

BASIC DESIGN STUDY REPORT
OR
PROJECT FOR IMPROVEMENT
OF
THE INSTITUTE OF HUMAN SETTLEMENTS
IN
THE REPUBLIC OF INDONESIA

SEPTEMBER 1968

JAPAN INTERNATIONAL COOPERATION AGENCY



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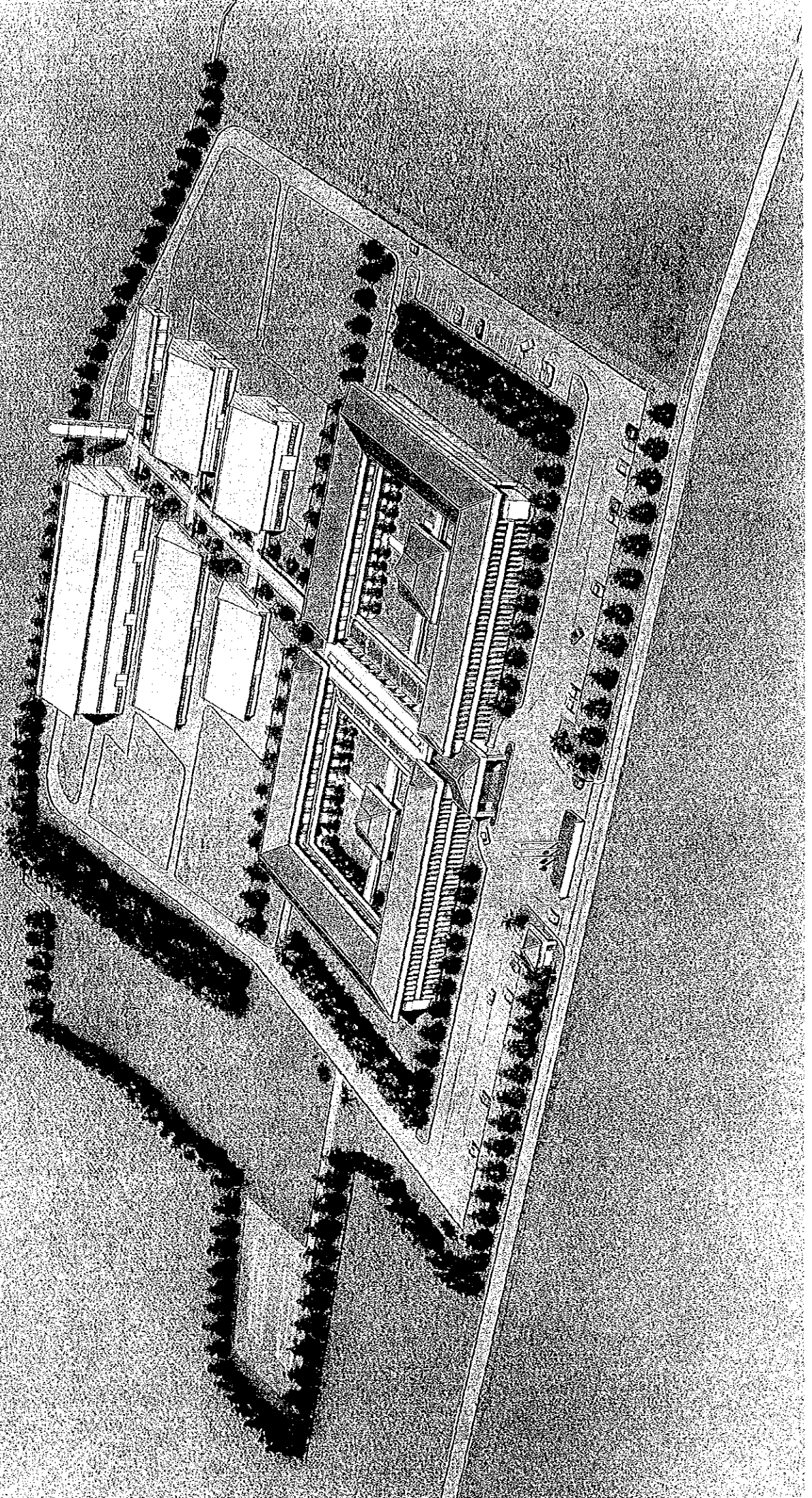
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JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to the request of the Government of the Republic of Indonesia, the Government of Japan has decided to conduct a basic design study on the Project for Improvement of the Institute of Human Settlements, and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Indonesia a study team headed by Mr. Hiroshi Asano, Director, Housing and Land Planning Division, Housing Planning Department, Housing and Urban Development Corporation from April 21 to May 11, 1988.

The team had discussions on the Project with the officials concerned of the Government of Indonesia and conducted a field survey in Bandung area. After the team returned to Japan, further studies were made, a draft report was prepared and, for the explanation and discussion of it, a mission headed by Mr. Yujiro Kaneko, Representative for International Activities, the Building Center of Japan was sent to Indonesia from August 12 to August 21, 1988. As a result, the present report has been prepared.

I hope that this report will serve for the development of the project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the team.

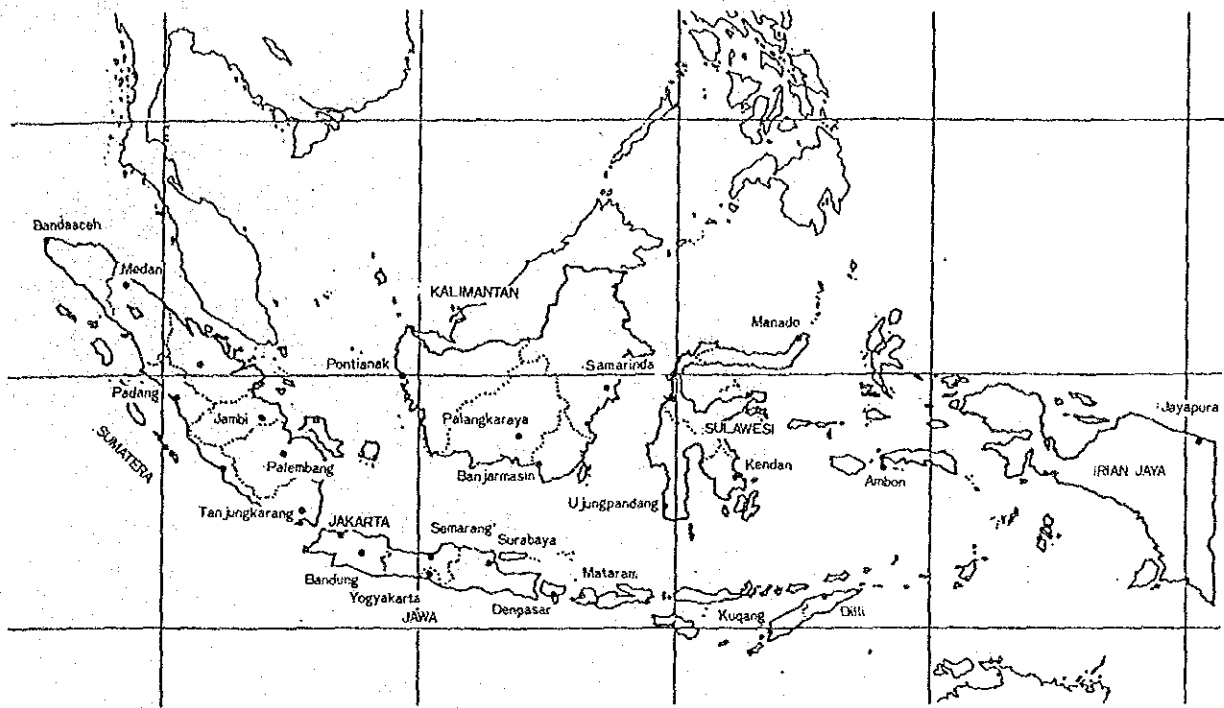
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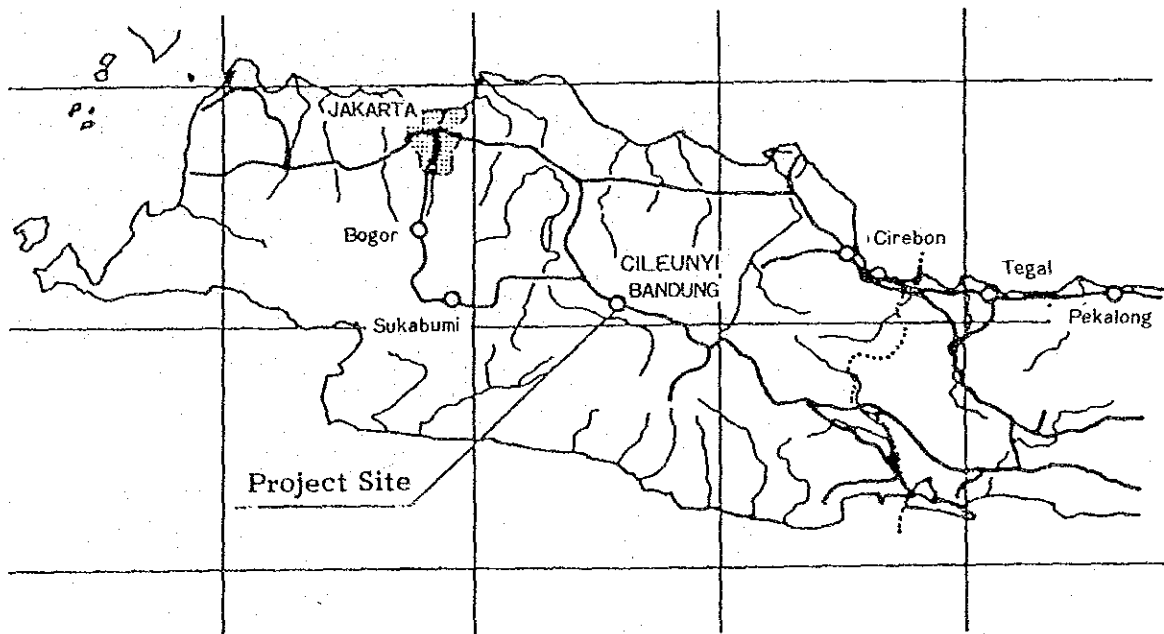
Kensuke YANAGIYA

President

Japan International Cooperation Agency



Republic of Indonesia



Western Java

SUMMARY

SUMMARY

Housing is one of the basic human needs, and improving it is critically important. The Government of the Republic of Indonesia (hereinafter abbreviated to Indonesia) has worked hard to improve the housing situation through a series of five-year plans for national development. However, rapidly increasing population and urban density are causing profound social problems such as lack of housing, particularly small and humble housing for the low-income segment of society, and deterioration of housing conditions.

The Institute of Human Settlements (IHS), an agency of the Ministry of Public Works, is the sole public research organization in Indonesia dealing with housing and buildings, and the Institute is scientifically and technically promoting activities of housing improvement. However, its present facilities are separated on two different sites, and its buildings and equipment are in a state of disrepair. All of these conditions are acting as restrictions on the Institute's desire to strengthen its research activities. The Ministry of Public Works has been studying how to strengthen the Institute for several years. They have secured a building site, formulated a facility improvement plan for IHS and made a request to the Japanese Government for grant aid to implement the plan.

Upon receiving this request from the Indonesian Government, the Japanese Government decided to conduct a preliminary study for the project and entrusted the study to the Japan International Cooperation Agency (JICA). JICA dispatched to Indonesia the Preliminary Study Team headed by Mr. Norihisa Ishikawa, Senior Officer for Construction, Building Guidance Division, Housing Bureau, Ministry of Construction from January 25 to February 5, 1988.

Based on the study results, the Japanese Government decided to initiate a basic design study and JICA dispatched a study team to Indonesia from April 21 to May 11, 1988. During its visit to Indonesia, the team discussed the request for the grant aid with concerned persons of Indonesia, performed a field survey, and collected necessary data.

IHS was founded in the 1950s as a building material research and development agency, and for a time was the Directorate of Building Research (DBR) within the Directorate General of Human Settlements of the Ministry of Public Works. With the reorganization of the Ministry of Public Works in 1984, IHS began to play its current

role under the Ministry's Agency for Research and Development. At present IHS is active in research and development on human settlements relating to city and regional development, structure/construction technology, building materials, water supply, sanitary engineering, as well as collection and analysis of information relevant to these fields, information dissemination and implementation of seminars. In recent years, IHS has come to establish a specially close relationship with the Japanese Government and has maintained intimate relations with JICA, which has dispatched long- and short-term experts to Indonesia, provided Third Country Training Programs, Joint Research Projects, etc., accomplishing substantial achievements in some specific fields of research and development activities. IHS is also designated as a UN Regional Center for Research on Human Settlements of the United Nations (UNRCRHS).

The development of low-cost housing using building materials made from resources available in Indonesia and designs suitable for the local topography and climate is an essential means of improving the housing situation in Indonesia. IHS has demonstrated through its previous record that it has the talented personnel to act as the organization in charge of improving housing and is expected to play an important role in this field.

IHS's activities are classified into three categories, i.e. research and development, information dissemination, and testing and technical guidance. The research and development are carried out in the housing environment/sanitary engineering division, building material division, and structure/construction division. The functions of these divisions focus on applied research which directly leads to housing construction and regional development. The information dissemination is mainly conducted in the information processing section, publication, production and library section, standards and guidance section, and the training and dissemination section. Its activities involve: collection and processing of data regarding the housing situation; publication of periodicals dealing with research activities; preparation of building construction manuals and standards; and planning and coordination of IHS-sponsored seminars. The testing and technical guidance division's activities are classified into three categories of experimentation, test inspection, and technical guidance. This division performs experiments/measurements and test inspections commissioned by public organizations, etc. and technical guidance on simple tests conducted at construction sites.

The intended building site is located in Cileunyi Village, east of Bandung Suburbs. The site used to be an old paddy field and is surrounded by agricultural fields, so site preparation is required. There is no city water, so deep wells must be used, but

electric and telephone lines can be extended from nearby facilities. An outline of the IHS's facilities and equipment development plan, which is based on the results of the basic design study, is as follows.

(1) Building Facilities

The Main Building 6,245 m²

- Two storeys, reinforced concrete structure

Administration office, research and development rooms, housing environment testing rooms, information dissemination rooms, seminar rooms, exhibition rooms, dormitory rooms, a canteen, etc.

Laboratories and Workshop 4,960 m²

- One storey (in part, two storeys), steel structure

Building material laboratory, structure/earthquake laboratory, sanitary engineering laboratory, fire testing laboratory, workshop, etc.

The Utility Building 293 m²

- One storey, reinforced concrete structure

Electrical room, water treatment room, elevated water tank, etc.

The Guardhouse 23 m²

- One storey, reinforced concrete structure

Guard room, overnight duties room, etc.

External Work -

- Connecting corridor, in-site road, parking lot, gateway, waste water treatment tank, etc.

(2) Equipment

Housing Environment Analyzing Equipment:

Equipment for statistical analysis, Equipment for survey data collection, Equipment for analyzing aerial photography, and Equipment for map analysis

Information Dissemination Division Equipment:

Audio visual equipment, seminar and exhibition equipment, and printing equipment

Building Material Laboratory Equipment:

General physical testing apparatus, General chemical testing apparatus, Fresh concrete testing apparatus, Hardened concrete testing apparatus, Testing apparatus for cement-based materials, Testing apparatus for wood & wood-based materials, Testing apparatus for plastics and coating materials, Durability testing apparatus, Aggregate testing apparatus, and Metal testing apparatus

Structure/Earthquake Laboratory Equipment:

Seismic loading system, Permanent loading system, Data acquisition system for structural tests, Static soil testing system, and Equipment for testing on building physics

Sanitary Engineering Laboratory Equipment:

General testing apparatus for water quality, General testing apparatus for liquid & solid waste, Microbiological testing apparatus, Chemical testing equipment, Physical testing equipment, Portable testing kits and data acquisition system for water and sanitary tests

Fire Testing Laboratory Equipment:

Fire-proof testing apparatus and Fire resistance testing apparatus

Workshop:

General metal workshop equipment and General wood workshop equipment

The project cost which should be borne by the Indonesian side is estimated at about Rp.1.1 billion.

After this Project has been formalized through the Exchange of Notes (E/N) in the grant aid program between the two countries, it will take 3.8 months for detailed design, 1.7 months for tendering and contracting and 18 months for construction, namely 23.5 months in total to complete the project.

The IHS, the executing agency for this Project, has 272 staff members only for its headquarters. With the expansion in its activities, its staff will be increased by 120

people. The management budget necessary for conducting its activities is expected to be doubled for the period of 1987/88 to 1992/93. Further, an increase in fees in consideration of experimentation commissioned by outside organizations is expected, and hence it is judged that all the expenses necessary for the operation of the new facilities will be satisfactorily prepared.

This Project should not only contribute greatly to meeting the basic needs of Indonesian people through its activities such as developing economical water treatment methods and conducting research on such structural systems, building materials and construction techniques as are required for realization of low-cost housing, but should also positively affect the Indonesian society and economy, through the rationalization and up-grading of the construction industry, increase of employment opportunities, etc. The Project should also extend beyond Indonesia and aid research in the human settlements field in other developing countries via IHS's activity as a UNRCRHS.

As noted above, this Project aims to improve human settlement conditions in the Republic of Indonesia, and should be completed as early as possible. There is great significance in Japan's implementing this Project through grant aid, and it is expected that the Project will be of great benefit to Indonesia.

CONTENTS

PREFACE	
MAP	
SUMMARY	I
ABBREVIATIONS	
CHAPTER 1 INTRODUCTION	1
CHAPTER 2 BACKGROUND OF THE PROJECT	
2.1 Outline of Improvement of Human Settlements in Indonesia	5
2.2 Problems in Human Settlements	10
2.3 IHS's Relationship with Relevant Organizations	
2.3.1 IHS: Its Position and Roles	13
2.3.2 Outline of IHS	20
2.3.3 Problems in Work Activities	40
2.4 Request for Grant Aid: Background and Contents	
2.4.1 Background of Request for Aid	41
2.4.2 Contents of Aid as Requested	42
CHAPTER 3 CONTENTS OF THE PROJECT	
3.1 Objectives	45
3.2 Review of the Request	
3.2.1 Review of Facility Scale	45
3.2.2 Review of Requested Equipment	47
3.3 Outline of the Project	
3.3.1 Implementing Organization and Operation Plan	61
3.3.2 Activity Plan	63
3.3.3 Planned Site Location and Situation	72
3.3.4 Outline of Facilities and Equipment	77
3.3.5 Manpower Plan	80
3.4 Technical Cooperation	
3.4.1 Relationship of this Project and Technical Cooperation	82
3.4.2 Request for Technical Cooperation	84

CHAPTER 4	BASIC DESIGN	
4.1	Design Principles	85
4.2	Review of Design Conditions	
4.2.1	Natural Conditions	86
4.2.2	Local Construction Conditions	87
4.2.3	Determination of Facility Scale	87
4.3	Basic Plan	
4.3.1	Site Plan	96
4.3.2	Architectural Plan	99
4.3.3	Equipment Plan	120
4.3.4	Basic Design Drawings	141
4.4	Construction Plan	
4.4.1	Construction Situation and Guidelines	157
4.4.2	Works Division	159
4.4.3	Construction Supervision Plan	161
4.4.4	Material and Equipment Procurement Plan	162
4.5	Schedule	164
4.6	Running Costs	165
4.7	Project Cost Estimate	166
CHAPTER 5	PROJECT EVALUATION	167
CHAPTER 6	CONCLUSION AND RECOMMENDATIONS	169

APPENDICES

APPENDIX 1	INFORMATION ON THE FIELD SURVEY (BASIC DESIGN STUDY AND BASIC DESIGN (DF) STUDY)	
	1.1 Members of the Study Teams	A1
	1.2 Diary of the Study Teams	A3
	1.3 Minutes of Discussions	A9
	1.4 Persons Concerned in Indonesia	A23
APPENDIX 2	HOUSING CONDITIONS IN THE INDONESIA	A27
APPENDIX 3	DATA OF BORING AT SITE	A30
APPENDIX 4	PHOTOGRAPHS OF SURROUNDING AREAS OF THE SITE	A33

ABBREVIATIONS

BAPPENAS	Badan Perencanaan Pembangunan Nasional/National Development Planning Board
BIC	Building Information Center
BTN	Bank Tabungan Negara/National Saving Bank
IHS	Institute of Human Settlements
ITB	Institut Teknologi Bandung/Bandung Institute of Technology
KANWIL	Kantor Wilayah/Regional Office
KIP	Kampung Improvement Program
P3D	Perintis Pemugaran Perumahan Desa/Pilot Project for Rural Housing Renovation
PERUMNAS	PERUM PERUMNAS/National Urban Development Corporation
PERUMTEL	Perusahaan Umum Telekomunikasi/Telecommunication Government Enterprise
PLN	Perusahaan Umum Listrik Negara/State Electricity Enterprise
PUSBINLAT	Pusat Pembinaan Latihan/Center for Training and Skill Improvement of Construction Industry
PUSDIKLAT	Pusat Pendidikan dan Latihan/Center for Training and Education
REI	Real Estate Indonesia
SEKKAB	Sekretariat Kabinet/Cabinet Secretariat of the Republic of Indonesia
SKBI	Standar Konstruksi Bangunan Indonesia/Standards of Building Construction in Indonesia
UNRCRHS	UN Regional Center for Research on Human Settlements

CHAPTER 1 INTRODUCTION

CHAPTER 1 INTRODUCTION

Improvement of human settlement conditions is one of the most important basic human needs. Human settlements are influenced by many factors such as the natural environment, culture, mode of living, economy, society, and individuals. In order to improve human settlements, it is necessary to envision all the involved factors on a wide and comprehensive basis. Human settlements are tightly interrelated to fundamental factors like the local topography, climate, custom and lifestyle. Efforts to improve human settlements, in ways suitable to the character of each locale, have been going on throughout the world for a long time.

In the Republic of Indonesia, the government took up improvement of housing and the related environmental conditions as one of the most important tasks in the national policy and has been continuing efforts for improvement through successive five-year plans of national development. The Ministry of Public Works (Departemen Pekerjaan Umum: DPU) and the agencies under its jurisdiction have been playing major roles in dealing with this task. However, in view of the scale and depth of the concerned problems as well as the diversity of life due to the expanse of the nation's territory, it has become more and more important in recent years for the country to restructure the system of approach to the involved problems and to promote and strengthen the ability to deal with them.

The Institute of Human Settlements (IHS) in Bandung has been engaged in research activities related to human settlements for three decades. The Institute was first established as a building material research institute in the 1950s, and later became the Directorate of Building Research (DBR) of the Directorate General of Human Settlements of DPU.

As a result of the reformation of DPU in 1984, it was reorganized into the present form, the Institute of Human Settlements within the Agency for Research and Development, DPU. Since then, IHS has been carrying out extensive activities in those fields of human settlement research studies which encompass research and development of urban and regional development, construction technology and materials, water supply and sanitary engineering, collection and analyses of data and information related to such research and development, dissemination of new acquired information and implementation of technical training. In addition, IHS has been playing an active role as part of the UN Regional Center for Research on Human Settlements (UNRCRHS). In recent years, IHS has come to establish a specially close

relationship with the Japanese Government and has maintained intimate relations with JICA, which has dispatched long- and short-term experts to Indonesia, provided Third Country Training Programs, Joint Research Projects, etc., accomplishing substantial achievements in some specific fields of research and development activities.

While IHS has been efficiently performing its work in connection with improvement and refinement of human settlements, which is a highly complicated task, as briefly described at the outset of this report, the renovation and enlargement of its present facilities are highly restricted in almost all respects because of limitation on land space, building space and equipment quality. DPU began to give priority to the improvement of these conditions a few years ago and has been considering appropriate countermeasures. It has secured a new site for IHS and made a request to the Japanese Government for grant aid to improve the facilities and equipment of the Institute.

In response to this request of the Indonesian Government, the Japanese Government decided to conduct a preliminary study for the project and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Indonesia the Preliminary Study Team headed by Mr. Norihisa Ishikawa, Senior Officer for Construction, Building Guidance Division, Housing Bureau, Ministry of Construction from January 25 to February 5, 1988. On the basis of the study results, JICA dispatched to Indonesia the Basic Design Study Team headed by Mr. Hiroshi Asano, Director, Housing and Land Planning Division, Housing Planning Department, Housing and Urban Development Corporation from April 21 to May 11, 1988.

While in Indonesia, the Basic Design Study Team studied the current status of the local human settlements, the proposed improvements thereto, the current IHS activities, the proposed activity programs, etc. Further, the Team ascertained the essence of Indonesia's request, its proposed project implementation organization, the existing IHS facilities and the conditions of the new site, and also discussed various fundamental conditions for the project implementation with the Indonesian counterparts.

Based on the discussion results and data collected, the Team conducted further studies on the current problems on human settlements in Indonesia, analysis of activities of IHS at present and in future and evaluation of the existing facilities and equipment; determined the appropriate scale and size of the projected facilities and

equipment; prepared basic design drawings and cost estimates thereof; and worked out implementation plans including operation and maintenance for the project.

The results of the studies as described above were compiled into the "Basic Design Study Report on the Project for Improvement of the Institute of Human Settlements in the Republic of Indonesia (Draft)". JICA sent to Indonesia the Basic Design Study Confirmation Team headed by Mr. Yujiro Kaneko, Representative for International activities, the Building Center of Japan from August 12 to 21, 1988 to explain and confirm the study results.

This report describes the optimum basic planning essential for the project implementation on the basis of the analyses which, in turn, were based on the results of the aforesaid field surveys.

The Minutes of Discussions, Member List of the Study Team, Itinerary of the Study and List of Persons Interviewed are attached at the end of this report.

CHAPTER 2 BACKGROUND OF THE PROJECT

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2.1 Outline of Improvement of Human Settlements in Indonesia

Indonesia is the world's biggest archipelago which, accounting for a greater portion of the Malayan islands centered about the Equator, stretches 5,110 km in the east-west direction and 1,900 km in the north-south direction. It consists of some 13,000 islands whose total area amounts to about 2 million km². About 6,000 islands are inhabited. Among those, there are five principal islands; Sumatra, Jawa, Kalimantan, Sulawesi and Irian Jaya.

The total population of Indonesia as indicated by the 1980 census was 148.04 million and that estimated by the 1985 census was 165.20 million. The population density differs greatly depending on the island, with Java and Madura being most densely populated.

The 1980 national census indicated the rate of total population increase at 2.4 % per annum and 2.2 % per annum for the decades of 1961-1970 and 1971-1980 respectively. Progress of urbanization in the nation was indicated by the population increase rates in city areas in the same decades, which were 4.0 % and 4.4 % for 1961-1970 and 1971-1980 respectively (Table 2.1).

Table 2.1 Population Increase in Indonesia

(Unit: Million)

	1961	1971	1980	1985 (estimate)	1990 (forecast)	1995 (forecast)	2000 (forecast)
Urban Areas	13.5 % 14.5	18.0 % 21.5	24.0 % 35.5	26.2 % 43.3	28.5 % 52.3	31.3 % 63.5	34.6 % 77.1
Rural Areas	86.5 % 82.6	82.0 % 97.7	76.0 % 112.5	73.8 % 121.9	71.5 % 131.2	68.7 % 139.3	65.4 % 145.7
Whole Nation	97.1	119.2	148.0	165.2	183.5	202.8	222.8

Source: Central Statistic Bureau, the Republic of Indonesia

While the nation's population has been showing a steady yearly increase and urbanization has been in rapid progress, the absolute insufficiency in the number of dwelling units coupled with the inferior conditions of housing units and living environment for people in the lower income bracket has been posing some serious social problems (Table 2.2). In addition, improvement of living conditions in villages and rural areas scattered over the nation's vast land and inhabited by about 73 % of the total population constitutes a very big task.

Table 2.2 No. of Households by Housing Area in Urban Districts

(Unit: Thousand Households)

	<20 (m ²)	20~29 (m ²)	30~39 (m ²)	40~49 (m ²)	50~69 (m ²)	70~99 (m ²)	100~ (m ²)	Total
Sumatra	89.8	129.8	134.4	159.6	172.4	152.0	103.0	944
Java	663.0	578.7	572.1	611.0	733.6	632.6	622.6	4,437
Kalimantan	22.6	35.8	42.7	51.6	44.8	41.5	28.9	270
Sulawesi	21.7	42.9	55.5	45.3	49.3	33.3	27.1	277
East Islands	44.1	38.4	39.7	35.8	32.2	26.0	24.4	240
Total	841.2	825.6	844.4	903.3	1,032.3	885.4	806.0	6,168

Average no. of household members: 5.44 persons

Source: Census in 1980

The Indonesian Government began to tackle the improvement of living conditions in the Second Five-Year Plan for National Development (1974/75 - 1978/79) in earnest. In the "National Policy Guidelines," which constituted the prerequisite for the said five-year plan, the housing policy was given a top priority, with special attention paid to measures to aid people in the lower income bracket. The following measures were taken during the period covered by the aforesaid five-year plan:

- PERUM PERUMNAS (the National Urban Development Corporation) was inaugurated. 1974
- KIP (Kampung Improvement Program) was introduced into the national policy. 1974
- P3D (Perintis Pemugaran Perumahan Desa: Pilot Project for Rural Housing Renovation) was established. 1974

- Home builders' loan system by BTN (Bank Tabungan Negara: National Saving Bank) was established.

1976

PERUMNAS, an organization fully financed by the Government, was established to construct and supply housing units at its own responsibility, and it constructed and supplied 20,000 core houses (house units each with one room and a toilet and built on a 90 m² site) and 30,000 low cost houses. KIP was established to improve inferior conditions in Kampung (inferior urban housing areas provided with deficient infrastructure and densely built up with unreasonably small houses inhabited mainly by people in a low income bracket) by implementing footpath repairs, drainage rearrangement, etc. and constructing communal toilets, wells and the like. These improvement projects were formerly carried out solely by the municipalities of Jakarta and Surabaya, but the establishment of KIP has enabled such projects to be subsidized by the state. In consequence, the improvement projects were implemented over a combined area of 7,000 ha in both the cities. P3D is basically intended to give aid to villages which wish to improve their community facilities by their own efforts by supplying them with construction materials necessary for providing communal washing places, potable water supply systems, road repairs, etc. Some 1,000 villages have so far received aid under the P3D project since its start. The home builders' loan by BTN was started to provide the purchasers of PERUMNAS houses with long-term low-interest loans (with interest rates of 5-9 %, loan terms of 5-20 years and financing ratio of 90 %).

In the Third Five-Year Plan for the National Development (1979/80 ~ 1983/84) which followed the Second Five-Year Plan, the above-mentioned projects were enlarged in scale as indicated in Table 2.3 below. Further, the scope of application of BTN loans was expanded to include non-PERUMNAS houses so that it became possible for purchasers of houses supplied by the enterprises belonging to REI (Real Estate Indonesia) to be entertained by BTN loans, provided that the houses to be purchased met the requirements set out by BTN. At the same time, measures to reorganize potable water supply systems, solid waste disposal systems, drainage and sewerage systems, etc. came to be taken on a full scale basis, and an urban renewal project was implemented in Jakarta on a trial basis.

Table 2.3 Five-Year National Development Plans

Plans	The First Five-Year Plan (1969/70 ~1973/74)	The Second Five-Year Plan (1974/75 ~1978/79)	The Third Five-Year Plan (1979/80 ~1983/84)
<u>Housing</u>			
PERUMNAS	-	50,670 units	103,654 units
Non PERUMNAS	-	-	70,752 units
KIP	On trial	7,000 ha (2 cities)	11,700 ha (227 cities)
P3D	-	1,000 villages	4,923 villages
Urban Renewal	-	(In 2 cities)	1.8 ha (1 city)
<u>Water Supply</u>			
Urban Coverage	-	-	39 %
Rural Coverage	-	-	32 %
<u>Environmental Sanitation</u>			
Solid Waste Disposal	-	4 cities	15 cities
Drainage	Rehabilitation	2 cities	25 cities
Sewerage	-	-	4 cities

Source: Directorate General of Human Settlements

In the Fourth Five-Year Plan for National Development (1984/85-1988/89), which is to end in this fiscal year, the aforesaid housing policy has been strengthened continuously. Stress has been placed on the improvement and rearrangement of environmental sanitation, with the targets set out as indicated in Table 2.4 below. During the implementation of the current Five-Year Plan, the post of State Minister in Charge of Housing, whose duty is to take charge of coordination of housing policy and measures, was newly created. At the same time, DPU was reorganized and in consequence the Directorate of Building Research within the Directorate General of Human Settlements was reorganized as the Institute of Human Settlements (IHS) within the Agency for Research and Development in 1984.

Table 2.4 Targets of the Fourth Five-Year Plan for National Development

Program	Targets
<u>Housing</u>	
PERUMNAS	140,000 units
Non PERUMNAS	160,000 units
KIP	400 cities; 15,000 ha
P3D	10,000 villages
New Towns	6,000 ha
Urban Renewal	50 ha
<u>Potable Water Supply</u>	
Urban Coverage	70 %
Rural Coverage	55 %
IKK (District Capital)	2,000 small towns
<u>Environmental Sanitation</u>	
Solid Waste Disposal	200 cities
Drainage Systems	200 cities
Sewerage Systems	10 cities
<u>Urban and Regional Planning</u>	
Spatial Planning	Nation wide
Regional Planning	198 regencies
Urban Planning	292 cities

Source: Directorate General of Human Settlements

The national budget of Indonesia in 1987/88 is about Rp.22,783,100 million, and the annual budgets for DPU, the Directorate General of Human Settlements, the Agency for Research and Development and IHS in the same year are about Rp.156,600 million, 23,400 million, 4,900 million and 1,200 million, respectively. The national budget is divided into two categories, i.e. routine expenditure and development expenditure. The development expenditure for this year is about Rp.7,756,600 million and, in this budget, housing sector and regional/urban sector occupy Rp.412,000 million and 873,800 million respectively.

2.2

Problems in Human Settlements

As has been previously described, the Indonesian Government has maintained an earnest desire to implement its human settlement improvement; however, both housing and living conditions in the nation still face diversified problems created by drastic changes in social and economic conditions as described below:

(1) Sharp Increase in Housing Demand

If a family of an average size is taken as consisting of 5.44 persons, then, the annual demand for housing units due to population increase comes up to about 700,000 housing units in Indonesia as a whole and to about 300,000 units in urban areas alone. If the deficiency in the number of housing units accumulated from the past and the number of units requiring renewal yearly are included, it is reasonably estimated that the overall demand for housing units which actually exists may amount to several times the figures given above. Against this huge demand, the Fourth Five-Year Plan for National Development (1984/85 - 1988/89) is to provide only 300,000 units (140,000 units by PERUMNAS and 160,000 by the others) for the citizens in the low income bracket during the five years covered by the plan (Fig. 2.1). At present, the majority of the citizens with low income living in cities are securing places to live in by themselves through varied means which include extension of existing houses, illegal occupancy of housing units, renting living space in relatives' houses, etc. Therefore, such over-density of population, illegal occupancy, etc. are liable to cause deterioration of the living environment in city areas.

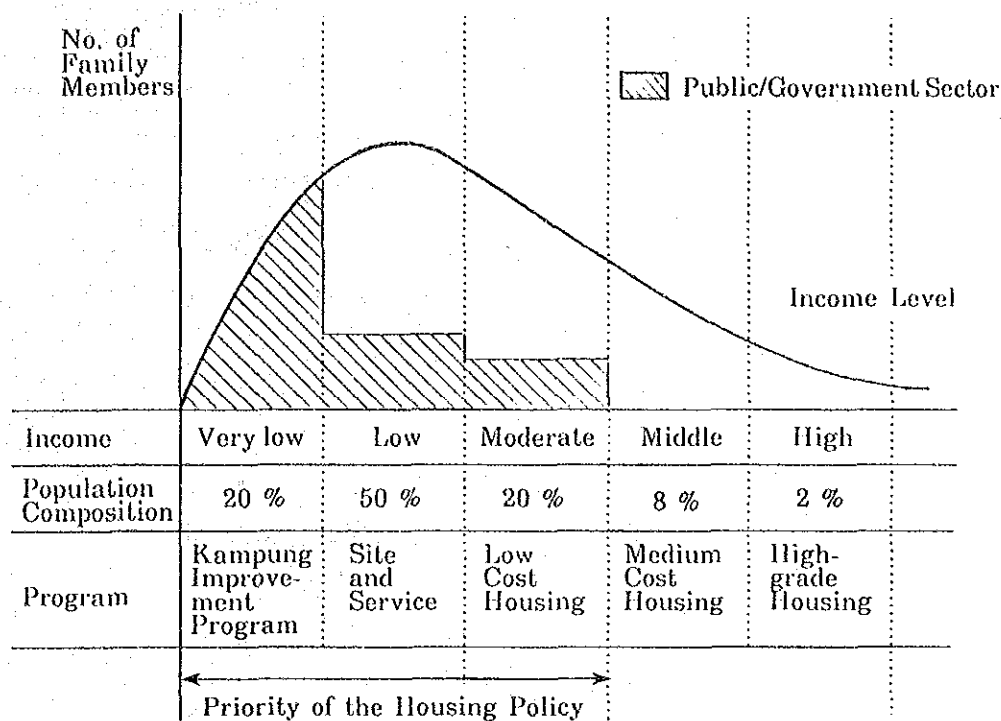


Fig. 2.1 Urban Housing Development and Income Distribution

(2) Imbalance of Regional Development

While urban development has been going on without proper discipline, sprawling of big cities has also become conspicuous. This phenomenon is closely related to such social and economic problems as drastic increase in population flow into city areas as well as delayed creation of employment opportunities in areas outside the cities; thus delay in formulating overall urban and regional plans is regarded as one of the greatest factors attributing to the present problem.

(3) Insufficiency of Usable Land and Infrastructure

While insufficiency of housing sites available for people in the low income bracket combined with incomplete control of rising land costs is creating certain problems, no effective comprehensive measures have so far been taken for land utilization and development. Deferred reorganization of infrastructure and provision of a hygienic living environment such as roads, drainage and sewerage system, and water supply in central parts of urban areas is particularly noticeable.

(4) Insufficient Financial Resources

Since only those who have regular and steady sources of income can be granted loans under the BTN system, a housing loan system available for people in the lower income bracket who are believed to account for 60-80 % of city dwellers still needs to be organized (Fig. 2.2.).

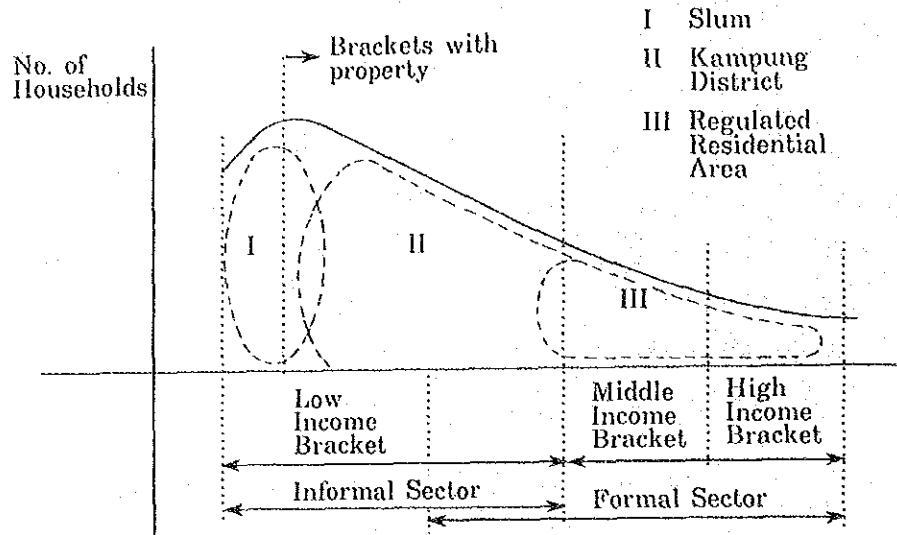


Fig. 2.2 Housing Status by Income Bracket

(5) Incomplete Legal Regulations

While establishment of standards based on proper research studies is essential to insure the structural safety of buildings, disaster prevention and construction material durability, Indonesia is delayed in this respect and practically no legal discipline is in enforcement to achieve these objectives. In consequence, inhabited areas of the country tend to suffer from great damage in case of disasters such as fires, earthquakes and floods.

(6) Lack of Technical Information

The housing supply policy adopted by the Indonesian Government is that the government should encourage self-help efforts of Indonesians by endeavoring to give them assistance to enable them to obtain low-cost, safe and comfortable housing units rather than the government assuming full responsibility for proper housing supply. As a result, any

effort directed to the improvement of human settlements in Indonesia cannot achieve fruitful results unless Indonesians at all social levels participate in such efforts. In this connection, it is of course necessary to promote the technical ability of construction specialists including researchers, civil servants, professionals and workers, and to implement the proper construction-related education to maintain them at an adequate level, but it is also essential that all possible efforts be made to impress on each and every inhabitant the need for improving the living environment. In other words, the approach to improvement as taken by the Indonesian Government cannot be expected to bear fruitful results unless information dissemination activities are tightly meshed with the housing policy and all of them are combined to form an effective process of development. It is therefore highly important to establish an efficient information network which can effectively transfer research and development achievements related to human settlements to those people engaged in the practical work of housing construction and living environment improvement.

2.3 IHS's Relationship with Relevant Organizations

2.3.1 IHS: Its Position and Roles

In Indonesia, DPU and its agencies have been taking charge of works required for improvement of human settlements. At the outset of the Fourth Five-Year Plan for National Development, the State Minister of Housing was newly appointed who would take charge of inter-ministerial coordination with the Ministry of Transmigration, Ministry of Interiors, Ministry of Health, Ministry of Agriculture and Fishery, etc. which are involved in the execution of the human settlement programs, and also coordination with PERUMNAS, BTN, etc.

The relationships between the various organizations involved in the field of human settlements are as shown in the chart below (Fig. 2.3).

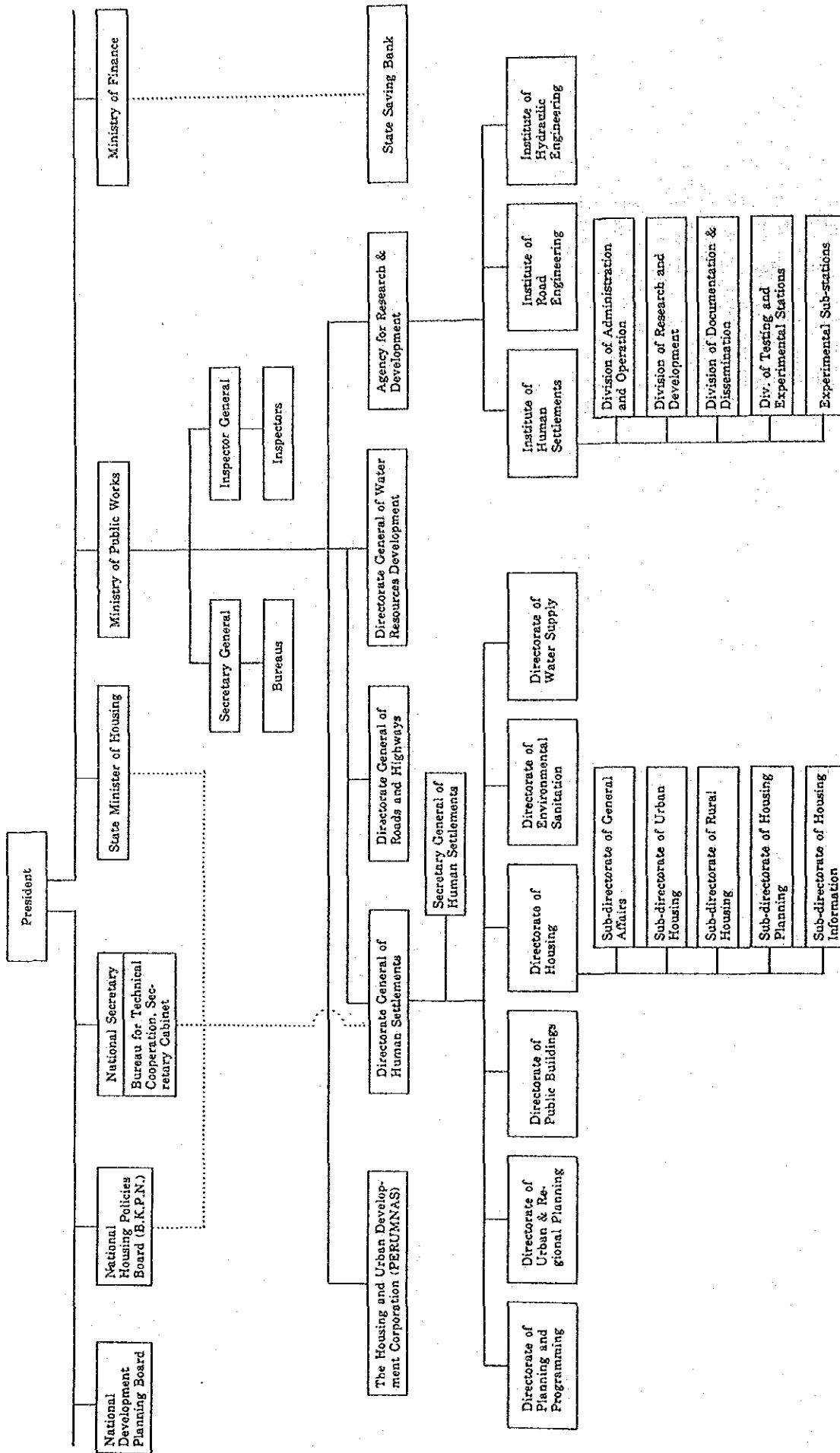


Fig. 2.3 Development-related Agencies Chart

Administration of matters concerning human settlements is in the hand of the Directorate General of Human Settlements of DPU.

The chart (Fig. 2.4) below may be regarded as graphically indicating the roles played by the Directorate General of Human Settlements.

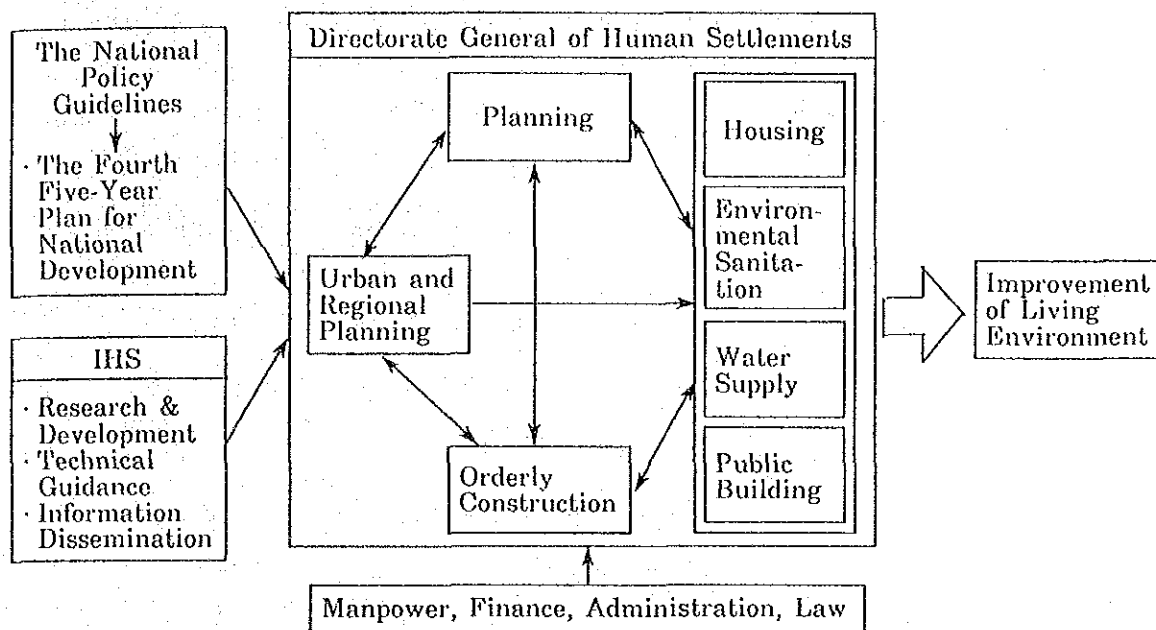


Fig. 2.4 Roles of Directorate General of Human Settlements

The development strategy as set out by the Directorate General of Human Settlements to aim at the targets of the Fourth Five-Year Plan is as described below.

(1) Supply of Low-Cost Houses - - - Continuous execution, with expansion as necessary, of the work of supplying low-cost houses to people in the low income bracket living in urban areas.

- Continuation/expansion of supply of standard houses and core houses
Regarding this, special consideration is given to the development of sites for low-cost houses.
- Continuation/expansion of housing environment development work and initiation of new town and large scaled urban development.
- Implementation of house inspection, information dissemination and model house construction.
- Development of guidelines and technical standards necessary for low cost housing construction.

(2) Water Supply Work

- Special attention is given to water supply work for provincial capitals.

(3) Environmental Sanitation Development

- Solid waste disposal and sewage treatment systems are to be developed for major cities.

(4) Fields of Activities given Priority in Substantiating Implementation Program

- Technical research and study program for housing environment and urban and regional development
- Economic and efficient building construction program
- Improvement of constructional ability in private sector
- Dissemination of information
- Improvement of working environment for construction workers

In 1984 when the Fourth Five-Year Plan was started, DPU established the Agency for Research and Development, having under its jurisdiction three research institutes which serve DPU's three Directorates General (of Roads and Highways, Water Resources and Human Settlements). Intended for research studies in fields related with human settlements, IHS is the institute related to the Directorate General of Human Settlements. Historically, IHS derived from the Directorate of Building Research (DBR) of the Directorate General of Human Settlements. With the reorganization as described above, the scope of activities of IHS was expanded to include, in addition to the housing and building-related research already taken up by its predecessor, research studies related to urban/regional development, water supply and environmental sanitation or, in other words, virtually all kinds of research and development connected with human settlements. IHS is also required to support, either directly or indirectly, the activities of all directorates under the Directorate General of Human Settlements and such governmental organizations as PERUMNAS by strengthening the activities on the information dissemination of the research results.

DPU places great hopes in IHS, the Executing Agency for this Project, expecting that it will obtain successful results: in developing constructional and structural technology which will insure housing of good quality and

performance at a low cost, construction materials utilizing natural resources available in various regions throughout Indonesia's vast land; in conducting research studies required for urban and regional planning which will encourage reorganization of large scale infrastructure in cities rather than improvement of small facilities closely associated with urban and rural lives, and also in research and development which will pave the way to establishment of new technological standards and codes for building construction. If such research and development activities are to serve their objectives satisfactorily, the results must be disseminated widely to all those who are concerned in one way or another in the development of human settlements in Indonesia.

Those concerned with the development of human settlements at varying stages and in different capacities include not only civil servants, researchers and practitioners (consultants, contractors and manufacturers in the private sector) but residents and the general public, whose consciousness about the improvement of human settlements needs to be reformed. If such dissemination activities are expected to achieve fruitful results, then it becomes a highly necessary task to create a system for distributing necessary technical information effectively. IHS naturally has to play a central role in distributing the results of its own research activities to all people concerned with the development of human settlements.

With DPU, the following organizations are concerned with dissemination of information related to human settlements.

(1) Minister's Secretariat: Public Relations Dept.

- Planning, management and administration of information and public relations for the three Directorates General and Agency for Research and Development
- Curriculum planning for the Center for Training and Education (PUSDIKLAT) and the Center for Training and Skill Improvement of Construction Industry (PUSBINLAT)

(2) Directorate General of Human Settlements: Housing Information Dept.

- Collection and compilation of data and information on housing construction, living environment improvement, etc. and preparation of reports related thereto
- Program planning for the Building Information Centers' (BICs') activities, planning and preparation of PR literature, seminars and training courses

(3) IHS: Documentation and Dissemination Dept.

- Preparation of reports and brochures in compliance with requests of the Directorate General of Human Settlements' Housing Information Dept.
- Preparation of brochures to be distributed by BIC
- Preparation of texts and other materials to be used by BIC in seminars
- Planning and implementation of IHS-sponsored seminars and training courses and preparation of texts and other materials therefor
- Planning and preparation of texts (including those with audio-visual aids) used at PUSDIKLAT and PUSBINLAT
- Preparation of standards, criteria, etc. applicable to various kinds of materials

(4) Experimental Sub-stations

- These are located in Medan, Cilacap, Semarang, Yogyakarta, Denpasar and Ujung Pandang.
- Guidance on manufacturing technology for specific construction materials utilizing local raw materials

(5) Building Information Center (BIC)

- There are 25 BICs in Indonesia and they are under the jurisdiction of the Directorate General of Human Settlements and staffed with personnel seconded to them by the local governments.
- Their major functions include training of personnel engaged in motivation of building activities, dissemination of information originating from Directorate General of Human Settlements, collection of information from respective provinces and also collection of data and information on costs of construction materials.

(6) PUSDIKLAT

- The training center for DPU's staff and staff in charge of public works in local governments.

(7) PUSBINLAT

- The training center for those construction workers in the private sector who are engaged in public works.

(8) Testing Divisions (KANWIL)

- Established as a part of local governments. There are 25 of them at present in each province. Each Testing Division undertakes testing and inspection of concrete pieces, aggregates and other building materials from local governments and contractors. They receive technical guidance from IHS.

Fig. 2.5 shows the functional connections of these organizations.

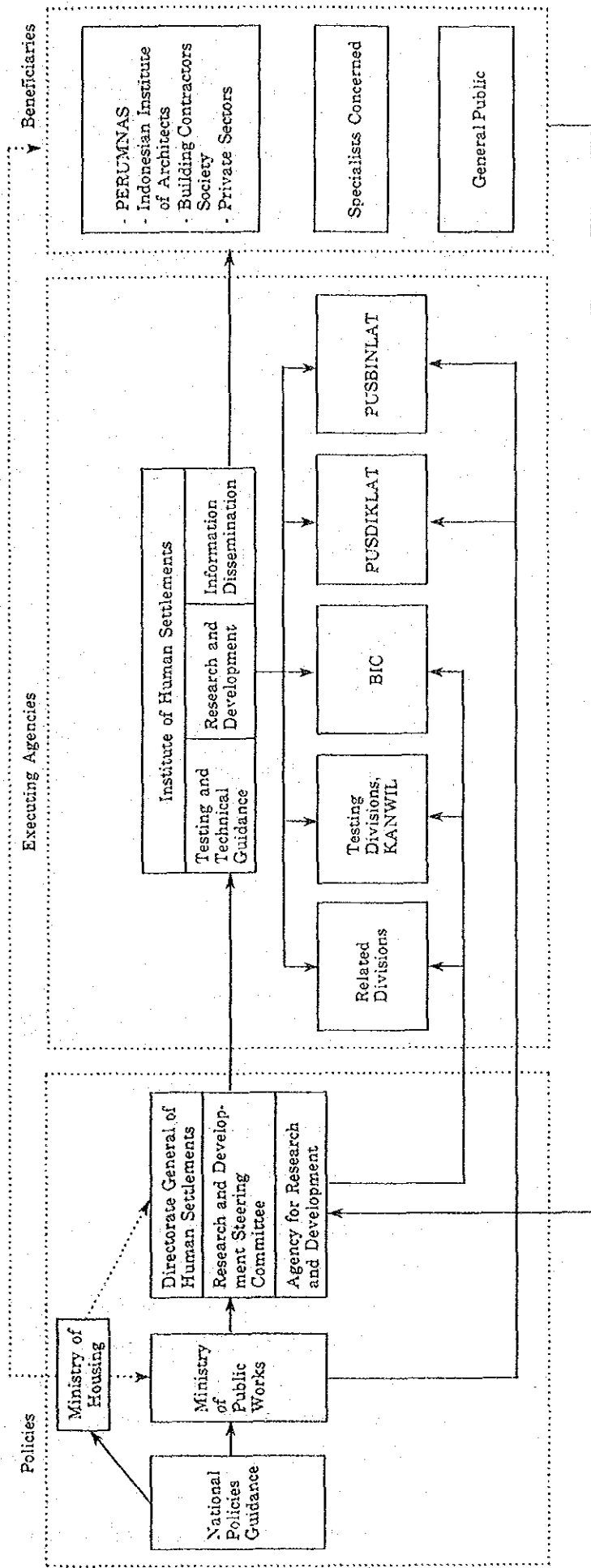


Fig. 2.5 Related Organs' Connection Flow Chart

2.3.2 Outline of IHS

(1) Scope of IHS's Work

Scope of IHS's work may be classified into three divisions: research and development, information dissemination, and testing and technical guidance.

1) Research and Development

Research and development is normally divided by category into basic research, pilot research and applied research. The chart below indicates the general category composition in various research organizations in Indonesia (Fig. 2.6).

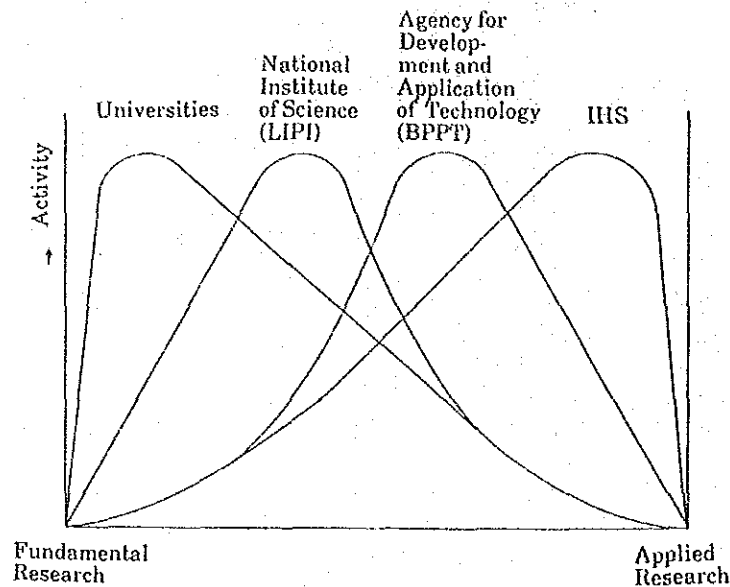


Fig. 2.6 General Category Composition
in various Research Organization

By research category, IHS puts stress on applied research, namely, research for development of economical building materials and construction techniques, development of improved water supply systems, sewage systems, garbage disposal systems, etc. which are directly linked with housing construction or regional development. This approach now being adopted by IHS is justifiable because its principal role is to support administrative efforts for improvement of human settlements; however, IHS at present is not yet at a stage to make positive contribution to the concerned administrative

agencies in making or implementing their policy for improvement of human settlements. IHS's activities by research category may be summarized as follows:

i. Housing Environment and Sanitary Engineering Division

a) **Regional Planning**

Research basically aiming at formulation of regional development techniques and standards is performed by means of case studies. Research in this discipline, however, has attained the least successful results due largely to insufficiency of equipment and appropriated budget.

b) **New Towns and Collective Housing Plans**

Plan for preparation of collective housing sites. At present, planning for a site in Bandung is being implemented.

c) **Design and Planning of Prototype Houses**

It has become increasingly difficult to secure housing sites of a sufficient size in over-populated large cities. This difficulty has prompted the necessity to construct collective housing blocks of either flat type or maisonette type. Thus, IHS designed and constructed prototype housing blocks of maisonette type called "Tumpuk" and "Bungkit."

d) **Development of Systems for Housing Construction by Joint Effort**

IHS has been developing systems which can be utilized for constructing housing units by joint effort. Some of the techniques thus developed have been already in practical use.

e) **Housing Environment**

Research in this category supports mainly research and development activities in the Building Material Division and Construction and Structure Division in connection with preparation of earthquake- and fire-resistant standards.

Research for reduction of initial and operating costs of public buildings is also conducted.

f) **Development of Land Development Evaluation Technique**

Land development guidelines, which have been prepared by IHS, are already available.

g) **Research and Development of Administrative Procedures for Building Construction**

IHS has been conducting research and development of administrative procedures involved in granting building permits, site development permits, etc.

h) **Development of Water Purification Systems**

The Fourth Five-Year Plan provides under its caption of water supply that waterwork capable of supplying water to 70 % of urban population and 55 % of rural population is to be completed during the period covered by the plan. Supply of potable water through utilities has so far been limited to city areas only. IHS has already initiated development of the following systems.

- Cikapayang Type Water Purification Method using Iron Rust (for Rural Villages)

With this method, water can be treated at a low cost by the use of easily available local materials, which are no more than iron scraps picked up here and there and coals. (Aluminum sulfate may be used as an alternative).

- Peaty Water Purification System

In most parts of Kalimantan, natural water contains peat and is brown in color; therefore, it must be purified. IHS has developed an easy-to-haul, easy-to-maintain device that can be used for treatment of peaty water.

- Evaluation and Development of Water Supply System

IHS has been evaluating existing public elevated water tanks which widely vary in type and developing some model tanks which optimize planning, operation and maintenance. IHS also disseminates among local inhabitants information on cautions to be exercised in using such tanks.

- Inspection and Certification of Materials and Equipment used in Water Supply Systems

IHS has been collecting data on products used in water supply systems and also evaluating water test devices to determine their suitability. IHS has given certificates of recommendation to a number of manufacturers who have made due contribution in maintaining safe water supply through furnishing adequate waterwork-related materials and equipment.

- Research and surveys of the potable water supply systems in the Metropolitan Sphere
- Research for development of materials and construction technique used for making potable water storage tank systems
- Research on potable water supply systems using "embung-embung" (traditional water storage tanks used in Indonesia)

i) **Sanitary Engineering**

Technological research for environmental improvement (except for air pollution) constitutes principal studies in this category. IHS gives the Ministry of Health technological support in setting out environmental criteria. IHS has been implementing technological development of sanitary systems (such as sewerage and solid waste disposal facilities).

j) **Development of Sewage Treatment Tanks**

IHS has developed a variety of sewage treatment tanks, some of which are used on a trial basis in a number of housing projects. In the PERUMNAS housing construction now under way in Bandung, two-compartment type tanks are used.

IHS recognizes that air pollution (e.g., that due to industrial exhaust in Jakarta) is an important theme which needs be tackled; however, it has not yet put its hand to this problem.

ii. Building Materials Division

a) **Evaluation of Potential Aggregates**

Study and evaluation were made of potential sources of aggregates, their quantities in reserve, their qualities and systems for their transport and distribution in such areas as Jakarta, Bandung, Surabaya, Medan, Ujung Pandang and Semarang where much construction work was being carried out. The results thus obtained have been and are still utilized in specifying the procurement method for aggregates in tender documents used for construction projects in the public and private sectors.

These results are being used also by local public organizations as base materials for providing appropriate rules for obtaining and distributing coarse aggregate (crushed rocks) in respective regions.

b) **Development of Construction Materials by Effective Use of Locally Available Raw Materials**

Wall materials (batacco, concrete blocks, etc.), sidewalk paving stones, cement roofing tiles, etc. were developed conforming to local levels of technology.

The results thus made available have been contributing to qualitative improvement of low cost houses constructed by prospective home owners themselves.

c) **Development of New Construction Materials**

Particle boards, fly ash cement, chip cement boards, etc. were developed by utilizing local agricultural and industrial wastes.

There are now eight particle board plants and one fly ash manufacturing plant in Indonesia. IHS has a pilot plant for pulp cement boards where tests and trial production are being conducted to expedite their production on a fully industrialized basis. With stricter regulations mandating the use of incombustible materials in enforcement, it is hoped that the day will come in near future when these materials can be used to advantage.

d) **Development of Wood Treatment Technology**

Wood treatment technology by which to improve quality and durability of wood materials has been widely disseminated through local IHS branches and is being effectively used by local suppliers in respective regions.

e) **Development of Coal and Brick Manufacturing Technology**

Technology by which to burn coals and bricks using fuel oil was developed about ten years ago, and this made it possible to manufacture coal/brick products of good quality in large quantities, which in turn enabled houses of a better quality to be constructed.

f) **Technical Guidance**

IHS assesses qualities of construction materials manufactured in both the public and the private sector and gives technical guidance on improved products as required.

iii. **Structure/Constructional Division**

a) **Development of Roof Frame Construction by Use of Nails**

This new roof framing method makes it possible to utilize square timber effectively and has been used to advantage in many housing projects requiring mass construction of dwelling houses. Technical guidelines and manuals have also been prepared by IHS.

b) **Research and Development of Earthquake-resistant Structures**

Seismic Research started in 1977 and codes and rules stipulating practical application of seismic standards have been worked out through joint research efforts with some Japanese structural experts. Presently, these research results are reflected on SKBI

c) Development of Improved Bonded Masonry Construction

An improved construction method as developed by IHS has been adopted by a large number of construction contractors.

d) Development of Improved Concrete Producing Technology

This technology which was developed about 15 years ago is now being used by many contractors and on-site superintendents.

e) Development of New Construction Methods

IHS has been developing new construction methods to insure effective use of new materials developed by it. Such new methods have contributed to qualitative improvement of houses.

f) Development of Composite Elements

Composite structural elements (such as ceramic-concrete floors, wood-concrete floors and wood-lightweight concrete floors) have been developed.

g) Construction of Model Houses

IHS has constructed a number of model houses using new construction materials and techniques developed by it. The patterns set out by some of these model houses have been adopted by PERUMNAS and developers in the private sector in implementing a large scale housing projects. IHS also developed a new type of multi-story apartments, which are now being further developed for improvement by PERUMNAS.

h) Fire Resistance and Prevention

IHS started research on this subject in 1983 and later prepared the Indonesian guidelines for structural safety against fires based on "Report on Overseas Development Project of Fire Prevention Construction Technique" published by the International Engineering Consultants Association in Japan in 1985, thereby giving technical support to "Fireproofing and Safety Criteria" as promulgated by

DPU in 1987. At present, IHS is conducting experiments on fireproof and fire-resistant materials by using a small-sized furnace and models. IHS is also conducting evaluation and diagnosis of fired buildings.

2) Information Dissemination Division

a) **Data Processing**

Based on the information collected from 25 BICs located throughout the nation, IHS classifies the unit costs of various building materials by region and publishes through BIC's "Latest Cost Data on Building Materials" several times each year.

b) **Publication, Production and Library**

Upon request of the Housing Information Department, the Directorate of Housing, IHS prepares reports and brochures. Also, it prepares teaching materials and brochures which are distributed by BIC. The publications amounts to some 57 kinds and about 80,000 volumes in total in 1987.

c) **Standards and Manual Preparation**

IHS prepares drafts of Standard of Building Construction in Indonesia (S.K.B.I.) and various manuals and guidelines. The manuals prepared by IHS amount to 64 kinds in 1987.

S.K.B.I. is formulated jointly by DPU, the Ministry of Industry, Ministry of Education and Culture, Indonesian Institute of Architects and Building Contractors Society.

Where IHS deems it necessary to have its new research results reflected on S.K.B.I., IHS submits its proposal for revision to the S.K.B.I. Committee of National Board of Standards (S.D.N.) formed by DPU and the Bureau of Technical Cooperation, and S.D.N. makes revision of S.K.B.I. at its discretion.

d) **Training and Dissemination**

IHS prepares teaching materials including visual aid materials used at IHS, BIC, PUSDIKLAT and PUSBINLAT. It also plans and operates the Third Country Training Programs and IHS-sponsored seminars.

3) **Testing and Technical Guidance**

Experimental Stations for Housing and Building and Sanitary Engineering were established in 1986. The activities may be divided into the following three categories.

a) **Experiments**

Experiments and measurement are conducted as requested by IHS's Research and Development Division, DPU, related public agencies and private enterprises.

b) **Tests**

Various kinds of tests and inspections are performed upon request of DPU, related public agencies and private enterprises to provide them with impartial test and inspection data and to insure for them building materials including water supply and sanitary materials which meet applicable quality standards.

- **Evaluation of Building Materials and Components**

Materials are inspected by IHS for conformity with applicable standards and specifications. IHS inform consultants and construction-related enterprises of the evaluation results.

- **Reasonable Evaluation**

IHS makes it principle to make proper and reasonable evaluation of products for which assessment is requested by foreign and domestic building material manufacturers or suppliers.

- Feasibility Evaluation

IHS makes assessment of feasibility of any new construction system proposed for use in future housing projects.

- Examination of Buildings

IHS examines upon request existing buildings to inspect whether or not they are susceptible to damage due to natural disasters (earthquakes, floods, typhoons, etc.) and fires, and also to see if they are free of inferior workmanship which forms latent hazards.

- Tests of Construction Methods

These tests are conducted in compliance with requests from PERUMNAS and private enterprises.

- Water Quality Test

IHS conducts this test upon request from public and private organizations.

- Inspection of Water Supply Systems

PVC pipes, gauges, etc. forming parts of a water supply system are inspected to determine their adequacy in specific water supply systems.

- Inspection of Sanitary Systems

IHS inspects products used for sanitary systems to determine if they meet the standards set out for some specific projects.

- Tests of Sewage Systems

IHS conducts tests of sewage systems used for detached houses and apartments.

- Evaluation of Industrial Wastes

Wastes from industrial plants are evaluated by IHS.

- Evaluation of Manufactured Materials used in Water Treatment Facilities

- Evaluation of Water Supply Systems for their improvements

- Followings are the amounts of monthly test activities

Concrete cube	150 pieces
Steel tensile strength	15 pieces
Timber	40 pieces
Lime	10 specimens
Soil	15 specimens
Gravel	10 specimens
Sand	10 specimens
Brick, paving block, concrete block, tile, etc.	10 specimens
Fire rating	5 specimens
Water quality	25 samples
Water and sanitary utilities	20 specimens
Water meter and other water distribution materials	10 samples

c) **Technical Guidance**

IHS gives technical guidance to regional testing divisions. It also gives guiding help to those who perform simplified on-site tests, and it disseminates such simplified tests.

(2) Administrative Organization and Structure

IHS is managed by the organization as illustrated below (Fig. 2.7).

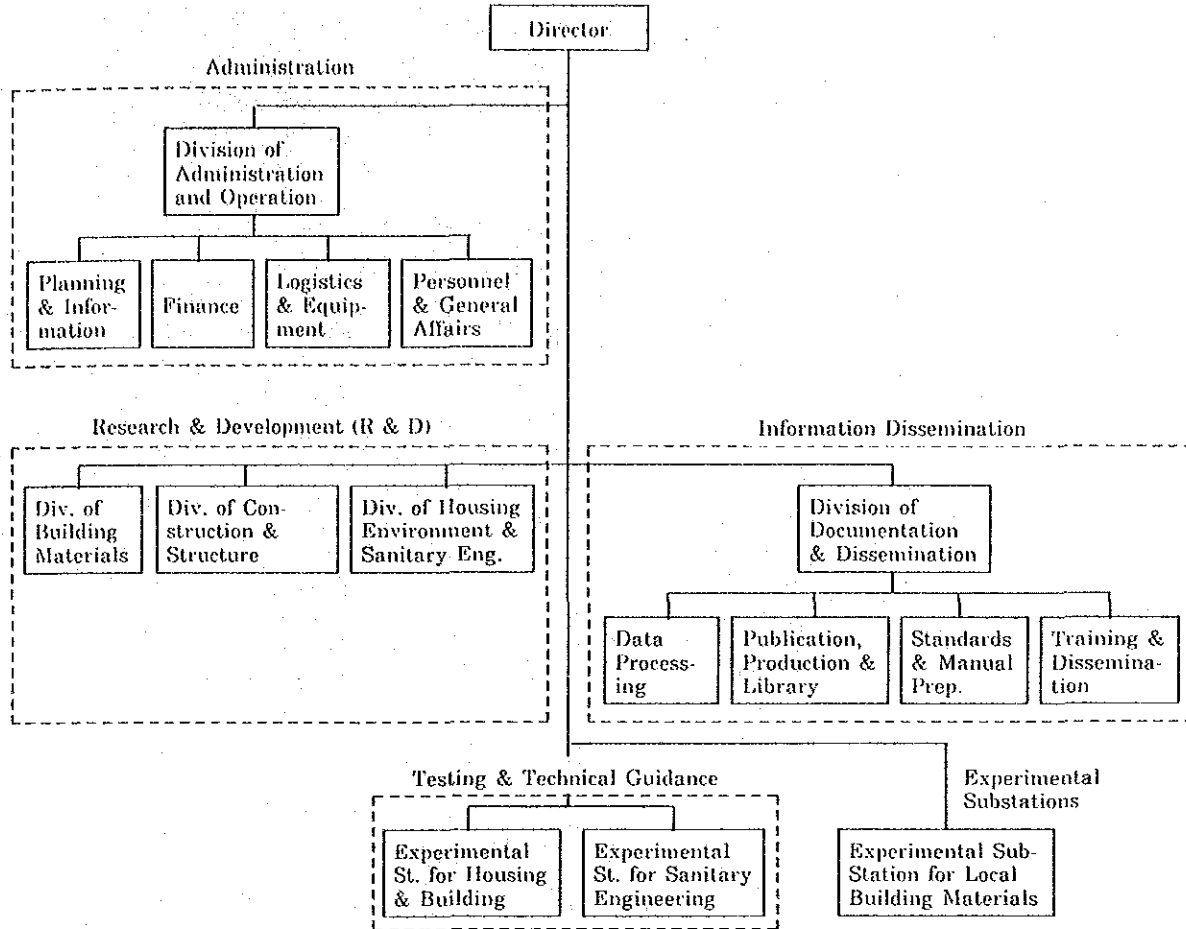


Fig. 2.7 Organization of IHS

IHS consists of four divisions: Administration Division (comprising four sections, i.e., Planning, Financing, Logistics and Personnel); Research and Development Division (comprising three departments, i.e., Building Materials, Construction and Structure, and Housing Environment and Sanitary Engineering); Information Dissemination Division (comprising four sections, i.e., Data Processing; Publication, Production & Library; Standards & Manual Preparation; and Training & Dissemination); Testing and Technical Guidance Division (comprising two departments, i.e., Experimental Station for Housing and Building and Experimental

Station for Sanitary Engineering). Also IHS has Six Experimental Sub-stations for Local Building Materials (located in Medan, Cilacap, Semarang, Yogyakarta, Denpasar and Ujung Pandang).

As of September 1987, IHS had some 320 staff members including 50 persons in the aforesaid six sub-stations.

Indicated below is the evolution of IHS's manpower since 1980 (Table 2.5).

Table 2.5 Change in No. of IHS' Employees

Fiscal Year	Personnel
1980/81	237
1981/82	259
1982/83	286
1983/84	307
1984/85	313
1985/86	318
1986/87	320
1987/88	322

Source: IHS

(3) Budget

IHS's budget is composed of a routine budget (from the Agency for Research and Development), a project budget (from the Agency for Research and the Development and the Directorate General of Human Settlements), the receivables arising from contract research (fees paid by various directorates under the Directorate General of Human Settlements, PERUMNAS, construction material suppliers in the private sector, etc.) and aid granted by foreign countries (Japan, the Netherlands, etc.).

The table below indicates the record of IHS budget since 1980 (Table 2.6).

Table 2.6 Record of IHS Budget

(Unit: Thousand Rupiahs)

Years	Routine Budget	Project Budget	Total
1980/81	194,887	576,000	770,887
1981/82	515,527	735,996	1,251,523
1982/83	374,110	1,085,844	1,459,954
1983/84	387,723	1,047,994	1,435,717
1984/85	423,683	884,092	1,307,775
1985/86	474,753	926,732	1,401,485
1986/87	581,753	927,260	1,509,013
1987/88	558,950	595,925	1,154,875
1988/89	703,597	907,991	1,611,588

Source: IHS

The IHS budget had shown a steady increase under the Fourth Five-Year Plan, but the budget for the fiscal 1987/88 was substantially cut down due to the the national budget curtailment necessitated by the plummeting crude oil price on the international market.

(4) Facilities

The existing IHS facilities are divided in two sites within the city area of Bandung, i.e., Main Building in Tamansari and a group of Laboratory Buildings in Turangga. These two sites are within a 20-minute driving distance of each other. The Main Building is located within the campus of the Bandung Institute of Technology which is also the owner of the IHS facilities. The Main Building is a three-storied structure, which houses Director's Office, Administration Section, Library, Housing Environment Division, Dormitory, etc. The building was constructed in 1953 and partially expanded in 1960.

Behind this Main Building is located a two storied Seminar & Training Building, which was completed in 1976. This block accommodates Seminar Rooms, Canteen, Water Quality Analysis Laboratory, Documentation & Dissemination Division and Printing Room. The site in Turangga is owned by the city of Bandung and is rented by DPU. A group of test laboratories comprises the laboratories and research rooms, for structures, materials, fires, etc., a PCB pilot plant, a workshop, etc., which are laid out in the 13,854 m² site. Except for the workshop which was built in 1976, most of the other buildings were constructed in the 1960's.

The table below indicates the areas of the existing IHS facilities.

Main Building	3,940 m ²	Structure Laboratory	1,350 m ²	
Seminar & Training Building (including 430 m ² of Water Quality Analysis Lab.)	1,310 m ²	Building Material Laboratory	850 m ²	
		Fire Testing Laboratory	40 m ²	
		Office for Testing Section	600 m ²	
		Research Rooms	900 m ²	
		Workshop	480 m ²	
		Storage, Electrical Room, etc.	140 m ²	
		* Lumber Kiln	360 m ²	
		* PCB Pilot Plant	1,160 m ²	
		* Water Meter Testing Room	580 m ²	
Total Area of Tamansari Facilities		5,250 m ²	Total Area of Turangga Facilities	6,460 m ²

Facilities with * will not be moved to the new IHS site.

Of the above-listed, all the laboratories are to be moved to the new IHS site except Lumber Kiln, PCB Pilot Plant, and Water Meter Testing Room for which equipment was granted by the Dutch Government in 1987/88. The facilities to be transferred to the new site (or rather to be succeeded by the new facilities in the new site) amount to 9,610 m² in total.

(5) Equipment

The existing items of equipment are as listed in Table 2.7, and they may be classified as follows.

- a. Outdated items which are out of order

- b. Outdated items which are in service but lacking in capacity or accuracy
- c. Items in active service at present
- d. Items which were granted by Japan and other country aid and which are still in active service

Most of the existing equipment was furnished in the 1950's and much of it is either deteriorated by age or obsolete.

Table 2. 7 Existing Equipment List

Name of Equipment	Quantity	Classification
(Information Dissemination)		
• AV Equipment		
Video camera (U-matic)	1	d
Video camera (NTSC)	L.S.	d
Video camera (PAL)	L.S.	d
VTR (U-Matic)	2	d
VTR (NTSC)	L.S.	d
VTR (PAL)	L.S.	d
Overhead projector	1	c
Slide projector	3	a
Film projector	1	a
• Printing Equipment		
Typewriter	2	c
Typewriter	2	a
Reprographic camera	1	a
Plate maker	2	b
Offset printing machine	2	a
Offset printing machine	2	b
Burnt paper machine	1	b
Mimeograph	2	a
Scanning machine	1	b
Photo copy machine	1	a
Cutting machine	1	c
Cutting machine (manual)	1	a

(to be continued)

(continued)

Name of Equipment	Quantity	Classification
Paper folding machine	1	a
Layout table	1	b
Sorter machine	1	c
(Structure Laboratory)		
Electric Hydraulic Pump	2	c
Manual Hydraulic Pump	1	c
Hydraulic Jack (100 tf)	2	b
Hydraulic Jack (50 tf)	2	b
Hydraulic Jack (40 tf)	2	c
Hydraulic Jack (20 tf)	1	c
Hydraulic Jack (10 tf)	3	c
Tilting Table Unit	1	c
Reaction Frame	1	c
Hydraulic Control Unit	1	c
Load Cell (100 tf, 50 tf)	2 sets each	c
Displacement Transducer	14	c
Dial Gauge	20	c
Magnet Stand	28	c
Clamp	30	c
Accelerometer	2	c
X-Y Recorder	2	c
Cassette Data Recorder	1	c
Strain Meter	1	b
Switch & Balancing Box	1	b
Digital Strain Meter	2	b
Soil Mixer	2	a
Soil Compaction Testing Apparatus	1	a
Compression Testing Machine	1	a

(to be continued)

(continued)

Name of Equipment	Quantity	Classification
(Building Material Laboratory)		
Core Drill	1	c
Concrete Masonry Saw	1	c
Cube Mould	30	c
Beam Mould	10	c
Table Vibrator	1	c
Capping Apparatus	1	c
Concrete Abrasion Testing Machine	1	c
Ultrasonic Non-Destructive Meter	1	b
Non-Destructive Bar Detection Meter	1	b
Three Gang Cube Mould	10	c
Mortar Flow Apparatus	1	b
Mortar Mixer	1	b
Mortar Mixer	1	a
Vicat Apparatus	1	b
Drying Oven	1	c
ASTM Mould	5	c
Mortar Grinder	1	c
Aggregate Test Sieve Set	2	b
Sieves Shaker	3	c
Sand Absorption Cone	1	b
Los Angeles Testing Machine	1	c
Abrasion Testing Machine	1	c
Aggregate Impact Test Machine	1	c
Sample Splitter	1	c
Analytical balance	2	c
Hot Plate	1	c
Compression Testing Machine	2	a
Schmidt Test Hammer	1	a
Concrete Mixer	1	b
Concrete Abrasion Testing Machine	1	a
Autoclave	1	a
Coarse Aggregate Specific Gravity Test Set	3	a
Wood Moisture Tester	1	c

(to be continued)

(continued)

Name of Equipment	Quantity	Classification
Viscosity meter	1	b
Muffle Furnace	1	a
Permeability Apparatus	1	a
Blain Air Permeability Apparatus	1	b
Length Comparator	1	b
Consist Meter	1	b
Gang Nail Press	1	b
Universal Mill	3	b
Hot Press	1	a
Cold Press	1	a
Compression Testing machine for Concrete	1	a
Air Meter	1	a
(Fire Testing Laboratory)		
Small Fire Furnace for Wall	1	c
Surface Test Apparatus	1	c
Elementary Material Heating Furnace	1	a
2 Feet Flame Tunnel	1	c
Fire Test Cabinet	1	c
Fire Tube Apparatus	1	c
Flash Point Tester	1	c
Thermal Conductivity Meter	1	c
Digital Balance	1	c
Oven	1	c
Gas Leak Detector	1	c
Decicator	1	c
(Water Quality Analysis Laboratory)		
Magnetic Stirrer	1	c
Shaking Machine	1	c
Water Bath	1	c
Titration	1	c
Muffle Furnace	1	a
Ordinary Microscope	1	c

(to be continued)

(continued)

Name of Equipment	Quantity	Classification
Incubator	1	c
Oven	1	c
Thermometer etc.	L.S.	c
Compressor etc.	L.S.	c
Water Pollution Outfit	1	c
(Workshop)		
• Wood Workshop	1	c
Jointer machine	1	a
Jointer machine	1	c
Face cut machine	1	a
Face cut Machine	1	c
Tool grinder	1	c
Grinder	1	a
Grinder	1	c
Surface planer	1	a
Surface planer	1	c
Band saw	1	c
Bench drill press		
• Metal Workshop	1	c
Arc welding machine	1	b
Lever shear	1	c
Pipe bending machine	1	c
Air compressor	1	c
Drilling machine	1	c
Cutting saw	2	a
Lathe machine	1	a
Milling machine	1	a
Shaping machine	1	a
Grinder		

2.3.3 Problems in Work Activities

The problems facing IHS may generally be classified into the following four categories.

(1) Scale of Facilities

IHS's activities have been increasing and expanding yearly at a steady rate. The size of the existing facilities, however, is not large enough to accommodate the manpower and equipment required for the increasing activities.

- The Main Building in Tamansari is presently used for various purposes including research offices and a dormitory. However, as this building was not planned as IHS' main building, various inconveniences result in respect of space and utility services.
- In the Laboratories, which were constructed in Turangga in the 1960s, implementation of future activities will be restricted by insufficiency of facilities in reserve.

(2) Research and Development Activities and Testing Equipment

Most of the existing equipment was procured in the latter half of the 1950s when the Directorate of Building Research (DBR), IHS's predecessor, was founded; therefore, many items of the equipment are now fairly old and rather ineffective for carrying out research and development and testing activities.

As the volume of work to be handled by IHS is sure to increase in future, a great need for new equipment is recognized.

(3) Locations

There is a distance of approximately 10 km between the Main Building in Tamansari and Laboratories in Turangga, and this has been causing considerable difficulty in maintaining close relationships among research disciplines. Further, it should be noted that IHS should require additional staff in the administrative sections at both sites and need additional manpower and time in daily communication and liaison, resulting in excessive cost in operation.

(4) Restrictions of the Sites

Since both the Main Building in Tamansari and its site are owned by the adjoining ITB, who requests prompt return of the properties. The site in Turangga is owned by the Bandung Municipal Authority and is leased to DPU. An army railroad is crossing the site. No extension of the buildings is possible at either site. The area around the Turangga site is a densely built up housing district; therefore, noise or smoke arising from structural, material or fire experiments and testing activities will create some problems.

2.4 Request for Grant Aid: Background and Contents

2.4.1 Background of Request for Aid

As has been mentioned, rapidly increasing population and urban density cause profound social problems, such as lack of housing, particularly for the low-income segment of society, and poor living environments. In the Republic of Indonesia, improvement of human settlements and living conditions for its people is one of the most important issues. DPU, with various agencies under its jurisdiction, has been tackling this issue. As the sole institute in Indonesia related to human settlements, IHS is expected to give powerful support, either directly or indirectly, to the projected improvement of living conditions of the nation.

As for relationship with Japan in respect of technical cooperation, JICA has cooperated with IHS by dispatching research experts, conducting third country training programs, and by other means, and some specific studies have consequently been implemented and substantial research achievements have been accumulated through the joint efforts.

Most items of the equipment now in possession of IHS are those handed down to it by the now defunct Building Research Institute, and they are too old fashioned to meet the requirements of modern research studies. In addition, its present facilities are divided on two sites. Further, neither of these sites are the property of IHS and there is no room for facility expansion. Thus, the Indonesian Government had decided to move IHS to a new site and intensify all its functions including technical information dissemination. In 1987, when the Government succeeded in securing the new site, about

9.36 ha in area in Cileunyi located 16 km east of Central Bandung, it requested the Japanese Government's cooperation to implement this project in the form of grant aid.

2.4.2 Contents of Aid as Requested

Details of the request for Japan's grant aid made by the Indonesian Government are summarized as follows.

(1) <u>Facilities</u>	Total	12,600 m ²
1) Main Building		4,000 m ²
2) Laboratories		6,000 m ²
- Building Material Laboratory		(1,400 m ²)
- Structural Testing Laboratory		(2,500 m ²)
- Water & Sanitary Engineering Laboratory		(800 m ²)
- Fire Testing Laboratory		(800 m ²)
- Workshop		(500 m ²)
3) Seminar and Exhibition Building		1,200 m ²
4) Dormitory and Dining Building		1,200 m ²
5) Energy Plant, Connecting Corridors, etc.		200 m ²

(2) Equipment

1) Housing Environment Laboratory (Main Building)

- a. Equipment for Statistical Analysis
- b. Equipment for Survey Data Collection
- c. Equipment for Analyzing Aerial Photographs
- d. Equipment for Map Analysis

2) Building Material Laboratory

- a. General Physical Testing Apparatus
- b. General Chemical Testing Apparatus
- c. Cement Testing Apparatus
- d. Fresh Concrete Testing Apparatus

- e. Hardened Concrete Testing Apparatus
- f. Testing Apparatus for Cement-based Materials
- g. Testing Apparatus for Wood & Wood-based Materials
- h. Testing Apparatus for Plastics and Coating Materials
- i. Durability Testing Apparatus
- j. Aggregate Testing Apparatus
- k. Metal Testing Apparatus

3) Structural Testing Laboratory

- a. Seismic Loading System
- b. Permanent Loading System
- c. Data Acquisition System for Structural Tests
- d. Static Soil Penetration Testing System
- e. Sensors and Data Acquisition System for Soil Testing
- f. Equipment for Testing on Building Physics

4) Water and Sanitary Engineering Laboratory

- a. General Testing Apparatus for Water Quality
- b. General Testing Apparatus for Liquid & Solid Waste
- c. Gas Analysis Apparatus
- d. General Microbiological Testing Apparatus
- e. Chemical Test Equipment
- f. Physical Test Equipment
- g. Portable Test Kits
- h. Data Acquisition System for Water and Sanitary Test

5) Fire Testing Laboratory

- a. Fire Prevention Testing Apparatus
- b. Fire Resistance Testing Apparatus

6) Workshop

- a. General Metal Workshop Equipment
- b. General Wood Workshop Equipment

7) Information Dissemination (Main Building)

- a. Audio-visual Equipment (Incl. production)
- b. Seminar and Exhibition Equipment
- c. Printing and Binding Equipment