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TOWARDS A SUSTAINABLE DECENTRALISED OPERATION AND MAINTENANCE OF RURAL WATER SUPPLY SYSTEM IN INDIA

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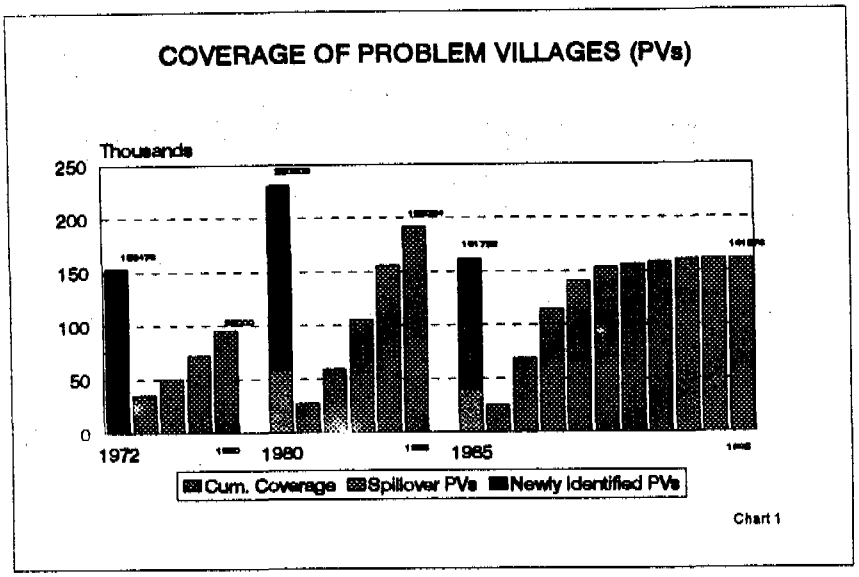
Establishing safe and sustainable rural water supply with access to each of the members of the community in more than 1.3 million habitations has been one of the very challenging tasks undertaken as a joint effort by the Union Government and the States in the Republic of India. Compared to the negligible effort before the formation of the Republic in 1950, the growth of water supply system and the advancement of the technological and organisational capabilities to deal with the problems since 1950 are commendable. Efforts are now on to decentralise the operation and maintenance at the community level as part of the effort to handover more and more locally manageable developmental/administrative tasks to the local bodies at various levels under the Panchayati Raj Institutions(PRIs). Judging from the past experience, the efforts to decentralise the operation and maintenance activities and to make it a people's programme is going to be a tremendous task, requiring not only an extra ordinary political will, but also greater administrative capability and organisational capacity to support the programme. The present paper attempts to give a brief picture of the growth of water supply system with its attendant problems and the initiative now taken by the Rajiv Gandhi National Drinking Water Mission (RGNDWM) to decentralise operation and maintenance system with a view to improve the rural environment and the sustainability of the system.

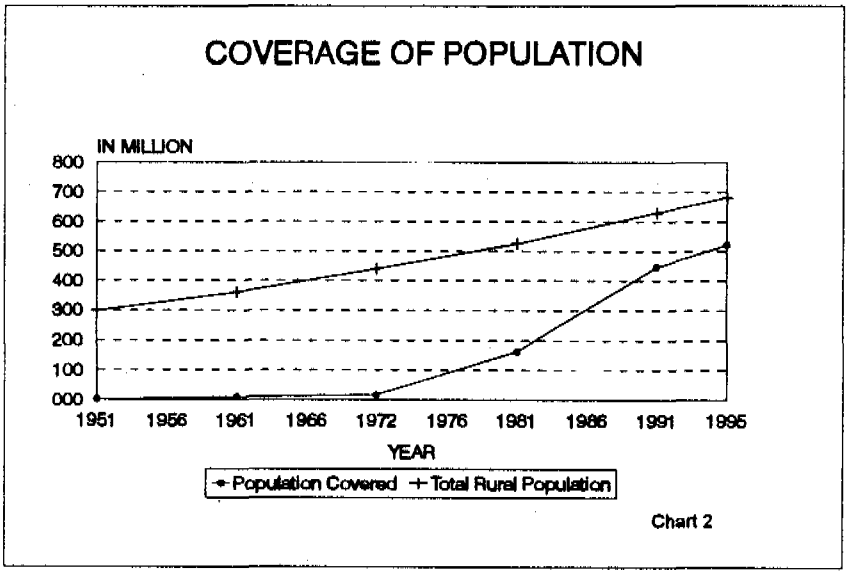
GROWTH OF RURAL WATER SUPPLY SYSTEM IN INDIA

In analyzing the growth of rural water supply system in India, one can perceive four distinct periods, (i) the entire period of negligible development till 1950, (ii) the period of slow development from 1951 to 1971, (iii) the period of fast development from the time of introduction of Accelerated Rural Water Supply Programme (ARWSP) in 1972 till 1986 when the Technology Mission was introduced and (iv) the period of Technology Mission -1986 to date - the period of accelerated development of the system and the technologies. In understanding the growth of the system, two parameters can be taken i.e. the number of problem villages sought to be covered and the population covered during the period. The growth in the coverage of problem villages and the coverage of population can be seen from the chart 1 & chart 2 respectively. It can be seen that specially after the introduction of the ARWSP, the growth in the coverage of both problem villages and the population has been at an accelerated pace.

Of the 74% of the population covered as on 1994, more than 80% of the population in rural areas is served through spot sources (mostly hand pumps). The present coverage of nearly 74% of the population with either handpumps, pipe water supply system or other sources has



been the result of the systematic effort to replace the existing traditional sources like springs/ wells, tanks, flowing streams and other systems by more safe water supply systems. These ensure the safe preservation of water till collected by the consumer, either within the treatment system like the pipe water supply/storage tanks or within the ground like the handpumps. As a result of this emphasis on more sophisticated and exogenously managed system, the need arose for providing adequate funds under operation and maintenance system and also for



developing the appropriate organisational structure for such maintenance. This problem has been perceived by the concerned implementing agencies of the various State Governments and steps have been taken by various states in providing funds and developing organisational structure within their constraints. The norms adopted by the Government of India (1987) for providing funds is as follows:

	TYPE OF SYSTEM	NORMS RECOMMENDED
-	Deep tubewells and handpump schemes	Rs.400-500 per pump per annum for India Mark II handpumps and Mark III handpumps
-	Shallow tubewell	Direct Action Pump - Rs.25 per pump per annum
-	Piped Water Supply	5% of the cost of the scheme excluding energy charge. The expenditure norm can be suitably enhanced for difficult areas such as desert and hilly areas
-	Gravity flow schemes	7.5 per cent of the cost of the schemes in hilly areas and 8 to 9 per cent for desert areas

The estimate of the growth of requirements of funds as per these norms and the actual flow of funds shows clear mis-match seen from the Table 1.

Table 1 : **FUNDS FLOW FOR OPERATION AND MAINTENANCE**

(Rs in Millions)

YEAR	TOTAL REQUIREMENT	TOTAL AVAILABILITY	SHORTFALL
1984-85	1609.86	804.93	804.93
1985-86	1963.92	1187.85	776.07
1986-87	2345.25	1409.22	936.03
1987-88	2784.96	1832.19	952.77
1988-89	3241.85	2077.82	1164.03
1989-90	3691.83	2295.90	1395.94
1990-91	4159.11	2546.83	1612.28
1991-92	4711.37	2907.94	1803.43
1992-93	5292.24	3227.00	2065.25
1993-94	6041.69	3770.29	2271.40
1994-95	6781.76	4130.95	2650.81
TOTAL	**42623.83**	**26190.91**	**16432.92**

A recent survey of the status of the functioning of the system showed the effect of this mis-match. Nearly 13% of the system were seen not working with variations from State to State (Table 2).

Table 2 : STATUS OF DRINKING WATER SUPPLY SYSTEMS

S.No.	State Name	Total Number of Sources	Number of Systems Installed		Percentage of Systems installed	
			Working	Defunct	Working	Defunct
1	ANDHRA PRADESH	215958	194994	20964	90.29	9.71
2	ASSAM	117069	101211	15858	86.45	13.55
3	BIHAR	152744	121064	31680	79.25	20.75
4	GOA	436	407	29	93.35	6.65
5	GUJARAT	52408	42229	10179	80.58	19.42
6	HARYANA	20618	17122	3496	83.04	16.96
7	HIMACHAL PRADESH	119582	112709	6873	94.25	5.75
8	JAMMU & KASHMIR	5390	4740	650	87.94	12.06
9	KERALA	9281	7207	2074	77.65	22.35
10	MADHYA PRADESH	238121	213702	24419	89.75	10.25
11	MAHARASHTRA	157098	126015	31083	80.21	19.79
12	MANIPUR	1045	853	192	81.63	18.37
13	MEGHALAYA	4284	3539	745	82.61	17.39
14	MIZORAM	3526	2660	866	75.44	24.56
15	ORISSA	122235	107128	15107	87.64	12.36
16	PUNJAB	8214	8140	74	99.09	00.01
17	TAMIL NADU	155471	132709	22762	85.36	14.64
18	RAJASTHAN	123702	105783	17919	85.51	14.49
19	UTTAR PRADESH	332580	317900	14680	95.58	4.42
20	WEST BENGAL	207164	177219	29945	85.55	14.45
21	ANDMAN & NICOBAR	1777	1589	188	89.42	10.58
22	DELHI	238	217	21	91.18	8.82
23	LAKSHADWEEP	233	233	0	100.00	0.00
24	TRIPURA	9939	6217	3722	62.55	37.45
	Total	2059113	1805587	253526	87.68	12.32

ORGANISATIONAL STRUCTURE COMPARED

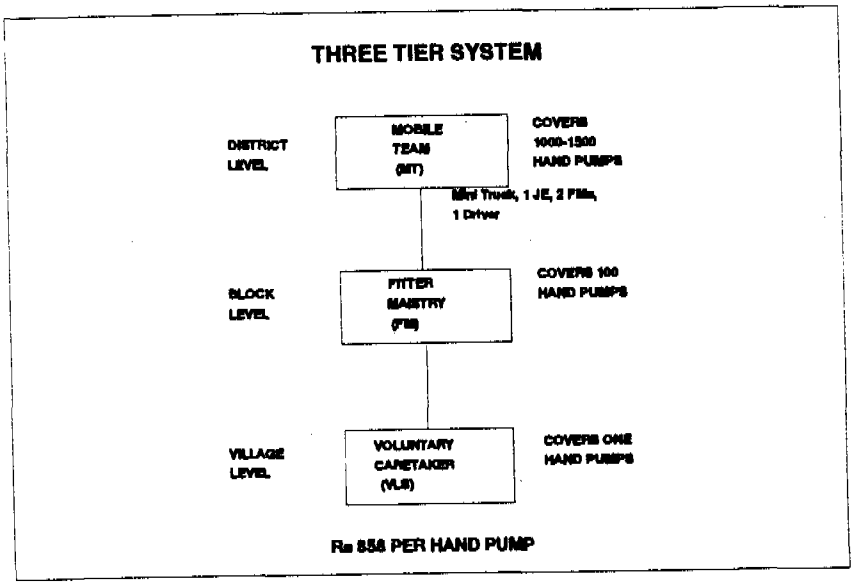
The pipe water supply system with huge pumps, sumps, storage tanks, treatment plants and distribution systems covering a number of villages needs more specialised professionals

to maintain the whole system. Therefore, this tends to be managed centrally by the departments. Even these centrally managed systems need well-trained and efficient set of people to promptly attend to the repairs and maintenance and also for monitoring such activities. In a number of States, there are reports of inadequate maintenance resulting in breakdown of the water supply system for months together.

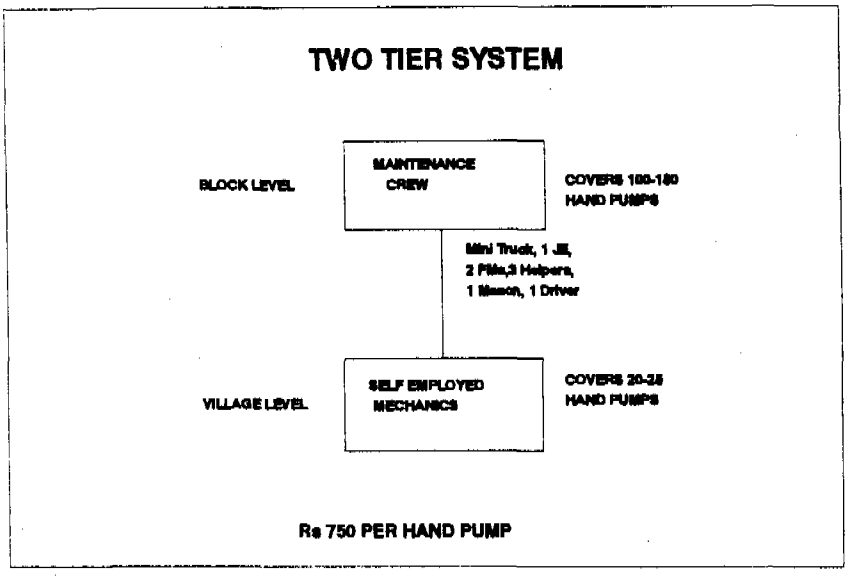
In the case of spot sources like handpumps, the installation and maintenance can be tackled locally. Some of the old type of handpumps which were in existence for long had become so familiar with the people that even a village smith could manage it. But a spot survey in 1971 in the States of Tamil Nadu and Maharashtra showed that around 75% of the handpumps were out of action. This situation arose mainly on two weaknesses of the system then existing, i.e., (i) pumps' fragility and (ii) lack of proper maintenance system. India Mark-II and subsequently Mark-III were the technical solutions to this problem. The three tier, two tier and single tier systems were developed for maintenance.

The three-tier system was first introduced in Tamil Nadu in 1976. In this system, each handpump at the village level is entrusted to a caretaker who does very simple repairs and reports to the local level mechanic who is incharge of 50-100 handpumps for more complex repairs. These mechanics were assisted in the major repairs by the mobile team located at the district level incharge of 500-1000 handpumps. Village caretaker who stayed near to the Handpump who had the stake in its maintenance. His role was crucial in getting the correct information at various levels and getting the handpump repaired. However, the system suffered from the following disadvantages:

* The system is mostly based on breakdown repair
* the 1st tier namely village level Caretaker does not work effectively without incentive in the field
* the block level mistry at the 2nd tier level could only attend to the repairs of above ground mechanisms. But maximum repairs of deep well pumps are found in the below ground assemblies
* the district level mobile team at the 3rd tier level has a large operational area to cover. It results in a considerable time lag in attending to the reported repairs by the mobile maintenance team.
* the reporting system needs to be effective,
* the participation of the users group in the maintenance of handpumps is not upto the desired level
* the cost of transport is relatively high.



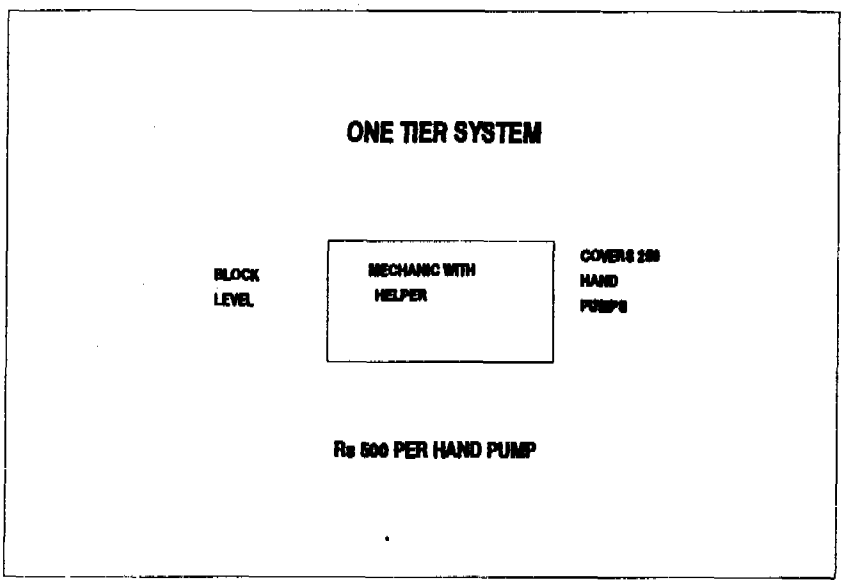
As an improvement to this, the two-tier maintenance system was introduced initially in Andhra Pradesh and Karnataka. In this system, the caretaker of each of the handpumps looks after the minor repairs and also takes immediate action to inform the mobile units at the block level whenever a major repair is to be carried out for the handpump. The caretaker is given adequate training and the tools of repairs for the upkeep of the pumps. A mobile team which is the second layer located at the block and taluka level has a van and the driver and a mechanic with three helpers including one mason. This unit is expected to cover around 500 handpumps. This unit would carry out repairs at site and even exchange the system damaged by the re-conditioned unit.



This system had a few advantages:

* the system is mostly based on preventive maintenance
* it is decentralised to the village habitation level for most of the day-to-day maintenance
* users cooperation is sought at all levels and involved in monitoring the system.

One tier system as opposed to the other two systems had the entire responsibility at a central organisation or the community. The key person in this exercise is the handpump mistry and the O&M is managed by the Panchayat Samitis (local bodies). The handpumps mistries are identified and selected by the Panchayat Samitis and trained under the TRYSEM programme. The Mistries are also given remuneration and payment for replacement of minor parts. These mistries are given assistance to purchase cycles and tool kits for repairs. The system is now prevalent in Andhra, Karnataka, Orissa and West Bengal.



TWO-TIER THROUGH PANCHAYATI RAJ INSTITUTIONS

A new two tier system has been formulated with DANIDA assistance with the express intent of overcoming these constraints and to provide greater efficiency and sustainability in operation and maintenance system. The system envisages Gram Panchayat managing handpump maintenance through a trained local artisan known as Self Employed Mechanic (SEM) with active involvement of the users. The mechanic will look after on an average 20-30 handpumps in a group of villages. The overall management including finance will be done by the Gram Panchayats with the help of local people. The backup support will be provided by the

State Panchayati Raj Department and the Rural Water Supply Department. The system envisages privatisation of the flow of spare parts with the state governments retaining the quality control function.

The broad features of this handpump maintenance system are:

1) all public water supply installations to belong to Gram Panchayats;
2) Village Panchayats to be responsible for the management of maintenance including financing and monitoring;
3) Village based artisan to work as self employed mechanics (SEMs) and be the pivotal of the system;
4) a village level user committee to assist village Panchayats in the management of hand pump maintenance to ensure community participation.
5) Maintenance system to emphasis a routine preventive maintenance and prompt breakdown repairs;
6) Maintenance costs to be met from users contribution to the Gram Panchayat
7) RWS Department to take up support activities like rehabilitation of wells, rejuvenation of old pumps, training of village-based artisans, long term monitoring of water quality changes and close liason with Gram Panchayats;
8) Availability of quality spares at Panchayat/block levels through private sector; and
9) Regular monitoring of water quality supported by testing facilities available at block/ Panchayat levels.

The self Employed Mechanic is paid at Rs.50/- per pump per month and the Gram Panchayat Secretary is paid Rs.60/- per handpump per annum for the additional responsibility with the minimum honorarium fixed at Rs.150/- per month. It is proposed that the community would contribute towards hand pump maintenance and the related expenses at the rate of Re.1/- per house hold per month which would be collected by the Gram Panchayat Secretary with the assistance of Users Committee. The amount collected will be deposited at the block levels and the Gram Panchayats Secretary will be authorised to operate the account. The expenses incurred towards hand pump spare parts, preventive maintenance, spares, monthly honorarium to mechanic and the Secretary will be met out of this contribution.

This two tier maintenance system experimented in 18 blocks in Orissa State has been found very successful in keeping the hand pump working to an extent of nearly 97% at any given time (in three tier system the same was reported to be 77%). The evaluation study conducted by independent agencies have also concurred with the view of the better performance of the operation and maintenance of situation because of the introduction of two tier maintenance system. The hand pump maintenance system is planned to be established in

the entire State (314 blocks) over a period of 8 years in two phases at an estimated cost of Rs.154 crore with assistance from the bilateral agency DANIDA.

As a result of these experiments and efforts in various states there was evidence of qualitative improvements in the functioning of the hand pumps in the villages in the country. In many states the percentage of hand pumps under repair was brought down to less than 5% at any point of time. Some States developed weekly monitoring system which reached upto the head of the organisation. However, a survey conducted in 1991 to 1993 to ascertain the status of water supply system in each of the 1.3 million habitations in the country. gave some idea of the status of the defunct sources from a verification of nearly 83591 sources.

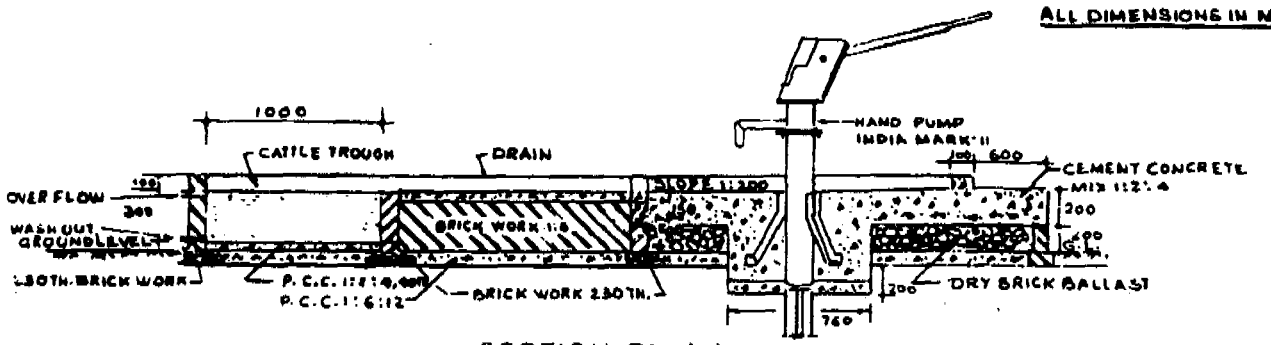
	Reason for being Defunct	**Number**
a)	the normal life of the system expired	3540
b)	system developed mechanical problems not rectifiable	624
c)	system developed mechanical aspects (rectifiable)	1344
d)	system destroyed in natural calamity	218
e)	system vandalised by anti-social elements	229
f)	water level fall permanently below pumping level	889
g)	water level fall temporarily below pumping level	264
h)	collapsing of tube wells	344
i)	Silting of well	182
j)	Others	2736
	Total	**10,370**

Along with these positive and negative feed backs within the organisational system there were political developments wherein by the 73rd Amendment of the Constitution on Panchayati Raj system was accepted by the Central Government and was adopted by the States for almost uniform implementation all over the country. This opened up a big opportunity of experimenting with the successful results of the earlier efforts and handing over the responsibility of maintenance to the Panchayats with the full cooperation of the engineering department concerned. To take advantage of this great opportunity, the RGNDWM, Government of India brought out a new policy for upgrading the handpump environment and maintaining it for a month by the departments to demonstrate the sustainability and handing them over to the Panchayats after making necessary arrangements at the local level. In this policy it is envisaged that in the case of handpumps and standposts proper platform, drains, separate washing platforms and arrangements for waste water disposal into a soakage pit will ensure safety and sustainability of the source and will also enhance their utility. It was also emphasised that the area covering the structures has to be protected by a fence or hedges of green plants and bushes with seating arrangements like benches for people waiting for water. When cattle traps

are to be provided in desert areas they have to be carefully designed so that the cattle get clean water and at the same time, women folk and children can take water from the sources without being disturbed by the cattle. (Three models are shown in the annexure). While the models look elegant the actual transformation of the 2.5 million hand pumps and 2 million standposts environment into one of these or acceptable models require tremendous organisational skill concentrated efforts at all levels and acceptance of these as improved environment as a benefit and need by the entire society. Initiative has already been taken to support such a massive effort through decentralised National HRD Programme and an IEC directed to create awareness on sanitation and environment.

PROPOSED IMPROVEMENT IN HAND PUMP SURROUNDING

ALL DIMENSIONS IN M.M.



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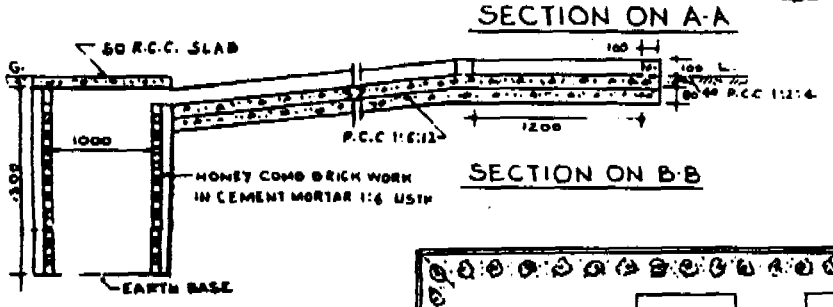

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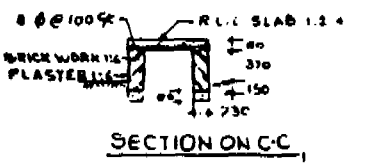

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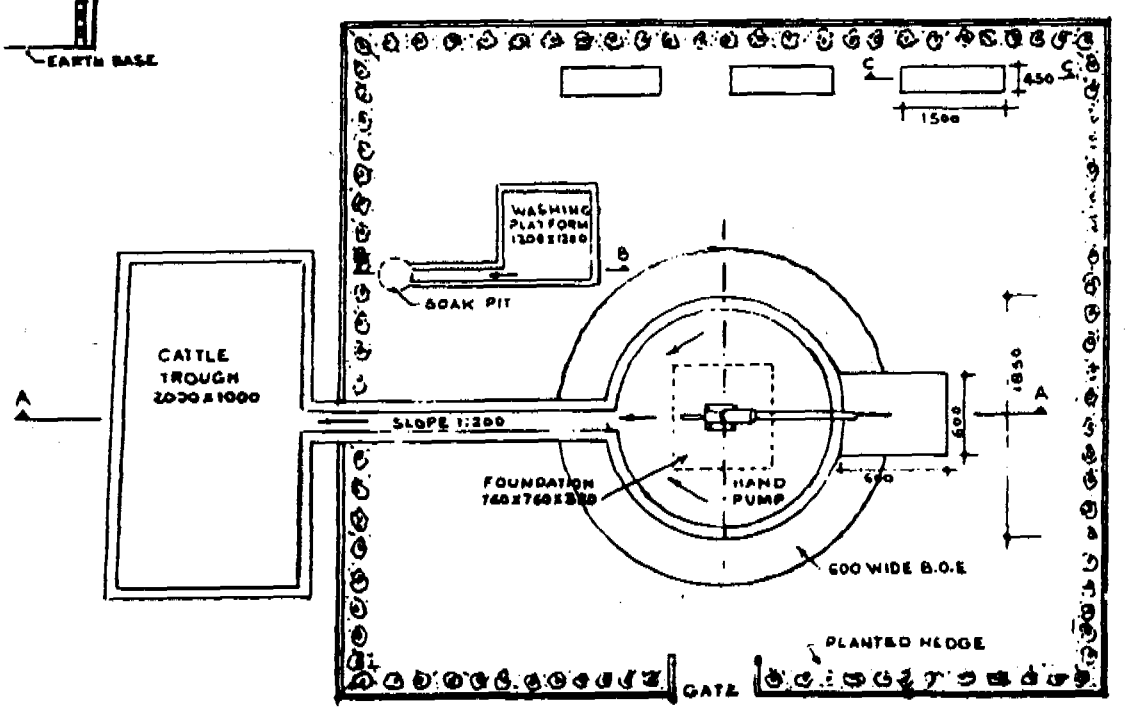

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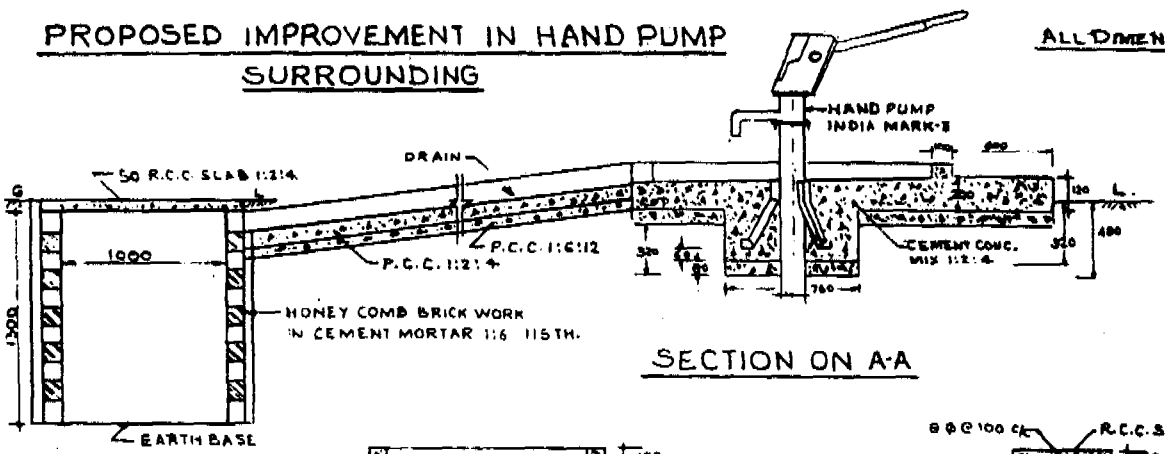
PROPOSED IMPROVEMENT IN HAND PUMP SURROUNDING

ALL DIMENSIONS IN MM



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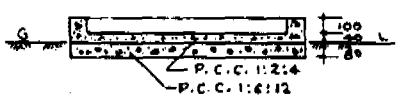

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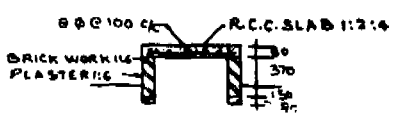

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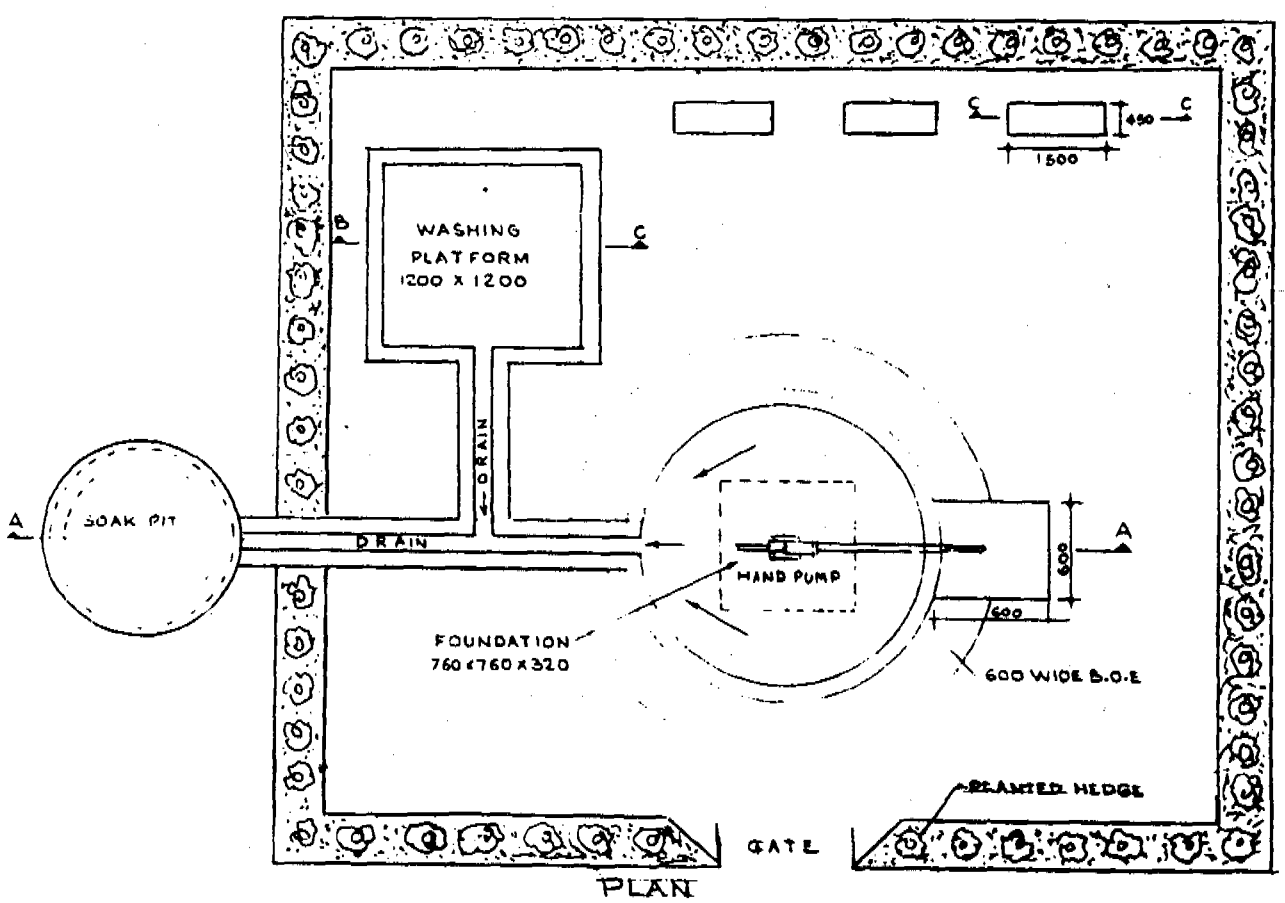

PLAN

LAYOUT PLAN OF HAND PUMP/ STAND POST