RAIN WATER HARVESTING IN CSMRS COMPLEX

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ABSTRACT

Artificial re-charge methods are proposed in order to revamp the depleting ground water resources, to prevent/retard salt water intrusion and to store water underground where surface facilities are inadequate to meet seasonal demands. A proposal has been made to harvest the rain water to be collected from roof tops of CSMRS building by constructing the required structure in the CSMRS Complex. The paper presents the details of the above in brief.

1.0 INTRODUCTION

The availability of fresh water is one of the greatest issues facing mankind today, because problems associated with it affect the lives of the millions of people. The concern is that, while the rising population demands more water, this finite resource must also satisfy the needs of every other form of life. In order to develop, manage and protect water resource for public health protection, it is imperative to understand that the fresh water is a unitary resource. The present population of Delhi is estimated to be 125 lakhs and apart from this, it is also influenced by a floating population of 3 to 4 lakhs. In post-independence era it has undergone exponential urban and industrial growths resulting in heavy pressure on natural resources.

Delhi occupies an area of 1485 sq.km. bounded between the latitudes North 28^0 24' 17" and 28^0 53'00" and longitudes East 76^0 50'24" and 77^0 20'37". The only perennial river that flows across Delhi is the Yamuna. Looking into the water problems being faced in Delhi, the capital of the country, it has been proposed by the Ministry of Water Resources to adopt suitable methodology for augmenting the water supply by harnessing the run off which goes unutilised as excess flows during the monsoon period. Considering considerable number of buildings within CSMRS Complex, it is proposed to harvest the rain water for recharging the ground water.

2.0 ARTIFICIAL RECHARGE

Any man-made scheme or facility that adds water to an aquifer may be considered to be an artificial recharge system. It may be planned, as in the case of a pit that has been dug for the purpose of putting water into an aquifer, or it may be unplanned or incidental to human activity, as in the case of surface water irrigation. Most of the artificial recharge projects are planned for

the specific purpose of storing fresh water for subsequent use by man. Thorough knowledge of geological and hydrological characteristics of an area is necessary for selection of the site and the type of recharge system. The prerequisite for taking up artificial recharge studies are :

- Favourable hydro-geological set-up
- Depleted aquifers
- Availability of unpolluted surface water
- Ground water dependent community.

All the above characteristics are fulfilled for Delhi city and it qualifies as test field area for artificial recharge studies.

Due to increase in population density and high standard of living, total water supply demand increases, which require a provision of sufficient water resource. In order to keep water supply sustainable in urban areas, a good artificial recharge programme is always imperative. Optimal utilization of ground water supply is the main basis of such a programme which also help to improve water impoverished by over extraction thereby increasing the availability of more ground water, so that it can support more density of population. For effective augmentation of water supply, various methods of artificial recharge are to be explored depending on their capability and need for an area. Keeping this in mind, the Central Ground Water Board has carried out model artificial recharge studies by using rain water harvesting technique in order to recharge ground water so as to raise the water table of the area. The studies for recharging ground water using roof top rain water harvesting technique have already been carried out in CSMRS by CGWB.

3.0 CSMRS COMPLEX – A REVIEW

The total area of the campus is about 34,075 sq.m. The annual rainfall in the area is 611.8 mm out of which 533.1 mm occurs in 142 days during monsoon period (June to September). It is estimated that about 6785 cu.m. runoff is available in the area. Due to continuous exploitation for drinking as well as horticulture purposes, the ground water level is declining and at present the depth of ground water level is about 18.0 m. For utilising the available runoff water from the roof top of CSMRS buildings, an artificial recharge system has been proposed with the following objectives :

- Construction of recharge structures to augment the ground water recharge from available surplus water
- To maintain the ground water table in the area
- To monitor the effect and extent of ground water recharge
- To create awareness in the society for proper management of ground water resources

Ground water occurs in sand and silt mixed with kankars and gravels in the alluvium formation and in weathered and fractured quartzites in hard rock areas where alluvium thickness is less. In general the tube wells in the campus and around yield about 500 Ipm water and can sustain pumping for 8-10 hours a day with a draw down of 10 – 18m. Ground water in this area is fresh and potable.

4.0 BENEFITS OF PROPOSED ARTIFICIAL RECHARGE STRUCTURES

It is proposed to construct four recharge trenches with injection well in the campus area. The location and the design of these structures are shown in fig.1 to 5. The life of the proposed structure is expected to be 20 years.

The major benefit from the proposed scheme is the proper utilization of available run-off, which otherwise is going waste in drains. The runoff availability of the proposed four recharge trenches are as given below :

* Recharge Trench-1 1595 cum
* Recharge Trench-2 2540 cum
* Recharge Trench-3 2160 cum
* Recharge Trench-4 490 cum

The construction work of recharge structures is being planned to be executed through CPWD.

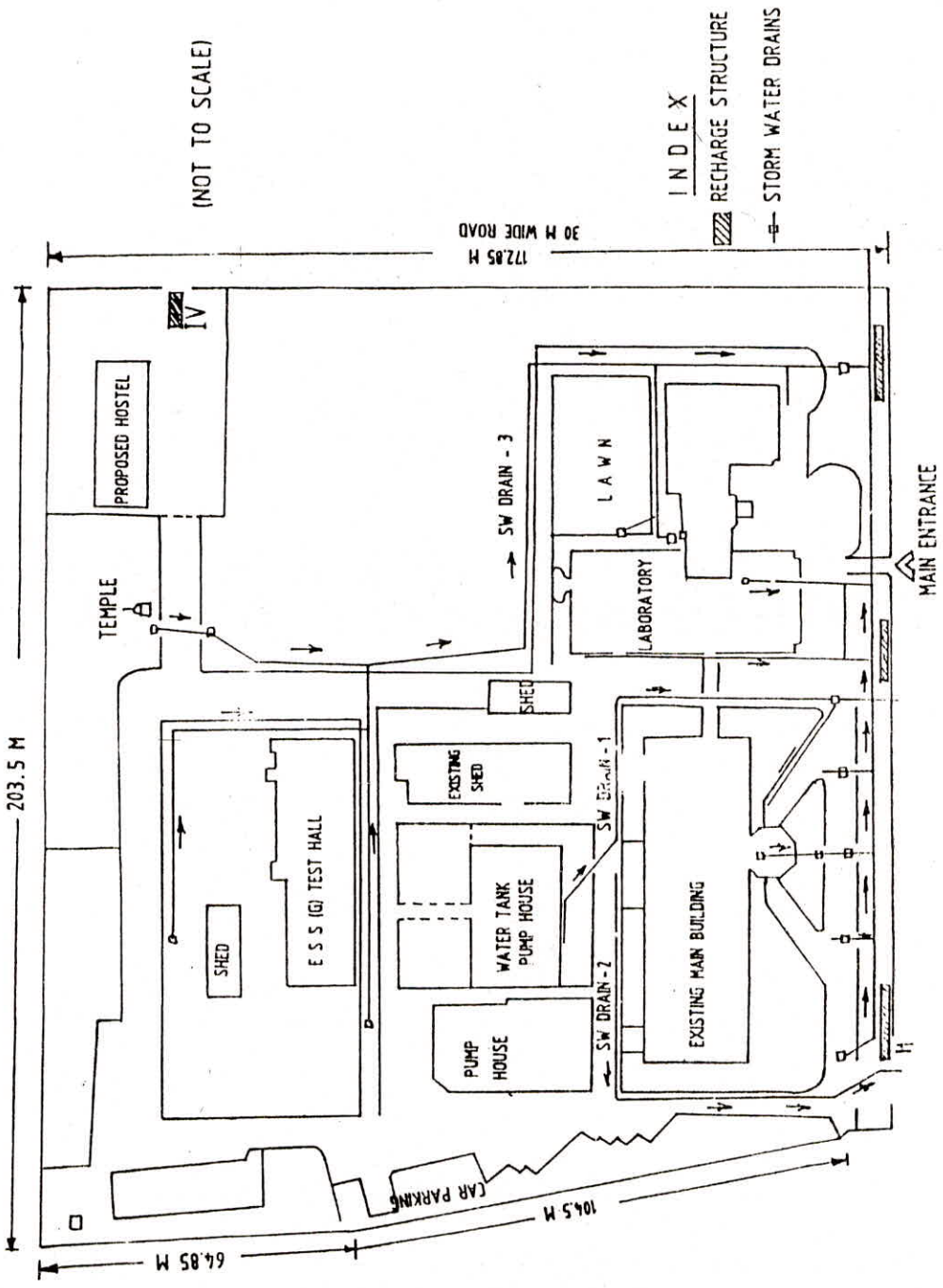

Fig. 1 : CSMRS Office Complex, Hauzkhas, New Delhi
Location of Recharge Structures

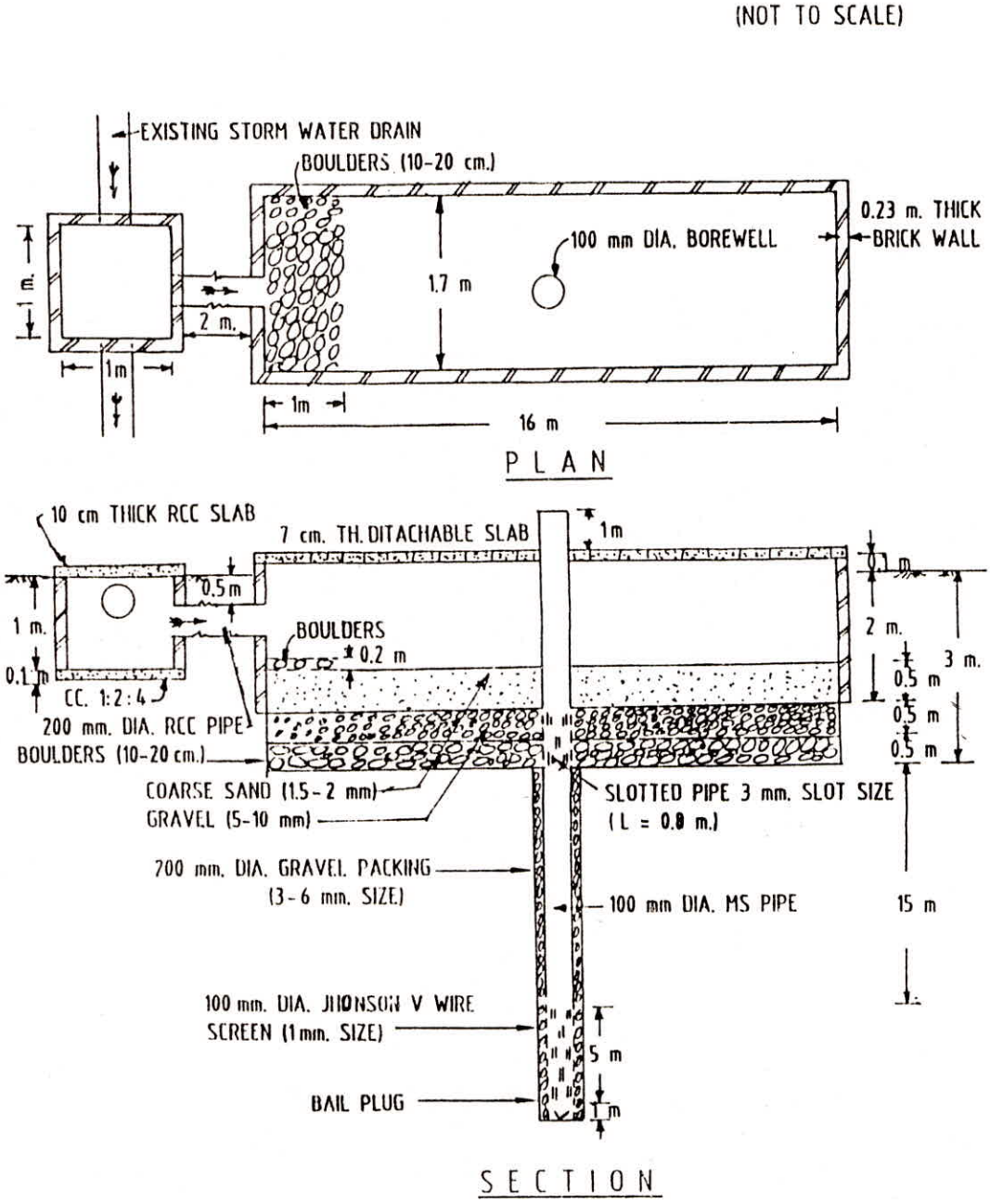

Fig. 2 : Design of Recharge Trench – 1 at CSMRS, New Delhi

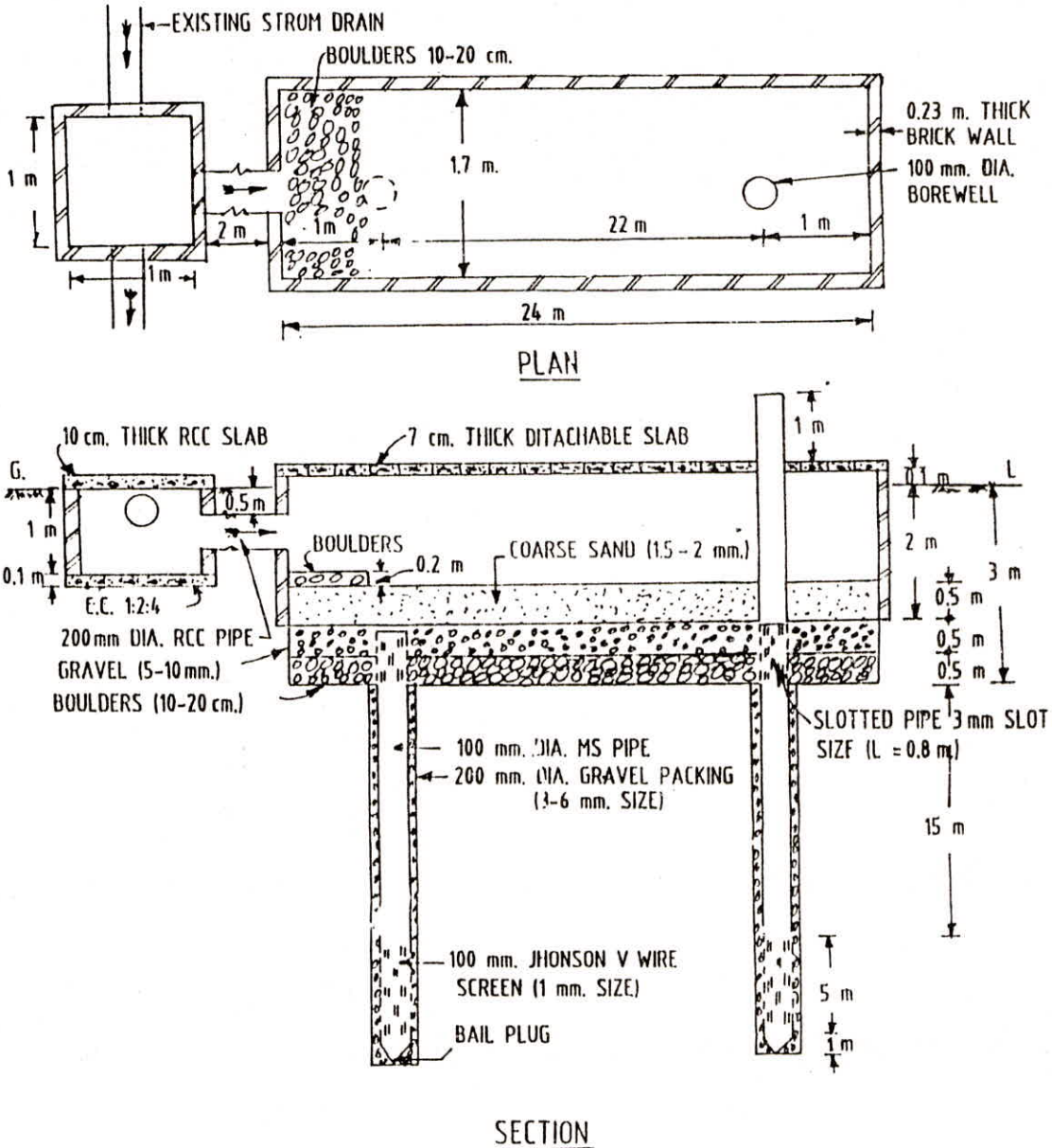

Fig. 3 : Design of Recharge Trench – 2 at C.S.M.R.S., New Delhi

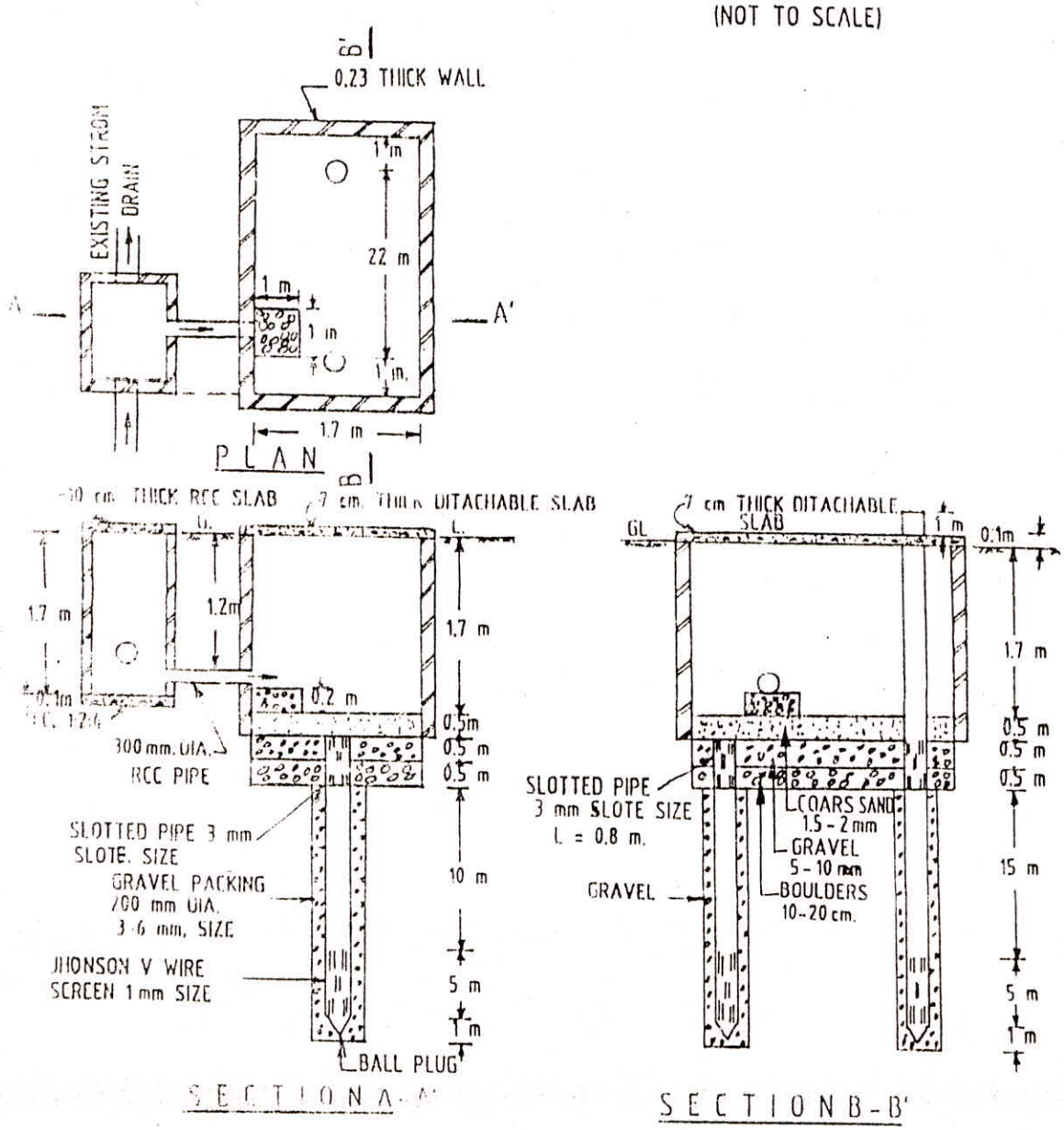

Fig. 4 : Design of Recharge Trench – 3 at CSMRS, New Delhi

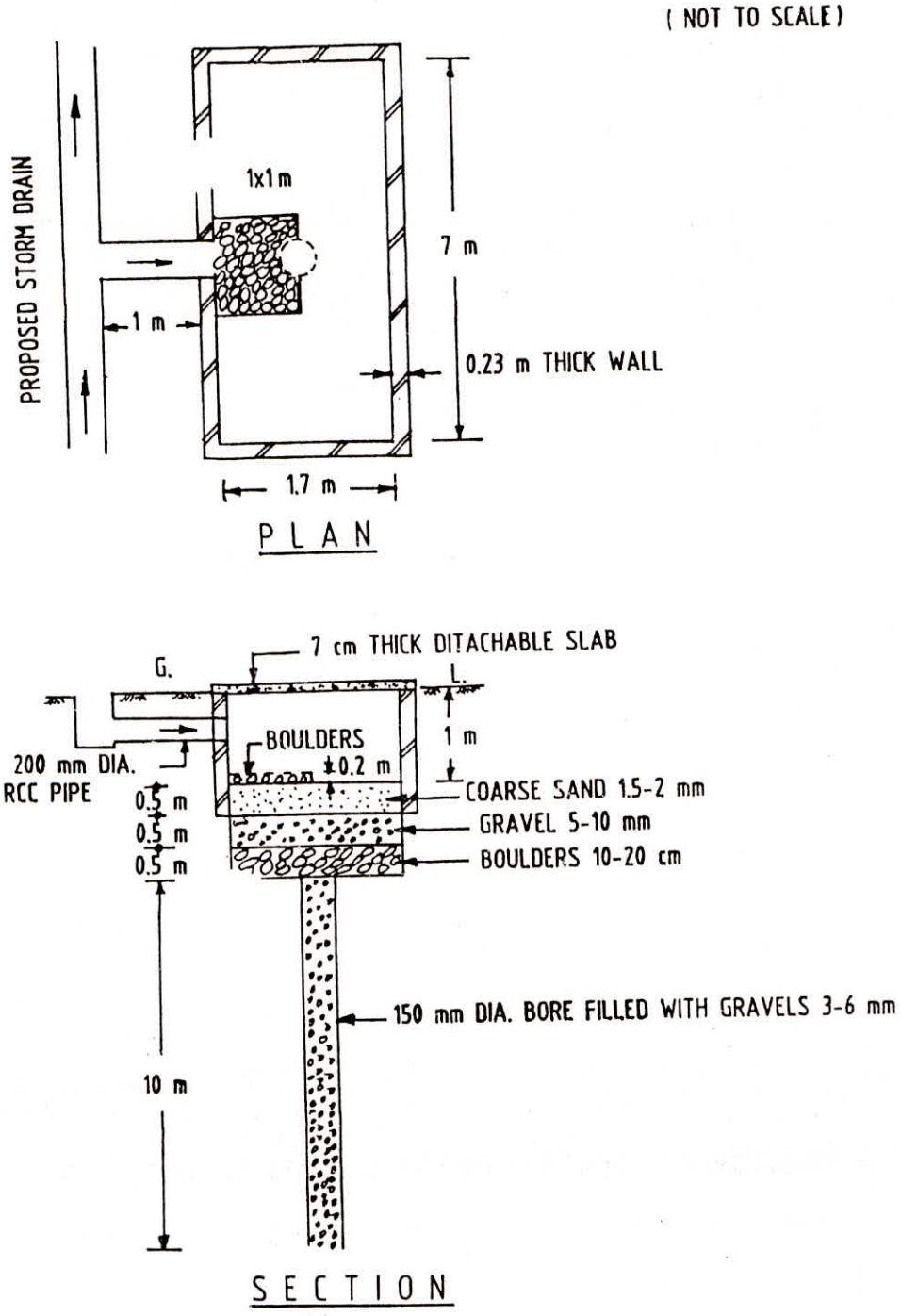

Fig. 5 : Design of Recharge Trench – 4, CSMRS, New Delhi

5.0 CONCLUSIONS

The proposed rainwater harvesting structures in CSMRS Complex likely to improve the Ground Water Table which in turn will meet the water requirements of CSMRS particularly during the non-monsoon period.

REFERENCES

The proceeding of Seminar on "Artificial Recharge of Ground Water", organised by Central Ground Water Board (CGWB), Dec. 15 – 16, 1998 in New Delhi.

Feasibility Report of CGWB on Artificial Recharge to Ground Water at CSMRS Complex., New Delhi.