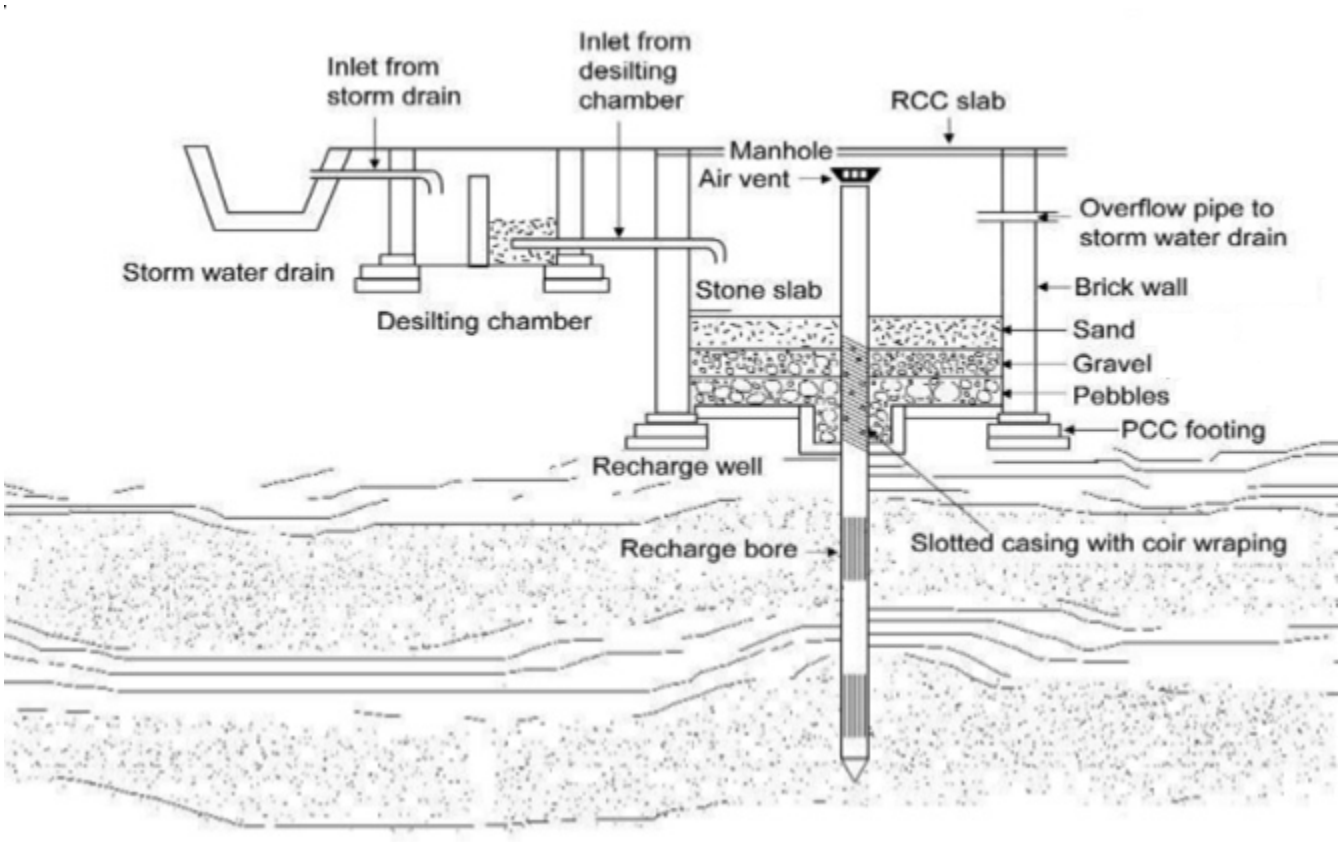
Technical Designs for Ground Water Recharge

1) Recharge Pit Method:-



Recharge Pit Method is most suitable for such alluvial areas (plains) where permeable strata are not below than 2 to 2.5 meter deeper from the ground surface.

This technique is generally considered suitable for the roof having 100 SQM areas and it is constructed to recharge shallow aquifers. Recharge pits can be constructed after calculating the quantum of rain water that can be available on the bigger rooves. Recharge pit may be of any size and shape and this is constructed generally with the width of 1 – 2 M, 1.5 to 2 M deeper or according to the availability of permeable strata. This pit is filled with layers in graded form with the boulders of 5-20mm, gravels of 5–10mm, thick sand/Morang (1.5 to 2mm). Boulders are placed on bed of the pit, gravels in middle and thick sand is filled on top so that the silt coming in with run off is deposited above thick sand or Morang which can be removed later. Recharge/percolations pits for the rooves comparatively of smaller size can be filled in with brick pieces or pebbles etc. A mesh should be put at the drainage point on the roof so that leaves or other solid materials can be prevented to fell in the pit. A desilting/collection chamber can also be constructed on the surface to stop silt which can further prevent the flow of small molecules towards the pit. "Over Flow" system should be integrated for each recharge pit to counter the situations of heavy rains. Upper layer of sand/Morang should be cleaned time to time to maintain the recharge rate.

A separate by-pass system should be there to allow over flowing the very first rain water before it enters water collection chamber. Construction of recharge pit is easier and cheaper. If the same is provisioned at the time of construction of building, it takes very less cost and suitable recharging can be managed with better planning. This is safer in comparison with other technics. So it should be widely adopted.

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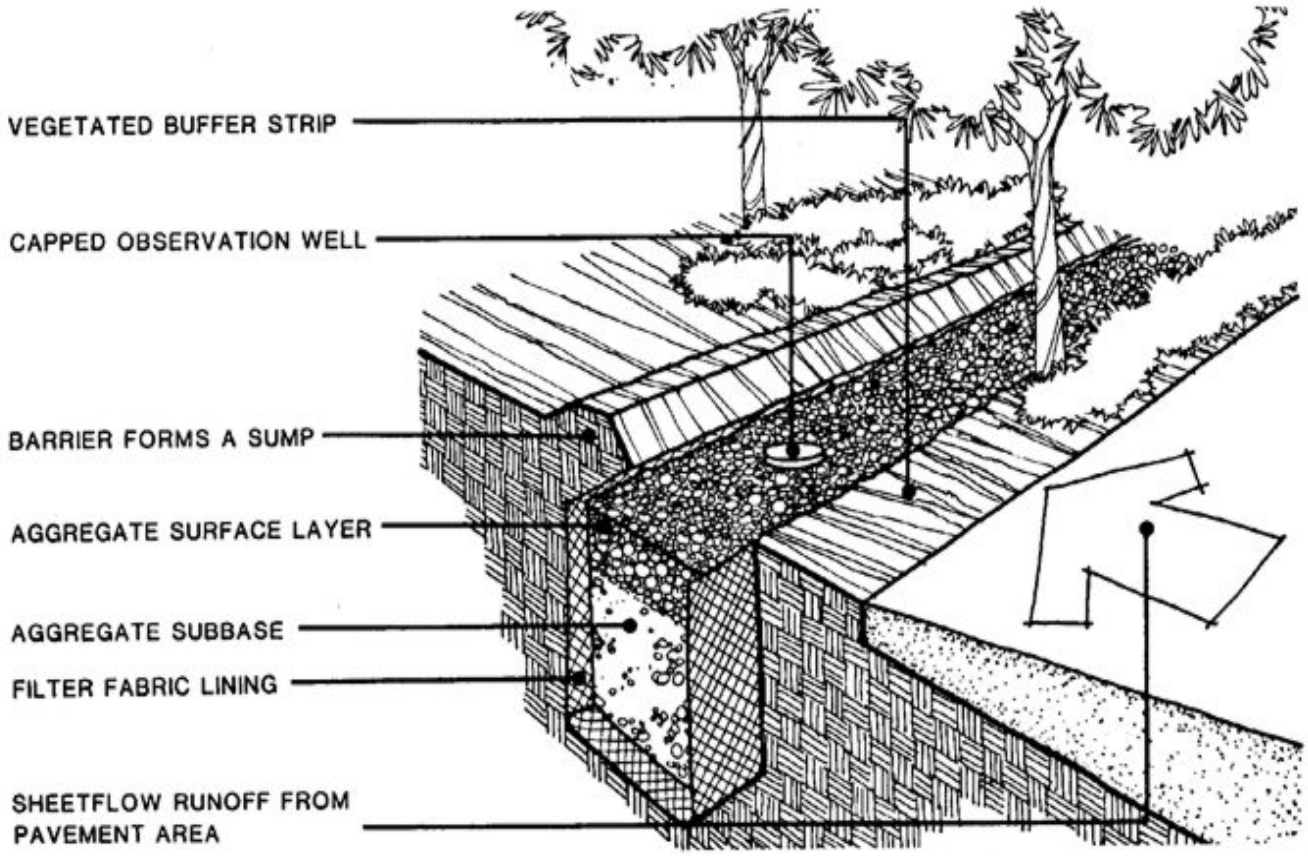
2) Recharge Trench Method:-



Recharge trench is also a simple method like recharge pit. Difference is only of shape and size.

Recharge trench is suitable for the buildings having roof size from 200-300 SQM. This method will also suit those areas where permeable strata are available on shallow depth.

Measurement of trench may be according to the availability of water that can be recharged, it may 0.5-1M wider, 1 – 1.5M deeper and 8-10M longer or it may be variable according to local needs. Recharge trench is filled with boulder (5 to 20 C.M.), Gravel (5-10M.M.) and thick sand/Morang (1.5 – 2 M.M.) in sequence. Filling of recharge trench is also like the pit as boulders on bed, gravels in middle portion and thick sand/Morang on the top so that silt coming with run-off is deposited on very upper layer and can be removed easily.

A wire mesh should be put on the on drainage point on roof to avoid entrance of leaves and other material into the trench. A desilting or collection chamber should also be constructed on ground surface to stop entry of smaller materials into the trench. A by-pass system should be there to prevent entry of very first rain water before it enters water collection chamber.

A separate by-pass system should be there to allow over flowing the very first rain water before it enters water collection chamber. Upper layer of thick sand/Morang should be cleaned before every monsoon season to maintain recharge rate. To counter the heavy rain, an “over flow” system should be integrated with recharge trenches.

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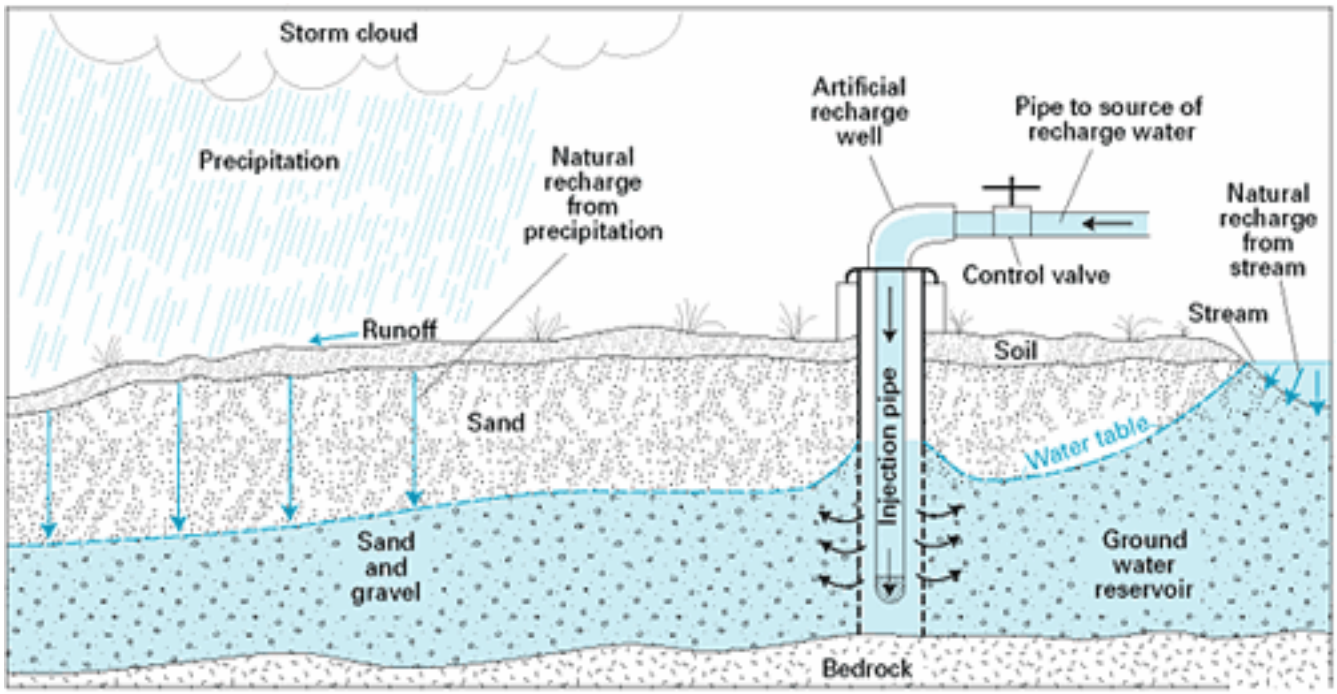
3) Recharge Well Method:-



In such areas where top layer clay is impervious and its thickness is comparatively more, aquifer is 25 to 30M deeper or more, adoption of "Recharge Well Method" will be most suitable.

In the multi-storied buildings (roof area is 400 – 1000 SQM or more), this technique is generally suites better especially where the place is limited and water level is deeper. This method can also be used for the rooves having lesser area like 100, 200, 300 SQM.

With the help of this technique, stressed aquifer can be recharged directly. By this method, rain water received from the rooves under recharge system, will reach at filter chamber first through piped conveyance network. The water will be stained here and will reach in the storage tank made from concrete. Rain water will enter through slotted pipe/strainer in the well, constructed within the chamber and recharge the aquifer directly.

Determination of size of storage tank and filter will be depending on the availability of water from the roof. Storage capacity of these storage tanks and filter will also depend on the depth and diameter of recharge well, thickness of aquifer, granularity and recharge rate. The size of storage tank and filter can be increased or decreased based on these factors. Filter should generally be graded with the boulder/pebble at the bed, gravels in the middle and Morang should be on the top thus total three layers should be there. P-gravel can be used as major filtering material so that cleaning of filter can be ensured easily every year.

This technique has been found practical with the view of long age and maintenance of recharge structure, thus the method is being implemented in maximum buildings. Special attention is paid on the requirement of wire mesh, over flow system, by-pass system, suitable screen/slot in this technique.

To manage the rain water storage in the recharge/storage tank and filter chamber, count of water storage volume is done in the ratio of normal monsoon rain as per area of roof catchment and other parameters.

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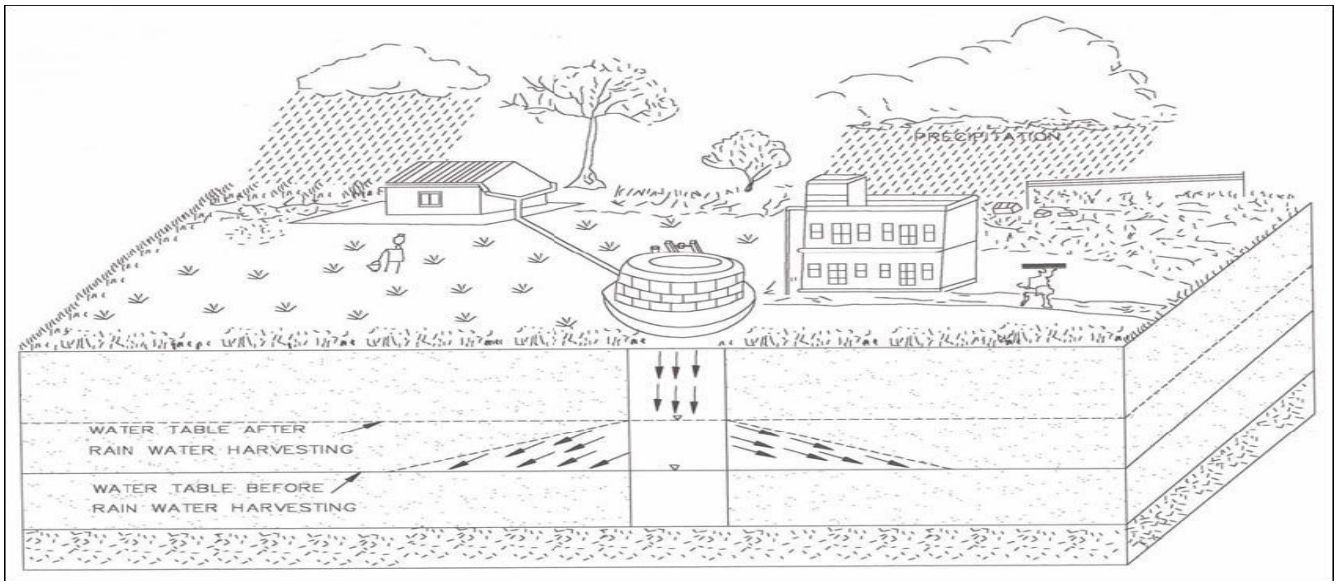
4) Recharge Through Dry Open Well:-



If the area of roof is 300 SQM and general rainfall is 700MM to 900MM, in this case rain water collected from rooves can be easily recharged through dry and open well.

First of all, the dry well should be cleaned and boulders, gravel and Morang layers should be filled in as filter up to 2- 3 meter thickness.

Rain water received from the rooves should be flown through desilting chamber so that silt etc. can be prevented to reach in the well.

Some other methods of rain water harvesting and recharging, received from rooves are as follows:-

Recharge Shaft (Diameter more than 2 meter and depth generally up to 8 meter) should be constructed in this nature of strata with a permeable lining.