

Stormwater Management a Case Study of Gandhinagar City

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Abstract - Stormwater management means to manage surface runoff. Stormwater management reduce or eliminate the negative impact of e impacts of Stormwater runoff. Its include controlling flooding and reducing erosion to improve water quality. This Strategy used in the Gandhinagar city to planning of prevents the impacts of Stormwater. In the rainy season much water flowing over the ground surface. This rain water has no impurity, its flowing by gravitation force and drainage through discharge in near lake or river. This river or lake already polluted by Industrial and Residual sewer system. Stormwater runoff polluted on Ground surface such contain as vehicle dropping oil and grease, metal, sediments, nitrogen, trash, phosphorus, pesticides, bacteria and other. Urbanization reduce the infiltrate land its causes of the flooding its occurs scouring and waterlogging problem. In this study to planning of use Best Management Practice to prevent impact of Stormwater, and use of the Stormwater to support to green infrastructure and infiltrate into ground. In this study to collect the past year rainfall data and calculate of runoff volume. Then after to identify area of problem and suggest BMPs techniques. Keyword: Rainfall, Runoff, Flooding, BMPs, Green Infrastructure, Storage Tank

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1. INTRODUCTION

The Gandhinagar is Green city and the capital Gujarat state. The urbanization of city impact reduces the infiltration land, it occurs the low infiltration of rain water in ground. The stormwater runoff occurs when the rainfalls over the infiltration land such as roadway, walk way, parking lots, rooftop and other surface that prevent the infiltration of stormwater and. This runoff volume increase and flooding problem generate in city. This runoff existing in the drain in near lake and river. The sedimentation, nitrogen, bacteria, phosphorus, oil, grease, trash, pesticides, metal and other matter pollute the storm water in urban areas. The stormwater drain in sewer line to meet the sewage water its more pollute, then after drain in lake or river the other industrial wastewater pollutes the stormwater.

The Stormwater management practice to prevent the pollution of runoff and use in storing tank the and water infiltration in ground. Stormwater management is the science of managing stormwater runoff to prevent adverse impacts on the environment. The main goal is to manage water quantity in addition to protecting water quality. This study to analysis of stormwater impact, and give solution

based on BMPs (Best Management Practice). To analysis the runoff and planning to managing runoff flow.

1.1 Need of Study

- To manage Stormwater runoff it occurs flooding in Gandhinagar city.
- The lack of the proper drainage system it occurs the overflow into sewer line.
- Due to erosion of land it occurs sedimentation into sewer system.
- The rain is main source of pure water, this rain water discharging into river is already polluted by industrials west and sewer system its west of Stormwater.
- Lack of infiltration of rainwater in ground due to urbanization, its require to recharging of groundwater.
- The green infrastructure they require the irrigation of garden.

1.2 Objective

In this study focuses on problem of stormwater in Gandhinagar and represents the solution based on BMPs (Best Management Practice). In this study to manage the stormwater under the strategy of BMPs (Best Management Practice). The guideline and practice as per BMPs

1. To provide effective, economic, safe and sustainable Stormwater managements practice. To Store and use Stormwater.
2. To use the stormwater, support the green infrastructure such as irrigation.
3. To prevents stormwater impact such as flooding and water-logging.
4. To increase the infiltration by reducing paved surface and developing green areas.

2. Study Area

Gandhinagar is the capital of the state of the Gujarat in western India. Gandhinagar is located on the latitude of Gandhinagar, Gujarat India is 23.233086 and the longitude is 72.651634. Gandhinagar is located on the 23km north of Ahmedabad, on the west central point of industrial corridor between Delhi the political capital of India. Gandhinagar lies on the west bank of the Sabarmati River, about 545 km north

of Mumbai, the financial capital of India, and 901km southwest of Delhi, the political capital of India. There is provision of parks, extensive planting and recreational area along the river giving the green grader city atmosphere. Gandhinagar city is also known as the “Tree capital of India” because of greenery with 54% green cover.

Due to Urbanization increase the land use in different sector such as residual and public development. This development reduces the infiltration land, it causes the urban storm problem. Select the Area of Gandhinagar the problem of the Stormwater. Study area select East side KH 7 to CH 7 And South side CH 7 to CH 4. The total study area 7.21km² in Include sector 27,28,29,22,23,24,15,16 and 17.



Fig -2: Stormwater Problem

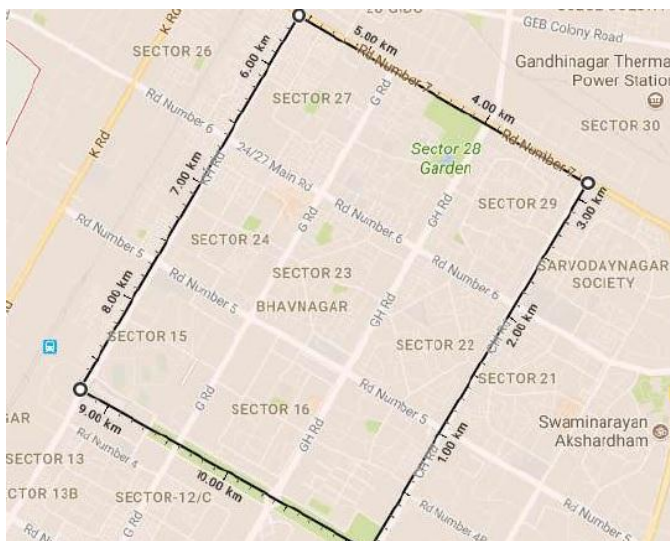


Fig -1: Study Area

2.2. Problem of Stormwater

After survey of study to area, identify problem of the Stormwater.in the city both side of road provided the Stormwater drain line network to discharge of Stormwater in Sabarmati river. But this network was doing not work perfectly. The Stormwater problem is Flooding and waterlogging. The inadequate storm drainage network are does not escape storm water,

The storm drainage line due sedimentation not properly work the debris close the storm drain. The impervious area reduces the infiltration. In the rainy season much water flowing over the ground surface. This rain water has no impurity, its flowing by gravitation force and drainage through discharge in near lake or river. This river or lake already polluted by Industrial and Residual sewer system. Stormwater runoff polluted on Ground surface such contain as vehicle dropping oil and grease, metal, sediments, nitrogen, trash, phosphorus, pesticides, bacteria and other. Due to flooding erosion of the pavements. The Stormwater is the main source of fresh water its drain through discharge into river. this water need to storage for domestic purpose.



Fig -3: Condition of Manhole



Fig -4: Sedimentation in storm sewer

2.3. Solution

After the existing survey of Study area identify the problem of Stormwater and causes of the Stormwater Such as the existing storm drainage was bad condition due to sedimentation network are blocked and does not effectively. Its cases flooding and waterlogging of the Stormwater. The Concrete paved area like parking areas are reduce the pervious land. Using permeable paving to reduce the impervious area. Near the GH 4 Garden area provide Stormwater tank to store the rainwater and use in irrigation of garden, so provide Storage tank to store the stromwater and use in irrigation of the garden and redesign storm sewer

manhole for control sedimentation in storm sewer, and suggest permeable paving at parking area and other concrete paving areas.

Storage tanks collect and store Stormwater runoff during a storm event, then release it at controlled rates to the downstream drainage system, thereby attenuating peak discharge rates from the site. This tank provided underground at near the Gh-4 garden to collect and use the Stormwater in garden for irrigation. The tank capacity of 80000 liters. It's used in dry season irrigation of garden and rain water harvest.

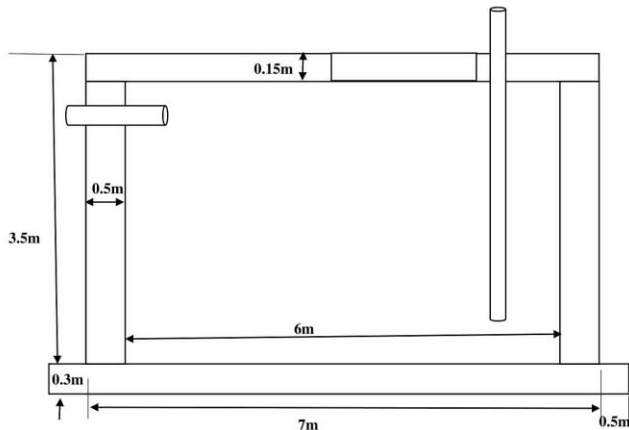


Fig -5: Storage Tank

Due to sedimentation the drainage system block the drainage system shown in fig 7 The design the sedimentation control system provides at entrance the manhole pipe. The control of sedimentation improves the water quality. It controls the enters of debris and other waste into storm drain. The cost of construction of Sedimentation Control Structure 300 Rs/Nos

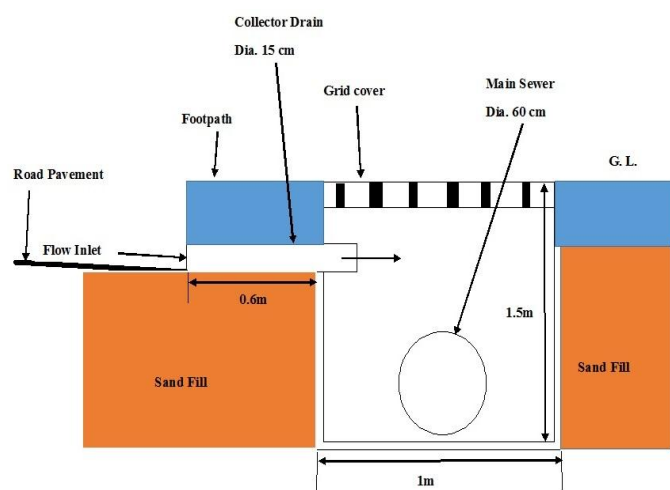


Fig -6: Existing Drainage Manhole

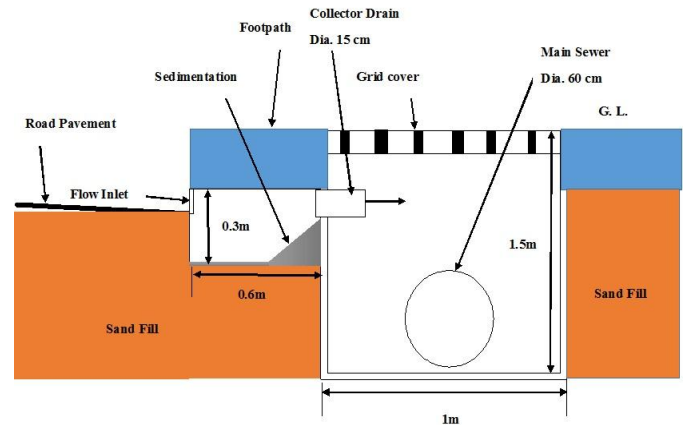


Fig -7: Designed Drainage Manhole

3. CONCLUSIONS

After all data collection and analysis to define the problem in the given study area and provide Best Management Practice for Prevents the impacts of the Stormwater. To provide sustainable, economic and safe practice. This Strategy used as per BMPs guideline, to improve urban Green Infrastructure and utilize the resources. In this study to planning of store the Stormwater in Underground tank and use the water in dry season for irrigation of garden. The storage tank is useful in dry season. The sedimentation control structure is provided at the entrance of manhole. This structure easy and effective solution of the sedimentation problem. The Permeable paving parking area suggested at the GH 5 to GH 4 Commercial Area. This practice control impact of Stormwater and use the Stormwater.

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