

# Proposed Development of Balapur Village as a “Smart Village”

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**Abstract:** - In India villages are the main sources of cultural as well as economic foundation of our country. So, development of villages is very important. This Research Paper Basically, deals with the Study and Development of Balapur village as a “Smart Village”. The Society, individuals and collectively, will be empowered to take the Smart Decisions by using Advance as well as Smart Technologies and Innovation. Basic concept of “Smart Village” is to collect data, analyze it and study the problems and Requirements in village and provide the require benefits and services by using Smart as well as Advanced Technologies. This Research Paper focuses on development of Education System, Better Infrastructures, Garbage Management, Watershed Management, Energy Saving by Energy Audit, etc.

**Keywords:** Energy Audit, Smart Decisions, Garbage Management, Watershed Management, Smart Health Centre.

## I. INTRODUCTION

The village which provides and serves the required services by using advanced and smart Technology is known as “Smart Village”. For the entire growth and development of the country it is very essential to convert the villages into Smart Villages. In India there are 6,40,000 villages out of these 1,25,000 are backward so it is not good for our country so, planning and developing the villages into “Smart Village” is very important. A “Smart Village” should develop in such a way that it is self-dependent with including the all required Services. The main vision of “Smart Village” is that it should provide Modern Technology Access and Development in Education with proper Hospitality and health services, proper sanitation, waste management, Infrastructure, etc.

## II. ABOUT BALAPUR VILLAGE

“Balapur” is a small village in ‘Aurangabad’ District having 479.23 hectares and population 1094. Balapur village doesn’t includes all services so planning, and development of these village is essential. While Planning of these village as a Smart Village we focus on development by using Modern as well as smart technologies. Also, we try entire development of village in economical way. We try to focuses on Efficient Construction of Building which conserves the Energy.

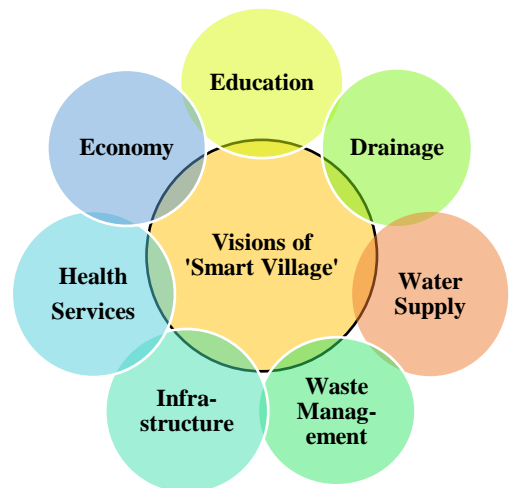


Fig.2.1

◆ Profile/Survey Data of ‘Balapur’ Village

Table 2.1

SR.NO	DATA	DETAILS
1.	Total Area	479.23 hectares
2.	Population: <ul style="list-style-type: none"> <li>• Men – 581</li> <li>• Women - 513</li> </ul>	Total: 1094
3.	Total No. of Houses	210
4.	Literacy Rate	80%
5.	Water supply System <ul style="list-style-type: none"> <li>1) Lake</li> <li>2) Borewell</li> <li>3) Well                             <ul style="list-style-type: none"> <li>a) Government</li> <li>b) Private</li> </ul> </li> </ul>	1 7 1 1
6.	Power/Electricity Supply through DP <ul style="list-style-type: none"> <li>1) Domestic Use</li> <li>2) Agriculture Use</li> </ul>	24 hours 8 hours
7.	Biogas plant	Na.
8.	Educational facility <ul style="list-style-type: none"> <li>1) Primary School</li> <li>2) Anganwadi Centre</li> </ul>	1 2
9.	Health Centre/hospital	Na.
10.	Community Hall	1
11.	Bank	Na.
12.	Income Sources	1) Agriculture 2) Animal Conservation 3) Dairy Products
13.	Main Crops in Agriculture	1) Cotton 2) Sugarcane 3) Wheat 4) Jowar 5) Bajra
14.	Irrigation System	Lift Irrigation
15.	Major Problems	<ul style="list-style-type: none"> <li>• Undeveloped Roads</li> <li>• No Hospital</li> <li>• Lack of use of Advance Technology</li> <li>• No Street Lamps</li> <li>• No Biogas Plant</li> <li>• No Watershed Management</li> <li>• Lack of Waste Management</li> </ul>

III. MAJOR PROBLEMS IN BALAPUR VILLAGE

Balapur village is not developed village. So, Peoples in Balapur villages facing various problems such as:

**A) Lack of Hospital Services**

Every Smart Village should provide good Health services with proper Hospitality and Medical Centre for the common peoples in Village.

There is no any hospital and doctor for Balapur village so it is major problem for these we have design the Smart health Centre for village.

**B) Undeveloped Roads**

For proper Transportation system every Smart village should have better Road network. In Balapur village not all roads are completely developed so development of most of the roads or Construction is necessary for best as well as comfortable Transportation. So, we have done the various roads comfortable for comfortable transportation.



**C) Waste/Garbage Management**

This is the main component of smart village. In every Smart village Garbage management should done properly. In

Smart Village there should dustbins to collect the Garbage. In Balapur village Garbage/Waste Management is not done and no dustbins are there.



#### D) No Biogas plants

Animal Conservation is the best as well as important Income source for Balapur Village. So, there is so many wastes from animals in balapur village from animals and it can be advantageously use for domestic as well as Agricultural purpose So, Biogas Plant is much important in Balapur Village. So, for these we have design four Biogas plants for Balapur village.



#### ◆ OTHER PROBLEMS IN VILLAGE

1. Infrastructure is not developed Completely.
2. No Water Supply System.
3. Lack of use of Modern Technology.
4. No Street Lights.
5. No Watershed Management.
6. No Energy Conservation Measures.

#### IV. PROPOSED SMART PRACTICES FOR SMART VILLAGE

Garbage Management

Smart Health Centre

Design of Biogas Plants

Design of Watershed

Small Smart Bank

Multiservice Centre

Design of Water System

#### 1. GARBAGE MANAGEMENT

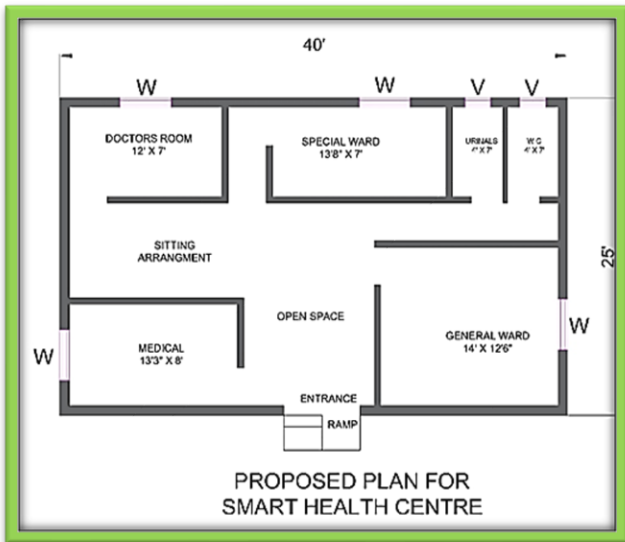
Garbage from houses and from entire village will arises pollution So, management of these waste is very important. For these, we place the common 'Dustbins' at place to place in village and collect it through Garbage Truck (which we requested it from municipal corporation of Aurangabad city) and transport it to the **Waste Treatment Plant** of Aurangabad City. These Garbage/Wastage after treatment we can use it as a Fertilizer in Agriculture for better growth of plants. We provided total 30 Dustbins in whole village for Garbage Collection. For every 3 days Garbage is collected from dustbins and transport it to Waste Treatment Plant.

#### 2. SMART HEALTH CENTER

For the good health of peoples in village health center/hospital is very important and essential. So, we design one "Smart Health Center" for Balapur village. In these Smart Health Center, we use Natural Resource and provide services in a Smart way.

**Following are some smart features of “Smart Hospital”**

1. Energy Consumption is less as compare to Conventional hospital.
2. No Artificial Ventilation is used in Hospital only Natural Ventilation is used.
3. Trees are planted in surrounding of hospital to maintain the fresh and healthy environment.
4. **For the Waste in Hospital, A special Container of RCC is designed to collect it and transport it to nearby Treatment Plant.**
5. Special Water Supply Scheme is designed for hospital to save the Water.



**Plan for Smart Hospital**

**3. DESIGN OF BIOGAS PLANT**

For Advantageous use of ‘Gobar’ waste from cows and buffaloes we have designed four Biogas Plants in Balapur Village in four directions for comfortable use of peoples.

**Parameters for Biogas Plant**

**1. Site Selection**

The 4 Biogas plants are constructed at North, East, South, and West side of Village where no houses there so no disturbances for peoples.

**2. Design of Digesters Tank**

→ For All plant

No. of Cows=12   Dung Avail. =10x12=120kg

No. of Calves=5   Dung Avail. = 5x5=25kg

**Total Dung= 120+25 = 145 kg say 145 liters of Daily**

**Dung Volume**

Daily Slurry volume (mixing equal Qty. of water) = 145x2= **290 liters**

Select Retention Time = 40 days

Volume of Digester tank = 290 x 40 = 11600 liters = 11.6 cubic meter

10% extra for overlap of gas holder

**Design volume of Digester tank = 11.6 + 10/100x11.6 = 12.76 cu.m**

Assume Diameter: Height ratio = 1:1

∴ Volume of Tank =  $12.76 = \pi/4(D^3)$

∴ D = 2.53 m  $\cong$  2.5 meters

▪ **Diameter of Digester = 250cm**

▪ **Depth of Digester = 250cm**

**3. Design of Gas holder**

→ For All Plant

Daily Gas Production = 40x145=5800 liters = 5.8 cubic meter

Diameter of gas holder= 250 – 20 = 230cm = **2.3m**

Volume of gas = (5.8/2) = 2.9 m<sup>3</sup>

Volume of gas holder = 2.9=  $\pi/4(2.3^2 \times h)$

$hg = (2.9 \times 4) / (\pi \times 2.3 \times 2.3) = 0.697m$

providing submergence height 15cm ∴ Total Height=0.71m

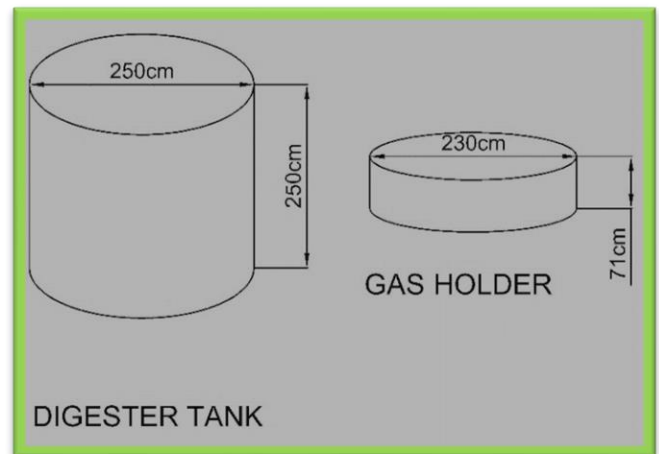
**4. Dimensions of Slurry Mixing Tank**

→ For All Plant

Daily slurry volume = 290 liters

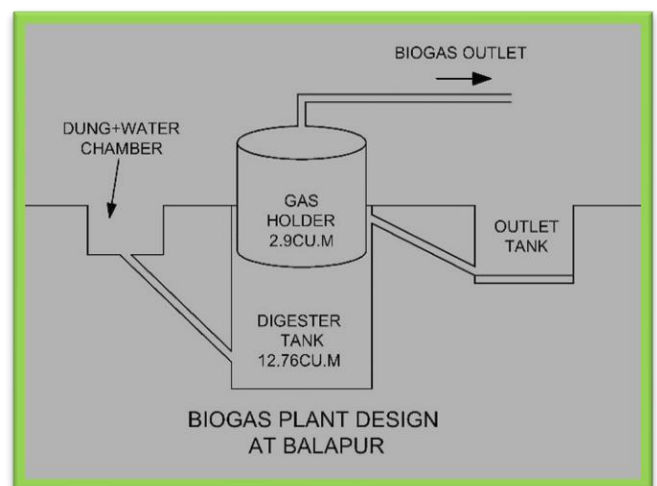
Take depth = 40cm ∴ Area = 0.29/0.4 = 0.72 m<sup>2</sup>

Take Square c/s L=B= $\sqrt{0.72} = 0.85m = 85cm$



**DIGESTER TANK**

**GAS HOLDER**



**BIOGAS PLANT DESIGN AT BALAPUR**

**Design of Biogas Plant at Balapur Village**

**4. WATERSHED MANAGEMENT**

In Marathwada Region Rainfall is sufficient if we conserve and manage the Rainwater properly. In balapur village Watershed Management is very important to conserve

the water. So, we planned and Design a Watershed for Balapur Village.

### 1. Water Budgeting

Rainwater on Watershed = Area x Rainfall  
=  $479.23 \times 10^4 \times 0.725 = 3.47 \times 10^6$

= 3.47 M.cum Evapo transpiration 30% 1.04 M.cum.

= **Total Rainwater on Watershed = 4.51 M.cum**

### 2. Solutions

#### ◆ CONTINUOUS CONTOUR TRENCH (C.C.T)

These are horizontal trenches built on hill slopes to store the runoff water and thereby to avoid soil erosion.

In Village C.C.T is provided on hilly area where runoff is more. Trenches are dug out and the plantation is done in soil which dugged out from trenches.

**For water collected from Watershed following structures were also proposed for Watershed Management.**

- Pond is constructed at west side of Balapur village to collect water from Watershed.
- There is one lake for balapur village water is also collected in lake from watershed.
- If due to excessive rainfall there is more outlet from watershed the sometimes water is collected in well also.
- Percolation pit is designed to increase the Water Table in Balapur village for future purpose.

Watershed management bring about transformation of balapur village with increase in per capita income in Agriculture. **In Balapur village there is 42% increase in income due to Watershed Management.**

#### 5. SMALL SMART BANK

For the Financial Development of Village, the Bank is required in Smart Village. So, all peoples in village do their financial business easily and in village.

We design a Smart bank for Balapur village in 1200 sq. ft area. Where Energy consumption is less and using Natural Resources smartly and greenery around it so we made it Smart. Bank is constructed at North Side of Village. All basic Facilities are available in bank for the customers in village.

#### 6. MULTISERVICES CENTRE

In any villages there is so many schemes from government for development of farmers and their yield from Agriculture. So, for applying these schemes peoples in village should go in nearby city so it is not much affordable, so one Multiservice center in Smart Village is necessary. So, we provided one small multiservice center for balapur village to apply the various government schemes for peoples in village.

✚ **For Information of Newly launched Schemes from Governments we provide one LCD at Temple of Balapur Village.**

#### 7. WATER SUPPLY SYSTEM

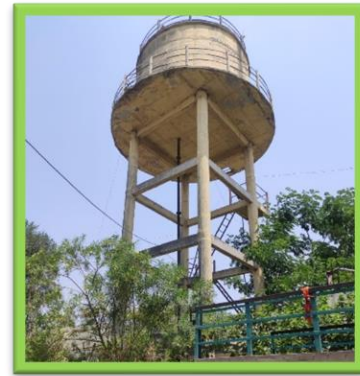
For proper water distribution, Smart Village should have proper Water Supply Scheme. In Balapur village there is an Overhead Water Tank but, distribution is not properly designed. So, we have designed a water supply scheme for Balapur village.

Water Requirement for one person = 135 liter/head/day

∴ **Total Water Demand = Water Req. x Population = 135 x 1094 = 1,47,690 lit/h/d**

In Balapur village capacity of Overhead water tank is 75,000 liters so we have to fill tank twice a day for requirement.

For Water Distribution in Balapur village 100mm diameter pipes are used from Overhead Water Tank to the houses. For Agricultural use Water supply is by Lift Irrigation from Lake by using 7.5 HP Pump. RO water plant is provided for drinking water.



**Overhead Water Tank of Balapur village**

#### ◆ Other Services provided in Balapur Village

1. Solar and Ordinary Street Lamps.
2. Development of Roads.
3. Energy Audit for Balapur Village.
4. Development in Primary School.
5. Plantation of Trees

### V. CONCLUSION

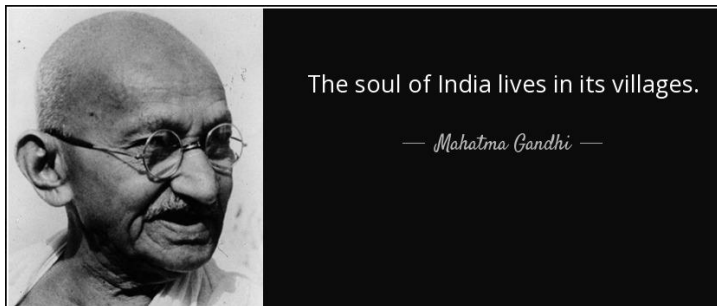
- ✚ “Smart Villages” Villages should be developed by using Modern as well as Smart Technologies in optimum way.
- ✚ “Smart Villages” plays important role in development of our country.
- ✚ During development of any village into smart village Natural Resources should use in optimum way and Energy Consumption should achieved by doing Energy Audit Practices.
- ✚ During development of balapur Village we focus on Energy Conservation, and uses Natural resources as much as Possible by which we achieved an economy in development.
- ✚ Development of villages into Smart Villages not only reduce the migration but also irrigate the population flow from urban to rural areas as well.

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**Let's Contribute to the 'Smarter Village' by using  
Modern Technology...!**



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