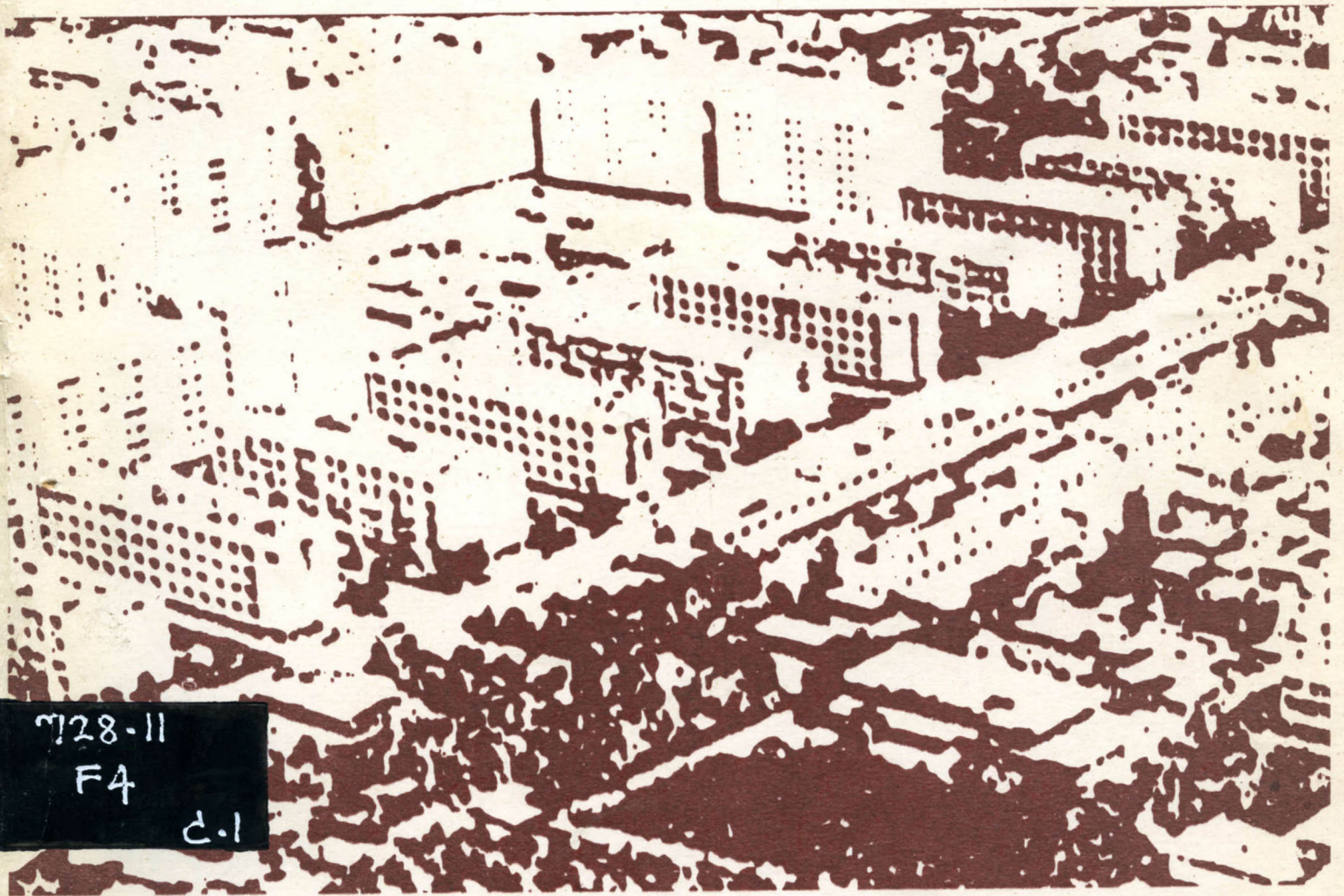


**FEISEAP / TISTR / UNESCO**

**Proceedings of The Seminar on**

**HOUSING FOR LOW - INCOME GROUPS**

**in Urban Environment**



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**THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH**

**BANGKOK 22-25 JUNE 1982**

Sponsored by Unesco

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## INTRODUCTION

1. The Federation of Engineering Institutions of South East Asian and the Pacific (FEISEAP) was established in July, 1979 at a meeting held in Chiang Mai Province, Thailand. The meeting was attended by Presidents and Secretaries of Institutions of Engineers of the region, including representatives and observers from Unesco, World Federations of Engineering Organizations (WFEO) and European Federation of National Association of Engineers (FEANI).
2. Five Working Groups have been organized to implement cooperative activities in the following respective areas;

- I Working Group on Urban and Rural Wastes
- II Working Group on Appropriate Technology for Rural Development and Low-Income Groups
- III Working Group on Use, Care and Maintenance of Instruments and Control Systems, and
- IV Working Group on Housing for Low-Income Groups
- V Working Group on Alternative Energy Sources

The major objective of the Working Groups is to develop programmes of cooperative activities to be implemented by a network of cooperating institutions. It is anticipated that the programmes would facilitate contact and cooperation, national and regional, among faculties, colleges, and professional institutions of engineering and among such establishments with government departments, business enterprises, industries and financial institutions in efforts to find solutions for problems in the respective areas in order to promote further development.

3. The first meeting of the Working Group on Housing for Low-Income Groups was held at the Department of Building and Surveying, Hongkong Polytechnic, Kowloon, Hongkong during 30 April to 2 May 1979.

4. During the period from 22 to 25 June 1982, Thailand Institute of Scientific and Technological Research hosted a FEISEAP Seminar on Housing for Low-Income Groups in Urban Environment and the Second Meeting of the FEISEAP Working Group on Housing for Low-Income Groups in Bangkok, Thailand.
5. The Seminar was organized with the support of UNESCO, and was held at the Thailand Institute of Scientific and Technological Research, Bangkok.

PROCEEDINGS OF THE SEMINAR ON HOUSING FOR LOW-INCOME GROUPS  
IN URBAN ENVIRONMENT

I Opening Session

- 1.1 Dr. Smith Kampempool, Governor of TISTR, in his capacity as the Chairman of the Organizing Committee of the Seminar gave an introduction speech. He welcomed the participants and conveyed his thanks to all concerned parties, and to Unesco in particular for its sponsorship of the Seminar and its continuing support of FEISEAP's activities.
- 1.2 The Opening Address was given by H.E. Wing Commander Thinakorn Bhandhugravi, Minister of Science, Technology and Energy. He welcomed all the participants and pledged his support for the effort in the development of housing for the urban poor. He expressed the hope that the results of the Seminar will be instrumental in finding ways and means to solve the housing problems for the low-income groups.
- 1.3 Dr. U.S. Kuruppu, on behalf of Unesco, expressed his appreciation for the support and cooperation given by the Minister and the Government of Thailand. He also thanked the Organizing Committee for the organization of the seminar. A brief background on FEISEAP and its activities, including those of other working groups, was given. He informed about two other seminars of FEISEAP Working Groups on Instrumentation and Appropriate Technology to be held in Thailand in the near future.
- 1.4 Professor Dr. Aroon Sorathesn, Vice-President of the Engineering Institute of Thailand under H.M. the King's Patronage gave an encouraging speech underlying the relevancy of the Seminar to the current problems of urban housing in the developing countries. He further emphasized the role of Unesco and FEISEAP in promoting efforts to solve such problems through organizing seminars and relevant cooperative programmes of action.

## II: Election of Officers

The following persons were unanimously elected as officers of the Seminars :

Chairman - Dr. Smith Kampempool (Thailand)  
Vice-Chairman - Mr. Ban Keng Thiam (Malaysia)  
Rapporteurs - Mr. Djauhari Sumintardja (Indonesia)  
Dr. Antonio F. Mateo (Philippines)

## III Adoption of Agenda

The tentative programme, as prepared by the Organizing Committee, was adopted with a slight modification on the first day's schedule due to the delayed arrival of one participant from Indonesia and the absence of the participant from Papua New Guinea.

## IV Country Presentation and Discussion

Participants from Malaysia, Indonesia, Philippines, Singapore and Thailand presented the country papers. Discussion followed at the end of each paper :

### Malaysia

#### 1. Public Housing for Urban Low-Income Group in Malaysia with Special Reference to the Federal Territory of Kuala Lumpur.

by Mr. Ban Keng Thiam

In the Federal Capital Kuala Lumpur in Malaysia, as much as one quarter of its city dwellers are squatters and therefore, the percentage of urban poor is in excess of 25% of its population of 1.1 million.

The provision of public and low cost housing which is a heavily subsidized accommodation for the low-income group is given very high priority in its national development plan-the 4th Malaysia Plan (1981-1985). This is considered one of the effective means in urban poverty deduction programme. Due to the

ineffectiveness and insufficiency of the existing traditional method of implementation of low cost housing programme over the past years, the number of low cost housing units completed so far is falling short of the great demand, consequently during the 4th Malaysia Plan, the Malaysia government is strongly advocating the adoption of new strategy and method in order to speed up the pace of low cost housing projects. This involved the use of 'turn-key' system and the 'accelerated implementation system' by awarding the whole project to a single consortium to undertake design, supervision and construction of all the necessary works traditionally handled by different parties, At the same time, the industrialised prefabricated method of construction is strongly favoured to supplement the existing conventional method for implementing low cost housing projects.

The government has recently changed the policy with regard to the ownership status of the low cost flats in Kuala Lumpur by proposing to sell instead of renting the units to the eligible tenants. This would satisfy the house ownership's desire of the urban poor but this might also bring with it the problem of having to assume the responsibility of management and maintenance of the common property concerned.

It was envisaged that the provision of low cost housing by both the public and private sector in Malaysia, in particular in Kuala Lumpur would continue for a long time to come in order to meet the ever increasing demand of the urban poor.

The following observations and remarks were made by various participants :

- The problems of housing for the low-income groups are more of a socio-economic nature rather than technical of engineering one.



- The housing problem in the urban area is closely associated with the problem of underemployment in rural areas which results in urban migration.
- The prefabrication technology for low-income housing has been introduced in Malaysia and at present, found to be not much competitive with conventional method.
- The problem of 'professional' squatters has been experienced also in other countries. It was believed that efficient registration and effective census would help reduce such problem.

## Indonesia

2. a) Housing Development in Indonesia : The Current Strategy  
by Mr. Djauhari Sumintardja
- b) Kampung Improvement Program in the Context of Urban Development in Indonesia  
by Mr. Suroto Hartomidjojo

The first paper dealt with new housing schemes for the low-income groups in urban areas and the role of the National Urban Development Corporation (NUDC) in meeting the housing need. It described also the role of the public and private Estate and Housing Developers.

The second paper described the improvement of existing facilities of the majority of urban poor through the massive Kampung (Village) Improvement Programme.

The magnitude of housing problems in Indonesia is quite large. For the period of the 3rd Five-year Development Plan, the NUDC programmes cover approximately 100 cities and the Kampung Improvement programmes 200 cities.

Discussions were made concerning the co-existence of affluent and poor groups, the problem 'professional' and 'real' squatters; and migration from rural areas due to underemployment.

In Indonesia and Thailand, there is a common problem concerning land ownership in urban area making it difficult for the government to obtain land for housing development scheme. The problem of legalizing land ownership in connection with urban land use still covers an area as high as 70% in Indonesia.

Mention was also made to the fact that in any urban housing scheme, people (residents) participation is vital to success.

To the question of how to prevent the relocated squatters from returning to the same area again or to being squatters in new areas the Indonesian Government enforces measure by giving them alternative to join transmigration programme.

### Philippines

3. Public Programme in Urban Housing for the Low-Income Group in the Philippines  
by Dr. Antonio F. Mateo

Dr. Mateo described the background and objectives of the integrated approach of human settlement programme, launched in the Philippines; whereby the interagency collaboration is most essential in programme implementation. The role of the Ministry of Human Settlements in relation to the overall housing delivery system was discussed, particularly with regard to production, regulation, finance and marketing aspects. The success of the housing development programme was attributed to the business approach and close cooperation between the

government and the private sector. Programmes such as BLISS, PAG, I.B.I.G. were described where essential services were provided to meet the basic needs of the people. The income-generating scheme is also integrated into the housing development scheme through the local residents organizations (People Association).

The paper pointed out that urban settlement plan has to be in consonance with the National Development goal of the country. This would mean countryside development, regional integration and resource utilization and management.

Emphasis was also made on the issue of appropriate building materials which are available locally (such as bamboos, coconut trunks, etc.).

It was also pointed out during the discussion that 'management' issue should also be given serious consideration in organizing and implementing housing development programme.

#### Singapore

4. a) Mechanization of Construction Industry in Singapore

by Dr. Saw Choo Ban

b) Metal Form Reference Manual - Singapore Housing and Development Board

Dr. Saw Choo Ban gave detailed background information on the Singapore Government's policy and plan which led to the adoption and promotion of mechanization of housing/construction industry. Key government policies included :

- the two-child policy to control population growth
- the setting up of the Housing and Development Board as the sole authority on public housing

- the decision to go high-rise in view of population density problem
- the implementation of a mechanization programme to reduce dependency on foreign construction labour. Measures such as metal forms, prefabrication, and interest-free financing scheme to help contractors to purchase machinery and equipments are now being adopted
- the preservation of Asian cultural value of promoting the family ties (allocating units to allow the young families and their parents to live together or closeby, for example)
- the use of Central Provident Fund to enable the resident to purchase housing units.

It was noted during the discussion that 1) good planning 2) effective management, and 3) good disciplines are contributing to the success.

It was also pointed out that the use of metal form is being considered for use in Indonesia.

#### Thailand

5. a) The Role of Private Housing for Urban Low-Income Group (in Thailand)  
by Dr. Smith Kempempool
- b) Statistical Data from the Bank of Thailand Report, 1981

The paper dealt with urban housing situation in Thailand in general and in the Bangkok metropolitan area in particular.

It was pointed out that housing development trend has switched from row house in suburban area to high-rise apartment in urban area. Also it was reported that large-scale

housing projects were found not to be favourable. During the last 3-4 years, townhouse-type housing development has become more and more favourable for Bangkok residents.

To the question of large numbers of unsold housing (shop-house) units, it was believed that low purchasing power of the people and unfavourable sites were the main reasons.

It was also observed that such wastage of national resources should be seriously given due consideration.

It was also noted that, unlike that in Singapore, the cost of housing in Thailand is much higher beyond what people can afford (when compared with earning).

Mr. Chalitpakorn Virabhalin of the Bangkok Municipality Administration elaborated further on the development of construction industry, mentioning particularly the modular coordination method. It was also suggested that this method should be further investigated for future housing development programme.

Ms. Laksami Chaiyanan from the National Housing Authority of Thailand gave a brief overview of the 5-year Housing Development Plan for Bangkok and other provincial towns. Current strategy is to build more houses of the site-and-service type.

## CONCLUSIONS AND RECOMMENDATIONS

1. From the discussions, the seminar realized
  - 1.1 that urban housing for the low-income groups is a wide field and with multidisciplinary character, involving not only technological aspect but also social, political and economical as well
  - 1.2 that urban housing development plan should be an integral part of the overall national development plan
  - 1.3 that there is a need for more collaborative efforts between the government and the private sector, including commercial financial institutions
  - 1.4 that serious consideration be given to the management aspect of future housing development programmes
  - 1.5 that people participation is essential to the successful housing development scheme for the poor (low-income groups)
  - 1.6 that there is a need to reduce the dominance of the urban center over the rest of the country by developing identified potential growth areas into self-sufficient urban centers which will lessen the national alternation of the metropolis.
2. The Seminar identified the following specific areas as possible subjects for further consideration by the Working Group on Urban Housing for Low-Income Groups :
  - 2.1 The Management Aspect of Housing Development Programme
  - 2.2 The Technological Aspect - particularly in relation with
    - a) modular coordination for urban housing
    - b) building materials for low-cost housing
    - c) construction methods and processes



3. The Seminar also agreed to recommend that the Working Group, should constitute representative of all institution members of FEISEAP (12 countries).

FEISEAP/TISTR/Unesco Seminar

on

Housing for Low-Income Groups in Urban Environment

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AGENDA

Tuesday 22 June 1982

- |               |   |
|---------------|---|
| 08:30 - 09:00 | Registration at TISTR (Building No. 1)  |
| 09:00 - 09:05 | Introduction to the Seminar by the Chairman of the organizing committee - Dr. Smith Kampempool Governor of TISTR                                |
| 09:05 - 09:15 | Welcoming address by H.E. Wing Commander Thinakorn Bhandhugravi, Minister of Science Technology and Energy (Reading room, Building No. 1)       |
| 09:15 - 09:30 | Address by representative of Unesco, Dr. U.S. Kuruppu Programme specialist Unesco Regional Office for Science and Technology for Southeast Asia |
| 09:30 - 09:45 | Address by Prof. Dr. Aroon Sorathesn Vice-President, The Engineering Institute of Thailand under H.M. The King's Patronage                      |
| 09:45 - 10:15 | Coffee Break  |
| 10:15 - 10:30 | Introduction of participants (Seminar room No. 224, Building No. 1)   |
| 10:30 - 10:40 | Election of Officers :<br>- Chairman<br>- Vice chairman<br>- Rapporteur (s)   |
| 10:40 - 11:00 | Adoption of agenda  |
| 11:00 - 12:00 | Presentation of country paper (Malaysia)  |
| 12:00 - 13:30 | Lunch (Reading room, Building No. 1)  |

13:30 - 14:00	Movie
14:00 - 15:00	Presentation of country paper (Indonesia)
15:00 - 15:30	Coffee Break
18:30 - 20:00	Cocktail reception at IMPALA HOTEL 9 Sukhumwit Soi 24 hosted by TISTR and VICHITPHAN Co., Ltd.

Wednesday 23 June 1982

09:00 - 10:00	Presentation of country paper (Philippines)
10:00 - 10:30	Coffee Break
10:30 - 12:00	Presentation of country paper (Singapore) and video on 'New Vitas in the 80's - HDB'
12:00 - 13:30	Lunch (Reading room, Building No. 1)
13:30 - 14:00	Movie
14:00 - 15:00	Presentation of country paper (Thailand)
15:00 - 15:30	Coffee Break
15:30 - 17:00	Discussion/conclusion

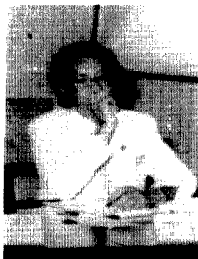
Thursday 24 June 1982

09:00 - 12:00	Study tour
12:00 - 13:30	Lunch at 'CHITPOJCHANA RESTAURANT'
13:30 - 17:00	Study tour

Friday 25 June 1982

09:00 - 10:00	Discussion
10:00 - 10:30	Coffee Break
10:30 - 11:50	Adoption of final report
11:50 - 12:00	Closing ceremony
12:00 - 13:00	Lunch (Reading room, Building No. 1)

I. DELEGATES:



Mr. Djauhari Sumintardja  
INDONESIA



Mr. Suroto Martomidjojo  
INDONESIA



Mr. Ban Keng Thiam  
MALAYSIA



Dr. Antonio F. Mateo  
PHILIPPINES



Dr. Saw Choo Ban  
SINGAPORE



Dr. Smith Kampempool  
THAILAND

2 PARTICIPANTS:



Prof. Aroon Sorathesn  
THAILAND



Mr. Harumi Watanabe  
Unesco Jakarta



Ms. Kobkul Intaravichitr  
THAILAND



Ms. Narelle Ray Townsend  
ESCAP/UNIDO/JHT  
BANGKOK



Mr. Twee Sibunruang  
THAILAND

FEISEAP/TISTR/Unesco Seminar on Housing for  
 Low-Income Groups in Urban Environment  
 Bangkok 22-25 June 1982

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LIST OF PARTICIPANTS

Delegates

<u>Name</u>	<u>Name of Organization</u>	<u>Address</u>
<b>Indonesia</b>		
Mr. Djauhari Sumintardja	Directorate of Building Research	<u>Office</u> Directorate of Building Research, Tamansari 84, Bandung
		<u>Home</u> Ciumbuleuit 113 Bandung
Mr. Suroto Martomidjojo	Ministry of Public Works	<u>Office</u> Directorate of Housing Jalan Wijaya I/68 Kebayoran-Baru Jakarta
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<b>Malaysia</b>		
Mr. Ban Keng Thiam	Special Project Implementation Department	<u>Office</u> Special Project Implementation Department, City Hall, D.B.K.L. Jalan Pekeliling, K.L., Malaysia
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<b>Philippines</b>		
Dr. Antonio F. Mateo	Council of Technology and Allied Sciences of the Philippines	<u>Office</u> 44-E Rizal Avenue Ext. Caloocan, City Philippines
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		or P.O. Box No. 10022 Q.C. Post Office Main Philippines 3008

<u>Name</u>	<u>Name of Organization</u>	<u>Address</u>
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Dr. Saw Choo Ban	The Institution of Engineers, Singapore	<u>Office</u> Housing and Development Board, Structural Engineering Dept., National Development Building, Maxwell Road, Singapore 0106
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<b><u>Thailand</u></b>		
Dr. Smith Kampempool	Thailand Institute of Scientific and Technological Research	<u>Office</u> 196 Phahonyothin Rd. Bangkok Bangkok
		<u>Home</u> 352 Moo Ban Mitrapab, Soi On Nutr, Prakanong, Bangkok
Ms. Kobkul Intaravichitr	King Mongkut Institute of Technology	<u>Office</u> Faculty of Architecture King Monkut Institute of Technology Ladkrabang Campus Bangkok
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Mr. Twee Sibunruang	Jalaprathan Concrete Products Co.	<u>Office</u> Jalaprathan Concrete Products Co. Bang Sue, Bangkok
		<u>Home</u> 199 Soi Akarnsongkra 14, Linchi Rd. Bangkok
Mrs. Laksami Chaiyanan	National Housing Authority of Thailand	<u>Office</u> Policy and Planning Section Sukaphibarn Rd. 1 Bang Kapi, Bangkok
Mr. Prasong Tharachai	Engineering Institute of Thailand	<u>Office</u> Engineering Institute of Thailand, Faculty of Engineering, Chulalongkorn University, Henri Dunant St., Bangkok



NameName of OrganizationAddress

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Unesco Representatives

Dr. U.S. Kuruppu	Unesco Regional Office For Science and Technology	<u>Office</u> Jalan Thamrin 14, Jakarta, Indonesia
		<u>Home</u> Jalan B.D.N. I/35 Cilandak, Jakarta, Indonesia
Mr. Harumi Wanatabe	Unesco Regional Office in Jakarta	<u>Office</u> Unesco Regional Office in Jakarta Indonesia
		<u>Home</u> Jalan Haj Salim II/51 Jakarta Indonesia

ObserversNameName of Organization

Mr. Anucha Leksakundilok	Thailand Institute of Scientific and Technological Research
Mr. Chalitpakorn Virabalin	Office of the Undersecretary of State for Bangkok Metropolitan
Mr. Chalerm Keokungwal	Department of Town and Country Planning
Mr. Chalermchai Honak	Thailand Institute of Scientific and Technological Research
Mr. Chaisak Amonchaiwong	Siamratt Newspaper
Mr. Komson Sukasumake	National Housing Authority of Thailand
Ms. Narelle Ray Townsend	Escap/Unido/Iht UN Building
Dr. Vicharn Poopath	Thailand Institute of Scientific and Technological Research

Introduction to the Seminar by Chairman of the organizing committee

Dr. Smith Kampempool  
Governor of TISTR

Your Excellency, Distinguished Delegates, Guests, Ladies and Gentlemen

It is really an honor for me to have this opportunity to welcome all delegates and guests to "FEISEAP/TISTR/Unesco Seminar on Housing for Low Income Groups in Urban Environment" and "The Second Meeting of the FEISEAP Working Group on Housing" sponsored by Unesco.

On behalf of the participants and observers, I humbly wish to express our deep appreciation to Unesco for hosting this seminar.

The Federation of the Engineering Institute of South East Asian and the Pacific (FEISEAP) was established in July 1978 at the meeting held in Chiang Mai Province, Thailand. The programmes of FEISEAP Working Groups cover the following fields:-

1. Exploitation of agriculture wastes, such as coconut palm, rice and sugar cane waste.
2. Development of appropriate technology for rural development and low-income groups.
3. Use, care and maintenance of instruments and control system.
4. Development of housing for urban low-income group.

The first meeting of the Working Group on Housing for Urban Low-income Group in South East Asia and the Pacific took place at Hong Kong Polytechnic during 30 April to 2 May 1979.

This seminar is the second of its kind, which aims at dealing the following topics

1. Public housing for urban low-income group
2. Economic house for urban low-income group
3. Public programme to solve the housing problems of urban low-income group
4. The role of private housing in the life of urban low-income group.

It should be realized that we have now entered into a period which housing is the source of many problems. One objective of this seminar is to try to initiate an active programme of co-operative activities in the subject area concerned to be implemented by a network of cooperative institutions.

May I now wish you a great success during this seminar and have much pleasure to invite His Excellency Wing Commander Thinakorn Bhanthugravi Minister of Science Technology and Energy to please deliver a welcome address,  
Thank you



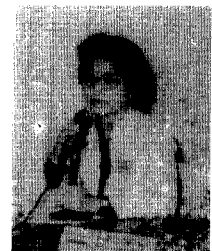
Welcoming Address  
by  
H.E. Wing Commander  
Thinakorn Bhandhugravi,  
Minister of Science Technology  
and Energy



Dr. U.S. Kuruppu  
Program Specialist  
Unesco Regional Office, Jakarta



SEMINAR ON HOUSING FOR LOW-INCOME GROUPS  
IN URBAN ENVIRONMENT



Dr. Malee Sundhagul  
Secretariat

FEISEAP/TISTR/UNESCO SEMINAR ON HOUSING FOR  
LOW-INCOME GROUPS IN URBAN ENVIRONMENT

By H.E. Wing Commander Thinakorn Bhandhugravi  
Minister of Science Technology and Energy

On behalf of the Government of Thailand, I extend a warm welcome to the distinguished participants at the Seminar on Housing for Low-Income Groups in Urban Environment. I am glad that this Seminar focussed specifically on an action programme of co-operative activities among countries has been organised by Unesco in collaboration with The Federation of Engineering Institutions of South East Asia and the Pacific (FEISEAP) and Thailand Institute of Scientific and Technological Research (TISTR). UNESCO's initiative in this regard is a welcome indication of the need and importance of developing a comprehensive and integrated approach to tackling the problem of housing in all its varied aspects-- scientific, technological, socio-economic and socio-cultural.

Housing for low-income groups in urban environments has become one of the most difficult problems of our times. The situation with this regard in almost all the developing countries is worsening on account of rapid increase in population, massive rural-urban migration, fast growth of large cities with more and more people living in slum and squatter settlements. As it may be well known that in the late report of United Nations it is found that about 30 per cent of the people in large city of the Asia-Pacific region live in slums and squatter settlements. The amount could shoot up to about 66 per cent for the next twenty years if this percentage of urban growth continue.

In Bangkok, the National Housing Authority reported that the number of slum dwellers up to the end of 1977 was estimated at 15 per cent of the population. The slum problems in other developing countries would perhaps be no better. This situation therefore underlines the need for the direct involvement of international agencies like the World Bank to a much greater

extent than before in the sector of slum upgradation. I would, therefore, earnestly appeal to them to increase their lending to this sector and participate more fully in this human effort in the developing countries.

Also to cope with the situation, co-operation among countries facing the similar problem is urgently needed. Objective of the co-operation should be conducted to seek the possibility of:

- 1) exchanging and transferring of innovative technologies among the countries;
- 2) forming a co-operative network for co-operative action programme;
- 3) financial and technological supports from developed countries.

I have touched on a wide range of issues which I consider are relevant for a proper appreciation of the problem of housing for low-income groups in urban environments. I keenly look forward to the recommendations of the seminar in this regard.

I wish your Seminar every success.



Remarks by Dr. Upali Kuruppu at the Opening Ceremony  
of the FEISEAP/TISTR/Unesco Seminar  
on Housing for Low Income Groups  
in Urban Environments

I am indeed privileged to be here today as the representative from Unesco. I bring you greetings and good wishes from our Director-General, Dr. Amadou Mahtar M'Bow and the Director of the Regional Office for Science and Technology for South East Asia, Dr. Vivek Prakash.

This Seminar is a follow up of one held in Hong Kong in April 1979. At that Seminar a working group was formed to look at all aspects of housing both Rural and Urban. But here we shall concentrate on the housing for Low income people in Urban environments and as you are all aware the numbers of such people are increasing rapidly causing great concern and serious servicing problems to Municipal Authorities especially in developing countries. This Seminar is undertaken as an activity of the FEISEAP Working Group on Low Cost Housing on which Dr. Smith Kampem-pool serves as the representative of Thailand.

In late March the second conference of Ministers responsible for the application of Science and Technology for development and those responsible for economic planning in Asia and the Pacific (CASTASIA II) was held in Manila. The Conference reviewed progress since CASTASIA I, made 25 recommendations and proclaimed the Manila declaration which among others called on the states and citizens of Asia and the Pacific to unite their will, pool their abilities and combine the rich heritage of the region with modern science and technology for accelerated development. It further invited Governments, scientific and technological bodies and the production sector in the region to ensure that science and technology permeate all forms of social and economic activity and help create prosperity which can be shared by all.

In many ways our Seminar is in keeping with these goals. We have brought together specialists from various countries of the region to pool their knowledge and experiences and suggest new technologies

and strategies to alleviate a problem which is increasing in complexity and magnitude. To a gathering of such eminent technocrats I cannot presume to offer any guide lines. I should just like to mention that while technological considerations are likely to be uppermost, spatial, social, cultural, environmental and allied dimensions should not be ignored.

Unesco is honoured to be associated as a sponsor of this Seminar and wish to thank Dr. Smith, Mr. Pongpun and the other staff of the TISTR for hosting this Workshop. I am aware of the great sacrifices they have made in time, efforts and resources to provide adequate facilities and arrange a stimulating programme. We also wish to express our thanks to the Government of Thailand and the National Commission for cooperation with Unesco for their ready cooperation and support.

Your Excellency, Wing Commander Thinakorn Bandhugravi, we can well imagine the pressures and numerous pressing engagements you have as the Minister responsible for Science, Technology and Energy. Your presence here despite these we take as an indication of your commitment to the cause of better housing and the goals on regional cooperation expressed in the Manila Declaration. By your presence you have given us much encouragement and we wish to express our deep appreciation and a special word of thanks to you for gracing this occasion.

This Seminar will be followed by the second meeting of the FEISEAP Working Group. The major task of this meeting will be to prepare an active and practical programme of activities for the next two or three years. This working group along with four other groups and the FEISEAP Secretariat comprise the Major Regional Project for Southeast Asia for which Unesco allocates annually about \$125,000 from its regular programme. Although all groups are entitled to equal amounts the more active groups are likely to get more. Therefore I would like to call upon participants to concentrate on recommendations which the FEISEAP working group and your own institutions can implement instead of suggesting what governments, International Agencies and others should do.

Needless to say, Unesco will do whatever is possible to help implement your recommendations and we look forward to the outcome of this Seminar with great interest. We hope you will have a lively and interesting exchange of ideas and viewpoints as well as make new contacts and friendships which will last long after this Seminar is over.

Thank you.

Bangkok, 22 June 1982.

Your Excellency, the Minister  
Dr. Kuruppu, of UNESCO  
The Governor of Thailand Inst. of Scientific &  
Technological Research

Ladies and Gentlemen,

I am pleased to be here this morning among the many distinguished delegates from the Professional Engineering Institutions of the Southeast Asia & Pacific Region to discuss on the topics of "Housing for Low-income Groups in Urban Environment". I am sure we all realize that human beings as well as all living creatures on earth do need some kind of shelters to safely protect themselves from the sometime (or almost all the time) unfavourable conditions of our universal environment.

In the few years past, the number of population in many of our countries has increased at an alarming rate. Here, in Bangkok, for instance, we had about over 3.5 million people living in this capital city, and now the number has gone up to more than 4.5 million, much more than the population in many other one country alone. Many of us must have experienced the problems of getting reasonable accommodation for them and Bangkok (may be as well as many other cities in this region) have seen a lot of poor people living in shacks, under poor sanitary conditions-- or non at all-- thus deteriorating the health and economy of the country as a whole.

We have here this morning, leaders in research, in cultural pursuits, in service to its people and in the quality and contributions of its facilities. Every one has his own experience, but not every experience may be the same as those of the others and it would be extremely difficult to find a single individual whose knowledge encompassed all such fields.

A seminar, is designed to serve as a locus of exchange of ideas to which each person can bring his knowledge and his experiences. Here he can make suggestions & give indications to others so that they can learn from his experiences (or even errors). They need not to exactly duplicate it, but to give instead their time to go into new research further development. This extending the overall body of knowledge.

I do hope that this seminar, organized by the FEISEAP, the TISTR and UNESCO will help all participants to acquire more knowledge and experience from one another,

to learn new point of view which will  
assist education and accelerate our  
research work

and to make our own knowledge of use to the others.

PUBLIC HOUSING FOR URBAN LOW INCOME GROUP  
IN MALAYSIA - WITH SPECIAL REFERENCE TO  
THE FEDERAL TERRITORY OF KUALA LUMPUR

BY

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ABSTRACT

The term 'urban poor' differs from country to country due to different income level per family and different economic and social structure in each country. But as a common reference, the low income group of the population living in the slum and squatter area of all the big cities in the region are generally regarded as urban poor. In the Federal Capital Kuala Lumpur in Malaysia, as much as 4 of its city dwellers are squatters and therefore, the percentage of urban poor is well in excess of 25% of its population of 1.1 million.

The provision of public and low cost housing which is a heavily subsidised accommodation for the low income group is given very high priority in its national development plan-the 4th Malaysia Plan (1981 - 1985). This is considered one of the effective means in urban poverty deduction programme. Due to the ineffectiveness and insufficiency of the existing traditional method of implementation of low cost housing programme over the past years, the number of low cost housing units completed so far is falling short of the great demand, consequently during the 4th Malaysia Plan, the Malaysia government is strongly advocating the adoption of new strategy and method in order to speed up the pace of low cost housing projects. This involved the use of 'turn-key' system and the 'accelerated implementation system' by awarding the whole project to a single consortium to undertake design, supervision and construction of all the necessary works traditionally handled by different parties. At the same time, the industrialised prefabricated method of construction is strongly favoured to supplement the existing conventional method for implementing low cost housing projects.

Recently the government has also changed the policy with regard to the ownership status of the low cost flats in Kuala Lumpur by proposing to sell instead of renting the units to the eligible tenants. This will satisfy the house ownership desire of the urban poor but this may also bring with it the problem of having to assume the responsibility of management and maintenance of the common property concerned.

It is envisaged that the provision of low cost housing by both the public and private sector in Malaysia, in particular in Kuala Lumpur will continue for a long time to come in order to meet the ever increasing demand of the urban poor.



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Who are the 'Urban Poor'?

The term 'Urban poor' may vary from country to country depending on the income level per family, the social and economical structure and the cost of living of the individual country concerned. It is however generally accepted that for the developing and under developed countries in the South East Asian and Pacific Region, the urban poor refers to the low income group of the population in the city. It is also accepted that the urban poor are not only poor due to their low income but also due to their inaccessibility to basic services and amenities. Low income and lack of access to basic services for day to day life very often render the life of urban poor miserable and intolerable. The existence of urban poor is a reflection of a social system related to a number of economical, political and social factors, deficiency and ills within a society. The nature of urban poverty is therefore much more complicated than what has been hitherto conceptualised. The solution to urban poor is undoubtedly a very complicated and difficult one. Amongst the many strategies and methods available, the most urgent and realistic way is none other than the provision of ample low cost housing for the urban poor so that they can live in a decent environment with the availability of basic services and amenities.

The 'Urban Poor' of Kuala Lumpur

Like many other developing countries in the region, urban poor constitutes a very serious and pressing problem in Malaysia. It is particularly acute in the case of the Federal Capital of Kuala Lumpur where an alarmingly high percentage of its one million population is living in an deplorable slum condition as illegal squatters, mostly on State land and some on private land. The picture of the squatters settlement in Malaysia is generally very chaotic and unpleasant due to the sub-standard type of temporary housing coupled with the unhygienic environmental condition where there is often lack of proper drainage, sewerage, water and electricity services. Despite the expressed effort taken by the government over the past two decades to improve the living condition of the urban poor in Kuala Lumpur, the percentage does not seem to have been reduced due to the continuous migration of new comers into the city. As Kuala Lumpur is the Federal Capital and also the

commercial, industrial, financial, political, educational and cultural centre of the country, it has unintentionally attracted large migration of people from many other less developed parts of Malaysia, especially from the rural areas, in search of better employment opportunity and better quality of life. Unfortunately, contrary to their wishes and belief, due to lack of skills and knowledge to participate in the socio-economic life of the bigger and more competitive society, with the exception of the lucky few, many others have to survive by living in the squatter settlement and find themselves in the company of the urban poor. Consequently, allowing for some urban poor who have improved their earning and economic position and have elevated to the status of middle class or higher class citizens, their places will soon be taken over by the new comers, so the nett result remains somehow not much different as a whole over a period of time.

#### Low Cost Housing As a Mean of Urban Poverty Deduction

The Malaysian Government has openly committed to the course of poverty deduction of the urban poor by undertaking the task of providing low cost housing to the low income group of its people ever since the achievement of independence of the country in 1957. In the local context, the provision of low cost housing is largely applicable to urban area where due to the higher concentration of population and scarcity of land, the demand for housing is very acute, whereas in the rural area, land is plentiful and cheap, the priority for low cost housing is generally less pressing and therefore not in demand at all.

In Malaysia, the provision of public housing is very much a subsidised affair due to the high cost of development and the relatively low rental charged to the tenants. It has been an universal phenomenon over the last few years that the inflation and escalation of building cost have taken leap and bound resulting in many folds increase in the building cost of all types of houses. The effect of inflation and price increase are tremendous, as a matter of fact, compares with say 15 years ago, the development cost of building has gone up by as much as 3 times. However, despite the massive increase in the building cost, the rental has remained static at the amount which was fixed some 20 years ago. One can imagine the great financial benefit in being able to obtain allocation for low cost housing unit in Kuala Lumpur and it is no wonder that the waiting list for low cost housing never seem to have shortened despite the continuous implementation of low cost housing by the government.

Malaysia being a parliamentary democracy, the elected government has as one of its major electoral pledges to provide access to housing for every Malaysian. Special emphasis was given in each of the past three 5-year plan and especially so in the current 4th Malaysia Plan covering the period of 1981-1985, to provide increased number of units of low cost housing for the low income group. In this regard, the public sector, meaning the relevant government departments and agencies

will continue to play a significant role and the private sector, meaning the individual housing developer is also expected to be more responsive in the provision of low cost housing to supplement the government effort.

#### Low Cost Housing by Private Sector

Up to the of the 2nd Malaysia Plan (end of 1975), the provision of low cost housing was almost solely undertaken by the public sector. At the beginning of the 3rd Malaysia Plan, realising the financial constraint, the scarcity of sufficient suitable land and the limited capacity of the public sector to implement the required number of low cost housing units to meet the ever pressing demand of the urban poor, the government has earnestly called upon the private sector to also play its part to help provide low cost housing to supplement the government's effort. At the beginning stage, this was done on a more or less voluntary basis. But the response was somehow not very positive and fruitful. Consequently, compulsory enforcement of the requirement of having to provide low cost housing units within the private housing schemes was implemented by the government approving authorities upon the private developers. Since the enforcement of this policy, the number of low cost housing units available was much increased. The selling price of the private low cost housing units is controlled at not more than the ceiling price of \$20,000/-per unit and the purchaser's qualification is also closely scrutinised in accordance with certain fixed criteria with the monthly income per family forms one of the important factors.

#### New Strategy and Method of Implementation

Despite the combined effort of both the public and private sector, the demand for low cost housing is still well in excess of the units available. With the view of narrowing the gap between the demand and supply, the government has embarked upon new strategy and methods during the implementation of the 4th Malaysia Plan in order to speed up the pace of development of low cost housing for the urban poor. Currently the emphasis is on the adoption of faster and more effective method of implementing housing development projects. The strategy and method involved are basically of two prongs action, one involves the method of tender and the other concerns with the method of construction or the combination of both the two at the same time. Hitherto, the implementation of low cost housing projects was done wholly by the government housing departments and agencies with their own technical staff undertaking the design, tender and supervision of the construction. From past experience, it was found that the existing set-up and system of implementation were unable to cope with the increased work load and demand. Consequently, the call for change to the new strategy and method, some of which are highlighted below :-

1) 'Turn Key' System

2) Accelerated System of Implementation (A.I.S.)

Both of the above two systems are basically the method of tendering, negotiation and awarding of project. Initially, pre-qualification exercise of relevant firms would be carried out followed with the submission of proposal and the targeted cost of the proposed project and in the final analysis only a single consortium will be appointed to undertake all the necessary works including the design, supervision, construction and administration of the contract for the whole project. This method of implementing project is intended to minimise and simplify the formal governmental formality and thus speed up the pace of implementation. However as the method allows the same party to be the designer, contractor, executor and assessor of the quality of work, some professional bodies have expressed reservation about the feasibility of both the turn key method and A.I.S. in that they may give rise to conflict of interest. The concept of 'turn key' method is not new, but it is undoubtedly a very controversial issue which will require a great deal of business and professional integrity and impartiality to make such a system producing satisfactory result.

Industrialised Prefabricated Method of Construction

During the mid 1960, the government of Malaysia has embarked upon the use of industrialised prefabricated method of construction with the view of speeding up the rate of development of low cost housing projects. Two major projects of high-rise apartment each consists of some 3,500 units of flats were completed in 1969 using large panel precast prefabricated method of construction. Since the completion of the two designated projects, the method was not used again partly due to the fact that it generates lesser employment opportunity and at the same time it is not really cheaper in term of cost as compared against the conventional method of construction. However, over the last few years, condition in the building industry in Malaysia has changed to be more favourable for industrialised prefabricated system of construction, due to the acute shortage of skilled and experienced builders and workers resulting very often in the long delay of completion of many housing projects, be it low cost or otherwise. As a remedy to the problem, the government has decided to go for the less labour intensive method of construction by utilising as much as applicable the industrialised prefabricated method of construction. Towards this end, certain projects were specifically selected for tender by the system builders while some projects were tendered out on open system in which the contractor is given the option of submitting alternative system of construction. The emphasis and the current trend is to encourage more extensive

use of industrialised system or for that matter, any new and sound building technology which will speed up the construction and completion of more low cost housing units at reasonable cost.

Change in Government Policy from Rental to Sale of Low Cost Flats to the Tenants

Recently there has been a change of government policy regarding the ownership status of the low cost flats in Kuala Lumpur. Hitherto, low cost flats in Kuala Lumpur are only on rental basis to the eligible urban poor, but during the last general election which was held on 22.4.1982, the government has openly declared that the low cost flats would be up for sale to those tenants who have stayed for a period of not less than 10 years in the units and the rental paid so far would be credited as down payment to make up as part of the purchase price. This is indeed a windfall for the flat dwellers provided that the selling price to be fixed is reasonable. On the other hand, it is debatable taking into consideration on pure economic term if it is really advantageous for the flat dwellers to buy the flats or continue renting them at the low rental as tabulated below :-

FLAT TYPE	MONTHLY RENT
One-room	M\$32
2-room	M\$42
3-room	M\$55
4-room	M\$68

M\$ = Malaysian dollar

The transfer of ownership carries with it the responsibility of managing the flats which is by no means an easy task. At the moment, a substantial portion of the rent collected is spent in the maintenance of the flats. Upon selling the flat, the responsibility of maintenance will be transferred to the management corporation to be incorporated by the flat owners. In a way, the selling of low cost flats will satisfy the house ownership desire of the common people and it is a very much welcomed move. On the part of the government, the amount of money to be collected from the sale will help to generate more new low cost housing scheme to meet the ever increasing demand of the urban poor for decent shelter. It is anticipated that even after the sale of the low cost flats to the tenants, the government would still require to play a certain role

in the running of the management corporation and the maintenance of the flats because the urban poor who are inexperienced in the organisational and management aspects of the corporation may not be able to run it efficiently and satisfactorily without the participation of the government.

### Conclusion

The provision of low cost housing for the urban poor is expected to be a continuous commitment by the government in Malaysia for the many more year to come, particularly for the Federal Capital of Kuala Lumpur. The tabulation below will serve to provide some information on the number of low cost housing units planned and implemented during the four Malaysia Plans :-

Table 2 - Low Cost Housing Units Planned and Implemented under Malaysia Plans

Plans	Malaysia	Federal Territory/ Kuala Lumpur
First Malaysia Plan (1966 - 1970)	22,522	6,034
Second Malaysia Plan (1981 - 1975)	43,000	5,000
Third Malaysia Plan Completed (1976 - 1980)            Implemented	26,250	6,626
	54,490	<u>15,000</u>
Total	80,740	21,626
Fourth Malaysia Plan Original (1981 - 1985)            Planned. Potential increase.	122,000	30,000
	-	45,000

In term of land area, Kuala Lumpur accounts for only 05 % of the whole area of Malaysia but it accounts for 8 % of the population of the whole country. It is currently having a population of 1.1 million and basing on an increment rate of 4.3 % the population is expected to reach 1.6 million by 1990. With the uncontrollable and non-stop urban migration of new comers into Kuala Lumpur, it is expected that the urban poor will continue to remain at a very high level in the years to come. In order to eradicate poverty and improve the living condition of the urban

poor in the Federal Capital of Kuala Lumpur, high priority was given in the 4th Malaysia Plan (1981 - 1985) to build 30,000 units of low cost housing units at an estimated cost of M\$600,000,000. There is a possibility that the number of units may be further increased to 45,000 units after the mid-term review depending on the availability of fund and land. This is quite an ambitious programme compares with the previous Malaysia Plan and it is hoped that with the introduction and adoption of new strategy and method of implementation the target can be achieved in good time so that the urban poor, particularly those living in the miserable slum area of Kuala Lumpur do not need to wait much longer before they can be given a decent shelter over their heads.

KAMPUNG IMPROVEMENT PROGRAM IN THE CONTEXT  
OF URBAN DEVELOPMENT IN INDONESIA

SUROTO MARTOMIDJOJO

DIRECTORATE OF HOUSING. DIRECTORATE GENERAL FOR HOUSING, BUILDING,  
PLANNING & URBAN DEVELOPMENT



## INTRODUCTION

- Similar to elsewhere in the cities of the developing countries, the major cause of the human settlement problem in Indonesia is the rapid growth of population, while the provision of housing and improvement of environmental facilities are very limited.

This situation results in increasing the very dense residential area with the worst conditions of healthy, safety and social activities of the inhabitants.

- The area/squatter mentioned specifically in Indonesia is called 'Kampung'; most of them have been in existence since the Dutch Colonial period. These Kampung have grown naturally, based on norms and the way of life of the previous place, of the inhabitants, who came from rural/agricultural areas.
- In the Kampung can be observed a blended pattern. A Kampung is both a residential and a place where several activities are carried out such as economy and other social activities. There is no clear division between the activities concerned.
- At this moment Kampung becomes a part of the cities in Indonesia, and the greater part of the citizens, consisting of low-income groups, stay and live in these Kampung.
- In the planning and development of the cities including the residential area, the norms and pattern which aim of a modern and business like way of life have been applied, but should be balanced with the traditional norms and potency of the Kampung, so that a harmonious urban development will be created, blending modern and traditional elements.

## ACTUAL CONDITION

- Generally a Kampung can be defined as urban settlements grown uncontrolled and unplanned, inhabited predominantly by low income groups.

In big cities, Kampung are usually very crowded with population density of hundreds even more than one thousand per hectare, especially Kampung which located very close to the city centre.

In fact, it can be observed that the smaller the city the lower population density is.

- However, Kampung have some characteristics in common, such as irregular settlement pattern (as they grow unplanned and uncontrolled), insufficient urban infrastructure and facilities, in quantity as well as in quality, such as : accessibility, water supply, environmental sanitation, social facilities etc.
- The low income groups spread in particular through out the Kampung, still have a limited capability in participating in development. This is not only due to limitations in economy, but also due to limitations in facilities such as available land, environmental facilities etc.
- This situation has created problems faced especially in the Kampung, which are among others :
  - 1/. disorderly social life
  - 2/. insufficient of low living conditions
  - 3/. unhealthy housing conditions
  - 4/. poor infrastructural and environmental facilities
  - 5/. high density and uncontrolled urban land use in the urban area
- The unsatisfactory physical conditions among others, bad infrastructure, lack of sewers, lack of drinking water supply, uncontrolled garbage disposal, stagnant water etc., have without doubt decreased and more over hampered the existing social economic and cultural potentialities of the Kampung inhabitants.

- This prevailing situation should be improved into better condition of environmental sanitation and infrastructure reaching normal standard of living and income of the community.

The quality of life of the people will deteriorate, if these problems cannot be surmounted.

- The potentialities available in the Kampung communities should be taken into consideration as these could be developed.

These available potentialities could be seen for example in close relationship among the inhabitants, existing home industry and workshop, man power, which are not yet properly managed.

- The effort in carrying out the Kampung improvement is in fact the target to overcome the physical and non physical problems, including the fostering and development of the existing potentialities, aiming at the fulfillment of a better cumulative quality of life.

#### POLICY and STRATEGY

- In Indonesia housing considered to be the responsibility of the people. Basic responsibility of local and central Government is to provide necessary regulations, guidance, stimulation, etc. So that housing supply can meet the need of the people in quantity and in quality.
- The Government may also undertake direct efforts in improving the human settlements, by :
  - preparing land as in the case of site and services
  - construction and improvement of basic infrastructure for communities, such as : drinking water, drainage and waste disposal system, etc.
  - construction of low cost housing for lower income people
  - improvement program, which aimed to improve the living environments and standards of the low income groups

- However as the income of most of the people is relatively very low compared to the building costs, the Government has to help in increasing their ability to get reasonable housing through various measures such as by giving direct subsidy or by providing long term low interest loans.
- In the Kampung which most of the inhabitants are very very poor, the Government takes considerations, by setting up the stimulation program through 'Kampung Improvement Program'.
- The ultimate goal of this program is aimed to increase the quality of life of the low income people, concerning their ability and role in participating in the development of human settlements.

According to the limitations of the Government fund, the implementation of the development program will be step by step, starting with the improvement of people's living quality/standards, towards an orderly and efficiently human environment in the context of urban development.

#### INTEGRATED EFFORTS

- The development of the human settlement in the Kampung could not applied the modern norms and standards.

The Kampung as it is, growth and developed by their own pattern, and traditional way of life with the previous conditions of the people take a great influence.

- In this considerations, Kampung Improvement Program is based on an understanding that the improvement is for the benefit of the Kampung inhabitants.

Therefore at the beginning, preconditioning of the community is important to attract their participation and support in every stage of implementation of the program.

- Through the people's participation and by considering the goal of Kampung Improvement is to improve the Kampung in totality, physical and non physical aspects, it needs an integrated approach for the development of Kampung.

- In general, the activities that should be integrated consists of :

1/. Development of Human Beings :

to increase the living standards as an individual or a groups, through training, education and informal approach program.

2/. Development of Physical Environment :

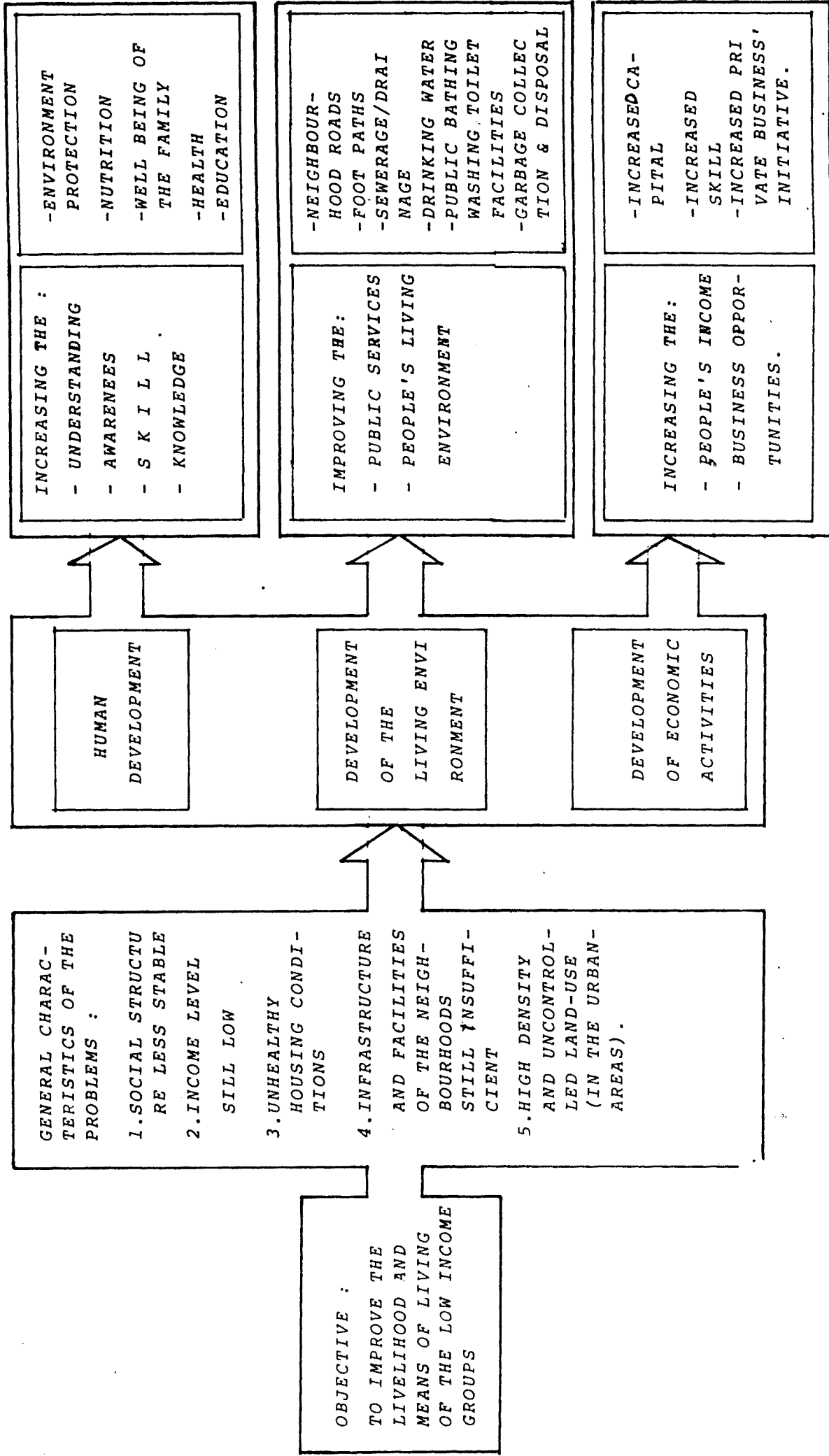
to develop the environment infrastructure, such as :  
drinking water, accessibility, drainage, waste disposal system and social facilities.

3/. Development of Economic Action :

to stimulate the production activities of the people, such as home industry and other economical activities.

Those three activities have to be integrated and supported each other, while the activities is clearly divided into various discipline, the problems is, how to achieve an optimum integrated action in the development of Kampung which it takes a great component in the frame work of urban development in Indonesia.

INTEGRATED KAMPUNG IMPROVEMENT AND VILLAGE RENEWAL



OBJECTIVE :  
TO IMPROVE THE  
LIVELIHOOD AND  
MEANS OF LIVING  
OF THE LOW INCOME  
GROUPS

GENERAL CHARAC-  
TERISTICS OF THE  
PROBLEMS :  
1. SOCIAL STRUCTURE  
LESS STABLE  
2. INCOME LEVEL  
LOW  
3. UNHEALTHY  
HOUSING CONDI-  
TIONS  
4. INFRASTRUCTURE  
AND FACILITIES  
OF THE NEIGH-  
BOURHOODS  
STILL INSUFFI-  
CIENT  
5. HIGH DENSITY  
AND UNCONTROL-  
LED LAND-USE  
(IN THE URBAN-  
AREAS).

DEVELOPMENT  
OF HUMAN

DEVELOPMENT  
OF THE  
LIVING ENVI-  
RONMENT

DEVELOPMENT  
OF ECONOMIC  
ACTIVITIES

INCREASING THE :  
- UNDERSTANDING  
- AWARENESSES  
- SKILL  
- KNOWLEDGE

-ENVIRONMENT  
PROTECTION  
-NUTRITION  
-WELL BEING OF  
THE FAMILY  
-HEALTH  
-EDUCATION

IMPROVING THE:  
- PUBLIC SERVICES  
- PEOPLE'S LIVING  
ENVIRONMENT

-NEIGHBOUR-  
HOOD ROADS  
-FOOT PATHS  
-SEWERAGE/DRAI-  
NAGE  
-DRINKING WATER  
-PUBLIC BATHING  
WASHING TOILET  
FACILITIES  
-GARBAGE COLLEC-  
TION & DISPOSAL

INCREASING THE:  
- PEOPLE'S INCOME  
- BUSINESS OPPOR-  
TUNITIES.

-INCREASED CA-  
PITAL  
-INCREASED  
SKILL  
-INCREASED PRI-  
VATE BUSINESS'  
INITIATIVE.]

## DEVELOPMENT PROGRAM

- Kampung improvement in Indonesia is not a new one. It was started in early 1930's by the Dutch Colonial Government.

The program was directed towards urban settlements inhabited by non European people.

Kampung grew without proper planning and with very little urban facilities provided by the government. Similarly with this Government's program, some improvement activities through self help and people participation has been done long enough. But because of their limited capability, technically as well as financially, the improvement they made did not reach sufficient level of standard and without considering the overall system.

- Since then the program had been abandoned for a certain period until the Government declare the Five Years National Development Plan in 1969.
- During the First and Second Five-Year National Development Plan (1969-1979), the implementation of Kampung Improvement Program had succeeded covering the two big cities Jakarta and Surabaya, with the total areas of 7000 Ha, benefited by 2,500,000 people.
- At the end of the Second Five-Year Development, the Indonesian Government realized that KIP were needed not only by big cities. It is also needed by medium and small cities. But their income are so small that they are not able to spare fund to finance KIP. Therefore, since the beginning of the Third Five-Year Development, Central Government decided to provide financial assistance to small and medium-sized cities. To a certain extent Central Government gives grant to small, medium and big cities as stimulant to start their KIP activities. In the Third Five-Year Development Plan it is mentioned that from 1979/1980 to 1983/1984 the Central Government will assist 200 cities of various size to improve a total area of about 15,000 Ha of Kampung's area with the following break-down.

<u>Type of city</u>	<u>Population size</u>	<u>No. of cities</u>	<u>Target per city</u>
B i g	500,000-1000,000	10	200 ha
M e d i u m	100,000- 500,000	40	100 ha
S m a l l	20,000- 100,000	150	60 ha

- Due to the limited budget, only part of the Kampung can be improved, and to get which area may need improvement, the selection criteria are based on the following :
  - a. Physical condition (those areas with the worst condition should be given priority for improvement).
  - b. Population density (high density should be given priority).
  - c. Strategic location of Kampung with respect to development trends of city.
  - d. Age of Kampung (older, well established Kampung should be given priority).
  - e. The Kampung improvement program shall be citywide in scope.
  - f. The Kampung should conform to the general land use patterns envisaged in the master plan.
  
- The basic components, aiming at the improvement of the Kampung, consists of :
  - environmental/access roads
  - footpath
  - sewerage system
  - drainage system
  - drinking water supply
  - toilet, washing & lavatory facilities
  - garbage disposal
  
- In connection with the implementation of the integrated Kampung improvement, directed and coordinated sectoral programs should be considered, aiming at the increase of the human values and activities, for instance, women activities in the neighbourhood, mother and childcare,



improvement of certain skills including the upgrading of home industries.

It is expected that through introduction of improvement in the Kampung, the health conditions and comfort of the settlements and the standard of life of the low-income group will gradually reach improvement.

Jakarta June, 20th 1982.

HOUSING DEVELOPMENT  
IN INDONESIA  
THE CURRENT STRATEGY

By :

Djauhari Sumintardja  
Head of Sub-Directorate of Human Settlements  
Directorate of Building Research

## Summary

The current Housing strategy in Indonesia, particularly in regard to Housing for the urban low income population groups has taken a firmer direction within the last decade. Allocation of budget and participation of the private sector have increased considerably in the last decade.

The country economy has at last come to a decade that stability is possible and in which the Government has launched extraordinary consideration to Housing Developers for receiving lenient bank loans and certain tax alleviation. The increased activities of Private Sectors in Housing Development have its impacts to capital investment in building material industries, building component manufacturers, and also a growth for nonformal building material and other business, related to it.

There is a general acceptance of the various standards in respect to floor size, and the ratio of housing quality to be built. It varies from the minimum 20 sq m core house type, up to 72 sq m detached dwelling unit. In addition there are other larger variation such as the 90 to 130 sq m standard houses for the middle lower income housing. In Indonesia apartment buildings or condominiums has not developed extensively yet. The first large scale 4 floor flats for the low income population groups for the country were inaugurated only last year in the capital city, and the second project is under construction. It will be followed by other greater cities in the country, as projected in the present Development Plan. Demonstration projects of these multifloor type of apartment buildings, have been tried out however since years ago. Several systems from the point of view of building method and techniques, have been implemented.

As regard to the development of the construction industries by Building Firms in Indonesia, to balance modern methods and management, with how to absorb the vast labour force, is still one of the primary considerations to be taken.

According to statistics, the building and related industries in Indonesia are a source of income for more than 20% of the vast low income urban population. The Real Estate in Indonesia for example also the mission to assist the Government to accelerate the massive effort in supplying urban areas, with shelters for the low income population groups.

## Introduction

Indonesia is an archipelago comprising about 13,000 islands linking the Indian and Pacific Oceans. It is populated by more than 147,000,000 people belonging to more than 300 ethnic groups, prolific in its traditions, its socio-cultural variation and its degree of development.

According to the latest statistics, more than 80% of the total population are living in rural areas, however from the point of view of population distribution, it prevails in a state of unbalance. For example, the islands of Java, Bali and Lombok comprising less than 8% of the country's total area, are at present populated by more than 65% of the Indonesian total population. This has created certain constraints in equating national economy growth and other physical developments.

Land conditions and ecology of natural resources of Java have already reached a critical point, and are consequently paired with increasing social problems, such as heavy urbanisation and decreasing opportunity for employment for the large percentage of the labour force age group.

Since housing development to a certain extent is thought of in Indonesia in terms of population, to give an impression of the overall situation of it, housing strategy for population in the rural areas must be mentioned, how even briefly. It covers the following.

## Transmigration Housing

Firstly, housing in connection with transmigration. That is resettling people from very densely populated areas in Java Bali and Lombok to areas in the other major islands such as Sumatra, Sulawesi, Kalimantan and Irian Jaya, very scarcely inhabited.

As planned for 1979 - 1984, new areas for human settlement have to be created for about 2,500,000 people or 500,000 families. This means that there is an annual need to create 200 new complete villages as living space for 500 families per village.

It also means that there is a need to find and prepare new agricultural lands for example by reclaiming tidal coastal areas or by clearing wild forest in the interior for human settlement. These schemes also have to be seen in the larger context of Regional Planning & Development. There is an important role for consultant and contractors, both for planning the environment as well as in the construction of the infrastructure or the houses and other community facilities.

In addition to settlement projects for transmigrants, there are resettlement project for 2,000,000 people still categorized as belonging to the isolated or primitive tribes.

The problem connected with these people is not only a matter of improving the condition of their habitat, but primarily a problem of conditioning them socially such as by raising the awareness of their right and obligation as citizen of modern day Indonesia. It is a programme projected for another 15 to 20 years.

They are at present encouraged to abandon their nomadic life and taught to practice stationary cultivation of crops rather than the traditional method of roving and burning down the forest. Then, there is the resettlement projects for rural population living in geographically remote areas, where the villages are difficult to reach and the people difficult to count on their participation in development projects.

They are now persuaded to re-locate their villages and to resettle in more accessible new planned villages, such as along new laid roads. Their houses are built through mutual self help; as part of the larger aim the project in raising their social and cultural standards. Involvement of the private sector in the construction of infrastructure is yet not very large as the share is taken up by the community itself.

Another mass housing project in rural areas and which has an emergency nature, is housing for victims of natural disasters such as earthquake, landslides, floods; and for people from areas to be developed for dams or other huge industrial projects.

Indonesia has made reservation of funds for the kind of social and emergency housing projects considering that the average number of dwelling units to be reconstructed annually exceeds 20,000. Due to its social character the involvement of the private sector in construction work is restricted to smaller local contractors.

#### Rural Housing Improvement

Finally there is the massive Rural Housing Improvement programme. A programme in which the Government input is restricted mainly to improving the quality of physical environment in regard to health and living condition. This includes providing the community with easier access to potable or clear eater, the provision of eventual communal or private toilets or bathing facilities, and introducing new techniques in building more durable and more healthy dwellings.

The target for the third National Development Plan, '79 - '84 is to select 6,000 villages out of the total village number of 64,000, to become demonstration sites in which the government extends technical aid and stimulative funds for the improvement of only limited number of houses namely 50 per village and in which the community will continue and complete the project through the traditional gotong-royong or self-help method.

### Urban Housing

Although the urban population in Indonesia is assumed to be less than 20% of the total population, the economy and socio-cultural on the overall housing situation is very great and grave. Urban housing programme is very substantial and special attention is required.

The few larger cities and towns in Indonesia were planned during the colonial period not as an integrated whole, but were divided into well planned main streets, where buildings permits were required for European and other affluent citizens living there, and behind these main streets were the Kampung, the native or original settlers who lived and organized themselves institutionally as well as administratively rather independently from the European or elite sector.

This was mutually benefiting co-existence since the Kampung dwellers fulfilled certain functions with their services in the complexity of their urban life.

This kind of co-existence prevails even today perhaps in a more democratic way, but with greater controversies, in particular because of the great influx of emigrants from rural hinterlands.

As faced by many other cities in the developing countries, the Indonesian cities as a centre of dynamic activity has become lesser opportunity for better earning and education becomes the push factor for the villagers to migrate to the towns.

Because of this, the larger Indonesian cities and town have to endure large scale urbanization, 3% to 5% on average per year, without the capacity for increasing control over matching the ever increasing demand for public services. For the majority of low income city dwellers the quality of life deteriorates all too rapidly.

## Kampung Improvement Programme

Efforts in improving this severe situation is done through the so called Kampung Improvement Programme. Although at present the funds allocated by the Government are not used directly for new housing construction or even structural improvement - this is trusted to the community's own capacity and capability - upgrading the environment infrastructure such as vehicular roads that fire-brigades and ambulance for emergency cases could have access to; footpaths, rain-water drainage, sewerage, communal washing and toilet facilities, and garbage disposal as basic facilities, is of the utmost importance.

Because as a whole, the changing for the better of physical living conditions of the low income urban population has been proven to become a stimulus to improvement of their economy, social and spiritual conditions.

This programme could be also an invaluable asset in achieving a balanced co-existence between the affluent and the less affluent urban population groups to live almost side-by-side.

Up to the end of the second 5-year development plan in 1979 the Kampung Improvement Programme has accomplished much in Indonesia's two largest cities. The programme has covered an area of 8,500 Ha and has given benefit to more than 3,000,000 people. For 1979 to 1984, the third 5-year development plan, the target is to cover 200 cities improving a total area of 15,000 Ha.

Kampung Improvement projects accommodate participation of urban planning consultants whereas in the project execution, opportunities are given to smaller local contractors with recommendation to employ local people from the Kampung where the project is located.

In certain Kampung Improvement projects, financial aid in form of loan or technical aid in form of consultant are received from international financing agency such as the World Bank or from interested developed countries through bilateral agreement.

## New Housing Schemes

In the early 60's when the national economy was rather in recession, there was limited opportunity to invest capital in housing. The government was then the sole housing developer and established a housing cooperative which could however not survive for long, as was expected. Indigenous building materials were much used in order to keep the cost down and let it to the occupants to re-model it to their needs aesthetic tastes.

After the establishment of the New Order Administration in the mid sixties, and the country's economic situation was successfully consolidated and revived, a new strategy for development including housing was launched.

In respect to urban housing, with the presumed annual need to build a new 120,000 dwelling units, due to limitation in financial resources, the Government can only provide 20% of it.

In 1969, the first 5-year development plan, as preparation for large scale implementation, experiments in developing local building materials through research were intensified. Likewise experiments in finding low-cost construction methods, rational building designs, or revision of building codes, norms, and standards were carried out.

It resulted in the construction of prototype houses which later become the standard sizes for many housing projects.

In 1974 by the beginning of the second 5-year development plan the Government legalized three important institutions.

1. The establishment of the National Housing Policy Board, according to agency taking the role of planning the total housing programme.
2. The founding of Perumnas, the National Housing Development Corporation, with the task to execute low cost housing projects funded by the government.

The types of low cost houses built by Perum Perumnas are for example the following : Site and Services and core houses. The floor area of this type of housing is 15 sq m to 20 sq m. The size of the plot is 60 sq m.

Twin houses or row houses, with floor area of 36 and 45 sq m. Detached houses or maisonette types, with floor area of 54 to 72 sq m. In addition to these houses, Perum Perumnas gives assistance in building community facilities such as markets and shops, schools, small recreation areas or hall for religious purposes. Recently, in the framework of urban renewal projects, the Government introduced 4-floor walk-up flats in the larger cities.

Perumnas housing is at present allocated mainly to civil servants and other low income families fulfilling the special criteria issued by the Government. The target for the third 5-year development plan, 1979 - 1984, is to build 120,000 dwelling units in 100 cities including introducing 4-floor walk-up flats, in the larger cities.

3. The assignment of the State Saving Bank to become a housing mortgage bank extending credits for housing development to public as well as private investors or housing developers. The target for 1979 - 1984 is to give credits to 30,000 prospective houses owners.



The credit is for 5 to 20 years at 5% to 9% interest. It lies between 20 to 30% of a family yearly income.

Consequently the participation of private investors, the real estate industry and housing developers have increased considerably. The economy has grown stable and credit facilities favourable.

### Real Estate

A recommendation was issued by the Government that real estate companies and private housing developers should supply the housing market with types of houses in the ratio 1 luxury house to 3 semi luxury houses to 6 low cost houses. By this way it is expected that the range of prospective buyers will be larger and it may in the same time a larger contribution in the effort of filling the gap in the urban housing market.

The Real Estate housing is launched on to the market to buyers having the capability of putting 30 - 50% downpayment and paying the remaining monthly instalments in a 2 to 5 years period.

By the end of 1980 the Government established a Housing Finance Corporation providing loans to the higher income group with interest rate up to 18% a year.

At present, the total number of housing unit supplied by the participation of the real estate industries is more than 10% of the total housing shortage or equal to more than 50% of the total number of houses which were financed through government resources.

Furthermore the participation of real estate industries in housing development projects is a natural follow up of the investment the real estate industry in Indonesia has put into its activities in connection with the construction boom of office buildings, in particularly in the capital city. Both facts occurred not without raising a side problem such as land speculation just to mention one.

Also there is an important aspect to be considered by the real estate and the construction industries in Indonesia, namely to balance on one side the modern methods and management, on the other side their expected participation in absorbing the vast unemployed and unskilled but cheap labour force. According to statistics, building industry or activity in Indonesia is a living source for more than 20% of the total labour force, which include the vast number of the low income urban population.

## Conclusion

Finally it should be noted that in many of the housing development projects mentioned earlier, cooperation in the form of funding and technical aid from international agencies as well as friendly developed countries on bilateral bases, has been established with high appraisal.

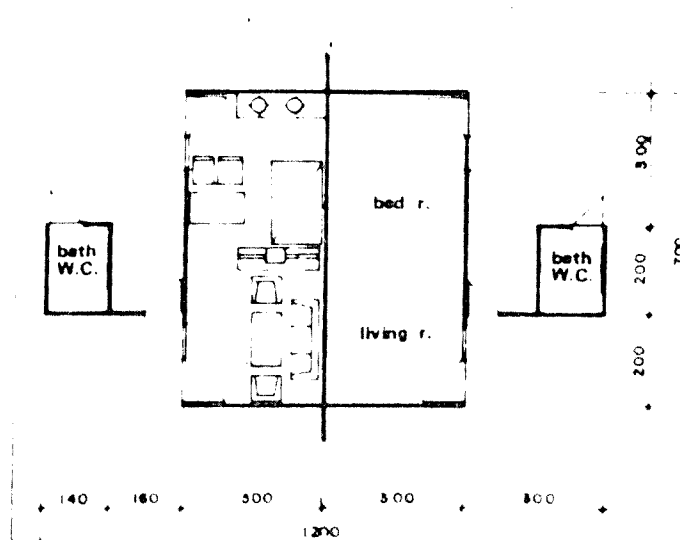
This interest shown by the nations of the world in the Indonesian approach and efforts in housing development in particular, in human settlements in general may contribute to the objective of providing man with better shelter in the global context.

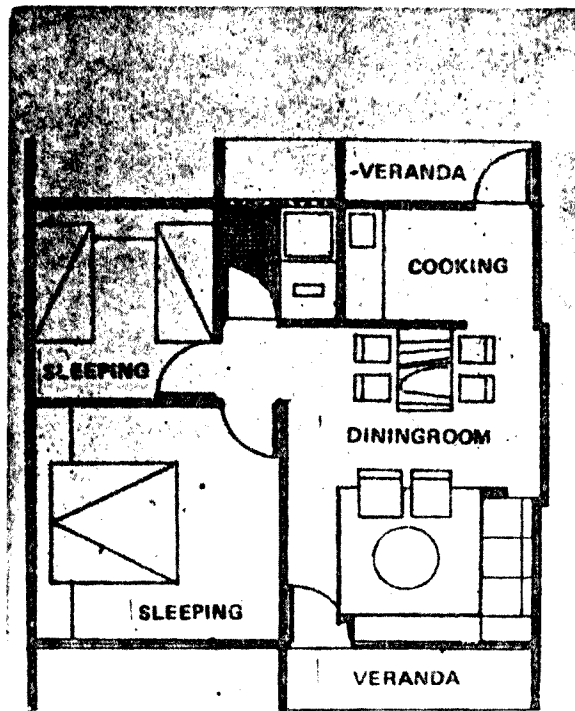
It has certainly borne out the conviction in Indonesia of the just and applicable strategy implemented in the country at present.

After all Housing Development as part of the total national development plan is essentially the unimpaired development of the Indonesian human being in entity and the development of the Indonesian society as a whole.



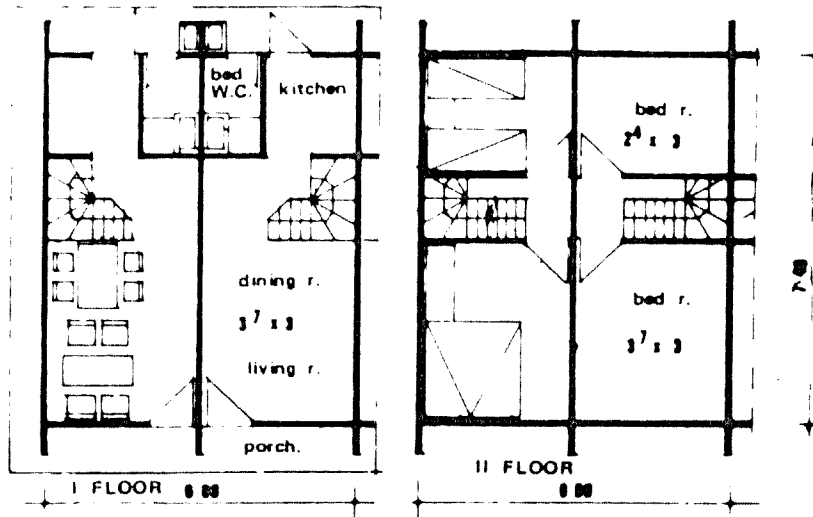
View and floor plan of Core-Houses.  
 Designed by PERUM PERUMNAS (the National Urban Development Corporation).  
 Floor area 20 sqm. Size of building plot 60 sqm.  
 There are several variation of floor plans. Core Houses are currently built in 8 cities in Indonesia. Standard price for Jakarta in 1980 : appr. US \$ 1200.--





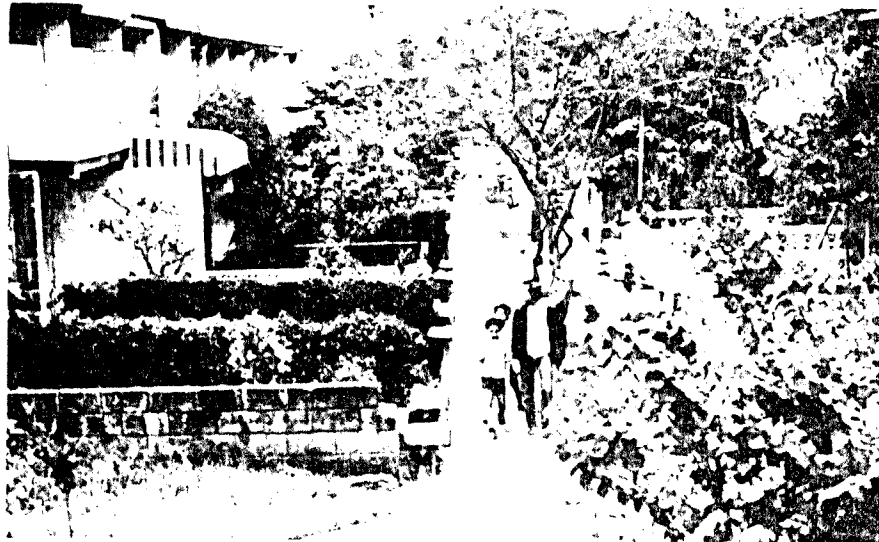
Floor plan of Row Houses. Type 42 sqm.  
Designed by PONDOK BAMBOO private  
Housing Developer- Jakarta.  
Built in 1975. Price appr. US \$ 2200,...





Floor plan of a Maisonette or 2 floor dwelling unit. Total floor area 45 sqm. Designed by PERUM PERUMNAS (the National Urban Development Corporation). Built in several cities. Standard price for Jakarta in 1976, appr. US \$ 1600,--

View of PERUM PERUMNAS maisonette housing in Bandung Built in 1976.

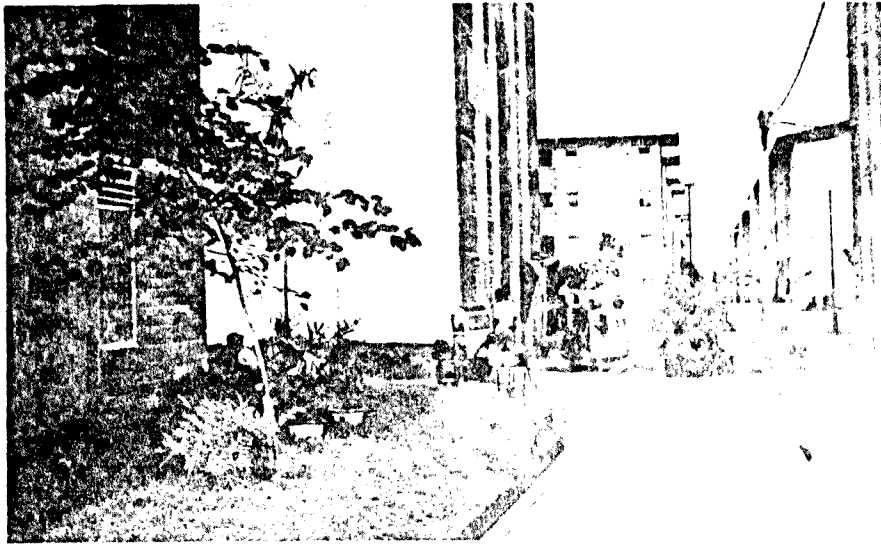


Variation of maisonette type dwelling units built by Real Estate/Housing Developers in Jakarta. The average floor size per unit is 45 sqm. Price, excluding land price but including water and electricity varies from US \$ 2000, .. to \$ 2700, ..



Upper picture: designed by KELAPA GADING  
Housing Developer - Jakarta  
Lower Picture : PELUIT HOUSING ESTATE  
Jakarta.





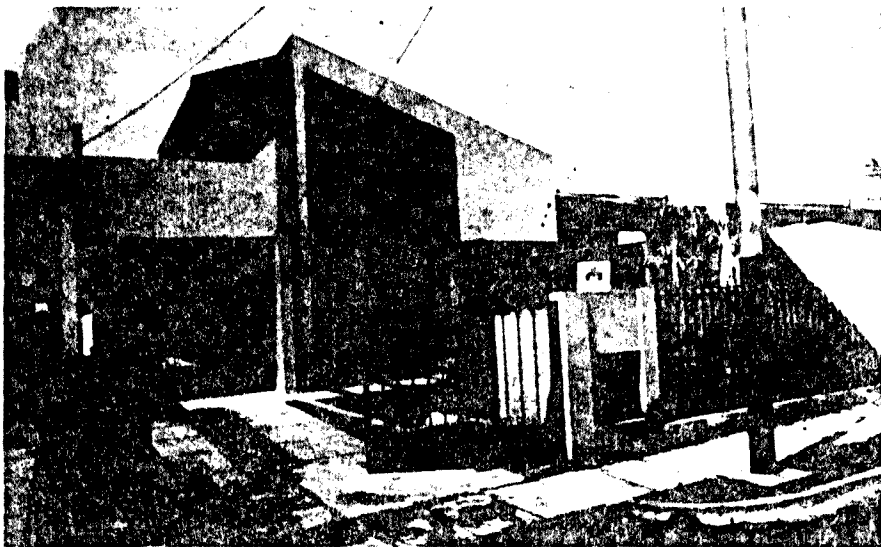
Upper picture.  
Flat or apartment housing, built by  
PERUM PERUMNAS (the NATIONAL URBAN  
DEVELOPMENT CORPORATION).  
Floor area of one unit is 36 sqm.  
Standard price of HUTAMA KARYA design  
appr. US \$ 2300,...

Lower picture.  
Designed by PT METROPOLITAN JAYA  
The same floor size and same price.  
In the price includes water and  
electricity.





The more fancy types of houses with the standard floor size of 45 to 54 sqm. Designed by private Housing Developers.  
Upper picture : PONDOK INDAH Estate- Jakarta.  
Lower picture : CIKUPRA INDAH Estate-Bandung.





PUBLIC PROGRAMS ON URBAN HOUSING  
FOR LOW INCOME GROUP IN THE PHILIPPINES

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By the year 2,000 A.D., the Philippines is expected to have 70 to 84 million people, a tremendous increase over the 1980 population of 48.1 million.<sup>1</sup>

Of the total 48.1 million Filipinos in 1980, 37.23% or 17.9 million individuals lived in urban areas.

During the last decade, the population increased by 35.4% at an average annual rate of 3.0 percent. Urban growth during the same period has an average annual rate of 3.68%.

Presently, the urban network is dominated by Metro Manila area with an estimated population of 5.9 million. This constitute a density of 8,395 persons per square kilometer.

Metro Manila is the most densely populated region in the country and has 50 times more people per unit of land than the national average of 148 persons per square kilometer.<sup>2</sup>

Although increase in population has vouchsafed many benefits—economic development, scientific advancement, computerized technology, accessible transport network, and improved infrastructure, it has also dragged in the attendant problems of food inadequacy, pollution, urban blight and congestion, and housing shortage particularly in the urban areas. The pressures of these "deficits of progress" are mounting. Continued misuse and waste of resources may soon be beyond nature's regenerative capacity and essential resources may be unnecessarily depleted.

While conditions have not reached critical levels, there is the need to promote a healthy balance between man and nature's resources, so that these resources serve and enhance man while man conserves and protects them.

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1

Based on May 1, 1980 population data of the National Census and Statistics Office.

2

Regional Multi-Year Human Settlements Plan 1978 to 2000. Realizing the vision of a New Society. Ministry of Human Settlements. p. 5., October 1978.

Thus, the human settlements program was born. The human settlements approach to the housing problem in the Philippines goes beyond providing physical structures for people. The concept of shelter is now premised on the recognition that development should integrate and interlock into a unified whole of the various basic services which provide man the opportunities for social and economic growth. Under the program, housing is environmental in scope - the provision of shelter is now synonymous to the development of a total community where residents are provided the basics of life for them to learn self-reliance. The program put together the effort of related government agencies and the private sector into integrative system of the program implementation. Under this novel approach, the inter-agency collaborative scheme integrates the Ministry organic functions namely; (1) Production, (2) Regulation, (3) Finance, and (4) Marketing into the national shelter system. (Refer to Figure 1).

This approach to shelter provision includes:

1. The physical and organizational development of self-reliant and self-managing communities equipped with the necessary facilities and amenities which will serve as models of development to surrounding areas.
2. The construction of economically recoverable housing units that meet sound architectural and engineering design and construction standards and affordability levels of income earners.

In operational terms, this concept of shelter is translated on the ground by such program as Bagong Lipunan Improvement of Sites and Services (BLISS). The URBAN RENEWAL, PAG-IBIG, JOINT VENTURES, BIGLANG BAHAY BONDS and the National Housing Authority (NEA) programs.

#### THE NATIONAL MULTI-YEAR HUMAN SETTLEMENT PLAN OF THE MINISTRY OF HUMAN SETTLEMENTS.<sup>4</sup>

##### Goals:

Certain policy goals have guided the formulation of the Multi-Year Human Settlements Plan. Improved quality of life, sustained economic growth, balanced ecology, and enhanced cultural heritage are goals that underlie the formulation of the physical framework plan for the country. Thus, as the Philippines strives for economic self-sufficiency, balanced growth and equitable distribution of development benefits, proper interaction between man and his environment is ensured.

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3

National Shelter Program. Abstracted from the Technical Report on Housing, National Human Settlements Plan. Ministry of Human Settlements. April 1981.

4

National Multi-Year Human Settlements Plan 1978 to 2000. Realizing the Vision of a New Society. Ministry of Human Settlements. pp. 3-4. September 1978.

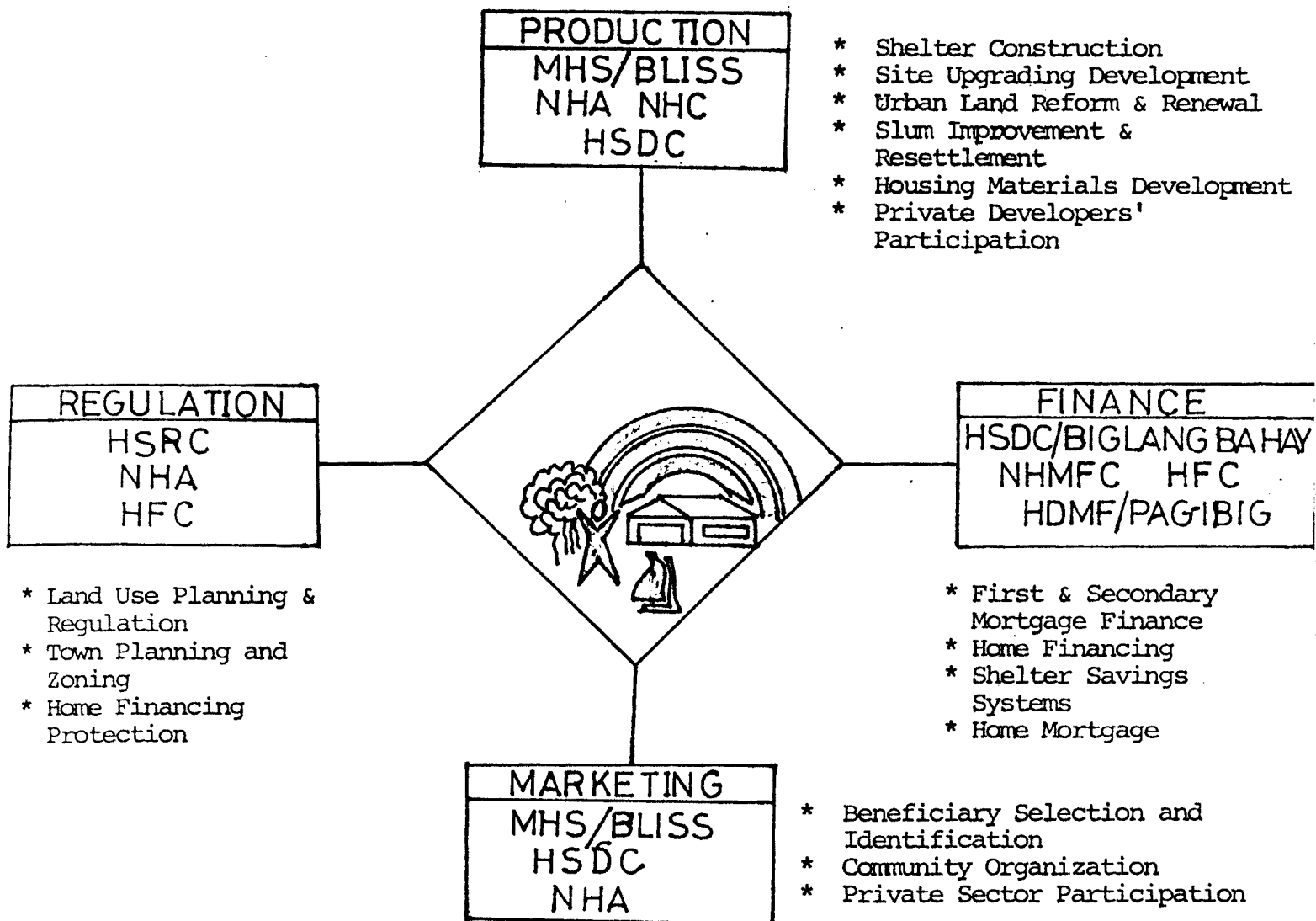


Figure 1 - Inter-agency collaborative scheme

Legend:

MHS- Ministry of Human Settlements  
 NHA- National Housing Authority  
 NHC- National Housing Corporation  
 HSDC- Human Settlements Development Corp.

HFC - Home Financing Commission  
 HDMF - Home Development Mutual Fund  
 NHMFC- National Home Mortgage Finance Corporation  
 BLISS- Bagong Lipunan Improvement of Sites & Services

### Objectives:

The broad national development goals are expressed in terms of specific objectives easily translated into policy plans and programs. One primary objective is to provide the basic needs of water, power, food, clothing, shelter, medical service, education, sports and recreation, livelihood, mobility and ecological balance to all Filipinos, through their communities.

Along with this is the second objective of reducing disparities in income and resource among communities, within and among regions.

The third objective is the maintenance of the quality of air, water and land by instituting ecological standards to guide all sectors.

### Strategies:

To support national development goals and objectives, the Multi-Year Settlements Plan has adopted a three-pronged approach: countryside development, regional integration, and resource utilization and management.

The countryside development strategy emphasizes development program throughout the country which will preserve the benefits and the wealth of resources in these parts. This will mean more employment for local people, higher incomes, better services and facilities, and in general, a higher standard of living.

Regional integration aims to lessen the dominance of Metro Manila and the dependence of other regions on it. This necessitates an improvement in the linkages within and among regions, linkages which in the long-run, will be more economical and efficient. This approach integrates the two other strategies.

Resource utilization and management involves a thorough inventory of the country's untapped resources and harnessing them for sustained food production and related industries. Thus, prime agricultural land, suitable areas for fishing and livestock production, and mining and forestry resources are identified and properly managed.

### Policies and Programs:

Policies and programs contained herein are reflections of the strategies the plan has adopted.

Through the growth center strategy, the Plan aims to reduce the dominance of Metropolitan Manila over the rest of the country by developing identified potential growth areas into self-sufficient urban center which will lessen the natural attraction of Metro Manila and thus help minimize movement of people into the area, prevent urban congestion and reduce income disparities. The growth center strategy entails, among others, raising farm incomes by providing market centers, credit and storage facilities as well as easy access to health, education and welfare services in these areas. To enhance the development of the identified growth centers, education opportunities will be made available. The curricula of the secondary and

tertiary schools will be tailored to the areas specific needs and characteristics. Emphasis will also be placed on shifting from a highly structured concept education into a more flexible types of learning which can strengthen management capability, planning and implementation at the local and regional levels.

The Plans' thrust for housing features planned living areas in and around growth centers with integrated urban services and supportive facilities.

The industrial dispersal scheme has been adopted as another means of checking the overdominant position of Metro Manila in economic activities and promoting dispersal of development benefits. Industrial activities essential to rural development are to spread out among the regions, particularly the lagging and less developed areas. Thus, labor-intensive industries are to be promoted and adaptive technology suited to local resources are to be developed in line with industrial dispersal. This scheme will enhance the development of the identified growth centers since it will encourage more industries to locate in said centers.

An efficient integrated transport system and its related supportive services are likewise planned. This is based on the industrial dispersal scheme and on the movement of population responding to the attractions of developing growth centers. The goal is for a coordinated intermodal transportation network with improved primary roads linking regional capitals, linked major urban settlements and resource frontiers developed road networks within metrocenters, regional capitals as well as major settlements. Rationalized port, airport and railway system will complete the total design of transport services.

Optimal utilization of land resources while preserving environmental quality ensures that land use plans for agriculture, forestry, inland fishery, mining and urban development are balanced against economic, social and environmental consideration in determining the most appropriate use of land. The incorporation of ecological tenets into land use planning thus reconciles the twin goals of improving living standards and maximizing ecological stability.

The various land use plans which allocate the rational alternative designs for land use development; a growth center strategy which ranks settlements according to their present suitability and potential for attracting the bases for progress; industrial, institutional and tourism dispersal schemes which diffuse the structures for development and their benefits to long-neglected areas; and a comprehensive social service and infrastructure support program - all these constitute an integrated human settlements plan. The concern of such plan span from universal national goals of improved living standards, environmental stability, and economic growth and community development to specific policy proposals which filter down to local levels for implementation.

## EXISTING SITUATION:

To attain proper perspective of the Program, a brief overview of physical, demographic and other conditions in the Philippines is presented as follows:

### Physical Features:

The total land area of the Philippines is 300,000 square kilometers<sup>5</sup> with Luzon, the biggest island, accounting to 141,395 square kilometers, and Mindanao, the second largest, with 101,999 square kilometers. There are 7,100 islands and islets within its territory, making it one of the largest archipelagos in the world in terms of number of component islands and islets.

### Demographic Features:

The population of the Philippines in May 1980 was 48.1 million; this has grown from about 7.6 million at the beginning of the century (1903). Population growth gained momentum during the intercensal period 1948 to 1960 with the population increasing at an annual growth rate of 3.1 percent. For the ten-year period 1960 to 1970, the country experienced a 3.0 percent annual increase, while from 1970 to 1977, it was calculated at 2.8 percent. (Refer to Figure 2).<sup>6</sup>

### Urbanization Trends:

Of the total 48.1 million Filipinos in 1980, 37.3% or 17.9 million individuals lived in urban areas. This number is more than trice the 1948 figure of only 5.1 million. From 1960 to 1970, urban growth (3.6% annually) outpaced both natural and rural growth (3.1 and 2.7% respectively). From 1970 to 1977, urban growth registered a 3.0 percent annual increase. During the same period, the rates of natural and rural growth were 2.8 and 2.6 percent, respectively.

Presently, the urban network is dominated by the Metro Manila Area, with an estimated population of 5.9 million.

### Housing:

An increase in housing needs is expected over time primarily due to two considerations - increase in the number of households and increase in the number of dwelling units to be replaced due to calamities, destruction and dilapidation. There has undoubtedly been a considerable growth in housing needs from 1970 to 1977, both for urban and rural areas. Estimates indicate that the housing needs in 1977 is 1,663,750 units, 34.70% of which is accounted for by urban areas. By the year 2000, an aggregate of 11,481,288

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5

National Census and Statistics Office 1972 .

6

National Multi-Year Human Settlements Plan 1978 to 2000. Realizing the Vision of a New Society. Ministry of Human Settlements. p. 16. September 1978.

# NATIONAL, RURAL & URBAN POPULATION: 1903 - 2000

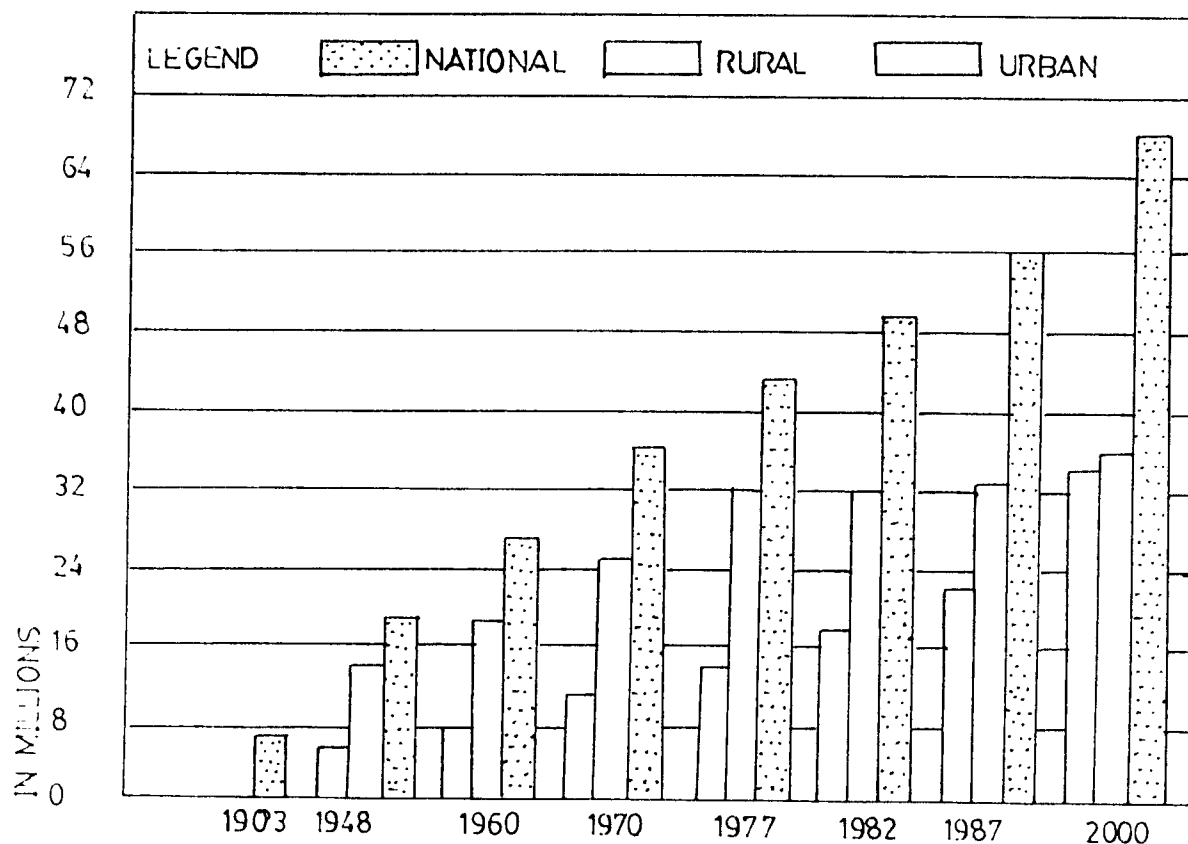


Figure 2 - Population Growth (Philippines)

dwelling units will be needed with the urban areas accounting for about 1/3 of the total. Statistically, the backlog can be demonstrated by the ratio of houses to households, the ideal set-up being a one-to-one correspondence. Using this standard, the ratio for urban areas is 232 houses per 1,000 households while for rural areas, it is 202 houses per 1,000 households.

Housing is the most pressing problem in Metro Manila today. This is brought about by several factors like high population growth rate, low levels of income, high value of land, increasing construction costs, and lack of credit resources. The shortage of adequate housing is particularly acute in the inner core and in rapidly growing urban centers in the intermediate and outer areas, as evidenced by the high concentration of squatters growing at a rate of 12 percent a year.

Using the standard of one dwelling unit per household, the housing backlog for the MMA is estimated at 120,896 units in 1977. By the year 2000, additional of 649,321 units will be needed.

#### PROGRAMS ON URBAN HOUSING FOR THE LOW INCOME GROUP IN THE PHILIPPINES.

Concerted efforts are presently underway towards adequately meeting the housing problems of the country. More coordinated and vigorous housing programs are envisioned to make the difference between remedial housing and well-planned human settlements.

The Ministry of Human Settlements (MHS) under the First Lady and Governor of Metro Manila is in the fore-front of all activities concerning housing. Coordinating with other government agencies and operationalizing an integrative system of program implementation, MHS views shelter to be more than the physical or structural unit but one which responds to the cultural, social and spiritual values of the family and the community. In this context, MHS vigorously implements the BAGONG LIPUNAN SITES and SERVICES PROGRAM (BLISS) the URBAN RENEWAL PROGRAM, PAG-IBIG, JOINT VENTURES and BI-BIGLANG BAHAY BONDS also within the area of concern of the MHS and in consonance with its goals and objectives, are the housing programs formulated and implemented by the National Housing Authority (NHA).

Specifically, the structure plan for urban areas provide the framework for achieving the following basic objectives for housing:

1. To progressively increase the share of housing in the government investment program and to develop additional financial sources for new construction and rehabilitation of older housing units.
2. To stabilize the costs of construction materials and land prices.
3. To increase the benefits of the low income groups in the provision of housing.
4. To improve the housing quality, facilities and services of existing residential areas.



5. To restructure residential densities in relation to services and natural amenities towards more diversified residential areas.
6. To distribute public facilities to efficiently service residential areas and to encourage convenient accessibility to employment areas.

The Urban Bagong Lipunan Sites and Services Program (BLISS):

Being a major component of the National Shelter Programs which seeks to establish and develop self-reliant communities, Urban Bliss communities are planned to include the delivery of essential services to meet the basic needs of the community.

Medium-rise apartment buildings are being constructed in selected sites in each of the four core cities and 13 sub-urban municipalities that compose Metro Manila, designed to provide housing and livelihood for residents of identified blighted areas in the metropolis. Eventually Urban Bliss projects will be adopted and completed in the other regional urban centers throughout the country. The shelter component of the Urban Bliss Program consists of medium-rise i.e., four-storey structures of sixteen or twenty dwelling units. These are classified into three levels by size with the corresponding rates:

Level	Rate/No. for 25 years *	No. of years Occupancy
Level I	₱ 150	25 years
Level II	275	50 years
Level III	550	50 years

\* Rate escalates at 10% per annum based on initial rate until the 14th year after which it remains constant until the 25th year.

Considering that most of the poor may not even be able to afford the specified rent levels, cottage industries such as bonsai growing, plastic flower-making bag-making and others will be established through cooperatives in each site.

The beneficiaries of the Program will be organized into the Bagong Lipunan Community Association (BLCA) which will be duly registered with the Home Financing Corporation. The association will serve as the venue for individual and group participation in all the projects and activities that will be undertaken.

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Handbook on Housing Materials and Construction Techniques. Technology Utilization Support System. Technology Resource Center pp. 261-266. February, 1981.

### PAG-I.B.I.G. Program

Since the ELISS program is aimed at setting up model communities, a complementary program known as Pag-I.B.I.G., has been launched to provide a viable finance system for broad-based housing. This program is basically a provident fund that pools the savings of workers and the contributions of their employers into a common fund that is used to operate a secondary mortgage market.

Through Pag-I.B.I.G., the government administers the fund that marshals additional fiscal resources to enlarge the credit pool from which shelter finance could be provided to members. The banks provide the credit facilitation services so that the largest segment of the working and saving public could be serviced with long-term shelter financing at affordable rates. A little over two years after it was launched, the program has accepted 316,000 members.

### PAG-I.B.I.G. (JOINT VENTURES) Program

An integration of ELISS and Pag-I.B.I.G., this program seeks to provide economic housing to the vast majority of Filipino income-earners who are members of the Pag-I.B.I.G., fund through joint ventures with private developers. Housing facilities to be extended to these members are designed and constructed according to the concepts and guidelines adopted in BLISS.

This program encourages the participation of the private sector which can build the homes that Pag-I.B.I.G. members can buy. In effect, the builders will be extended financing so they can build and the buyers so they can buy.

### Urban Renewal Program

Through its corporate arm, the Human Settlements Development Corporation (HSDC), the Ministry develops new communities through innovative urban land mechanism and self-financing schemes.

The corporation is at present developing more than 11 projects within Metro Manila Area (MMA). Among which are the establishment of medium rise apartment, office and commercial buildings, a cottage industry display and commercial center and the construction of low-cost housing units for government employees which will be accessible to their place of work.

In addition, HSDC also takes charge of the Biglang Bahay Bond, a large scale lottery which affords Filipino families an easy chance to own a house and lot worth ₱100,000.00 at the site and in the design of their own choice. Through ₱10 bonds, holders participate in a daily raffle. At the same time, this allows the Ministry to increase its funds to finance its various projects.

## National Housing Authority Programs

As an attached program of the Ministry of Human Settlements, the National Housing Authority (NEA) formulates and implements a comprehensive and integrated housing programs which includes among others, housing, development and resettlement, sources and scheme of financing, and a delineation of government and private sector participation.

Through new constructions, the NEA (a) builds self-sustaining communities equipped with the eleven basic needs for low income groups and (b) meets the increased demand for housing brought on by household formation and in-migration. The types of houses constructed vary from single-detached and cluster houses to medium-rise apartments depending on the location and affordability of prospective beneficiaries. In urban cores where land available for housing is scarce, medium- and high-rise buildings are preferred. In suburban as well as rural areas, the use of single-detached, bungalow type dwelling units still predominate. And for primary urban centers, the trend is toward the clustering of dwellings and home-lots and communal living.

In addressing its efforts to the solution of the housing problem, NEA has, therefore, adopted three major housing thrusts:

### New Units

The construction of new housing units is geared to meet the increase in population due to internal growth and in-migration. Primarily, its thrust is toward the low-income groups - to make decent housing affordable to our cities' working class.

### Slum Improvement through the Upgrading of Sites & Service

This entails the on-site upgrading of slums and other blighted communities. Its components include: the introduction of infrastructures; resolution of the land tenure issue; provision of basic facilities and services; implementation of effective measures for decongestion; improvement of environmental hygiene; and the establishment of income-generation projects.

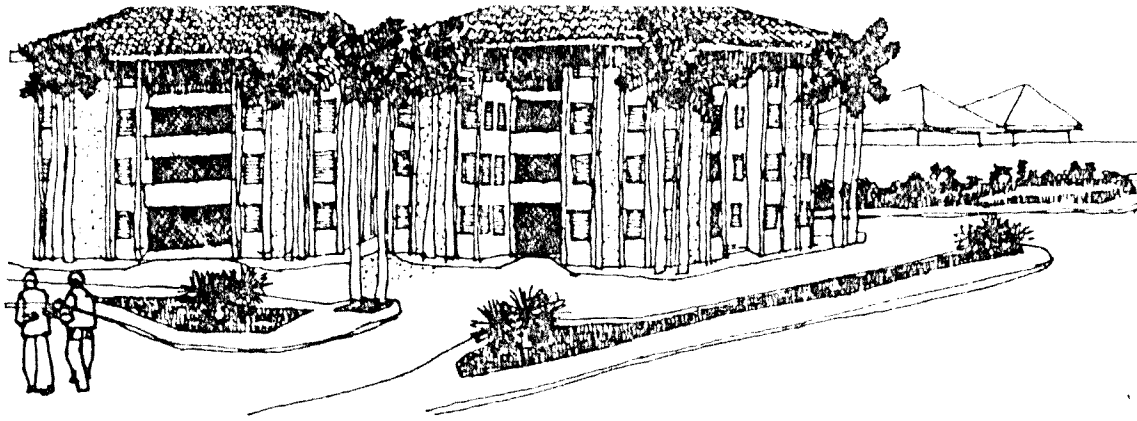
### Site and Services Development

This involves the preparation of new sites with basic community facilities and services. It accommodates families displaced from slum improvement projects, danger areas like railroad tracks and esteros, and lands reserved for the government's infrastructure program. Marginal-income families migrating to the urban core are also accommodated, as well as the annual increase in households. Aside from having the necessary facilities and services, resettlement sites are also provided with economic bases, infrastructures, co-rehouses, water and power supplies and components for sanitation and hygiene.

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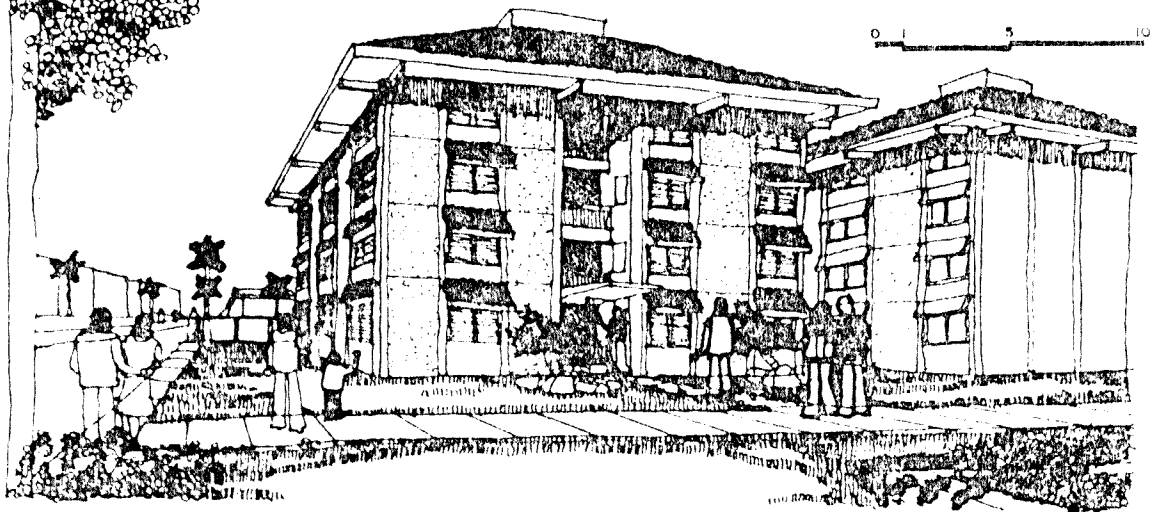
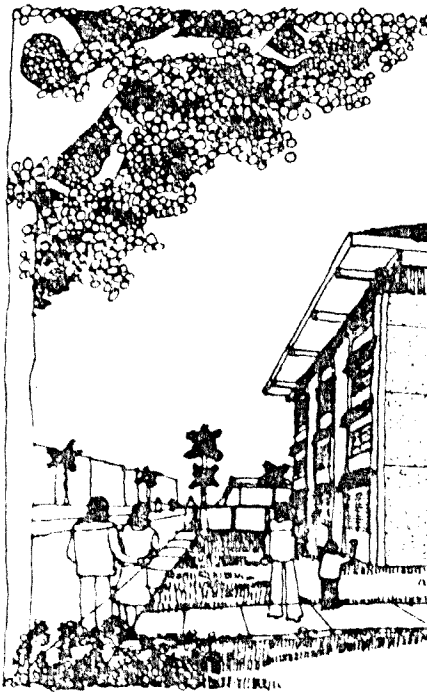
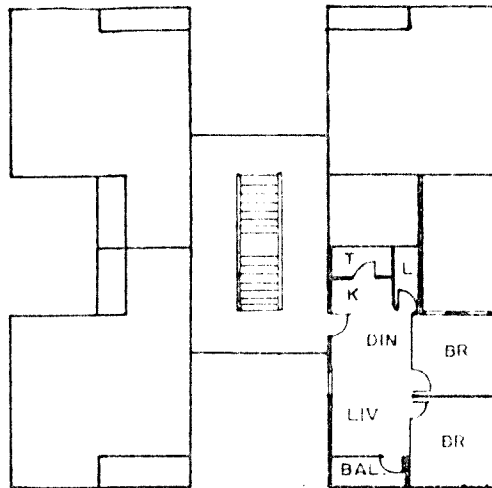
The programs and projects of the Ministry of Human Settlements (MHS) in the Philippines evolved and expanded dramatically since its creation in 1978. It can be safely said that these programs have initiated models in development planning, community development, provision of basic human services, enhancement of productivity among people, and the responsible management of our resources in our environment.

By and large, indications are that these concepts and approaches on Urban housing based on self-reliance, integrations, resource utilization and management will find ultimate acceptance and hopes are bright that a practical and lasting solutions to low income group housing problems in the urban areas may have been found.

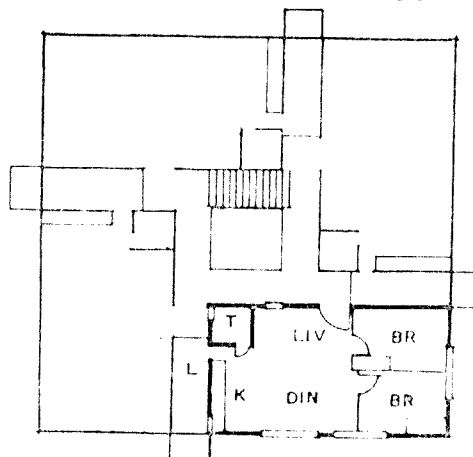


## URBAN BLISS

The first Urban BLISS project to be implemented is located in the city of Manila, not far from the tourist district. It is an imposing structure in a neighborhood of mostly 2-storey buildings. The symmetry and fine proportions of the building are eye-catching. A unique feature is the balcony which can be both an extension of the living room and an alternate emergency exit.



The design stands out in terms of space distribution, habitability and flexibility. Without sacrificing ventilation, the high-pitched roof provides additional sleeping areas for 4th floor occupants. Cross ventilation and circulation are satisfied in the building and interior court designs. Contrasting use of building materials lends distinction and appeal to the facade.



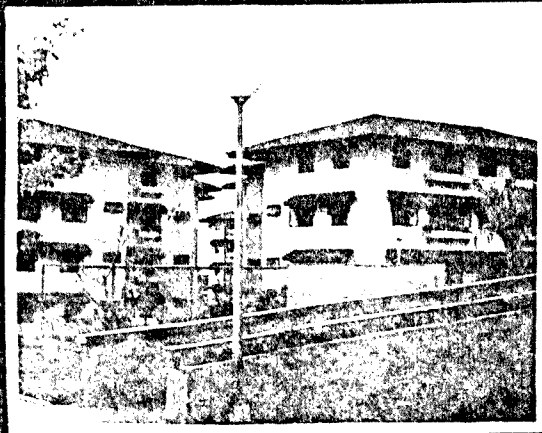
# NEW UNITS



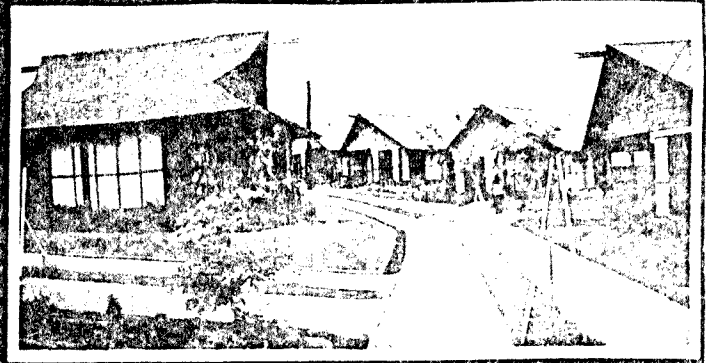
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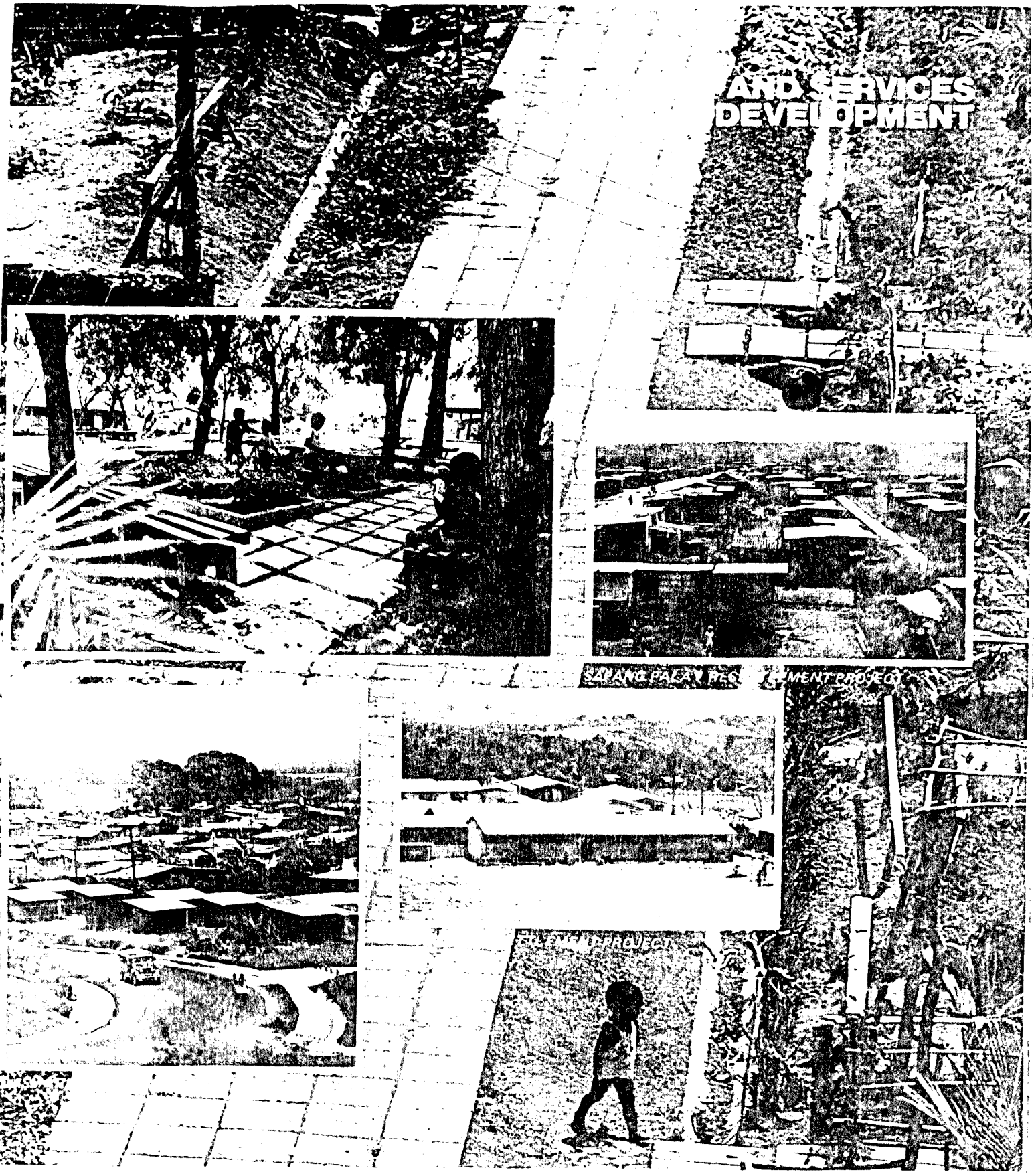
ANG BAGONG LIPUNAN CONDOMINIUM



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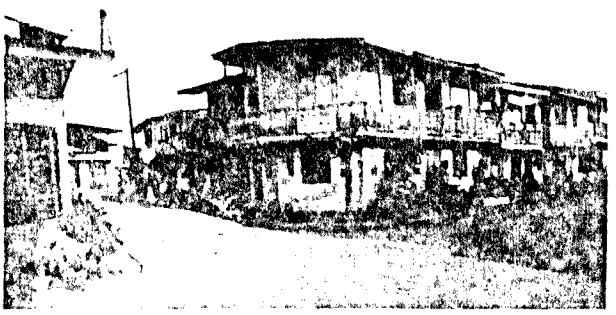
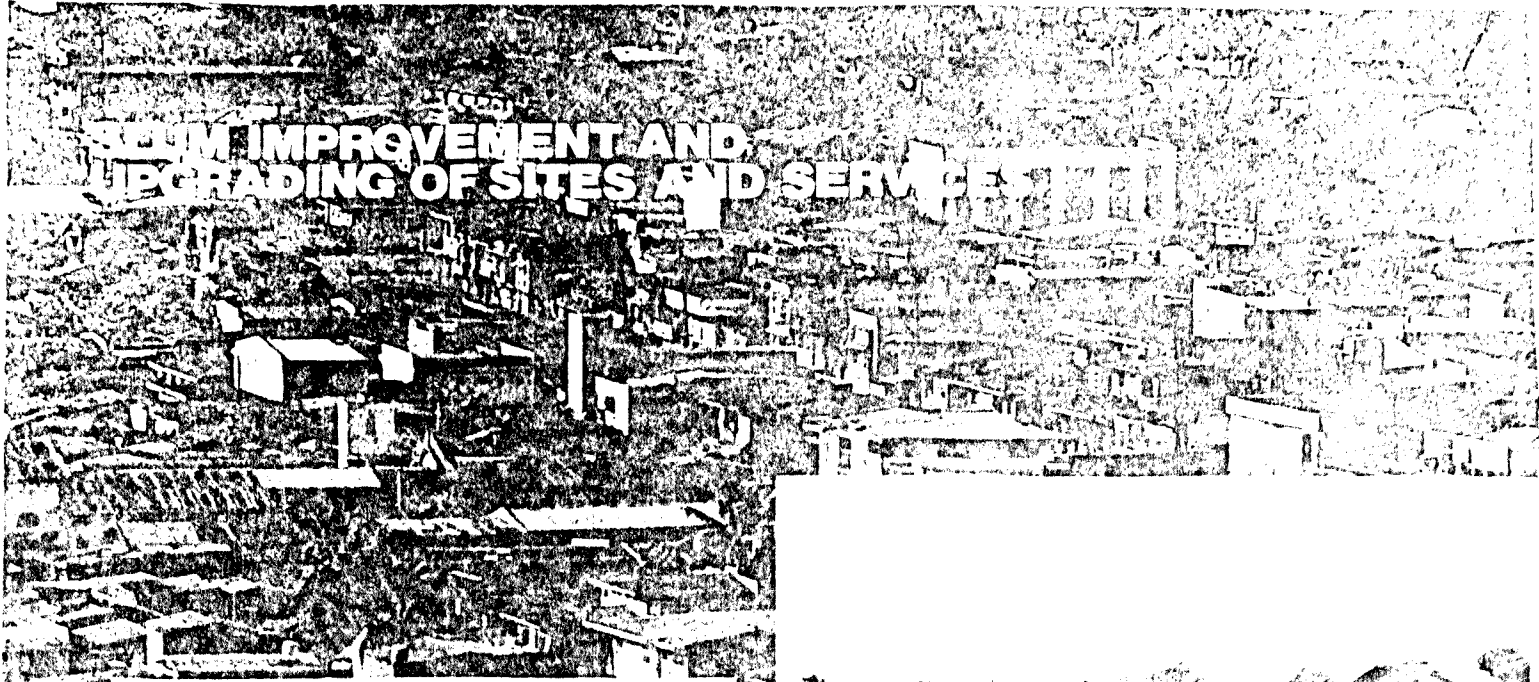
**LAND SERVICES  
DEVELOPMENT**



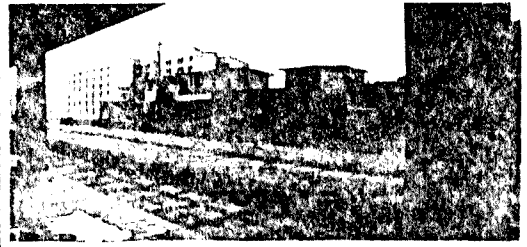
SAYANG BALAY RES. DEVELOPMENT PROJECT

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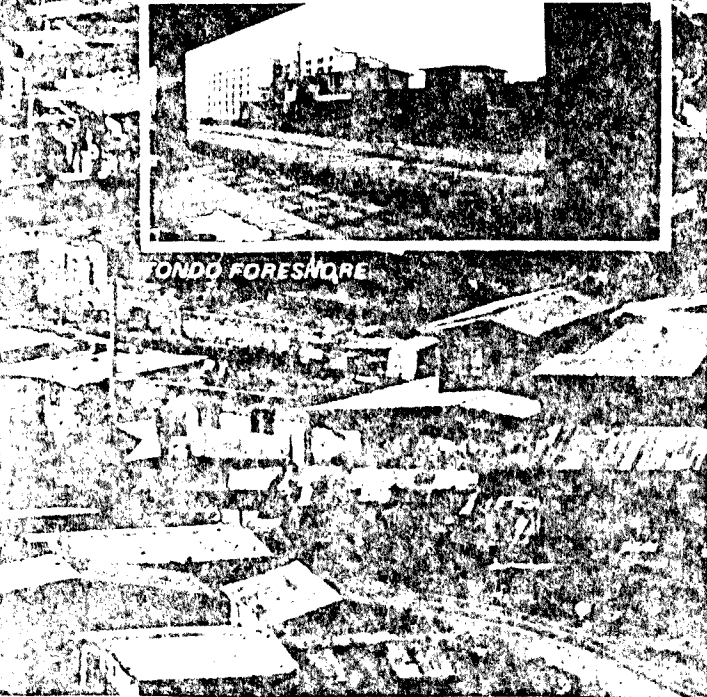
# SLUM IMPROVEMENT AND UPGRADE OF SITES AND SERVICES



TONDO FORESHORE



TONDO FORESHORE



TOLOSAN TRINIDAD



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**MECHANISATION OF CONSTRUCTION INDUSTRY IN SINGAPORE**

**STATE OF DEVELOPMENT, USE OF SITE EQUIPMENT FOR CONVENTION  
CONSTRUCTION AND INTRODUCTION OF NEW CONSTRUCTION TECHNOLOGY**

**By:**

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**SINGAPORE HOUSING & DEVELOPMENT BOARD**

COUNTRY REPORT

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SINGAPORE HOUSING & DEVELOPMENT BOARD

Abstract

The Housing & Development Board (HDB), the public authority responsible for public housing, is the single largest developer in the Republic. Presently, it has over 357,000 units of public housing under its management which housed about 69 per cent of the population of 2.44 million. With the rising construction cost and shortages of construction labour, the HDB has embarked on an ambitious mechanisation programme to increase productivity reduce construction labour and improve the quality of housing.

This report examines Singapore's experience in public housing with particular references to its drive to upgrade and modernise conventional construction industry.

## Introduction

The Republic of Singapore comprises the Island of Singapore together with some 56 off-shore islands. It occupies an area of approximately 618 sq km. It is situated approximately 140 km north of the Equator. The climate is essentially equatorial with an average day temperature of 31°C and an average night temperature of 24°C. There is no distinct dry or wet season as rain falls all year round with an average annual rainfall of 2,440 mm.

Singapore has grown from a small fishing village when founded by Sir Stamford Raffles in 1819 into a modern metropolis with a population of 2.44 million with overall gross density of 3,950 persons per sq km. Its central locality at the cross roads of the East-West shipping route has made it the second largest port in the world. Its rapid economic progress in the last two decades has brought prosperity to the people. The per capita Gross Domestic Product of S\$9,018 in 1980 was the second highest next to Japan in Asia.

When Singapore attained self government in 1959, the housing shortage had become one of the most acute and serious problems facing the nation. The solution to the problem was given top priority among the many tasks ahead. The Housing & Development Board (HDB) was formed in 1960 in place of the Singapore Improvement Trust (set up by the Colonial Administration) to deal with the housing problem. The Board was entrusted with the task of providing decent shelter for the lower income group who were mainly living in dilapidated squatters and slums.

Owing to the small physical size of the Republic, land is a very critical resource. In 1960, out of a total of 581 sq km, about 162 sq km (27.9 %) was built-up area taken up by residential, commercial and industrial usage. A significant proportion (142 sq km) was used for agriculture. Cultivable waste occupied 117 sq km, forests 38 sq km, marsh and tidal waste 46 sq km. The remainder of 76 sq km was used for other purposes, including open spaces, public parks, cemeteries, inland

water, quarries and non-built up areas in military establishments. Clearly there was no alternative, but for HDB to go for high rise development for public housing. The rapid rate of development at about 1 % per annum at which land is being consumed over the last 20 years has led HDB to consider increasing the density by about 15 % of New Towns which average about 1,000 people/ha (net residential density). In 1979, out of a total of 618 sq km, about 268 sq km (43 %) was built-up area taken by residential, commercial and industrial usage.

The need for more housing units is generated by the rapid population growth. An effective family planning programme is a pre-requisite for alleviating the housing problem in view of the limited availability of land and other resources in the country. Singapore's successful family planning programme has reduced population growth rate to 1.2 per cent a year. Still, the total population will grow by more than one quarter to three million by the year 2000. It is expected to stabilise by the year 2030.

From 1927 to 1959, the Singapore Improvement Trust (SIT) completed slightly over 23,000 units of public housing. The HDB completed over 118,000 units in its first decade (1960 - 1970) and presently has over 356,000 units under its management, housing about 69 per cent of the population. The rest of the housing stock consists of detached and terrace houses, condominium and private flats and isolated clusters of attap or zinc roofed houses.

Demand for public housing would continue to rise as the Board has relaxed the income ceiling and eligibility rules and also it has to rehouse about 15 % of Singaporeans still living in unsewered, though habitable slums. This would mean that the Board would be housing nearly 95 % of the population. With growing affluence of the Nation and the higher expectations of the people, the Board has to constantly gear itself towards producing better design and quality flats in a more conducive and pleasant environment taking into account the social and economic factors.

The energy crisis and the consequent rise in construction cost coupled with shortages of both skilled and unskilled labour have rendered the Board's objective to provide housing within the means of the average citizen much more difficult. To meet these challenges, the Board has embarked on an ambitious mechanization programme to improve construction methods and techniques. This would lead to a greater utilization of equipment that will increase productivity, reduce the total labour requirement and the time necessary to complete the project. The optimally efficient utilization of the resources available is of crucial importance in making possible sufficient housing units to satisfy the growing demands and at a reasonable price.

#### CONSTRUCTION INDUSTRY

The growth and structural change of the economy and the increases in the Gross Domestic Product and the per capita Gross Domestic Product between 1960 and 1980 is illustrated in Table 1.

The construction sector played no small role in the achievement of this undoubtedly impressive and remarkable progress. Its contribution in 1960 was 3 % increasing to 7% in 1965 and steadied at 5% in 1979. In 1980, construction of public housing by HDB constitutes 66% of the total development projects as shown in Figure 1. The Housing & Development Board is the single largest developer in the Republic.

TABLE 1

Year	Gross Domestic Product (GDP) (At Current Factor Cost S\$M)	Per Capita GDP S\$
1960	1985.3	1206
1970	5319.9	2564
1980	21769.3	9018

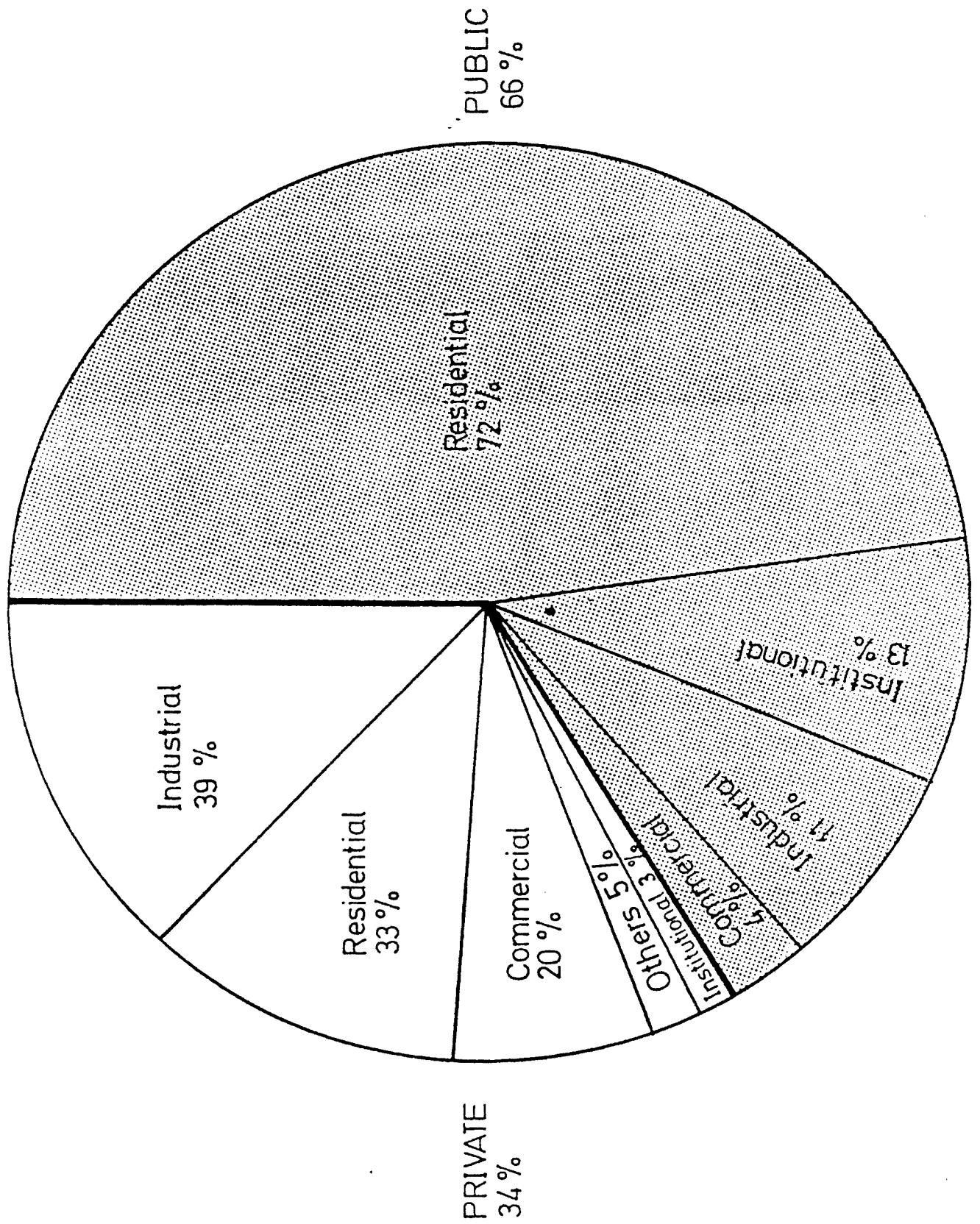
Gross Domestic Product By Industry (1980)

Agriculture & Fishing	-	1.2 %
Manufacturing	-	22.5 %
Utilities	-	2.8 %
Construction <sup>1</sup>	-	5.1 %
Trade	-	24.3 %
Transport & Communication	-	17.8 %
Financial & Business Services	-	15.9 %
Other Services	-	10.9 %

<sup>1</sup> Includes quarrying

Source: Ministry of Trade & Industry

Figure 1 : APPORTIONMENT OF DEVELOPMENT PROJECTS





## MECHANISATION

### State of Mechanisation

The building industry in Singapore in the sixties was extremely efficient in spite of the very little equipment being used at the work sites. With cheap and abundant labour from the neighbouring countries, the construction cost for multistorey flats in Singapore was among the lowest in the world. However, the oil crisis in the early seventies resulted in the soaring of the construction material prices. There was a need to increase productivity of the construction labour which was relatively low compared to the other industries. The reasons hindering the increase in productivity were :-

- a) a certain degree of manual craftsmanship is present in the various building trades;
- b) regular moving of workers from one building site to another;
- c) frequent breaking off of employment in between contract;
- d) difficulty in supervision due to wide scope and order of work.

To deal with these problems, work-site mechanisation was gradually introduced to reduce manual work and increase productivity. Emphasis was then on concrete works and cutting and bending of steel reinforcement. These machinery were purchased on credit arrangement between the Board and the manufacturer and this was then deducted from their progress payment. The capital investment by these contractors was relatively low.

As the construction activities in the Republic and the neighbouring countries increase, the construction industry faces an acute shortage of

both skilled and unskilled labour. The problem is further aggravated by the rapidly rising cost of construction and labour. In line with the Government policy to upgrade the industry and increase productivity, the Board stepped up its effort to mechanise the conventional construction industry and introduce new construction technology.

### Objectives

The objectives in the on-going mechanisation programme may be broadly stated as :-

- a) to increase the productivity of workers and efficiency of construction operations and hence reduction in labour;
- b) to reduce construction time and wastage in materials;
- c) to supplement the conventional in-situ method with other methods of construction;
- d) to improve on the quality of the works.

### Areas of Mechanisation

The areas of mechanisation being implemented by the Board include the following :-

- a) Use of metal formwork;
- b) Use of site equipment for conventional construction;
- c) Introduction of new construction technology:-
  - prefabricated flats using industrialised method of construction;
  - semi-precast method of construction;

- tunnel/table forms with tower cranes.

## MECHANISATION OF THE CONVENTIONAL CONSTRUCTION

### Use of Metalform Works

The Board has been pioneering the use of metal formworks construction in place of timber formworks since 1975 to alleviate the problem of shortage of skilled carpenters and plasterers. The metal formworks are owned by the Board and hired to the Board's contractors. After the successful implementation of this formwork in a few pilot projects, the capacity of metal formwork hiring operation was gradually increased. Metalform is presently being used to construct about 17,000 units of residential flats. This constitutes about 38 % of the Board's current building programme. With the accelerated building programme, the Board has expanded the metalform operation by another 2.0m pieces which would serve another 12,500 flats per annum.

These metalforms are manufactured from carbon steel plates of thickness 2.2 mm by forming and welding. They are manufactured into various standard types and sizes and are assembled on site by means of specially designed U-clips and L-pins. They can be easily handled by the workers and no cranes are required. The metalforms are broadly classified into 3 types: namely, Standard Forms, Semi-standard Forms and Variety Forms. Attached in the Appendix is the Metalform Manual which details the procedures of assembly, dismantling, maintenance and repair of the use of these forms and site organisations required.

With the combination of the standard, semi-standard and variety forms, they can be easily fitted to suit various architectural design and layout of HDB projects. The HDB provides good engineering services backed up through its Metalform Unit which was specially set up to run the formwork hiring operations. Besides looking after the hiring, centralised maintenance of the forms, this Unit prepares the formwork

hiring operations. Besides looking after the hiring, centralised maintenance of the forms, this Unit prepares the formwork arrangement plans, works out quantities of various forms and accessories for each hire, design custom-made metalforms, provide technical advice on job site and explore into areas of improvement of this form system.

The main advantage of using metalforms over conventional timber formwork are :-

- a) employment of skilled carpenters has been drastically reduced as metal formwork construction requires mostly unskilled workers;
- b) construction rate is 10-15 % faster than the conventional;
- c) good workmanship, with regard to accurate and well aligned structures can be achieved with minimum supervision;
- d) a saving of 5 mandays per unit of flat or 90 % of the plastering as the use of metalform does not require plastering.

#### USE OF SITE EQUIPMENT FOR CONVENTIONAL CONSTRUCTION

The use of site equipment is motivated by the desire to increase productivity, profit and to construct the apartment in a shorter time. In order to encourage local contractors to have a greater degree of mechanisation, the Board introduced a Free Financing Scheme and Core Contractors' Scheme. At the same time, the Board's Architects and Engineers have rationalised their design to enable mechanisation to be exploited to the fullest.

Under the Free Financing Scheme, the Board will finance \$1m for every \$15m worth of contract in their purchase of labour-saving and more

productive plants and equipment. The Core Contractors' Scheme is for a selected group of local contractors who are assured of continuity of work with a minimum workload of constructing 1,000 dwelling units per contractor per year. The selected core contractors are provided with incentives to make substantial investment in manpower, mechanisation and new construction technology. Responses to both schemes have been extremely favourable. Local contractors are now using more equipment such as tower cranes, crawler cranes, rough terrain forklifts, concrete pumps and batching plants and formwork systems.

A special unit known as the Construction Technology Unit was set up by the Board to spearhead this increased use of site equipment for conventional construction. They identify and assess the areas of mechanisation, conduct the feasibility studies including the economic life of equipment, costs of maintenance, salvage value, economic viability and productivity achieved.

#### Concrete Pumps and Batching Plants

The use of concrete batching plants and pumps in bigger sized contracts for the production of concrete are gradually replacing the traditional reversing drum mixers, wheel barrows and dumpers and hoist method.

The batching plants used have fully automatic control for batching of the aggregates, cement and water/admixture. The aggregates are stored in a radial stockpile arrangement and fed to the weighing hopper through

a discharge gate by gravity. The radial dragline and weighing gauge are fully automatic and only a mixer driver is required for the operation. Cement is stored in the silo and delivery of cement is in bulk thus cutting down on wastage and labour. "Compulsory" pan mixer or single/twin shaft mixer is normally used for the mixing of concrete. This type of mixer produces better quality concrete and has a faster mixing time. The automatic high capacity batching plant used in HDB construction site can produce up to 20-25 m<sup>3</sup> per hour when they are operated efficiently as compared to the traditional reversing drum of 8.0 m<sup>3</sup>/hr.

Concrete can be efficiently placed with concrete pumps. Use of the concrete pumps may require some modifications to the constituents of the concrete mix design. The maximum horizontal placing distance and vertical placing height ranges up to 400m and 100m respectively with maximum output from 45 to 60 cu m/hr.

A comparison of the labour requirement at site for production and placement of concrete using batching plant/concrete pump in place of the traditional rotating drum concrete mixer, wheel barrow/dumper and hoist shows a saving of 7 workers besides faster concrete production output.

Mechanisation in concrete production has in fact taken a step further in cases of larger contracts where contractors have found that ready-mix concrete delivered by mixer trucks from a large central batching plant is more productive and economical.

#### MECHANISED HANDLING SYSTEM FOR MATERIAL HANDLING

A pilot mechanised handling system consisting of a rough terrain forklift, material/passenger hoist and hand truck is currently being

practised at a few HDB sites. This system is proposed to replace the traditional system of dumper, wheelbarrows, hoist which is labour intensive and has significant wastage.

The rough terrain forklift, operating at ground level, helps in transporting unit loads of materials, from place of storage to the material/-passenger hoist which then lifts the loads vertically to the required floor level. The hand pallet truck or masonry hand cart is used to pick up the loads from the hoist and deliver them to convenient locations in the building.

Each unit load, either strapped or palletised, has been proposed to be about 1,000 kg for easy handling by the hoist and hand truck in the building. The system requires 4 workers: a forklift operator, a hoist operator and 2 workers in the building floor. This, comparing with 5 workers required by traditional method of material handling, has resulted in labour saving. Further, the proposed system eliminates manual handling of materials saving and shorter handling time needed with unit loads. The estimated savings of 30 to 40 % on labour for material handling and 5 to 8 % on materials from less wastage and damage make the system economically feasible for buildings higher than 18 storeys.

#### NEW CONSTRUCTION TECHNOLOGY

To supplement the conventional in-situ method of construction, the Board has introduced prefabrication and semi-prefabrication methods of construction on a large scale. Such methods will increase productivity and help to overcome the serious problems of shortage of both skilled and unskilled labour and check rising construction cost.

#### Prefabricated Method of Construction

In 1981, the Board awarded two contracts using prefabricated method of construction to M/s White Industries Limited (Australia) and GTM-COIGNET

Joint Venture (France). These two contracts combined are for 30,000 3-room and 4-room apartments to be constructed over the next 6 years.

The method of construction by M/s White Industries Ltd is based on the prefabrication system proposed by the Board's Engineers and Architects. It comprises precast concrete portal frames supporting prestressed hollow core floor planks. Internal partitions are large non-load bearing concrete panels. The system allows flexibility in the internal layout of the apartments.

GTM-COIGNET Joint Venture will use proprietary prefabrication system patented under the name of Coignet. It comprises large precast concrete panels to be used as floors and load bearing walls.

The manufacture of the prestressed hollow core slabs involves a long line production method with a casting speed of 1.0m to 1.5m per minute for 2.4m wide slab. It will require about 2 hours to produce 150m line of prestressed slab. Battery and tilting table moulds for large precast walls and slab panels have been specially designed to maximise production. Steam curing will be used to achieve high early strength for concrete. To prevent water seepage in the wet areas of the apartments, precast box toilet units, in-situ concrete topping, water proofing membranes and sealant will be used.

A comparison of the building rate, labour requirement, construction time between prefab contract and conventional in-situ method is shown in Table 2. A saving of 20 % in construction time can be achieved. Labour requirement can also be reduced by about the same margin.

#### Semi-Prefabrication Method of Construction

The semi-prefabrication method of construction used by the Board's contractor Societe Generale D'Enterprises to construct 7,000 units of apartments over the next 3 1/2 years consists of :



- a) steel table wall-forms for in-situ reinforced concrete load bearing wall and slab construction;
- b) pretabrication of whole bath/toilet box units, refuse chute, balcony slab and facade elements.

This system combines the advantages of rapid production of high quality industrialised precast components with those of monolithic easy to cast, in-situ reinforced concrete structures. The speed of construction is just as fast as the prefabricated method.

The Board is also studying into various precast floor system and light weight panelised partition in combination with in-situ construction for use by our local contractors.

#### Progressive Strength Building System of Construction

The progressive strength building system of construction was used by one of our local contractors, M/s Lee Kim Tah in 1973. Since then, 6,080 units of 3-room apartments have been completed. The Board has awarded a further 5,000 units of apartments to this contractor using the same system.

TABLE 2

INDUSTRIALISED METHOD OF CONSTRUCTION

CONTRACT VS CONVENTIONAL CONTRACT

Item	Industrialised Method of Construction	Conventional In-Situ Method of Construction	Comparison
1) BUILDING RATE \$/SQM (4TH QUARTER 1980)	* \$269.66	\$264.85	+ 1.8 %
2) CONSTRUCTION TIME FOR A BLOCK OF 12-STOREY APARTMENT BUILDING INCLUDING STRUCTURAL AND FINISHING WORKS	16 months	21 months	- 23.8 %
3) LABOUR CONTENT AS PERCENTAGE OF BUILDING COST	23 %	30 %	- 23.3 %

\* White Industries Ltd's Tender Rate

The progressive strength system is based on progressive gain in strength of concrete so that each element of the structure develops sufficient strength to support its self weight and other construction loads. The formwork is supported by trusses which rest on the newly cast columns. With most of the formwork and reinforcement fabricated at a central workshop, construction time and labour can be reduced by about 20 %.

### CONCLUSION

Singapore has excelled in her bold programme of urbanisation and public housing. The rising construction costs, critical shortages of workers and relatively low labour productivity in the construction industry have rendered the Housing & Development Board's objective to provide housing within the means of the average citizen much more difficult. To cater for these needs, the Board has therefore embarked on an ambitious mechanisation programme to improve construction methods and techniques. It is expected that this programme would modernise our construction industry, increase productivity, reduce labour and improve the quality of our housing.

APPENDIX

METAL FORM

REFERENCE MANUAL

SINGAPORE HOUSING & DEVELOPMENT BOARD

## 1 METAL FORMS AND ACCESSORIES

Metal forms are manufactured from steel plates by forming and welding. They are prefabricated into various types and sizes and are assembled on site by means of specially designed U-clips and L-pins. Metal forms can be broadly divided into 3 types, namely Standard Forms, Semi-Standard Forms and Variety Forms.

### 1.1 Standard Forms

There are two types of standard forms, the flat forms and the corner forms:

#### a) Flat Forms (Fig 1)

Flat forms are used for forming plane surfaces. They are rectangular panels of various standard widths and lengths as shown in Fig 1.

#### b) Corner Forms (Fig 2)

Only inner corner forms are being used by HDB. These forms are used for forming inner right-angled corners of a structure.

### 1.2 Semi-Standard Forms

#### a) L-shaped Forms (Fig 3)

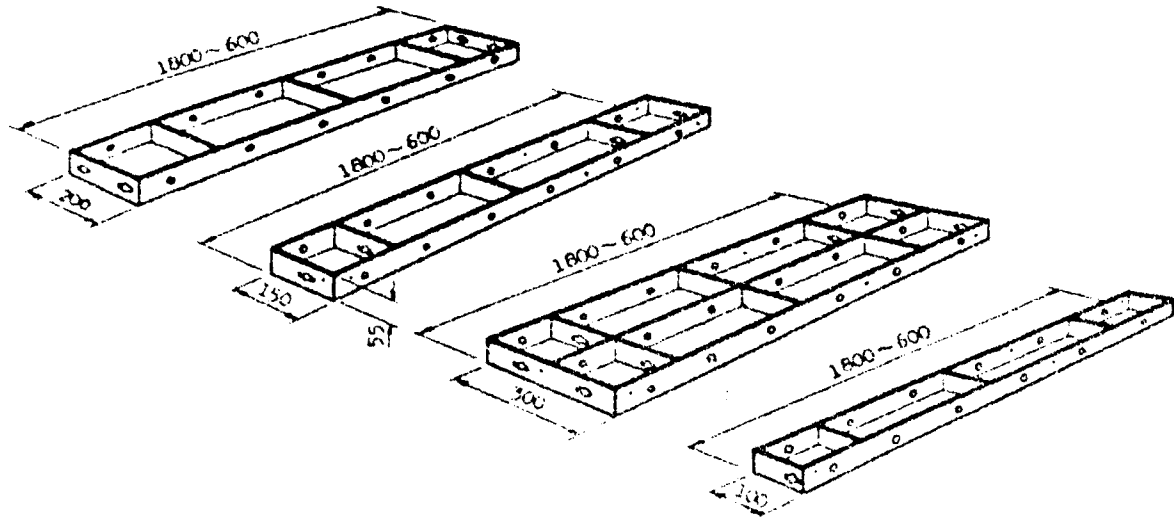
Also used to form inner right-angled corners of a structure.

#### b) Square Corner Forms (S-forms) (Fig 4)

Used for connecting inner corner forms or L-shaped forms at the intersection of 3 surfaces.

Besides these forms, corner angles are used to form outer right-angles of a structure by joining two forms together, see Fig 5.

Flat Forms, corner forms and corner angles are painted in orange. L-shaped forms and square corner forms are painted in green. These forms are numbered in accordance with a code which indicates their types and sizes as shown in Figs 1 to 5



Classification	Symbol	Shape and size (mm)	Weight (kg)	Classification	Symbol	Shape and size (mm)	Weight (kg)
F133 (F108)	3018	300x1800	16.9	F008	1518	150x1800	9.5
	3015	300x1500	14.2		1515	150x1500	7.9
	3012	300x1200	11.5		1512	150x1200	6.4
	3009	300x 900	8.8		1509	150x 900	4.9
	3007	300x 750	7.2		1507	150x 750	4.0
	3006	300x 600	6.1		1506	150x 600	3.4
F008	2018	200x1800	13.5		1018	100x1800	7.7
	2015	200x1500	11.3		1015	100x1500	6.4
	2012	200x1200	9.1		1012	100x1200	5.2
	2009	200x 900	6.9		1009	100x 900	3.9
	2007	200x 750	5.6		1007	100x 750	3.2
	2006	200x 600	4.8		1006	100x 600	2.7

Rib height of all types of forms is 55 mm.

FIG 1

Flat Forms

FIG. 2 INNER CORNER FORMS

Classification	Symbol	Shape and size (mm)	Weight (kg)
C F	5518	150x150x1800	14.2
	5515	150x150x1500	11.2
	5512	150x150x1200	8.2
	5509	150x150x 900	5.2
	5507	150x150x 750	4.1
	5506	150x150x 600	3.1
	0518	100x150x1800	12.4
	0515	100x150x1500	10.4
	0512	100x150x1200	8.4
	0509	100x150x 900	6.4
	0507	100x150x 750	5.3
	0506	100x150x 600	4.3

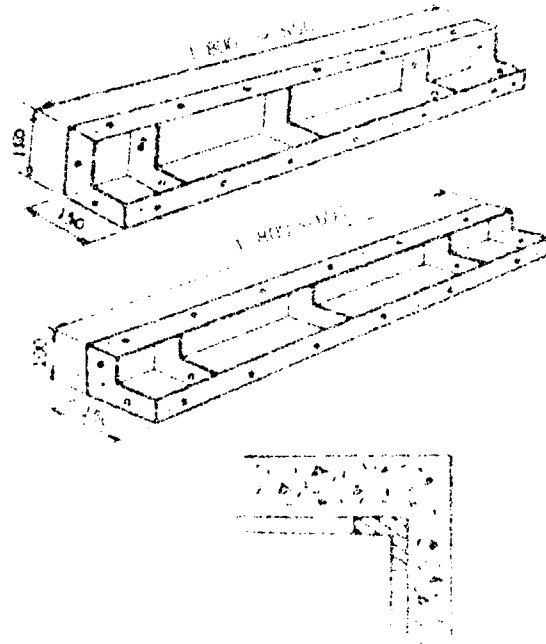
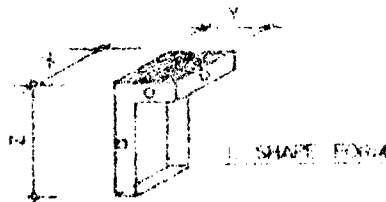


FIG. 3 L-SHAPED FORMS

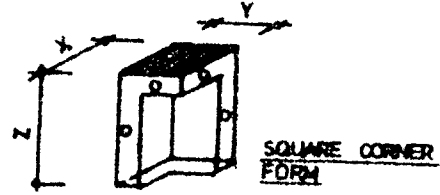


CODES	DIMENSIONS (mm)		
	X	Y	Z
L 1015 A	100	150	300
L 1015 B	100	150	350
L 1015 C	100	150	400
L 1015 D	100	150	450
L 1015 E	100	150	500
L 1515 A	150	150	300
L 1515 B	150	150	350
L 1515 C	150	150	400
L 1515 D	150	150	450
L 1515 E	150	150	500

L-SHAPE FORM

CODES	DIMENSIONS (mm)		
	X	Y	Z
L 2015 A	200	150	300
L 2015 B	200	150	350
L 2015 C	200	150	400
L 2015 D	200	150	450
L 2015 E	200	150	500
L 2020 A	200	200	300
L 2020 B	200	200	350
L 2020 C	200	200	400
L 2020 D	200	200	450
L 2020 E	200	200	500

FIG 4 SQUARE CORNER FORMS

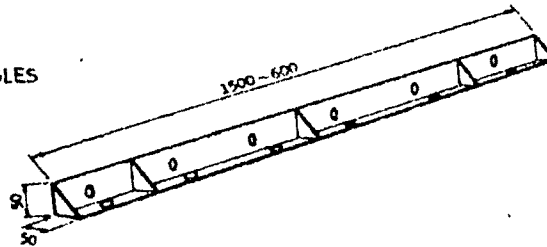


CODES	DIMENSIONS (mm)		
	X	Y	Z
S1515 A	150	150	300
S1515 B	150	150	350
S1515 C	150	150	400
S1515 D	150	150	450
S1515 E	150	150	500

SQUARE CORNER FORM

CODES	DIMENSIONS (mm)		
	X	Y	Z
S1520 A	150	200	300
S1520 B	150	200	350
S1520 C	150	200	400
S1520 D	150	200	450
S1520 E	150	200	500

FIG 5 CORNER ANGLES



Product symbol		Shape and size (mm)	Weight (kg)
Classification	Symbol		
C A	0015	1,500	3.2
	0012	1,200	2.6
	0009	900	2.0
	0007	750	1.6
	0006	600	1.3



### 1.3 Variety Forms (Special Forms) (Fig 6)

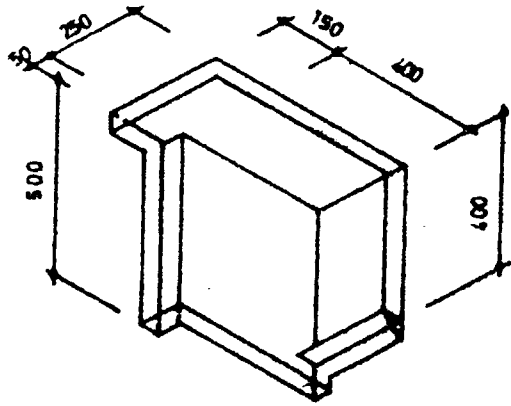
Apart from the standard and semi-standard forms, there are the Variety Forms which are fabricated into special sizes and shapes to suit the special configurations of certain portions of a structure.

Variety Forms are painted in blue for sets forms and numbered consecutively. Each number represents one particular type. For non-sets forms, they are also numbered in series with alphabet(s) added in front of the number to identify different portions of a structure.

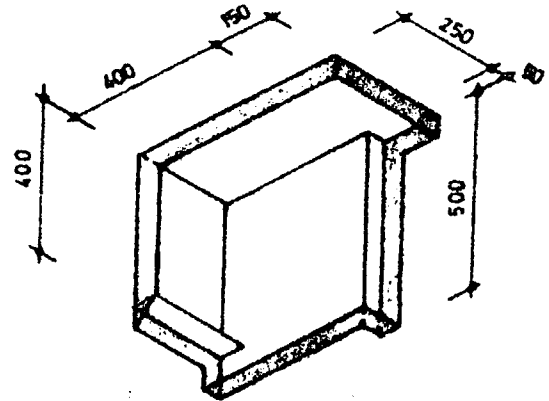
### 1.4 U-clips, L-pins and Shino (Fig 7)

U-clips and L-pins are specially designed to fasten various metal forms together lengthwise and crosswise by threading through pre-drilled holes along the outer and centre ribs of the forms. U-clips are clipped on or removed from metal forms by means of a hammer or a special hand tool called Shino.

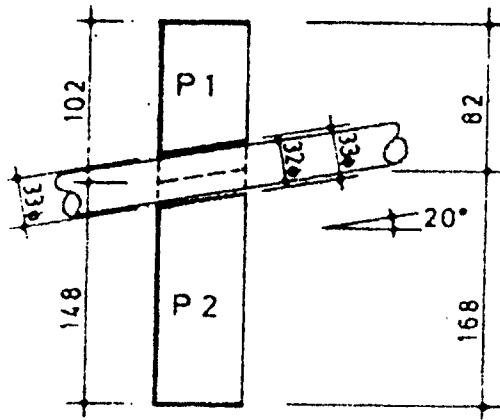
FIG. 6 VARIETY FORMS



RCI - 2

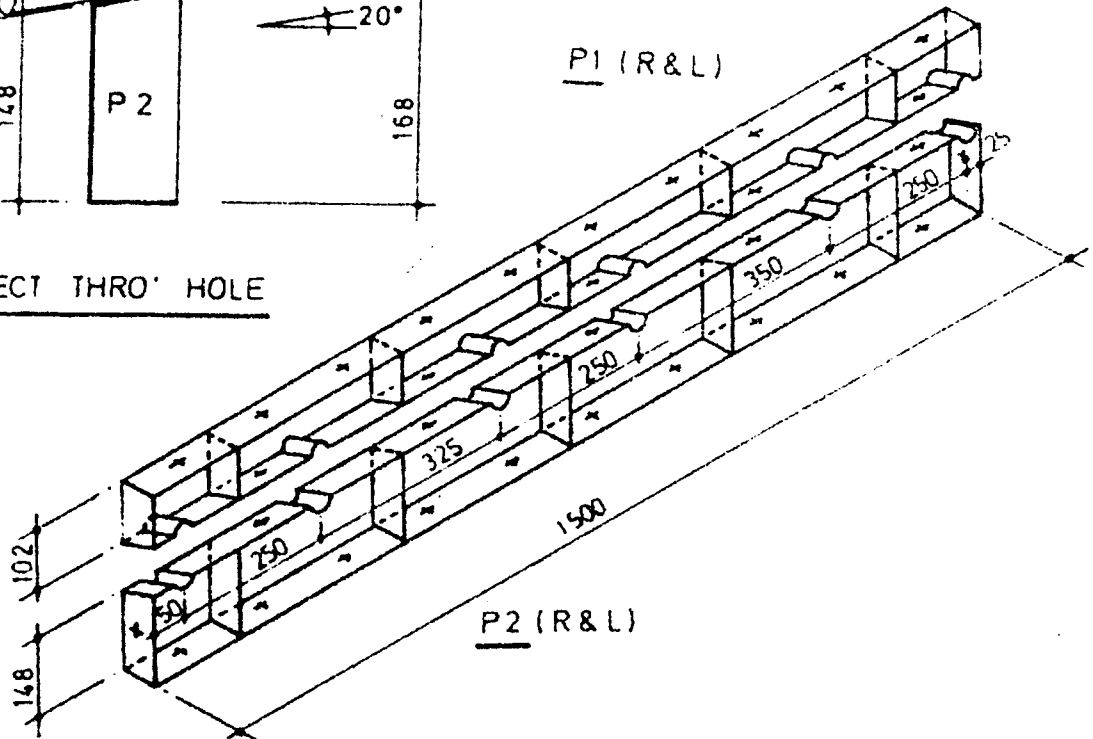


RCI - 1



SECT THRO' HOLE

P1 (R&L)



P2 (R&L)

FIG 7 U-CLIPS , L - PINS & SHINO



SHINO



U-CLIPS & L - PINS

## 2 METAL FORMS ARRANGEMENT DRAWINGS

### 2.1 Projection Method and Scale

For horizontal or near horizontal surfaces like slabs, beam bottoms, etc, the arrangement drawing is drawn by projecting the upper surfaces (smooth surfaces) of the arranged metal forms downwards.

For vertical or near vertical surfaces like columns, walls, parapets, beam sides, etc, the arrangement drawing is drawn by projecting the back surfaces (non-smooth surfaces) of the arranged metal forms onto the concrete surfaces of the structures.

1:30 and 1:40 scales are used for arrangement drawings. In some instances, 1:20 or 1:50 scale may also be used if it is more appropriate.

### 2.2 Reading Arrangement Drawing

The types and sizes of metal forms shown in the arrangement drawing are indicated by their corresponding symbols. For example flat forms '3009', '2018'; corner forms '0507'; L-shaped forms 'L 2020E'; S forms 'S 1515C' etc. Forms are assembled in accordance with these symbols. Figs 1 to 5 shown earlier illustrate how to read and interpret these symbols.

Arrangement details of identical structural members and repetitive portions are often omitted in arrangement drawings.

Figs 9, 10 and 11 show the metal form arrangement of slabs and beam soffits, beam sides and column respectively.

FIG. 8 FLOOR PLAN

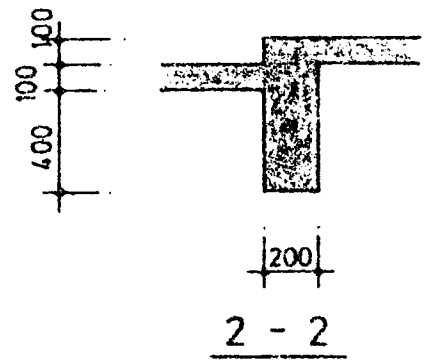
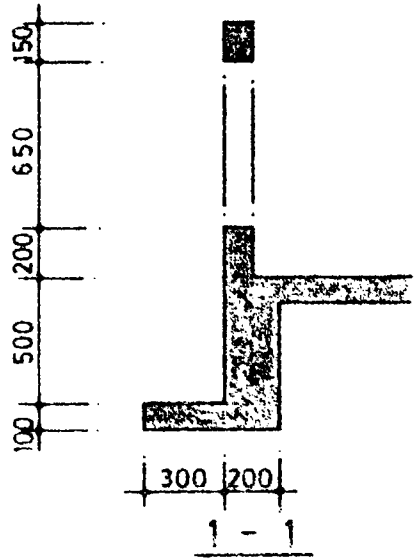
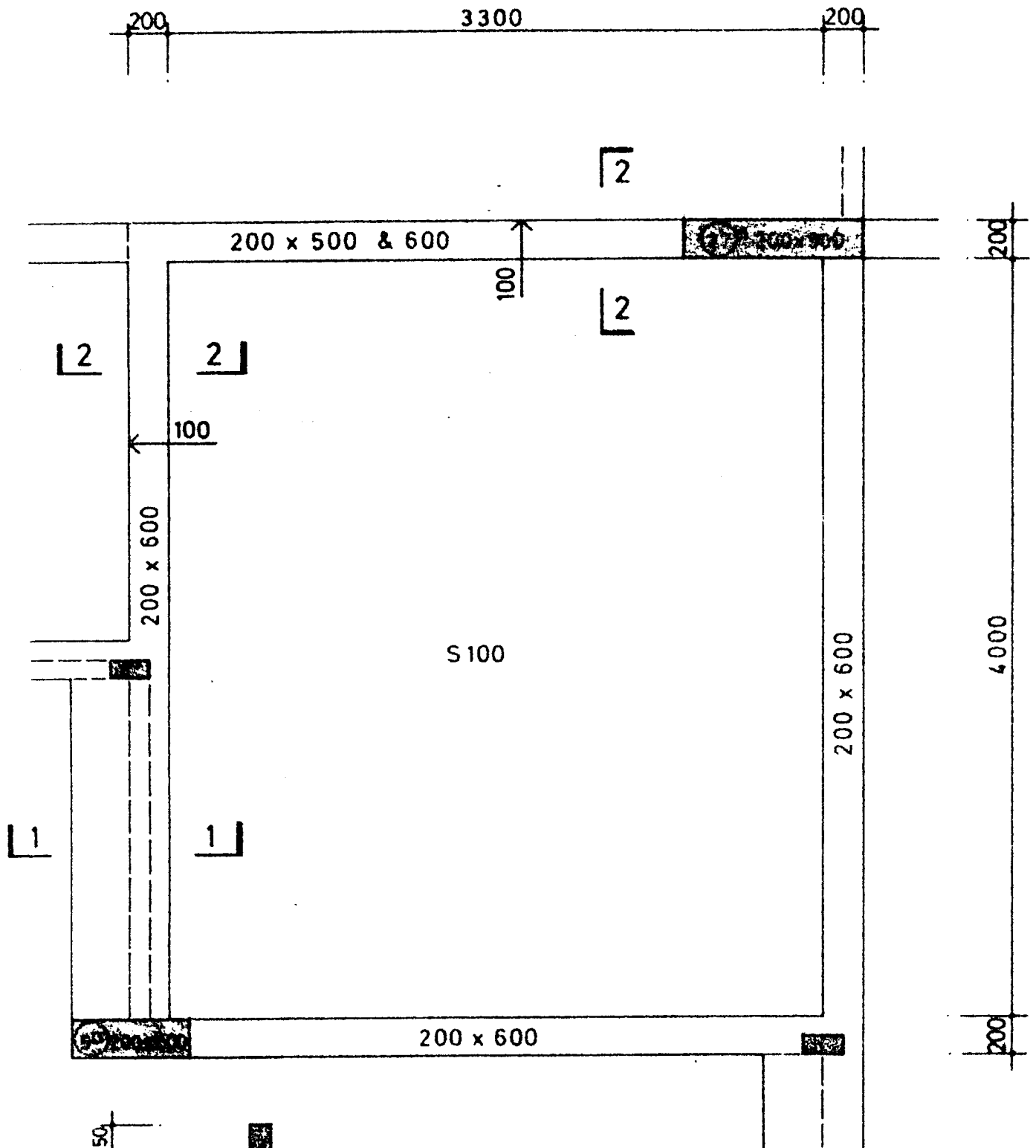


FIG. 9 FLOOR SLAB

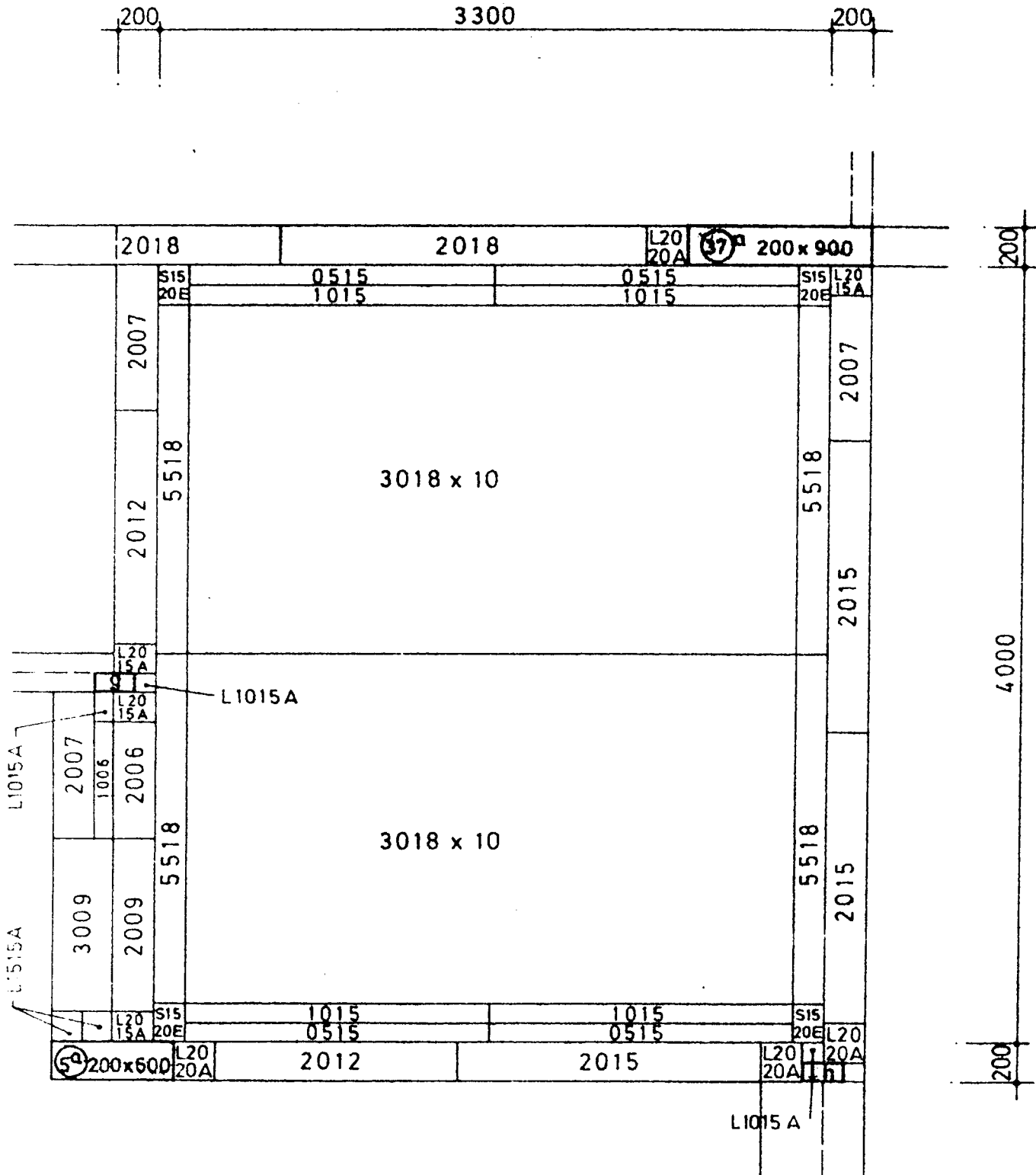
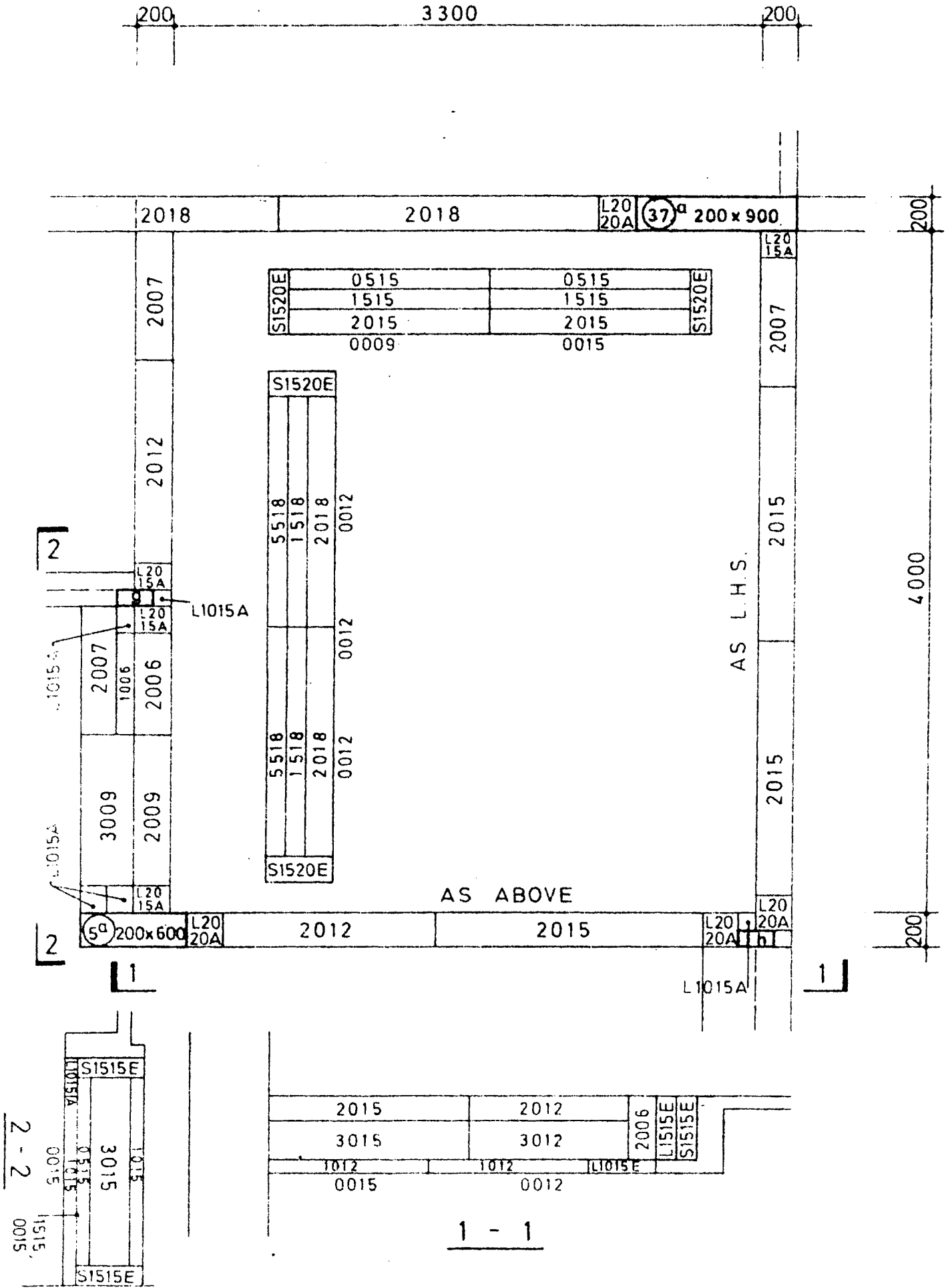


FIG. 10 FLOOR BEAM



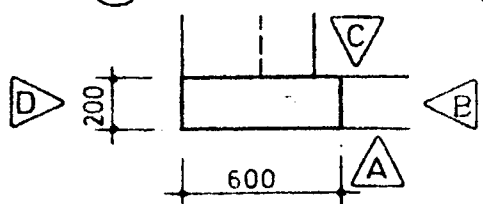
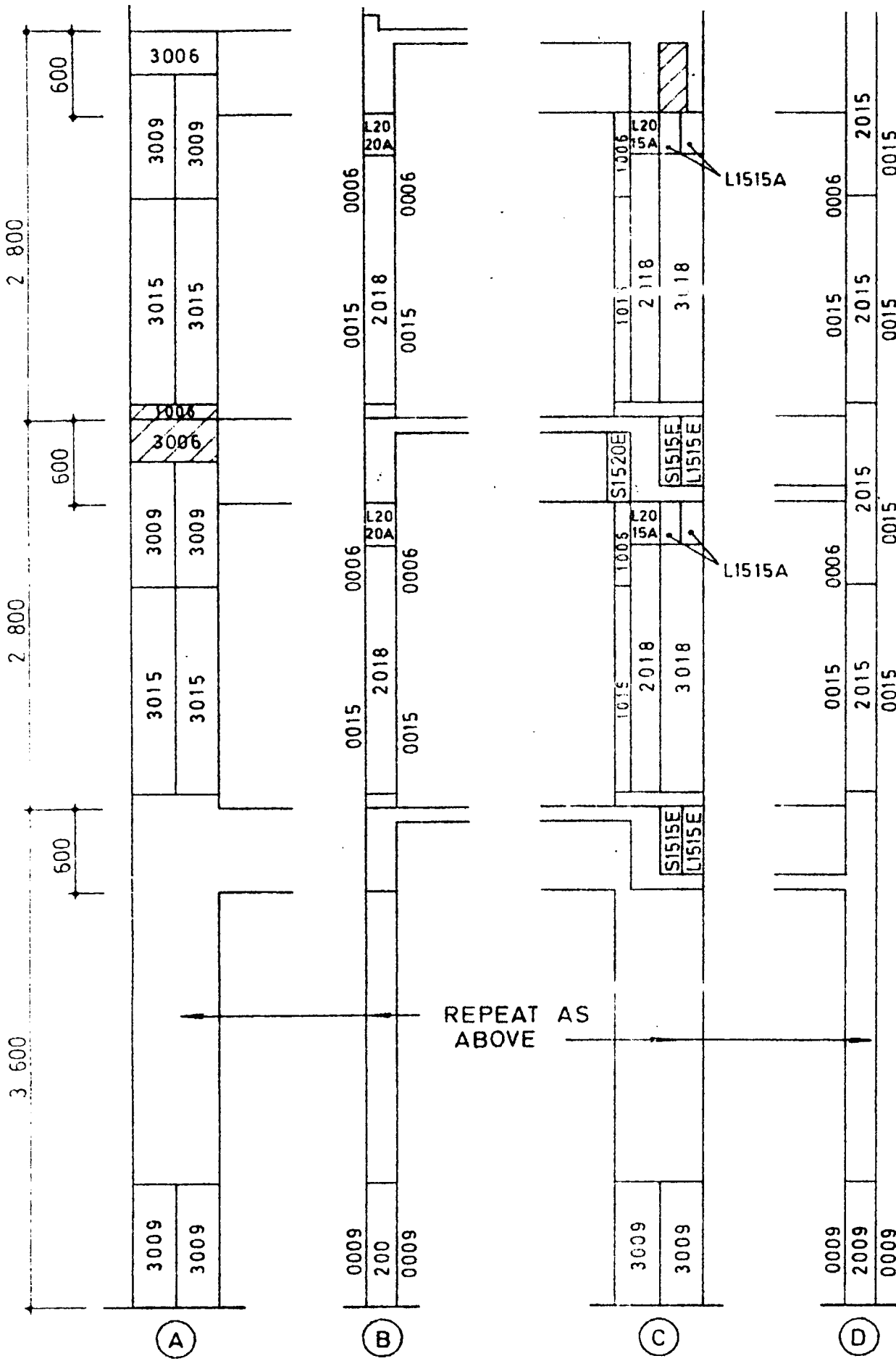


FIG. 11 COLUMN (5a)



### 3 STORAGE AND TRANSPORTATION OF METAL FORMS AND ACCESSORIES

#### 3.1 Storage of Forms and Accessories

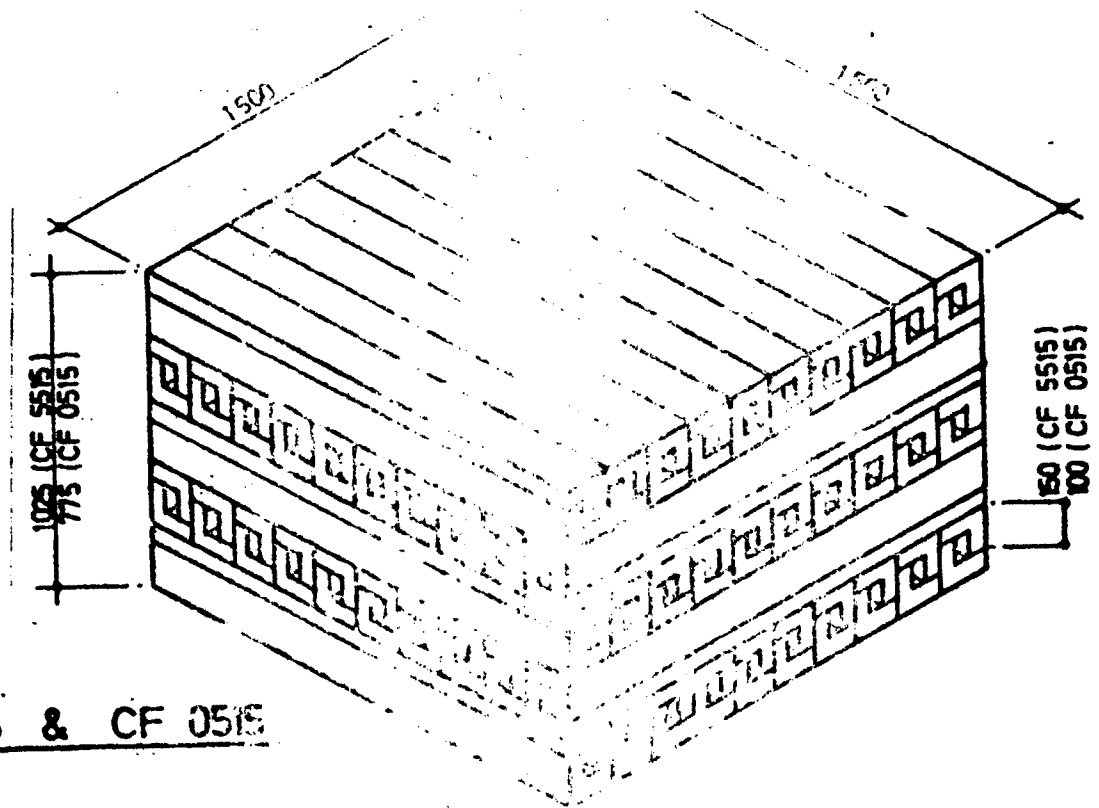
Forms and accessories required for each building should be arranged and stacked according to different types and sizes in a covered shed on a slightly raised platform. If the forms are stored in the open, they should be stacked with their smooth surfaces facing downwards so that they are not exposed to rain. They should be covered with tarpaulin or the like. Examples of stacking metal forms are shown in Figs 12 and 13.

#### 3.2 Arrangement and Handling of Forms and Accessories

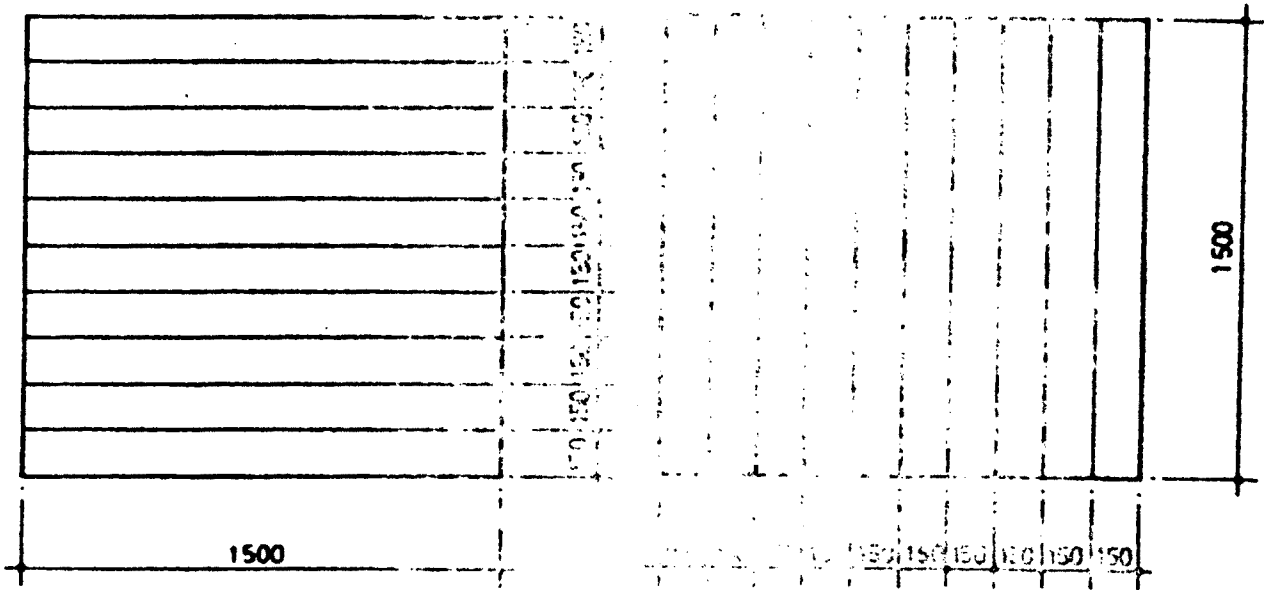
As the forms and accessories are in a great quantities and in a wide variety of types and sizes, in order to handle them efficiently, thorough planning is highly essential. As far as possible, the storage areas should be located immediately adjacent to the building blocks.

Forms and accessories should be transported according to types and sizes as stipulated in the quantity list. Only the required quantity of forms and accessories should be distributed and unloaded to the designated storage areas. Once these forms and accessories are unloaded, they must be properly arranged and stacked up to facilitate easy finding and smooth handling.

Fig.12 STACKING OF CONER FORM



CF 5515 & CF 0515



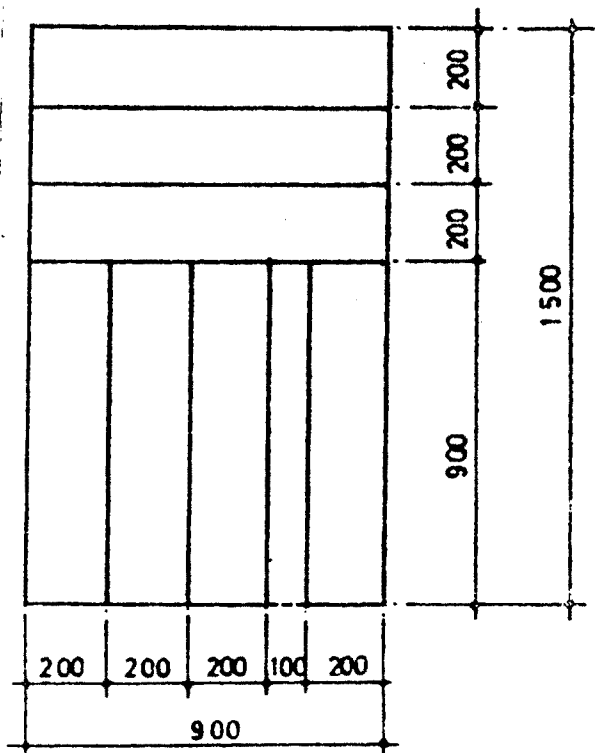
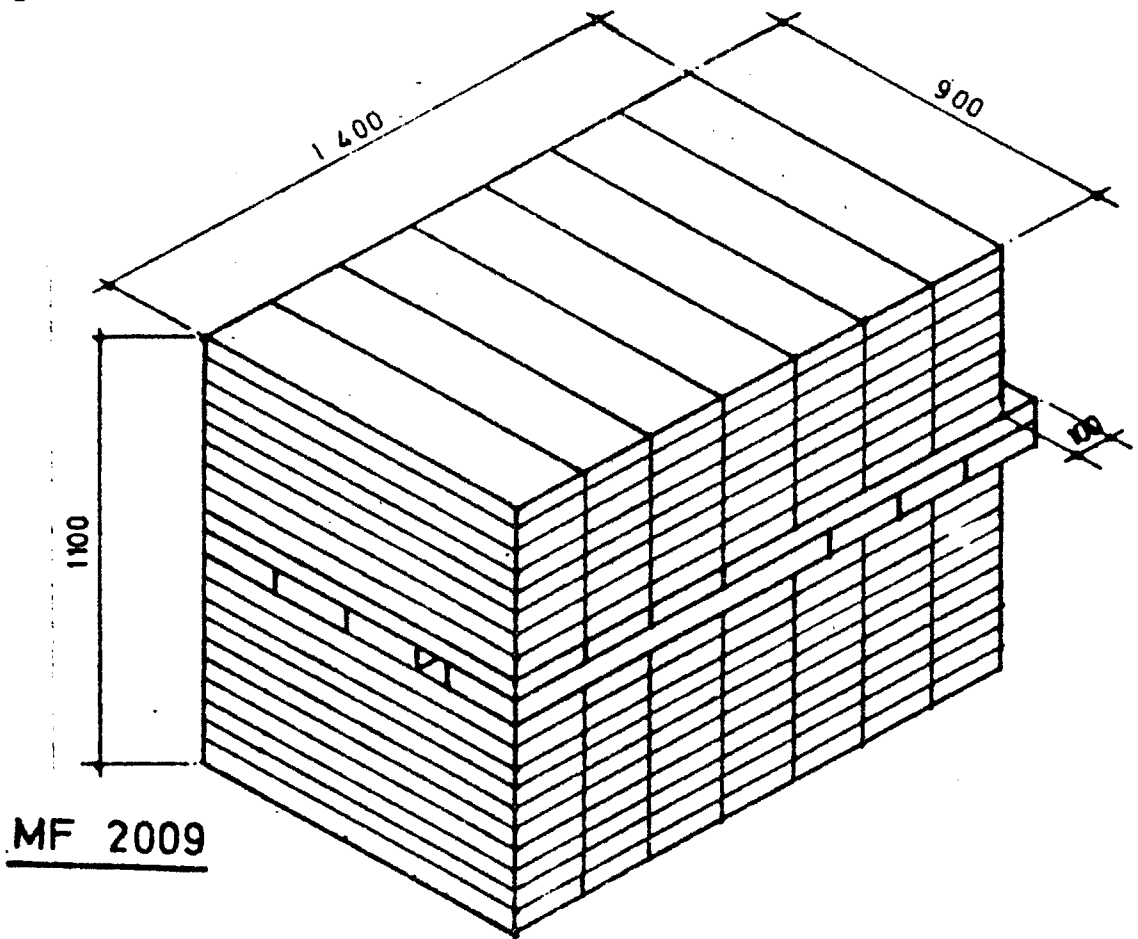
PLAN

( AT 1st, 3rd, 5th LAYER )

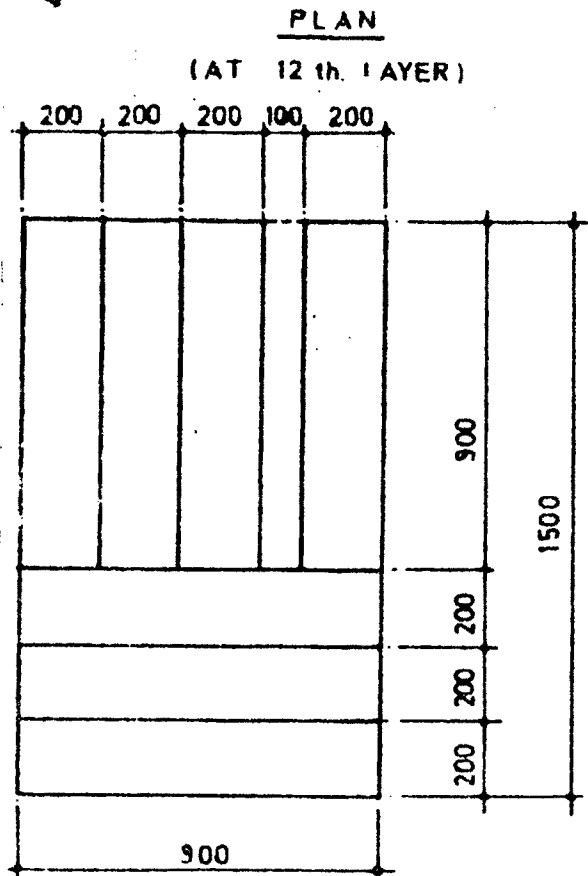
PLAN

( AT 2nd, 4th LAYER )

Fig.13 STACKING OF FLAT FORMS



PLAN  
(AT 11th. LAYER)



PLAN  
(AT 12th. LAYER)

#### 4. INITIAL PREPARATORY WORKS

##### 4.1 Study of Arrangement Drawings

Metal forms are assembled by combining different types and sizes of forms together as shown in the arrangement drawings. The quantities and types of forms to be used for each part of a structure can be calculated from the arrangement drawings. The drawings have to be studied carefully and thoroughly before distribution and assembly of forms can be planned and executed.

##### 4.2 Drilling of Holes for Form Ties

The forms to which separators/concrete spacers are to be attached should be located, sorted out and drilled holes before they are assembled.

Drilling of holes should be done on site by means of a small drilling machine or a portable electric drill.

Position of holes should be located such that separators or concrete spacers would not be obstructed by steel reinforcements.

##### 4.3 Welding of Steel Angles to Form Grooves

As there is no plastering on concrete surfaces, "V" grooves are provided along concrete surfaces where the casement windows and block walls abut to prevent water penetration. They are also provided at the bottom surfaces of canopies as drips.

The grooves are formed by spot welding 20 mm steel angle along the surfaces of the forms where the grooves will lie. It is a common practice to weld the steel angles on the spot. This is usually done after whole floor has been assembled.

## 5 ASSEMBLY OF FORMS

### 5.1 Order of Assembling

Metal forms are usually assembled in the following order:

- a) External faces of peripheral columns and walls and internal faces of refuse chutes.
- b) Internal faces of peripheral columns and walls.
- c) Internal columns and walls.
- d) Beam soffits and staircases.
- e) Beam sides except external sides of peripheral beams.
- f) Slab soffits.
- g) External sides of peripheral beams.

### 5.2 Levelling and Plumbing of Forms

Once the position of columns and walls are accurately set out and the kickers cast, horizontal lines should be marked on the sides of kickers 100 mm above the floor slab or as shown in the arrangement drawings. These lines should be levelled by a dumpy level and they should serve as the starting point for column and wall forms erection, leaving a space of 100 mm above the floor slab to facilitate easy dismantling.

Inaccurate levelling will result in unexpected increase in assembling time. Wooden packings or wedges should be inserted into the 100 mm gaps to support and level the forms as shown in Fig 14.

To be left metal forms are normally used to support the forms for outer faces of peripheral beams, walls and columns.

After the column and wall forms are assembled they should be plumbed vertically before forms for the beam bottoms are connected.

### 5.3 Column and Wall Forms

Forms can be assembled either one by one or preassembled into large panels on the floor before they are fixed in position. If the latter method is used, not only efficiency will increase, but also failure to attach U-clips and L-pins will be considerably reduced.

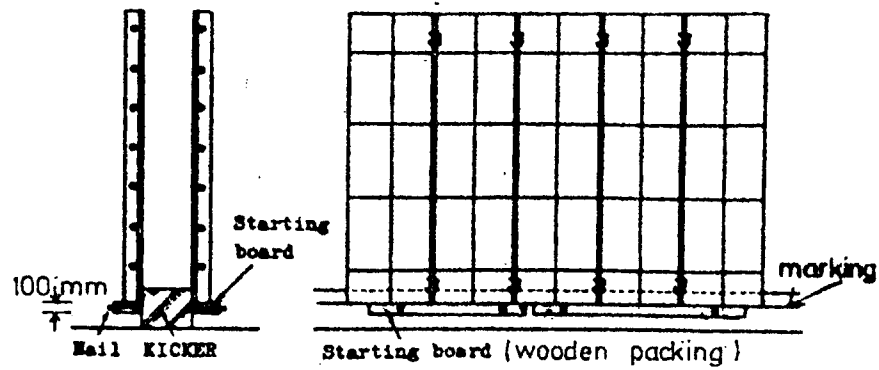


Fig.14 LEVELLING METHOD FOR INTERNAL WALLS, COLUMNS & STIFFENERS AND INNER FACES OF PERIPHERAL WALLS & COLUMNS

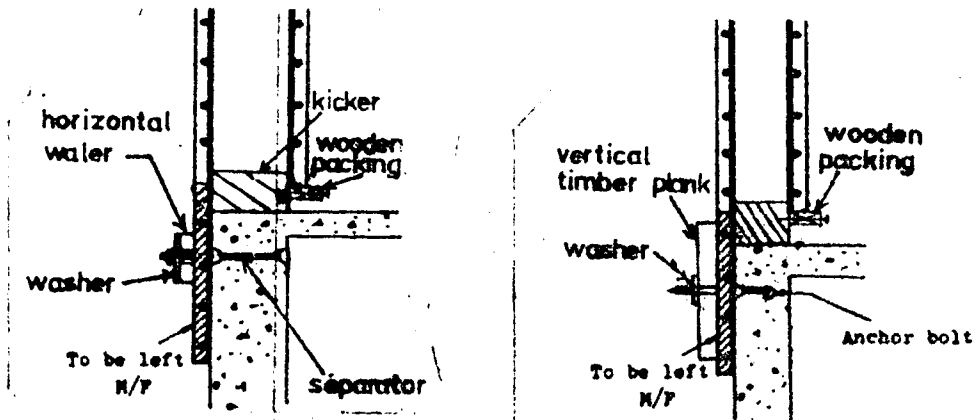


Fig.15 TO BE LEFT M/F ARE USED TO SUPPORT THE FORMS FOR OUTER FACES OF PERIPHERAL WALLS, COLUMNS & BEAMNS

If corner angles for the forms to be erected last are set in advance, assembling of the last piece of form may become troublesome. To overcome this problem, corner angles for the last corner to be assembled should be fixed last. U-clips for fixing corner angles should be inserted as shown in Fig 18.

As a standard, 4 U-clips are used for forms of 1800 mm in longitudinal direction, 3 for forms of 1500 to 1200 mm and 2 for forms of 900 to 600 mm. U-clips should be used by striking them down from top. U-clips holes at the lowest portion of the form should not be used to avoid difficulty in removing them when dismantling. In an unavoidable case, fasten them by striking up from below (see Fig 19).

L-pins are used together with U-clips for joints in the transverse direction to facilitate correct alignment and assembling work (see Fig 20).

When the forms on one side have been assembled, especially for long or high walls, they should be propped to prevent collapse due to wind (Fig 21).

#### 5.4 Beam Forms

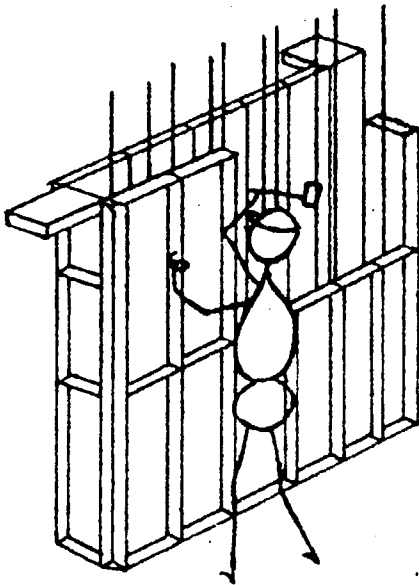
Forms for beam soffits may be lifted up and connected to column forms after they have been assembled into a large panel for the entire or part of a span in advance, but such a preliminary assembly should be limited to an extent where the panel can be handled with ease. Corner angles connecting the beam soffit forms and beam side forms should be fixed to the beam soffit before beam soffit is being lifted up (Fig 22). If the various forms are jointed together (forms to forms, forms to corner angles) in a staggered manner, they would be more rigid in handling.

Simple platforms on trestles should be used for fixing the forms into the correct positions and props should be placed in the vicinity of the panel joints (Fig 23).

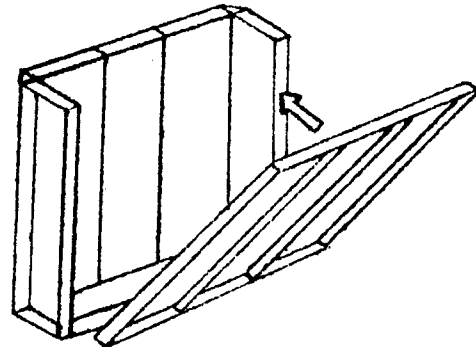
Forms for beam sides should not be pre-assembled into large panels of length greater than 1800 mm. Corner forms connecting the beam side forms and slab forms should be assembled together with the beam side forms (Fig 24).

If steel props of 48.6 mm diameter section are used to support beam soffits, they can be spaced at about 1500 mm to 1800 mm c/c. The spacing between wooden props supporting beam soffits would be the same as conventional timber forms system.

Fig.16 ERECTION OF METAL FORMS FOR COLUMNS & WALLS



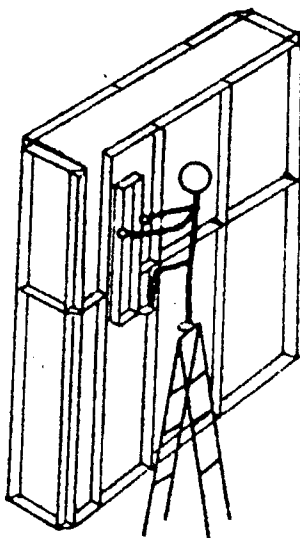
(i) The forms can be assembled either one by one.



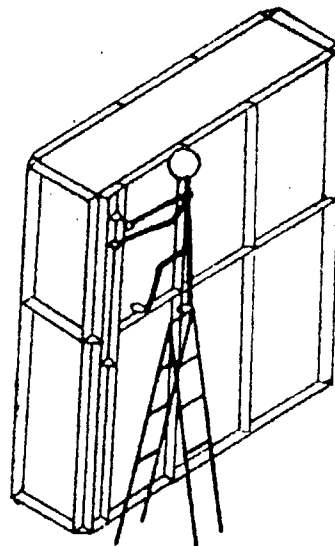
(ii) Preassembled into large panels before they are fixed in position.

OR

Fig.17 CORNER ANGLES FOR THE FORMS TO BE ERECTED LAST SHOULD NOT SET IN ADVANCE



Bad



Right



Fig. 18 CORRECT WAY TO INSERT U-CLIPS FOR FIXING CORNER ANGLE

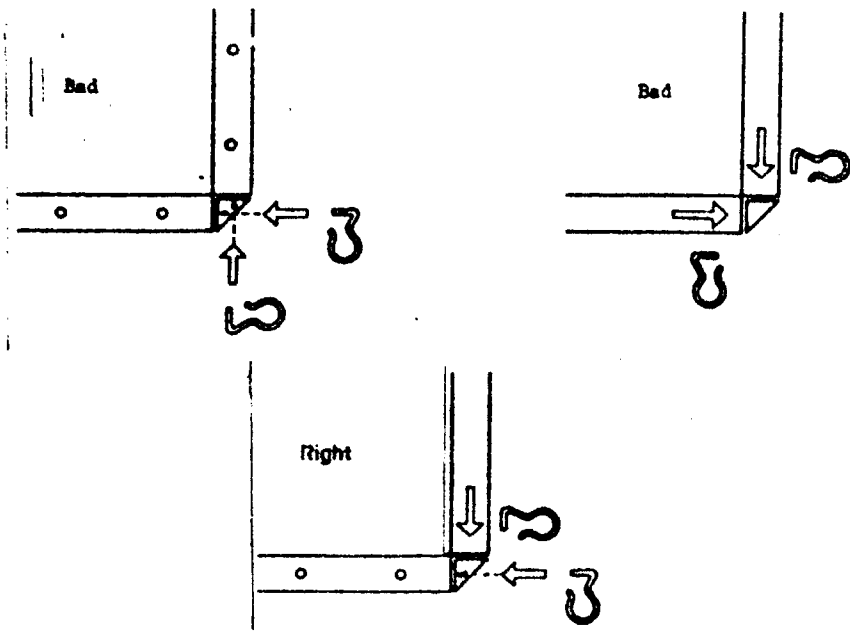


Fig. 19 ARRANGEMENT OF U-CLIPS OF COLUMNS & WALLS

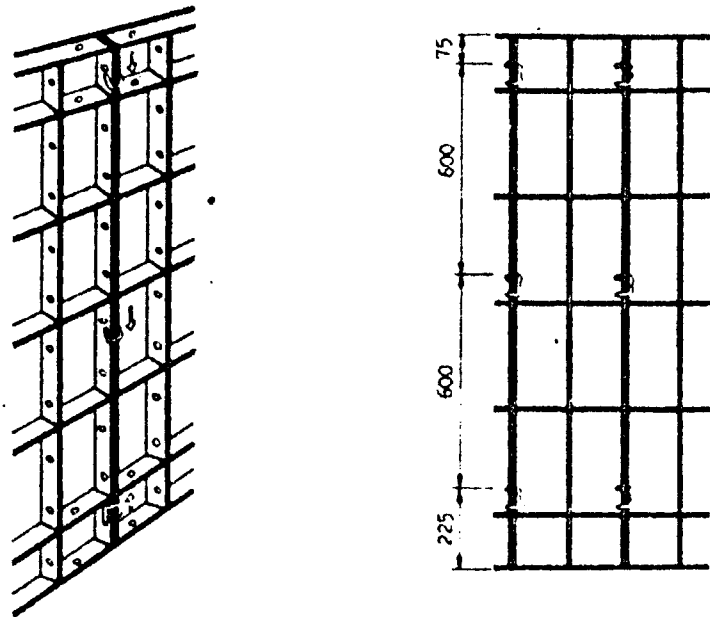


Fig.20 U-CLIPS & L-PINS IN POSITION .

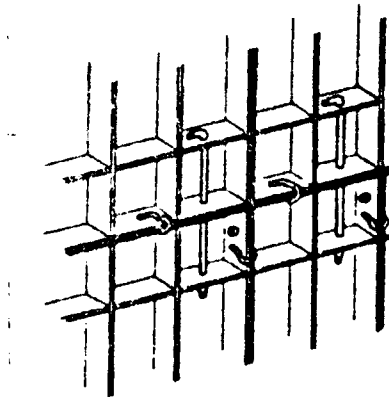


Fig.21 LONG WALL SHOULD BE STRUTTED TEMPORARY TO PREVENT COLLAPSE .

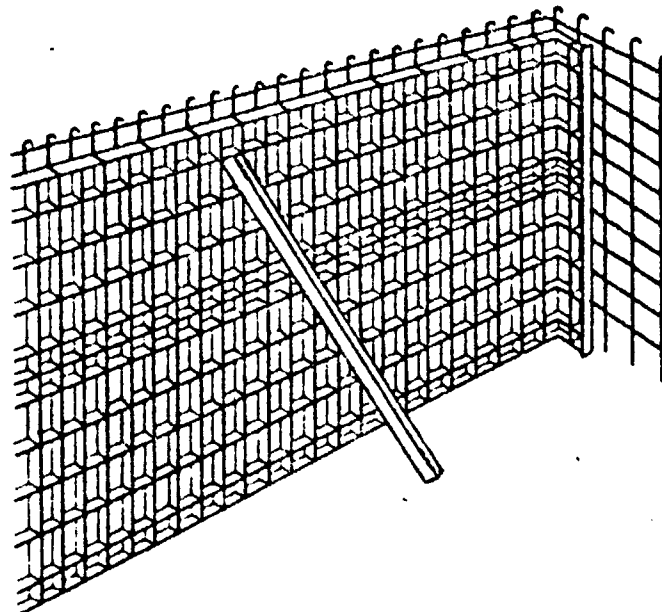


Fig. 22 VARIOUS FORMS SHOULD BE JOINTED IN A STAGGERED MANNER

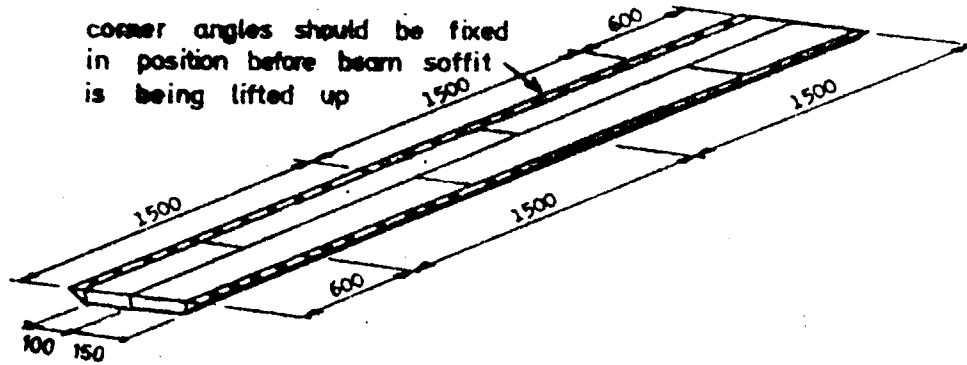


Fig. 23 ERECTING BEAM SOFFIT FORMS

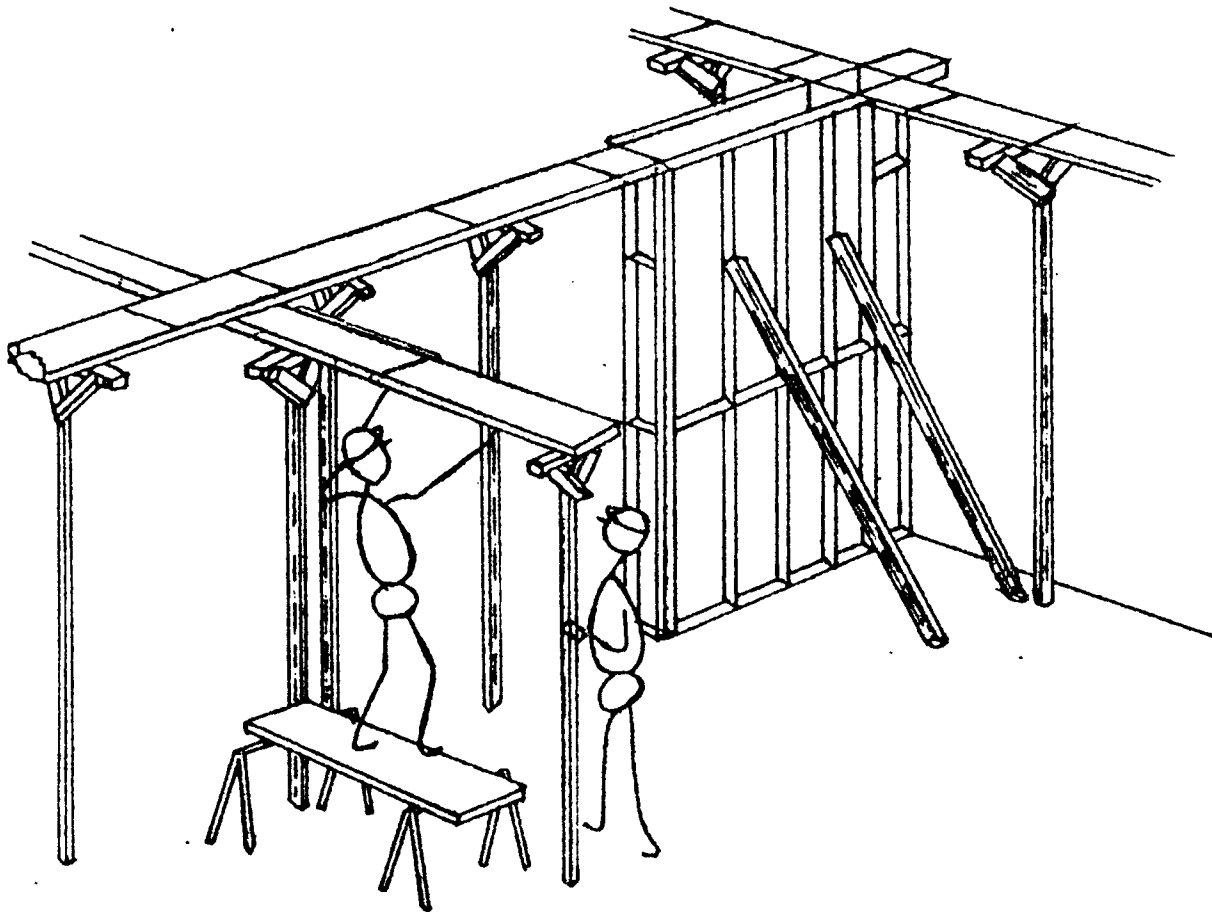
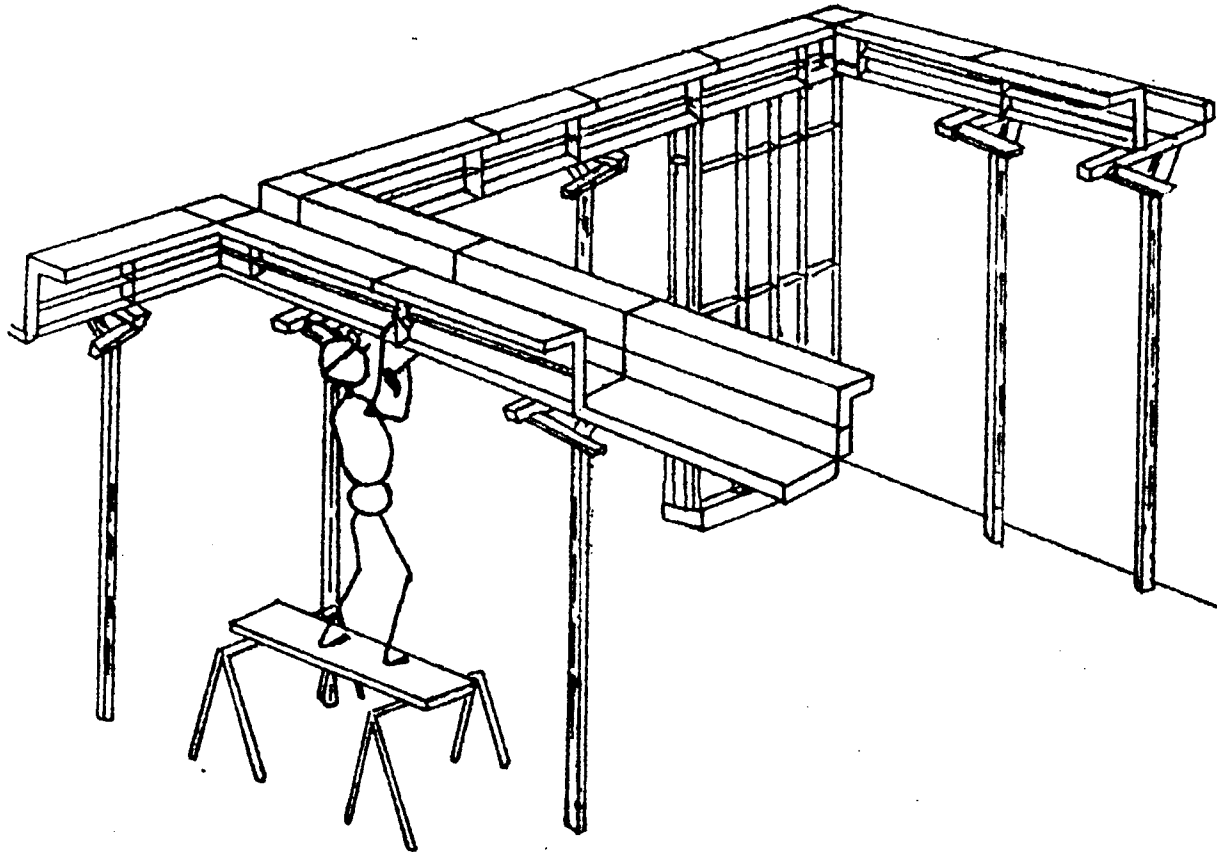


Fig. 24 ASSEMBLING OF BEAM SIDE FORMS



## 5.5 Slab Forms

Supports for slab forms can either use wooden joists and props or steel scaffoldings and hollow section joists.

As the strength of metal forms is greater than timber ones, the forms can be supported directly on wooden joists without the use of sleepers. The joists should be arranged in the vicinity of the joints of metal forms. The distance between joists depends on slab thickness and the strength of supporting joists and props. A general guideline is shown below:

<u>Slab Thickness</u>	<u>Spacing of wooden joist (Min. 50 mm x 100 mm)</u>	<u>Wooden Prop Spacing</u>
100 mm	1200 ~ 1500 mm	600 ~ 750 mm
150 mm	1200 mm	600 mm

As for steel scaffoldings and hollow section joists supporting system, the spacing between scaffoldings, bracing members and the strength of the scaffoldings including the joists will determine the actual arrangement.

For wooden support system, the joists can either be supported by props before the metal forms for slabs are placed in position as steel scaffolding system or tied to the corner forms with steel wires through the holes in the form ribs before they are supported on props. The latter method is usually applied to ground floor only (Fig 25).

Once the joists and props are set up, metal forms for slab can then be placed in position. The forms can be assembled piece or preassembled into small panels before they are jointed together using U-clips and L-pins (Fig 26). The number of U-clips in the longitudinal direction is the same as walls and columns, ie 4 for 1800 forms, 3 for 1500 mm to 1200 mm forms, 2 for 900 mm to 600 mm forms. In the lateral direction there should be 1 U-clip for each end of the forms and L-pins should be used for each panel joint (Fig 27).

When the forms are completely assembled for 1 storey, they should be cleaned and oiled. Care must be taken to ensure that the column reinforcement is not contaminated with oil. The beam and slab reinforcement can then be fabricated. Steel benders should use appropriate footwear as the oiled surface can be very slippery. They should, as far as possible, keep the oiled form surface clean as dirt can easily adhere to the oily surface and subsequent cleaning of the form can be difficult.

Fig. 25 WOODEN JOISTS TEMPORARY TIED TO CONER FORMS BEFORE THEY ARE SUPPORTED ON PROPS

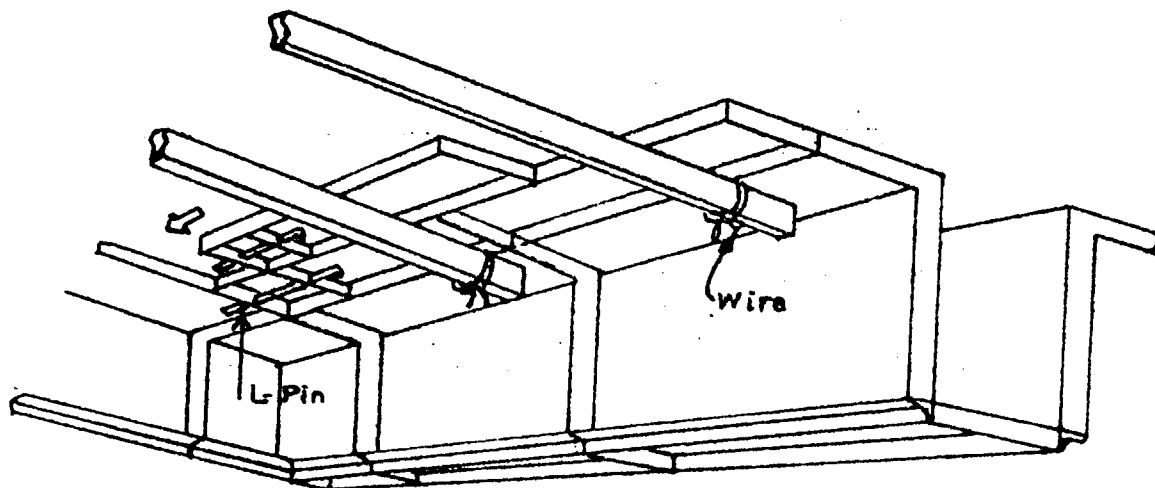


Fig. 26 ASSEMBLING OF SLAB FORMS

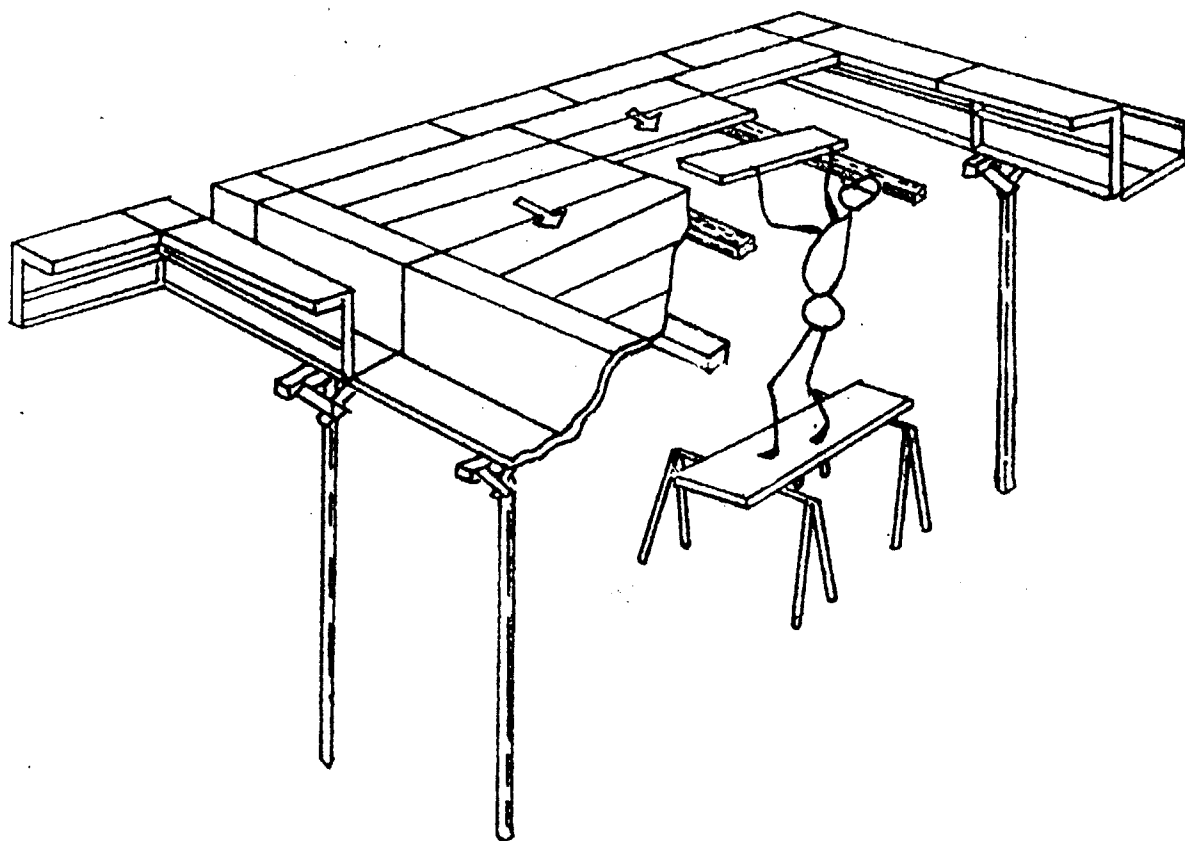
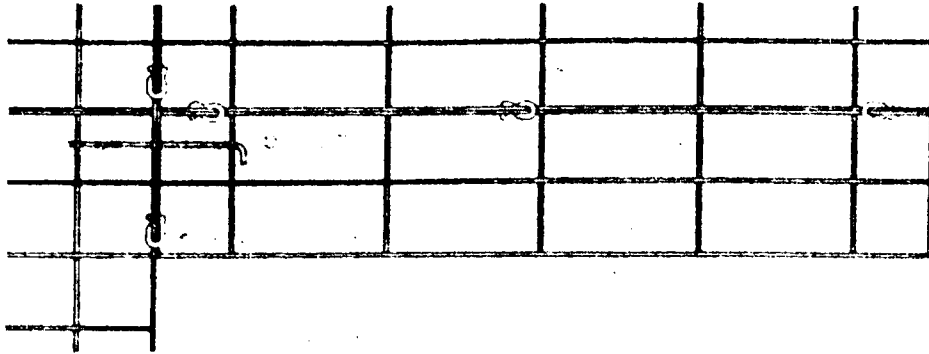


Fig. 27 ARRANGEMENT OF U - CLIPS & L - PINS FOR SLAB



BRACING

Bracing is needed for columns, walls, stiffeners, parapets, peripheral beams, staircases and lift shafts in order to hold the forms and keep them in shape. Walers, clamps, tie bolts, washers, plastic cones, concrete spacers, separators and form ties are the accessories used in bracing. The general guidelines for bracing system are as follows:

## 6.1 Columns and Stiffeners

Generally, columns may brace in the following way:

- a) Column length  $< 1000$  mm  
: 3 stages of walers, no separator/concrete spacer is required.
- b)  $1000$  mm  $<$  column length  $< 1300$  mm  
: 4 stages of walers, no separator/concrete spacer is required.
- c)  $1300$  mm  $<$  column length  $< 1800$  mm  
: 3 stages of walers, one centre separator/concrete spacer is required for each stage of waler provided.
- d)  $1800$  mm  $<$  column length  $< 2100$  mm  
: 4 stages of walers, one centre separator/concrete spacer is required for each stage of waler provided.

At ground floor, 2 extra stages of walers are to be provided. For column's length greater than 1300 mm, one centre separator/concrete spacer is required for each extra stage of waler (Fig 29).

## 6.2 Walls, Staircases and Lift Shafts

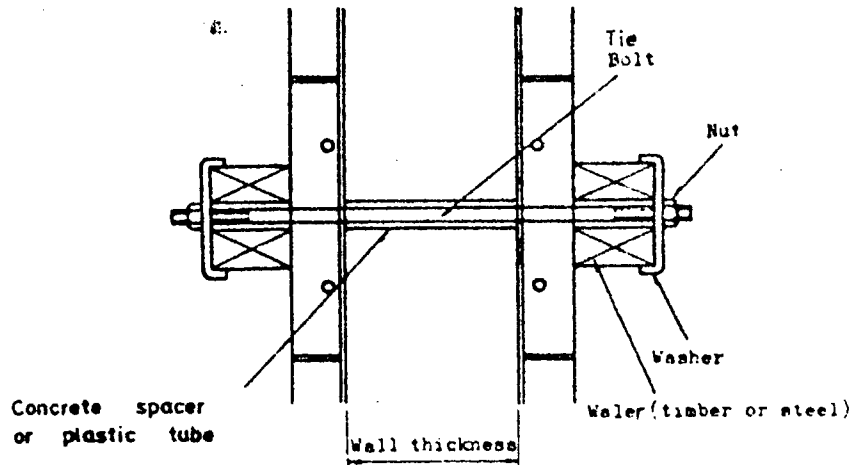
Walls, staircases and lift shafts should be braced as shown in Fig 30. Depending on the strength of the separators/tie bolts used, generally, maximum horizontal spacing between separators/concrete spacers should not exceed 900 mm c/c/. Vertical bracing is required for long walls and the spacing of vertical bracing should not exceed 1500 mm. At ground floor extra, 2 horizontal walers together with separators/concrete spacers space at not more than 900 mm c/c/ are to be added.

## 6.3 Peripheral Beams (Fig 31)

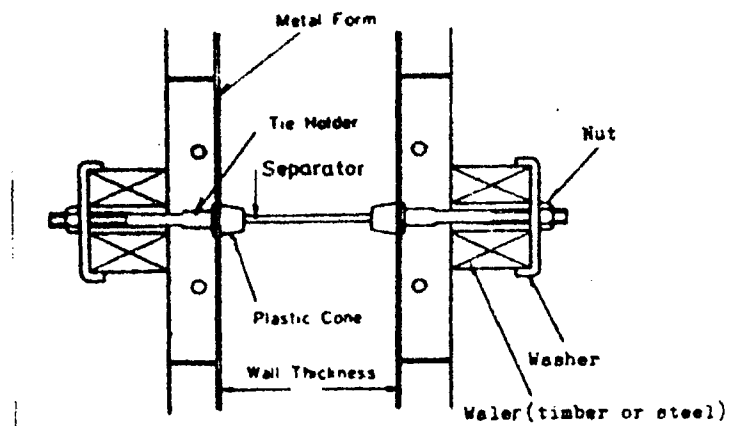
Beam clamps, concrete spacers with tie bolts, separators together with form ties and wooden trestle props with inclined struts may be used to brace the peripheral beams.



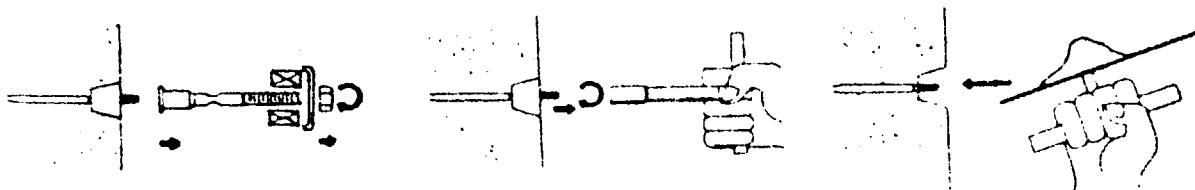
Fig.28 BRACING



(i) USING CONCRETE SPACER OR PLASTIC TUBE



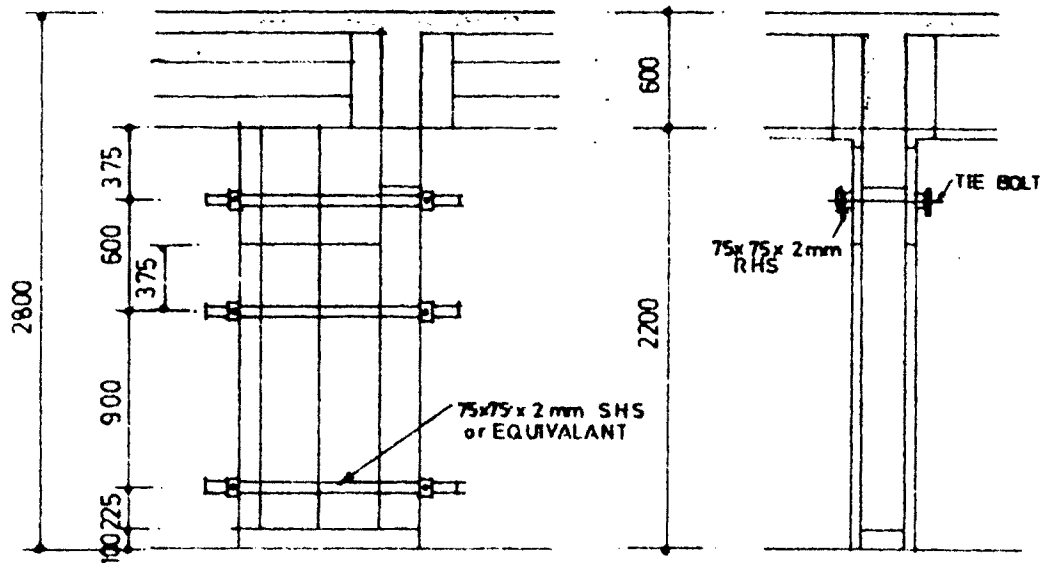
(ii) USING SEPARATOR



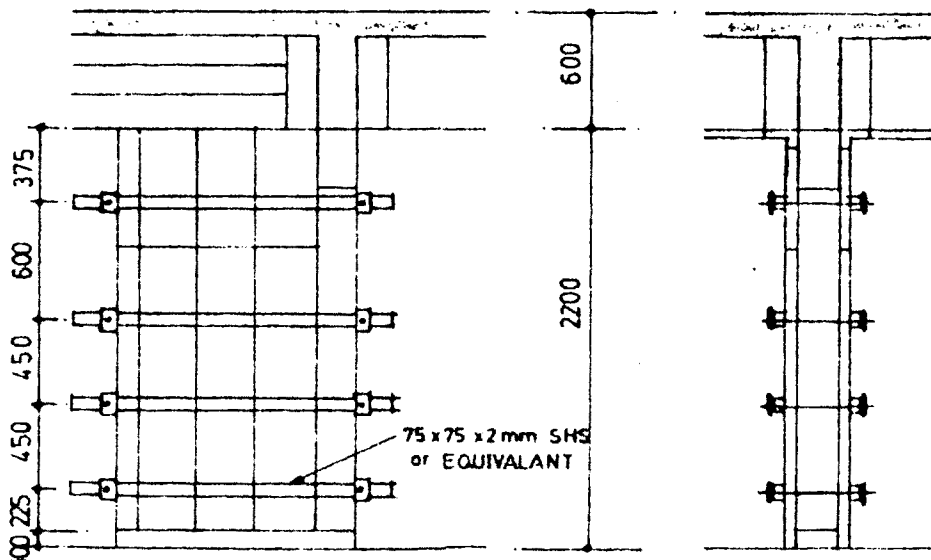
TAKING OUT PLASTIC CONE

Fig.29 Bracing for column

i) Column length < 1000 mm



ii) 1000 mm < Column length < 1300 mm



iii) For Column length > 1300 , one centre separator is required for each stage of water provided.

iv) AT GROUND FLOOR

Case (a) using 900 mm flat forms

Case (b) using 750 mm flat forms

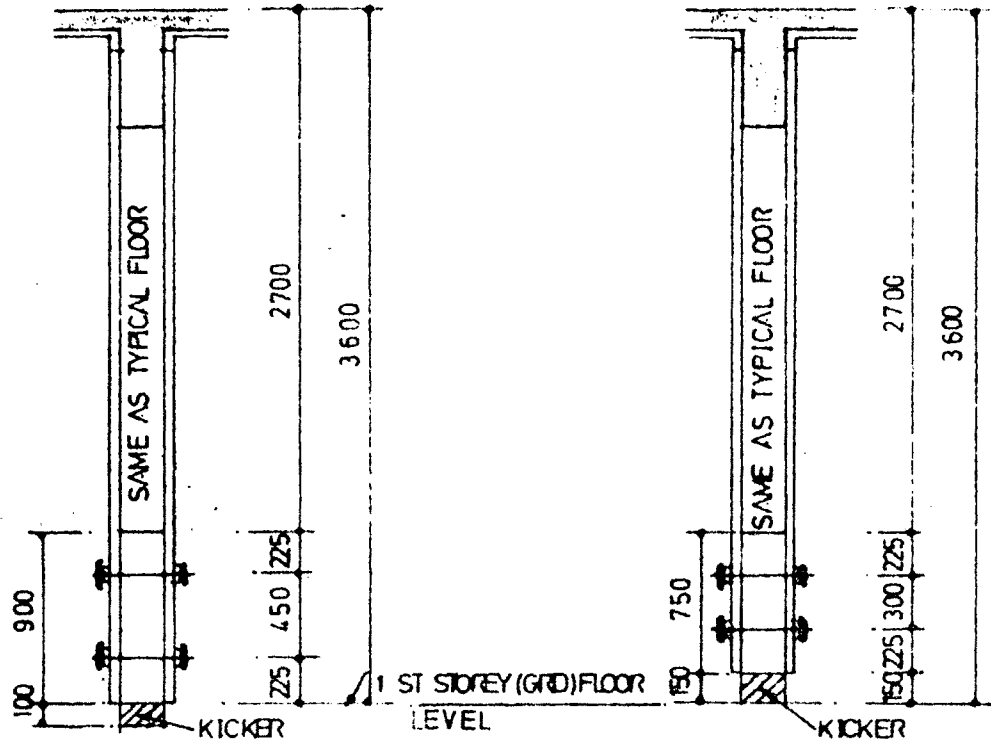


Fig 30 Bracing for walls, staircases & Lift shafts ( AT GROUND FLOOR )

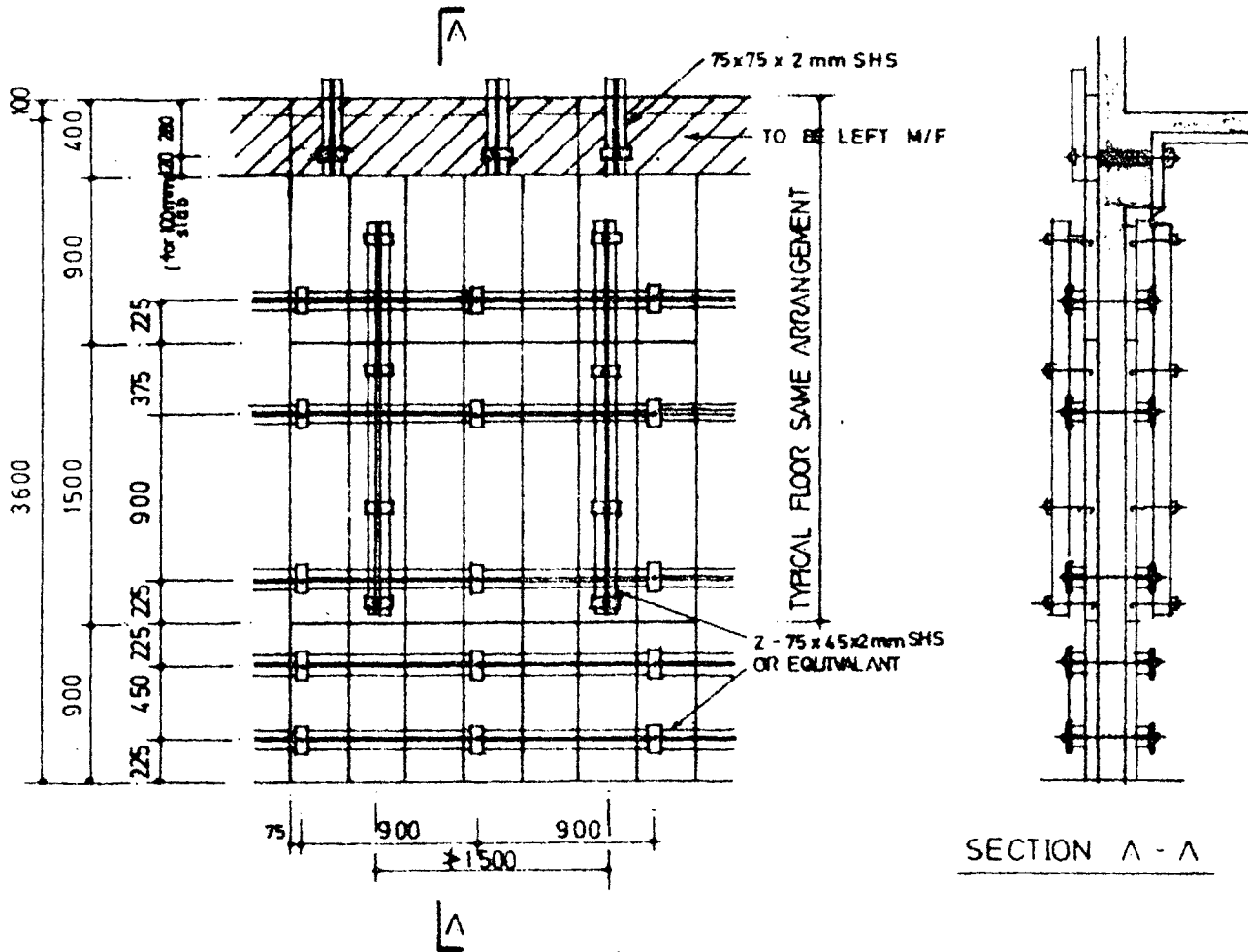
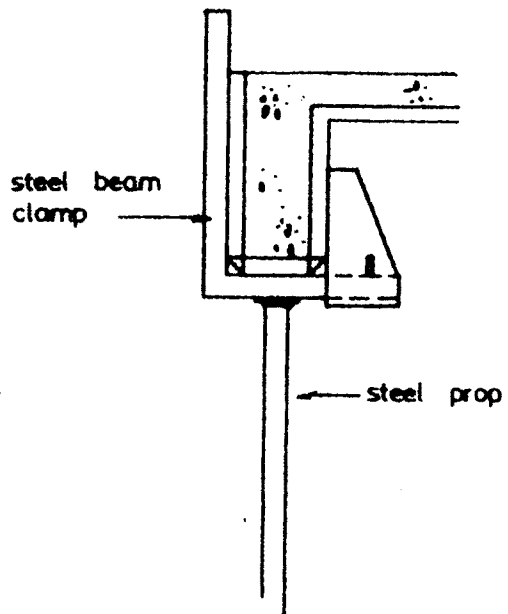
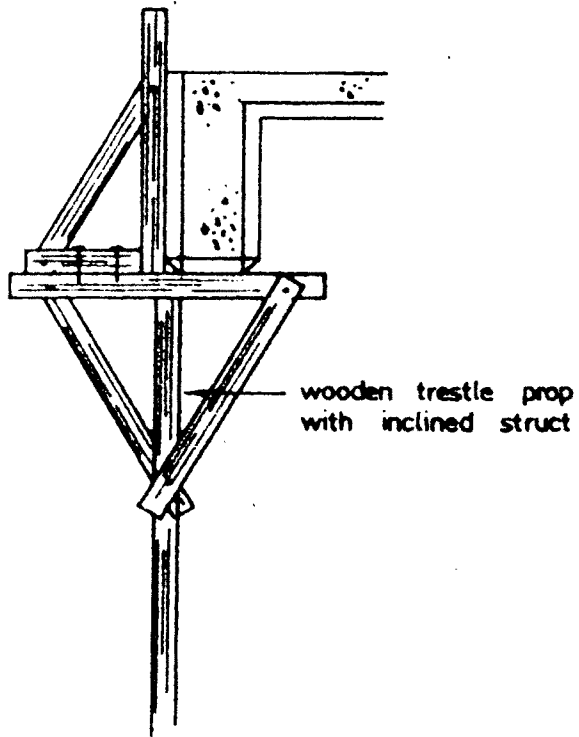
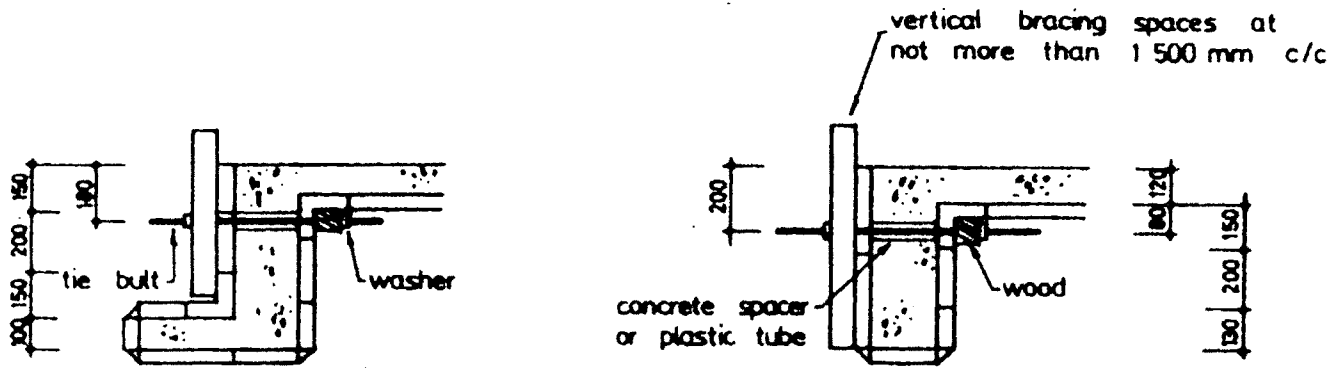


Fig 31 BRACING FOR PERIPHERAL BEAMS



## 7 DISMANTLING OF FORMS

### 7.1 Procedure and Methods of Dismantling Forms

Metal forms are dismantled in the following order:

- a) External faces of peripheral columns and walls.
- b) Internal columns and walls, internal faces of peripheral columns and walls.
- c) Beam soffits.
- d) Slab soffits.
- w) Beam sides.

When removing forms for columns and walls, remove the corner angles first and pry the forms with a large bar and L-pin (see Fig 32). The order of stripping these forms is as follows: Walers → form ties → U-clips, L-pins → flat forms → corner forms.

Beam soffit forms are usually dismantled in full length of the beams together with the corner angles. Beam sides forms can be removed together with the corner forms in small full height panel. They should not exceed 1800 mm in length, otherwise they would be too heavy to handle.

For slab soffits, usually the centre portion is dismantled first, the method of removal is as follows (Fig 33):

- a) Remove props and joist(s) under portion B.
- b) Remove all the U-clips for the centre flat form under portion B, leaving the L-pins joining portions A & C intact.
- c) Pull out the L-pins and remove the flat form under portion B.
- d) Repeat the procedures (b) to (c) until all the flat forms under portion B are removed.
- e) Repeat the same procedures to remove the forms under portions A & C.

### 7.2 Precautions and Advices in Removing Forms

The following precautions and advices should be observed during removal of forms:

- a) The time and manner of form removal should first be determined among the site supervisory staff so that the forms can be removed and subsequently transfer to the next storey for reassembling efficiently.

Fig. 32 PRYING METAL FORMS WITH A LARGE BAR & L - PIN

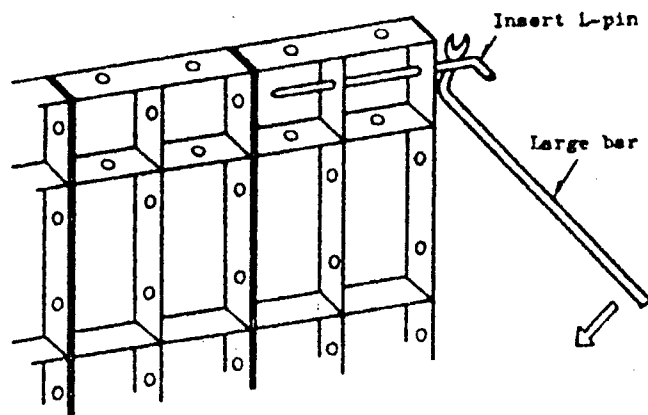
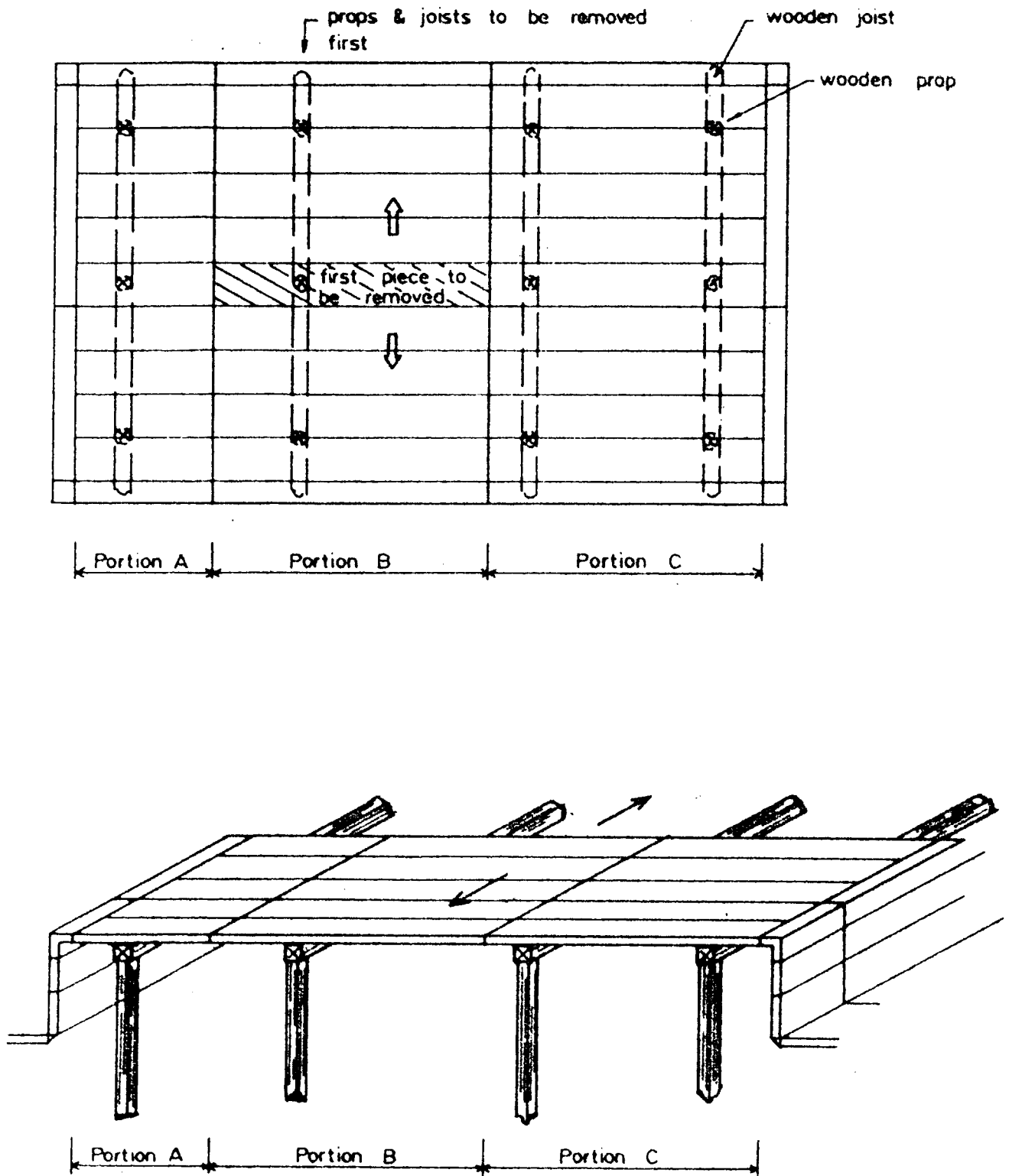


Fig 33 DISMANTLING OF SLAB FORMS



- b) Forms for slab soffits should be removed piece by piece with care. Column and wall forms can be removed in full height panels and beam side forms can be removed together with the corner forms in one piece.
- c) Dismantling of forms into large panels or dropping the forms could be dangerous and might cause damage to concrete structures below as the forms can easily be released from the concrete and drop off unexpectedly. Extra care should be taken in removing props, U-clips and L-pins.
- d) Removed form should not be thrown or dropped onto the floor, but should be lowered onto a raised platform on trestles or handed from worker to worker.
- e) Care should be taken not to cause excessive impact to the freshly cast concrete or to cause damage to its surface when removing forms.
- f) All removed U-clips and L-pins should be put in boxes or pails for easy handling and they must not be strewn all over the place.
- g) Special markings may be made on the forms for each particular part of a structure so that they can be easily sorted out for re-assembling.
- h) Props should be removed progressively with the forms and should never be removed too many at a time.
- i) Beams and slabs should be reproped immediately after their soffit forms are removed.
- j) Care must be taken especially for peripheral beams, columns and overhanging structures to prevent any forms and accessories from dropping out of the building and endangering the lives of other site workers.

### 7.3 Preparation Work for Reassembling of Forms

The dismantled forms should be cleaned of cement grout with an oily piece of cloth or a thin metallic scrapper. They should then be oiled with form releasing agent before being carried up to the newly cast floor above. They are then arranged and classified and ready for use again.

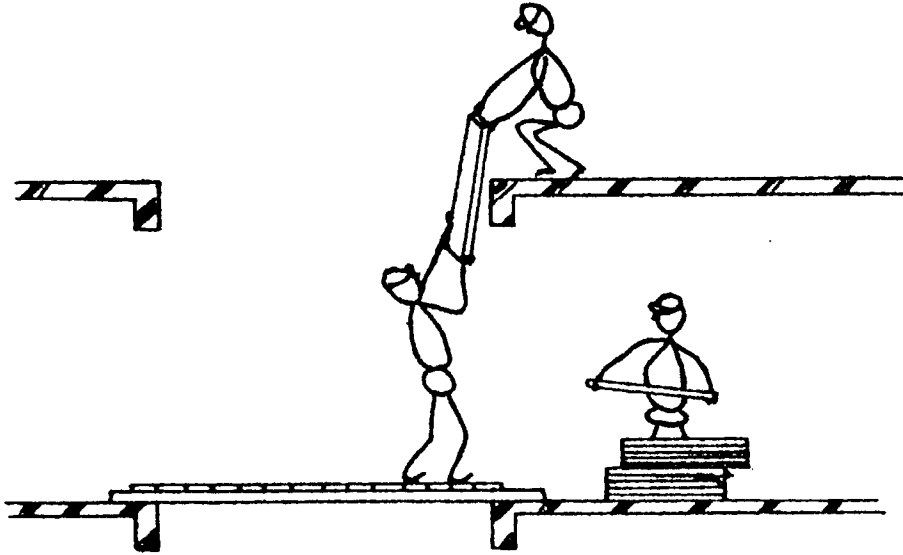
This operation is done immediately after the first piece of column form is removed. In this way, the confusion of dismantling the forms and stacking them on the same floor and to sort them out again can be avoided.



While the newly cleaned and oiled forms for the columns and walls are being assembled for the next storey, the beam and slab forms can be removed, cleaned, oiled and carried up to the newly cast floor. They can then be neatly stacked, classified and ready for re-use just when the column and wall forms are all assembled.

Forms can be carried up by the staircases, through lift pits, or handed up at the edge of the building manually (Fig 34). They can be lifted up by a motor winch or other special equipment designed to transfer metal forms.

Fig. 34 TRANSFERRING FORMS MANUALLY



## 8 MAINTENANCE AND REPAIR

### 8.1 Form Releasing Agent

For metal form it is necessary to use form releasing agent to facilitate form removal. Apart from this, the releasing agent enables easy cleansing of forms and prevents rusting of form faces. Quick drying, oily agent or paraffin base agent are recommended to be used. Viscous agents should not be used as they have had effects on workability and the bond between concrete and steel reinforcement if the steel bars are contaminated. Releasing agents with resin base should also be avoided as they are usually poor in their releasing property and cement grout is likely to adhere to the form faces.

### 8.2 Cleaning, Minor Repair and Rust Prevention

After completion of a project, metal forms should be cleaned and repaired for minor defects like bent and broken ribs. All concrete grout on the form should be scrapped off and those on the back and ribs of the forms can be removed with a hammer. Rust can be removed with sand paper or steel wool if it is not too excessive. If the rust contains dirty oil in large quantities, it should be washed off with a weak acid or a degreasing agent. After degreasing, the form should be washed with phosphoric acid, and then rinsed with sufficient water.

Deformed ribs caused by rough handling of forms should be straightened by striking it with a hammer and with an anvil underneath. All detached ribs should be welded back into the original positions.

Before the cleaned and repaired forms are stored away they should be protected from rust. This can be done by applying rust preventive agent. The agent can be applied with sprayer or with a cloth or brush. The rust preventive agent used is usually the form releasing agent with rust preventive properties.

### 8.3 Major Repair

Major repair is required after the forms have been used for many times and are badly damaged and rusty. Major repairs has to be carried out in a proper workshop equipped with all the necessary machineries where the forms can be sand or shot blasted, straightened, welded, oil coated and repainted. U-clips and L-pins have to be reformed.

## 9 SITE ORGANISATION

### 9.1 Construction Schedules

Unlike the conventional system where columns and walls are cast first before the steel benders work on the beams and slabs reinforcement, columns, walls, beams and slabs are cast in one operation for metal form system. As a result, building time is shorten and the schedule has to be reorganised to co-ordinate the various building trades.

As the metal form construction is rigid and requires no patching up of holes and gaps in the formwork, the steel benders can start fabricating the slab steel when the forms are assembled for part of a block. Fig 35 shows a typical breakdown of a metal form construction cycle.

### 9.2 Labour Force

In metal form system, only a few skilled carpenters are required among a gang of unskilled workers. The skilled carpenters will interpret working drawings to the workers, help and instruct the workers to erect, align, plumb, level, prop and brace the formwork. Unskilled workers only need to insert and remove U-clips and L-pins, set up props and bracing, clean and oil the forms and move forms from one floor to another.

Fig 35 BREAKDOWN OF METAL FORM CONSTRUCTION CYCLE

ACTIVITY	NO. OF DAYS (AT 8 WORKING HOURS/DAY)												
	1	2	3	4	5	6	7	8	9	10	11		
CAST COI UMNS & WALLS BEAM & SLABS													REPEAT CYCLE
ERECT COLUMN STEEL													
ERECT FORMWORK													
FABRICATE SLAB STEEL													

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

THAILAND : Country Paper on

"The role of private housing for Urban Low income group"

by

Smith Kampempool, Ph.D.

Governor of TISTR

Paper Presented at the FEISEAP/TISTR/UNESCO Seminar

on

Housing for Low-Income Groups in Urban Environment

at TISTR

Bangkok,

June 22-25, 1982

TISTR, Bangkok, THAILAND

June, 1982

## THE ROLE OF PRIVATE HOUSING FOR URBAN LOW INCOME GROUP

by

SMITH KAMPEMPOOL, Ph.D.

1. Land development and housing business of private sector have played a very important role in the housing shortage problem of the country. It tends to grow rapidly and emphasizes more on its importance. About 10 years ago this kind of business was initiated only in Bangkok and was later on extended to most of the provinces all over the country. Chiang Mai, in the north and Phuket, in the south were among the first provinces where private company seriously conducted housing business. However, they were only small-scale pilot projects to test the market. Only recently that they expanded to commercial scale, together with other large-scale projects in other towns such as Hat Yai district, Songkhla province, also in the northeastern part of Nakhon Ratchasima and Khon Kaen provinces.
2. These housing projects were mostly carried out on empty lands, not suitable for cultivation, in the outskirts of the province or in the vicinity. They were mostly near to the governmental office or educational campus, for example, the area around Chiang Mai University in Chiang Mai Province. At the early stage of housing development some 10 years ago, there were several large-scale housing projects launched in the suburb of Bangkok Metropolitan. This procedure was later proved to have many unfavorable impacts. The developers, therefore, introduced smaller projects scattering in the urban areas which were already densely populated, convenient for communication and close to working places. However, the cost of such land is very high, it was necessary to reduce the size of the houses.

Eventually townhouse became very popular now. As the Condominium Royal Act was enacted in the year 1979, there are only a few condominium projects under construction to-day.

3. In the past, the developers would initiate a certain investment and development schemes, which after completion would present their products to customers. Nowadays the trend was shifted to build according to the demand or order of the clients. This could help solving the problem of heavy investment as well as to reduce the sale tax and related expenditure of transferring land and house ownership.

Some intrepeneurs have separated their companies to two firms. One firm takes care of land dividing and to build infrastructure to cope with the requirements of City Planning Law and local municipal codes. The other firm deals only with the construction of houses. By this arrangement, the developer can save up to 2 per cent of total revenue.

4. However the purchasing power of clients are one of the prime important impacts on housing industry. During the last 2 years, the cost of living has sharply increased, also to couple with the rising cost of construction material, the unit sale price of the house is, therefore, inevitably increased 20-30 per cent per annum. Moreover, the finance agencies have imposed more restrictions on long-term credit as well as interest rate.

5. Despite this fact the housing business in the year 1980 indicated a sign of slow down. This symptom, however, should not impose a serious impact on the overall construction industry. One of the reasons derived from the fact that the number of un-sole houses accumulated from the year 1978 to the end of 1980 was only 8.4 per cent of the total constructed houses.



Another important sector of construction industry is the commercial building (row-house type) and the large-scale shopping center. Since it is rather a common practice in Thailand that traders would actually dwell themselves at the same place as their shop, there is no definite borderline between commercial and residential buildings. According to the latest survey, however, there were 120,000 commercial building units constructed in 1976 upto 1980, and not less than 36,000 units are still un-sold. This amounts to 30.8 per cent. In Chiang Mai, Province, there are more than 2,000 units now un-sold; also there are 3 shopping centers completely built without success in selling.

6. From this survey, it can be forecast that the trend of housing business of private sector is favourable specially for Khan Kaen Province in the northeast and Songkhla Province in the south where a sharp increase in demand is expected. However, for the rest of the country only a nominal amount of increment is envisaged.

The above statement can be summarized as follows:

- (1) The average population growth being 2.85 per annum during 1971-1980. The number of people per family increased from 5.5 and 5.7 per cent in 1973 and 1975 respectively to 6.0 per cent in 1979. However, the younger generation tends to start their family earlier than before.
- (2) The National Housing Authority (NHA) could not cope with high demand for housing. During 1976-1980, there were only 30,000 dwelling units built. This was only 70 per cent of the planned target. Moreover, according to the survey conducted by NHA, the demand for housing in the Bangkok Metropolitan alone is now as high as 100,000 units. About 85 per cent of these people have an earning power for not less than 5,000 baht per month.

From the above findings, it is expected that the economic and financial situation of the country should be improved. There are many new developers now executing their housing projects, while the old counterpart hastily concludes their business. The long-term loan for construction industry is now available and the interest rate is not too high. It is highly hoped that housing projects of private sector shall once again be boosted as it was 5 years ago.

---

TABLE 1. NUMBER OF BUILDINGS COMPLETED DURING 1978-1981

Year	Bangkok	Central	North	Northeast	South	Total	Rate of increase (%)
1978	2,700	500	450	50	250	3,950	-
1979	4,400	480	510	120	390	5,900	+49.4
1980	4,200	350	470	160	570	5,750	-2.5
1981	4,400	300	450	300	750	6,200	+7.8

Note Estimated on the basis of interviews to contractors in each section. Part of the buildings may belong to completed projects (before August 1980)

TABLE 2. NUMBER OF BUILDINGS IN PROGRESS

Unit : No. of buildings

Type of buildings	Bangkok	Central	North	Northeast	South	Total
Detached house	2,872	979	76	27	14	3,968
Row house	903	120	40	8	4	1,075
Townhouse	839	36	41	12	80	1,008
Duplex house	77	20	56	-	43	196
Commercial house	-	-	50	-	-	50
Others	530	-	12	-	16	558
<b>Total</b>	<b>5,221</b>	<b>1,155</b>	<b>275</b>	<b>47</b>	<b>157</b>	<b>6,855</b>
<b>Total of the projected buildings (%)</b>						
Detached house	13.9	54.4	3.8	2.4	7.0	15.4
Row house	24.2	30.0	83.3	18.2	3.4	24.8
Townhouse	12.8	5.4	16.5	42.9	6.1	11.4
Duplex house	5.8	19.2	41.2	-	8.9	9.5
Commercial house	-	-	11.0	-	-	3.1
Others	74.6	-	44.4	-	44.4	72.2
<b>Total</b>	<b>15.3</b>	<b>38.9</b>	<b>9.4</b>	<b>3.7</b>	<b>7.3</b>	<b>15.8</b>
<b>Result of the building construction</b>						
	No. of buildings in progress (%)					
Not more than 25%	34.2	88.3	49.8	38.3	6.4	43.3
Between 26-50%	35.8	8.6	20.0	14.9	9.6	29.9
Between 51-75%	16.8	1.7	10.2	12.8	71.3	15.2
More than 75%	13.2	1.4	20.0	34.0	12.7	11.6
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

TABLE 3. NUMBER OF BUILDINGS SOLD FOR THE PRESENT PROJECT

Unit : No. of buildings

	Bangkok	Central	North	Northeast	South	Total
<u>Type of buildings</u>						
Detached house	7,878	571	669	112	111	9,341
Row house	981	30	8	21	70	1,110
Townhouse	1,833	261	135	21	469	2,719
Duplex house	465	84	20	-	180	749
Commercial buildings	320	-	143	36	-	499
Others	53	-	13	-	30	96
Total	11,530	946	988	190	860	14,514
Average per contractor	240	158	35	21	57	137
Average per housing project	128	79	29	21	48	89
<u>Completed building (%)</u> <u>&amp; building in progress(%)</u>						
Detached house	67.6	35.9	85.9	74.2	79.3	65.2
Row house	59.5	15.0	38.1	47.7	61.4	54.0
Townhouse	63.1	91.6	76.3	75.0	89.5	69.4
Duplex house	58.6	80.8	26.3	-	77.3	62.1
Commercial buildings	88.4	-	65.0	100.0	-	80.7
Others	9.1	-	76.5	-	83.3	15.1
Total	64.2	43.4	75.0	73.4	82.1	63.8

TABLE 4. NUMBER OF BUILDINGS SOLD DURING 1978-1981

Year	Unit : No. of buildings						Rate of increase (%)
	Bangkok	Central	North	Northeast	South	Total	
1978							
Detached house	1,720	258	283	26	12	2,299	-
Row house	217	-	2	-	54	273	-
Townhouse	183	71	35	-	94	383	-
Duplex house	104	40	-	-	40	184	-
Commercial house	184	-	30	18	-	232	-
Others	32	-	-	-	-	32	-
Total	2,440	369	350	44	200	3,403	-
1979							
Detached house	2,413	185	281	49	54	2,982	↑ 29.7
Row house	335	15	6	15	16	387	↑ 41.8
Townhouse	860	173	67	8	236	1,344	↑ 250.9
Duplex house	318	34	12	-	48	412	↑ 123.9
Commercial house	117	-	55	10	-	182	↑ 21.6
Others	12	-	1	-	20	33	↑ 3.1
Total	4,055	407	422	82	374	5,340	↑ 56.9
1980							
Detached house	1,065 (2,297)	125 (227)	98 (208)	25 (57)	39 (69)	1,352 (2,858)	(↓ 4.2)
Row house	398 (873)	18 (30)	- (-)	6 (21)	- (44)	422 (968)	(↓ 150.1)
Townhouse	478 (938)	17 (25)	33 (85)	13 (20)	139 (198)	680 (1,266)	(↓ 5.8)
Duplex house	43 (105)	10 (30)	8 (15)	- (-)	54 (94)	115 (244)	(↓ 40.8)
Commercial house	19 (38)	- (-)	63 (105)	- (-)	- (-)	82 (143)	(↓ 21.4)
Others	9 (28)	- (-)	12 (16)	- (-)	10 (16)	31 (60)	(↓ 81.8)
Total	2,012 (4,279)	170 (312)	214 (429)	44 (98)	242 (421)	2,682 (5,539)	(↓ 3.7)
1981 (estimated)	4,450	350	470	150	580	6,000	↑ 8.3

Note Figures in brackets for 1980 are estimated for the whole year made by contractors.

TABLE 5. NUMBER OF BUILDINGS UNSOLD IN EACH YEAR

No. of buildings	Bangkok	Central	North	Northeast	South	Total	Rate of increase (%)
1978	+260	+131	+100	+6	+50	+547	-
1979	+605	+204	+188	+44	+66	+1,107	+102.4
1980	+526	+242	+229	+106	+215	+1,318	+ 19.1
1981	+476	+192	+209	+256	+385	+1,518	+ 15.2
Completed buildings (%)							
1978	9.6	26.0	22.0	12.0	20.0	13.8	-
1979	8.5	20.8	19.6	25.9	10.3	11.2	-
1980	4.7	17.2	16.0	32.1	17.8	8.4	-
1981	3.0	11.8	11.1	40.6	19.6	7.0	-

Note No. of buildings accumulated each year, calculated from the number of completed and sold buildings since 1978.

TABLE 6. SELLING PRICE OF SEVERAL TYPES OF BUILDINGS INCLUDING LAND

Unit : average baht/building

	Bangkok	Central	North	Northeast	South	Total
<b><u>Detached house including land</u></b>						
1978	349,000	314,000	355,000	260,000	425,000	351,000
1979	411,000	367,000	442,000	346,000	645,000	432,000
1980	529,000	389,000	541,000	427,000	683,000	542,000
1981	580,000	431,000	610,000	477,000	790,000	600,000
Size of land per building (square Wa)	50 - 80	40 - 60	65-100	55 - 80	70-100	60 - 90
<b><u>Row house including land</u></b>						
1978	231,000	113,000	200,000	140,000	150,000	212,000
1979	274,000	163,000	220,000	175,000	175,000	250,000
1980	329,000	175,000	280,000	190,000	250,000	302,000
1981	350,000	200,000	320,000	210,000	310,000	323,000
Size of land per building (square Wa)	12 - 16	12 - 16	16 - 20	16 - 20	12 - 18	14 - 18
<b><u>Townhouse including land (square Wa)</u></b>						
1978	231,000	220,000	263,000	220,000	288,000	250,000
1979	312,000	280,000	356,000	257,000	353,000	328,000
1980	349,000	325,000	399,000	297,000	416,000	382,000
1981	436,000	380,000	437,000	340,000	472,000	445,000
Size of land per building (square Wa)	16 - 20	16 - 20	20 - 40	18 - 25	20 - 30	18 - 24

TABLE 6. (Cont.)

Unit : average baht/building

	Bangkok	Central	North	Northeast	South	Total
<u>Duplex house including land</u>						
1978	350,000	265,000	140,000	-	165,000	208,000
1979	400,000	315,000	160,000	-	197,000	254,000
1980	455,000	350,000	200,000	-	250,000	289,000
1981	480,000	410,000	240,000	-	300,000	320,000
Size of land per building (square Wa)	30 - 60	30 - 50	20 - 30	-	20 - 35	30 - 50
<u>Commercial building including land</u>						
1978	285,000	-	220,000	220,000	350,000	253,000
1979	333,000	-	317,000	275,000	420,000	330,000
1980	413,000	-	390,000	350,000	480,000	404,000
1981	465,000	-	473,000	425,000	530,000	462,000
Size of land per building (square Wa)	12 - 16	-	12 - 16	16 - 18	18 - 24	14 - 18
<u>Average all types of building</u>						
1978	305,000	228,000	315,000	210,000	283,000	255,000
1979	361,000	281,000	390,000	263,000	388,000	319,000
1980	445,000	310,000	472,000	316,000	462,000	384,000
1981	501,000	355,000	523,000	363,000	512,000	430,000
<u>Sale price of land (Baht/square Wa)</u>						
1978	2,037	1,367	1,300	1,330	2,500	1,793
1979	2,545	2,250	1,850	1,720	3,100	2,350
1980	2,949	2,738	2,208	2,190	3,700	2,795
1981	3,460	3,000	2,685	2,510	3,940	3,211

Remarks

1. Selling price in 1981 is an estimate made by contractors.
2. Selling price for detached house and commercial buildings including land in Bangkok area can be further classified as follows.



TABLE 7. METHODS OF SALE OF HOUSES INCLUDING LAND

% of no. of buildings

	Bangkok	Central	North	Northeast	South	Total
Cash	11.3	6.2	28.2	28.4	33.8	13.7
On instalment	88.7	93.8	71.8	71.6	66.2	86.3
Direct sale to companies	6.3	-	6.7	9.0	2.0	5.7
Housing Welfare Bank	48.4	74.7	3.4	-	-	43.5
Commercial banks	25.4	11.1	59.7	62.6	55.1	29.0
Finance Company	4.0	-	2.0	-	9.1	3.9
Credit foncier	3.9	6.6	-	-	-	3.5
Others	0.7	1.4	-	-	-	0.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 8. COMMENTS ON THE CONDITION OF SALE DURING 1978-1981

% of No. of contracts

Condition of Sale	Bangkok			Provincial			Total		
	79/78	80/79	81/80	79/78	80/79	81/80	79/78	80/79	81/80
<b>Increase</b>	58.5	21.0	39.0	68.7	23.4	30.7	63.0	22.2	35.0
Not exceeding 10%	2.4	2.3	2.4	3.0	-	7.7	2.7	1.1	5.0
Between 11-20%	17.1	2.3	2.4	9.4	4.3	10.2	13.7	3.3	6.2
Between 21-30%	4.9	9.4	4.9	12.5	6.4	2.6	8.2	7.8	3.8
Between 31-50%	17.1	4.7	4.9	12.5	-	-	15.1	2.2	2.5
Between 51-100%	9.7	2.3	-	9.4	8.5	-	9.6	5.6	-
Exceeding 100%	2.4	-	-	9.4	2.1	-	5.5	1.1	-
Not specified	4.9	-	24.4	12.5	2.1	10.2	8.2	1.1	17.5
<b>Reason for increase</b>									
High demand from customer	-	4.7	7.3	-	8.5	7.7	-	6.7	7.5
Inexpensive selling price	-	4.7	-	-	4.3	10.2	-	4.4	5.0
Customer bought the house for fear of increase in price	-	2.3	2.4	-	-	-	-	1.1	1.2
Improvement in economic and political condition	-	-	17.1	-	2.1	5.0	-	1.1	11.3
Bank releases more credit	-	2.3	-	-	-	2.6	-	1.1	1.2
Others	-	4.7	7.3	-	6.4	3.6	-	5.6	5.0
Not specified	-	2.3	4.9	-	2.1	2.6	-	2.2	3.8
<b>Decrease</b>	24.3	53.5	29.2	31.3	50.9	28.0	27.4	52.2	28.6
Not exceeding 10%	2.4	4.7	4.9	-	2.1	7.7	1.4	3.3	6.2
Between 11-20%	4.9	4.7	7.3	6.4	10.6	5.0	5.5	7.8	6.2
Between 21-30%	4.9	9.4	2.4	6.4	6.4	2.6	5.5	7.8	2.5
Between 31-50%	2.4	18.6	4.9	3.0	10.6	5.0	2.7	14.4	5.0
Between 51-100%	-	9.4	2.4	12.5	10.6	-	5.5	10.0	1.2
Not specified	9.7	6.7	7.3	3.0	10.6	7.7	6.8	8.9	7.5

TABLE 8. CONT.

Condition of Sale	Bangkok			Provincial			Total		
	79/78	80/79	81/80	79/78	80/79	81/80	79/78	80/79	81/80
Reasons for decrease									
Higher selling price	-	9.4	9.7	-	-	-	-	4.4	5.0
Decreased purchasing power	-	6.7	2.4	-	21.2	15.1	-	14.4	8.7
No financial support from bank	-	6.7	2.4	-	2.1	-	-	4.4	1.2
High interest rate on purchase on instalment	-	15.0	-	-	-	-	-	6.7	-
Unfavourable economic and political condition	-	6.7	14.7	-	8.5	7.7	-	7.8	11.3
Others	-	2.3	-	-	10.6	2.6	-	6.7	1.2
Not specified	-	6.7	-	-	8.5	2.6	-	7.8	1.2
Constant	17.2	25.5	31.8	-	25.7	41.3	9.6	25.6	36.4
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 9. SELLING CONDITION IN 1978-1979 FOR CONTRACTION, HAVING  
STARTED BUSINESS PRIOR TO 1979

	Rate of increase (%)		% of sold out building		
	79/78	80/79	1978	1979	1980
Bangkok	+20.1	-11.4	91.1	65.8	55.3
Provincial	+15.2	-22.7	68.3	59.0	46.5
Central	-20.2	-55.7	59.1	42.8	24.7
North	+48.0	-46.4	56.6	69.4	36.6
Northeast	+16.7	+14.3	68.2	42.7	40.8
South	+28.0	+21.9	100.0	68.4	34.9
Total	+18.9	-13.9	84.7	64.2	53.3

TABLE 10. COMMENTS ON SELLING PRICE OF DUPLEX HOUSES DURING 1978-1981

(% of No. of contractors)

Selling price	Bangkok			Provincial			Total		
	79/78	80/79	81/80	79/78	80/79	81/80	79/78	80/79	81/80
<u>Increase</u>	83.0	93.0	90.9	90.6	93.9	93.9	86.3	93.5	92.5
Not exceeding 10%	22.0	14.0	27.3	6.2	10.2	16.3	15.1	12.0	21.5
Between 11-20	31.8	39.5	31.8	46.9	57.2	59.2	38.4	48.9	46.2
" 21-30	12.2	18.5	13.6	21.9	14.3	12.3	16.4	16.3	12.9
" 31-50	2.4	7.0	2.3	6.2	4.1	-	4.1	5.4	1.1
" 51-100	-	-	-	-	2.0	-	-	1.1	-
Not specified	14.6	14.0	15.9	9.4	6.1	6.1	12.3	9.8	10.8
<u>Increase</u>	2.4	-	2.3	-	2.0	2.0	1.4	1.1	2.1
<u>Constant</u>	14.6	7.0	6.8	9.4	4.1	4.1	12.3	5.4	5.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 11

Problems of business management in Housing Project  
including land

Type of problem	Bangkok		Provincial		Total	
	yes	no	yes	no	yes	no
<u>Construction material</u>	78.0	22.0	56.9	43.1	66.7	33.3
Insufficient supply	46.0		13.8		28.7	
Sufficient supply but exceeding high price	20.0		36.2		28.7	
Others	50.0		19.0		33.3	
	8.0		10.3		9.3	
<u>Labour</u>	56.0	44.0	34.5	65.5	44.4	55.6
Labour takes time to learn in performing- -their duties	10.0		3.4		6.5	
High labour cost	20.0		19.0		19.4	
High turn over rate	20.0		6.9		13.0	
Low responsibility of labours	30.0		19.0		24.1	
Lack of skill labour	34.0		17.2		25.0	
Others	-		3.4		1.9	
<u>Finance</u>	80.0	20.0	62.1	37.9	70.4	29.6
High rate of interest	62.0		46.6		53.7	
No sources for additional loans	58.0		44.8		50.9	
Customer delay in paying debt	22.0		12.1		16.7	
Obtain less credit or lenders withdraw loans before due dates	10.0		8.6		9.3	
Others	6.0		-		2.8	
<u>Other problems</u>						
Red tapes and inconveniences in making contact with government agencies	8.0		5.2		6.5	
Others						

N.B.

Some contractor may have several problems on each heading. Thus, the detailed answers taken together do not necessary match the heading of that particular problem.

FEISEAP/TISTR/Unesco Seminar on Housing for  
Low-Income Groups in Urban Environments

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THURSDAY 24 JUNE 1982 PROGRAMME

07:45 Standby at the lobby of Impala Hotel

08:00 Departure from Impala Hotel

08:45 Arrival at TISTR

09:00 Departure from TISTR to visit NHA's Housing  
Project at "Prachanivech 3", Gnamwongwarn road,  
Soi Wat Buakwan

11:00 Departure from "Prachanivech 3" to Chitpojana  
restaurant

12:00-13:00 Lunch at Chitpojana restaurant

13:00 Departure from Chitpojana restaurant to  
"Building together Project" at Soi 101 Lardpraw  
road

15:00 Departure from "Building together Project" to  
visit "NHA's Project" at Tung-Song-Hong

16:30 Departure from "Tung-Song-Hong Project" to  
Impala Hotel Soi 24 Sukumvit

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## STUDY TOUR



### NATIONAL HOUSING AUTHORITY PROJECT at "Prachanives 3"

- 2 storey duplex
- part 1 564 units
- part 2 446 units
- Hire purchase

### THE BUILDING TOGETHER PROJECT

THE BUILDING TOGETHER  
PROJECT at Soi 101  
Lardpraw road



### NHA SITE & SERVICE PROJECT at "TUNG SONG HONG"

- Project cost US\$ 5.2 millions  
millions. Year start 1979  
Number of dwelling units 2969
- floor area per unit
  - 1 storey = 42.48 sq m
  - 2 storey = 46.08 sq m



## ORGANIZING COMMITTEE

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Mr. Pongpun	Vorasuntharosoth	Vice-Chairman
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Ms. Walairat	Suchat	Assistant Secretary

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FEISEAP/TISTR/UNESCO SEMINAR ON  
HOUSING FOR LOW-INCOME GROUPS IN URBAN  
ENVIRONMENT.

HOUSING FOR LOW-INCOME GROUPS IN  
URBAN ENVIRONMENT.

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ศูนย์บริการเอกสารการวิจัยฯ



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Housing for