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A review on Analysis of Water and Waste Water System

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Abstract: - *This paper concerns for the design of rural water distribution and waste water disposal system in developing countries. Most of population of India is staying in rural area. At end of nineteen century, community is not getting water at their resident and not disposed out waste water in the village. But water supply and waste water disposal is basic need of human being and it is directly effect on human health. Indian government is decided to provide safe, regular and adequate water to the community at their resident and safely carry out the sewage of the community from their resident. In a Darjipura village, Vadodara, facilities of drinking water and waste water disposal System is not available. For survival of every living body or creatures most basic need is water, without it is very difficult to live. We find nearest water source, pipe networks for drinking water and disposal point for waste water which can carry whole wastes which is likely to be occur. So we analyse that system for those villagers. For this we find such kind of information about that village like village layout, map, area, population, reduce level, available pipe networks etc. and judge future requirement of water and amount of sewage. This paper is helpful to water supply engineers who are facing the problem of designing new water distribution network and waste water disposal network in haphazard developed rural area.*

Keywords: - *water distribution network, sewerage system, hydraulic data, conveyance & disposal, system*

I. INTRODUCTION

The water distribution system is component connected between the water supply sources and the consumer. It is careful conveyance system that allows water to be moved through piping before reaching the consumer's tap. Planning of water distribution systems by consider many factors such as location, current demand, future growth, pipe sizes, head loss, fire fighting, leakages, etc. using pipe network analysis.

Water distribution system is a hydraulic infrastructure consisting of elements such as pipes, tanks reservoirs pumps and valves etc. It is crucial to provide water to the consumers; effective water supply is of paramount importance in designing a new water distribution network or in expanding the existing one.

Design and construction of sanitary sewers should conform to all applicable local or provincial regulations. Because of the difficulties associated with the operation and maintenance of pressure sewerage systems, it is desirable to avoid their use if gravity sewage flow is practical and economically feasible.

Hence, firstly planning of gravity sewage flow by take into account the pipe sizes, topography of the area, slope of the land.

Aims: -

1. Collect data, maps and other vital information regarding their water infrastructure.
2. Evaluate the performance of their systems on the basis of their existing demands.
3. Identify the necessary changes in the system to meet future water demands.

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Figure 1 - satellite map of Darjipura village.

Selection of Site: -

As mentioned previously the goal of this project was to assist smaller communities in planning their infrastructural needs in a sustainable and cost-efficient manner. This village was selected because it is a middle class community which has a population is around 1,000 people. The current population of the village is 800 people. Darjipura is one of the rural water districts in Vadodara. After a discussion with the project group, the Darjipura village was found to be suitable for carrying out the investigations and was thus selected.

Objectives: -

1. To provide consumers water in sufficient quantity and quality solutions;
2. Ensure full diversion pipe lines and cleaning them up to the standards of surface impoundment;
3. Conservation of natural water conditions and its protection from pollution and contamination;
4. To provide proper waste water disposal system.

II. REVIEW OF LITERATURE

Water Distribution Network Design and Analysis: A Case Study

This paper concerns for the design of rural water distribution systems in developing countries. Most of population of India is staying in rural area. At end of nineteen century community is not getting water at their resident in the village. But water is basic need of human being and it is directly effete on human health. Indian government is decided to provide safe, regular and adequate water to the community at their resident.

Small Parameters of Water Treatment Process

The paper presents the importance and the necessity to increase the efficiency of cleaning process of the residual waters from waste industry. There are presented the methods of treatment of the residual wastewaters, in order to find the best condition and parameters treatment process.

Guideline for sewage works Design

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Proposed a technique for simulation of water distribution system in developing countries, where supply is less than demand i.e., intermittent supply.

Rehabilitation of Water Distribution Network

While discussing the issues related to water distribution system focused on some of the most compelling problems facing optimization viz. (i) Designer must strike a balance between cost minimization and net benefits (benefit minus costs), (ii) Reliability of the water distribution networks should not be reduced for the sake of cost reduction.

III. METHODOLOGY

Following are some of the important method of population forecasts:

1. Arithmetical increase method
2. Geometrical increase method
3. Incremental increase method
4. Decreasing rate of growth method
5. Simple graphical method
6. Comparative graphical method
7. Logistic curve method

From above these methods we adopt for 30 years we will use first three methods.
Water quantity count from various water demands:

1. Domestic water demand
2. Institutional & commercial water demand
3. Demand for public use
4. Fire demand
5. Composite losses demand

Per capita demand (q): It is the annual average amount of daily water required by one person. It is expressed in litre/capita/day.

$$q = Q/P \times 365$$

Q = total quantity of water required by a village per year in litre.
P = population of village

Design period: Water supply projects are design to serve over specified period after completion of the project. This time period is called design period.

Data collection:

1) Area: - Area of that village is = 0.05657 km2

2) Population: - Number of people = 1000 no.

3) Drinking water pipe networks: - 2.0 km far

4) Pressure: - Adequate pressure should be available in distribution mains at all points located even at the remotest spots.

5) Head loss in network**: -** When water flows through pipes, head loss takes place. Total head loss is composed of the following items:

a) Head loss due to friction,
b) Head losses due to bend, contraction, expansion, fitting, entry, exit etc.

Head loss due to friction: - Head loss due to friction may be computed from the following formula:

Darcey-Weisbach formula:

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$$h_f = 4fLV^2 / 2gD$$

Where, h_f = head loss due to friction (m)
f = coefficient of friction which is function of Reynolds no.
f = 64/Re, When; Re ≤ 2000
f =0.079/Re $^{0.25}$; When; Re 4000 to 10, 00,000
L = length of the pipe (m)
V =average velocity of flow (m/s)
D =internal diameter of pipe (m)
g = acceleration due to gravity=9.81 m/s^2

Hazen William's formula: This is the most widely used formula

$$V= 0.849\ CR^{0.63}\ S^{0.54}$$

Where, V= mean velocity of flow in pipe (m/s)
R= hydraulic radius (mean depth) (m)
S= hydraulic gradient C= coefficient of roughness of pipe

Head loss due to minor

$$h_m = K\ V^2/2g$$

Where; h_m= minor head loss (m)
K= coefficient of various fitting

Dead end system:

It is suitable for old town or cities having no different patterns of roads.

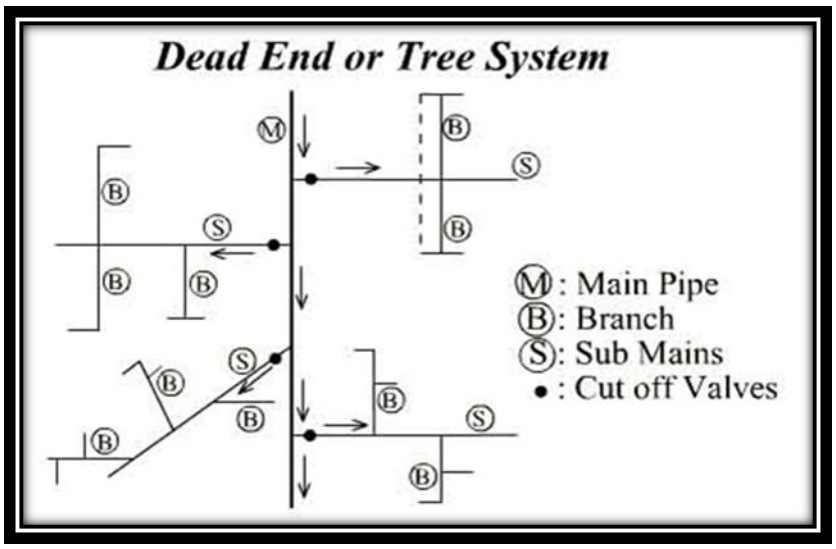


Figure 2: Dead end system

Advantages: -
1. Relatively cheap
2. Determination of discharge and pressure easier due to less number of valves

Disadvantages: -
1. Due to many dead ends, stagnation of water occurs in pipes.

IV. CONCLUSION

1) For water distribution: -

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I. From the methodology of water it can be concluded that due to low cost and determination of discharge & pressure is easier in dead end system so, we can adopt Dead End System for water distribution pipe networks.
II. We can adopt Simple calculation method for water & population quantity**.**

2) For waste water collection, conveyance & disposal: -

I. From the methodology of waste water conclusion have been made for collection, conveyance & disposal of sewage from village and we can adopt that Combined or Separate System in Water Carriage System from its good advantages & benefits.
II. We can adopt Simple calculation method for waste water quantity.

REFERENCES

[1] "Manual on Water Supply And Treatment" Third Edition, The GOI, Ministry of Urban Development, New Delhi, March 1991, pp 319
[2] "Small parameters of Water Treatment Works Design Guidelines", Republic of South Africa, June 2014.
[3] A Vasan and Slobodan P. Simonovic, "Optimization of Water Distribution Network Design Using Differential Evolution," Journal of water resources planning and management, asce, 279-287, march/april 2010.
[4] Ioan Sarbu, "Design of optimal water distribution systems", International journal of energy, Issue 4, Vol. 3,pp 59-67, 2009.
[5] J. Izquierdoa, I. Montalvo, R. P´ereza, M. Herrera "Sensitivity analysis to assess the relative importance of pipes in water distribution networks," Mathematical and Computer Modeling 48 (2008) 268–278.
[6] Jacob Michel, "Guidelines for Sewage Works Design" August 1991.
[7] Kalanithy Vairavamoorthy et al." Design of Sustainable Water Distribution System In Developing" Water Development Research Unit, Faculty of the Built Environment South Bank University, 2000, pp 1-10, 202, UK.
[8] Kay Chambers, John Creasey and Leith Forbes, Safe Piped Water: Managing Microbial Water Quality in Piped Distribution Systems, World Health Organization, ISBN: 1 84339 039 6. Published by IWA Publishing, London, UK. pp 39-68, 2004.
[9] Neha Mangesh Bhadbhade: Bachelor of Science; "Performance Evaluation of a Drinking Water Distribution System Using Hydraulic Simulation Software", In Instrumentation and Control University Of Pune, June 2004.
[10] Srila Gopal, Rajiv Sarkar. "Study of water supply & sanitation practices in India using geographic information systems: Some design & other considerations in a village setting" Indian J Med Res 129, March 2009, pp 233-241.

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