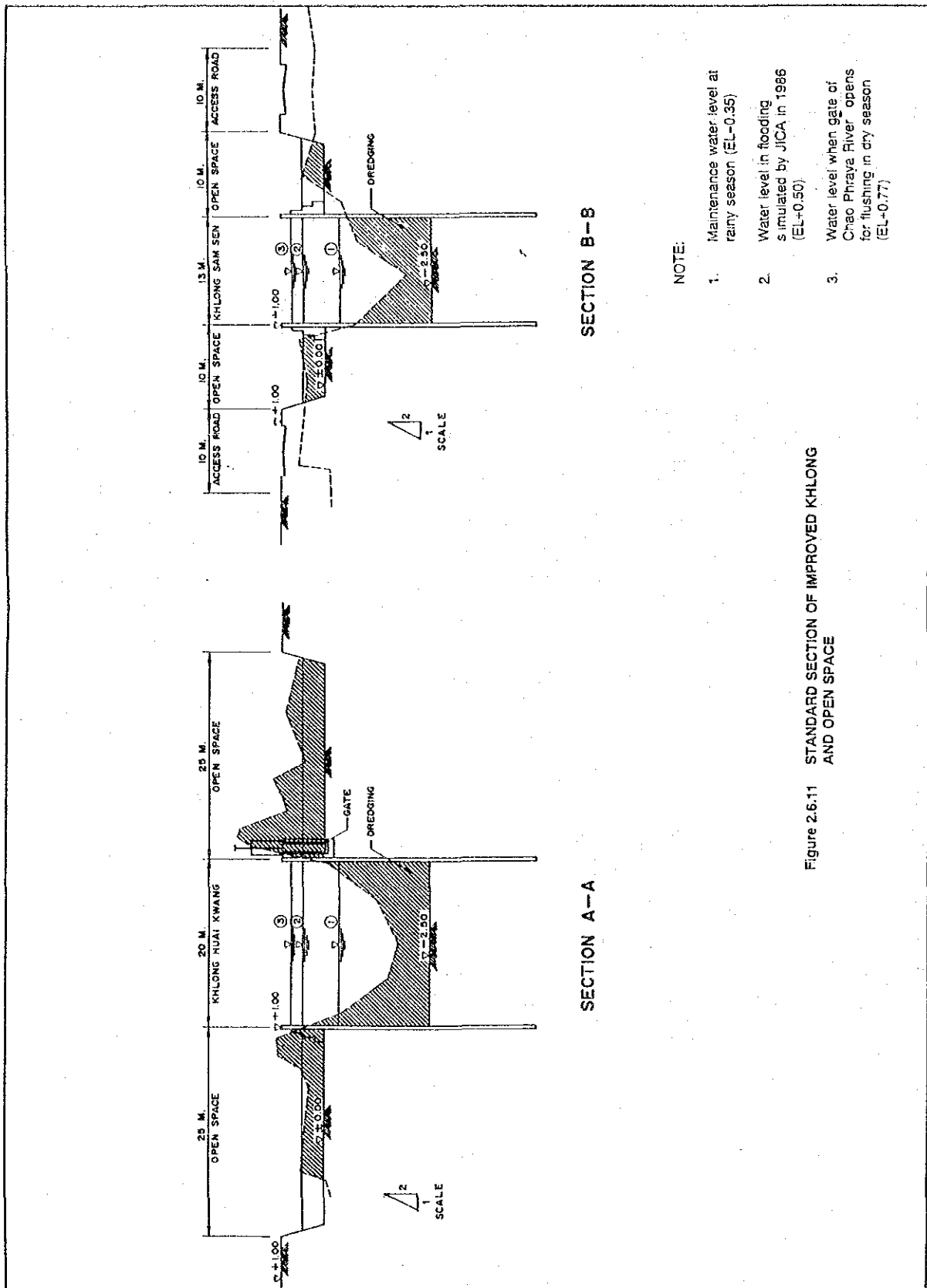
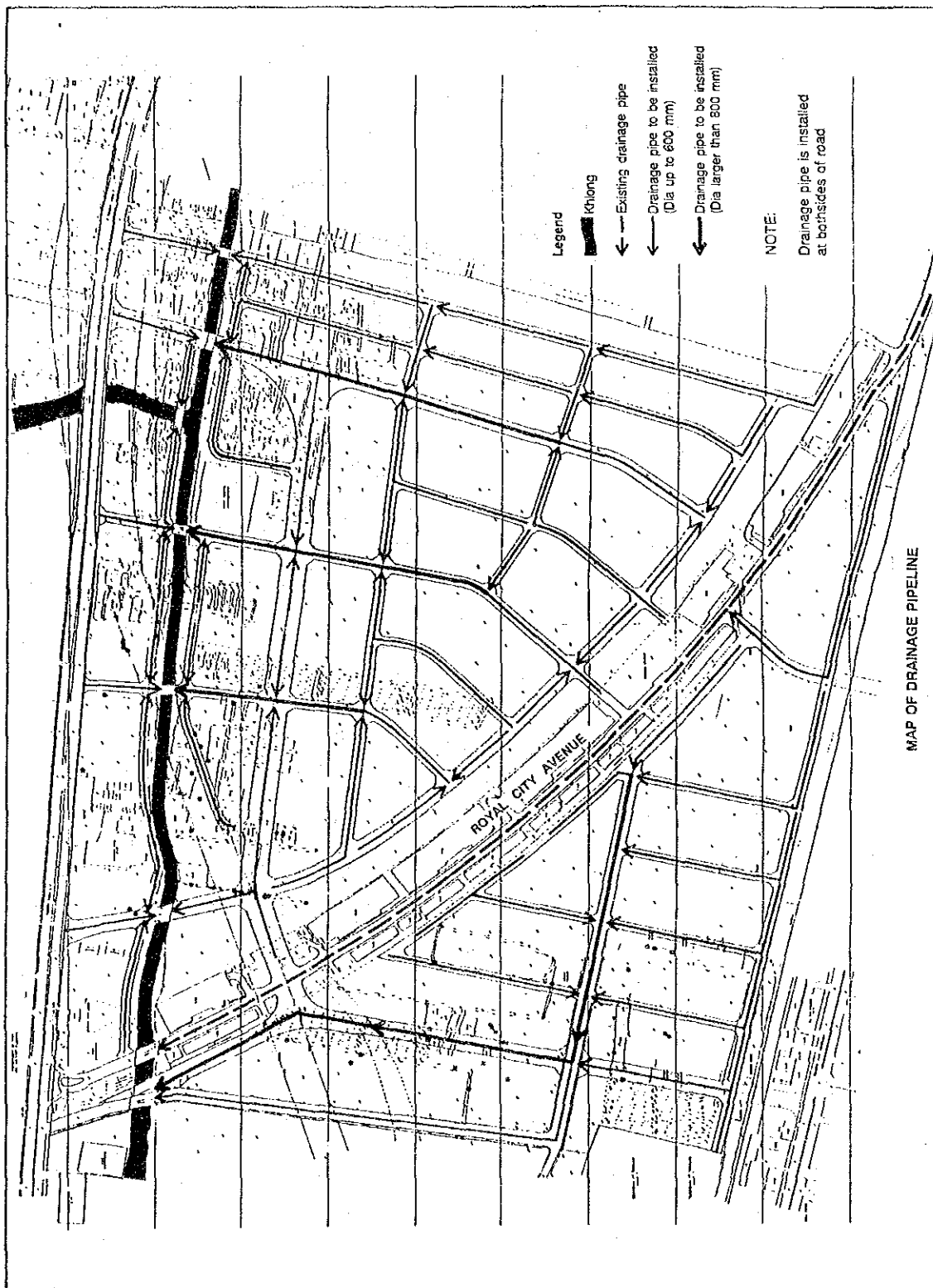


Figure 3.4.32-Map of Drainage Pipeline



(5) Land Filling Design

The land is reclaimed up to an elevation +1.0 m at the Khlong, and an elevation +1.4 m at the south end of the project area for the surface drain. The quantity of soil for filling is 320,000 m³ for Zone 2, and 240,000 m³ for Zone 3, which are estimated from the latest topographic map by an on-site survey. An average filling height is 65 cm in Zone 2, and 95 cm in Zone 3.

Table 3.4.12-Flow Capacity of Drainage Pipe

Drainage Pipe (mm)	Slope i (%)	Velocity v (m/sec)	Flow Capacity Qa (m ³ /sec)	Drainage Area to be Covered	
				f = 1.0 (ha)	f = 0.67 (ha)
400	0.25	0.829	0.104	0.6	0.9
500	0.20	0.860	0.169	1.0	1.5
600	0.15	0.841	0.238	1.5	2.2
800	0.10	0.832	0.418	2.6	3.8
1000	0.10	0.965	0.758	4.6	6.9
1200	0.10	1.090	1.233	7.5	11.2
1500	0.10	1.265	2.235	13.6	20.4
1800	0.08	1.278	3.251	19.8	29.6

- Note: 1) Rain water intensity:
 $I_2 = 5690/(t+37) = 59 \text{ (mm/hr)}$
 (2 years frequency, t = 60 min.)
- 2) Rain water discharge:
 $Q = 1/360 \times I_2 \times f \times A$
 where, f: Run-off coefficient
 A: Drainage area (ha)
- 3) Drainage area which can be covered by respective drainage pipe is calculated as follows:
 $A_a = Q \times 360 / (I_2 \times f) = 6.10 \times Q_a / f$

Table 3.4.13-Summary of Drainage Pipeline

Pipe Dimension (mm)	Length (m)
1) Dia 400 - 600	13,300
2) Dia 800 - 1000	1,800
3) Dia larger than 1200	1,100

The following buildings and houses are left as is.

- Royal City Avenue and office along Rama IX
- Sunroute Hotel
- 20-story hospital under construction along Khlong
- 9-story office building under construction along the planned district road (east)
- two 4-story buildings behind the above office building
- three houses in good condition along the east boundary

The following building and houses are subject to demolition for construction of road and building lot:

Zone 2: - 1 pub-restaurant along Rama IX
 - 64 houses

Zone 3: - 8 houses

The residents' temporary move and resettlement program is planned in the implementation study of Section 8 in this Volume.

(6) Water Supply and Sewerage System

1) Water Supply

Water supply pipeline network of the project area is designed as follows:

- Water for Zone 2 is supplied from the dia 300 mm main distribution pipe of Rama IX. For Zone 3 water is supplied from the dia 300 mm main distribution pipes of both Rama IX and Thanon New Phetchaburi.
- Fire-hydrant is installed at every road intersection for fire-fighting.

Figure 3.4.33 shows the water supply pipeline network and served water demand of the MWA to each block of the project area which was estimated in the same manner as the MWA. At the time of building planning, if the water demand of any district is expected to surpass it, a recycle system as proposed in the concept plan is to be introduced by the developers.

Building developers shall provide a water tank for water distribution in a building or blocks, so that a water supply pipeline for the project area is designed based on daily maximum water demand, but not on hourly peak demand. The water supply construction work of the project area is summarized in **Table 3.4.14**.

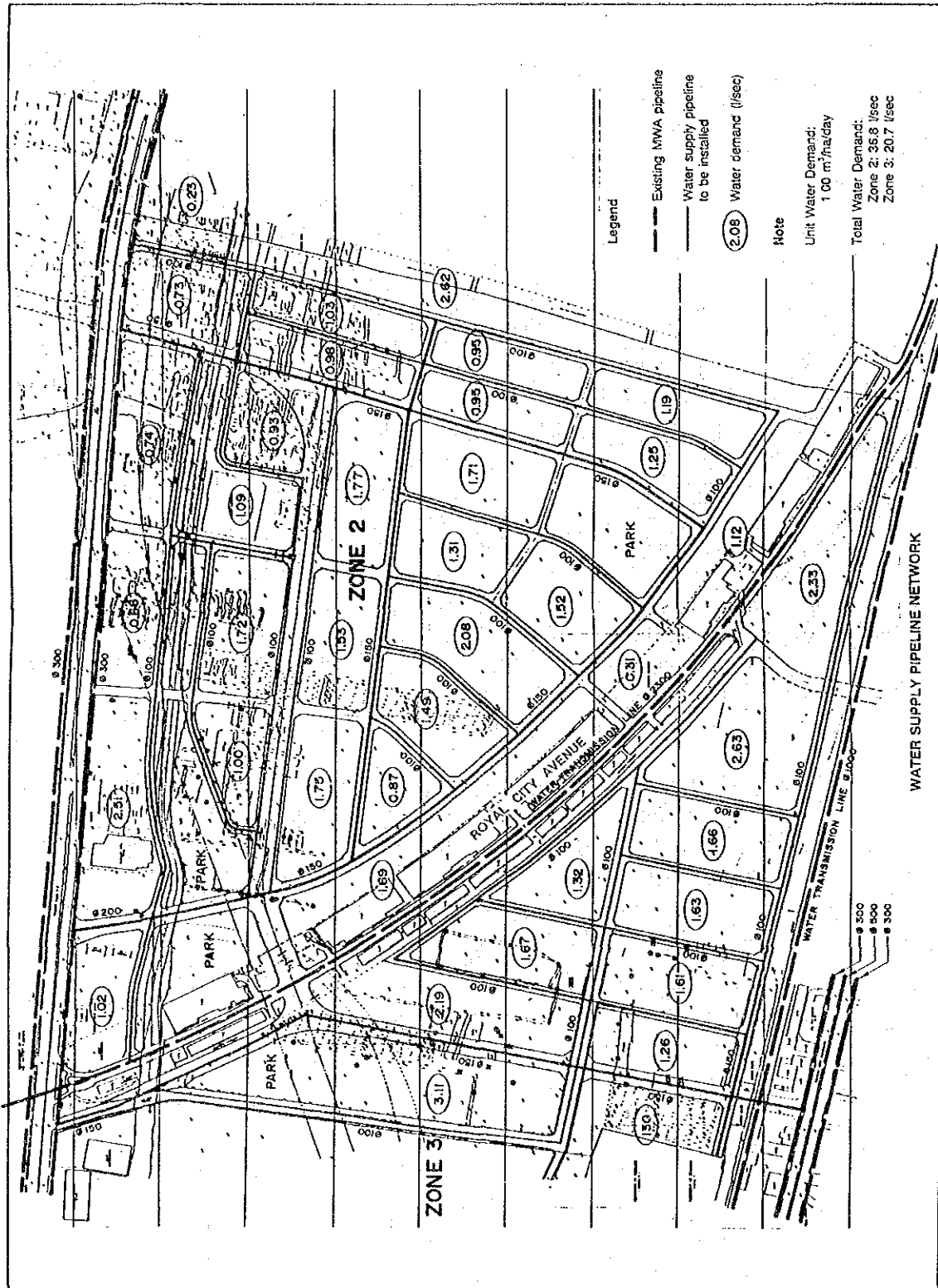
Table 3.4.14-Summary of Water Supply Pipeline

Distribution Line	Length
Dia 100-150	11,900 m.
Dia 200	300 m.
Fire-hydrant	40 unit

2) Sewerage System

The L/R project does not provide physical construction works regarding sewerage works. Building developers must provide a sewage treatment plant in accordance with the BMA standard regarding waste water disposal upon construction of buildings. In other words, a community sewerage system shall be the responsibility of developers under present regulations.

Figure 3.4.33-Water Supply Pipeline Network



The treated water in the BOD of less than 20 ppm of the project area shall be discharged to the Khlong Sam Sen through drainage pipes installed under the roads.

(7) Other Public Utilities

State companies such as the MEA, TOT shall take charge of designing public utilities that fall under their jurisdictions.

(8) Building/Landscaping

1) Building Development

a. CBD Scale Buildings Plan

Purpose of the project is to develop a New CBD utilizing a land readjustment method. Mainly, the land readjustment project focuses on infrastructure improvement. However, achieving this concept, a building development plan is required in order to have the CBD scale buildings. The image of the perspectives are shown in **Figures 3.4.34 and 3.4.35.**

b. Urban Design Covenant

For successful integrated urban development as a New CBD in the project area, a building development and landscaping covenant shall be set up for future development after land readjustment is completed.

A building development covenant regulates building shape and texture, advertisement sign and its wall colors. A landscaping covenant focuses on exterior design.

In addition, there is one more regulation related to urban covenant, it is the District Plan that regulates floor area ratio, building coverage ratio, building set back, et cetera. The urban design covenant relation shall be wrapped out as shown in **Figure 3.4.36.**

2) Landscaping

As landscaping is mentioned during the concept plan study in the project area, public space design is an effective factor to create a suitable environment. Public spaces design in the project area are examined as follows.

a. Road

Hierarchical special design on the road is shown in **Figure 3.4.37.**

Figure 3.4.34-Image Perspective Along the Rame IX Road

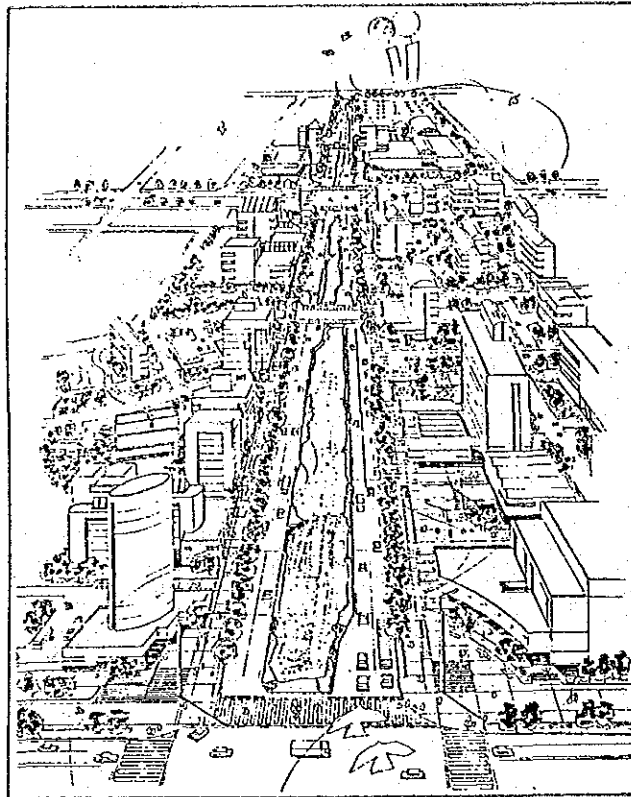


Figure 3.4.35-Image Perspective around Office Building

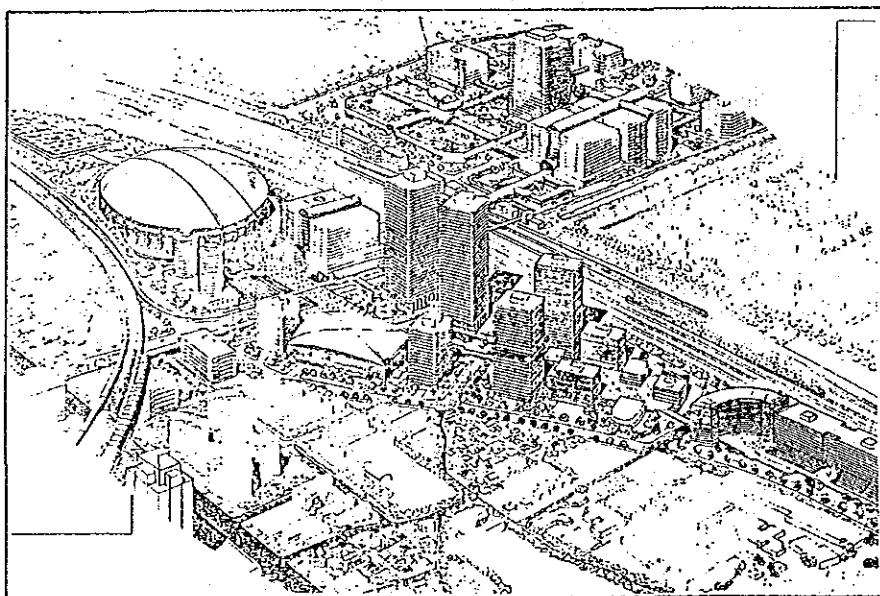


Figure 3.4.36-Landscape Design on Road

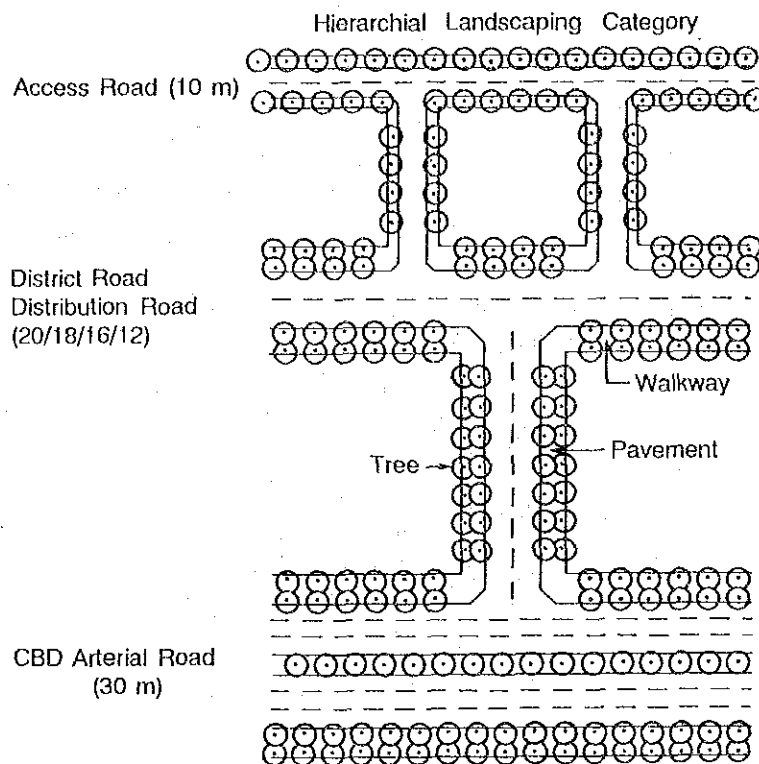


Figure 3.4.37-Urban Design Covenant

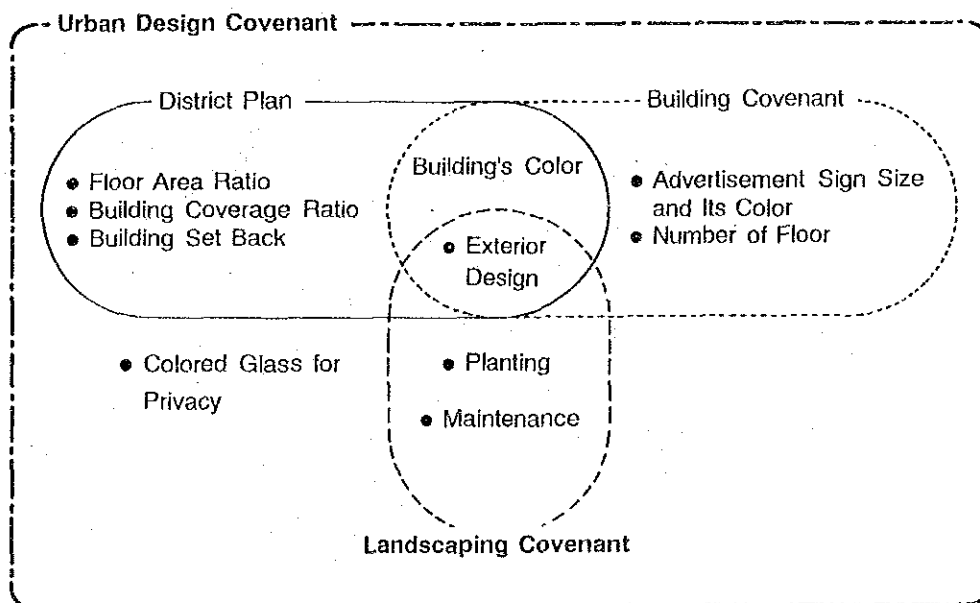


Figure 3.4.38-Landscaped Road

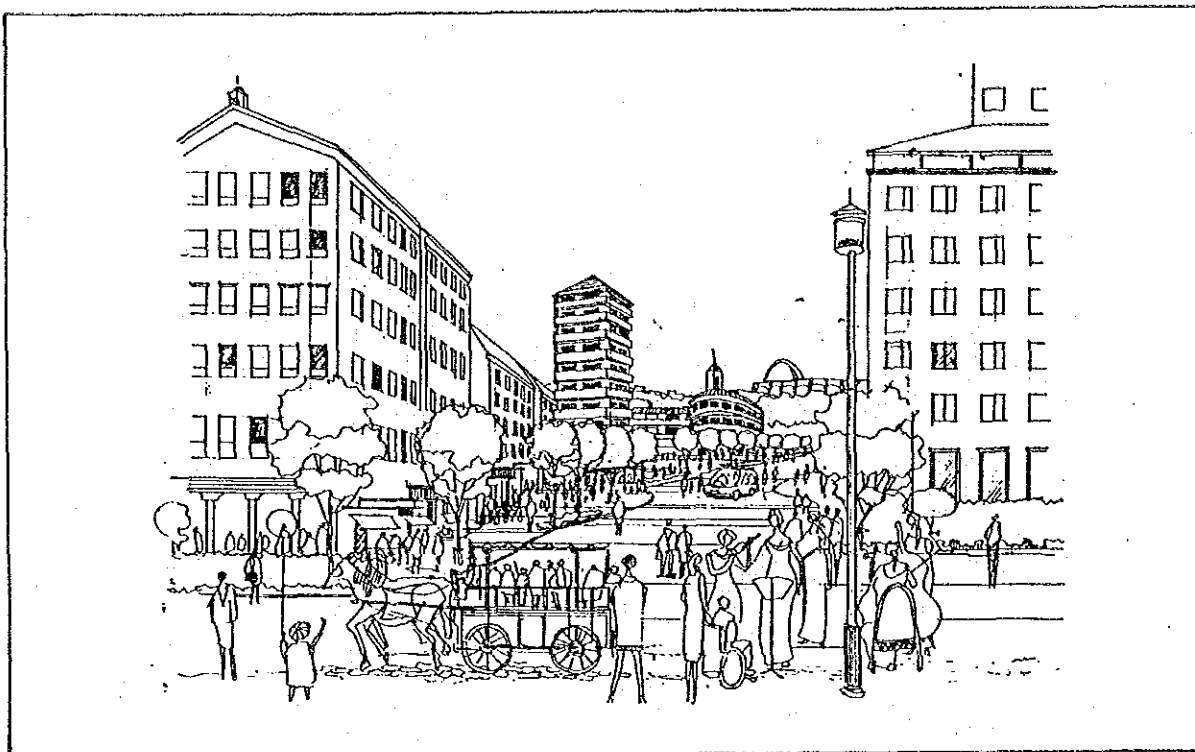
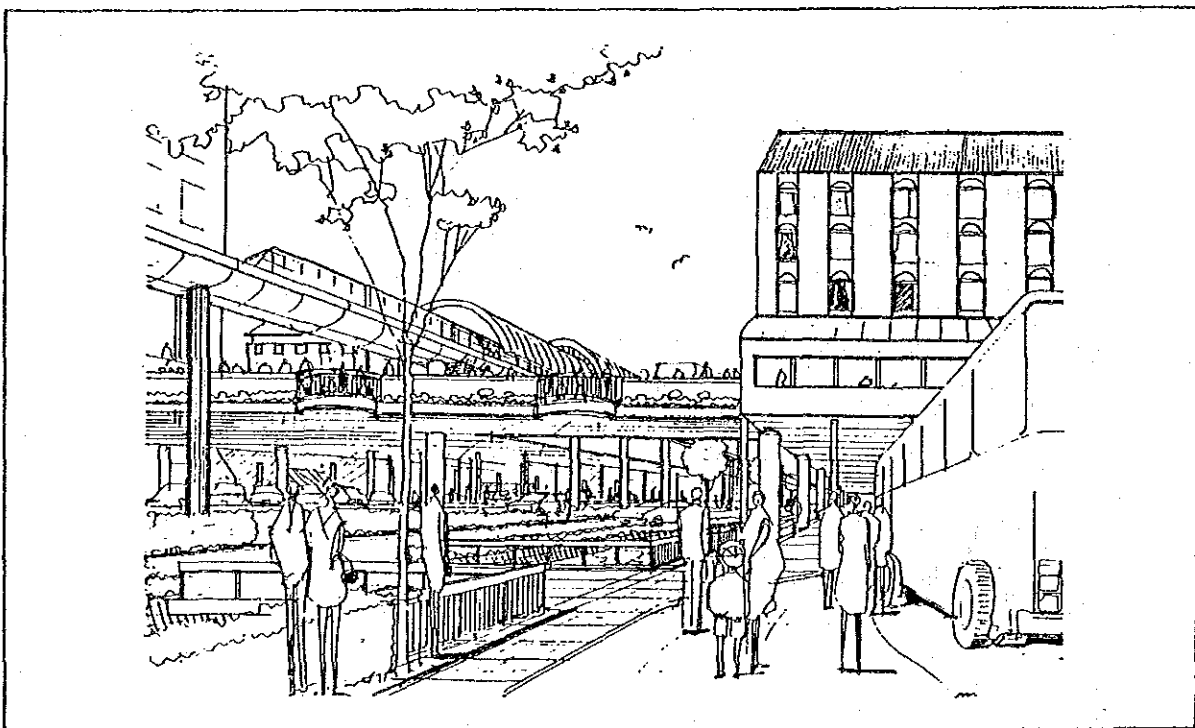


Figure 3.4.39-Pedestrian Deck



b. Park

Symbolic plaza, fountain and statue as a landmark shall be distributed in the park. Some example designs are shown in **Figures 3.4.38 and 3.4.39.**

c. Node

People's gathering points are required signs, square and marks shall be designed.

d. Canal

Retention area and along the canal area can be a comfortable space after the water quality is improved. The canal section shall be of a natural design.

e. Other public space and facilities

Gate to the new development area, shelter with bench on the street, bus stop and other street fixtures shall be designed.

Helpful design examples are shown in **Figures 3.4.40.**

6.2.3 Summary of L/R Design

Summary of L/R design executed in the preceding sections is shown as:

(1) **L/R Design Map**

L/R design map in a scale of 1/1,000 is prepared as shown in **Figure 3.4.41.**

(2) **Infrastructure Improvement (Public Facility Project)**

Public facilities to be constructed in the L/R project are summarized in **Table 3.4.15.**

(3) **Land Use**

1) **Public Land**

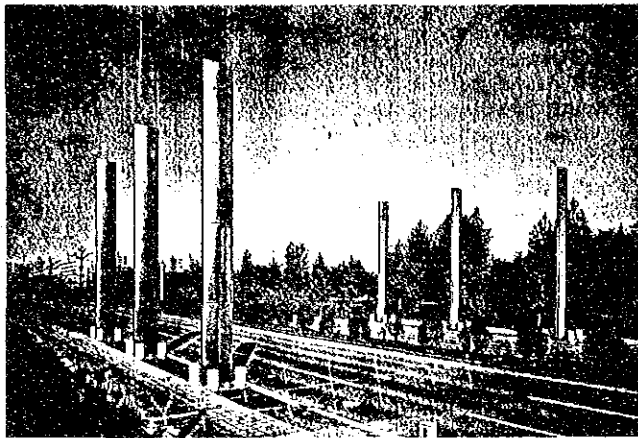
Public lands before and after the project implementation are summarized in **Table 2.6.9.**

2) **Land Use**

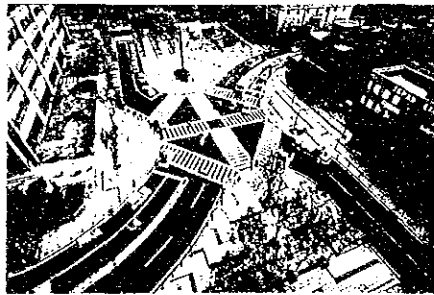
Comparison of land use before and after the project is also shown in **Table 2.6.9.**

The basic features drawn from the land use are outlined as follows:

Figure 3.4.40-Public Space Design



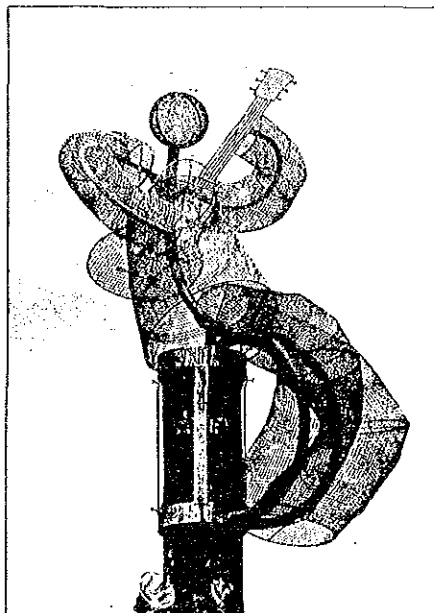
City Gate



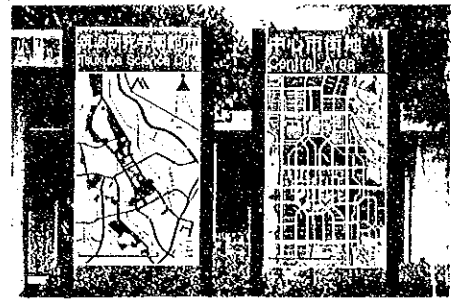
Pedestrian Plaza



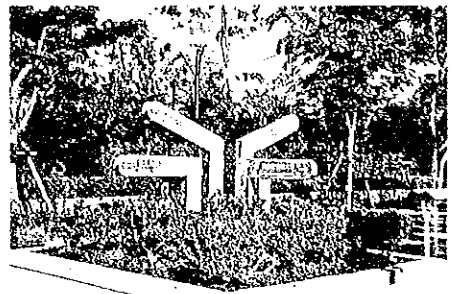
Pavement



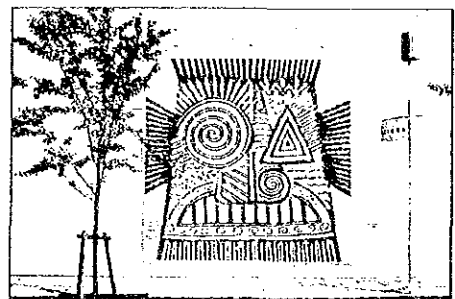
Street Art



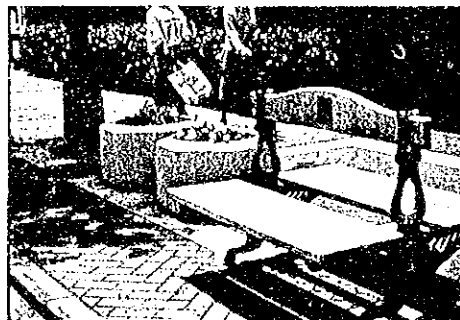
City Guide Map and Street Plan Panel



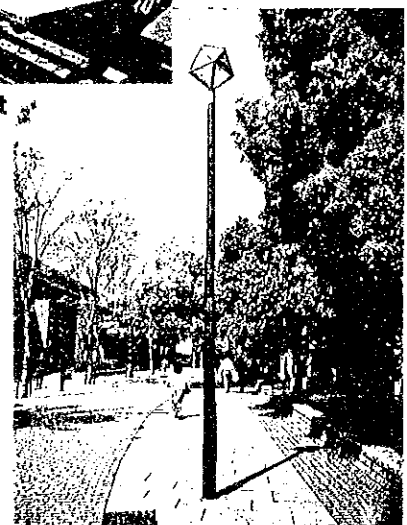
Direction Sign Posts



Street Art

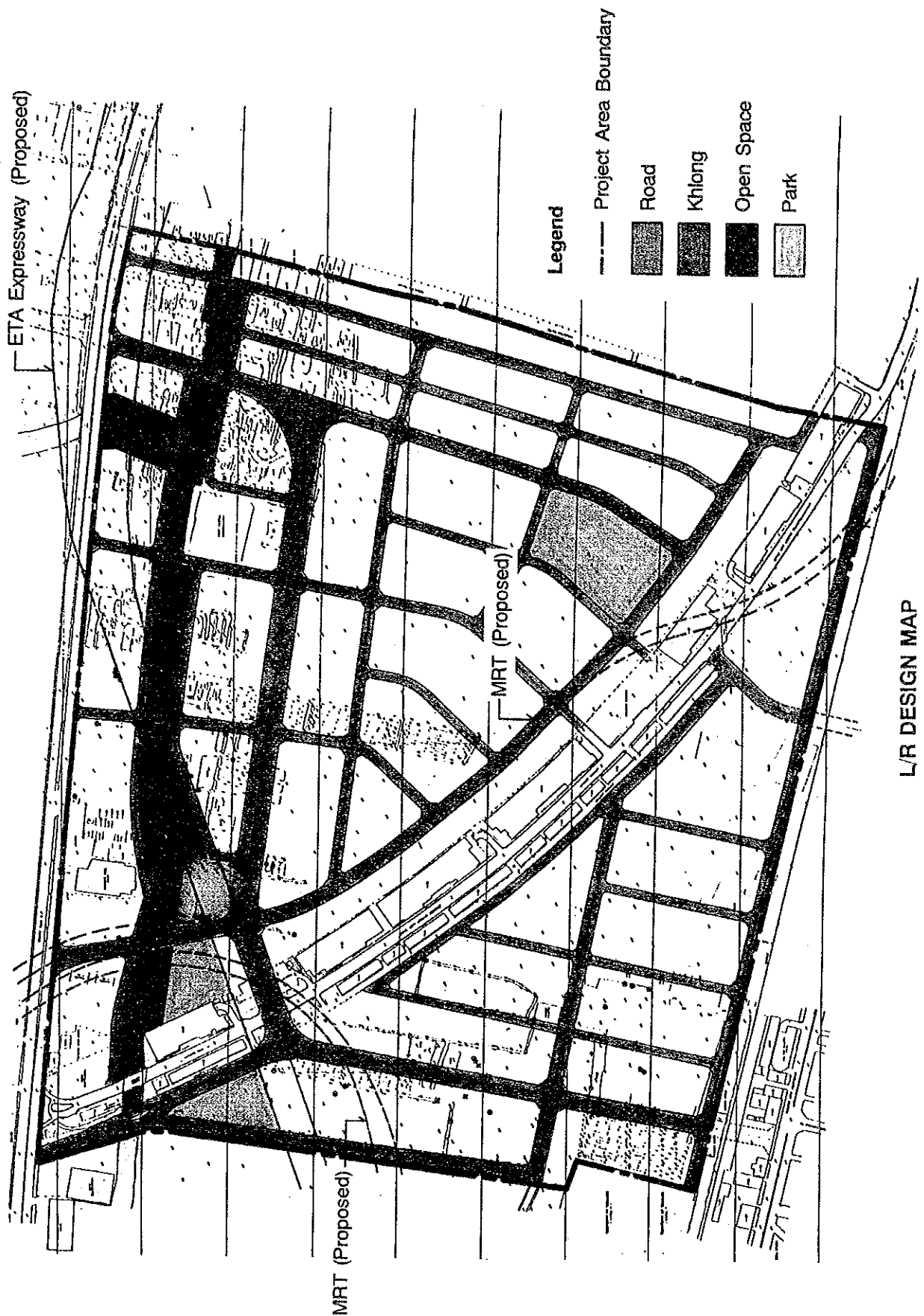


Bench and Flower Pot



Pavement and Lighting

Figure 3.4.41-L/R Design Map



- a. Public land ratio over the project area is to drastically jump up to 29.1% from 28%. The main contribution to increasing the public land is roads. The area of public land created through L/R is 225,526 m². (difference in public land area before and after the project)
- b. One of the characteristics of land use in the project area is that public land for an expressway and a mass transit system share a large portion of the land area. One of the important subjects of an implementation plan will be a combination ratio set to the public lands.
- c. Reserve land listed in the table is the result of project cost/revenue in the succeeding sections.

Table 3.4.15-List of Public Land After L/R Project

Public Land	Width (m.)	Length (m.)	Area (m ²)	Remark
Land for Road				
CBD Arterial Road	30	780	23,490	
District Road	20	1,821	38,035	
Distribution Road	18/16/12	5,389	74,484	
Access Road	10	4,333	43,980	
Land for Khlong	20	75	1,500	Khlong Sam Sen:
	18/15	307	5,097	L = 1067 m
	13	787	10,231	Khlong Huai Khwang
				L = 102 m
Land for Park and Open Space				
Pedestrian Park	-	-	11,458	
District Park	-	-	15,431	
Khlong Green Park	-	-	26,501	
Total of Public Land			250,207	

(4) Land Use Comparison

The land area and the land ownership before the project and after the project are defined as follows and classified in the **Table 3.4.16**.

- 1) The area of 858,085 sq.m was calculated by a survey.
- 2) Land before the project
 - a. Public land area, road, canal, is measured utilizing a cadastral map with a scale of 1/1,000.
 - b. Land for the public use area is measured utilizing a cadastral map with a scale of 1/1,000.

- The expressway area and sky train area are defined as proposed land acquisition sites instead of current land ownership so that the area was calculated as land for public use. The alignment was measured. The area that crossed both alignments was measured as the expressway area.
 - The area between the south side of Royal City Avenue and South last part of boundary was measured as SRT area.
 - c. Private land area was calculated based on land registration data at CVA.
- 3) Land after the project
- Land area after the project was measured utilizing plan map in the scale of 1/1,000.
- a. New public land shall be transferred to management agency.
 - b. Land for public use area is objected to contribution in the replotting calculation as private land. Crossed area between public land and land for public use shall be transferred to the public side.

6.3 Financial Analysis

6.3.1 Project Cost

A total project cost is estimated at 844,530,000 Baht, including the project's compensation cost, infrastructure development costs, survey and design fees, and operation costs as shown in **Table 6.1**.

A total project cost includes total construction costs and total interest due for loans. However, interest charges are calculated for project length and various revenue sources; actual total project cost shall be calculated in the course of the Financial Plan.

6.3.2 Project Revenue

Using the rule of cost recovery of an L/R system, the project must generate revenue. For this end, serviced lots after an L/R project should be disposed to raise project funds.

(1) Projection of Land Value after an L/R Project

The land value after an L/R project is projected to increase up to an average of the existing land value of lots along the Ratchada Phisek (average of Baht 30,000/m²) as a result of land evaluation in consideration of the land value determinants, such as infrastructure provision and others.

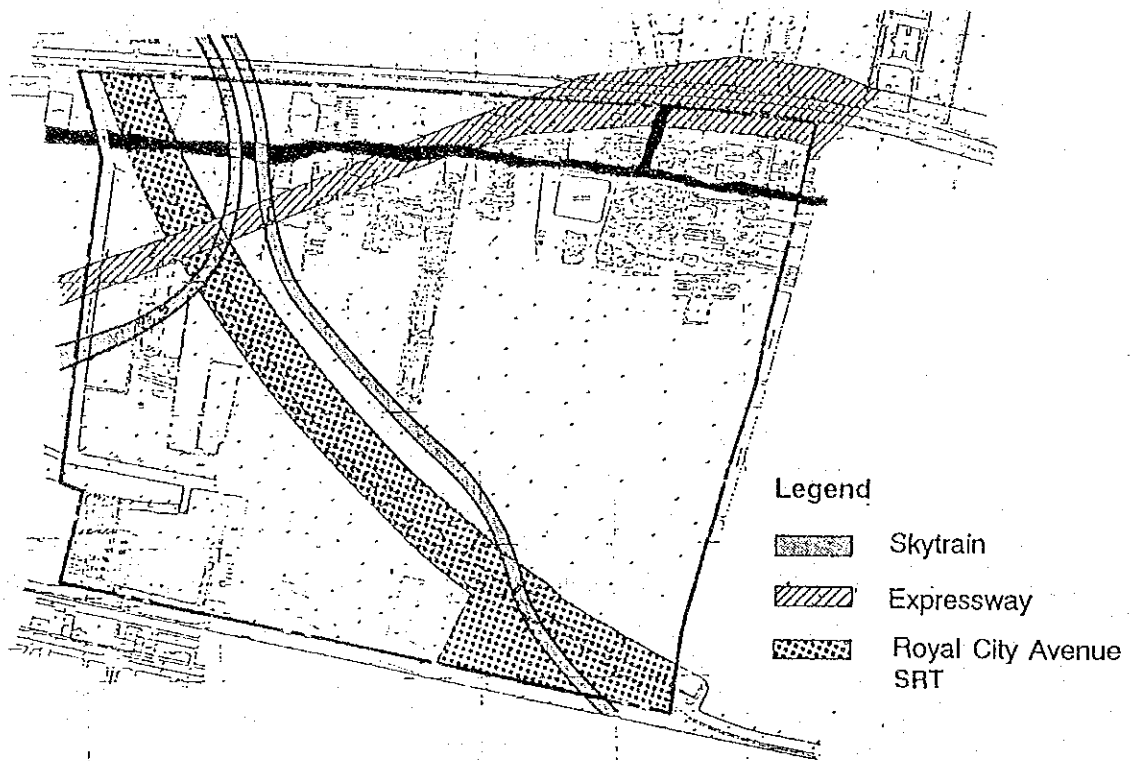


Figure 3.4.42-Land Ownership before the Project

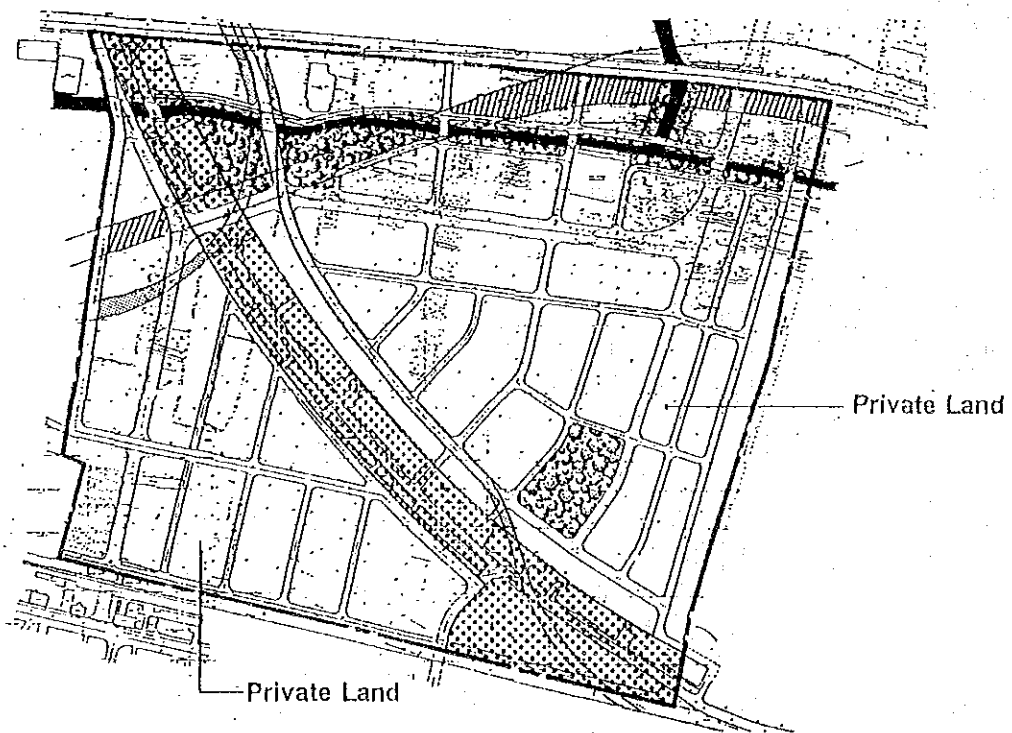


Figure 3.4.43-Land Ownership after the Project

Table 3.4.16-Land Use Comparison

	Category	Before Project		After Project	
		Area (m ²)	Ratio (%)	Area (m ²)	Ratio (%)
Public Land	CBD arterial road	0	0.00%	23,490	2.74%
	District road	0	0.00%	38,035	4.43%
	Distribution road	0	0.00%	74,483	8.68%
	Access road	270	0.03%	43,980	5.13%
	Sub Total	270	0.03%	179,988	20.98%
	Canal	24,410	2.84%	16,828	2.00%
	Open space	0	0.00%	26,501	3.10%
	Park	0	0.00%	26,889	3.10%
	Sub Total	24,410	2.84%	70,218	8.18%
	Sub Grand Total	24,680	2.88%	250,206	29.16%
Land for Public Use	Expressway	39,621	4.62%	23,967	2.80%
	Skytrain Workshop	0	0.00%	0	0.00%
	Skytrain (MRT)	18,305	2.13%	6,131	0.70%
	Royal City Avenue	93,025	10.84%	89,640	10.40%
	SQT	22,450	2.62%	20,109	2.30%
	School	0	0.00%	0	0.00%
	Sub Total	173,401	20.21%	139,847	16.30%
Private Land	Residential	0	0.00%	0	0.00%
	Commercial	0	0.00%	0	0.00%
	Private Road	0	0.00%	0	0.00%
	Government	0	0.00%	0	0.00%
	Wat	0	0.00%	0	0.00%
	Agriculture	0	0.00%	0	0.00%
	Unused Land	660,004	76.92%	437,732	51.01%
	Sub Total	660,004	76.92%	437,732	51.01%
	Sub Grand Total	833,405	97.12%	577,579	67.31%
	Reserved Land	0	0.00%	30,300	3.53%
	Adjustment	0	0%	0	0.00%
	Grand Total	858,085	100.00%	858,085	100.00%

Table 3.4.17-Summary of Project Cost

Item	Amount (x1,000 Bt)	Remark
1. Compensation cost	98,270	Refer to Table 2.8.2
2. Infrastructure development cost	575,210	Refer to Table 2.8.1
3. Survey and design fee	94,280	14% of item (1. + 2.)
4. Operation cost	76,770	10% of item (1. + 2. + 3.)
Subtotal	844,530	
5. Repayment of interest		To be estimated by financial plan
Total Project Cost		

Table 3.4.18-Infrastructure Development Cost

Work Item	Unit	Unit Price	Quantity	Amount (Baht)
1. Land filling work	m ³	340	560,000	190,400,000
2. Road work				153,152,000
2.1 Arterial road W = 30 m	m	19,500	780	15,210,000
2.2 District road W = 20 m	m	11,800	1,750	20,650,000
2.3 Major dis. road W = 18 m	m	10,300	440	4,532,000
2.4 Major dis. road W = 16 m	m	9,900	1,560	15,444,000
2.5 Minor dis. road W = 12 m	m	6,900	3,340	23,046,000
2.6 Access road W = 10 m	m	5,900	4,300	25,370,000
2.7 Bridge works (7 places)	m ²	20,000	2,220	44,400,000
2.8 Temporary bridge	Ls		1	4,500,000
3. Park & Green Work				20,340,000
3.1 Gardening of public park	m ²	500	30,000	15,000,000
3.2 Planting on open space along khlongs	m ²	200	26,700	5,340,000
4. Drainage work				132,570,000
4.1 Khlong improvement	m	30,000	2,340	70,200,000
4.2 Dredging	m ³	100	23,500	2,350,000
4.3 Open space excavation	m ³	50	9,800	490,000
4.4 Aeration facilities	Ls		1	15,000,000
4.5 Drainage pipe				
1) dia. 400-600	m	2,300	13,300	30,590,000
2) dia. 800-1000	m	4,200	1,800	7,560,000
3) dia. bigger than 1,200	m	5,800	1,100	6,380,000
5. Water supply work				26,460,000
5.1 Pipeline dia. 100-150	m	1,500	11,900	17,850,000
5.2 Pipeline dia. 200	m	3,500	300	1,050,000
5.3 Valves & fire-hydrant	Ls		1	7,560,000
TOTAL				522,922,000
Physical contingency (10% of TOTAL)				52,292,000
GRAND TOTAL				575,214,200 (670 Bt/m ²)

With the existing land value of 15,200 Baht/m² in the project area. Utility increase ratio is calculated at 1.97 (30,000 Baht/m²/15,200 Baht/m²).

(2) Sales of Reserve Land

As a rule of an L/R system, the sales of reserve land should amount to not more than the increase of the total land value in monetary terms through the L/R project implementation.

1) Total Increased Land Value

In spite of the contraction of the private land due to the land contribution for public facilities construction, the total land value of private lands is due to

increase because of the utility increase (unit land value increase 1.97) In this project area, the total increased land value is calculated at 52.5 Billion Baht.

Table 3.4.19-Compensation Cost

Work Item	Unit	Unit Price	Quantity	Amount (Baht)
1. Demolition of building				2,235,000
1.1 Wooden building				
1) Restaurant (1 buil.)	m ²	150	300	45,000
2) Residential (58 houses)	m ²	150	8,600	1,290,000
1.2 RC building				
1) Residential (14 houses)	m ²	250	3,600	900,000
2. Temporary move program				15,450,000
2.1 Temporary house (30 houses)	unit	300,000	30	9,000,000
2.2 Rental of house (43 houses for max. 2 years)	unit	150,000	43	6,450,000
3. Reconstruction of building				71,650,000
3.1 Wooden building				
1) Restaurant (1 buil.)	m ²	5,500	300	1,650,000
2) Residential (58 houses)	m ²	5,000	8,600	43,000,000
3.2 RC building				
1) Residential (14 houses)	m ²	7,500	3,600	27,000,000
TOTAL				89,335,000
Physical contingency (10% of TOTAL)				8,933,500
GRAND TOTAL				98,268,500 (115 Bt/m ²)

Table 3.4.20-Disbursement Schedule

Time (every 6 months)	Amount (x 1000 Bt)		
	Compensation	Construction	Total
First	19,454	123,083	142,537
Second	-	170,839	170,839
Third	78,815	181,556	260,371
Fourth	-	99,736	99,736
TOTAL	98,269	575,214	673,483

2) Sale of Reserve Land

To generate revenue to cover the project cost of 909,000,000 Baht, 30,300 m² of reserve land must be sold out at the unit land price of 30,000 Baht as estimated above.

The revenue of 844,530,000 Baht gained through the sale of reserve land is earmarked for the fund resource for L/R implementation.

(3) Examination of Revenue Source

1) Examination of Project Cost Classified by Revenue Source

The shared defrayment of public facilities by a management authority, subsidy and other shared defrayments of the above-mentioned revenue sources encourages land readjustment projects in Japan financed by the Central Government, or local government. In this regard, it is necessary to have an L/R legal system for the project.

In the case that a legal system is required, it will be prepared in Thailand during the study. However, it is only possible to estimate a total project cost less subsidies.

Although it is necessary to take into account the cost sharing system in this clause, only two cases, a self-finance system and a subsidy finance system, are examined.

2) Prediction of Land Prices after the Project

The average official land price before the project in the project planning area is about 15,200 Baht/sqm sourced by the land department (CVA).

The average official land price after the project is predicted at about 30,000 Baht/sqm (refer to the official land price along the Ratchada Pisek Road).

Both of those land prices are utilized to calculate the proposed reserve land area and shared defrayment of public facility by the management authority.

(4) Case Study of Revenue

1) Case-1 (Self-finance system)

Case-1 is a self-finance project that total project cost is provided by disposition of reserve land for cost recovery. For case-1, a total project cost of 909,000,000 Baht as shown in **Table 3.4.21** shall be financed by disposition of reserve land of 30,300 sqm after the project.

Table 3.4.21-Case-1 Income Flow

Category	Amount (1,000 Bt)	Remark
National & local government's subsidies	0	
Sales of reserve land	909,000	30,000 B/m ² x 30,300 m ²
Shared defrayment of public facilities by the management authority	0	
Others	0	
Total	909,000	

2) **Case-2 (subsidy finance system)**

Case-2 is a subsidy finance system with a total project cost provided by sale of reserve land and the shared defrayment of public facilities by the management authority. It is estimated that total project cost is 887,000,000 Baht as shown in Table 6.6 based on the examination of the following conditions.

- **Shared defrayment of public facilities by the management authority**

The shared defrayment of public facilities by the management authority states that all or a part of land acquisition costs for principal public facilities improvement, for instance, arterial roads, parks, and canals or rivers, shall be supplied by the management authority when the land readjustment project is carried out.

- One hundred percent (100%) of total cost of land acquisition fees for principal public facilities development shall be supplied as defined in this case, however it is generally negotiable.
- The road aligned to Rama IX Road from the New Phetchaburi Road through the west part of the project planning area as a arterial road of the Bangkok Metropolis has been committed by the NESDB's Road Plan. This road's acquisition fee shall be provided by the management authority and the Road details are as follows.

Talbe 3.4.22-NESDB's Road Plan

	Width	Length	Area
Arterial Road	20m	693m	14,145m ²

The area excludes existing developed road and public land.

- An amount of cost sharing shall be calculated as follows.

Area of public facilities x land price before the project

$$14,145 \text{ sqm} \times 15,200 \text{ Baht/sqm} = 215,800,000 \text{ Baht}$$

- **Disposition fee of reserve land**

A total of the disposition fee of the reserve land is calculated based on total project cost is subtracted from the shared defrayment of public facilities by the management authority and leaves 672,000,000 Baht as shown in Table Case-2 Income Flow. This balance is a total project cost deficit, and is disposed of by the reserve land equivalent to land after the project of 22,400 sqm.

Table 3.4.23-Case-2 Income Flow

Category	Amount (1,000 Bt)	Remark
National & local government's subsidies	0	
Sales of reserve land	672,000	30,000 B/m ² x 22,400 m ²
Shared defrayment of public facilities by the management authority	215,000	
Others	0	
Total	887,000	

6.3.3 Financial Plan

In the course of the financial plan, a revenue plan, and an expenditure plan annually are formulated and preconditions are described below.

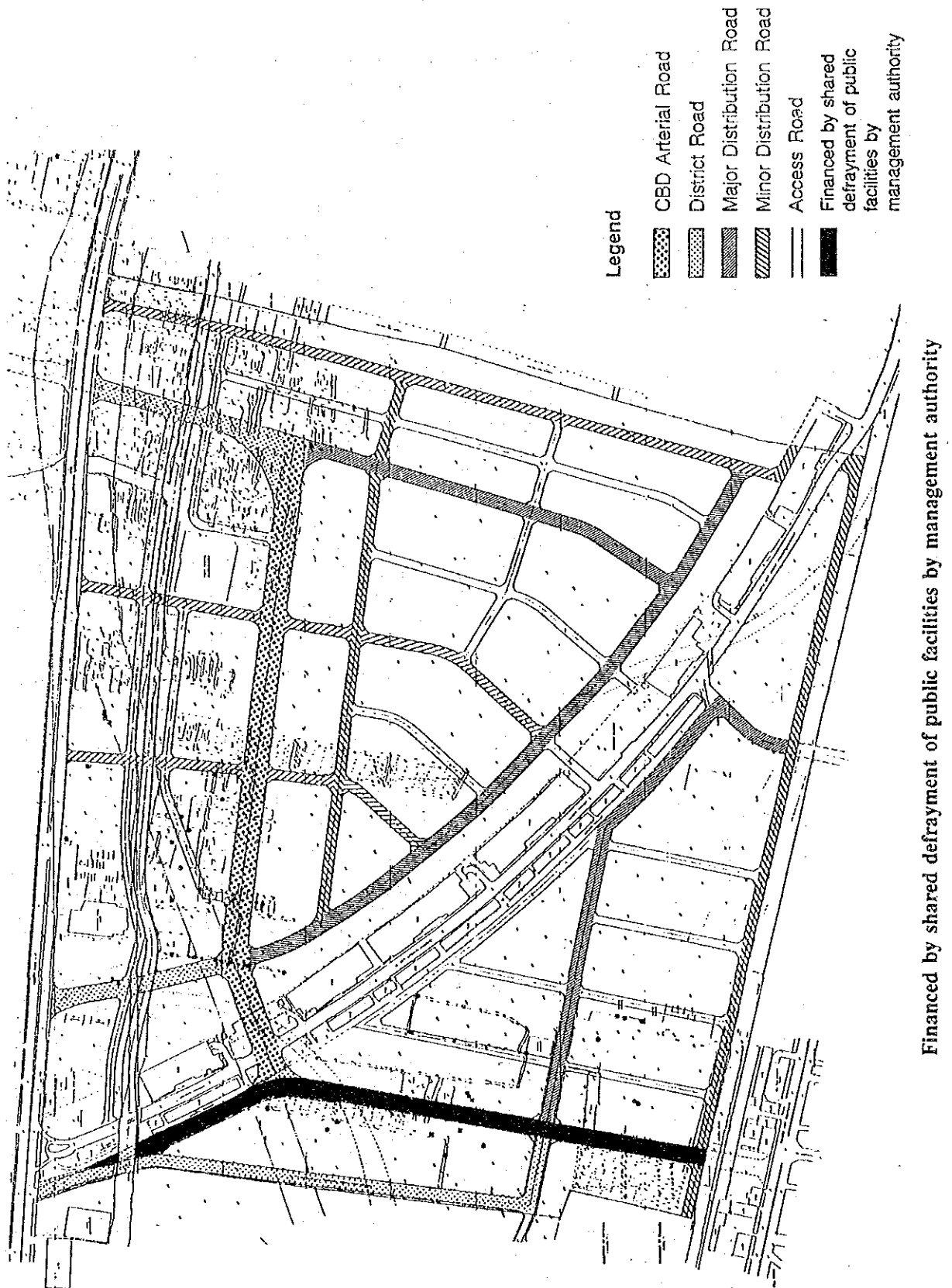
(1) Revenue

- Disposition of reserve land shall be executed in accordance with construction work schedule and commence to dispose from the fourth fiscal year.
- An amount of the deficit every fiscal year shall be summed up as the loan. The income source is set reserved land which will cover the construction costs.

(2) Expenditure

- Expenditure plan subjects five year length as same as implementation schedule shown in Figure No. Implementation Schedule.
- Relocation fees and construction fees shall be paid in the third and fourth fiscal years.
- Survey and design fees, totals, and operation fees are same.
- Interest rates loans is set at 12% per year.

**Figure 3.4.44-Roads Financed by Sared Defrayment of Public Facilities
by Management Authotiry**



Case-1 (self-finance system)

Total project cost is estimated at 909,000,000 Baht as shown in **Table 3.4.24**, and total interest is estimated at 64,470,000 Baht; that is 7.1% of total project cost based on the conditions previously described.

Table 3.4.24-Case-1 Annual Expenditure Calculation

Unit: Thousand Baht

Fiscal Year	Expenditure		Income	Total	Balance
	Project Cost	Loan Interest			
1.	33,800	P. 2,028	0	-35,828	-35,828
2.	38,600	P. 2,316 L. 4,299	0	-45,215	-81,043
3.	342,370	P. 20,542 L. 9,725	0	-372,637	-453,680
4.	389,110	P. 23,346 L. 2,214	SR 454,500	+39,830	-413,050
5.	40,650	0	SR 454,500	+413,850	0
Total	844,530	64,470	909,000	0	0

Notes: P: Loan interest to project cost
L: Loan interest to balance in the previous fiscal year
SR: Fee of disposition of reserve land

Case-2 (subsidy finance system)

A total project cost for Case-2 is estimated at 887,000,000 Baht, and total interest charges for loans is estimated as shown in **Table 3.4.25**. A total disposition fee for the reserve land is the total project cost minus the shared defrayment of public facilities by the management authority. Shared defrayment of public facilities by the management authority for the annual revenue plan year is established as follows.

- The total amount of every fiscal year subjects the project cost of previous fiscal year.
- The shared defrayment of public facilities by the management authority does not subject the interest of loan.

Table 3.4.25-Case-2 Annual Expenditure Calculation

Unit: Thousand Baht

Fiscal Year	Expenditure		Income	Total	Balance
	Project Cost	Loan Interest			
1.	33,800	P. 2,028	0	-35,828	-35,828
2.	38,600	P. 2,316 L. 243	PD 33,800	-7,359	-43,187
3.	342,370	P. 20,542 L. 550	PD 38,600	-324,862	-368,049
4.	389,110	P. 16,791	PD 142,600 SR 336,000	+72,699	-295,350
5.	40,650	0	SR 336,000	+295,350	0
Total	844,530	42,470	887,000	0	0

Notes: P: Loan interest to project cost
L: Loan interest to balance in the previous fiscal year
SR: Fee of disposition of reserve land
PD: Shared defrayment of public facilities by management authority

6.3.4 Contribution

Two cases for the contribution ratio and proposed reserve land area are calculated based on the previous examination, and the method of calculation contributions and contents are described below.

- (1) Private land area and land area for public uses shall be determined by the site survey before the project and land use plan are initiated.
(cf. 6.2.3 Land use comparison)
- (2) Land price before the project and after the project, for the project area, shall be evaluated based on the site survey results.
(cf. 6.3.2 Land price)

a total private land area \times land price

- (3) Total land price after the project and subtracting total land price before the project, leaves increased amounts. In this regard, the land area after the project decreases compared to the land before the project, however, the land value after the project is increased compared to the land value before the project. Because infrastructure, for example, roads, parks, drainage and so, is improved by the land readjustment project.
- (4) The amount of increased value can be a revenue source for the project that provides maximum calculated amounts of reserve land.
- (5) Proposed reserve land area is calculated as appropriate revenue sources equivalent to the disposition fee of reserve lands.
- (6) Contribution ratio shall be calculated in accordance with ascertained proposed reserve land area as follows.
 - a. Contribution Ratio for Public Use

Increased public land (difference of public land area before and after the L/R project) is equivalent to the contribution area for public use.
 - b. Contribution Ratio for Reserve Land

The land area to be sold for the fund resource is equivalent to the contribution area for one reserve land.
 - c. Aggregated Contribution Ratio

The sum of the contribution ratio for public use and the contribution ratio for reserve land.

The contribution ratio and the proposed reserve land area for two cases (Case-1 and Case-2) are calculated below.

- Case-1 (self-financing system)

A total project cost of 909,000,000 Baht is supplied from the disposition of the reserve land that necessity land area is calculated below.

$$909,000,000 \text{ Baht} \div 30,000 \text{ Baht/sqm} = 30,300 \text{ m}^2$$

Aggregated contribution ratio comprising public and reserve land contribution is calculated at 30.70%, and proposed reserve land area is rated at 16.32% of maximum reserve land area.

- Case-2 (subsidy financial system)

A total project cost of 672,000,000 Baht equivalent to necessity reserve land area is calculated utilizing land price after the project of 30,000 Baht/sqm.

$$672,000,000 \text{ Baht} \div 30,000 \text{ Baht/sqm} = 22,400 \text{ m}^2$$

As a result, aggregated contribution ratio is calculated at 29.75% shown in **Table 3.4.27** and proposed reserve land area is rated at 12.07% of maximum reserve land area.

Therefore, aggregated contribution ratio decreased at 0.95% and reserve land area also decreased at 7,900 m² compared to Case-1 (self-financing system). It seems that introduction of the shared defrayment of public facilities by management reduces landowners' contribution.

Table 3.4.26-Contribution and Ratio Case-1

Total Private Land Use	Total Adjusted Land Area A	Private Land Area after PJ Included Reserved Land E	Contribution Land Area			Contribution Rate		
			Contribution Area for Public Use P	Contribution Area for Reserved Land R	Added up Land Area D	Contribution Rate for Public p=P/A	Contribution Rate for Reserved Land r=R/A	Final Contribution Rate d=D/A
(A) (sqm)	A (sqm)	E (sqm)	P (sqm)	R (sqm)	D (sqm)	p=P/A (%)	r=R/A (%)	d=D/A (%)
833,405	833,405	607,879	225,526	30,300	255,826	27.06	3.64	30.70

Table 3.4.27-Private Land Price Case-1

Private Land Area	Adjusted Land Area	Land Price before PJ (Unit)	Land Price before PJ (Total)	Land Area after PJ	Land Price after PJ (Unit)	Land Price after PJ (Total)	Increased Ratio
(A) (sqm)	A (sqm)	a=V/A (Baht/sqm)	V=Aa (TB)	E (sqm)	e=V'/E (Baht/sqm)	V'=Ee (TB)	y=e/a
833,405	833,405	15,200	12,667,756	607,879	30,000	18,236,370	1.97

Table 3.4.28-Proposed Reserved Land Area Case-1

Total Land Price before PJ	Total Land Price after PJ	Increased Land Price (Total)	Land Price per sqm after PJ	Maximum Land for Reserved Land	Reserved Land Area	Ratio	Remarks
V (TB)	V' (TB)	Delta V=V'-V (TB)	e (Baht/sqm)	Rmax=DV/e (sqm)	R (sqm)	R/Rmax (%)	
12,667,756	18,236,370	5,568,614	30.00	185,620	30,300	16.32	

TB: Thousand Baht Construction and Compensation Cost 909,000 TB 1.090706199 TB/sqm

Average LP before PJ 15.2 Thousand Baht

Land Price after PJ 30 Thousand Baht

Increase Ratio 1.97

Table 3.4.29-Contribution and Ratio Case-2

Total Private Land Use	Total Adjusted Land Area A	Private Land Area after PJ Included Reserved Land E	Contribution Land Area			Contribution Rate		
			Contribution Area for Public Use P	Contribution Area for Reserved Land R	Added up Land Area D	Contribution Rate for Public p=P/A	Contribution Rate for Reserved Land r=R/A	Final Contribution Rate d=D/A
(A) (sqm)	A (sqm)	E (sqm)	P (sqm)	R (sqm)	D (sqm)	p=P/A (%)	r=R/A (%)	d=D/A (%)
833,405	833,405	607,879	225,526	22,400	47,926	27.06	2.69	29.75

Table 3.4.30 Private Land Price Case-2

Private Land Area	Adjusted Land Area	Land Price before PJ (Unit)	Land Price before PJ (Total)	Land Area after PJ	Land Price after PJ (Unit)	Land Price after PJ (Total)	Increased Ratio
(A) (sqm)	A (sqm)	a=V/A (Baht/sqm)	V=Aa (TB)	E (sqm)	e=V'/E (Baht/sqm)	V'=Ee (TB)	y=e/a
833,405	833,405	15,200	12,667,756	607,879	30,00	18,236,370	1.97

Table 3.4.31 Proposed Reserved Land Area Case-2

Total Land Price before PJ	Total Land Price after PJ	Increased Land Price (Total)	Land Price per sqm after PJ	Maximum Land for Reserved Land	Reserved Land Area	Ratio	Remarks
V (TB)	V' (TB)	Delta V=V'-V (TB)	e (Baht/sqm)	Rmax=DV/e (sqm)	R (sqm)	R/Rmax (%)	
12,667,756	18,236,370	5,568,614	30.00	185,620	22,400	12.07	

TB: Thousand Baht Construction and Compensation Cost 887,000 TB 1.033 TB/sqm

Average LP before PJ 15.2 Thousand Baht

Land Price after PJ 30 Thousand Baht

Increase Ratio 1.97

6.4 Implementation Program

Project implementation is interpreted as the general management of the three (3) factors, this is "substance = construction" "money = cost and revenue" and "time = time period".

6.4.1 Construction Work

(1) Construction Method

The following construction method is proposed for the effective relocation of residents of the project area and safe, early completion of the construction work.

1) Temporary housing for residents

Temporary housing (appx. 30 houses) will be constructed along Rama IX at the preparatory stage for residents who want to live within the project area during the construction period. Soon after completion of the construction work, residents move to the land replotted for them.

2) Minimizing temporary works for construction

In order to minimize expenditures and time for construction, a temporary road is placed on the permanent road route where feasible. One temporary bridge over the Khlong Sam Sen is constructed for enabling early commencement of land filling work in Zone 2.

For Zone 3, construction of an existing bridge and road constructed by a private company for a subdivision is utilized as a temporary road, and at the time of completion, the surface course is reconstructed.

3) Prevention of public nuisance

A dirt prevention wall is placed along the project area boundary and Royal City Avenue. During the land filling work, water is spread on the filled soil to prevent dispersing of the soil. Vehicles used during the construction are not allowed to pass across Royal City Avenue to ensure the safety of pedestrians.

(2) Construction Program

Construction work will be accomplished in phases. In order to reduce financial burdens, the reserved land is sold as soon as possible after completion of the construction.

Figure 3.4.42 indicates the phased construction area. The construction schedule and commencement of each phase is shown in **Figure 3.4.43**.

A major component of the construction work is the land filling, The Khlong improvement and road construction that includes bridge works. Bridge construction and the Khlong improvement works shall commence first. The land filling work in Zone 2 shall commence after completion of a temporary bridge. All construction work will be

completed in two years.

1) Phase 1 (Northern half of Zone 2)

The quantity of soil for filling is 170,000 m³. The major components of Phase 1 construction are bridge construction, khlong improvement, and the CBD arterial road.

Phase 1 construction will be completed in 15 months, and is immediately open to the public. At the completion of Phase 1, traffic from Rama IX is directed into the CBD arterial road passing through the 20 m wide district roads located east and west.

2) Phase 2 (Zone 3)

Zone 3 construction will proceed independently from the Zone 2 construction. The quantity of soil for filling is 240,000 m³. Phase 2 construction completion is expected in 18 months.

By completion of the Phase 2 construction, Zone 2 and Zone 3 are connected crossing Royal City Avenue, and Rama IX and Thanon New Phetchaburi are connected directly, if the BMA's road construction work between the L/R project boundary and Thanon New Phetchaburi are complete.

3) Phase 3 (Southern half of Zone 2)

The Phase 3 construction will follow Phase 1 construction. The quantity of soil for filling is 150,000 m³. Vehicles for the construction are allowed to use the 12 m wide minor distribution road at the east boundary from/to Rama IX, but not allowed to use the other completed Phase 1 roads for traffic safety and the prevention of dispersed dirt. A dirt prevention wall is installed at the location between the Phase 1 and Phase 3 areas.

(3) Construction Cost

Construction cost and compensation cost are summarized in **Table 3.4.32** and **Table 3.4.33**. The disbursement schedule is in accordance with the construction program established in **Figure 3.4.43** and shown in **Table 3.4.34**.

6.4.2 Implementation Schedule

The implementation schedule (**Figure 3.4.44**) is described and provides the following points:

(1) Precondition of the Project

- The construction area is divided into three segments and will be completed within two years according to the proposed construction schedule.

Figure 3.4.45-Map of Phasing

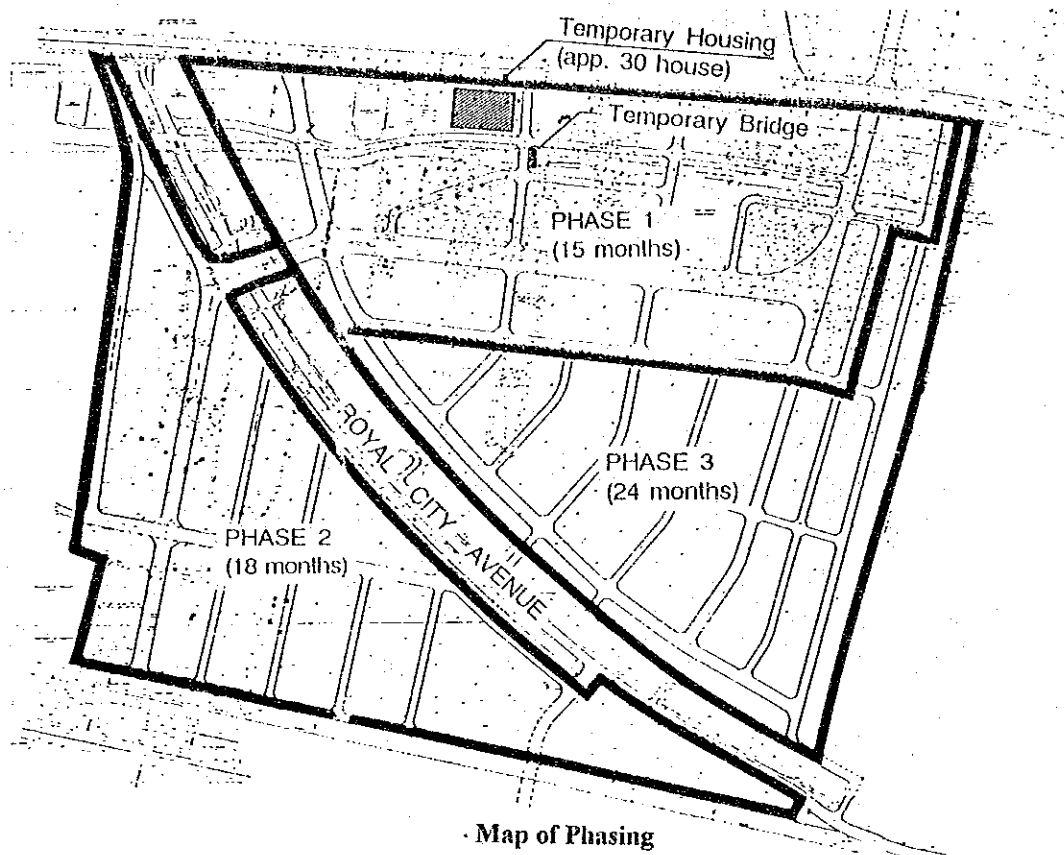


Figure 3.4.46-Construction Program

Item	Time	1st Year												2nd Year											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Opening Schedule																Phase 1 Open		Phase 2 Open							Phase 3 Open
1. Temporary Works (Housing & Bridge)																									
2. Bridge Construction																									
3. Khlong Improvement																									
4. Land Filling & Road Base																									
5. Road Pavement																Phase 1		Phase 2						Phase 3	
6. Drainage Piping																									
7. Water Supply Piping																Phase 1		Phase 2						Phase 3	
8. Land-scaping																Phase 1		Phase 2						Phase 3	

Table 3.4.32-Infrastructure Development Cost

Work Item	Unit	Unit Price	Quantity	Amount (Baht)
1. Land filling work	m ³	340	560,000	190,400,000
2. Road work				153,152,000
2.1 Arterial road W = 30 m	m	19,500	780	15,210,000
2.2 District road W = 20 m	m	11,800	1,750	20,650,000
2.3 Major dis. road W = 18 m	m	10,300	440	4,532,000
2.4 Major dis. road W = 16 m	m	9,900	1,560	15,444,000
2.5 Minor dis. road W = 12 m	m	6,900	3,340	23,046,000
2.6 Access road W = 10 m	m	5,900	4,300	25,370,000
2.7 Bridge works (7 places)	m ²	20,000	2,220	44,400,000
2.8 Temporary bridge	Ls		1	4,500,000
3. Park & Green Work				20,340,000
3.1 Gardening of public park	m ²	500	30,000	15,000,000
3.2 Planting on open space along khlongs	m ²	200	26,700	5,340,000
4. Drainage work				132,570,000
4.1 Khlong improvement	m	30,000	2,340	70,200,000
4.2 Dredging	m ³	100	23,500	2,350,000
4.3 Open space excavation	m ³	50	9,800	490,000
4.4 Aeration facilities	Ls		1	15,000,000
4.5 Drainage pipe				
1) dia. 400-600	m	2,300	13,300	30,590,000
2) dia. 800-1000	m	4,200	1,800	7,560,000
3) dia. bigger than 1,200	m	5,800	1,100	6,380,000
5. Water supply work				26,460,000
5.1 Pipeline dia. 100-150	m	1,500	11,900	17,850,000
5.2 Pipeline dia. 200	m	3,500	300	1,050,000
5.3 Valves & fire-hydrant	Ls		1	7,560,000
TOTAL				522,922,000
Physical contingency (10% of TOTAL)				52,292,000
GRAND TOTAL				575,214,200 (670 Bt/m ²)

- The total number of relocation buildings is estimated at seventy three (73). A majority of the project land area is vacant.
- The total number of lots is two hundred ninety seven (279), and the total number of landowners with land titles in the project area is 141.
- It is recommended that the project be carried out as an inaugural project in Thailand at the earliest time, and is predicted to be completed on schedule.

(2) Project Period

The project period is for five years from commencement of the project to the completion based on the land readjustment legal proposals.

Table 3.4.33-Compensation Cost

Work Item	Unit	Unit Price	Quantity	Amount (Baht)
1. Demolition of building				2,235,000
1.1 Wooden building				
1) Restaurant (1 buil.)	m ²	150	300	45,000
2) Residential (58 houses)	m ²	150	8,600	1,290,000
1.2 RC building				
1) Residential (14 houses)	m ²	250	3,600	900,000
2. Temporary move program				15,450,000
2.1 Temporary house	unit	300,000	30	9,000,000
(30 houses)		150,000		
2.2 Rental of house	unit		43	6,450,000
(43 houses for max. 2 years)				
3. Reconstruction of building				71,650,000
3.1 Wooden building				
1) Restaurant (1 buil.)	m ²	5,500	300	1,650,000
2) Residential (58 houses)	m ²	5,000	8,600	43,000,000
3.2 RC building				
1) Residential (14 houses)	m ²	7,500	3,600	27,000,000
TOTAL				89,335,000
Physical contingency (10% of TOTAL)				8,933,500
GRAND TOTAL				98,268,500 (115 Bt/m ²)

Table 3.4.34-Disbursement Schedule

Time (every 6 months)	Amount (x 1000 Bt)		
	Compensation	Construction	Total
First	19,454	123,083	142,537
Second	-	170,839	170,839
Third	78,815	181,556	260,371
Fourth	-	99,736	99,736
TOTAL	98,269	575,214	673,483

- In the first fiscal year, an implementation plan should be approved from selection of an implementation body to final approval for the project. Primary activities of this period will include various surveys and examinations regarding the preparation of the implementation plans. However, the actual project period depends on conditions of government policy and the social consensus process.
- After the second fiscal year, replotting, relocation and construction work will commence.

(3) Schedule Management

The following should be considered for effective management of the project schedule.

- Social consensus and adjustments in conjunction with the responsible authority for the implementation plan.
- Replotting plan should be designated appropriately.
- Agreement of relocation should be carried out effectively.
- Construction work should be accomplished safely and with adequate preventive measures for possible natural or other disasters.

To ensure effective schedule management and adequate controls to accomplish the previously mentioned conditions, if the project area scale, borders, etc., present difficulties, the project area should be reduced in size to meet implementation goals.

6.4.3 Financial Program

The annual financial program shall be elaborated and described for two cases based on an examination of the project cost revenues and implementation schedule.

(1) Total Expenditure

1) Comparison of Case-1 and Case-2 (Table 3.4.35, Table 3.4.36)

- Case-1 and Case-2 have the same project period, project materials, with a total project cost estimated at 844,530,000 Baht (984 Baht per sqm).
- Total project cost based on the difference of Case-1, 909,000,000 Baht (1,059 Baht/sqm) from Case-2, 887,000,000 Baht (1,033 Baht/sqm) is 22,000,000 Baht, due to different loan interest payments.
- The loan interest for Case-2 is less than Case-1, due to the revenue source of shared defrayment of public facilities by the management authority supplied during prior fiscal year.

2) Case-1 (self finance system)

The loan interest is calculated for the financial program by fiscal year.

3) Case-2 (subsidy finance system)

The loan interest is calculated for the financial program by fiscal year.

Figure 3.4.47-Implementation Schedule

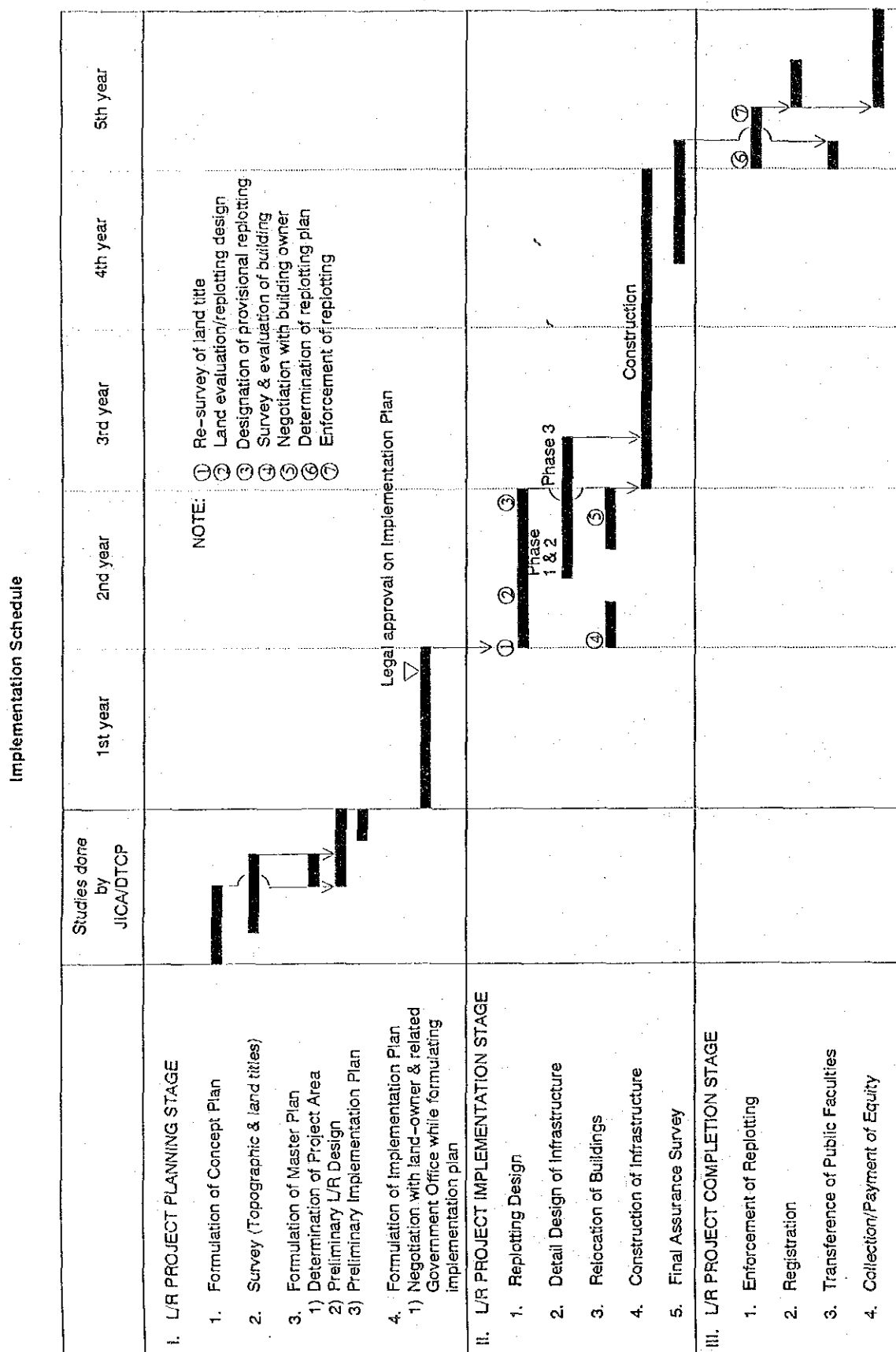


Table 3.4.35-Case-1 Project Cost

Item	Amount (x1,000 Bt)	Remark
1. Compensation cost	98,270	Refer to Table
2. Infrastructure development cost	575,210	Refer to Table
3. Survey and design fee	94,280	14% of item (1. + 2.)
4. Operation cost	76,770	10% of item (1. + 2. + 3.)
Subtotal	844,530	
5. Repayment of interest	64,470	Interest rate: 12% Project period: 5 years
Total Project Cost	909,000	1,059 Baht/m ²

Table 3.4.36 Case-2 Project Cost

Item	Amount (x1,000 Bt)	Remark
1. Compensation cost	98,270	Refer to Table
2. Infrastructure development cost	575,210	Refer to Table
3. Survey and design fee	94,280	14% of item (1. + 2.)
4. Operation cost	76,770	10% of item (1. + 2. + 3.)
Subtotal	844,530	
5. Repayment of interest	42,470	Interest rate: 12% Project period: 5 years
Total Project Cost	887,000	1,033 Baht/m ²

(2) Annual Financial Plan

An annual financial plan shall be presented according to the implementation schedule in this clause.

For the project implementation, initial revenue, it is a balance between revenue and expenditure, in other words, the deficit, must be financial by Banking Organs.

1) Case-1 (self-finance system)

Issues and characteristics of Case-1 as given in Table 3.4.37 are described as below.

- Estimates reveal that Case-1 implementation is easier to obtain than Case-2 due to the self-finance system.
- The total loan interest, 453,680,000 Baht, is more expensive than that of Case-2 because of revenue timing of the disposition fees for reserve lands.
- The disposition of the reserve lands for land sales after construction work is estimated during the fourth and fifth fiscal year. However, disposition

of reserve lands should be carried out at early stage to reduce interest charges.

Table 3.4.37-Case-1 Annual Financial Plan

Unit: Thousand Baht

Year	1	2	3	4	5	Total
Expenses						
Construction	0	0	293,920	281,290	0	575,210
Compensation	0	0	19,450	78,820	0	98,270
Survey & Design	18,800	23,600	14,000	14,000	23,880	94,280
Interest	2,028	6,615	30,267	25,560	0	64,470
Administration	15,000	15,000	15,000	15,000	16,770	76,770
Total	35,828	45,215	372,637	414,670	40,650	909,000
Income						
National & local government's Subsidies	0	0	0	0	0	0
Shared defrayment of public facilities by the management authority	0	0	0	0	0	0
Sales of reserve land	0	0	0	454,550	454,550	909,000
Total	0	0	0	454,550	454,550	909,000
Balance	-35,828	-45,215	-372,637	39,830	413,850	±0
Loan	35,828	45,215	372,637	0	0	453,680

2) Case-2 (subsidy finance system)

Issues and characteristics of Case-2 are shown in Table 3.4.38 and described below.

- For Case-2, shared defrayment of public facilities by the management authority is supplied from the second fiscal year so that the total loan is 368,049,000 Baht (85,31,000 Baht below Case-1 estimates). Total interest of 42,470,000 Baht, is also below Case-1 estimates by 22,000,000 Baht.
- The introduction of a shared defrayment of the public facilities by the management authority as a revenue source resulted in a disposition fee for the reserve lands at 672,00,000 Baht. This rate is 23% below those for Case-1. Therefore, reserve land area calculated at 22,400 m² equals a significant reduction in contributions by landowners.

6.5 Project Analysis

6.5.1 Financial/Economic Analysis

The L/R project is an urban development program to be implemented at the cost of landowners' lands in the form of contributions. Economic principles indicate that landowners invest a part of their land into an L/R project in return for development profits realized from land value increases.

Table 3.4.38-Case-2 Annual Financial Plan

Unit: Thousand Baht

Year	1	2	3	4	5	Total
Expenses						
Construction	0	0	293,920	281,290	0	575,210
Compensation	0	0	19,450	78,820	0	98,270
Survey & Design	18,800	23,600	14,000	14,000	23,880	94,280
Interest	2,028	2,559	21,059	16,791	0	42,470
Administration	15,000	15,000	15,000	15,000	16,770	76,770
Total	35,828	41,159	363,462	405,901	40,650	909,000
Income						
National & local government's Subsidies	0	0	0	0	0	0
Shared defrayment of public facilities by the management authority	0	33,800	38,600	142,600	0	215,000
Sales of reserve land	0	0	0	336,000	336,000	672,000
Total	0	33,800	38,600	478,600	336,000	887,000
Balance	-35,828	-7,359	-324,862	72,699	295,350	±0
Loan	35,828	7,359	324,862	0	0	368,049

Development costs and economic returns are analyzed below.

(1) Development Costs

The combined contribution land areas calculated in the preceding section can be viewed as development costs for the project. Accordingly, the landowners invest their lands in an amount of 255,826 m² (about 30.7% of their lands).

Changes in the composition of privately held lands and public lands through the L/R project are illustrated in Table 3.4.39.

Table 3.4.39-Change of Land Use

Land	Before L/R Area (m ²)/(%)	After L/R Area (m ²)/(%)	Remarks
Private Land	833,405 (97.1%)	577,578 (67.3%)	
Public Land	21,747 (2.5%)	250,207 (29.2%)	Difference is contribution land
Reserve Land Adjustment	2,933 (0.4%)	30,300 (3.5%)	Contribution for reserve land
	858,085 (100%)	858,085 (100%)	

The development cost is 255,826 m² in land, or 3.89 Billion Baht (255,826 m² x 15,200 Baht/m²) in monetary terms.

(2) Development Profits

1) Increase of Land Value

Development profit accrues from the increased land values of properties through the L/R project. The unit land price is expected to rise from 15,200 Baht/m² to 30,000 Baht/m², an increase ratio of 1.97.

2) Increase Property Value and Development Profits

a) Total Development Profits

The difference in the total land value of private land before and after the L/R project is given as total development profits.

- Total land value at present
$$= 858,085 \text{ m}^2 \text{ (total land area)} \times 15,200 \text{ Baht/m}^2 \text{ (unit land price)}$$
$$= 13.04 \text{ Billion Baht - 1}$$
- Total land value in future
$$= 858,085 \text{ m}^2 \text{ (total land area)} \times 30,000 \text{ Baht/m}^2 \text{ (land price)}$$
$$= 25.74 \text{ Billion Baht - 2}$$
- total increased land value (development profits)
$$= 2 - 1 = 12.7 \text{ Billion Baht}$$

Economic return is estimated at 12.7 Billion Baht and development profits/development cost = 3.26, provided that the project is implemented in five years. Annual economic return is estimated at 26.7%.

b) Share of Property Value and Development Profit between the Public and Private

(Land Property)

The total development profits estimated above are to be converted into two (2) part: (1) creation of public land (as a return of development profits to the public); and (2) increase of private land value.

Accordingly, the total public land value is pegged at 7.51 Billion Baht, and private land at 18.24 Billion Baht shortly after implementation of the L/R project. Development profits (the difference in total land value

before and after the L/R project) consists of 5.57 Billion Baht for landowners, and 7.18 Billion Baht for the public.

(Total Asset)

Total private lands and values will be reduced due to the disposition of reserve lands for public facility construction. Thus, total private land value becomes 17.33 Billion Baht after deducting for reserve lands and public land values estimated at 8.42 Billion Baht after adding the value of public facilities. (This seems reasonable if the value of public facilities are held equal in value to the reserve land.)

In the same manner, development profits for the public and private investments are estimated in Table 3.4.40.

Table 3.4.40-Total Asset and Development Profit

	Total Value	Development Profit
The private (landowners)	17.33	4.66
The public (government)	8.42	8.09

Figure 3.4.48-Formation of Asset Value and Development Profits

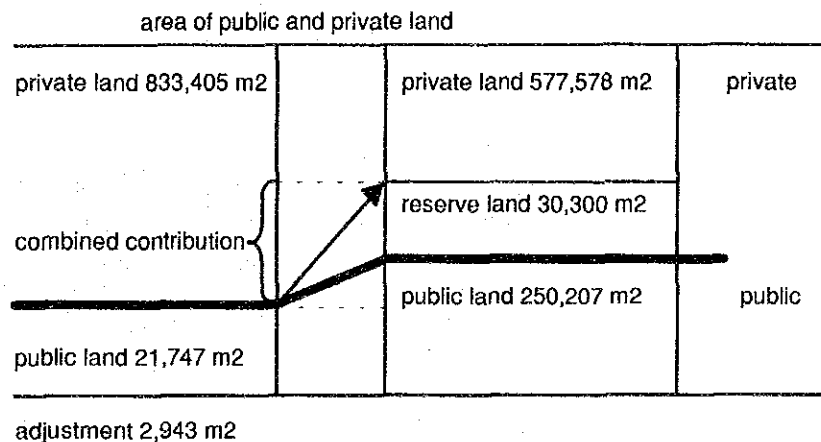


Table 3.4.41. Total Land Value

Total land area	858,085 m ²	858,085 m ²	difference
Unit land price	15,200 Billion/m ²	30,000 Billion/m ²	14,800 Billion/m ²
Total land value	13.04 Billion Bt	25.74 Billion Bt	12.70 Billion Bt
Total private land value	12.67 Billion Bt	18.24 Billion Bt	5.57 Billion Bt
Total public land value	0.33 Billion Bt	7.51 Billion Bt	7.18 Billion Bt
Value of reserve land	0	0.91 Billion Bt	0.91 Billion Bt

(included in the private land above)

Table 3.4.42-Total Asset Value

Private landowners	17.33 Billion Bt	4.66 Billion Bt
Public	8.42 Billion Bt	8.09 Billion Bt

The ratio of development profits between the private and public is set at 1:1.74.

c) Private Land Value

The concept and rule of the L/R predicts that total private land values should be unchanged during the start and conclusion of the L/R project implementation.

Following this principle, all the development profits (the difference in the total private land values between before/after the L/R) should be deposited into the project account to improve infrastructures. If so, reserve lands should be 185,667 m² (5.57 Billion Baht divided 30,000 Baht/m²).

This figure shows maximum allowable reserve land. Then the combined contribution theoretically would be 47.9%.

$$\frac{(185,667m^2 + 225,526m^2)}{858,085}$$

In reality the reserve land of 255,826 m² established for in this study is equivalent to 16.32% of the maximum allowable reserve land. Consequently, in spite of the rule of an L/R, considerable amounts of development profits remain for landowners, resulting in increased private land values by 1.37 (17.33 Billion Baht/12.67 Billion Baht).

(3) Conclusion

An economic analysis portends the following.

- 1) The contribution ratio adapted for this project is 30.70%, which is significantly lower than a theoretical contribution ratio of 47.9%.

Judging from this contribution ratio, it may be concluded that the level of public facilities improvement designed for the L/R project seems not to be excessive to landowners, and also that development profits are reasonably distributed to landowners.

- 2) As previously discussed, the L/R project makes a significant contribution to the formation of public properties with an enormous amount of value and increase in property taxes through private value-added properties, which in turn leads to the strengthening of the nation's financial base.

In this regard, the government should promote the L/R project as a point of public policy.

6.5.2 Social Analysis

A social analysis of the L/R project was accomplished as an opinion poll survey addressed to the landowners holding title to the lands in the project. The data gathered are used for the study materials.

(1) Outline of the Opinion Survey

The survey comprised a sample number of 390,100 landowners who responded to the survey either by mail or via an interview.

1) The Characteristics of Landownership

The landowner survey characteristics are as follows:

- a) The largest age-group of landowners belong to the 40's (38.1%), followed by 30's (24.7%), and 50's (13.4%).
- b) By profession, business operators have the largest share (25.8%), followed by office works (21.6) and housewives (18.6%).
- c) Most landowners (79.2%) obtained their land by personal purchases, with inheritance comprising 12.8%.
- d) 38.2% of landowner respondents were in possession of their land for a period of 11 to 15 years, 20.2% for 16-20 years.

This implies that most of the landowners purchased their land before the construction/land speculation boom of the late 1980's and early 1990's. However, 15.7% landowners purchased their land in the last 5 years.

- e) Residential use is dominant in the existing land uses of last lands.
- f) As for future land use, 46.2% want to keep as it is, 16% have no plans, and 17.9% plan development for commercial or housing. It is interesting to note that 11.3% of landowners indicated "*transfer or donate*". This may be interpreted that the landowners bought the lands with an intention to transfer their property to their descendants.

2) Remarks on the Problems and Development of the Project Area

- a) As for the problems in using and developing their land, most respondents claimed "*flood*" and "*road*" problems (no or poor access road) - 47.7%, 37.5% of landowners respectively,
- b) As many as 6.95% of those surveyed believe that infrastructure

improvements are necessary to resolve the problems listed above.

- c) 58.3% of landowners gave affirmative answers regarding an urban center should be developed in the project area.

3) Remarks about an L/R

- a) As many as 74% of the landowners agreed that an L/R is necessary for Thailand, with only 18.8% responding negatively.
- b) A total 60% of the landowners remarked they would cooperate with an L/R project, 26.9% responding positively, and 33% conditionally if a majority of landowners agreed.
- c) 52.7% of the respondents expressed an intention to participate in public meeting in preparation for the project. 16.8% responded no intention to participate.

In addition to the results of the survey, individual remarks expressed in the survey are summarized in **Table 3.4.43**.

(2) Social Acceptance

From the stand point of social acceptance of the L/R project, the social analysis results are outlined as follows:

- 1) The participating landowners are not farmers, but are residents who are likely to be knowledgeable about urban problems, and the necessity of land development and an L/R. Accordingly, it is suggested that there is a social basis where urban development through an L/R system is socially accepted.
- 2) Judging from the results of the opinion survey a majority of landowners are aware of the problems associated with the project area and also understand the necessity to resolve the problems.

More specifically, transportation (access problems) and flooding are major concerns, to which due consideration has been paid in the L/R planning. Therefore it may be safely said that the L/R planing will be well appreciated by the landowners.

- 3) As for the development concept of an L/R project, more than a half (58.3%) of the landowners recognize the preciousness of the land in the area and would be in favor of developing an urban center. However, it is also true that there are individual remarks, especially raised by the landowners who have already developed their sites for housing, indicating disagreements regarding this.

Table 3.4.43-Individual Remarks in the Opinion Survey

Positive	Negative
Question 1: Necessity of Infrastructure Improvement	
<ul style="list-style-type: none"> • Infrastructure service is a basic right of tax payer • Not solved alone • Preventing infectious diseases and traffic congestion • Providing access road and electricity • Creating comfortable life • No longer rural area, but urban center • Land value will rise • Some public services over the Bangkok must be provided 	<ul style="list-style-type: none"> • Already comfortable living • Select by landowner • Tendency of roads and expressway is not known • Lands already close to road • Already high value of land • Already regular shape of land
Question 2: Development of New Urban Center	
<ul style="list-style-type: none"> • Precious lands where a great CBD should be developed with a good plan • Located in the center of Bangkok (no idea of CBD) • High profits with systematic use of private/public lands • Open space affluent for development (a business center should have been developed) • Prevent traffic congestion and flood • Higher land value • To provide adequate public services • To help develop an urban center with housing area • Improve a poor land and poor access 	<ul style="list-style-type: none"> • Further congested in Bangkok • Urban center developed in suburban area • More suitable for residential area Government should mind only public facilities do no implement L/R • The more development the congestion
Question 3: Cooperation to L/R	
	<ul style="list-style-type: none"> • Already high value of land no need to increase more • Development should be in the up-country • Already developed as housing area • Lack of details on project • The government is taking up lands the landowner bought at high price • No intention to sell for profits • Only small parcel of land with no open space for L/R • Keep for children

(continued)

Question 4: Necessity of L/R in Thailand	<ul style="list-style-type: none"> • Already comfortable housing land • Government's duty to develop for the tax payer • What is the gain/lose of the landowner • Difficult problems to landowner • The project come late, already congested over
Question 5: Intention to Participate in the Meeting	
<ul style="list-style-type: none"> • If not busy • If on Sunday, holiday • If convenient place • If concerned with public/private profits 	<ul style="list-style-type: none"> • No time available • Already developed as community • Haven't got time schedule yet • Have only small land lot.
Question 6: Expectation of Profit from L/R	
<ol style="list-style-type: none"> 1. Thriving economic and public services 2. Good environment/park/public facilities 3. Solve traffic congestion and flood. Provision of drainage, water supply, electricity, telephone and access roads 4. High-priced land 5. Better right in land use 6. The land be developed systematically in a planned manner with good town plan 7. Achieve regular shape of land 8. Solve over crowded accommodation 9. Public sector save budget to pay for expropriation 10. The land kept as it is located, justice and no removal 11. Depend on the objectives of L/R complying with request of landowners 12. Thriving community 13. Small profit is expected and no more land for L/R 14. Develop in the under developed area for middle landowners 	
Question 7: Suggestion to L/R	
<ol style="list-style-type: none"> 1. There should be more details in public relations/ all media. 2. Good drainage system, meet standard in consideration of long-term problems to solve. 3. Contribution ratio should depend on a portion of landownership. Small lot with small ratio. 	

(continued)

Question 7: Suggestion to L/R	
<p>4. Solve traffic congestion and flood. Provision of public service facilities.</p> <p>5. Should complete the project quickly. Otherwise lands may be changed to other owners which might be difficult to manage.</p> <p>6. The project should be implemented in such areas as 1) with no access roads; 2) area of low-density residential; 3) under developed area; 4) business area and center; 5) rural area to spread development; and 6) open land and the area with agreement by most people.</p> <p>7. Do not develop in area where traffic congestion is caused, unbalanced population with land and environmental problems.</p> <p>8. Depend on government intention -high or low to conduct the project</p> <p>9. Private sector has more capital to invest than public sector even with more effectiveness.</p> <p>10. It is government duty to conduct the project to return income tax for doing the project for people.</p>	

- 4) Percentage of the landowners who gave affirmative answers to the questions regarding an L/R are shown in **Figure 3.4.46**. The following are the major findings.
- a) almost 100% of the landowners perceive the existence of problems in the project area (85.2% regarding transport and flood). However this figure drops to 69.5% and 58.3% respectively in regard to the more concrete question items such as the necessity of solving the problems or development (urban center) of the area.
 - b) While general questions on such items as necessity of an L/R in Thailand are likely to be favorably answered by a larger percentage (74%) of landowners, favorable answers to the questions on landowners' intentions to cooperate with the project and participate in meetings for project preparation appear to drop (69.5%, 58.3% respectively).
 - c) Two-thirds of the landowners think 20% to 30% is an appropriate contribution ratio, while very few (10.8%) think 40 to 50% appropriate.
- 5) Judging from the discussion above, it may be concluded that a majority of the landowners appear to be in favour of infrastructure improvement, urban center development and an L/R project.

However, a variety of individual opinions were presented. Although some of

them seem to derive from less knowledge and misunderstandings regarding an L/R system, there are many important opinions to consider.

In light of individual opinions expressed, lessons for an L/R project implementation can be derived as follows:

The landowners are not uniform in their opinions, can be described as bipolar opposites in such areas as follows:

1. Large lot landowners and small lot landowners
2. Developed lot landowners and undeveloped lot landowners
3. Landowners of lots close to the existing road and of lots with no or poor.
4. Different access road land uses for future
5. Different perceptions of government tasks

In the course of the project implementation the following measures must be considered without neglecting the opinions of the minority landowners.

1. Special measures for alleviating inconveniences and disadvantages which the minority may suffer.
2. Special measures for uniting the landowners with different interests.

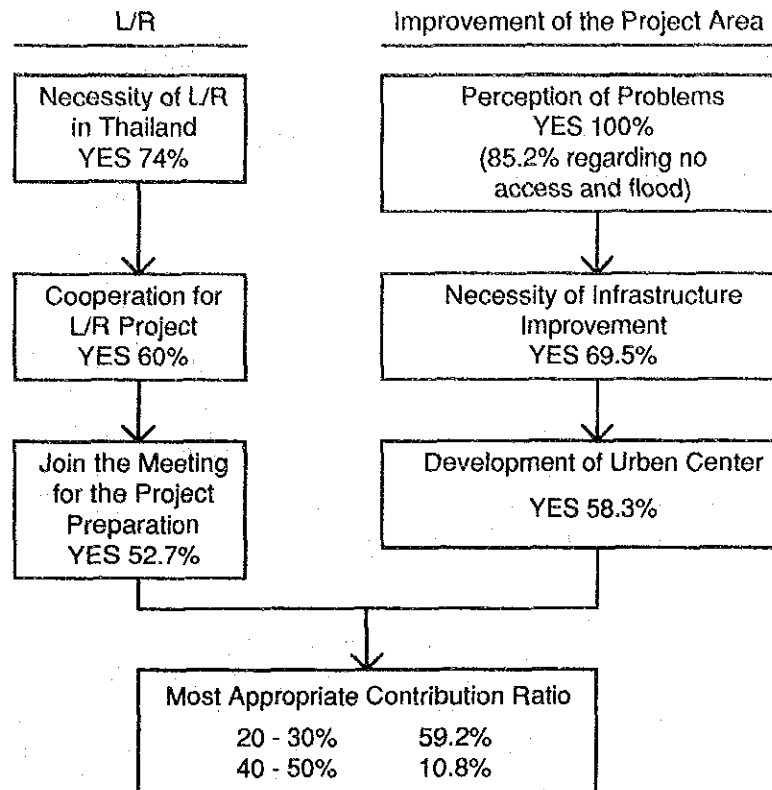
In short, a social coordination system through which all the landowners are brought together must be established for the successful implementation of the L/R project.

(3) Conclusion

- 1) Problems of the area, necessity of improvement and L/R are generally and conceptually understood by most landowners in the project area. This suggests that the L/R project will be accepted through the positive/enthusiastic approach of the government for persuading and convincing landowners.
- 2) Judging from the result of the opinion poll, acceptance of the concept plan, master plan and L/R project seem to receive more than half or a majority of the landowners. This suggests that the consensus of landowners is in favor of the project implementation.
- 3) On the other hand, due attention must be paid to opinions of the minority. It is admitted that in any good project, there is likely to be a few dissidents. Therefore, it may be necessary to establish a system so that the project implementation would not be put in an impasse due to a few dissidents.
- 4) Although the contribution ratio of 40 to 50 % is supported by some landowners in the survey, the percentage is quite small (10%).

Accordingly, it may be recommendable that the contribution ratio should be limited to not more than 4% for the purpose of gaining landowner support and cooperation.

Figure 3.4.49-Percentage of Affirmative Answers to the Questions Regarding L/R



6.5.3 Development Effect to Urban Socio-Economy of Bangkok

(1) Level and quality of improvement

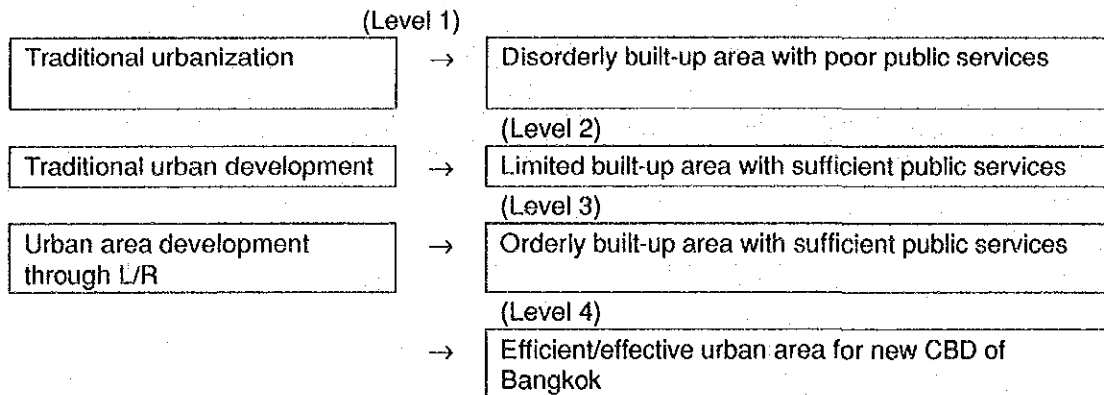
The effects of an urban development project varies depending upon the level and quality of improvements achieved.

As shown in **Figure 3.4.47** urban development in the project area will provide four levels of improvement. If/when the traditional urbanization proceeds without any measures taken in the project area, it is certain that disorderly built-up area with poor public services will emerge. Even if the traditional urban development system of land subdivision is applied in the project area, urban improvement will be quite limited in terms of land area to be developed and standard of public services. Subdivision projects are to sprawl like the patchwork of built-up areas with no integrated public service system covering all over the project area.

In contrast, an orderly built-up area with sufficient public services, namely high standard of public facilities, is attainable when urban area development is implemented through an L/R system. (Level 3)

Further more, urban area development through an L/R system for this project area is targeted at higher level of development (Level 4) as shown in the development plan formulated in the preceding chapter. A more effective and efficient urban area is to be developed in order to create modernized urban centers for the new CBD of Bangkok.

Figure 3.4.47-The 4 Levels of Improvement to the Project Area



Development effect of the project is the difference between level 1 and 3, or 4 in the socio-economic effects. Urbanization/building up or construction activities will surely take place in the project area with or without the project, in other words at all levels of development as listed above.

Therefore, socio-economic effects of urbanization cannot be attributed to one specific level of development among the four. Rather, development effects of the project are to accrue from the differences in effectiveness and efficiency of the level 1 to level 4 urbanization.

(2) Expected socio-economic effects

Through an upgrading of development from Level 1 to Level 4 as shown above, efficiencies will be improved in urban management. And the socio-economic effects are expected as the results of the improved efficiencies.

1) Socio-economic effects in urban management

1. Land resource management

Economic benefits are expected to be achieved through the improved efficiency of land utilization. In the project area, the L/R project shall create highly intensive urban area in good condition of the environment and public services, thus increasing the productivity of lands. The converse, urban sprawl equates to ineffective use of lands (Level 1) and waste precious land resources. Accordingly, economic benefit is due to accrue from avoiding the waste of land resources in Bangkok.

If urbanization at Level 1 as stated above in the project area takes place, additional lands must be wastefully used to accommodate the same amount of urban activities at Level 3 or 4 of development. The losses caused by the wasting of land resources are defined as the economic benefits of the L/R project (Level 3 and 4).

For example, the economic benefits are equivalent to agricultural product

of farm lands which might have been destroyed because of the additional land without the L/R project being implemented.

2. Public service management

a. Improved efficiency of public investment

Intensive urban development of an L/R in the project area is to improve efficiency of public investment for infrastructure. It is commonly known that infrastructure development is more economically efficient in the high-density urban area than in the low-density urban area spread over a broad area (because it must inefficiently cover the broader area in the latter). In this regard, intensive urban development is of great help to economize the infrastructure development in Bangkok.

b. Economic benefit in transport services

Economic benefit is expected in the following transport service areas.

- Alleviation of traffic congestion in/around the existing CBD by means of dispersing the urban center
- Reduction of access time and distance to work locations in the new CBD instead of the old CBD (People do not need to commute to and from working place through the congested CBD)
- Reduction of traffic accidents in the project area

c. Socio-economic effect in provision of housing and business site

It is one of the government's responsibilities and policies to encourage provision of housing and business sites for socio-economic development.

It is predicted that the L/R project will provide served lands and is effective to implement government policy for social and economic development of Bangkok.

d. Socio-economic effects through the improvement of environmental/sanitary conditions

It is apparent that compared to Level 1, significant improvement of environmental/sanitary conditions can be achieved in the Level 3 and 4 development. Socio-economic benefits can be found in the prevention of diseases and reduction of mortality. And also, improvement of fire prevention in the project area will yield

economic benefits.

3. Urban industrial development and management

The following effects are expected in the industrial development and management.

It is certain that productivity and efficiency of urban activities will increase in an orderly built up area with sufficient public services (Level 3) and CBD (Level 4), than in a disorderly congested area with poor public services (Level 1). It is expected that the improvement of productivity and efficiency of urban activities will advance the urban industries and economy of Bangkok.

- Direct and indirect economic effects of construction work and real estate business
- Economic effects, through improved efficiency of urban and business activities, and the improvement of the Bangkok industrial/economic structure.
- Economic effects of the provision of effective business sites for advanced urban industries such as international finance and trade, and others which otherwise would have failed to be located in Thailand and Bangkok without the new CBD.

2) Financial effect of government revenues

As a result of the economic effects as stated above, the volume of Bangkok industrial and economic activities shall be expanded, thus leading to an increase of government revenues from taxation.

The taxes which are expected to increase are classified as follows.

1. Property tax; land development tax

It is supposed that land value shall increase at the Level of 3 and 4 higher than that at the Level 1 of development.

Revenue from the property tax and land development tax collection is due to increase in accordance with the amount of increased land value.

2. Income tax (personal and corporate) and selected business tax

Transaction of lands and buildings in the project area shall be more activated and it shall increase in number and volume and in the total amount of property value.

Accordingly revenue from taxes imposed on transactions such as income tax (on land transfer) and selected business tax (on real estate business), shall be raised in proportion to the increased number and amount of value of property transactions.

7. L/R Project Implementation Plan Study

In the course of the L/R project implementation plan study, preconditions for an implementation plan formulation shall be compiled according to clause 7.1 Precondition of Project Implementation and proposal to stipulation of the implementation plan shall be compiled to clause 7.2 L/R Implementation Plan based on the proposal of the L/R legal system, and the examination of the master plan formulation.

7.1 Precondition of Project Implementation

Preconditions for the project implementation in the project area are administrative, financial, social, acknowledgement, and ascertainment of the project centers. Subjects concerned with the legal proposal of the above-mentioned preconditions for project implementation includes the condition of the preconditions and revisions have its changes among adjustment process later on through the examination of the master plan study.

(1) Implementation body

Implementation body of this project shall be proposed implementation by public sector. Following items examined focus on the relations between project type and the implementation body.

Following items are examined for the selection.

- In case of implementation by the private sector, the project has to have profit, in other words, it is absolutely necessary to manage revenue and expenditure. It is recommended that this implementation type is a small size of development and a small number of land owners, moreover, sale of reserve land will be sold smoothly.
- Public benefit comes before private benefit, if the project suits implementation of the private sector instead of implementation by public sector. On the other hand, the project area which is located in existing urbanized area, have many land titles and that main purpose of the project is to develop public facilities besides rare thought of profit applies implementation by public sector.
- However, implementation by the public sector for the purpose of a large number of housing and improvements of urban functions, for instance, development by the NHA is stressed regarding profit. Moreover, it is more flexible than implementation by the private sector because the profit is absorbed in the large scale of development.