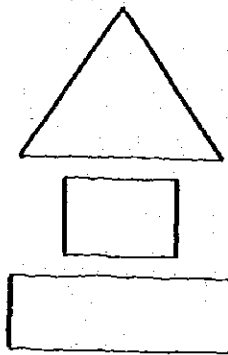


# How to Succeed to the Traditional Javanese Architectural Principle to the Future?

## CANDI

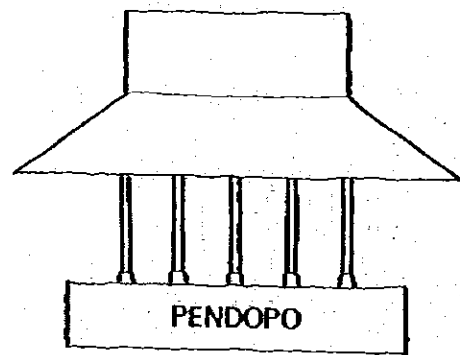


ARUPADATU

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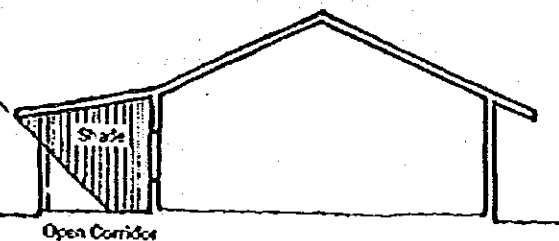
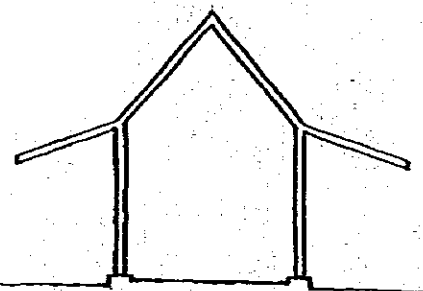
KAMADATU

## KRATON

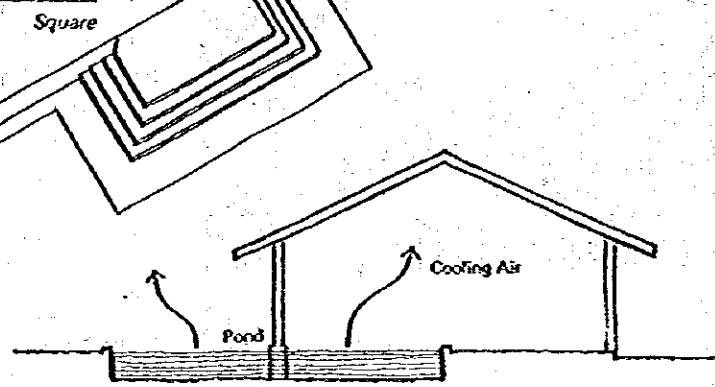
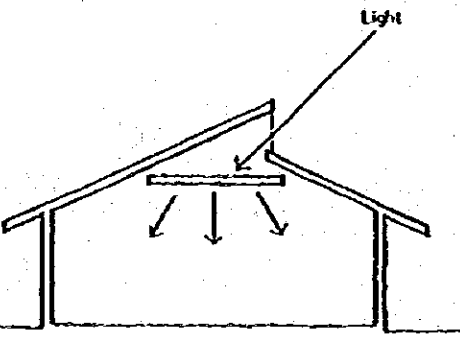
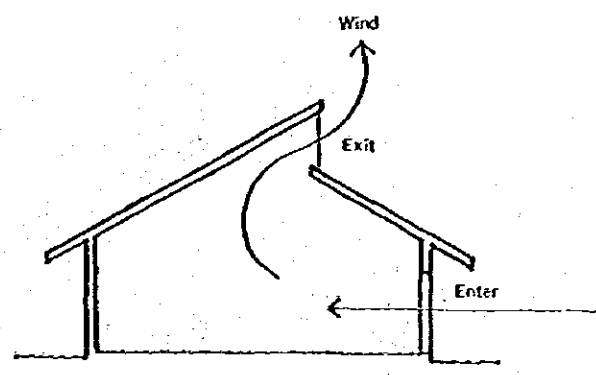
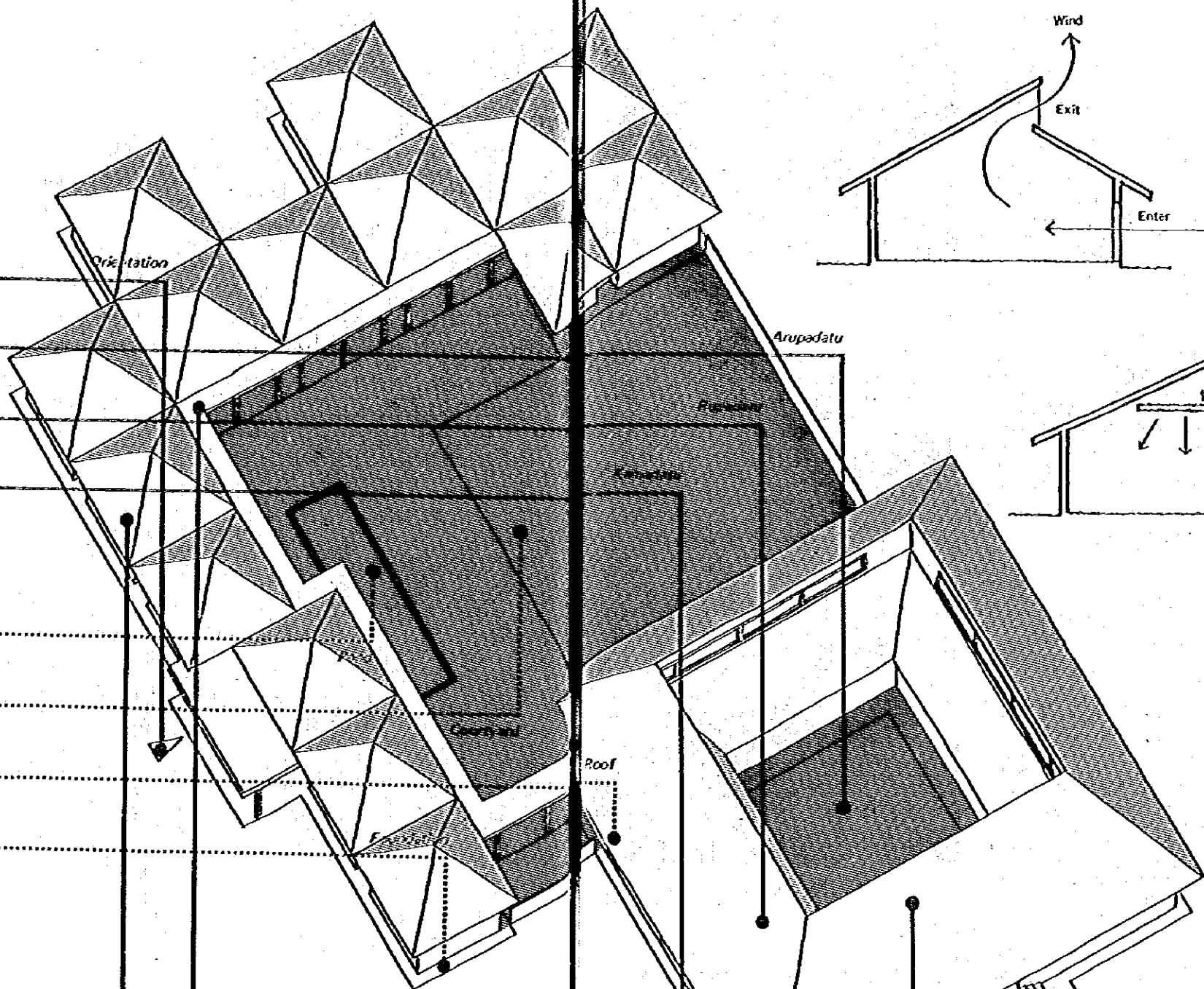


PENDOPO

## TRADITIONAL HOUSE



Open Corridor



## Facility Scheme

Facility Scheme of Museum Park  
 The building is especially designed for museum park and is suitable for museum exhibits and for visitors. With the facility for observers there is an outdoor museum. This consists of an exhibition room for the wind and a pond, and a visual room of the building can easily understand the structure of the building from the north and so forth. The building is designed to be a museum and a park. The building is designed to be a museum and a park. The building is designed to be a museum and a park.

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# Design Policy

Following is concerned about the basic idea on design and about the form, space and method of construction of the buildings, which would conduct the design policy and has been resulted from the observation and analysis on the Javanese climate, architecture and so on.

## Basic Consideration

### Climate and Construction

Jaya is characterized by a broad flat expanse dotted with palm, banana, and other groves interspread with fields and *padjas*. It is simple landscape with the trees serving to break the harsh sun and rain. These same climate considerations also account for the sharply sloping roofs, deep eaves, high ceilings, thick brick walls, cool tile floors, and other features of Javanese architecture. At the same time, the architecture uses locally available natural materials fashioned with simple methods.

### Space and Design in Javanese Architecture

The traditional wooden architecture uses straightline, symmetrical spaces, and the prototype may be found in Kraton Palace. These same sensibilities are also applied to the placement of buildings, courts, plazas and other outdoor spaces. While virtually all of the buildings are block surrounded by walls or block pillars and roofs alone for an open structure, these latter are spaces unique to festivals, ceremonies, assemblies, meetings, and other diverse activities fundamental to local social life. The most characteristic design is to have a creased roof, with the design of the roof varying widely depending upon the size and shape of the building.

## Principle of Design

- (1) The special environment of the archeological park demands a sophisticated harmony between the natural environment and the human environment. In this sense, the buildings should avoid large-scale, monumental structures and be based upon groupings of low-rise, smaller buildings to blend in better with the natural environment.
- (2) While the buildings must assure to comfort and satisfy the visitors favor, they must have consistency in their appearance as well as their form in view of the character of the park, by keeping down the sorts of decorating and printing materials as possible.
- (3) The facilities plan within this environment of preserving the historical monuments should utilize modern techniques for convenience and functionality but must at the same time, or even more importantly, reflect Javanese history and tradition.
- (4) From a technical aspect, this facilities plan must consider the natural conditions on Java, and especially the need for mitigating glare, insulating from heat, providing drainage, etc. Every effort is to be made to use locally produced materials. It is also important to shun mechanical means and to instead put the priority on employing local residents.

## Design Solution and Its System

### Building Unit

Facilities are composed of groups of building unit and courtyard, this to avoid each facility's emphasizing its own shape and to give a oneness and harmony as a whole.

Standard size of building unit area are 7m x 7m, 10m x 10m.

Although this may seem contradictory to what has been said in the sect on building units, the combination of two or three kinds of building units around each courtyard will give each a more attractive character in view of the fact that each of the planned facilities will have its own functions and spatial arrangement in accordance with them. Furthermore, because of such individuality, it is desirable that the reception hall of the guest house have the traditional architectural style known as "Pendopo", that the ceiling of the Archeological Museum be 5-6m high in view of the dimensions of the items on display and the exhibition space and that the design be appropriate to such spatial dimensions.



### Roof Design

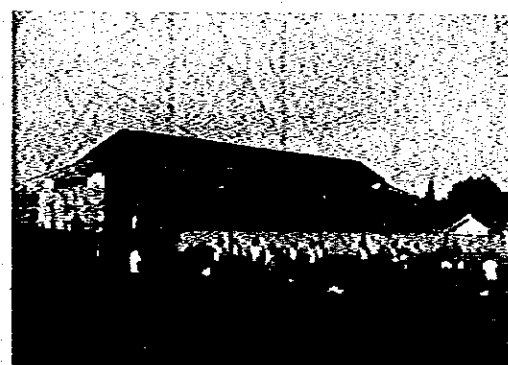
One of the most important elements in Facility design is a roofs and their sequence. Emphasis on the expression of roof design is needed and the deep eave for the open corridor wide covered terrace provides comfortable shade.

Adopted for the keynote of the roof design is the square type of roof which is ubiquitously found on central Java. (Exceptionally, the special kinds of roof design is provided for the Pendopo and the Museum, to make their internal spaces function at the most). Ceilings are set about 5-8m high, depending upon the unit scale of facilities.



### Structure

Standard unit is constructed of concrete post and beam and block buildings. The foundation work for it is planned to lay the cloth-type ones, with the prerequisite of over 10t of bearing capacity of soil. Floor space is in principle, set at the height of 30cm from the ground. Meanwhile, the noodle-type structure by the reinforced concrete is applied to for such large space construction, as the Information Center, Museum, Pendopo as well as for some part of the Guest House. Roof is assembled on top of the wall like a wooden hut without exception.



### Finishing

#### External finishing

- Roof - roofing tiles
- Wall - mortared plasters covered by stones for stone part.
- Floor - bricks or cemented tiles

#### Internal finishing

- Ceiling - finished at the hut assembly uncovered, or covered with teaks or the processed teak plate.
- Wall - plasters, or covered by the processed teak plate.
- Floor - covered by the tile on the cemented ground; wooden flooring is provided for some part.

Above is the most popular sort of finishing on Java.

#### Utility Service

- (1) Virtually all facilities are to be provided with security and maintenance lighting.
- (2) Telephones are to be located in the different facilities with the switchboard in the Park Corporation Office.
- (3) Stormwater drainage from each building shall be collected and discharged into the main stormwater drainage pipes or into open ditches.
- (4) For airconditioning, package type ones shall be introduced.

# Composition of Facilities and its Construction

Explanation about sorts and composition of facilities proposed by the plan and their operational bodies, and about outlines on the extent of construction of facilities within the park area and on the period of constructions.

## Definition of the term "Facility Site" and its area

Although a specific area for facilities is not to be separated by fence from other area in the Park, it is necessary to use the term "Facility Site" in this planning and implementation stages for the following reasons;

In the planning stage, it is easier to work out necessary changes and cost estimates of facility construction, because the term Facility Site can clarify the relation between the Site Plan, Landscape Plan and the Infrastructure Plan.

In the implementation stage, the term can clarify demarcation of the various types of construction and makes easy to work out changes and cost estimates of each construction works.

Some facilities have an independent function, which is not related to the general visitors. In such facilities, the Facility Site can provide proper space for those working in such facilities.

All facilities are managed and maintained under three Operation Bodies. The Facility Site can clarify the administrative area of each Body and provide clear demarcation for future reconstruction and extension works.

From the above mentioned reasons, the area for Facility Site is basically set at four times of the building space, with the building coverage rate of 25%.

## Facility Line-Up and Its Operation Body

The following facilities are proposed in accordance with the goals of the Park;

- Facility to function as a center for archeological study, research and restoration  
Borobudur Archeological Conservation Center (BACC)  
Prambanan Archeological Office (PAO)
  - Facility where the visitors can become acquainted with the ancient culture and the results of the excavation surveys  
Borobudur Archeological Museum  
Prambanan Archeological Museum
  - Facility to show traditional festivals in Java  
Ramayana Theater
  - Facility for proper administration and maintenance of the Park  
Park Operation Corporation Office  
Gate Facilities  
Guard Facility, etc.
  - Facility for visitor service  
Guest House  
Restaurants  
Kiosks  
Shelters
- Operation Body  
Government Agencies  
Park Operation Corporation  
Candidate to Private

The relation between these bodies and the visitors can be illustrated in the following Table;

| Operation Bodies     | User's classification  |  |                               |
|----------------------|--|--|-------------------------------|
|                      | Visitors   | POC staff  | Government staff              |
| Government Agencies  | Museums  | -  | BACC<br>PR Office             |
| POC                  | Entrance<br>Plazas<br>Visitor centers<br>Parkings<br>Toilets<br>Shelters | POC offices<br>Staff housing<br>Guard boxes<br>Maintenance shops | Guest house<br>(Gov't guests) |
| Candidate to Private | Restaurants<br>Souvenir shops<br>Kiosks<br>Ramayana theater              | -  | -                             |

Remarks: All construction works are done by the Park Authority.

### Facility List: Borobudur

|  | Building area (m <sup>2</sup> ) | Site area (m <sup>2</sup> ) | Operation body | Number of staffs | Main structures |
|--|---------------------------------|-----------------------------|----------------|------------------|-----------------|
| <b>Theme facilities;</b>                     |                                 |                             |                |                  |                 |
| Archeological museum (B.A.M.)                | 1,800                           | 7,200                       | G              | 15               | RC, W.          |
| Archeological conservation center (B.A.C.C.) | 1,200                           | 4,800                       | G              | 43               | B, W            |
| Guest house                                  | 1,300                           | 5,200                       | C              | 8                | RC, B, W        |
| <b>Operation facilities;</b>                 |                                 |                             |                |                  |                 |
| Park corporation office                      | 500                             | 2,000                       | C              | 40               | B, W            |
| Information center                           | 400                             | 1,600                       | C              | 11               | RC, W           |
| Ticket booth & entrance plaza                | 300                             | 10,000                      | C              |                  | W               |
| Maintenance shops                            | 600                             | 2,000                       | C              | 2                | B, W            |
| Guard boxes                                  | 100                             | 400                         | C              | 2                | W               |
| <b>Service facilities;</b>                   |                                 |                             |                |                  |                 |
| Restaurants                                  | 600                             | 2,400                       | P              |                  | B, W            |
| Souvenir shops                               | 450                             | 1,800                       | P              |                  | W               |
| Kiosks                                       | 105                             | 420                         | P              |                  | W               |
| Public toilets                               | 120                             | 480                         | C              |                  | B, W            |
| Shelters                                     | 350                             | 1,400                       | C              |                  | W               |
| <b>Total</b>                                 | <b>9,725</b>                    | <b>50,500</b>               |                |                  |                 |

### Facility List: Prambanan

|                               | Building area (m <sup>2</sup> ) | Site area (m <sup>2</sup> ) | Operation body | Number of staffs | Main structure |
|-------------------------------|---------------------------------|-----------------------------|----------------|------------------|----------------|
| <b>Theme facilities;</b>      |                                 |                             |                |                  |                |
| Ramayana theater              | 4,500                           | 18,000                      | P              |                  | RC             |
| Archeological museum (P.A.M.) | 900                             | 3,600                       | G              | 12               | RC, W          |
| Archeological office (P.O.M.) | 1,000                           | 6,400                       | G              | 42               | RC, B, W       |
| <b>Operation facilities;</b>  |                                 |                             |                |                  |                |
| Park corporation office       | 500                             | 2,000                       | C              | 40               | B, W           |
| Information center            | 400                             | 1,600                       | C              | 11               | RC, W          |
| Ticket booth & entrance plaza | 300                             | 10,000                      | C              |                  | W              |
| Maintenance shops             | 500                             | 2,000                       | C              | 2                | B, W           |
| Guard boxes                   | 100                             | 400                         | C              | 2                | W              |
| <b>Service facilities;</b>    |                                 |                             |                |                  |                |
| Restaurants                   | 600                             | 2,400                       | P              |                  | B, W           |
| Souvenir shops                | 450                             | 1,800                       | P              |                  | W              |
| Kiosks                        | 105                             | 420                         | P              |                  | W              |
| Public toilets                | 120                             | 480                         | C              |                  | B, W           |
| Shelters                      | 350                             | 1,400                       | C              |                  | W              |
| <b>Total</b>                  | <b>9,725</b>                    | <b>50,500</b>               |                |                  |                |

## Sphere of Facility Construction

### Demarcation with the Basic Site Work

The Basic Site Work of the Park as a whole includes that of the Facility Site and is outside the sphere of facility construction works. But the ground making and gardening works are within the sphere of facility construction.

### Demarcation with the Landscape Work

While the tall and middle height trees in the Facility Site are in the sphere of Landscape works, the pond, pavement, shrubs, loan, benches are to be included in the facility construction works.

### Demarcation with the Utility Work

Water supply, sewerage and refuse disposal system, including the pipings within the Site, are to be included in the facility construction works. The secondary distribution lines of electricity within the Site are also included in the facility construction works.

Operation body C = Corporation body G = Government body  
P = Private  
Structure RC = Reinforced concrete B = Brick  
W = Wood

# Determination of Facilities Scale

Observed and analyzed the character and object of facilities as well as their operation and management, and made as tables by evaluation the determination standards for the planned scale of facilities.

- (2) Another way of determining facility scale is on the basis of visitor activity simulations, as in the case of shelters, kiosks, and souvenir shops.
- (3) Park administration facilities, scale has been determined on the basis of the number of personnel that will work there: Park Operation Offices, gate facilities, staff housing, maintenance shops.
- (4) Facilities such as the following have had their scales determined on the basis of future projections of present activities or already formulated programs: SPABA Subcenter, Borobudur Archeological Conservation Center, Amphitheater, and Prambanan Archeological Office.

The scale of facilities is determined on the basis of their characters, as follows:

- (1) The scale of some facilities has been determined on the basis of the anticipated number of visitors as in case of Restaurants, Public Toilet.

Table on the Scale Determination

|                  | BACC PAO  | BAM PAM   | Guest House  | Ramayana Theater   | Park Operation Office  |
|------------------|---|---|--|--|--|
| Proposition      | Determined on the estimated size demand on the basis of the Organization and Manpower Program (1982-1983).  | Scale of operation capacity is determined to meet the maximum number of visitors expected in a certain time on each day in the season of 1983.  | In view of the character of this park, capacity for 50-150 persons is determined on the basis of the anticipated U/V, not of the public visitors, and the activities by specific groups, i.e., various conferences, events and so on.  | Scale of the preparatory room, stage, etc., is worked at present level in the historical area. While a large number about 400-500 at present, the seat capacity at 2 is 2,000 seats, expanding the effect by the development of park.  | Determined on the estimated size demand on the basis of the Organization and Manpower Program. The scale is to meet the expected scope of the park in 1983, as well.       |
| Parking Criteria | Office area 5-7 m/person<br>Library 10-12 m/person<br>Conference room 2-4 m/person<br>Lecturer 2-4 m/person<br>Dining room 10-12 m/person                 | Peak number of visitors:<br>Borobudur 14,250 person<br>Prambanan 8,350 person<br>Total of use 26 %<br>Turnover 5-6 m/person<br>Unit scale 3 m/person  | Guest room 24-50 m/person<br>Restaurant 3-4 m/person<br>Conference room 2-4 m/person<br>Reception 15-3 m/person<br>Office 5-7 m/person   | Address area 68-63 m <sup>2</sup> /area<br>Stage 77m <sup>2</sup> (50x15)  | Office area 5-7 m/person<br>Library 10-12 m/person<br>Dining room 10-12 m/person<br>Office 5-7 m/person  |
| Space Supply     | BACC<br>Office block<br>Library   | Borobudur<br>14,250 x 0.25 = 600 person<br>Prambanan<br>8,350 x 0.25 = 300 person<br>300 x 3 = 900m <sup>2</sup>  | Guest room<br>42.8 x 3 + 30.5 x 3 + 24.5 x 3 = 433m <sup>2</sup><br>Restaurant<br>3 x 40 = 120m <sup>2</sup><br>Conference room<br>2 x 50 = 100m <sup>2</sup><br>Reception<br>15 x 150 = 2250m <sup>2</sup><br>Lobby Front, Lounge, Office<br>361m <sup>2</sup> = 20%<br>Other<br>Total area 1,338 m <sup>2</sup>                        | Address area<br>68 x 2,000 = 1,360 person<br>Office<br>Total 2,826m <sup>2</sup>   |  |
| Specification    |   | Rate of use - visitors are consist of Foreign visitors 5%, Student 25%, Domestic visitor 70% (Est. 1983-1984)<br><br>4% of Foreign visitors, 8% of Students, 1% of Domestic visitors, That is 75% of total number of visitors visit Museum.                           | For the number of guest rooms, capacity for 10-15 person is planned to accommodate about 16 business visiting the SPABA Subcenter, and other anticipated U/V.  |  |  |
| Proposition      | Ticket Booth<br>The scale is estimated to manage the number of visitors expected on Sunday in the season of 1983.   | Guard boxes<br>To deal with the anticipated number of visitors in 1983, 20 guides and parkers are to be provided on the basis of work in two shifts a day.  | Facilities<br>Designed to manage the anticipated number of visitors in 1983. Facilities are naturally to be expanded upon the increase of its customers. And for the reason that facilities are to be run by the entered private management, such concept of economic rate of use must be introduced to meet the managerial feasibility. | Shelters, Kiosks, Souvenir Shops<br>Allocated to each block on the basis of visitor capacity to meet the anticipated number of visitors on Sunday in the season of 1983.   | Toilet<br>Determined on the anticipated number of visitors on Sunday in the season of 1983, considering those who would be in the Museum, Restaurant and other facilities. |
| Parking Criteria | Visitor per the site maximum 80-120 m <sup>2</sup> /area  | Unit scale 6-10 m/person<br>(10-15 out of 35 guards and parkers are supposed to be distributed at the Guard box)  | Annual number of day visitors Borobudur 2,750,000 person<br>Prambanan 1,540,000<br>Rate of use 10-15 %<br>Turnover 6 m <sup>2</sup> /day<br>Economic rate of use<br>Unit scale 154-176<br>3 m <sup>2</sup> /unit   | Unit scale Borobudur 11shelter 10 m <sup>2</sup><br>11.5-2nd Borobud 15 m <sup>2</sup><br>1 shelter 15 m <sup>2</sup><br>1 souvenir shop 15 m <sup>2</sup>   | Borobudur 12,500 + 8,500 = 21,000 person<br>Prambanan 7,500 + 2,500 = 10,000 person<br>Rate of use 0.78 - 0.81<br>Unit scale 25 m <sup>2</sup> /person                     |
| Space Supply     | Two ticket inspection will be placed at one booth, by which to manage 20-30 visitors at each booth.   | Borobudur<br>Guard box 40m <sup>2</sup> x 1<br>Secretary 30m <sup>2</sup> x 1<br>Dignitary 30m <sup>2</sup> x 1<br>Prambanan<br>Guard box 40m <sup>2</sup> x 1<br>Secretary 30m <sup>2</sup> x 1<br>Dignitary 30m <sup>2</sup> x 1<br>Grand Stew 20m <sup>2</sup> x 1 | Borobudur<br>2,250 x 0.25 = 562.5 = 300 person<br>Prambanan 1,540,000 x 0.25 = 385,000<br>6 x 153-175 = 918<br>200 x 3 = 600m <sup>2</sup><br><br>This formula are given by the Director General of National Park  | Borobudur<br>shelter 10<br>Kiosk<br>Guard box 5<br>Secretary 15<br>Museum area 2<br>Dignitary 3<br>Reception area 8<br><br>Prambanan<br>shelter 10<br>Kiosk<br>Guard box 5<br>Secretary 15<br>Museum area 2<br>Dignitary 3<br>Reception area 8<br><br>Prambanan<br>5,000 + 8,000 - 0.81 = 45 person<br>45 x 25 = 1125m <sup>2</sup><br>Parking area 40 x 1 m <sup>2</sup><br>Guard box 40 x 1<br>Secretary 40 x 1<br>Reception area 40 x 1 |  |
| Specification    | "Ticket booth 30m <sup>2</sup> ", mentioned in the Facility List, covers the total space for seats and areas required for the guards including the booth. |   | 30 souvenir shops are provided for each parking block.   |  |  |

# Cost Estimates

Showing the idea on estimating the construction costs, setting their clear scope, and making the tables.

Category-classification of Facilities according to the general specifications

For the cost estimates, facilities are classified as follows according to their general specifications;

The construction cost (cost per unit/m<sup>2</sup>) of each Class and their percentages to the overall construction cost are shown in the table

The cost is estimated on the basis of Class-B Facility as a standard, with the reference to "Ketentuan - Ketentuan Klasifikasi Gedung Kantor Pemerintah Tahun 1977/78" and other materials, as well as our on-the-spot survey.

The figure in the Table shows only the construction cost and does not include designing cost or other expenses for various technical investigations.

The foundation is supposed to be relatively firm and expected to have bearing capacity 10 ton/m<sup>2</sup>.

As for the Ramayana Theater, the stage is considered to be a building, whereas the audience seat is a kind of plaza. The cost estimate for the Theater includes that of pavement and chairs in this plaza, and is converted into a unit cost.

The shelter, kiosk, etc. in Class-C include bench and kitchen units. In the case of toilet, it does not include pots or other utilities.

## Facility Site Gardening

Classification of the construction cost of Facility Site gardening is as follows according to its specifications;

## Facility site gardening:

**Class-A (1,000- 2,000 Rp/m<sup>2</sup>)** Ground cover plants and some trees around the facility, some hard surface is included.

**Class-B (3,000- 4,000 Rp/m<sup>2</sup>)** Ground cover plants and some trees and shrubs around the facility. Hard surface and level changes, some other gardening water surface. Outdoor furniture are included.

**Class-C (7,000-17,000 Rp/m<sup>2</sup>)** Trees and shrub, hard surface outdoor furniture, these are relatively in high quality to be designed.

## Category-classification of Construction Cost:

(Unit: 1,000 Rp.)

|                                | Class A        | Class B        | Class C        | Class D        |
|--------------------------------|----------------|----------------|----------------|----------------|
| Unit cost (Rp/m <sup>2</sup> ) | 120-130        | 100            | 70-80          | 40-60          |
| Structure                      | 40-45 (35%)    | 36 (35%)       | 30-35 (40-43%) | 20-25 (10-50%) |
| Finishing                      | 40-45 (35-40%) | 36-40 (35-40%) | 25 (30%)       | 20-30 (50%)    |
| Utility service                | 25 (20%)       | 20 (20%)       | 15-20 (20-25%) | 5 (8-10%)      |
| Airconditioning                | 15-20 (15%)    | 5-10 (10%)     |                |                |

## Category-Classification of Facilities

| Facilities                           | Class-A  | Class-B  | Class-C  | Class-D  |
|--------------------------------------|--|--|--|--|
| Archaeological museum<br>Guest house | Archeological museum<br>Guest house                        | P.C.O.<br>Information center<br>B.A.C.C., P.A.O.<br>Staff House                  | Restaurant<br>Gate facility                    | Kiosk, Shelter<br>Souvenir shop<br>Toilet, etc.                                    |
| Outline and finish                   | Composed of wide rooms. Some rooms need special interiors. | Relatively large number of rooms which separated by wall and finish for ceiling. | Small number of rooms and open system facility | Open system facility with no walls, only roof                                      |
| Structure                            | Relatively long span in its structure and large scale.     | Designed as having an economic-span structure<br>Rc and block buildings          | Similar to B<br>Rc and block buildings         | Small scale and simple wooden structure<br>Wooden house only toilet in block built |
| Utility service                      | Utility service with air-conditioning                      | Utility service partially air-conditioned  | Utility service only                           | Partially with utility service   |

## Facility Cost: Borobudur

(Unit cost = 1,000Rp., Construction cost = million Rp.)

|  | Building<br>Unit cost<br>(Rp/m <sup>2</sup> ) | Construction<br>cost | Facility site gardening<br>Unit cost<br>(Rp/m <sup>2</sup> ) | Construction<br>cost | Total<br>construction<br>cost | Development<br>year |
|--|---|----------------------|--|----------------------|-------------------------------|---------------------|
| <b>Theme facilities:</b>                     |   |                      |  |                      |                               |                     |
| Archeological museum (B.A.M.)                | 130   | 234.0                | 4  | 28.8                 | 262.8                         | 1982-83             |
| Archeological conservation center (B.A.C.C.) | 100   | 120.0                | 4  | 19.2                 | 139.2                         | 1984-85             |
| Guest house                                  | 120   | 156.0                | 4  | 20.8                 | 176.8                         | 1986-87             |
| <b>Operation facilities:</b>                 |   |                      |  |                      |                               |                     |
| Park corporation office                      | 100   | 50.0                 | 2  | 4.0                  | 54.0                          | 1981-82             |
| Information center                           | 100   | 40.0                 | 2  | 3.2                  | 43.2                          | 1981-82             |
| Entrance plaza                               | 70  | 21.0                 | 7  | 70.0                 | 91.0                          | 1981-82             |
| Maintenance shops                            | 40  | 20.0                 | 2  | 4.0                  | 24.0                          | 1982, 83            |
| Staff housing                                | 100   | 600.0                | 2  | 4.8                  | 64.8                          | 1983                |
| Guard boxes                                  | 40  | 4.0                  | 2  | 0.8                  | 4.8                           | 1982, 83            |
| <b>Service facilities:</b>                   |   |                      |  |                      |                               |                     |
| Restaurants                                  | 80  | 72.0                 | 4  | 14.4                 | 86.4                          | 1982, 83            |
| Souvenir shops                               | 40  | 18.0                 | 4  | 7.2                  | 25.2                          | 1982, 83            |
| Kiosks                                       | 40  | 6.0                  | 2  | 1.2                  | 7.2                           | 1982, 85, 88        |
| Public toilets                               | 50  | 9.0                  | 2  | 1.4                  | 10.4                          | 1982, 85, 88        |
| Shelters                                     | 40  | 16.0                 | 2  | 3.2                  | 19.2                          | 1982, 85, 88        |
| <b>Total</b>                                 | -   | 826.0                | -  | 183.0                | 1,009.0                       |                     |

## Facility Cost: Prambanan

(Unit cost = 1,000Rp., Construction cost = million Rp.)

|                               | Building<br>Unit cost<br>(Rp/m <sup>2</sup> ) | Construction<br>cost | Facility site gardening<br>Unit cost<br>(Rp/m <sup>2</sup> ) | Construction<br>cost | Total<br>construction<br>cost | Development<br>year |
|-------------------------------|---|----------------------|--|----------------------|-------------------------------|---------------------|
| <b>Theme facilities:</b>      |   |                      |  |                      |                               |                     |
| Ramayana theater              | 100   | 440.0                | 4  | 72.0                 | 512.0                         | 1984-85             |
| Archeological museum (P.A.M.) | 130   | 117.0                | 4  | 14.4                 | 131.4                         | 1981-82             |
| Archeological office          | 100   | 100.0                | 3  | 19.0                 | 119.0                         | 1981-82             |
| <b>Operation facilities:</b>  |   |                      |  |                      |                               |                     |
| Park corporation office       | 100   | 50.0                 | 2  | 4.0                  | 54.0                          | 1982-83             |
| Information center            | 100   | 40.0                 | 2  | 3.2                  | 43.2                          | 1982-83             |
| Entrance plaza                | 70  | 21.0                 | 7  | 70.0                 | 91.0                          | 1982-83             |
| Maintenance shops             | 40  | 20.0                 | 2  | 4.0                  | 24.0                          | 1983, 88            |
| Guard boxes                   | 40  | 4.0                  | 2  | 0.8                  | 4.8                           | 1983, 88            |
| <b>Service facilities:</b>    |   |                      |  |                      |                               |                     |
| Restaurants                   | 80  | 43.0                 | 4  | 9.6                  | 57.6                          | 1983, 88            |
| Souvenir shops                | 40  | 18.0                 | 4  | 7.2                  | 25.2                          | 1983, 88            |
| Kiosks                        | 40  | 4.2                  | 2  | 0.8                  | 5.0                           | 1983, 85, 88        |
| Public toilets                | 50  | 6.0                  | 2  | 1.0                  | 7.0                           | 1983, 85, 88        |
| Shelters                      | 40  | 14.0                 | 2  | 2.8                  | 16.8                          | 1983, 85, 88        |
| <b>Total</b>                  | -   | 822.2                | -  | 208.8                | 1,031.0                       |                     |

# Building Catalog-1 Borobudur Archeological Museum

This facility will consist of three pavilions, one commemorating the great feat of restoration of Candi Borobudur through film, model, and other presentations regarding the restoration process itself, the results achieved, and the modern technical methods employed, another with displays regarding the candi as it originally stood in the 8th century after its mysterious birth as well as its religious, historical, and cultural background, and still another with presentations on the subject of the various archeological discoveries, restoration work, etc. since Raffles's discovery in 1814. The facility will have a total floor space of 1,800m<sup>2</sup> and will be able to accommodate about 600 persons at a time. In the center court enclosed by the pavilions will be displayed Buddhist statues and other valuable archeological items as a place where visitors can rest and relax among grass, flowers, and trees. The pavilions will consist of small architectural units incorporating Javanese architectural style, and the space of the facility, including the courtyard will be like the traditional space of Kraton.

Location: Museum area in Borobudur Park  
 Scale: Building area - 1,800m<sup>2</sup>  
 Site area -- 7,200m<sup>2</sup>  
 Development year: 1984-1985  
 Capacity of Exhibition Place:  
 Total 600 persons at one time  
 Exhibition Hall: 341 person  
 (3m<sup>2</sup>/person x 341 person = 1,023m<sup>2</sup>)  
 Exhibition Courtyard: 269 person  
 (3m<sup>2</sup>/person x 270 person = 808m<sup>2</sup>)

## General Technical Descriptions

For exhibition rooms, special installations and equipments may be required to protect the exhibited materials from hazard. However, such special items may be required are not included in the "Scope of Work" and shall be determined upon the decision of final requirements by the authorities concerned.

General technical descriptions are as follows:

Structural system  
 Main structure: Reinforced concrete post & beam  
 Roof structure: Wooden Trass

## Finish

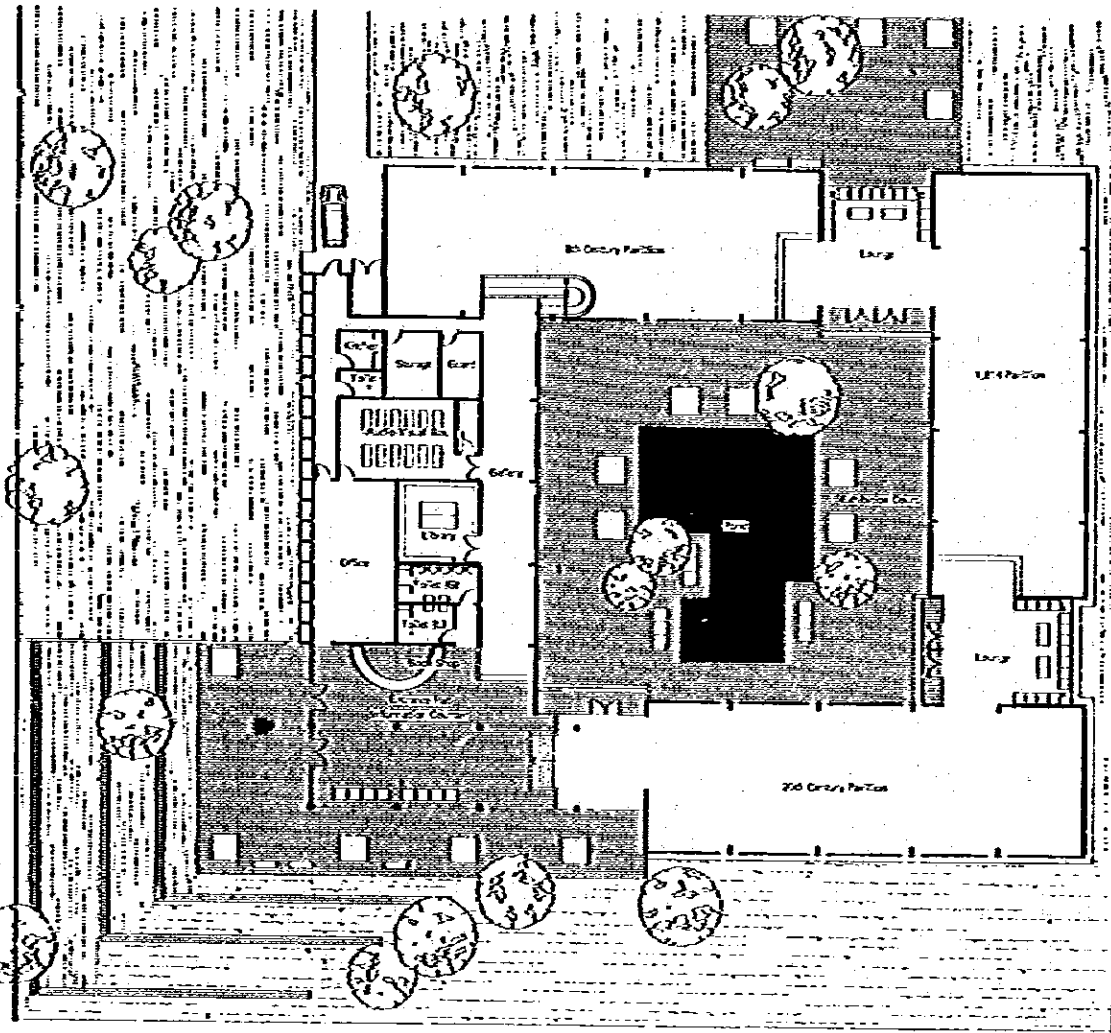
Exterior  
 Roof Roofing tile  
 Wall Plastering  
 Floor of open corridor and terrace  
 flooring Clay brick flooring

Interior  
 Ceiling Suspended ceiling with teak wood  
 band plumbing  
 Wall Plastering  
 Floor Mosaic pattern terrazzo tile

Air conditioning  
 All rooms are supplied air conditioning

## Floor Area

|                       |                           |
|-----------------------|---------------------------|
| 8th century Pavilion  | 341m <sup>2</sup>         |
| 1814 Pavilion         | 341                       |
| 20th century Pavilion | 341                       |
| Gallery               | 108                       |
| Audiovisual room      | 63                        |
| Library               | 36                        |
| Lounge, entrance hall | 381                       |
| Others                | 203                       |
| <b>Total</b>          | <b>1,814m<sup>2</sup></b> |



B-Section



C-Section

# Building Catalog-2 Borobudur Archeological Conservation Center

This will be a facility for comprehensive research on all scientific aspects of archeological restoration work, including petrography, chemistry, and microbiology and for carrying out surveys, research, excavations, etc. in the Borobudur area.

It will be reorganized from the present Borobudur Restoration Office when that facility is relocated after the restoration work is completed and will also serve as an international archeological training center. According to plans, it is to have a floor space of 1,200m<sup>2</sup> and accommodate approximate fifty personnel, including research workers, trainees, and office staff. The structures for the different functions of the facility will enclose a quiet inner courtyard with grass, flowers, and trees as beautiful space reminiscent of ancient Java.

Location: Research/Education area in Borobudur Park  
 Scale: Building area - 1,200m<sup>2</sup>  
 Site area: - 4,800m<sup>2</sup>  
 Development year: 1984-1985  
 Man power  
 Program Total 48 persons

## General Technical Descriptions

For laboratories, special installations, equipments, and services may be required in accordance with the real function of each laboratory.

However, such special items may be required are not included in the "Scope of Work" and shall be determined upon the decision of final requirements by the authorities concerned.

General technical descriptions are as follows:

Structural system  
 Main structure: Concrete block masonry  
 Roof structure: Wooden trass

## Finish

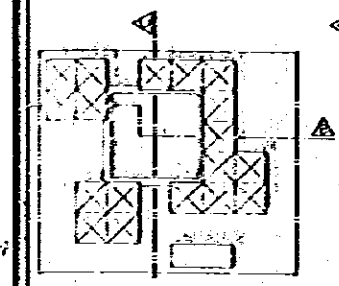
Exterior  
 Roof Roofing tile  
 Wall Plastering  
 Floor of open corridor and terrace  
 Clay brick flooring

Interior  
 Ceiling Suspended ceiling with ply wood boarding painted by oil painting  
 Wall plastering  
 Floor Mosaic pattern terrazzo tile

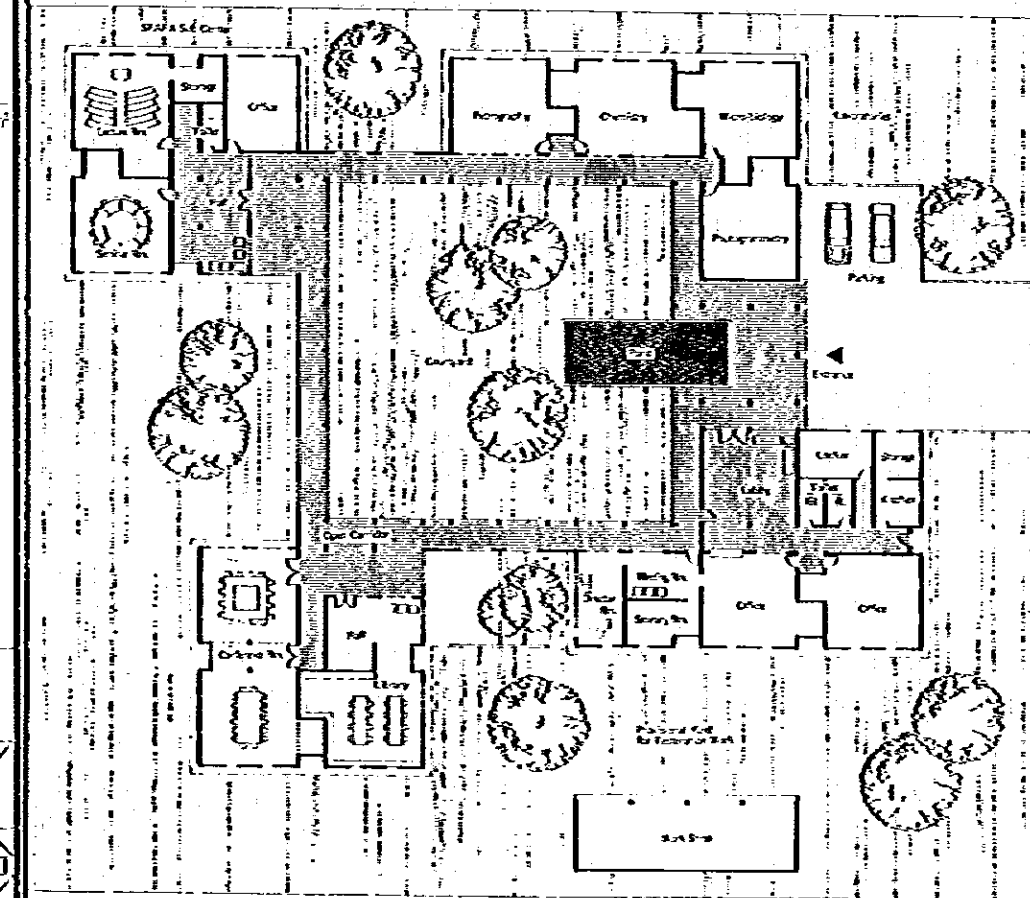
Air conditioning  
 Rooms as follows are supplied air conditioning  
 Office rm., Director's rm., Conference rm. and Library

## Floor Area and Manpower Allocation

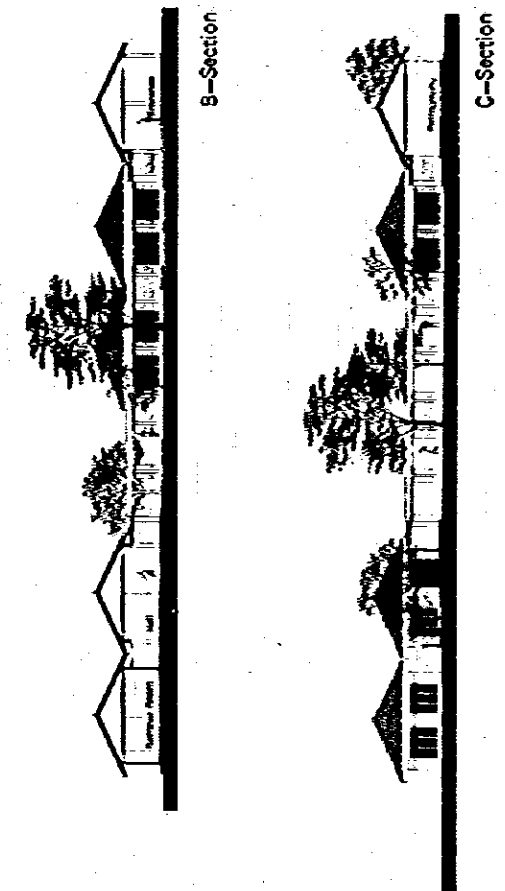
|                          |            |                    |
|--------------------------|------------|--------------------|
| Director                 | 1 person   | 24.5m <sup>2</sup> |
| Secretariat              | 2 persons  | 38.5               |
| Administrator department | 18 persons | 115                |
| Restoration department   |            |                    |
| Maintenance department   |            |                    |
| Documentation department |            |                    |
| Laboratory               | 17 persons | 229                |
| SPAFA office             | 7 persons  | 228                |
| Lecture room             | 16 persons | 56                 |
| Seminar room             | 16 persons | 54.5               |
| Library                  |            | 93                 |
| Conference room          |            | 116.4              |



Key Plan



A-Section



# Building Catalog-3 Guest House

This facility will serve as reception, conference for states guests, research personnel, and other visitors. It will consist of 1 large reception hall for 200 people, 3 conference room for 80 people, 1 restaurant for 60 people.

Location: Research/Education area in Borobudur Park  
 Scale: 1,300m<sup>2</sup>  
 Development year: 1986-1987

## General Technical Descriptions

Structural system  
 Main structure: Reinforced concrete post & beam for Public sector  
 Concrete block masonry for guest room sector

Roof structure: Wooden truss

### Finish

Exterior:  
 Roof: Roofing tile  
 Wall: Plastering  
 Floor of open corridor and terrace: Clay brick flooring

### Interior:

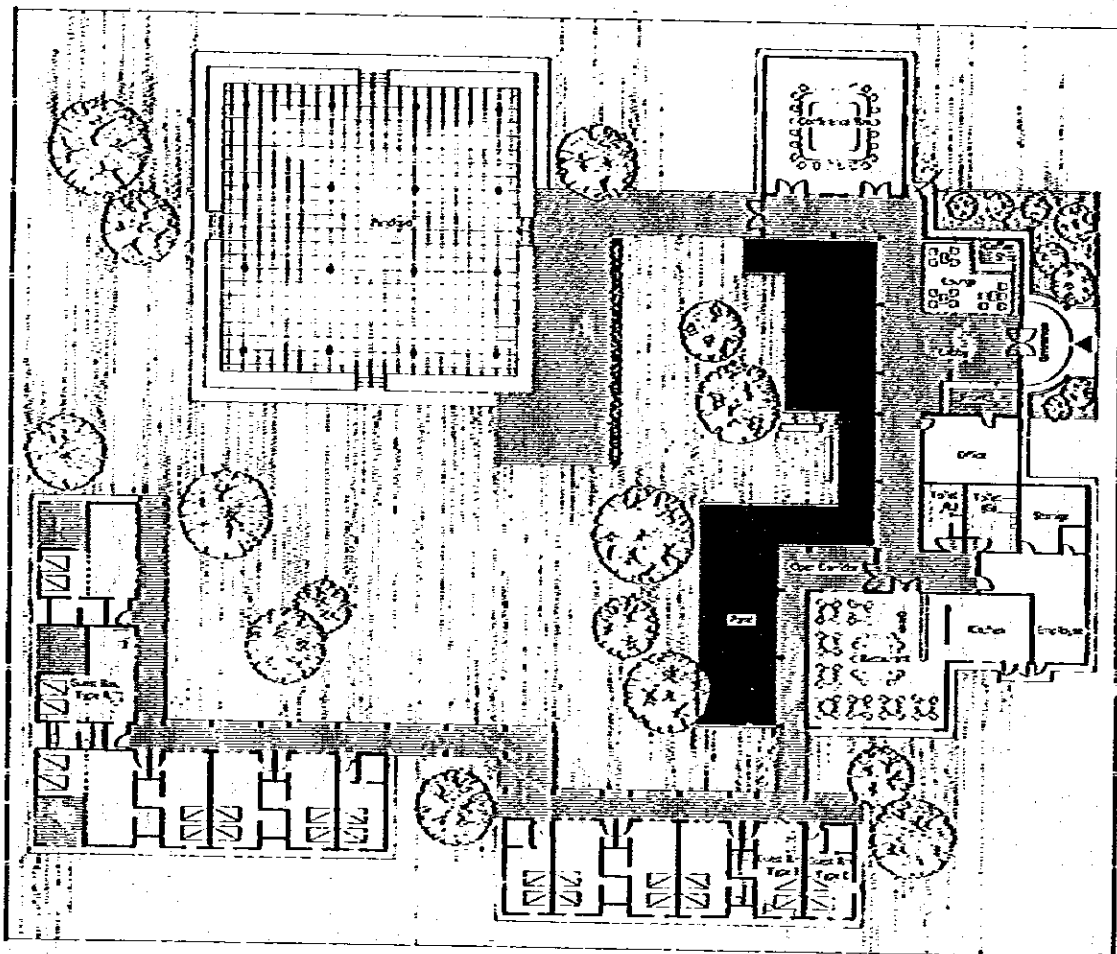
Ceiling: Suspended ceiling with teak wood board plumbing  
 Wall: Plastering partly wall cloth  
 Floor: Mosaic pattern terrazzo tile

### Air conditioning

All rooms without kitchen and employee's room are supplied air conditioning

### Floor Area and Manpower Allocation

|                                |                     |              |
|--------------------------------|---------------------|--------------|
| Guest room                     | Total 13 rooms      |              |
| Type A x 3                     | for 3 persons       | 49.5         |
| Type B x 7                     | for 2 persons       | 30.5         |
| Type C x 3                     | for 2 persons       | 24.5         |
| Restaurant                     | for 45 seats        | 130          |
| Conference                     | for 100 persons     | 100          |
| Pendopo                        | for 150-200 persons | 324          |
| Lobby, Front, Lounge, Corridor |                     | 200          |
| Others                         |                     | 248          |
| <b>Total</b>                   |                     | <b>1,338</b> |



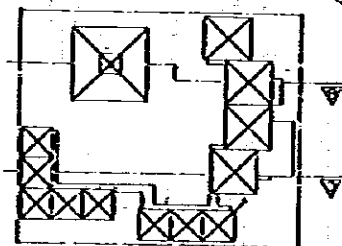
A-Elevation



B-Section



C-Section



# Building Catalog-4 Ramayana Theater

The Ramayana Theater presently on the south side of Candi Loro Jonggrang is to be replaced by a new one on the west bank of the Opak River. The new theater, which will be able to hold 2,400 spectators, will be used not only for six regular Ramaya festivals held each year but also for periodical public performances of traditional dancing, music, and performing arts of the central Java area in order to further enhance the attractiveness of the Prambanan park while at the same time serving as a core facility for the preservation, and passing on to future generations, of such traditional arts. Once again the lights of the theater will go on this evening as the gamelan players begin to tune their instruments.

Location: Ramayana theater area in Prambanan  
 Scale: 4,400m<sup>2</sup>, Site area 18,000m<sup>2</sup>  
 Development year: 1984-1985

## General Technical Descriptions

The stage and stage lightings are designed same as existing in terms of dimension and system in order to meet requirements of the traditional performance.

General technical descriptions are as follows:

### Structural system

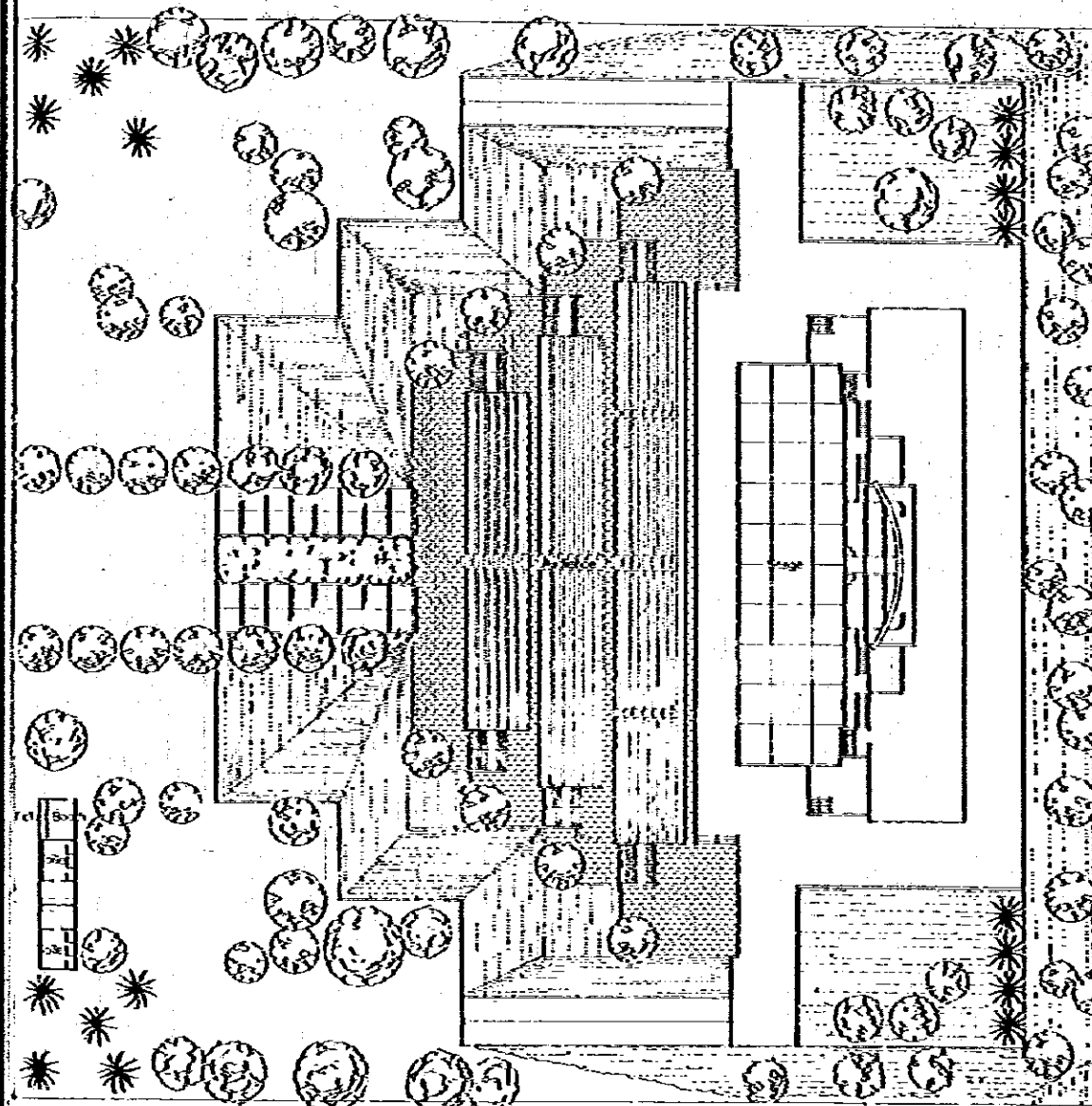
Stage: Reinforced concrete  
 Audience area: Concrete slab on grade

No. of seat: 2,400

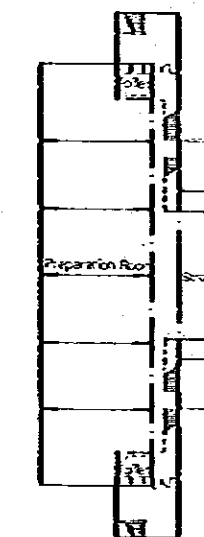
### Floor Area

|                       |                     |
|-----------------------|---------------------|
| Audience seats        | 2,665m <sup>2</sup> |
| Stage                 | 726                 |
| Preparation rm.       | 910                 |
| Ticket booth & toilet | 100                 |

**Total** 4,400m<sup>2</sup>



Plan



Preparation Floor Plan



# Building Catalog-5 Prambanan Archeological Museum and Office

## Prambanan Archeological Museum (P.A.M.)

The exhibits at this facility, employing films, posters, models, and other communicative techniques, will describe religious, historical, cultural, and technical aspects of the numerous archeological ruins to be found in the Prambanan area, most notably Candi Loro Jonggrang and Candi Sewu, in order to enhance peoples appreciation and understanding of Central Java culture through study of these monuments that still have quite a few unsolved mysteries. The initial floor space is to be 900m<sup>2</sup>, but it will be necessary to increase it later on in view of the vast amount of material that will have to be displayed.

## Prambanan Archeological Office (P.A.O.)

This office, which will serve as a branch archeological office of the Ministry of Education and Culture in the Central Java area, will be in charge of administrative, research, and all other aspects of management of the many archeological ruins to be found through the area, including maintenance, excavation, systematic investigation and documentation, and publicity and public relations activities regarding such research. It will replace the facility presently located on the grounds of Candi Loro Jonggrang.

Location: Research/Education area in Prambanan  
 Scale: Floor area - 1,900m<sup>2</sup>  
 Site area - 10,000m<sup>2</sup>  
 Development year: 1981-1982

Capacity of Exhibition Place  
 Total persons at one time  
 Exhibition Hall: 341 persons  
 (3m<sup>2</sup>/person x 252 persons = 756m<sup>2</sup>)  
 Exhibition Court: 75 persons  
 (3m<sup>2</sup>/person x 75 persons = 225m<sup>2</sup>)

### General Technical Descriptions

Note for museum: same as B.A.M.

Structural system  
 Main structure: Reinforced concrete post & beam  
 Roof structure: Wooden trass

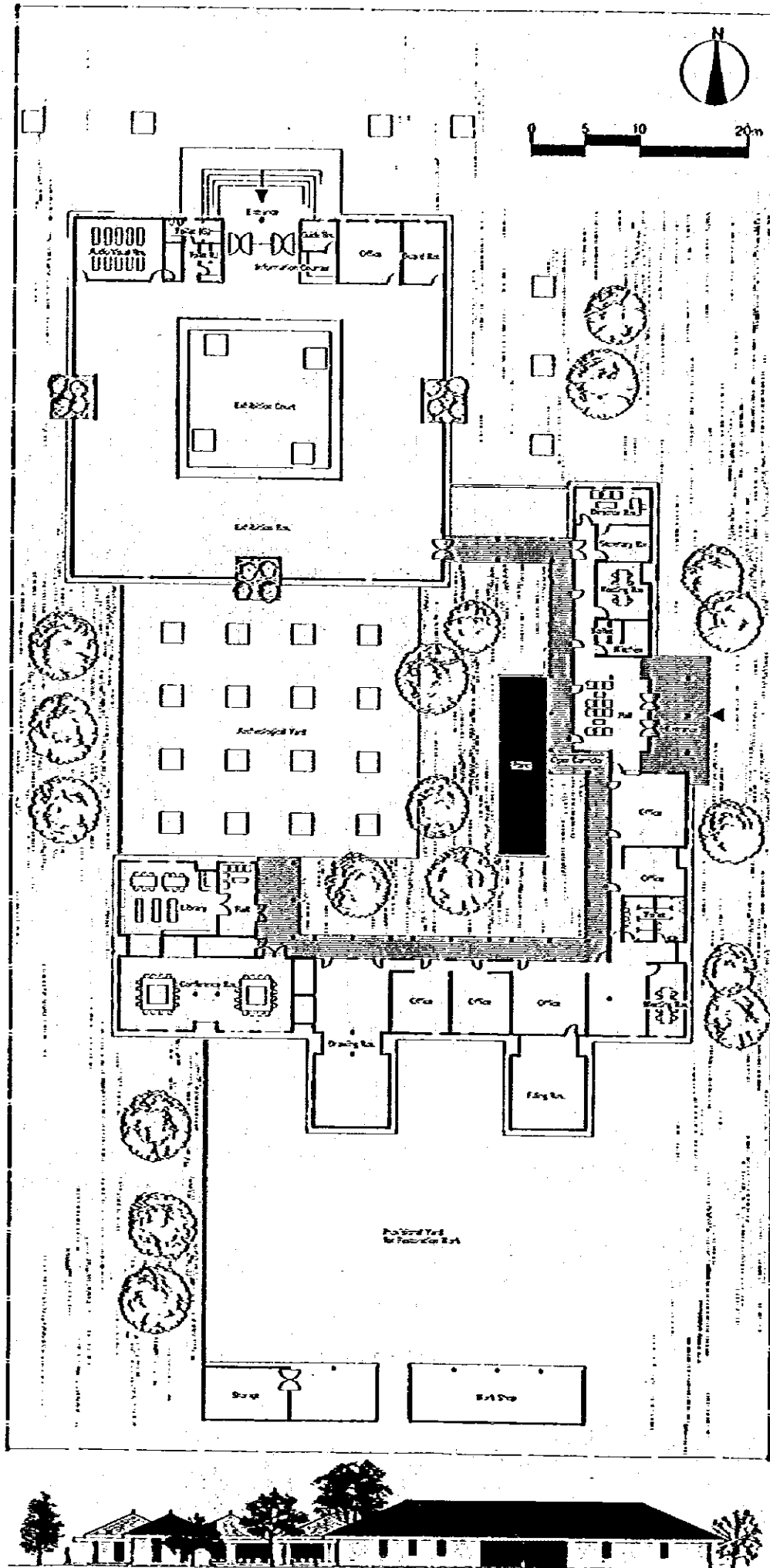
Finish  
 Exterior  
 Roof: Roofing tile  
 Wall: Plastering  
 Floor of open corridor and terrace  
 Clay brick flooring

Interior  
 Ceiling: Suspended ceiling with teak wood board plumbing  
 Wall: Plastering  
 Floor: Mosaic pattern terrazzo tile

Air conditioning:  
 Rooms as follows are supplied air conditioning:  
 Director's rm., Conference rm. and Library

### Floor Area and Manpower Allocation

|                        |                  |                           |
|------------------------|------------------|---------------------------|
| P.A.M.                 | Total 12 persons | 900m <sup>2</sup>         |
| P.A.O.                 | Total 42 persons |                           |
| Director               | 1 person         | 24.5m <sup>2</sup>        |
| Secretariat            | 1 person         | 17.5                      |
| Administrator division | 12 persons       | 76                        |
| Documentation division |                  |                           |
| Restoration division   | 13 persons       | 104                       |
| Drawing division       | 12 persons       | 120                       |
| Library                |                  | 92                        |
| Conference             |                  | 116                       |
| Others                 |                  | 485                       |
| <b>Total</b>           |                  | <b>1,935m<sup>2</sup></b> |



# Building Catalog-6 Park Corporation Office and Information Center

## Park Corporation Office (P.C.O.)

The Park Corporation Office is the facility that will be in charge of all park operational and management matters. It will organize and hold various events seasonal or religious in nature and concerning traditional culture and art, including special festivals, as well as engage in park publicity and public relations and information collection and other similar activities. At the same time, it will have a security function involving guard service and patrols.

## Information Center

This facility includes an information room, guide room, first aid office, and other functions giving information services to visitors.

Location: Concourse, O/M are in Borobudur Park, Prambanan Park  
 Scale: Floor area - 900m<sup>2</sup>  
 Site area - 3,600m<sup>2</sup>  
 Development year: 1982-1983

### General Technical Description

Structural system  
 Main structure: Reinforced concrete post & beam  
 Concrete block masonry for office  
 Roof structure: Wooden trass

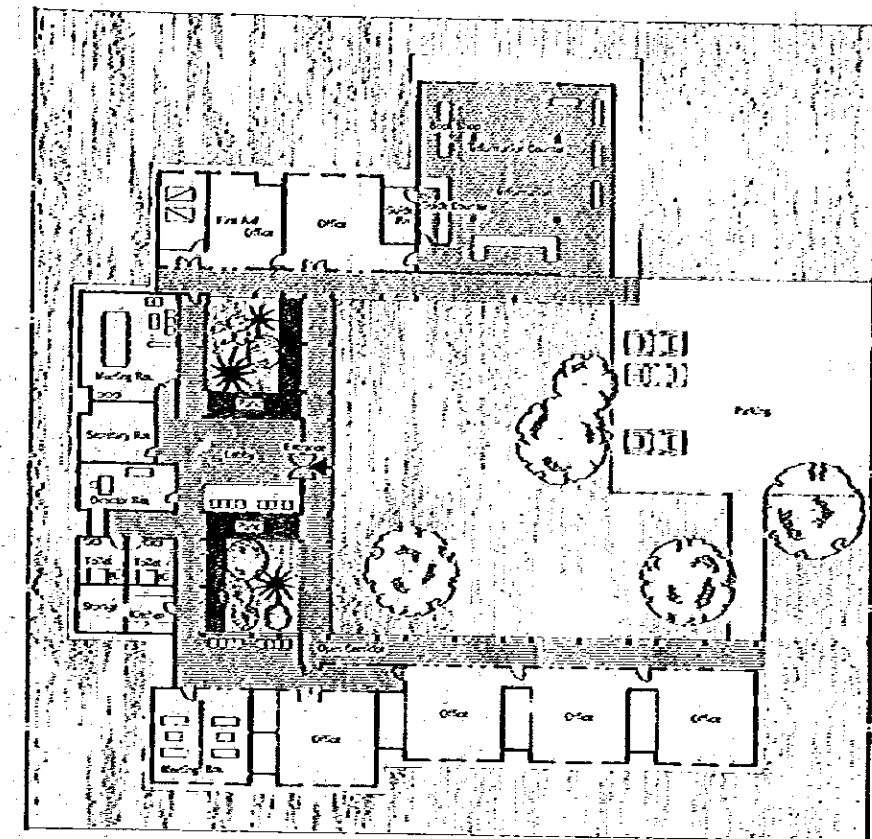
Finish  
 Exterior  
 Roof: Roofing tile  
 Wall: Plastering  
 Floor of open corridor and terrace  
 Clay brick flooring

Interior  
 Ceiling: Suspended ceiling with ply wood oil painting  
 Wall: Plastering

Air conditioning  
 Rooms as follows are supplied air conditioning  
 Director's rm. and Meeting rm.

### Floor Area and Manpower Allocation

|                    |                  |                   |
|--------------------|------------------|-------------------|
| P.C.O.             | Total 40 persons | 610m <sup>2</sup> |
| Information center | 11 persons       | 321m <sup>2</sup> |



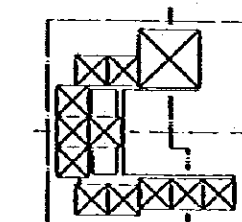
A-Section



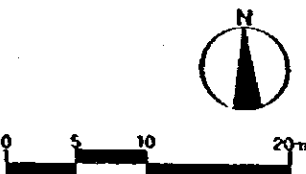
B-Section



C-Section



Key Plan

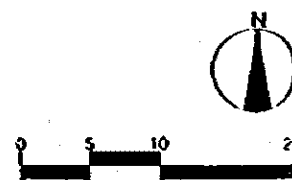
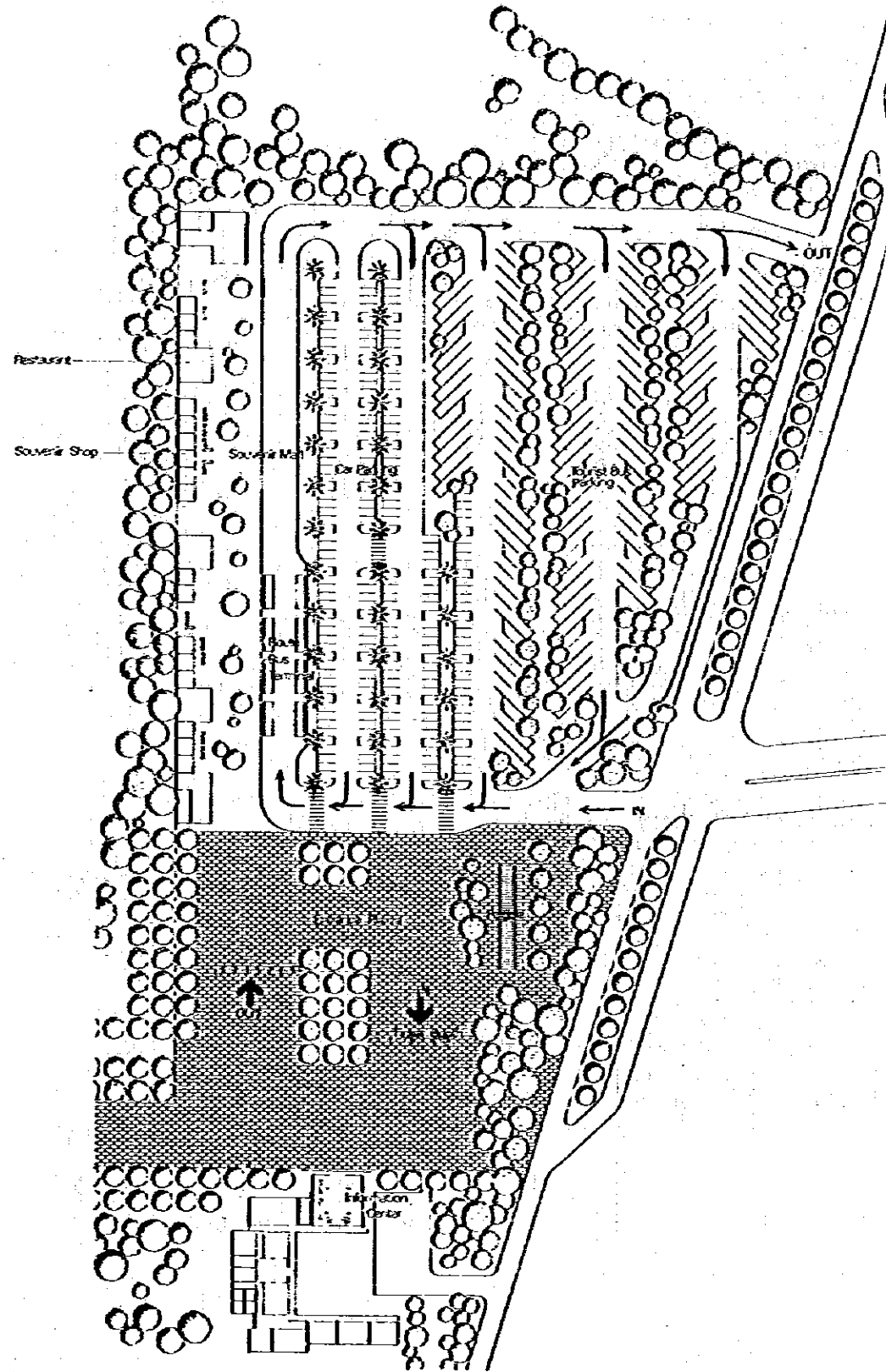


## Building Catalog-7 Borobudur Entrance Complex

This will be space for visitors, on the way back from the park, nesting, meals, refreshments and drinks can be served and souvenirs can be sold and this will consist restaurants for 100 visitors each, 15 souvenir shops, 15 refreshments and drinks shops and 10 shelters for resting.

Location: Parking Area in Borobudur Park  
 Development year: Restaurants, Souvenir shops  
 Public toilets 1983-1988  
 Parking 1982-1983, 1987-1988

| Scale            | Building area     | Facility site area   |
|------------------|-------------------|----------------------|
| Restaurant       | 900m <sup>2</sup> | 3,600m <sup>2</sup>  |
| Souvenir shops   | 450               | 1,800                |
| Public toilet    | 60                | 240                  |
| Shelter          | 100               | 400                  |
| Parking          | Total area        | 22,415m <sup>2</sup> |
| Parking capacity |                   |                      |
| Bus              | 121               |                      |
| Passenger's car  | 201               |                      |
| Route bus        | 10 berths         |                      |

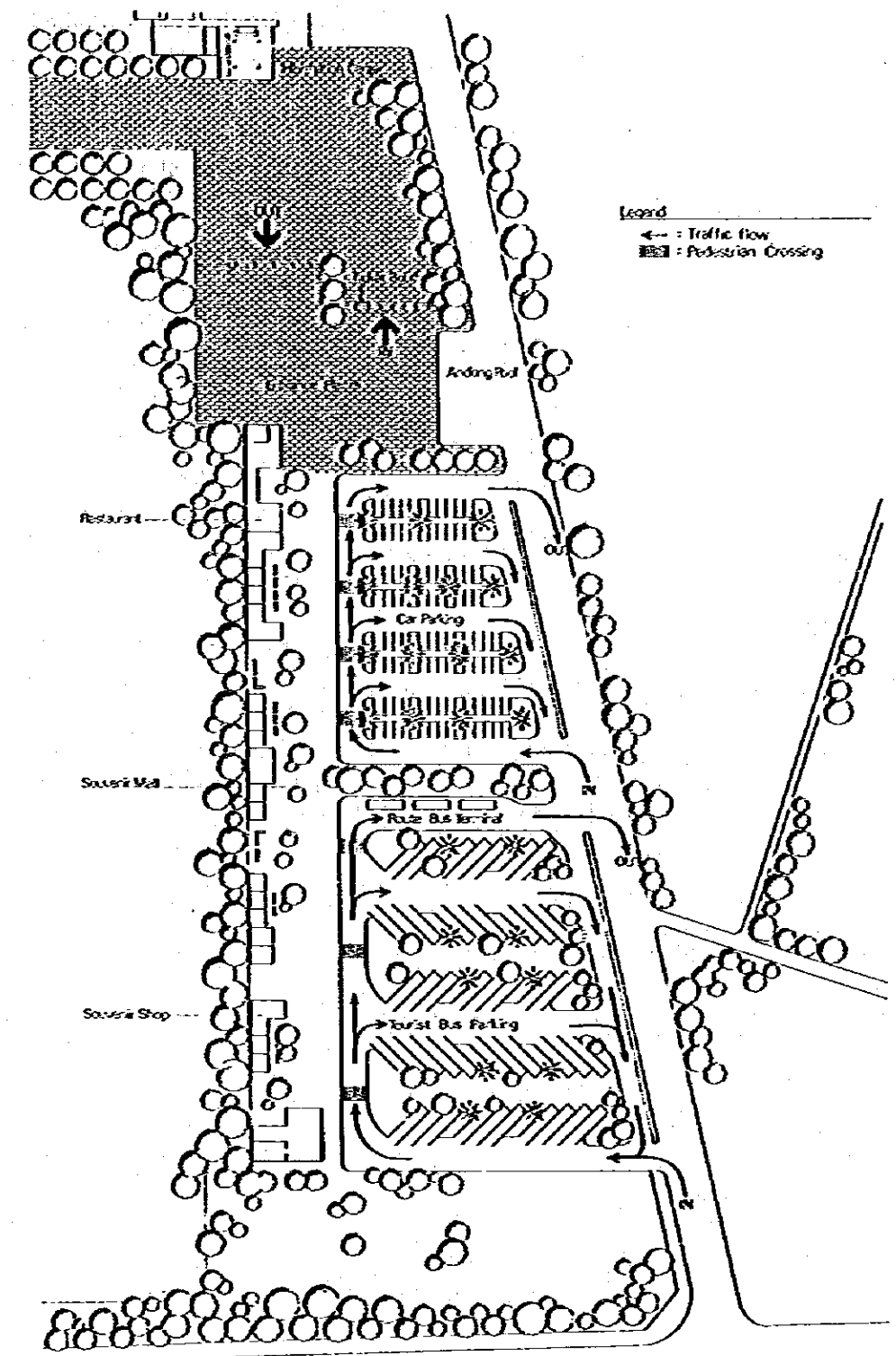


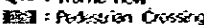
## Building Catalog-8 Prambanan Entrance Complex

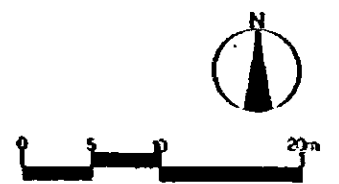
This will be space for visitors, on the way back from the park, nesting, meals, refreshments and drinks can be served and souvenirs can be sold and this will consist restaurants for 100 visitors each, 15 souvenir shops, 15 refreshments and drinks shops and 10 shelters for resting.

Location: Parking Area in Prambanan Park  
 Development year: Restaurants, Souvenir shops  
 Public toilets 1983-1988  
 Parking 1982-1983, 1987-1988

| Scale            | Building area     | Facility site area   |
|------------------|-------------------|----------------------|
| Restaurant       | 600m <sup>2</sup> | 2,400m <sup>2</sup>  |
| Souvenir shops   | 450               | 1,800                |
| Public toilet    | 40                | 160                  |
| Shelter          | 100               | 400                  |
| Parking          | Total area        | 12,665m <sup>2</sup> |
| Parking capacity |                   |                      |
| Bus              | 45                |                      |
| Passenger's car  | 90                |                      |
| Route bus        | 3 berths          |                      |



Legend  
 ← : Traffic flow  
 : Pedestrian Crossing



# Utility

This section contains utility plan consideration from a technical perspective of the establishment of the various facilities below to be constructed to ensure the functioning of the various park facilities in the Borobudur and Prambanan park areas.

- (1) Water supply system
- (2) Sewerage system
- (3) Refuse disposal system
- (4) Electric power supply system
- (5) Telephone system

## Water Supply System

Water supply system consists of feed system, reservoir tank and supply system. Feed system must meet seasonal fluctuation that is, 1.7 times of average demand through the year. Reservoir tank must meet seasonal and weekly fluctuation, that is 4 times of average demand. Supply system must meet seasonal, weekly and daily fluctuation. It is assumed that one-fourth of daily demand is spent in a peak hour. Demand of water is calculated as follows.

|  | Borobudur | Prambanan |
|--|-----------|-----------|
| Seasonal peak (m <sup>3</sup> /day)        | 318       | 275       |
| Weekly peak of above (m <sup>3</sup> /day) | 610       | 456       |
| Daily peak of above (m <sup>3</sup> /hour) | 153       | 114       |

## Alternatives of Water Supply System

There are three kinds of means to supply water, elevated tank system, pressurized tank system and tankless system. In pressurized tank system, troubles often occur and its maintenance is not easy. Tankless system is under development. Elevated tank system is easy to maintain, and it easily meets big fluctuation of demand. So elevated tank system is recommended in the park area. Capacity of reservoir tank should be 1.6 times of maximum demand considering further future demand.

## Water Supply System: Borobudur

It is reported that water from deep well (60m) is slightly salty. The spring of Ngrajeg village has already been used by Candi Borobudur Restoration Office. The quality of the spring seems suitable for potable water. It is reported the flow of the spring is approximately 180 l/sec (10,800 l/min). The demand of this park area is only 220 l/min. Therefore, this spring can be recommended as water source of the park area. 100ϕ(4") diameter pipe which has been already installed by the Borobudur Restoration Office may be used as a part of feed pipe. It is recommended to install elevated reservoir tank of 1,000m<sup>3</sup> capacity underground on the top of Dagi Hill from aesthetic aspect. 200ϕ(8") diameter pipe is to be used for main supply pipe.

## Water Supply System: Prambanan

In Yogyakarta, deep well is used to water supply system. So deep well is recommended as water source of the park area. For feed pipe, 100ϕ diameter pipe is necessary. It is recommended to install elevated reservoir tank of 800m<sup>3</sup> capacity underground on the top of Kraton Hill from aesthetic point of view. 250ϕ(10") diameter pipe is used for supply pipe.

## Sewerage System

### Estimation of Sewerage Demand

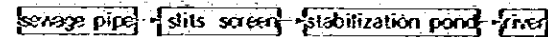
For sewerage system, seasonal fluctuation should be considered. Amount of sewage is calculated as follows. It is assumed that 90% of supplied water for visitor who use facilities, and staff and 80% of supplied water for visitor who don't use facilities, becomes sewage.

- Borobudur 196m<sup>3</sup>/day
- Prambanan 139m<sup>3</sup>/day

### Sewerage System

As sewerage system, individual septic tank system, centralized treatment plant system, and centralized stabilization pond system are considered. Centralized stabilization pond system is found to be most economical excluding land acquisition cost and easiest to maintain.

The process of treatment is as follows:



In Borobudur area, stabilization pond of capacity 200m<sup>3</sup>/day, and in Prambanan area, that of capacity 150m<sup>3</sup>/day is planned.

## Refuse Disposal System

### Amount of Refuse

At present, efficient re-use is made of paper, clothing, and other articles in Indonesian daily life so that relatively small volumes of refuse are generated. The refuse generated from this plan has been calculated using the following standards.

|         | Standard (kg/person) | Borobudur (t/day) | Prambanan (t/day) |
|---------|----------------------|-------------------|-------------------|
| Visitor | 0.1                  | 1.67              | 0.95              |
| Staff   | 0.2                  | 0.06              | 0.06              |
| Total   |                      | 1.73              | 1.01              |

### Basic Considerations

There are three kinds of refuse disposal system, incineration system, composting system and reclamation system.

Initial equipment cost of incineration is highest and air pollution by it can't be neglected. It does not harmonize with environment. Sanitary land fill system is the simplest and cheapest method, if land can be acquired at reasonable price.

Refuse from the park area does not contain harmful materials so it should be utilized to regional agriculture. Therefore garbage and waste paper should be land-filled and composted. Re-usable waste bottle, waste can and waste plastics should be selected and the rest should be reclaimed.

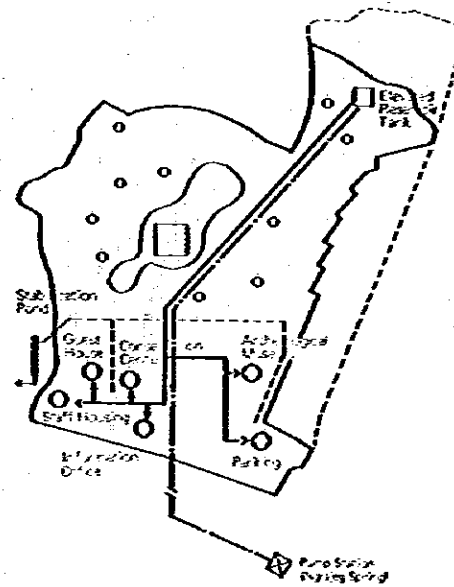
### Refuse Disposal System

Two kinds of trash box, that is, trash box for garbage and waste paper, and trash box for waste bottle waste can and waste plastics are arranged in the park area. Two kinds of refuse are collected separately by collection car and they are carried to refuse disposal yard. There, refuse is classified perfectly into two kinds by workers. Garbage and waste paper are carried to sanitary land-fill yard and by trench method they are finally composted. Produced compost is used to agriculture. Re-usable bottle, can and plastics are selected and they are sold. The rest is reclaimed. Refuse stock yard, refuse selection yard and sanitary land fill yard are arranged together in a refuse disposal yard. Most frequent direction of wind is south west so refuse disposal yard should be arranged in north-east direction of the park. For reclamation, suitable hallowed ground should be selected.

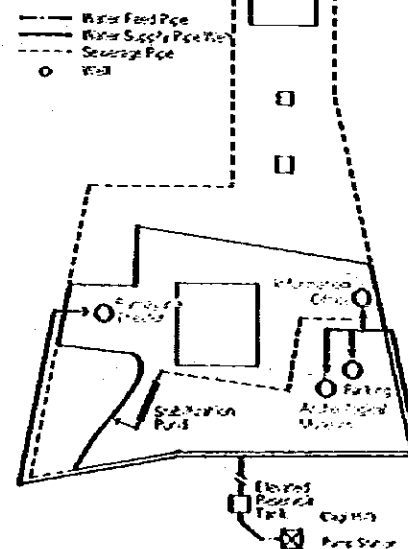
## Cost Estimates

| Items                                     | (unit: million Rp.) |            |
|---|---------------------|------------|
|   | Borobudur           | Prambanan  |
| <b>Water supply:</b>                      |                     |            |
| Deep well                                 | -                   | 6          |
| Pumping station                           | 9                   | 10         |
| Feed pipe                                 | 5                   | 8          |
| Reservoir tank                            | 46                  | 49         |
| Supply pipe                               | 27                  | 53         |
| Branch pipe                               | 6                   | 6          |
| Subtotal                                  | 93                  | 123        |
| <b>Sewerage:</b>                          |                     |            |
| Stabilization pond                        | 39                  | 26         |
| Piping work                               | 4                   | 3          |
| Subtotal                                  | 43                  | 29         |
| <b>Stagewater drainage:</b>               |                     |            |
| Open ditch of Borobudur hillfoot          | 16                  | -          |
| <b>Refuse disposal:</b>                   |                     |            |
| Workshop for refuse selection             | 3                   | 2          |
| Land acquisition for refuse disposal yard | 10                  | 7          |
| Subtotal                                  | 13                  | 9          |
| <b>Total</b>                              | <b>165</b>          | <b>161</b> |

## Water Supply and Sewerage System Borobudur Park



## Prambanan Park



## Electric Power Supply System

### Basic Considerations

All the distribution lines and service lines in the park area will be so wired by underground cables in flexible pipes and handholes that the good landscaping be secured for tourists.

Security lighting will be provided along the main park way and concourse. Average intensity of illumination with full moon light.

Projection lighting will be provided at Prambanan park to rise up the candi in the night.

### Estimation of Power Demand

The electric power demand in the park area has been estimated in accordance with the unit demand multiplying by the effective floor area of buildings/facilities, including the demand for security and/or projection lighting.

The power demand for the park development plan is estimated as follows:

- Borobudur 360KVA
- Prambanan 540KVA

### Electric Power Supply System: Borobudur

Since the maximum power demand of a building in the park area is less than 100KW and wiring distance is not so long, all electric power will be supplied by low tension (380V/220V).

A substation, which is to step down HT (22KV) to service voltage (380V/220V), will be constructed near past house.

The substation will be provided with 500KVA bank capacity with double transformers.

The HT line will be fully underground between the substation and the interface point of 22KV overhead distribution line outside the candi area, as shown in the drawing.

Low Tension (LT) lines will be also fully underground in the park area.

A part of 22KV distribution lines, which is existing in the park area, will be removed.

### Electric Power Supply System: Prambanan

Two substations will be required for electric power supply to the park in the reasons that:

- Ramayana theater is to be located opposite side of the candi being separated by Opak river.
- Power demand of Ramayana theater is fairly large.

Hence, LT power supply to Ramayana theater over the river is unfeasible due to significant voltage drop.

No. 1 substation will be provided near Archeological site office and No. 2 substation near Ramayana theater.

The No. 1 substation will be provided with 500KVA bank capacity and No. 2 200KVA with double transformers respectively.

The HT lines will be fully underground between the No. 1 and No. 2 substation and the interface point of 22KV overhead distribution lines, as shown in the drawing.

The LT lines will be also fully underground in the park area.

## Telephone System

### Basic Considerations

It is basically considered that the telephone subscribers in the park could be classified to 2 groups in accordance with operation body, i.e., governmental group and private group, since the telephone operation and tariff payment will differ.

PBX (Private Branch Exchange) exchange will be applied for governmental group, and private telephones for tenants. PBX exchange could reduce the number of city lines for which it takes high investment cost.

It would be possible to provide public telephones with coin box and/or booth provided that exchange of the end offices would be automated and also tariff counting system would be established. Accordingly, public telephones in the candi will be served not by coin box but by administrative staff for a while.

### Estimation of Telephone Demand

The telephone demand in the park has been estimated in accordance with the unit demand multiplying the number of staffs and/or tenants. 16PBX, 5 Public and 2 Private telephone demand for the park development is estimated.

### Telephone System

#### (1) Public telephone

Since the existing exchange in the end offices are not automated, it will be difficult to provide public telephones with coin box and/or booth.

Hence, public telephones will be handled and tariff will be collected by governmental staff. In this connection, public telephones could be categorized to PBX telephone in the calculation of city lines.

#### (2) PBX telephone

PBX telephone will be applied for governmental group so that the number of city lines can be reduced and automatic operation could be served as soon as the end offices would be automated. Herein, telephone sets for maintenance shop and staff housing will be considered as "interphone" by which, no direct outgoing calls are allowed.

The required number of city lines for PBX exchange is calculated to be 4 lines for 14 extension lines excluding 7 interphones.

#### (3) Private telephone

2 private telephones and 2 city lines will be required for restaurant within the park.

#### (4) City lines

6 city lines will be required for PBX telephone, public telephone and private telephone.

### Recommendations

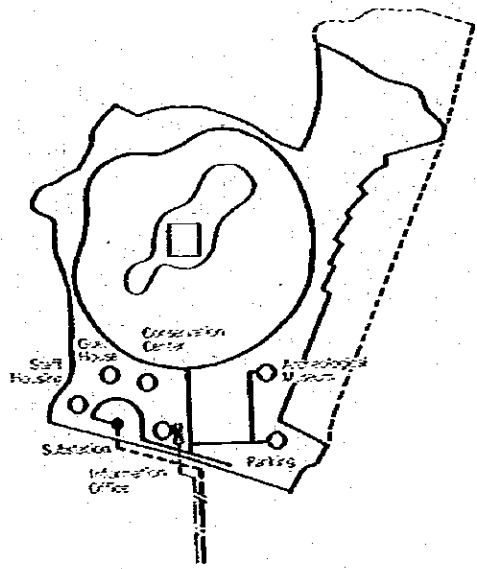
It is recommended that the exchanges in the related end offices be automated to serve an automatic operation in the candi area.

It is recommended that more than 6 city lines be constructed, by the Telephone Authority of Indonesia, from the related end offices, prior to the completion of the park development.

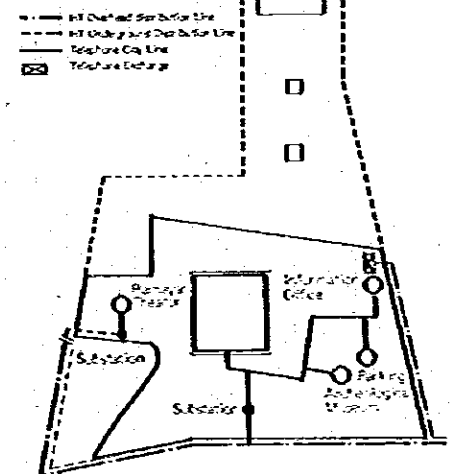
## Cost Estimates

| Items                                     | (unit: million Rp.) |            |
|---|---------------------|------------|
|   | Borobudur           | Prambanan  |
| <b>Electric power supply:</b>             |                     |            |
| HT underground line and conduit           | 33                  | 20         |
| Transformer and switch gear outside       | 24                  | 36         |
| LT underground line, conduit and lighting | 77                  | 92         |
| Subtotal                                  | 134                 | 148        |
| <b>Telephone:</b>                         |                     |            |
| Exchange and related apparatus            | 14                  | 14         |
| Underground service line                  | 12                  | 12         |
| Subtotal                                  | 26                  | 26         |
| <b>Total</b>                              | <b>160</b>          | <b>174</b> |

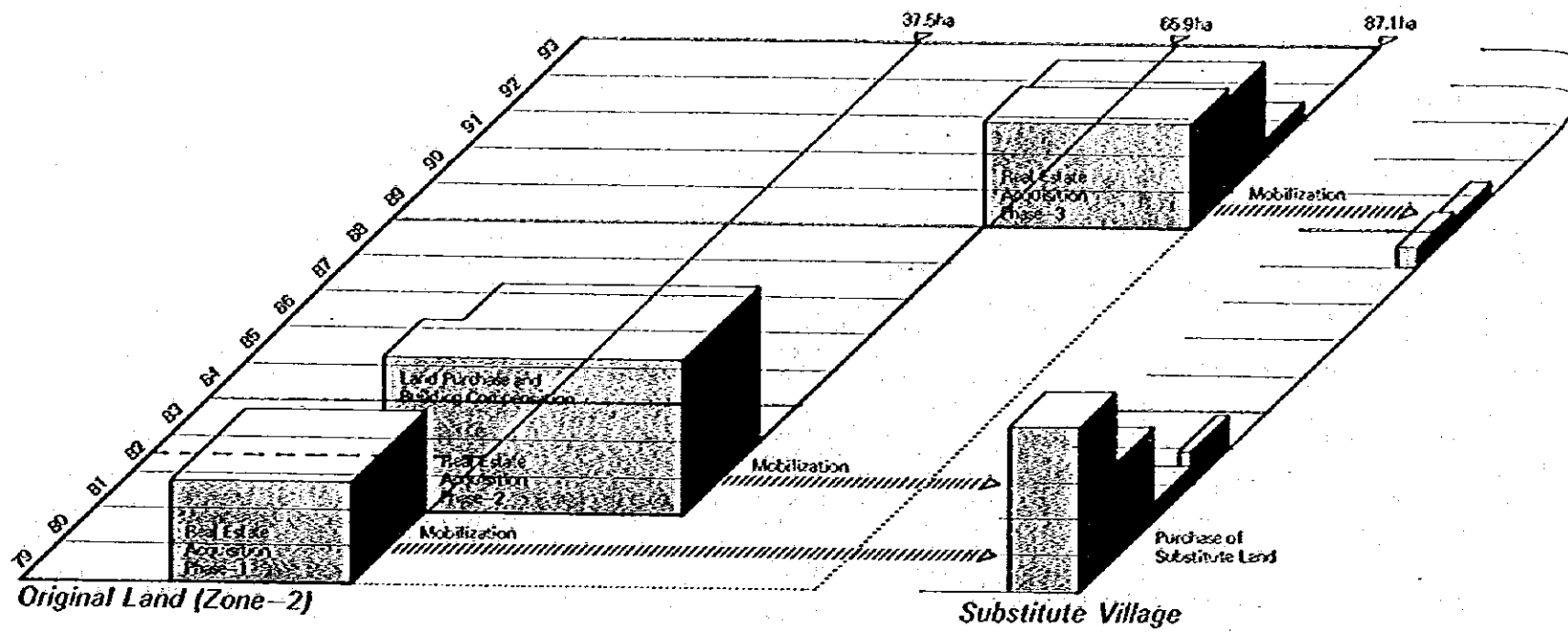
## Electric Power Supply and Telephone System Borobudur Park



## Prambanan Park



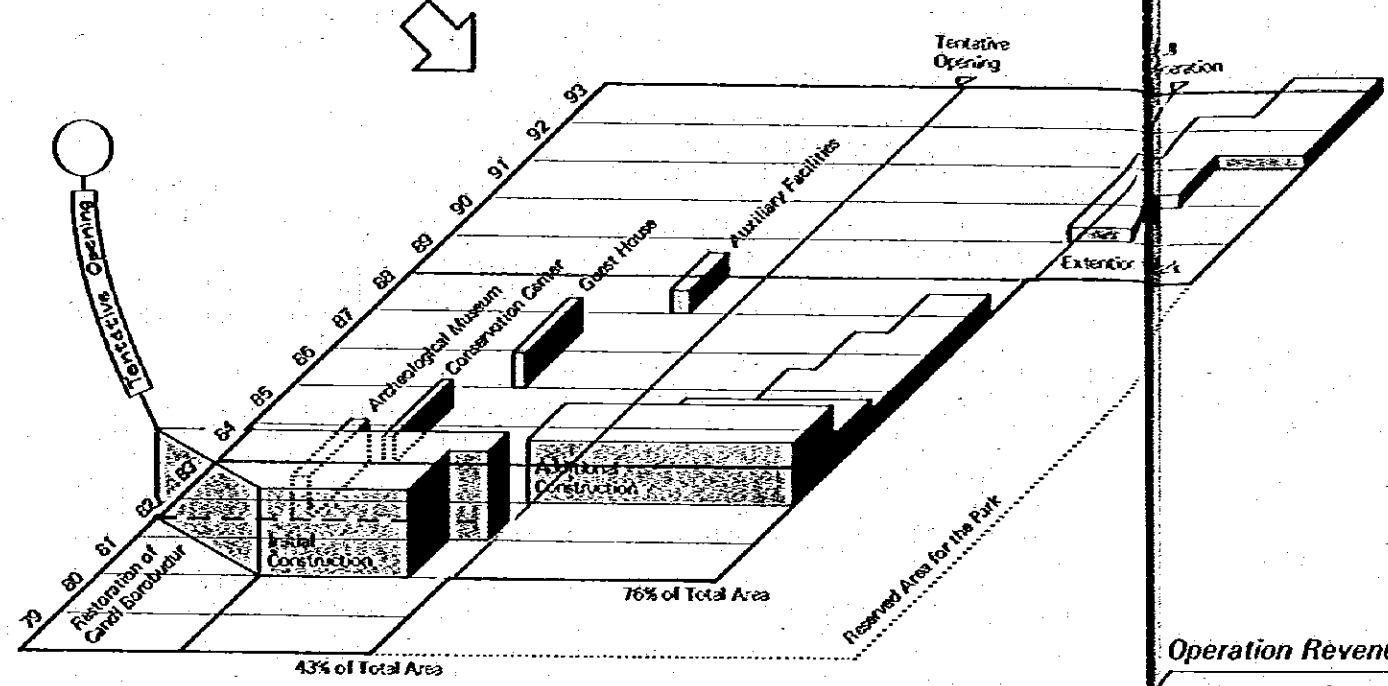
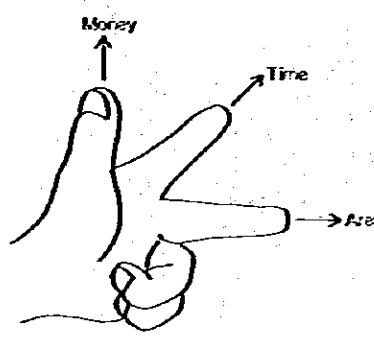




### Real Estate Acquisition Stage

The first step in park project implementation is acquisition of land. The land that is already nationally owned will be transferred to the park corporation, but privately owned farmland will have to be bought up by it. As for land on which public facilities and private housing are located in the area in question, it will be transferred to the park corporation in return for substitute land outside its park, with compensation being paid for the buildings. Such land acquisition will take place in three stages so that the area of the park can be gradually expanded. In the period covered by Pelita III and Pelita IV it will cost Rp. 4,532 million in the case of Borobudur and Rp. 1,895 million in the case of Prambana.

▶ see pp. 147-152



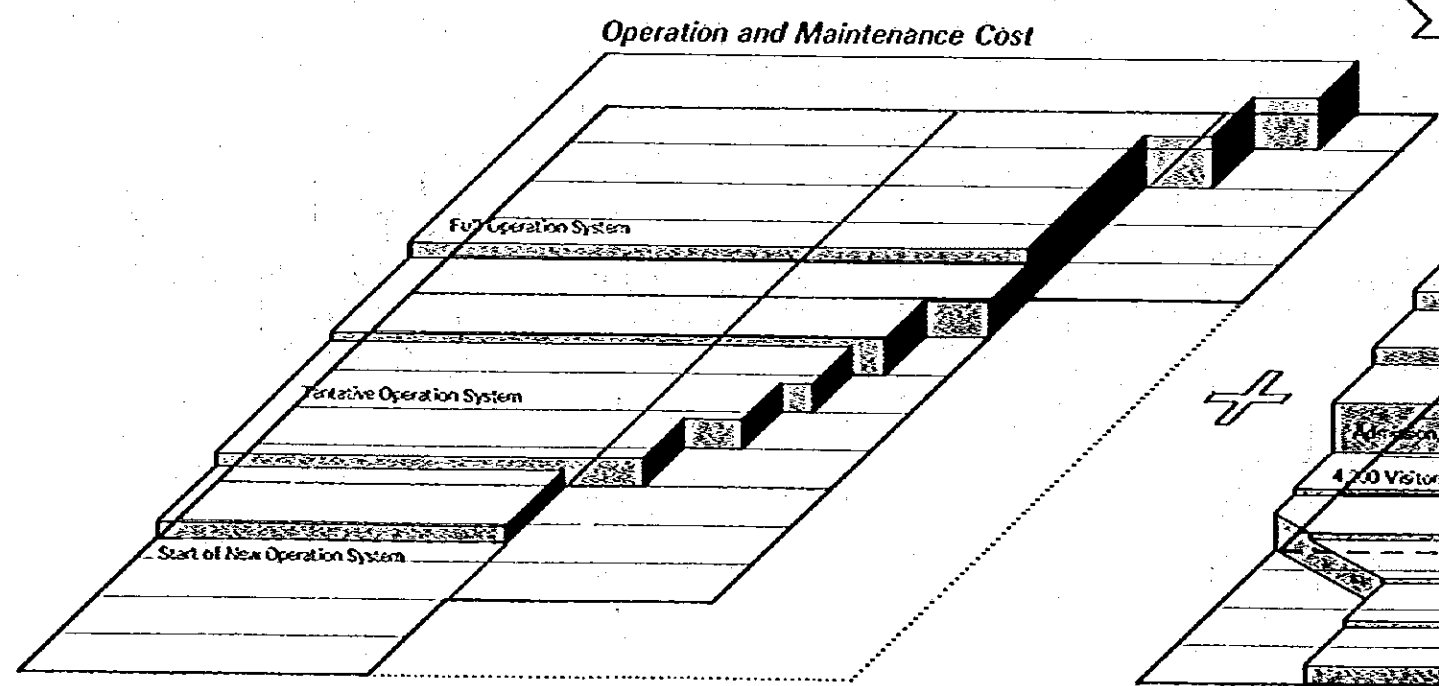
### Construction Stage

Park construction will begin with respect to each part of the park site as soon as its land is acquired, the procedure being: (1) removal of roads, buildings, etc. that are no longer needed, (2) basic earthwork, (3) laying of water underground supply and sewer pipes, electricity and telephone cables, etc., (4) landscaping, and (5) construction of park facilities.

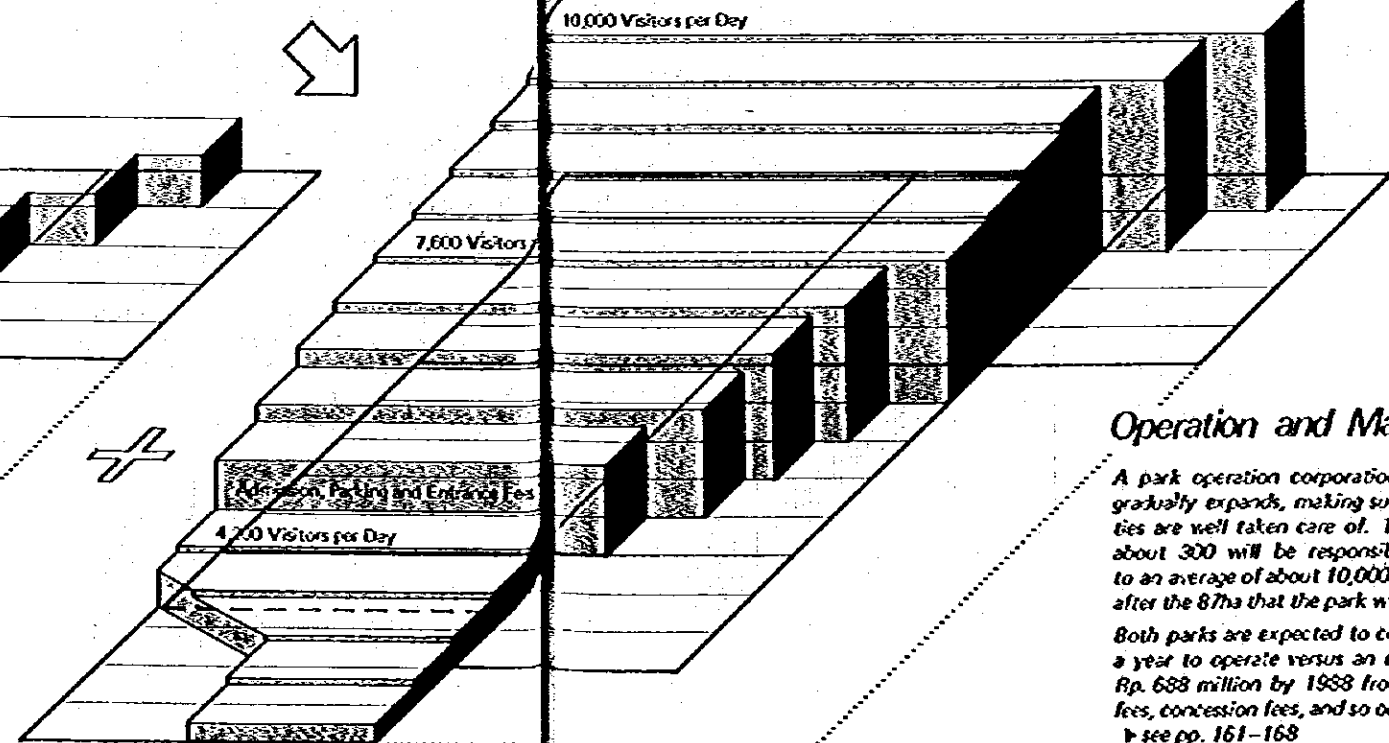
The skeleton of the park will be completed by the autumn of 1982, when it is to be provisionally opened, and thereafter the park will be gradually expanded and functionally improved.

In the period covered by Pelita III and Pelita IV the park construction will involve an investment of Rp. 1,449 million in the case of Borobudur and Rp. 2,503 million in the case of Prambanan.

▶ see pp. 153-160



### Operation Revenue



### Operation and Maintenance Stage

A park operation corporation will run the park as it gradually expands, making sure that its land and facilities are well taken care of. The corporation's staff of about 300 will be responsible for providing services to an average of about 10,000 visitors a day and looking after the 87ha that the park will cover.

Both parks are expected to cost about Rp. 334 million a year to operate versus an estimated park income of Rp. 688 million by 1988 from admission fees, parking fees, concession fees, and so on.

▶ see pp. 161-168

# Whole Park Development Costs

## Summary of Park Development Costs

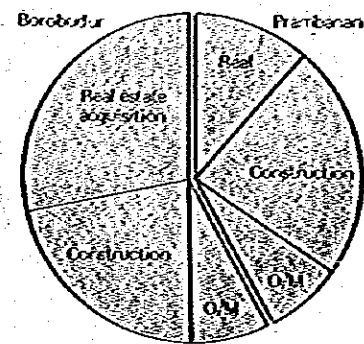
### The Contents of the Costs for Park Project

The cost for the park project during Pelita III & IV period, is divided into the following three points: cost for real estate acquisition, for construction and management maintenance.

The following table is the list of both parks. The costs for real estate acquisition of Borobudur is 2.5 times of that of Prambanan.

| Cost Items                | Borobudur       | Prambanan       | Total           |
|---------------------------|-----------------|-----------------|-----------------|
| Real estate acquisition   | 3,062<br>(48.9) | 1,226<br>(26.8) | 4,288<br>(39.6) |
| Construction              | 2,367<br>(37.7) | 2,503<br>(54.8) | 4,870<br>(44.9) |
| Operation and maintenance | 89<br>(1.4)     | 89<br>(1.9)     | 178<br>(1.6)    |
| Total                     | 6,258           | 4,568           | 10,826          |

Note: The figure in the parenthesis is the percentage of total



### Breakdown of Real Estate Acquisition Cost

| Cost Items            | Borobudur       | Prambanan     | Total           |
|-----------------------|-----------------|---------------|-----------------|
| Land purchase         | 2,284<br>(74.6) | 370<br>(30.2) | 2,654<br>(61.9) |
| Building compensation | 778<br>(25.4)   | 856<br>(69.8) | 1,634<br>(38.1) |
| Total                 | 3,062           | 1,226         | 4,288           |

Note: The figure in the parenthesis is the percentage of total

### Breakdown of Construction Cost

| Cost Items      | Borobudur       | Prambanan       | Total           |
|-----------------|-----------------|-----------------|-----------------|
| Basic site work | 213<br>(9.0)    | 456<br>(18.2)   | 669<br>(13.8)   |
| Landscape       | 810<br>(34.4)   | 621<br>(24.8)   | 1,431<br>(29.4) |
| Utility         | 325<br>(13.8)   | 335<br>(13.4)   | 660<br>(13.6)   |
| Facility        | 1,009<br>(42.8) | 1,091<br>(43.6) | 2,100<br>(43.2) |
| Total           | 2,367           | 2,503           | 4,870           |

Note: The figure in the parenthesis is the percentage of total

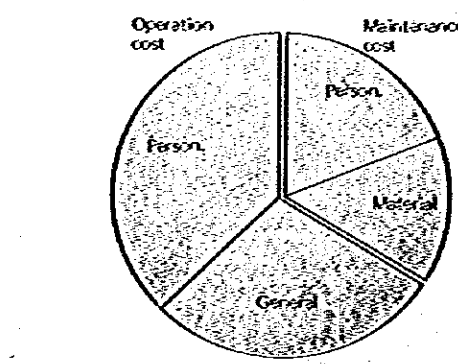
## Operation and Maintenance Costs

### Operation and Maintenance Costs in General

Concerning the management of parks, operation and maintenance costs are needed. Operation cost consists of personnel expenses for the maintenance and material consumption (here estimated as 1% of the park construction costs).

The operation and maintenance costs for both parks in the full operation system at the completed state are as the following list.

| Cost Items           | Operation cost | Maintenance cost | Total |
|----------------------|----------------|------------------|-------|
| Personnel expense    | 126.1          | 63.0             | 189.1 |
| General expense      | 94.7           | -                | 94.7  |
| Material consumption | -              | 50.0             | 50.0  |
| Total                | 220.8          | 113.0            | 333.8 |



### Breakdown of Personnel Expenses

The personnel and personnel expenses necessary for both parks are as the following list; the rate of the members of persons for operation to those of maintenance is 2 to 1.

| Status       | Number of employee | Unit cost per year | Annual personnel expense |
|--------------|--------------------|--------------------|--------------------------|
| Upper class  | 20                 | 2,400              | 48,000                   |
| Middle class | 90                 | 600                | 54,000                   |
| Lower class  | 490                | 180                | 88,200                   |
| Total        | 600                | -                  | 190,200                  |

### Breakdown of O/M Costs by Years till Full Management

The following list shows the percentage of the necessary operation and maintenance expenses of each year to the expenses of the year of construction completion (1988), when the parks' full operational setup starts.

| Year | Personnel expense | General expense | Material consumption |
|------|-------------------|-----------------|----------------------|
| 1979 | -                 | -               | -                    |
| 80   | -                 | -               | -                    |
| 81   | -                 | -               | -                    |
| 82   | 50                | 50              | 40                   |
| 83   | 50                | 50              | 40                   |
| 84   | 70                | 70              | 60                   |
| 85   | 70                | 70              | 60                   |
| 86   | 70                | 70              | 60                   |
| 87   | 100               | 100             | 80                   |
| 88   | 100               | 100             | 100                  |

## Distribution of Development Costs Over Time

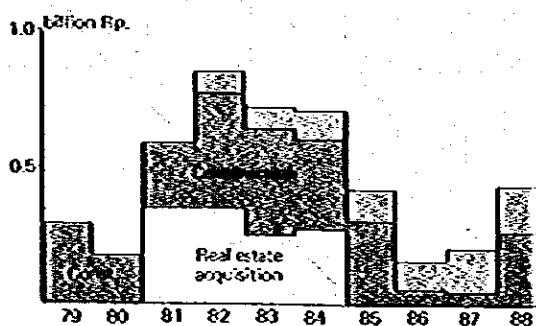
### Development and Recurrent Costs by Years:

| Fiscal year      | Real estate acquisition | Construction | Operation & maintenance | Total   |
|------------------|-------------------------|--------------|-------------------------|---------|
| 1979-80          | 628.7                   | 218.1        | -                       | 846.8   |
| 80-81            | 628.7                   | 153.3        | -                       | 782.0   |
| 81-82            | 902.3                   | 495.3        | -                       | 1,397.6 |
| 82-83            | 902.2                   | 488.7        | 81.0                    | 1,471.9 |
| 83-84            | -                       | 350.5        | 81.0                    | 431.5   |
| 1984-85          | -                       | 109.4        | 114.3                   | 223.7   |
| 85-86            | -                       | 113.8        | 114.3                   | 228.1   |
| 86-87            | -                       | 114.8        | 119.3                   | 234.1   |
| 87-88            | -                       | 124.0        | 161.9                   | 285.9   |
| 88-89            | -                       | 129.3        | 166.9                   | 296.2   |
| Pelita III total | 3,061.9                 | 1,705.9      | 162.0                   | 4,929.8 |
| Pelita IV total  | -                       | 651.3        | 676.7                   | 1,328.0 |
| Grand total      | 3,061.9                 | 2,357.2      | 838.7                   | 6,257.8 |



### Development and Recurrent Costs by Years:

| Fiscal year      | Real estate acquisition | Construction | Operation & maintenance | Total   |
|------------------|-------------------------|--------------|-------------------------|---------|
| 1979-80          | -                       | 291.2        | -                       | 291.2   |
| 80-81            | -                       | 168.8        | -                       | 168.8   |
| 81-82            | 351.0                   | 243.9        | -                       | 594.9   |
| 82-83            | 351.0                   | 421.9        | 81.0                    | 853.9   |
| 83-84            | 253.8                   | 389.0        | 81.0                    | 723.8   |
| 1984-85          | 270.1                   | 327.4        | 114.3                   | 711.8   |
| 85-86            | -                       | 304.1        | 114.3                   | 418.4   |
| 86-87            | -                       | 48.0         | 119.3                   | 167.3   |
| 87-88            | -                       | 38.8         | 161.9                   | 200.7   |
| 88-89            | -                       | 269.7        | 166.9                   | 436.6   |
| Pelita III total | 955.8                   | 1,514.8      | 162.0                   | 2,632.6 |
| Pelita IV total  | 270.1                   | 988.0        | 676.7                   | 1,934.8 |
| Grand total      | 1,225.9                 | 2,502.8      | 838.7                   | 4,567.4 |

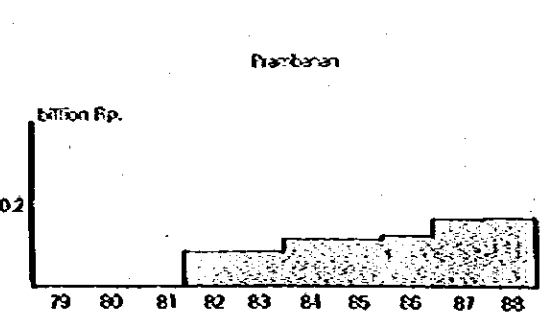
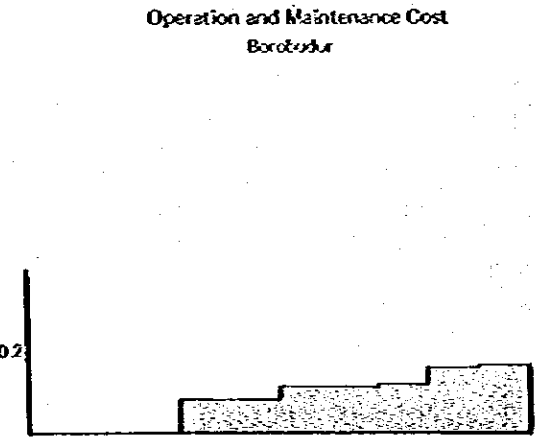
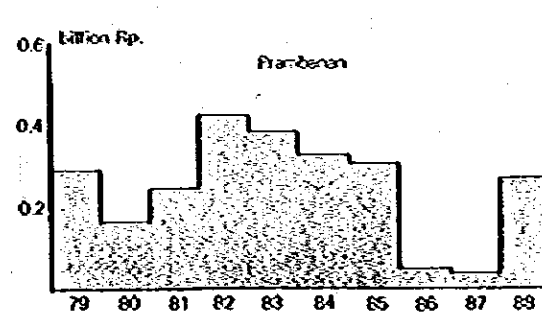
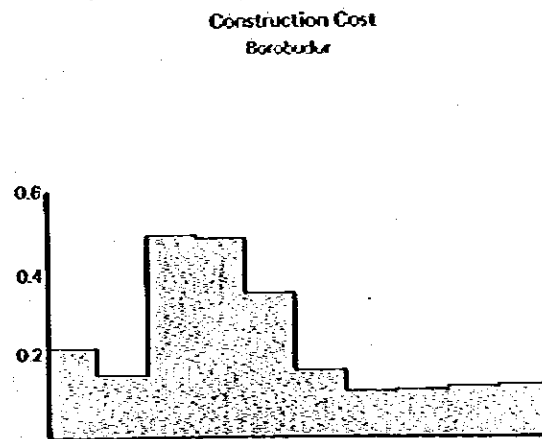
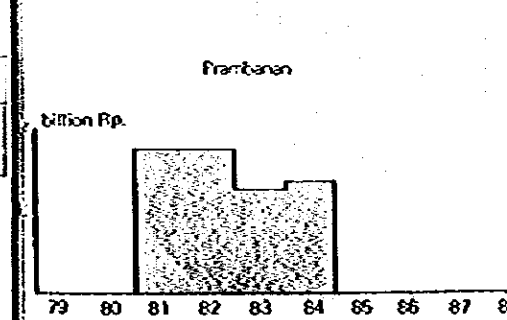
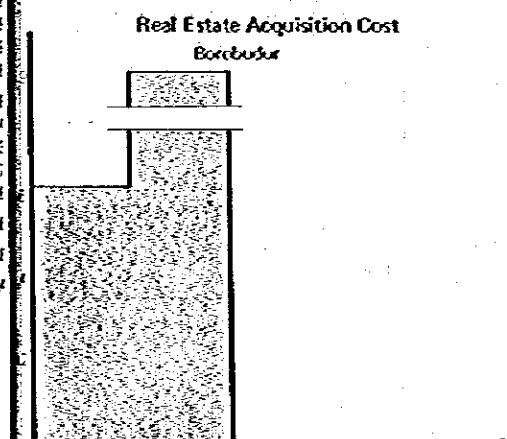


## Distribution of Development Costs by Years: Borobudur Park

| Items                           | 79/80 | 80/81 | 81/82   | 82/83   | 83/84 | Pelita III total | 84/85 | 85/86 | 86/87 | 87/88 | 88/89 | Pelita IV total | Pelita III + IV total |
|---------------------------------|-------|-------|---------|---------|-------|------------------|-------|-------|-------|-------|-------|-----------------|-----------------------|
| Real estate acquisition cost:   |       |       |         |         |       |                  |       |       |       |       |       |                 |                       |
| 1) Land purchase                | 419.0 | 419.0 | 722.8   | 722.8   | -     | 2,283.6          | -     | -     | -     | -     | -     | -               | 2,283.6               |
| 2) Building compensation        | 209.7 | 209.7 | 179.5   | 179.4   | -     | 778.3            | -     | -     | -     | -     | -     | -               | 778.3                 |
| Total                           | 628.7 | 628.7 | 902.3   | 902.2   | -     | 3,061.9          | -     | -     | -     | -     | -     | -               | 3,061.9               |
| Construction cost:              |       |       |         |         |       |                  |       |       |       |       |       |                 |                       |
| 1) Basic site work              | 23.6  | 28.0  | 39.1    | 27.7    | 18.2  | 136.6            | 23.7  | 20.7  | 10.6  | 11.6  | 10.0  | 76.5            | 213.1                 |
| 2) Landscaping                  | 129.5 | 60.3  | 335.4   | 73.3    | 32.0  | 630.5            | 58.6  | 23.6  | 23.1  | 31.2  | 43.1  | 179.6           | 810.1                 |
| 3) Utilities                    | 65.0  | 65.0  | 65.0    | 65.0    | 65.0  | 325.0            | -     | -     | -     | -     | -     | -               | 325.0                 |
| 4) Facilities                   | -     | -     | 55.8    | 322.7   | 235.3 | 613.8            | 87.1  | 69.5  | 81.2  | 81.2  | 76.2  | 395.2           | 1,009.0               |
| Total                           | 218.1 | 153.3 | 495.3   | 488.7   | 350.5 | 1,705.9          | 169.4 | 113.8 | 114.8 | 124.0 | 129.3 | 651.3           | 2,357.2               |
| Operation and maintenance cost: |       |       |         |         |       |                  |       |       |       |       |       |                 |                       |
| 1) Operation                    | -     | -     | -       | 55.2    | 55.2  | 110.4            | 77.3  | 77.3  | 77.3  | 110.4 | 110.4 | 452.7           | 563.1                 |
| 2) Maintenance                  | -     | -     | -       | 25.8    | 25.8  | 51.6             | 37.0  | 37.0  | 42.0  | 51.5  | 56.5  | 224.0           | 275.6                 |
| Total                           | -     | -     | -       | 81.0    | 81.0  | 162.0            | 114.3 | 114.3 | 119.3 | 161.9 | 166.9 | 676.7           | 838.7                 |
| Grand total                     | 846.8 | 782.0 | 1,397.6 | 1,471.9 | 431.5 | 4,929.8          | 283.7 | 228.1 | 234.1 | 265.9 | 296.2 | 1,328.0         | 6,257.8               |

## Distribution of Development Costs by Years: Prambanan Park

| Items                           | 79/80 | 80/81 | 81/82 | 82/83 | 83/84 | Pelita III total | 84/85 | 85/86 | 86/87 | 87/88 | 88/89 | Pelita IV total | Pelita III + IV total |
|---------------------------------|-------|-------|-------|-------|-------|------------------|-------|-------|-------|-------|-------|-----------------|-----------------------|
| Real estate acquisition cost:   |       |       |       |       |       |                  |       |       |       |       |       |                 |                       |
| 1) Land purchase                | -     | -     | 88.3  | 88.3  | 88.3  | 264.9            | 104.7 | -     | -     | -     | -     | 104.7           | 369.6                 |
| 2) Building compensation        | -     | -     | 262.7 | 262.7 | 165.5 | 690.9            | 165.4 | -     | -     | -     | -     | 165.4           | 856.3                 |
| Total                           | -     | -     | 351.0 | 351.0 | 253.8 | 955.8            | 270.1 | -     | -     | -     | -     | 270.1           | 1,225.9               |
| Construction cost:              |       |       |       |       |       |                  |       |       |       |       |       |                 |                       |
| 1) Basic site work              | 26.6  | 18.2  | 33.0  | 77.4  | 29.5  | 184.7            | 31.4  | 24.8  | 27.6  | 17.1  | 170.5 | 271.4           | 456.1                 |
| 2) Landscaping                  | 197.6 | 83.6  | 10.5  | 95.5  | 56.6  | 443.8            | 46.2  | 29.6  | 20.4  | 21.7  | 59.0  | 176.9           | 620.7                 |
| 3) Utilities                    | 67.0  | 67.0  | 67.0  | 67.0  | 67.0  | 335.0            | -     | -     | -     | -     | -     | -               | 335.0                 |
| 4) Facilities                   | -     | -     | 133.4 | 182.0 | 235.9 | 551.3            | 249.8 | 249.7 | -     | -     | 40.2  | 539.7           | 1,091.0               |
| Total                           | 291.2 | 168.8 | 243.9 | 421.9 | 389.0 | 1,514.8          | 327.4 | 304.1 | 48.0  | 38.8  | 269.7 | 988.0           | 2,502.8               |
| Operation and maintenance cost: |       |       |       |       |       |                  |       |       |       |       |       |                 |                       |
| 1) Operation                    | -     | -     | -     | 55.2  | 55.2  | 110.4            | 77.3  | 77.3  | 77.3  | 110.4 | 110.4 | 452.7           | 563.1                 |
| 2) Maintenance                  | -     | -     | -     | 25.8  | 25.8  | 51.6             | 37.0  | 37.0  | 42.0  | 51.5  | 56.5  | 224.0           | 275.6                 |
| Total                           | -     | -     | -     | 81.0  | 81.0  | 162.0            | 114.3 | 114.3 | 119.3 | 161.9 | 166.9 | 676.7           | 838.7                 |
| Grand total                     | 291.2 | 168.8 | 504.9 | 853.9 | 723.8 | 2,632.6          | 711.8 | 418.4 | 167.3 | 200.7 | 436.6 | 1,934.8         | 4,567.4               |



# Real Estate Acquisition Technics

## Method of Real Estate Acquisition

The real estate acquisition in Zone-2 areas, designated as park development areas, is to be carried out by the four methods described below, depending on the property and rights and relationships of ownership involved:

- Transfer**  
All of the nationally owned and other public land in such areas presently under the control of various government agencies is to be transferred to the park authority for control and use in connection with the present project, the land involved being:
- Archeological monument sites and restoration yards.
  - Such sites as those of the existing monuments administrative office and parking areas.
  - Sites of roads, rivers, irrigation channels, and the like.

- Purchase**  
All of the privately owned land in the two areas other than residential land is to be purchased by the park authority, including the following:
- Privately owned agricultural land.
  - Open space, residential land of absentee landlords, and dukuh commons within present residential areas.
  - The sites of the two private schools at Borobudur.
  - Land owned by the Dagi Hill Corporation.

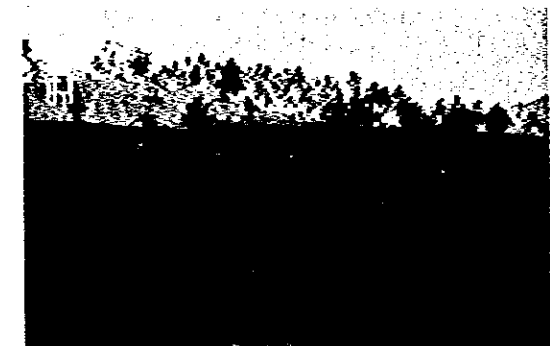
- Substitution Exchange**  
All public facility sites (passar, kantor, public school, etc.) and residential land other than that mentioned in (2) above located in the areas concerned are to be replaced with substitute land at appropriate locations in Zone-3, the old sites being taken over by the park authority for control and use by it.

- Compensation**  
All of the buildings in the areas concerned are to be assessed for determination of their real estate value so as to be able to determine what amount of compensation for them will be reasonable.

## Legal Measure for Reserved Area for Park Development

Urgent legal action is necessary with respect to the following controls on private development activity in Zone-2, the park development area, prior to commencement of land acquisition:

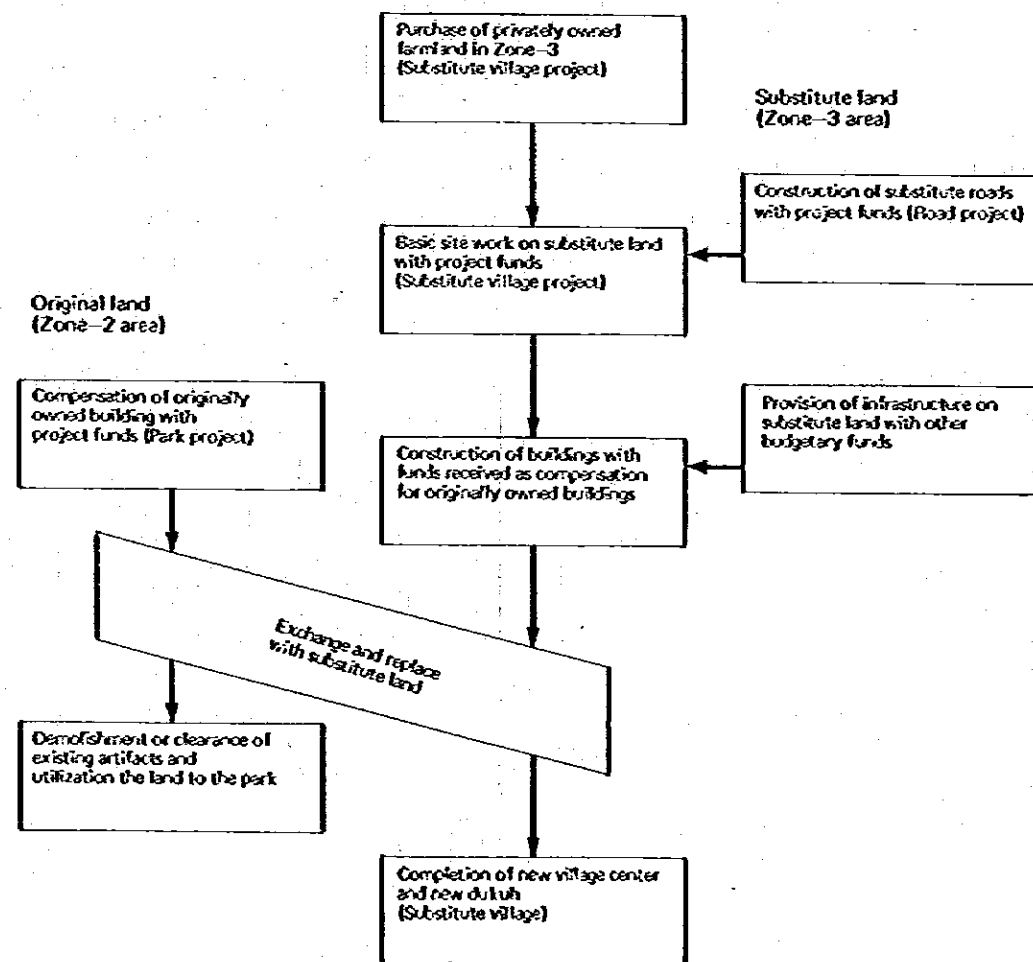
- Prohibition of private land transactions.
- Prohibition of land development.
- Freezing or control of land prices.



## Matrix of Real Estate Acquisition by Land Use Types

| Present Land-use  | Present Land-use            |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
|---|-----------------------------|--------------------------------|-------------------------------|--------------------|------------------------------|----------------------------|------------|----------------|-------------------------------------|------------------------------------|-----------------|
|   | Archeological monument site | Archeological restoration yard | Present tourist facility area | Regional road area | Riverside irrigation channel | Local public facility area | Grave yard | Private school | Residential area (new housing site) | Open space within residential area | Public farmland |
| Conditions for Acquisition  |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| Type of landownership   |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| (1) Government own  | ■                           | ■                              |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| (2) Other publicly own  |                             |                                | ■                             | ■                  | ■                            | ■                          | ■          | ■              | ■                                   | ■                                  | ■               |
| (3) Privately own   |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    | ■               |
| Arrangement for land acquisition  |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| (1) Transfer to Park Authority  | ■                           | ■                              | ■                             | ■                  | ■                            | ■                          | ■          | ■              | ■                                   | ■                                  | ■               |
| (2) Purchase by Park Authority  |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| (3) Acquisition in exchange for substitute privately owned farmland purchased in Zone-3 |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| Property other than land for which compensation will have to be made                    |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| (1) Public buildings  |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| (2) Private housing   |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| (3) Other property  |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| Construction of substitute building by  |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| (1) Park Authority  | ■                           | ■                              |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| (2) Local government agencies   |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |
| (3) Villagers   |                             |                                |                               |                    |                              |                            |            |                |                                     |                                    |                 |

## Process of Substitute Exchange



# Scale of Acquisition

## and Purchase Program

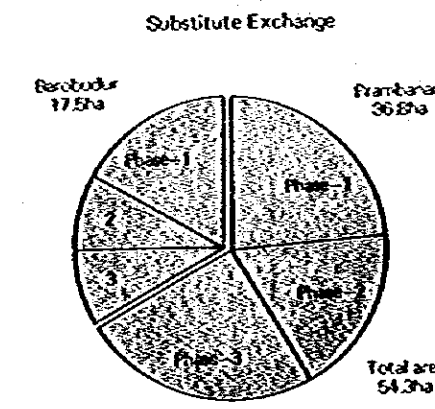
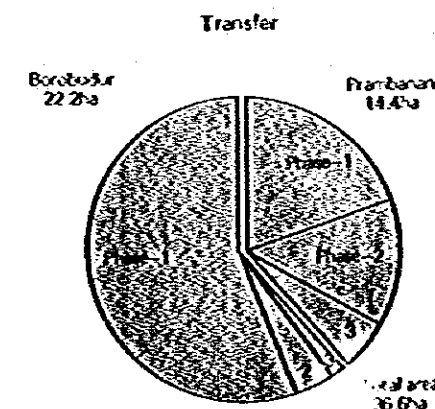
| Areas                                 | Average unit price (Rp./m <sup>2</sup> ) | Phase-1     |              | Phase-2     |                | Phase-3     |                |
|---------------------------------------|--|-------------|--------------|-------------|----------------|-------------|----------------|
|                                       |  | Area (ha)   | Cost         | Area (ha)   | Cost           | Area (ha)   | Cost           |
| <b>Borobudur area:</b>                |  |             |              |             |                |             |                |
| 1) Privately owned farmland           | 7,613                                    | 6.7         | 514.0        | 9.0         | 690.5          | 8.3         | 622.5          |
| 2) Open space within residential area | 7,500                                    | 1.4         | 105.0        | 6.4         | 407.3          | 1.2         | 90.0           |
| 3) Site for private school            | 5,000                                    | -           | -            | 0.9         | 47.0           | -           | -              |
| 4) Dagi Hill                          | 5,043                                    | -           | -            | 7.5         | 378.6          | 7.0         | 353.4          |
| <b>Total</b>                          | -  | <b>8.1</b>  | <b>619.0</b> | <b>22.8</b> | <b>1,523.4</b> | <b>16.5</b> | <b>1,065.9</b> |
| <b>Prambanan area:</b>                |  |             |              |             |                |             |                |
| 1) Privately owned farmland           | 2,000                                    | 7.4         | 143.0        | 6.8         | 136.0          | 8.4         | 168.0          |
| 2) Open space within residential area | 2,723                                    | 0.9         | 43.2         | 1.3         | 26.0           | 1.0         | 20.0           |
| <b>Total</b>                          | -  | <b>8.3</b>  | <b>191.2</b> | <b>8.1</b>  | <b>162.0</b>   | <b>9.4</b>  | <b>168.0</b>   |
| <b>Borobudur + Prambanan total</b>    | -  | <b>16.4</b> | <b>810.2</b> | <b>30.9</b> | <b>1,685.4</b> | <b>25.9</b> | <b>1,233.9</b> |

## Building Compensation Program

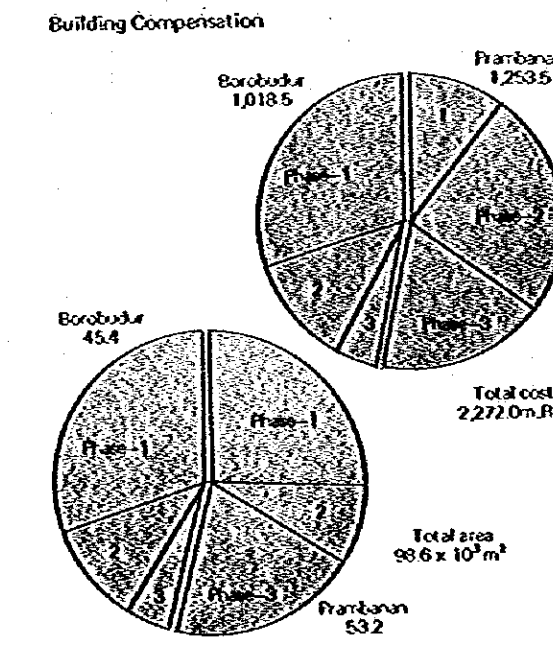
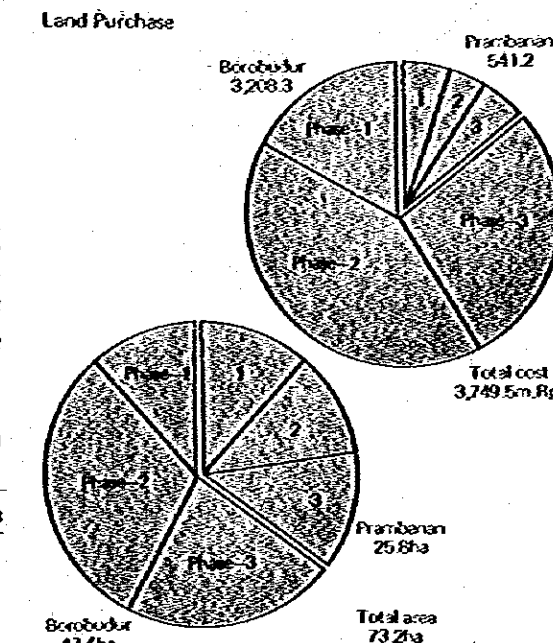
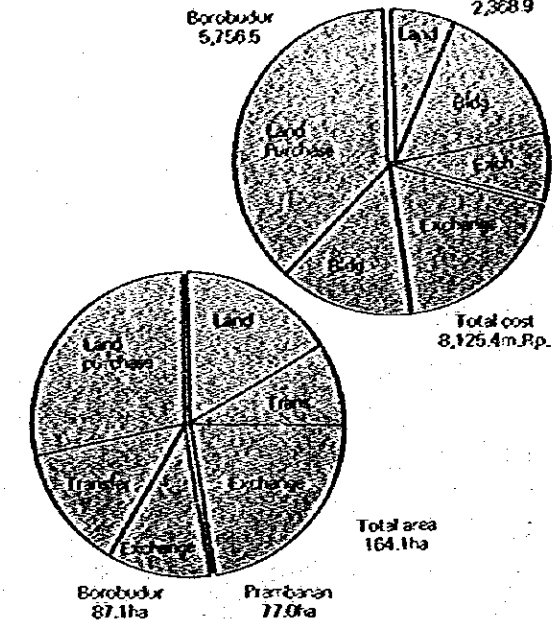
| Areas                              | Average unit price (Rp./m <sup>2</sup> ) | Phase-1       |                | Phase-2       |              | Phase-3       |              |
|------------------------------------|--|---------------|----------------|---------------|--------------|---------------|--------------|
|                                    |  | Area (ha)     | Cost           | Area (ha)     | Cost         | Area (ha)     | Cost         |
| <b>Borobudur area:</b>             |  |               |                |               |              |               |              |
| 1) Public building                 | 31,650                                   | 8.440         | 237.6          | 3,530         | 141.2        | -             | -            |
| 2) Private housing: Permanent      | 30,000                                   | 5,277         | 158.3          | 373           | 11.2         | -             | -            |
| 3) Private housing: Semi permanent | 20,000                                   | 4,954         | 99.1           | 811           | 16.2         | 4,950         | 99.0         |
| 4) Private housing: Temporary      | 15,000                                   | 11,043        | 165.6          | 6,017         | 90.3         | -             | -            |
| <b>Total</b>                       | -  | <b>29,714</b> | <b>660.6</b>   | <b>10,731</b> | <b>258.9</b> | <b>4,950</b>  | <b>99.0</b>  |
| <b>Prambanan area:</b>             |  |               |                |               |              |               |              |
| 1) Public building                 | 33,200                                   | 2,572         | 85.4           | -             | -            | -             | -            |
| 2) Private housing: Permanent      | 30,000                                   | 15,283        | 458.8          | 3,329         | 99.9         | -             | -            |
| 3) Private housing: Semi permanent | 20,000                                   | 2,915         | 58.3           | 3,121         | 62.4         | 19,850        | 397.2        |
| 4) Private housing: Temporary      | 15,000                                   | 4,132         | 62.0           | 1,967         | 29.5         | -             | -            |
| <b>Total</b>                       | -  | <b>24,908</b> | <b>664.5</b>   | <b>8,417</b>  | <b>191.8</b> | <b>19,850</b> | <b>397.2</b> |
| <b>Borobudur + Prambanan total</b> | -  | <b>54,622</b> | <b>1,325.1</b> | <b>19,148</b> | <b>450.7</b> | <b>24,810</b> | <b>496.2</b> |

## Transfer and Substitute Exchange Program

| Transfer:                                   | Borobudur area |            |            | Prambanan area |             |             |
|---|----------------|------------|------------|----------------|-------------|-------------|
|   | Phase-1        | Phase-2    | Phase-3    | Phase-1        | Phase-2     | Phase-3     |
| 1) Government owned archeological site      | 163            | -          | -          | 39             | 38          | -           |
| 2) Other publicly owned land                | 12             | -          | -          | 0.5            | 1.0         | -           |
| 3) Road area                                | 2.6            | 1.6        | 0.5        | 1.3            | 0.6         | 1.7         |
| 4) River                                    | -              | -          | -          | -              | 1.6         | -           |
| <b>Subtotal</b>                             | <b>20.1</b>    | <b>1.6</b> | <b>0.5</b> | <b>5.7</b>     | <b>7.0</b>  | <b>1.7</b>  |
| <b>Substitute exchange:</b>                 |                |            |            |                |             |             |
| 1) Public facility site                     | 2.7            | 0.2        | -          | 2.8            | -           | -           |
| 2) Private housing site                     | 6.6            | 3.9        | 4.1        | 6.0            | 6.5         | 7.9         |
| 3) Publicly owned farmland                  | -              | -          | -          | 4.3            | 3.4         | 5.9         |
| <b>Subtotal</b>                             | <b>9.3</b>     | <b>4.1</b> | <b>4.1</b> | <b>13.1</b>    | <b>9.9</b>  | <b>13.8</b> |
| <b>Transfer + Substitute exchange total</b> | <b>29.4</b>    | <b>5.7</b> | <b>4.6</b> | <b>18.8</b>    | <b>16.9</b> | <b>15.5</b> |



## Whole Real Estate Acquisition

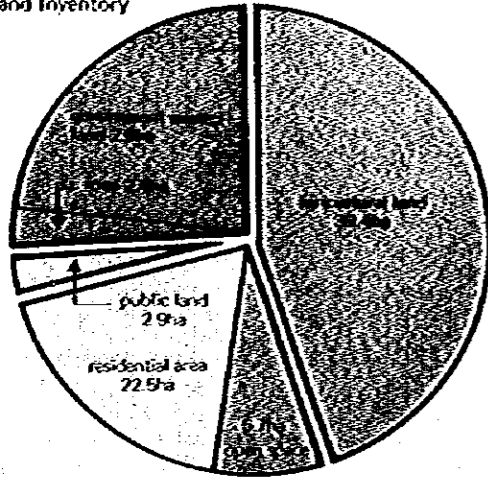


# Land Acquisition Program: Borobudur

Land acquisition is the very first step of park implementation project and the key for realization of parks depends on its success.

However, land acquisition is such a difficult work that will affect residents who are living in the area of object and in order to make it succeed, the influence over the regional community which will be caused by purchasing land should be kept minimum, and yet it is necessary to establish the program in terms of time, scale and area so that park implementation can be accomplished smoothly.

Land Inventory



## Urgent Land Clearance Work (1979-80)

An area of 37.5 ha (43% of the total park area) is to be acquired urgently so as to be able to meet the schedule of tentative opening of the park at the time the Candi Borobudur restoration works are completed, which is expected to be October 1982. This will involve the relocation of 150 households and the pasar, school, and other public facilities.

## Next Land Clearance Work (1981-82)

Another 28.4 ha of land (33% of the total) is to be acquired by 1981 for the park construction work during Pelita IV, including all of the remaining sanctuary areas of the park. This will involve the relocation of 87 households.

## Future Land Clearance Work (after 1989)

The remaining 21.2 ha of the total park area of 87.1 ha envisioned in the Master Plan, consisting of West side of Dagi Hill and farmland on the north side of Candi Borobudur, is to be acquired after 1989 for the extension of the park that will be necessary in order to accommodate the increasing number of visitors that is expected.

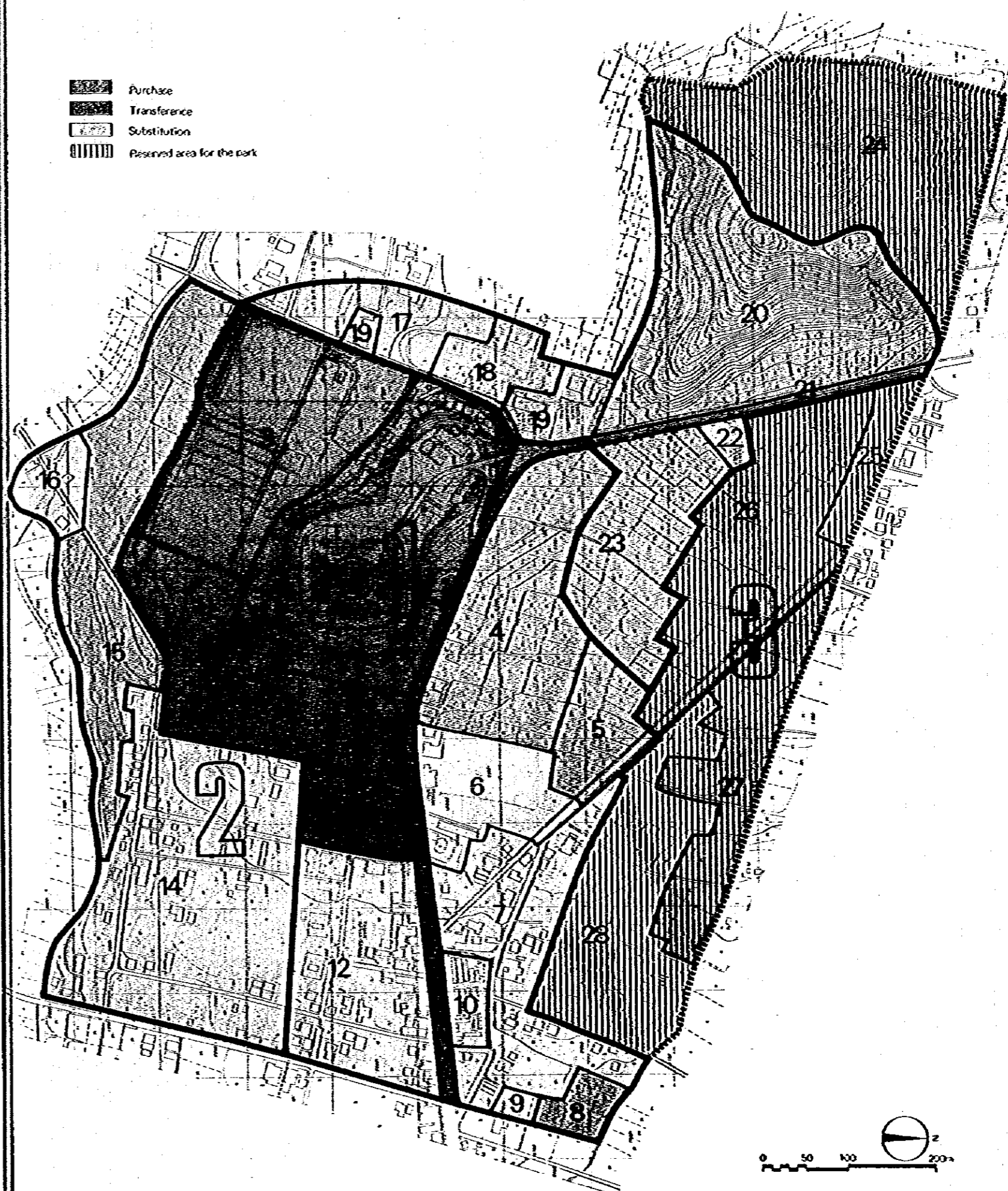
## Land Acquisition Scale

|  | 1979-1980<br>Phase 1 | 1981-1982<br>Phase 2 | After 1989<br>Phase 3 | Total  |
|--|----------------------|----------------------|-----------------------|--------|
| <b>Residential land</b>                                |                      |                      |                       |        |
| Population   | 779                  | 370                  | 246                   | 1,395  |
| No. of household (unit)                                | 150                  | 87                   | 41                    | 278    |
| Substituted area (ha)                                  | 6.6                  | 3.9                  | 4.1                   | 14.6   |
| Purchased area (ha) (open space)                       | 1.4                  | 5.4                  | 1.2                   | 8.0    |
| Building compensation (m <sup>2</sup> )                | 21,274               | 6,623                | 4,950                 | 32,847 |
| <b>Public facility land</b>                            |                      |                      |                       |        |
| Substituted area (ha)                                  | 2.7                  | 0.2                  | -                     | 2.9    |
| Building compensation (m <sup>2</sup> )                | 8,440                | 3,530                | -                     | 11,970 |
| <b>Agricultural land (Dagi hill)</b>                   |                      |                      |                       |        |
| Purchased area (ha)                                    | 6.7                  | 17.4                 | 15.3                  | 39.4   |
| <b>Government owned land</b>                           |                      |                      |                       |        |
| Transferred area (including monument site, road, etc.) | 20.1                 | 1.6                  | 0.6                   | 22.3   |

## Inventory of Real Estate by Blocks

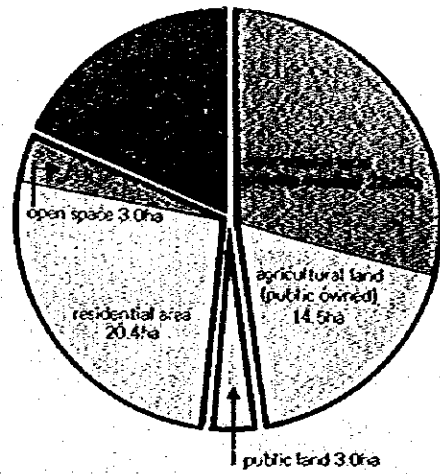
| Code no. of block                 | Land title                     | Area (ha) |           | Road within residential area | Open space within residential area | Building floor area (m <sup>2</sup> ) | Types of structures |           |        | Population | No. of households | Implementation phasing |
|-----------------------------------|--------------------------------|-----------|-----------|------------------------------|------------------------------------|---------------------------------------|---------------------|-----------|--------|------------|-------------------|------------------------|
|                                   |                                | Net       | Temporary |                              |                                    |                                       | Semi permanent      | Permanent |        |            |                   |                        |
| <b>Government owned land</b>      |                                |           |           |                              |                                    |                                       |                     |           |        |            |                   |                        |
| 1                                 | Borobudur hill (monument site) | 69        | 69        |                              |                                    | 13,300                                |                     |           | 13,300 |            |                   | 1                      |
| 2                                 | BPCB owned land                | 42        | 42        |                              |                                    |                                       |                     |           |        |            |                   | 1                      |
| 3                                 | BPCB owned restoration land    | 52        | 52        |                              |                                    | 16,300                                |                     | 16,300    |        |            |                   | 1                      |
| 11                                | Regional road                  | 1.6       | 1.6       |                              |                                    |                                       |                     |           |        |            |                   | 1                      |
| 13                                | Present tourist facility site  | 12        | 12        |                              |                                    | 1,200                                 |                     |           | 1,200  |            |                   | 1                      |
| 21                                | Regional road                  | 0.8       | 0.8       |                              |                                    |                                       |                     |           |        |            |                   | 2                      |
| <b>Local public facility land</b> |                                |           |           |                              |                                    |                                       |                     |           |        |            |                   |                        |
| 6                                 | School, mosque, kantor         | 1.8       | 1.8       |                              |                                    | 1,770                                 |                     |           | 1,770  |            |                   | 1                      |
| 9                                 | School                         | 0.2       | 0.2       |                              |                                    |                                       |                     |           |        |            |                   | 1                      |
| 10                                | Pasar                          | 0.7       | 0.7       |                              |                                    | 6,670                                 |                     |           | 6,670  |            |                   | 1                      |
| 19                                | School (privately owned)       | 1.0       | 0.9       | 0.1                          |                                    | 3,530                                 |                     |           | 3,530  |            |                   | 2                      |
| 22                                | Kantor                         | 0.2       | 0.2       |                              |                                    |                                       |                     |           |        |            |                   | 2                      |
| <b>Residential land</b>           |                                |           |           |                              |                                    |                                       |                     |           |        |            |                   |                        |
| 7                                 | Kenayan village                | 4.3       | 2.6       | 0.5                          | 1.2                                | 7,758                                 | 3,053               | 2,925     | 1,770  | 400        | 66                | 1                      |
| 12                                | Ngrang Krajan village          | 4.5       | 4.0       | 0.3                          | 0.2                                | 13,516                                | 7,980               | 2,029     | 3,507  | 379        | 84                | 1                      |
| 14                                | "                              | 7.9       | 3.7       | 0.5                          | 3.7                                | 6,328                                 | 5,717               | 238       | 373    | 355        | 84                | 2                      |
| 16                                | Gopalan village                | 0.7       | 0.2       |                              | 0.5                                | 300                                   | 300                 |           |        | 15         | 3                 | 2                      |
| 17                                | Sabrang Bawa Village           | 1.2       |           |                              | 1.2                                |                                       |                     |           |        |            |                   | 2                      |
| 25                                | Gendingan village              | 0.9       | 0.9       |                              |                                    | 725                                   |                     | 725       |        | 19         | 3                 | 3                      |
| 28                                | Kenayan village                | 4.7       | 3.2       | 0.3                          | 1.2                                | 4,225                                 |                     | 4,225     |        | 227        | 38                | 3                      |
| <b>Agricultural lands</b>         |                                |           |           |                              |                                    |                                       |                     |           |        |            |                   |                        |
| 4                                 | Private farmland               | 4.6       | 4.6       |                              |                                    |                                       |                     |           |        |            |                   | 1                      |
| 5                                 | "                              | 1.6       | 1.4       | 0.2                          |                                    |                                       |                     |           |        |            |                   | 1                      |
| 8                                 | "                              | 0.7       | 0.7       |                              |                                    |                                       |                     |           |        |            |                   | 1                      |
| 15                                | "                              | 5.2       | 5.1       | 0.1                          |                                    |                                       |                     |           |        |            |                   | 2                      |
| 18                                | "                              | 0.8       | 0.8       |                              |                                    |                                       |                     |           |        |            |                   | 2                      |
| 20                                | Dagi hill                      | 7.5       | 7.5       |                              |                                    |                                       |                     |           |        |            |                   | 2                      |
| 23                                | Private farm land              | 3.1       | 3.1       |                              |                                    |                                       |                     |           |        |            |                   | 2                      |
| 24                                | Dagi hill                      | 7.0       | 7.0       |                              |                                    |                                       |                     |           |        |            |                   | 3                      |
| 26                                | Private farm land              | 5.3       | 5.0       | 0.3                          |                                    |                                       |                     |           |        |            |                   | 3                      |
| 27                                | "                              | 3.3       | 3.3       |                              |                                    |                                       |                     |           |        |            |                   | 3                      |

# Land Acquisition Map



# Land Acquisition Program: Prambanan

## Land Inventory



### Urgent Land Clearance Work (1979-82)

An area of 27.1 ha (35% of the total park area) must be urgently acquired so as to make it possible to meet the schedule of tentative opening of the park by March 1984, i.e. the end of Pelita III. This will involve the relocation of 195 households, a school, and the regional office of the Archeological office

### Next Land Clearance Work (1983-85)

Another 26.0 ha (32% of the total park area) is to be acquired between 1984 and 1985 for the park development work scheduled during Pelita IV. This area will include the Sewu, Lumbung, and Butrah sanctuary areas, and its acquisition will involve the relocation of 124 households and the Ramayana theater as well as other facilities.

### Future Land Clearance Work (after 1989)

The remaining 249 ha of the park area (33% of the total) is to be acquired after 1989 for the park extension work scheduled in the Master Plan after Pelita IV. This will involve the relocation of 131 households.

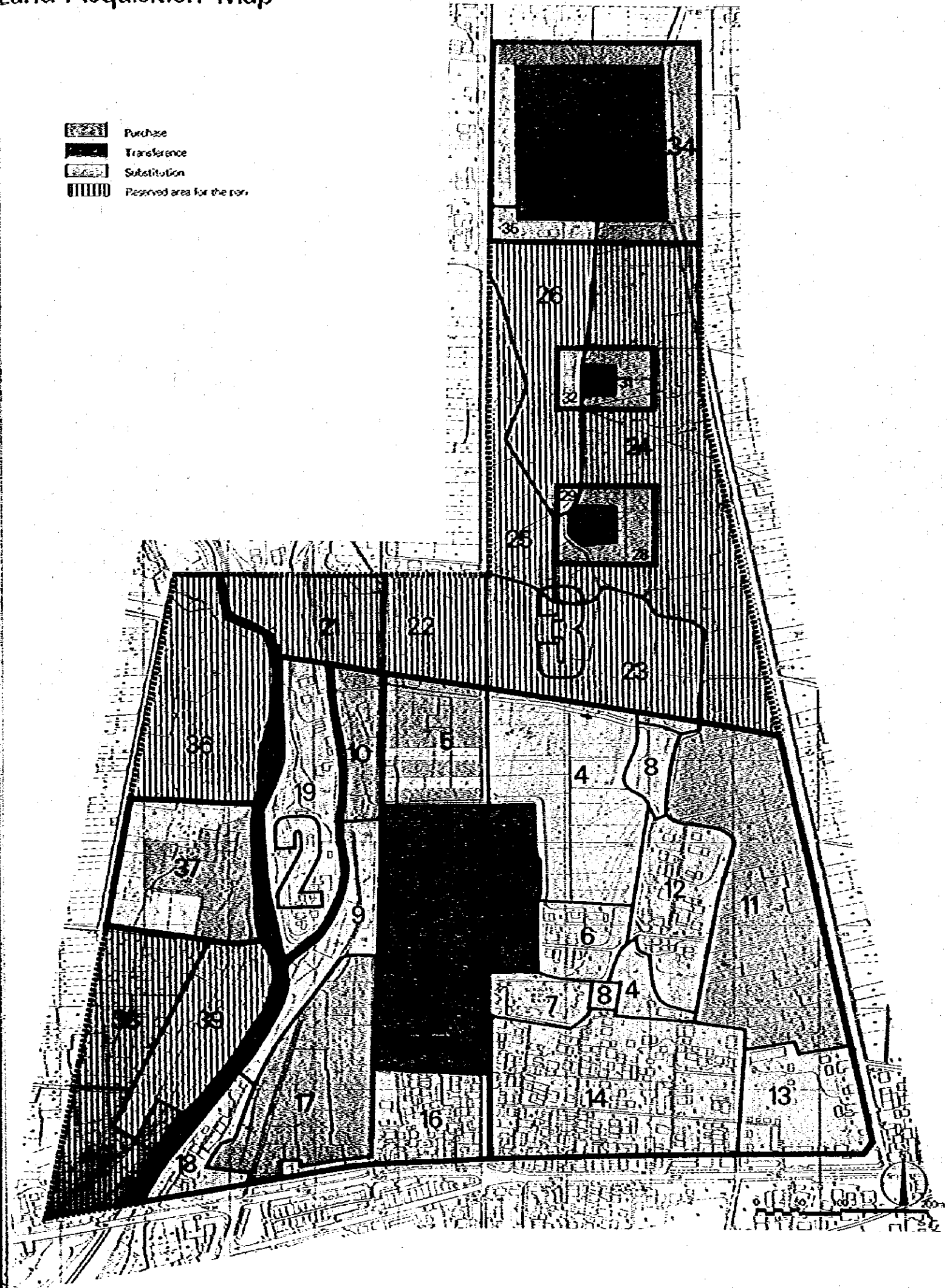
## Land Acquisition Scale

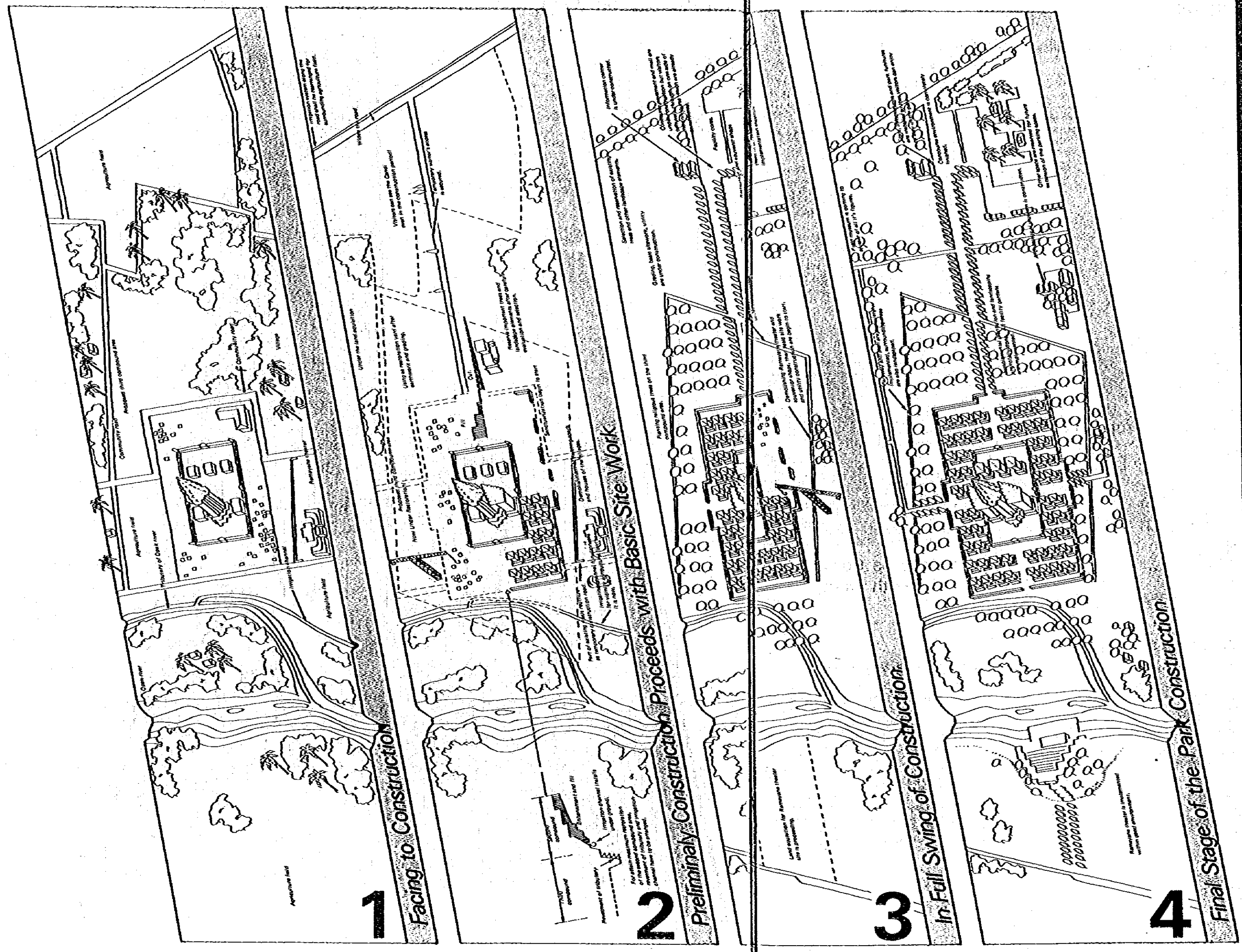
| Acquisition scale   | 1979-1980 | 1981-1982 | After 1989 | Total  |
|---|-----------|-----------|------------|--------|
|   | Phase 1   | Phase 2   | Phase 3    |        |
| <b>Residential land</b>   |           |           |            |        |
| Population  | 689       | 595       | 611        | 1,895  |
| No. of household (unit)   | 195       | 124       | 131        | 450    |
| Substituted area (ha)   | 6.0       | 6.5       | 7.9        | 20.4   |
| Purchase area (ha) (open space)                                       | 0.9       | 1.3       | 1.0        | 3.2    |
| Building compensation (m <sup>2</sup> )                               | 20,634    | 8,417     | 19,660     | 48,711 |
| <b>Public facility land</b>   |           |           |            |        |
| Substituted area (ha)   | 2.8       | -         | -          | 2.8    |
| Building compensation (m <sup>2</sup> )                               | 2,663     | -         | -          | 2,663  |
| <b>Agricultural land (ha)</b>   |           |           |            |        |
| Substituted area (public owned)                                       | 4.3       | 3.4       | 5.9        | 13.6   |
| Purchased area (private owned)  | 7.4       | 6.8       | 8.4        | 22.6   |
| <b>Government owned land</b>  |           |           |            |        |
| Transferred area (ha) (including monument site, road and river, etc.) | 5.7       | 7.0       | 1.7        | 14.4   |

## Inventory of Real Estate by Blocks

| Code no. of block                 | Land title                     | Area (ha)    | Net | Road within residential area | Open space within residential area | Building floor area (m <sup>2</sup> ) | Types of structures |                |           | Population | No. of households | Implementation phasing |
|-----------------------------------|--------------------------------|--------------|-----|------------------------------|------------------------------------|---------------------------------------|---------------------|----------------|-----------|------------|-------------------|------------------------|
|                                   |                                |              |     |                              |                                    |                                       | Temporary           | Semi permanent | Permanent |            |                   |                        |
| <b>Government owned land</b>      |                                |              |     |                              |                                    |                                       |                     |                |           |            |                   |                        |
| 1                                 | Monument site                  | 3.6          | 3.6 |                              |                                    |                                       |                     |                |           |            |                   | 1                      |
| 2                                 | Archeological regional office  | 0.3          | 0.3 |                              |                                    | (800)                                 |                     |                | (900)     |            |                   | 1                      |
| 3                                 | Pre-setn tourist facility site | 0.5          | 0.5 |                              |                                    |                                       |                     |                |           |            |                   | 1                      |
| 16                                | " (Ramayana theater)           | 1.0          | 1.0 |                              |                                    | (1,500)                               |                     |                | (1,500)   |            |                   | 2                      |
| 20                                | Opak river                     | 1.6          | 1.6 |                              |                                    |                                       |                     |                |           |            |                   | 2                      |
| 27                                | Candi Lumbung area             | 0.3          | 0.3 |                              |                                    |                                       |                     |                |           |            |                   | 2                      |
| 30                                | Candi Butrah area              | 0.2          | 0.2 |                              |                                    |                                       |                     |                |           |            |                   | 2                      |
| 33                                | Candi Sewu area                | 3.3          | 3.3 |                              |                                    |                                       |                     |                |           |            |                   | 2                      |
| <b>Local public facility land</b> |                                |              |     |                              |                                    |                                       |                     |                |           |            |                   |                        |
| 7                                 | School                         | 0.7          | 0.6 |                              | 0.1                                | 720                                   |                     |                | 720       |            |                   | 1                      |
| 8                                 | Grave yard                     | 0.4          | 0.4 |                              |                                    |                                       |                     |                |           |            |                   | 1                      |
| 13                                | School                         | 2.0          | 1.8 | 0.2                          |                                    | 1,852                                 |                     | 99             | 1,753     |            |                   | 1                      |
| <b>Residential land</b>           |                                |              |     |                              |                                    |                                       |                     |                |           |            |                   |                        |
| 6                                 | Krang Lor village              | 1.0          | 0.8 |                              | 0.2                                | 1,080                                 | 147                 | 754            | 179       | 69         | 15                | 1                      |
| 12                                | Ringin Putil village           | 1.4          | 0.9 | 0.1                          | 0.4                                | 1,736                                 | 808                 | 684            | 1,781     | 59         | 22                | 1                      |
| 14                                | Krang Kidul village            | 4.9          | 4.3 | 0.3                          | 0.3                                | 17,818                                | 3,012               | 1,477          | 13,329    | 561        | 158               | 1                      |
| 15                                | Krang Kidul village            | 1.5          | 1.4 | 0.1                          |                                    | 3,756                                 | 938                 | 1,239          | 1,479     | 417        | 83                | 2                      |
| 18                                | Klurak village                 | 0.9          | 0.9 |                              |                                    | 1,414                                 | 300                 | 96             | 1,018     | 37         | 7                 | 2                      |
| 19                                | Klurak village                 | 4.3          | 3.0 |                              | 1.3                                | 1,739                                 | 729                 | 178            | 832       | 68         | 23                | 2                      |
| 29                                | Ngang Kruk village             | 0.1          | 0.1 |                              |                                    | 137                                   |                     | 137            |           | 5          | 1                 | 2                      |
| 32                                | " "                            | 0.2          | 0.2 |                              |                                    | 548                                   |                     | 548            |           | 20         | 4                 | 2                      |
| 35                                | " "                            | 0.9          | 0.9 |                              |                                    | 823                                   |                     | 823            |           | 28         | 6                 | 2                      |
| 22                                | Klurak Lor village             | 1.7          | 1.5 | 0.2                          |                                    | 6,000                                 |                     | 6,000          |           | 132        | 33                | 3                      |
| 23                                | " "                            | 3.1          | 2.8 | 0.3                          |                                    | 6,300                                 |                     | 6,300          |           | 165        | 39                | 3                      |
| 26                                | Ngang Kruk village             | 2.3          | 2.0 | 0.3                          |                                    | 2,880                                 |                     | 2,880          |           | 140        | 23                | 3                      |
| 39                                | Kwenirejo village              | 1.6          | 1.4 | 0.2                          |                                    | 4,250                                 |                     | 4,250          |           | 150        | 33                | 3                      |
| 40                                | Bogem village                  | 1.3          | 0.2 | 0.1                          | 1.0                                | 400                                   |                     | 400            |           | 24         | 3                 | 3                      |
| <b>Agricultural land</b>          |                                |              |     |                              |                                    |                                       |                     |                |           |            |                   |                        |
|                                   |                                | Public owned |     | Private owned                |                                    |                                       |                     |                |           |            |                   |                        |
| 4                                 | Public farm land               | 4.6          | 4.3 | 0.3                          |                                    |                                       |                     |                |           |            |                   | 1                      |
| 5                                 | Private farm land              | 1.8          |     | 0.3                          | 1.5                                |                                       |                     |                |           |            |                   | 1                      |
| 11                                | " "                            | 5.9          |     |                              | 5.9                                |                                       |                     |                |           |            |                   | 1                      |
| 9                                 | Public farm land               | 0.9          | 0.8 | 0.1                          |                                    |                                       |                     |                |           |            |                   | 2                      |
| 10                                | Private farm land              | 0.9          |     |                              | 0.9                                |                                       |                     |                |           |            |                   | 2                      |
| 17                                | " "                            | 2.9          |     | 0.1                          | 2.8                                |                                       |                     |                |           |            |                   | 2                      |
| 37                                | Public + private farm land     | 2.3          | 1.0 | 0.2                          | 1.1                                |                                       |                     |                |           |            |                   | 2                      |
| 28                                | Private farm land              | 0.8          |     |                              | 0.8                                |                                       |                     |                |           |            |                   | 2                      |
| 31                                | " "                            | 0.7          |     |                              | 0.7                                |                                       |                     |                |           |            |                   | 2                      |
| 34                                | Public + private farm land     | 2.2          | 1.6 | 0.1                          | 0.5                                |                                       |                     |                |           |            |                   | 2                      |
| 21                                | " "                            | 1.8          | 0.8 | 0.2                          | 0.8                                |                                       |                     |                |           |            |                   | 3                      |
| 24                                | Private farm land              | 6.0          |     |                              | 6.0                                |                                       |                     |                |           |            |                   | 3                      |
| 25                                | Public farm land               | 2.2          | 2.1 | 0.1                          |                                    |                                       |                     |                |           |            |                   | 3                      |
| 36                                | " "                            | 3.0          | 2.7 | 0.3                          |                                    |                                       |                     |                |           |            |                   | 3                      |
| 38                                | Public + private farm land     | 1.9          | 0.3 |                              | 1.6                                |                                       |                     |                |           |            |                   | 3                      |

# Land Acquisition Map





**1**

Facing to Construction

**2**

Preliminary Construction Proceeds with Basic Site Work

**3**

In Full Swing of Construction

**4**

Final Stage of the Park Construction

# Construction Process in General

The purpose of this article is to select one typical area of the park, to itemize its construction process and to clarify the general construction process.

## Outline of Construction

### Demolishment and Clearance Stage

On the occasion of implementation, how soil, vegetation, artifacts, etc. are transacted, is determined. The determination is started after the distinguishing of things to be protected, to be demolished and for clearance.

### Archaeological Survey Stage

Before entering into earthwork, an archaeological survey is made to determine whether to develop a certain area or not from an archaeological point of view.

### Earthwork Stage

This is the major grading based on returning the artificially changed topographical ground to its natural form. The arrangement of retaining walls with danger and revetment will be done.

### Utility Construction Stage

This includes the equipment of Drainage Sewage Water Supply System and Electric Supply Telephone System.

### Landscape Structure Construction Stage

The equipment of hard structure of the landscape in pavements stairways enclosure, etc.

### Planting Stage

This is the last stage of Landscape. Includes the wide range from the planting of topsoil spreading trees or shrubs to that of green pavement with lawn grass.

### Building Construction Stage

This stage includes the equipment of construction facilities in the park. On the occasion of the construction, an archaeological survey of the relevant areas is made to reascertain the feasibility for the site development.

### Gardening Stage

This includes the equipment of facility sites within the park in parallel with the building construction.

## Demolishment/Clearance Stage

### Demolishment/Clearance

The planned areas in the park cannot be used as a completed park as it is. According to its project contents, the ground clearance and demolition of existing artifacts are the primary things to be done. It also includes the removing of unnecessary or obstructive elements according to the landuse and the facility layout of the park, and the aiming at the conveniences for the construction works. Villages or agricultural area covers a wide range in the park area, a number of trees and vegetations, village houses and roads are the objects for the clearance and demolition.

### Protection and Store Materials for Reuse

For the three materials available for landuse in future, other than landscaping of the park, should be cultivated instead of demolition. The reuse is aimed with any form of equipment or temporary replantation to protect the complete removal.

## Earthwork Stage

### Strip and Store Topsoil

The earthwork is generally made after the removal of the artifacts in the planned areas. In this case, the area for the planted should preserve fertile topsoil as possible for its reuse after major grading.

### Cut and Excavation

In case of cut and excavation work in the park, a rapid change of slopes should be avoided above a things for the harmony with the natural topographic conditions. The rounding of topsoil is also important along with the smoothing of topsoil.

### Fill and Embankment

The materials for embankment is the main material composing the embanking. Therefore, it is necessary to use good materials as the quality of soil materials has effects on the difficulty of works and the swelling of soil after completion.

### Compacting

When there is the necessity of hardening or tightening soil for the prevention of the subsidy of the ground, owing to the compression in case of embankment, careful work should be done in order to evade the subsidy of base ground embanked, as it happens very easily to such soft soil as fields for compacting.

## Utility Construction Stage

### Drainage System Construction

The stormwater fallen within the park results in a big inconvenience that it is accumulated without being drained. When a lot of stormwater is accumulated, it may result in big temporary puddles and the harms to parkroads or facilities, these not only give harms to the environment of park, but also have a great effect on visitors' activities, and in addition, on the operation functions of park. The primary point to protect archaeological monuments from erosion owing to natural disasters, is the equipment of the stormwater drainage system. Stormwater runoff can easily change the ground surface by the erosion.

The stormwater flows along the slopes of ground surface. However, if the ground surface has slopes in the same direction only, and if it covers a wide area, stormwater runoff may concentrate on only one direction. The stormwater drainage in this park is devised to cope with ground cover plants and lawn grass and the principle of groundmodelling or ground surface treatment.

## Building Construction Stage

### Basement

In case that any construction near or on the undisturbed remains is needed, the construction should be done so as to fix the basement closely on the swollen ground lest an unequal ground pressure should have an effect on the remains.

### Structure

Designating the frame construction including the equipments of wall, roof, floor, etc.

### Finishing

It consists of the fixing of sash, finishing of wall, roof or floor after giving the last finishing of the framework. In case of museum, facilities for exhibition are to be equipped.

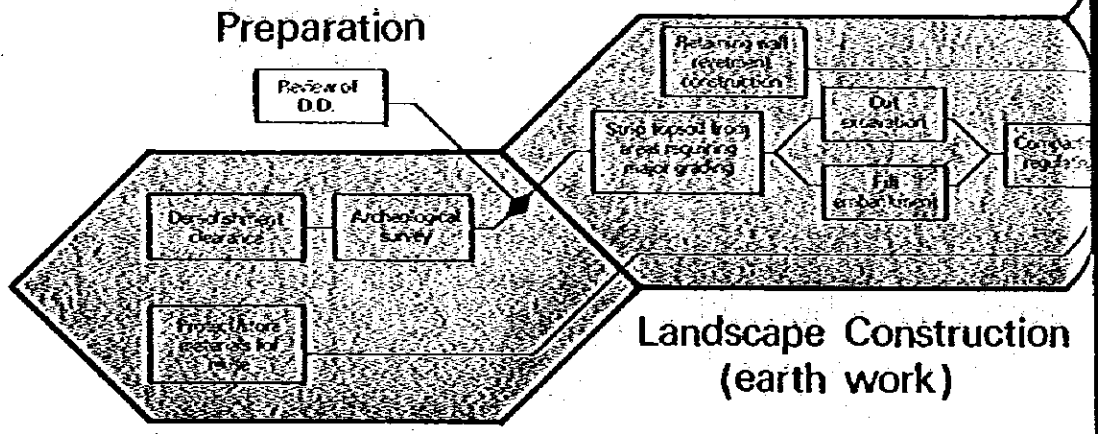
## Landscape Structure Construction Stage

### Pavement

This is represented by parkway, concourse, mall, footpath, service road and plaza, etc. In this park, emphasis was put mainly on the security, pleasantness and the good scenery. This pavement was generally made for pedestrians' sake. The cars for operation are run through service road. As for parkway, cars for operation use are run on routes with systematic structure taking the endurance of cars into consideration.

### Level Change and Stairway

For the ground apt to the difference in surface level, an artificial transaction is necessary to provide visitors with a secure and pleasant walk. There are certain limits to the slopes in stairs for visitors. But climbing long stairways at a time makes one feel tired and insecure. In this plan, a decent stairway harmonized also with the scenery of archaeological monument, taking the slopes in stairways landing zone, side wall, railing, texture, etc. into consideration to cope with the current topographic



## Archaeological Survey Stage

### Archaeological Survey

The feasibility study of the availability of the site development and the check whether there are remains still remain undiscovered, should be made before starting the earthwork. In case that any undiscovered remains are found or when they judge that a preciser investigation should be needed, it is possible to change the master plan of the development or to postpone the time.

### Retaining Wall and Revetment Construction

It is necessary to equip retaining walls to control erosion for the slopes which need the preservation of surface soil and for the places that are apt to extreme differences of ground level. On riverside, on the other hand, a revetment should be made to protect the river and for erosion control. These works are the primary things that need functioning and so a full arrangement should be made in the view of scenery as they are made in cubic. The cross section of the construction should be made as to have an appropriate difference of ground level harmony with the topography. Taking a secure slopes the ground surface into account, there may be construction, in some cases, with differences in grades.

## Utility Construction

### Water Supply System

It designates to connect the pipes from spring and deep well outside the park into elevated reservoir tank and from there to supply water to various places in the park through feedpipe. Before the equipment, however, an archaeological survey is made to check the feasibility of the development like building construction.

## Gardening Stage

### Gardening

Almost in parallel with the finishing works of facility sites, the equipment of facilities for gardenmaking, such as minor grading for the adjustment fitting to that of parking area, step, stairways, and that of facility greenery, green pavement are to be made.



## Planting Stage

### Minor Grading

The arrangement of horizontal angles in the slopes, of the heights and difference between landscape facility and ground level will be made.

### Spread Topsoil

Topsoil spreading will be made to bring out a good-quality fertile soil for the trees to be planted and green pavement. In this case, the ground that stores a fertile existing topsoil is heaved up partially.

### Reutilization of Existing Materials

For this, the transplantation of the existing materials that are planted under protection, and the equipments are to be made in the stage of preparation.

### Planting

Trees are firstly planted with the successive planting of shrubs. They are fixed to stakes according to necessity and protected by treeguards. Ground coverplants and lawn grass are lastly planted. Planting also includes the maintenance such as watering during the period when tree shrubs and others take firm roots into the soil.