**DETAIL PROJECT REPORT**

# VISHWAKARMA YOJANA: VIII
# AN APPROACH TOWARDS RURBANISATION
# AGATRAI Village
# JUNAGADH District

**PREPARED BY**


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**Government Engineering College**
**Rajkot**

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**Prof. K.J. Savaliya**


## YEAR: 2020-21

**GUJARAT TECHNOLOGICAL UNIVERSITY**
**Chandkheda, Ahmedabad – 382424 Gujarat**

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**ON**

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**Prof. K.J. Savaliya**


**Year: 2020-21**

**Gujarat Technological University**
**Chandkheda, Ahmedabad – 382424 Gujarat**

# CERTIFICATE

This is to certify that the following students of Degree Engineering successfully submitted

**Detail Project Report for,**
**VILLAGE _AGATRAI__**
**DISTRICT _JUNAGADH_**

**Under**

## Vishwakarma Yojana: Phase-VIII

In partial fulfilment of the project offered by

**GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA**

**during the academic year 2020-21.**

This project work has been carried out by them under our supervision and guidance.

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# ABSTRACT

The Government of Gujarat has launched Vishwakarma Yojana for development of villages by identifying the requirements of villages. Under this scheme, the villages are surveyed and this project was identified and selected for implementation. Rurbanisation is to bring peace of mind to the villagers by providing them the basic amenities required and still keeping the village soul intact.

Agatrai village is located in Keshod taluka of Junagadh district in Gujarat, India. It is situated 7km away from sub-district headquarter Keshod and 30km away from district headquarter Junagadh. As per 2019 stats, Agatrai villages comes under Keshod assembly & Porbandar parliamentary constituency. Keshod is nearest town to Agatrai which is approximately 7km away. The location code or village code of Agatrai village is 514730. Pin code of Agatrai is 362222. The village comes under Agatrai panchayat.

The total geographical area of village is 1804.8 hectares. Agatrai has a forest area of 269.48 hectares. Agatrai has an agricultural land area of 1496.318. Agatrai has a total population of 5,318. Population consists of 2737 male and 2581 female. There are about 1,179 houses in Agatrai village. Most of people are engaged with agricultural occupation.

Agatrai is big village which has large area and good population. There are some good physical facilities available like primary school, secondary school and high school, banks, overhead water tank, underground drainage facilities, panchayat bhavan, Public Health Centre etc.

There are some basic facilities which are not available in village like Community Hall, Improper Waste water management facilities, Garden, Library etc. We have proposed designs of the above problems. We also have proposed smart design of Dry Composite Toilet.

In the future we will propose designs for Milk Co-operative Society building, Agricultural Storage building for the betterment of the people associated with the agriculture and animal husbandry.

**KEY WORDS**:
Rurbanisation
Sustainable Development
Infrastructure Facilities
Smart Development

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# ABBREVIATIONS

| SHORT NAME | FULL NAME |
|---|---|
| RCC | Reinforced Cement Concrete |
| PCC | Plain Cement Concrete |
| DPC | Damp Proof Course |
| PHC | Public Health Centre |
| PPP | Public Private Partnership |
| BOT | Built Operate Transfer |
| MNREGA | Mahatma Gandhi National Rural Employment Guarantee Act |
| PMGSY | Pradhan Mantri Gram Sadak Yojana |
| SAGY | Sansad Adarsh Gram Yojana |
| NRUM | National Rurban Mission |
| DRDA | District Rural Development Agency |
| PURA | Provision of Urban amenities in Rural Area |
| WBM | Water Bound Macadam |
| DDO | District Development Officer |
| TDO | Taluka Development Officer |
| IAY | Indira Awas Yojana |
| PMRDF | Prime Minister Rural Development Fellowship |
| MoRD | Ministry of Rural Development |
| IoT | Internet of Things |
| APMC | Agricultural Produce Market Committee |

# Chapter: 1

## Ideal Village Visit from District of Gujarat State

## 1.1 Background & Study Area Location

### Background

Meswan is a Village in Keshod Taluka in Junagadh District of Gujarat State, India. It is located 39 KM towards west from District headquarter Junagadh. 4 KM from 381 KM from state capital Gandhinagar.

Meswan has a population of 6191. There are 1379 houses in the village.

Mainly people here are involved in agricultural activities. Meswan has 993 hectares of agricultural land.

The village has received several awards from Government of Gujarat and India.

## Study Area Location

Meswan is situated in Keshod Taluka in Junagadh District, Gujarat. Meswan pin code is 362227.

Meswan is located at 21.2609° N Latitude and 70.2780° E longitude.

Figure 1: Map of Meswan

Table 1: Geographic Detail of Meswan

| **Village** | **Meswan** |
|---|---|
| Gram Panchayat | Meswan |
| Taluka | Keshod |
| District | Junagadh |
| State | Gujarat |
| Area | 15.51 $km^2$ |
| Population | 6191 |
| Population Density | 399 per $km^2$ |
| Household | 1379 |
| Pin code | 362227 |

## 1.2 Concept: Ideal Village, Normal Village

### 1.2.1 Objectives

1. The development of model villages, called ideal /smart villages, through the implementation of existing schemes, and certain new initiatives to be designed for the local context, which may vary from village to village.
2. Creating models of local development which can be example of other villages.
3. Work with keep in mind SDGs
4. Sustainable development is our main object for planning.
5. Smart infrastructure and batter economically status.
6. Self-awareness centre and e centre.

## 1.2.2 Example / Live Case studies of ideal village of India/Gujarat

### 1. Punsari (Gujarat)

Punsari, located in Gujarat, puts most metros to shame. Funded by the Indian government and the village's own funding model, Punsari is no NRI-blessed zone. The village also boasts of a mini-bus commute system and various other facilities.

### 2. Dharnai (Bihar)

Dharnai, a village in Bihar, beat 30 years of darkness by developing its own solar-powered system for electricity. With the aid of Greenpeace, Dharnai declared itself an energy-independent village in July. Students no long need to limit their studies to the day time, women no longer limit themselves to stepping out in the day in this village of 2400 residents.

### 3. Pothanikkad (Kerala)

Unsurprisingly in Kerala, Pothanikkad village was the first in the country to achieve a 100% literacy rate. Not only does the village boast of city-standard high-schools, but it also has primary schools and private schools. Guess the number of people the village has educated? Well, per the 2001 census there are 17563 residents living in the village.

### 4. Mawlynnog (Meghalaya)

Mawlynnog, a small village in Meghalaya, was awarded the prestigious tag of 'Cleanest village in Asia' in 2003 by Discover India Magazine. Located at about 90 Km from Shillong, the village offers a sky walk for you to take in the beauty as you explore it. According to visitors, you cannot find a single cigarette butt/plastic bag lying around there.

## 1.2.3 The Idea of a Model/Smart Village

The concept of smartness is popular in respect and honour of human development regardless of rural or urban area, literate or illiterate in all country and India is not omission to it. The ideas of smart village will also attention to multiple challenges such as unplanned urbanization, under development of village and smart villages. What is smart village? In smart village access sustainable energy services acts as a catalyst for development enabling the provision of good education and health care, access to clean water, sanitation and nutrition, the growth of productive enterprise to boost income and enhanced security.

## 1.2.4 Ancient History Civil concept about Indian Village/Foreign Countries Perspective and its Development

### Key elements of ideal village:

### Sustainability

- Better health with special focus on maternal and child health
- Practical smart education, housing and livelihood
- Capacity building of all stake holders
- Clean drinking water, sanitation, Environmental sustainability

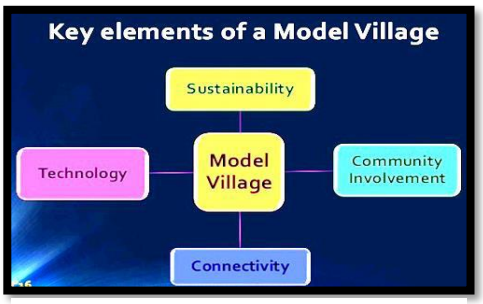


Figure 2: Key Elements of Model Village

### Community involvement

- Planning for village development
- Utilization of government funds to increase accountability, influencing personal and community behaviour.

- Mobilizing resources for the plan, with active engagement with elected representative monitoring.

### Technology

- Remote sensing for resource mapping and better utilization of existing assets.
- Land records modernization biometrics for better targeting of services such as PDS, insurance pension.
- Delivery of Government services ICT and space technology in the aid of farmers.

### Connectivity

- Digital connectivity and mobile connectivity augmenting power connectivity through off grid renewable sources, financial connectivity.
- Physical connectivity to towns and other places through roads by easy and cheap means of transportation.

## 1.3 Detail study of Meswan

### Demographic Detail

Table 2: Demographic Detail of Meswan

| Particulars | Total | Male | Female |
|---|---|---|---|
| Total No. of Houses | 1379 | | |
| Population | 6191 | 3201 | 2990 |
| Child (0-6) | 514 | 278 | 236 |
| Schedule Caste | 897 | 457 | 440 |
| Schedule Tribe | 19 | 11 | 8 |
| Literacy Rate(%) | 79.06 | 87.06 | 70.55 |
| Total Workers | 2853 | 1977 | 876 |
| Main Worker | 2677 | 1925 | 742 |
| Marginal Worker | 176 | 105 | 71 |

### Infrastructure Details:

### Drinking Water / Water Management Facilities

For drinking purpose there are two overhead water tanks in Agatrai village.
One overhead tank has 50000 litres of capacity and other tank is of 20000 litres of capacity.
Water is supplied through underground pipes to the houses.

### Sanitation

Open Drainage System Available in this Village. House to House waste Collection available. There is system to Collect garbage on street. Drain water is discharged into sewer plant.

### Wi-Fi

A Wi-Fi facility is available in this village. With the use of Wi-Fi, a people of village are use internet banking, online shopping, e-governance, Etc.

### Public announcement

Public Announcement system is installed at many places wherein announcements, news been announced when necessary.

### Security
Many point CCTV cameras and monitors been installed at key locations in order to keep a close watch on the daily activities
Also CCTV cameras are installed in schools and health centre.

### Education
There are 2 primary schools in the village. There is also a secondary school in the village.

### Community hall
There is One community halls within sittings of 450-500 people at a time with facilities of projectors and a sound system.

### Play ground
There is a special play ground is available in near village and also school playground is available.

### Gram Panchayat
Gram Panchayat office of the village was fully computerized with personal for operation for each section. All forms and certificates were given immediately on payment of fee through computer. Panchayat office had conference hall for meetings of panchayat members and gramshabha. People at gram panchayat were very cooperative with positive attitude.

## Existing Infrastructure Photographs:

Figure 3: School

Figure 4: Water Tank

Figure 5: Community Hall


Figure 6: Bank


Figure 7: PHC

Figure 8: Internal Street

## 1.4 SWOT Analysis of Ideal Village

Table 3: SWOT Analysis

| |
|---|
| **Strength :** Waste management, Higher secondary education |
| **Weakness :** Recreational facilities, Public library |
| **Opportunity :** Use of Renewable energy, Use of Wi-Fi in educational purpose |
| **Threats :** Open Drainage |

## 1.5 Future prospects of Development of the Ideal village

- Establishment of R.O. Plant for providing a pure drinking water for all people.
- Provide roof top rain water harvesting in all houses.
- Using CCTV for security purposes.

## 1.6 Benefits of the visits of Ideal village

- It helps us gain first-hand information regarding functioning of the village.
- Provides an opportunity to plan, organize and engage in active learning experience.
- It will help us in developing better ideas for sustainable development of the village.

### 1.7 Civil Aspects required in Ideal Village

By visiting the ideal village Meswan we have observed balanced use of finance in building different types of infrastructures required. But as per the feedback given by the villagers and from the techno economical survey we have found some infrastructure facilities are lacking in the village.

Infrastructures like Public Garden for recreational purpose are required in the village. As electricity comes for only 6 hrs for irrigation, there is a need for constructing smart renewable source of energy to meet the peak demand of the irrigation season. Library is also a requirement for studying purpose for children and also an internet accessible centre for all the villagers.

# Chapter: 2
# Agatrai Literature Review

## 2.1 Introduction: Urban & Rural village concept

### Urban:

An urban area is a human settlement with high population density and infrastructure of built environment. Urban areas are created through urbanization and are categorized by urban cities, towns, conurbations or suburbs. People living in urban India have better living conditions than those living in the rural parts of India

All places with a municipality, corporation, cantonment board or notified town area committee, etc.

All other places which satisfied the following criteria

A minimum population of 5,000; At least 75% of the male main working population engaged in non-agricultural pursuits

A density of population of at least 400 persons per sq. km.

### Rural:

All the areas which are not characterised as urban area is called rural area. In which the population is very low compared to urban areas. Mainly they depend on agricultural activities. According to census 2011, there are 6, 40,867 villages in India.

The area where more than 75% of male population is associated with agricultural activity is known as rural area.

## 2.2 Importance of Rural development

Rural development is of greater importance in India as majority of the population of India lives in the rural area. Due to low opportunity of employment in rural area people are migrating towards the metropolitan cities, so rural development is important to stop the migration of people and to help people prosper in the rural areas.

## 2.3 Ancient Villages / Different Definition of: Rural Villages

A village is a small settlement usually found in a rural setting. It is generally larger than a "hamlet" but smaller than a "town".

### According to the Planning Commission

A town with a maximum population of 15,000 is considered rural in nature. In these areas the panchayat takes all the decisions. There are five people in the panchayat.

### According to Reserve Bank of India(RBI)

RBI defines rural areas as those areas with a population of less than 49,000.

According to the National Sample Survey Organization an area with a population density of up to 400 per square kilometre with clear surveyed boundaries but no municipal board is a village.

### According to UK

A small community or group of houses in a rural area, larger than a hamlet and usually smaller than a town, and sometimes incorporated as a municipality the inhabitants of such a community collectively.

## 2.4 Scenario: Rural / Urban village of India population growth

India is the second most populated country in the world with nearly a fifth of the world's population. According to the 2017 revision of the World Population Prospects population stood at 1,324,171,354.

According to the provisional reports released on 31 March 2011, the Indian population increased to 1.21 billion with a decadal growth of 17.70%. Adult literacy rate increased to 74.04% with a decadal growth of 9.21%. The motto of the census was 'Our Census, Our future'

These parameters include population, growth rate in population, rate of literacy, density of population, sex ratio and child sex ratio.

According to the census reports of Indian census 2011, the population of India is 1,210,193,422 with 623,724,248 males and 586,469,174 females. The total literacy rate in the country at 74.04%. the density of population is 382 person/sq.km.

Table 4: Population of India

| **Population of India (In Crores)** | | | |
|---|---|---|---|
| **Year** | **2001** | **2011** | **Difference** |
| India's Population | 102.9 | 121.0 | 18.1 |
| Rural Population | 74.2 | 83.3 | 9.0 |
| Urban Population | 28.6 | 37.8 | 9.2 |

### Growth Rate of Population (in %)

The slowing down of the overall growth rate of population is due to the sharp decline in the growth rate in rural areas, while the growth rate in urban area remains almost the same.

Table 5: Growth Rate of India

| | **1991-2001** | **2001-2011** | **Difference** |
|---|---|---|---|
| India | 21.5 | 17.6 | -3.9 |
| Rural | 18.1 | 12.2 | -5.9 |
| Urban | 31.5 | 31.8 | +0.3 |

Table 6: Urban & Rural Growth Rate of India

| | **1991-2001** | **2001-2011** | **Difference** |
|---|---|---|---|
| EAG | 25.0 | 20.9 | -4.1 |
| Rural | 23.5 | 18.7 | -4.8 |
| Urban | 31.6 | 29.9 | -1.7 |
| Non EAG | 18.9 | 15.0 | -3.9 |
| Rural | 13.2 | 5.7 | -7.5 |
| Urban | 31.5 | 32.7 | +1.2 |

### Growth Rates (Rural)

General decline in Rural Growth Rate among all the three categories during the last decade 2001-11 whereas Non-EAG States have shown decline in growth since 1971-81, the EAG States have declined only during the last decade.

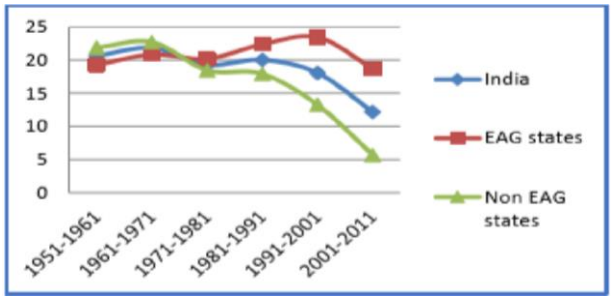


Figure 9: Growth rate in rural area

### Growth Rates (Urban)

There has been a spurt in growth of population in Urban areas in the country, which could be due to:
Migration
Natural increase

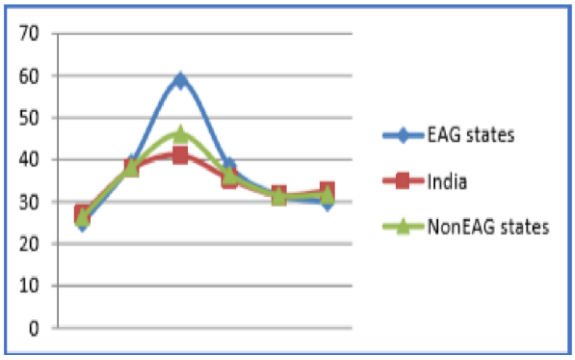


Figure 10: Growth rate in urban area

## 2.5 Scenario: Rural / Urban village of Gujarat as per census 2011

Table 7: Population of Gujarat

| Population of India (In Crores) | | | |
|---|---|---|---|
| **Year** | **2001** | **2011** | **Difference** |
| Gujarat's Population | 5.07 | 6.04 | 0.97 |
| Rural Population | 3.11 | 3.46 | 0.35 |
| Urban Population | 1.81 | 2.53 | 0.75 |

## Population Growth in Gujarat

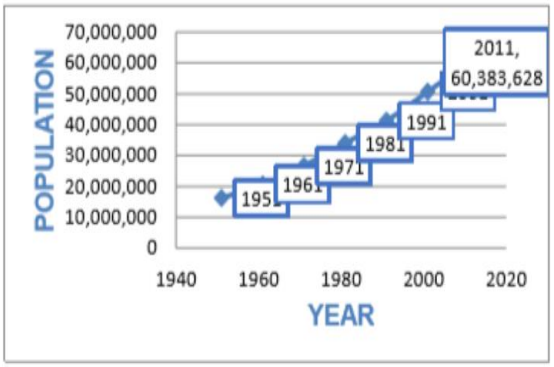


Figure 11: Population growth in Gujarat

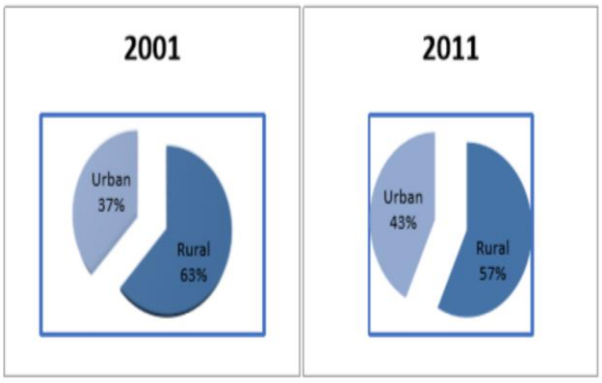


Figure 12: Rural and Urban Population, Gujarat

Gujarat has witnessed a descent growth in its population in the last 60 years.
From a small figure of 16 Lakh in 1950, it has gone passed 6.03 Crore in 2011.

## 2.6 Rural Development Issues & Concerns

### 2.6.1 Crime Free / Dispute free:

The Home Department of the Government of Maharashtra launched the innovative scheme for Alternative Dispute Resolution in 2007 aimed to address the issues with efforts from the community for speedy disposal. It was observed that at the village level, disputes often arise over petty issues. The Mahatma Gandhi Tantamukt Gaon Mohim is a village level Alternative Dispute Resolution (ADR) system which seeks to work with a two pronged strategy, firstly it has a preventive role by virtue of which there is a conscious effort made by the village community to prevent the occurrence of any passive or regressive conflict – dispute in the village and secondly to resolve existing disputes at the village level through people's participation and initiative.

### 2.6.2 Resources:

- A disproportionate burden of chronic disease relative to the general public
- Restricted access to quality health care
- Insufficient or lack of health insurance coverage
- Geographic isolation
- Lack of public transportation
- Poor infrastructure
- Low educational attainment
- Low health literacy
- Poverty and unemployment
- A smaller health care workforce and a lack of specialty care
- Limited availability of bilingual providers and interpreter services
- Cultural or social differences, stigma, and norms

### 2.6.3 Literacy:

The concept and phenomenon of education based on school-going is of modern origin in India. Education in the past was restricted to upper castes and the content taught was also ascriptive. However, today, to lead a comfortable life in this fast-changing world, education is seen as the most influential agent of modernization.

The educational attainments in terms of enrolment and retention in rural India generally correspond to the hierarchical order. While the upper castes have traditionally enjoyed and are enjoying these advantages, the Scheduled Caste and other backward castes children have lagged behind in primary schooling.

An important reason for withdrawal of children from school is the cost and work needs of poor households. Income and caste are typically correlated with lower castes having lower incomes and higher castes having better endowments in terms of land, income and other resources. Thus, one fact is certain that there is a clear divide in the villages, along caste lines, regarding access to schools.

The very poor children are enrolled in the municipal school because it provides a number of incentives such as lower expenditure on books, uniforms, fees, etc. The well-off children go to the private school, where English and computers are given more importance.

Parental illiteracy is another cause for lack of interest to become literates. Many rural children enrolled are thus first generation learners, who come from illiterate families thus, they have to single handily grapple with school life, mastering language and cognitive skills without parental help and guidance. Most of these illiterate parents do whatever is possible to educate their children because education for them acts as a vehicle of social mobility. Moreover, education and the subsequent attainment of town jobs is often looked upon by many of these rural families, especially families belonging to lower castes, as a means to break out of their position in caste hierarchy.

### 2.6.4 Health/ Hygiene:

People in rural areas face some different health issues than people who live in towns and cities. Getting health care can be a problem when you live in a remote area. You might not be able to get to a hospital quickly in an emergency. You also might not want to travel long distances to get routine check-ups and screenings. Rural areas often have fewer doctors and dentists, and certain specialists might not be available at all.

Because it can be hard to get care, health problems in rural residents may be more serious by the time they are diagnosed. People in rural areas of the United States have higher rates of chronic disease than people in urban areas. They also have higher rates of certain types of cancer, from exposure to chemicals used in farming.

### 2.6.5 Women Empowerment:

Major issues faced by women in rural areas are given bellow:

1. Sexual harassment: It is the form of sexual exploitation of a girl child at home, streets, public places, transports, offices, etc. by the family members, neighbours, friends or relatives.
2. Dowry and Bride burning: It is another problem generally faced by women of low or middle class family during or after the marriage. Parents of boys demand a lot of money from the bride's family to be rich in one time. Groom's family perform bride burning in case of lack of fulfilled dowry demand. In 2005, around 6787 dowry death cases were registered in India according to the Indian National Crime Bureau reports.
3. Disparity in education: The level of women education is less than men still in the modern age. Female illiteracy id higher in the rural areas. Where over 63% or more women remain unlettered.
4. Domestic violence: it is like endemic and widespread disease affects almost 70% of Indian women according to the women and child development official. It is performed by the husband, relative or other family member.
5. Child Marriages: Early marriage of the girls by their parents in order to be escaped from dowry. It is highly practiced in the rural India.
6. Inadequate Nutrition: Inadequate nutrition in the childhood affects women in their later life especially women belonging to the lower middle class and poor families.
7. Low status in the family: It is the abuse or violence against women.
8. Women are considered as inferior to men so they are not allowed to join military services.

### Various Measures for Rural Development:

- To develop rural area as whole in terms of culture, society, economy, technology and health.
- To develop rural youths, children and women.
- To develop and empower human resource of rural area in terms of their psychology, skill, knowledge, attitude and other abilities.
- To develop infrastructure facility of rural area.
- To provide minimum facility to rural mass in terms of drinking water, education, transport, electricity and communication.
- To develop rural institutions like Panchayat, cooperatives, post, banking and credit.
- To provide financial assist to develop the artisans in the rural areas, farmers and agrarian unskilled labour, small and big rural entrepreneurs to improve their economy.
- To develop rural industries through the development of handicrafts, small scaled industries, village industries, rural crafts, cottage industries and other related economic operations in the rural sector.

## 2.7 Various infrastructure guidelines with the Norms for Villages for the provisions of different infrastructure facilities

### Physical infrastructure facilities

### 1) Water

- With two thirds of the earth's surface covered by water and the human body consisting of 75 percent of it, it is evidently clear that water is one of the prime elements responsible for life on earth
- Water circulates through the land just as it does through the human body, transporting, dissolving, replenishing nutrients and organic matter, while carrying away waste material

### 2) Drainage

- Drainage is the natural or artificial removal of surface and sub-surface water from an area.
- The internal drainage of most agricultural soils is good enough to prevent severe water logging (anaerobic conditions that harm root growth), but many soils need artificial drainage to improve production or to manage water supplies.

### 3) Transportation

- Transportation is really much more than the movement of people.
- The truly vital function that it plays is the movement of goods

## Social infrastructure facilities

### 1) Education

- Education is not all about studying and getting good marks. It is really a means to discover new thing which we don't know about and increase our knowledge.
- An educated person has the ability to differentiate between right and wrong.

### 2) Sanitation

- Sanitation makes a positive contribution in family literacy. A healthy child has better learning and retaining ability.

### 3) Fire Station

- A fire department provide "fire protection" or fire prevention services, whereby firefighters visit homes and give fire safety advice and fit smoke alarms for members of the public.

### 4) Health

- Each day we work toward maximizing our level of health and wellness to live long, full, and healthy lives.
- The pursuit of health, personal growth, and improved quality of life relies on living a balanced life. To achieve balance, we need to care for our mind, body, and spirit.

## Socio-culture Infrastructure facilities

### 1) Community Hall

- Developing inspiring projects that bring together residents, small groups and local businesses.
- Engaging residents in the development of services and activities that encourage participation and engagement.

### 2) Play Ground

- Playgrounds play an essential role in the social, economic, cognitive, and physical wellbeing of children right from the stage of early childhood.

### 3) Public library

- Library plays an important role in our academic and social lives.
- Library is an organized collection of information resources made accessible to defined community for reference or borrowing and this collection of information may be in the form of books, newspaper, CD's, journals and research papers etc.

### 4) Post office

- A post office is a customer service facility forming part of a national postal system.
- Post offices offer mail related services such as acceptance of letters and parcels, provision of post office boxes, and sale of postage stamps, packing, and stationary.

### 5) Gram Panchayat

- It plays an important role at providing some benefit for the community life of the rural people. Some of the function are meant for improving the economic life of the rural people

### Renewable energy source

### 1) Water

- Development of water resources and wastelands are other important activities

### 2) Bio-Gas

- It can be used both as a raw material for the production of a wide range of most if not all organic compounds, depending on the sequence of reaction and degree of polymerization carried out.

## 2.8 Other Projects / Schemes of Gujarat / Indian Government

### Following are the projects/schemes by Govt. Sector:

1. Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)
2. Pradhan Mantri Gram Sadak Yojana (PMGSY)
3. Indira Awas Yojana (IAY)

**1. Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)**

MGNREGA Launched on 2nd February 2006 as a momentous initiative towards proper growth. For the first time, rural communities have been given not just a development programme but also a regime of rights. The National Rural Employment Guarantee Act, 2005 guarantees 100 days of employment in a financial year to any rural household whose adult members are willing to do unskilled manual work.

This work guarantee also serves other objectives: generating productive assets and skills thereby boosting the rural economy, protecting the environment, empowering rural women, reducing rural urban migration and fostering social equity, among others. The Act offers an opportunity to strengthen our democratic processes by entrusting principle role to Panchayats at all levels in its implementation and promises transparency through involvement of community at planning and monitoring stages.

**2. Pradhan Mantri Gram Sadak Yojana (PMGSY):**

Pradhan Mantri Gram Sadak Yojana (PMGSY) was launched on 25th December 2000 as a fully funded Centrally Sponsored Scheme to provide all weather road connectivity in rural areas of the country. The programme envisages connecting all habitations with a population of 500 persons and above in the plain areas and 250 persons and above in hill States, the tribal and the desert areas.

According to latest figures made available by the State Governments under a survey to identify Core Network as part of the PMGSY programme, about 1.67 lakh Unconnected Habitations are eligible for coverage under the programme. This involves construction of about 3.71 lakh km. of roads for New Connectivity and 3.68 lakh km. under upgradation. A total of 59564 habitations are proposed to be provided new connectivity under Bharat Nirman. This comprises 60% up gradation from Government of India and 40% renewal by the State Governments.

**3. Indira Awas Yojana (IAY):**

Housing is one of the basic requirements for human survival. For a normal citizen owning a house provides significant economic security and status in society. For a shelter less person, a house brings about a profound social change in his existence, endowing him with an identity, thus integrating him with his immediate social background.

The objective of Indira Awas Yojana is primarily to help construction of dwelling units by members of Scheduled Castes/ Schedule Tribes, freed bonded labourers and also non SC/ST rural poor below the poverty line by providing them with grant-in-aid.

**Following are the projects/schemes running by the private sector:**

1. Non-Governmental Organisations (NGOs)
2. Provision of Urban Amenities in Rural Areas (PURA)

**1. Non-Governmental Organisation (NGOs):**

The NGOs became prominent after independence, especially after 1970s. Development parishioners, government officials and foreign donors consider that NGOs by virtue of being small scale, flexible, innovative and participatory, are more successful in reaching the poor and in poverty alleviation, NGOs involved in initiating and implementing rural development programme. At present 30,000 NGOs working in India.

A non-governmental organization (NGO) is a legally constituted organization created by legal persons that operates independently from any government and a term usually used by governments to refer to entities that have no government status. In the cases in which NGOs are funded totally or partially by governments, the NGO maintains its nongovernmental status by excluding government representatives from membership in the organization. The term is usually applied only to organizations that pursue some wider social aim that has political aspects, but that are not overtly political organizations such as political parties.

**2. Provision of Urban Amenities in Rural Areas (PURA):**

The objective of the scheme is to provide urban amenities and livelihood opportunities in rural areas to bridge the rural-urban divide, thereby reducing migration from rural to urban areas.

PURA aims to achieve “holistic and accelerated development of compact areas around a potential growth centre in a Panchayat (or group of Panchayats) through PPP by providing livelihood opportunities and urban amenities to improve the quality of life in rural areas.”

The PURA Scheme envisages rapid growth of rural India given enhanced connectivity and infrastructure, the rural population would be empowered and enabled to create opportunities and livelihoods for themselves on a sustainable and growing basis.

The key characteristics of the scheme are:

- Simultaneous delivery of key infrastructure in villages leading to optimal use of resources.
- Provision of funds for O&M of assets for 10 years post-construction, along with capital investment for creation of assets.
- Transformation of several schemes into a single project, to be implemented as per set standards in a defined timeframe, with the requirements of each scheme being kept intact.
- Combining livelihoods creation with infrastructure development.
- Enforcement of standards of service delivery in rural areas almost at par with those obtaining in urban areas.
- Enforcement of service standards through a legally binding arrangement.

**Public-Private-Partnership - The Concept:**

Public-Private-Partnership or PPP is a mode of implementing government schemes in partnership with the private sector. The term private in PPP encompasses all non-government agencies such as the corporate sector, voluntary organizations, self-help groups, partnership firms, individuals and community based organizations, PPP, moreover, subsumes all the objectives of the service being provided earlier by the government, and is not intended to compromise on them. Essentially, the shift in emphasis is from delivering services directly, to service management and coordination. The roles and responsibilities of the partners may vary from sector to sector. While in some schemes/projects, the private provider may have significant involvement in regard to all aspects of implementation; in others s/he may have only minor role.

The potential benefits expected from PPP could be mentioned as below:

- Cost-effectiveness: since selection of the developer depends on competition or some bench marking, the project is generally more cost effective than before.
- Higher Productivity: by linking payments to performance, productivity gains may Be expected within the programme/project.
- Accelerated Delivery: since the contracts generally have incentive and penalty clauses vis-a-vis implementation of capital projects/programmes this leads to accelerated delivery of projects.
- Clear Customer Focus: the shift in focus from service inputs to outputs create the scope for innovation in service delivery and enhances customer satisfaction.
- Enhanced Social Service: social services to the mentally ill, disabled children and delinquents etc. require a great deal of commitment than sheer professionalism.
- Recovery of User Charges: Innovative decisions can be taken with greater flexibility on account of decentralization. Wherever possibilities of recovering user charges exist, these can be imposed in harmony with local conditions.

# Chapter: 3
# Smart Cities / Village Concept Idea

## 3.1 Introduction: Concepts, Definitions and Practices

### Concepts:

- A smart village is one where sustainable energy sources are used as a measure of development and people have access to quality education and healthcare, access to clean drinking water, sanitation and nutrition, enhanced security, gender equality and democratic engagement.
- Based on the exploration of a wide and extensive array of literature from various disciplinary areas we identify eight critical factors of smart city initiatives: management and organization, technology, governance, policy context, people and communities, economy, built infrastructure, and natural environment.

### Definition(Civil):

- Smart village means all the necessaries facilities is developed in the village and no need to moves in city for any kind of requirement.
- A Smart Village enables its inhabitants to make use of the contemporary technological and social achievements, while its infrastructures are still being developed in line with Sustainable Development Goals, offers an opportunity to efficiently deal with future of energy security and issues of local and circular.

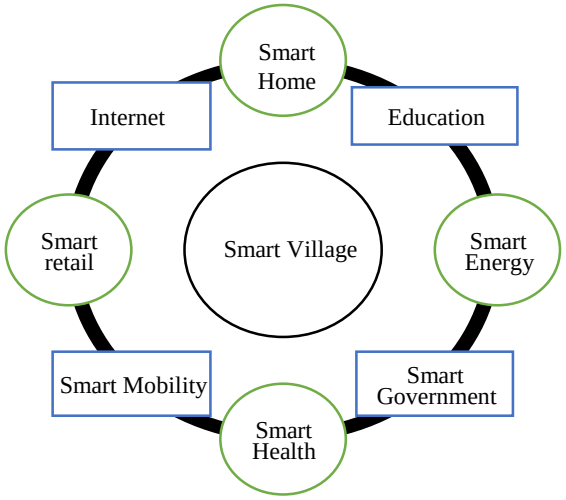


Figure 13: Smart Village Concept

## 3.2 Vision – Goals, Standards and performance measurement indicators Smart Cities bench mark

Table 8: Smart Cities Benchmark

| Sr no. | Parameter | Benchmark |
|---|---|---|
| A | Transport | • Maximum travel time of 30 minutes in small &medium size cities and 45 minutes in metropolitan areas.<br>• Continuous unobstructed footpath for 2 m wide on either side of all street with Row 12 m more<br>• Dedicated and physically segregated bicycle tracks with width of 2m or more, one in each direction, should be provided on all streets with carriage way larger than 10 m<br>• High quality and high frequency mass transport within 800 m of all residences in areas over<br>• 175persons / ha of built area |

| | | |
|---|---|---|
| B | Spatial Planning | • 175 persons per Ha along transit corridors.<br>• 95% of residences should have daily needs retail, parks, primary schools and recreational areas accessible within 400m walking distance.<br>• 95% residences should have access to employment and public and institutional transport or bicycle or walk<br>• At least 20% of all residential units to be occupied by economically weaker sections in each Transit Oriented Development Zone 800m from Transit Stations<br>• At least 30% residential and 30 commercial/institutional in every TOD Zone within 800m of Transit Stations |
| C | Water Supply | • 24 x 7 supply of water<br>• 100% household with direct water supply connections<br>• 135 liters of per capita supply of water<br>• 100% metering of water connections<br>• 100% efficiency in collection of water related charges |
| D | Sewerage & Sanitation | • 100% households should have access to toilets<br>• 100% schools should have separate toilets for girls<br>• 100% households should be connected to the waste water network<br>• 100% efficiency in the collection and treatment of waste water<br>• 100% efficiency in the collection of sewerage network |
| E | Solid management | • 100% households are covered by daily door-step Collection system.<br>• 100% collection of municipal solid waste<br>• 100% segregation of waste at source, i.e. bio-degradable and non-degradable waste<br>• 100% recycling of solid waste |
| F | Storm storage | • 100% coverage of road network with storm water drainage network<br>• Aggregate number of incidents of water logging reported in a Year = 0<br>• 100 % rainwater harvesting |
| G | Electricity | • 100% metering of electricity supply<br>• 100% households have electricity connection 24 x 7 supply of electricity<br>• 100% recovery of cost<br>• Tariff slabs that work towards minimizing waste |
| H | Health care facilities | • Availability of telemedicine facilities to 100% residents<br>• 30 minutes ‘emergency response time<br>• 1 dispensary for every 15,000 residents<br>• Nursing home, child, welfare and maternity. Enter - 25 to 30 beds per lakh population. |

## Smart Cities Performance Measurement Indicators

Table 9: Smart Cities Measurement Indicators

| People | Prosperity | Planet | Governance | Propagation |
|---|---|---|---|---|
| 1. Health<br>2. Safety<br>3. Access to services<br>4. Education<br>5. Diversity & social cohesion<br>6. Quality of housing | 1. Employment<br>2. Equity<br>3. Green economy<br>4. Economic performance<br>5. Innovation<br>6. Attractiveness & Competitiveness | 1. Energy & Mitigation<br>2. Material, Water & Land<br>3. Climate resilience<br>4. Pollution<br>5. Ecosystem | 1. Organization<br>2. Community involvement<br>Multi-level governance | 1. Scalability<br>2. Reliability |

## 3.3 Technological Options

**Enhanced Use of Smart Phones and Optical Fibre Technology for Internet:**
India has become the second biggest Smartphone market in terms of unique Smartphone users, crossing 220 million users, surpassing the US market, as per the report by Counterpoint research. Over 20 mobile phone brands are now assembling their parts in India.

**Online Library & E – education:**
After provision of internet facility at villages using various advanced technology, our next responsibility towards making villages smarter is to provide a quality education to the villagers. Internet is one of the easy way of accessing the data and information. This technology can now be explored to more extent by providing online education in schools and colleges. Worldwide digital contents are available on internet which can be accessed by children in villages to make them compatible with rest of the world. All Schools shall be connected with broadband.

**Smart and efficient public transport system**
Lack of transportation facility is the major reason behind isolating villages from rest of the world. Since last 70 years of freedom, roads and train network in rural part of India could not be spread to our expectations. There are thousands of villages in our country to which as such no transportation is available. The direct impact of this is on accessibility of villagers to urban areas, market and lack of any other facilities which is only available in big cities. To overcome this problem, smart transportation can be main melody for development of smart villages.

**Smart sewage management system and sanitation**
No village or group of villages can be termed truly ‘smart’ without an effective sewage management system and there is a need for framing a proper sanitation plan for towns intended to become smart. Management of large quantity of household waste and garbage had become major headache for local managing bodies. Also dumping such garbage in locality is affecting common people’s health. The knowledge enhancement and capacity building on sanitation diagnostics, town sanitation planning and decision making and analysis of cost effective and sustainable waste water treatment technologies for mainstreaming faecal sludge should be main focus for developing smart villages. Different coloured dust bins can be chosen for different categories of wastes like dry and wet, decomposable and non-decomposable waste, etc.

**Renewable energy sources and solar energy:**
Traditional sources of energy like wood, coal, diesel, petrol, oil, natural gas, etc. are now on the verge of ending. Also excessive use of these sources is polluting earth's environment and is responsible for remarkable adverse effects, like abrupt climate change, drought and flood situation, green house effects, melting of ice caps on poles collectively known as global warming. Due to fast growing development of urban civilization, forests are reducing with greater rate. Thus to save our earth from the threat of global warming, alternative energy sources which burns less carbon are required to be invented and solar energy source can play vital role to overcome these global environmental effects.

## 3.4 Road map and Safe Guards

A smart city roadmap consists of three major components:

- Study the Community: Before deciding to build a smart city, first we need to know why. This can be done by defining the benefits of such an initiative. Study the community to know the citizens, the business's needs know the citizens and the community's unique qualities, such as the age of the citizens, their education, hobbies, and attractions of the city.
- Develop a Smart City Policy: Develop a policy to drive the initiatives, where roles, responsibilities, objective, and goals, can be defined. Create plans and strategies on how the goals will be achieved.
- Engage the Citizens: This can be done by engaging the citizens through the use of e-government initiatives, open data, sport events, etc.

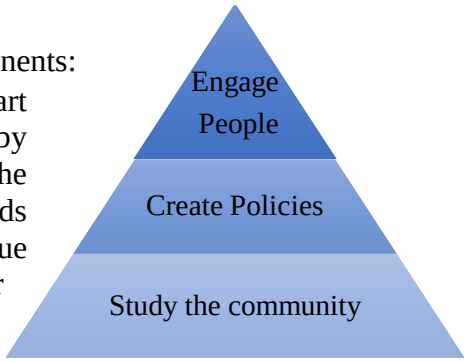

Figure 14: Road map for smart city

## 3.5 Issues & Challenges

The establishments that help cities manage electricity, water, waste, traffic flows, municipal operations, and city services are becoming increasingly complex and can be expensive. Although the return on investment may be attractive, complexities often make it challenging for cities to kick-start their Smart City projects. Successful implementation of smart city solutions needs effective horizontal and vertical coordination between various institutions involving institutions providing various municipal amenities as well as effective coordination between central government, state government as well as local government agencies on various issues related to financing, sharing of best practices and sharing of service delivery processes.

**Financial aspect**
The estimated Per Capita Investment Cost is Rs. 43,386 as reported by the High Power Expert Committee. The total estimate of investment in smart city totals up to 7 lakh crore within a span of 20 years and an annual requirement of Rs. 35,000 crores, assuming the population as 1 million people in each smart city. Mobilizing such huge finance is a challenge for any government. The Government can look for Public Private Partnership in order to gather funds

**Quick Clearance and Approval by Government**
It is a given that it takes a great deal of time to get approval and clearance from any government institution. This has to be changed while developing smart cities with Big Data and IoT. The project is time bound and all clearances and approvals must be granted with minimum time so that the project sticks to the schedule. The state government should also co-operate in this case and speed up the approval process. If needed, entire approval processes can be automated and made online.

**Availability of Utility Services**
Smart cities need uninterrupted access to electricity and water. Considering the power generation and distribution systems in the existing states and union territories, this seems to be a challenge in meeting the growing energy demands. States must resort to non- conventional energy resources to meet the energy shortage.

**Current state of Urban Local-Bodies (ULBS)**
ULBs are not financially self-sustaining. Low tariff and inadequate cost recovery are the reasons for ULBs not being self-sustainable. Furthermore, the human resource capability of ULBs is also not adequate which calls for an additional training program to equip the workers and labourers. This means the extra allocation of budget in training and capacity building, which is a challenge. The fact of the matter is, the Government must factor in above challenges and look for a smart way to overcome these challenges for this project to be successful. Implementing Smart Cities is a prestigious project of the Government of India. It is a very important milestone to achieve for the existing government as this was one of the major promises made by the Prime Minister Mr. Narendra Modi. The future of urbanization in India lies in the success of this project.

## 3.6 Smart Infrastructure

Smart infrastructure provides the foundation for all the key themes related to a smart city, including smart people, smart mobility, smart economy, smart living, smart governance and smart environment. The central characteristic that underlies most of these components is that they are connected and that they generate data, which may be used intelligently to ensure the optimal use of resources and improve performance. This section introduces some key components of smart city infrastructure and concludes by highlighting the need for a combined method in dealing with such infrastructure. Smart infrastructure includes following:

**Smart housing:**
Smart houses are built as per the codes of the Indian Green Building Council (IGBC) guidelines. All houses in smart cities are connected with a network of fibre optic cables to provide telephone and broadband connectivity.

**Smart mobility:**
Infrastructure also provides different means of commuting other than cars and bikes. Most of the mobility needs of a smart city should be fulfilled by walking and cycling. The public transport should be efficient and environment friendly.

**Smart sanitation:**
Sewage should be treated and must not be released in rivers or water bodies. The methane released from sewage should be captured and used as fuel and its residue can be used as a bio-fertilizer.

**Smart waste management:**
Water should be treated as a precious natural resource. The infrastructure should be such that water supply should be metered. Dual water supply lines should be established – one for drinking and cooking and the other for various uses. Each housing complex should have rain water harvesting and water treatment plants for optimum usage.

**Technology infrastructure:**
Internet connectivity along with cell phone coverage is essential in smart cities as most of the city services are offered online. Technology infrastructure can provide real time vehicle tracking, control of street lighting, solid waste serving vehicle tracking, citizen's portal, online building permissions and water and energy management applications at testing level.

**Solid waste management:**
Solid waste must be mandatorily segregated into dry and wet waste and collected through separate channels that handle all activities from collection to disposal. Where wet waste can be used by converting into fuel/fertilizer/heat source, while the dry waste should be segregated into reusable parts and non-usable parts which can further be converted into electricity.

**Smart industry:**
Smart cities are employment oriented. They should follow guidelines given by 'Ease of Doing Business Index' to facilitate industrial development. They should provide 'single window clearance' system for industries. Fuel pipelines and dedicated high tension electricity lines should be provided for uninterrupted supply of energy.

**Smart security:**
A smart city should be covered by CCTV cameras for round-the-clock surveillance. Advanced surveillance techniques with facial recognition and video processing should be implemented to track would-be criminals.

## 3.7 Cyber Security

- Smart city technologies capture data relating to all forms of privacy and drastically expand the volume, range and granularity of the data being generated about people and places.
- Privacy can be threatened and breached by a number of practices which are normally treated as unacceptable, however are part of operations in a smart city eco system.
- As mentioned previously, smart city technologies have large attack surfaces that have a number of vulnerabilities, especially in systems that contain legacy components using old software which has not been regularly patched.
- Technology solutions aim to use best practices to mitigate these risks and keep the data safe and secure.
- The aim of the technological solutions is to reduce the attack surface as much as possible and to make the surface that is visible as robust and resilient as possible.

These solutions include:

1. End-to-end encryption
2. Strong password policy
3. Up-to date firewalls, anti-virus
4. Isolation of trusted resources from public resources
5. Implement manual over rides on all systems

Figure 15: Cyber Security

## 3.8 District Cooling and Heating

**District Cooling**

District cooling is the cooling equivalent of district heating. Working on broadly similar principles to district heating, district cooling delivers chilled water to buildings like offices and factories needing cooling. In winter, the source for the cooling can often be sea water, so it is a cheaper resource than using electricity to run compressors for cooling.

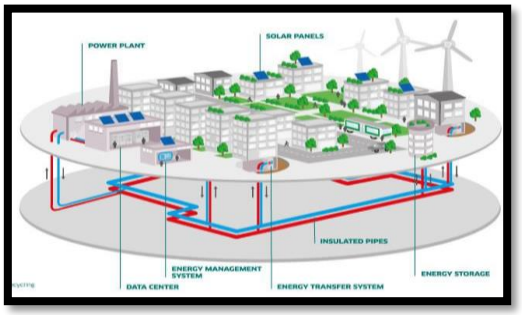


Figure 16: District Cooling and Heating

### District Heating

District heating is a system for distributing heat generated in a centralized location for residential and commercial heating requirements such as space heating and water heating. The heat is often obtained from a cogeneration plant burning fossil fuels but increasingly also biomass, although heat-only boiler stations, geothermal heating, heat pumps and central solar heating are also used, as well as nuclear power.

District heating plants can provide higher efficiencies and better pollution control than localized boilers. According to some research, district heating with combined heat and power (CHPDH) is the cheapest method of cutting carbon emissions, and has one of the lowest carbon footprints of all fossil generation plants.

## 3.9 Strategic Options for Fast Development

The strategic components of area-based development in the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (Greenfield development) plus a Pan-city initiative in which Smart Solutions are
applied covering larger parts of the city.

Below are given the Deion's of the three models of Area-based smart city development:

### Retrofitting

Retrofitting will introduce planning in an existing built-up area to achieve smart city objectives, along with other objectives, to make the existing area more efficient and liveable. In retrofitting, an area consisting of more than 500 acres will be identified by the city in consultation with citizens. Depending on the existing level of infrastructure services in the identified area and the vision of the residents, the cities will prepare a strategy to become smart. Since existing structures are largely to remain intact in this model, it is expected than more intensive infrastructure service levels and a large number of smart applications will be packed into the retrofitted smart city. This strategy may also be completed in a shorter time frame, leading to its replication in another part of the city.

### Redevelopment

Redevelopment will effect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density. Redevelopment envisages an area of more than 50 acres, identified by Urban Local Bodies (ULBs) in consultation with citizens. For instance, a new layout plan of the identified area will be prepared with mixed land-use, higher FSI and high ground coverage.

### Greenfield Development

Greenfield development will introduce most of the Smart Solutions in a previously vacant area which is more than 250 acres using innovative planning, plan financing and plan implementation tools with provision for affordable housing, especially for the poor. Greenfield developments are required around cities in order to address the needs of the expanding population. One well known example is the GIFT City in Gujarat. Unlike retrofitting and redevelopment.

## 3.10 India's Urban Water and Sanitation Challenges and Role of Indigenous Technologies

### Urban water Challenges

- Climate change is predicted to cause significant in precipitation and temperature patterns, affecting the availability of water.
- Population growth and urbanization are enforcing rapid changes leading to a dramatic increase in high-quality water consumption. Frequently, this demand for water cannot be

satisfied by the locally available water resources, while the discharge of insufficiently treated wastewater increases costs for downstream users and has detrimental effects on the aquatic systems.

## Urban Sanitation Challenges

- More than 40% of the world's population lacks improved sanitation facilities, and India's urban sanitation coverage rate is only 50%.
- Consequences of poor sanitation are devastating on human health and the environment.
- Many urban areas provide access to toilets, yet often upkeep is lacking, seepage is not well managed, and sewerage is discharged untreated.
- It must also ramp up the waste treatment facilities so that water bodies are not polluted by effluent discharge.
- One of the major challenges for the government is to elevate India to the international levels of urban sanitation that is found in developed counties. - Health Risks Along the Entire Sanitation Chain

## 3.11 Initiatives in village development by local self-government

The concept of development has been defined by many in different ways. However, it can be generally stated that "Development is about improvement in economic and social condition of people and places".
Since 1992, the powers of rural localities have been formalized under the Panchyati raj system, under the 73rd amendment to the Constitution. Rural local self-government is popularly known by the name Panchayati Raj. It has a three tier system.

1. The Gram Sabha:
The Gram Sabha which is not a tier of Panchayati Raj is the general body consisting of all the voters residing in the jurisdiction of a Gram Panchayat. The Gram Sabha is supposed to work as the watchdog of the Gram Panchayat which is its executive body.

2. Gram Panchayat:
The Gram Panchayat is the first tier in the Panchayat Raj System. It is constituted for one village or group of villages. It is a decision-making body for the entire village. It has to meet at least twice or thrice in a year to approve the annual budget. This is a council consisting of several ward members often called panchs, and a President or Sarpanch. They are directly elected by all the adult population living in that ward or village by secret ballot system.

3. Panchayat Samiti:
The intermediate tier in the Panchayati Raj System is known as the Panchayat Samiti. It is constituted for two or more Gram Panchayats at the block level. The members of this representative body are elected by all the Panchayat members in that area. Panchayat Samiti is the executive bodies for the state government and the ZillaParishad. They execute transferred schemes, which were previously implemented by the different departments of state governments.

## 3.12 Smart initiatives by District Municipal Corporation

At present, Gandhinagar Municipal Corporation (GMC) is in the process of revising the Smart city proposal for second round participation.
Urban India faces an enormous challenge: managing its gigantic load of solid waste. It is not just a public health issue, but also turning out to be a serious law and order problem as people resort to violent methods to protest waste being dumped in their backyard. But cities simply do not have the space or the wherewithal to dispose of waste. The challenge is going to be tougher.

## 3.13 Any Project contributed working by Government / NGO

1. DRDA Administration
2. PradhanMantri Awas Yojana (Grameen)
3. MGNREGA-2005
4. National Social Assistance program
5. PradhanMantri Gram Sadak Yojana
6. Prime Minister Rural Development Fellowship

**Projects/ schemes by private sector:**

1. Ministry of Rural Development schemes
2. Non- Ministry of Rural Development schemes
3. Financing
4. Capital Grant under RURA

## 3.14 How to implement other Countries smart villages projects in Indian village context

**Integrated biomass and solar town concept for a smart eco village in Iskandar Malaysia (2014):**

This paper presents a new integrated biomass and solar town concept that can serve as a global model for smart eco-villages in tropical countries. The proposed model considers actual operation constraints due to biomass availability, weather variation, and restriction of the thermal plant. The application of this new concept on the Iskandar Malaysia (IM) case study with an average daily demand load of 16,900 kWh/d revealed that a 417 kW direct-fired biomass power generator, 412 kW biogas thermal power plant, 136 kW solar photovoltaic (PV) modules, and sodium sulphur battery with an energy capacity of 3046 kWh and power of 1530 kW were required. The annual cost of the integrated biomass and solar town was estimated to be approximately RM 3 million at an electricity cost of RM 0.48/kWh.

**Village-level solar power in Africa: Accelerating access to electricity services through a socio-technical design in Kenya (2014):**

Village-level solar power supply represents a promising potential for access to electricity services. The analysis includes the reasons for its socio-technical design, and the actual functioning of the model. The research shows that an energy centre model can cover basic electricity needs in areas with dispersed settlement patterns, where mini-grid based systems as well as conventional grid extension meet significant challenges. Close attention to the socio-cultural context and the challenges of users, operators and managers is required. Our research draws on theories of socio-technical change and users' innovation, and presents a five step analytical framework for analysis of village-level power provision.

**Solar power energy solutions for Yemeni rural villages and desert communities (2016):**

According to UNDP Policy Note 2014, only 23% of Yemen rural community have access to electricity – having connected to national grid or use small isolated generating units – while the country is one of the richest in solar energy with over 3000 h per year clean blue sky. Otherwise, energy poverty that is a facet of a multidimensional poverty in Yemen will persists because the possibility of connecting rural communities to the national grid, even in the next ten years, is invisible due to major political and financial problems that the country is facing. Moreover, PV energy is environmentally clean and has proved to be one of the best solutions for rural electrification in many countries worldwide due to noticeable drop of PV systems prices with the advance in PV technology. Accordingly, it should be the best solution for rural electrification in Yemen.

# Chapter: 4
# About Agatrai

## 4.1 Introduction

### 4.1.1 Introduction about Agatrai Village details

Table 10: Geographical Information of Agatrai

| | |
|---|---|
| Village | Agatrai |
| Gram Panchayat | Agatrai |
| Taluka | Keshod |
| District | Junagadh |
| State | Gujarat |
| Area | 18.22 km2 |
| Population | 5318 |
| Population Density | 295 per km2 |
| Household | 1179 |
| Pin code | 362222 |

### 4.1.2 Justification / need to study

Vishwakarma Yojana is one of the initiatives towards Rurbanisation by Government of Gujarat, which was allotted as a pilot project to GTU. The students meet all the stake-holders in a village, survey the existing facilities. Implement the different Physical and Social infrastructural facilities in the villages and to lessen the urban migration of people from the village. This project is very useful for the villagers to know about the current scenario of cities and become aware about the government facilities which can help the villagers for their betterment.

### 4.1.3 Study Area (Broadly define):

Allotted village Agatrai is 9 km far from taluka headquarter Keshod and 30 km from district headquarter Junagadh. Area of village is 1822.82 hectares. Villagers are mainly involved in agriculture sector. Approximately 1500 hectares of land are agriculture land. Major crops in village are ground nuts, wheat and rice.

### 4.1.4 Objectives of the study

Following are the various objectives of the study:

- To collect data through techno-economic survey of Agatrai village.
- To analyze basic social and physical infrastructure.
- To analyze existing public infrastructure.
- To promote integrated development of rural areas with provision of quality housing, employment opportunities and supporting physical and social infrastructure.
- To promote integrated development.
- To reduce migration from rural to urban areas due to lack of basic services and sufficient economic activities in rural areas.

### 4.1.5 Scope of the study

- By studying the present status through techno-economic survey and gap analysis of Agatrai village in Junagadh district of the Gujarat state in terms of basic services, public amenities, other infrastructural facilities for the need of the people and to prepare a report on the expected socio-economic growth of the area with the consultation of TDO, DDO and Sarpanch will help full in providing better facilities and services in village.

### 4.1.6 Methodology Frame Work for development of the village


Figure 17: Methodology Framework

### 4.1.7 Available Methodology for development related to civil Methodology

1. Collection of data through Techno Economic Survey and Gap Analysis
2. Identification of the problem
3. Finding the solution
4. Design of the solution
5. Implementation

## 4.2 Agatrai Study Area Profile

### 4.2.1 Study Area Location with brief History land use details

### 4.2.2 Base Location map, Land Map, Gram Tal Map

Figure 18: Map of Agatrai Village

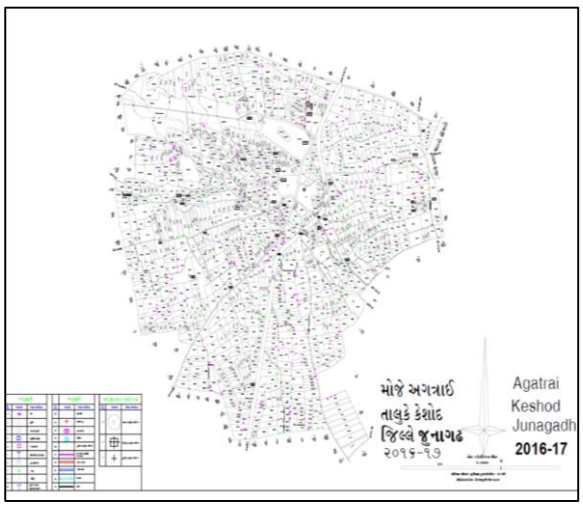


Figure 19: Gram Tal Map of Agatrai

### 4.2.3 Physical & Demographical Growth

Agatrai is a big size village located in Keshod taluka of Junagadh district. The population of Agatrai village is 5318 of which 2737 are male and 2581 are female as per Population Census 2011.In Agatrai village population of children with age up to 6 years is which makes up % of total population of village. Sex ratio of Agatrai village is more than Gujarat state average of 919. child sex ratio is, then Gujarat's average of 890.

Agatrai village has lower literacy rate compared to Gujarat. In 2011, literacy rate of Agatrai village was 71.1 % compared to 78.03% of Gujarat. In Agatrai male literacy rate stands at 74.3% while female literacy rate was 30.8%.

### 4.2.4 Economic generation profile / Banks

About the economic profile of this village, most of the villagers are interested in farming and labor work. The village doesn't have any better facilities regarding infrastructure but has good electrification system which distributed 24*7 hours for domestic use and 8 hours for agricultural use. Agriculture is the main occupation of Agatrai Village. Majority crops taken in the village are wheat, gram and groundnut. Some of the peoples are also running their stores. Dairy and milk production are the secondary source of income.

### 4.2.5 Actual Problems faced by Villagers and smart solutions

**Problems**

- Problem of waste water
- Lack of Socio-Cultural Infrastructure like Community hall
- Lack of a Library
- Lack of Recreational area

**Solutions**

- Design of Septic Tank for treatment of waste water
- Design of Garden for recreational purpose
- Design of infrastructures like community hall and library.

## 4.2.6 Social scenario

Table 11: Social Scenario of Agatrai

| Sr. No. | Details | Population |
|---|---|---|
| **Total Population** | | |
| 1 | Male | 1336 |
| 2 | Female | 1029 |
| **Total numbers of family** | | |
| 3 | Total B.P.L Family | 374 |
| **Village Literacy rate** | | |
| 1 | Male literacy rate | 74.3% |
| 2 | Female literacy rate | 30.8% |
| 3 | Total literacy rate | 61.9% |

## 4.2.7 Migration Reasons

**Reasons of migration**

- Many people decide to migrate to have a better life.
- Employment opportunities are the most common reason due to which people migrate.
- Except this, lack of opportunities, better education, globalization, natural disaster and sometimes crop failure forces villagers to migrate to cities.
- People from the village normally migrate to nearby Keshod city which is only 10 kms from the village.

# 4.3. Data Collection Agatrai

## 4.3.1 Describe Methods for data collection

A detailed baseline survey was undertaken which involved household census survey and Village level data collection from Sarpanch and Talati Mantri. This gave in the details of the demographic profile of the village, the literacy percentage, SC/ST population, cattle population and net consumption rate in the village, average milk production of the cattle and various schemes running and their benefits physical survey was undertaken to identify various natural resources available in the village. It included the soil typology, well in the area, crop taken in the field, cropping pattern, fertilizer used and various sources of irrigation in the field.

### 4.3.2 Primary details of survey details

Agatrai is village in Keshod Taluka. This taluka is located on latitude 21.4204° N and on longitude 70.1715° E. We had study about the basic amenities by in different category like education, social life, primary amenities, transportation facilities and economic growth of the village.

### 4.3.3 Average size of the House

All houses are built in size of average is 30*27 foot. All houses have 1 floor only average.
Total no. house of village is 1030.

### 4.3. Geo-Tagging of House

Agatrai village is located in Keshod taluka in Junagadh district of Gujarat state. It is located 30 km towards west from district headquarter Junagadh. 380 KM from state capital Gandhinagar.

### 4.3.4 No. of Human being in One House

The no. of human being in one house is approximately 4 persons.

### 4.3.5 Material available locally in the village

No material used available locally in the village all are out sourced.

### Material Out Sourced by the villagers

Major occupation of the village is farming so there are no more locally material available. So, this material is brought from the nearest city for the construction of houses.

### 4.3.6 Geographical Detail

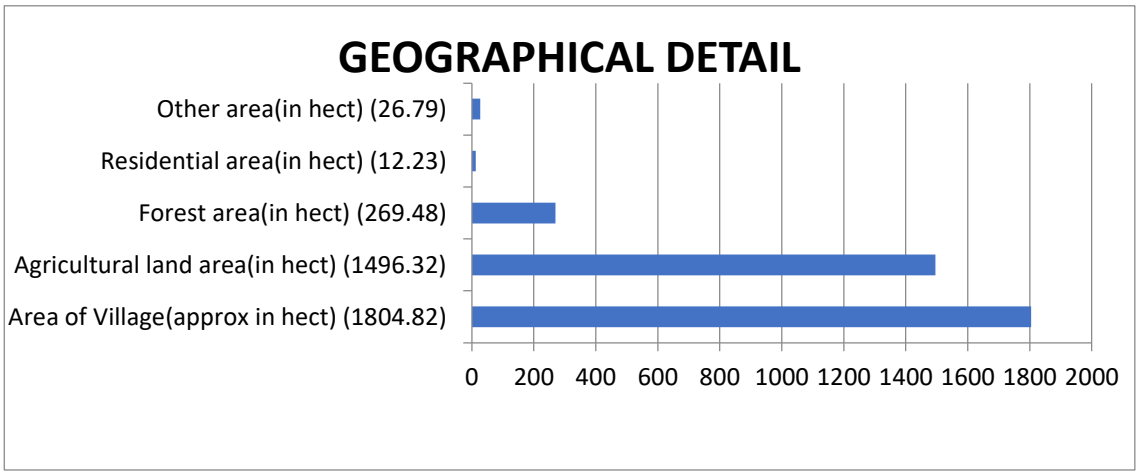


Figure 20: Graph of Geographical Detail

### 4.3.7 Demographical Detail

Table 12: Demographical Detail

| Sr. No. | Census | Population | Male | Female | No. of House Holds |
|---|---|---|---|---|---|
| 1. | 2001 | 3782 | 2143 | 1639 | 1022 |
| 2. | 2011 | 5318 | 2737 | 2581 | 1179 |

### 4.3.8 Population Details

Table 13: Population Detail

| Census Parameter | Census Data |
|---|---|
| Total Population | 5318 |
| Total No. of Houses | 1179 |
| Female Population | 2581 |
| Total Literacy Rate % | 71.1% |
| Female Literacy Rate % | 30.8% |
| Scheduled Tribes Population | 342 |
| Schedule Caste Population | 948 |
| Child Population (0-6 years of age) | 496 |
| Girl Child Population | 246 |

### 4.3.9 Occupational Detail

Table 14: Occupational Detail

| | |
|---|---|
| **Three Major Occupation in the Village** | 1. Farming |
| | 2. Agricultural Labor Work |
| | 3. Animal Husbandry |

### 4.3.10 Agricultural Details

Main source of income in this village is farming. Farmers use drip irrigation system to do farming. The main agricultural crops grown in the village are wheat, groundnut and Gram. Total Agricultural land is 1496 hectare.

### 4.3.11 Manufacturing HUB / Ware House

There is no Manufacturing HUB or Ware House in the village.

### 4.3.12 Tourism Cluster

There is no tourism cluster in the village.

## 4.4 Infrastructure Details

### 4.4.1 Drinking Water / Water Management Facilities

For drinking purpose there are two overhead water tanks in Agatrai village.

One overhead tank has 50000 litres of capacity and other tank is of 20000 litres of capacity.

Figure 21: Water Tank

Water is supplied through underground pipes to the houses. Water is drawn from wells and checkdams around the village for the use of water in the village.

### 4.4.2 Drainage Network / Sanitation Facilities

Underground Drainage System is available in the village. The underground drainage pipes from the houses feed the main drainage pipe under the road. The waste water is directly discharged into the open fields far from the village.

### 4.4.3 Transportation & Road Network

**Transportation**

For local transportation public uses auto rickshaws and private vehicles.

State Road Transport bus service is available in the village.

Nearest Railway Station is at distance of about 10 kms at Keshod town.

Figure 22:Internal Street

**Road network**

State Highway passes through the outskirts of the village. Approach road are in good condition. Most of the internal streets are of interlocking paver blocks.

Figure 23: Main Road

### 4.4.4 Housing condition

There are 1179 houses in the village, out of which 70% households are pucca and 30% kutcha.

### 4.4.5 Social Infrastructure Facilities

**Health Facilities:**

There is a Public Health Centre in the village.

Figure 24: Public Health Centre

**Community Hall**

There is no community hall in the village.

**Library**

There is no public library in the village.

**Education Facilities:**

There are 2 Government primary schools and a private primary school.

There is government secondary and higher secondary school in the village.

There are 6 anganwadis in the village.

Figure 25: School

### 4.4.6 Existing Condition of Public Buildings & Maintenance of existing Public Infrastructures

Existing condition of the public buildings are in good condition. New gram panchayat building has been built.

### 4.4.7 Technology Mobile/ WIFI / Internet Usage Details

Most of the people in the village use smart phones. There is good network coverage in the residential area of the village.

There is no Wi-Fi in the village.

### 4.4.8 Sports Activity as Gram Panchayat
There is no sports activity by the gram panchayat.

### 4.4.9 Socio-Cultural Facilities
**Public Garden:**
There is no public garden or park or playground in the village.

**Pond**
There is one pond in the village. Solid waste is disposed in the surroundings of the pond area. So, proper solid waste management around the pond is necessary.


Figure 26: Pond

### 4.4.10 Other Facilities
There are 3 banks in the village.
There is a post office in the village.

### 4.4.11 Any Other Details
There are no other facilities available in the village.

Figure 27: Bank

## 4.5 Existing Institution like - Village Administration – Detail Profile
### 4.5.1 Bachat Mandali
There is no bachat mandali in the village.

### 4.5.2 Dudh Mandali
There is no dudh mandali in the village.

### 4.5.3 Mahila forum
There is no mahila forum in the village.


Figure 28: Post Office

### 4.5.4 Plantation for the Air Pollution
There is plantation on the side of the roads for the reduction in air pollution.

### 4.5.5 Rain Water Harvesting
There is no infrastructure for rain water harvesting in the village.

# Chapter: 5
# Technical Options with Case Studies

## 5.1 Concept

### 5.1.1 Advance Sustainable Construction Techniques

**Sustainable Construction**

Sustainable construction is the practice of creating a healthy environment that's based on ecological principles. The goal is to reduce the industry's impact on the environment by utilizing sustainable development practices, employing energy efficiency, and taking advantage of green technology.

Sustainable construction focuses on six principles: Reduce, Reuse, Recycle, Protect nature, Create non-toxic and High quality materials.


Figure29: Sustainable Construction

**Advanced Sustainable Construction Techniques**

**1. IoT Integrated Automated Building Systems**

The Internet of Things (IoT) gives facility managers access to data that they did not previously have access to. These small connected sensors can integrate with automated building systems to improve the sustainability of operations. For example, IoT sensors can dynamically adjust the required ventilation and lighting levels inside the building based on temperature, weather and CO2 readings. The facility manager doesn't need to manually stay on top of these adjustments or input data from multiple pieces of equipment.

**2. Green Roofs**

Another innovation for the top of commercial properties comes from green roofs. Grass, plants, flowers, bushes and other greenery grows on the roofing material. Storm water is absorbed into the soil and managed more easily than with a bare roof. Heating and cooling costs are reduced, and the air quality is improved.

**3. Grid Hybrid System**

Renewable energy sources provide a sustainable way for organizations to power their commercial properties, but many grid systems lack storage to power facilities during times of low solar availability. A hybrid system stores excess energy and allows the renewable source to function at night, during overcast days and in other conditions that aren't ideal.

**4. Structural 3D Printing**

Creating and moving building materials to the job site can have heavy environmental costs. As structure 3D printing begins moving forward, it becomes easier to cut down on shipping costs or reduce the weight of components.

**5. Self-healing Concrete**

This material is in its early stages, but once it's commercially viable it opens up many sustainable possibilities. Everything from roads to walkways can benefit from concrete that heals itself. Road crews would no longer need to shut down busy streets and highway lanes to address potholes and cracks.

**Benefits of Sustainable Construction**

**1. Reduces Waste**

The reduction of construction waste is also a beneficial side effect in building more green buildings. By their nature, they already use fewer resources, relying on recycled and renewable materials along with more sustainable construction methods. The use of sustainable materials is also beneficial to overall human health as paint, industrial cleaning products and building materials can be dangerous for human health.

**2. Boosts the Economy**

Sustainable construction can also provide many jobs and boost the economy. As climate change devastates the world, efforts to combat its effects have increased, resulting in an increased demand for construction workers and a hike in construction jobs.

**3. Promotes Sustainability**

Sustainable construction also promotes sustainability and efficient energy use. With renewable energy construction on the rise, coupled with sustainable construction methods, more people are beginning to see the importance and efficiency of using sustainable methods. It also sends a clear message to the industry and everywhere else: sustainability is viable and important.

**4. Promotes Healthier Living**

Construction projects that develop green buildings aren't only beneficial to the environment; they also provide many psychological benefits to the people inside them.

## 5.1.2 Soil Liquefaction

Soil liquefaction occurs when the effective shear strength of soil is reduced to essentially zero. This may be initiated by either monotonic loading i.e. a single, sudden occurrence of a change in stress or cyclic loading i.e. repeated changes in stress condition. In both cases a soil in a saturated loose state, and one which may generate significant pore water pressure on a change in load are the most likely to liquefy. This is because loose soil has the tendency to compress when sheared, generating large excess pore water pressure as load is transferred from the soil skeleton to adjacent pore water during undrained loading. As pore water pressure rises, a progressive loss of strength of the soil occurs as effective stress is reduced.
Liquefaction is more likely to occur in loose to moderately saturated granular soils with poor drainage, such as silty sands or sands and gravels containing impermeable sediments.

The effects of soil liquefaction on the built environment can be extremely damaging. Buildings whose foundations bear directly on sand which liquefies will experience a sudden loss of support, which will result in drastic and irregular settlement of the building causing structural damage, including cracking of foundations and damage to the building structure, or leaving the structure unserviceable, even without structural damage. Where a thin crust of non-liquefied soil exists between building foundation and liquefied soil, a 'punching shear' type foundation failure may occur. Irregular settlement may break underground utility lines. The upward pressure applied by the movement of liquefied soil through the crust layer can crack weak foundation slabs and enter buildings through service ducts, and may allow water to damage building contents and electrical services. Bridges and large buildings constructed on pile foundations may lose support from the adjacent soil and buckle, or come to rest at a tilt.

Mitigation methods have been devised by earthquake engineers and include various soil compaction techniques such as vibro compaction, dynamic compaction, and vibro stone columns. These methods densify soil and enable buildings to avoid soil liquefaction. Existing buildings can be mitigated by injecting grout into the soil to stabilize the layer of soil that is subject to liquefaction.


Figure30: Soil Liquefaction

## 5.1.3 Solid &Liquid Waste Management

### Concept of the solid waste management

#### Land filling

According to Barker A.V. Land filling is an economical method of wastes disposal in developing countries involving pitching refuses into a depression, abandoned, mining void, excavated land, or borrowed pits. It is the most traditional way of true waste disposal practiced in many countries.

The following are various forms of landfills:

#### Open Dump System/Ordinary Landfill

This disposal of waste materials is in pits, excavated lands, canals, sloping landscapes or flat surface without covering the waste. From time to time, open dumps burn leading to air pollution. Other environmental implications of landfill are the sites eyesore, wind blow of litters along the landscape, presence of faecal matters, intrusion of vermin such as mice and rats, odour, smoke with resultant effects on human health and breeding ground for disease vectors (cockroaches, flies and mosquitoes).

#### Vermi composting

According to ICRISAT and APRLP, Vermi composting is a simple biotechnological process of composting, in which certain species of earthworms are used to enhance the process of waste conversion and produce a better end product. Vermi composting differs from composting in several ways (Gandhi et al. 1997). It is a mesophilic process, utilizing microorganisms and earthworms that are active at 10–32°C (not ambient temperature but temperature within the pile of moist organic material). The process is faster than composting; because the material passes through the earthworm gut, a significant but not yet fully understood transformation takes place, whereby the resulting earthworm castings (worm manure) are rich in microbial activity and plant growth regulators, and fortified with pest repellence attributes as well.

### Concept of liquid waste management

#### Stabilization pond system for waste water treatment

According to Arthur J.P. Waste Stabilization Ponds are one of the main natural wastewater treatment methods. They are man-made earthen basins, comprising at any one location one or more series of anaerobic, facultative and, depending on the effluent quality required, maturation ponds. WSPs are particularly suited to tropical and subtropical countries since sunlight and ambient temperature are key factors in their process performance.

Prior to treatment in the WSPs, the wastewater is first subjected to preliminary treatment screening and grit removal − to remove large and heavy solids.

**Liquid Waste Management in Maharashtra**

An innovative Effort in the grey water (bathroom, cloth washing) management especially in the reuse of grey water in a hygienic manner in Wadgaon village (Ahmed Nagar) was initiated with objectives:

- To avoid unhygienic and insanitary surroundings on village road arising out of poor drainage system.
- To avoid mosquito breeding & foul odour.
- To reuse treated grey water (bathroom, cloth washing waste) for irrigation and Gardening.

## Various types method for drainage system:

### Storm water drains

The detailed design of storm water drains should be carried out by engineer, sand take into account climatic and hydrological data. These data may be scarce, or may not cover the community where work is to be carried out. In such cases, the community can help by describing where major flood problems occur in the village and providing information about previous floods. Storm water drains should be designed to collect water from all parts of the Community and lead it to a main drain, which then discharges into a local river. The size of the drains should be calculated according to

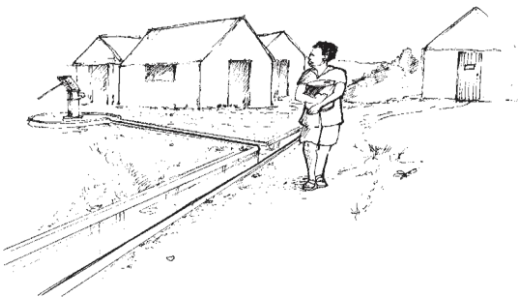

Figure 31: Storm water drain through a village

### Combined drains

Combined drains are designed to carry both storm water and sullage. Unless a combined drain is well designed and maintained, however, sullage will pool within the drain and form insect breeding sites. These problems can be over-come by using a system with a small insert drain that carries the sullage into a larger drain for carrying storm water. As with all drainage systems, it is essential that the drains are properly operated and maintained, and that refuse is cleared from the drains.

### Buried drains and combined sewers

Drains may also be incorporated into sewerage systems and be buried. This is more appropriate for urban areas, but can be considered in rural areas if the village roads are paved and if flood flows are significant. Buried drains have inlet chambers at regular intervals, usually along roadsides, that allow the entry of storm water. The drains then lead directly either to a watercourse or to a sewage-treatment works. When drains flow directly into sewage-treatment works, care must be taken not to overload the works.

## 5.1.4 Transport Infrastructure / system

### Various types of roads:

**Asphalt roads:** One of the most popular types of construction ever since its inception in the early 1920s is asphalt paving. In this construction technique a layer of asphalt is laid on top of an equally thick layer gravel base. Advantages of this form of road construction are that the pavement produces relatively little noises, its relative low cost compared to other material, and that is relatively easy to repair and maintain as well.

Figure 32: Asphalt Road

However, asphalt is known to be significantly less durable and strong than other choices, and isn't the best for the environment either.

**Concrete roads:**

Concrete is another popular choice for roadways, though it is typically only used for local roads and not for other types of construction. There are three major types of concrete road surfaces, JPCP, JRCP, and CRCP; the distinguishing feature between the three being the joint system that is used to help prevent cracks from forming. Concrete is more long lasting than asphalt and significantly stronger as well, but is quite expensive to lay and maintain.

Figure 33: Concrete Road

**Composite roads:**

Composite materials are often used in types of construction that are more related to maintenance, recycling and rehabilitation. Composite materials are combination of both asphalt and concrete, and are typically employed on one of two methods. Asphalt overlays literally are placed a damaged surface, or alternatively pavement may be cracked and seated instead, forming a true new surface.

Figure 34: Composite Road

**Bituminous Solutions:**

Bituminous and other temporary solutions are types of construction that are only suitable for use on very low-traffic thoroughfares. Chip sealing techniques, thin membrane surfacing, and Otta sealing are all examples of bituminous surface options. These are all more commonly employed as sealing coats or finishes than as full road surfaces.

**Recycling:**

There are three typical types of construction techniques related to recycling the surface of distressed or damaged pavement. Rubblizing, Cold/Hot in-place Recycling, and Full-depth Reclamation. Rubblizing involves reducing the road to gravel and then applying a new surface, both hot and cold in-place recycling relies on using bituminous pavement to reinforce the road (at different temperatures and admixtures, of course), and Full-depth reclamation involves both total pulverization and the addition of binding agents or other additives.


Figure 35: Recycled Road

## 5.1.5 Vertical Farming

Vertical farming is the practice of growing crops in vertically stacked layers. It often incorporates controlled-environment agriculture, which aims to optimize plant growth, and soilless farming techniques. The modern concept of vertical farming was proposed in 1999 by Dickson Despommier professor of Public and Environmental Health at Columbia University.

The main advantage of utilizing vertical farming technologies is the increased crop yield that comes with a smaller unit area of land requirement. The increased ability to cultivate a larger

variety of crops at once because crops do not share the same plots of land while growing is another sought-after advantage. Additionally, crops are resistant to weather disruptions because of their placement indoors, meaning less crops lost to extreme or unexpected weather occurrences. Because of its limited land usage, vertical farming is less disruptive to the native plants and animals, leading to further conservation of the local flora and fauna.
Traditional farming's arable land requirements are too large and invasive to remain sustainable for future generations. With the rapid population growth rates, it is expected that arable land per person will drop about 66% in 2050 in comparison to 1970. Vertical farming allows for, in some cases, over ten times the crop yield per acre than traditional methods. Unlike traditional farming in non-tropical areas, indoor farming can produce crops year-round. All-season farming multiplies the productivity of the farmed surface by a factor of 4 to 6 depending on the crop.

Figure 36: Vertical Farming

## 5.1.6 Corrosion Mechanism, Prevention & Repair Measures of RCC Structure

### Corrosion Process

The ingress of chloride ions (Cl-) to the level of the steel reinforcing bars destroys the passive film and initiates corrosion. This makes reinforced concrete structures in coastal areas and/or marine environments vulnerable to damage by corrosion of steel reinforcement.
It is now a must look into field as corrosion of reinforcing steel is seen almost in every 10 out of 100 constructions within a life of 10 years. Nowadays the increase content of pollutants in the city atmosphere has very much affected the lifespan of RCC structures. The increased content of pollutants includes a very high rates of Sulphates and Chlorides which when these mixes with rain water and falls over these structures and damages the visible parts.

**Prevention:**

Corrosion of steel in reinforced concrete structures can be divided into four different categories, based on how they provide protection:

1. Alternative reinforcement and slab design method includes materials that electrically isolate the steel from the concrete and create a barrier for chloride ions, materials that protect steel galvanic-ally, and materials that have significantly higher corrosion thresholds than conventional reinforcing steel. Concrete slabs have been designed without any internal reinforcement.
2. Barrier methods protect reinforced concrete from corrosion damage by preventing water, oxygen, and chloride ions from reaching the reinforcement and initiating corrosion.
3. Electrochemical methods use current and an external anode to protect the reinforcement, even when the chloride ion concentration is above the corrosion threshold.
4. Corrosion inhibitors offer protection by raising the threshold chloride concentration level, by reducing the permeability of the concrete, or by doing both.

**Repair Measure:**
Repairs are performed on damaged buildings to restore the strength after disaster.
The traditional method of concrete repair is to remove the cracked and degraded concrete to a depth of 20 to 300 mm behind the reinforcing bars to fully expose the rusted reinforcement and move the contaminated concrete away from the steel. All corroded material is removed and the steel is treated. If the corrosion is spread in more area, then the steel is replaced.

Figure 37: Corrosion of Steel Reinforcement

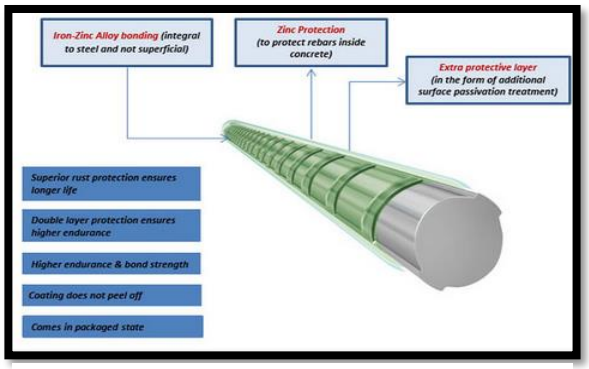


Figure 38: Corrosion Resistant TMT Bars

## 5.1.7 Sewage Treatment Plant

Sewage is generated by residential, commercial and industrial establishments. It includes household waste liquid from toilets, baths, showers, kitchens, and sinks draining into sewers. In many areas, sewage also includes liquid waste from industry and commerce. Sewage treatment plant is the place where sewage treatment process takes places on the waste water. Treating wastewater has the aim to produce an effluent that will do as little harm as possible when discharged to the surrounding environment, thereby preventing pollution compared to releasing untreated wastewater into the environment.

Generally, there are three stages of sewage treatment process:
Primary Treatment:
In Primary treatment, wastewater is fed to a screen to remove all large objects that are suspended in the water. After this, the water gets into a Grit chamber where the grit is removed. Grit includes sand, gravel, eggshells, bone chips, seeds, and other materials. Grit removal is necessary to reduce heavy deposits in aeration tanks, digester, and channels. The next step consists of primary settling tanks. These tanks are usually large in size and the solids settle down due to gravity and are removed as sludge from the bottom. The oil floats on the surface and is skimmed off. 50-60% of the suspended solids get removed and a 30-40% reduction of the five-day biological oxygen demand can be expected.

Secondary Treatment:
Secondary treatment is the second stage of wastewater treatment. In primary treatment, suspended solids, colloidal particles, oil, and grease are removed. Then second biological treatment is done on the wastewater to remove the organic matter present. This treatment is performed micro-organisms like bacteria and protozoa which consume biodegradable soluble contaminants like sugar, fat, detergent, and food waste. These processes are sensitive to temperature and with an increase in temperature rate of biological reactions increases.

Tertiary Treatment:
Tertiary treatment is the third stage of the wastewater treatment and is also known as an advanced treatment. Tertiary treatment removes the load of nitrogen and phosphorus present in the water. It includes processes like filtration, ion exchange, activated carbon adsorption, electro dialysis, nitrification, and denitrification.

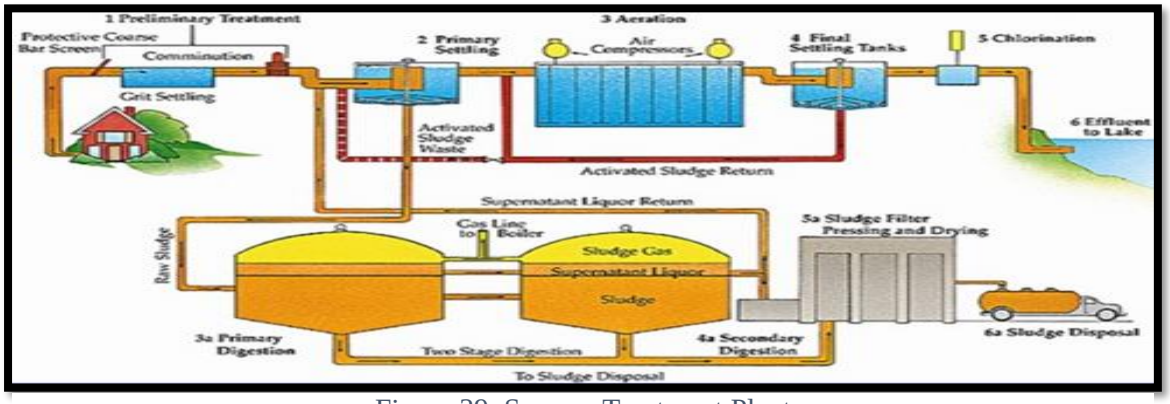


Figure 39: Sewage Treatment Plant

## 5.1.8 Technical Case Study on "Motera Cricket Stadium"

We have selected a recently constructed structure named Motera Cricket Stadium as a technical case study. It is located on the banks of Sabarmati river in the Motera area in the city of Ahmedabad in the state of Gujarat.

The Motera Cricket Stadium is the world's biggest Cricket stadium and second biggest stadium in the world. It is also known as Sardar Patel Stadium in tribute to former Indian leader Sardar Vallabhbhai Patel. The stadium is spread across 63 acres of land and it has a capacity to hold 110 thousand spectators.

Figure 40: Motera Cricket Stadium

### Location


Figure 41: Location of Motera Stadium

## History

The Motera stadium was built in 1982. The Government of Gujarat donated 100 acres of land on the banks of Sabarmati River to build a new stadium. The construction was completed in nine months. The stadium had a capacity of 54,000. Prior to that, international cricket matches were played at Ahmedabad's Municipal Corporation Stadium. In 1984 first cricket match was played in the stadium in which India played against Australia. The stadium has seen some major cricketing events in the past such as Cricket World Cup matches in 1987, 1996 and 2011.

## Conception

The idea to build the new stadium was allegedly proposed by Narendra Modi, the president of the Gujarat Cricket Association and the Chief Minister of Gujarat at the time. Shortly before Modi moved to Delhi after becoming the Prime Minister of India, there were discussions about minor upgrades to the stadium and development of the structure at the pavilion end. Modi asked the officials to build a new larger stadium instead of minor renovation work when he learned about the Melbourne Cricket Ground.

## Design

The redesigned stadium occupies 63 acres of land, with three entry points compared to one in the old stadium, with a metro line at one of the entry points. It contains 76 corporate boxes that can hold 25 persons each, a 55-room clubhouse, an Olympic sized swimming pool, and four dressing rooms. A unique feature of the stadium is the LED lights on the roof instead of the usual floodlights at cricket grounds. The LED lights are installed on an anti-bacterial, fireproof canopy with PTFE membrane that covers 30 out of 55 metres width of sitting area. The roof was done by the company Walter P Moore and was specifically designed to be lightweight and separate from the seating bowls in order to make it fairly earthquake resistant. The structure eliminates the need for pillars and gives spectators an unobstructed view of the entire field from any place in the Stadium.

Outside of the main ground, the stadium is able to accommodate several other features, including an Olympic-sized swimming pool, an indoor cricket academy, badminton and tennis courts, a squash arena, a table tennis area, a 3D projector theatre, and a clubhouse with three practice grounds and 50 rooms. The parking lot can accommodate 3,000 cars and 10,000 two-wheelers. Stadium also has a huge ramp designed to facilitate the movement of around 60,000 people simultaneously. The stadium has been designed such that patrons fill the lower levels of the ground for smaller events to maintain the crowd atmosphere when not at capacity. It has also been planned that the stadium will be connected to the metro station by a skywalk to decrease road congestion.

| | |
|---|---|
| 1 | Main Vehicular Entry & Exit |
| 2 | Pedestrian Entry Exit |
| 3 | Podium |
| 4 | Field of Play |
| 5 | Tensile Roof |
| 6 | Club House |
| 7 | Academy Ground |
| 8 | Cricket Ground B |
| 9 | Cricket Ground C |
| 10 | Main Electric Substation |


Figure 42: Design of Motera Stadium

## Construction Cost

The total cost of the Motera stadium was estimated to be Rs 650 crores at the time of planning. But eventually after all the construction work was completed it cost Rs 700 crores for the construction work.

Table 15: Cost Break-up of Motera Stadium Project

| SR. NO. | ITEM | AMOUNT (Cr.) |
|---|---|---|
| 1 | CIVIL STRUCTURE | 265.05 |
| 2 | FINISHING & INTERIORS | 119.27 |
| 3 | MEP | 125.89 |
| 4 | STRUCTURAL STEEL | 99.39 |
| 5 | EXTERNAL DEVELOPMENT | 33.13 |
| 6 | OPERATION AND MAINTENANCE | 19.88 |
| | **TOTAL** | **662.62** |
| 7 | CONSULTANTS | 33.13 |
| 8 | LEGAL APPROVALS | 52 |
| 9 | O & M | 19.88 |
| 10 | OTHER EXPENSES & OVERHEADS | 32.37 |
| | **TOTAL** | **800** |

## Construction Work

The demolition work was done at the end of 2015. On 1st of January 2016 he Gujarat Cricket Association issued a request for tender in The Times of India and The Indian Express. Three companies submitted Technical and Financial bids on time, they were the Shapoorji Pallonji Group, Nagarjuna Construction Company, and Larsen & Toubro.
Each of the three bidders presented their designs, models, and technical details of their concepts & designs. Because of the sheer size and complexity of the project, the bidders were evaluated on multiple parameters like efficiency, resources, the time frame of completion, ease of implementation, etc. The bidders were ranked and weighted on all of the parameters.
In the end, L&T was finalized as the Principal Contractor to build and design the stadium. L&T took over the construction work of the stadium in December 2016. On 16 January 2017, the Gujarat Cricket Association oversaw the project, which formally began on the same day. The stadium was planned to be finished in 2 years. Eventually it took 3 years to complete.

Figure 43: Comparison of New and Old Motera Stadium

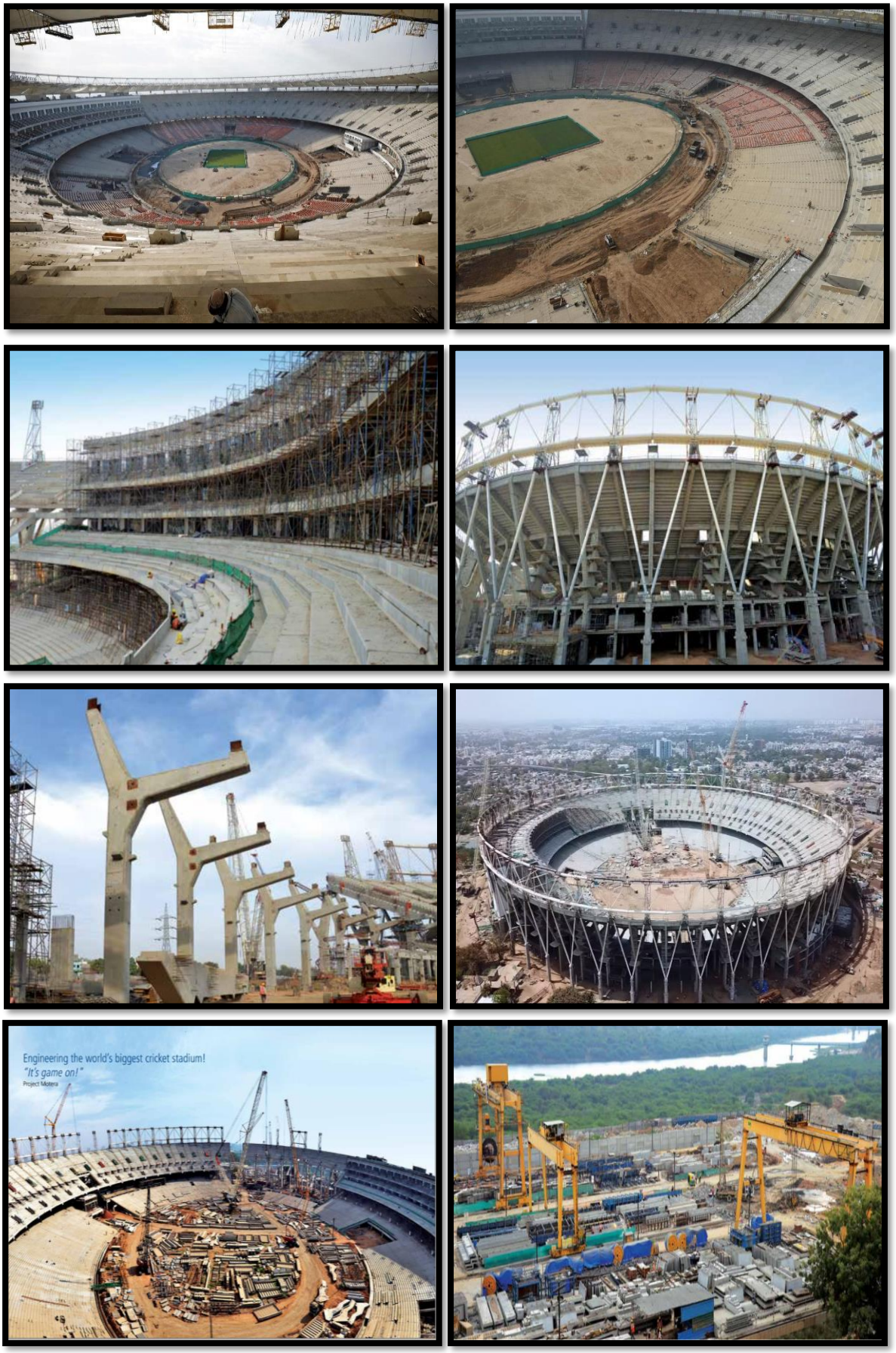


Figure 44: Construction Images of Motera Stadium

## Salient Features

The Motera Stadium is the world's largest cricket stadium with a capacity of 1,10,000 spectators and is the second largest stadium in the world after the Rungrado 1st of May Stadium located in Pyongyang, North Korea with a capacity of 1,14,000 spectators.

After the completion it has surpassed Melbourne Cricket Ground located in Melbourne, Australia which has a capacity of 1,00,000 spectators as the world's biggest cricket stadium. It surpassed Eden Gardens Cricket Stadium located in Kolkata which has a capacity of 68,000 spectators as the biggest cricket stadium in the country. It surpassed Salt Lake Stadium located in Kolkata which has a capacity of 85,000 spectators as the biggest stadium in the country.

The stadium is spread across 63 acres of land. The stadium has a seating capacity of 1,10,000 spectators. There are 76 corporate boxes with a capacity of 25 people each. There are four dressing rooms in the stadium for the teams to use. The stadium has 55 suites and an Olympic size swimming pool.

The stadium has a state of the art indoor cricket academy for the aspiring next generation players. It also has a dormitory to accommodate 40 athletes. The stadium has six indoor practice pitches and three outdoor practice pitches

Table 16: Features of Motera Stadium Project

| **Project** | **Sardar Patel Stadium, Motera** |
|---|---|
| **Location** | Motera, Ahmedabad |
| **Type of Project** | Infrastructure |
| **End use of Project** | Outdoor Stadium |
| **Owner** | GCA(Gujarat Cricket Association) |
| **Project Management Consultant** | M/s. STUP Consultants Pvt. Ltd. |
| **Contractor** | Larsen & Toubro Ltd.(L&T) |
| **Architect** | Populous |
| **Structural Consultant** | Larsen & Toubro Ltd.(L&T) |
| **Designing Consultant** | Engineering design and research centre(EDRC) |
| **Value of the Project** | Rs. 800 Crores |
| **Type of Contract** | Turnkey lump sum basis offer |
| **Project Duration** | 36 months |
| **Project Start Date** | 8th December 2016 |
| **Project Completion Date** | 8th December 2019 |
| **Payment Method** | Monthly basis |
| **Design Life** | 100 years |
| **Demolition Period of old Stadium** | September 2015 – December 2015 |
| **Plot Area** | 63 acres |
| **Built up Area** | 17.32 Lakh sq. ft. |

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## Striking Highlight: Green Building

The stadium is IGBC's 'Gold Rating' under its 'Green New Building Rating System'. Using renewable energy sources to power is key utilities in the stadium is expected to take out load on the traditional power suppliers, at the same time ensure the facility to access clean and cost effective power. The Motera Stadium is equipped with rooftop solar power plant on the roof of the stadium. Its main aim is to make the stadium carbon emission free and utilize clean energy.
Lubi Solar, which is a division of Lubi Electronics is responsible for the supply and commissioning of this rooftop solar power plant. The project has a sanctioned load capacity of around 4 MW.

Some of the green features incorporated in the stadium include the following:

- 11 acres of vegetation to enhance biodiversity
- High performance air conditioning systems
- 100% LED lighting to reduce energy consumption
- Potable water saving of 1.2 Million litres every year
- Rainwater harvesting capacity of 32 lakh litres per day
- Onsite sewage treatment plant of 1 MLD capacity to treat and reuse 100% wastewater for landscaping & flushing requirements
- 3,400 tonnes of construction waste diverted from being sent to landfills.

## Advantages

- The Motera Cricket Stadium is the biggest cricket stadium and the second biggest stadium in the world. It will help set Gujarat and India apart on a global stage in terms of cricket and sports.
- It will help in boosting cricket in the state of Gujarat by the means of using the state of the art cricket academy build around the stadium.
- Due to unique design and size of the stadium, it will attract tourists. Thus it will help in employment generated due to tourism and will help build a good image for tourism in Gujarat.
- Due to massive size of construction around 25000 labourers and 300 engineers were employed for around 3 years during the construction of the stadium. Thus it generated employment from the massive construction.

## Disadvantages

- A big amount of government money is being used after the construction of the Motera Stadium. The total amount spent is Rs 800 crores. This money could have been used for developing small villages by giving them basis infrastructures which are not available to the people of the villages.
- The operation and maintenance cost of a stadium of this size is very expensive. It will cost the government a lot of money.
- The stadium has a rooftop solar plant but it is not sufficient to power such a large stadium. Thus the stadium will consume a lot of power.

# Chapter: 6
# Swachh Bharat Abhiyan (Clean India)

## Swachh Bharat Abhiyan

**Swachh Bharat Abhiyan** or **Clean India Mission** is a country-wide campaign initiated by the Government of India in 2014 under the leadership of Honourable Prime Minister Narendra Modi to eliminate open defecation and improve solid waste management.
The core objectives of the mission were to reduce open defecation and improve management of municipal solid waste in both urban and rural areas. Elimination of open defecation was to be achieved through construction of individual household level toilets and public toilets.

Swachh Bharat Abhiyan is expected to cost over ₹62 thousand crores. The government provides an incentive of ₹12,000 for each toilet constructed by a rural family. An amount of ₹9 thousand crores was allocated for the mission in the 2016 Union budget of India. The World Bank provided a US$1.5 billion loan and $25 million in technical assistance in 2016 for the Swachh Bharat Mission to support India's universal sanitation initiation. The programme has also received funds and technical support from the World Bank, corporations as part of corporate social responsibility initiatives, and by state governments under the Sarva Shiksha Abhiyan and Rashtriya Madhyamik Shiksha Abhiyan schemes.

## Impacts of Swachh Bharat Abhiyan

According to the dashboards maintained by respective ministries, more than 100 million individual household level toilets have been constructed in rural areas, and 6 million household toilets in urban areas. In addition, nearly 6 million community and public toilets have also been constructed in the urban areas. Consequently, 4,234 cities and more than 600,000 villages across the country have declared themselves open defecation free
More than 81.5 thousand wards in urban areas now have100% door to door collection of solid waste and nearly 65 thousand wards practice 100% segregation of waste at source. Of the nearly 150 thousand metric tonnes of solid waste generated in urban areas, 65% is being processed.

## 6.1 Swachhta needed in allocated village -Existing Situation with photograph

- The village has a solid waste collection system which collects the solid waste two days a week.
- But there is a lack of awareness in the people to use the dustbins to throw the solid waste.
- Therefore, there are solid wastes on the sides of the pond in the village.
- Other than that the village is clean and has no waste thrown here and there.
- The Gram Panchayat authorities are trying their best to keep the village clean.
- Sweepers are employed to clean the village.

Figure 45: Solid Waste at the side of the Pond

## 6.2 Guidelines - Implementation in allocated village

### Guideline for the process of implementation of SBA

1. Elimination of open defecation
2. Eradication of Manual Scavenging
3. Modern and Scientific Municipal Solid Waste Management
4. Generate awareness about sanitation and its linkage with public health
5. Capacity Augmentation for ULBs to create an enabling environment for private sector participation in Capex (capital expenditure) and Opex (operation and maintenance)
6. The estimated cost of implementation of SBM (Urban) based on unit and per capita costs for its various components is Rs. 62,009 Crore.
7. The Government of India share as per approved funding pattern amounts to Rs. 14,623 Crore. In addition, a minimum additional amount equivalent to 25% of GoI funding, amounting to Rs. 4,874 Crore shall be contributed by the States as State/ ULB share.

### Mission Components

1. Household toilets, including conversion of insanitary latrines into pour-flush latrines
2. Community toilets.
3. Public toilets and urinals
4. Solid waste management
5. IEC & Public Awareness
6. Capacity building and Administrative & Office Expenses (A&OE)

## 6.3 Activities Done by Students for Allocated Village

- There is lack of awareness among the people to use the dustbin to throw solid waste.
- So we educated the people of the village of the importance of the cleanliness of the village and to throw the waste in the dustbins.
- We also made people aware of the Swachh Bharat Abhiyan which is started by our beloved Prime Minister Narendra Modi.
- We also discussed the issue with the Sarpanch and Talati about the programs for the awareness of the clean village through Swachh Bharat Abhiyan.

Figure 46: Cleanliness of the Village

# Chapter: 7
# Village condition due to Covid-19

## 7.1 Taken steps in allocated village related to existing situation

District administrations and Gram Panchayats all across the country are proactively taking various measures to check the spread of the COVID-19 pandemic in the country's hinterland. Ministry of Panchayati Raj, Government of India remains in close coordination with State Governments, District authorities and Gram Panchayats to ensure that lockdown conditions are not violated and norms of social distancing are scrupulously followed.

In all gram panchayats in the state, the use of Social Media WhatsApp group has been used to create awareness among the masses in the villages. Information at the grassroots level is being given to the people by putting posters everywhere. Regular cleaning operations are being carried out and disinfectant is being sprayed on the roads.

Face masks are being distributed to the citizens by Gram Panchayat members and social organizations and citizens are also being told not to touch their eyes, nose, and mouth, wash hands with soap frequently and maintain social distance. Along with ration distribution to villagers, fodder for abandoned cattle is also being provided by a social service organization.

Due to the lockdown there were no jobs in the cities, therefore lots of people who resided in the cities came back to the village which increased the risk of coronavirus in the village.
Therefore, quarantine center was established in the school premises for the people coming from cities outside of the village. The people were quarantined for 14 days in the quarantine facility before they can go to their homes in the village Their daily needs were satisfied by the gram panchayat in collaboration with the district authorities and state government.

### Arogya Setu App

Aarogya Setu is an COVID–19 contact tracing, syndromic mapping and self-assessment digital service. It is a mobile app. It is developed by the National Informatics Centre. It is run by the Ministry of Electronics and Information Technology (MeitY).

Arogya Setu app has the stated purpose to spread awareness of COVID–19 and to connect essential COVID–19-related health services to the people of India. This app augments the initiatives of the Department of Health to contain COVID–19 and shares best practices and advisories.

Arogya Setu App is a tracking app which uses the smartphone's GPS and Bluetooth features to track the coronavirus infection. With Bluetooth, it tries to determine the risk if one has been near (within six feet of) a COVID–19-infected person, by scanning through a database of known cases across India. Using location information, it determines whether the location one is in belongs to one of the infected areas based on the data available.

The central government has made it mandatory for the government employees to use the Arogya Setu app. The gram panchayat officials and the health care officials have made people aware to use the Arogya Setu app for the benefit of the village. With the Arogya Setu app the government health officials can track down the origin of the corona virus if there is any case noted in the village.

## 7.2 Activities Done by Students for allocated village

- Due to lack of knowledge of the Coronavirus disease the villagers are afraid to meet the people of the city.
- We made them aware about the Coronavirus disease and how it spreads through contact of hand.
- We made them aware about the importance of the social distance, wearing mask at public places and cleaning your hands with soap or disinfectant at regular intervals.
- We assured them that there is nothing to fear about the disease if we follow the guidelines given by the government.
- We made the people aware about the Arogya Setu app on the mobile. We insisted people to use the Arogya Setu app on their mobile. We taught the village people how to use the Arogya Setu app which will be helpful in the future.

## 7.3 Any other steps taken by the students / villagers:

Sanitization has been done in the Agatrai Village. The disinfectant has been sprayed on the back of a bike. The sanitization process is done in every street of the village and the public buildings across the village.

"Remember the 3 W's" slogan is given to spread awareness on the coronavirus disease.
The 3 W in the slogan are:
Wear a mask to cover your face.
Wait six feet apart from each other to avoid close contact.
Wash your hands frequently by using hand sanitizer or soap.

Figure 47: Sanitization of the village


Figure 48: Slogan for awareness of coronavirus

# Chapter: 8

# Sustainable Design Planning Proposal (Prototype Design) Part-I

## 8.1 Design Proposals

### 8.1.1 Sustainable Design

### Septic Tank

Septic Tank is used in the process of settling and removal of suspended particles in the water. Water stands still in the tank, due to this turbulence will generally be absent or negligible, and particles having specific weight higher than that of the water will be allowed to settle. These particles will ultimately be deposited on the bottom of the tank forming a sludge layer. The water reaching the tank outlet will be in a clarified condition. The sludge can be drained off or removed.

### Current Scenario

Agatrai village does not have a waste water treatment process. The waste water generated from the household is transported through an underground drainage pipe system to a waste land. The waste water is spread across the waste land and the water evaporates and infiltrates the land. There is foul smell spread all over nearby the waste land. The waste water is a breeding place for the mosquitoes. So it is necessary to treat the waste water generated.

### Design Overview

The septic tank design consists of three separate tanks in which the waste water will be filled. There is an inlet pipe at the starting of the tank and an outlet pipe at the end of the tank. There is an RCC slab on the top of the tank. There is an opening in the top RCC slab to access the tank for cleaning of the sludge which is formed by solids present in the waste water.

## Design Drawings

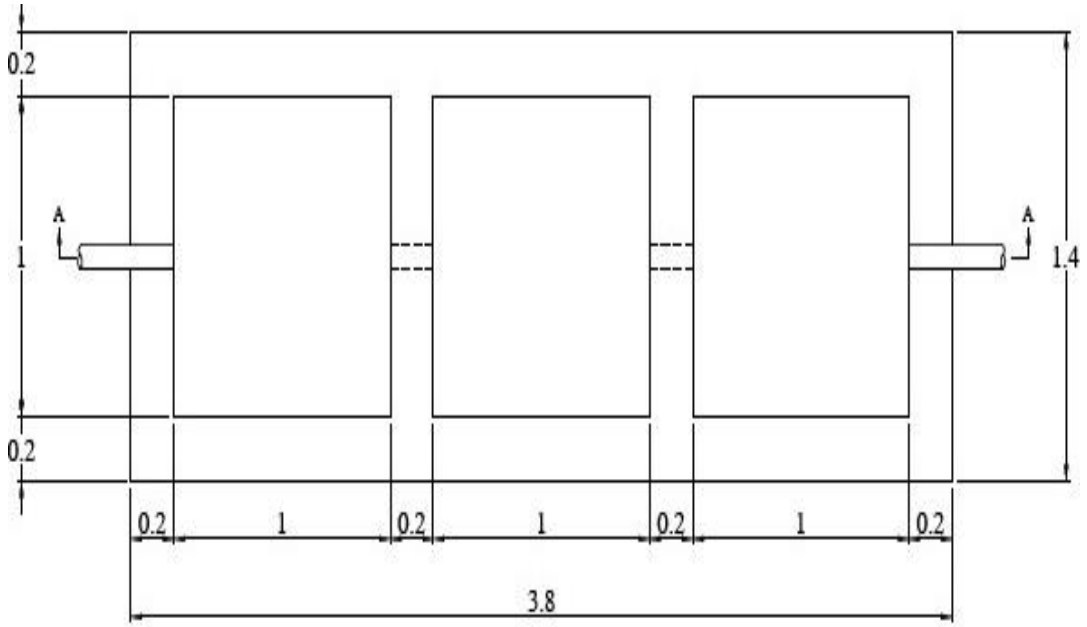



Figure 49: Plan of Septic Tank

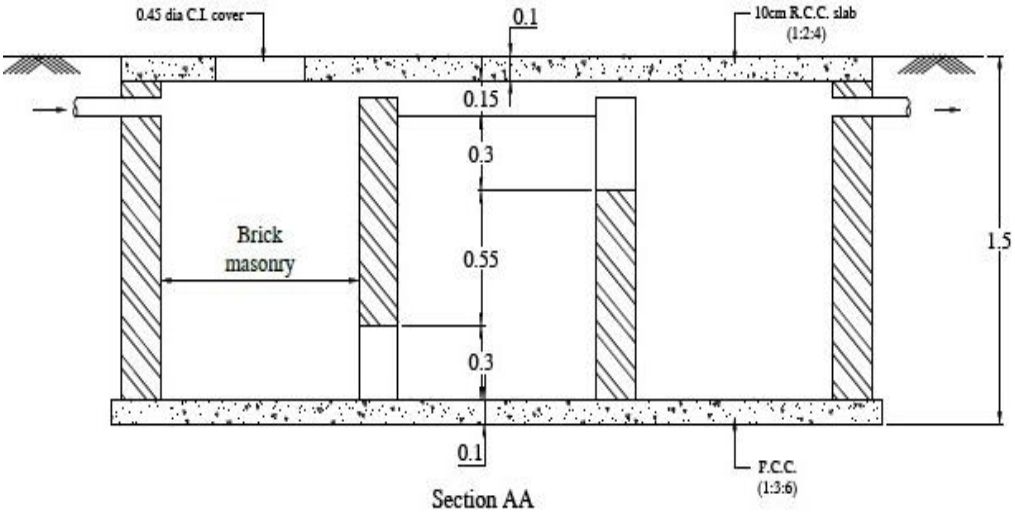



Figure 50: Section of Septic Tank

**Measurement Sheet:**

Table 17: Measurement Sheet of Septic Tank

| Sr. No. | Item | No. | Length | Breadth | Height | Qty. |
|---|---|---|---|---|---|---|
| 1 | Excavation work up to depth 1.5m | 1 | 3.9 | 1.5 | 1.5 | **8.76** |
| 2 | P.C.C. (1:3:6) flooring | 1 | 3.9 | 1.5 | 0.1 | **0.59** |
| 3 | First class brick masonry in C.M. (1:6) | | | | | |
| | Long walls | 2 | 3.8 | 0.2 | 1.3 | 1.98 |
| | Short walls | 2 | 1 | 0.2 | 1.3 | 0.52 |
| | Middle walls | 2 | 1 | 0.2 | 1.15 | 0.46 |
| | | | | | Total | **2.96** |
| 4 | R.C.C. slab in proportion (1:2:4) | 1 | 3.8 | 1.4 | | **5.32** |
| 5 | Weight of steel reinforcement in slab | | | | | **41.76** |

**Abstract Sheet:**

Table 18: Abstract Sheet of Septic Tank

| No. | Item | Qty. | Per | Rate | Amount |
|---|---|---|---|---|---|
| 1 | Excavation | 8.78 | cu m | 95 | **834.10** |
| 2 | P.C.C. Flooring | 0.59 | cu m | 2010 | **1185.90** |
| 3 | 1st class Brick Masonry | 2.96 | cu m | 1920 | **5683.20** |
| 4 | R.C.C. Slab | 0.53 | cu m | 2565 | **1359.45** |
| 5 | Steel reinforcement | | | | |
| | 20% Mild Steel | 8.35 | kg | 41.75 | **348.61** |
| | 80% HYSD Steel | 33.41 | kg | 39.45 | **1318.02** |
| | | | | Total | **10729.28** |
| | | | | Add 5% contingencies | **536.46** |
| | | | | Grand Total in Rs | **11300** |

## 8.1.2 Physical design

## Garden

Gardens are the resources for recreation, as well as education and research oppurtunities. Garden is a place where people can spend time and socialize in a relaxing natural environment. Garden provides a place for kids to play and interact with other kids and learn new things and new sports. Trees in the garden also help to keep the village green and give fresh air.

**Current Scenario**

Agatrai village is a big village with population of 5000 people and there are no proper facilities for garden area. Garden area will help reduce the pollution by planting trees around the boundary of the garden. Trees will also give fresh air. By keeping the playing instruments in the garden the children can also play and enjoy the playing instruments.

**Design Overview**

The design of the garden is a rectangular type. There is a walkway on the perimeter of the ground. There are trees on the boundary of the garden. There are benches for people to sit in the garden.

**Design Drawings**

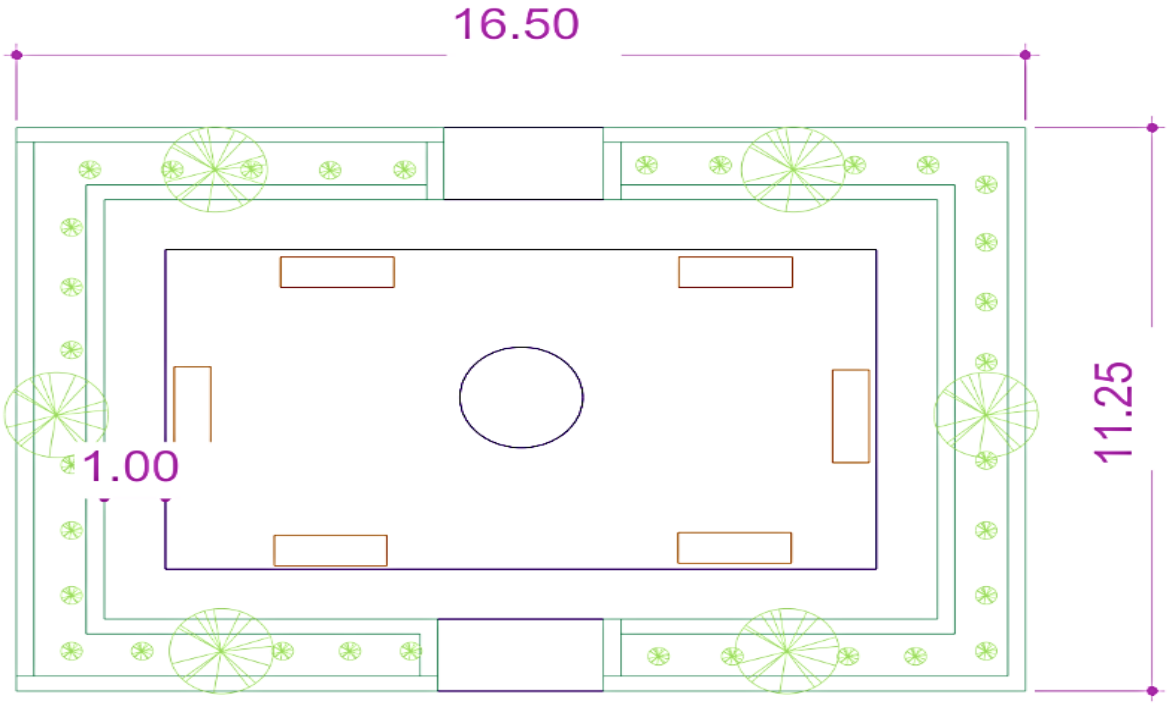



Figure 51: Plan of Garden

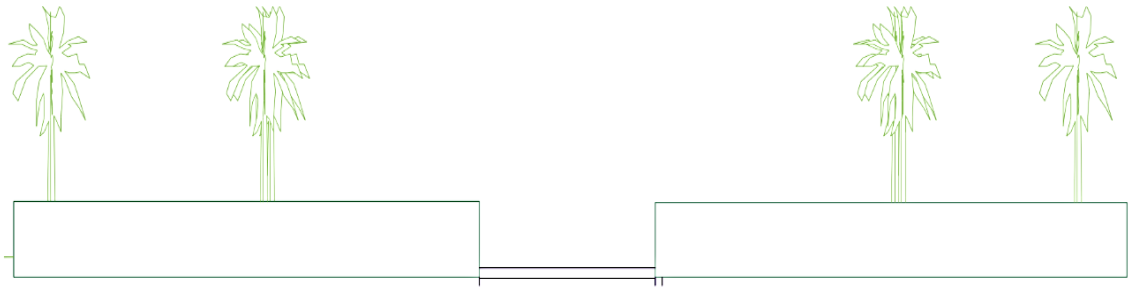


Figure 52: Elevation of Garden

**Measurement Sheet:**

Table 19: Measurement Sheet of Garden

| Sr. No. | Description | No. | Length | Breadth | Height | Qty. | Total Qty. |
|---|---|---|---|---|---|---|---|
| 1 | Excavation for foundation up to 1.2m depth | | | | | | |
| | LW | 2 | 16.50 | 0.60 | 1.39 | 27.52 | |
| | SW | 2 | 10.65 | 0.60 | 1.39 | 17.76 | **45.29** |
| 2 | Providing and laying P.C.C. | | | | | | |
| | LW | 2 | 16.50 | 0.60 | 0.15 | 2.97 | |
| | SW | 2 | 10.65 | 0.60 | 0.15 | 1.92 | **4.89** |
| 3 | 0.60m thick un-course rubble masonry | | | | | | |
| | LW | 2 | 16.50 | 0.60 | 0.91 | 18.02 | |
| | SW | 2 | 10.65 | 0.60 | 0.91 | 11.63 | **29.65** |
| 4 | 0.60m thick masonry in plinth | | | | | | |
| | LW | 2 | 16.50 | 0.60 | 0.60 | 11.88 | |
| | SW | 2 | 10.65 | 0.60 | 0.60 | 7.67 | **19.55** |
| 6 | Compound wall masonry | | | | | | |
| | LW | 2 | 16.50 | 0.23 | 1.20 | 9.11 | |
| | SW | 2 | 10.79 | 0.23 | 1.20 | 5.96 | **15.06** |
| 7 | Plaster in compound wall | | | | | | |
| | LW | 2 | 16.50 | 1.5 | | 49.5 | |
| | LW | 2 | 14.5 | 1.5 | | 43.5 | |
| | SW | 2 | 11.25 | 1.5 | | 33.75 | |
| | SW | 2 | 9.50 | 1.5 | | 28.5 | **155.25** |
| 8 | Paving block in walkway | | | | | | |
| | LW | 2 | 13.30 | 1.00 | | 26.60 | |
| | SW | 2 | 6.30 | 1.00 | | 12.60 | |
| | SW | 2 | 1.20 | 0.85 | | 2.04 | **41.24** |
| 9 | Steel gate | 2 | 1.20 | 1.50 | | | **3.60** |
| 10 | Tree | 8 | | | | 8 | **8** |
| 11 | Pipe fitting | 1 | 56 | | | 56 | **56** |

**Abstract Sheet:**

Table 20: Abstract Sheet of Garden

| Sr. no. | Description | Qty. | Rate | Per | Amount |
|---|---|---|---|---|---|
| 1 | Excavation for foundation up to 1.2m depth | 45.29 | 280 | $m^3$ | **12681.2** |
| 2 | Providing and laying P.C.C. | 4.89 | 2507 | $m^3$ | **12259.23** |
| 3 | 0.60m thick uncourse rubble masonry | 29.65 | 2443 | $m^3$ | **72434.95** |
| 4 | 0.60m thick masonry in plinth | 19.55 | 2443 | $m^3$ | **47760.65** |
| 5 | R.C.C. Coping | 3.26 | 3236 | $m^3$ | **10549.36** |
| 6 | Compound wall masonry | 15.06 | 2443 | $m^3$ | **36791.58** |
| 7 | Plaster in compound wall | 155.25 | 97 | $m^2$ | **15059.25** |
| 8 | Paving block in walkway | 41.24 | 430 | $m^2$ | **17733.2** |
| 9 | Steel gate | 3.6 | 9612 | $m^3$ | **34603.2** |
| 10 | Tree | 6 | 800 | Nos. | **4800** |
| 11 | Pipe fitting | 56 | 50 | mtr. | **2800** |
| | | | | **Total** | **Rs. 2,67,472.** |
| | | | | Add 5% contingencies | **Rs 13,373** |
| | | | | **Grand Total** | **Rs 2,80,846** |

## 8.1.3 Social Design

### Public Library

Public Library is a place where people come to read books, newspapers, journals, etc. to gain knowledge. Public Library promotes literacy by providing a wide range of reading for all ages. It is also the centre for community information services. Public Library play an important role in providing opportunity and provides resources for people to acquire learning. Modern libraries provide wide access to internet services for the purpose of acquiring knowledge to the people who do not have access to internet.

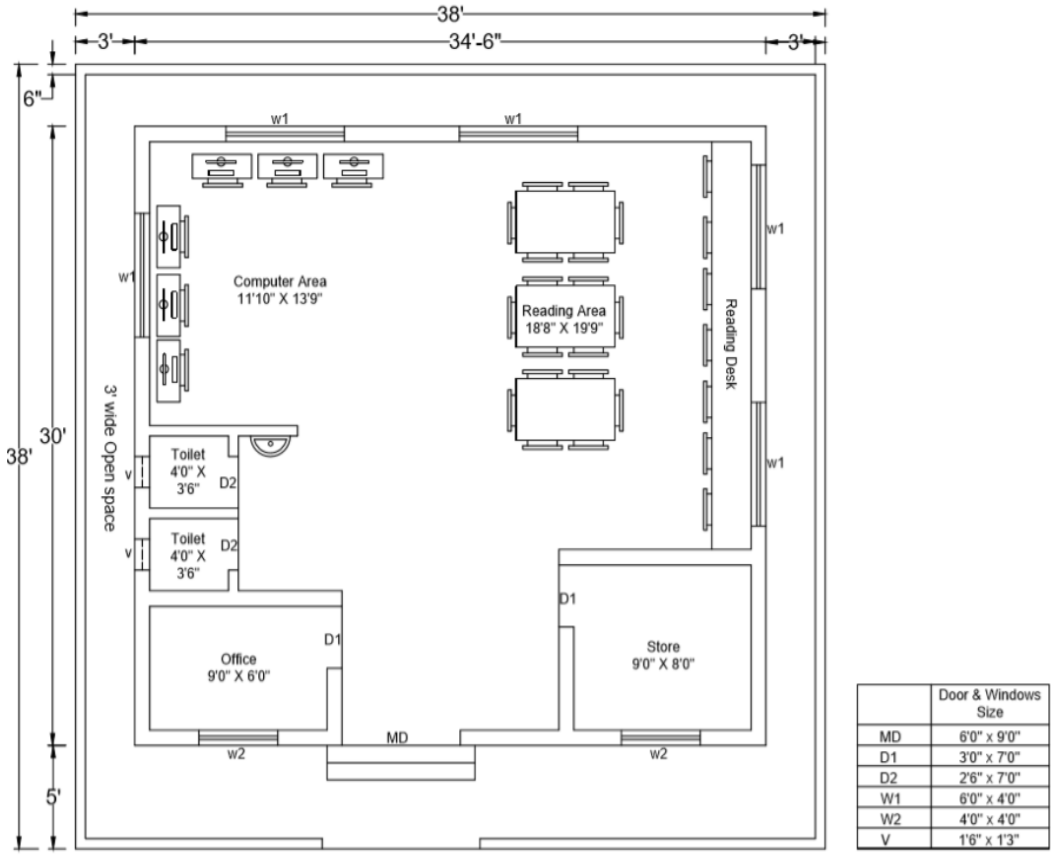
**Current Scenario**

Agatrai village has 2 primary schools, 1 secondary school and 1 high school. So Agatrai village has a large number of student population. But there is no public library in the village. The villagers also want a library to be built in the village to access wide range of books and newspapers to gain valuable information to gain knowledge. Students can also access internet through computers in the library.

**Design Overview**

The design of the public library consists of one large hall in which there are reading tables, book racks and computer tables. There is an office for the librarian who will run the library. There is a store room in which the excess books and old newspapers can be stored. There are two toilets.

## Design Drawings




| | Door & Windows Size |
|---|---|
| MD | 6'0" x 9'0" |
| D1 | 3'0" x 7'0" |
| D2 | 2'6" x 7'0" |
| W1 | 6'0" x 4'0" |
| W2 | 4'0" x 4'0" |
| V | 1'6" x 1'3" |

Figure 53: Plan of Public Library

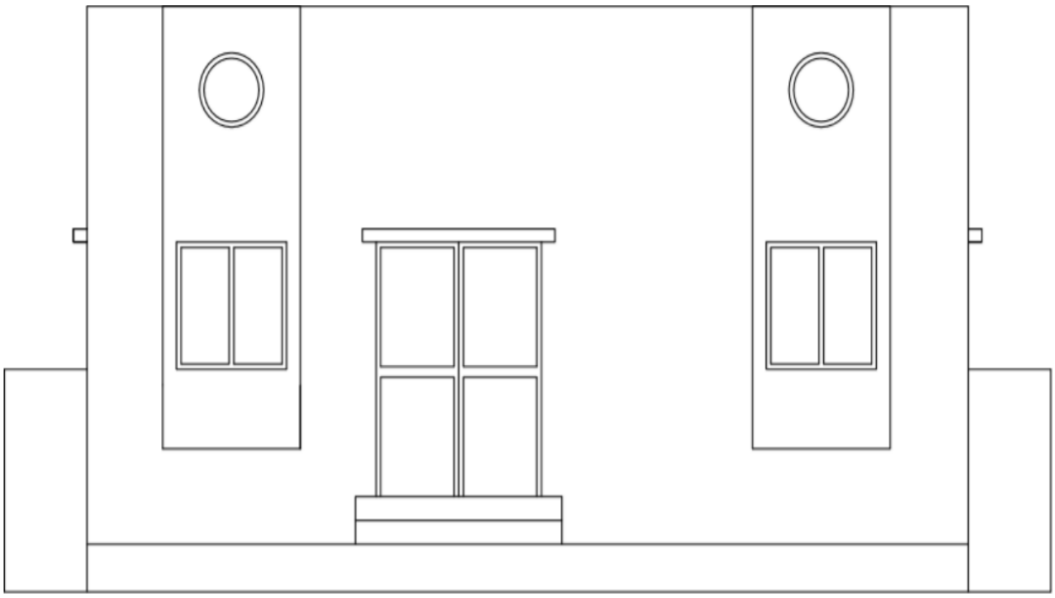


Figure 54: Elevation of Public Library

**Measurement Sheet:**

Table 21: Measurement Sheet of Library

| Sr No. | Item Description | No. | Length (m) | Width (m) | Height (m) | Quantity (m3) |
|---|---|---|---|---|---|---|
| 1 | Excavation in Foundation<br>Net C.L. Length<br>=53.67-0.5*0.9*6<br>=50.97 m | 1 | 50.97 | 0.9 | 1.10 | **50.46** |
| 2 | Plain cement concrete in foundation in 1:4:8 | 1 | 50.97 | 0.9 | 0.3 | **13.76** |
| 3 | Brickwork in foundation<br>Up to plinth | | | | | |
| | Step 1<br>L=53.67-0.5*0.6*6<br>=51.87 m | 1 | 51.87 | 0.6 | 0.2 | 6.22 |
| | Step 2<br>L=53.67-0.5*0.5*6<br>=50.37 m | 1 | 50.37 | 0.5 | 0.2 | 5.04 |
| | Step 3<br>L=53.67-0.5*0.4*6<br>=49.17 m | 1 | 49.17 | 0.4 | 0.2 | 3.93 |
| | Step 4<br>L=53.67-0.5*0.3*6<br>=48.27 m | 1 | 48.27 | 0.3 | 0.9 | 13.03 |
| | Total Quantity | | | | | **28.22** |
| | Brickwork in super structure in cement mortar 1:6 | | | | | |
| | L=53.67-0.5*0.3*6 | | | | | |
| | =48.27 m | 1 | 48.27 | 0.3 | 3 | **43.44** |
| 4 | RCC. Slab | 1 | 11.68 | 11.58 | 0.12 | **16.09** |
| 5 | Smoot plaster on inside wall and celling in C.M. (1:3) | | | | | |
| | Office | 4 | 2.74 | 1.83 | 3 | 60.17 |
| | Store | 4 | 2.74 | 2.44 | 3 | 80.23 |
| | Common Area | 4 | 7.78 | 6.70 | 3 | 625.512 |
| | Total Quantity | | | | | **765.912** |
| 6 | Parapet Wall | | | | | |
| | L=46.32m | 1 | 46.32 | 0.3 | 0.7 | **9.73** |

**Abstract Sheet:**

Table 22: Abstract Sheet of Public Library

| Sr No. | Item Description | Quantity | Rate | Per | Amount Rs. |
|---|---|---|---|---|---|
| 1 | Excavation in foundation | 51.80 | 85 | $m^3$ | **4403** |
| 2 | Brick bat cement concrete in foundation | 14.13 | 3200 | $m^3$ | **45216** |
| 3 | First class brickwork up to plinth in C.M. 1:6 | 28.22 | 3200 | $m^3$ | **90304** |
| 4 | Brickwork in super structure in C.M. 1:6 | 44.68 | 3500 | $m^3$ | **156380** |
| 5 | Brickwork for parapet wall | 9.73 | 3500 | $m^3$ | **34055** |
| 6 | RCC work for slab | 16.09 | 8800 | $m^3$ | **141592** |
| 7 | Smooth plaster on inside walls and ceiling in C.M. 1:3 | 625.512 | 150 | $m^2$ | **93826.8** |
| | | | | **Total** | **568976.8** |
| | | | | Add 5% contingencies | **28448** |
| | | | | **Grand Total** | **597424.8** |

## 8.1.4 Socio-Cultural design

**Community Hall**

Community Hall is a public location where members of a community tend to gather for group activities, social gatherings, public information and various other activities. Community Hall is an important part of the community. It fosters a cohesive and harmonious feeling in the community. Community Hall is also used to develop programmes, services and activities that address the social, cultural, recreational, welfare and educational needs of the village people.

**Current Scenario**

Agatrai village has a big population which comes from different communities and religions. There is no community hall in the village for the purpose of social and religious gatherings. So there is a need for public community hall in which all the different community can gather for their social gatherings such as festivals and marriages.

**Design Overview**

The Community Hall designed has a big hall which has a sitting facility and a stage. There is a store room next to the stage for storing various materials used for the functions. There are two toilets one gents toilet and one ladies toilet.

**Design Drawings**

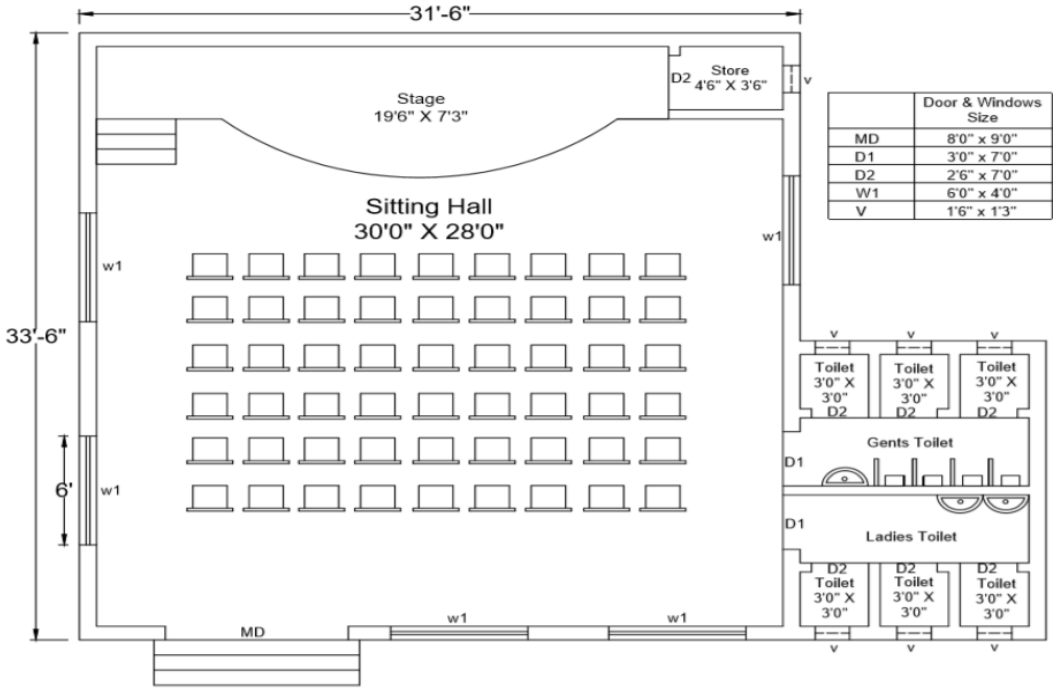



Figure 55: Plan of Community Hall

Figure 56: Elevation of Community Hall

**Measurement Sheet:**

Table 23: Measurement sheet

| Sr No. | Item Description | No. | Length (m) | Width (m) | Height (m) | Quantity (m3) |
|---|---|---|---|---|---|---|
| 1 | Excavation in Foundation<br>Net Centre line length<br>= 48.92-(0.5*0.9*2) =48.02m | 1 | 48.02 | 0.9 | 1.1 | 47.54 |
| 2 | P.C.C. in foundation (1:4:8) | 1 | 48.02 | 0.9 | 0.2 | 8.64 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | Brickwork in foundation up to plinth | | | | | |
| | Step 1<br>L=48.92-0.5*0.5*2 =48.42 m | 1 | 48.42 | 0.5 | 0.2 | 4.84 |
| | Step 2<br>L=48.92-0.5*0.4*2 =48.52 m | 1 | 48.52 | 0.4 | 0.2 | 3.88 |
| | Step 3<br>L=48.92-0.5*0.3*2 =48.62 m | 1 | 48.62 | 0.3 | 0.85 | 12.40 |
| | | | | | Total Quantity | 29.5 |
| 4 | Brickwork in super structure in cement mortar (1:6) | 1 | 48.62 | 0.3 | 3 | 43.76 |
| 5 | RCC. Slab | 1 | 13.06 | 10.24 | 0.12 | 16.05 |
| 6 | Smoot plaster on inside wall and celling in C.M. (1:3) | | | | | |
| | Hall walls | 2 | 9.03 | | 3 | 54.18 |
| | | 2 | 9.64 | | 3 | 57.84 |
| | Hall ceiling | 12 | 0.91 | | 3 | 32.76 |
| | Toilet wall | 12 | 0.91 | | 3 | 32.76 |
| | | 2 | 1.40 | | 3 | 8.40 |
| | Toilet ceiling | 2 | 1.10 | | 3 | 6.60 |
| | | | | | Total Quantity | 192.90 |
| 7 | Parapet wall | 1 | 45.4 | | 0.7 | 31.78 |

**Abstract Sheet:**

Table 24: Abstract Sheet of Community hall

| Sr. No. | Description | Qty. | Rate | Per | Amount |
|---|---|---|---|---|---|
| 1 | Excavation in foundation | 47.54 | 85 | $m^3$ | 4040.9 |
| 2 | Brick bat cement concrete in foundation | 8.64 | 3200 | $m^3$ | 27648 |
| 3 | First class brickwork up to plinth in C.M. 1:6 | 29.5 | 3200 | $m^3$ | 67584 |
| 4 | Brickwork in super structure | 43.76 | 3500 | $m^3$ | 153160 |
| 5 | Brickwork for parapet wall | 31.78 | 3500 | $m^3$ | 95515 |
| 6 | RCC work for slab | 16.05 | 8800 | $m^3$ | 141240 |
| 7 | Smooth plaster on inside walls and ceiling in C.M. 1:3 | 192.90 | 150 | $m^2$ | 28935 |
| | | | | **Total** | **527432.9** |
| | | | | Add 5% contingencies | 26371.64 |
| | | | | **Grand total** | **Rs. 553805** |

## 8.1.5 Smart Village Design

### Dry Composting Toilet

A dry composting toilet is a type of dry toilet that treats human waste by a biological process called composting. This process leads to the decomposition of organic matter and turns human waste into compost-like material, but does not destroy all pathogens. Composting is carried out by microorganisms mainly bacteria and fungi under controlled aerobic conditions. Most composting toilets use no water for flushing and are therefore called dry composting toilets.

**Current Scenario**

Agatrai village has a small amount of population which do not have access to toilets. There is also a shortage of water in summer season. The ordinary toilet uses a large amount of fresh water in flushing function of the toilet. So instead of building a regular toilet we designed a dry composting toilet.

**Design Overview**

The design of the Dry composting toilet is a very simple design. It has two separate toilets with doors in front. Both the toilets are connected to a pit which is dug out in the ground. The toilets and pit are connected through a pipe.

**Design Drawings**

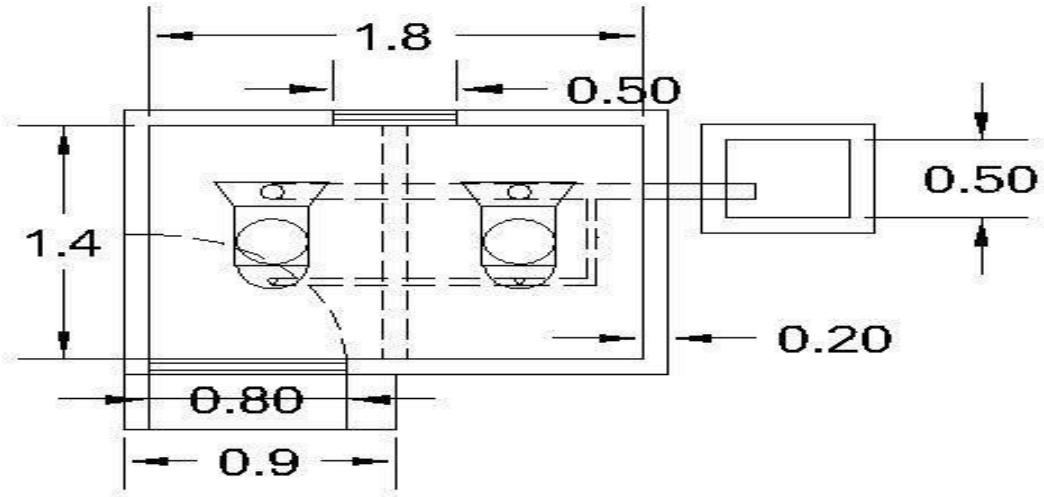



Figure 57: Plan of Dry Composting Toilet

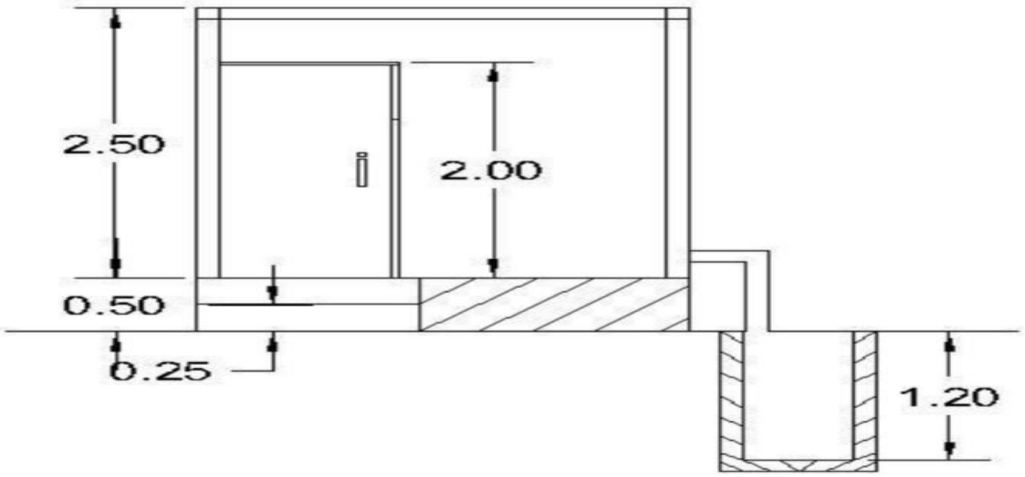



Figure 58: Elevation of Dry Composting Toilet

## Specification for Dry Composting Toilet:

Table 25: Specification for Dry Composting Toilet

| Design details | Specification |
|---|---|
| No. of users | 5 members |
| Average volume of desiccated material | 0.25 liters / person / day |
| Retention period | 300 days |
| No. of chambers | 2 nos. |
| Size of faeces collection tanks | 5 nos. x 300 days x 0.25 l/p/d = 375 liters |
| Volume of tanks needed | 630 liters |
| Size of one tank provided | 0.9 m x 1.4 m x 0.50 m x 1000 liters |
| Size of chamber access hole | 750 mm wide x 400 mm high |
| Vent pipe | 100 mm dia connecting both tanks 500 mm above roof level Cowl on top |
| Toilet size (floor area) | 1.4m width x 1.8 m length |
| Plant bed or Soak pit | 0.50 m x 0.50 m size or<br>0.50 m x 0.50 m x 1.20 m size |
| Door | 0.8 m x 2 m |
| Roof | 1–2” thick Ferro-cement slab or AC/GI sheets |
| Super structure | Brick wall 200 mm thick |

## Estimation of cost for Dry Composting Toilet:

Table 26: Abstract Sheet of Dry Composting Toilet

| Item | Length | Breadth | Height | Quantity | Rate | Amount |
|---|---|---|---|---|---|---|
| Excavation | 8.7 | 0.4 | 0.25 | 0.87 | 201 | **174.8** |
| Brickwork | 8.7 | 0.4 | 0.10 | 0.348 | 4000 | **1392** |
| **Masonry up to plinth** | 8.7 | 0.3 | 0.65 | 1.696 | | |
| Deductions of doors(2) | 0.75 | 0.3 | 0.4 | -0.18 | | |
| **Total** | | | | **1.516** | **2817** | **4270** |
| **Masonry in super structure** | 7.2 | 0.2 | 2.5 | 3.6 | | |
| Deduct | | | | | | |
| Door | 2 | 0.2 | 0.8 | -0.32 | | |
| Ventilator | 0.5 | 0.2 | 0.5 | -0.05 | | |
| **Total** | | | | **3.23** | **2900** | **9367** |
| Slab at plinth | 2.2 | 1.8 | 0.1 | 0.396 | 3392 | 1343 |
| Roof of Asbestos sheet | 1.8 | 1.4 | | 2.5 | 1000 | 2500 |
| **Both side plaster(2)** | 7.2 | | 2.5 | 36 | | |
| Deduction | | | | | | |
| Door | 2 | | 0.8 | -1.6 | | |
| Ventilator | 0.5 | | 0.5 | -0.25 | | |
| **Total** | | | | **34.15** | **100** | **3415** |
| Cost of pans and door | | | | | 2600 | 2600 |
| | | | | | **Total Cost** | **25061** |

## 8.1.6 Heritage Village Design

### Village Entry Gate

Village Entry Gate is a heritage structure of the village. It is placed at the entry of the village. It is the first structure anyone sees while entering the village. So village entry gives the first impression of the village. Also from the village entry gate we identify the name of the village. So it is an important public structure of the village.

### Current Scenario

There is no entry gate in the Agatrai village. The villagers also wanted a village entry gate as it is the first impression of the village that people from outside see. So we have designed the village entry gate.

### Design Overview

Village entry gate design consists of two columns on the either side of the road and a beam resting on the top of the columns.

### Design Drawings

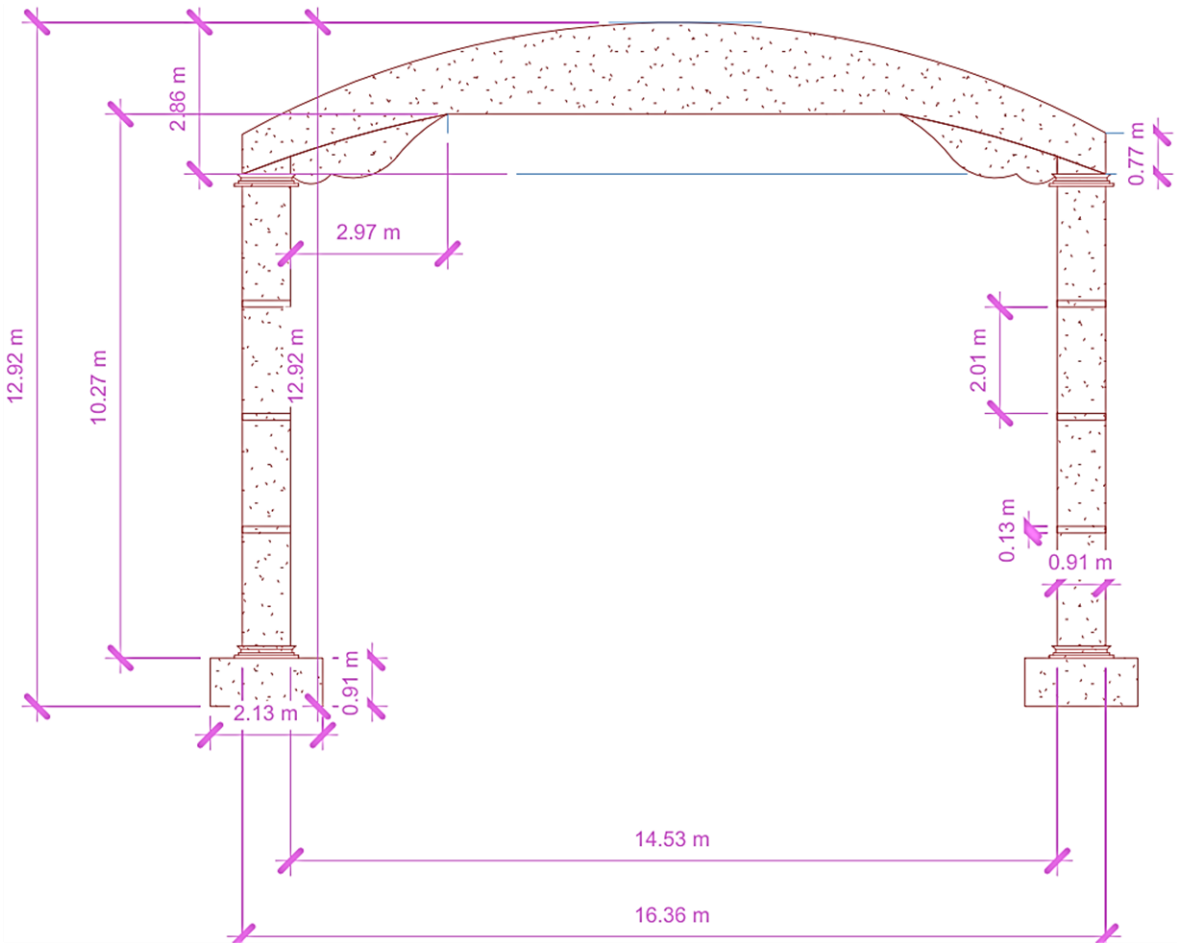



Figure 59: Elevation of Village Entry Gate

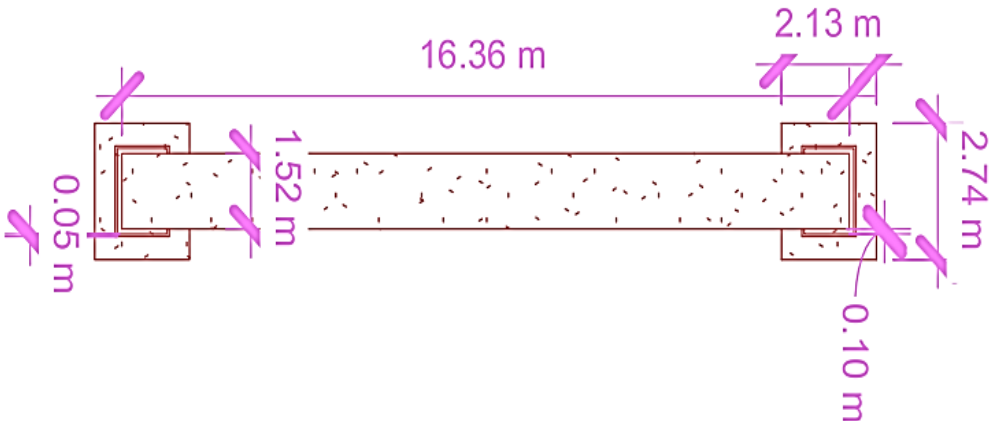



Figure 60: Plan of Village Entry Gate

**Measurement Sheet:**

Table 27: Measurement Sheet of Village Entry Gate

| Sr No. | Item Description | No. | Length (m) | Width (m) | Height (m) | Quantity |
|---|---|---|---|---|---|---|
| 1 | Excavation in Foundation | 2 | 2.8 | 2.2 | 0.91 | **11.21** |
| 2 | P.C.C. in foundation (1:4:8) | 2 | 2.74 | 2.13 | 0.91 | **10.6** |
| 3 | Brickwork in column in cement mortar (1:6) | 2 | 1.52 | 0.91 | 9.15 | **25.31** |
| 4 | RCC. Beam | 1 | 16.36 | 1.52 | 0.77 | **19.14** |
| 5 | Smoot plaster in C.M. (1:3) | | | | | |
| | Front of Column | 2 | 0.91 | - | 9.15 | 8.32 |
| | Sides of Column | 2 | 1.52 | - | 9.15 | 13.90 |
| | Top Beam | 1 | 16.36 | - | 2.09 | 34.75 |
| | Total Quantity | | | | | **56.97** |

**Abstract Sheet:**

Table 28: Abstract Sheet of Village Entry Gate

| Sr. No. | Description | Qty. | Rate | Per | Amount |
|---|---|---|---|---|---|
| 1 | Excavation in Foundation | 11.21 | 85 | $m^3$ | **952** |
| 2 | P.C.C. in foundation (1:4:8) | 10.62 | 3200 | $m^3$ | **33984** |
| 3 | Brickwork in column in cement mortar (1:6) | 25.31 | 3500 | $m^3$ | **88585** |
| 4 | RCC. Beam | 51.97 | 5500 | $m^3$ | **105300** |
| 5 | Smoot Plaster in C.M. (1:3) | 56.97 | 150 | $m^2$ | **8545** |
| | | | | **Total Amount** | **237366** |
| | | | | Add 5% contingencies | **11868** |
| | | | | **Grand Total** | **249250** |

## 8. 2 Reason for Students Recommending this Design

- The Septic Tank system will improve the cleanliness and health of the people of village because there is no provision for disposal of waste water generated. It is thrown out in open land areas.
- Recreational facilities should be provided like garden for the recreational purpose because there are no such provisions made in the village.
- There is no place for gathering of people for social or cultural activities in the village so community hall should be built.
- There is no library in the village for the people to read books.
- There is no village entry gate in the village.

## 8.3 About designs Suggestions / Benefit of the villagers

- Septic Tank will clean the waste water of solid waste generated from the village household.
- Sludge formed in the septic tank is stored in pits and will generate manure from it.
- Garden is a great benefit in the growth of children of the village. They can enjoy and play in the garden.
- Garden can be used for recreational purpose by the adults.
- Public library can be very useful in studying purpose as it has books and equipped with internet.
- Elderly people can come to library and read books and newspapers.
- Community hall is an essential infrastructure in village for social or cultural programmes in the village.
- Dry Compose Toilet is a smart idea which saves water which is used in flushing.
- Village Entry Gate will give a nice look at the entry road of the village.

## 9. Proposing designs for Future Development of the Village for the PART-II Design

After completion of visit & data collection the project carried out in the current semester by the group members which includes the design of a sustainable facilities for Agatrai village in Keshod Taluka of Junagadh District in Gujarat.

Future scope would be study over other different urban amenities that would be sustainable in rural areas.
In the coming semester we will be giving designs for following:

- Agricultural Storage building for the storage of the agricultural products.
- Milk Co-operative Society building for the purpose of storing and selling milk.
- Design of the new bus stand as the old bus stand is in very poor condition.
- Design for Farmer Help Centre
- Design of Skill Development Centre
- Design for Rainwater Recharge

# Chapter: 10
# Conclusion of the Entire Village Activities of the Project

The Main Aim of Vishwakarma Yojana is Developing village with a rural soul but with all smart urban amenities that a city has. This will help in developing Smart villages in sustainable manner, reduce migration from villages and prevent the cities from the urban pressure. This will lead to higher standard of living and better basic facilities needed in the village.

This project tends to improve the physical, social as well as socio cultural facilities in the village by implementing various designs of infrastructures that are not available to the people of the village. The infrastructures are designed with regards to lesser or least hindrance to the Rural Authenticity.

With the techno-economic survey, we come to a conclusion of the infrastructures facilities which are present in the village. With the techno-economic survey of ideal village Meswan and smart village Ajab we come to know about the infrastructure facilities which are needed for the sustainable development of the village.

With the gap analysis of the village according to the Urban Development Plans Formulation and Implementation (UDPFI) guidelines we come to know about the infrastructure facilities which are lacking to make the village a smart village.

With all the surveys and guidelines, we come to the conclusion of the designs which are
Sustainable Design - Septic Tank
Physical Design - Garden
Social Design - Public Library
Socio Cultural Design - Community Hall
Smart Design - Dry Composite Toilet
Heritage Design - Village Entry Gate

The infrastructure facilities designed under this project will be helpful in solving the problems of the people residing in the village. It will benefit in the development of the village. This will help in stopping migration of the people to the city which will help in the urban congestion problem faced in the metro cities of India. The people of the village can also enjoy the urban amenities in the village by the development of the village.

This project will be helpful to develop the village as it will increase basic infrastructure facilities and add smart infrastructure facilities in the village. With increasing use of facilities will generate employment opportunities. It will also help to increase the revenue and GDP of state and country. It will also increase country's image in front of world as Good infrastructure, Good Economic Profile and good employment solution.

Vishwakarma Yojana gives an opportunity to design solutions for the village which will help in the development of the village and betterment of the people of the village. The infrastructures are designed keeping in mind the sustainability and economic factor in the consideration. This development will eventually be the development of the country, which is developed keeping the vision of the future in mind.

# Chapter: 11
## References refereed for this project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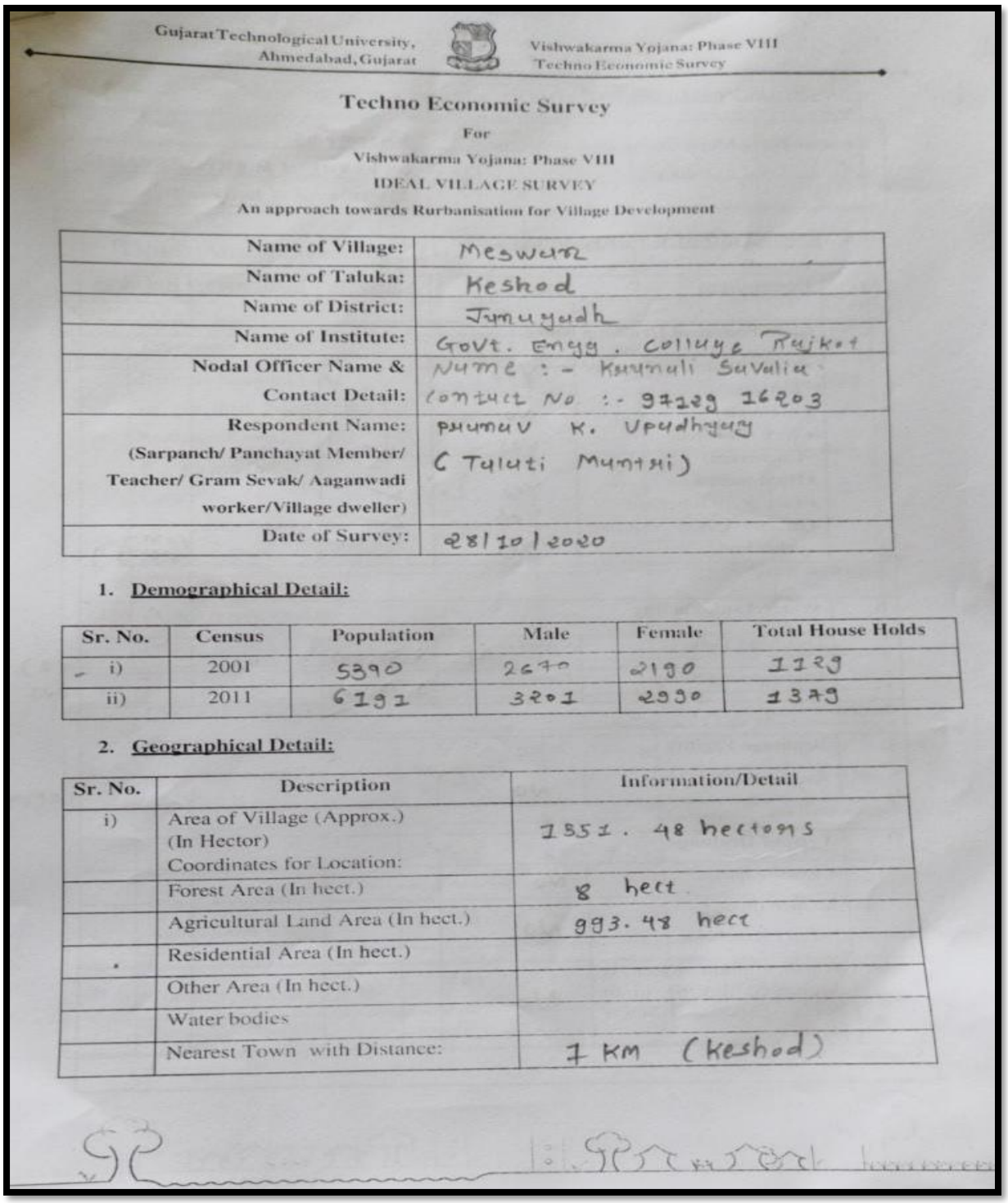
# Chapter: 12

## Annexure attachment

### 12.1 Survey form of Ideal Village Scanned copy attachment



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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

**Techno Economic Survey**

For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

| | |
|---|---|
| Name of Village: | Meswan |
| Name of Taluka: | Keshod |
| Name of District: | Junagadh |
| Name of Institute: | Govt. Engg. College Rajkot |
| Nodal Officer Name & Contact Detail: | Name :- Kaumuli Savaliya<br>Contact No :- 97129 16203 |
| Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller) | Pramukh K. Upadhyay<br>(Taluti Mantri) |
| Date of Survey: | 28/10/2020 |

1. **Demographical Detail:**

| Sr. No. | Census | Population | Male | Female | Total House Holds |
|---|---|---|---|---|---|
| i) | 2001 | 5390 | 2670 | 2190 | 1129 |
| ii) | 2011 | 6191 | 3201 | 2990 | 1379 |

2. **Geographical Detail:**

| Sr. No. | Description | Information/Detail |
|---|---|---|
| i) | Area of Village (Approx.) (In Hector) Coordinates for Location: | 1351.48 hectors |
| | Forest Area (In hect.) | 8 hect |
| | Agricultural Land Area (In hect.) | 993.48 hect |
| | Residential Area (In hect.) | |
| | Other Area (In hect.) | |
| | Water bodies | |
| | Nearest Town with Distance: | 7 KM (Keshod) |

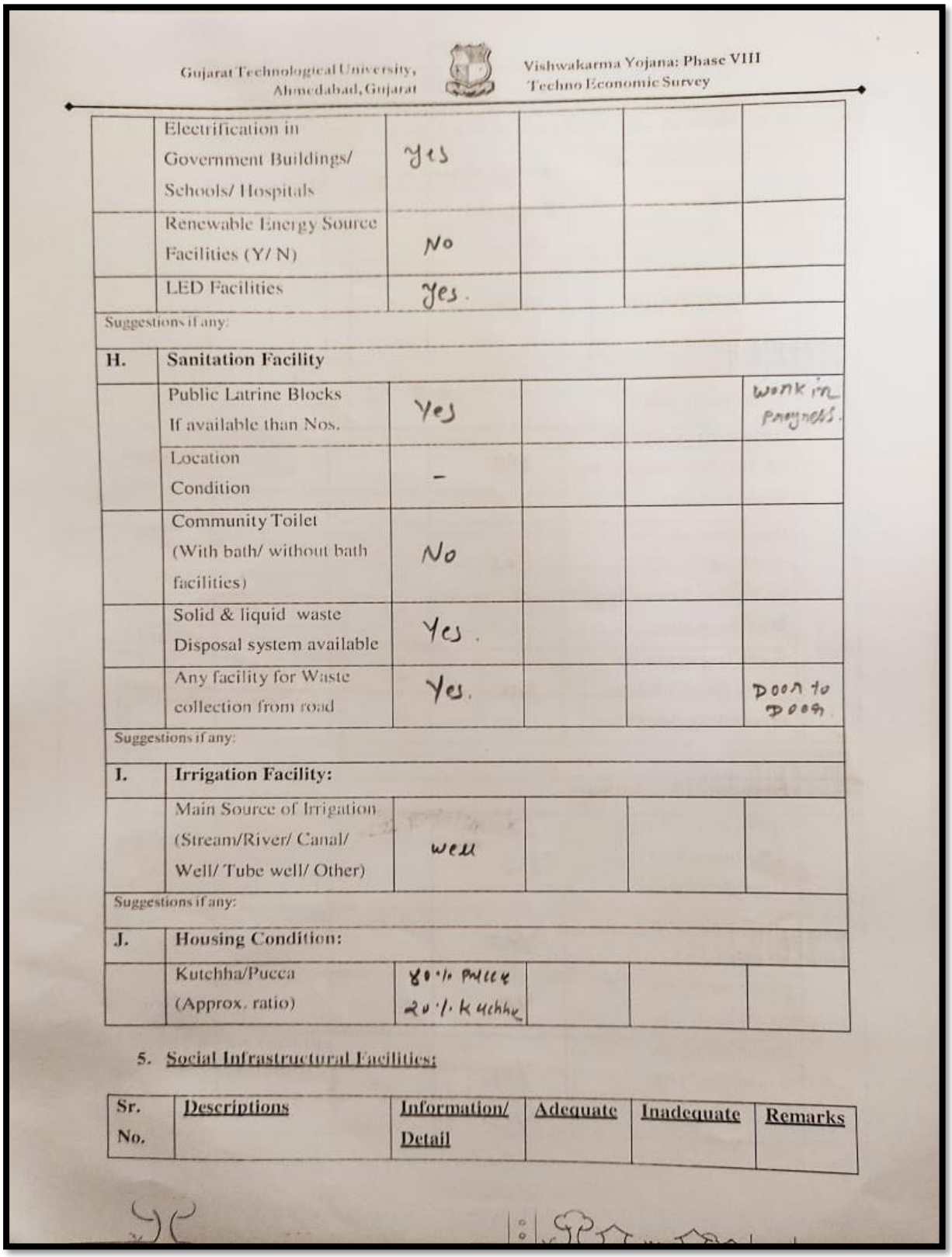
### 3. Occupational Details:

| | | |
|---|---|---|
| Name of Three Major Occupation groups in Village | 1. | Farmers |
| | 2. | Labours (Agricultural) |
| | 3. | Diamond (Labours) |

### 4. Physical Infrastructure Facilities:

| Sr. No. | Descriptions | Detail | Adequate | Inadequate | Remarks |
|---|---|---|---|---|---|
| A. | **Main Source of Drinking water** | | | | |
| | • Tap Water (Treated/ Untreated) | Yes | | | |
| | • RO Water | No | | | |
| | • Well (Covered/ Uncovered) | Yes | ✓ | | |
| | • Hand pumps | Yes | ✓ | | |
| | • Tube well/ Borehole | Yes | ✓ | | |
| | • River/ Canal/ Spring/ Lake/ Pond | Yes | | | (only M.S.) |
| Suggestions if any: | | | | | |
| B. | **Water Tank Facility** | | | | |
| | Overhead Tank | Capacity: lit. | ₹,50,000 | | (1) |
| | Underground Sump | Capacity: | 3,50,000 | | (2) |
| Suggestions if any: | | | | | |
| C. | **Drainage Facility** | | | | |
| | Available (Yes/ No) | No | | | Open |
| Suggestions if any: | | | | | |
| D. | **Type of Drainage** | | | | |
| | Closed/ Open | No | | | |
| | If Open than Pucca / Kutchcha | No | | | |
| | Whether drain water is discharged directly in to Water bodies/ Sewer plants | No | | | |
| Suggestions if any: | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **E.** | **Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM** | | | | |
| | Village approach road | Mycadam | | | |
| | Main road | Asphalt | | | |
| | Internal streets | Block | | | |
| | Nearest NH/SH/MDR/ODR Dist. in kms. | SH | | | |
| Suggestions if any: | | | | | |
| **F.** | **Transport Facility** | | | | |
| | Railway Station (Y/N) (If No than Nearest Rly Station---Kms) | No | | | Keshod 3 km |
| | Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms) | Yes | | | |
| | Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other) | All | | | |
| Suggestions if any: | | | | | |
| **G.** | **Electricity Distribution** | | | | |
| | (Y/N ) Govt./ Private (Less than 6 hrs./ More Than 6 hrs) | Yes | | | More than 6 hrs. |
| | Power supply for Domestic Use | Yes | | | 24hr |
| | Power supply for Agricultural Use | Yes | | | 8hr |
| | Power supply for Commercial Use | Yes | | | 24hr |
| | Road/ Street Lights | Yes | | | 12 hr. |



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| | | | | | |
|---|---|---|---|---|---|
| | Electrification in Government Buildings/ Schools/ Hospitals | Yes | | | |
| | Renewable Energy Source Facilities (Y/ N) | No | | | |
| | LED Facilities | Yes. | | | |
| Suggestions if any: | | | | | |
| **H.** | **Sanitation Facility** | | | | |
| | Public Latrine Blocks If available than Nos. | Yes | | | Work in progress. |
| | Location Condition | - | | | |
| | Community Toilet (With bath/ without bath facilities) | No | | | |
| | Solid & liquid waste Disposal system available | Yes. | | | |
| | Any facility for Waste collection from road | Yes. | | | Door to Door. |
| Suggestions if any: | | | | | |
| **I.** | **Irrigation Facility:** | | | | |
| | Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other) | well | | | |
| Suggestions if any: | | | | | |
| **J.** | **Housing Condition:** | | | | |
| | Kutchha/Pucca (Approx. ratio) | 80% Pucca 20% Kutchha | | | |

5. **Social Infrastructural Facilities:**

| Sr. No. | Descriptions | Information/ Detail | Adequate | Inadequate | Remarks |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| **K.** | **Health Facilities:** | | | | |
| | Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition: | 1 PHC | | | |
| | Private Clinic/Private Hospital/ Nursing Home | 1. P.C. | | | |
| | If any of the above Facility is not available in village than approx. distance from village: .....kms. | | | | |
| Suggestions if any: | | | | | |
| **L.** | **Education Facilities:** | | | | |
| | Aaganwadi/ Play group | Yes | | | No. 7 |
| | Primary School | Yes. | | | No. 2 |
| | Secondary school | Yes. | | | No. 1 Pvt. |
| | Higher sec. School | – | | | – |
| | ITI college/ vocational Training Center | – | | | – |
| | Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities | – | | | – |
| | If any of the above Facility is not available in village than approx. distance from village: .....kms. | | | | |
| Suggestions if any: | | | | | |
| **M.** | **Socio- Culture Facilities** | | | | |
| | Community Hall (With or without TV) Location: | Yes without TV | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Condition: | | | | |
| | Public Library (With daily newspaper supply: Y/N)<br>Location:<br>Condition: | No | | | |
| | Public Garden<br>Location:<br>Condition: | No | | | |
| | Village Pond<br>Location:<br>Condition: | No | | | |
| | Recreation Center<br>Location:<br>Condition: | No | | | |
| | Cinema/ Video Hall<br>Location:<br>Condition: | No | | | |
| | Assembly Polling Station<br>Location:<br>Condition: | Yes. | At School. | | No. 4 |
| | Birth & Death Registration Office<br>Location:<br>Condition: | Yes | At Pan. office | | |
| **If any of the above Facility is not available in village than approx. distance from village: .....kms.** | | | | | |
| Suggestions if any: | | | | | |
| **N.** | **Other Facilities** | | | | |
| | Post-office | Yes | | | |
| | Telecommunication Network/ STD booth | No. | | | |

| | | | | | |
|---|---|---|---|---|---|
| | General Market | Yes. | | | |
| | Shops (Public Distribution System) | Yes. | | | |
| | Panchayat Building | Yes. | | | Not. Still worked. |
| | Pharmacy/Medical Shop | NO. | | | |
| | Bank & ATM Facility | Yes. | | | SBI. |
| | Agriculture Co-operative Society | Yes. | | | Co-op. |
| | Milk Co-operative Soc. | No. | | | Pvt. |
| | Small Scale Industries | Yes. | | | |
| | Internet Cafes/ Common Service Center/Wi Fi | CSC - Yes. | | | E-gram |
| | Other Facility | — | | | — |
| Suggestions if any: | | | | | |

6. **Sustainable /Green Infrastructure Facilities:**

| Sr. No. | Descriptions | Information/ Details | Adequate | Inadequate | Remarks |
|---|---|---|---|---|---|
| O. | Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources | No. | | | |
| P. | Bio-Gas Plant<br>Solar Street Lights<br>Rain Water Harvesting System | (RWHS) ↓ Yes. | | | Pipeline at River. |
| Q. | Any Other | — | | | — |

7. **Data Collection From Village**

| | |
|---|---|
| Village Base Map Available: Hard Copy/Soft Copy | Yes. (Both) |

Not at panchayat at Junagadh

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| | |
|---|---|
| Recent Projects going on for Development of Village | WASMO (work in progress) |
| Any NGO working for village development | — |

8. Additional Information/ Requirement:

| Sr. No. | Descriptions | Information/ Detail | Remarks |
|---|---|---|---|
| 1. | Repair & Maintenance of Existing Public Infrastructure facilities(School Building, Health Center, Panchayat Building, Public Toilets & any other) | PHC. | Work in Progress (Repair) |
| 2. | Additional Information/ Requirement | NO | No. |
| | | | |
| | | | |

9. Smart Village Proposal Design

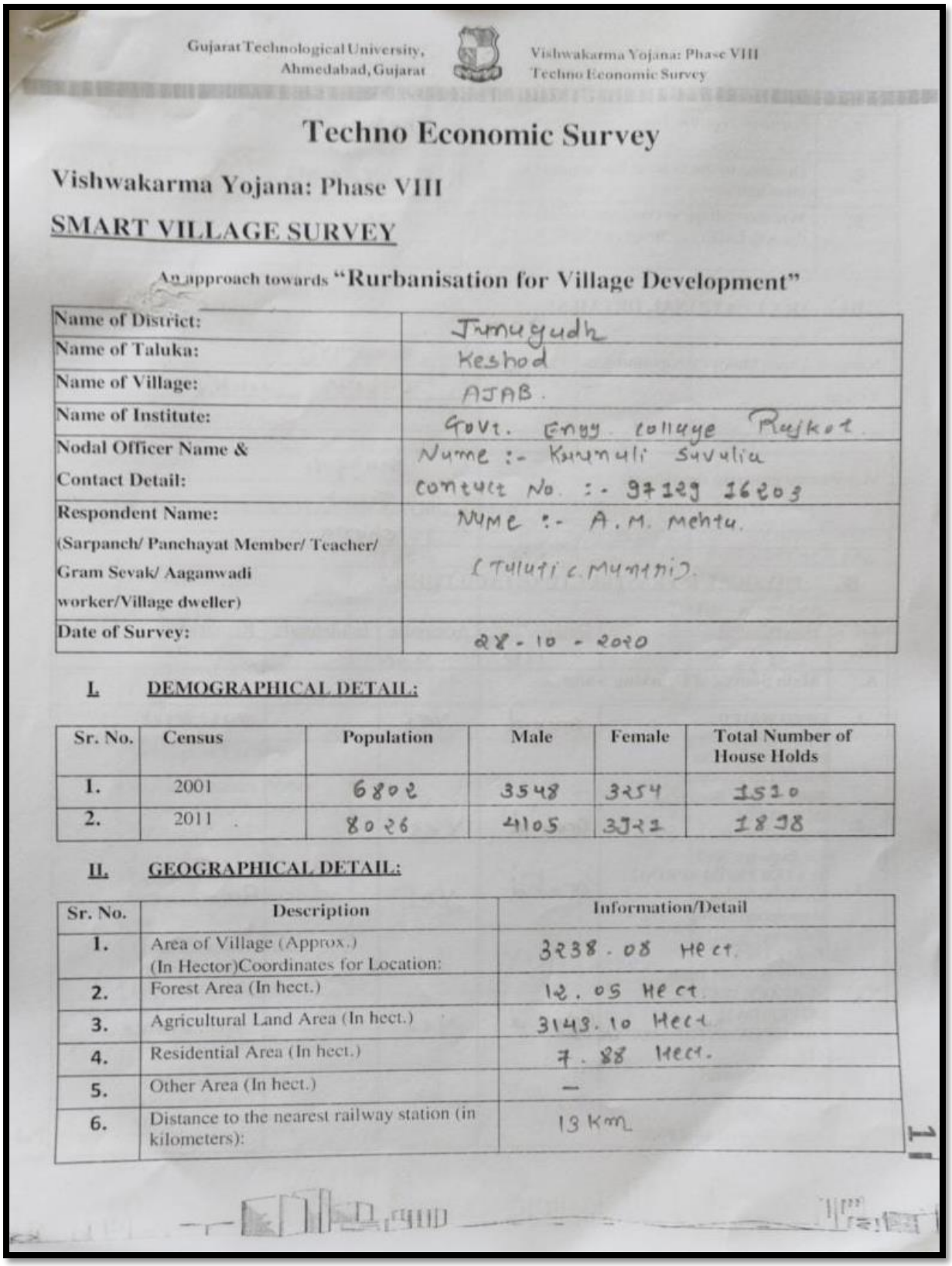
| Sr. No. | Descriptions | Information/ Detail | Remarks |
|---|---|---|---|
| 1. | Solar Root top, wifi public | Need this | - |

Note: Photographs/ Video/ Drawings of all existing Infrastructure facilities & conditions should be taken by students of respective villages for their record and information.

For Any Administration queries/ Difficulties:
GTU VY Section:
Contact No – 079-23267588
Email ID: rurban@gtu.edu.in

સરપંચ
ગ્રામ પંચાયત મેસવાણ

## 12.2 Survey form of Smart Village Scanned copy attachment



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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

# Techno Economic Survey

## Vishwakarma Yojana: Phase VIII

## SMART VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

| | |
|---|---|
| Name of District: | Junagadh |
| Name of Taluka: | Keshod |
| Name of Village: | AJAB. |
| Name of Institute: | Govt. Engg. college Rajkot. |
| Nodal Officer Name & Contact Detail: | Name :- Kamnuli Savaliu<br>contact No. :- 97129 16203 |
| Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller) | Name :- A.M. Mehta.<br>(Talati c. Munim) |
| Date of Survey: | 28 - 10 - 2020 |

### I. DEMOGRAPHICAL DETAIL:

| Sr. No. | Census | Population | Male | Female | Total Number of House Holds |
|---|---|---|---|---|---|
| 1. | 2001 | 6802 | 3548 | 3254 | 1510 |
| 2. | 2011 | 8026 | 4105 | 3721 | 1898 |

### II. GEOGRAPHICAL DETAIL:

| Sr. No. | Description | Information/Detail |
|---|---|---|
| 1. | Area of Village (Approx.) (In Hector)Coordinates for Location: | 3238.08 Hect. |
| 2. | Forest Area (In hect.) | 12.05 Hect. |
| 3. | Agricultural Land Area (In hect.) | 3143.10 Hect. |
| 4. | Residential Area (In hect.) | 7.88 Hect. |
| 5. | Other Area (In hect.) | — |
| 6. | Distance to the nearest railway station (in kilometers): | 13 Km |

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| | | |
|---|---|---|
| 7. | Name of Nearest Town with Distance: | Sherguadh 4 km |
| 8. | Distance to the nearest bus station (in kilometers): | 200 m |
| 9. | Whether village is connected to all road for the any facility or town or City? | Yes. |

## III. OCCUPATIONAL DETAILS:

| | | |
|---|---|---|
| Name of Three Major Occupation groups in Village | 1. | Farming |
| | 2. | Labour work |
| | 3. | |

| | | |
|---|---|---|
| Major crops grown in the village: | 1. | Mayfuli |
| | 2. | Tuver. |
| | 3. | chana |

## IV. PHYSICAL INFRASTRUCTURE FACILITIES:

| Sr. No. | Descriptions | Detail | Adequate | Inadequate | Remarks |
|---|---|---|---|---|---|
| A. | **Main Source of Drinking water** | | | | |
| 1. | **PIPED WATER**<br>Piped Into Dwelling<br>Piped To Yard/Plot<br>Public Tap/Standpipe<br>Tube Well Or Bore Well | Good | Yes | | Tubewell & Banewell |
| 2. | **DUG WELL**<br>Protected Well<br>Un Protected Well | Good | Yes | | |
| 3. | **WATER FROM SPRING**<br>Protected Spring<br>Unprotected Spring<br>Rainwater<br>Tanker Truck<br>Cart With Small Tank | Good | Yes | | Rainwater |
| 4. | **SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/**<br>Irrigation Channel<br>Bottled Water<br>Hand Pump<br>Other(Specify)**Lake/ Pond** | Good | Yes. | | Handpump. |

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| | | | | | |
|---|---|---|---|---|---|
| **Suggestions if any:** | | | | | |
| **B.** | **Water Tank Facility** | | | | |
| | Overhead Tank | Capacity: Lit. | 3,00,000 | | |
| | Underground Sump | Capacity: | 5,00,000 | | |
| **Suggestions if any:** | | | | | |
| **C.** | **The Type of Drainage Facility** | | | | |
| | A. UNDERGROUND DRAINAGE<br>1<br>2<br>B. OPEN WITH OUTLET<br>C. OPEN WITHOUT OUTLET | open without outlet | yes. | | |
| **Suggestions if any:** | | | | | |
| **D.** | **Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM** | | | | |
| | Village approach road | Good | yes | | All weather |
| | Main road | Good | yes | | All weather. |
| | Internal streets | | yes | | All weather paved block |
| | Nearest NH/SH/MDR/ODR Dist. in kms. | ODR | yes. | | 16 km |
| **Suggestions if any:** | | | | | |
| **E.** | **Transport Facility** | | | | |
| | Railway Station (Y/N) (If No than Nearest Rly Station---Kms) | No | | | 13 km |
| | Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms) | - | Yes | | 6-8 buses daily. |
| | Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other) | Good | Yes | | All. |
| **Suggestions if any:** | | | | | |
| **F.** | **Electricity Distribution** | | | | |
| | (Y/N ) Govt./ Private (Less than 6 hrs./ More Than 6 hrs) | Good | Yes | | More than 8 hrs. |

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| | | | | | |
|---|---|---|---|---|---|
| | Power supply for Domestic Use | | Yes | | >6 |
| | Power supply for Agricultural Use | Good | Yes | | >6 |
| | Power supply for Commercial Use | Good | Yes | | >6 |
| | Road/ Street Lights | Good | Yes | | |
| | Electrification in Government Buildings/ Schools/ Hospitals | Good | Yes | | |
| | Renewable Energy Source Facilities (Y/ N) | Good | Yes | | solar |
| | LED Facilities | Good | Yes | | |

Suggestions if any:

| G. | Sanitation Facility | | | | |
|---|---|---|---|---|---|
| | Public Latrine Blocks If available than Nos. | NO | | | |
| | Location Condition | | | | |
| | Community Toilet (With bath/ without bath facilities) | NO | | | |
| | Solid & liquid waste Disposal system available | Good | Yes | | |
| | Any facility for Waste collection from road | Good | Yes | | door to door collection |

Suggestions if any:

| H. | Main Source of Irrigation Facility: | | | | |
|---|---|---|---|---|---|
| | TANK/POND<br>STREAM/RIVER<br>CANAL<br>WELL<br>TUBE WELL<br>OTHER (SPECIFY) | Good | Yes | | tube well & open well |

Suggestions if any:

| I. | Housing Condition: | | | | |
|---|---|---|---|---|---|
| | Kutchha/Pucca (Approx. ratio) | K = 33%<br>P = 67% | | | |

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## V. SOCIAL INFRASTRUCTURAL FACILITIES:

| Sr. No. | Descriptions | Information/ Detail | Adequate | Inadequate | Remarks |
|---|---|---|---|---|---|
| J. | **Health Facilities:** | | | | |
| | ICDS (Anganwadi)<br>Sub-Centre<br>PHC<br>BLOCK PHC<br>CHC/RH<br>District/ Govt. Hospital<br>Govt. Dispensary<br>Private Clinic<br>Private Hospital/<br>Nursing Home<br>AYUSH Health Facility<br>sonography /ultrasound facility | 3 PHC.<br>4 private clinic | Yes<br>Yes. | | |
| | If any of the above Facility is not available in village than approx. distance from village: .....kms. | | | | |
| **Suggestions if any:** | | | | | |
| K. | **Education Facilities:** | | | | |
| | Aaganwadi/ Play group | Yes | | | |
| | Primary School | Yes | | | |
| | Secondary school | Yes | | | |
| | Higher sec. School | No | | | |
| | ITI college/ vocational Training Center | No | | | |
| | Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities | No | | | |
| | If any of the above Facility is not available in village than approx. distance from village: .....kms. | | | | |

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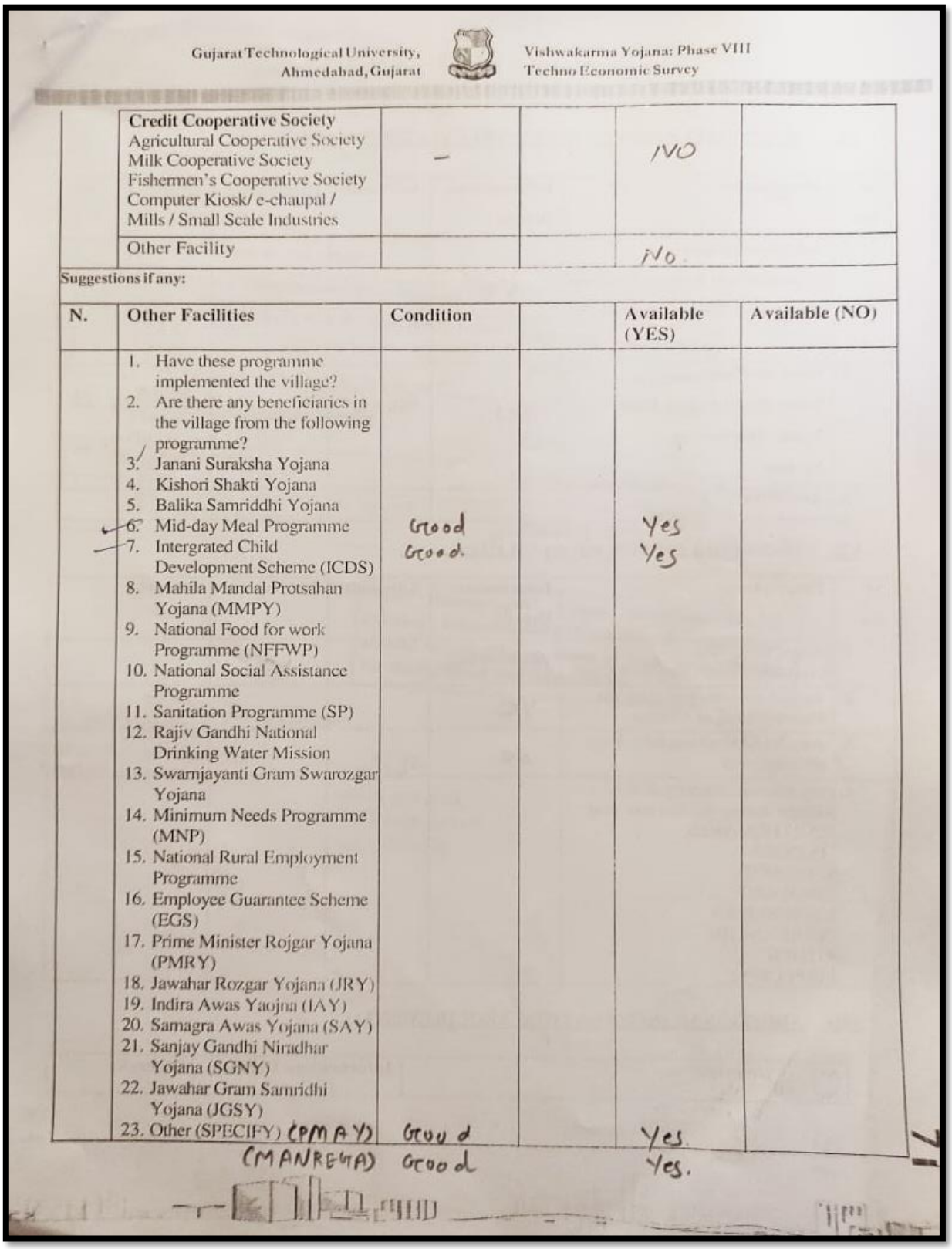
**Suggestions if any:**

| L. | Socio- Culture Facilities | Condition | Location | Available (YES) | Available (NO) |
|---|---|---|---|---|---|
| | Community Hall (With or without TV) | Good | | Yes | |
| | Public Library (With daily newspaper supply: Y/N) | | | No | |
| | Public Garden | | | No | |
| | Village Pond | | | No | |
| | Recreation Center | | | No | |
| | Cinema/ Video Hall | | | No | |
| | Assembly Polling Station | Good | | Yes | |
| | Birth & Death Registration | Good. | | Yes | |

**If any of the above Facility is not available in village than approx. distance from village: .....kms.**

**Suggestions if any:**

| M. | Other Facilities | Condition | Location | Available (YES) | Available (NO) |
|---|---|---|---|---|---|
| | Post-office | Good | | Yes | |
| | Telecommunication Network/ STD booth | | | No | |
| | General Market | | | Yes | |
| | Shops (Public Distribution System) | Good | | Yes | |
| | Panchayat Building | Good | | Yes | |
| | Pharmacy/Medical Shop | Good | | Yes | |
| | Bank & ATM Facility | Good | | Yes | |
| | Agriculture Co-operative Society | | | Yes | |
| | Milk Co-operative Soc. | | | No | |
| | Small Scale Industries | | | Yes | (cried recently) |
| | Internet Cafes/ Common Service Center/Wi Fi | | | No | |
| | Youth Club | | | - | |
| | Mahila Mandal | | | - | |



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| | | | | | |
|---|---|---|---|---|---|
| | **Credit Cooperative Society**<br>Agricultural Cooperative Society<br>Milk Cooperative Society<br>Fishermen's Cooperative Society<br>Computer Kiosk/ e-chaupal /<br>Mills / Small Scale Industries | – | | NO | |
| | Other Facility | | | NO | |

**Suggestions if any:**

| N. | Other Facilities | Condition | | Available (YES) | Available (NO) |
|---|---|---|---|---|---|
| | 1. Have these programme implemented the village? | | | | |
| | 2. Are there any beneficiaries in the village from the following programme? | | | | |
| | 3. Janani Suraksha Yojana | | | | |
| | 4. Kishori Shakti Yojana | | | | |
| | 5. Balika Samriddhi Yojana | | | | |
| | 6. Mid-day Meal Programme | Good | | Yes | |
| | 7. Intergrated Child Development Scheme (ICDS) | Good. | | Yes | |
| | 8. Mahila Mandal Protsahan Yojana (MMPY) | | | | |
| | 9. National Food for work Programme (NFFWP) | | | | |
| | 10. National Social Assistance Programme | | | | |
| | 11. Sanitation Programme (SP) | | | | |
| | 12. Rajiv Gandhi National Drinking Water Mission | | | | |
| | 13. Swarnjayanti Gram Swarozgar Yojana | | | | |
| | 14. Minimum Needs Programme (MNP) | | | | |
| | 15. National Rural Employment Programme | | | | |
| | 16. Employee Guarantee Scheme (EGS) | | | | |
| | 17. Prime Minister Rojgar Yojana (PMRY) | | | | |
| | 18. Jawahar Rozgar Yojana (JRY) | | | | |
| | 19. Indira Awas Yaojna (IAY) | | | | |
| | 20. Samagra Awas Yojana (SAY) | | | | |
| | 21. Sanjay Gandhi Niradhar Yojana (SGNY) | | | | |
| | 22. Jawahar Gram Samridhi Yojana (JGSY) | | | | |
| | 23. Other (SPECIFY) (PMAY) | Good | | Yes. | |
| | (MANREGA) | Good | | Yes. | |

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## VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

| Sr. No. | Descriptions | Information/ Details | Adequate | Inadequate | Remarks |
|---|---|---|---|---|---|
| 1. | Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources | No | | | |
| 2. | Bio-Gas Plant<br>Solar Street Lights Rain Water Harvesting System | Yes. | Good | | Solar street light & Rain |
| 3. | Any Other | | | | |

## VII. DATA COLLECTION FROM VILLAGE

| Sr. No. | Descriptions | Information/ Details | Adequate | Inadequate | Remarks |
|---|---|---|---|---|---|
| 1. | Village Base Map Available: Hard Copy/Soft Copy | Available | | ✓ | |
| 2. | Recent Projects going on for Development of Village | Yes | | | 14th ની ગ્રાન્ટ |
| 3. | Any NGO working for village development | No. | | | |
| 4. | Any natural calamity in the village during the last one year:<br>EARTHQUAKES<br>FLOODS<br>CYCLONE<br>DROUGHT<br>LANDSLIDES<br>AVALANCHE<br>OTHER<br>(SPECIFY) | | | | |

## VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

| Sr. No. | Descriptions | Information/ Detail | Remarks |
|---|---|---|---|
| | | | |

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| | | | |
|---|---|---|---|
| 1. | Repair & Maintenance of Existing<br>Public Infrastructure facilities,<br>School Building<br>Health Center<br>Panchayat Building<br>Public Toilets & any other | — | — |
| 2. | Additional Information/ Requirement | — | — |
| 3. | During the last six months how many times<br>CLEANING .....<br>FOGGING.....<br>Drive was undertaken in the village? | cleaning :- Regular<br>Fogging :- 2 times | |

## IX. Smart Village / Heritage Details

| Sr. No. | Descriptions | Information/ Detail | Remarks |
|---|---|---|---|
| 1. | IS THEIR ANY THING FOR THE VILLAGE ENHANCEMENT POSSIBLE ? | public wifi | needed |

**Note: Photographs/ Video/ Drawings of all existing Infrastructure facilities & conditions should be taken by students of respective villages for their record and information.**

For Any Administration queries/ Difficulties:
GTU VY Section
**Contact No – 079-23267588**
**Email ID: rurban@gtu.edu.in**

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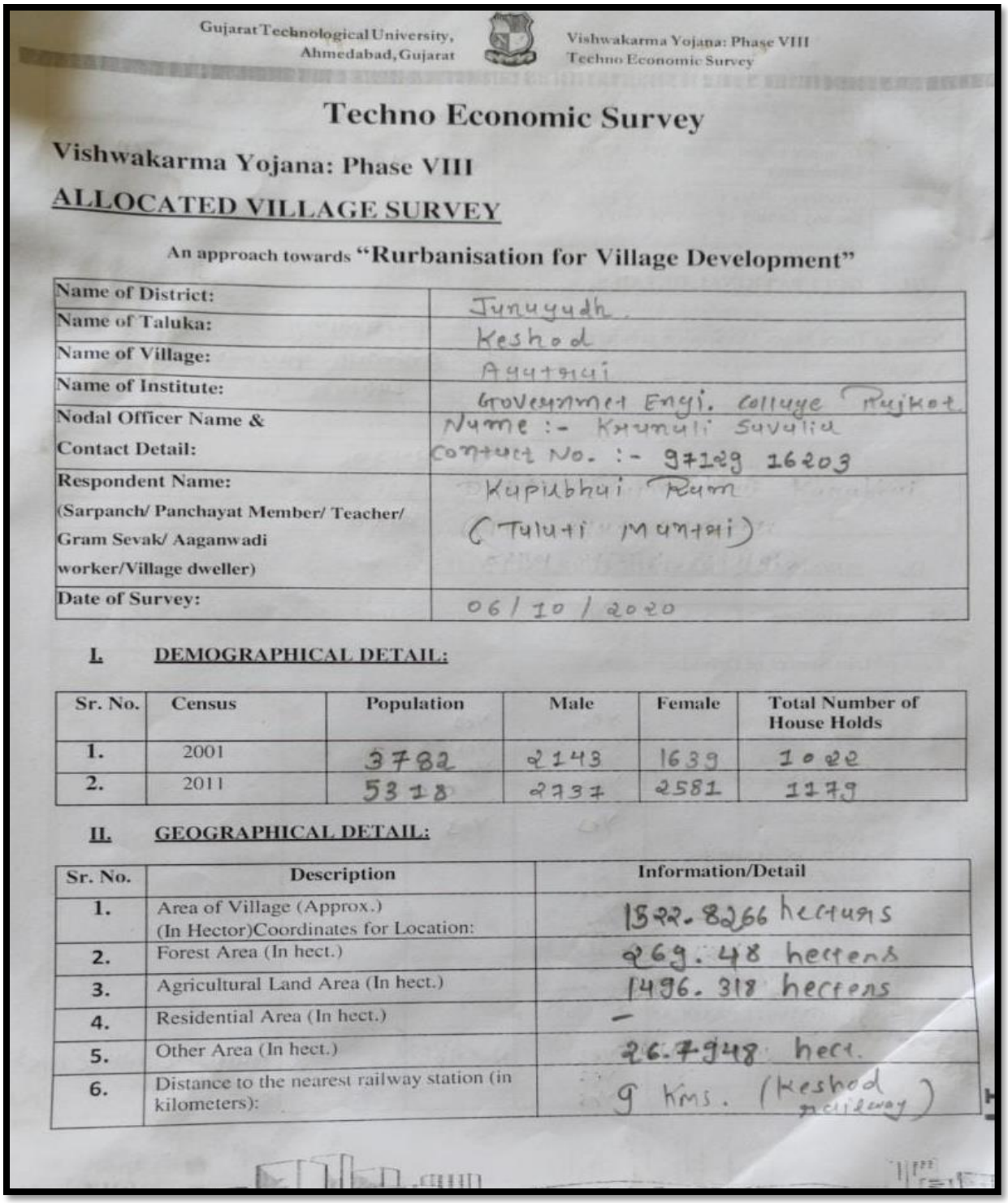
## 12.3 Survey form of Allocated Village Scanned copy attachment



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# Techno Economic Survey

## Vishwakarma Yojana: Phase VIII

## ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

| | |
|---|---|
| Name of District: | Junuyudh |
| Name of Taluka: | Keshod |
| Name of Village: | Ayutrai |
| Name of Institute: | Government Engi. College Rajkot |
| Nodal Officer Name & Contact Detail: | Name :- Kamuli Suvalia Contact No. :- 97129 16203 |
| Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller) | Kapilbhai Ram (Talati Mantri) |
| Date of Survey: | 06/10/2020 |

### I. DEMOGRAPHICAL DETAIL:

| Sr. No. | Census | Population | Male | Female | Total Number of House Holds |
|---|---|---|---|---|---|
| 1. | 2001 | 3782 | 2143 | 1639 | 1022 |
| 2. | 2011 | 5318 | 2737 | 2581 | 1179 |

### II. GEOGRAPHICAL DETAIL:

| Sr. No. | Description | Information/Detail |
|---|---|---|
| 1. | Area of Village (Approx.) (In Hector)Coordinates for Location: | 1522.8266 hectares |
| 2. | Forest Area (In hect.) | 269.48 hectens |
| 3. | Agricultural Land Area (In hect.) | 1496.318 hectens |
| 4. | Residential Area (In hect.) | - |
| 5. | Other Area (In hect.) | 26.7948 hect. |
| 6. | Distance to the nearest railway station (in kilometers): | 9 Kms. (Keshod railway) |

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| | | |
|---|---|---|
| 7. | Name of Nearest Town with Distance: | Keshod |
| 8. | Distance to the nearest bus station (in kilometers): | 1 KM (In Village in road) |
| 9. | Whether village is connected to all road for the any facility or town or City? | Yes. |

## III. OCCUPATIONAL DETAILS:

| | | |
|---|---|---|
| Name of Three Major Occupation groups in Village | 1. | Farming |
| | 2. | Animal husbandary |
| | 3. | Labour work |

| | | |
|---|---|---|
| Major crops grown in the village: | 1. | મગફળી |
| | 2. | ઘઉં |
| | 3. | જુવાર |

## IV. PHYSICAL INFRASTRUCTURE FACILITIES:

| Sr. No. | Descriptions | Detail | Adequate | Inadequate | Remarks |
|---|---|---|---|---|---|
| A. | **Main Source of Drinking water** | | | | |
| 1. | **PIPED WATER** | | | | |
| | Piped Into Dwelling | Yes | Yes | | |
| | Piped To Yard/Plot | Yes | Yes | | |
| | Public Tap/Standpipe | Yes | Yes | | |
| | Tube Well Or Bore Well | Yes | Yes | | |
| 2. | **DUG WELL** | | | | |
| | Protected Well | Yes | Yes | | |
| | Un Protected Well | | | | |
| 3. | **WATER FROM SPRING** | | | | |
| | Protected Spring | No | | | |
| | Unprotected Spring | No | | | |
| | Rainwater | Yes | | | |
| | Tanker Truck | No | | | |
| | Cart With Small Tank | No | | | |
| 4. | **SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/** | | | | |
| | Irrigation Channel | Yes | Not to | | Half in village/ombi |
| | Bottled Water | Yes | | | |
| | Hand Pump | Yes | | | |

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| | | | | | |
|---|---|---|---|---|---|
| | Other(Specify)Lake/ Pond | Lake | Yes | | very big. |
| Suggestions if any: | | | | | |
| B. | **Water Tank Facility** | | | | |
| | Overhead Tank | Capacity: 50000 | | | |
| | Underground Sump | Capacity: 20,000 | | | Qty :- 2 |
| Suggestions if any: | | | | | |
| C. | **The Type of Drainage Facility** | | | | |
| | A. UNDERGROUND DRAINAGE 1 | — | | | |
| Suggestions if any: | | | | | |
| D. | **Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM** | | | | |
| | Village approach road | Block/cc | | | |
| | Main road | WBM | | | |
| | Internal streets | Block/cc | | | |
| | Nearest NH/SH/MDR/ODR Dist. in kms. | NH - 8 | | | |
| Suggestions if any: | | | | | |
| E. | **Transport Facility** | | | | |
| | Railway Station (Y/N) (If No than Nearest Rly Station---Kms) | No | | | Near :- Keshod KM :- 8 KM |
| | Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms) | No | | | Near :- Keshod KM :- 9 KM |
| | Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other) | chukda. | | | |
| Suggestions if any: | | | | | |
| F. | **Electricity Distribution** | | | | |
| | (Y/N ) Govt./ Private (Less than 6 hrs./ More Than 6 hrs) | Govt. | | | More than 6 hrs. |

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| | | | | | |
|---|---|---|---|---|---|
| | Power supply for Domestic Use | Yes | | | 24 hrs |
| | Power supply for Agricultural Use | Yes | | | 24 hrs |
| | Power supply for Commercial Use | Yes | | | 24 hrs |
| | Road/ Street Lights | Yes | | | 24 hrs. |
| | Electrification in Government Buildings/ Schools/ Hospitals | Yes | | | 24 hrs. |
| | Renewable Energy Source Facilities (Y/ N) | No | | | |
| | LED Facilities | Yes | | | |

**Suggestions if any:**

| **G.** | **Sanitation Facility** | | | | |
|---|---|---|---|---|---|
| | Public Latrine Blocks If available than Nos. | Yes | | | 01 |
| | Location Condition | Near P.O. | | | Medium. |
| | Community Toilet (With bath/ without bath facilities) | No. | | | |
| | Solid & liquid waste Disposal system available | Yes | | | |
| | Any facility for Waste collection from road | No. | | | |

**Suggestions if any:**

| **H.** | **Main Source of Irrigation Facility:** | | | | |
|---|---|---|---|---|---|
| | TANK/POND | | | | |
| | STREAM/RIVER | | | | |
| | CANAL | Yes | | | (on H.W. not in V.) |
| | WELL | Yes | | | |
| | TUBE WELL. | | | | |
| | OTHER (SPECIFY) | | | | |

**Suggestions if any:**

| **I.** | **Housing Condition:** | | | | |
|---|---|---|---|---|---|
| | Kutchha/Pucca (Approx. ratio) | Total 1050 | | | Ratio : |

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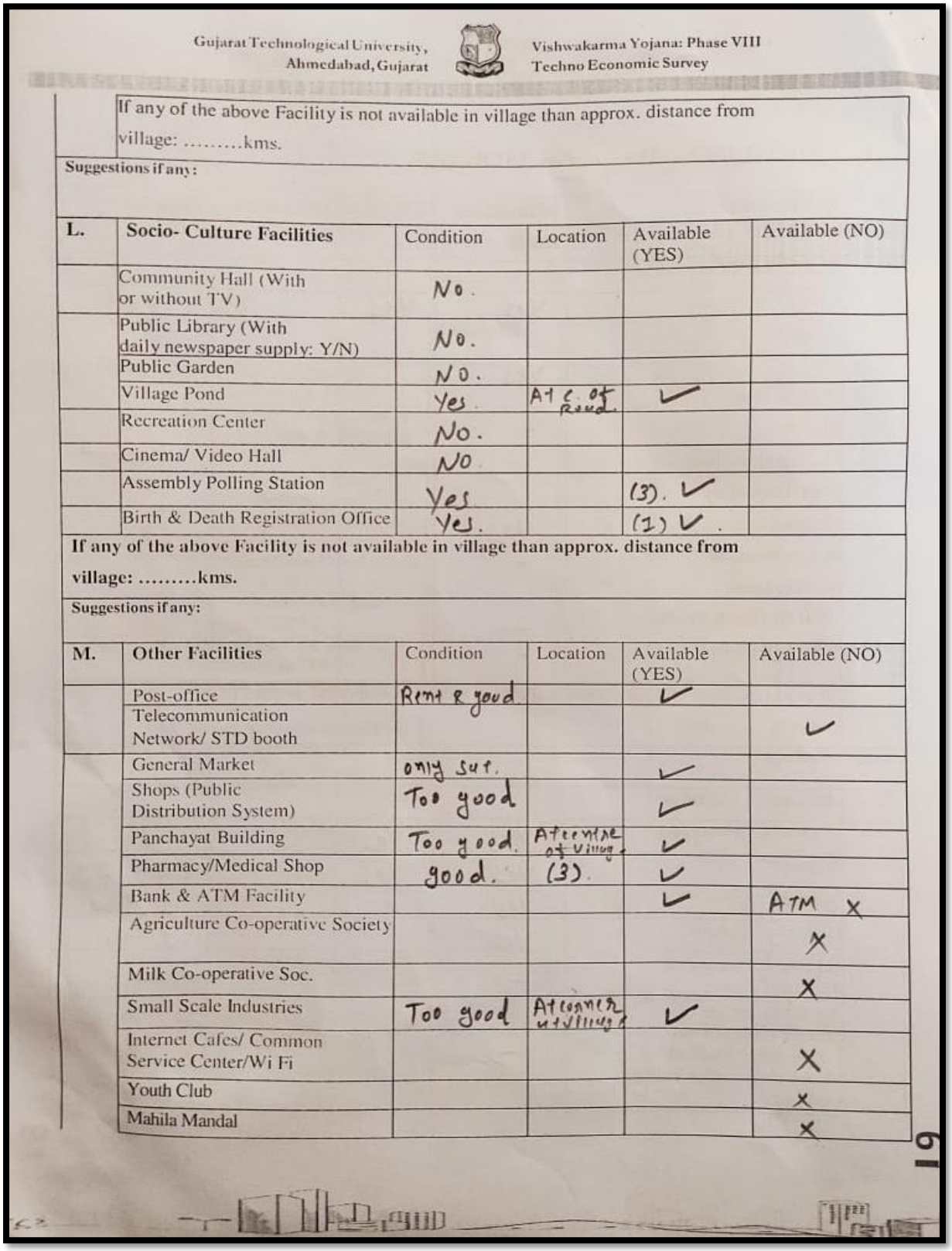
## V. SOCIAL INFRASTRUCTURAL FACILITIES:

| Sr. No. | Descriptions | Information/ Detail | Adequate | Inadequate | Remarks |
|---|---|---|---|---|---|
| J. | **Health Facilities:** | | | | |
| | ICDS (Anganwadi) | Yes | Yes | | 6 |
| | Sub-Centre | | | | |
| | PHC | Yes | | | 2/AYU. 1 |
| | BLOCK PHC | - | | | |
| | CHC/RH | - | | | |
| | District/ Govt. Hospital | - | | | Keshod |
| | Govt. Dispensary | - | | | |
| | Private Clinic | Yes | | | 3 |
| | Private Hospital/ | - | | | |
| | Nursing Home | - | | | |
| | AYUSH Health Facility | - | | | |
| | sonography /ultrasound facility | - | | | |
| | If any of the above Facility is not available in village than approx. distance from village: .....kms. | | | | |
| **Suggestions if any:** | | | | | |
| K. | **Education Facilities:** | | | | |
| | Aaganwadi/ Play group | Yes | Yes | | 6 |
| | Primary School | Yes | Yes | | 2 Gov. 1 P. |
| | Secondary school | Yes | | | 1. Gov. |
| | Higher sec. School | Yes. | | | 1. Gov. |
| | ITI college/ vocational Training Center | - | | | - |
| | Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities | - | | | - |



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If any of the above Facility is not available in village than approx. distance from village: .....kms.

**Suggestions if any:**

| L. | Socio- Culture Facilities | Condition | Location | Available (YES) | Available (NO) |
|---|---|---|---|---|---|
| | Community Hall (With or without TV) | No. | | | |
| | Public Library (With daily newspaper supply: Y/N) | No. | | | |
| | Public Garden | No. | | | |
| | Village Pond | Yes | At C. of Road. | ✓ | |
| | Recreation Center | No. | | | |
| | Cinema/ Video Hall | No | | | |
| | Assembly Polling Station | Yes | | (3). ✓ | |
| | Birth & Death Registration Office | Yes. | | (1) ✓ | |

**If any of the above Facility is not available in village than approx. distance from village: .....kms.**

**Suggestions if any:**

| M. | Other Facilities | Condition | Location | Available (YES) | Available (NO) |
|---|---|---|---|---|---|
| | Post-office | Rent & good | | ✓ | |
| | Telecommunication Network/ STD booth | | | | ✓ |
| | General Market | only sat. | | ✓ | |
| | Shops (Public Distribution System) | Too good | | ✓ | |
| | Panchayat Building | Too good. | At centre of village. | ✓ | |
| | Pharmacy/Medical Shop | good. | (3). | ✓ | |
| | Bank & ATM Facility | | | ✓ | ATM X |
| | Agriculture Co-operative Society | | | | X |
| | Milk Co-operative Soc. | | | | X |
| | Small Scale Industries | Too good | At corner of village | ✓ | |
| | Internet Cafes/ Common Service Center/Wi Fi | | | | X |
| | Youth Club | | | | X |
| | Mahila Mandal | | | | X |

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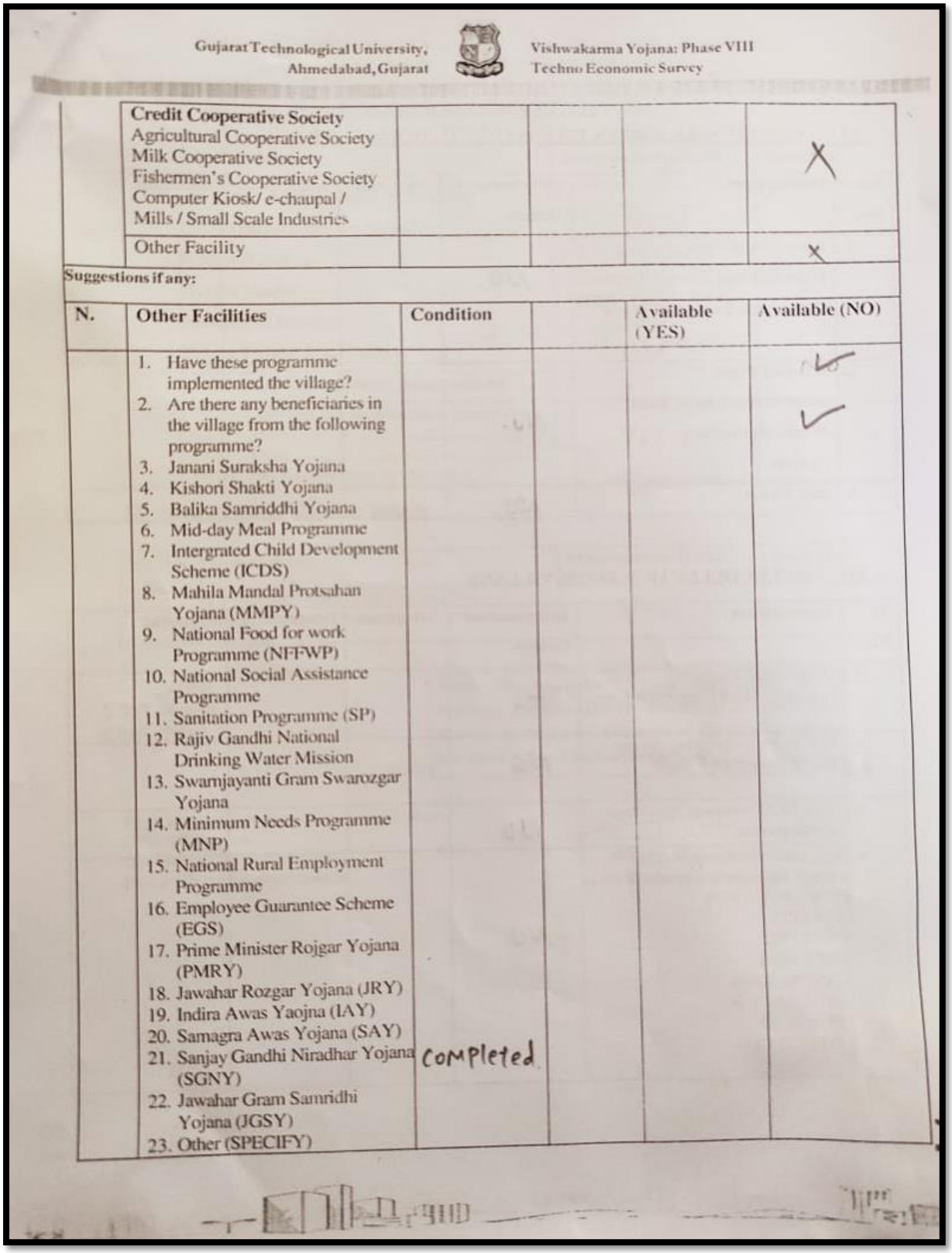

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| | | | | | |
|---|---|---|---|---|---|
| | Credit Cooperative Society<br>Agricultural Cooperative Society<br>Milk Cooperative Society<br>Fishermen's Cooperative Society<br>Computer Kiosk/ e-chaupal /<br>Mills / Small Scale Industries | | | | X |
| | Other Facility | | | | X |

Suggestions if any:

| N. | Other Facilities | Condition | | Available (YES) | Available (NO) |
|---|---|---|---|---|---|
| | 1. Have these programme implemented the village? | | | | ✓ |
| | 2. Are there any beneficiaries in the village from the following programme? | | | | ✓ |
| | 3. Janani Suraksha Yojana | | | | |
| | 4. Kishori Shakti Yojana | | | | |
| | 5. Balika Samriddhi Yojana | | | | |
| | 6. Mid-day Meal Programme | | | | |
| | 7. Intergrated Child Development Scheme (ICDS) | | | | |
| | 8. Mahila Mandal Protsahan Yojana (MMPY) | | | | |
| | 9. National Food for work Programme (NFFWP) | | | | |
| | 10. National Social Assistance Programme | | | | |
| | 11. Sanitation Programme (SP) | | | | |
| | 12. Rajiv Gandhi National Drinking Water Mission | | | | |
| | 13. Swarnjayanti Gram Swarozgar Yojana | | | | |
| | 14. Minimum Needs Programme (MNP) | | | | |
| | 15. National Rural Employment Programme | | | | |
| | 16. Employee Guarantee Scheme (EGS) | | | | |
| | 17. Prime Minister Rojgar Yojana (PMRY) | | | | |
| | 18. Jawahar Rozgar Yojana (JRY) | | | | |
| | 19. Indira Awas Yaojna (IAY) | | | | |
| | 20. Samagra Awas Yojana (SAY) | | | | |
| | 21. Sanjay Gandhi Niradhar Yojana (SGNY) | Completed | | | |
| | 22. Jawahar Gram Samridhi Yojana (JGSY) | | | | |
| | 23. Other (SPECIFY) | | | | |

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## VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

| Sr. No. | Descriptions | Information/ Details | Adequate | Inadequate | Remarks |
|---|---|---|---|---|---|
| 1. | Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources | NO. | | | |
| 2. | Bio-Gas Plant Solar Street Lights Rain Water Harvesting System | NO. | | | |
| 3. | Any Other | NO. | | | |

## VII. DATA COLLECTION FROM VILLAGE

| Sr. No. | Descriptions | Information/ Details | Adequate | Inadequate | Remarks |
|---|---|---|---|---|---|
| 1. | Village Base Map Available: Hard Copy/Soft Copy | Yes | | | Both Hard copy Soft copy |
| 2. | Recent Projects going on for Development of Village | NO | | | |
| 3. | Any NGO working for village development | NO | | | |
| 4. | Any natural calamity in the village during the last one year: EARTHQUAKES FLOODS CYCLONE DROUGHT LANDSLIDES AVALANCHE OTHER (SPECIFY) | NO. | | | |

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## VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

| Sr. No. | Descriptions | Information/ Detail | Remarks |
|---|---|---|---|
| 1. | Repair & Maintenance of Existing Public Infrastructure facilities, School Building Health Center Panchayat Building Public Toilets & any other | All things & building are new and good condition. | |
| 2. | Additional Information/ Requirement | - | |
| 3. | During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village? | Yes. | |

## IX. Smart Village / Heritage Details

| Sr. No. | Descriptions | Information/ Detail | Remarks |
|---|---|---|---|
| 1. | IS THEIR ANY THING FOR THE VILLAGE ENHANCEMENT POSSIBLE ? | Yes. | |

Note: Photographs/ Video/ Drawings of all existing Infrastructure facilities & conditions should be taken by students of respective villages for their record and information.

For Any Administration queries/ Difficulties:
GTU VY Section
Contact No – 079-23267588
Email ID: rurban@gtu.edu.in

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ગ્રામ પંચાયત-અગતરાઇ

## 12.4 Gap Analysis of the Allocated Village

Table 29: Gap Analysis of Agatrai Village

| VILLAGE GAP Analysis | | | | |
|---|---|---|---|---|
| **Village Facilities** | **Planning Commission/UDPFI Norms** | **Village Name:** | Agatrai | |
| | | **Population: 5318** | | |
| | | **Existing** | **Required as per Norms** | **Gap** |
| **Social Infrastructure Facilities** | | | | |
| **Education** | | | | |
| Anganwadi | Each or Per 2500 population | 6 | 2 | 4 |
| Primary School | Each Per 2500 population | 2 | 2 | 0 |
| Secondary School | Per 7,500 population | 1 | 0 | 1 |
| Higher Secondary School | Per 15,000 Population | 1 | 0 | 1 |
| College | Per 125,000 Population | 0 | 0 | 0 |
| Tech. Training Institute | Per 100000 Population | 0 | 0 | 0 |
| Agriculture Research Centre | Per 100000 Population | 0 | 0 | 0 |
| Skill Development Centre | Per 100000 Population | 0 | 0 | 0 |
| **Health Facility** | | | | |
| Govt/Panchayat Dispensary or Sub PHC or Health Centre | Each Village | 1 | 1 | 1 |
| Primary Health & Child Health Centre | Per 20,000 population | 0 | 0 | 0 |
| Child Welfare and Maternity Home | Per 10,000 population | 0 | 0 | 0 |
| Multispecialty Hospital | Per 100000 Population | 0 | 0 | 0 |
| **Public Latrines** | 1 for 50 families (if toilet is not there in home, especially for slum pockets & kutcha house) | 0 | 2 | -2 |
| **Physical Infrastructure Facilities** | | | | |
| **Transportation** | | **Adequate / Inadequate** | | |
| Pucca Village Approach Road | Each village | Adequate | | |
| Bus/Auto Stand provision | All Villages connected by PT (ST Bus or Auto) | Adequate | | |
| Drinking Water (Minimum 70 lpcd) | | Adequate | | |
| Over Head Tank | 1/3 of Total Demand | Adequate | | |
| U/G Sump | 2/3 of Total Demand | Adequate | | |
| Drainage Network - Open | | Adequate | | |

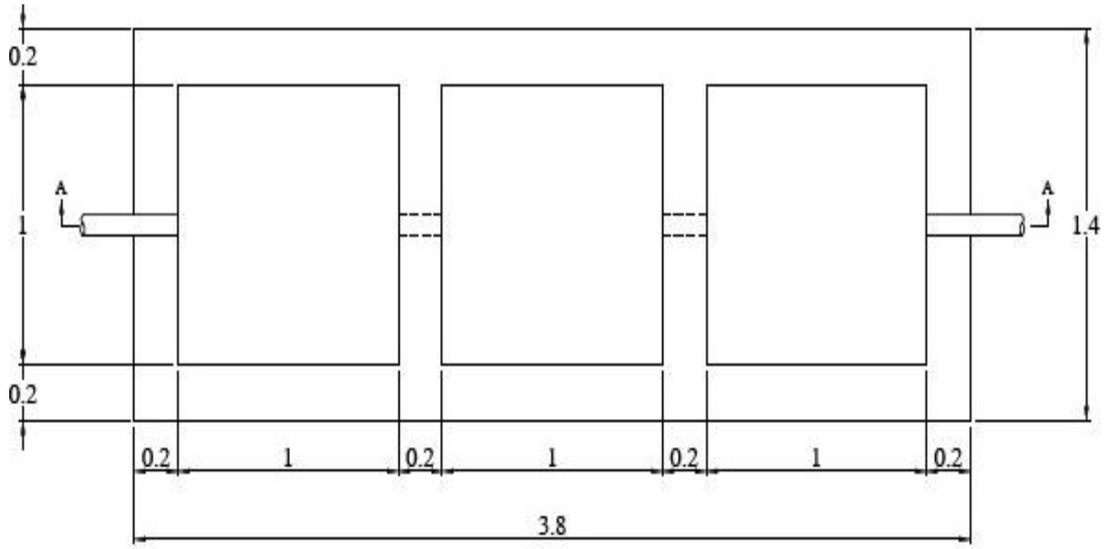
| | | | | |
|---|---|---|---|---|
| Drainage Network - Cover | | Inadequate | | |
| Waste Management System | | Inadequate | | |
| **Socio- Cultural Infrastructure Facilities** | | | | |
| **Community Hall** | Per 10000 Population | 0 | 1 | -1 |
| **Community hall and Public Library** | Per 15000 Population | 0 | 1 | -1 |
| **Cremation Ground** | Per 20,000 population | 0 | 0 | 0 |
| **Post Office** | Per 10,000 population | 1 | 1 | 0 |
| **Gram Panchayat Building** | Each individual/group panchayat | 1 | 1 | 0 |
| **APMC** | Per 100000 Population | 0 | 0 | 0 |
| **Fire Station** | Per 100000 Population | 0 | 0 | 0 |
| **Public Garden** | Per village | 0 | 1 | -1 |
| **Police post** | Per 40,000Population | 0 | 0 | 0 |
| **Shopping Mall** | 0 | | | |
| **Electrical Design** | | | | |
| **Electricity Network** | | **Adequate / Inadequate** | | |
| For Domestic use | 24 hrs per day | Adequate | | |
| For Agricultural use | 8hrs per day | Adequate | | |
| For commercial use | 24hrs per day | Adequate | | |
| **Any Smart Village Facility** | | | | |
| **Technology** | - | | | |
| | | **ESR Cap** | 50000 ltr | |
| | | **Sump Cap** | 200000 ltr | |
| | | **Lat** | - | |

## 12.5 Summary Details of All the Villages Designs in Table form

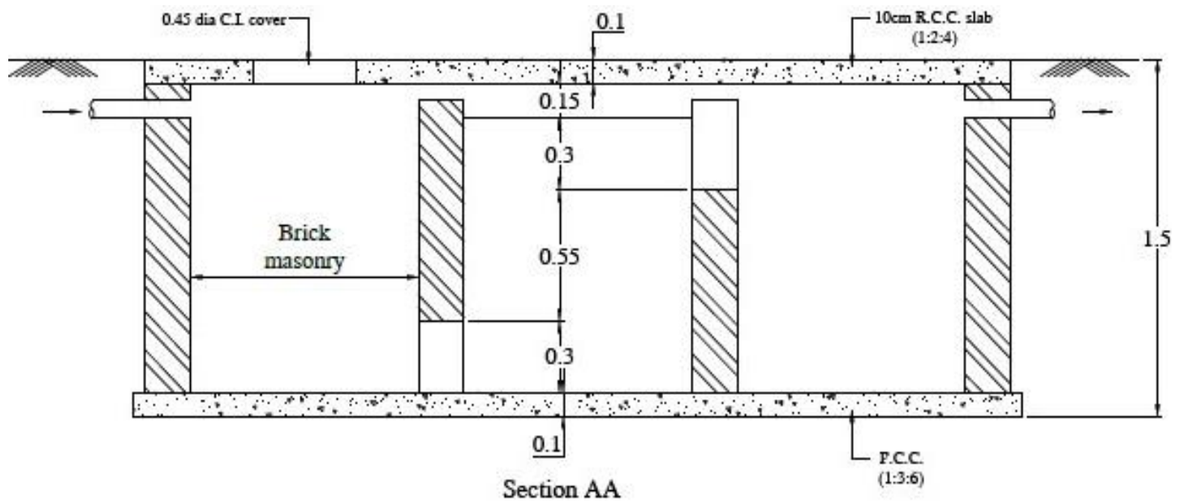
Table 30: Summary Details of all the Village Designs

| Sr No. | Village | Discipline | Part-I | Part-II |
|---|---|---|---|---|
| **1** | **Agatrai** | **Civil** | **Septic Tank** | **Agricultural Storage Yard** |
| | | | **Garden** | **Skill Development Centre** |
| | | | **Public Library** | **Milk Cooperative Society** |
| | | | **Community Hall** | **Bus Stop** |
| | | | **Dry Composite Toilet** | **Farmer Help Centre** |
| | | | **Village Entry Gate** | **Rainwater Recharge System** |
| 2 | Khoja Beraja | Civil | Rain Water Harvesting | Bus Stop |
| | | | Bio Gas Plant | Artificial Pond |
| | | | Step Auditorium | ATM Machine |
| | | | Library | Public Health Centre |
| | | | Swimming Pool | Community Toilet |
| | | | Children Playground | Open Party Plot |
| 3 | Rangpar (Bela) | Civil | Bio Gas Plant | Green House |
| | | | Children Park | Septic Tank |
| | | | Rainwater Harvesting | Bank |
| | | | Community Hall | Post Office |
| | | | Library | Dry Composite Toilet |
| | | | Clock Tower | Auditorium |

## 12.6: A3 Size Drawing Sheets




**PLAN**




**SECTION**

**Gujarat Technological University**

- **All dimensions are in meters unless stated otherwise.**
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- **Design is not responsible for any kind of wrong data.**
- **Minimum grade of concrete is M20 and all steel grade is Fe500.**
- **All brick masonry walls in cement mortar in proportion of 1:6.**
- **Drawings should not be read for scale.**

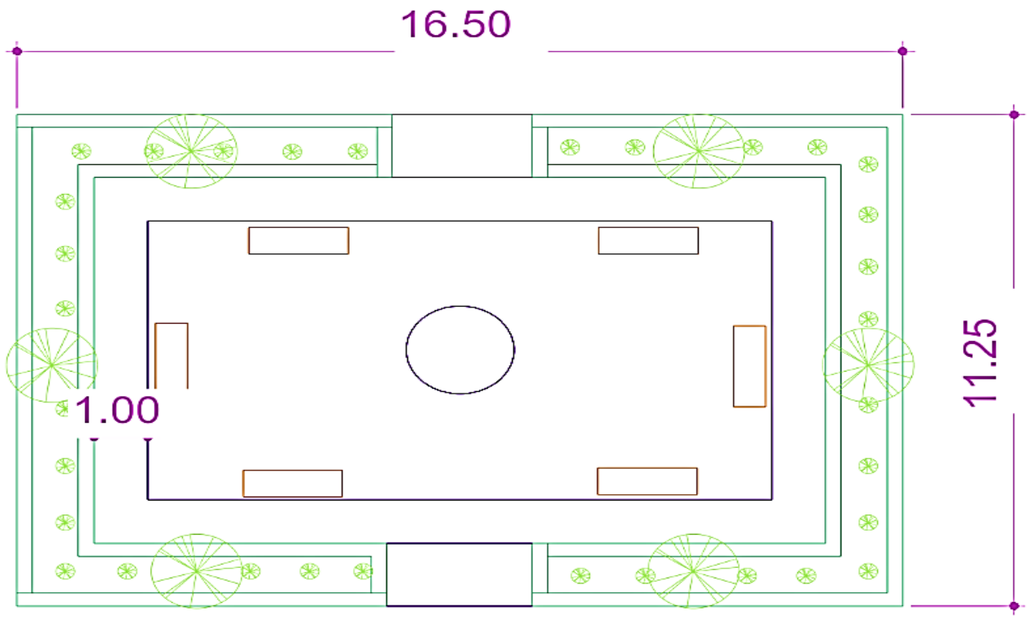
**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

**Design No: 1**
**Septic Tank**

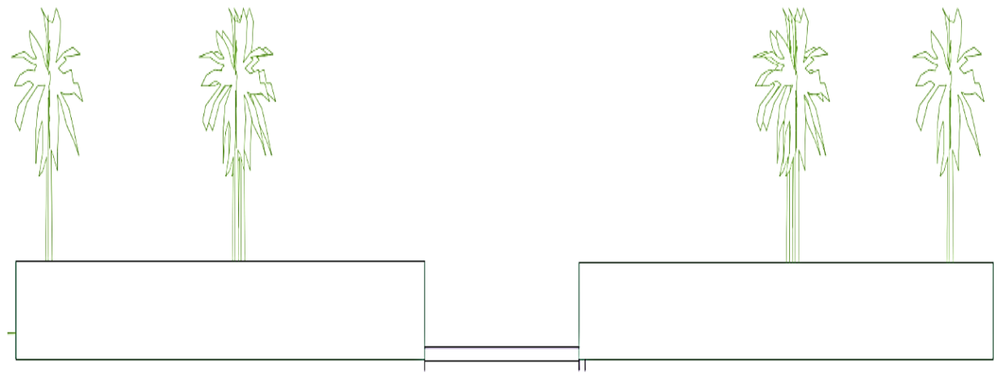
**Vishwakarma Yojana Phase:VIII**

**Guided By: Prof. K.J. Savaliya**

**Date: 09/11/2020**




**PLAN**



**ELEVATION**

**Gujarat Technological University**

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- **Drawings should not be read for scale.**

**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

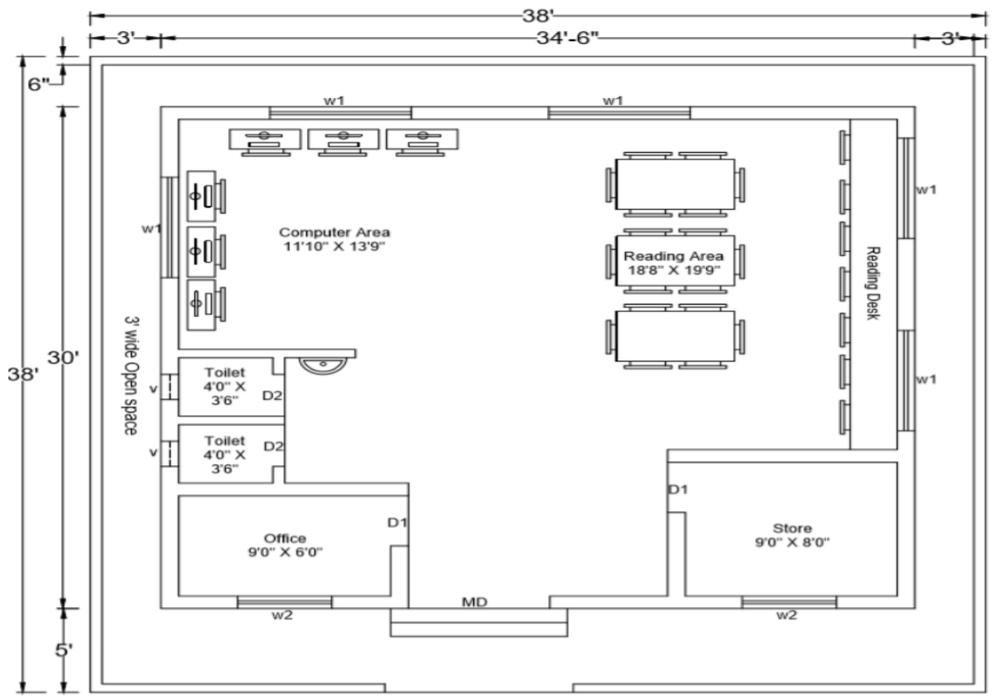
**Design No: 2**

**Garden**

**Vishwakarma Yojana Phase:VIII**

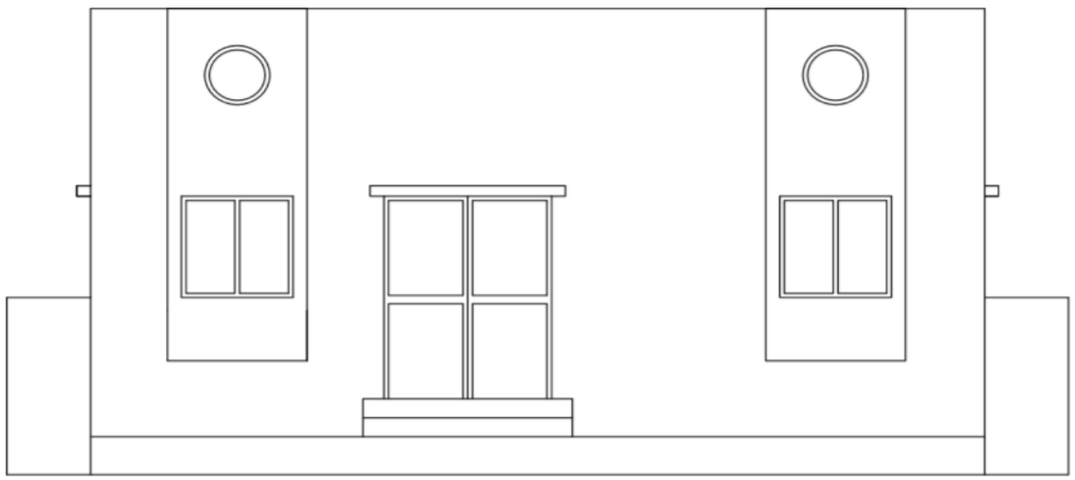
**Guided By: Prof. K.J. Savaliya**

**Date: 09/11/2020**




| | Door & Windows Size |
|---|---|
| MD | 6'0" x 9'0" |
| D1 | 3'0" x 7'0" |
| D2 | 2'6" x 7'0" |
| W1 | 6'0" x 4'0" |
| W2 | 4'0" x 4'0" |
| V | 1'6" x 1'3" |

**PLAN**



**ELEVATION**

**Gujarat Technological University**

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- **All brick masonry walls in cement mortar in proportion of 1:6.**
- **Drawings should not be read for scale.**

GOVERNMENT ENGINEERING COLLEGE RAJKOT
Established in: 2004

**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

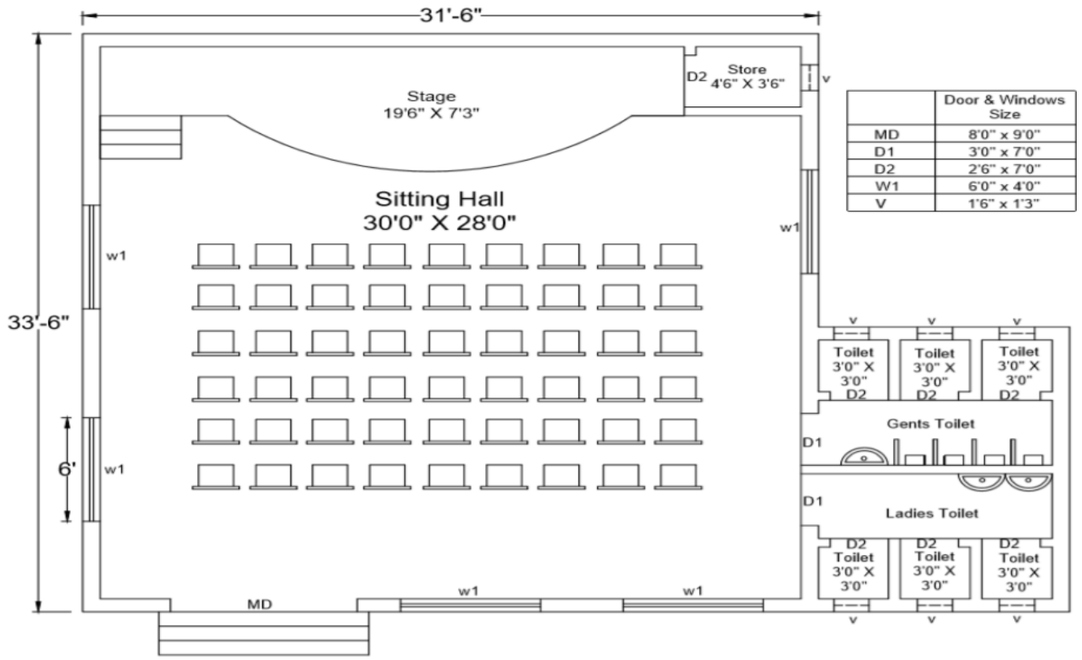
**Design No: 3**

**Public Library**

**Vishwakarma Yojana Phase:VIII**

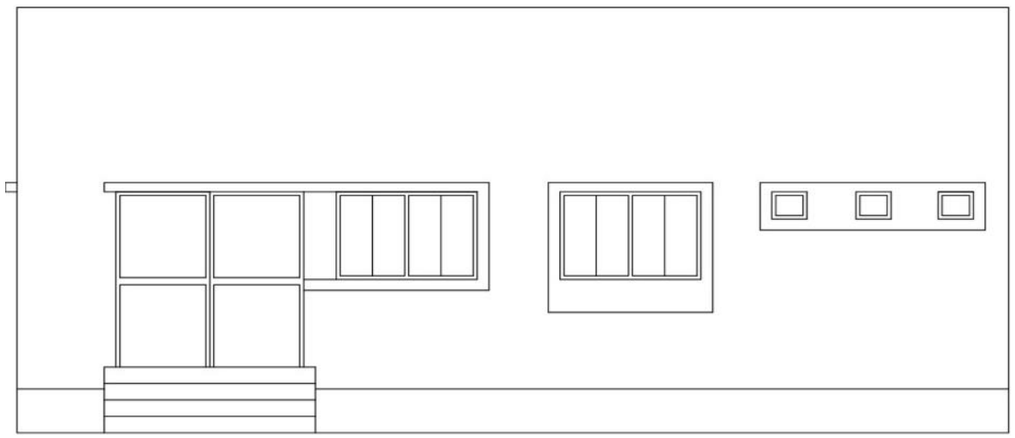
**Guided By: Prof. K.J. Savaliya**

**Date: 09/11/2020**




| | Door & Windows Size |
|---|---|
| MD | 8'0" x 9'0" |
| D1 | 3'0" x 7'0" |
| D2 | 2'6" x 7'0" |
| W1 | 6'0" x 4'0" |
| V | 1'6" x 1'3" |

**PLAN**



**ELEVATION**

**Gujarat Technological University**

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- **Design is not responsible for any kind of wrong data.**
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- **Drawings should not be read for scale.**

**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

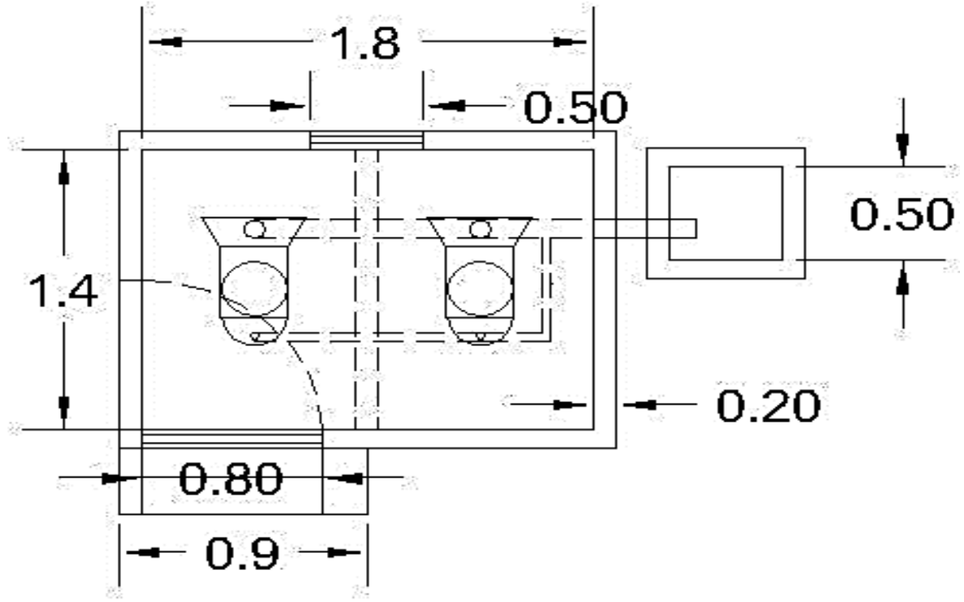
**Design No: 4**

**Community Hall**

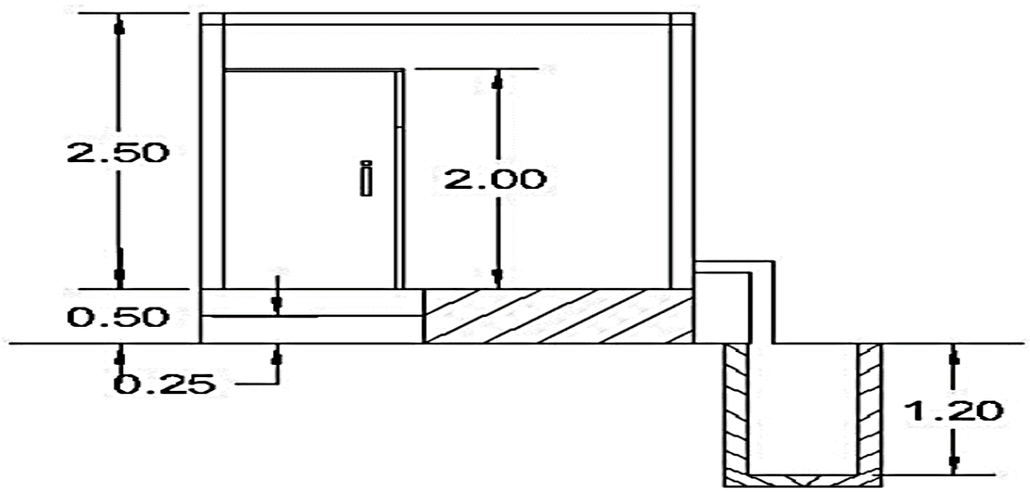
**Vishwakarma Yojana Phase:VIII**

**Guided By: Prof. K.J. Savaliya**

**Date: 09/11/2020**




**PLAN**




**ELEVATION**

**Gujarat Technological University**

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- **Design is not responsible for any kind of wrong data.**
- **Minimum grade of concrete is M20 and all steel grade is Fe500.**
- **All brick masonry walls in cement mortar in proportion of 1:6.**
- **Drawings should not be read for scale.**

**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

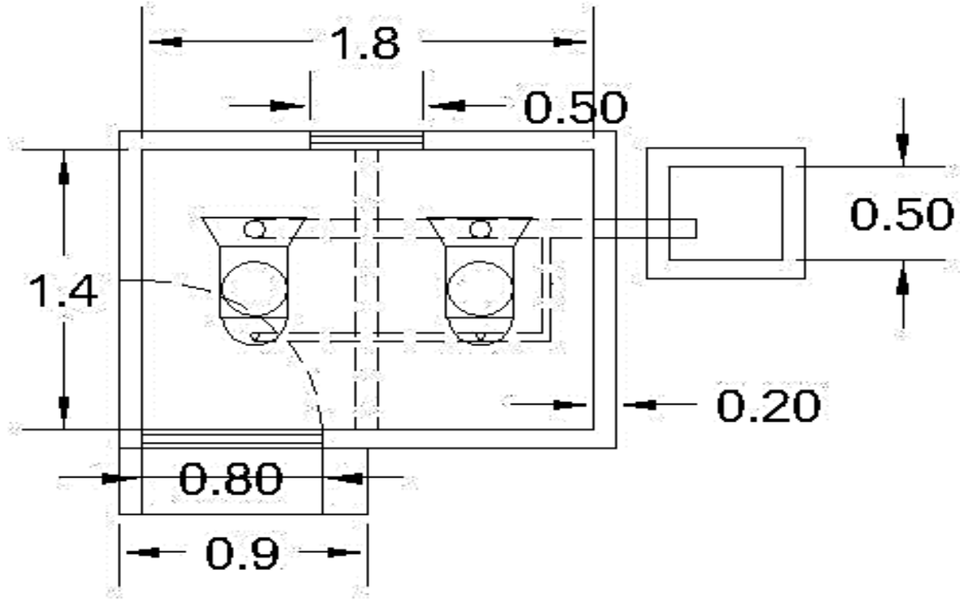
**Design No: 5**

**Dry Composting Toilet**

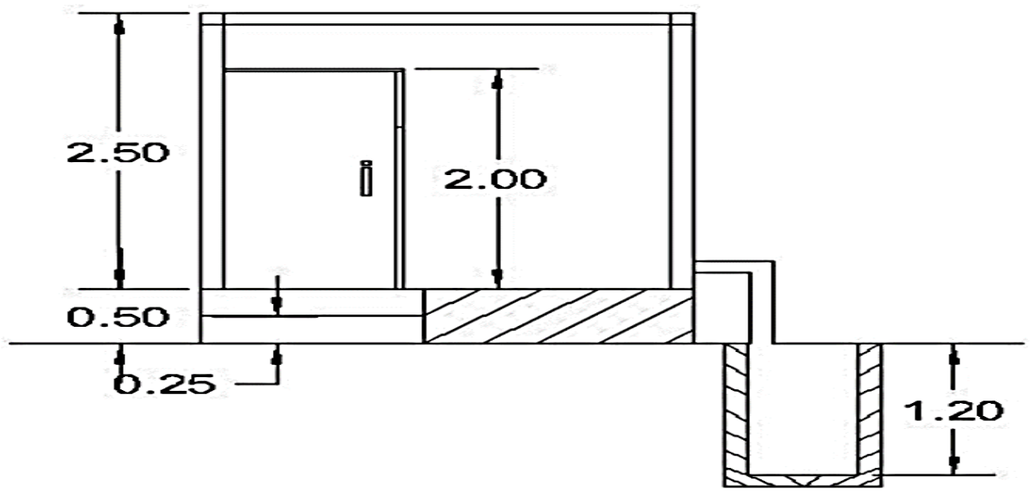
**Vishwakarma Yojana Phase:VIII**

**Guided By: Prof. K.J. Savaliya**

**Date: 09/11/2020**




**PLAN**




**ELEVATION**

**Gujarat Technological University**

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- **Design is not responsible for any kind of wrong data.**
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- **All brick masonry walls in cement mortar in proportion of 1:6.**
- **Drawings should not be read for scale.**

**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

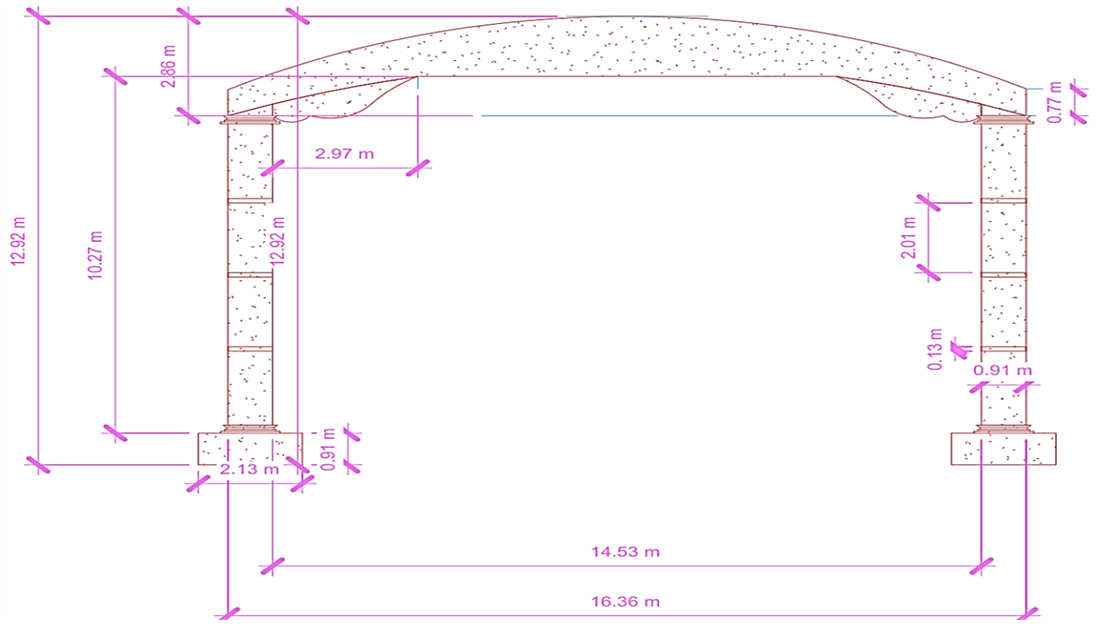
**Design No: 5**

**Dry Composting Toilet**

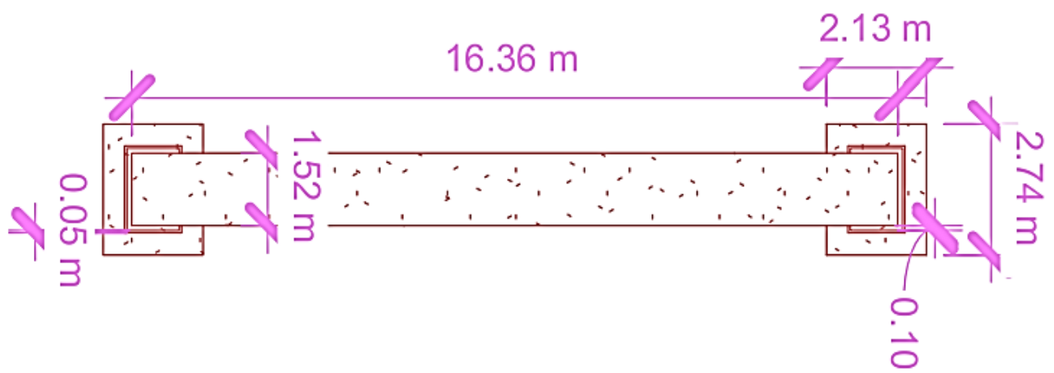
**Vishwakarma Yojana Phase:VIII**

**Guided By: Prof. K.J. Savaliya**

**Date: 09/11/2020**




**ELEVATION**




**PLAN**

**Gujarat Technological University**

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- **Design is not responsible for any kind of wrong data.**
- **Minimum grade of concrete is M20 and all steel grade is Fe500.**
- **All brick masonry walls in cement mortar in proportion of 1:6.**
- **Drawings should not be read for scale.**

**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

**Design No: 6**

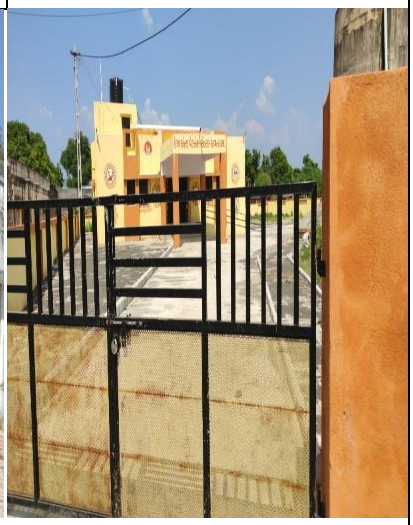
**Village Entry Gate**

**Vishwakarma Yojana Phase:VIII**

**Guided By: Prof. K.J. Savaliya**

**Date: 09/11/2020**

## 12.7 Summary of Good Photographs in Table Format

| Ideal Village (Meswan) | Smart Village (Ajab) | Allocated village (Agatrai) |
|---|---|---|
|  |  |  |
|  |  |  |
|  |  |  |

## 12.8 Village Interaction with Sarpanch Report

**A Report**
**On**
**Interactive Presentation (Vishwakarma Yojana: Phase-VIII)**
**At**
**Agatrai Village, Junagadh.**

**9th November. 2020**

As per the circular GTU guideline, GTU informed all the teams of Vishwakarma Yojana to present their work in village for the effective implementation of Vishwakarma Yojana. Under this guideline, we have visited to Agatrai village and meet the peoples and Panchayat members to interaction with them.

We visited allocated village Agatrai and we did the techno economic survey. We collected various information and data from the Talati of the Agatrai village. We also visited the Ideal village Meswan and Smart village Ajab and did the techno economic survey. Sarpanch, Talati and all the panchayat members and village dwellers actively participated and told us the problems they were facing.

After doing the gap analysis of the village with UDPFI guidelines we prepared the designs of the infrastructures. We presented our work under Vishwakarma Yojana. We explained core theme of Vishwakarma Yojana, various benefits of village development and issues prevailing in villages.
We explained various designs under Physical infrastructures, Social infrastructure and Socio-cultural facilities such as:

- **Septic Tank**
- **Garden**
- **Community Hall**
- **Public Library**
- **Dry Composite Toilet**
- **Village Entry Gate**

The presentation was very much interactive. Sarpanch, Talati and all the panchayat members and village dwellers were very much interested to know how the development of Agatrai village is possible and to give their feedback. and helpful to understand various amenities to be designed at village level for the overall development of Agatrai village as Rurban town.

## 12.9 Sarpanch Letter giving information about the village development

### Sarpanch Letter For Agatrai Village Design Proposal Approval

**Government Engineering College Rajkot**

**Civil Engineering Department**

**Vishwakarma Yojana Phase VIII**

Date: 9-11-2020

Subject: Agatrai Village design proposal approval Sarpanch letter for Vishwakarma Yojana Phase VIII, Part 1

It is the approval of below mentioned design of Agatrai village which is suggested by us for the development of Agatrai village.

Students have conducted Techno Economic Survey of the village. During the visit we discussed with various authorities of village as well as with the people of the village. We also have visited various infrastructures existing in the village.

List of students who have visited the Agatrai village:

| Sr. No. | Enrollment No. | Name of Student |
|---|---|---|
| 1 | 170200106037 | Smit B. Nakrani |
| 2 | 170200106028 | Krutarth R. Joshi |

List of design for Agatrai Village:

1. Septic Tank (Sustainable Design)
2. Garden (Physical Design)
3. Public Library (Social Design)
4. Community Hall (Socio Cultural Design)
5. Dry Composite Toilet (Smart Village Design)

સરપંચ
ગ્રામ પંચાયત–અગતરાય

તલાટી–કમ–મંત્રી
ગ્રામ પંચાયત–અગતરાય

# PART II

# Chapter 13

## Sustainable Design Planning Proposal Part II

## 13.1 Design Proposals

### 13.1.1 Civil Design 1

### Agricultural Storage Yard

Agricultural Storage Yard is a place where the farmers' store their crops which are yielded, before selling to the appropriate buyer at appropriate rate. Agricultural Storage Yard helps to keep the crop of the farmers' safe from the sun and the rain.

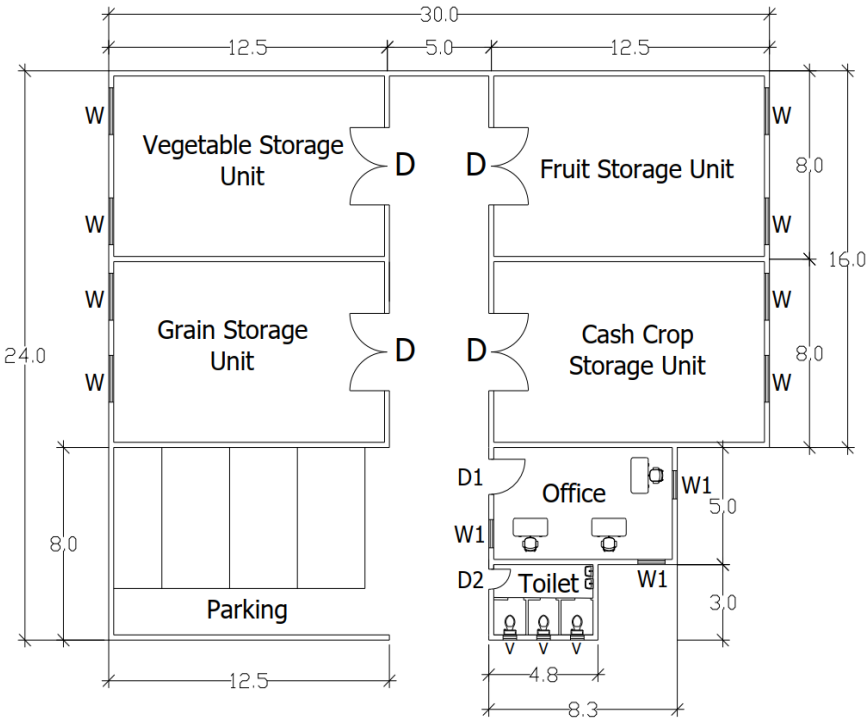
**Current Scenario**

Agatrai village is a big village with 1500 hectares of agricultural land. Due to the pandemic the Agricultural Produce Market Committee (APMC) centres are been closed for the sale of the agricultural goods. Therefore, the farmers are forced to store the crops harvested in the open fields or under shed for long time. The quality of the crops deteriorates with time due to environmental effect of high temperatures of summer and unexpected rains. Agricultural Storage Yard will help the farmers to store their crops temporarily under good condition.

**Design Overview**

The design of the Agricultural Storage Yard consists of 4 large storage units. There is a Grain Storage Unit, a Cash Crop Storage Unit, a Vegetable Storage Unit and a Fruit Storage Unit. There is an office for the employees who will run the Agricultural Storage Yard. The office will keep record of the goods stored and will collect the fees for storing the goods. There is a big parking area for the transport vehicles to park in front of the storage units. The vehicle can be parked next to the gate of storage unit and goods can be loaded and unloaded. If there is already a vehicle, then the other one can wait in the parking space. Security will be arranged for the safety of the stored goods. Total Area of Yard is 720 $m^2$.

**Design Drawings**




| | Doors and Windows Sizes (m) |
|---|---|
| D | 3.5 x 3.2 |
| D1 | 2.1 x 1.3 |
| D2 | 2.1 x 1.1 |
| W | 2.3 x 2 |
| W1 | 1.4 x 1.2 |
| V | 1.5 x 0.6 |

Figure 61: Plan of Agricultural Storage Yard

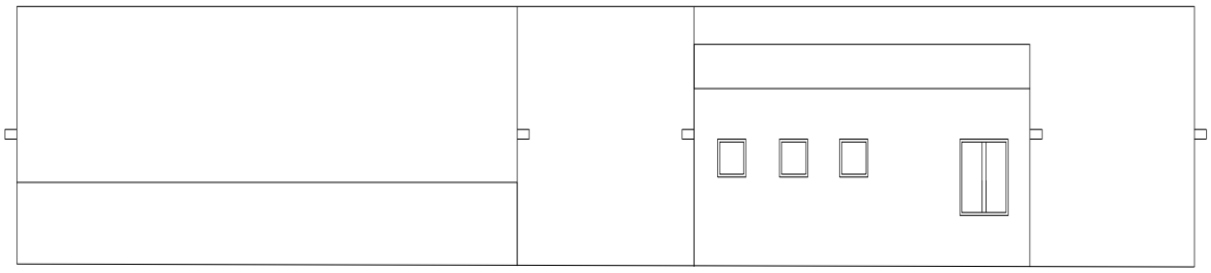


Figure 62: Elevation of Agricultural Storage Yard

**Measurement Sheet**

Table 31: Measurement Sheet of Agricultural Storage Yard

| Sr No. | Item Description | No | Length (m) | Width (m) | Height (m) | Quantity |
|---|---|---|---|---|---|---|
| 1 | Excavation in Foundation<br>Net Centre line length<br>= 183-(0.5*0.8*2) =182.2m | 1 | 182.2 | 0.8 | 1.1 | 160.3 $m^3$ |
| 2 | P.C.C. in foundation (1:4:8) | 1 | 182.2 | 0.8 | 0.2 | 29.1 $m^3$ |
| 3 | Brickwork in foundation up to plinth | | | | | |
| | Step 1<br>L=183-0.5*0.4*2 =182.6 m | 1 | 182.6 | 0.4 | 0.2 | 14.6 |
| | Step 2<br>L=183-0.5*0.3*2 =182.7 m | 1 | 182.7 | 0.3 | 0.2 | 10.95 |
| | Step 3<br>L=183-0.5*0.2*2 =182.8m | 1 | 182.8 | 0.2 | 0.5 | 18.25 |
| | | | | | Total Quantity | 43.8 $m^3$ |
| 4 | Brickwork in super structure in cement mortar (1:6) | 1 | 182.7 | 0.2 | 3 | 109.62 $m^3$ |
| 5 | Roofing | 1 | 50 | 30 | - | 1500 $m^2$ |
| 6 | RCC Slab | 2 | 10 | 10 | 0.12 | 12 $m^3$ |
| 7 | Smoot plaster on wall and celling in C.M. (1:3) | | | | | |
| | Storage walls | 12 | 50 | - | 3 | 1800 |
| | | 12 | 30 | - | 3 | 1080 |
| | Office Walls | 8 | 10 | - | 3 | 240 |
| | | | | | Total Quantity | 3120 $m^2$ |

**Abstract Sheet**

Table 32: Abstract Sheet of Agricultural Storage Yard

| Sr. No. | Description | Qty. | Rate | Per | Amount |
|---|---|---|---|---|---|
| 1 | Excavation in foundation | 160.3 | 85 | $m^3$ | 13625 |
| 2 | Brick bat cement concrete in foundation | 29.1 | 2200 | $m^3$ | 64020 |
| 3 | First class brickwork up to plinth in C.M. 1:6 | 43.8 | 2300 | $m^3$ | 100740 |
| 4 | Brickwork in super structure | 109.62 | 2400 | $m^3$ | 263015 |
| 5 | Roofing | 1500 | 150 | $m^2$ | 225000 |

| | | | | | |
|---|---|---|---|---|---|
| 6 | RCC work for slab | 12 | 8000 | $m^3$ | 96000 |
| 7 | Smooth plaster on walls and ceiling in C.M. 1:3 | 3120 | 75 | $m^2$ | 234000 |
| | | | | **Total** | **996400** |
| | | | | Add 5% contingencies | 49800 |
| | | | | **Grand total** | **Rs. 1046200** |

## 13.1.2 Civil Design 2

## Skill Development Centre

Skill Development Centre is a place where people come to learn skills so as to gain employment in their desired profession. It provides theoretical and practical application of the desired subject to the under educated people who are unemployed due to lack of skill and knowledge.

**Current Scenario**

Most of the people are employed in the agricultural sector in the village. But due to uncertain conditions the agriculture is becoming difficult day by day. So the people want to take different occupation but as they don't have enough skills they don't get a good job. So it would be great opportunity for the people to upgrade or learn new skills from the Skill Development Centre.

**Design Overview**

The design of Skill Development Centre consists of three classrooms. There is a staffroom for the teachers. There is a ladies' toilet. There is a gents' toilet. The central area is open in which the practical teaching can be done. Centre can offer different short duration courses on agriculture and different skills related to agriculture. Centre can also offer industrial training courses with the help of Industrial Training Institute of Keshod city. Total Area is 103 $m^2$.
This Skill Development Centre will offer both Agricultural and Industrial Skill Trainings.

**Design Drawings**

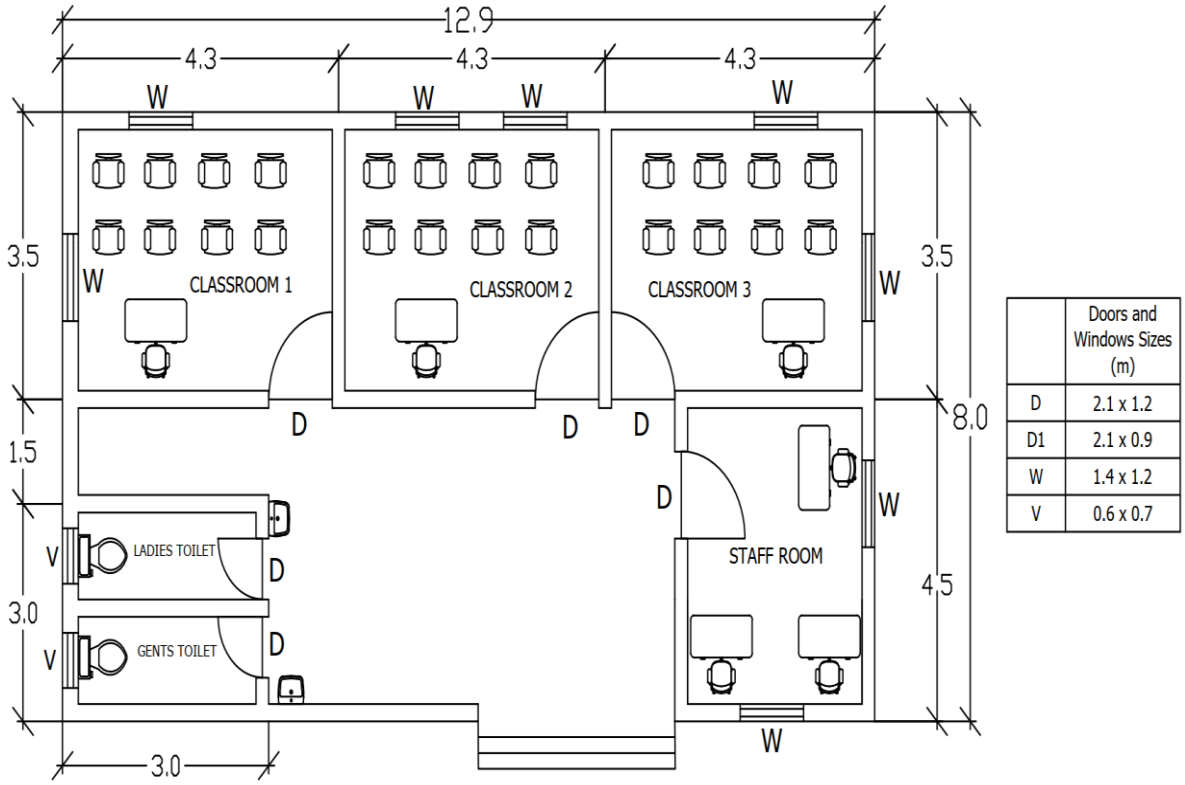



Figure 63: Plan of Skill Development Centre

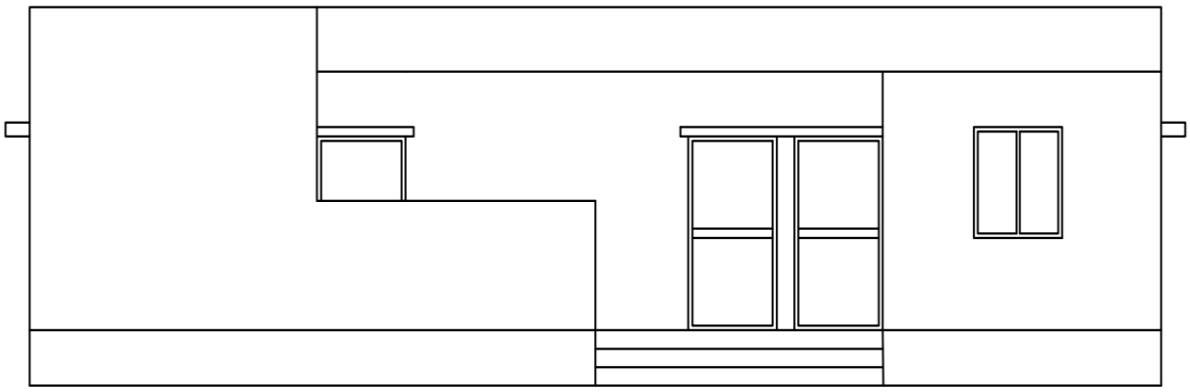


Figure 64: Elevation of Skill Development Centre

**Measurement Sheet**

Table 33: Measurement Sheet of Skill Development Centre

| Sr No. | Item Description | No. | Length (m) | Width (m) | Height (m) | Quantity (m3) |
|---|---|---|---|---|---|---|
| 1 | Excavation in Foundation<br>Net Centre line length<br>= 39.6 -(0.5*0.8*2) =38.8m | 1 | 38.8 | 0.8 | 1.1 | 34.15 |
| 2 | P.C.C. in foundation (1:4:8) | 1 | 38.8 | 0.8 | 0.2 | 6.4 |
| 3 | Brickwork in foundation up to plinth | | | | | |
| | Step 1<br>L=39.6-0.5*0.4*2 =39.2 m | 1 | 39.2 | 0.4 | 0.2 | 3.14 |
| | Step 2<br>L=39.6-0.5*0.3*2 =39.3 m | 1 | 39.3 | 0.3 | 0.2 | 2.36 |
| | Step 3<br>L=39.6-0.5*0.2*2 =39.4 m | 1 | 39.4 | 0.2 | 0.85 | 6.7 |
| | | | | | Total Quantity | 12.2 |
| 4 | Brickwork in Super Structure in cement mortar (1:6) | 1 | 39.4 | 0.2 | 3 | 23.64 |
| 5 | RCC. Slab | 1 | 12.8 | 7 | 0.12 | 10.75 |
| 6 | Smoot Plaster on Walls and Ceiling in C.M. (1:3) | | | | | |
| | Hall Walls | 8 | 4 | - | 3 | 96 |
| | | 4 | 3 | - | 3 | 36 |
| | Hall Ceiling | 1 | 12 | 4 | - | 48 |
| | Toilet Wall | 3 | 3 | - | 3 | 27 |
| | | 2 | 1 | - | 3 | 6 |
| | Toilet Ceiling | 1 | 3 | 2 | - | 6 |
| | Staffroom Wall | 2 | 2.75 | - | 3 | 16.5 |
| | | 1 | 2 | - | 3 | 6 |
| | Staffroom Ceiling | 1 | 2 | 2.75 | - | 5.5 |
| | | | | | Total Quantity | 247 |

**Abstract Sheet**

Table 34: Abstract Sheet of Skill Development Centre

| Sr. No. | Description | Qty. | Rate | Per | Amount |
|---|---|---|---|---|---|
| 1 | Excavation in foundation | 34.15 | 85 | $m^3$ | 2900 |
| 2 | Brick bat cement concrete in foundation | 6.4 | 3200 | $m^3$ | 20500 |
| 3 | First class brickwork up to plinth in C.M. 1:6 | 12.2 | 3200 | $m^3$ | 39040 |
| 4 | Brickwork in super structure | 23.64 | 3500 | $m^3$ | 82750 |
| 5 | RCC work for slab | 10.75 | 8800 | $m^3$ | 94600 |
| 6 | Smooth plaster on inside walls and ceiling in C.M. 1:3 | 247 | 150 | $m^2$ | 37050 |
| | | | | **Total** | **276840** |
| | | | | Add 5% contingencies | 13840 |
| | | | | **Grand total** | **Rs. 290680** |

## 13.1.3 Civil Design 3

## Milk Cooperative Society

Milk Cooperative Society is an association of the people associated with cattle milk production. They collect all the milk and store in a place. Then they negotiate with the milk buying person or organization for a better price and sell the milk.

**Current Scenario**

In Agatrai village there is a large number of milk giving cattle such as cows, buffaloes and goats. There is no facility of selling milk in the village. The people have to go to city to sell the milk. Due to transportation and storage costs, the profit on selling milk becomes very less. So the Milk Cooperative Society will help the people to sell the milk easily and at a better price.

**Design Overview**

In the design of Milk Cooperative Society, we have a collection room in which the people can come and sell the milk from the windows provided. There is a storage room for the milk to be stored. There is an office for the employees to work. There is a head's office within the office for the head of the Milk Cooperative Society who handles all the work. Total Area is 120 $m^2$.

**Design Drawings**

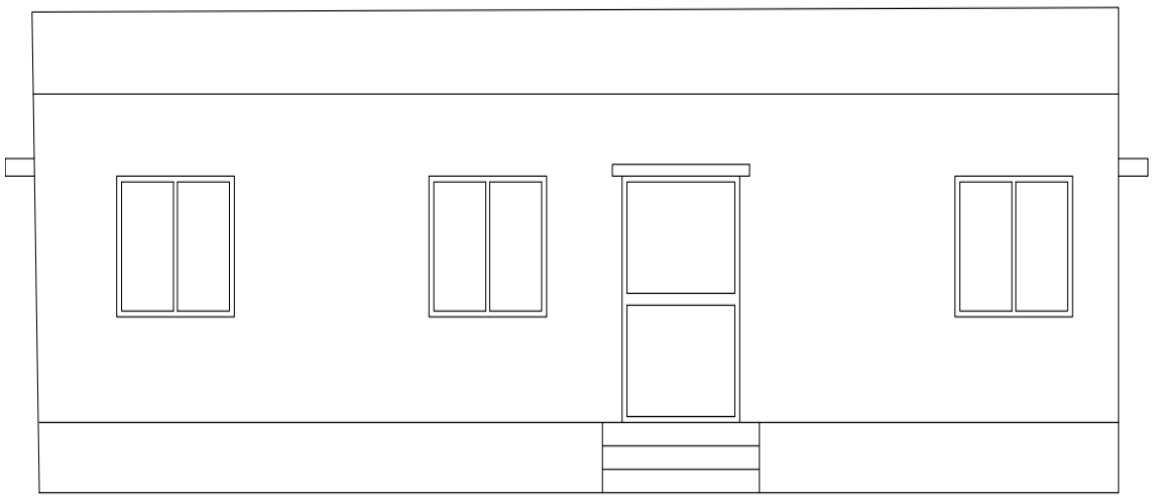


Figure 65: Elevation of Milk Cooperative Society

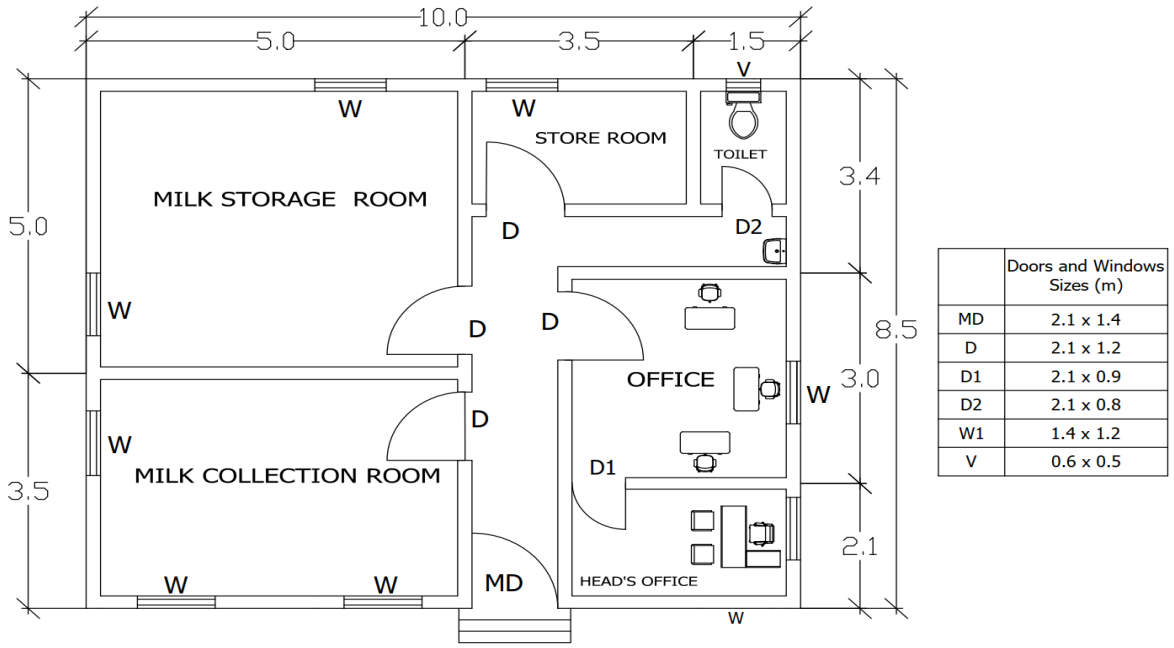



Figure 66: Plan of Milk Cooperative Society

**Measurement Sheet**

Table 35: Measurement Sheet of Milk Cooperative Society

| Sr No. | Item Description | No. | Length (m) | Width (m) | Height (m) | Quantity (m3) |
|---|---|---|---|---|---|---|
| 1 | Excavation in Foundation<br>Net Centre line length<br>= 36-(0.5*0.9*2) =35.1m | 1 | 35.1 | 0.8 | 1.1 | 30.9 |
| 2 | P.C.C. in foundation (1:4:8) | 1 | 35.1 | 0.8 | 0.2 | 5.6 |
| 3 | Brickwork in foundation up to plinth | | | | | |
| | Step 1<br>L=36-0.5*0.4*2 = 35.6 m | 1 | 35.6 | 0.4 | 0.2 | 2.85 |
| | Step 2<br>L=36-0.5*0.3*2 =35.7 m | 1 | 35.7 | 0.3 | 0.2 | 2.2 |
| | Step 3<br>L=36-0.5*0.2*2 =35.8 m | 1 | 35.8 | 0.2 | 0.85 | 6.1 |
| | | | | | Total Quantity | 11.15 |
| 4 | Brickwork in super structure in cement mortar (1:6) | 1 | 35.8 | 0.2 | 3 | 21.5 |
| 5 | RCC. Slab | 1 | 10 | 8 | 0.12 | 9.6 |
| 6 | Smoot plaster on walls and ceiling in C.M. (1:3) | | | | | |
| | Walls | 3 | 5 | - | 3 | 45 |
| | | 5 | 3 | - | 3 | 45 |
| | | 4 | 8 | - | 3 | 96 |
| | Ceiling | 1 | 10 | 8 | - | 80 |
| | | | | | Total Quantity | 266 |

**Abstract Sheet**

Table 36: Abstract Sheet of Milk Cooperative Society

| Sr. No. | Description | Qty. | Rate | Per | Amount |
|---|---|---|---|---|---|
| 1 | Excavation in foundation | 30.9 | 85 | $m^3$ | 2625 |
| 2 | Brick bat cement concrete in foundation | 5.6 | 3200 | $m^3$ | 17920 |
| 3 | First class brickwork up to plinth in C.M. 1:6 | 11.15 | 3200 | $m^3$ | 35680 |
| 4 | Brickwork in super structure | 21.5 | 3500 | $m^3$ | 75250 |
| 5 | RCC work for slab | 9.6 | 8800 | $m^3$ | 84480 |
| 6 | Smooth plaster on inside walls and ceiling in C.M. 1:3 | 266 | 150 | $m^2$ | 39900 |
| | | | | **Total** | **255855** |
| | | | | Add 5% contingencies | 12795 |
| | | | | **Grand total** | **Rs. 268650** |

## 13.1.4 Civil Design 4

## Bus Stop

Bus Stop is a place where the bus stops for the people who want to travel through the bus. People also use it as a waiting area waiting for the arrival of the bus.

**Current Scenario**

The bus stop of Agatrai is in unusable condition. So there is a requirement of a proper bus stand by the people of the village. Therefore, bus stand is a required physical structure in the village.

**Design Overview**

In the design of the Bus Stop there is a sitting area for the people who are waiting for the arrival of the upcoming buses. There is a ladies' toilet. There is a gents' toilet. There are two gates for getting in and out of the bus stop. Total Area is 22 $m^2$.

**Design Drawings**

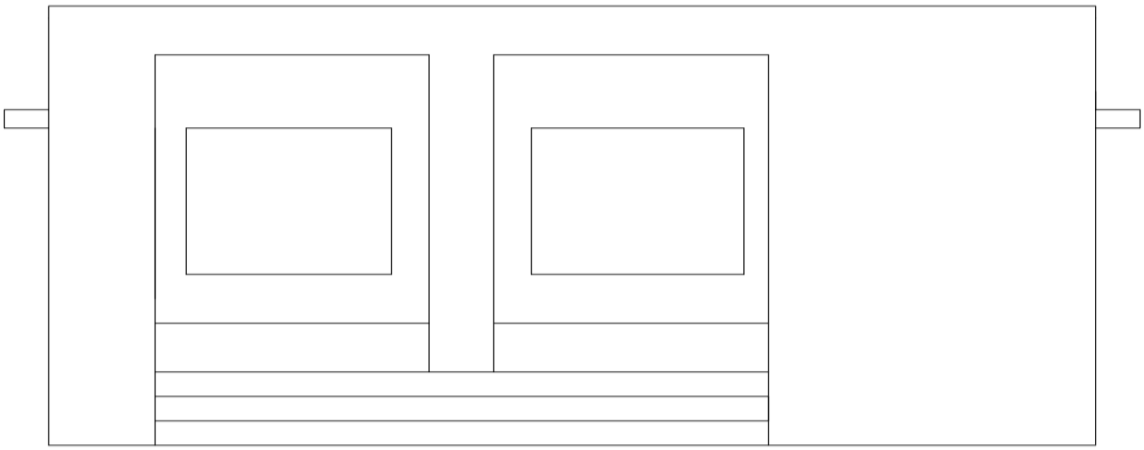


Figure 67: Elevation of Bus Stop

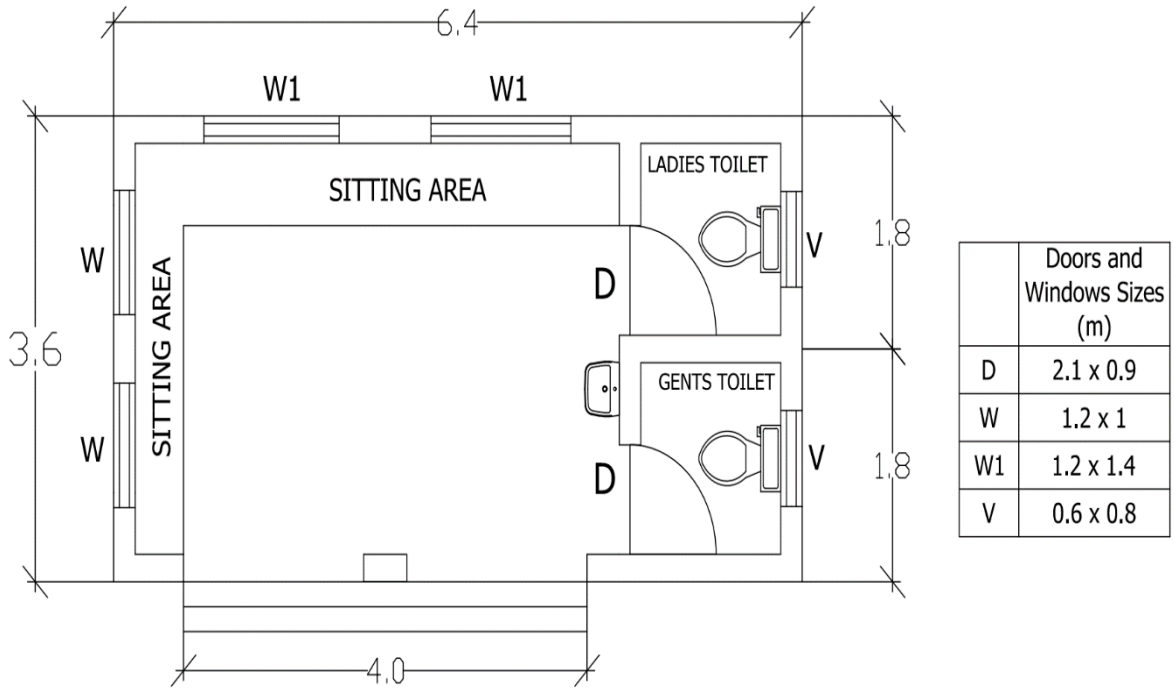



Figure 68: Plan of Bus Stop

**Measurement Sheet**

Table 37: Measurement Sheet of Bus Stop

| Sr No. | Item Description | No. | Length (m) | Width (m) | Height (m) | Quantity (m3) |
|---|---|---|---|---|---|---|
| 1 | Excavation in Foundation<br>Net Centre line length<br>= 19.6-(0.5*0.8*2) =18.6 m | 1 | 18.6 | 0.8 | 1.1 | 16.37 |
| 2 | P.C.C. in foundation (1:4:8) | 1 | 18.6 | 0.8 | 0.2 | 3 |
| 3 | Brickwork in foundation up to plinth | | | | | |
| | Step 1<br>L=19.6 -0.5*0.4*2 =19.2 m | 1 | 19.2 | 0.4 | 0.2 | 1.55 |
| | Step 2<br>L=19.6 -0.5*0.3*2 =19.3 m | 1 | 19.3 | 0.3 | 0.2 | 1.15 |
| | Step 3<br>L=19.6 -0.5*0.2*2 =19.4 m | 1 | 19.4 | 0.2 | 0.85 | 3.3 |
| | | | | | Total Quantity | 6 |
| 4 | Brickwork in super structure in cement mortar (1:6) | 1 | 19.4 | 0.2 | 3 | 11.65 |
| 5 | RCC. Slab | 1 | 6.4 | 3.4 | 0.12 | 2.6 |
| 6 | Smoot plaster on inside wall and celling in C.M. (1:3) | | | | | |
| | Walls | 2 | 6.4 | - | 3 | 38.4 |
| | | 2 | 3.4 | - | 3 | 20.4 |
| | Ceiling | 1 | 6.4 | 3.4 | - | 21.8 |
| | | | | | Total Quantity | 80.6 |

**Abstract Sheet**

Table 38: Abstract Sheet of Bus Stop

| Sr. No. | Description | Qty. | Rate | Per | Amount |
|---|---|---|---|---|---|
| 1 | Excavation in foundation | 16.37 | 85 | $m^3$ | 1395 |
| 2 | Brick bat cement concrete in foundation | 3 | 3200 | $m^3$ | 9600 |
| 3 | First class brickwork up to plinth in C.M. 1:6 | 6 | 3200 | $m^3$ | 19200 |
| 4 | Brickwork in super structure | 11.65 | 3500 | $m^3$ | 40775 |
| 5 | RCC work for slab | 2.6 | 8800 | $m^3$ | 22880 |
| 6 | Smooth plaster on Walls & Ceiling in C.M. 1:3 | 80.6 | 150 | $m^2$ | 12100 |
| | | | | **Total** | **118050** |
| | | | | Add 5% contingencies | 5900 |
| | | | | **Grand total** | **Rs. 123950** |

## 13.1.5 Civil Design 5
## Farmer Help Centre

Farmer Help Centre is an institution which helps farmers in knowing and implementing newer technologies for better quality and quantity of agricultural crops. It also consults farmers on the types of crops to grow, fertilizers to use, etc. for better production of the crops. They also give knowledge of the subsidies provided by the government for the help of farmers.

**Current Scenario**

Agatrai is a big village with approximately 1500 hectares of cultivable agricultural land. Most of the people are associated with the agricultural sector in the village. So the Farmer Help Centre would provide a good knowledge of modern technology and methods that can be implemented in the agricultural sector. Training sessions can be implemented to teach the farmers about various aspects in the agriculture field.

**Design Overview**

In the design of Farmer Help Centre there is a consulting room for the farmers to consult to the dedicated personals appointed there. There is a seminar room to gather the farmers for the teaching purpose. There is an office room. There is a storage for the goods that can be sold to the farmers. Total Area is 48 $m^2$.

**Design Drawings**

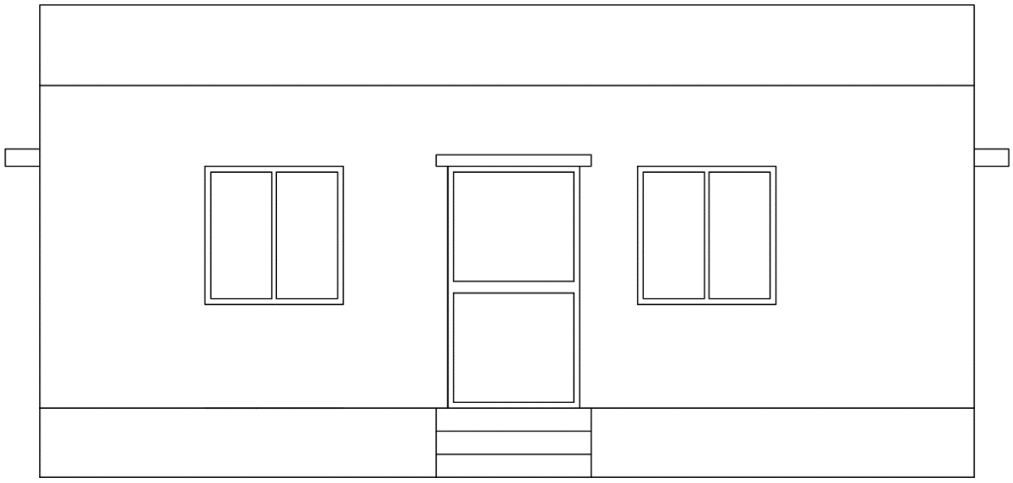


Figure 69: Elevation of Farmer Help Centre

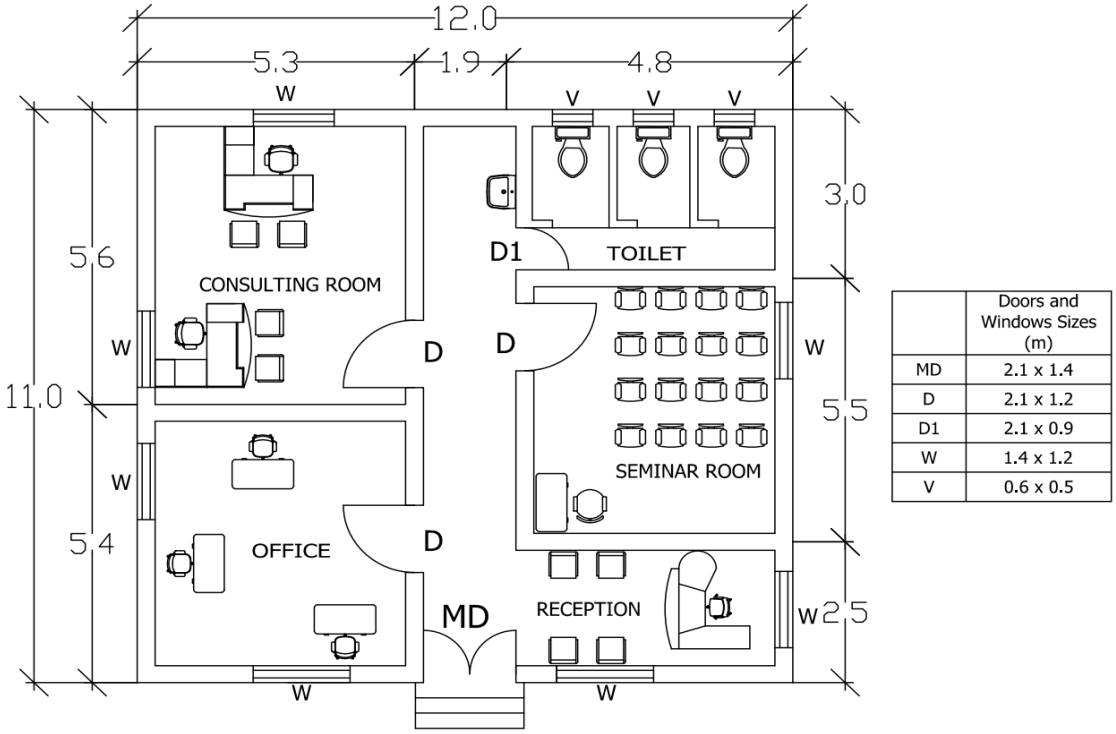



Figure 70: Plan of Farmer Help Centre

**Measurement Sheet**

Table 39: Measurement Sheet of Farmer Help Centre

| Sr No. | Item Description | No. | Length (m) | Width (m) | Height (m) | Quantity (m3) |
|---|---|---|---|---|---|---|
| 1 | Excavation in Foundation<br>Net Centre line length<br>= 22 - (0.5*0.8*2) = 21.2 m | 1 | 21.2 | 0.8 | 1.1 | 18.65 |
| 2 | P.C.C. in foundation (1:4:8) | 1 | 21.2 | 0.8 | 0.2 | 3.4 |
| 3 | Brickwork in foundation up to plinth | | | | | |
| | Step 1<br>L = 22 – 0.5*0.4*2 = 21.6 m | 1 | 21.6 | 0.4 | 0.2 | 1.73 |
| | Step 2<br>L = 22 -0.5*0.3*2 = 21.7 m | 1 | 21.7 | 0.3 | 0.2 | 1.3 |
| | Step 3<br>L = 22 - 0.5*0.2*2 = 21.8 m | 1 | 21.8 | 0.2 | 0.85 | 3.7 |
| | | | | | Total Quantity | 6.73 |
| 4 | Brickwork in super structure in cement mortar (1:6) | 1 | 21.8 | 0.2 | 3 | 13.1 |
| 5 | RCC. Slab | 1 | 6 | 5 | 0.12 | 3.6 |
| 6 | Smoot plaster on wall and celling in C.M. (1:3) | | | | | |
| | Walls | 4 | 5 | - | 3 | 60 |
| | | 3 | 6 | - | 3 | 54 |
| | Ceiling | 1 | 6 | 5 | - | 30 |
| | | | | | Total Quantity | 144 |

**Abstract Sheet**

Table 40: Abstract Sheet of Farmer Help Centre

| Sr. No. | Description | Qty. | Rate | Per | Amount |
|---|---|---|---|---|---|
| 1 | Excavation in foundation | 18.65 | 85 | $m^3$ | 1585 |
| 2 | Brick bat cement concrete in foundation | 3.4 | 3200 | $m^3$ | 10880 |
| 3 | First class brickwork up to plinth in C.M. 1:6 | 6.73 | 3200 | $m^3$ | 21540 |
| 4 | Brickwork in super structure | 13.1 | 3500 | $m^3$ | 45850 |
| 5 | RCC work for slab | 3.6 | 8800 | $m^3$ | 31680 |
| 6 | Smooth plaster on walls and ceiling in C.M. 1:3 | 144 | 150 | $m^2$ | 21600 |
| | | | | **Total** | **133135** |
| | | | | Add 5% contingencies | 6665 |
| | | | | **Grand total** | **Rs. 139800** |

## 13.1.6 Civil Design 6

## Rainwater Recharge System

Rainwater Harvesting is a technique to store the rainwater in the monsoon season for the purpose of using it in the dry season of summer. Rainwater Recharging is a technique to recharge the underground water with the rainwater so as to keep the underground water level high to easily use in the future.

**Current Scenario**

In Agatrai village only a few people use rainwater harvesting system at their house. So we designed rainwater recharge system which can be used in the bore wells that are in the village and also in the agriculture farms that are being used for irrigation purpose. It will greatly benefit the villagers as a great amount of water is being slipped in the underground water sources that can be beneficial in the hot summer days.

**Design Overview**

Here water is being collected from the roof of the house and transferred to a diversion tank through a PVC pipe. When the diversion tank is full the water is passed to the filtration tank where, the water is filtered and the impurities are removed. Now the water is passed to the nearest underground water sources such as bore well through a pipe connected from the filtration tank.

**Design Drawings**

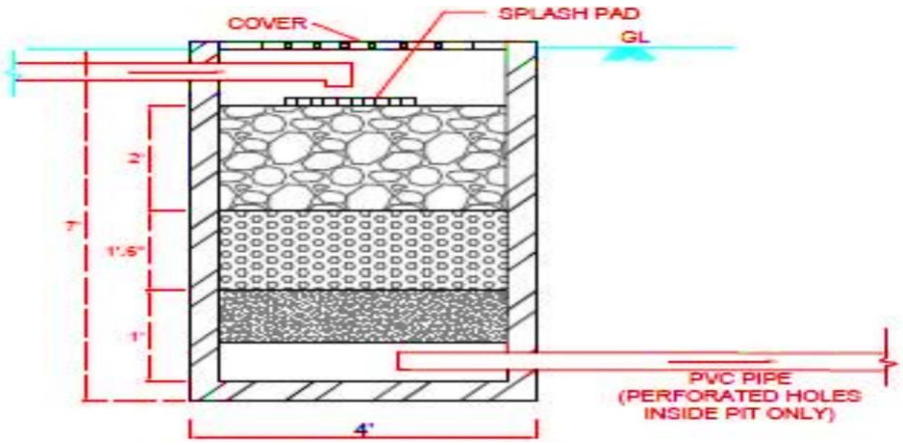



Figure 71: Filtration Tank

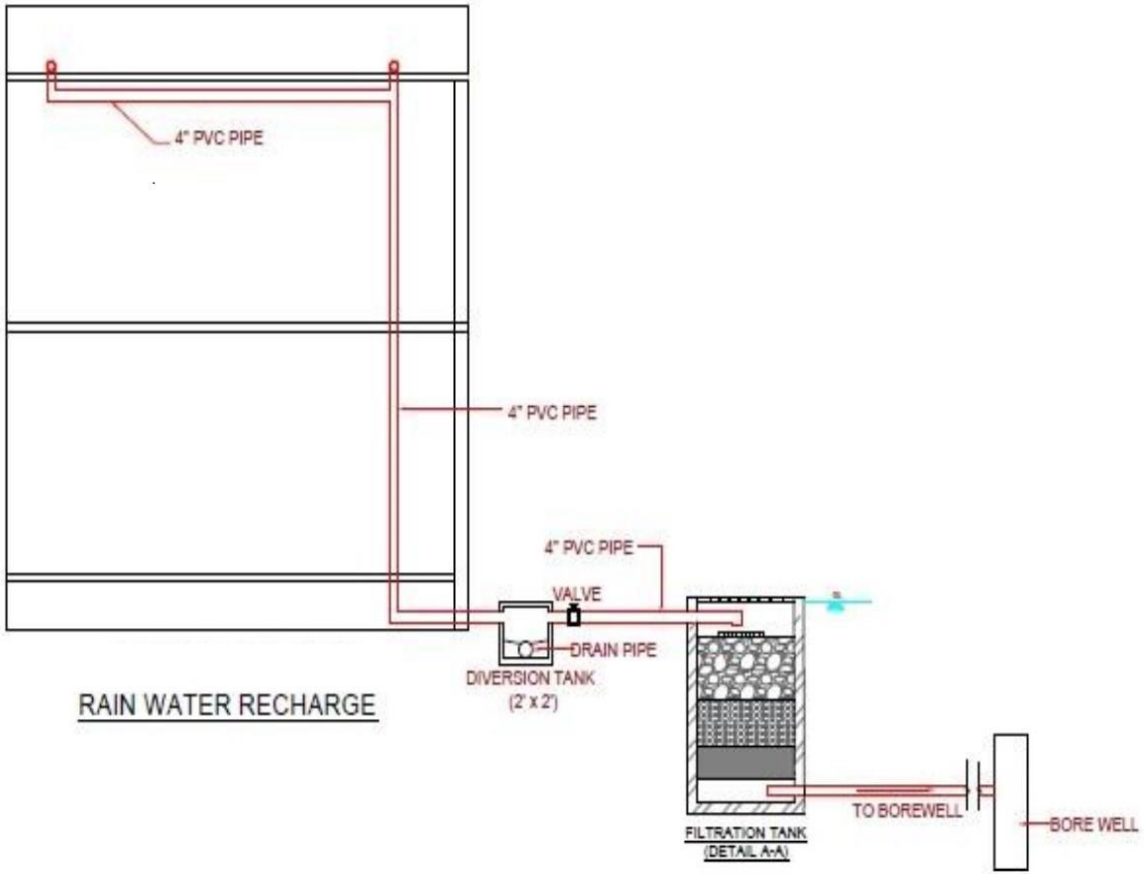



Figure 72: Rainwater Recharge System

**Abstract Sheet**

Table 41: Abstract Sheet of Rainwater Recharge System

| Sr.No | Description of item | Qty. | Rate | Per | Amount |
|---|---|---|---|---|---|
| 1 | Filtration tank | 1 | 15000 | Nos. | 15000 |
| 2 | Diversion tank | 1 | 2000 | Nos. | 2000 |
| 3 | 4" PVC pipe | 10 | 400 | Nos. | 4000 |
| 4 | Valve | 4 | 700 | Nos. | 2800 |
| 5 | Elbow, T & Coupling | 15 | 350 | Nos. | 5250 |
| 6 | Solution | 15 | 100 | Nos. | 1500 |
| | | | | **Total** | **30550** |
| | | | | Add 5% contingencies | 1550 |
| | | | | **Grand total** | **Rs. 32100** |

## 13. 2 Reason for Students Recommending this Design

- The Agricultural Storage Yard will help the farmers of the village because there is no provision for storage of agricultural goods. The goods are stored out in open land areas.
- Skill Development Centre will help people learn new skills and also improve their known skills.
- The people of village have to go to city to sell their milk. Milk Cooperative Society will help people with cattle sell their milk easily and at a better price.
- Bus Stop is in very poor condition. So, Bus Stop will help people to comfortably wait for the bus they want to travel on.
- Farmer Help Centre will help farmers in doing the agricultural work with newer, better and efficient techniques for the prosperity of the farmers.
- In the summer days there is a shortage of water. So Rainwater Recharge System will help in storage of rainwater for the use of water in summer.

## 13.3 About designs Suggestions / Benefit of the villagers

- Agricultural Storage Yard will help farmers in storing the agricultural goods in a safe and secure environment.
- Skill Development Centre will help people learn new skills, thus help in employment of the people. Thus reducing unemployment problem in the village.
- Milk Cooperative Society will collect milk in the village and sell it all together at a good price. Thus saving time and transportation costs of villagers who have to go to city to sell milk for a better price.
- Bus Stop will help people waiting for the bus to sit and relax in the sitting area comfortably.
- Farmer Help Centre will educate farmers on new technology in agriculture sector. Thus will help farmers in better quality and quantity of agricultural goods. Thus help the farmers prosper.
- Rainwater Recharge System will help in recharging the underwater sources through the collection of rainwater. Thus helping in the use of water in summer days.

# Chapter: 14
# Technical Options with Case Studies

## 14.1 Civil Engineering
## 14.1.1 Advanced Earthquake Resistant Techniques

### Floating Foundation

The levitating or floating foundation separates the substructure of a building from its superstructure. One way of doing this is by floating a building above its foundation on lead-rubber bearings that comprise a solid lead core covered in alternating layers of rubber and steel. The bearings are attached to the building and its foundation with the help of steel plates. So, when an earthquake occurs, the floating foundation can move without moving the structure above it.

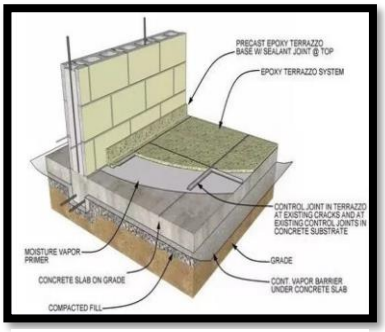



Figure 73: Floating Foundation

### Shock Absorption

Similar to the shock absorbers used in vehicles, buildings also make use of this technology. This earthquake resistant technology helps buildings slow down and reduce the magnitude of vibratory motions. Ideally shock absorbers should be placed at each level of the building – one end attached to the beam and the other end to the column. Each comprises a piston head that moves inside a cylinder full of silicone oil. During earthquakes, the horizontal motion of building will make the piston push against the oil, transforming mechanical energy from the quake to heat.

Figure 74: Shock Absorbers

### Rocking Core-Wall

Modern high-rise buildings use this technique to improve seismic resistance at a low cost. To make this work, a reinforced concrete core is set through the heart of the structure, surrounded by elevator banks. Many modern high-rise buildings use this technique to increase seismic resistance in an affordable way. It works most effectively when used together with base isolation. For base isolation, elastometric bearings are built with alternating layers of steel and natural rubber/neoprene. The bearing thus created has low horizontal stiffness and vertical rigidity. The combination is highly effective, cost-friendly and simple to implement.

Figure 75: Rocking Core Wall

### Pendulum Power

The pendulum power technique works by suspending a huge mass near the top of the structure. This mass is supported by steel cables and viscous fluid dampers are placed between the mass and the building that it protects. In case of any seismic activity, the pendulum moves in the opposite direction to balance the energy. Each of the pendulums are tuned to sync with the natural frequency of the structure and these systems are called tuned mas dampers. Their goal is to counter resonance and reduce the structure's dynamic response.

Figure 76: Pedulum at top of the building

## 14.1.2 Seismic Retrofitting of Buildings

## Seismic Retrofitting

It is the modification of existing structures to make them more resistant to seismic activity, ground motion, or soil failure due to earthquakes. The retrofit techniques are also applicable for other natural hazards such as tropical cyclones, tornadoes, and severe winds from thunderstorms.

## Seismic Retrofitting Objectives

**Public Safety:**

The goal is to protect human life, ensuring that the structure will not collapse upon its occupants or passers-by, and that the structure can be safely exited. Under severe seismic conditions the structure may be a total economic write-off, requiring tear-down and replacement.

**Structure Survivability:**

The goal is that the structure, while remaining safe for exit, may require extensive repair (but not replacement) before it is generally useful or considered safe for occupation. This is typically the lowest level of retrofit applied to bridges.

## Conventional Retrofitting Techniques

**Adding Steel Bracings**

An effective solution when large openings are required.

Advantages of adding steel bracings:

- Higher strength and stiffness,
- Opening for natural light,
- Amount of work is less since foundation cost may be minimized
- Adds much less weight to the existing structure

Figure 77: Steel Bracing

**Jacketing**

Most popular method for strengthening of building columns.

It is used in restoring existing column to original size or to increase in size.

Advantages of Jacketing:

- Increases concrete confinement
- Increase shear strength
- Increases flexural strength

Figure 78: Jacketing of Column

## Modern Advanced Retrofitting Technique

**Use of Fibre Reinforced Polymer (FRP)**

Fiber reinforced polymer (FRP) composites are now widely used for seismic strengthening of the reinforced concrete members as conventional materials pose complications. Although it is cost-effective to use steel plates, the strengthening technique is labor intensive and have many disadvantages. One of the major disadvantages of traditional strengthening techniques is the manipulation of heavy steel and the risk of corrosion. It is also impossible to visually examine the condition of a concrete member following a seismic event.

FRP composites are used to considerably increase strength and ductility without increasing stiffness. Therefore, the use of FRPs in seismic retrofit applications can help prevent the need to retrofit other parts of the structure.

Following are some of the key metrics of FRP application for seismic retrofitting as compared with steel and other conventional techniques:

- High stiffness and strength-to-weight ratio make advanced composites ideal for strengthening and seismic retrofitting.
- The durability and mechanical characteristics of FRPs can be customized in accordance with the application.
- FRP composites protect the inner reinforcement against rust as they can effectively withstand the harsh environment.
- It is easy to produce, handle, and install FRP wraps without any heavy equipment.
- The reduced maintenance cost and long service life make FRPs economically viable strengthening solution.

Figure 79: Fibre Reinforcement of Column

## 14.1.3 Advance Practices in Construction field in Modern Material, Techniques and Equipment's

## Building Information Modelling (BIM)

Building Information Modelling (BIM) is a very broad term that describes the process of creating and managing digital information about a built asset such as a building, bridge, highway or tunnel.

ISO 19650:2019 defines BIM as:

Use of a shared digital representation of a built asset to facilitate design, construction and operation processes to form a reliable basis for decisions.

**BIM Maturity Levels**

The range of BIM maturity levels have been categorised as:

- Level 0: Unmanaged CAD (Computer Aided Design).
- Level 1: Managed CAD in 2D or 3D.
- Level 2: Managed 3D environment with data attached, but created in separate discipline models.
- Level 3: Single, online, project model with construction sequencing, cost and life-cycle management information.


Figure 80: Building Information Modelling

**Characteristics of BIM**

Fundamentally, the purpose of BIM is to ensure that appropriate information is created in a suitable format at the right time so that better decisions can be made throughout the design, construction and operation of built assets. It is not about creating a 3D model for its own sake, and it is not an add-on process. BIM is fundamental to the way a project is set up and run.

BIM centres around the creation of employer's information requirements (EIR), which define the information that the employer wishes to procure in order to develop and operate a built asset. Setting this out in a contract document ensures that appropriate information is created in a suitable format at the right time.

## Sustainable and Green Building Materials

### 1. Bamboo

Bamboo is considered one of the best eco-friendly building materials. It has an incredibly high self-generation rate, with some being reported to have grown up to three feet within 24 hours. It continues spreading and growing without having to be replanted after harvest. Bamboo is a perennial grass and not wood and grows everywhere.

It also has a high strength-to-weight ratio, even greater comprehensive strength than concrete and brick, and lasts incredibly long. It is, therefore, the best choice for flooring and cabinetry.

Figure 81: Bamboo

### 2. Rammed Earth

It is a technology that has been used throughout human civilization for thousands of years and lasts a very long time. It is a popular and affordable solution to creating steadfast foundations and floors and walls.

When pressed tightly in wooden forms, it creates walls that have a similar feel to concrete. Rammed earth provides several advantages such as superior thermal mass, temperature and noise control, strength and durability, low maintenance, fire proofing, load bearing and pest deterrence.

Figure 82: Rammed Earth

### 3. Hemp Crete

It is a concrete-like material created from the woody inner fibres of the hemp plant. The fibres are bound with lime to create concrete-like shapes that are strong and light. Hemp concrete blocks are lightweight, dramatically reducing the energy used to transport the blocks.

Hempcrete is sturdy, has good thermal and acoustic insulation qualities and is fire resistant. Additionally, its biggest sustainable property is that it is $CO_2$ negative, meaning it absorbs more $CO_2$ than it emits.

Figure 83: Hemp Crete

### 4. Timbercrete

Timbercrete is made from a combination between timber waste from various sources and concrete. It is a green material that is lighter that solid concrete with greater strength and insulating capabilities.

This green material provides unique thermal qualities that combine thermal mass and insulation usually turned constructed for eco-housing. Timbercrete is also bushfire proof, which allows minimal heat transfer and radiation.

Figure 84: Timbercrete

## 14.1.4 Engineering Aspects of Soil Mechanics - Environmental Impact Assessment

## Soil Mechanics

Soil mechanics is a branch of soil physics and applied mechanics that describes the behaviour of soils. Soil consist of a heterogeneous mixture of fluids usually air and water also particles such as clay, silt, sand, and gravel, but soil may also contain organic solids and other matter. Along with rock mechanics, soil mechanics provides the theoretical basis for analysis in geotechnical engineering.

Soil mechanics is used to analyse the deformations of and flow of fluids within natural and man-made structures that are supported on or made of soil, or structures that are buried in soils. Principles of soil mechanics are also used in related disciplines such as geophysical engineering, coastal engineering, agricultural engineering, hydrology and soil physics.

**Application of Soil Mechanics**

**1. Foundations**

The loads from any structure have to be ultimately transmitted to a soil through the foundation for the structure. The foundation is important part of a structure, the type and details of which can be decided upon with the knowledge and application of the principles of soil mechanics.

**2. Underground and Earth-retaining Structures**

Underground structures such as drainage structures, pipe lines, and tunnels and earth-retaining structures such as retaining walls and bulkheads can be designed and constructed only by using the principles of soil mechanics and the concept of 'soil-structure interaction'.

**3. Pavement Design**

Pavement Design may consist of the design of flexible or rigid pavements. Flexible pavements depend more on the subgrade soil for transmitting the traffic loads. Problems peculiar to the design of pavements are the effect of repetitive loading, swelling and shrinkage of sub-soil and frost action. Consideration of these and other factors in the efficient design of a pavement is a must and one cannot do without the knowledge of soil mechanics.

**4. Excavations, Embankments and Dams**

Excavations require the knowledge of slope stability analysis; deep excavations may need temporary supports 'timbering' or 'bracing', the design of which requires knowledge of soil mechanics. Likewise, the construction of embankments and earth dams where soil itself is used as the construction material requires a thorough knowledge of the engineering behaviour of soil especially in the presence of water. Knowledge of slope stability, effects of seepage, consolidation and consequent settlement as well as compaction characteristics for achieving maximum unit weight of the soil in-situ, is absolutely essential for efficient design and construction of embankments and earth dams.

Figure 85: Soil Testing

Figure 86: Soil Mechanics

## Environmental Impact Assessment

Figure 87: Environmental Impact Assessment

Environmental assessment (EA) is the assessment of the environmental consequences of a plan, policy, program, or actual projects prior to the decision to move forward with the proposed action.

The purpose of the assessment is to ensure that decision makers consider the environmental impacts when deciding whether or not to proceed with a project. The International Association for Impact Assessment (IAIA) defines an environmental impact assessment as "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made". EIAs are unique in that they do not require adherence to a predetermined environmental outcome, but rather they require decision makers to account for environmental values in their decisions and to justify those decisions in light of detailed environmental studies and public comments on the potential environmental impacts.

Environment Impact Assessment in India is statutorily backed by the Environment Protection Act, 1986 which contains various provisions on EIA methodology and process.

## The EIA Process

EIA involves the steps mentioned below. However, the EIA process is cyclical with interaction between the various steps.

- **Screening:** The project plan is screened for scale of investment, location and type of development and if the project needs statutory clearance.
- **Scoping:** The project's potential impacts, zone of impacts, mitigation possibilities and need for monitoring.
- **Collection of baseline data:** Baseline data is the environmental status of study area.
- **Impact prediction:** Positive and negative, reversible and irreversible and temporary and permanent impacts need to be predicted which presupposes a good understanding of the project by the assessment agency.
- **Mitigation measures and EIA report:** The EIA report should include the actions and steps for preventing, minimizing or by passing the impacts or else the level of compensation for probable environmental damage or loss.
- **Public hearing:** On completion of the EIA report, public and environmental groups living close to project site may be informed and consulted.
- **Decision making:** Impact Assessment Authority along with the experts consult the project-in-charge along with consultant to take the final decision, keeping in mind EIA and EMP (Environment Management Plan).
- **Monitoring and implementation of environmental management plan:** The various phases of implementation of the project are monitored.
- **Assessment of Alternatives, Delineation of Mitigation Measures and Environmental Impact Assessment Report:** For every project, possible alternatives should be identified, and environmental attributes compared. Alternatives should cover both project location and process technologies. Once alternatives have been reviewed, a mitigation plan should be drawn up for the selected option and is supplemented with an Environmental Management Plan (EMP) to guide the proponent towards environmental improvements.
- **Risk assessment:** Inventory analysis and hazard probability and index also form part of EIA procedures.

## 14.1.5 Water Supply, Sewerage System, Waste Water, Sustainable Development Techniques

### Sustainable Water Supply

Sustainable water management means the ability to meet the water needs of the present without compromising the ability of future generations to do the same. Achieving sustainable water management requires a multidisciplinary and holistic approach in which technical, environmental, economic, landscape aesthetic, societal and cultural issues are addressed.

On a global scale, having sustainable water means to provide each person on the planet with affordable access to the minimum 20 to 50 litres of daily water required to sustain life. This follows the United Nations General Assembly recognition of "the right to safe and cleaning drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights".

**Sustainable Water Solutions**

Sustainable water systems should provide adequate water quantity and appropriate water quality for a given need, without compromising the future ability to provide this capacity and quality.

**Surface water**

Surface water is limited as is unequally distributed around the world and pollution from various activities means that surface water without treatment is not suitable for drinking. If properly constructed, dams can provide a sustainable water supply as the structures can be used for power generation, irrigation, flood prevention, water diversion and navigation.

**Groundwater**

Groundwater accounts for more than 50 per cent of global freshwater and is critical for potable water. Groundwater can be a sustainable supply of water only if the amount of water entering, leaving and being stored in the system is conserved.

**Reclaimed water**

Reclaimed water, or water reuse as it's known, can also be a sustainable source for water supply and can alleviate stress on primary water resources, such as surface and groundwater. Depending on the given application, reclaimed water must be treated to provide an appropriate quality, for example for irrigation or industry use. The level of water reuse varies globally.

**Reduce Wastage of Water**

A water supply system will be sustainable only if it promotes efficiencies in both the supply and the demand sides. Initiatives to meet demand for water supply will be sustainable if they prioritize measures to avoid water waste. Avoiding wastage will contribute to reducing water consumption and, consequently, to delaying the need for new resources.


Figure 88: Sustainable Water Supply

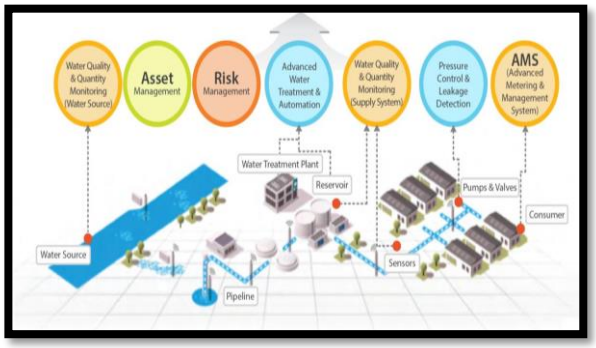



Figure 89: Smart Water Management

## Sustainable Method of Wastewater Treatment Systems

For sustainable wastewater treatment the most economical method is to decentralize the treatment rather than installing expensive sewer systems that combine and increase the volume of the waste. The next involved choosing an appropriate treatment technology for the community where several types proposed included lagoons/wetlands, up flow anaerobic sludge blanket, and soil aquifer treatment. The common characteristic of all of the described types is that they encourage "zero-discharge" technology. This cyclical, rather than linear approach includes the reuse of the treated effluent for agricultural reuse. The reuse of the wastewater decreases the money spent on fertilizers and it is considered safe, since it has been treated for microorganisms. The traditional linear treatment systems must be transformed into the cyclical treatment to promote the conservation of water and nutrient resources.

Decentralized wastewater systems convey, treat and dispose or reuse wastewater from small and low-density communities, buildings and dwellings in remote areas, individual public or private properties. Wastewater flow is generated when appropriate water supply is available within the buildings or close to them. Decentralized wastewater systems treat, reuse or dispose the effluent in relatively close vicinity to its source of generation. They have the purpose to protect public health and the natural environment by reducing substantially health and environmental hazards.

### Application

In locations with developed infrastructure, decentralized wastewater systems could be a viable alternative of the conventional centralized system, especially in cases of upgrading or retrofitting existing systems. Many different combinations and variations of *hybrid* systems are possible. The development of new treatment technologies allows for decentralized solutions, which are technically and aesthetically sound and acceptable.

Decentralized applications are a necessity in cases of new urban developments, where the construction of the infrastructure is not ready or will be executed in future. Decentralized systems allow for flow separation or source separation, which segregates different types of wastewater, based on their origin, such as: black water, greywater and urine. This approach requires separate plumbing systems to convey the segregated flows and the purpose is to apply different level of treatment and handling of each flow and to enhance the safe reuse and disposal of the end products.

In the specific case of developing countries, where localities with poor infrastructure are common, decentralized wastewater treatment has been promoted extensively because of the possibility to apply technologies with low operation and maintenance requirements. In addition, decentralized approaches require smaller scale investments, compared to centralized solutions.

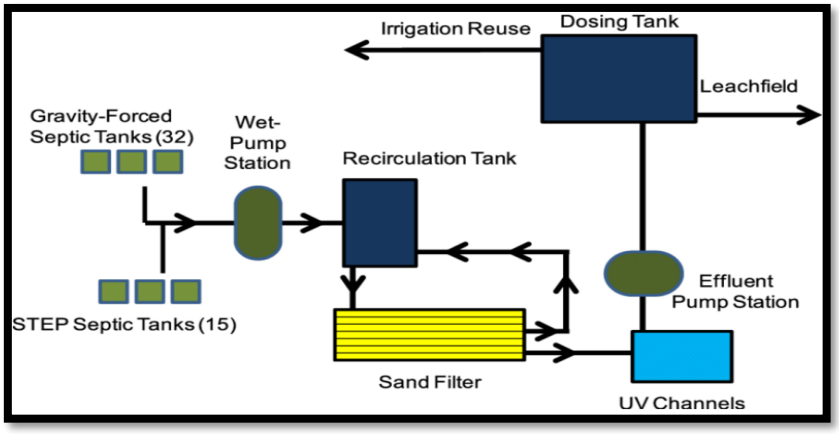



Figure 90: Decentralized Wastewater Treatment System

## 14.1.6 Technical Case Study on "Sardar Sarovar Project"

The Sardar Sarovar Project (SSP) is currently one of the biggest irrigation and power projects in the country. It is an inter-state project whose benefits will be shared between the four states of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan. The terminal major dam for the Project is located in Gujarat, near Vadgam.

The Sardar Sarovar Dam is India's third highest concrete dam with a maximum length of 1210 m and maximum height of 138.68 m. One of the unique aspects of the dam is that it has the lowest ratio of area submerged to area irrigated. The Sardar Sarovar Reservoir has a Designed Live Storage Capacity of 5860 MCM (Million Cubic Metre). The water stored here is used to generate power through the hydro power plants in the dam. The total installed capacity of the hydro power plants is 1450 MW. The water is fed into the Narmada Main Canal for drinking and irrigation in 940 villages and 173 towns across the state of Gujarat and Rajasthan.

The Narmada Canal is a contour canal that brings water from the Sardar Sarovar Dam to the state of Gujarat and then into Rajasthan state. The main canal has a length of 458 kilometres (285 mi) in Gujarat and then 74 kilometres (46 mi) in Rajasthan. The main canal is connected with 42 branches resulting in a Culturable Command Area (CCA) of 2,129,000 hectares (5,260,000 acres).

Recently on the downstream of Sardar Sarovar Dam world's tallest statue "Statue of Unity" has been constructed. It has a height of 182 m. It had a construction cost of Rs 2700 crore. Different places have been developed around the statue of unity for the tourism purpose. Some of the locations are the Valley of Flowers, Cactus Garden, Butterfly Garden, Zoo and Tent city for tourists for a luxurious stay amidst the nature.

**Location**

Figure 91: Satellite View of Sardar Sarovar Dam

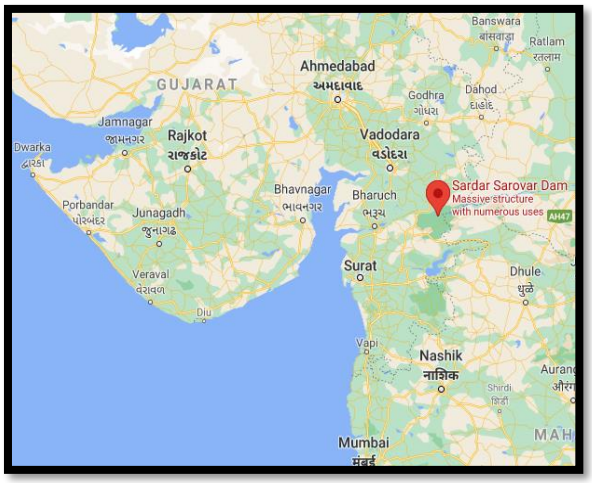



Figure 92: Location of Sardar Sarovar Dam

**History**

The Sardar Sarovar project was a vision of the first deputy prime minister of India, Sardar Vallabhbhai Patel. The plan for harnessing the river for irrigation and power generation in the Narmada basin was initiated in 1946. After the completion of investigation, the proposed dam at Gora in Gujarat with the full reservoir level (FRL) 161 ft (49.08m) was selected and the foundation stone was laid by late Prime Minister, Pandit Jawaharlal Nehru on 5th April, 1961. A project report prepared for the dam led to much dispute over the means of distributing the Narmada water among the three states- Gujarat, Maharashtra and Madhya Pradesh.

In 1964, to resolve the dispute about sharing of the Narmada Waters between the Governments of Gujarat and Madhya Pradesh, the Government of India appointed an expert committee under the Chairmanship of late Dr. Khosla which recommended a higher dam with FRL 500 ft (152.44m) in 1965. However, Govt. of M.P. was not agreeable to development of Narmada water as per Khosla Committee_report and hence the Narmada Water Dispute Tribunal (NWDT) was constituted by the Government of India in October 1969, under the Inter State River Water Disputes Act, 1956.

After having studied a large number of reports and studies made by the three states, the NWDT gave its verdict in 1979. Accordingly, the 35 billion cubic metres of water available for consumption from the dam, Madhya Pradesh would receive 65 percent, Gujarat 32 percent and Rajasthan and Maharashtra would be eligible for the remaining 3 percent. The Planning Commission finally approved the project in 1988.

A group of local people opposed the project in 1989 under the Narmada Bachao Andolan because they found out that the project did not meet the required environment standards. Construction was halted as per the Supreme Court's stay in May 1995. It resumed in February 1999 and the dam's height was increased from the planned 80m to 88m. The Court allowed the increase of the dam's height to 90m in October 2000, but ordered adherence to the rehabilitation and resettlement issues. The dam's height was increased to 110.6m with the approval from Narmada Control Authority, in June 2004. It was further raised to its current 121.9m height in December 2006.

**Components of Project**

**(A) Sardar Sarovar Reservoir**

The Full Reservoir Level (FRL) of the Sardar Sarovar Dam is fixed at RL 138.68 meters (455 feet). The Maximum Water Level is 140.21 meters (460 feet.) while minimum draw down level is 110.64 metres (363 feet.). The normal tail water level is 25.91 meters (85 feet.). The gross storage capacity of the reservoir is 0.95 M.ha.m. (7.7 MAF) while live storage capacity is 0.58 M.ha.m. (4.75 MAF). The reservoir would occupy an area of 37,000 ha. and would have a linear stretch of 214 kilometre of water and an average width of 1.77 kilometre.

The submergence at Full Reservoir Level (FRL) is 37,533 ha. (86,088 acres), which comprises 11,279 ha. agricultural land, 13385 ha. forest land and112869 ha. river bed and waste land. In all 230 villages of the three states viz. 178 Villages of Madhya Pradesh, 33 villages of Maharashtra and 19 villages of Gujarat are affected. Only 3 villages of Gujarat are fully affected, while the remaining 16 villages are partly affected.

**(B) Sardar Sarovar Dam**

A concrete gravity dam, 1210 meters (3970 feet) in length and with a maximum height of 163 meters above the deepest foundation level, is completed and it has been dedicated to Nation at the worthy hands of Hon'ble Prime Minister on 17.09.2017.

The dam is the third highest concrete dam in India. In terms of the volume of concrete involved for gravity dams, this dam is ranking as the second largest in the world with an aggregate volume of 6.82 million cu.m. This dam with its spillway discharging capacity of 85,000 cumecs (30.00 lac cusecs), is the third in the world.

The design of the dam allows for a horizontal seismic coefficient of 0.125g and it also covers an additional risk due to reservoir induced seism city. Most sophisticated seismological instruments for monitoring and evaluation of the stresses in the body of the dam as well as the effect on the periphery of the reservoir are under installation.

**(C) Power**

There are two power houses for the Sardar Sarovar Project (SSP). One is the river bed power house and the other one is canal head power house. Power benefits are shared among Madhya Pradesh, Maharashtra and Gujarat in the ratio of 57:27:16 respectively.

The river bed power house is an underground powerhouse. It has a six Francis turbine each capable of producing 200 MW. The power generation depends upon the inflow of the river from upstream and the need of water for irrigation in the canal. The canal head power house is a surface power house. It has five turbines capable of producing 50 MW each.

**(D) Main Canal**

Narmada Main Canal is a contour canal. It is the biggest lined irrigation canal in the world. It is about 458.318 km. long up to Gujarat -Rajasthan border. The canal extends further in the state of Rajasthan to irrigate areas in Barmer and Jhalore districts of Rajasthan. The Main Canal is lined with plain cement concrete to minimise seepage losses to attain higher velocity and to control the water logging in future. The lining work is carried out with the mechanized pavers. Such a large scale paving of concrete lining is done for the first time in India. It has a capacity to flow 1133 cumecs at its head-at kevadia to irrigate 17 district 79 talukas and 3125 villages of gujarat and reducing to 71 cumecs at the Gujarat -Rajasthan border.

The Main Canal in its journey has to negotiate several water streams, rivers, roads, railways etc. This is possible by constructing appropriate structure on the canal. In all, there are 598 Structures on the Narmada Main canal. Out of this 236 structures are cross drainage structures, comprising of 5 Aqueducts, 15 canal syphons, 182 drainage syphons, 33 canal crossing and one super passage. There are 89 Regulating structures comprising of 1 Main HR, 44 Branch HR, 32 Cross Regulators and 12 Escapes. There are total 274 nos. of Road Bridge.

**(E) Canal Distribution System and Irrigation Water Operations**

According to the Narmada Water Disputes Tribunal Award, 75% dependability is considered while assessing the availability of 28 MAF (Million Acre Feet) utilizable water in Narmada basin. 75% dependability means the probability of getting 28 MAF of water, is for the period of 3 years out of average 4 years. While in the remaining distressed year, less quantity of utilizable water will be available.

Out of the total assessed quantity of utilizable Narmada water, (a) Madhya Pradesh is entitled to a share of 18.25 MAF (65.18%), (b) Gujarat is entitled to a share of 9 MAF (32.14%) (c) Rajasthan is entitled to a share of 0.5 MAF (1.79%) and (d) Mahrashtra is entitled to a share of 0.25 MAF (0.89%). In case of availability of utilizable in excess of the water 28 MAF in a good year or falling short of the 28 MAF is a lean year, the allocation of water among the four states shall be proportionately increased /decreased.

The total estimated length of Canal network is 71,748 km which includes the Main Canal, Branch-Canals, Sub-branch Canals, Distributaries, Minors & Sub-minors. In the entire command it is planned to distribute the irrigation water in farmers' fields by conveying irrigation water up to 5 to 8 Ha area through the Canal network.

Out of total 38 branch canals off taking from the Main Canal, Miyagam, Vadodara, Saurashtra and Kachchh branch canals are the major branches having their discharge carrying capacity more than 75 cumecs (2650 cusecs). About 18.55 lac Ha command area Spread over 3177 villages of 77 Taluka of 17 Districts will be getting benefit of irrigation water through a Canal network of 71,748 km.

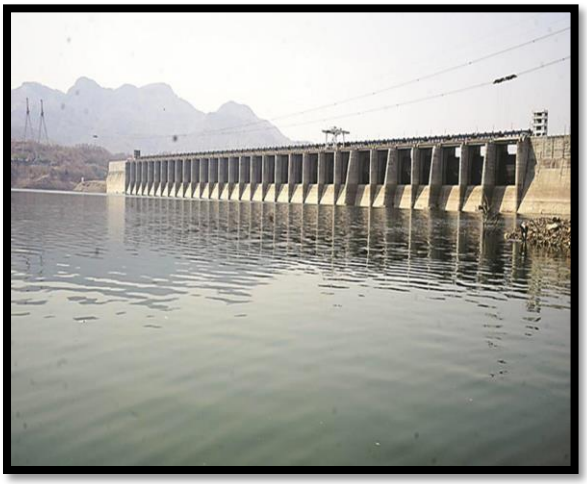


Figure 93: Sardar Sarovar Reservoir

Figure 94: Sardar Sarovar Dam

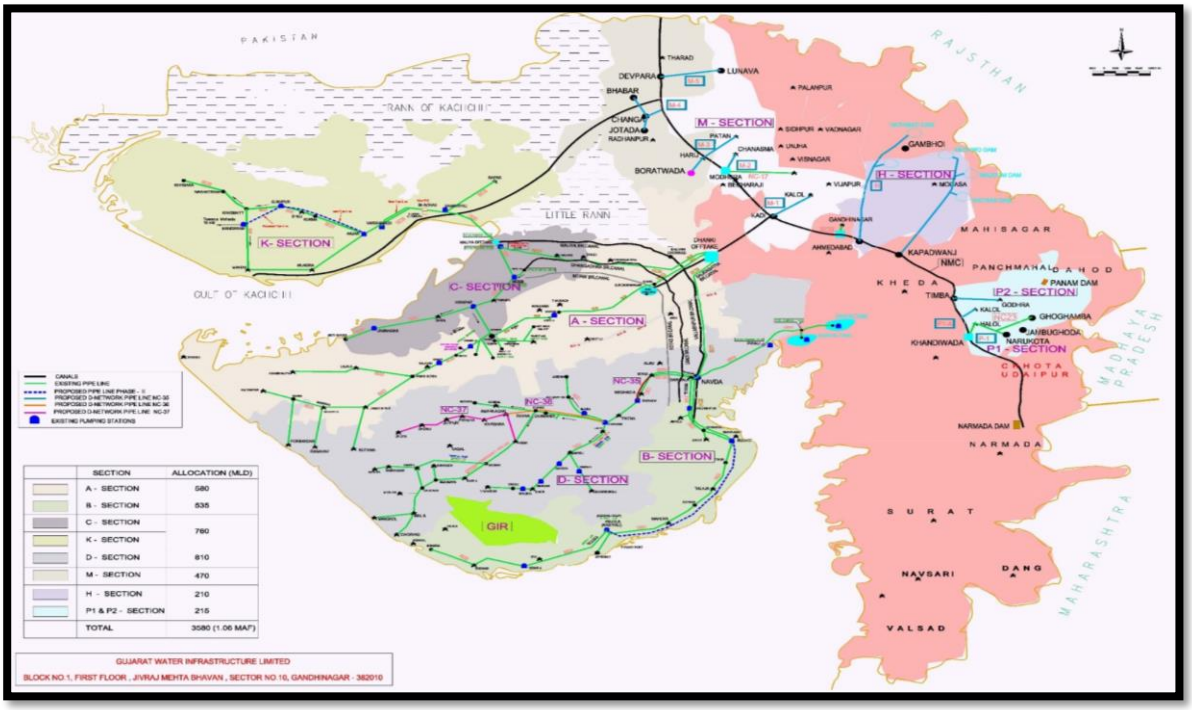



Figure 95: Narmada Canal Network

Figure 96: Origin of Narmada Main Canal

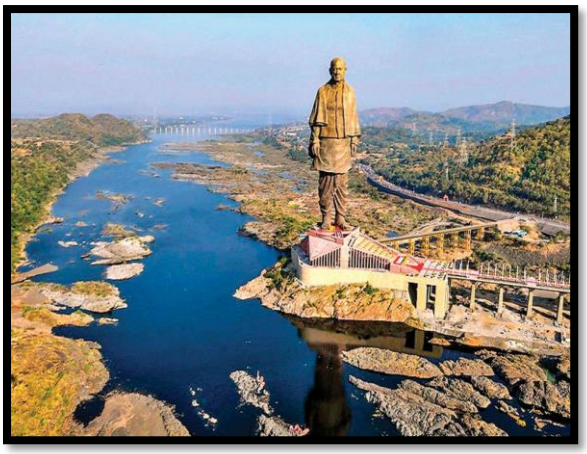


Figure 97: Statue of Unity

**Features of Project**

Table 42: Features of the Project

| | |
|---|---|
| **Dam** | |
| Length of main concrete gravity dam | 1210.00 m |
| Maximum height above deepest foundation level | 163.00 m |
| Top R.L. of dam. | 146.50 m |
| Catchments area of river above dam site | 88,000 Sq. km |
| Live storage capacity | 0.5860M.Ha.m |
| Length of reservoir<br>Maximum width<br>Average Width | 214.00 km<br>16.10 km<br>1.77 km |
| Spillway gates<br>Chute Spillway<br>Service Spillway | <br>7 Nos. 60' x 60'<br>23 Nos. 60' x 55' |
| Spillway Capacity | 87000 cumecs |
| **Canal System** | |
| **Main Canal** | |
| Full supply level (F.S.L.) at H.R. | 91.44 m (300 ft) |
| Length up to Gujarat - Rajasthan border | 458.318 km |
| Base width in head reach | 73.01 m |
| Full supply depth (F.S.D.) in head reach | 7.60 m |
| **Design discharge capacity** | |
| (1) In head reach | 1133 cumecs |
| (2) At Gujarat Rajasthan border | 74.55 cumecs |
| **Distribution System** | |
| Numbers of Branches | 38 |
| Length of distribution system network | 74626.00 km |
| Culturable Command Area | 18.45 lakh hectares |

**Branch Canals**

There are 38 branch canals which are off taking from Narmada Main Canal. The details of same are given in the table below.

Table 43: Details of Branch Canal Off Taking from Main Canal

| Sr. No | Name of Canal | Chainage of NMC (km) | Sr. No. | Name of Canal | Chainage of NMC (km) | Sr. No. | Name of Canal | Chainage of NMC (km) |
|---|---|---|---|---|---|---|---|---|
| 1 | Wadia | 9.931 | 2 | Tilakwada | 17.871 | 3 | Mandwa | 25.263 |
| 4 | Bhilodia | 32.694 | 5 | Timbi | 38.523 | 6 | Sankheda | 45.109 |
| 7 | Miyagam | 62.916 | 8 | Gojali | 70.236 | 9 | Vadodara | 81.834 |
| 10 | Dena | 88.770 | 11 | Dumad | 100.026 | 12 | Sakarda | 102.953 |
| 13 | Zumkha | 106.905 | 14 | Nahra | 111.645 | 15 | Desar | 126.645 |
| 16 | Sanali | 171.961 | 17 | Mehmdabad | 187.074 | 18 | Ghodasar | 202.368 |
| 19 | Vehlal | 212.546 | 20 | Daskroi | 223.667 | 21 | Dholka | 246.286 |
| 22 | Sanand | 258.632 | 23 | Saurashtra | 263.200 | 24 | ViramgamI | 267.063 |
| 25 | ViramgamII | 277.166 | 26 | Goriya | 290.605 | 27 | Kharaghoda | 292.398 |
| 28 | Zinzuwada | 301.041 | 29 | Bolera | 326.389 | 30 | Rajpura | 344.772 |
| 31 | Amarapura | 354.000 | 32 | Radhanpur | 374.486 | 33 | Kachchh | 385.814 |
| 34 | Vejpur | 405.722 | 35 | Madka | 417.792 | 36 | Malsan | 423.732 |
| 37 | Dhima | 438.552 | 38 | Godasisar | 453.837 | | | |

**Green Feature:**

Solar panels atop Narmada river at Chandrasan village near Mehsana, 45 kms from Ahmedabad. India's first 1MW canal-top solar power plant will generate 1.6 million units of electricity per year. The project has been developed by the Gujarat State Electricity Corporation Limited (GSECL).This project is scheduled to be implemented on all the major sites on the main canal and the branch canals.

Figure 98: Solar Panels on Top of Narmada Canal

**Benefits of Project**

**Irrigation**

The Sardar Sarovar Project will provide irrigation facilities to 18.45 lac ha. of land, covering 3112 villages of 73 talukas in 15 districts of Gujarat. It will also irrigate 2,46,000 ha. of land in the strategic desert districts of Barmer and Jallore in Rajasthan and 37,500 ha. in the tribal hilly tract of Maharashtra through lift. About 75% of the command area in Gujarat is drought prone while entire command in Rajasthan is drought prone. Assured water supply will soon make this area drought proof.

Figure 99: Irrigation

**Drinking water supply**

A special allocation of 0.86 MAF of water has been made to provide drinking water to 173 urban centres and 9490 villages within and out-side command in Gujarat for present population of 28 million and prospective population of over 40 million by the year 2021. All the villages and urban centres of arid region of Saurashtra and Kachchh and all "no source" villages and the villages affected by salinity and fluoride in North Gujarat will be benefited. Water supply requirement of several industries will also be met from the project giving a boost to all-round production.

Figure 100: Drinking Water Supply

**Power**

There are two power houses viz. River Bed Power House and Canal Head Power House with an installed capacity of 1200 MW and 250 MW respectively. The power would be shared by three states - Madhya Pradesh - 57%, Maharashtra - 27% and Gujarat 16%. This will provide a useful peaking power to western grid of the country which has very limited hydel power production at present. A series of micro hydel power stations are also planned on the branch canals where convenient falls are available.

Figure 102: Power

**Wild Life**

Wild life sanctuaries viz. "Shoolpaneshewar wild life sanctuary" on left Bank, Wild Ass Sanctuary in little Rann of Kachchh, Black Buck National Park at Velavadar, Great Indian Bustard Sanctuary in Kachchh, Nal Sarovar Bird Sanctuary and Alia Bet at the mouth of River will be benefited.

Figure 102: Wild Life

**Flood Protection**

It will also provide flood protection to riverine reaches measuring 30,000 ha. covering 210 villages and Bharuch city and a population of 4.0 lac in Gujarat.

Figure 103: Flood Protection

**Additional Production**

SSP would generate electricity. On completion, annual additional agricultural production would be Rs. 1600 crores, power generation and water supply Rs. 175 crores, aggregating about Rs. 2175 crores every year equivalent to about Rs. 6.0 crores a day.

In addition, there will be benefits of fisheries development, recreational facilities, water supply for industries, agro industrial development, protection of conserved forest from grazers and secondary benefits viz employment generation, increase in vegetal cover in 3.4 M. Ham. of GCA, gains due to compensatory forest, tree plantation 100 times and Carbon Dioxide ($CO_2$) fixation to large extent by 70 times.

## Issues

**Unreliability of supply**

Villages covered under the Narmada project are expected to receive water every day. However, in many villages water sometimes reaches once in two or three days. The officials blame unexpected power-cuts, failure of pumps and breakage of pipelines as major reasons for this. As a remedial measure they should have alternative plans to take care of such problems to strengthen the reliability of supply.

**Inadequacy of supply**

Villages are expected to get water at the rate of 70 lpcd. In the absence of water meters, it is difficult to assess the adequacy of water supply. Based on population, supply varies from one hour per day to 3 hours per day but leakages in the pipeline result in low pressure and sometimes a 3-hour supply becomes equivalent to one hour to the end users. Therefore, it is suggested to install water meters at every village to assure quantum of supply and to check leakages in the pipeline through carrying out routine maintenance regularly.

**Inefficiency in operation and maintenance**

The O&M work has been entrusted to private contractors. They appoint linesmen to operate the valve, maintain the pipeline, clean the tank periodically, report breakages/leakages, manage repairs, observe the quality of water, apply chlorine if required, support the cooperative society/village Panchayat in managing the water supply. However, it is observed that contractors are always keen to reduce their costs by understaffing. Adequate supervision of the contractors by officials is needed to maintain smooth operation of lines.

**Absence of systematic disposal of used water**

Any amount of domestic water consumption ends with generation of waste water. In normal conditions for domestic water supply it is observed that about 80 per cent of the used water is discharged as waste water. Therefore, any village with a population of 2,000 with 70 lpcd water supply will generate waste water amounting to 112,000 litres per day. However, management of waste water at the village level is not so efficient. It is a well-established fact that proper disposal of waste water can reduce the incidence of waterborne diseases. The project should encourage better management of waste water at the village level in terms of its collection and systematic disposal with required treatment

# Chapter 15

## Smart and/or Sustainable features of Chapter 8 & 13 designs, Impact on society with doing small changes, Period, Amount Expenditure and Benefit

## Smart and/or Sustainable features of Chapter 8 & 13 Designs

| Sr.No | Design Name | Amount (Rs) | Benefit |
|---|---|---|---|
| 1 | **Septic Tank** | 11300 | To provide proper drainage facilities for village |
| 2 | **Garden** | 280846 | Provide entertainment for children and refreshment for the adults. |
| 3 | **Public Library** | 597424 | To provide facilities of reading different books and access internet. |
| 4 | **Community Hall** | 553805 | Provide facilities for cultural activities and to undertake community activities. |
| 5 | **Dry Composite Toilet** | 25060 | To improvement in cleanliness, hygiene and the general quality of life in rural areas |
| 6 | **Village Entry Gate** | 249250 | It gives aesthetic look and is the symbol of the village. |
| 7 | **Agricultural Storage Yard** | 1046200 | To store goods of the farmers so that it is kept safe before selling it in the market. |
| 8 | **Skill Development Centre** | 290680 | To develop skills of the people of the village so that they can be employed at better places. |
| 9 | **Milk Cooperative Society** | 268650 | To collect milk and sell all the milk of the village so that people don't have to go to city themselves. |
| 10 | **Bus Stand** | 123950 | To repair the existing bus stand to use it again properly. |
| 11 | **Farmer Help Centre** | 139800 | To provide help and increase the knowledge of the farmers. |
| 12 | **Rainwater Recharge System** | 32100 | To recharge the underground water. |

## Impact on society with doing small changes, Period, Amount Expenditure and Benefit

| Sr. No. | Design Name | Period | Amount (Rs) | Benefit |
|---|---|---|---|---|
| 1 | **Septic Tank** | Immediately | 11300 | It reduce the strength of sewage to the extent about 30-35%. |
| 2 | **Garden** | Long term | 280846 | It is used for entertainment and relaxation place for villagers. |
| 3 | **Public Library** | Long term | 597424 | It is used for reading and internet purpose for villagers. |
| 4 | **Community Hall** | Within one year | 553805 | It is used for general functions or program of villagers. |
| 5 | **Dry Composite Toilet** | Within one year | 25060 | To provide facilities of toilet and reduce use of water. |
| 6 | **Village Entry Gate** | Long term | 249250 | For aesthetic and heritage of the people of the village. |
| 7 | **Agricultural Storage Yard** | Within one year | 1046200 | To keep the crops of the farmers. |
| 8 | **Skill Development Centre** | Long term | 290680 | To provide facility of entertainment for villagers. |
| 9 | **Milk Cooperative Society** | Immediately | 268650 | It is used for direct selling of milk and other product. |
| 10 | **Bus Stand** | Immediately | 123950 | To use for people waiting for the bus. |
| 11 | **Farmer Help Centre** | Within one year | 139800 | For people security and better visibility in night time. |
| 12 | **Rainwater Recharge** | Immediately | 32100 | For increasing the underground water to use the water in summer. |

# Chapter 16
## Survey By Interviewing With Talati And/Or Sarpanch

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Survey with Interviewing

### SURVEY BY INTERVIEWING WITH TALATI AND/OR SARPANCH

**Vishwakarma Yojana: Phase VIII**

**ALLOCATED VILLAGE SURVEY**

An approach towards **"Rurbanisation for Village Development"**

CHAPTER- 16

| Sr. | Questions | Yes/ No | Remarks |
|---|---|---|---|
| 1 | What are the sources of income in village? | Yes | Agriculture. |
| 2 | What are the chances of employment in village? | | |
| 3 | What are the special technical facilities in village? | No | |
| 4 | Is any debt on village dwellers? | No | |
| 5 | Are village people getting agricultural help? | Yes | |
| 6 | Is women health awareness Program organized in village? | No | |
| 7 | Are women having opportunity to work and income? | No | |
| 8 | Child girl education is appreciated in village? | Yes | |
| 9 | Facility of vaccination to child is available in village? | Yes | |
| 10 | Are village people aware about child vaccination and done to each and every child as per norms? | Yes | |
| 11 | Women help line number information is provided to village people? | Yes | |
| 12 | Is water scarcity in village? How many days per year? | No | |
| 13 | Is village under any debt? | No | |
| 14 | Is any serious issue due to debt from bank or any person happened in village? | No | |
| 15 | Is any suicide like incident observed in village due to government policy, debt or threatening? | No | |
| 16 | Is any death of patient occurred due to unavailability of medical facility in village? | No | |
| 17 | How many disabled (physically challenged) is observed in village? Provide list with Male/female/girl/boy with age and type of disability and reason of disability. | Yes | Male - 5<br>Female - 0<br>others - 0 |
| 18 | Is village improvement is observed in comparative scenario from past to present? | Yes | |
| 19 | Is any unavoidable difficulty village people are facing? Any natural calamity is there? | No | |
| 20 | Life Living standard of girls and women is appreciated and uplifted in village? | Yes | |

**Nodal officer and students can add more questions. This is a sample. Having Minimum requirement.**

Administration queries/ Difficulties:
GTU VY Section
**Contact No – 079-23267588**
**Email ID: rurban@gtu.edu.in**

તલાટી-કમ-મંત્રી
ગ્રામ પંચાયત-અગતરાય

# Chapter 17
## Irrigation / Agriculture Activities and Agro Industry, Alternate Technics and Solution

## Agroecology
Agroecology is an applied science that studies ecological processes applied to agricultural production systems. Bringing ecological principles to bear can suggest new management approaches in agroecosystems. Agroecologists study a variety of agroecosystems. The field of agroecology is not associated with any particular method of farming. As a systematic approach, agroecology relies on the improvement of agro-food processes as a whole, with the constant goal of improving environmental performance.

Small-scale farmers produce food for 70% of the global population. Yet, they are some of the world's poorest and most food insecure people. Alternatives to conventional farming should be embraced to improve subsistence farmers' yields and to ensure adequate food production for the growing global population. The stark reality, according to the International Food Policy Research Institute, is that the world needs to produce more food with fewer resources.

Agroecology, a farming approach that mimics natural ecosystems, is an alternative method that can produce more food using fewer resources. Small-scale farmers in Africa have used Agroecology to more than double crop yields within 3 to 10 years of implementation, according to the UN special rapporteur on the right to food. Farmers also use Agroecology to improve soil fertility, adapt to climate change, and reduce farming input costs.

In contrast, conventional farming is characterised by mono-cropping, green revolution technologies, and synthetic fertiliser. It is resource intensive in terms of capital, land, water, and fossil fuel use. Conventional farming threatens future food production by reducing biodiversity, and contributing to environmental degradation and climate change which lower yields.

## Application of Agroecology: Permaculture
Permaculture, a contraction of permanent agriculture, is a promising design system for the application of Agroecology. It was developed in Australia in the 1970s based on Agroecology and indigenous farming systems. In practice, permaculture farms are organic, low-input, and biodiverse, and use techniques like intercropping trees, planting perennials, water harvesting, and resource recycling. Permaculture programmes are more multifunctional than typical agricultural development programs. This is important given the growing call for "triple-win solutions" for agriculture, health, and environmental sustainability.

Despite the potential of permaculture and Agroecology, mainstream agriculture continues to focus on conventional techniques. There are a number of reasons why permaculture has not been more widely adopted, or even considered.

First, the small-scale, grassroots nature of permaculture, while part of its strength, has contributed to its slow dissemination and minimal visibility.

Second, permaculture is a design system, rather than an easily replicated model, which makes it more difficult to teach and adopt than a typical agriculture project. Further, permaculture challenges how governments and NGOs usually teach people to farm. Indigenous farming knowledge, like that used in permaculture, has been devalued and eroded with the imposition of mono-cropping and green revolution technologies.

Third, scepticism remains over whether people's food needs can be met using organic, labour intensive, small-scale farming. To date, there has not been enough rigorous research on permaculture to evaluate its impact, its application on a large scale, or to support its adoption. Academia has not seriously engaged with permaculture, and there are no companies with a profit incentive to research and disseminate it.

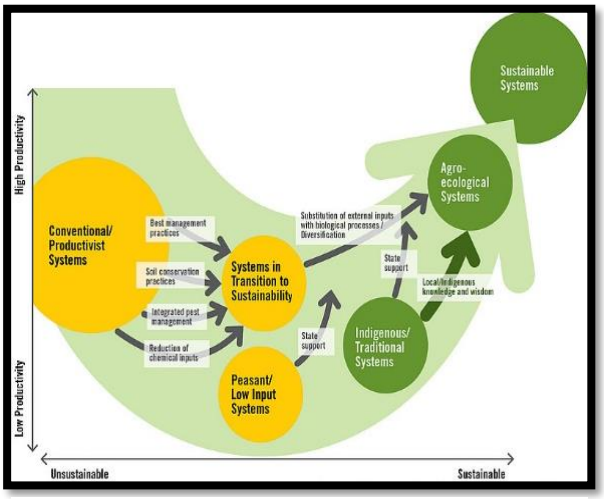



Figure 104: Agroecology

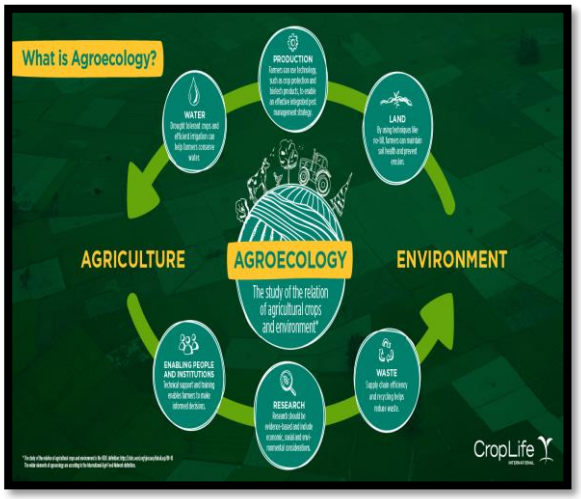



Figure 105: Agroecology

## Agriculture Technology – Revolutionising the Food Industry

Agriculture technology is one of the far-reaching and dynamic areas of new-age technology redefining the farming sector. Its rapid growth has largely been prompted by the demand for more food to cater to the ever-growing world population.

Therefore, the agricultural sector must increase its production efficiently and effectively, to keep up with this escalating demand.
Furthermore, the fast depleting and rampantly used natural resources have also raised the red flag and require immediate corrective and preventive measures.

## The Current Scenario

The conventional methods of farming have led to irresponsible use of natural resources like water and energy over the years. Coupled with this is a lack of awareness and training in good agricultural practices among the farmers. As a result, all these have added to the challenges faced by the sector.

Water wastage, overuse of fertilisers and pesticides are some of the challenges faced by traditional methods of farming. They eventually seep into the soil and water sources, causing irreparable damage to the ecosystem. Therefore, there is an urgent need to conserve the resources and move towards a sustainable future.

Agriculture technology beckons the use of new and sophisticated techniques like robots, GPS, soil, weather and moisture mapping and IoT (Internet of Things) etc. These help in making the sector more productive, efficient, profitable, safer and environment-friendly.
Agriculture technology has opened new vistas for the farming sector.

High-tech, powered machinery is taking over, and progressive techniques are being used to increase productivity. This sweeping change has led to an increase in the farm output, and very important, the optimal utilisation of resources.

## The significance of Agriculture Technology

- Helps in the optimal utilisation of water (by using new-age irrigation techniques like 'Drip and Sprinkle Irrigation'). Also, in the effective usage of fertiliser, pesticides and other inputs. Consequently, it helps in the conservation of natural resources and minimal and effective use of pesticides.
- Keeps the nutrition value of the food intact and protects it from the harmful effects of overuse of pesticides. Furthermore, the efficient use of the resources also helps in keeping the food prices down.
- Helps in increasing crop productivity.
- The utilisation of safe and modern machinery leads to higher farmer/worker safety.
- Employing sophisticated and efficient techniques results in reducing the impact on the ecosystem. Which, in turn, makes moving toward a sustainable future, a viable option.

## New Age Agricultural Technologies

### High-Tech Irrigation Techniques

Irrigation is most certainly among the most evolved areas of agriculture that uses technology to improve the efficiency of natural resources like water.
New techniques like Drip and Sprinkler irrigation play a pivotal role in helping sustain the environment. Soil moisture sensors, weather and other field data's availability on phones and computers, support the farmers to make informed irrigation control decisions.

Figure 106: Drone Sprinkler

### Robotics

Robotic technologies enable dependable monitoring and management of natural resources like water and air quality.
Therefore, its use results in more efficient and safer production of the crop.
Additionally, it helps in lowering the price of the produce and aids in reducing the adverse effects on the environment.

Figure 107: Robot in Field

### Internet of Things (IoT)

Internet of Things connects the various devices being used on the field to monitor and measure the work done. Right from information on the soil moisture levels, water meters, weather stations to irrigation pumps, all data is accessible on smartphones.

These inputs help in planning and quick decision making, on all sizes of farms, from small to the big. As more solution-centric devices develop, we will see even more significant benefits from IoT in agriculture in the future.


Figure 108: IoT in Agriculture

Technology is an integral part of our lives and is redefining every aspect of modern lives, including the farming sector. The high-tech technology currently being used in agriculture is making sure that what we eat today, reaches us faster. Also, is fresher, retains its nutritional value and is more cost-effective. Agricultural technology is revolutionising the food industry and will only become more cutting edge in the times to come.

# Chapter 18
## Social Activities -Any Activates Planned By Students

## 1. Digital India

- Digital India was launched by the Prime Minister of India Narendra Modi on 1 July 2015, with an objective of connecting rural areas with high-speed Internet networks and improving digital literacy.
- The vision of Digital India program is inclusive growth in areas of electronic services, products, manufacturing and job opportunities.
- It is center on three key areas – digital infrastructure as a utility to every citizen, governance and services on demand, and digital empowerment of citizens.

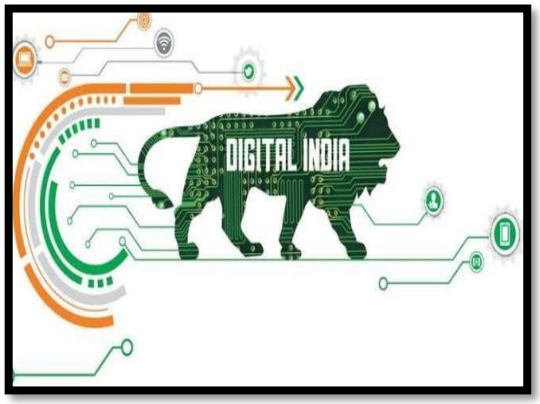


Figure 109: Digital India

## 2. Entrepreneurship

- Entrepreneurship development is a program, method or process that aims to identify, nurture, support and grow the talents in bigger level so that it brings new business leaders in the market to reduce employment, health, educational, business, environmental problems.
- The goal is to improve the living, the economic, social standard thinking, and actions of people.

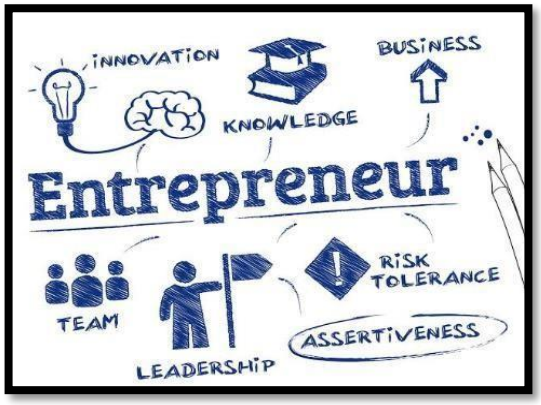


Figure 110: Entrepreneurship

## 3. Women Empowerment

- Women empowerment means accepting and allowing women who are on the outside of the decision-making process into it.
- Empowerment is the process that creates power in individuals over their own lives, society, and in their communities.
- People are empowered when they are able to access the opportunities available to them without limitations and restrictions such as in education, profession and lifestyle.
- Empowerment includes the action of raising the status of women through education, raising awareness, literacy, and training.


Figure 111: Women Empowerment

# Chapter 19
## Agatrai Village SAGY Questionnaire Survey form

**SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire**

Village: Ayatrai Gram Panchayat: Ayatrai Ward No. -

Block: Keshod District: Junagadh

State: Gujarat L S Constituency: _____

**1. Family Identity and Size**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Name of Head of Household | Buddhu bhai Guneja | | | | | | | Male/ Female | M |
| SECC Survey ID: | | Family Size | 5 | Over 18 | 4 | 6 to 18 | 1 | Under 6 | - |

**2. Category & Entitlement Details** (Tick as appropriate)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Social Category[1] | | Life Insurance | 1. All Adults 2. Some Adults 3. None | AABY | 1. Yes 2. No | Kisan Credit Card | NO Yes / No |
| Poverty Status Year[2]: | 1. BPL 2. APL | Health Insurance | 1. All Adults 2. Some Adults 3. None | RSBY | 1. Yes 2. No | MGNREGS Job Card Number | 0 |
| PDS (If NFSA is not implemented) | Annapurna | Antyodaya | BPL | APL | Is any woman in the family | | |
| PDS (If NFSA is implemented) | Annapurna | Antyodaya | Priority | Other | member of an SHG? Yes / No | | |

**2. Adults (above 18 years)**

| Name | Age | Sex M/F / O | Disability Status Y/N | Marital Status[3] | Education Status[4] | Adhaar Card (Y/ N) | Bank A/C (Y/N) | Social Security Pension[5] |
|---|---|---|---|---|---|---|---|---|
| Buddhuben Guneja | 95 | M | N | | 10 Pass | Y | Y | N |
| Kuhiben Guneja | 93 | F | N | | 12 Pass | Y | Y | N |
| Hunsh bhai Guneja | 74 | M | N | | 12th Pass | Y | Y | N |
| Nehulben Guneja | 90 | F | N | | Graduate | Y | Y | N |

**3. Children from 6 years and up to 18 years**

| Name | Age | Sex M/F/O | Disability Y/N | Marital Code* | Level of Education: Code# | Going to School /College (Y/N) | Current Class | Computer Literate Y/N |
|---|---|---|---|---|---|---|---|---|
| Gaurav Guneja | 15 | M | N | | | Y | 10th | Y |
| | | | | | | | | |
| | | | | | | | | |

**4. Children below 6 years**

| Name | Age | Sex M/F/ O | Disability Yes/No | Going to School (Y/N) | Going to AWC Y/N | De-worming Done | Fully Immu-nised Y/N | Mother's Age at the time of Child's Birth |
|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - |
| | | | | | | | | |
| | | | | | | | | |

[1] Scheduled Caste 1, Scheduled Tribe 2, Other Backward Castes 3, Other 4
[2] Enter the BPL Survey round being used in the Gram Panchayat for identification of BPL Families (e.g. 1997/2002/2011)
[3] *Marital Status: Not Married – 1, Married – 2, Widowed – 3, Divorced/Separated – 4*
[4] *Level of Education: Not Literate – 01, Literate – 02, Completed Class 5 - 03, Class 8th – 04, Class 10th-05, Class 12th-06, ITI Diploma-07, Graduate-08, Post Graduate/Professional – 09 (write the highest level applicable)*
[5] No Pension – 0, Old Age Pension – 1, Widow Pension – 2, Disability Pension – 3, Other Pension – 4 (mention)

## SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

**5. Hand washing**

| | Always | | Sometimes | | Never |
|---|---|---|---|---|---|
| After use of Toilet | Soap ✓ | Other | Soap | Other | |
| Before Eating | Soap ✓ | Other | Soap | Other | |

**6. Use of Mosquito Net**

Children: Yes / No Adults: Yes / No

**7. Do members take Regular Physical Exercise**

| | Yoga | Games | Other Exercises |
|---|---|---|---|
| Adults | Yes / ~~No~~ | Yes / ~~No~~ | Yes / ~~No~~ |
| Children | Yes / ~~No~~ | Yes / ~~No~~ | Yes / ~~No~~ |

**8. Consumption of Tobacco**

| | Smoking | Chewing |
|---|---|---|
| Adults | — | Tobacco |
| Children | — | — |

**9. House & Homestead Data**

| | |
|---|---|
| Own House: Yes / ~~No~~ | No. of Rooms: 2 |
| Type: Kutcha / ~~Semi Pucca~~ / Pucca | |
| Toilet: Private / Community / ~~Open Defecation~~ | |
| Drainage linked to House: Covered / ~~Open~~ / ~~None~~ | |
| Waste Collection System | Door Step / ~~Common Point~~ / No ~~Collection System~~ |
| Homestead Land: Yes / ~~No~~ | Kitchen Garden : ~~Yes~~ / No |
| Compost Pit: Individual/ ~~Group~~/ ~~None~~ | Biogas Plant: ~~Individual~~/ ~~Group~~/ None |

**10. Source of Water** (Distance from source in KMs)

| Source of Water | | Distance |
|---|---|---|
| Piped Water at Home | Yes / No | |
| Community Water Tap | Yes / No | |
| Hand Pump (Public / Private) | Yes / No | |
| Open Well(Public / Private) | Yes / No | |
| Other (mention): Bore Well | | 200m |

**11. Source of Lighting and Power**

| |
|---|
| Electricity Connection to Household: Yes / No |
| Lighting: Electricity/Kerosene/Solar Power |
| **Mention if Any Other:** L.P.G. |
| Cooking: LPG/Biogas/Kerosene/Wood/Electricity |
| **Mention if Any Other:** _____ |
| **If cooking in Chullah:** Normal/ Smokeless |

**12. Landholding (Acres)**

| | | | |
|---|---|---|---|
| 1. Total | 4 Acres | 2. Cultivable Area | 4 Acres |
| 3. Irrigated Area | 4 Acres | 4. Uncultivable Area | - |

**13. Principal Occupations in the Household**

| Livelihood | Tick if applicable |
|---|---|
| Farming on own Land | ✓ |
| Sharecropping /Farming Leased Land | ✗ |
| Animal Husbandry | ✗ |
| Pisciculture | ✗ |
| Fishing | ✗ |
| Skilled Wage Worker | ✗ |
| Unskilled Wage Worker | ✗ |
| Salaried Employment in Government | ✗ |
| Salaried Employment - Private Sector | ✗ |
| Weaving | ✗ |
| Other Artisan(mention) | ✗ |
| Other Trade & Business (mention) | ✗ |

**14. Migration Status**

Does any member of the household migrate for Work: Yes / No. If Yes Entire Year / Seasonal

Does anyone below 18 years migrate for work: Y/N

**15. Agriculture Inputs**

| | |
|---|---|
| Do you use Chemical Fertilisers | Yes/No |
| Do you use Chemical Insecticides | Yes/No |
| Do you use Chemical Weedicide | Yes/No |
| Do you have Soil Health Card | Yes/No |
| Irrigation: None/ Canal/ Tank/ Borewell/Other | |
| Drip or Sprinkler Irrigation: Drip /Sprinkler / None | |

**16. Agricultural Produce in a normal year (Top 3)**

| Name | Unit | Quantity |
|---|---|---|
| Peanuts | 1 | 200 kg |
| | | |
| | | |

**17. Livestock Numbers**

| | | |
|---|---|---|
| Cows:_____ | Bullocks:_____ | Calves:_____ |
| Female Buffalo:_____ | Male Buffalo:_____ | Buffalo Calves:_____ |
| Goats/ Sheep:_____ | Poultry/ Ducks:_____ | Pigs:_____ |
| Any other: Type _____ | | No._____ |
| Shelter for Livestock: Pucca / Kutcha / None | | |
| Average Daily Production of Milk(Litres):_____ | | |

**18. What games do Children Play**

Cricket

**19. Do children play musical instrument** (mention)

NO

Schedule Filled By:
Principal Respondent:
Date of Survey:

## Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

*(Note: Please aggregate information from village level questionnaires wherever relevant)*

### I. Basic Information

a. Gram Panchayat: Ayatmai

b. Block: Keshod

c. District: Junagadh

d. State: Gujarat

e. Lok Sabha Constituency: Porbandar

f. Number of Wards in the Gram Panchayat: 10

g. Number of Villages in the Gram Panchayat: 1

h. Names of Villages:

1. Ayatmai

**Demographic Information**

Number of Households 1179 Total Population 5318 Male 2737 Female 2581

SC HHs 343 ST HHs 350 OBC HHs 700 Other HHs 3325

### I. Access to Infrastructure / Facilities / Services

| | Infrastructure Facilities / Services | Located within the GP Yes (Y)/No (N) | If located elsewhere (N), distance from the GP office |
|---|---|---|---|
| a. | ANM/ Health Sub Centre | | |
| b. | Nearest Primary Health Centre (PHC) | Yes | |
| c. | Nearest Community Health Centre (CHC) | N | 10 Km away |
| d. | Nearest Post Office | Yes | |
| e. | Nearest Bank Branch (Any) | Yes | |
| f. | Nearest Bank with CBS Facility | No | 8 Km away |
| g. | Nearest ATM | Yes | |
| h. | Nearest Primary School | Yes | |
| i. | Nearest Middle School | Yes | |
| j. | Nearest Secondary School | Yes | |
| k. | Nearest Higher Secondary School / +2 College | Yes | |
| l. | Nearest Graduate College | NO | 25 Km away |
| m | Nearest ITI / Polytechnic Centre | NO | 12 Km away |
| n | Kisan Seva Kendra | NO | 8 Km away |

1

## Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

*(Note: Please aggregate information from village level questionnaires wherever relevant)*

| | Infrastructure Facilities / Services | Located within the GP Yes (Y)/No (N) | If located elsewhere (N), distance from the GP office |
|---|---|---|---|
| o | Agriculture Credit Cooperative Society | No | 15 km away |
| p | Nearest Agro Service Centre | No | 14 km away |
| p | MSP based Government Procurement Centre | No | 7 km away |
| q | Milk Cooperative /Collection Centre | No | 11 km away |
| r | Veterinary Care Centre | No | 9 km away |
| s | Ayurveda Centre | No | 6 km away |
| t | E – Seva Kendra | Yes | |
| u | Bus Stop | Yes | |
| v | Railway Station | No | 10 km away |
| w | Library | No | 8 km away |
| x | Common Service Centre | No | 8 km away |

**IV. Sports Facilities in the Gram Panchayat**

**a.** Number of Play Grounds in the GP: Total _____ Public_____ Private_____

**b.** Mini Stadium : No Yes(Y) /No (N) *(Playground with equipment and sitting arrangement)*

**V. Education, ICDS**

a. Number of Angan Wadi Centres: 6

b. Number of villages without Angan Wadi Centres 0

Names of such villages: -

c. Schools (Number)

Primary Private: 1 Primary Govt.: 2

Middle Private:_____ Middle Govt.: 1

Secondary Private:_____ Secondary Govt.: 1

Higher Secondary Private: _____ Higher Secondary Govt: 1

**VI. Public Distribution System**

| | Item | Private Contractor | Women's SHG | Gram Panchayat | Cooperative | Other (Mention) | Location in GP (mention Location) | If outside GP, Location & distance from GP HQrs) |
|---|---|---|---|---|---|---|---|---|
| a. | Cereal (Rice/ Wheat/ Millets) | | | (2) | | | 1. Dhunm Shuk | |
| b. | Kerosene | | | (2) | | | 2. Bus Vistun | |
| c. | Other (mention) | | | (2) | | | | |

2

## Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

*(Note: Please aggregate information from village level questionnaires wherever relevant)*

### VII. Coverage of Villages under different Facilities & Services

| | Parameter | Villages Status[1] | Names of Villages Covered | Names of Villages not Covered |
|---|---|---|---|---|
| a. | Piped Water Supply Coverage to Villages | Covered ✓ / Not Covered | Ayatmai | – |
| b. | Hand Pump Coverage in Villages: | Covered ✓ / Not Covered | Ayatmai | |
| c. | Coverage under Covered Drains: | Covered ✓ / Not Covered | Ayatmai | |
| d. | Coverage under Open Drains: | Covered ✓ / Not Covered | Ayatmai | |
| e. | Villages with Household Electricity Connection (Numbers) | Connected ✓ / Not Connected | Ayatmai | |

### VIII. Land and Irrigation

| | Private Land | Area in Acres | | Common Land | Area in Acres | | Irrigation Structure | No. |
|---|---|---|---|---|---|---|---|---|
| a. | Cultivable Land | 1496 | d. | Pasture / Grazing Land | 20 | g. | Check Dam | 2 |
| b. | Irrigated Land | 1300 | e. | Forests/ Plantations | 270 | h. | Wells/Bore Wells | 1050 |
| c. | Un-irrigated Land | 196 | f. | Other Common Land | 26 | i | Tanks /Ponds | 4 |

[1] Mention the number of Villages Covered and Not Covered

3

**Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire**

*(Note: Please aggregate information from village level questionnaires wherever relevant)*

IX. Parameters relating to Households & Institutions

| | | Number |
|---|---|---|
| a) | Number of eligible Households for pension (old age, widow, disability) | 10 |
| b) | Number of Households receiving pension (old age, widow, disability) | 10 |
| c) | Number of eligible Households who are not receiving pension | – |
| d) | Number of Households eligible for Ration Card | 1000 |
| e) | Number of eligible HHs having ration cards | 4 |
| f) | Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana) | – |
| g) | Number of HHs covered under AABY (Aam Aadmi Bima Yojana) | – |
| h) | Number of active Job Card holders under MGNREGA | 0 |
| i) | Number of Job Card holders who completed 100 days of work during 2013-14 | 0 |
| j) | Number of shops selling alcohol | 0 |
| k) | Number of BPL families | 600 |
| l) | Number of landless households | 0 |
| m) | Number of IAY beneficiaries | 0 |
| n) | Number of FRA[2] beneficiaries | 0 |
| o) | Number of Community Sanitary Complexes | 5 |
| p) | Number of Households headed by single women | 0 |
| q) | Number of Households headed by physically handicapped persons | 4 |
| r) | Total number of Persons with Disability in the village | 5 |
| s) | Number of SHGs | – |
| t) | Number of active SHGs | – |
| u) | Number of SHG Federations | – |
| v) | Number of Youth Clubs | – |
| w) | Number of Bharat Nirman Volunteers | – |

**Name and Signature of Surveyor and Respondent'**

| | | | |
|---|---|---|---|
| Joshi Krutunth Nakhani smit<br>Surveyor | તલાટી-કમ-મંત્રી<br>Gram Panchayat Chairperson) | તલાટી-કમ-મંત્રી<br>Official (Preferably seniormost Government official in the Gram Panchayat) | 17-05-'21<br>Date of Survey |

[2] The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006

4

## SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

*This questionnaire should be filled for each of the villages in the selected Gram Panchayat*[1]

10

### I. Basic Information

a. Village: Agatrai

b. Ward Number: –

c. Gram Panchayat: Agatrai

d. Block: Keshod

e. District: Junagadh

f. State: Gujarat

g. Lok Sabha Constituency: Porbandar

h. Number of Habitations / Hamlets in the Gram Panchayat: –

i. Names of Habitations / Hamlets:
–

**Demographic Information**

Number of Households 1179 Total Population 5318 Male 2737 Female 2581

SC HHs 943 ST HHs 350 OBC HHs 700 Other HHs 3325

### II. Access to Infrastructure/Amenities etc.

| i. | Access to Infrastructure / Facilities / Services | Located in the Village Yes (Y)/No(N) | If located elsewhere (N), distance in kms from the village |
|---|---|---|---|
| a. | Nearest Primary School | Yes | |
| b. | Nearest Middle School | Yes | |
| c. | Nearest Secondary School | Yes | |
| d. | Kisan Seva Kendra | NO | 8 Km away |
| e. | Milk Cooperative /Collection Centre | NO | 11 Km away |
| g. | Health Sub Centre | Yes | |
| h. | Bank | Yes | |
| i. | ATM | Yes | |
| j. | Bus Stop | Yes | |
| k. | Railway Station | NO | 10 Km away |

[1] While filling this the surveyor must collect the information from the Ward Member/s and relevant government officials

1

## SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

| i. | Access to Infrastructure / Facilities / Services | Located in the Village Yes (Y)/No(N) | If located elsewhere (N), distance in kms from the village |
|---|---|---|---|
| l | Library | No | 8 Km 4W4y |
| m | Common Service Centre | No | 8 Km 4W4y |
| n | Veterinary Care Centre | No | 9 Km 4W4y |

**ii.** Road Connectivity

**a.** Habitations connected by All-weather Roads *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations where not available: 1. _____

**iii. Drinking Water Facilities**

a.Piped Water Supply Coverage to Habitations: 1 *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: _____

b.Hand Pump Coverage in Habitations: 1 *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: _____

**iv. Coverage of Habitations under Waste Management System**

a. Coverage under Covered Drains: 1 *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: _____

b. Coverage under Open Drains: 2 *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: _____

c. Coverage under Doorstep Waste Collection: *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: 1. _____

**v. Coverage of Habitations under Electrification**

a. Coverage under Household Connections: *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: 1. _____

b.Coverage under Street Lighting: All*(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: 1. _____

**vi. Sports Facilities in the Village**

a.Number of Play Grounds in the Village (minimum size 200 square meters): NO

b.Mini Stadium : No Yes(Y) /No (N)

**vii. Education, ICDS**

a. Number of Anganwadi Centres: 6

c. Schools (Number)

Primary Private: 1 Primary Govt.: 2

Middle Private: _____ Middle Govt.: 1

Secondary Private: _____ Secondary Govt.: 1

Higher Secondary Private: _____ Higher Secondary Govt: 1

2

## SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

| viii. Land Category | | Area in Acres | | Land Category | Area in Acres | | Irrigation Structure | No. |
|---|---|---|---|---|---|---|---|---|
| a. | Cultivable Land | 1436 | d. | Pasture / Grazing Land | 20 | g. | Check Dam | 2 |
| b. | Irrigated Land | 1300 | e. | Forests/ Plnatations | 976 | h. | Wells/Bore Wells | 1050 |
| c. | Un-irrigated Land | 136 | f. | Other Common Land | 96 | I | Tanks /Ponds | 4 |

| ix. Entitlement Related Parameters | | |
|---|---|---|
| 1 | Number of active Job Card holders under MGNREGA | 0 |
| 2 | Number of active Job Card holders who have completed 100 days of work | 0 |
| 3 | Number of shops selling alcohol | 0 |
| 4 | Number of BPL families | 600 |
| 5 | Number of landless households | 0 |
| 6 | Number of IAY beneficiaries | 0 |
| 7 | Number of FRA beneficiaries | 0 |
| 8 | Number of common sanitation complexes | 5 |
| 9 | Number of SHGs | — |
| 10 | Number of active SHGs | — |
| 11 | Existence of SHG Federation in the Village (Yes / No) | No |
| 12 | Number of Youth Clubs | — |
| 13 | Number of Bharat Nirman Volunteers | — |

**Name and Signature of Surveyor and Respondent'**

| | | | |
|---|---|---|---|
| Joshi Kavitanth R.<br>Nakhwani Smit B.<br>Surveyor | તલાટી-કમ-મંત્રી<br>ગ્રામ પંચાયત-અગતરાય<br>PRI Respondent (Preferably a ward member from a ward that is fully or partially covered under the Village) | તલાટી-કમ-મંત્રી<br>ગ્રામ પંચાયત-અગતરાય.<br>Official Respondent (Preferably seniormost Government official in the Gram Panchayat) | 17-05-'21<br>Date of Survey |

# Chapter 20

## TDO-DDO-Collector email sending Soft copy attachment in the report

Gmail

**Smit Nakrani <smitnakrani2306@gmail.com>**

### Detailed Project Report of Agatrai, Keshod

**Smit Nakrani** <smitnakrani2306@gmail.com> Wed, May 19, 2021 at 1:10 PM
To: tdo-keshod@gujarat.gov.in, ddo-jun@gujarat.gov.in, collector-jun@gujarat.gov.in

Respected Sir/Madam,

Greetings from Civil Engineering Department,Government Engineering College Rajkot,

Government Engineering College Rajkot affiliated to Gujarat Technological University-GTU is an institution of higher learning dedicated to providing quality, career-focused undergraduate programs that prepares students with the knowledge, skills, and credentials needed to launch, enhance, or change careers.

The Gujarat Technological University has allotted an important and prestigious project of Vishwakarma Yojana by the Government of Gujarat in the year 2012-13. Vishwakarma Yojana is providing Design to Delivery solution for the development of villages in Rurban areas. The developmental work in villages that could be undertaken as per the need of the village includes Physical infrastructure facilities, Social infrastructure facilities Socio-Cultural Facilities, and Sustainable Infrastructures for the effective development of Villages.

As a part of the final year UG Civil Engineering Project, we students carried out the survey of Agatrai Village and designed various amenities to deliver it to them making them ideal for living a better life as per necessity & current village condition.

**Our Proposed Designs with an approximate cost:-**

| Sr. No. | Design Name | Period | Amount (Rs) | Benefit |
|---|---|---|---|---|
| 1 | **Septic Tank** | Immediately | 11300 | It reduce the strength of sewage to the extent about 30-35%. |
| 2 | **Garden** | Long term | 280846 | It is used for entertainment and relaxation place for villagers. |
| 3 | **Public Library** | Long term | 597424 | It is used for reading and internet purpose for villagers. |
| 4 | **Community Hall** | Within one year | 553805 | It is used for general functions or program of villagers. |
| 5 | **Dry Composite Toilet** | Within one year | 25060 | To provide facilities of toilet and reduce use of water. |
| 6 | **Village Entry Gate** | Long term | 249250 | For aesthetic and heritage of the people of the village. |
| 7 | **Agricultural Storage Yard** | Within one year | 1046200 | To keep the crops of the farmers. |
| 8 | **Skill Development Centre** | Long term | 290680 | To provide facility of entertainment for villagers. |
| 9 | **Milk Cooperative Society** | Immediately | 268650 | It is used for direct selling of milk and other product. |
| 10 | **Bus Stand** | Immediately | 123950 | To use for people waiting for the bus. |
| 11 | **Farmer Help Centre** | Within one year | 139800 | For helping farmers progress |
| 12 | **Rainwater Recharge** | Immediately | 32100 | For increasing the underground water to use the water in summer. |

Please find herewith attached Detailed Report Of Agatrai Village.

**Detailed Report of Agatrai Village Vishwakarma Yojana Phase VIII.pdf**
15583K

# Chapter 21
# Comprehensive Report for the entire Village

Vishwakarma Yojana is a special scheme provided for development of village by GTU and Government of Gujarat in which students work together and collect data and information regards village development with the help of gram panchayat and stake holders. It is one of the strategies to reduce urban city pressure and lower the migration rate by developing village with a “rural soul” but with all urban amenities that a city may have.

In this project we met the Sarpanch, Talati and the citizens of Agatrai village and survey the existing facilities through techno economic survey. We collected various information and data from the Talati of the Agatrai village. We also visited the Ideal village Meswan and Smart village Ajab and did the techno economic survey, so that we can understand the infrastructure required for Agatrai village to become a smart village. Sarpanch, Talati, Panchayat members and village dwellers of Agatrai village actively participated and told us the problems they were facing and the infrastructure they seek for the progression and prosperity of the village.

We also did Sansad Adarsh Gram Yojana (SAGY) Baseline Household Survey to know the basic details of the households of people living in the Agatrai Village. After the survey we can understand the problems of the people and what we can do to elevate the living standard of the people of the village. We did a Social Survey by interviewing talati to better understand the current social scenario of the village.

After doing the gap analysis of the village with UDPFI guidelines we understood the requirements of infrastructure in the village. We prepared the designs of the required infrastructures such as physical infrastructure, social infrastructure, socio cultural infrastructure, smart infrastructure, sustainable infrastructure and heritage infrastructure. We presented our work to the villagers. We explained core theme of Vishwakarma Yojana, various benefits of village development due to the designed infrastructures.

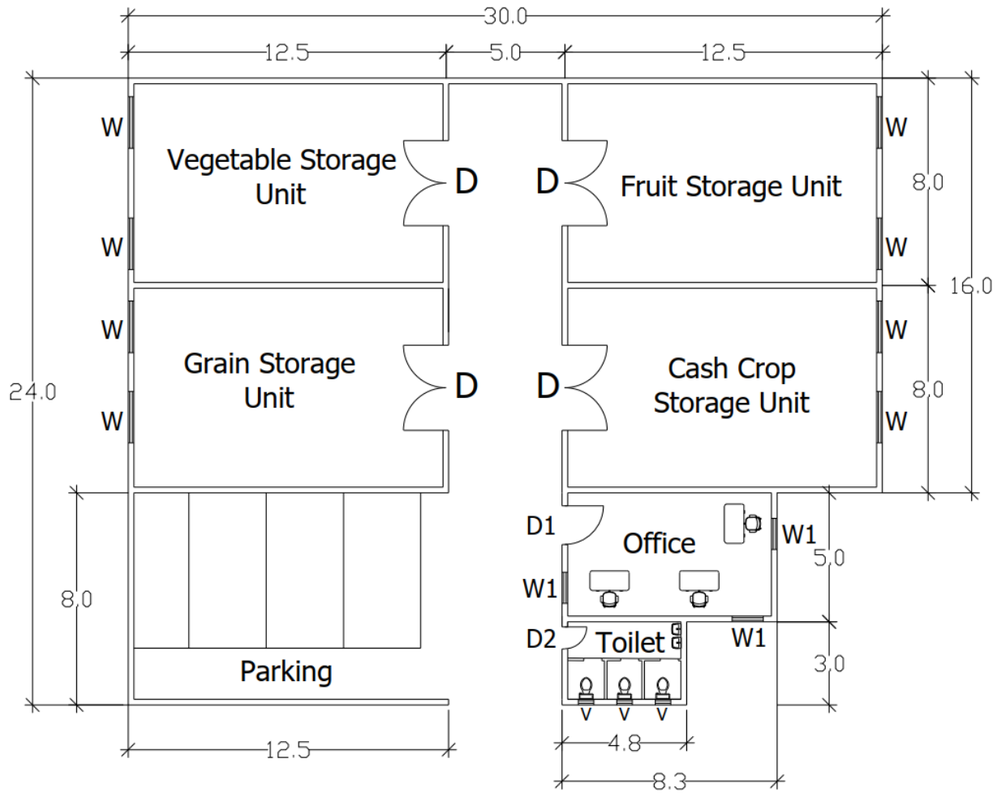
We explained various designs of Infrastructure facilities such as:

- **Septic Tank**
- **Garden**
- **Community Hall**
- **Public Library**
- **Dry Composite Toilet**
- **Village Entry Gate**
- **Agricultural Storage Yard**
- **Skill Development Centre**
- **Milk Cooperative Society**
- **Bus Stop**
- **Farmer Help Centre**
- **Rainwater Recharge System**

By implementing the above mentioned designs the development and growth of the village will be possible. By the development of the village we hope we can elevate the living standard of the people of Agatrai village. Thus people living a happy and prosperous life.

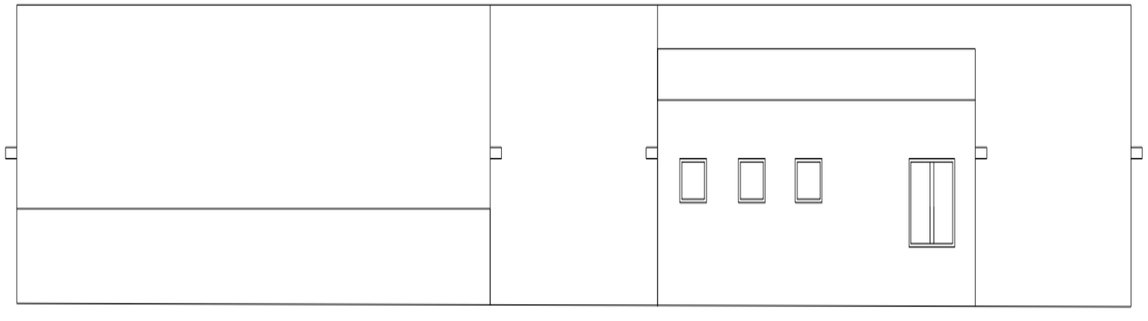
We also got to know about the culture of the village and the kindness of the village people. This project helped us to implement our engineering skills for the development of the Agatrai village.

# Chapter 22: A3 Size Drawing Sheets




| | Doors and Windows Sizes (m) |
|---|---|
| D | 3.5 x 3.2 |
| D1 | 2.1 x 1.3 |
| D2 | 2.1 x 1.1 |
| W | 2.3 x 2 |
| W1 | 1.4 x 1.2 |
| V | 1.5 x 0.6 |

**PLAN**



**ELEVATION**

**Gujarat Technological University**

- **All dimensions are in meters unless stated otherwise.**
- **Design is prepared only for educational purpose and correction for all data must be check before use.**
- **Design is not responsible for any kind of wrong data.**
- **Minimum grade of concrete is M20 and all steel grade is Fe500.**
- **All brick masonry walls in cement mortar in proportion of 1:6.**
- **Drawings should not be read for scale.**

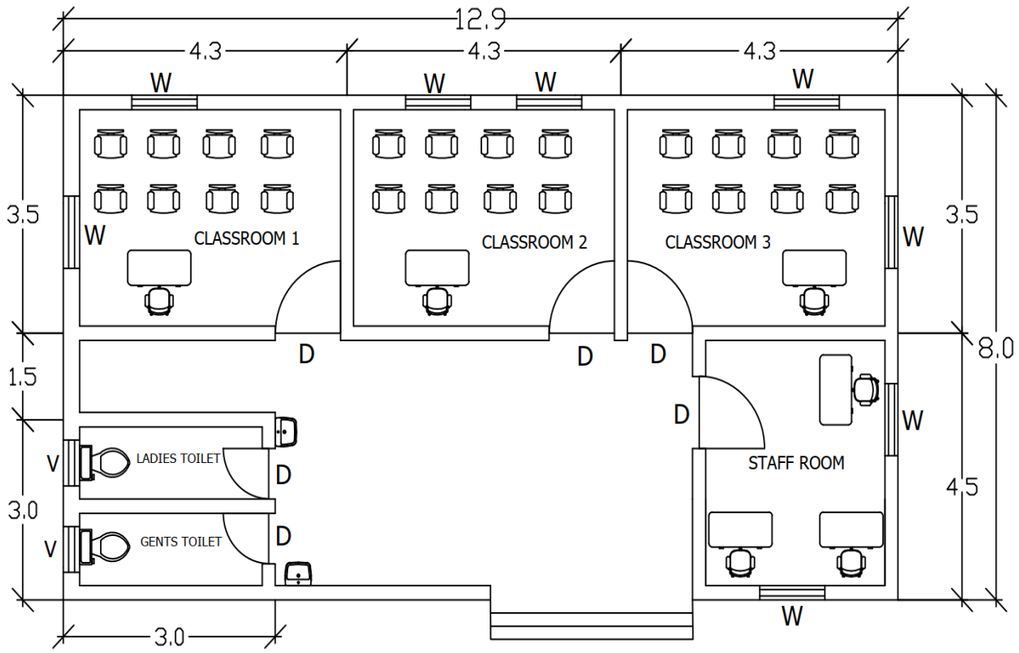
**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

**Design No: 7**
**Agricultural Storage Yard**

**Vishwakarma Yojana Phase:VIII**

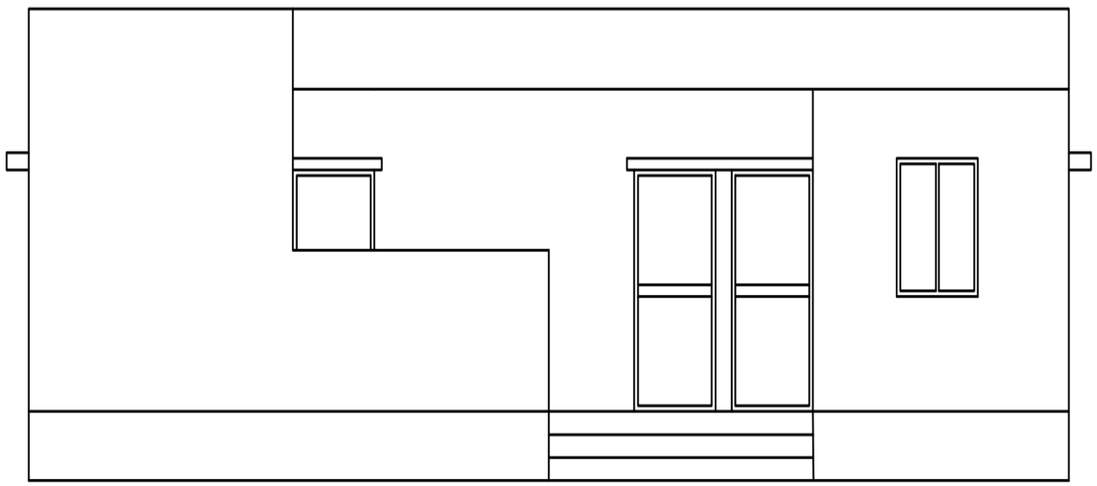
**Guided By: Prof. K.J. Savaliya**

**Date: 15/05/2021**




| | Doors and Windows Sizes (m) |
|---|---|
| D | 2.1 x 1.2 |
| D1 | 2.1 x 0.9 |
| W | 1.4 x 1.2 |
| V | 0.6 x 0.7 |

**PLAN**



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**Gujarat Technological University**

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- **Drawings should not be read for scale.**

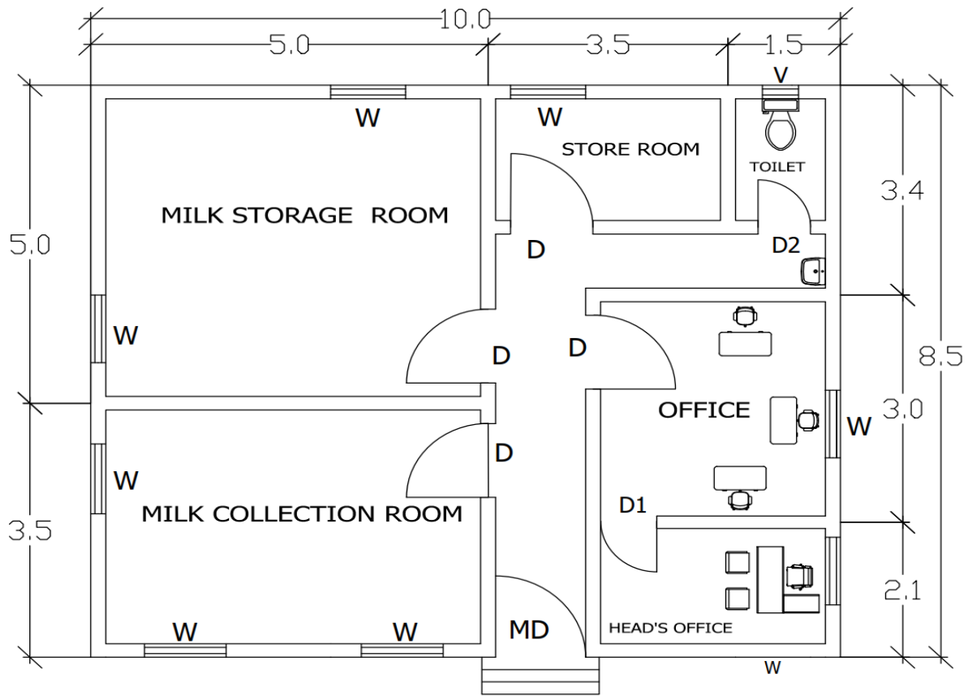
**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

**Skill Development Centre**

**Vishwakarma Yojana Phase:VIII**

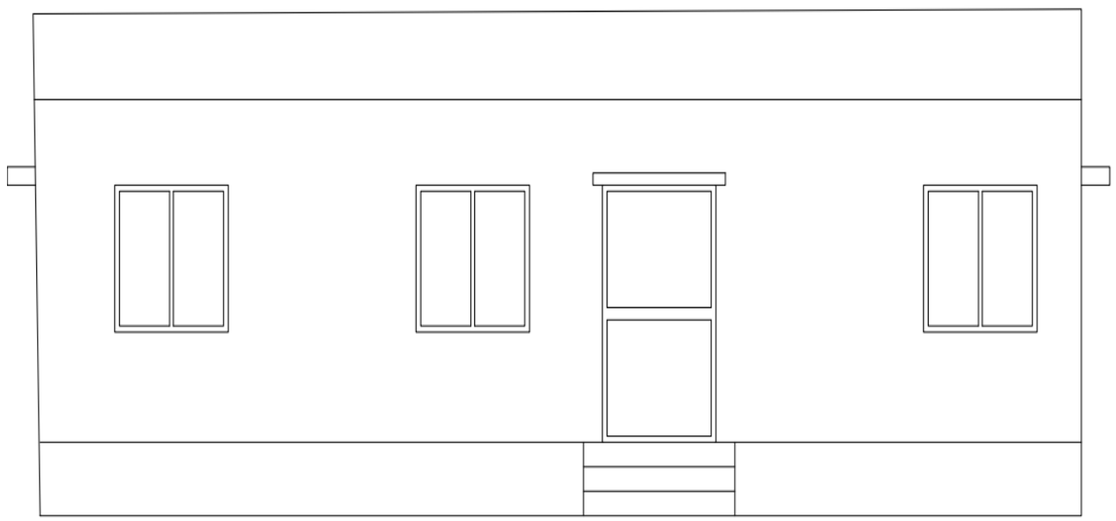
**Guided By: Prof. K.J. Savaliya**

**Date: 15/05/2021**




| | Doors and Windows Sizes (m) |
|---|---|
| MD | 2.1 x 1.4 |
| D | 2.1 x 1.2 |
| D1 | 2.1 x 0.9 |
| D2 | 2.1 x 0.8 |
| W1 | 1.4 x 1.2 |
| V | 0.6 x 0.5 |

**PLAN**



**ELEVATION**

**Gujarat Technological University**

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GOVERNMENT ENGINEERING COLLEGE RAJKOT Established in: 2004

**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

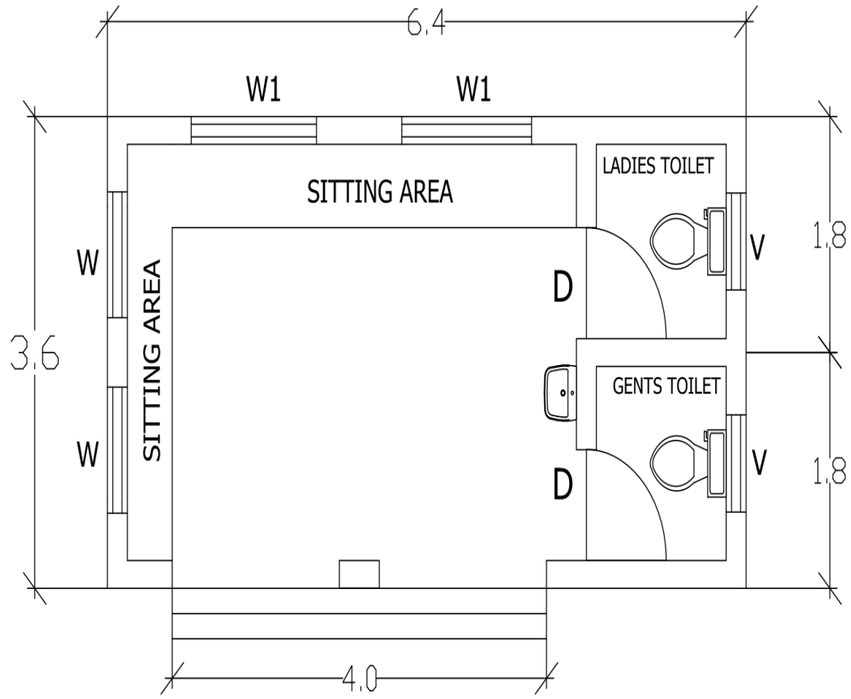
**Design No: 9**

**Milk Cooperative Society**

**Vishwakarma Yojana Phase:VIII**

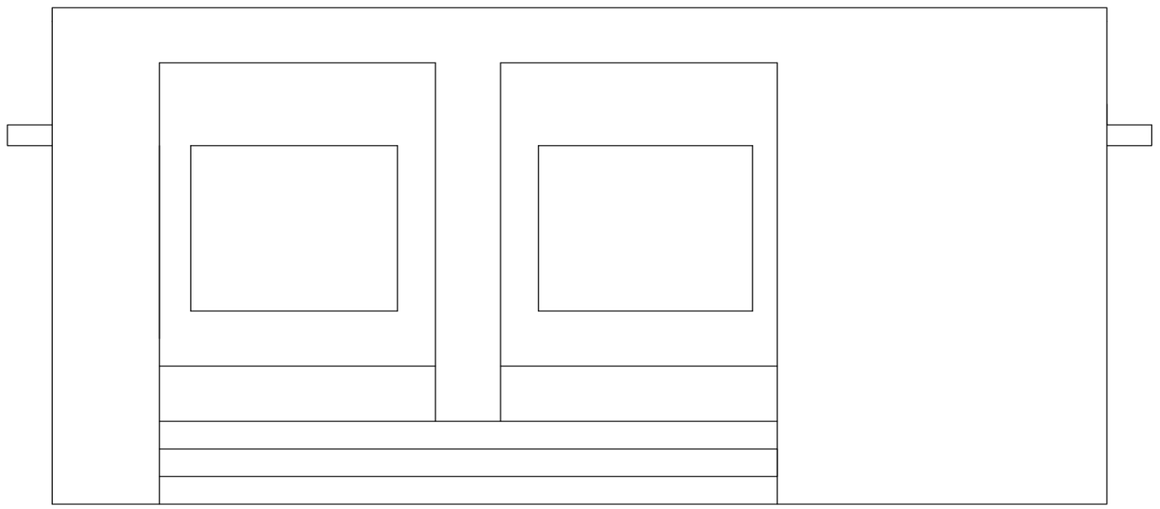
**Guided By: Prof. K.J. Savaliya**

**Date: 15/05/2021**




| | Doors and Windows Sizes (m) |
|---|---|
| D | 2.1 x 0.9 |
| W | 1.2 x 1 |
| W1 | 1.2 x 1.4 |
| V | 0.6 x 0.8 |

**PLAN**



**ELEVATION**

**Gujarat Technological University**

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- **Drawings should not be read for scale.**

**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

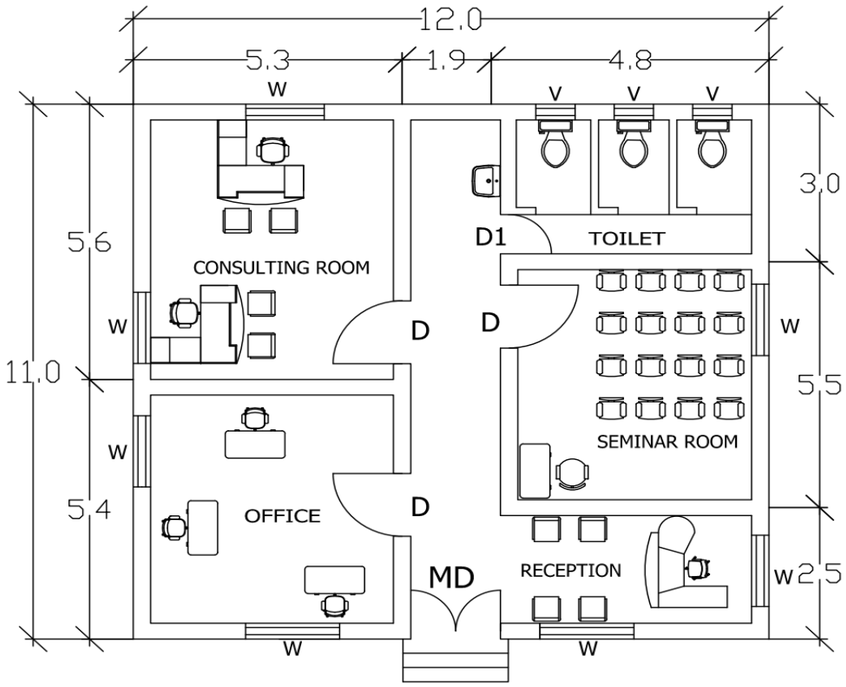
**Design No: 10**

**Bus Stop**

**Vishwakarma Yojana Phase:VIII**

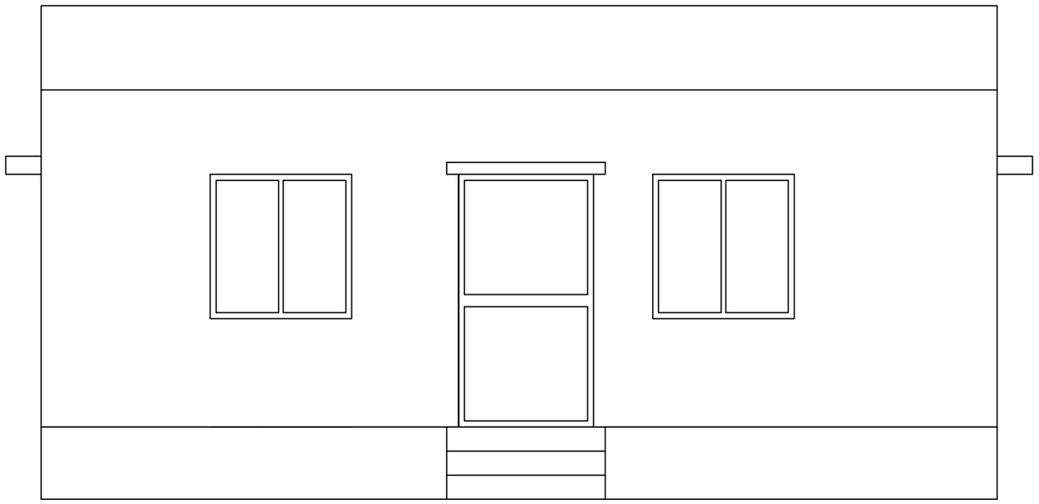
**Guided By: Prof. K.J. Savaliya**

**Date: 15/05/2021**




| | Doors and Windows Sizes (m) |
|---|---|
| MD | 2.1 x 1.4 |
| D | 2.1 x 1.2 |
| D1 | 2.1 x 0.9 |
| W | 1.4 x 1.2 |
| V | 0.6 x 0.5 |

**PLAN**



**ELEVATION**

**Gujarat Technological University**

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- **Drawings should not be read for scale.**

**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

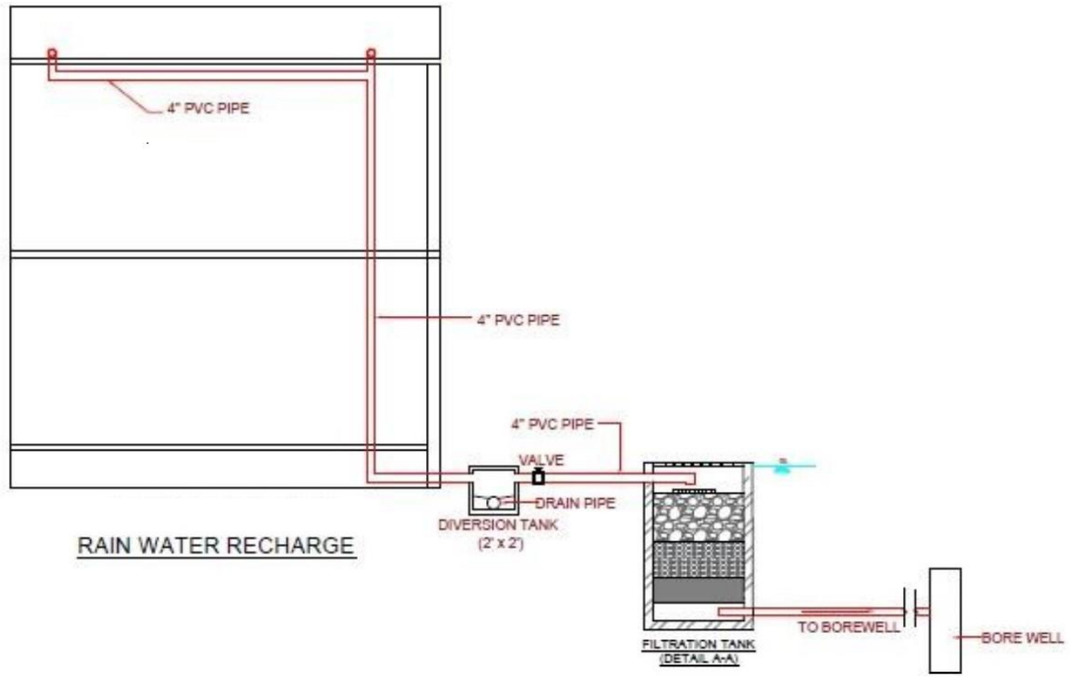
**Design No: 11**

**Farmer Help Centre**

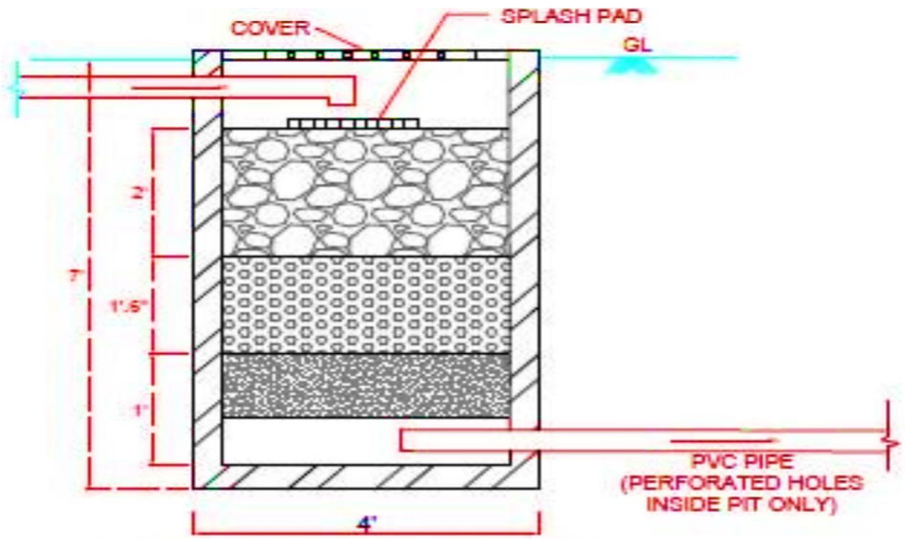
**Vishwakarma Yojana Phase:VIII**

**Guided By: Prof. K.J. Savaliya**

**Date: 15/05/2021**




**ELEVATION**




**SECTION**

**Gujarat Technological University**

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- **All brick masonry walls in cement mortar in proportion of 1:6.**
- **Drawings should not be read for scale.**

**Prepared By:**
**Smit Nakrani**
**Krutarth Joshi**

**Design No: 12**

**Rainwater Recharge System**

**Vishwakarma Yojana Phase:VIII**

**Guided By: Prof. K.J. Savaliya**

**Date: 15/05/2021**