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Study of Storm water Problem at Akhbarnagar Underpass (Ahmedabad)

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Abstract- Akhbarnagar underpass is one of the major underpasses of city Ahmedabad. Every year Akhbarnagar underpass is filled up with water due to rain, which causes many difficulties to public in traffic, water logging in nearby areas and creates many other problems like spread of diseases. It is necessary to overcome this problem. To solve these problems proper study of area i.e. different levels of underpass and nearby areas, pumping requirement to remove water from underpass, sewer network analysis, required. The study can be helpful in finding solution by redesign of rain water drainage lines. Also it can be useful to implement at other underpasses which have the common problem.

INTRODUCTION

➢ *General Information*

In last few decades in normal or in heavy rainfall they badly affect the all underpasses and surrounding areas of Ahmedabad city. This problem is not only makes the local public to come in trouble but also create so much problem for the traffic systems of Ahmedabad city.
The main underpass of Ahmedabad city (i.e. akhbarnagar underpass and there surrounding areas) are waterlogged every year during monsoon due to which the whole traffic systems gets blocked for some hours.
Generally ahmedabad city are situated near the line of tropic of cancer and far from the sea/coastal area due to which the city have there average temperature is 38*C and during rainy season the humidity is affect the city due to which there is normal/heavy rainfall takes place.
It is necessary to solve this problem. For this problem solution study all data regarding this project and then after try to find actual solution of this problem. Then after by proper designing of rainwater drainage lines and levels try to solve it.

➢ *Site Information*

Site is at Akhbarnagar underpass and its surrounding areas where water logging problem occure every year in monsoon season.
As per survey due to this problem, the whole traffic systems gets blocked for some hours or diverted to some other routes and this directly affects the local/professional public.
Crossing any underpass on a rain day in Ahmedabad is no less than passing through an inundated canal during monsoon. Majority of the underpasses get flooded during incessant rains severely hampering traffic flow in the city.
Taking note of the havoc created by rains which leave underpasses flooded an inaccessible. Recently two persons drowned in the water logged akhbarnagar underpass.

OBJECTIVES OF STUDY

1. To identify problem and locations of repetitive water logging at akhbarnagar underpass.
2. To undertake study of flood prone areas and to assess impact of water logging.
3. To recommend Engineering Solutions for preventing water logging in underpass.

IDENTIFICATION OF PROBLEM

1. Underpass filled up with water
2. Traffic problem
3. Disease occur due to waste water

METHODOLOGY

1. Collection of data[1]
   - Storm water drainage line network
   - Past rainfall data
2. Survey study area [3]
   - Survey by the Theodolite equipment
   - Measure the area of study

➢ *DATA COLLECTION*

- Location of underpass near akhbarnagar circle near Nava vadaj.
- Total width of main road before and after underpass is 40m.
- Width of road in underpass is 14.5m and footpath is 1.2m and 287m long.

- Height of bridge from bottom of underpass is in between 5.5 to 7m.
- R.L of main road is 49.33m at entry of underpass and R.L of underpass at mid is 46.405m. [3]
- Road slope in length is 1 in 333m. [3]
- In underpass main drainage line diameter is 1800mm (1.8m).
- There are 4 no of pumps are used for pumping out of water stored in underpass.

No.of Pump	Horse Power
1	50
2	40
1	20

Fig 1 Well of Power house at site

- Power house well diameter is 2000mm (2m).

Fig. 2 Suction Pipe

- Pumping house Suction pipe diameter is 200mm(0.2m).

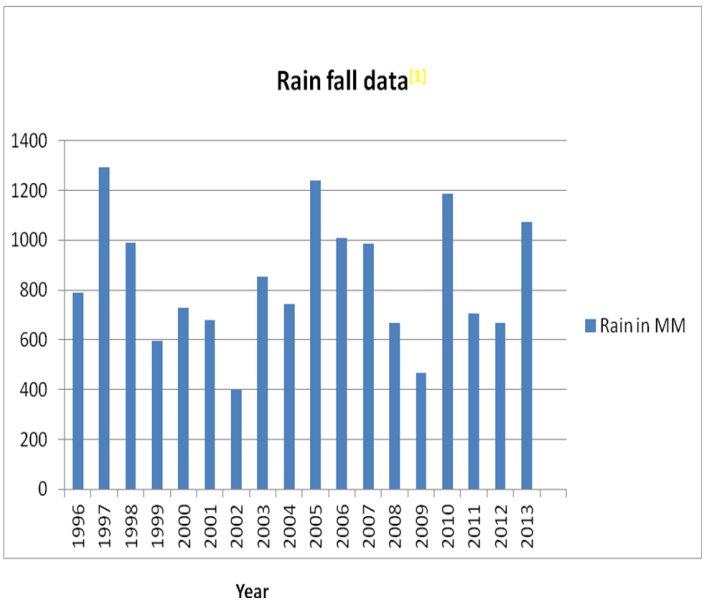
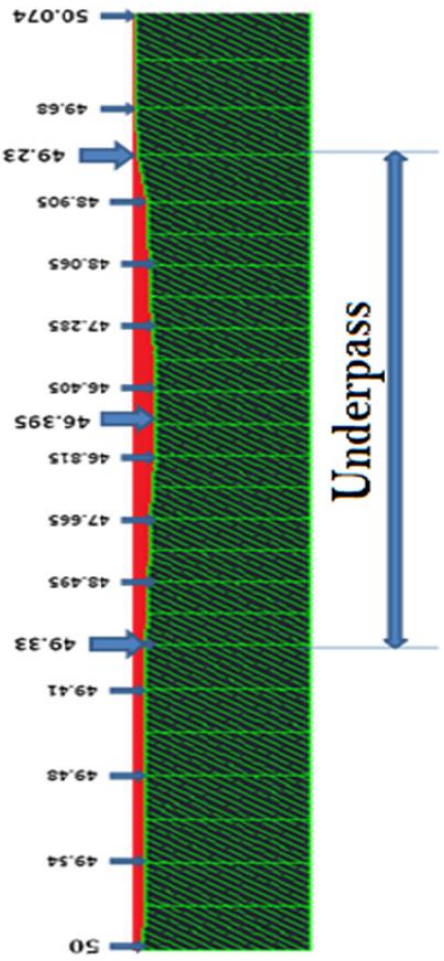


Fig 3 Rainfall data



All values are in meter

Fig 4 Road level profile

➢ *Traffic Problems At Site*

As said above that akhbarnagar underpass is come under the flood prone area and it is comes under one of the main route of BRTS/AMTS.
During rainy season generally the underpass is submerge and hold the whole traffic systems of this route. And as it is near Shivranjani which is official work area and many schools, residential area comes near it. Due to which sometimes the local/official public are stuck in this underpass and it can directly affect the whole traffic systems.

➢ *Problems At Local Areas Near To Site*

As the areas near the akhbarnagar underpass is also submerged with underpass in the rainy season. There is some gravity inland difference between surrounding areas and underpass due to which it can makes the waterlogging condition directly/indirectly manner.
There is also some gravity difference in the drainage provisions in underpass and near areas.

➢ *Effects Of Water Logging In Surroundings*

The stagnation of flood water causes damage to the roads, and to sub-grade and sub-soil. Water logging and damaged roads are a major cause of increasing accidents during monsoon.

➢ *Effect On Public Helth Due To Waterlogging*

Due to heavily waterlogged in underpass and in surrounding areas this area is also act as a breeding places of mosquitoes, and every year there is numbers of people in (Akhbarnagar) Ahmedabad are suffered with diseases like malaria and dengue.

➢ *Rainfall Amount Of Year 2012 (Which Make The Underpass Closed*)

- 54.89mm rains in 24 hours ending at 10 pm on august 1st.
- 72mm of rain in 12 hours ending at 8pm on august 13th.
- 42.06mm rains in between 12noon and 2pm on august 14th.
- 49.42mm rains in 24 hours ending at 10pm on august 19th.

➢ *Plans Of Municipality (Which Failed In Every Year Monsoon)*

- The Ahmedabad Municipal Corporation authorities were floated a planned for sump and storm water drainage facilities in nearby area of underpass to pump out the water. But plan were failed when the level of vasna barrage is increased from a level of 134mtr to 136.5mtr.
- The municipality were set up the pump for water disposal but it can't use due to back flow of rain water from main drainage line.
- The municipality also set the water level indication systems near the underpass but it was not worked properly during this year monsoon.


Fig 5. Pumps are used for water disposal from underpass

➢ *Spread Of Dieseases Due To Waterlogging*

- Cholera.
- Typhoid fever.
- Enteric fever.
- Dengue.

➢ *Increase Chances Of Seepage In Beneath Of Bridge*

What causes water seepage?

Water seepage involves the movement of water from up beneath the foundation of a underpass bridge structure. Heavy rain, rising water table levels and it can all cause excessive water to travel through the soil beneath and structure, changing its volume and consistency.

What causes settling?

When underpass is water logged for more time and seepage is continuously takes place then the road pavement is may get settled.

Due to water logging, Settling is what happens when the soil shifts and shrinks beneath of a underpass, disrupting the stability of the foundation and often causing damage to the pavements of road.

Settling can happen for a number of reasons, depending on the soil type beneath the road. In some cases the road in underpass hasn't been compacted properly, and due to seepage and water logging the soil becomes loose which results in settlement of road pavement.

When compaction hasn't been properly leave a void, which causes the soil to drop; undetected air pockets can also cause settlement. Highly reactive clay sites can expand and contract unpredictably, sometimes gaining or losing close to 20 times

their volume, depending on how much available moisture there is. This can easily cause settling.

PROBLEM SUMMARISE

- As akhbarnagar underpass is water logging prone area, due to which problems like traffic problem, seepage of water, spread of diseases are arise for public.
- This underpass is one of the major underpass of Ahmadabad, comes under main route of BRTS due to which in monsoon it creates a horrible situation and delays time of working officials.

POSSIBLE SOLUTIONS

- Maintenance of different levels of main chambers at underpass and there surrounding areas
- Try to find normal flow as well as hydraulic gradient in conduit during ordinary season and in rainy season.
- Select the adequate/economic drainage patterns for underpass and its surroundings areas.
- Take the necessary economic actions for road maintenance which is badly affected in every year monsoon.
- The sewer line, drainage line and rain water line are common at study area so separation is required.
- This study give solution for storm water problem at Akhbarnagar underpass (Ahmedabad) in different way as per case study.
- Diversion of rain water lines
- Proper leveling
- Design of sewer lines

CONCLUSION

The main purpose of this study is to reduce traffic problem, dieses problem, water logging problem at akhabarnagar area due to storm water, because it is one of the major underpasses of ahmedabad. There is great difficulties during rain and after rain to public and it is required to diversified the traffic, which consumes more time. So, to overcome these problems proper solution must be required.

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