

PLANNING PROPOSALS OF STORAGE WATER INFRASTRUCTURE IN PALANPUR CITY BASED FOR 2031 REQUIREMENTS

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ABSTRACT: Palanpur city is the administrative headquarters of Banaskantha district. Palanpur town has been witnessing a rising urban population and the growth of urban areas, both in number as well as geographical area – over last more than two decades. Palanpur faces rapid urbanization, lack infrastructure facilities. This paper includes water infrastructure proposals (water storage proposals E.S.R.s. & Sumps).

Key words: Water infrastructure, Norms and standard, Sump, ESR.

1. INTRODUCTION

This paper represents proposals of water infrastructure facilities for human settlement in expanded urban area of Palanpur city including the objectives, Methodology, norms and standard.

2.OBJECTIVES

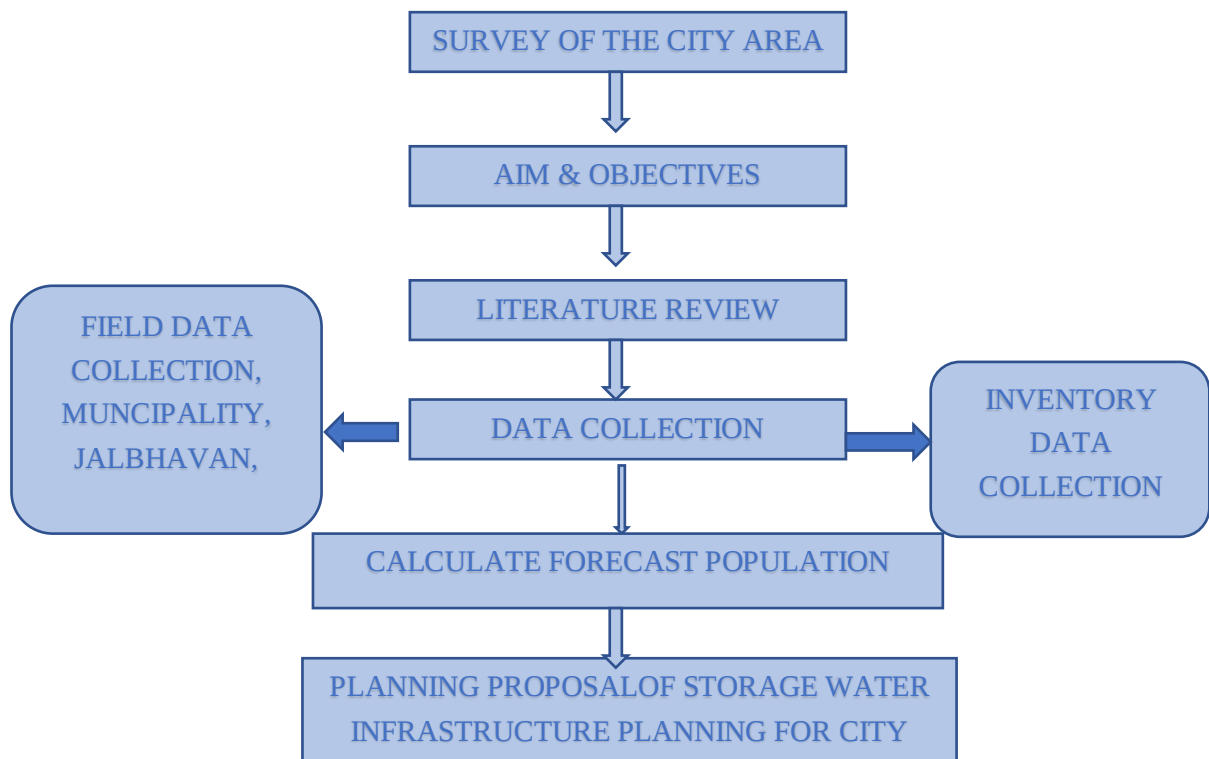
Objectives: The objectives for the paper are discussed as follows:

- To study the water infrastructure of Palanpur city.
- To prepare storage proposals for water infrastructure based for future requirement.

3. METHODOLOGY

Methodology used in this dissertation is at first survey the Palanpur city and then after deciding aim and objectives, to fulfill objectives review literature from the inter net and books, then visited the site and collected field data and also inventory data collected from municipality, Jalbhvan office. At last found forecast future population, water infrastructure planning's proposals for Palanpur City.

Study Methodology



4. LITERATURE REVIEW

4.1 Water distribution systems

Water distribution systems consist of an interconnected series of pipes, storage facilities, and components that convey drinking water and meeting fire protection needs of cities, homes, schools, hospitals, businesses, industries and other facilities. Public water systems depend on distribution systems to provide an uninterrupted supply of pressurized safe drinking water to all consumers. It is the distribution system mains that carry water from the treatment plant (or from the source in the absence of treatment) to the consumer.

4.2 Components

Components of a typical urban water supply are:

- a. Collection work
- b. Transmission work
- c. Purification work or water treatment plant

d. Distribution works

5. FIELD STUDY & ANALYSIS OF EXISTING AREA

5.1 Water Supply network

In Palanpur water supply network available by Dharoi Dam and bore. The Daily requirement of water is 19.2 MLD in Palanpur but sufficient water is not required. Daily Water supply is 11.5 MLD.

Water relieves by Dharoi Dam – 9.0 MLD.

Water relieves by bore -- 2.5MLD

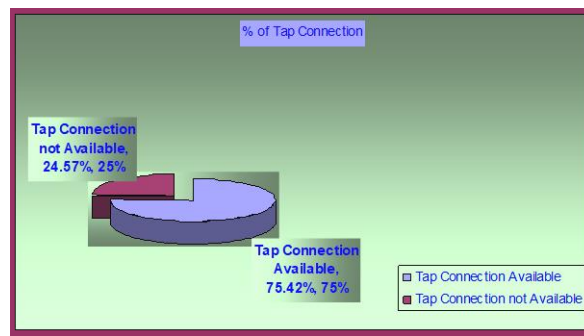
5.2 Analysis of water supply network in Palanpur

There are 26400 water connections in Palanpur City in 2012 in which include domestic, non-domestic, commercial. Requirements tap connection 35000 in Palanpur City.

Table-1 shows tap connection and perception of City people about water supply facilities in Palanpur.

Tap Connection	% of Tap Connection
Available	75.42%
Not Available	24.57%

Comments: Above table indicates tap connection and perception of City people about water supply facilities in Palanpur City. In which 75.42% of tap connection is available and 24.57 % not available.



Comment: Fig-1 indicates tap connection in Palanpur City.

5.3 Issues and challenges for water supply

The average rainfall is about 20 to 30 inches per season. At present, lack of 100% water supply coverage network in Palanpur City.

- High amount of transmission and distribution losses, unequal distribution of water, low pumping efficiency, lack of professional approaches.
- Lack of public awareness regarding the conservancy of water.
- At present no systematic approach is adopted for maintenance of water supply distribution system and the high cost of the O &M system.

6. PLANNING PROPOSALS

Proposal of water infrastructure is given with E.S.R. and Sump location with its capacity and required area as per future demand.

6.1 Future water Demand

According to opinion of local authority (Jalbhavan) in Palanpur daily requirement of water 15 MLD

Population of Palanpur forecasted followed

- **Arithmetic increase method**

Table: 2 Arithmetic increase method

Year	Population	Increase in population(x)
1981	61261	
		30217
1991	91478	
		18941
2001	110419	
		32181
2011	142600	
Total		81339
Average increase per decade		$x = 81339/3$ $= 27113$

Comment: Above table indicate calculation of future population by Arithmetic increase method.

Now $P_n = P_0 + n \cdot x$

Population after 2 decade beyond 2011

$$= P_{2031} = P_{2011} + 2 \times 27113$$

$$= 142600 + 54226$$

$$= 196826 \text{ (for 2031)}$$

- **Geometric increase method.**

Table: 3 Geometric increase method.

Year	Population	increase population	% age increase in population =growth rate =col-3/col-2x100
1981	61261		
		30217	49.32%
1991	91478		
		18941	20.70%
2001	110419		
		32181	29.14%
2011	142600		

Comment: Above table indicate calculation of future population by Geometric increase method.

Now, $r = \sqrt[3]{49.32 \times 20.70 \times 29.14}$

$r = 30.98\%$ per decade

The population after n decades

$P_n = P_0 (1+r/100)$

Population for 2031

$P_n = 142600 \times (1+30.98/100)^2$

$= 244641.14$

Forecast population for 2031 = 244641.14

Table-4 Forecast population of Palanpur City

Years	Population
2011	142600
2031	199769

For 2031 requirement of water:

$$= 199769 \times 135$$

$$= 26968815$$

$$= 26.96 \text{ MLD}$$

Table: 5 Future requirement of water

Year	Population	Water requirement in MLD
2011	142600	19.25
2031	199769	26.96

Comment: Above table indicate population and water requirement of 2011 & 2031 of Palanpur City. In 2031 water requirement is 26.96 MLD.

6.2 Water storage Proposal

Daily water supply in Palanpur 11.5 MLD

- Daily Requirement of water at present day 22 MLD.
- Available storage structure capacity (E.S.R. & Sumps)
 - = 65 lacs lit (E.S.R. storage capacity) + 69 lac lit (storage capacity of sumps)
 - = 134 Lac lit
 - = 13.4 MLD

Requirement of water in 2031 $26.96\text{MLD} = 27\text{ MLD}$

Capacity of storage structure = 13.4 MLD

Therefore, requirement of capacity of storage structure = $27\text{ MLD} - 13.4\text{ MLD}$

$= 13.6\text{ MLD}$

$= 136\text{ Lac lit}$

Therefore, requirement of structure for storage 136 lac lit water.

So, 2 no of 40 lac lit storage capacity of sump and 12 lac lit storage capacity E.S.R. (5 no) required in Palanpur City.

In proposal, provide 40 lac lit storage capacity sumps (2 no) and 20 lac lit storage capacity of sump. In proposal also provide 12 lac lit storage capacity E.S.R. (5 no) and 10 lac lit storage capacity E.S.R. (1 no).

So, total 100 lac lit storage capacity of sumps + 70 lac lit storage capacity of E.S.R = 170 lac lit

Which is more than the 136-lac lit (Requirement at 2031).

6.3 Proposal of sumps:

- Proposal of 40 lac liters sump near NH-14.
- Proposal of 40 lac liters sump near Gobari lake.
- Proposal of 20 lac liters sump near Dhaniyana chockdi.

6.4 For proposal of E.S.R.

- 12 lac liters E.S.R. near Ramdev hotel
- 12 lac liters E.S.R. near songadha village
- 12 lac liters E.S.R. near Sadarpur village
- 12 lac liters E.S.R. near Parpuda village.
- 12 Lac liters E.S.R. Gathamam village.
- 10 lac liters E.S.R. at near Police station.

7. CONCLUSION

Today the urban population of Palanpur is increasing at a rapid rate and so at the same time the demand of water also increasing. Present population and water demand in the future are critical factors in the design of water distribution network in Palanpur City. For distribution of available water supply, requirement of more water storage structures like no of E.S.R. & Sumps. Thus, to maintain good quality of water, with high supply efficiency, collective action is required to meet these challenges. The water storage proposal is given for future requirement of Palanpur City. It is proposed to have 3 no sumps and 6 no E.S.R. at different areas of Palanpur City.

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