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WASTE MANAGEMENT IN URBAN SLUMS

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ABSTRACT The high rate of population growth in developing countries in recent times has created intricate sanitation problems which Governments can no longer ignore. The problem is further ascentuated by the constant drift of rural dwellers to the few Urban centres in search of jobs and other opportunities offered by Urbanization.

Urbanization and its concomitant housing problems have created the situation where Urban slums have become a regular feature of most Urban Centres. High population density, temporary structures used as living quarters and lack of proper sanitation are conspicuous features of these slums. The predominant method of excreta collection known to these slum dwellers is the night soil system. This paper examines some popular methods of excreta collection and puts forward another possible method of excreta Management in high density Urban slums.

INTRODUCTION

The Tema District Council in Ghana covers an area of 720km^2 and is not only one of the largest district council areas in Ghana, but also includes Ghana's only planned industrial city, in addition to extensive rural areas most of which serve as "domitory towns" for the cities of Tema and Accra. While Tema, the administrative centre has a central sewerage system, the high population density in the unsewered surrounding satellite slums create many problems for the District Council, among which is that of excreta management.

Various excreta collection systems have been tried and considered unsuitable for the type of urban slums the council has to deal with. For example, the aqua privy system has the disadvantage of limited capacity, while the night soil collection system, apart from the unacceptably high health hazard, tends to be rather expensive to operate, mainly on account of shortage of labour. Experiences both in Tema and elsewhere in Ghana have also shown that water closet system is unsuitable in the particular situations under consideration. The water closet system requires an expensive maintenance programme on account of improper use, particularly in respect of use of improper anal cleansing material. This system also requires imported items too delicate for use in such slums.

In its desire to improve sanitation in these slums, the Tema District Council in conjunction with a private contractor developed the Automatic Flushing Toilet. The salient features of this system are discussed in this paper.

FEATURES OF THE SYSTEM

Figure one shows details of the system, which consist mainly of a conduit serving various squating chambers, an automatic flushing device at one end of the conduit, and the superstructure.

The conduit consist of 200 mm bore precast concrete segments which are assembled on site. The upper arm of each segment leads to a squating hole. The flushing unit is a trapezoidal bucket, hinged near its centre of gravity into which water is allowed to flow. The bucket when full tilts and discharges its contents through a chute into the conduit. The rate of flow of water is regulated to ensure flushing once in every half hour.

Other features include a trap gulley which is provided to trap flushed solid particles and a syphon which ensures that odour gases are excluded from the squating chambers. A substantial part of the cost of the unit is invested in the superstructure. Current attempts at reducing cost include proposals to use mud-bricks for construction of the superstructure.

LOCATION OPERATION AND MAINTENANCE

Location of these units is so planned that each 20 - hole unit serves approximately fifty compound houses, each of which may contain as many as twenty people. This means that about a thousand people use one such unit. In the present areas of operation, walking distances are less than three hundred metres.

Routine maintenance consist mainly of the toilets being cleaned daily with hosed water. The tilting mechanism of the bucket also requires greasing once in every three months. It is proposed to incorporate a rack in the trap gulley which will require daily cleaning.

MERITS AND DEMERITS OF THE SYSTEM

The main disadvantage of the system is that it can only be operated in areas served by pipe borne water. The system may also be criticised in that, the automatic flushing device operates even during periods when the unit is not subject to extensive use, such as night hours. However, with an average daily water consumption of 1.2 gallons per capita, the system is clearly more efficient in water usage than the conventional water closet system. Difficulties arise during periods of water shortage since the conduit becomes clogged, necessitating roding and flushing when regular supply is restored. The tilting bucket, which is made of

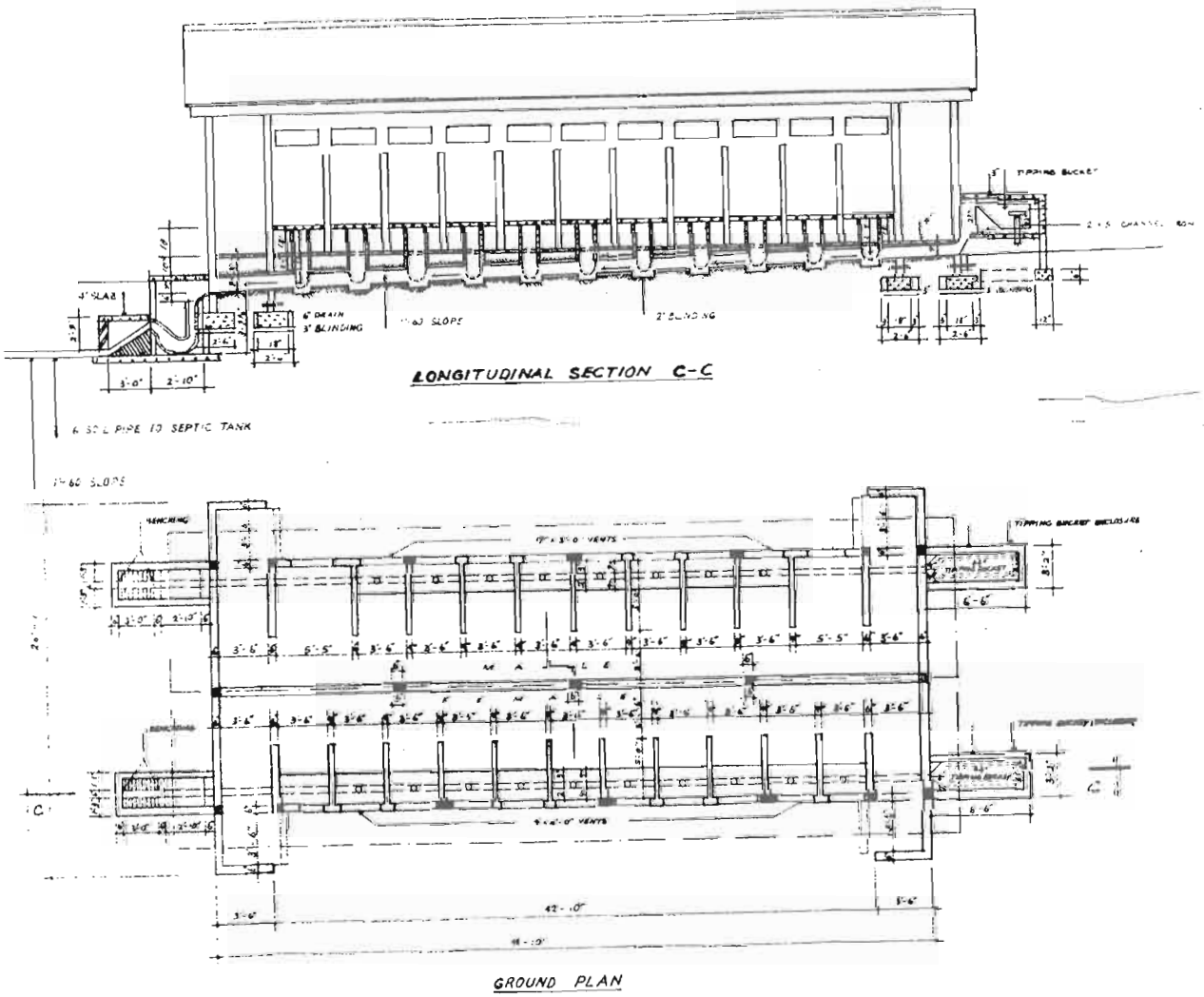

Fig. 1 Details of the Automatic Flushing Toilet

TABLE 1
COST COMPARISON OF ALTERNATIVES
FOR A THIRTY YEAR PERIOD

ALTERNATIVES	PRESENT WORTH ¢ (CEDIS)		
	1%	3%	8%
Automatic Flushing System	101,896	84,759	58,385
Night Soil System	1,092,104	850,013	516,546
Water Closet System	195,410	155,007	99,992

¢2.75 = ₵1.00

steel is also subject to corrosion over relatively short periods. Studies are underway to replace the tilting bucket with a concrete tank operated by a syphon, as a way of overcoming this problem.

On the credit side, the automatic flushing toilet has been found to have low initial and maintenance costs compared with the water closet and night soil collection systems. Table one gives a summary of economic analysis using the discounted cash flow technique. A thirty year life span, and interest rates of 1%, 3% and 8% were adopted for units serving a population of one thousand each. The system is found to be more hygenic. There is no odour and no contact with faecal matter, it has a long life and there is no reliance on imported materials. The technology is simple and suited to any locality, privacy is ensured and it has a capacity to withstand heavy loads. There is no pollution of soil and groundwater and no access to excreta by flies and rodents.

Abolition of Pan Latrines

Other merits of the system can be seen in its adoption as a practical way of abolishing pan latrines, particularly in sewered areas where landlords refuse to connect to central sewers. The respective council can provide such public units and pass by-laws abolishing the use of pan latrines. The conservancy labourers so affected may be re-deployed. Landlords who still prefer home units will have no alternative but to connect their houses to central sewers.

Home units of the automatic flushing toilets can easily be made without use of imported items. An interesting feature is that, in villages, untreated water may be fetched from streams and wells to operate the units as and when required. Effluent discharged may be treated by any of the known on-site treatment methods.

CONCLUSIONS

The object of presenting this paper is not only to stimulate discussions which might in turn be of help in our future improvements, but also to introduce the system to other areas having similar collection problems. As mentioned the major disadvantage of the system is the fact that it is waterborne, and therefore may not be in line with current trends in this field. However, for an urban Community that uses drinking water for watering of lawns and garden, provision of 1.2 gallons per capita per day for its socially deprived people for proper

sanitation is not asking for too much. Finally mention must be made of benefits to the nation as a whole namely:-

(a) benefit accruing to the user in terms of an easy access to good sanitary facilities, which may be-related to his willingness thereafter to pay his taxes

(b) benefits accruing to the user and non-user in terms of improved health and productivity, savings in medical expenses, an enhanced social status of the community and an improvement in the economic potential of the area.