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## Sanitation improvements in Indonesian kampungs

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## **Sanitation improvements in Indonesian Kampung**

**G J W de Kruijff**

### **THE KAMPUNG IMPROVEMENT PROGRAMME (KIP) IN INDONESIA**

Based on earlier Dutch models, KIP was initiated on a large scale in Jakarta in 1969. It was found that no services were provided to the dense, lower-income areas with the worst environmental conditions. It has since become an ambitious nation-wide programme for upgrading the informal unplanned and unserved 'urban villages', which house over half of Indonesian population. The principles of KIP are to insert basic infrastructure into kampungs with minimum disturbance or removal of the residents. The improvement components vary according to the condition in the kampung, but normally include local roads, footpaths, micro-drainage, water supply, public sanitation facilities, solid waste improvements and sometimes schools or clinics (Ref.1). Standards vary according to the availability of local and foreign funds; costs per hectare can be as high as Rp 12 million and as low as Rp 2 million\*. In the early days of the Jakarta KIP most emphasis, approximately 50% of all expenditure, was given to roads and drains. Sanitation facilities, MCKs (mandi=bathing; cuci=cleaning; kakus=toilet), are still given a low priority usually not exceeding 5% of total expenditure. Foreign aided programmes tend to give more emphasis to sanitation, but even so it usually accounts for a small proportion of the total. Only in Jakarta, KIP provided private sanitation facilities by a construction programme of approximately 3000 leaching pits.

#### **WATER SUPPLY IN KAMPUNGS**

##### **Shallow Wells and Handpumps**

Most of the people in kampung areas rely on shallow wells. A widespread problem in kampung areas is the insufficient distance between handpumps, shallow wells and leaching pits. This is the result of space limitations on the plot and, therefore, the risk of water contamination in shallow wells is high: a survey in Jakarta revealed that more than 70% of these wells are located less than 7 metres from the nearest leaching pit (29% even within 5 metres) (Ref.2). As a result the shallow wells are grossly polluted (recorded counts were up to 6500 coliform per 100 ml). People living in kampung areas are in general

well aware of the pollution level of their water source and normally boil their water for consumption if obtained from a shallow well. However, teeth brushing takes place in general with non boiled water.

##### **Public Water Supply**

If water is available from the public water supply it is often only used for drinking and cooking (to save money). Public water supply is in general scarce, often taps are non-operational due to low pressures. When public water is supplied for the low-income dweller it is relatively expensive. Low-income people normally obtain water from standpipe operators or water vendors, which further increase the cost of water. In addition public water standpipes are not very popular with the water authorities. Normally a high percentage (up to 50%) of the total water production is unaccounted for. Besides leakages and losses, water is consumed through illegal connections or not charged due to faulty water meters.

##### **Water consumption by use**

Use	Litres/cap/day
Drinking	10
Washing	22
Bathing	35
Toilet use	13

##### **Water charges in kampung areas**

Supplier	US\$/1000 litres
House con.	0.08
Stand post	1.39
Vendors	2.78

#### **EXCRETA DISPOSAL IN KAMPUNGS**

##### **Leaching Pits**

Where possible direct defaecation into waterways is the most popular choice in low-income housing areas. Open privies extending out

\* Currency exchange rate is Rp 1000 = US\$ 1.

over the water, so-called helicopters, or floating privies on bamboo rafts or in-house toilets with short discharge pipes into water ways are usual. For the user himself, a reasonably clean, odor-free and hygienic method. From the water pollution viewpoint this is unacceptable. It has been estimated that 70-90% of the water pollution in rivers through Indonesian towns is the result of human waste (Ref.3). In particular the lower branches of all waterways in Jakarta have turned septic, while the upper streams have also become grossly polluted. Small roadside ditches are used by the smaller children to defaecate. The majority of kampung houses use handflush waterseal toilets connected to an unlined leaching pit outside or within the house. The direct discharge type (pits directly under the squatting slab) is also used. These leaching pits are primarily used for a variety of reasons: (a) the limited space available, which precludes the use of a septic tank/leaching system; (b) the fact that relatively little water is needed for the toilets. Bathing/washing water is separately drained into the roadside drain. Most of the people construct their leaching pits from brick or concrete. Where high ground-water tables are present, bamboo hampers are used for structural support. Elsewhere, unlined dug holes are used, the soil being sufficiently stable so that no shoring is needed. The usual size of a leaching pit is about 0.8-1.0 metre diameter by 3.0 metres deep, which serve a family of up to 8 people. In spite of their low status in public health engineering practice, leaching pits generally give a satisfactory service and moreover are well suited to the socio-economic condition of the kampung environment (Ref.4).

#### Cleaning Services

At regular intervals septic tanks/leaching pits have to be desludged. While a recent survey revealed that approximately 91% of the leaching pits have never been desludged, approximately 71% of the leaching pits were constructed in the last 5 years and probably still did not require any desludging services. But over the years this requirement will increase. Leaching pits after their first desludging will require desludging more often due to a gradual decrease in the permeability of the pit walls. All vacuum trucks in Jakarta are equipped with a suction hose of 80 metres length. Unfortunately, there are still many houses that cannot be reached with this cleaning equipment. Aerial photograph interpretation reveals that approximately 15-25% of all houses are located at a distance greater than 75 metres from an accessible road. Desludging services are provided for a minimum fee of Rp 4000 for 2 m<sup>3</sup> and an extra Rp 2000 for each additional m<sup>3</sup> of sludge. However, it

is common practice to pay an extra tip to the cleaning crew to obtain the emptying service. Actually desludging of a leaching pit will cost a minimum of Rp 10,000. Also it has been observed that the cleaning crew has little interest in going to the official dumping site through all the traffic congestion. Most of the sludge is, therefore, dumped in the nearest available waterway, aggravating the already existing pollution levels. Solid removal efficiency from the pit is shown to be low, and in general only partial desludging of leaching pits takes place with the present equipment. There is a need for improved equipment, which will make all leaching pits in kampung areas accessible for desludging. An over-capacity of equipment, better remuneration of personnel and competition could divert desludging services from wealthy customers to lower-income people. During the rainy season leaching pits are often scooped out manually and discharged to the roadside drain. The costs involved for this type of operation are normally a fraction of the fee charged by the official desludging service.

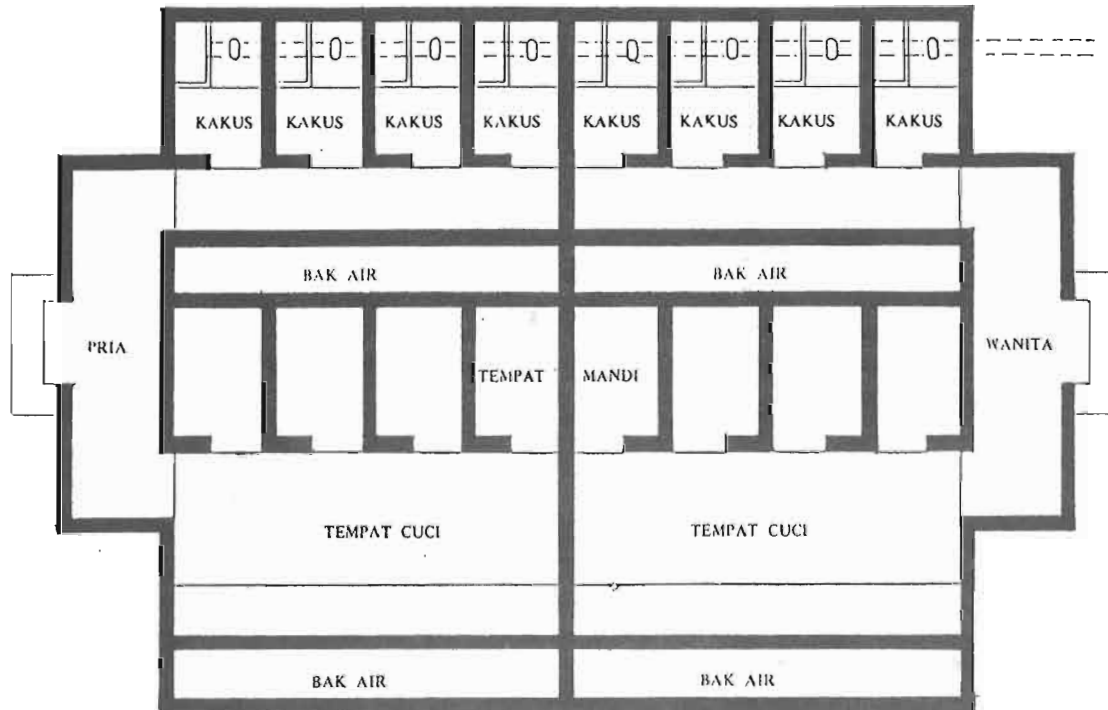
#### SANITATION PROVISION BY KIP

##### Public Facilities (MCKs)

In the high-density, low-income areas, the KIP provides communal sanitation facilities. These sanitation facilities, MCKs, can contain up to 16 toilet seats (see Drg.1). However, the 4 toilet seat unit is now the more popular type. Toilet wastes are discharged into a septic tank which is built below ground level normally next to the MCK unit. These septic tanks often overflow to the roadside drain. Water supply is usually with a handpump, but many MCKs are built with an internal water distribution network, which is, however, not operational. The numbers of MCKs provided by the KIP are, however, insufficient to meet the minimum desirable needs. Design figures of 120 people for every toilet seat are not unusual. However, it is physically impossible to accommodate more than 25 people for each toilet seat. The large MCKs have not become very popular in KIP projects. One of the main difficulties in using the standard MCK is the size of plot required (14m x 13m) which has proved to be simply too large to find and acquire in dense kampungs.

##### Operation and Maintenance

Operation and management of these large MCKs is often beyond the capacities of the local community. The communities arrange the operation of the MCKs in different ways. Some MCK operators charge a direct user fee for every visit to the MCK. Typical charges are:



Drawing No.1 Communal sanitation facility, MCK, provided by KIP

for toilet use Rp 10, bathing and washing Rp 20. However, it was observed that on a number of occasions the operator requires a payment of Rp 50 for the use of the MCK. Direct user charges do not encourage use of the sanitation facilities. Another method in use is that the local village head collects from every family which uses the MCK a designated sum. These collections are based on the financial capabilities of the families. The village head pays the caretaker. A method in use also is that the village head receives in advance for each week a list of persons, selected by the families concerned, who will clean and maintain the MCK. The village head regularly checks their work and the MCK can now be used free of charge. Only for the desludging of the septic tank is money collected via the village head from people using the facilities. However, a large number of these MCKs have become non-operational due to lack of maintenance.

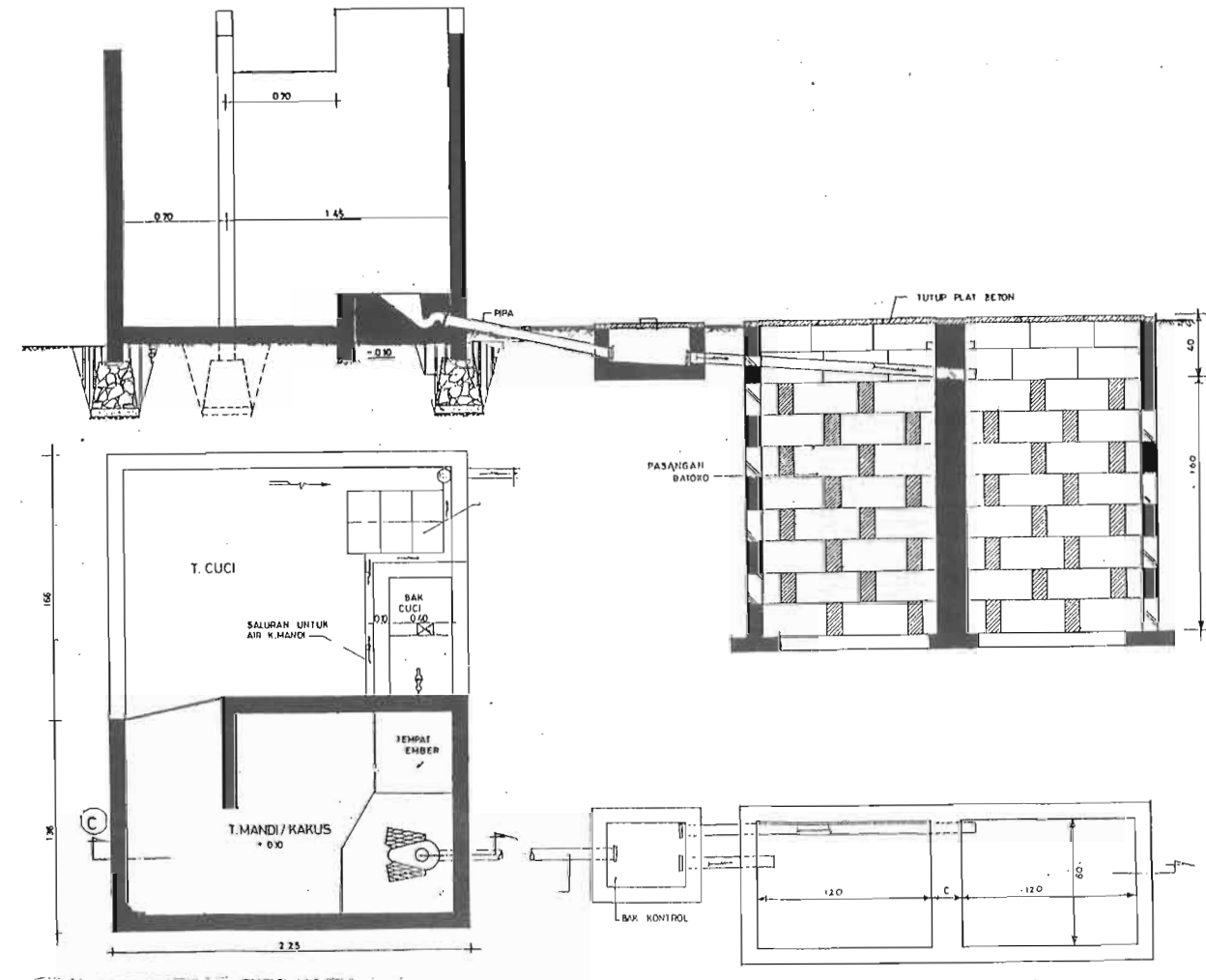
#### Semi-Private Facilities

Discussions with local leaders reveal that it would be relatively easy to find and obtain permission to use relatively small plots of land, on which smaller versions of the MCK could be located. In the Dutch-financed kampung improvement schemes steps in this

direction have been taken. A greater number of smaller MCKs, the so-called MCK-Keluarga type, serving up to 5-6 households (30 people) each equipped with its own handpump and septic tank/anaerobic upflow filter were built. Bathing and washing wastewater is discharged directly to existing footpath drainage ditches. After an initial reluctant acceptance by the local community these sanitation units have become popular. Unfortunately, all MCK-Keluargas were provided with septic tanks of an effective volume of only 900 litres. For several reasons, these small septic tanks started to malfunction within 3-6 months and made the small MCKs non-operational for toilet purposes (Ref.5). In general it was felt that the small MCK is a step forward in the direction of adequate sanitation provision in kampung areas. Future designs of these MCK-Keluargas will replace the septic tank/anaerobic upflow filter with double leaching pits, eliminating earlier problems (see Drg. 2).

#### THE FUTURE SANITATION PROGRAMME IN KIP

The Government of Indonesia plans that 60% of the urban households should have access to sanitation facilities. This would mean that approximately an additional 26 million people will require sanitation facilities



Drawing No. 2 The MCK-Keluarga in combination with double leaching pits.

during this decade. Pilot sewerage projects have been initiated in a number of selected cities but are too costly for mass implementation. The current programmes show that there are a number of problems associated with existing excreta disposal practices. Social constraints are a low awareness of residents on the subjects of hygiene and sanitation and the unpopularity of large public MCKs. It is clearly beyond the financial capability of the Government to implement in each and every town a full sanitation programme. One of the major strategies will be to increase the awareness and education level of the population by using mass information campaigns, in combination with a human waste disposal programme which is based on a simple technology which can be implemented or supported by self-help activities. The technology of pourflush toilets connected to double leaching pits appears to be the most effective and will eliminate all major problems related to human waste disposal. Therefore, the Government of Indonesia expects to spend 20 million US\$ in KIP programmes for an improved public informa-

tion campaign to encourage the construction of toilets in combination with leaching pits.

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