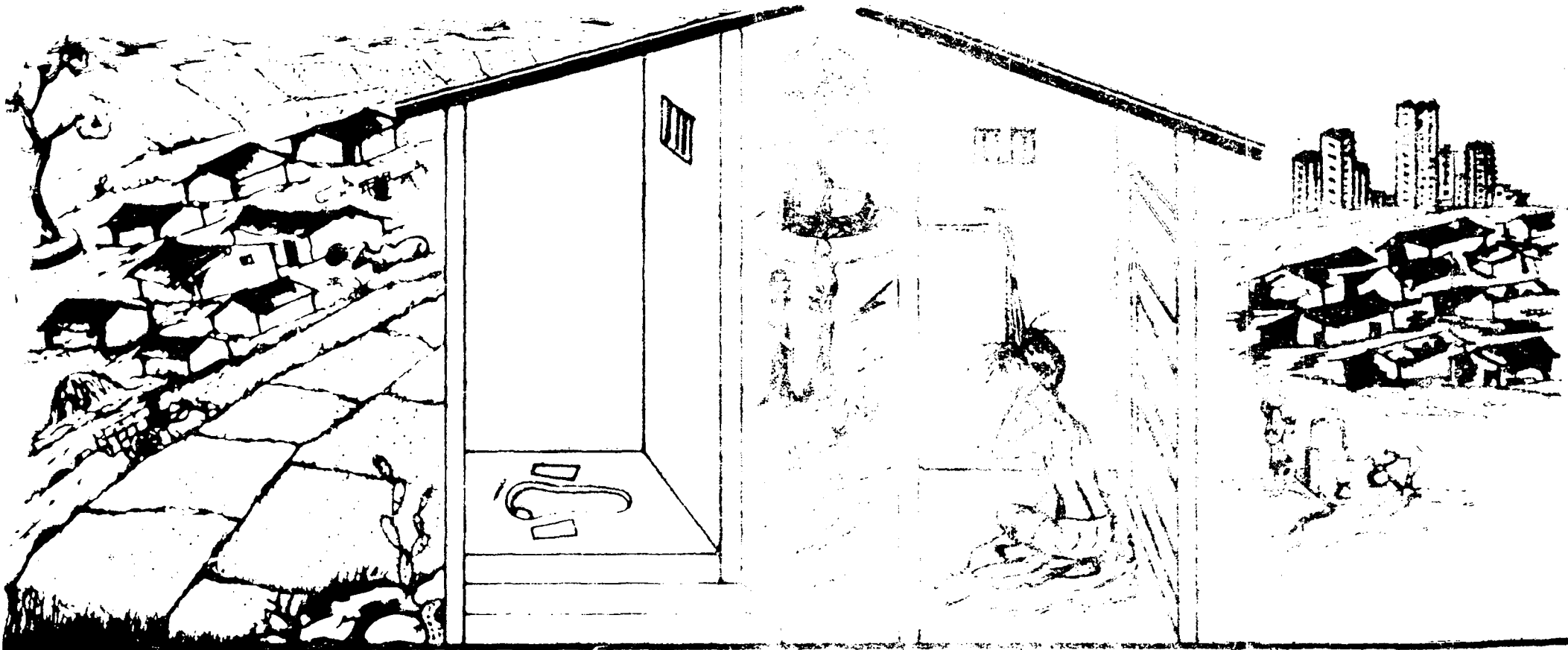


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# Sanitation for Slums &

# Urban Areas



NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE

NEHRU MARG, NAHOLLANDS

~~KE-1782~~

# SANITATION FACILITIES for SLUMS & RURAL AREAS



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NATIONAL ENVIRONMENTAL ENGINEERING  
RESEARCH INSTITUTE, NAGPUR (INDIA)

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**PROF. N. MAJUMDER,**  
DIRECTOR, NEERI, NAGPUR

\* Compiled by :

**V. RAMAN**  
SCIENTIST  
NEERI, NAGPUR

**1975**

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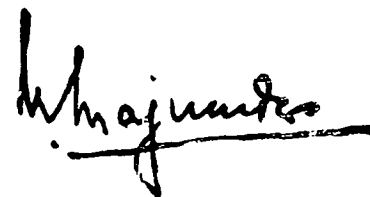
## FOREWORD

Urban slums and rural areas present a dismal picture in respect of environmental sanitation. NEERI is seized with this problem and engaged in devising ways and means to ameliorate the situation. The means to achieve this have got to be necessarily simple, easy to operate and well within the reach of a household.

Construction of sanitary latrines to prevent faecal contamination and consequent transmission of pathogenic microorganisms and provision of safe water supply are characterised as bare minimum requirements for ensuring environmental sanitation.

This brochure presents typical designs of sanitation facilities. It is hoped that the brochure will serve as a guide to Government Departments, local bodies and individuals for successful implementation of the sanitation programme. Even though such schemes might not be remunerative on their value, the improved living conditions will indirectly reflect on increased productivity. Moreover, such a programme forms a social responsibility to the communities.

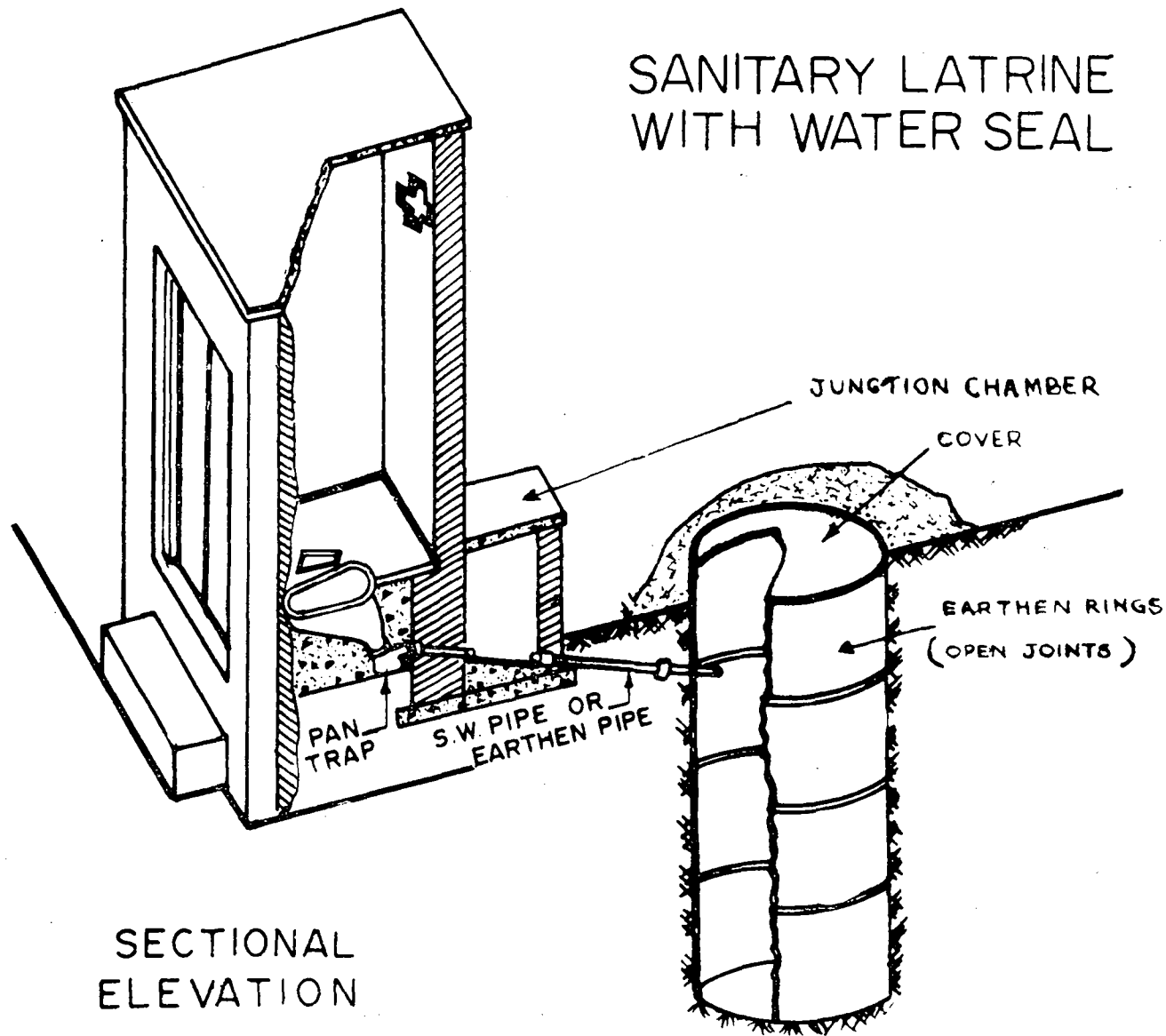
NEERI would be happy to associate itself with such programmes.



NAGPUR  
December, 1975.

(N. MAJUMDER)  
Director

# SANITARY LATRINE WITH WATER SEAL



SECTIONAL ELEVATION

## **Introduction**

Slum areas habitate as much as one fifth of city's population in India. Susceptibility to diseases is much higher in these areas, primarily due to poor environmental conditions resulting in relatively higher morbidity and death rates. Rural areas, covering four fifth of the population of the country, also present an equally dismal picture in the absence of the basic environmental services.

## **Slum Area**

A 'slum' in common parlance denotes an unhygienic and a substandard condition of living. A slum is predominantly a residential area where the dwellings are detrimental to safety or health by reasons of dilapidation, over crowding, faulty arrangements of design, lack of ventilation, sanitary facilities or any combination of these factors. By and large, the slum dwellers are labourers, workers or people self-employed in small business.

The sample survey conducted by the Census of India in a portion of Madras city in the year 1961 showed an infant mortality rate of 124 per 1000 live births in a slum area, whereas the corresponding rate in a non-slum area was only 73. The infant mortality rate has been recognised as a good index of sanitary conditions, high in association with poverty, over crowding and adverse socio-economic conditions. The birth rate for slum areas is found to be 43 and the corresponding death rate of 18, showing natural increase rate of 25 per 1000 persons. While in the non-slum area with a birth-rate of 30 per 1,000 persons and with a death rate of 12 per 1000, the natural increase rate is 18 per 1000 persons. From the above sample survey, it can be seen that the natural increase in the rate of population is higher in the slum area than that in a non-slum area. One of the plausible

reasons for this disparity may be that people in slum areas may like to have more children consequent to the high infant mortality rate prevailing over there.

## **Rural Area**

An area is considered to be 'rural' where agriculture is the pre-dominant occupation with scattered individual houses or groups of houses. In such areas, only 3 percent of the rural population has been provided with protected water supply with practically no sewerage or similar other sanitation facilities (till 1972). Further, nearly 70 percent of the rural population are afflicted with parasitic infections as a direct consequence of unhygienic and unsatisfactory excreta disposal methods.

## **Slums and Village Improvement**

Thus, any scheme which provides to the slum dwellers and villagers better healthful tenements and ancilliary sanitary facilities is a welcome step in the right direction for the improvement of the health of the community. Any effort towards improvements in environmental sanitation is also bound to assist directly or indirectly in the lowering of birth rate or reducing the consequent natural increase in the population.

A slum and village improvement scheme, inter alia, should cover the following facilities.

- a) Sanitary latrine facilities to avoid the age long habit of easing out in the open, with arrangements for the hygienic disposal of night soil in an economic way, suiting to the habits of the community.
- b) Proper and sufficient space for bathing and washing clothes, with arrangements for water supply and satisfactory disposal of the wash water.

- c) Facilities for proper collection and disposal of refuse and garbage of the community.
- d) Arrangements for 'safe' water supply for drinking and domestic uses.
- e) Drainage facilities to avoid stagnation of water.

As far as slums are concerned, community latrines for excreta disposal and safe water supply for domestic consumption will satisfy the basic sanitation requirements.

In slums, community sanitary (excreta disposal) and water supply facilities can provide solution to these basic requirements.

In rural areas, however, individual attention will have to be paid especially for excreta and refuse disposal. For water supply, communal or public taps will be adequate. Where household latrine cannot be provided, community latrines will serve the purpose particularly in areas consisting of clustered houses.

In an overall view, 'collective sanitation' seems to be the immediate answer for the slums, while individual household sanitation' appears to be appropriate in 'rural areas.'

As regards water supply, public water supply and distribution system (preferably piped water supply with stand posts) should be provided in both the cases. Where this is not feasible, sanitary wells is the other alternative.

It must be emphasised here that these schemes are not remunerative as it is commonly understood. Nonetheless, these are social responsibilities to a class of people who constitute a majority of the population of India. The well-being of slum dwellers and villagers will add immensely to step up the productivity and, in this sense, these schemes can be considered as remunerative. Well-being of communities is a basic pre-requisite for the socio-economic development of a country. Hence, such a

programme should be envisaged with the ultimate aim of providing these services in every family dwelling unit.

In any sanitation scheme, minimum hygienic and aesthetic standards must be maintained. Sacrifices of some of these norms for the sake of pruning the expenditure would amount to be a 'false economy'. In fact, inclusion of aesthetic and attractive features in the sanitation and water supply schemes would provide an incentive to overcome the inertia to change over to newer and better habits. This motivation is desirable to ensure adoption of the improvised sanitation utilities.

Therefore, the type designs of such facilities should take into consideration all these facets namely : habits of the community, simplicity, basic facilities, economy and aesthetics.

#### **Type Designs for Sanitation Facilities in Slums :**

Slums are located within the urban conglomeration where public water supply is provided. Electricity is also available in most of the cases. Land is available, but with limited availability of space. Water carriage sewerage system exists in the town. Assuming the availability of these utilities, few type designs are made to make use of these facilities.

#### **For community Latrines and Bath**

Salient features of the design are :

1. Indian type water closet or pan with water seal trap made of cement mortar with mosaic finish or glazed chinaware.
2. Water facilities within each cubicle.
3. provision of combined flushing of toilets with water
4. over head tank or ground level tank for storage of water from public water distribution system.

5. separate enclosures for men and women.
6. electric light facilities especially in women enclosure
7. separate enclosed cubicle with doors with W.C for ensuring privacy.
8. separate enclosed cubicle with tap for bath
9. proper waste collection system with provision of cleaning and connection to public sewers.
10. aesthetic aspects of the whole system.
11. paved floorings and drains.

For every 200 individuals or 35 to 40 households, separate blocks for water closet latrines, baths, washing facilities, and urinals are provided as per Fig. Nos. 1 to 9. Separate enclosures are provided for men and women.

The number of sanitary facilities for a population block of 400 individuals is as follows :

Number of sanitary latrines	—	12 (6 for men and 6 for women)
Number of bath rooms	—	12 (6 for men and 6 for women)
Number of urinals	—	6 (4 for men and 2 for women)
Number of taps for washing clothes	—	4
Number of washing platforms	—	2

Where adequate space is not available, a two storeyed block is suggested for housing latrines and baths as shown in Fig. Nos. 3 & 4, for a population of 400 people.

The total capital cost for the sanitary facilities consisting of latrines, baths, urinals and washing platforms for 200 persons is approximately Rs. 20,000/- and the per capita cost works out to Rs. 100/- and the cost per household will be Rs. 570/-

The approximate cost of various facilities are presented in Appendix I.

It is obvious that these require an efficient and regular maintenance for cleaning and removal of chokages etc. In addition, supply of water and electricity has to be assured to these blocks. Further, some expenditure may have to be incurred for repair work in the structure, plumbing system, electrical fittings etc. These constitute the recurring cost and provision of about Rs. 3,500/- may be required annually.

#### **Disposal methods for waste water :**

If a water carriage sewerage system exists in the town, and the area nearby the slum is sewerred, arrangements are made for the waste water to be discharged into the public sewerage system.

Alternatively, when the area is not sewerred, the waste from the latrine block only and urinals are led into a closed septic tank. The effluent from the septic tank is disposed off by discharging through sub-surface tile drain system or by discharging into a soak pit, if soil conditions and water table permit. Otherwise, the effluent need further treatment by trickling filter or up-flow submerged filters before discharged into open drains or natural water course nearby.

Waste water from baths and washing platform can be led into soak pits or deep bore holes.



For urinal block, the waste is taken to a nearby sewerage system through closed pipes. In the absence of a sewerage system, the waste is led underground through soak pits or bore holes.

**Water supply for the sanitary and bathroom blocks, and Washing platform :**

The water closets (W.C.s) need frequent flushing. It would be prudent, therefore, that the W.C.s are flushed simultaneously at intervals of one hour by means of an overhead storage tank with capacity of 1,500 liters.

In addition, a ground level cement concrete tank of capacity 1,500 liters need be provided to store water for ablution purposes.

While individual flushing units may be desirable for latrines for household use, they are not suited for community latrines.

**Latrine for Rural Areas :**

The age old practice of excreta removal and collection as headloads by scavenger and the habit of easing out in the open fields should be done away with as early as possible to ensure minimum sanitation standards. The collection and localisation of excreta without any help of human agency is possible through the provision of a sanitary latrine for hygienic collection and disposal of human excreta

The general scattered configuration of houses, and the financial limitations of a public body like Panchayat impose serious limitations to providing community sewerage system in rural areas. Therefore, it becomes incumbent for each household to have its own facility.

The sanitary latrine in a rural area must satisfy certain norms such as :

1. it should ensure privacy and protection against weather
2. it should be simple, elegant and cheap, but should not sacrifice the basic sanitary and safety aspects,
3. it should avoid exposure of excreta to flies and do not cause odour nuisance.
4. it should suit the habits of the local people.
5. it should lend itself to safe collection and disposal of excreta without the help of human beings.

For proper development of a latrine programme, an adequate water supply is a pre-requisite. Since water is available generally in limited quantity, hand or pour flushed latrines are recommended. In this case, the excreta is cleaned and washed away into a pit by pouring one to two liters of water. With the majority of the people in India using water for ablution purpose, the habit of using water for flushing will not pose much difficulty.

In cases, where personal cleansing materials are used, the latrine design will need certain modifications to prevent chokage.

Essentially a sanitary latrine for the rural areas should be hand flush type, having 1 meter x 1 meter covered enclosure 2 to 2½ meters high made of local materials, a door and impervious flooring. The latrine encloses the water closet pan or receptacle with foot rest, water seal trap (1½ cms to 1¾ cms seal); and a lead away stoneware or burnt earth pipe of 10 cm. diameter empties the contents into a pit 1 meter diameter 2 to 3 meters deep constructed 1 to 2 meters away from the tank and suitably covered. The liquid portion leaches into the pervious soil. In certain soils the pit may require lining of inside surface to protect against caving.

Such a unit can serve a family of 6 persons for a period of 4 to 5 years. If needed, one pit can be used for two latrines constructed nearby. Cost of construction of latrine will vary according to the availability of raw materials and labour. The cost of latrine block will vary between Rs. 100/- to Rs. 450/- depending upon the superstructure and the pit lining.

The latrines pose problems in water-logged areas and where the soil is rocky or impervious. In such cases, costlier alternate methods will have to be used.

Practice of using a leach or soak pit for a community latrine is not advisable.

A sanitary latrine will not be 'sanitary' in the real sense unless it is kept clean and flushed with water every time it is used.

A permanent structure for the latrine should be encouraged and the users' motto should be "keep the latrine as clean as the kitchen".

NEERI would be willing to offer any possible assistance for the implementation of the sanitation programme in the rural and urban areas.

**APPENDIX-I**

LIST OF DRAWINGS AND APPROXIMATE COST  
ESTIMATES OF UNITS

Drawing No.	Item	Approximate cost*
<b>URBAN SLUMS</b>		
		(Rs.)
1.	12 W.C.s (single Storey)	9,500/-
2.	12 W.C.s and 10 Baths (Single storey)	14,000/-
3.	12 W.C.s and 12 Baths, 4 washbasins (double storey)	27,000/-
4.	24 W.C.s and 16 Baths (double storey)	31,000/-
5.	12 W.C.s (single storey) with septic tank and disposal	20,000/-
6.	12 Bathrooms, (single storey)	7,400/-
7.	2 seat urinals for ladies	960/-
8.	Stand post and washing platform	725/-
9.	4 seat urinals for gents	660/-
<b>RURAL AREAS</b>		
R-1	1 seat latrine block for Rural Housing	270/-
R-2	—do—	315/-
R-3	—do—	325/-
R-4	—do—	450/-

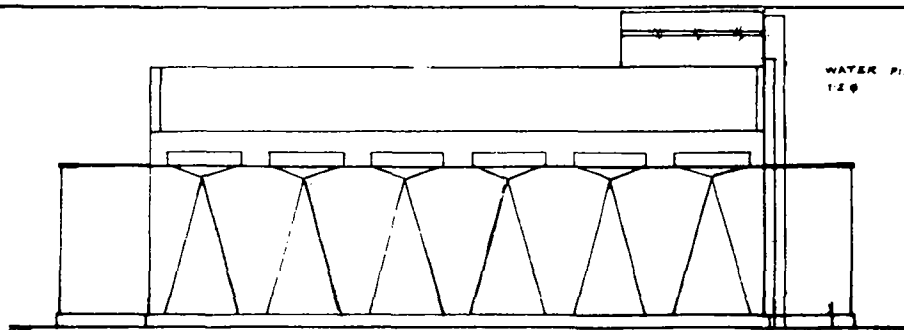
\* as per rates prevailing at Nagpur

**APPENDIX II**

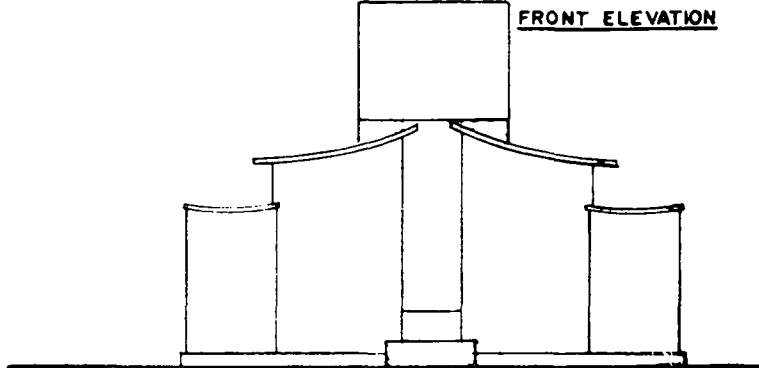
BREAK-UP OF ESTIMATE

Drawing Number	Civil Work	Sanitary work	Electrification
	(Rs.)	(Rs.)	(Rs.)
1.	4600/-	4200/-	700/-
2.	8450/-	4175/-	1375/-
3.	18475/-	6775/-	1750/-
4.	20150/-	8550/-	2300/-
5.	7400/-	11675/-*	925/-
6.	5880/-	630/-	890/-

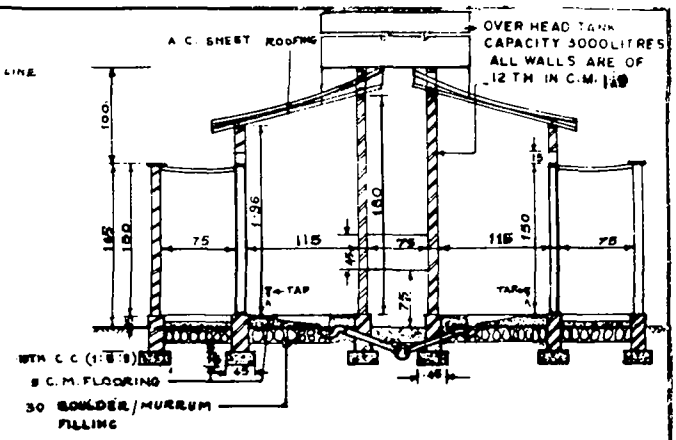
\* Includes Septic tank and disposal system.



FRONT ELEVATION

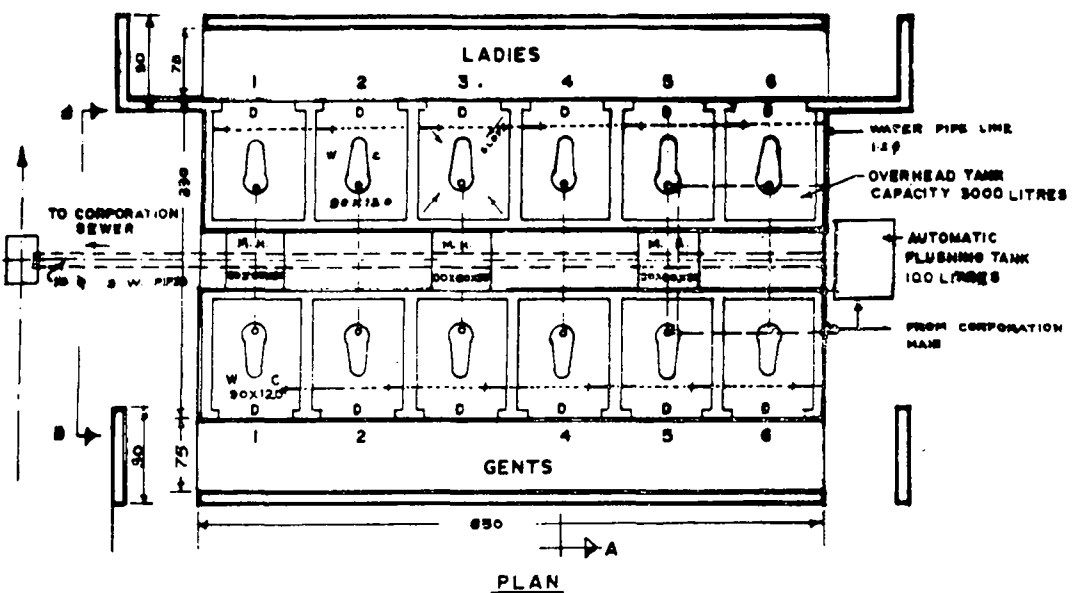


SIDE ELEVATION ON B-B



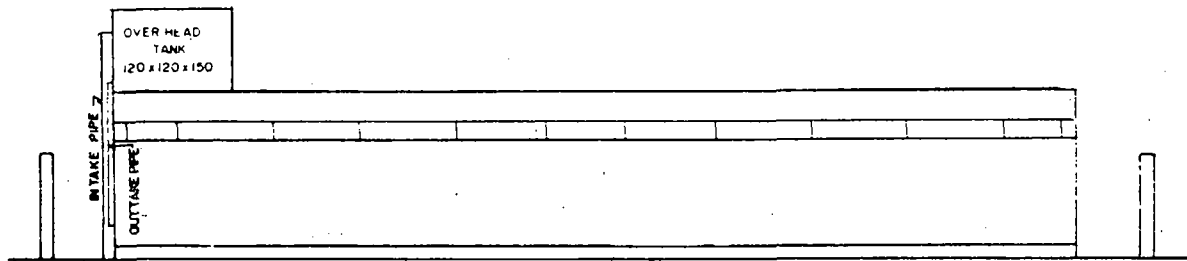
SECTION ON A-A

NOTE:  
ALL DIMENSIONS ARE IN CM

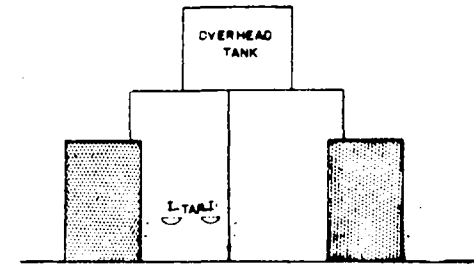


SANITATION FACILITIES IN SLUMS

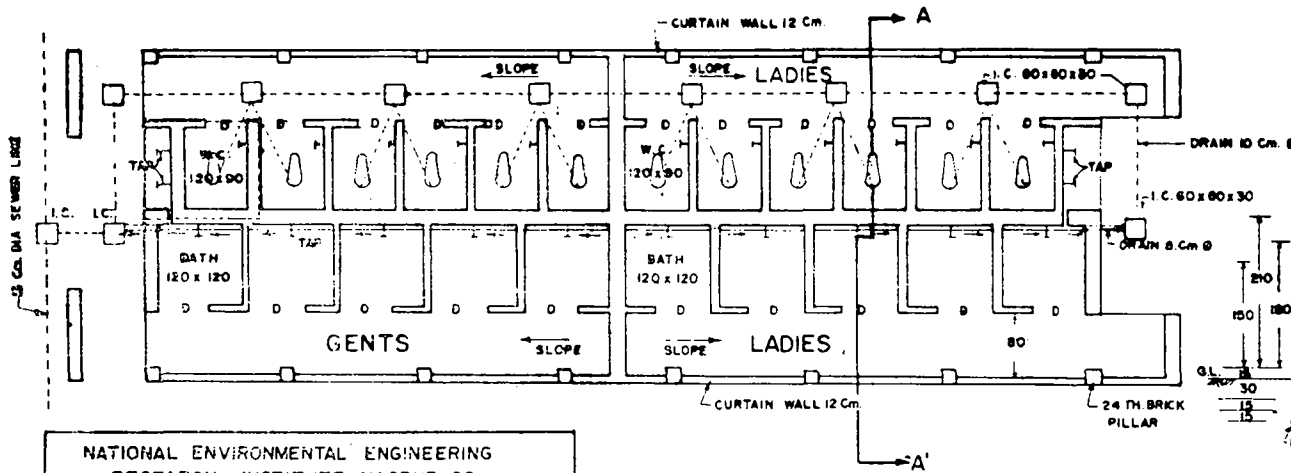
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TITLE	TYPE DESIGN FOR HAND FLUSH SANITARY LATRINE			
DESIGNED BY	DRAWN BY	TRACED BY	CHECKED BY	REVISION
K. S. NIMSINER	P. A. KASTURE	P. A. KASTURE	B. K. HANDA	
SCIENTIST	V. RAMAN			
DIRECTOR	PROF. H. MAJUMDER			
DATE 31-10-75	SCALE: -	1:50	DRG. NO. 1/76	



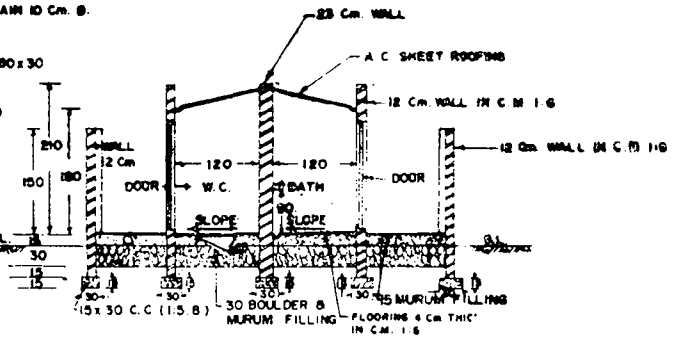
FRONT ELEVATION



SIDE ELEVATION



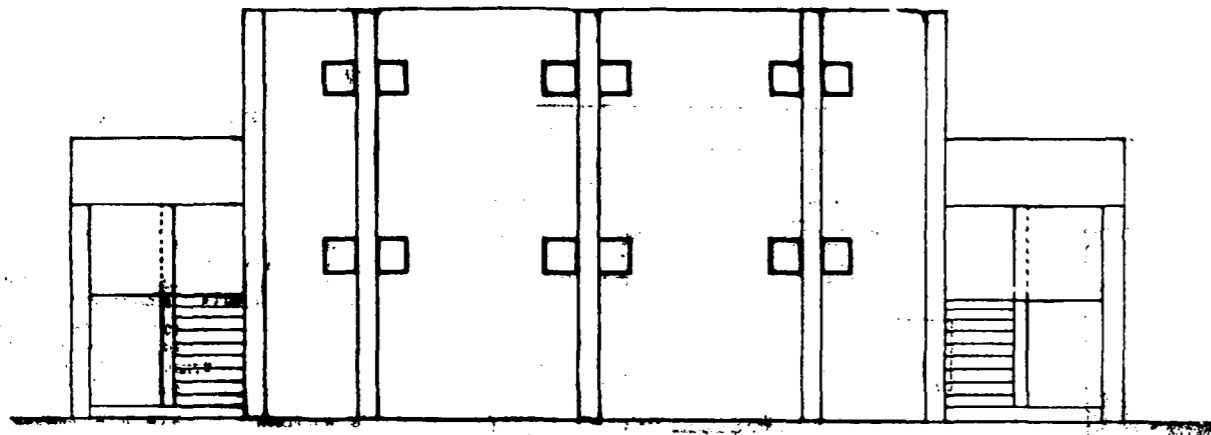
PLAN



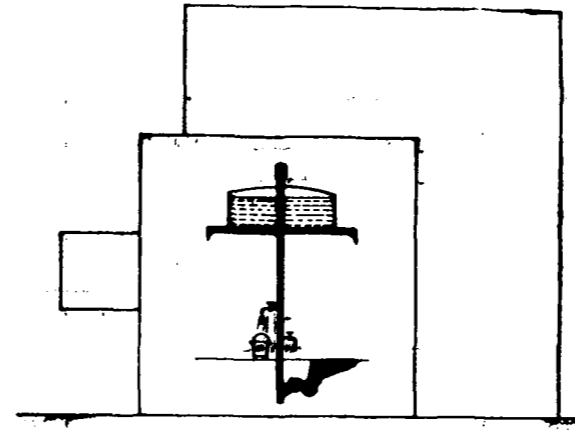
SECTION AT A-A'

NOTE -- ALL DIMENSION ARE IN CM

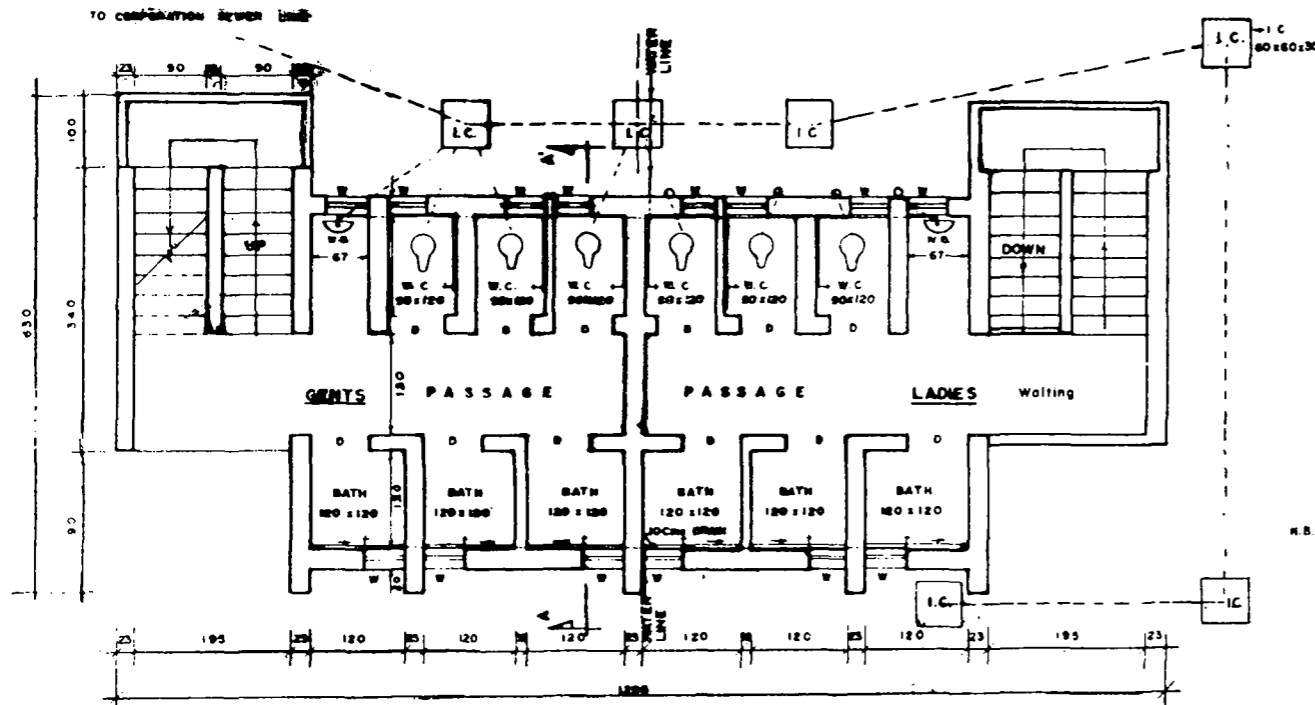
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TITLE		TYPE DESIGN FOR BATH & LATRINE		
DESIGNED BY	DRAWN BY	TRACED BY	CHECKED BY	REVISION
K. G. NIMBALKAR	S. R. PANCHPATKAR		B. K. HANDA	
SCIENTIST	V. RAMAN			
DIRECTOR	PROF. N. MAJUMDER			
DATE 16-12-75	SCALE: 1:50	ORG. NO 2/76		



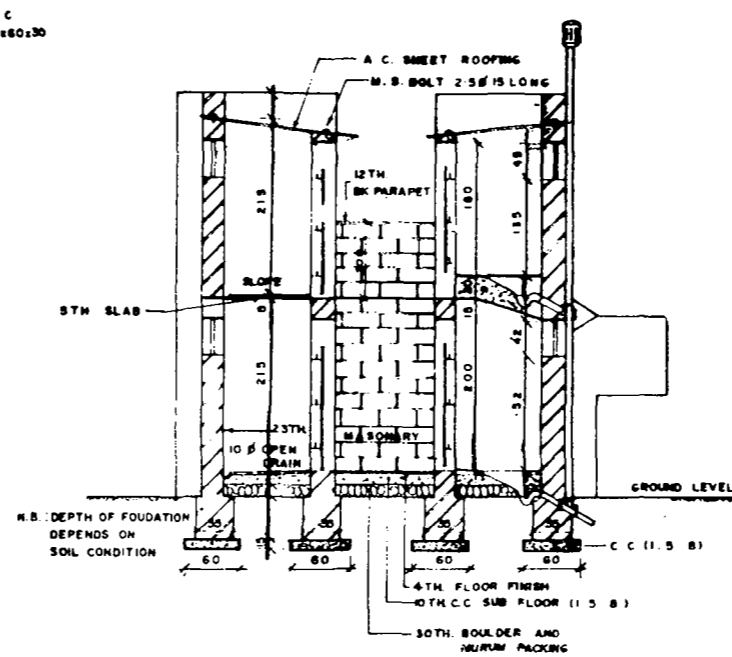
FRONT ELEVATION



SIDE ELEVATION  
(RIGHT HAND SIDE)



GROUND FLOOR PLAN



SECTION AT A-A'

**SPECIFICATIONS**

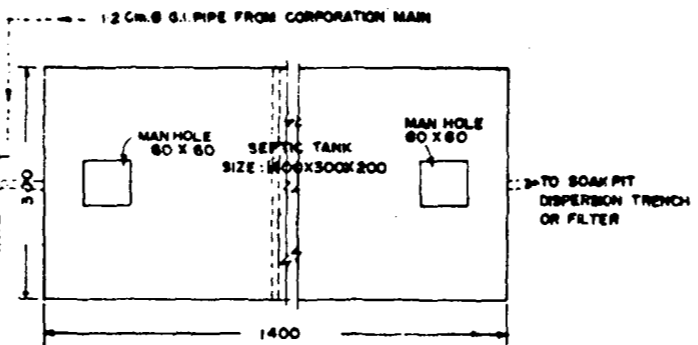
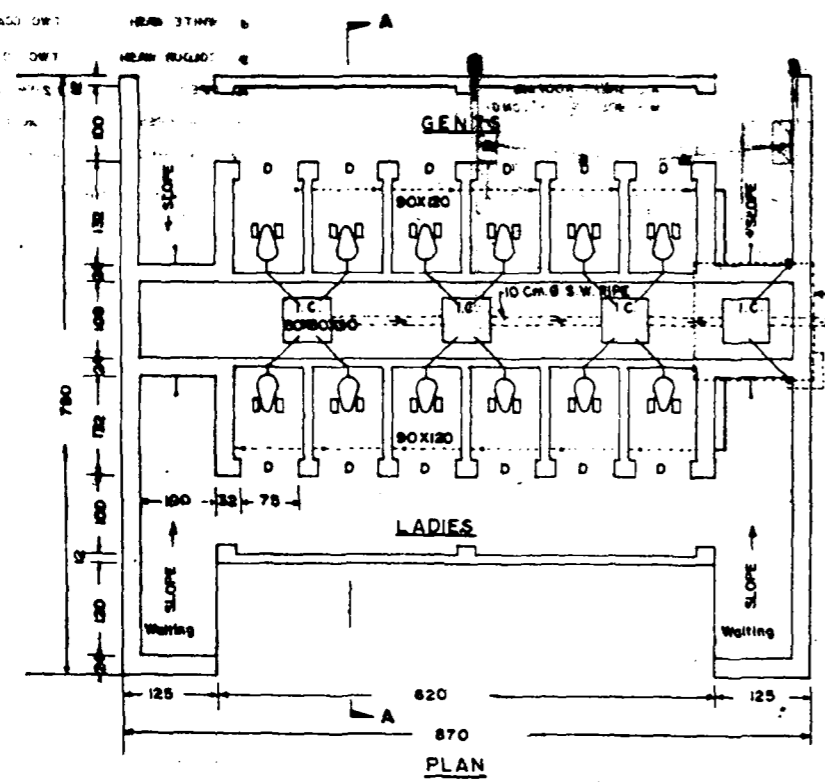
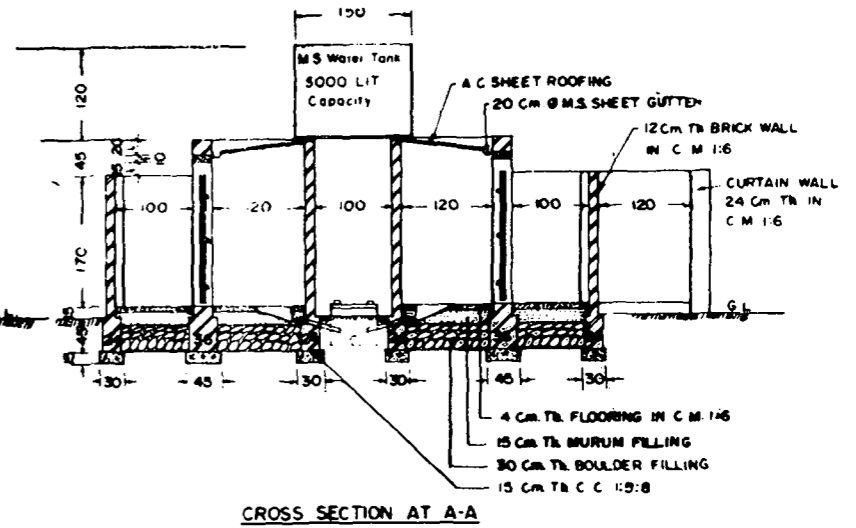
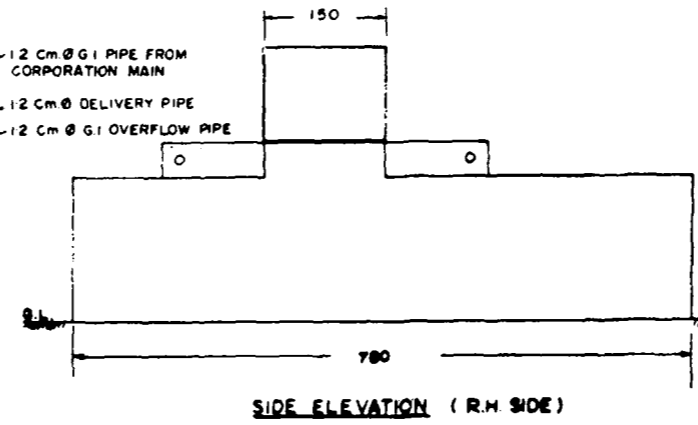
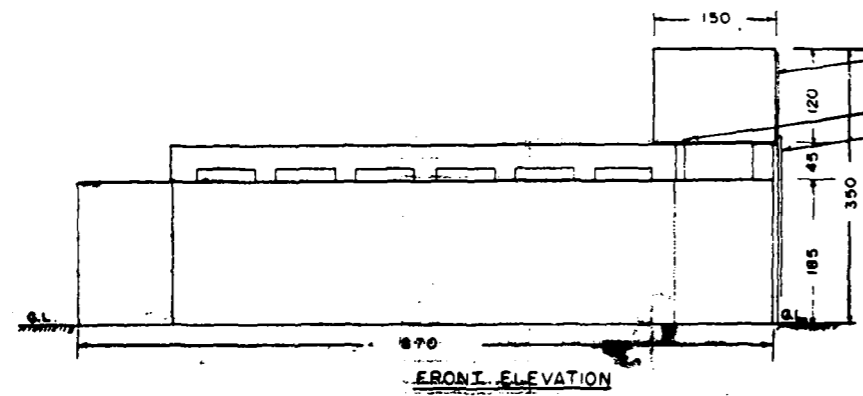
1. P.C.C. FOUNDATION 1:5:8
2. PLINTEPH (BRICK MASONRY) 23Cms TH IN 1:6 CEMENT MORTAR
3. PARTITION WALLS 12Cms TH IN 1:4 CEMENT MORTAR
4. DOOR 75 Cm x 150 Cm COUNTRY WOOD BATTENED AND BRACED 2.5 Cm TH
5. ROOF 8 TH R.C. SLAB FOR GROUND FLOOR A.C. SHEET FOR FIRST FLOOR
6. W.C. FLOOR 4cm TH IN 1:6 C. MORTAR OVER MURRUM & BRICK BARS FILLING
7. PLASTER 1:2 Cms TH IN 1:6 C. MORTAR
8. WHITE WASH TWO COATS
9. COLOUR WASH TWO COATS
10. PIPES 12mm DIA G.I. PIPES
11. S.W. PIPES 10 Cm DIA S.W. PIPES
12. VENT PIPES 10 Cm DIA A.C. PIPES
13. AUTOMATIC FLUSHING M.S. TANK 100LITRES CAPACITY TANK
14. OVERHEAD WATER TANK M.S. OR ASBESTOS TANK 2000LITRES CAPACITY
15. DECORATIVE PROJECTIONS 2 Cm TH IN PLASTER
16. CEMENT RENDERING UP TO 120 Cms INSIDE THE LATRINES AND BATH ROOMS
17. WATER TAP
18. I.C. INSPECTION CHAMBER

**SANITARY FACILITE SLUMS**

NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE, NAGPUR				
TITLE TYPE DESIGN FOR SANITARY LATRINE AND BATH				
DESIGNED BY	DRAWN BY	TRACED BY	CHECKED BY	REVISION
K G NIMBALKAR	K G NIMBALKAR	P A KASTURE	B K HANDA	
SCIENTIST	V RAMAN			
DIRECTOR	PROF. N MAJUMDER			
DATE: 1-76	SCALE: 1:50	DRG NO: 3/76		

NOTE - ALL DIMENSIONS ARE IN Cms



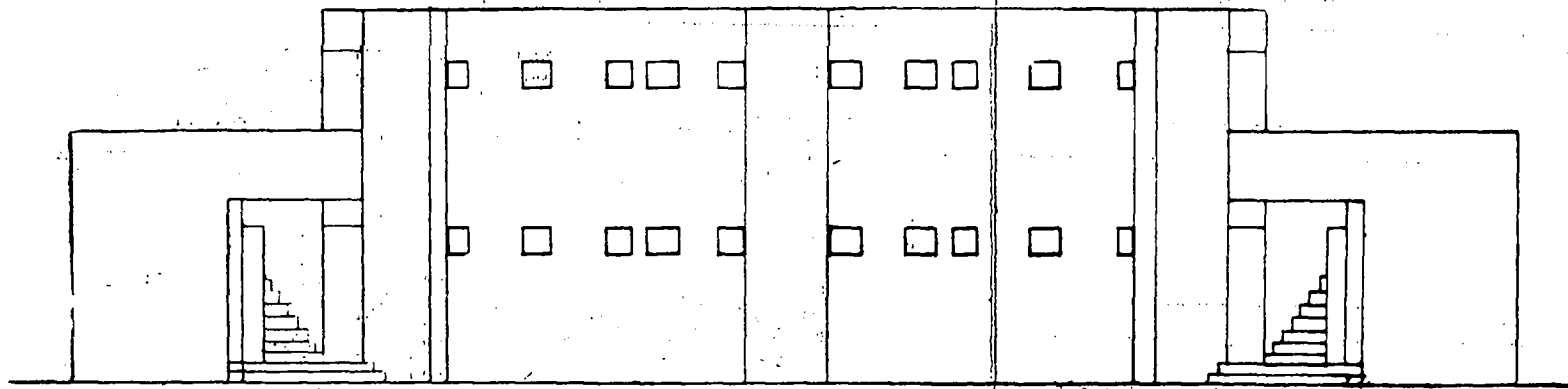


- CONSTRUCTION NOTES -**
- 1 C.C. FOUNDATION 1:5:8
  - 2 BRICK MASONARY SUPER STRUCTURE - 12 Cm. Ø 24 Cm TH IN C.M. 1:6
  - 3 SEPTIC TANK 24 Cm TH WALLS IN C.M. 1:6 WITH TWO CHAMBERS, SIZE - 1400 X 300 X 200 Cm
  - 4 ROOF A.C.C. SHEET
  - 5 W.C. PAN & TRAP M.E.E.R.I. DESIGN
  - 6 FLOORING 4 Cm TH IN C.M. 1:6 OVER 15 Cm TH MURUM FILLING
  - 7 DOOR 170 X 75 Cm. SIZE OF BATTENED AND BRACED DOOR, IN HARD WOOD WITH SINGLE SHUTTER WITHOUT DOOR FRAME
  - 8 WATER TANK M.S. TANK OF 3000 LIT CAPACITY

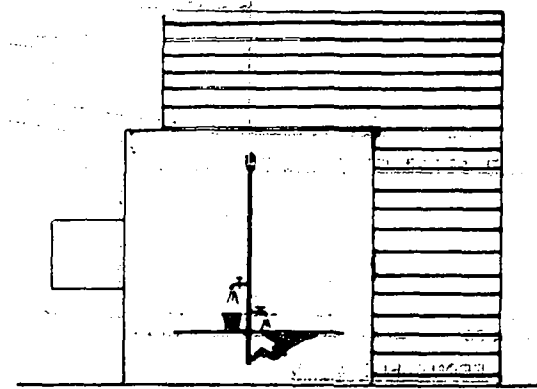
**SANITATION FACILITIES IN SLUMS**  
 \* ALL DIMENSIONS ARE IN CENTIMETER

NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTT, NAGPUR				
TITLE	TYPE DESIGN FOR SANITARY LATRINES FOR LADIES AND GENTS			
DESIGNED BY	DRAWN BY	TRACED BY	CHECKED BY	REVISION
KG. Nimbalkar	D.B. DIGHEKAR	B.X. HANDA		
SCIENTIST	V. RAMAN			
DIRECTOR	PROF. N. MAJUMDER			
DT 7.1.1976	SCALE - 1:80			DRG. No 5/78

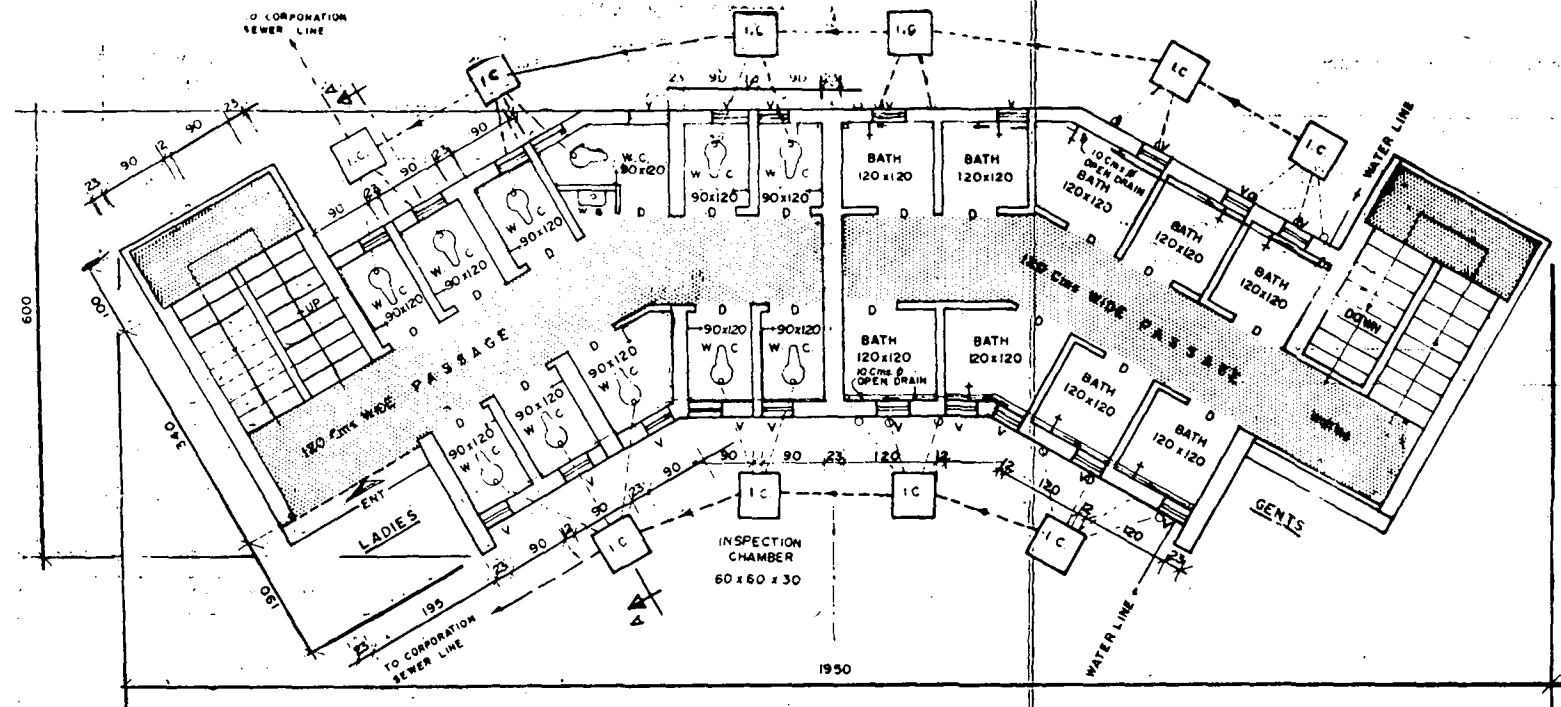




FRONT ELEVATION

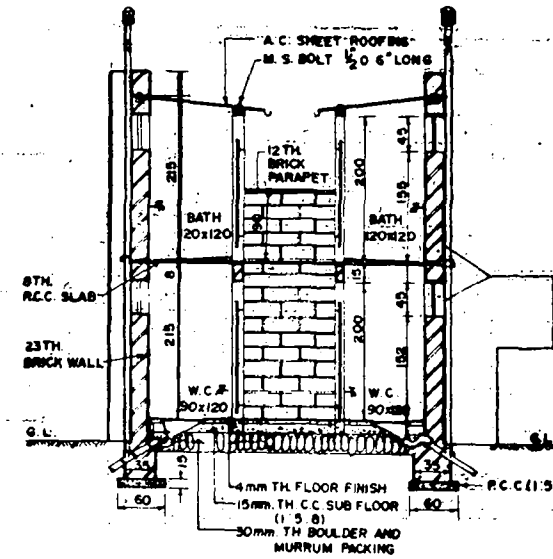


SIDE ELEVATION  
(RIGHT HAND SIDE)



GROUND FLOOR PLAN

FIRST FLOOR PLAN



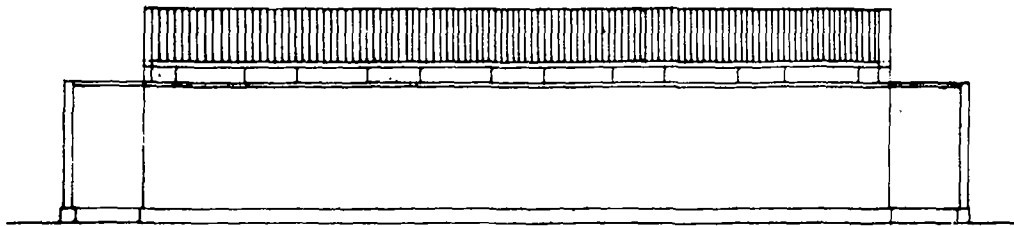
SECTION A-A

**SPECIFICATIONS**

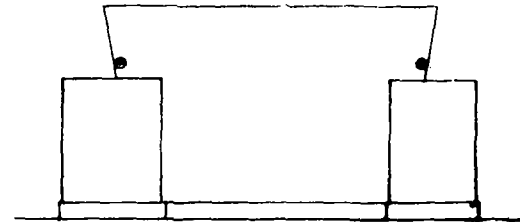
- 1 P.C.C. FOUNDATION 1:5:8
- 2 PLINTH (BRICK MASORARY) 23TH IN 1:6 CEMENT MORTAR
- 3 PARTITION WALLS 12CM TH IN 1:4 CEMENT MORTAR
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- 9 COLOUR WASH TWO COATS
- 10 PIPES 1.2 CM DIA. G.I. PIPES
- 11 S.W. PIPES 10 CM DIA. S.W. PIPE
- 12 VENT PIPES 10 CM DIA. A.C. PIPE
- 13 AUTOMATIC FLUSHING M.S. TANK 100 LITRES CAPACITY TANK
- 14 OVERHEAD WATER M.S. OR ASBESTOS TANK 2000 LITRES CAPACITY TANK
- 15 DECORATIVE PROJECTIONS 2 CM THICK IN PLASTER
- 16 CEMENT RENDERING UP TO 120 CM INSIDE THE LATRINES AND BATH ROOMS
- 17 WATER-TAP
- 18 DEPTH OF FOUNDATION ACCORDING TO SOIL CONDITIONS
- 19 I.C. INSPECTION CHAMBER

NOTE - ALL DIMENSIONS ARE IN CMs.

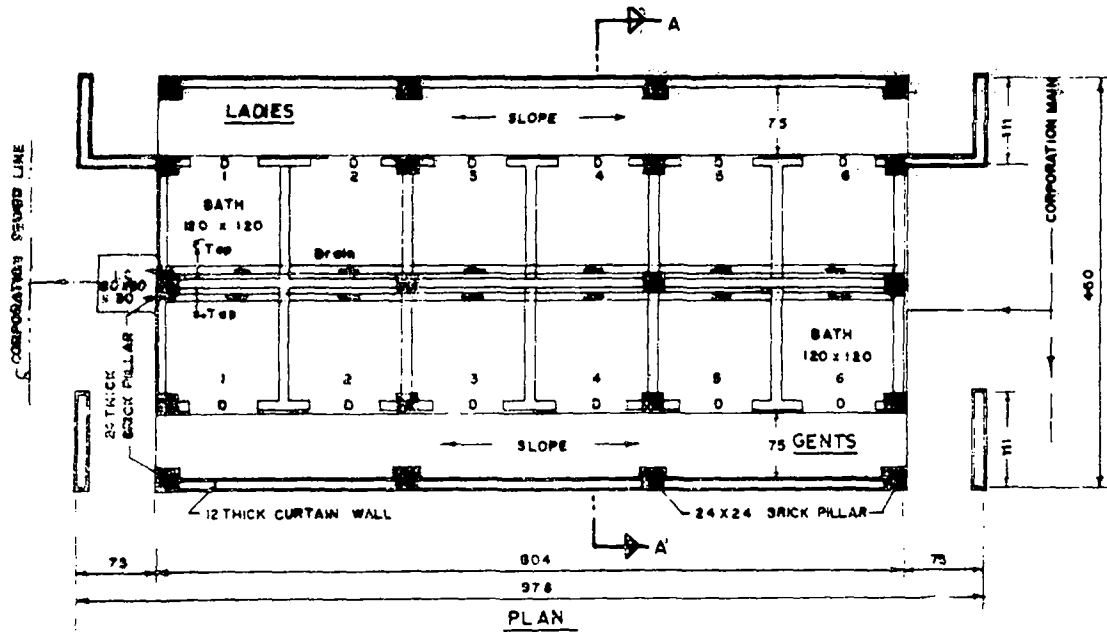
NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE, NAGPUR				
TITLE TYPE PLAN FOR COMMUNITY SANITARY LATRINES & BATH				
DESIGNED BY	DRAWN BY	TRACED BY	CHECKED BY	REVISION
D.S. DEBAPANDAR	D.C. DE SHANDE	P.A. KASTUR	B.K. HANDE	
SCALE	V. RAMAN			
DIRECTOR	PROP. H. MAJUMDER			
DATE: 1/76	SCALE: 1/50			SHEET 10/76



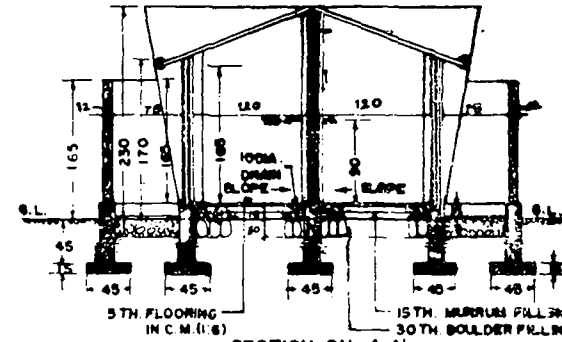
FRONT ELEVATION



SIDE ELEVATION



PLAN

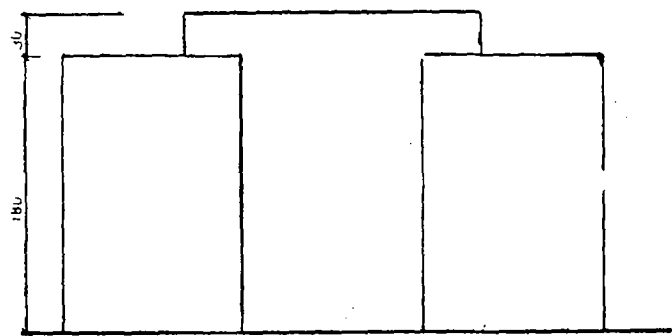


SECTION ON A-A

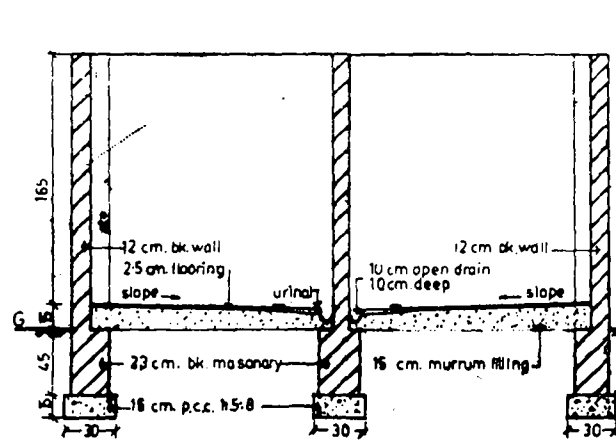
NATIONAL ENVIRONMENTAL ENGINEERING  
RESEARCH INSTITUTE, NAGPUR-20

TITLE		TYPE DESIGN FOR BATH		
DESIGNED BY	DRAWN BY	TRACED BY	CHECKED BY	REVISION
K. G. NIMBALKAR	P. A. KASTUR	P. A. KASTUR	B. K. HANDE	
SCIENTIST	V. RAMAN			
DIRECTOR	PROF. N. MAJUMDER			
DATE 12-12-75	SCALE - 1:50		DRG. NO. 18/78	

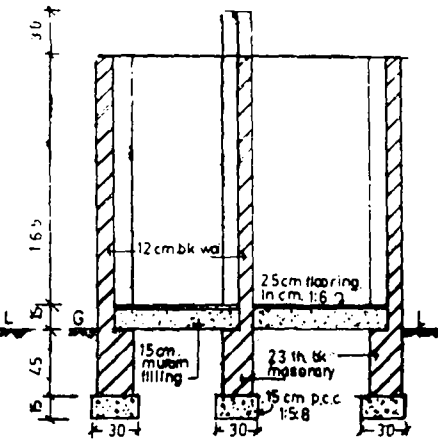
NOTE.- ALL DIMENSIONS ARE IN CMS.



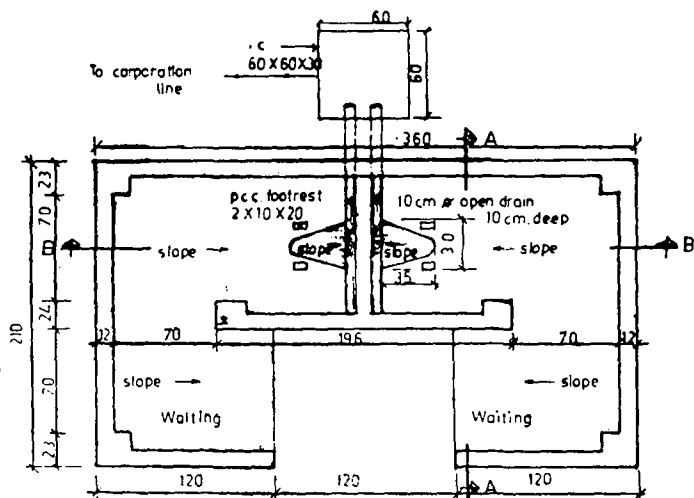
FRONT ELEVATION



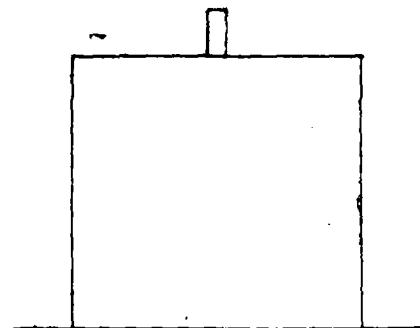
CROSS SECTION B-B



CROSS SECTION A-A



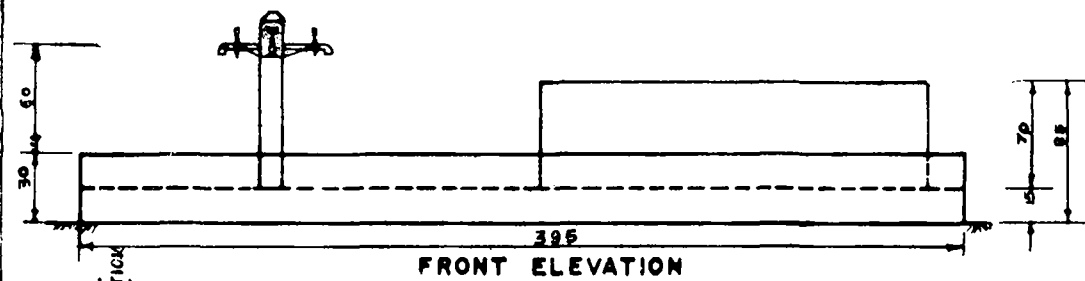
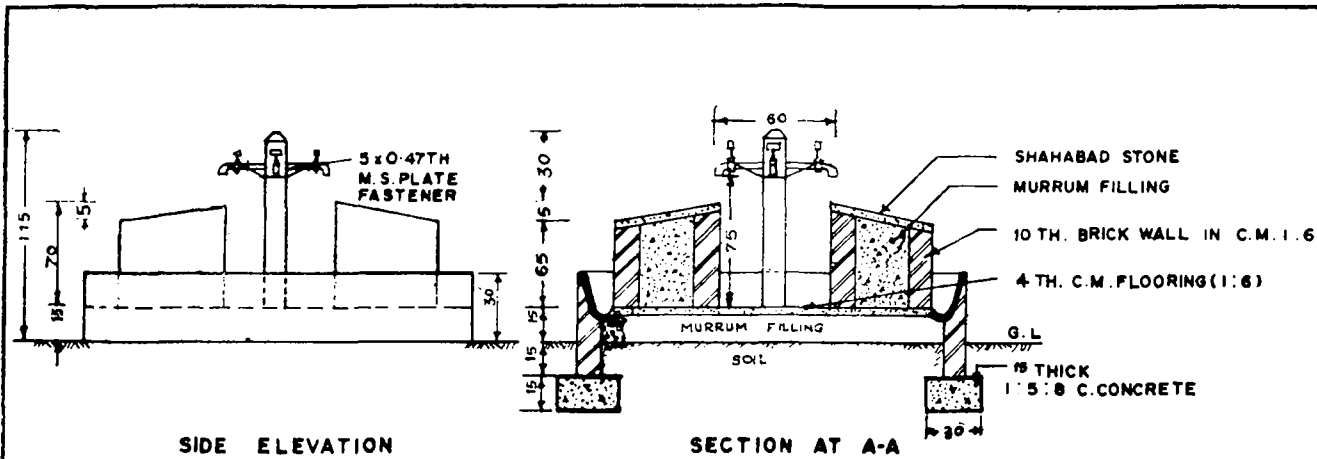
PLAN



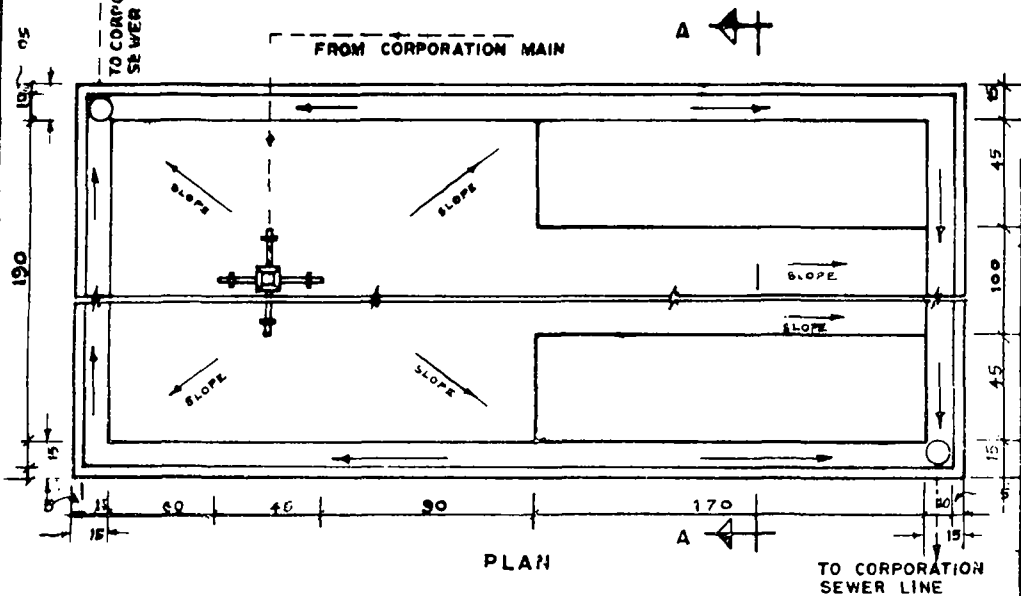
SIDE ELEVATION

**TYPE DESIGN FOR LADIES URINAL.  
SANITATION FACILITIES IN SLUMS.**

NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE, NAGPUR				
TITLE				
DESIGNED BY	DRAWN BY	TRACED BY	CHECKED BY	REVISION
SCIENTIST		V. RAMAN		
DIRECTOR		Prof. N. MAJUMDER		
DATE	SCALE			Dr. 7
6-1-76	1:20			Nr. 7R

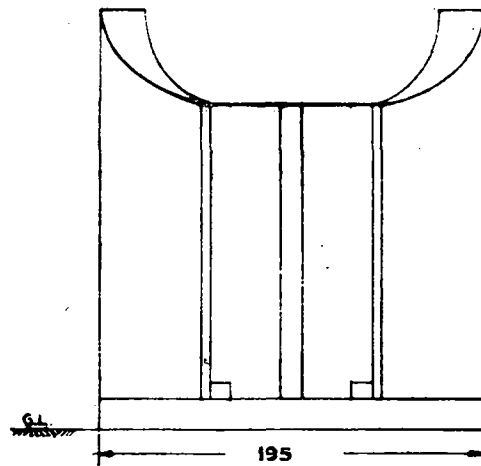


NOTE:-  
ALL DIMENSIONS ARE IN Cm

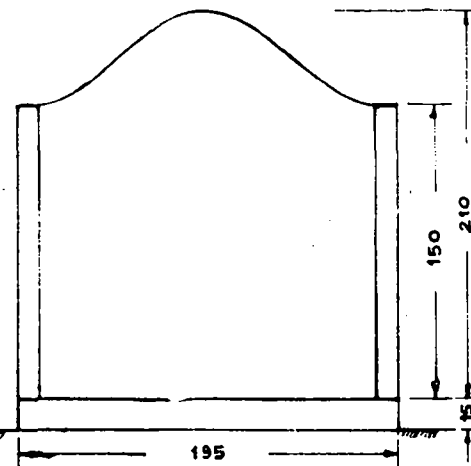


SANITATION FACILITIES IN SLUMS

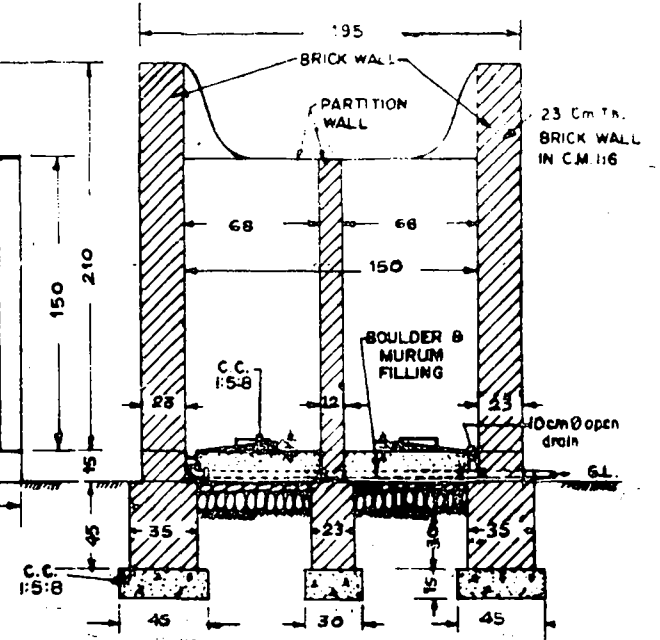
NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE, NAGPUR-20				
TITLE		PUBLIC WATER STAND-POST AND WASHING PLATFORM		
DESIGNED BY	DRAWN BY	TRACED BY	CHECKED BY	REVISION
K.G. NIMBALKAR	P.A. KASTURE	P.A. KASTURE	B.K. HANDA	
SCIENTIST	V. RAMAN			
DIRECTOR	PROF: N MAJUMDER			
DATE 10-11-75	SCALE: 1:25			DRG. NO. 8/76



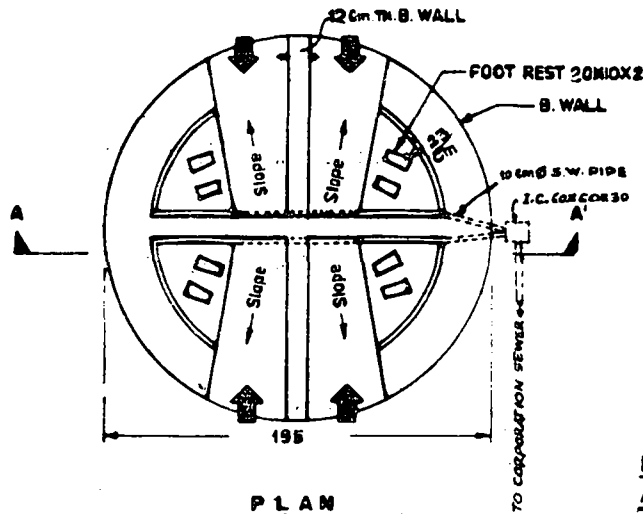
**FRONT ELEVATION**



**LEFT HAND SIDE VIEW**



**SECTION ON A-A'**



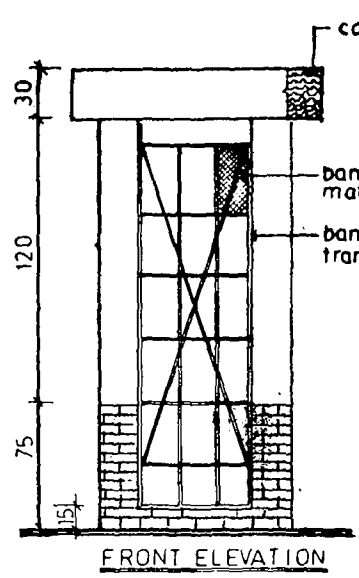
**PLAN**

**URINAL BLOCK FOR GENTS**

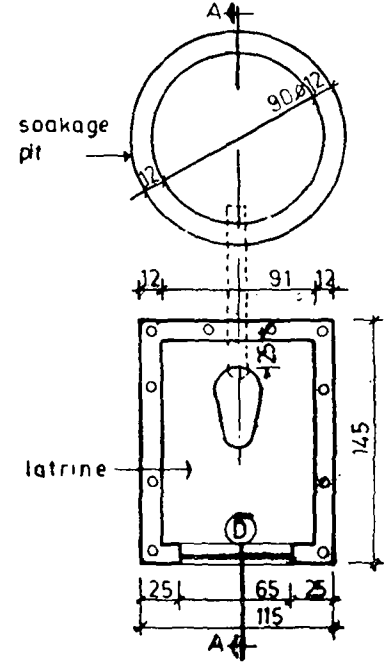
**NOTE:**  
**ALL DIMENSIONS ARE IN Cms**

**SANITATION FACILITIES IN SLUMS**

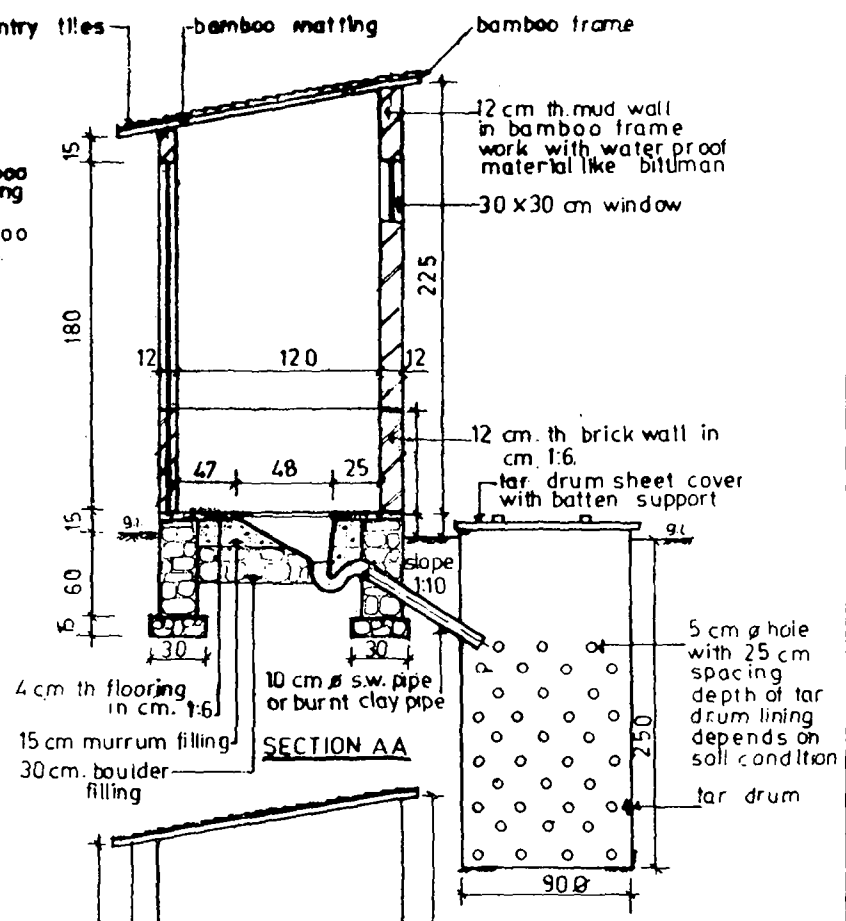
NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INST., MUMBAI				
TITLE	URINAL BLOCK FOR GENTS.			
DESIGNED BY	DRAWN BY	TRACED BY	CHECKED BY	REVISION
K.G.N.	K.G.N.	D.B.D.	B.K.HANDA	
SCIENTIST	V. RAMAN			
DIRECTOR	PROF. N. MAJUMDER			
DT-10.11.75	SCALE - 1/25			DRG. No. 9/75



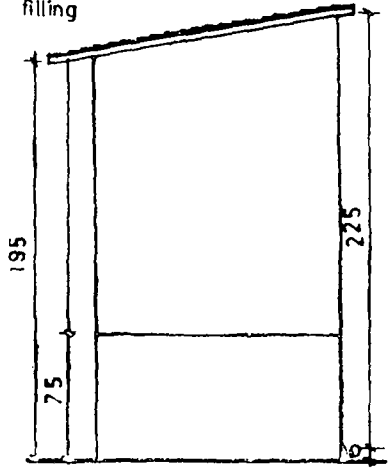
FRONT ELEVATION



PLAN



SECTION AA



SIDE ELEVATION

**LATRINE BLOCK FOR RURAL HOUSING**

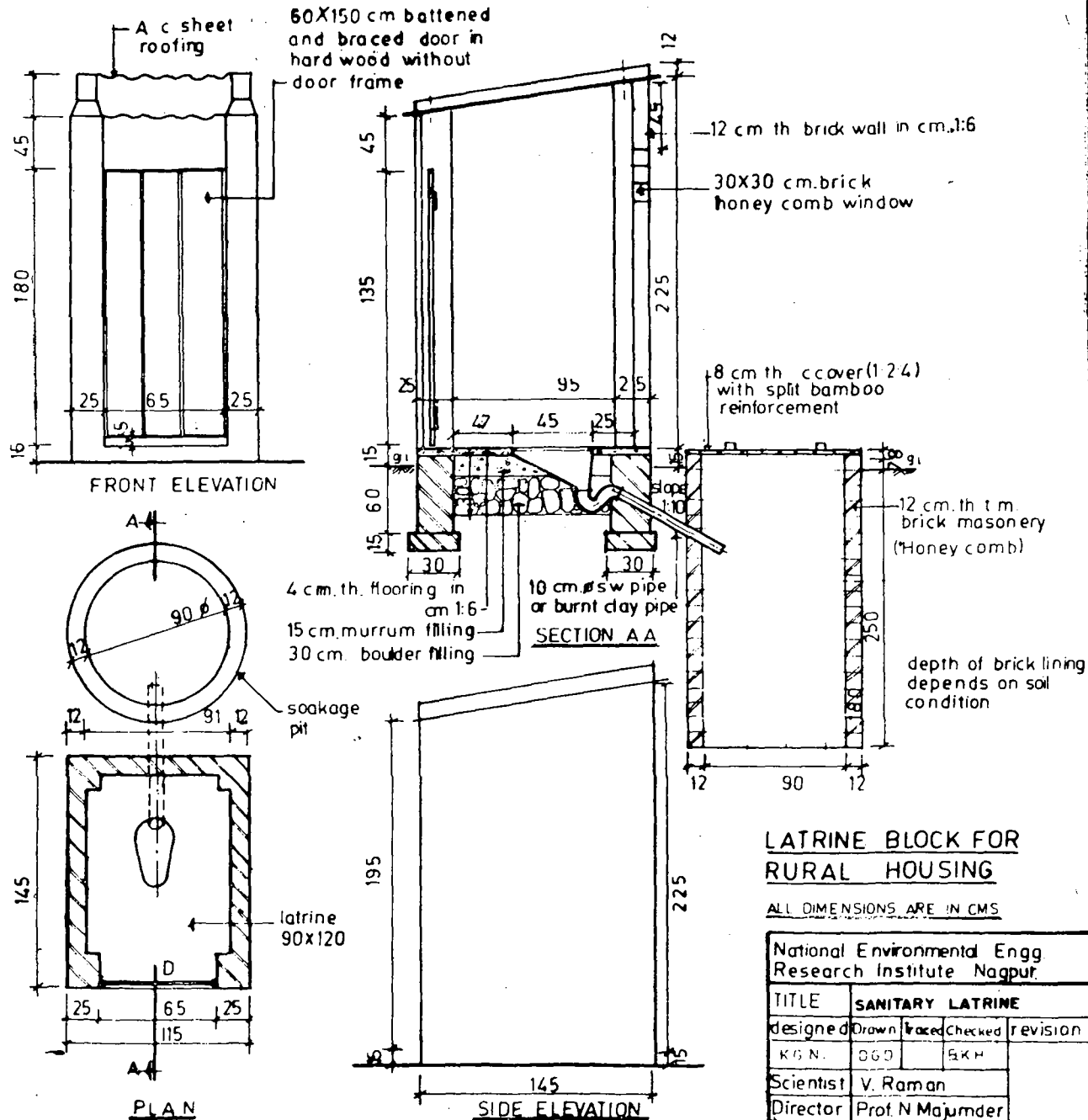
ALL DIMENSIONS ARE IN CMS.

National Environmental Engg Research Institute Nagpur			
TITLE	SANITARY LATRINE		
designer	Drawn	Traced	Checked
K G N	DGD		BKH
Scientist	V Raman		
Director	Prof. N. Magumder		
Date	scale	1/25	Org no
17.12.75			RJ/76









**LATRINE BLOCK FOR RURAL HOUSING**

ALL DIMENSIONS ARE IN CMS

National Environmental Engg. Research Institute Nagpur.			
TITLE	SANITARY LATRINE		
designed	Drawn	Checked	revision
KGN.	GGD	SKH	
Scientist	V. Raman		
Director	Prof. N. Majumder		
Date	scale 1:25	Org no. <sup>R4</sup> 76	