EARLY CHILD DEVELOPMENT PROJECT
WEST JAVA, SOUTH SULAWESI & BALI PROVINCES

CONSTRUCTION OF KINDERGARTENS & BKB/POSYANDU CENTRES

IMPLEMENTATION SPECIALIST'S REPORT
MAY 1998

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1. INTRODUCTION

1.1 The Implementation Specialist's Terms of Reference for the Pre-Appraisal Mission of the Early Child Development Project were to:

a. Review existing designs for kindergartens and adapt as necessary to a rural context.
b. Appraise sample sites and locations proposed by the project districts for the facilities.
c. Review current and proposed construction responsibilities and arrangements.
d. Assess proposed funding arrangements for construction, rehabilitation and maintenance of these facilities in all three provinces.
e. Assess and evaluate the procurement process for all items as proposed by the districts.
f. Explore the cost-effectiveness of various delivery options such as new construction versus extending existing facilities.

1.2 The Implementation Specialist's work on this project continues the work carried out on the Basic Education Projects in West Java, South Sulawesi and Maluku in 1996 and 1997. Many of the issues raised in these projects such as land acquisition, design of facilities, construction arrangements, community participation and the maintenance of school buildings are very relevant to the Early Child Development Project.

1.3 This report focuses on the main issues that will affect the construction, renovation and maintenance of kindergartens and BKB/Posyandu Centres which are similar to those affecting primary and junior secondary school design, construction, renovation and maintenance. These are: the availability of suitable sites, the design of the facilities to be provided; the generally low standard of construction of new facilities and renovation of existing ones; the more or less total lack of preventative or corrective maintenance of any school buildings; the provision of clean water and functioning toilets; and the provision of correctly sized furniture.

1.4 The Implementation Specialist visited Pandeglang and Tangerang Districts in West Java and Kotamadya Denpasar and Bulaleng District in Bali Province and inspected proposed sites for kindergartens and BKB/Posyandu posts (see Annex 1).

2. PROJECT OBJECTIVES

2.1 The principal objectives of the project are to assist the Government of Indonesia in its adoption of an integrated Early Child Development policy framework providing services for child survival and children's cognitive and psycho-social development and to improve the quality, access and utilization of ECD programmes, particularly those targeted at the poor.

2.2 In order to improve access to ECD programmes, existing Kindergartens will be extended and/or renovated and new Kindergartens built. New BKB/Posyandu Centres will also be built or existing buildings extended to accommodate their activities in three Provinces, West Java, South Sulawesi and Bali.

2.3 The expansion of the Kindergarten programme, especially in poor villages, is expected to reduce repetition and drop out rates in both primary and junior secondary schools. The BKB (Mother/Child) Programme is an education programme directed at mothers of young children to enable them to better prepare their children for primary school. The Posyandu (integrated health service delivery post) programme is oriented primarily towards promoting preventative health and nutrition interventions. Both programmes should lead to improvements in children's early ability and through this, improve their later educational and occupational attainment.

3. PROJECT COMPONENTS

3.1 Kindergartens

3.1.1 DIKDAS has prepared a standard design for 'Model' kindergartens to be built in Provincial and District centres. This design was not felt to be appropriate for use in village situations because of its size and the standard of accommodation provided.

3.1.2 The most cost-effective way of providing additional kindergartens would be to use redundant primary school buildings (see Annex 5). In Provinces where World Bank Basic Education Projects are being implemented, the provision of primary schools is being rationalised and some schools should be vacated. In other Provinces, the present provision of primary schools should be examined and rationalised if possible. A 3-Classroom primary school building (with an office) can be used, with the addition of a small kitchen and store, for a kindergarten as shown on drawing KD1 in Annex 2.

3.1.3 The minimum size of a site for a standard village kindergarten was agreed with DIKDAS as being 1,500m². Different layouts for this size of site, depending on orientation, are shown in Annex 2.

3.1.4 In urban situations the only sites available could well be smaller than 1,500m² and layouts for schools on smaller sites are also shown in Annex 2.

3.1.5 The availability and size of sites for kindergartens does not seem to be an issue in Pandeglang District, which is mainly rural, in West Java Province. It could be more of a problem in Tangerang District, also in West Java, which is more urban in character, although the one site that was seen there was more than adequate in size.

3.1.6 Land seems to be much more of an issue in Denpasar and Bulaleng District in Bali. In the more central parts of Denpasar, land is at a premium and in some places there is no vacant Desa land. Any vacant private land is very expensive. This also seems to be the case in some parts of Bulaleng District. The urban areas have however, the same or an even greater need for kindergartens as the more rural Desas and it seems unfair to penalise them (by not providing kindergartens) because they cannot afford to purchase land for sites. There seems to be no procedure laid down for the purchase of sites for kindergartens as there is for primary and secondary schools and some method must be found therefore to fund sites for kindergartens in the Desas where land is not at present available.

3.2 BKB/Posyandu Centres

3.2.1 The basic design for new BKB/Posyandu Centres has been based upon one built by a community using their own resources in a village in Tangerang District (see drawing BKB1 in Annex 2).

3.2.2 The Centre is designed as a large unenclosed open space for meetings of up to 25 mothers, health demonstrations, etc. A small consultation/storage space is also provided for private consultations, simple examinations and storage of toys, equipment, etc with a small waiting space outside. The design of the centres will vary in each Province to take account of local design and construction traditions.

3.2.3 In situations where an existing building, such as a Banjar in Bali, is used for BKB/Posyandu activities an extension can be built, if land is available, to accommodate the consultation/storage room and waiting space (see drawing BKB1).

3.2.4 There does not seem to be as much of a problem with providing sites for BKB/Posyandu Centres as there is for kindergartens. The area of land required for a new BKB/Posyandu Centre is much smaller than that required for a kindergarten and land appears to be available for them in both Pandeglang and Tangerang Districts. In Kotamadya Denpasar and in Bulaleng District, most communal activities, including BKB/Posyandu programmes are held in the Banjar (the village meeting place) and most communities are only asking for a small extension to the Banjar to be used for consultations, examinations and storage of materials (see Annex 5).

4. CONSTRUCTION IMPLEMENTATION

4.1 Kindergartens

4.1.1 There are very few purpose-built kindergartens in any of the Provinces and those that do exist are usually in the provincial centres or the larger towns. In other places, kindergartens at present use other facilities such as primary schools or village centres.

4.1.2 New kindergartens would probably be built in a similar way to new schools in that contractors supervised by PU staff would construct them. The technical competence of such contractors seems however to be low and, because of the present system where contracts are let to national contractors and sub-contracted sometimes more than once, the funds for construction are much reduced and building standards are therefore further reduced. PU Cipta Karya and PUK who are supposed to supervise construction work are usually understaffed at the district and sub-district level and do not have funding for many site visits. Supervision therefore takes the form of inspections when stage payments are due and there is no real supervision of the work in progress. Supervision by consultants also seems to be fairly superficial. After the buildings are completed there is a defects liability period of only one month and after this there is no way of making the contractor put right defective work. Renovations of schools (or kindergartens) are carried out in a similar way. The combined effect is that the majority of school buildings are badly built and/or renovated.

4.1.3 A further problem is that very little money is spent on corrective or preventative maintenance of any school buildings, including primary schools and kindergartens. The effect of this lack of maintenance, combined with the initial poor standard of building is that school buildings deteriorate rapidly and soon have to be renovated, often within a period of less than 10 years and this is obviously a major waste of resources.

4.1.4 Communities see INPRES primary schools as government schools and could well see kindergartens built by the government in the same way. The communities have no real involvement in the schools apart from paying BP3 fees and therefore have no interest in helping with their maintenance or upkeep because they feel that this is the government's responsibility. Many of the primary schools and kindergartens seen in Bali however are community schools and are very well maintained and looked after. One of the objectives of this project therefore must be to involve the communities in the construction and management of the schools as much as possible in order that they see them as belonging to the community and part of their responsibility.

4.1.5 In the provinces where the Basic Education Projects are being implemented, a comprehensive school mapping exercise (see Implementation Specialist's Report: December 1997) is being undertaken which will show the location, catchment area, etc of existing schools and areas where new ones are required. Before any new kindergartens are proposed, a similar exercise should be undertaken in order that any

new kindergartens are located in positions where they will be most effective (see Annex 3: Rehabilitation of Existing & Construction of New Kindergartens).

4.1.6 Any existing kindergartens that require renovation should be renovated to a standard that will ensure, with regular maintenance, a useful life for the buildings of at least 25 years. Funds for renovation should be sent directly to a bank account controlled by the kindergarten and/or local community/LKMD and they will then organise the renovation using local craftsmen or small builders. The involvement of the communities in this way should help to ensure their future involvement in the running and maintenance of the schools.

4.1.7 It is also intended to construct new kindergartens using local contractors with the local community/LKMD as the implementing agency. Only contractors actually registered in each District should be eligible to tender.

4.1.8 If existing kindergartens are to be renovated and new ones built to a standard that will ensure that they will have a reasonably long life, the communities will require technical assistance and supervision. PU does not appear to have the staff or resources to do this. It is proposed therefore that Consultant Architects be appointed in each province to design the new kindergartens and prepare working drawings, schedules of work for the renovation of existing kindergartens and supervise the construction and renovation on site. The architects will however be expected to provide a much more comprehensive supervisory service than is usual. (see Annex 4: Construction Implementation).

4.1.9 When new kindergartens are complete or existing ones are renovated to an acceptable standard, adequate funds should be made available by GOI for preventative maintenance programmes to stop the cycle of deterioration. The funding should go directly to the kindergartens and the Head Teachers should be responsible for maintenance. During the life of the project, the Consultant Architects will develop maintenance handbooks for the Head teachers and they will be given training in their use. Regular, preventative maintenance should prolong the useful life of the kindergartens and reduce the amount of money spent wasteful renovations.

4.2 Kindergarten water supply and toilets

4.2.1 A problem that relates to primary and junior secondary schools and kindergartens in all provinces is the lack of clean water and working toilets especially, but not only at, rural locations. Wells if provided are usually uncovered and dirty and quite often, because they are not deep enough, dry during the dry season. The toilets provided usually depend on a constant supply of running water which is usually not available.

4.2.2 No kindergarten should be built or renovated without the provision of adequate clean water and working toilets for pupils and staff. The Consultant Architects will, as part of their commission, ensure that covered wells and appropriate toilets are provided to all renovated or new kindergartens and will provide assistance in their construction.

4.3 Kindergarten furniture

4.3.1 As in many primary schools, the furniture at present provided in kindergartens is often inappropriate in terms of size and design. It is proposed therefore to carry out a standing height survey of kindergarten age children in order that a standard range of furniture can be designed that will better fit them. A method for carrying out the survey and for calculating the average standing heights for each age group is shown in

Annex 6. The Consultant Architects, when appointed, will produce designs for the furniture using the ratios given in the UNESCO Educational Building Digest attached.

4.3.2 The furniture should be designed to be made (and repaired) at the village level. Small contracts can be let to village carpenters or others for the manufacture of furniture for kindergartens. These measures should ensure the provision of appropriate furniture that is easily repairable and more comfortable for pupils.

4.4 BKB/Posyandu Centres

4.4.1 BKB/Posyandu programmes are held at present in a variety of locations including the house of the Polindes (the village mid-wife), in the Banjar or village meeting place, in a clinic or occasionally, in purpose built centres.

4.4.2 As described above, in order to increase access to the BKB/Posyandu programme, it is intended to build either complete new centres or extend existing meeting places to provide an examination/storage room together with a waiting place.

4.4.3 It is intended to fund and manage the construction of both types of building through the community in a similar way to the kindergartens. There will be similar problems therefore in constructing and supervising them.

4.4.4 The Consultant Architects appointed to design and supervise the construction of the kindergartens will also be appointed to produce final designs and working drawings for the new Centres and to assist the community in the management of their construction (see Annex 4).

5. CONCLUSION

5.1 It seems that a large part of the Early Child Development Project will consist of funding for the renovation of existing and the construction of new kindergartens and the provision of clean water supplies, appropriate toilets and furniture. If more control is to be given to kindergartens and communities, technical assistance and support will have to be provided. A system of management will also have to be instituted that gives tight control over all aspects of the project, including funding. The proposals outlined above and gone into in more detail in the Annexes are one way of providing the required levels of technical assistance and management. However, some of the funding and other aspects of the proposals will require policy changes at the centre.

ANNEX 1: PROVINCES, DISTRICTS & VILLAGES VISITED

A. WEST JAVA PROVINCE

1. PANDEGLANG DISTRICT

Pandeglang District was visited on February 27 and 28 1998. A meeting was held at the DIKMAS office on the morning of February 27 to discuss the project and several Desas were visited in the afternoon:

Desa Wanagiri, Kecamatan Sakati: The Midwife's house, which is not very big, is at present used for BKB and Posyandu activities and there is no room for an extension. There is a fairly small site on Desa land in the middle of the Desa where they wish to build new LKMD offices and a new BKB/Posyandu centre. They would like two separate rooms: one for Posyandu activities, examinations, etc and one for storing BKB equipment, toys,etc. The Desa has not requested a Kindergarten.

Desa Langansari, Kecamatan Sakati: There is a Kindergarten in the Desa run in a mosque. It has 60 pupils and three teachers; two are paid by government and one is paid an honorarium by the parents. It has very little equipment, toys, etc. There is a primary school in the Desa which also has a pre-school class age 5/6 of 30 pupils. The school pays the teacher an honorarium. The primary school was said to have a low drop out rate. There is a fairly large site (approximately 1,500m2) next to the primary school on Desa land for a new Kindergarten. There is a midwife in the Desa and a site for a BKB/Posyandu Centre.

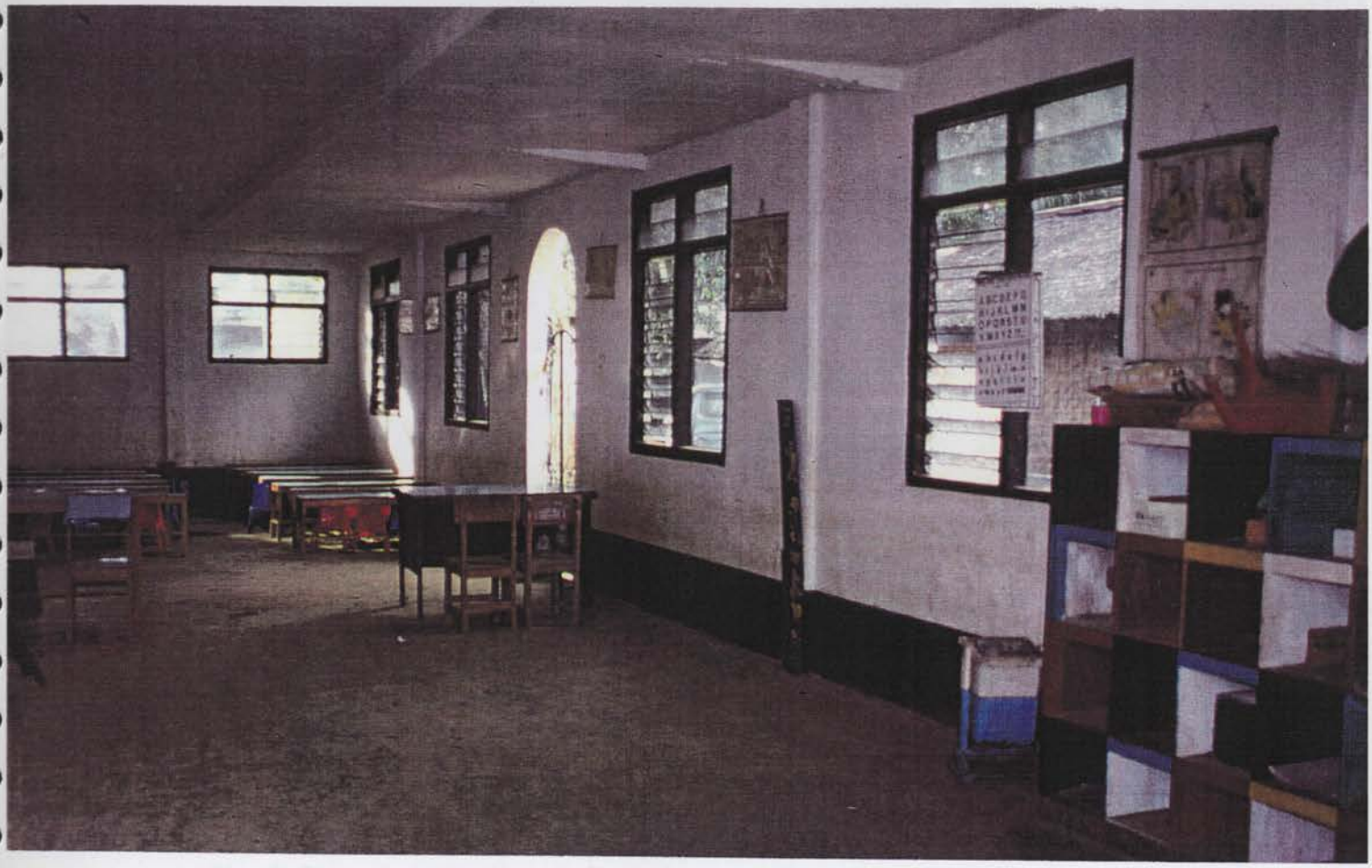


Plate 1: Kindergarten in Mosque, Desa Langansari, Keacamatan Sakati

A meeting was held with Bappeda on the morning of February 28 to discuss the project and several Desas were visited in the afternoon:

Desa Cibodas, Kecamatan Banjar: There is no Kindergarten at present in the Desa but there is land set aside for one. It was also stated that there were teachers available in the Desa. The land is next to the Desa offices and is very small, only about 200m2. It was pointed out that this was too small for a Kindergarten and it was agreed that the land at the back of the Desa offices could also be used giving a total of probably over 1,000m2.

Desa Gn Putri, Kecamatan Banjar: 4 Posyandus operate in sub-villages around the main village. There is only one building which is extremely small and built on private land. The village has land available (approximately 15m x 9m) in front of the village offices where they would like to build a new BKB/Posyandu centre.

Plate 2: Posyandu Post in Desa Gn Putri, Kecamatan Banjar

2. TANGERANG DISTRICT

Tangerang District was visited on March 3 1998 and a meeting was held at Bappeda to discuss the project. It was stated that there are problems in finding suitable land in the District especially in the urban areas. It might be necessary to build two-storey Kindergartens in some locations. 56 day-care centres have been requested but these are not now included in the project. It was stated that about 70% of BKB/Posyandus meetings are held in private houses. A question was raised as to whether these houses can be extended to accommodate meetings. A number of Kindergartens and sites were visited.

Tangerang Urban Area: Two private Kindergartens were visited in Tangerang. The first, Kelompor Berman TK, is part of complex housed in a converted retail building which also contains a day-care centre and a primary school. The Kindergarten has 50 pupils in two classes. Parents have to pay Rp42,000 a month. It is very well equipped and furnished but has virtually no play space. The second Kindergarten is run by the Policewomen's Association. It is housed in a purpose built building and, although it was closed when visited, it seems to be well equipped with a large playground with play equipment.

Plate 3: Policewomen's Association Kindergarten, Tangerang Urban Area

Desa Rawa Mekar Jaya Kelserpong: A combined BKB/Posyandu Centre was built by the community in 1994. It consists of an open meeting space with a tiled floor and roof and open sides. There is a small room at one end for storing equipment and for carrying out basic examinations. The overall area is approximately 55m2. The centre is on Desa land and is used for other activities. There is also a site for a Kindergarten on Desa land close to the Desa office that consists of 2,000m2 of open land.

Plate 4: Combined BKB/Posyandu Centre, Desa Rawa Mekar Jaya Kelserpong

Desa Rawa Meka Jaya: There is a small BKB/Posyandu Centre in this village built by the local community on land donated by the mosque. It consists of one small room with a small veranda, a total of about 12m2. There is land for expansion and the community would like to increase the size of the building, as there is at present no room for meetings.

Plate 5: BKB/Posyandu Centre, Desa Rawa Meka Jaya

B. BALI PROVINCE

Bali Province was visited between March 6 and March 15 1998. Kindergartens, BKB/Posyandu Centres and sites were visited in the two project Districts, Denpasar and Bulaleng and meetings were held with Provincial, District and Desa representatives to discuss the project. There are similar problems in Kotamadya Denpasar as in Tangerang in that finding adequate sites for Kindergartens is difficult. Smaller sites and two-storey buildings will probably have to be accepted. In some Desas there is no suitable vacant land or what land there is too expensive to purchase for Kindergartens.

1. KOTAMADYA DENPASAR

Desa Serangan, Denpasar Selatan: There is an existing Kindergarten on a small site on the edge of the Desa next to the sea with 47 pupils. The Kindergarten consists of one classroom approximately 7.2 x 5.2m and a small extension which contains an office. There are some books, toys and posters in the classroom and the furniture is in good condition. There is a working flush toilet at the rear. The site is owned by the Desa and is approximately 600m2. There is space for expanding the site to the east and the community would like to build a larger Kindergarten. They also want to build a BKB/Posyandu Centre next to the Desa offices.

Desa Sidakarya, Denpasar Selatan: There are two existing community Kindergartens in the Desa and there is a site opposite the Desa offices for a new one. The site is small, approximately 800m2 and owned by the village. Half of the site is at present occupied by two buildings that will be demolished. The new Kindergarten will probably have to be on two stories in order to leave some play space. A Banjar (a covered community meeting place) was visited which is used for BKB/Posyandu meetings. There is a site at the back of the Banjar where the Desa would like to build an extension for the BKB/Posyandu for storing equipment and for examinations. Another sub-Desa was visited which does not have a Banjar but has a site (500m2) for a BKB/Posyandu. The Desa would like to organise the construction through the LKMD.

Plate 6: Kindergarten, Desa Serangan, Denpasar Sealatan

Desa Panjer, Denpasar Selatan: There is a site for a new Kindergarten opposite the Banjar. The site is quite small approximately 800m2 and the Kindergarten would probably have to be two-storey.

Desa Kesiman Petilan, Denpasar Timur: The Desa has a Poskesmas Pambantu and does not need a BKB/Posyandu Centre. There is a private (community) Kindergarten, TKK Indra Prasta, which requires renovating. The Kindergarten consists however of two classrooms added on to the back of a private SMP. The site is very small, has very little play space, has a right of way used by vehicles running through it and has no room for expansion. It is probably not worth renovating.

Plate 7: Kindergarten, Desa Kesiman Petilan, Denpasar Timur

Desa Kesiman Kertalangu, Denpasar Timur: There are three private Kindergartens in the Desa: a community Kindergarten which forms an extension of the Desa offices, a Muslim Yayasan and a Hindu Yayasan. The Desa would like to extend the Kindergarten next to the Desa offices which has 130 pupils and consists of one large room and two classrooms. The site however is small but there would probably be room to build one extra classroom and the large room could be renovated and sub-divided to provide a classroom, toilet and kitchen. There is a small Poskesmas and the Desa would like to build a BKB/Posyandu on a small site (500m2) next to it. They would also like to build an extension to a Banjar in a sub-district, which is used for Posyandu activities for storing equipment and for examinations. In a further sub-Desa, there is a site of 1500m2 for a new Kindergarten.

Desa Sanur Kauh, Denpasar Selatan: There are two existing Kindergartens: one run by an NGO serves three sub-villages; one run by the Bali Beach Hotel serves the surrounding community. There is no Desa land available and very little other vacant land. What there is costs around Rp18million 100m2. Consolidation of two primary schools might be possible; the vacant school could then be used as a Kindergarten.

Desa Sesetan, Denpasar Selatan: The Desa has no land but there is land in the Desa belonging to the Kotamadya. The village will ask for 1,500m2 of this to be released for a Kindergarten.

Desa Ubung Kaja, Denpasar Barat: The Desa has one existing Kindergarten, TK Widyasanthi I with four classes and 139 pupils. It has four qualified teachers and one unqualified one. It shares a site with two primary schools and has one classroom, which originally belonged to one of the primary schools and two small classrooms that have been added on. It also has a very small playground. The Kindergarten operates two shifts and the classrooms are then used for a junior secondary school in the afternoons! There is however 8,000 m2 of land available on the same site where the Desa would like to build a new Kindergarten. There is a second site of 2,000m2 on Desa land at the edge of another sub-village where they would like to build another Kindergarten.

Plate 8: Kindergarten TK Widyasanthi I, Desa Ubung Kaja, Denpasar Barat

Desa Peguyangan, Denpasar Barat: There is one existing Kindergarten, TK Swa Dharma, built on community land. The Kindergarten has three classrooms and 90 pupils. There is plenty of playground space and equipment. The school appears to be very well run with plenty of books, toys, posters, etc. The Lura said that there was no available land for building a new Kindergarten in the Desa but that there was land available close by in and adjoining Desa (see below). They would like to build a kindergarten on this site to serve the Desa.

Plate 9: Kindergarten TK Swa Dharma, Desa Peguyangan, Denpasar Barat

Desa Peguyangan Kaja, Denpasar Barat: There is an existing Kindergarten on the same site as a primary school and the Desa offices. The Kindergarten has 52 pupils and occupies what was the store of the primary school. The primary school has a total of 8 rooms plus a health room and a teacher's room. There are thus two rooms spare (including the store presently used by the Kindergarten) and the Desa would like to build another classroom, office, etc for the Kindergarten behind the existing classrooms. The space available however is only 7m wide and is therefore not wide enough for the construction of additional buildings. After discussions with the owner of the adjacent land, it was agreed that he would exchange a strip of land 6m wide along the school boundary in exchange for a piece of Desa land elsewhere. There would then be sufficient space for the additional rooms, new toilets, play space, etc. The Desa also has another site on which they would like to build a Kindergarten at a sub-village, Adat Peguyangan. The site is a clear section of land approximately 1,200m2 set back from the road. It was also confirmed that there was a site available on which to build a Kindergarten for Desa Peguyangan.

Desa Peguyangan Kangin, Denpasar Barat: There is an existing Kindergarten in the Desa but they would like to construct another one. There are two existing primary schools in the Desa within 500m of each other. One of them, SD No.9 Peguyangan Di Peninjoan has an average of 11 children per class and the other school has equally low enrolment. It was suggested that these two schools are consolidated and one of them renovated as a Kindergarten. If this is not possible, there is a site of 4,000m² on land next to one of the primary schools.

Desa Pandangsambian Kaja, Denpasar Barat: The Desa has one existing Kindergarten but requires another. There is a site available on Desa land of 2,000m².

Desa Padangsambian Klod, Kecamatan Denpasar Barat: There is an existing Kindergarten on a site 1,500m². It consists of one original classroom together with an office and a smaller classroom in an extension and has 85 pupils. The Desa would like to renovate the existing buildings (the extension is not very good quality) and build additional accommodation.

Desa Dauh Puri, Denpasar Barat: There is an existing Kindergarten TK Ekasilva that has 60 pupils in two classes which are held in two rooms of the first floor of a building at the back of the Banjar. There is no outside play-space only a small inside play- room. It was agreed that it was not feasible to renovate it but there is a problem finding another suitable site.

Plate 10: Kindergarten TK Ekasilva, Desa Dauh Puri, Denpasar Barat

TK Negeri Dembina in Denpasar was also visited. This acts as the model Kindergarten for Bali Province and the Head Teacher carries out a lot of training of Kindergarten teachers, both trained and untrained. The Kindergarten is very well built, equipped and run. It is on site of 1,600m² and has a very well equipped play area. It has a small house on the site for a caretaker which is unused and which the Kindergarten would like to convert into more useful accommodation.

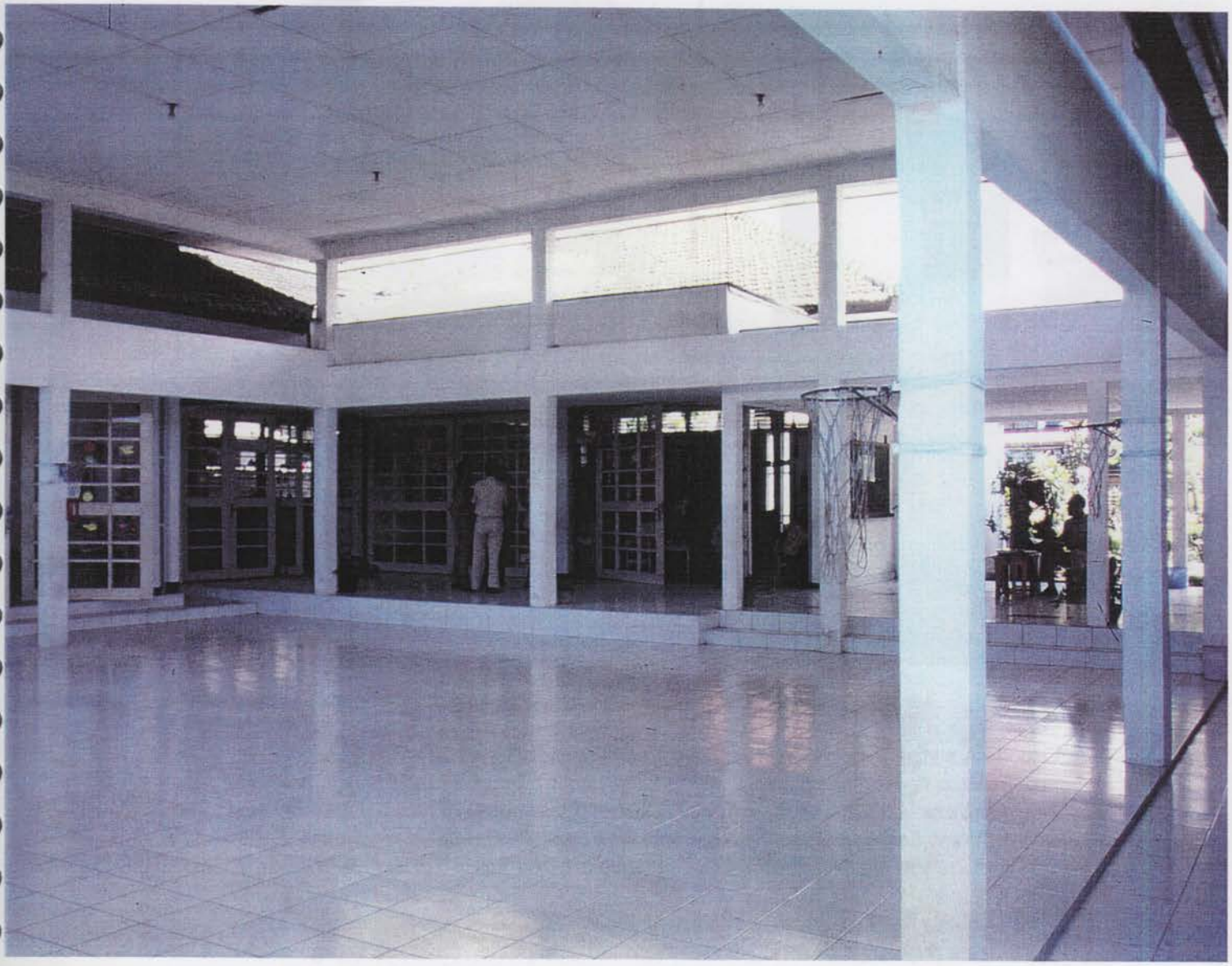


Plate 11: Kindergarten TK Negeri Dembina, Denpasar: Internal Play Space

2. BULALENG KABUPATEN

Bulaleng Kabupaten was visited on March 9 and March 10 1998 and several existing Kindergartens and proposed sites for new ones were visited:

Desa Bungkulan: At present a room in a dilapidated existing building next to the Desa office is used as a kindergarten. There are 35 children and two qualified teachers. More parents would like to send their children but there is not space. There is a proposed site for a new Kindergarten next to the new Desa meeting hall that is being constructed. The site is however much too small. Other possible sites will be discussed with the LKMD.

Plate 12: Kindergarten, Desa Bungkulan, Kabupaten Bulaleng

Desa Les: One classroom of an existing primary school (there are 2 primary schools on the site) is at present being used for a kindergarten. There is not enough space to extend the building to provide extra accommodation and play space is already extremely limited. There is no Desa land available for a new kindergarten and private land costs between Rp2 and 3million for 100m². There is a small site (400m²) available for use as a BKB/Posyandu Centre.

Desa Tembak: There are BKB/Posyandu programmes operating in all sub-villages. Buildings are therefore not required but support in the form of toys, equipment and supplementary food would be appreciated. There are 4 primary schools and a very good site on Desa land for a kindergarten in the middle of the village. It is next to a primary school and has a BKB/Posyandu Centre in one corner. There are dilapidated buildings that can be removed and the area of the site not including these is around 1,100m².

Desa Tegera: A new Polindes and toilets have been built on a site in the centre of the Desa and it was suggested that a new kindergarten could be built here. This site is however much too small. Another site on Desa land was suggested behind an existing primary school. It is only about 900m² but could probably be used.

Desa Sulanyah: There is an existing kindergarten with 40 pupils and 2 teachers paid by the government. It uses a room in a primary school and there is no room for expansion. There is no suitable site in the village itself but there is a large site (approximately 3,500m²) between two sub-villages that could serve both. The site is in open land and parts of it slope steeply.

Plate 13: Site for Kindergarten, Desa Tembak, Kabupaten Bulaleng

Desa Pankung Paruk: A Posyandu operates in the Banjar behind the Desa offices. The Desa owns a large site (approximately 2,500m²) on which it is building a large meeting hall. The approval of the LKMD will be sought to use part of this site (1,000m²) for a new kindergarten.

Desa Kalisada: An existing kindergarten with 30 pupils and one government teacher operates in the Banjar. There is no Desa land available in the village but they plan to buy private land that costs approximately Rp1million 100m².

Desa Patemon: There is no existing kindergarten and the two sites available, next to existing primary schools are very small. On one of these some existing buildings could be knocked down which would give an area of approximately 800m². There is also some other land adjacent to this that could possibly be added on.

Desa Temukus: The Desa had a kindergarten but it fell down 2 years ago! Two sites were suggested. The first one behind the Banjar was much too small. The second, a disused rice drying floor was very large (approximately 6,000m²) but been rented out to a local co-operative. The use of part of this site will be discussed with the LKMD.

The Government Kindergarten in Singaraja (see cover photograph) was also visited. The site is 940m² and the kindergarten operates two shifts and has a total of 90 children. It has 2 classrooms; a playroom with a teachers' room attached; a library/office; toilets and a small kitchen. There is a reasonable amount of play space in front of the school with play equipment but no space at the back of the buildings. There is also a small caretaker' house on the site. The school has 6 qualified teachers, plenty of books, toys and equipment and seems to be very well run.

ANNEX 2: APPROPRIATE DESIGNS: KINDERGARTENS & BKB/POSYANDU CENTRES

A. EXISTING DESIGNS FOR KINDERGARTENS

1. DIKDAS has prepared standard designs for 'Model' kindergartens to be built in those Provincial and District centres which do not at present have government kindergartens.

2. The model kindergartens are very large and require a site of 2,000m2. The accommodation is as follows:

a) 3 Classrooms area @ 64m²	192m²
b) Inside Play/Resource Room area	100m²
c) Head Teacher's office area	12m²
d) Teachers Room area	12m²
e) Administration Office area	12m²
f) Sick Room area	9m²
g) Kitchen area	9m²
h) Store area	9m²
j) Lavatories/Washroom area	28m²

Total area 383m²

3. Other accommodation is also provided including a security post, a large open covered play area, a covered waiting area and a house for the Head Teacher.

7. The total cost of all the buildings using the average rate for the three Project Provinces is estimated at Rp302,940,000.

B. REVISED DESIGNS FOR DESA KINDERGARTENS

1. The 'Model' kindergarten design was not felt to be appropriate, because of its size, for construction in the villages covered by the Project. Alternative designs were therefore prepared. These designs were based upon the accommodation provided in a standard 3-classroom primary school building. This usually consists of 3 Classrooms and an Office. The accommodation provided in the standard Desa Kindergarten is as follows:

a) 3 Classrooms area @ 57.4m²	172m²
b) Teachers Office area	16m²
c) Sick Room/Store area	12m²
d) Kitchen area (addition)	8m²
e) Store area (addition)	6m²
f) Toilets (where main water is assured) area	14m²

Total area 228m²

2. This basic design has been discussed with DIKDAS and approved by them. The cost of the building using the average rate for the three Project Provinces is estimated at Rp116,280,000. See Drg. KD1 for details of layout.

3. The most cost-effective way of providing a kindergarten would be to use an existing primary school building (see Annex: 4) and this layout is shown on Drg. KD1. Other layouts providing the same accommodation and which could be used on sites of the same size but of different shapes or orientation are shown on Drgs. KD2 and KD3.

4. The site to be provided for this standard Desa kindergarten has been agreed with DIKDAS as being at least 1,500m2. Different layouts for this size site, depending upon the orientation of the site, are shown on Drgs KD4 and KD5. These layouts also show the provision of pour-flush privies and wells for rural sites with no main water supply.

5. A kindergarten providing the standard accommodation on a smaller site (1,000m2) is shown on Drg. KD6. This is probably the smallest site on which a single-storey standard kindergarten should be built. It assumes that there is a dependable main water supply on the site. It would be difficult to provide pour-flush privies and a well on this size site.

6. In urban situations where land of the optimum size is sometimes not available it might be necessary to build a 2-storey kindergarten. The details of a 2-storey building are shown on Drg. KD7 and a site layout is shown on Drg. KD8. A minimum site area of approximately 800m2 is shown on this layout.

7. It would be possible to construct a 1-classroom kindergarten on a much smaller site as shown on Drg. KD9. This is not however recommended, as there is very little play space or space around the building. It could be used in rural situations where the numbers of children are small but sites in this situation would probably be larger anyway. In urban situations, where the numbers of children are likely to be large but Desa land is unavailable or private land expensive, some way must be found for purchasing adequate sites for kindergartens.

BKB/POSYANDU CENTRE DESIGN

1. As described in Annex 1, BKBs and Posyandus operate at present in a range of accommodation such as the Polindes house, the village clinic, the village Banjar and occasionally in a building built specifically for the purpose.

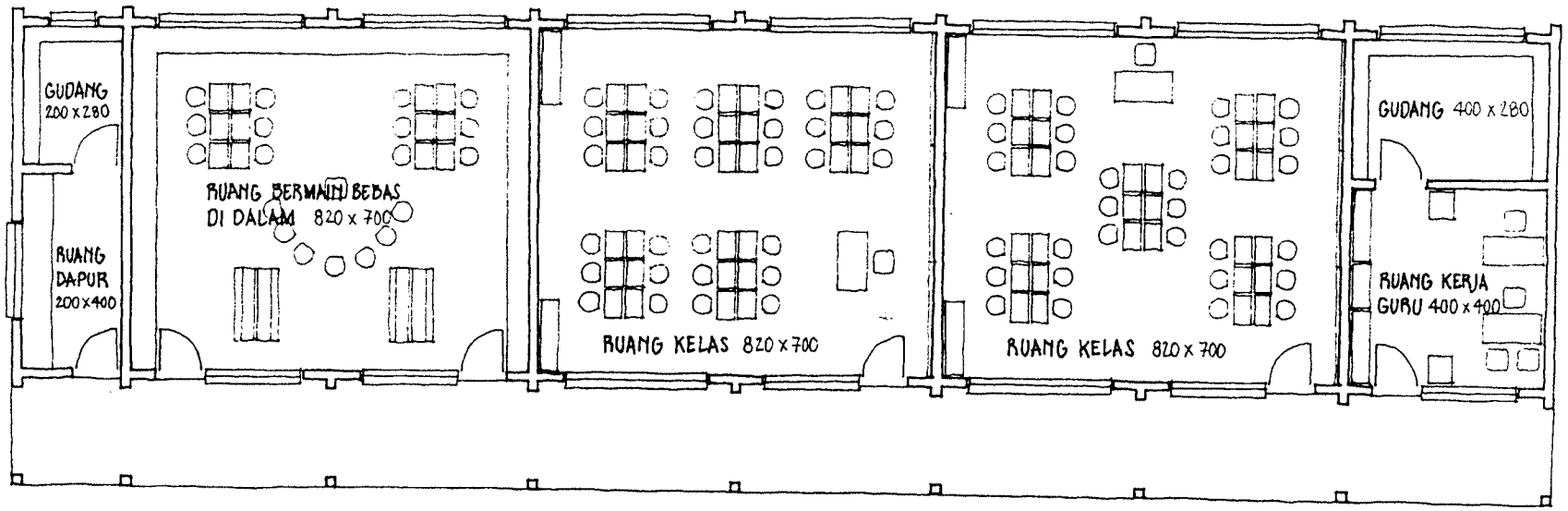
2. One such purpose-built centre was visited in Tangerang District (see Annex 1) and it was felt that the accommodation that it provided was appropriate for its purpose. The design for the new Centre has therefore been based upon this (see Drg. BKB1) The accommodation provided in the new centre is as follows:

a) A Meeting space area	32m²
b) A Consultation/Storage Room area	7m²
c) A Waiting space area	7m²
Total area	**46m²**

3. The Centre is designed as a large open space, without walls, to accommodate 25 mothers for meetings, demonstrations, etc; a small consultation/storage room for private consultations, simple examinations and storage of toys, equipment, etc.; and a small waiting space. The detail design of the Centre will vary in each Province to fit in with local, traditional design and construction.

4. For situations where an existing meeting place is used for BKB/Posyandu activities, the Consultation/Storage Room and Waiting space can be built as an extension to the existing building (see Drg. BKB1).

NEW KITCHEN EXT. EXISTING STANDARD 3 CLASSROOM PRIMARY SCHOOL BUILDING



SKALA 1:100

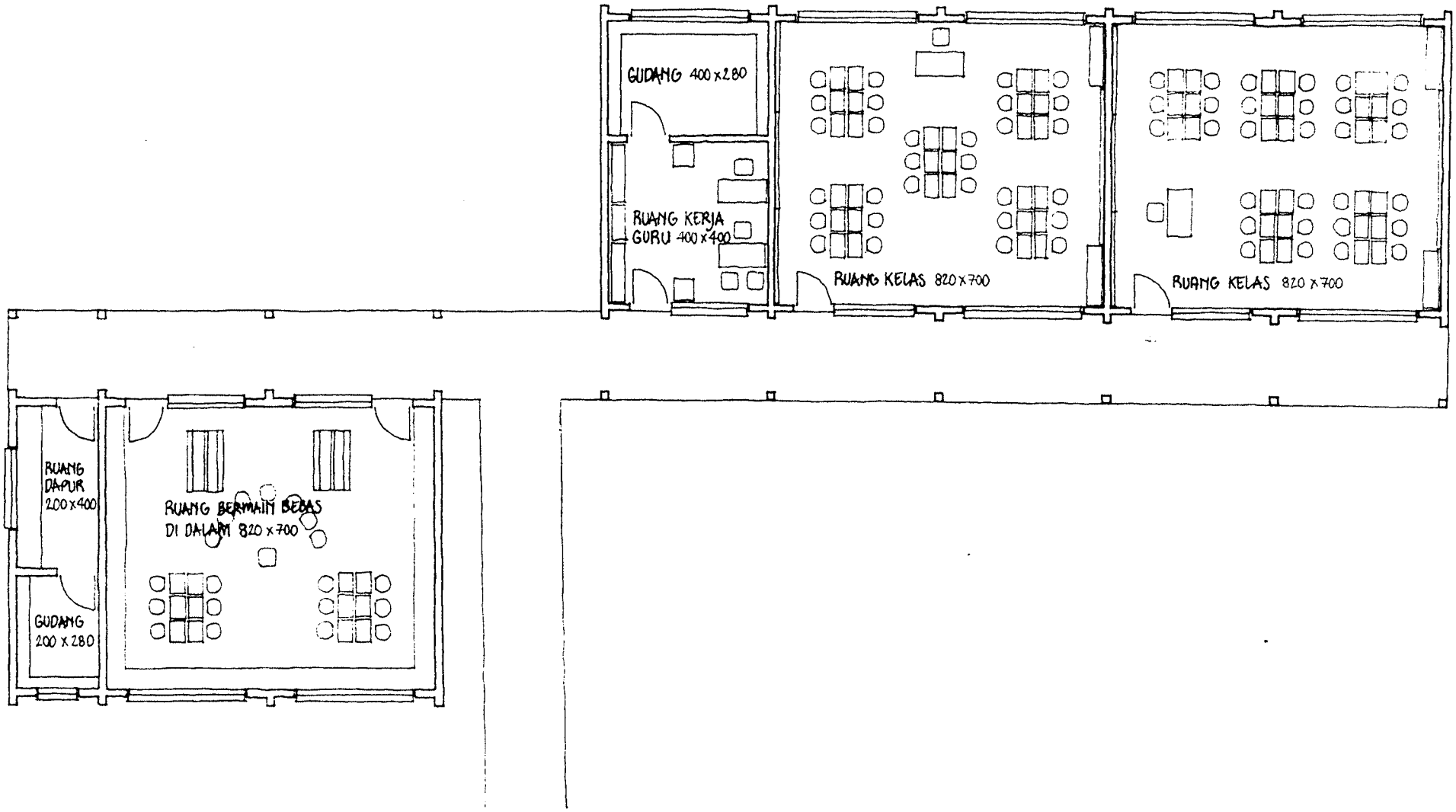
0 1 2 3 4 5 6 7 8 9 10m

UDARA

KD1

EXISTING 3 CLASSROOM PRIMARY SCHOOL BUILDING RENOVATED FOR USE AS KINDERGARTEN WITH ADDITIONAL KITCHEN & STORE. TOTAL NET AREA 214 m²

NOTE: NO MAINS WATER AVAILABLE ON SITE



SKALA: 1:100

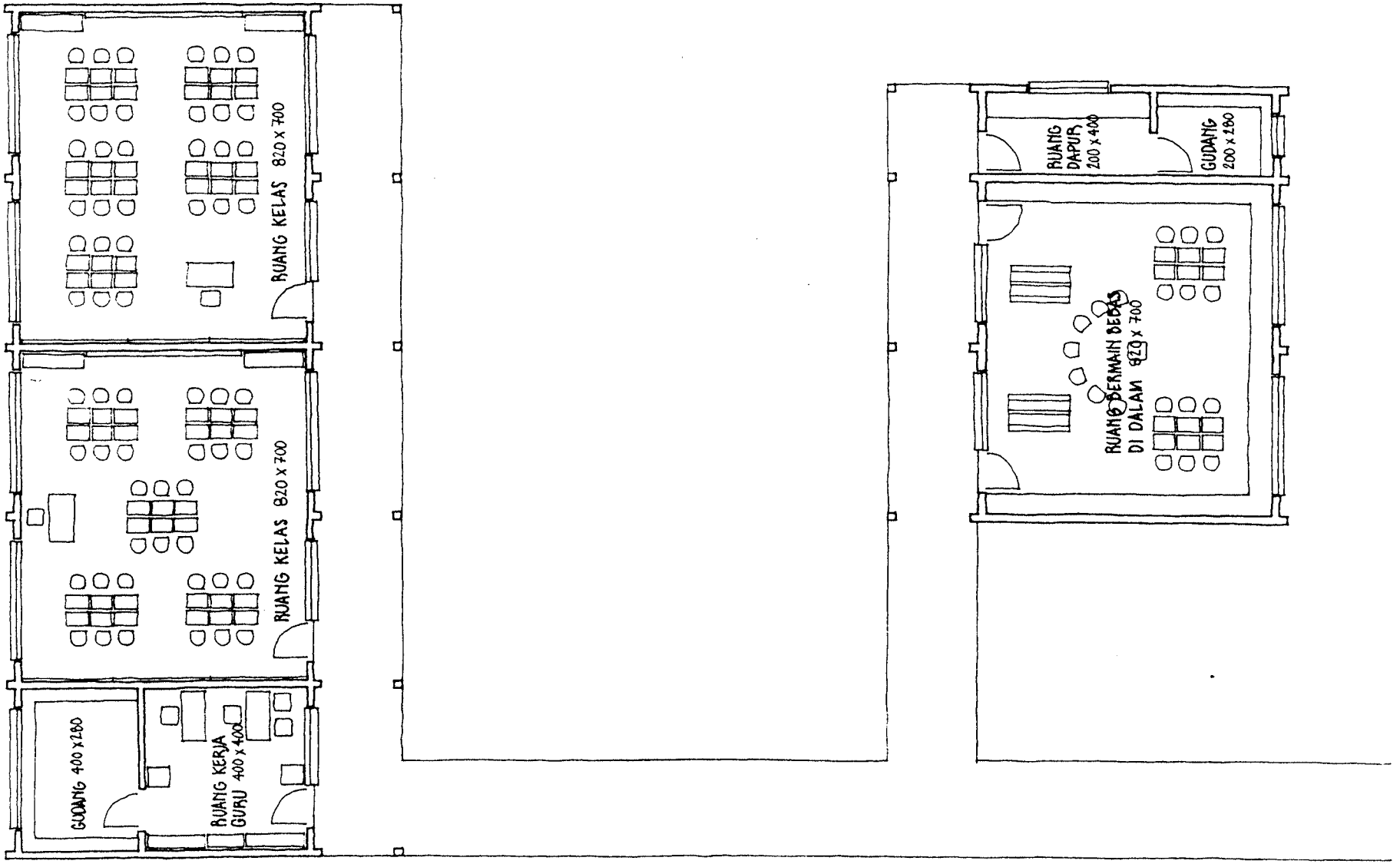
0 1 2 3 4 5 6 7 8 9 10m

UDARA

NEW VILLAGE KINDERGARTEN - 1
TOTAL NET AREA 214 m²

KD2

NOTE : NO MAINS WATER AVAILABLE ON SITE



SKALA: 1-100

0 1 2 3 4 5 6 7 8 9 10m

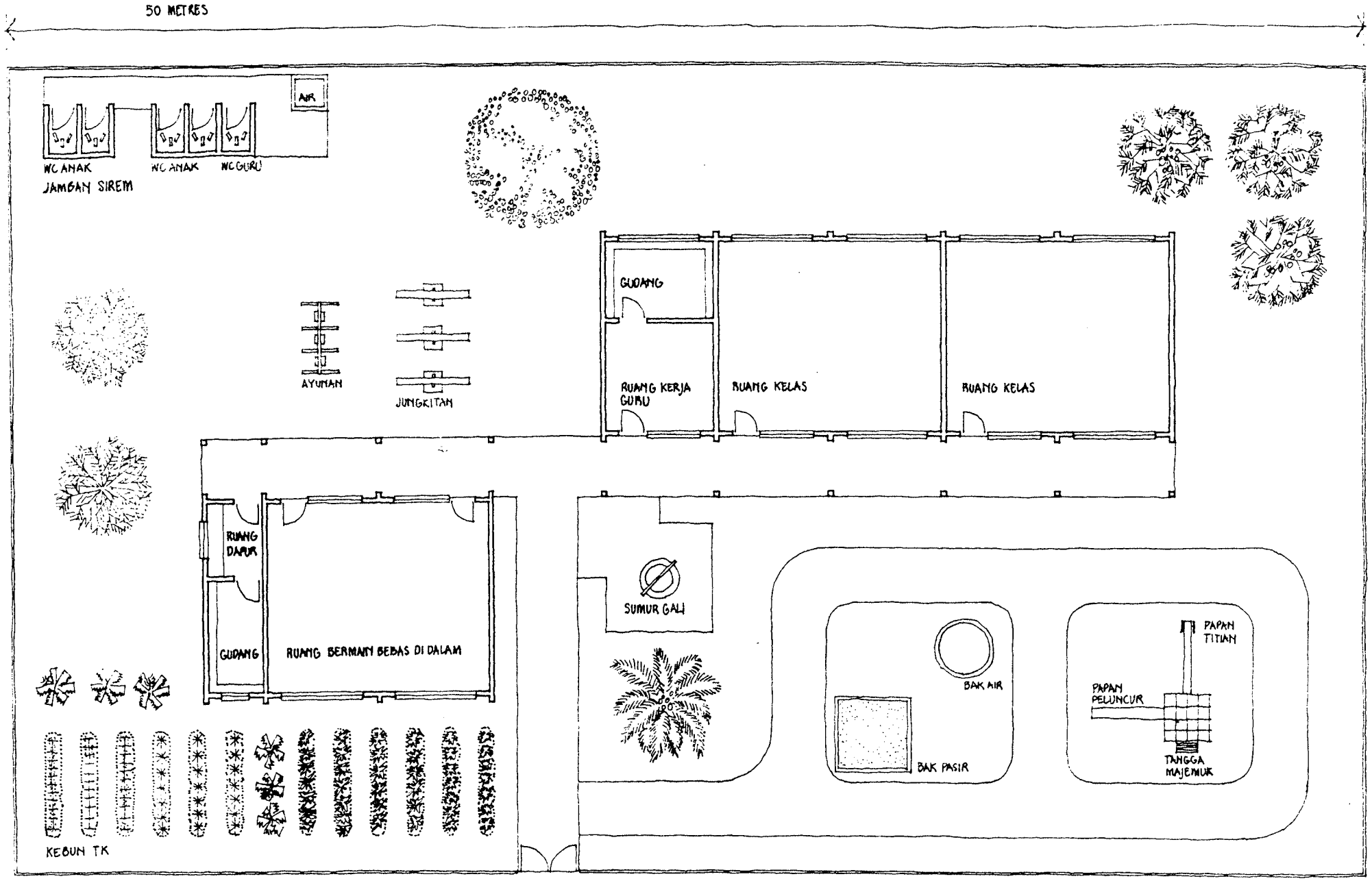
UDARA

UDARA

NEW VILLAGE KINDERGARTEN - 2
ALTERNATIVE ORIENTATION
TOTAL NET AREA 214 m²

KD3

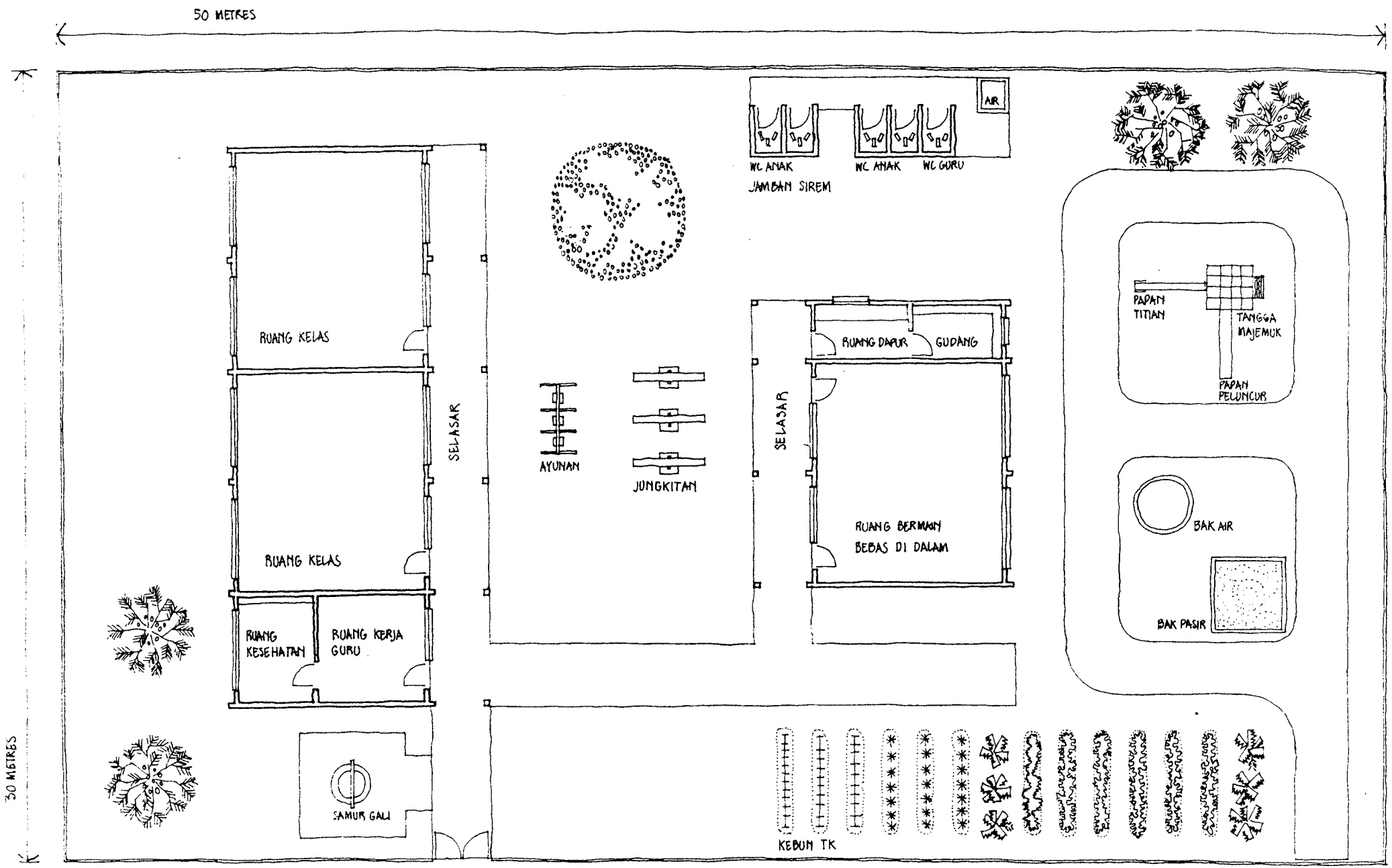
NOTE: NO MAINS WATER AVAILABLE ON SITE



STANDARD VILLAGE KINDERGARTEN - 1
SITE AREA 1500 m²

KD4

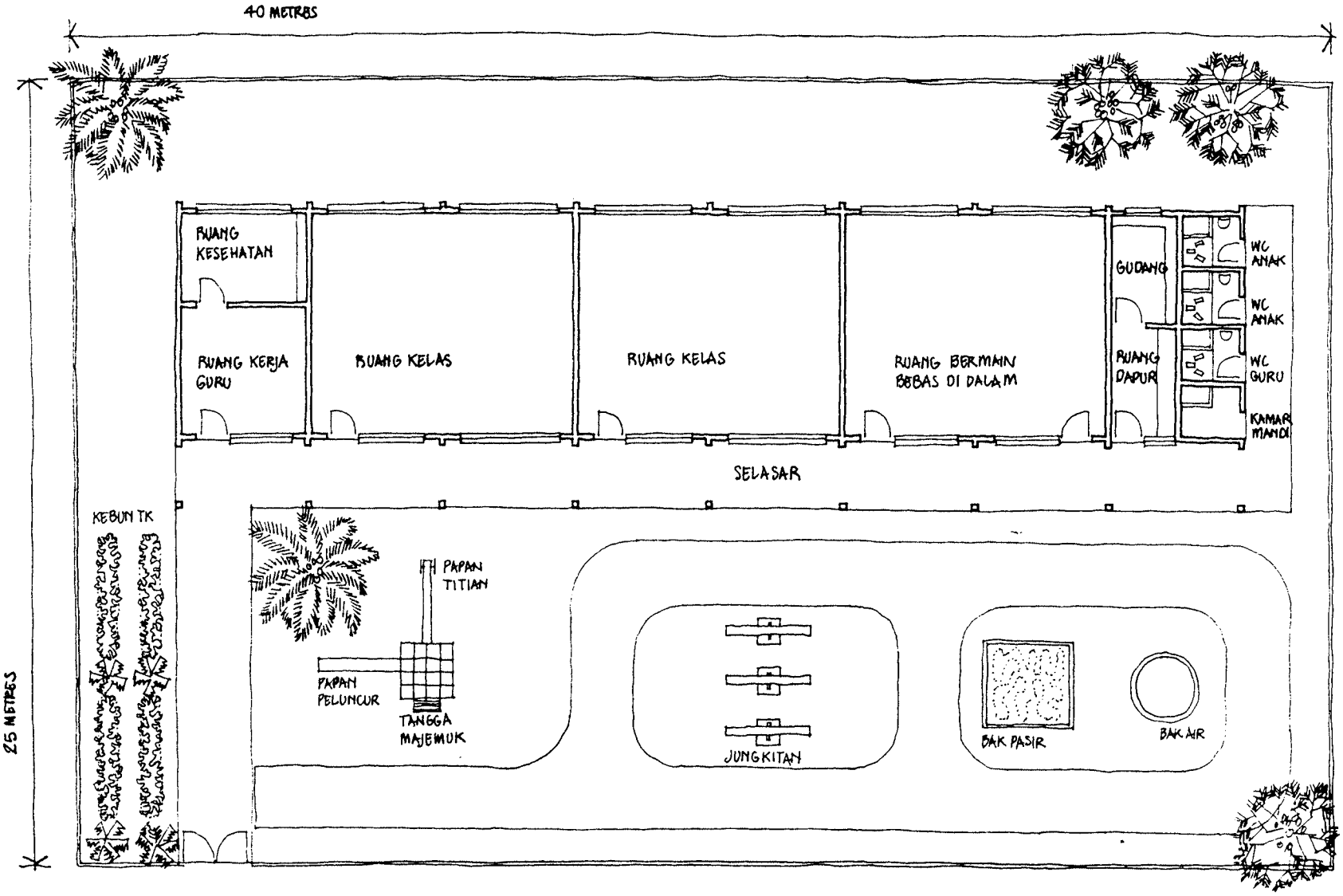
NOTE: NO MAINS WATER AVAILABLE ON SITE



STANDARD VILLAGE KINDERGARTEN - 2
SITE AREA 1500 M2

KD5

NOTE : NO MAINS WATER AVAILABLE ON SITE



SKALA: 1:300

0 1 2 3 4 5 6 7 8 9 10 M

UDARA

STANDARD VILLAGE KINDERGARTEN - 3
SITE AREA 1000 M²

KD6

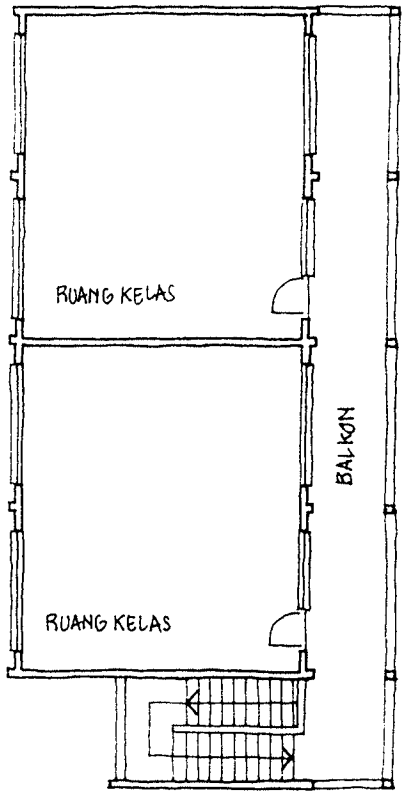
NOTE: MAINS WATER AVAILABLE ON SITE

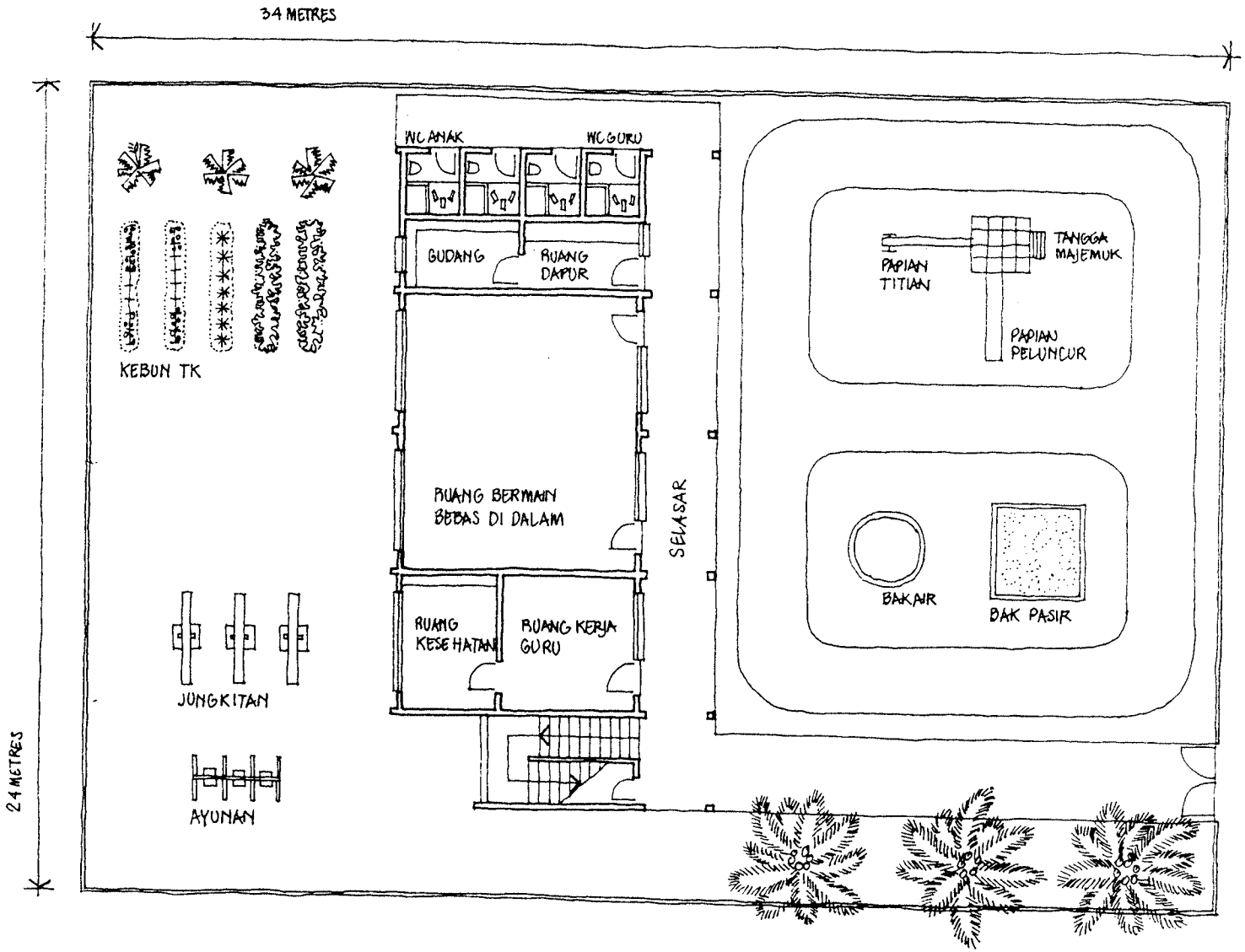
NEW URBAN KINDERGARTEN
TWO STOREY - TOTAL NET AREA 228 m2

KD7

NOTE: MAINS WATER AVAILABLE ON SITE

SKALA: 1-100





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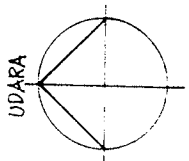
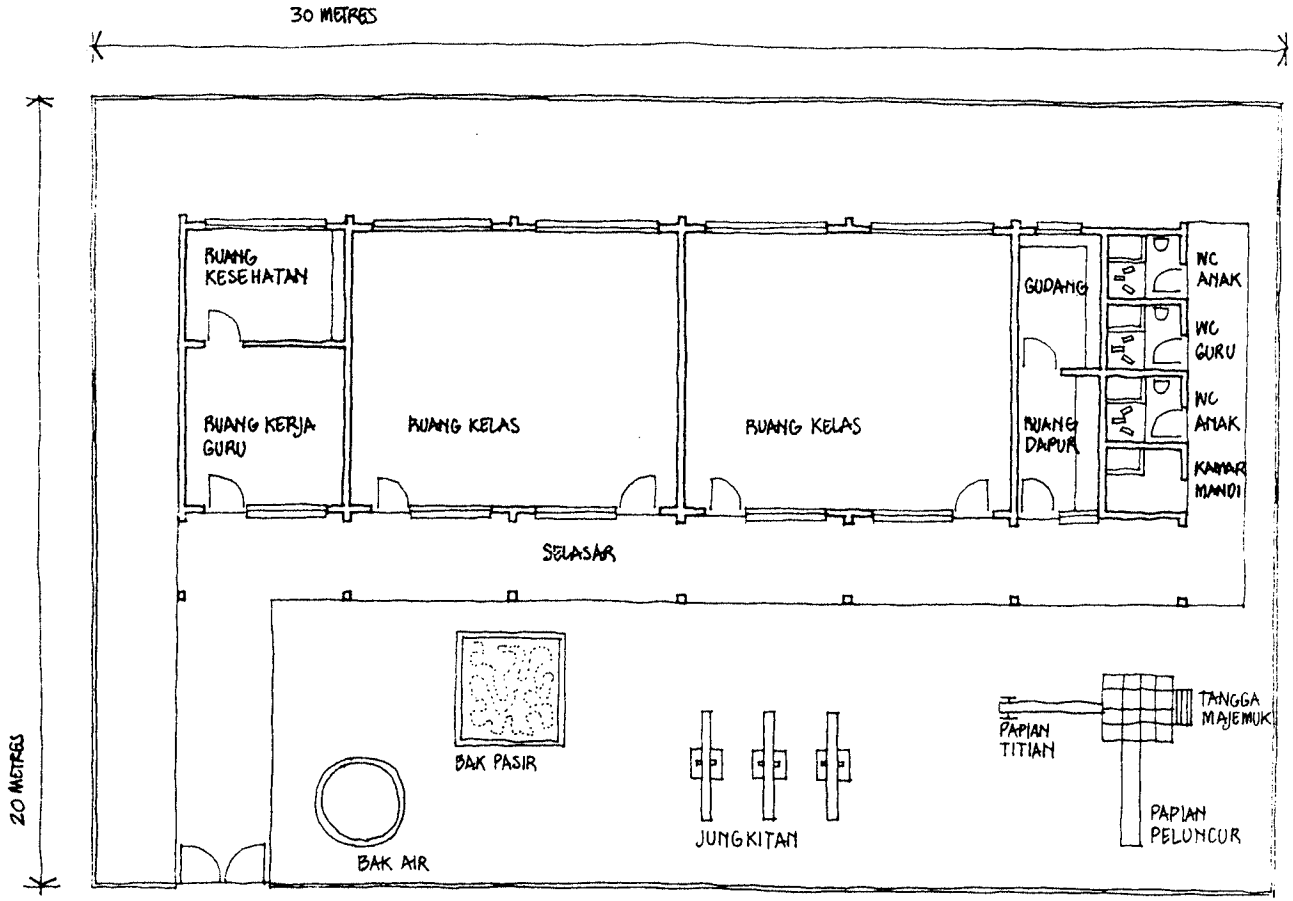


STANDARD URBAN KINDERGARTEN - 4
TWO STOREY - SITE AREA 816 m²

KD8

NOTE: MAINS WATER AVAILABLE ON SITE



SKALA: 1:300

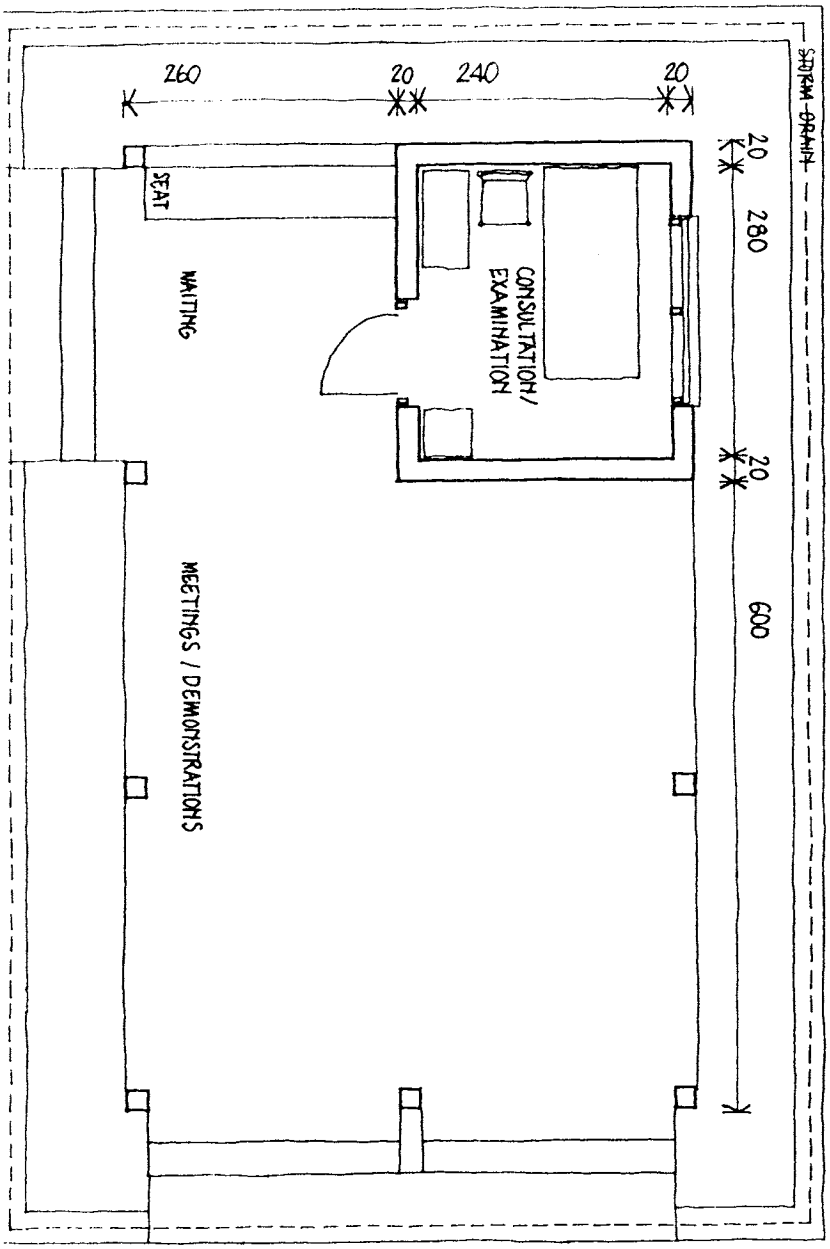
0 1 2 3 4 5 6 7 8 9 10 m

UDARA

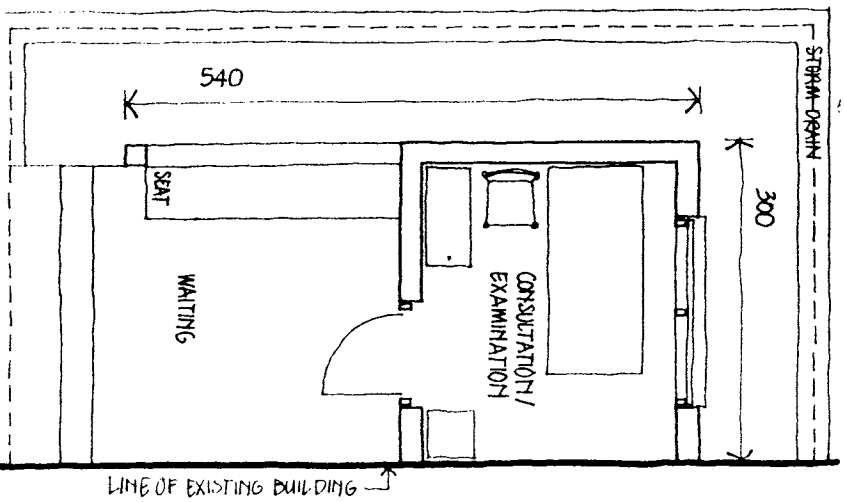
SMALL VILLAGE/URBAN KINDERGARTEN - 5
SITE AREA 600 M2

KD9

NOTE: MAINS WATER AVAILABLE ON SITE



NEW BKB/POSYANDU CENTRE



EXTENSION TO EXSTG. BUILDING

SKALA : 1-50

0 1 2 3 4 5m

BKB/POSYANDU CENTRE

BKB1 NEW BUILDING & EXTENSION TO EXISTING BUILDING

ANNEX 3: REHABILITATION OF EXISTING & CONSTRUCTION OF NEW KINDERGARTENS

A. Criteria for rehabilitation of existing and construction of new Kindergartens

The Kabupatens, assisted by the Province authorities, should establish the following:

1. The present and projected numbers of children of kindergarten age during the project.
2. The location of all existing kindergartens, present requirements for new kindergartens and projected future needs during the life of the project.
3. The condition of existing kindergartens.

1. Children of kindergarten age

a) In each Kecamatan the present number of pupils in each existing kindergarten, government, private and religious, should be determined by class, age and sex.
b) Estimates should be prepared of the numbers of kindergarten age children in each settlement in all Kecamatans through the life of the project and thus the annual need for new kindergarten places.

2. Location of kindergartens

a) A school map should be prepared for each Kecamatan showing its boundaries, rivers, bridges and main roads; the location of existing kindergartens; the location and catchment areas of all SD/MI schools, government, private and religious; and the size and location of all settlements, clearly indicating the ones that the schools serve.
b) The size, condition, ownership and adequacy of the sites of existing kindergartens should be established together with physical access i.e. whether by road or track, by vehicle or foot, ease of access, etc.
c) The possibility of consolidating existing primary schools with small numbers of pupils and in close proximity to each other should be investigated with a view to converting any redundant primary schools into kindergartens.
d) The availability, size and adequacy of sites should be established for those kindergartens that are required at present and those that will be required during the life of the project. The cost of land should be determined and whether communities are prepared to donate sites for kindergartens, with or without compensation.
e) The numbers and qualifications of teachers in existing kindergartens should be established and whether any teachers are available for any proposed kindergartens.

3. Condition of existing kindergartens

a) The date of construction of existing kindergartens should be established together with the numbers and types of all buildings i.e. classrooms, offices, stores, staff housing, etc.
b) The type of construction of all buildings should be listed together with their condition, any repairs that are required and the expected life of the building after repair.
c) The type, amount and condition of any furniture and equipment should be listed.
d) The existence of services such as main water and electricity should be noted and whether and when they operate. Any wells and their condition i.e. whether full or empty, covered or open or provided with a pump and storage tank, should be noted.
e) The type and number of toilets and their location and working order should be noted.

Note: All these activities should be completed during the first year of the project

B. Proposals for Kindergarten Renovation and Construction

When the location of existing kindergartens and primary schools, numbers of children, etc, have been established using the above criteria, the Kabupatens, assisted by the Provincial authorities, should prepare detailed proposals for the renovation of existing and construction of new kindergartens. These proposals should include the following:

1. The school map described above showing:

    a) The location and size of all existing kindergartens and any proposed new ones should be shown together with their catchment areas.

Note: The availability of teachers in each Kecamatan should be established once plans for the construction of new kindergartens have been completed. Plans should be made for training and employing new teachers.

2. Proposals for the renovation or rehabilitation of existing kindergartens:

    a) A schedule should be prepared for each existing kindergarten (or primary school that is being vacated for use as a kindergarten) that is being renovated, of all necessary repairs together with a programme showing how the work to all kindergartens will be completed, using LKMD and/or community participation, during the life of the project.

3. Proposals for the construction of new kindergartens or additional classrooms

    a) The existing designs for kindergartens have been reviewed by the Implementation Specialist in terms of the space standards used and the facilities provided and new designs have been agreed.
    b) Preliminary designs for new classrooms and other school buildings are attached showing a variety of site sizes and room layouts. Proposals should be prepared for the use of the various designs on the selected sites.
    c) Proposals for the construction of new kindergartens using LKMD and/or community involvement should be prepared.

4. Provision of furniture

    a) The existing designs for classroom furniture will be reviewed before the project commences. The sizes of furniture required in existing and future kindergartens will be established through a simple anthropometric survey of kindergarten age children in the three Provinces. The furniture requirements for existing and new kindergartens will also be established in terms of number and size.
    b) Standard designs for classroom furniture will be prepared in a range of sizes to suit the age groups of pupils in kindergartens. The furniture should be designed if possible for manufacture at the village level out of locally available materials.
    c) Working drawings and schedules of materials will be prepared to assist village carpenters to manufacture the furniture.
    d) Schedules of numbers and sizes of furniture required by existing and proposed new schools will also be prepared. A simple method should be proposed that would allow Head Teachers to dispose of and account for, broken and worn out furniture.

5. Provision of drinking water and toilets.

a) Adequate supplies of clean drinking water should be provided on sites that have no reliable main water supplies, through the construction of wells with covers and buckets or hand pumps.
b) Appropriate toilets should be provided on sites that do not have constant main water supplies through the construction of Pour-Flush Privies or through other means.

Note: All these activities should be completed during the first year of the project.

Consultant architects will be employed in each Province to prepare schedules of work for the renovation of existing kindergartens and primary schools; to prepare detail designs and working drawings for new kindergartens and kindergarten furniture; and to supervise the renovation of existing kindergartens and the construction of new ones in association with PUK. Standard designs for wells and latrines will be provided.

6. Maintenance of facilities.

a) Proposals should be made for giving head teachers and communities more autonomy in the maintenance of their kindergartens by giving adequate funding, based on numbers of pupils or classrooms, for repairs and maintenance, to schools or communities direct.
b) A maintenance handbook should be prepared to give guidance to head teachers on carrying out regular maintenance and minor repairs together with a simple reporting system by which the head teacher can report more serious maintenance problems and the measures taken to remedy them. The Kecamatan authorities can also use this to monitor the condition of kindergartens.
Proposals should be made for the future supervision and monitoring of maintenance and repair work by PUK in order to improve the quality of this work by possibly making the school responsible for paying for supervision. PU or any other supervising agency would be paid for their supervision visits after these have taken place.

Note: The maintenance handbook will be prepared by the consultant architects employed to design and supervise the buildings.

ANNEX 4: CONSTRUCTION IMPLEMENTATION

A. KINDERGARTENS

1. Preliminary designs for the Desa Kindergartens have been agreed with DIKDAS and final designs, working drawings and schedules of materials will be prepared for the construction of new and the renovation and extension of existing kindergartens in each Province.

2. Consultant architects will be contracted in each Province to:

a) Carry out site surveys when sites have been selected.
b) Carry out surveys of existing kindergartens.
c) Prepare final designs and layouts of buildings for each site, using the standard accommodation already agreed.
d) Prepare working drawings including separate foundation designs for each site if necessary, and schedules of materials.
e) Supervise construction on site.

3. It is intended to construct the new kindergartens and to renovate and extend existing ones using local craftsmen and labour with the LKMD as the implementing agency. Site layouts and working drawings of the buildings and schedules of materials will be supplied to the LKMD by the consultant architects. The LKMD will then enter into contracts for the supply of materials and into labour contracts with local suppliers and artisans, assisted and advised by the architects. Simple contracts will be prepared by the architects.

4. The consultant architects will closely supervise construction and renovation on all sites. Properly qualified supervisors will visit each site at least twice a week to assist and advise the contractors building the kindergartens and to ensure that they are built to an acceptable standard.

5. The supervisors will provide weekly reports on progress, problems, etc at all sites to the architects and the architects will provide monthly progress reports to the Project Implementation Unit.

6. The architects will be supplied with designs for wells and latrines prepared by PU Cipta Karya and UNICEF and these will be built into the design of facilities where main water supplies are not available.

7. The architects will also be supplied with the results of the anthropometric surveys and with preliminary classroom furniture designs. Final designs, working drawings and schedules of materials will be prepared for the furniture by the architects and supplied to LKMD in order that they can contract out the manufacture of furniture to local carpenters. The manufacture of furniture will be supervised by the architects' field supervisors.

8. The architects will also prepare maintenance handbooks to be used in a system of simple preventative maintenance for the kindergartens.

B. BKB/POSYANDU CENTRES

1. Preliminary designs have also been completed for the BKB/Posyandu Centres (see DRG BKB No.1) and final designs, working drawings and schedules of materials will be prepared for the construction of new Centres in each Province.

2. Consultant architects will be contracted in each Province to:

a) Carry out site surveys if necessary when sites have been selected.
b) Prepare final designs and layouts of buildings for each site, using the standard accommodation already agreed.
c) Prepare working drawings and schedules of materials.
d) Supervise construction on site.

3. It is intended to construct the BKB/Posyandu Centres in a similar way to the kindergartens, using local craftsmen and labour with the LKMD as the implementing agency. Site layouts and working drawings of the buildings and schedules of materials will be supplied to the LKMD by the consultant architects. The LKMD will then enter into contracts for the supply of materials and into labour contracts with local suppliers and artisans, assisted and advised by the architects. Simple contracts will be prepared by the architects.

4. The consultant architects will again closely supervise construction on all sites. Properly qualified supervisors will visit each site at least twice a week to assist and advise the contractors building the Centres and to ensure that they are built to an acceptable standard.

5. The supervisors will provide weekly reports on progress, problems, etc at all sites to the architects and the architects will provide monthly progress reports to the Project Implementation Unit.

C. TERMS OF REFERENCE FOR CONSULTANT ARCHITECTS

1. The firm of Consultant Architects selected for the project will have a properly constituted permanent office, fully equipped and permanently staffed.

2. The Consultant Architects will be professionally qualified and have relevant experience in the design and construction of low-cost, locally acceptable (and preferably educational) buildings and in the preparation and management of building contracts preferably in the rural areas. They should also have access to qualified engineering support if any structural design is necessary.

3. The Consultant Architects will have, or will have access to, sufficient numbers of qualified supervisory staff. The supervisors should have, at a minimum, a senior secondary school certificate in a building trade and have at least 6 years experience in supervising construction projects, preferably in the rural areas.

ANNEX 5: INCREASING ACCESS TO KINDERGARTENS & BKB/POSYANDU PROGRAMMES: A COST EFFECTIVENESS STUDY

A. PROJECT OBJECTIVES

1. The principal objectives of the project are to assist the Government of Indonesia in its adoption of an integrated Early Child Development policy framework providing services for child survival and children's cognitive and psycho-social development and to improve the quality, access and utilization of ECD programmes, particularly those targeted at the poor. In order to improve access to ECD programmes, new Kindergartens and BKB/Posyandu Centres will be built or existing buildings extended to accommodate their activities.

B. ACCESS TO KINDERGARTENS

1. Access to Kindergartens can be increased by a variety of means: the renovation and extension of existing Kindergartens; the construction of new Kindergartens; or through the conversion of existing buildings such as primary schools into Kindergartens.

2. The cost of renovation and construction of Kindergartens will vary between Provinces and between the different Kabupatens within the Provinces. The highest construction rates for single-storey buildings in the Project Provinces are as follows: West Java Province: Rp503,000 m^2; South Sulawesi Province: Rp529,000 m^2; Bali Province: 494,000 m^2 an average of approximately Rp510,000 m^2.

3. DIKDAS have plans to construct model Kindergartens in each Province and in most Districts that do not already have them. Designs have been prepared for these model Kindergartens and the accommodation provided is as follows: 3 classrooms; an inside-play/resource room; an office for the head teacher; a teachers room; and admin office; a sick room; a kitchen; a store; flush lavatories; and a security room. The net area of this accommodation is 383 m^2. The size of the site is set at 2,000 m^2 and other accommodation is provided such as a large covered outside play area (120 m^2), a head teacher's house, etc.

4. It was felt that the size of the site and accommodation was not appropriate for Kindergartens to be built in small villages and both have been, with the agreement of DIKDAS, reduced. The optimum size of the site for a Desa Kindergarten has therefore been reduced to 1,500 m^2 and even less in certain circumstances (see below). The accommodation to be provided has also been reduced to something more appropriate: 2 classrooms (one for 5- year old and one for 6-year old children); an inside-play/resource room; a teachers' office; a sick room; and a small kitchen and store. Flush lavatories will be provided on sites with guaranteed supplies of main water. On other sites, pit-latrines or pour-flush privies and wells will be provided. The net area for a Desa Kindergarten without flush toilets is 214 m^2 (see Drgs. KD1, 2 &3).

2. The cost of land will have a great influence on the type of accommodation that is to be constructed. In urban areas such as Denpasar and Tangerang, undeveloped land is at a premium, is very expensive and many Desas have very little community land. In these situations it could be necessary to either reduce the size of the Kindergarten; reduce the size of the external playground; or build the Kindergarten on two-stories. The minimum size of a site for a Desa Kindergarten with 2 classrooms, play/resource room, office, sick-room, kitchen and store in a Desa has been set at 1,500 m2 (see Drgs KD4 & 5). This will allow adequate space for the buildings, play areas and gardens and also

for optimum separation between a well and a latrine if these are provided. It is possible to reduce this area if necessary to around 1,000 m2 by reducing the garden and play area (see Drg. KD 6). If the area is reduced below this, it will then become necessary to construct the Kindergarten on two floors. It would be possible to construct a Kindergarten with reduced accommodation, for instance in a village that only requires a one-classroom kindergarten, on a smaller site (see Drg. KD9). The cost of two-storey construction will obviously be much greater than that for single-storey construction and two-storey Kindergartens should only be built where absolutely necessary. The highest costs of building simple two-storey buildings in the Project Provinces are as follows: West Java Province: Rp575,000 m^2; South Sulawesi Province: Rp642,000 m^2; and Bali Province: Rp542,000 m^2; giving an average of Rp586,000 m^2.

3. An alternative to constructing new Kindergartens would be to use existing primary school classroom units that are no longer required. Because of the way primary schools have been funded, it is known that there are many redundant schools. In the West Java Basic Education a school mapping and primary school consolidation exercise is being carried out which should reduce the total number of primary schools. During the visits to existing Kindergartens and proposed sites (see Annex: 1) several cases of under-utilised primary schools were seen. A 3-classroom primary school building provides much the same accommodation as that required for a new Desa Kindergarten. Therefore, if these buildings were renovated and if necessary extended for use as Kindergartens, the cost of providing a Kindergarten could be much reduced. The cost of renovating a 3-classroom unit in West Java Province was estimated last year at Rp40million. If this is increased by a factor of 20% to allow for inflation, this year's cost would be Rp56million. The building would need to be extended to accommodate a small kitchen and store and toilets (see Drg. KD1). The average cost of this in West Java would be Rp14.28million. The total cost of renovating and extending a three-classroom primary school unit would therefore be Rp70.28million.

Type of Kindergarten	Cost
DIKDAS Model Kindergarten (main kindergarten building only)	Rp195.330,000
2-Storey Urban Kindergarten	Rp133,608,000
Village Kindergarten	Rp116,280,000
Renovated & extended Primary School building	Rp 70,280,000

Table 1: Comparative costs of providing Kindergartens

8. It can be seen therefore that the most cost effective way of providing new Kindergartens is through the use of surplus primary school buildings and this option should be thoroughly explored when preparing the detailed District plans. Where these buildings are not available, the best option is the single-storey Desa Kindergarten. In urban situations however, the sites available could be too small for a single-storey building and a two-storey Kindergarten will have to be built even though these cost a great deal more. The demand for Kindergartens in urban Desas is likely to be high and these Desas should not be deprived of Kindergartens merely because of high land costs; a way has to be found to overcome this problem.

C. ACCESS TO BKB/POSYANDU PROGRAMMES

1. As described in Annex 1, BKB/Posyandu programmes are at present held in a variety of locations such as:

   a) The house of the Polindes (the village mid-wife).
   b) The Banjar (the village meeting place in Bali).
   c) The village Poskesdas (clinics)
   d) Purpose built centres of various sizes.

2. From discussions held in the Districts and villages visited, the accommodation required in a BKB/Posyandu Centre is: a covered (but not necessarily enclosed) meeting space large enough to accommodate 25 mothers; a room for consultations, simple examinations and storage of toys and equipment; and a small waiting area.

3. There are various ways of increasing access to BKB/Posyandu programmes such as:

   a) By building an extension to a Polindes. There are problems with this solution however. The Polindes is usually the house belonging to the village mid-wife and there is often not very much room for an extension. There is also the problem of what happens if the mid-wife moves or retires.
   b) By building a complete new Centre (Area: 46 m^2 see Drg. BKB1) if land is available.
   c) By extending an existing meeting place, such as a Banjar in Bali, by providing a Consultation/Storage Room and Waiting Area (Area: 14 m^2 see Drg. BKB1).

4. The square metre cost of constructing a complete new BKB/Posyandu centre should not be the same as the cost of building a Kindergarten for instance, because the main meeting space does not have walls, windows, doors, etc. The cost could therefore be reduced, probably by a factor of 20% giving an average cost of Rp408,000 m^2. The cost of just building the consultation/storage room and waiting area would however be higher at Rp510,000 m^2 because it has walls, doors and windows. The costs of the two alternatives are shown in Table 2.

Type of Building	Cost
BKB/Posyandu Centre	Rp18,768,000
Extension to Existing Building	Rp 7,140,000

Table 2: Comparative costs of BKB/Posyandu Centres

5. It can be seen therefore that the most cost-effective way to provide increased access to BKB/Posyandu programmes would be to extend existing buildings already used for the programmes with Consultation/Storage Rooms and Waiting Areas where these are not already in place and where there is land available. This is quite often the case in for instance Bali, where the Banjar provides accommodation for meetings but not storage or consultation rooms.

6. Where there are no existing buildings available for extension, simple BKB/Posyandu Centres as shown on Drg. BKB1, will have to be built and sites will have to be made available by the Desas.

ANNEX 6: CLASSROOM FURNITURE FOR KINDERGARTENS

A SURVEY OF THE STANDING HEIGHT OF KINDERGARTEN PUPILS IN BALI, WEST JAVA & SOUTH SULAWESI PROVINCES

1. It is important that Kindergarten children have furniture that fits them and is comfortable in order that they can concentrate on what is happening in the classroom. It is proposed therefore that a range of standard furniture is designed to suit children of the Kindergarten age groups. In order to do this, a survey of the standing height of children of ages 4 and 5 will be carried out. A random sample of approximately 100 pupils of each sex in each age group should be taken ie. 100 girls and 100 boys age 4 and 100 girls and 100 boys age 5 and their standing height measured. Using these standing heights, the furniture designer can convert the ratios of part-body measurements to standing height into actual measurements for each furniture size using a standard table of ratios.

2. A sample of Kindergarten children from urban, semi-urban and rural districts should be used if possible for the survey. In order to do this samples of children from all the Kabupatens included in the project should be taken.

3. The method of measurement to be used is as follows:

   a) A measuring scale marked with horizontal lines at 1cm intervals or a tape measure is fixed to a wall or door to a height of approximately180cm.
   b) Each child is measured standing barefoot with his or her back against the wall. He/she has to stand erect and look straight ahead making four points of contact with the wall, the back of the head, the shoulders, the buttocks and the heels.
   c) Using a right-angle square, the teacher places the straight edge on top of the child's head and the other straight edge against the measuring scale on the wall. The height of the child is taken as the reading on the underside of the horizontal edge. Measurements should be taken to the nearest centimetre.

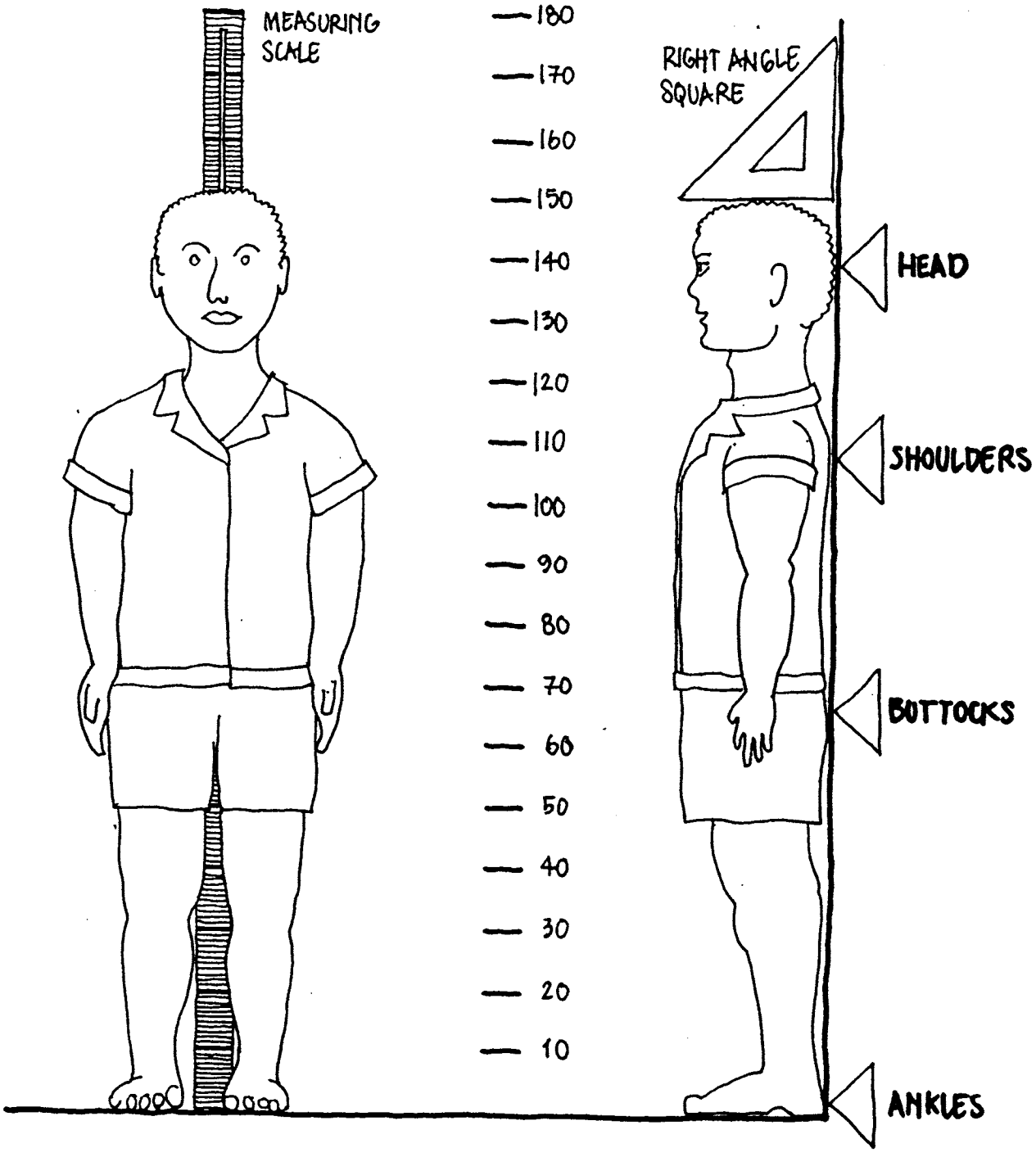
   See illustrations showing the method on Page 2: Measurement of Standing Height

4. The heights of the children should be recorded on Form A: 'Standing Height Measurement & Average Standing Height: Calculation by Kindergarten', which is attached. One form should be used for each class and each age group. Boys should be measured separately to girls. A worked example for a typical Kindergarten is given on Page 3.

5. The Average Standing Heights from these forms should then be transferred to Form B: 'Average Standing Height: Calculation by Kabupaten' which is also attached. Separate forms should be used for boys and girls. A worked example for a typical Kabupaten is given on Page 4.

6. All the completed Form Bs should be collected by the Province and Average Standing Heights then calculated for all children of both sexes and age groups in the Province. Using these heights and the ratios given in the UNESCO leaflet attached, a range of standard furniture in one or two sizes can be designed to suit all Kindergarten children.

METHOD OF MEASURING STANDING HEIGHT



FORM A: STANDING HEIGHT MEASUREMENT & AVERAGE STANDING HEIGHT CALCULATION BY KINDERGARTEN

KINDERGARTEN: Serangan			**KECAMATAN: Denpasar Selatan**		
CLASS: 2			**SEX: Female**		
No.	Age	Standing height in cm	No.	Age	Standing height in cm
1	**5**	**99**	31		
2	**5**	**98**	32		
3	**5**	**100**	33		
4	**5**	**101**	34		
5	**5**	**98**	35		
6	**5**	**98**	36		
7	**5**	**100**	37		
8	**5**	**101**	38		
9	**5**	**97**	39		
10	**5**	**98**	40		
11	**5**	**101**	41		
12	**5**	**102**	42		
13	**5**	**99**	43		
14	**5**	**99**	44		
15	**5**	**97**	45		
16	**5**	**100**	46		
17	**5**	**99**	47		
18	**5**	**98**	48		
19	**5**	**99**	49		
20	**5**	**97**	50		
21	**5**	**101**	51		
22	**5**	**100**	52		
23	**5**	**102**	53		
24	**5**	**97**	54		
25	**5**	**101**	55		
26	**5**	**99**	56		
27	**5**	**96**	57		
28	**5**	**98**	58		
29			59		
30			60		

Group boys and girls separately and use separate forms for each sex.

The average standing height for 5-year old girls at TK Serangan is calculated as follows:

$\frac{\text{Total for age group}}{\text{Number in sample}}$ = Average Standing Height Total for 5-year old girls $\frac{2775}{28}$ = 99.1cm AST

FORM B: AVERAGE STANDING HEIGHT CALCULATION BY KABUPATEN

PROVINCE: BALI		**KABUPATEN: Denpasar**	
AGE GROUP: 5 years		**SEX: Female**	
KECAMATAN: Denpasar Selatan			
Kindergaten:	**Serangan**	**AST:**	**99.1**
	Sidakarya		91.5
	Sesetan		90
	Pedungan		89.5
	Panjer		92
	Pemogan		93.5
	Sanur Kauh		89
		Total	644.6
KECAMATAN: Denpasar Timur			
Kindergarten:	Dangin Puri Klod	**AST:**	89.6
	Kesiman Kurtalangu		90
	Kesiman Petilan		92
	Penatih		88
	Penatih Dangin Puri		90
	Sumerta Kaja		91
	Dangin Puri Kaja		90
	Dangin Puri Klod		89
	Dangin Puri		89
		Total	808.6
KECAMATAN: Denpasar Barat			
Kindergarten:	Dangin Puri Kauh	**AST:**	91.2
	Ubung Kaja		90
	Peguyangan		90
	Peguyangan Kaja		89
	Padangsambian Kaja		88.5
	Padangsambian Klod		88
	Pemecutan Klod		90
	Padangsambian		92
		Total	718.7
		TOTAL:	**2165.3**

The average standing height for 5-year old girls in Denpasar Kabupaten is calculated as follows:

$$\frac{\text{Total for age group}}{\text{Number of TKs}} = \text{Average Standing Hgt. Total for 5-year old girls } \frac{2171.9}{24} = 90.5\text{cm AST}$$

The process should be repeated for all Kabupatens and the AST for all 5-year old girls in the Province should then be calculated

FORM A: STANDING HEIGHT MEASUREMENT & AVERAGE STANDING HEIGHT CALCULATION BY KINDERGARTEN

KINDERGARTEN:			**KECAMATAN:**		
CLASS:			**SEX:**		
No.	Age	Standing height in cm	No.	Age	Standing height in cm
1			31		
2			32		
3			33		
4			34		
5			35		
6			36		
7			37		
8			38		
9			39		
10			40		
11			41		
12			42		
13			43		
14			44		
15			45		
16			46		
17			47		
18			48		
19			49		
20			50		
21			51		
22			52		
23			53		
24			54		
25			55		
26			56		
27			57		
28			58		
29			59		
30			60		

Group boys and girls separately and use separate forms for each sex.

The Average Standing Height for the age group in the Kindergarten is calculated as follows:

$$\frac{\text{Total for age group}}{\text{Number in sample}} = \text{Average Standing Height}$$

FORM B: AVERAGE STANDING HEIGHT CALCULATION BY KABUPATEN

PROVINCE:		KABUPATEN:	
AGE GROUP:		SEX:	
KECAMATAN:			
Kindergaten:		AST:	
KECAMATAN:			
Kindergarten:		AST:	
KECAMATAN:			
Kindergarten:		AST:	
TOTAL:			

The average standing height for the age group in the Kabupaten is calculated as follows:

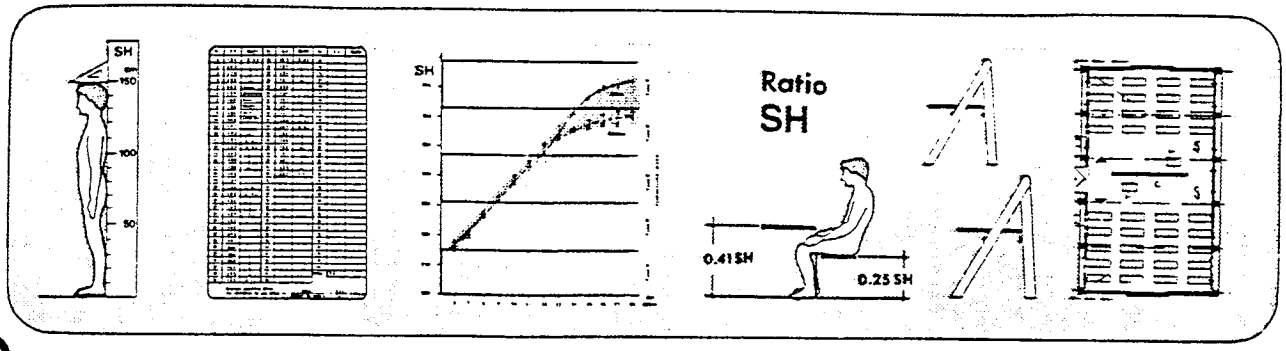
$$\frac{\text{Total for age group}}{\text{Number of TKs}} = \text{Average Standing Height}$$

The process should be repeated for all Kabupatens and the AST for the age group in the Province should then be calculated

EDUCATIONAL BUILDING DIGEST 18
Unesco Regional Office for Education in Asia and the Pacific
Bangkok, Thailand

ANTHROPOMETRIC DATA AND ITS USE FOR EDUCATIONAL BUILDING AND FURNITURE DESIGN

by Evelyn Tan Guat-Lin



INTRODUCTION

In the early 1970s data on the body sizes of children in 11 Asian countries, which had been collected were analyzed and published (Unesco, 1973, 1974, 1975). Since then more recent information on standing heights of these and seven other countries has been received.

The purpose of this paper is to provide the updated anthropometric data in a useful form for designers of buildings and furniture and to provide a method of deriving anthropometric data which may be used for countries where data on children's body sizes are not available. A technique is also presented on the application of such information in furniture design.

The comfort of the student is one of the many factors likely to increase the learning effectiveness and he is comfortable in furniture that is adapted to the size of his body. If furniture is to be correctly designed, then the body measurements of the users must be known. This matching of furniture to the user's body measurements is the key issue because badly-sized furniture can affect the physical development of students as well as their academic performance.

Since the times of Vitruvius, it has been established that there is a constant ratio between the dimensions of parts of the body and the standing height (Martin, 1960). This is true in any generally related ethnic groups. A study of survey materials from various countries in the Asian region showed that there were generally no important differences in the ratios of the body-parts from one country to another. Thus, the most important dimension is that of standing height and using this system of proportion, it is possible to deduce part-body measurements from the standing height.

Some of the dimensions commonly used for the design of educational furniture and buildings are shown in Figure 1 and listed in Table 1. These dimensions are all given as ratios to standing height. Besides the conventional postures of standing and sitting, other seating postures traditional to the region-"lotus", "sideways tuck" and "squatting" are also included.

All body dimensions increase from birth to late teens or early twenties. Between the ages of five and fourteen years, children of both sexes grow very rapidly. Therefore, in the design of furniture for schools, a variety of furniture sizes would be necessary in order to cater to the differences in body sizes with age. At some stage in the design process, a judgement has to be made on the grouping of elements of approximately similar size and the subsequent use of the elements by children from several age groups. Thus, it is also necessary to know a series of part-body measurements corresponding to the different age groups for which the furniture is to be designed.

There is a continuing worldwide trend toward and increase in height and most other body dimensions. For example, a review of data on Japanese male children revealed that the standing height and weight had increased consistently over a period of 30 years (Figure 2). This secular increase in size may be attributed to a number of factors - viz. the increase in per capita income, and availability of protein food, coupled with a general increase in educational level of mothers, who essentially have become more aware of nutritional values, have improved eating habits and the general nutritional status of the children with each decade.

It should be noted that data received from some Asian countries is more than ten years old. It is possible that secular changes in size may be large enough to invalidate anthropometric surveys of earlier decades. Thus, it is advisable for these countries to conduct another anthropometric survey.

Figure 1. Dimensions used for design of educational furniture and buildings: Ratio to standing height

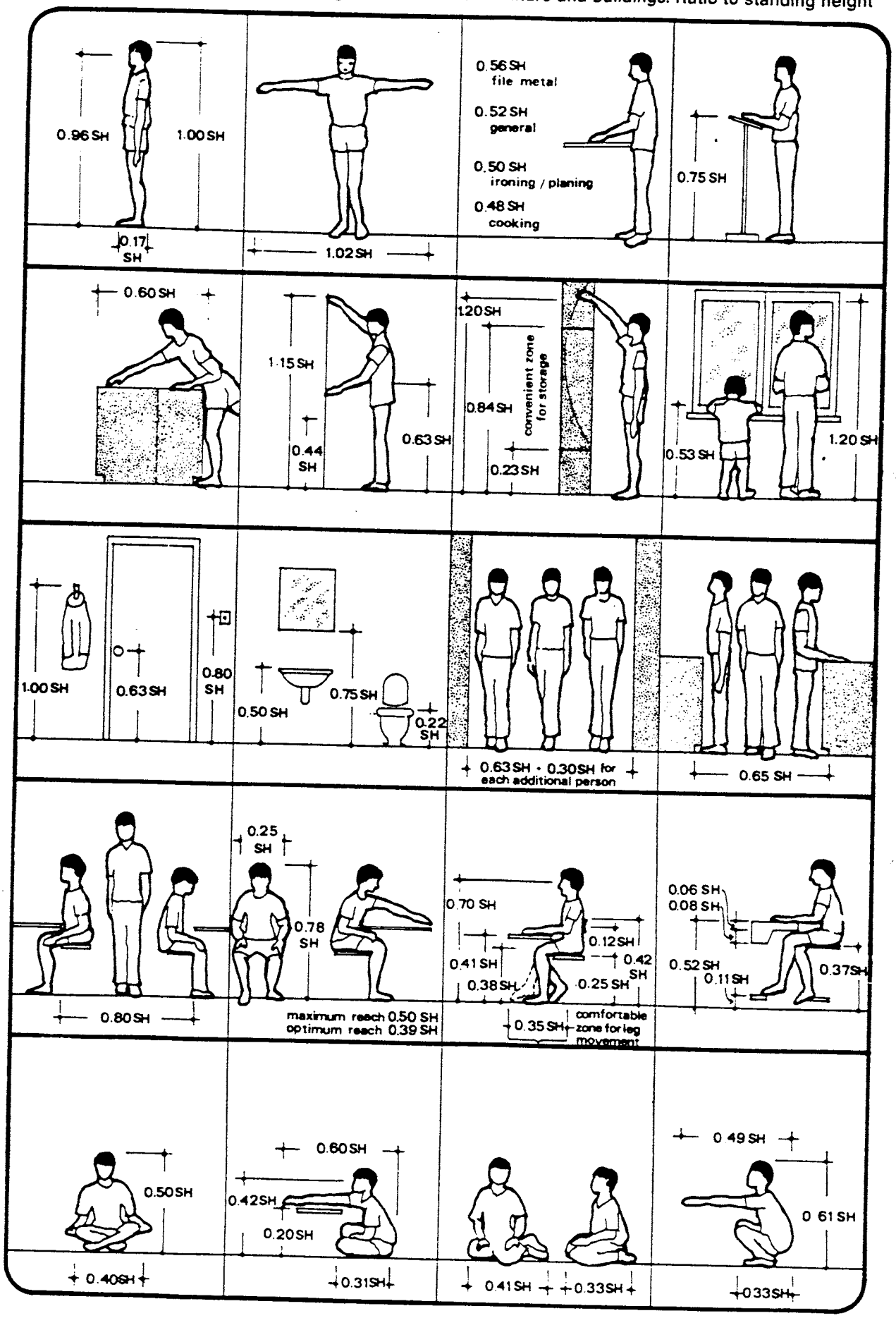


Table 1. Ratios between standing height and dimensions used in educational furniture and building design

Standing Posture	Ratio
Standing height	1.00 SH
Eye height	0.96 SH
Depth of body, standing	0.17 SH
Arms outstretched, length end to end	1.02 SH

Circulation Spaces	Ratio
Width of corridor for 2 persons	0.63 SH
Circulation space between 2 standing work surfaces	0.65 SH
Circulation space between 2 sitting work surfaces	0.80 SH

Working Surface Standing	Ratio
Height of work surface – general	0.52 SH
– for ironing/planing	0.50 SH
– for cooking	0.48 SH
– for filing metal	0.56 SH
Height of lectern	0.75 SH
Forward Reach – maximum	0.53 SH
– optimum	0.34 SH

Working Surface Seated	Ratio
Height of desk/table	0.41 SH
*Width of desk/table	0.40 SH
Reach – maximum	0.50 SH
– optimum	0.39 SH

*Sizes of work surfaces are often given in absolute dimensions. ARISBR recommends 45cm x 55cm for 6 to 12 years of age and 45cm x 70cm for 12 years to adult.

Vertical Surface (chalkboard and storage)	Ratio
Upper reach	1.15 SH
Lower reach	0.44 SH
Eye height	0.90 SH
Elbow height	0.63 SH
Reach – maximum	1.28 SH
– optimum	1.10 SH
Storage – convenient lower storage height	0.23 SH
convenient upper storage height	0.90 SH
Height of shelf which can be reached but not seen	1.06 SH
Height of shelf which can be reached and seen	0.94 SH

	Ratio
Depth of storage	0.23 SH
Optimum distance of subject from storage	0.46 SH
Windowpane – upper reach	1.20 SH
– lower reach	0.53 SH
Height of hook	1.00 SH
Height of door knob	0.63 SH
Height of switch	0.80 SH
Height of lower edge of mirror	0.75 SH
Hight of sink top	0.50 SH
Hight of toilet seat	0.22 SH

Sitting Posture	Ratio
Seated height	0.78 SH
Seated eye height	0.70 SH
Elbow height	0.65 SH
Height of seat (popliteal height)	0.25 SH
Width of seat (hip width)	0.25 SH
Front of knee to buttock	0.34 SH
Depth of seat	0.24 SH
Floor to top of thigh	0.38 SH
Thigh thickness	0.08 SH
Distance between desk top and top of thigh	0.06 SH
Comfortable zone for leg movement from front of table	0.35 SH

	Ratio
Shoulder width	0.25 SH
Top of backrest to floor	0.42 SH
Optimum height of backrest to seat	0.12 SH
Top of backrest to seat	0.19 SH
Angle of seat	
0–5° slope backwards for listening and relaxing	
0° or slightly forward for reading or writing	
Curve of backrest 5–8°	
Height of stool	0.37 SH
Width of stool	0.20 SH
Depth of stool	0.16 SH
Height of footrest	0.11 SH

Other Postures	Ratio

Sitting Lotus	Ratio
Sitting lotus height	0.50 SH
Sitting lotus eye height	0.42 SH
Knee to knee width	0.40 SH
Sitting lotus depth	0.31 SH
Sitting lotus forward reach	0.60 SH
Work surface top from floor, sitting lotus	0.20 SH

Sitting Sideways Tuck	Ratio
Maximum width	0.41 SH
Maximum depth	0.33 SH

Squatting	Ratio
Squatting height	0.61 SH
Squatting depth	0.33 SH
Squatting forward reach	0.49 SH

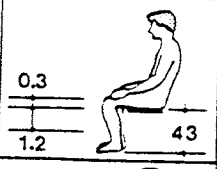
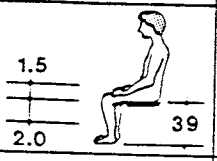
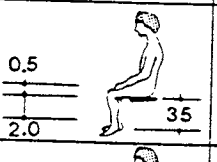
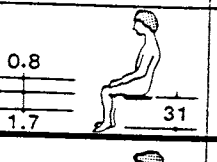
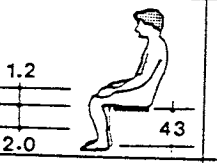
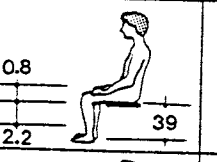
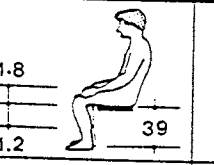
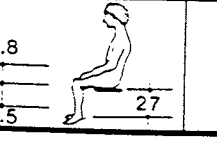
Table 4. Design Dimensions for furniture sizes in centimetres and inches

Average Standing Height Ranges	A	B	C	D	E	A	B	C	D	E
	115	115–130	131–146	147–162	163–179	45.3	45.3–51.2	51.3–57.5	57.6–63.8	63.9–70.5
Midpoints	108	123	139	155	171	42.5	48.4	54.7	61.0	67.3
Ratios	Design Dimensions (centimeters)					Design Dimensions (inches)				
0.06	6	7	8	9	10	2.4	2.8	3.2	3.5	3.9
0.08	9	10	11	12	14	3.5	3.9	4.3	4.7	5.5
0.11	12	14	15	17	19	4.7	5.5	5.9	6.7	7.5
0.12	13	15	17	19	21	5.1	5.9	6.7	7.5	8.3
1.16	17	20	22	25	27	6.7	7.9	8.7	9.8	10.6
0.17	18	21	24	26	29	7.1	8.3	9.5	10.2	11.4
0.19	21	23	26	29	32	8.3	9.1	10.2	11.4	12.6
0.20	22	25	28	31	34	8.7	9.8	11.0	12.2	13.4
0.23	25	28	32	36	39	9.8	11.0	12.6	14.2	15.4
0.24	28	30	33	37	41	10.2	11.8	13.0	14.6	16.1
0.25	27	31	35	39	43	10.6	12.2	13.8	15.4	16.9
0.33	36	41	46	51	56	14.1	16.1	18.1	20.1	22.1
0.34	37	42	47	53	58	14.5	16.5	18.5	20.8	22.8
0:35	38	43	49	54	60	15.0	16.9	19.3	21.3	23.6
0.37	40	48	51	57	63	15.8	18.1	20.1	22.4	24.8
0.38	41	47	53	59	65	16.1	18.5	20.9	23.2	25.6
0.39	42	48	54	60	67	16.5	18.9	21.3	23.6	26.4
0.40	43	49	58	62	68	16.9	19.3	22.1	24.4	26.8
0.41	44	50	57	64	70	17.3	19.7	22.4	25.2	27.6
0.42	45	52	58	65	72	17.7	20.5	22.8	25.6	28.4
0.44	48	54	61	88	75	18.9	21.3	24.0	26.8	29.5
0.48	50	57	64	71	79	19.7	22.4	25.2	28.0	31.1
0.48	52	59	67	74	82	20.5	23.2	26.4	29.1	32.3
0.49	53	60	68	76	84	20.9	23.6	26.8	29.9	33.1
0.50	54	62	70	78	86	21.3	24.4	27.6	30.7	33.9
0.52	56	64	72	81	89	22.0	25.2	28.4	31.9	35.0
0.53	57	65	74	82	91	22.4	25.6	29.2	32.3	35.8
0.56	60	69	78	87	96	23.6	27.2	30.7	34.3	37.8
0.60	65	74	83	93	103	25.6	29.1	32.7	36.6	40.6
0.61	66	75	85	95	104	26.0	29.5	33.5	37.4	41.0
0.63	68	78	88	98	108	26.8	30.7	34.7	38.6	42.5
0.65	70	80	90	101	111	27.6	31.5	35.4	39.8	43.1
0.70	76	86	97	109	120	29.9	33.9	38.2	42.9	47.2
0.71	77	87	99	110	121	30.3	34.3	39.0	43.3	47.6
0.75	81	92	104	116	128	31.9	36.2	41.0	45.7	50.4
0.78	84	96	108	121	133	33.1	37.8	42.5	47.6	52.4
0.90	97	111	125	140	154	38.2	43.7	49.2	55.1	60.6
0.94	102	116	131	146	161	40.2	45.7	51.6	57.5	63.4
0.96	104	118	133	149	164	41.0	46.5	52.4	58.7	64.6
0.02	110	125	142	158	174	43.3	49.2	55.9	62.2	68.5
1.06	114	130	147	164	181	44.9	51.2	57.9	64.6	71.3
1.10	119	135	153	171	188	46.9	53.1	60.2	67.3	74.0
1.28	138	157	178	198	219	54.3	61.8	70.1	78.0	86.2

Table 4. Design Dimensions for furniture sizes in centimetres and inches

Average Standing Height Ranges	A	B	C	D	E	A	B	C	D	E
	115	115–130	131–146	147–162	163–179	45.3	45.3–51.2	51.3–57.5	57.6–63.8	63.9–70.5
Midpoints	108	123	139	155	171	42.5	48.4	54.7	61.0	67.3
Ratios	Design Dimensions (centimeters)					Design Dimensions (inches)				
0.06	6	7	8	9	10	2.4	2.8	3.2	3.5	3.9
0.08	9	10	11	12	14	3.5	3.9	4.3	4.7	5.5
0.11	12	14	15	17	19	4.7	5.5	5.9	6.7	7.5
0.12	13	15	17	19	21	5.1	5.9	6.7	7.5	8.3
1.16	17	20	22	25	27	6.7	7.9	8.7	9.8	10.6
0.17	18	21	24	26	29	7.1	8.3	9.5	10.2	11.4
0.19	21	23	26	29	32	8.3	9.1	10.2	11.4	12.6
0.20	22	25	28	31	34	8.7	9.8	11.0	12.2	13.4
0.23	25	28	32	36	39	9.8	11.0	12.6	14.2	15.4
0.24	28	30	33	37	41	10.2	11.8	13.0	14.6	16.1
0.25	27	31	35	39	43	10.6	12.2	13.8	15.4	16.9
0.33	36	41	46	51	56	14.1	16.1	18.1	20.1	22.1
0.34	37	42	47	53	58	14.5	16.5	18.5	20.8	22.8
0:35	38	43	49	54	60	15.0	16.9	19.3	21.3	23.6
0.37	40	48	51	57	63	15.8	18.1	20.1	22.4	24.8
0.38	41	47	53	59	65	16.1	18.5	20.9	23.2	25.6
0.39	42	48	54	60	67	16.5	18.9	21.3	23.6	26.4
0.40	43	49	58	62	68	16.9	19.3	22.1	24.4	26.8
0.41	44	50	57	64	70	17.3	19.7	22.4	25.2	27.6
0.42	45	52	58	65	72	17.7	20.5	22.8	25.6	28.4
0.44	48	54	61	88	75	18.9	21.3	24.0	26.8	29.5
0.48	50	57	64	71	79	19.7	22.4	25.2	28.0	31.1
0.48	52	59	67	74	82	20.5	23.2	26.4	29.1	32.3
0.49	53	60	68	76	84	20.9	23.6	26.8	29.9	33.1
0.50	54	62	70	78	86	21.3	24.4	27.6	30.7	33.9
0.52	56	64	72	81	89	22.0	25.2	28.4	31.9	35.0
0.53	57	65	74	82	91	22.4	25.6	29.2	32.3	35.8
0.56	60	69	78	87	96	23.6	27.2	30.7	34.3	37.8
0.60	65	74	83	93	103	25.6	29.1	32.7	36.6	40.6
0.61	66	75	85	95	104	26.0	29.5	33.5	37.4	41.0
0.63	68	78	88	98	108	26.8	30.7	34.7	38.6	42.5
0.65	70	80	90	101	111	27.6	31.5	35.4	39.8	43.1
0.70	76	86	97	109	120	29.9	33.9	38.2	42.9	47.2
0.71	77	87	99	110	121	30.3	34.3	39.0	43.3	47.6
0.75	81	92	104	116	128	31.9	36.2	41.0	45.7	50.4
0.78	84	96	108	121	133	33.1	37.8	42.5	47.6	52.4
0.90	97	111	125	140	154	38.2	43.7	49.2	55.1	60.6
0.94	102	116	131	146	161	40.2	45.7	51.6	57.5	63.4
0.96	104	118	133	149	164	41.0	46.5	52.4	58.7	64.6
0.02	110	125	142	158	174	43.3	49.2	55.9	62.2	68.5
1.06	114	130	147	164	181	44.9	51.2	57.9	64.6	71.3
1.10	119	135	153	171	188	46.9	53.1	60.2	67.3	74.0
1.28	138	157	178	198	219	54.3	61.8	70.1	78.0	86.2

Table 5. Acceptable tolerence for seat heights.

	AGE (year)	MALE: Standing Height (cm)	MALE: Popliteal Height (cm)	Acceptable Tolerance (cm)	Recommended Popliteal Height for seat (cm)	Furniture size	
Group I	18	173	43.3		43	E	The seat height for size E is 43 cm. This is 0.3 cm below 43.3 cm the popliteal height for 18 year olds. At the lower limit this height will suit 15 year olds with popliteal height of 41.8 cm, being 1.2 cm above fit.
	17	171	42.8				
	16	170	42.5				
	15	167	41.8				
	14	162	40.5		39	D	Size D seat height is 38 cm, this 1.5 cm below 40.5 cm which is the popliteal height for 14 year olds. At the lower limit, this height will suit 12 year olds, with 37.0 cm popuiteal height being 2.0 cm higher than fit.
	13	155	38.8				
	12	148	37.0				
	11	142	35.5		35	C	Size C seat height is 35 cm, which is 0.5 cm below 35.5 cm, the popliteal height for 11 year olds. At the lower limit, the height will suit 9 year olds of popuiteal height 33.0 cm, being 2.0 cm above fit.
	10	137	34.3				
	9	132	33.0				
	8	127	31.8		31	B	Size B seat height is 31 cm. This is 0.8 cm below 31.8 cm, the popliteal height of 6 year olds. At the lower limit, it will suit 6 year olds with popliteal height of 29.3 cm, being 1.7 mm higher than fit.
	7	121	30.3				
	6.	117	29.3				
Group II	18	167	41.8		43	E	The seat height for size E is 43 cm. This is 1.2 cm above 41.8 cm, the popliteal height for 18 year olds. At the lower limit this height will suit 16 year olds with popliteal height of 41.8 cm, being 2.0 cm above fit.
	17	166	41.5				
	16	164	41.0				
	15	159	39.8		39	D	Size D seat height is 39 cm, this 0.8 cm below 39.8 cm which is the popliteal height for 15 year olds. At the lower limit, this height will suit 13 year olds, with 36.8 cm popliteal height being 2.2 cm higher than fit.
	14	154	38.5				
	13	147	36.8				
	12	141	35.3		35	C	Size C seat height is 35 cm, which is 0.3 cm below 35.3 cm, the popliteal height for 12 year olds. At the lower limit, the height will suit 10 year olds of popliteal height 33.0 cm, being 2.0 cm above fit.
	11	136	34.0				
	10	132	33.0				
	9	128	32.0		31	B	Size B seat height is 31 cm. This is 1.0 cm below 32.0 cm, the popliteal height of 9 year olds. At the lower limit, it will suit 6 year olds with popliteal height of 28.3 cm, being 2.7 cm higher than fit.
	8	123	30.8				
	7	119	29.8				
	6	113	28.3				
Group III	18	163	40.8		39	D	Size D seat height is 38 cm, this is 1.8 cm below 40.8 cm, the popliteal height for 18 year olds. At the lower limit this height will suit 15 year olds with popliteal height of 37.8 cm, being 1.2 cm above fit.
	17	162	40.5				
	16	159	39.8				
	15	151	37.8				
	14	145	36.3		35	C	Size C seat height is 35 cm. This is 1.3 cm below the popliteal height (36.3 cm) of 9 year olds. At the lower limit, it will suit 12 year olds with popliteal height of 33.8 cm being 1.2 cm higher than fit.
	13	138	34.5				
	12	135	33.8				
	11	129	32.3		31	B	Size B seat height of 31 cm is 1.3 cm below the popliteal height (32.3 cm) of 11 year olds. At the lower limit, it will suit 9 year olds with popliteal height of 30 cm being 1.0 cm above fit.
	10	123	30.8				
	9	120	30.0				
	8	115	28.8		27	A	Size A seat height of 27 cm is 1.8 cm below 28.8 cm, the popliteal height of 8 year olds. At the lower limit it will suit 6 year olds with popliteal height of 26.5 cm, being 0.5 cm higher than fit.
	7	111	27.8				
	6	106	26.5				