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## A Study on Use of Road under Bridge to Harvest Rain Water

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**ABSTRACT:** Nowadays Intensity of Traffic, both Rail & Road due to the fast development of Industries and other Infrastructures, is very heavy and so it cannot be disturbed, so to eliminate level crossing, Road Under Bridge (R.U.B) are required to be provided under earth embankment for crossing of Road traffic, railway traffic across the level crossing of Railway line, etc. The under Bridges are also required in urban area where the busy Business location streets crossing to Railway lines etc. The major problem faced after the construction of R.U.B is water-logging during rainy season and its prolonged impacts. So to eliminate the problem of water logging and to give the necessary remedies detail study was conducted and the concept of rain water harvesting is implemented by collecting water from the road surface.

**KEYWORDS:** Road under bridge, water logging, rain water harvesting, storage tank

### I. INTRODUCTION

With a development of road network and increase in traffic both on roads as well as Railways, the requirement of providing RUBs have increased many fold in recent years. From the report of Press Information Bureau Government of India Ministry of Railways, in 2014 there are 30348 level crossings on Indian Railways across the country. Out of these, 18785 are manned and 11563 are unmanned level crossings. A total number of 4792 level crossings have been removed on Indian Railways in the last five years. In 2015-16, 350 manned level crossings have been closed and eliminated 1000 unmanned level crossings. 820 ROB (road over bridge)/RUB have been completed in the current year. With increasing in the number of RUB, the problem of water logging is faced in RUB structure during rainy season. Also India's water crisis is often attributed to lack of government planning, increased corporate privatization, industrial and human waste and government corruption. In addition, water scarcity in India is expected to worsen as the overall population is expected to increase to 1.6 billion by year 2050. To that end, global water scarcity is expected to become a leading cause of national political conflict in the future, and the prognosis for India is no different. Thus the idea of collecting water with the help of RUB will be effective in overcoming the water crisis in the areas where water draught is a major issue.

### II. RELATED WORK

Review of literature regarding the problem of water logging on road surfaces has been made thoroughly. The results and conclusion arrived in various research papers will be helpful in understanding the problem.

A study on Highway Surface drainage system & Problems of water logging in road section by Mr Dipanjan Mukherjee in his research paper in IJES. He has discussed about the various techniques for the drainage system for the road surface water problems and given solutions for the water logging problems.

A review of Rainwater Harvesting by J.R.Julius, Dr R.Angeline Prabhavathy & DR G.Ravikumar in IJESER has discussed the importance, need, benefits and methods of rainwater harvesting. The overall conclusion is made on efficient management of water resources by various techniques to overcome the water scarcity problems.

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## III. WATER LOGGING PROBLEM

The monsoon is highly important for India as it fills up water reservoirs, replenishes ground water and is essential for the Indian agriculture of which around 70% are rainfed. Every year the newspapers report about the exact date when the rains are expected to start and whether the monsoon has brought more or less rain than in the years before. As the rain falls the water accumulates from the surroundings catchment area i.e. approach road of RUB and gets clogged in it, this creates problem for the road users during monsoon.



Figure 1: RUB water logging problem (Gujarat, India)

The above figure shows the problem of water logging during monsoon in India.

Harmful side effects of water logging as follows:

- Destruction of roads occurred due to reduced bearing capacity of waterlogged soil
- The water here accumulates for days and create unhygienic situation for the road users.
- The water becomes polluted when it mixes with the garbage and waste that is littered everywhere and apart from disrupting traffic it also becomes a risk to health

## IV. RAIN WATER HARVESING IN RUB

A way to tackle the water logging problem as well as the ever decreasing levels of ground water could be rain water harvesting, a technology that has been used. Rainwater harvesting is a technology used for collecting and storing rainwater. Commonly used systems are constructed of three principal components; namely, the catchment area, the collection device, and the conveyance system.

Land surface catchments: Rainwater harvesting using ground or land surface catchment areas is less complex way of collecting rainwater. It involves improving runoff capacity of the land surface through various techniques including collection of runoff with drain pipes and storage of collected water. Compared to rooftop catchment techniques, ground catchment techniques provide more opportunity for collecting water from a larger surface area.

Now after the Road under Bridge is made open to the road users, there is problem of water-logging due to rains. For this we suggest the following:

- Cross-slope or necessary Camber should be provided along the road.
- By this the water will get accumulated at the sides.
- Also to accommodate this accumulated water, the required drainage work should be done along the sides of the road.

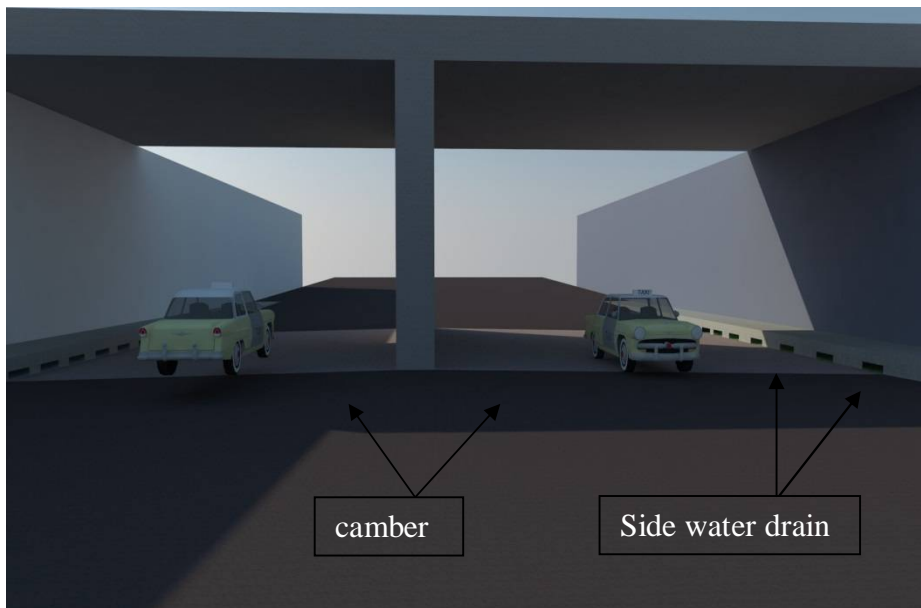
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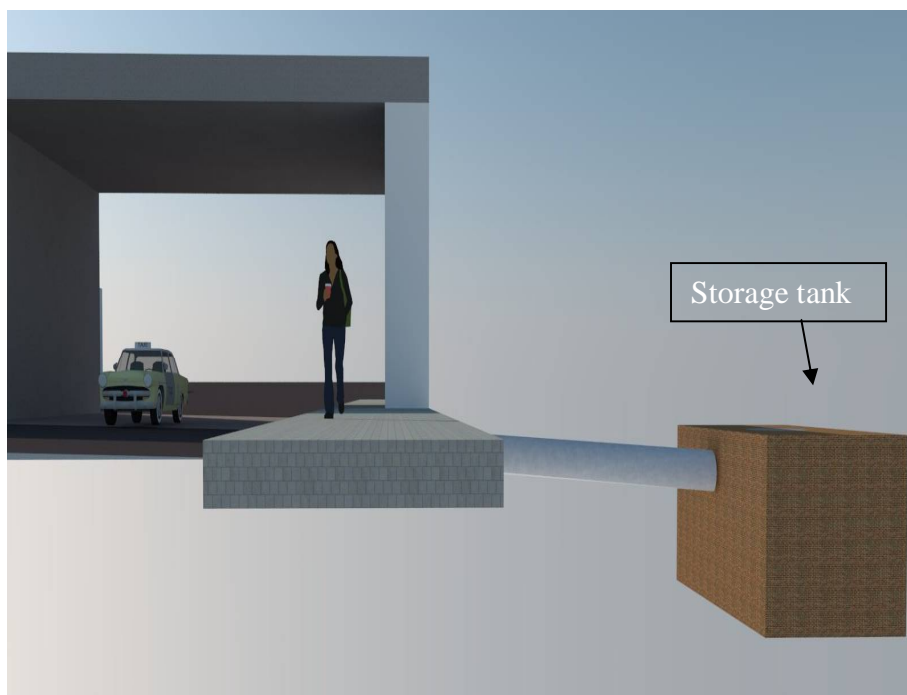
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- Thus the water during rainy season should be collected through the drainage works and it should be made to store in a tank. The necessary arrangements for the same should be done.

Following are the conceptual image generated using google sketch up for the conservation of rain water harvesting using road under bridge.BER



(Figure:2)



(figure:3)

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Thus after the storage of water, it can be used for various purposes such as:

- Gardens
- Livestock
- Irrigation
- Recharging of ground water
- Domestic use with proper treatment
- The harvested water can also be used as drinking water, longer-term storage and for other purposes such as groundwater recharge.

## V. CONCLUSION

As water crisis problems throughout the world are increases tremendously due to the various reasons. An ideal solution to water problems in areas having inadequate water resources. The aim of the project was to highlight the water scarcity problem and to contribute the idea of conserving water with the help of road under bridge. This idea of collecting water is challenging, but will surely help in harvesting rain water. It will be an ideal solution to water problems in areas having inadequate water resources.

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