DETAIL PROJECT REPORT

VISHWAKARMA YOJNA: VIII

AN APPROACH TOWARDS RURBANISATION

Dahemi Village

Anand District

PREPARED BY

STUDENT NAME	BRANCH NAME	ENROLLMENT NO.
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KITE

Knowledge Institute of Technology & Engineering

Prof. Divyesh G Mandali
Assistant Professor
Civil Department
NODAL OFFICER
KITE-135

YEAR: 2020-21

GUJARAT TECHNOLOGICAL UNIVERSITY

Chandkheda, Ahmedabad – 382424 Gujarat

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CERTIFICATE

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

Detail Project Report for,

VILLAGE: DAHEMI

DISTRICT: ANAND

Under

Vishwakarma Yojana: Phase VIII

in partial fulfillment 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.

STUDENT NAME	BRANCH NAME	ENROLLMENT NO.
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ABSTRACT

Vishwakarma Yojana is an initiative of Government of Gujarat towards "Rurbanisation". This project is been allotted to GTU as a pilot project. The main aim of this project is to provide villages with lacking facilities and giving students an on-site experience. All the students who overtook the project visits several villages and made a survey and on that basis they have to designed the lacking facilities.

We were allocated with Dahemi village which is located in Borsad Taluka of Anand District. It is located about 9 kms from Borsad. The local language of the Dahemi is Gujarati. As pe the 2011 Census data, there is total of 5015 population in the village.

There are many problems in the village like there are not good roads, the school in the village is not in too good condition and is dangerous for the students upto some extent, the community hall is also in very bad condition and not of use, there is no recreational facilities in the village. The water distribution is good in the village, the sanitation system is also somewhat good as 1/3rd village has got the closed sewerage lines and work for the remaining lines is going on.

We can design many things for the welfare of the villagers and development of the village. We can redesign the school, community hall, recreation center such as public park, we can also provide the villagers with the facility like public toilet, there is no library in the village so we can also design the library for the villagers.

If this type of facilities will be provided in the village, the migration rate will be decreased and villagers could live happily in the village.

Keywords: Rurbanisation, developed village, Smart village smart infrastructure, high living standard, renewable energy

ACKNOWLEDGEMENT

We are highly indented to **Gujarat Technological University**, Ahmedabad for providing us such opportunity to work under Vishwakarma Yojana to get real work experience and applying our technical knowledge in the development of Villages.

We wish to express our deep sense of gratitude to **Prof. (Dr.) Navin Sheth**, **Hon'ble Vice Chancellor, Gujarat Technological University-Ahmedabad**, for his encouragement and giving us the wonderful project.

We also express our gratitude to **Dr. K.N.Kher**, **Registrar, Gujarat Technological University-Ahmedabad** for giving us complete support.

We express our sincere thanks to **Commissionerate of Technical Education, Gujarat State** for appreciating and acknowledging our work.

We express our sincere thanks to **DDO, TDO, Sarpanch, Talati and staff members of Anand** District for providing us with requisite data whenever we approached them. Especially our thanks are to all villagers and stake holders for their support during Survey.

We are also thankful to our **Dr. S. R. Panchal Principal**, faculties of our colleges for their encouragement and support to complete this project work.

An act of gratitude is expressed to our internal guide / Evaluator / Nodal Officer, **Mr. Divyesh Mandali from college Knowledge Institute of Engineering & Technology** for their invaluable guidance, constant inspiration and active involvement in our project work.

We are also thankful to all the experts who provided us their valuable guidance during the work. We express our sincere thanks to, **Dr. Jayesh Deshkar, Hon'ble Director of Vishwakarma Yojana project and Principal, V.V.P Engineering College and Core Committee member of Vishwakarma Yojana project Prof(Dr.)Jigar Sevalia**, Professor, SCET, Surat, **Prof.K.L.Timani,** Associate Professor,VGEC, **Prof.Rena Shukla**, Associate Professor, LD Engineering College, **Prof.Y.B.Bhavsar,** Associate Professor,VGEC, **Prof.Jagruti Shah**, Assistant Professor, BVM Engineering College for providing us technical knowledge of this project work.

We are also thankful to **Ms. Darshana Chauhan, Vishwakarmrma Yojana**, for all support during our work. We, therefore, take this opportunity for this Project work expressing our deep gratitude and sincere thanks for her cooperation to produce this project work in the present form.

Above all we would like to thank our Parents, family members and Friends for their encouragement and support rendered in completion of the present this work.

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1.1 Background and Study Area Location:

"Vishwakarma Yojana" is a Government of Gujarat allotted to GTU under which students are to be trained for technical association for rural development. Gujarat Technological University has been allotted an important and prestigious project of Vishwakarma Yojana by the Government of Gujarat from the year 2012-13. Vishwakarma Yojana is providing "Design to Delivery" solution for development of villages in 'Rurban' areas. The developmental work in villages that could undertake as per the need of the village in particular includes Physical infrastructure facilities (Water, Drainage, Road, Electricity, Solid Waste Management, Storm Water Network, Telecommunication & Other), Social infrastructure facilities (Education, Health, Community Hall, Library, Recreation Facilities & other) and renewable energy (Rain Water Harvesting, Biogas Plant, Solar Street Lights & Other) for Sustainable development.

"Rurbanisation" means soul of a village and the facilities/amenities of the urban, is a combined process of preserving the "soul of villages" by providing all the civic and infrastructure facilities available in big towns and cities to arrest migration and at the same time, bringing down the burden on big cities and towns bursting at their seams. Vishwakarma Yojana will create infrastructure - connectivity, civic and social infrastructure along with provision of alternative employment opportunities which are the key pillars that the concept of Rurbanisation hinges on. By taking up project under VY, a student is able to become both a good technologist as well as an agent of change for the better.

It is proposed to frame "Vishwakarma Yojana" to provide the benefit of real-world experience to engineering students and simultaneously apply their technical knowledge in the development of infrastructure in Villages. The Engineering colleges would study the identified villages and make the recommendations on the application of technology to achieve integrated and comprehensive development, through project preparation and management.

For the purpose of Vishwakarma project, we have selected Gana village as an ideal village. We have visited Gana village and collected information for development of our allocated village (Dahemi). All types of necessary facilities are provided in Gana village. It has good infrastructure. All roads are constructed in village (R.C.C. & Bitumen). It is having facility of education properly from primary education to higher education. Various recreational facilities like public gardens, gym, etc. are available in the village. 1 bank and 1 ATM are available in village.

It is having good facility for drinking water R.O. water purification plant in its community hall. Underground drainage system is excellently working in the village. People of village are aware and utilizing various renewable sources like solar panels (for producing electricity), rainwater (Rain water recharging) and Biogas Plant (for producing gas).

The village is very much developed in term of basic facilities and amenities as the Sarpanch of the village is working very hard towards overall development of the village and development of the villagers. So, villagers are very happy with her work as she works hard for the development of the village.

1.2 Concept: Ideal Village, Normal Village

1.2.1 Objectives:

An ideal village has good system of sanitation and drainage. Because filth and rubbish of the village should be regularly removed away into the compost pits. An ideal village has very good drains so that the dirty water of the village is properly drained away.

- Prevent distress migration from rural to urban areas, which is common occurrence in India's villages due to lack of opportunities and facilities that guarantee a decent standard of living.
- Make the model village a hub that could attract resources for the development of other villages in its vicinity.
- Provide easier, faster and cheaper access to urban markets for agricultural produce or other marketable commodities produced in such villages.
- Contribute towards social empowerment by engaging all sections of the community in the task of village development.
- Create and sustain a culture of cooperative living for inclusive and rapid development.

1.2.2 Examples/Live Case Studies of Ideal Village from India / Gujarat

- Examples of ideal villages from India are as below:

1) Dharnai, Bihar

Dharnai is a small village with 2400 people. Located near Bodh Gaya in Bihar's Jehanabad district, it didn't have access to electricity. But a few years ago, the villagers took things in their own hands and changed their fate forever. With the help of Greenpeace, the village installed a solar-powered micro-grid, which provides 24×7 electricity to more than 450 households and 50 commercial establishments. The entire project cost them 3 crores, making Dharnai India's first fully solar powered village.

2) Payvihir, Maharashtra

Payvihir eco-village was started when the organization KHOJ helped the villagers of Payvihir to bring around 180 hectares of land under the gram panchayat as per the Forest Rights Act (FRA). Srinivasan C with the experience of Vellore Hill Restoration Project got involved in the project and helped the village of Payvihir in planning and execution of afforestation. Today around 1 Lakh saplings are planted in the village of Payvihir with the help of MGNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme). Contour Check Dams were initially dug to help percolate the water. With the help of department of renewable energy, a grant of Rs. 75 lakhs helped the villages of Payvihir and Naykheda to build 70 community biogas plants. The aim is to reduce the dependency of households of both the villages from firewood. Payvihir received the United Nations Development Program award for the decentralized governance and biodiversity.

3) Odanthurai, Tamil Nadu

Odanthurai, a panchayat situated in Mettupalayam taluk of Coimbatore district, has been a model village for the other villages for more than a decade. The panchayat has not only been generating electricity for their own use, but also selling power to Tamil Nadu Electricity Board having already won international acclaim through its unique welfare schemes and energy self-sufficiency drives, Odanthurai near Mettupalayam has begun efforts to develop a corpus of Rs 5 crore to install wind and solar energy farms. This project will enable free supply of electricity to over 8,000 residents.

4) Punsari, Gujarat

Punsari village, barely 100 km from Ahmedabad, could be a textbook case of development. Closed-circuit cameras, water purifying plants, biogas plants, air-conditioned schools, Wi-Fi, biometric machines – the village has it all. And all of it was done in a matter of eight years, at a cost of Rs. 16 crores. The man behind the transformation is its young tech-savvy sarpanch – 33-year-old Himanshu Patel – who proudly states that his village offers "the amenities of a city but the spirit of a village."

5) Mawlynnong, Meghalaya

In the tiny hamlet of Mawlynnong, plastic is banned, spotless paths are lined with flowers, bamboo dustbins stand at every corner, volunteers sweep the streets at regular intervals and large signboards warn visitors against littering. Here, tidying up is a ritual that everyone from tiny toddlers to toothless grannies – takes very seriously. Thanks to the tireless efforts of the village community, this small, 600-odd-person hamlet in Meghalaya is today renowned as the cleanest village in India and Asia.

6) Piplantri, Rajasthan

For the last several years, the Piplantri village panchayat has been saving girl children and increasing the green cover in and around it at the same time. Here, villagers' plant 111 trees every time a girl is born and the community ensures these trees survive, attaining fruition as the girls grow up. They also set up a fixed deposit for the girls and make their parents sign an affidavit that ensures their education.Over the last nine years, people here have managed to plant over a quarter million trees on the village's grazing commons. To prevent these trees from being infested with termite, the residents planted over 2.5 million aloe vera plants around them. Now, these trees, especially the aloe vera, are a source of livelihood for several residents.

7) Baghuvar, Madhya Pradesh

A small village in Madhya Pradesh, Baghuvar is the only village in India that has functioned without a sarpanch since independence, and that too efficiently. Every house in the village has its own lavatories and there is a common toilet complex that is used for social functions. The village has underground sewage lines as well as the highest number of biogas plants in the state. The gas produced is used as cooking fuel and to light up the village. Thanks to its unique way of water conservation, this village also has enough water to survive drought-like conditions for years.

8) Shikdamakha, Assam

Way before Swacch Bharat, in 2010, a remote Assam village had set cleanliness goals for itself. Shikdamakha, near Guwahati, runs cleanliness drives and competitions, and wants to

surpass Mawlynnong in Meghalaya as Asia's cleanest village. A plastic-free village that earned the maximum points in the cleanliness sub-index of Union Ministry of Drinking Water and Sanitation, Shikdamakha has also earned the coveted Open Defecation Free status recently.

9) Eraviperoor, Kerala

At a time when the country is abuzz with talks about Digital India, and how technology can be taken to the remotest corners of the country, the Eraviperoor gram panchayat in Pathanamthitta district of Kerala is leading way. It is the first gram panchayat in Kerala to have free Wi-Fi for the general public. The village has also launched a free palliative care scheme for the poor and is the first panchayat in the state to get ISO-9001 certification for its Primary Health Centre. It has also been recognised as a Model Hi-tech Green Village, by the Horticulture Department, for its green initiatives.

10) Ramchandrapur, Telangana

The first village in Telangana region to win the Nirmal Puraskar in 2004-05, Ramchandrapur came into focus a decade ago when the villagers pledged to donate their eyes for the visually challenged. Among its many achievements, all the houses in the village have smokeless chullahs and toilets with tap-water facilities. It is the first village in the state to construct a sub-surface dyke on the nearby river and solve drinking water problems by constructing two over-head tanks in each house. The village does not have drainage system and all the water generated from each house is diverted to the gardens, which are planted by the villagers in each house.

1.2.3 The Idea of Model / Smart Village

Smart Village is idea adopted by national, state and local governments of India, as an initiative focused on holistic rural development, derived from Mahatma Gandhi's vision of "Adarsh Gram" and "Swaraj".

68.9% of our population lives in rural areas according to Censes 2011. Though number is expected to fall in the coming years, it is still estimated that more than half of our population would be rural even in 2050. Despite being several past initiatives by governments at all levels i.e.; Central, State and Local – in past the level of improvement has not kept pace with the rising aspiration among Indians. On most development parameters, there is still significant gap between rural and urban India, as the table below:

Table 1 Development Parameter Gap Analysis

Sector	Parameter	Urban	Rural
Expenditure poverty	% people below poverty line (2011-12) (Tendulkar estimates)	14%	26%
	% people below poverty line (2011-12) (Rangarajan estimates)	27.2%	31.3%
Education	Literacy Rate - 2011	85%	68.9%

	Average years of school education of working population	8.42	4.72
Health	Infant Mortality Rate (IMR) – 2011	28	46
	Life Expectancy at birth - 2002-06	68.8	62.1

The idea of an "Adarsh Gram" or model village has been explored earlier as well, most notably through the Pradhan mantri Adarsh Gram Yojana, launched by the Central Government in 2009-10. The scheme was implemented in pilot mode in 1000 villages of Assam, Bihar, Himachal Pradesh, Rajasthan and Tamil Nadu, with an allocation of Rs 10 lakh per village. This limit was later raised to Rs 20 lakh per village. The target villages under the scheme were those with more than 50% of the population belonging to Scheduled Castes (SCs). Additionally, State governments have also taken steps in this direction. Himachal Pradesh launched a Mukhya Mantri Adarsh Gram Yojana along similar lines in 2011, with the allocation of Rs 10 lakh per village.

The proposed "Sansad Adarsh Gram Yojana" of the Central Government aims to involve MPs more directly in the development of model villages. By adopting a village(s) under this initiative, an MP has the opportunity to directly benefit all sections of a village community in an integrated, efficient and participatory fashion. The following sections in this brief highlight the important objectives that a model village could achieve, and covers the core features of a model village in India.

Objectives of Model Village:

- Prevent distress migration from rural to urban areas, which is a common phenomenon in India's villages due to lack of opportunities and facilities that guarantee a decent standard of living.

- Make the model village a "hub" that could attract resources for the development of other villages in its vicinity.

- Provide easier, faster and cheaper access to urban markets for agricultural produce or other marketable commodities produced in such villages

- Contribute towards social empowerment by engaging all sections of the community in the task of village development.

- Create and sustain a culture of cooperative living for inclusive and rapid development.

Resources for model villages:

- Funds under existing schemes across different sectors such as health, education, skill development, livelihood etc could be utilized, and based on the specific demands of the village, resources could be channelized into the development of the village. Some important Centrally Sponsored Schemes (CSS) which could be utilized are NRLM, NHM, SSA, NREGA, BRGF, RKVY and Mid-day Meal Scheme.

- MPLAD funds (Rs 5 crore per year) could be utilized for the construction of high quality, sustainable assets such as school buildings, hospitals, Anganwadi Centres and school kitchens for Mid-Day meals. Funds could also be channelized into road construction, and the construction of toilets in schools and homes, particularly for girls.

- CSR funds, of which a much larger corpus is available after the latest amendment to the Companies Act, could also be used for the purpose of infrastructure development in the constituency.

- Self-help groups, who are eligible for subsidized loans under various Central and State government initiatives

- Gram Panchayats could also raise loans, if legally permitted to do so under the State Panchayati Raj Acts like in the case of Kerala.

Choosing a village for adoption:

As per the latest Census, there are more than 640,000 villages in India, and more than 2.5 lakh Gram Panchayats (GPs). In other words, every Lok Sabha constituency has more than 450 such Panchayats on an average. Among these, choosing one (or 2-3) GP for the purpose of adoption is also an important decision to be made. According to the latest guidelines, the MP may choose any Gram Panchayat with a population of 3000-5000 people in plain areas, and 1000- 3000 in hilly, tribal and difficult areas. However, as the PM has observed,

1. Strong Panchayats in terms of finances, functions and functionaries – The village Panchayat will have a pivotal role to play in any village development project. The financial and functional strength of a Panchayat will be extremely useful in preparing village plans, mobilizing community opinion in favour of a particular initiative, and implementing the initiative in a transparent and time-bound manner.

2. Proximity to an urban centre – Choosing a village close to an urban centre might facilitate access to physical and financial resources, and also help in establishing better connectivity between the village and the urban town. Such a village could also become an extension of the urban centre, and have facilities which could virtually be at par with the urban centre. This would be very similar to the "Rurban" approach announced in the latest Union Budget, which aims to provide city-like facilities in rural areas close to existing cities.

3. Potential for piloting new technologies – Since technology would be at the core of the model village concept, the village must offer avenues for experimenting with such technology. Some examples of such technologies could be the use of solar power for irrigation and domestic lighting, and agricultural innovations based on soil suitability and climate.

4. Diverse population groups – The real success of such an initiative can be demonstrated if the lives of large and diverse sections of the population can be positively impacted by it. Rather than focusing on any particular religious or caste group, the model village must aim towards the uplift of all sections of the population in the village. However, it is important that special attention is paid to vulnerable groups such as young children, women and the BPL population.

1.2.4 Ancient History Civil Concept about Indian Village / other Countries Perspective about Village and it's new Development

There is sufficient evidence to suggest that the village was one of the important settlements in ancient India. The Rig Veda talks about the gram to which various families owed their allegiance. Valmiki's Ramayana talks of two types of villages – the ghosh and the gram. The ghosh was smaller than the gram and was also known as vraja, or brij (signifying a cattle farm). Both types of villages had their officials, called the mahattar. There is also a reference to a senior official called gramani or gramik.

The Mahabharata talks of different types of settlements, for example, ghosh or brij (cattle farm), palli (small hutments), gram (villages around the forts or durgs), kharvata or pattan (towns), and pur, puri, nagar (cities of different types). The villages were linked with one another, culturally, socially and administratively.

The administrator of ten villages was called dashi; of 20 villages, vinshati; of 100 villages, shati, and of over 1,000 villages, sahasra gramadhipati. This is a clear indication of the interlink-ages between the villages. Kautilya's Arthashastra suggests that river, hill, forests, ditches, tanks, bunds or trees demarcated village boundaries. He prescribed that villages should be situated at distances of one or two krosha (in Rajasthan, it is spelt as koss, which is the equivalent of two miles or 3.219 km) from each other so that in times of need, one village could go to the help of the other.

- **The villages were organized thus:**

a) 10 villages Samgrahana

b) 200 villages Karvatika

c) 400 villages Dronamukha

d) 800 villages Mahagrama or Sthatnuja

During the period of Chandragupta Maurya, the villages were divided into three categories according to their size: Jyeshtha (the biggest), Madhyama (medium sized) and Kanishtha (smaller ones).

- **In terms of land revenue, these villages were put into four categories:**

a) **Gramagra:**

Ordinary villages paying tax in cash

b) **Pariharak:**

Revenue free, given to priests and teachers, who would collect the tax from the villagers and use it as their salary for spreading education and pursuing a religious life

c) **Ayudhuja:**

Revenue free, for supplying soldiers during a war

d) **Anya:**

Villages allowed to pay tax in kind in the form of agricultural products, minerals or labor The villages have remained the administrative units of various princely states. The maharajas or maharanas appointed jagirdars or zamindars and collected revenues, called lagaan, through them. The practice of giving a village to a priest or not charging any lagaan from an agriculturist family continued until recently. In Rajasthan, such lands or villages were called Mafi ki Zameen or Mafi ke Gaon.

According to all the information mentioned above we can say that, in Indian history at the villages were divided in different categories on the basis of revenue paid by the villagers and number of villages. And also they were decided on the basis of the employment of the villagers in that villages, such as ordinary farmers, priests, teachers, soldiers, etc.

1.2.5 Detail Study (Socio economic, Physical, demographic and infrastructure details) of Ideal Village

Figure 1 Gram Panchayat

The building in this image is “Shrimati Kamlaben and Shree Shanabhai Patel Gram Panchayat”. It is the gram panchayat building of Gana Village. It is fully computerized and air conditioned. All the basic documents are available in panchayat like, birth and death certificate, property related documents, etc.

Figure 2 Community Hall

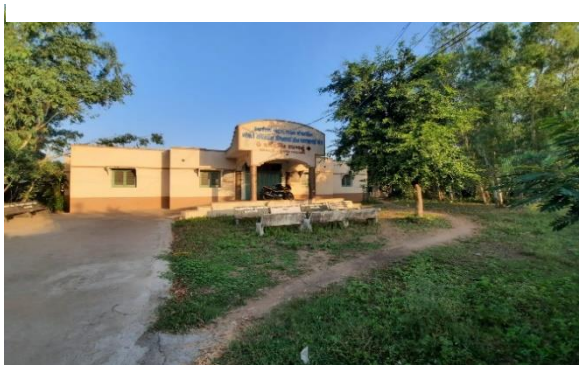
This is the community hall of the village. It is known as “Gana Patidar Samaj Community Hall”. It was constructed and maintained by “Patel Samaj, Gana”. It provides space and facilities for different types of function in the village. This hall is very helpful to villagers for organising any type of function as its rent is cheaper so than anyone can afford it.

Figure 3 Milk Co-Operative Society

This building is milk co-operative society of Gana Village. The cleanliness and hygiene of the building is maintained properly so that milk in the dairy does not get infected. Milk collected here is sold to villagers and goes to Amul Dairy. Here, the system for collection of the milk is semi-automated and the payment method is digital and so the payment of milk directly gets credited to distributer’s bank account

The building in this image is of school in Gana which is known as “Shrimati K.D. Patel Vidhya Mandir”. This school provides quality education from nursery to higher secondary”. All the facilities like garden, drinking water plant, computer lab, etc. This school is managed and maintained by Gana Kelavni Mandal.

Figure 4 School Building



The building in this image is Sarvajanik Hospital in Gana. It is known as “Shrimati Savitaben Chimanbhai Patel Sarvajanik Hospital”. The hospital has five beds capacity, dressing room, Pharmacy and Pathology lab. It is managed and maintained by “Arogya Mandal Gana”. The doctor practicing in this hospital has experience of more than 40 years and studied MBBS.

Figure 5 Hospital Building

1.3 SWOT Analysis of Ideal Village

- **Strength**

  Having beautiful climate.

  Closeness to the main road.

  Nearness to the main city Anand

  Good Governance body

  Having government clinic.

  Having good schools

- **Weakness**

  No cinema hall in village.

  No recreation centres other than gym.

  No beautification of the lake.

  Migration of villagers to foreign country.

  Less interest of youth in the political field.

- **Opportunities**

  Use of modern technique in agriculture and develop new cropping patent

  Development of waste lands and another village land.

  Develop WI-FI network in the village.

  Area is large enough to locate many other facilities.

- **Threats**

  Decreasing agricultural land.

  Decreasing village population due to foreign migration.

  Increasing thefts due to lack of security and CCTV camera in the village.

1.4 Future prospects of Development of the Ideal Village

The Gana village is a fast-developing village. The local government body of this village is very active in development of this village and works very well for the development of the village. And also, the villagers residing in foreign countries shows their interest towards development of the village. So, they provide funding for the development of the village. The different builders of Anand city and nearby are taking interest in developing properties near Gana village. So, there are many societies in village. The Anand city is growing very fast so in nearby future Gana village will become developed and become part of Anand Nagarpalika.

1.5 Benefits of the visits of Ideal Village

The benefits of visiting ideal village are given below,

- We got to know the strength and weakness of village.
- We saw some different type of little requirements of village.
- We discussed the good and bad things about village from villagers.
- We saw all type of basic and primary amenities available.
- We created gap analysis table so that we came to know about lacking facilities in our allocated village.
- We got the benchmark for the development of our allocated village.

1.6 Civil Aspects Required in Ideal Village / Smart Village

There are two civil aspects required in the ideal village. The ideal village “Gana” does not have public library which should be there as it is necessary for any village so that people can read books and gain knowledge about different things.

Chapter. 2 Literature Review

2.1 Introduction: Urban & Rural Village Concept

➢ Urban Village:

In urban planning and design, an urban village is an urban development typically characterized by medium-density housing, mixed use zoning, good public transit and an emphasis on pedestrianization and public space. Contemporary urban village ideas are closely related to New Urbanism and smart growth ideas. Urban villages are seen to provide an alternative to recent patterns of urban development in many cities, especially decentralization and urban sprawl. hey are generally purported to:

- Reduce car reliance and promote cycling, walking and transit use.
- Provide a high level of self-containment (people working, recreating and living in the same area).
- Help facilitate strong community institutions and interaction.

The concept of urban villages was formally born in Britain in the late 1980s with the establishment of the Urban Villages Group (UVG). Following pressure from the UVG, the concept was prioritized in British national planning policy between 1997 and 1999. Urban villages also come in the form of suburbs of metropolitan areas that are politically designated as villages. Urban villages are widely seen to provide a solution to the demise of community that is often associated with modernism and sprawl. The concept uses the social and physical morphology of the traditional rural village as an inspiration for creating better functioning communities. The urban village movement has been influenced by Ebenezer Howard's Garden City ideals which also emphasize environmental determinism in relation to community. Urban design techniques such as public space and pedestrianization are employed to facilitate the development of community by encouraging human interaction. This philosophy shares many attributes with the new urbanism school of thought.

➢ Rural Village:

Rural areas are also known as the 'countryside' or a 'village' in India. It has a very low population density. In rural areas, agriculture is the chief source of livelihood along with fishing,[14] cottage industries, pottery etc. The quest to discover the real rural India still continues in great earnest. Almost every economic agency today has a definition of rural India. Here are a few definitions: According to the Planning Commission, a town with a maximum population of 15,000 is considered rural in nature. In these areas the panchayat makes all the decisions. There are five people in the panchayat. The National Sample Survey Organisation (NSSO) defines 'rural' as follows:

- An area with a population density of up to 400 per square kilometre,
- Villages with clear surveyed boundaries but no municipal board,
- A minimum of 75% of male working population involved in agriculture and allied activities.

RBI defines rural areas as those areas with a population of less than 49,000. It is generally said that the rural areas house up to 70% of India's population. Rural India contributes a large chunk to India's GDP by way of agriculture, self-employment, services, construction etc. As per a strict measure used by the National Sample Survey in its 63rd round, called monthly per capita expenditure, rural expenditure accounts for 55% of total national monthly expenditure. The rural population currently accounts for one-third of the total Indian FMCG sales.

2.2 Importance of Rural Development

To make basic amenities like good roads and drinking water accessible to people even in remote villages, The Ministry of Rural Development, Government of India has re-launched the scheme Provision of Urban Amenities in Rural Areas as a Central Government scheme during the remaining period of the eleventh five-year plan. Ministry of Rural Development, with support from Department of Economic Affairs and the Asian Development Bank (which provided the technical assistance), intends to implement the Provision of Urban Amenities in Rural Areas scheme under a Public Private Partnership between Local executive bodies like the Gram Panchayat(s) and private sector partners. The vision of the scheme in particular is providing dual benefits like rural infrastructure development coupled with economic re-generation activities; it is the first attempt of the government in this direction of delivering basic amenities and infrastructure through this model to people in remote rural areas. All the efforts are directed to obtain dual benefits, provide a different framework for the efficient implementation of rural infrastructure development schemes and benefit from the private sector efficiencies in the management of assets and delivery of services.

Rural development is important not only for the majority of the population residing in a rural area but the growth of rural activities is necessary to stimulate the speed of overall economic expansion of the nation. Rural development is pretended to be noticeable importance in the country today than in the olden days in the process of the evolution of the nation. It is a strategy trying to obtain improved rural creation and productivity, higher socio-economic equality, and ambition, stability in social and economic development.

The primitive task is to decrease the famine roughly about 70 percent of the rural population, implement sufficient and healthy food. Later, serve fair equipment of clothing and footwear, a clean environment and house, medical attention, recreational provision, education, transport, and communication.

2.3 Ancient Villages / Different Definition of: Rural Urban Villages

An urban area is the region surrounding a city. Most inhabitants of urban areas have non- agricultural jobs. The population density is quite high. Urban areas are very developed, meaning there is a density of human structures such as houses, commercial buildings, roads, bridges, and railways. “Urban area" can refer to towns, cities, and suburbs. An urban area includes the itself, as well as the surrounding areas. Many urban areas are called metropolitan areas, when two or more metropolitan areas grow until they combine, the result may be known as a megalopolis.

Rural areas are the opposite of urban areas. Rural areas, often called "the country," have low population density and large amounts of undeveloped land. Usually, the difference between a rural area and an urban area is clear. This is because improved technology has decreased the need for agricultural workers and partly because cities are offering greater economic opportunities.

2.4 Scenario: Rural / Urban village of India population Growth

Table 2 Population Growth in 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 3 Rate of Increase in Indian Population

Per Year	1,55,31,000
Per Month	12,73,033
Per Day	42,434
Per Hour	1,768
Per Day	29

2.5 Scenario: Rural / Urban village of Gujarat as per Census 2011 and latest

- Gujarat Population 2011

Total population 60,439,692

Total population of male: - 31,491,260

Total population of female: 28,948,432

Total population growth in decade is 19.28%

Out of total population of Gujarat, 42.60% people lives in urban region and rest in rural.

Table 4 Demographic Data of Gujarat

Description	Rural	Urban
Population	57.14	42.60
Total population	34,694,609	25,745,083
MALE population	17,799,159	13,692,101
Female population	16,895,450	12,052,982
Population growth	9.31%	36%
Sex ratio	949	880
Literacy	21,420,842	19,672,516
Average literacy	71.71%	86.31%

2.6 Rural Development Issues - Concerns – Measures

Rural Issues and Concerns are given below:

As we know, the 60 to 70 % of rural population in India lives in primitive conditions. This statement exists even after many years of Independence of India. So that the rural development programs have urgency in the present condition also. There are many obstacles in the development programs of rural which are given below:

Crime Free / Dispute Free

In rental property, the community tends to be more passing. Most often, people sign a six-month, nine-month or 12-month lease for a rental property. In many cases, owner doesn't even require leases, and residency is based on a month-to-month accord. This allows for an occupant to move very easily if they feel wrong has reached a level they will not tolerate. It is easier to move away from crime than to face it.

Literacy

In the modern world, this is the one mode of interpret literacy. An additional broad understanding is literacy as knowledge and competence in a specific area. The concept of literacy has evolved in meaning. The up-to-date term's meaning has been prolonged to include the ability to use language, communicate, gain useful knowledge, solve geometric problems and use the overriding symbol system of a back ground.

Health / Hygiene

It is a set of practices performed to protect health. According to the WHO , "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseas".

Various Measures for Rural Development are given below:

The main objective of rural development has been to remove poverty of the people whose living in the rural area and villages and fill to the wide gap between the rich and poor. This has been the primary concern in the economic planning and development process of the country rural development which encompasses the entire gamut of improvement in the overall quality of life in the rural areas can be achieved through eradication of poverty in rural areas. The basic facilities supply to people in rural area for improve the lifestyle.

Good Governance

There are various projects for rural development in India like, 20-point program, IRDP, Training Rural Youths for Self-employment, Food for Work Program, etc.

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

Table 5 Guidelines for village for provision of infrastructure

Facilities	Planning commission/UDPFI Norms	Required as per Norms
Education		
Anganwadi	Each village	1
Primary School	Each village	1
Secondary School	For 7,500 Population	1
Higher Secondary school	Per 15,000 Population	1
College	Per 125,000 Population	1
Tech. Training institute	Per 100,000 Population	1
Agriculture Research Centre	Per 100,000 Population	1
Medical Facility		
Govt./Panchayat Dispensary or sub PHC or health centre	Each Village	1
PHC & CHC	Per 20,000 Village	1
Child Welfare and Maternity Home	Per 10,000 Population	1
Hospital	Per 10,000 Population	1

Transportation		
Pucca Village Approach Road	Each Village	1
`Bus/Auto Stand Provision	All villages connected by PT (ST Bus or Auto)	1
	Drinking Water	
Water facilities		1
Over Head Tank	1/3 For Demand	1
U/G Sump	2/3 For Demand	1
Public Latrines	Each Village	1
Cremation ground	For 20,000 Population	1

2.8 Other Projects / Schemes of Gujarat / Indian Government

In other projects for the development of the rural area is the Public Private Partnership. Public-Private-Partnership is a mode of implementing government programmer/ 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 in them. Essentially, the shift in emphasis is form delivering services directly, to service management and coordination. The roles and responsibilities of the partners may vary from sector to sector.

There are many projects run by the government of India for the development of villages such as Swachchh Bharat Mission, Pradhan Mantri Gram Sadak Yojna(PMGSY), Antyodaya Anna Yojna(AAY), Sarva Siksha Abhiyan, Deen Dayal Antyodaya Yojna, MGNREGA, Mission Antyodaya, Pradhan Mantri Awas Yojna (Gramin), National Rurban Mission, Sansad Aadarsh Gram Yojna(SSGY), etc.

Swachh Bharat Mission (Gramin), which was known as Nirmal Bharat Abhiyan (NBA), is a Community-led sanitation program initiated by GOI and is being implemented in the State since 2004-05. It is program which is basically people-centred sanitation and also a demand-driven program. The pattern of fund sharing by GOI and State Government is in the ratio of 75:25 approximately. GOI launched an award-based Incentive Scheme "Nirmal Gram Puraskar" (NGP) in the October 2003, for Gram Panchyats, Blocks, Districts and States which are fully sanitized and open defecation free. The total number of awards received by Gujarat is 2283 till 2011 which makes it to third place in country in terms of Nirmal Gram Puraskar (NGP) received. Swachh Bharat Mission (G) envisages covering the entire community for saturated outcomes with a view to create Nirmal Gram Panchayats with following priorities

- Provision of Individual Household Latrine (IHHL) of both Below Poverty Line (BPL) families and Identified APL households within a gram panchayat.
- Gram Panchayat where all habitation has access to water to be taken up priority may be given to gram panchayats having functional piped water supply.
- Provision of Sanitation facilities in government schools and anganwadis in government buildings within these GPs.
- Solid and Liquid waste management for proposed and existing Nirmal Grams.
- Extensive capacity building of the stake holders like panchayat Raj Institutional (PRIs) village water and sanitation committees and field functionaries for sustainable sanitation.
- Appropriate convergence with MGNRegs with unskilled man days and skilled man days.

Objectives of the Swacchh Bharat Mission are as following:

- Improve quality of life in the rural areas.
- Accelerate sanitation coverage in rural areas to achieve the vision of Swachh Bharat by 2019.
- Motivate Communities and PRIs promoting sustainable sanitation facilities through awareness and health education.
- Cover the remaining schools not covered under SSA and Anganwadi centres in rural areas with proper sanitation facilities.
- Encourage cost effective and appropriate technologies for safe and sustainable sanitation.
- Develop community managed environmental sanitation systems focusing on SLWM for overall cleanliness in the rural areas.

Chapter. 3 Smart Village concept idea and its visit

3.1 Introduction: Concepts, Definitions and Practices

A Smart village is a part of rural area which facilitate with the advanced infrastructure facility, communication, sustainable market, where information technology is principal infrastructure of the city and that incorporates information and technologies. It contains all the basic amenities and vitalities required for a person in a case of emergency or for recreation. It gives an enhance and a good elegance to the villagers are developed an free from pollution, smart villages helps to motivate underdeveloped villages to be such kind of village developed and clean.

Smart village also refers to a bundle of services delivered to its residents through community participatory approach in an effective and efficient manner. The service includes affordable clean water, basic education, shelter and food, communication and transportation, job for the youths, farms and grazing fields for cattle and a proper market for agriculture produce.The smart village framework for a region depends on the resource availability, people's occupation, co-operation between the villagers and social acceptance. It is indeed important to understand the dynamics of socio-economic aspects of the village with geographical features and quantifying available resources. Knowledge of current skills and practices with the gaps in agriculture, energy, water resources and livestock management will help in choosing apt technologies for sustainable development.

3.2 Vision-Goals, Standards and Performance Measurement Indicators

Below are given the scoring criteria to be used by the States / UTs to score the potential smart cities and send the names to cities with the highest scores to MOUD:

1. **Existing Service Levels:**

a) Percentage of increase over Census 2011 or Swachh Bharat baseline on number of house hold sanitary latrines, whichever is less.

b) Making operable online grievance redressed system with response being sent back to complainant.

c) At least first monthly e-newspaper published.

d) Electronically place project wise municipal budget expenditure information for the last two financial years on the website.

2. **Institutional Systems / Capacities**

a) Started to levy compensatory penalty for delays in service delivery.

b) Has the total collection of internally generated revenue (e.g., taxes, fees, charges) shown an increasing trend during the last three FYs

3. **Self-financing**

a) Payment of salaries by ULB up-to last month.

b) Audit of accounts up-to FY.

c) Percentage contribution of tax revenue, fees and user charges, rents and other internal revenue sources to the ULB Budget.

d) Percentage of operation and maintenance cost of water supply, which is met by collected user charges for supply of water during last FY.

4. Past track records and reforms

a) Percentage of internal revenue sources (self-generated) budget funds used for capital works during FY.

b) Percentage of City-level JnNURM Reforms achieved.

c) Percentage of JnNURM projects completed, which were sanctioned during the original Mission period.

3.3 Technological Options

The technological options for the smart villages are given below:

- Smart Energy

Smart energy is the process of using devices for energy efficiency. It focuses on powerful, sustainable renewable energy sources that promote greater eco-friendliness while driving down costs. In today's era, smart energy proves increasingly important, with forward-thinking companies making smart energy systems a top priority. This increased investment into smart energy systems poses many benefits to consumers, the environment, and to energy providers at large.

Figure 6 Solar System for Electricity in Private Bungalow (Dharmaj)

- Smart Mobility

Smart mobility refers to using modes of the transportation alongside or even instead of owing a gas-powered vehicle. This can take on many different forms, including ridesharing, car-sharing, public transportation, walking, biking and more. Smart mobility is a new and revolutionary way of thinking about how we get around – one that is cleaner, safer and more efficient. The concept of smart mobility includes a wide range of modes of transportation: kick scooters, bicycles, buses, light rail trains, subways, streetcars, taxis, autonomous vehicles, walking, etc. Smart mobility is built on the following principles:

Flexibility: Multiple modes of transportation allow travellers to choose which ones work best for a given situation.

Efficiency: The trip gets the traveller to their destination with minimal disruption and in as little time as possible

Integration: The full route is planned door-to-door, regardless of which modes of transportation are used.

Clean Technology: Transportation moves away from pollution-causing vehicles to zero-emission ones.

Figure 7 Electric Scooter for Smart Mobility

- Smart Infrastructure

Smart infrastructure utilizes innovative methods of design and implementation in various sectors of infrastructure. And also, in planning to create communities that operate at a higher level of relative sustainability than their traditional counterparts.

- Smart Public Services

3.4 Road Map and Safeguards

The smart village which is been selected by us is very developed and modern in terms of infrastructure and facilities. The local government of that village i.e., Gram Panchayat has made many efforts from last many years to develop the village. The main contribution for the development of the village in terms of the funding is of NRIs (Non-Resident Indians) of the

village. They mainly live-in countries like United States of America, United Kingdom, Australia, Canada, Etc. They worked hard from many years in these countries and earn good money. The villagers of Dharmaj residing in foreign countries lo0ves their village and thus they send their hard-earned money to India for the development of the village. Most of the facilities in the Dharmaj village are made available to the villagers from the funds provided by the NRIs. The Sarpanch and Vice-Sarpanch of the village are working too hard for the development of the village.

3.5 Issues and 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 (MoUD), state government as well as local government agencies on various issues related to financing, sharing of best practices and sharing of service delivery processes.

3.6 Smart Infrastructure- Intelligent Traffic Management

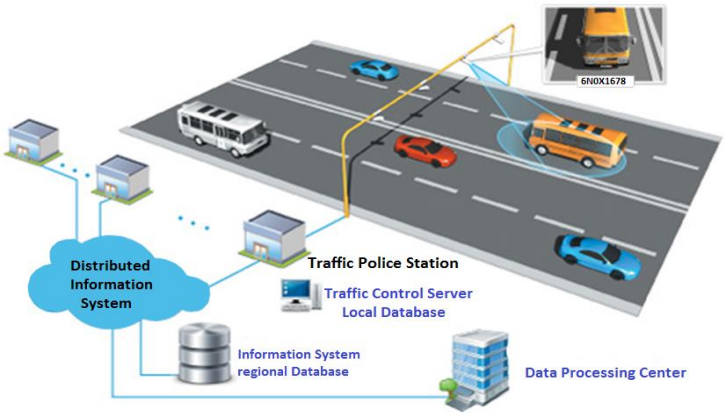


Figure 8 Intelligent Traffic Management System

In a world where infrastructure is truly smart, sensing technologies are embedded in infrastructure and the equipment it interacts with. These sensors are connected to a communication backbone which allows real-time data acquisition and analysis. The information gathered is analysed, interpreted and delivered as reliable, robust and meaningful information to infrastructure providers, who can then make better informed decisions about the structural health and maintenance of their assets.

In a sensing environment, infrastructure is able to respond in real time to users' needs. Self-aware infrastructure assets direct their own maintenance, leading to condition- based maintenance, reduced down time and greater operational efficiency of the infrastructure overall.

Better information leads to an enhanced understanding of the behaviour of infrastructure. The impact of this will lead to transformations in the approaches to design and construction as well as step changes in improved health and productivity, greater efficiency in design and performance, a low-carbon society and sustainable urban planning and management.

3.7 Cyber Security or any other concept as per the (ANNEXURE 1)

Insecure Hardware

One of the major concerns about smart cities sensors in the equipment; buildings etc. are insecure and not tested thoroughly. Owing to lack of standardization of IoT devices, the sensors are prone to hacking. Notorious individuals can hack the sensors and feed fake data, causing signal failures, system shutdowns etc.

Large Attack Surface

Smart city operations utilize complex, networked assembly of ICT infrastructure to manage various services. Any device that is connected to the network is vulnerable to being hacked; the number of potential entry points is multiplied in Smart Cities. By compromising a single device, it is possible to attack the entire system or network. The vulnerability of systems is worsened by a number of issues including weak security and encryption; the use of insecure legacy systems and poor maintenance; cascade effects; and human error.

Bandwidth consumption

Thousands of sensors, or actuators, trying to communicate to a single server will create a flood of data traffic which can bring down the server. Additionally, most of the sensors use an unencrypted link to communicate, and hence, there are possibilities of security lapses. The bandwidth consumption from billions of devices will put a strain on the spectrum of other wireless communications, which also operate on the megahertz frequencies like radio, television, emergency services, etc.

Application Risk

Apps have accelerated the integration of mobile devices within our daily lives. From mapping apps, to social networking, to productivity tools, to games, apps have largely driven the smartphone revolution and have made it as significant and as far-reaching as it is today. While apps demonstrate utility that is seemingly bound only by developer imagination, it also increases the risk of supporting Bring Your Own device (BYOD) in a corporate environment.

Disaster recovery and backup services

Data centres, either on site or off site, are at the heart of smart cities. Disaster recovery is a critical part of the data Centre ‘s architecture. If servers go down, is it important that systems are brought back online as soon as possible and, once those systems are back up and running, need to have all their previous workloads operational. It is important to identify the right level of back-up required for various services. Data back-ups should be done regularly, and according to the best practices, should be done off site. This helps in data protection in case of physical security breach at the data centre.

3.8 Retrofitting-Redevelopment-Greenfield Development District Cooling

District energy, both heating and cooling, tie together the energy generating sources in a city with buildings and facilities having a need of heating and/or cooling. Instead of each building having its own heating or cooling system, the energy is delivered to several buildings

in large area from a central plant. The water-based distribution system guarantees that heat and cooling arrive safely to the end users.

District heating is the most widespread of the two types of district energy; heating and cooling. To transport heat efficiently, the district heating distribution infrastructure comprises a network of insulated pipes, delivering heat in the form of hot water, from the generation site to the end user. Networks can measure from a few hundred meters to covering entire large cities. End users range from residential buildings to offices industrial and facilities. The network ‘s coverage can easily be extended by laying more pipes, often in combination of adding more points of generation.

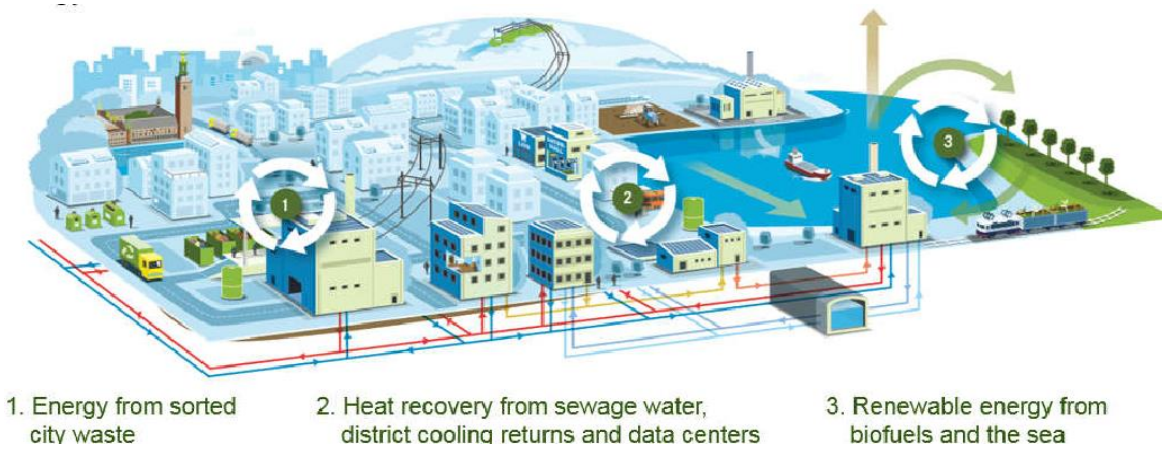


Figure 9 City Layout of District Heating and Cooling System

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 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 that 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 will affect 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.

Two examples of the redevelopment model are the Saifee Burhani Upliftment Project in Mumbai (also called the Bhendi Bazaar Project) and the redevelopment of East Kidwai Nagar in New Delhi being undertaken by the National Building Construction Corporation.

Greenfield development will introduce most of the Smart Solutions in a previously vacant area (more than 250 acres) using innovative planning, plan financing and plan implementation tools (e.g., land pooling/ land reconstitution) 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,

Greenfield developments could be located either within the limits of the ULB or within the limits of the local Urban Development Authority (UDA).

Pan-city development envisages application of selected Smart Solutions to the existing city-wide infrastructure. Application of Smart Solutions will involve the use of technology, information and data to make infrastructure and services better. For example, applying Smart Solutions in the transport sector (intelligent traffic management system) and reducing average commute time or cost of citizens will have positive effects on productivity and quality of life of citizens. Another example can be waste water recycling and smart metering which can make a huge contribution to better water management in the city.

The smart city proposal of each shortlisted city is expected to encapsulate either a retrofitting or redevelopment or greenfield development model, or a mix thereof and a Pan-city feature with Smart Solution(s). It is important to note that pan-city is an additional feature to be provided. Since smart city is taking a compact area approach, it is necessary that all the city residents feel there is something in it for them also. Therefore, the additional requirement of some (at least one) city-wide smart solution has been put in the scheme to make it inclusive.

For North Eastern and Himalayan States, the area proposed to be developed will be one-half of what is prescribed for any of the alternative models - retrofitting, redevelopment or greenfield development.

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

Swachh Bharat Abhiyaan was launched by Hon’ble Prime Minister Mr. Narendra Modi on 2nd October 2015, which caught attention of everybody not only in India, but also in the world. The Government has taken various steps to create awareness among the masses for keeping the area surrounding them neat and clean. Government is also paying special attention for cleaning of rivers, railway stations, tourist destinations and other public places.

To achieve the target of cleanliness, the technologies to treat the waste material should also be developed along with creating awareness. There are many technologies that are used to treat waste materials. They are usually very costly, very complex to be understood and viable only for large size units. At the same time, indigenous technologies are low-cost capital and easy to use and they can also be used by different size units. The objective of the workshop was to disseminate indigenous technologies of water, wastewater and solid waste treatment developed by the Bhabha Atomic Research Centre under “Swachh Bharat Abhiyan” and to

bridge gap between the research at the research centres and the practical application of the technologies.

- Environment Friendly Plasma Technologies:

Solid waste dumping sites or landfill sites need more amount of land which is not available in urban areas. Incineration of solid waste pollutes the environment if the incinerators are not designed or operated properly. Thermal Plasma Technology is ideally suited for waste treatment.

By plasma technology Hazardous & toxic compounds are broken down to elemental constituents at high temperatures; Inorganic materials are converted to Vitrified Mass; and Organic materials are Pyrolyzed or Gasifier, converted to flue gases (H2 & CO) & Lower hydrocarbon gases when operated at low temperature (500 – 600OC). Disposal of carcass is also being thought of using plasma pyrolysis.

- Unique Multi Stage Biological Treatment Solution:

Multi Stage Biological Treatment Solution can be implemented on existing STP which are not able to process Sewage to optimum efficiency. MSBT can be implemented as a modular or container on the banks of rivers on Drains/Nalas which discharge waste water to the river. It can also be implanted in small urban societies and housing complex for better water management. Benefits of MSBT are: No Surplus of Organic Sludge, No Odour problem, drastic reduction of Electrical Power usage which minimizes operating costs, no need for return sludge pumping (minimizing electromechanical component which ultimately reduces operating cost).

3.11 Initiatives in village development by local self-government

In the past "government as provider" approach, the priorities were to secure budget allocations and develop projects. The Housing Policy and the NCU statement implicitly give higher priority to two other requirements: first, the reform of policies and regulations that now inhibit development initiatives by the people; and second, more efficient resource management and the building of institutional capacity. Resource Management and Institutional Development. As discussed in Section 5, India's urban institutions do not have the capacity to provide adequate services at present, let alone address the requirements of accelerated urban growth in the future. Proposals relate to three types of institutions.

3.12 Smart Initiatives by District Municipal Corporation

Smart city Mission was launched by Prime Minister Shri Narendra Modi on 25 June, 2015. Surat city was selected among 100 cities to be developed as smart city in India due to various achievements, initiatives and all-inclusive approach. Accordingly, Surat city had submitted “Smart City Proposal” for Surat City in the given format on 15 December, 2015 to Ministry of Urban Development, Government of India with required consent of Government of Gujarat and statutory authority of Surat Municipal Corporation. Till deadline for submission total 97 cities had submitted their smart city proposal to Government of India. As per the already given plan, 20 cities were to be selected in round-1 (current year) on merit of their submitted proposal. Government of India had constituted 3 teams with expert members of World Bank,

ADB and other independent members for evaluation and marking of all the submitted smart city proposals from 97 smart cities and to select final list of top 20 cities based on marking.

3.13 Any Projects contributed working by Government / NGO / Other Digital Country concept

ReNew Power, under its CSR initiative "Lighting Lives" in rural India is working on its commitment to ensure the fruits of development reach the most marginalised. The concept of SVARG (Smart Village Adopted by ReNew Group) was developed as a tool for a "Bottom-up approach" towards development ensuring energy security as the driver for development. Under SVARG, ReNew Power decided to adopt a village from one of the most prosperous yet underdeveloped states - Uttar Pradesh, where approximately 30% of the people live below poverty line. Various government reports indicate that around 99% of the villages in UP are electrified, of which only 60% of the households have access to electricity, with 3 to 4 households receiving electricity for less than 12 hours a day. One such village is Paniyara for whose inhabitants, access to electricity is a basic need. Availability of electricity and enhanced energy security would go a long way in transforming the lives of its residents - by improving education, catalysing women empowerment, creating livelihoods opportunities for youth among other benefits, ReNew Power adopted and developed Paniyara over a period of 3 years as a "SMART Village" in 2016. Paniyara village is a medium - sized village, located in Arajiline block of Varanasi district. According to the 2011 population census, it had population of 1921. The major occupation there is agriculture followed by stray economic activities such as owing petty shops, with some inhabitants also working as labourers.

Key highlights of the CSR programme:

- Establishment of Community-based solar micro-grids; providing electricity to households, government schools and Anganwadi centres.
- Establishment of "ReNew Edu hub" – an education centre with a career building model for children and youth; it imparts education using technology and promotes digital literacy.
- Promotion of rural sports talent under ReNew Scholarship for Exceptional Talent (ReSET).
- Access to safe drinking water Ro units in schools and Aanganwadi centres.
- Training and information centre for farmers.

Impacts of SVARG:

In 2016, two community solar mini-grid of 11Kw were installed in the village, through which 50 households were electrified. In 2017, ReNew Power installed three community solar grids in the village, through which 115 households belonging to economically weaker section were electrified. By end of August 2017, ReNew Power supported the installation of community solar grids of total capacity 25 kW in Paniyara, ensuring 100% access to electricity covering 165 households, two government schools and 2 Anganwadi centres. After the installation of these grids, the beneficiary households are getting regular electricity supply. This has reduced the household expenditure on purchase of kerosene. Children have additional 1-2

hours of study time at home. Local petty shops on an average have additional 1-2 hours of business hours.

With the installation of street lights, there is an increased sense of security among women and adolescent girls. With the electrification of local schools, one can see an increase in the attendance levels in the classes. As per the school authorities, the attendance in the schools has increased by 15% in a year. Besides ensuring access to electricity in schools, basic infrastructure has also been developed in terms of improved access to drinking water and sanitation. This has led to a decline in dropout rate by 5% in the academic year 2018 as compared to 2017.

As a result of the CSR intervention of ReNew Power, the Government Primary School has been upgraded to "Model English Medium School" in the academic year 2018. With the establishment of Edu hub in 2018, children and youth of Paniyara and neighbouring villages have access to a basic computer course. Since its launch in June 2018, 90 children have completed this course. Buoyed by this positive response from the children, the course has now been extended to youth and adolescent girls. The programme also focuses on capacity building of local farmers; by promoting effective agriculture management practices.

Regular training sessions are organised in partnership with Indian Vegetable Research Institute, Department of Agriculture, Government of Uttar Pradesh. Around 700 farmers from Paniyara and surrounding villages have been part of these sessions.

3.14 How to implement other countries smart villages projects in Indian Village context

Prior to making Smart Village, it should become simple village first with basic facilities, it has been 70 years since our independence, great minds have been working in Indian Politics to progress India in forward direction. But villages, towns and cities lack basic amenities. I have simple solution for Political leaders who can develop India just like this snap, if they have determination to fulfil their duties as we do in our roles. It means that our great minds at work have failed to do their duties, here is common man's idea on how to develop India, each village should have following 5 basic amenities in 5 years, Roads, Electricity, Water, Hospital, School.

In entire country, rule should be passed in such a way that, in each year one mentioned amenity should be completed across country in all villages. something like this, year 1- Roads, Year 2 - Electricity and so on. by the end of each year, villagers and their local political leader should check this off from their list. if they don't do it then they should not complain about it in the future. both people and political leader should be responsible in constructing Simple India.

Chapter. 4 Allocated village Dahemi

4.1 Introduction

4.1.1 Introduction about Dahemi village

Dahemi is a village which is located 13 kms from Borsad. The village lies under Anand district and Borsad taluka. The whole village is surrounded by agricultural land. There are mainly three approach roads to the village. From which one comes from the Napa village; another comes from the main road of state highway and another from Pamol village. The approach road which comes from Napa village is damaged due to rain, the road coming from state highway is in good condition and the road coming from Pamol village is also in good condition. All the approach roads are of single lane.

On entering the village, we can see the main gate of the village. On the left-hand side there is a lake filled with water. The main road in the village is damaged due to rain. The community hall of the village is located near the entrance of the village which is in damaged condition and can't be used anymore. There is a bus stand in the middle. There are 4-5 kutcha shops on the opposite side of the community hall which are on the panchayat land. Then moving forward, we can see overhead water tank in good condition in the bhagol of the village.

4.1.2 Need of 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 and faculty members meet all the stakeholders in a village, survey the existing facilities. Then they re-imagine and re-design the whole of the infrastructure of the village. The students use their engineering skills to prepare detailed project reports for the infra-structure as a part of their final year project work.

4.1.3 Study Area

Dahemi village is located at 9 km from Borsad. Present status and techno-economic survey of villages in given District of the state in terms of basic and public amenities, essential commodities, other infrastructural facilities for the need of people and on the adequacy of the available resource with reference to the population of the village and growth of the area with the consultation of Local revenue. authorities, TDO and DDO the future need of the village keeping into mind the need of days, future targeted population growth, growth of surrounding town or Taluka placesetc.

4.1.4 Objectives of the study

The main objectives of the study are as following: -

1. Promote integrated development of rural areas with provision of quality housing, better connectivity, employment opportunities and supporting physical and social infrastructure.

2. Basic Social Infrastructure should be provided and ensure proper delivery of facilities to village dwellers.
3. Electricity connections like street lighting that is energy efficient and eco-friendly.
4. Identification of sanitation facilities that need improvement.
5. Development of socio culture facilities like community hall, public library, recreational activities and repairing of existing amenities.
6. Refurbishing of village lakes, water tanks and wells, construction of rain water harvesting structures for sustainable Development.

4.1.5 Scope of the Study

- In Dahemi village many people commute from village to nearest city for job, business, employment etc. From guideline of Vishwakarma Yojana Phase VII we will studies about village and carried out various surveys from village.
- In the village we will conduct techno- economic survey and collected all information from village such as Sociocultural infrastructure, sustainable infrastructure etc.
- According to survey we will know about their problems, existing condition, requirement of facilities etc. From this we carry out gap analysis as per census 2011 and also the future action plan to village. From all the information we will try to provide best work for village development as per guideline of smart village development.

4.1.6 Methodology Frame Work for development of Dahemi

We visited the village and collected the required data from the village authority and villagers. We asked about the problems faced by the villagers related to infrastructure services. And from that data we have decided to provide designs of some basic facilities required in village for its development.

4.1.7 Available Methodology for development of village related to Civil

The available methodology for the development of the village is to provide design to village authorities and local government. We will provide AutoCAD designs of required facilities, estimated cost, etc., so that government can plan for the work.

4.2 Study Area Profile

4.2.1 Study Area Location with brief history land use details

Locality Name: Dahemi

District Name: Anand

Taluka Name: Borsad

State: Gujarat

Language: Gujarati and Hindi

Time Zone: IST (UTC +5:30)

Telephone Code/Std Code: 02692

Dahemi village is located in Anand district. People of this village lives in peaceful manner. The main occupation of this village is Agriculture. Good facilities such as industrial development, proper health care facilities, good quality education, etc. are the main concerns of this village. If banks and finance institutes provide loan and other financial support to the villagers, this village will see real development. And medical and health care facilities must be improved.

4.2.2 Base Location map, Land Map, Gram Tal Map

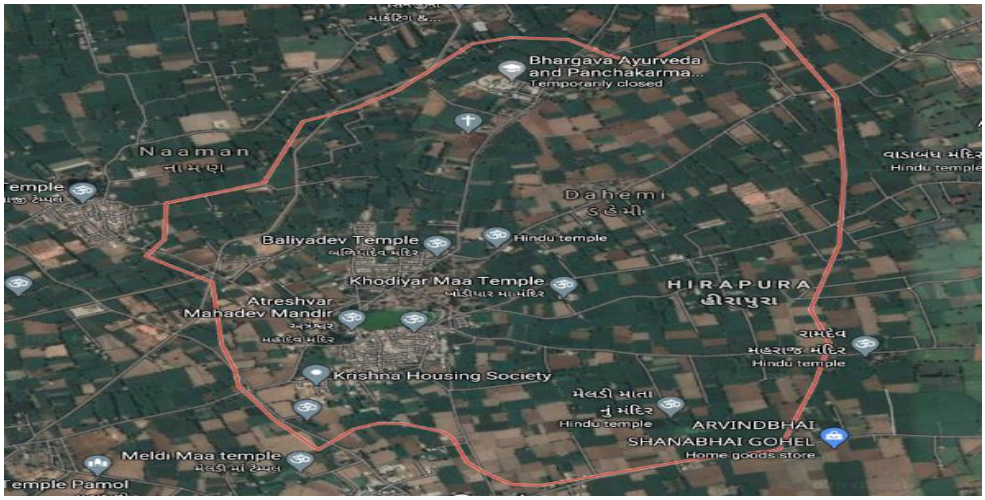


Figure 10 Dahemi Village Base Map

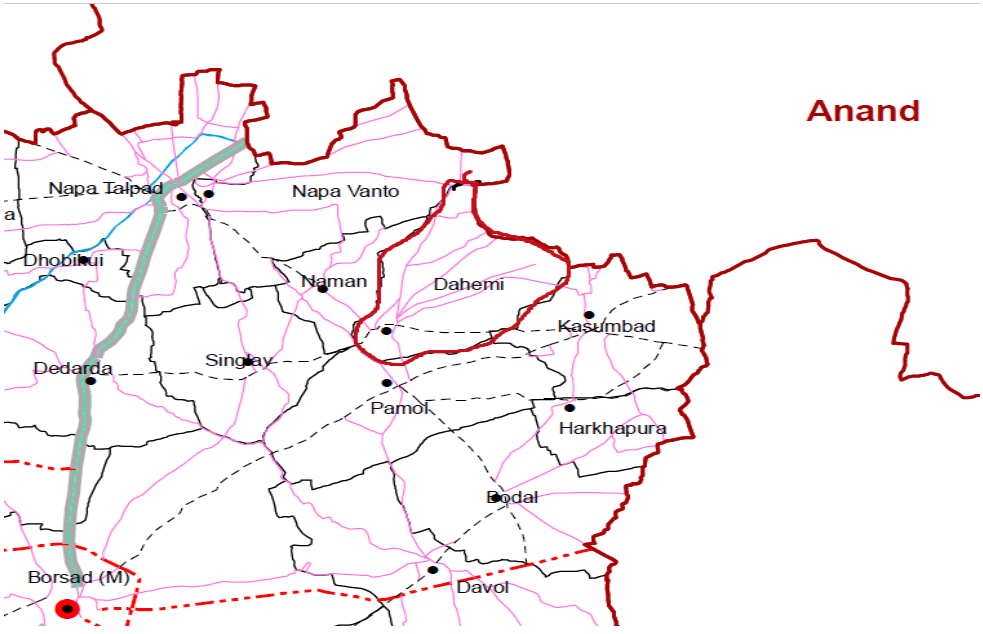


Figure 11 Dahemi Village Location in Borsad Taluka

4.2.3 Physical and Demographical Growth

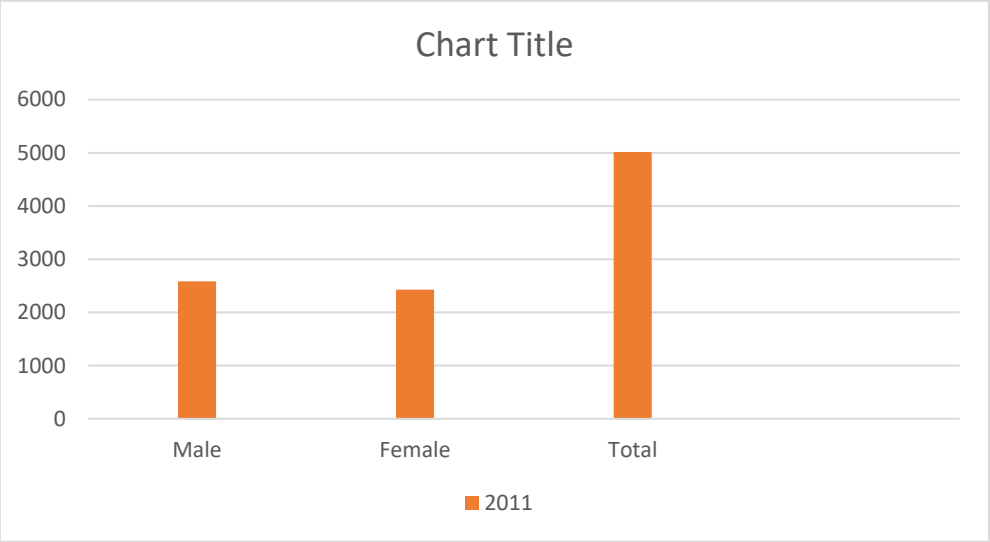


Figure 12 Population data of Dahemi

4.2.4 Economic generation profile / Banks

About the economic profile of this village, many villagers work in agricultural sector or labour work. The village has good electrification system which is distributed 24 x 7 for the domestic use and 8 hours for agricultural use. Village has good drainage system installed in 1/4th area of village. There is a mini bank branch in the village

4.2.5 Actual Problem faced by villagers and smart solution

Actual problems faced by villagers are no recreational facilities, no garden, there is no lake beautification done, etc. The smart solution for their problem is that, we can re-design existing primary school which is in bad condition but in large area. We can re-design school in which we can provide public garden and public library.

4.2.6 Social scenario – preservation of traditions, festivals, cuisine

The traditions of India are well preserved in the village. There are many people in the village who wear dhotis as their daily wear. They like to eat Gujarati cuisine like dal, bhat, bajra rotla, rotli, milk, khichdi, etc. We can also see the bhajiya vendors in the village which is one of the famous dishes of Gujarat. The people in this village celebrates many festivals like Diwali, Navratri, Uttarayan, Holi, Janmashtmi, Idd, etc.

4.2.7 Migration Reasons / Trends

In our allocated village “Dahemi”, many of the villagers have migrated to different cities. They have migrated due to lack of basic facilities and less opportunities to earn good income. Most of the villagers have migrated to Borsad, Anand and Ahmedabad. They also migrate due to lack of good education system in the village. And cities are far away freom the village and roads are also not too good for their children to commute to school daily in located in the cities.

4.3 Data Collection

4.3.1 Describe methods for data collection

We have carried out techno – economic survey for collection of the data. First, we asked the Sarpanch and Talati for the data and filled up the form of techno – economic survey given by V – Yojana section of the GTU. Then after we started survey in village and asked many villagers for the facilities they are provided with, by local government and also asked for their problems. They gave us all the data and we collected all the information.

4.3.2 Primary details of survey

Dahemi village is in Borsad taluka of Anand district of Gujarat state. It is the village consisting of 5015 population. Sarpanch of the village Dahemi is Mrs. Jayaben Vikrambhai Parmar. Total area of the village is

The nearest town to the village Dahemi is Borsad which is 9 km away from village. The village has Gram Panchayat, Milk co – operative society, Anganwadi, etc.

4.3.3 Average size of the house – geo-tagging of house

Average size of house in the village is 1050 sqft.

4.3.4 Number of human beings in one house

The average number of human beings in one house are four members.

4.3.5 Material available locally in the village and material out sourced by the villagers

The construction of the houses was made of cement, sand, bricks and concrete. In this village kutcha houses are lesser than pucca house.

The locally available material is red bricks as there is brick manufacturing unit near the village. Other materials like aggregates, cement, reinforcement bars, etc. are to be brought from nearest city for the construction.

4.3.6 Geographical Detail

- Village Name: Dahemi
- Taluka Name: Borsad
- District: Anand
- State: Gujarat
- Language: Gujarati

4.3.7 Demographical Detail – Caste wise Population Details / which ID proof using by villagers

The ID proof used by most of the villagers are Aadhar Card and Voter's ID.

4.3.8 Occupational Detail – Occupation wise details / Majority business

In this village 70 to 85 % people are connected with agriculture activities. It's the main source of income of the villagers. Village also has milk co – operative society so milk production also the source of income in village. And other people work as daily labour. And remaining do job.

- Agriculture – 80%
- Milk production – 10%
- Daily wages – 10%

4.3.9 Agricultural Details / Organic Farming / Fishery

80% village is depended on agriculture as main source as income. Wheat and tobacco are main agricultural products produced in the village.

4.3.10 Physical Infrastructure Facilities – Manufacturing HUB / Warehouses

Wheat, Tobacco and milk are the main manufacturing products of the village.

4.3.11 Tourism development available in the village for attracting the tourists

No tourism in this village.

4.4 Infrastructure Details

4.4.1 Drinking Water / Water Management Facilities

Figure 13 Reinstalling Faulty Water Distribution Pipes

For drinking water purpose 1 Overhead Water tank and water distribution line is provided in village. Some of the people also use handpump for water purpose.

4.4.2 Drainage Network / Sanitation Facilities

In village drainage system work is going on. 1/4th village has got proper drainage facilities and remaining village will get it soon.

4.4.3 Transportation & Road Network

Figure 14 Street of the village without pavement

For transport network, bus stand is available in the village. Most of the villagers are depended on Rickshaws and private vehicles for transportation. Approach road of the village is Bitumen Road. Main road of the village concrete road. Internal streets of the village are either of R.C.C. or paver blocks. And most of the roads in the village are in damaged condition.

4.4.4 Housing Conditions

There are 80% pucca houses in the village and 20% kuccha houses in the village.

Figure 16 Pucca House

Figure 15 Kuccha House

4.4.5 Social Infrastructure Facilities, Health, Education, Community Hall, Library

- Health Facility

The village has private clinics for the medical needs, and they can also go to Borsad for health facilities.

Figure 17 Cmmunity Hall

- Education Facility

For education purpose, Primary School, Anganwadi and private schools are available. But government primary school is not in well condition and needs to be reconstructed.

- Community Hall

Our allocated village has one community hall but it is in very bad condition. It needs to be reconstructed at another place as using existing community hall is like putting life of village in danger.

- Library

There is no library in the village.

4.4.6 Existing Condition of Public Buildings & Maintenance of existing Public Infrastructure

The public buildings such as Anganwadi and milk co – operative society building needs renovation. The village roads also need maintenance.

4.4.7 Technology Mobile / Wi-Fi / Internet Usage Details

In our allocated village most people have smart phones. But village does not have Wi-Fi. Villagers are depended on the mobile data service providers for the internet.

4.4.8 Sports Activity as Gram Panchayat

There is no any sports activity as Gram Panchayat.

4.4.9 Socio – Cultural Facilities, Public Garden / Park / Playground / Pond / Other Recreation Facilities

There is no availability of any socio-cultural facility like public library, public garden, park, etc.

4.4.10 Other Facilities

No facilities are there in village other than specified.

4.5 Existing Institutions like – Village Administration – Detail Profile

4.5.1 Bachat Mandali

Usually, villagers use Indian Post Savings account for bachat purpose.

4.5.2 Dudh Mandali

There are many villagers in the village who are depended on milk production for their income. So, there is a “Dudh Utpadak Sahakari Mandali Lt.” i.e., “Milk co – operative Society limited” for the purpose of milk collection and distribution. People having cows and buffalos, come here with the milk and sell the milk to the society two times a day. And the people who want to buy milk, they can buy it from distribution counter in the society building. The milk is also sent to Amul Dairy.

4.5.3 Mahila Forum

There is no mahila forum in the village. We have discussed with the sarpanch regarding it and they are positive to form such a forum.

4.5.4 Plantation for Air Pollution

As there is no city or town near by the village and village is surrounded by the farms there is very lesser air pollution in the village.

4.5.5 Rainwater Harvesting – Wastewater recycling

There is no plant for wastewater recycling and also there is no arrangement for the rainwater harvesting in the village. We are planning to provide design for the rainwater harvesting in our allocated village.

4.5.6 Agricultural Development

Most of the villagers in this village are depended upon farming for their income. The most common way used for agriculture in this village is irrigation by borewell. Even in this era of tractors, many people in village uses ox – plough for farming purpose.

4.5.7 Any Other

No other institutions are there in the village.

Chapter. 5 Technical Options with Case Studies

5.1 Concept (Civil)

5.1.1 Advance Sustainable construction techniques / Practices and Quantity Surveying

Self-Healing Concrete:

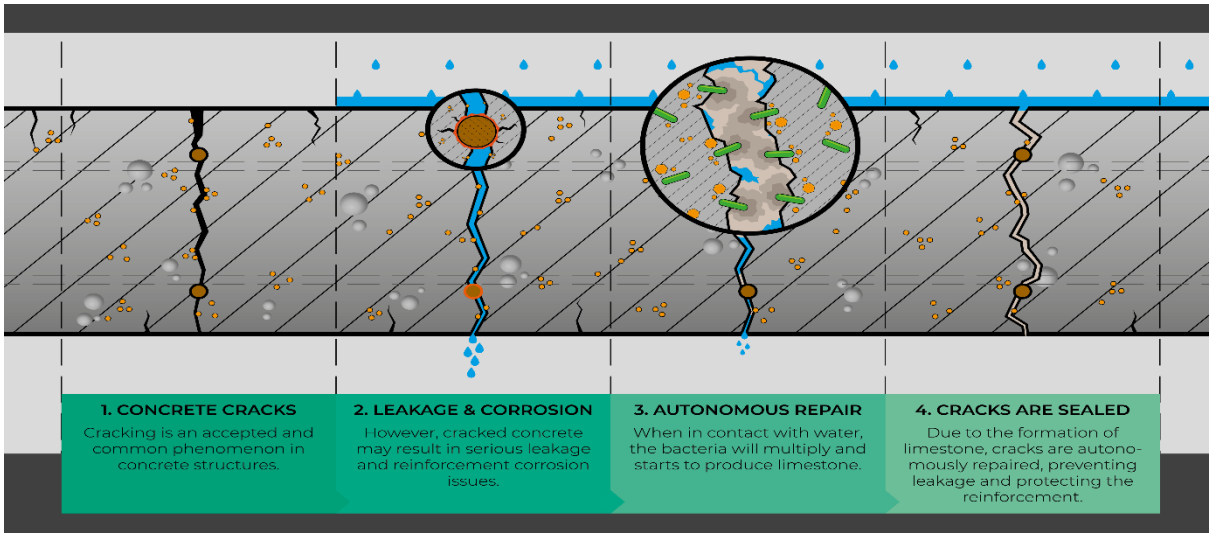


Figure 18 Self-Healing Concrete Infographic figure

The self-healing system in concrete is principally divided into two types, autogenic and autonomic. Autogenic self-healing in concrete is an intrinsic material-healing property wherein the self-healing process initiates from the generic materials present. For example, cementitious materials exhibit a self-repairing ability due to the rehydration property of unhydrated cement remaining on the crack surface. In contrast, a self-healing process that involves the incorporation of material components that are not traditionally used in the concrete is termed autonomic self-healing.

One of the principal causes of autogenic self-healing is the hydration of unhydrated cement remaining in the matrix. Then again, the volume of healing products formed in this process is limited. Hence, the autogenic self-healing is effective within the crack width up to 50–150 μm . Autogenic self-healing performance is higher in early age due to high content of unhydrated cement, and parameters such as compressive stress to restrict crack and wet-dry cycles can increase the healing performance. Autogenic healing performance can also be enhanced using fibres to restrict crack opening and the use of superplasticizer in engineered cementitious composite (ECC) to reduce w/c ratio. Cardiff University research group introduced polyethylene terephthalate (PET) tendons, a shrinkable polymer activated with a heating system inside the concrete structural element to compress and close the crack enhancing the autogenous healing process. Considerable enhancement in healing performance is also possible to achieve using optimum supplementary cementitious materials (SCMs) and smart expansive minerals Autonomic self-healing in concrete, in contrast to the autogenous healing process, requires the release of the healing agent from reserved encapsulation or a continuous vascular network. Common encapsulating shell materials are glass and polymers.

Healing agents in autonomic self-healing are epoxy resins, cyanoacrylates (super glues), alkali-silica solutions, methyl methacrylate, expansive minerals, hydrogel and bacteria-based microorganisms.

Autogenous self-healing in cement was spotted early in the twentieth century by Lauer and Slate, and the concept was gradually established by different researchers. The crystallisation of calcium carbonate within the crack is the primary process in autogenous self-healing of matured concrete. In those reactions, CO_2 dissolved in water from the air, and the calcium ion Ca^{2+} is derived from concrete.

Reasons for autogenous self-healing proposed by different researchers are:

(i) Further reaction of the unhydrated cement.

(ii) expansion of the concrete in the crack flanks.

(iii) crystallisation of calcium carbonate.

(iv) closing of the cracks by fine particles existing in the water.

(v) Closing of the cracks by spiling off loose concrete particles resulting from the cracking.

5.1.2 Soil Liquification

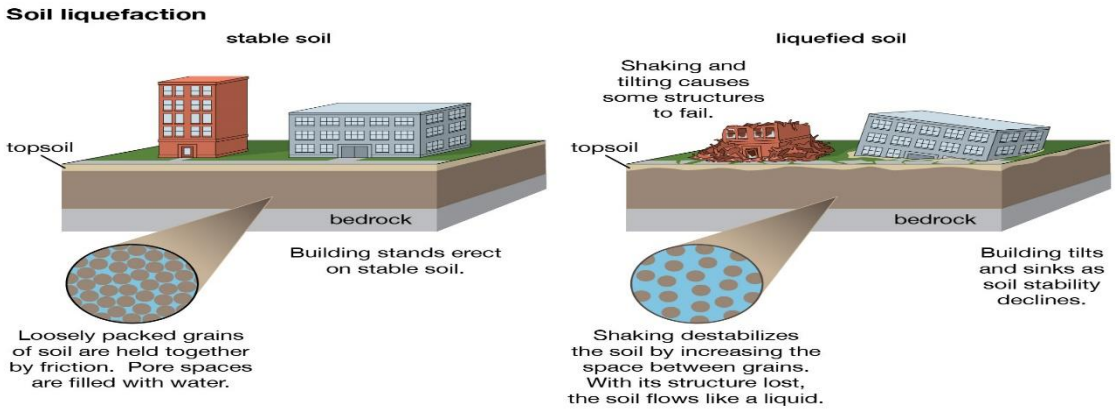


Figure 19 soil Liquification Results

A Phenomenon whereby a saturated or partially saturated soil substantially loses strength and stiffness in response to an applied stress, usually earthquake shaking or other sudden change in stress condition, causing it to behave like a liquid is called Soil Liquefaction.

There are two types of soil liquification:

1) Flow Liquification

2) Cyclic Mobility

The soil is a mixture of soil particles that stay connected together. These particles naturally rest upon each other due to gravity and form grids based on its properties. Each particle produces its own contact force by the surrounding particle. These contact forces

together hold all the individual soil particles in their place. Soil liquefaction occurs due to sudden and rapid load on the soil particle. The sudden water pressure leads to soil losing its cohesive strength. Once the soil loses its cohesion, it gets softened, weak and loses its solid properties that are converted to liquid properties.

Earthquakes or seismic events cause number of disturbances in the ground which can harm or damage the structural stability which could turn fatal. Liquefaction causes a sudden movement shift that is out of sync with the rest of the structure. This might cause several structural damages to the property leading to casualties. Liquefaction in saturated soils generates a quicksand effect. This phenomenon occurs during liquefaction when the building or the foundation gets pulled into the diluted soil causing it to lean and eventually collapse. Construction of buildings near water bodies use retaining walls which are heavily dependent on the strength and stiffness of the soil. Once the soil gets liquefied, the retaining wall collapses which could cause landslides.

Seismic events affect ground conditions. Liquefaction of soil causes structural instability in buildings. This occurs due to various instances of structural failure. The liquefied ground cannot sustain the stresses of its load from the foundations. Foundations will sink into the sand deposit and cause the building to lean and eventually collapse. Soil liquefaction occurs only in areas which have saturated soils. Most of these areas are located near a water body such as lakes, ponds, rivers etc. Buildings constructed in this zone must adhere strict codes and bylaws. The soil can sustain the ground forces in general conditions. But an earthquake or strong motion/vibrations in the ground, can cause water logging which increases the liquid consistency in the soil. The soil loses its rigidity and the ground cannot support the loads causing them to sink or collapse.

Effects of Liquification on building:

Buckling of Piles: Pile foundations are embedded deep into the ground because of the soils support. But if the soil is not strong, the foundations buckle which lead to failure.

Spreading of ground: The soil starts to move in a downward direction due to the liquefaction. Slopes starting from an angle of 3 degrees are prone to lateral spreading.

The effects of soil liquefaction on the built environment can be extremely damaging. Buildings whose foundations stand directly on the sand, which liquefies, will experience a sudden loss of support. Where a thin crust of non-liquefied soil exists between building foundation and the liquefied soil, a ‘punching shear’ type foundation failure may occur. The irregular settlement of ground may also 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 the 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 after the earthquake induced shaking.

Methods to reduce damage due to soil liquification:

- By avoiding construction on saturated soils

Soil study must be conducted before construction to check whether the soil is durable for construction. Soil mapping must be made mandatory.

- Liquification proof structural system
- Improving Soil Conditions

5.1.3 Sustainable Sanitation (Low-cost PVC drainage system in Amrapur)

The Amarapur in Ahmednagar district of Maharashtra is a village having total human population of 3539 in 746 households. Before the underground PVC drainage, Amarapur village having open type of RCC drainage system which collect water from toilet, kitchen etc. and transport it into outside to village. 80% of available water is converted in to wastewater which create following problems in Amarapur.

- Increase percent of Water borne diseases
- Unhygienic and insanitary surrounding on village road.
- Mosquitos breeding in showed water increases rapidly.
- Children are consistently becoming ill due to unhygienic surrounding which also affect school attendances.

Strategy:

To solve this problem Amarapur Gram panchayat decided to make action plan, Gram panchayat staff visited experimental model at Muthevadgaon. With the consent of all low-cost PVC drainage Model is accepted and granted through ZP engineers. For Funding this Plan is put in front of planning department for year 2014-2015. Planning department gives approval under BRGF scheme and gives work order to Shevgaon Panchayat Samiti. The pipeline work is started in January 2014 and completed in August 2015. Stages of Development

Main Feature:

In this system waste water goes through Underground covered PVC pipe line in place of open drainage system. After the construction of silt catcher at household level it relates to 3” PVC pipe and finally connected with 6” PVC pipe with the main line. In house silt catcher should be constructed near the plate farm made for washing purposes and pipe slope should be kept approx. 1:200. Instead of bends it is better to provide chambers in turning points of pipe lines. This Waste water is collected in waste water stabilization pond located in outside of village.

This stabilization pond is specially designed for stored wastewater for reuse (irrigation purpose). Amrapur gram panchayat having 5 – acre land which is unused due to water scarcity. Now using this wastewater this land is used to cultivate different crops through a joint venture with a local farmer. Due to this great decision of gram panchayat farmer get permanent employment and panchayat gets extra revenue from agricultural commodity sale.

For proper O& M, the depth of underground drainage should be at least 60cm so that PVC pipe line is safe from any surface pressure. Silt catcher should be clean at least once in a

weak. Time to time water should flow in the drains. The important aspect for the O&M is active people participation and awareness in the community.

Benefits:

This project is very much appreciated by users in Amarapur because against open drain system, close drain system is more useful and due to low maintenance cost this system is economical viable. This system keeps surrounding environment cleaner and safer against health hazards. Pipes were buried 60cm below the ground surface so this system is more sustainable than open drain system. Socially this system is more acceptable than any another because house holding using the system had developed participatory approach and developed more capacity of community in respect to economy, relationship and awareness. As the system is closed, materials like garbage, road side solid wastes, plastics, building materials etc. will not find access to the system. Operation and maintenance become easily manageable by Gram Panchayat Construction cost is comparably low as cost for surface drain. Road space is fully utilized.

5.1.4 Transport Infrastructure / system

There are a range of different types of transport available to us; the type we choose to use will depend on the purpose of travelling, length of the journey and anyone you may be travelling with. Increasingly cost is becoming a deciding factor in the types of transport we use, especially due to the increase in fuel costs we all wish to avoid.

Car:

The most popular type of transport, most people use cars daily for short and long journeys. Cars have many advantages such as their ease of use and convenience, getting you exactly where you want to be without additional buses, trains or walking needed to get to your destination. To save money you can carpool with friends or work colleagues when possible.

Bicycles:

Numbers of cyclists are fast increasing as it is a cheap and environmentally friendly method of transport. There are now incentive schemes which businesses can run, making bikes cheaper for their employees who are going to use them to travel to work. The main disadvantage is being exposed to the elements on wet days.

Buses:

Buses are available in all cities, towns and most villages. They are ideal for those short journeys from one part of a town to another. Short journeys may take longer than expected on a bus due to the frequent stops and routes which cover a lot of the area to accommodate everyone. Buses are however a cheap method of transport, if you use the buses a lot there are a range of travel cards, passes and long-term tickets to help you save more money.

Trains:

Rail transport is used for both goods and people and is a popular method of public transport. Many towns have a train station but there are still a lot more than don’t which would make travelling by train difficult to get to some destinations and will require further

transportation by bus, car or taxi. Shopping around and buying your tickets in advance will help you save money which may make travelling by train more affordable than a car or even bus.

Airplanes:

Domestic travel by air in the UK, thanks to low-cost airlines is becoming increasingly popular with many, especially for business trips with lots of advantages making it a relatively simple type of transport to use. Aero planes can travel from one city to another in a matter of hours, much faster than bus, car or even train. The main problem many have is the location of the airports and needing to use an additional method of transport to get to and from the airport and your destination.

5.1.5 Vertical Farming

Figure 20 Vertical Farm

Vertical farming is the practice of producing food on vertically inclined surfaces. Instead of farming vegetables and other foods on a single level, such as in a field or a greenhouse, this method produces foods in vertically stacked layers commonly integrated into other structures like a skyscraper, shipping container or repurposed warehouse.

Using Controlled Environment Agriculture (CEA) technology, this modern idea uses indoor farming techniques. The artificial control of temperature, light, humidity, and gases makes producing foods and medicine indoor possible. In many ways, vertical farming is similar to greenhouses were metal reflectors and artificial lighting augment natural sunlight. The primary goal of vertical farming is maximizing crops output in a limited space. And, by using vertical farming we can grow different plants, fruits and vegetables in our house only.

There are four critical areas in understanding how vertical farming works:

1) Physical Layout
2) Lighting
3) Growing medium
4) Sustainability features

Firstly, the primary goal of vertical farming is producing more foods per square meter. To accomplish this goal, crops are cultivated in stacked layers in a tower life structure. Secondly, a perfect combination of natural and artificial lights is used to maintain the perfect light level in the room. Technologies such as rotating beds are used to improve lighting

efficiency. Thirdly, instead of soil, aeroponic, aquaponic or hydroponic growing mediums are used. Peat moss or coconut husks and similar non-soil mediums are very common in vertical farming. Finally, the vertical farming method uses various sustainability features to offset the energy cost of farming. In fact, vertical farming uses 95% less water.

Advantages of Vertical Farming:

- **Preparation for future:** By 2050, around 68% of the world population is expected to live in urban areas, and the growing population will lead to an increased demand for food.4 The efficient use of vertical farming may perhaps play a significant role in preparing for such a challenge.

- **Increased and Year-Round Crop Production**: Vertical farming allows us to produce more crops from the same square footage of growing area. In fact, 1 acre of an indoor area offers equivalent production to at least 4-6 acres of outdoor capacity. According to an independent estimate, a 30-story building with a basal area of 5 acres can potentially produce an equivalent of 2,400 acres of conventional horizontal farming.6 Additionally, year-round crop production is possible in a controlled indoor environment which is completely controlled by vertical farming technologies.

- **Less use of Water in cultivation**: Vertical farming allows us to produce crops with 70 to 95% less water than required for normal cultivation.

- **Not Affected by unfavourable Weather Conditions**: Crops in a field can be adversely affected by natural calamities such as torrential rains, cyclones, flooding or severe droughts—events which are becoming increasingly common as a result of global warming. Indoor vertical farms are less likely to feel the brunt of the unfavourable weather, providing greater certainty of harvest output throughout the year.

- **Increased Production of Organic crops**: As crops are produced in a well-controlled indoor environment without the use of chemical pesticides, vertical farming allows us to grow pesticide-free and organic crops.

- **Human and Environmentally Friendly**: Indoor vertical farming can significantly lessen the occupational hazards associated with traditional farming. Farmers are not exposed to hazards related to heavy farming equipment, diseases like malaria, poisonous chemicals and so on. As it does not disturb animals and trees inland areas, it is good for biodiversity as well.

Limitations of Vertical Farming:

- **No established Economics:** The financial feasibility of this new farming method remains uncertain. The financial situation is changing, however, as the industry matures and technologies improve.

- **Difficulties with Pollination:** Vertical farming takes place in a controlled environment without the presence of insects. As such, the pollination process needs to be done manually, which will be labour intensive and costly.

- **Labour Costs:** As high as energy costs are in vertical farming, labour costs can be even higher due to their concentration in urban centres where wages are higher, as well as the

need for more skilled labour. Automation in vertical farms, however, may lead to the need for fewer workers. Manual pollination may become one of the more labour-intensive functions in vertical farms.

- **Too much Dependency on Technology:** The development of better technologies can always increase efficiency and lessen costs. But the entire vertical farming is extremely dependent on various technologies for lighting, maintaining temperature, and humidity. Losing power for just a single day can prove very costly for a vertical farm. Many believe the technologies in use today are not ready for mass adoption.

5.1.6 Corrosion Mechanism, Prevention & Repair Measures of RCC Structure

➢ **Corrosion Mechanism**

Corrosion in the concrete is induced by the generation of the electrochemical potentials in following ways:

1. When two different metals are present in concrete, such as steel rebars, aluminium conduit pipes, or when significant variation exist in surface characteristics of the steel, formation of composition cell can occur.

2. Concentration cells may be formed near reinforcing steel because of the differences in the concentration of dissolved ions, such as alkalis and chlorides.

The following reactions occur at anode and cathode.

Anode: $Fe \rightarrow Fe^{2}+2e^{\wedge}-$

(Metallic iron)

Some parameters are essential to initiate corrosion. Presence of oxygen, humidity are the two important parameters without which corrosion is not possible. The rate of corrosion is slow if the amount of water or oxygen is limited. Presence of humidity, moisture and oxygen acts as catalyst for the corrosion to occur, forming more OH- thereby producing more rust components Fe (OH)-.

➢ **Prevention**

Corrosion control is usually handled in design codes in the form of minimum concrete cover, minimum grade of concrete, maximum allowable crack width, etc., when exposure conditions are particularly harsh, there is a need to apply special measures beyond the minimum provided in the design codes. These include both passive and active measures. The passive measures refer to the improvement of durability of concrete that includes the use of high-quality concretes produced by the incorporation of various chemical admixtures (e.g., plasticizers, superplasticizers, shrinkage reducing admixture corrosion inhibitors) and mineral admixtures. Active corrosion system, on the other hand, directly reduces the corrosion rate, which include cathodic protection and galvanization. Some of the commonly used corrosion control measures are summarized as follows

- Good quality concrete with low W/C ratio.

- Use of superplasticizers

- Provision of adequate concrete cover
- Use of pozzolans
- Use of stainless steel that produces a stable passivating film

➢ **Repair Measures**

Numerous repair options are available and new technologies continue to make an impact in the field of concrete repairs. The suitability and cost-effectiveness of repairs depends on the level of deterioration and specific conditions of the structure.

1. **Patch Repairs**
2. **Coating Systems**
3. **Migrating Corrosion inhibitors**
4. **Electrochemical Techniques**
5. **Cathodic Protection Systems**
6. **Demolition / Reconstruction**

5.1.7 Sewage Treatment Plant

Sewage is the waste generated from residential, institutional, commercial and industrial establishments. STP plant treats the sewage to make it fit for safe disposal, agricultural use or domestic use in toilets etc. Sewage usually contains a high quantity of organic and inorganic wastes. It is essential to treat sewage before it enters into any water body. If sewage, is allowed to enter the water sources without treatment, it will contaminate them; which is why it is essential to treat sewage properly before letting it into rivers or any other sources of water.

Sewage may include stormwater runoff or urban runoff. Sewerage systems capable of handling storm water are known as combined sewer systems. This design was common when urban sewerage systems were first developed, in the late 19th and early 20th centuries. Combined sewers require much larger and more expensive treatment facilities than sanitary systems. Heavy volumes of storm runoff may overwhelm the sewage treatment system, causing a spill or overflow. Sanitary sewers are typically much smaller than combined sewers, and they are not designed to transport stormwater. Backups of raw sewage can occur if excessive infiltration/inflow (dilution by stormwater and/or groundwater) is allowed into a sanitary sewer system. Communities that have urbanized in the mid-20th century or later generally have built separate systems for sewage (sanitary sewers) and stormwater, because precipitation causes widely varying flows, reducing sewage treatment plant efficiency.

As rainfall travels over roofs and the ground, it may pick up various contaminants including soil particles and other sediments, heavy metals, organic compounds, animal waste, and oil and grease. Some jurisdictions require stormwater to receive some level of treatment before being discharged directly into waterways. Examples of treatment processes used for stormwater include retention basins, wetlands, buried vaults with various kinds of media filters, and vortex separators (to remove coarse solids).

Industrial Effluent:

In highly regulated developed countries, industrial effluent usually receives at least pre-treatment if not full treatment at the factories themselves to reduce the pollutant load, before discharge to the sewer. This process is called industrial waste water treatment or pre-treatment. The same does not apply to many developing countries where industrial effluent is more likely to enter the sewer if it exists, or even the receiving water body, without pre-treatment.

Industrial wastewater may contain pollutants which cannot be removed by conventional sewage treatment. Also, variable flow of industrial waste associated with production cycles may upset the population dynamics of biological treatment units, such as the activated sludge process.

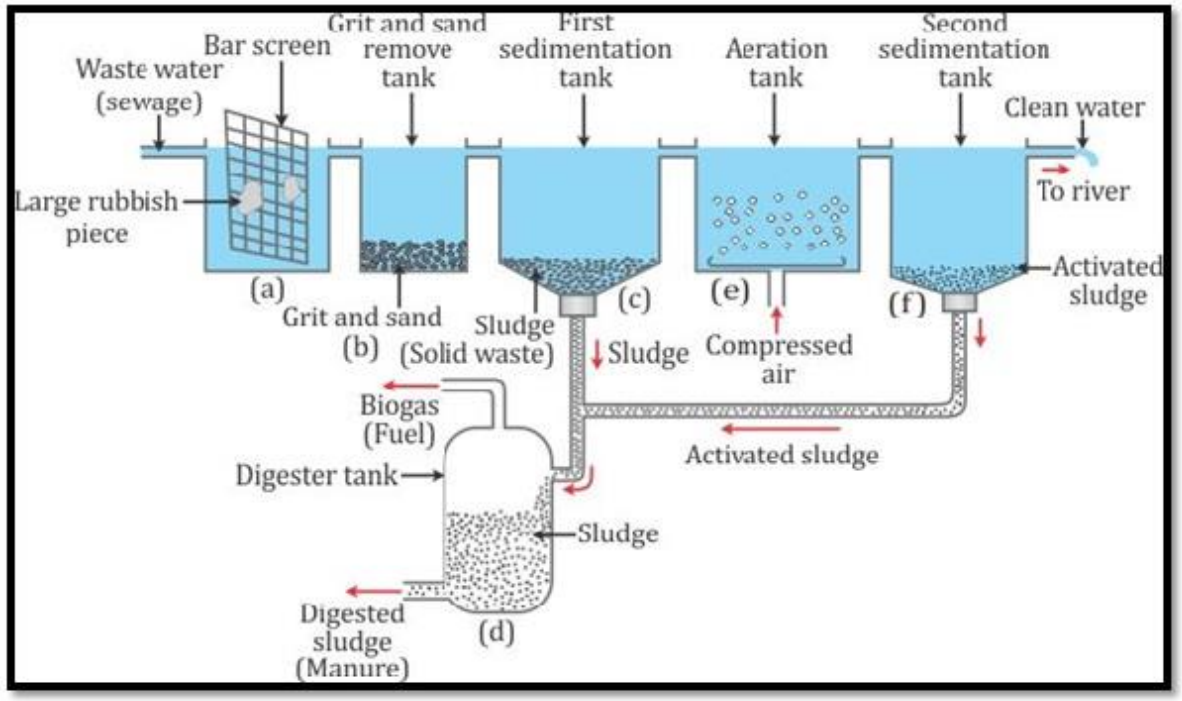


Figure 21 Sewage Treatment Plant Layout

Area in a STP Plant

- Pre-treatment

Pre-treatment removes all materials that can be easily collected from the raw sewage before they damage or clog the pumps and sewage lines of primary treatment clarifies. Objects commonly removed during pre-treatment include trash, tree limbs, and other large objects.

The influent in sewage water passes through a bar screen to remove all large objects like cans, rags, sticks, plastic packets etc. carried in the sewage stream. This is most commonly done with an automated mechanically raked bar screen in modern plants serving large populations, while in smaller or less modern plants, a manually cleaned screen may be used. The raking action of a mechanical bar screen is typically paced according to the accumulation on the bar screens and/or flow rate. The solids are collected and later disposed in a landfill, or incinerated. Bar screens or mesh screens of varying sizes may be used to optimize solids

removal. If gross solids are not removed, they become entrained in pipes and moving parts of the treatment plant, and can cause substantial damage and inefficiency in the process.

- Grit Removal

Grit consists of sand, gravel, cinders, and other heavy materials. It also includes organic matter such as eggshells, bone chips, seeds, and coffee grounds. Pre-treatment may include a sand or grit channel or chamber, where the velocity of the incoming sewage is adjusted to allow the settlement of sand and grit. Grit removal is necessary to (1) reduce formation of heavy deposits in aeration tanks, aerobic digesters, pipelines, channels, and conduits; (2) reduce the frequency of digester cleaning caused by excessive accumulations of grit; and (3) protect moving mechanical equipment from abrasion and accompanying abnormal wear. The removal of grit is essential for equipment with closely machined metal surfaces such as comminutors, fine screens, centrifuges, heat exchangers, and high pressure diaphragm pumps. Grit chambers come in 3 types: horizontal grit chambers, aerated grit chambers and vortex grit chambers. Vortex type grit chambers include mechanically induced vortex, hydraulically induced vortex, and multi-tray vortex separators. Given that traditionally, grit removal systems have been designed to remove clean inorganic particles that are greater than 0.210 millimetres (0.0083 in), most grit passes through the grit removal flows under normal conditions. During periods of high flow deposited grit is resuspended and the quantity of grit reaching the treatment plant increases substantially. It is, therefore important that the grit removal system not only operate efficiently during normal flow conditions but also under sustained peak flows when the greatest volume of grit reaches the plant.

- Flow Equalization

Clarifiers and mechanized secondary treatment are more efficient under uniform flow conditions. Equalization basins may be used for temporary storage of diurnal or wet-weather flow peaks. Basins provide a place to temporarily hold incoming sewage during plant maintenance and a means of diluting and distributing batch discharges of toxic or high-strength waste which might otherwise inhibit biological secondary treatment (including portable toilet waste, vehicle holding tanks, and septic tank pumpers). Flow equalization basins require variable discharge control, typically include provisions for bypass and cleaning, and may also include aerators. Cleaning may be easier if the basin is downstream of screening and grit removal.

- Fat and Grease Removal

In some larger plants, fat and grease are removed by passing the sewage through a small tank where skimmers collect the fat floating on the surface. Air blowers in the base of the tank may also be used to help recover the fat as a froth. Many plants, however, use primary clarifiers with mechanical surface skimmers for fat and grease removal.

- 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, channels, and conduits. 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. Meanwhile, 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 by indigenous and aquatic 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.

Secondary treatment is divided into two different treatment processes.

1. Aerobic Treatment

Aerobic wastewater treatment is a biological treatment that uses oxygen to break down organic matter and remove other pollutants like nitrogen and phosphorus. Generally, in the sewage treatment, aerobic treatment is performed. Aerobic treatment is usually used to polish industrial wastewater pre-treated by anaerobic processes. This ensures the wastewater is fully degraded and can be safely discharged in accordance with strict environmental regulations. Aerobic treatment processes are suitable for a range of industries such as food & beverage, chemical and municipal.

Aerobic treatment of wastewater is a stable, simple and efficient process that produces high-quality secondary effluent. The resulting sludge is odour-free and can be sold as excellent agricultural fertiliser. When combined with anaerobic treatment, aerobic treatment systems ensure complete contaminant and nutrient removal. This means your wastewater can be safely discharged without breaching stringent environmental regulations.

2. Anaerobic Treatment

Anaerobic treatment is a process where wastewater or material is broken down by micro-organisms without the aid of dissolved oxygen. However, anaerobic bacteria can and will use oxygen that is found in the oxides introduced into the system or they can obtain it from organic material within the wastewater. Anaerobic wastewater treatment is used to treat a variety of industrial effluent streams from agricultural, food and beverages, dairy, pulp and paper, and textile industries, as well as municipal sewage sludge and wastre water. Anaerobic technologies are typically deployed for streams with high concentrations of organic material (measured as high BOD, COD, or TSS), often prior to aerobic treatment. Anaerobic treatment is also used for specialized applications, such as treatment of waste streams with inorganics or chlorinated organics, and is well-suited for treating warm industrial wastewater.

The anaerobic wastewater treatment process consists of two stages: an acidification phase followed by a methane production phase, with both processes occurring in dynamic equilibrium. In the initial acid-forming phase, anaerobes break down complex organic compounds into simpler, short-chain volatile organic acids. The second phase, known as the methane-production phase, consists of two steps: acetogenesis, where anaerobes synthesize organic acids to form acetate, hydrogen gas, and carbon dioxide; and methanogenesis, where the anaerobic microorganisms then act upon these newly-formed molecules to form methane

gas and carbon dioxide. These by-products can be reclaimed for use as fuel, while the wastewater can be routed for further treatment and/or discharge.

- 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, electrodialysis, nitrification, and denitrification.

Treatment options in tertiary treatment depend upon the characteristics of effluent after secondary treatment and what kind of water is needed at the end of the treatment.

Energy Requirement

For conventional sewage treatment plants, around 30 percent of the annual operating costs is usually required for energy. The energy requirements vary with type of treatment process as well as wastewater load. For conventional sewage treatment plants, around 30 percent of the annual operating costs is usually required for energy. The energy requirements vary with type of treatment process as well as wastewater load. For example, constructed wetlands have a lower energy requirement than activated sludge plants, as less energy is required for the aeration step. Sewage treatment plants that produce biogas in their sewage sludge treatment process with anaerobic digestion can produce enough energy to meet most of the energy needs of the sewage treatment plant itself sludge For example, constructed wetlands have a lower energy requirement than active plants, as less energy is required for the aeration step. Sewage treatment plants that produce biogas in their sewage treatment sludge process with anaerobic digestion can produce enough energy to meet most of the energy needs of the sewage treatment plant itself.

In conventional secondary treatment processes, most of the electricity is used for aeration, pumping systems and equipment for the dewatering and drying of sewage sludge.

Sludge treatment and disposal

The sludges accumulated in a wastewater treatment process must be treated and disposed of in a safe and effective manner. The purpose of digestion is to reduce the amount of organic matter and the number of disease-causing microorganism present in the solids. The most common treatment options include anaerobic digestion, aerobic digestion, and composting. Incineration is also used, albeit to a much lesser degree. The use of a green approach, such as phytoremediation, has been recently proposed as a valuable tool to improve sewage sludge contaminated by trace elements and persistent organic pollutants.

Sludge treatment depends on the number of solids generated and other site-specific conditions. Composting is most often applied to small-scale plants with aerobic digestion for mid-sized operations, and anaerobic digestion for the larger-scale operations. The sludge is sometimes passed through a so-called pre-thickener which de-waters the sludge. Types of pre-thickeners include centrifugal sludge thickeners, rotary drum sludge thickeners and belt filter presses. Dewatered sludge may be incinerated or transported offsite for disposal in a landfill or use as an agricultural soil amendment.

Biological Nutrient Removal

Biological nutrient removal (BNR) is regarded by some as a type of secondary treatment process, and by others as a tertiary (or "advanced") treatment process. Wastewater may contain high levels of the nutrient's nitrogen and phosphorous. Excessive release to the environment can lead to a build-up of nutrients, called eutrophication, which can in turn encourage the overgrowth of weeds, algae, and cyanobacteria (blue-green algae). This may cause an algal bloom, a rapid growth in the population of algae. The algae numbers are unsustainable and eventually most of them die. The decomposition of the algae by bacteria uses up so much of the oxygen in the water that most or all of the animals die, which creates more organic matter for the bacteria to decompose. In addition to causing deoxygenation, some algal species produce toxins that contaminate drinking water supplies. Different treatment processes are required to remove nitrogen and phosphorus.

Nitrogen Removal

Nitrogen is removed through the biological oxidation of nitrogen from ammonia to nitrate (nitrification), followed by denitrification, the reduction of nitrate to nitrogen gas. Nitrogen gas is released to the atmosphere and thus removed from the water. Nitrification itself is a two-step aerobic process, each step facilitated by a different type of bacteria. The oxidation of ammonia (NH3) to nitrate (NO2-) is most often facilitated by Nitrosomonas spp. ("nitroso" referring to formation of a nitroso functional group). Nitrite oxidation to nitrate (NO3-), through traditionally believed to be facilitated by Nitrobacter spp. (nitro referring the formation of a nitro functional group), is now known to be facilitated in the environment almost exclusively by Nitrospira spp.

Denitrification requires anoxic conditions to encourage the appropriate biological communities to form. It is facilitated by a wide diversity of bacteria. Sand filters, lagooning and reed beds can all be used to reduce nitrogen, but the activated sludge process (if designed well) can do the job the most easily. Since denitrification is the reduction of nitrate to dinitrogen (molecular nitrogen) gas, an electron donor is needed. This can be, depending on the waste water, organic matter (from faeces), sulphide, or an added donor like methanol. The sludge in the anoxic tanks (denitrification tanks) must be mixed well (mixture of recirculated mixed liquor, return activated sludge [RAS], and raw influent) e.g., by using submersible mixer in order to achieve the desired denitrification.

Costing and estimation for planning and designing of a decentralised wastewater treatment plant

Decentralised wastewater treatment plant is a site-specific system. There are different components of the anaerobic baffled reactor, planted fitter, system settler and polishing pond which are planned and designed according to generated wastewater treatment requirement. Average water consumption for domestic usage in India is 135 Lpcd. 80% of the water which is used or consumed for the domestic purpose comes out of the waste water. An on-site wastewater treatment plant like DWWT can be installed to treat and recycle this wastewater in order to close the loop. The capacity of the system may vary from 1KLD to 100 KLD. For instance, DWWT system at CSE is designed for the capacity of 8KLD to treat and reuse wastewater which is generated by the staff population is 150-200.

Broadly, planning and designing, implementation and operation and maintenance activities comprise of 25%, 60% and 15% respectively of the total cost incurred. Parameters

which are considered while planning and designing DWWT system are land requirement, installation and operation and planning.

- **Land Requirement**

Depending on the total volume, total area of the land required to install different units of DWWT can be calculated. This is influenced by the nature of wastewater and depth of the unit tanks.

Settler: 0.5 m^2/m^3 daily flow

Anaerobic baffled reactor: 1 m^2/m^3 daily flow

Constructed wetland: 30 m^2/m^3 daily flow

Anaerobic ponds: 4 m^2/m^3 daily flow

Facultative aerobic ponds: 25 m^2/m^3 daily flow

These figures are approximate values, also the area requirements increase with the strength of the wastewater. Structures like settler and improved septic tank or anaerobic baffled reactor are underground hence leading to no wastage of open area.

- **Installation**

This includes activities like excavation, plastering, brick work, plumbing, flooring etc. along with the cost of construction material. The different items which are required for construction are walls of solid cement blocks with outside and inside plastering for water tightness, PCC base, PVC pipes, baffle walls, gravel filter media, RCC slab, perforated slabs, vent pipes and plants/reeds like cana, cattails, bulrushes, etc. The cost component pertaining to the construction and installation varies from cities to cities. Typically, for installation of a plant of 8-10 KLD capacity would cost around Rs. 2.5-3 lakhs.

- **Operation & Maintenance**

Decentralised wastewater treatment systems are low-cost on-site treatment approach but continuous operation and maintenance cost for the plant is generally in the range of Rs. 3000-5000. Regular de-sludging of the settler and baffled reactor is required in the span of 1-3 years in order to meet the effluent standards. Replacement of filter media is also necessary when treatment efficiency goes down. The normal period of cleaning the gravel filter media is the interval of 8-10 years.

As the capacity increases, up-to some level DEWATS is effective but for larger capacity multi-units of DWWT system is recommended of smaller manageable sizes limit to 100 KLD. Average cost of construction is Rs. 25,000-30,000 per KL flow per day approximately.

Table 6 Cost summary of DWWT components for 1KLD plant

Components	Surface area requirement (sqm/KL)	Capacity (Cum/KL)	% of Total Cost (Approximate)
Settler	0.5	1	10
Reactor	1	1.73 (inner); 3 (outer)	40
Planted filter	5	4	30
Storage	-	1	10
Polishing Pond	1	0.88	5
Misc	-	-	5

Chapter. 6 Swachh Bharat Abhiyan (Clean India)

Swacch Bharat Abhiyan is a country-wide campaign initiated by the GOI in 2014 to eliminate open defecation and improve solid waste management. Phase-1 of the mission lasted till October-2019. Phase 2 will be implemented between 2020-21 and 2024-24.

Swachh Bharat Abhiyan (SBA) (or Swachh Bharat Mission (SBM) or Clean India Mission is a campaign in India that aims to clean up the streets, roads and infrastructure of India's cities, smaller towns, and rural areas. The objectives of Swachh Bharat include eliminating open defecation through the construction of household-owned and community-owned toilets and establishing an accountable mechanism of monitoring toilet use. Run by the Government of India, the mission aims to achieve an OpenDefecation Free (ODF) India by 2 October 2019, the 150th anniversary of the birth of Mahatma Gandhi, by constructing 12 million toilets in rural India at a projected cost of Rs. 1.96 lakh crore.

The core objective of the first phase 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, toilets and public toilets. For improving solid waste management, cities were encouraged to prepare detailed projects reports that are bankable and have financial model. The second phase o the other hand focuses on sustaining gains of the first phase and improving management of the solid and liquid wastes.

Swacch Bharat Abhiyan is expected to cost over Rs. 620 billion. The government provides an incentive of Rs. 12,000 for each toilet constructed by a rural family. An amount of Rs. 90 billion was allocated for the mission in the 2016 Union budget of India. The World Bank provided a 1.5 billion USD loan and 25 million USD in technical assistance in 2016 for the Swacch Bharat Mission to support India’s Universal sanitation initiation. The program has also received technical support from World Bank, corporations as part of corporate social responsibility initiatives, and by state governments under Sarva Shiksha Abhiyan and Rashtriya Madhyamik Shiksha Abhiyan schemes.

Current Situation of cleanliness in village:

- In our allocated village, there is less cleanliness.
- When the reason asked by us to Sarpanch she told us that they are not getting required funds from government from which they can pay salaries to sweepers.
- They clean whole village only on festivals like Navratri, Diwali, etc.
- And also, there is no solid waste management system in village or no garbage site, people just throw their garbage in their farm.

Actual Activities done by students:

Figure 23 Safai Abhiyan At Dahemi Village

Figure 22 Safai Abhiyan with all groups

Figure 25 Cleaning Dahemi Village

Figure 24 Cleaning Pamol Village

Chapter. 7 Village Condition due to Covid-19

7.1 Taken steps in allocated village related to existing situation with photograph

In our allocated village, the panchayat has sprayed the sanitizer in whole village 5 to 6 time. Wearing the mask when in public was also made mandatory by the panchayat and on not doing so, panchayat has decided to fine such person with Rs. 100/-.

7.2 Activities Done by Students for allocated village with photograph

- We visited our allocated village and explained the villagers about the ongoing pandemic of Covid-19.
- We distributed masks in the village to create awareness among villagers to wear masks and be safe.

Figure 29 Distribution of Mask by Krunal

Figure 26 Distribution of Mask by Zeel

Figure 28 Distributing Mask to VC of Dairy

Figure 27 Distributing Mask to Chairman of Dairy

Chapter. 8 Sustainable Design Planning Proposal (Prototype Design) Part-I (Scenario / Existing Situation / Proposed Design in AutoCAD / Recapitulation Sheet / Measurement Sheet / Abstract Sheet / Sustainability of Proposal / Any other software)

8.1 Design Proposals

8.1.1 Design Proposal of Public Library (With Plan, Elevation, Section and Costing)

As we know that there is nothing in this world without appropriate knowledge, a library is a very important thing any place should have. But in our allocated village there is no public library for knowledge gaining purpose. So, we decided to design a public library. And the approximate cost for the construction of a public library is **INR 4,85,691 /-**

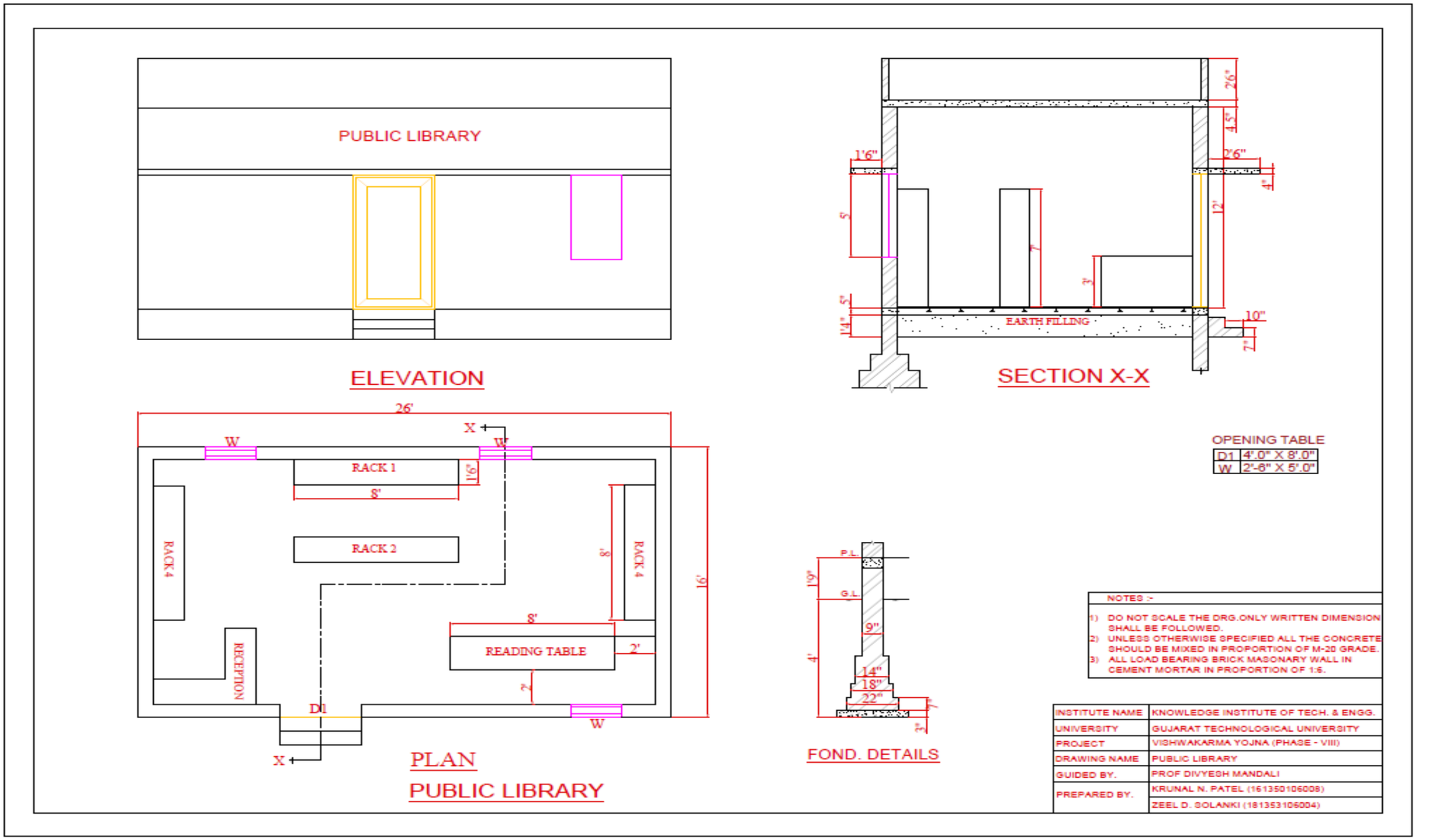


Figure 30 Plan. Elevation and Section of Public Library

Table 7 Measurement Sheet of Public Library

Item No.	Description of item	No.	L (feet inches)	B (feet inches)	H (feet inches)	Quantity
1	**Excavation in foundation**					
	Long Walls:					
	L = 25’3” + 3’ = 28’3”					
	H = 4’	2	28’3”	3’	4’	678 cft
	Short Wall:					
	L = 15’3” – 3’ = 12’3”					
	H = 4’	2	12’3”	3’	4’	294 cft
	Total:					**972 cft**
2	**PCC in foundation**					
	Long wall:	2	28’3”	3’	3”	42.38 cft
	Short wall:	2	12’3”	3’	3”	18.38 cft
	Total:					**60.76 cft**
3	**Brick Masonry up to plinth level**					
	Long Walls:					
	First Step: L= 28’3” – 14” = 27’1”	2	27’1”	22”	7”	57.92 cft
	Second Step: L= 27’1” – 4” = 26’9”	2	26’9”	18”	7”	46.82 cft
	Third Step: L= 26’9” – 4” = 26’5”	2	26’5”	14”	14”	71.92 cft
	Fourth Step: L=26’5” – 5” = 26’					
	H = 5’9” – (28” + 8”) = 2’9”	2	26’	9”	2’9”	107.26 cft
	Short walls:					
	First step: L= 12’3” + 14” = 13’5”	2	13’5”	22”	7”	28.7 cft
	Second Step: L= 13’5” + 4” = 13’9”	2	13’9”	18”	7”	24.06 cft

	Third Step L = 13'9" + 4" = 14'1"	2	14'1"	14"	14"	38.34 cft
	Fourth Step L = 14'1" + 5" = 14'6"	2	14'6"	9"	2'9"	59.82 cft
	Total:					**434.84 cft**
4	**RCC Plinth Beam:**					
	Long Wall:	2	26'	9"	5"	16.26 cft
	Short Wall:	2	14'6"	9"	5"	9.06 cft
	Total:					**25.32 cft**
5	**BBCC at plinth level:**	1	24'6"	14'6"	5"	**148.02 cft**
6	**Steps of brickwork:**					
	1st step:	1	4'	10"	7"	1.94 cft
	2nd step:	1	4'	10"	14"	3.89 cft
	Total:					**5.83 cft**
7	**Brick Masonry above plinth up to slab:**					
	Long Wall:	2	26'	9"	12'	468 cft
	Short Wall:	2	14'6"	9"	12'	261 cft
	Total:					**729 cft**
a)	**Deduction for doors and windows:**					
	D1	1	4'	9"	8'	24 cft
	W	3	2'6"	9"	5'	28.14 cft
	Total Deduction (-)					**52.14 cft**
b)	**Deduction for lintels:**					
	Long Walls:	2	26'	9"	4"	13 cft
	Short Walls:	2	14'6"	9"	4"	7.26 cft
	Total Deduction (-)					**20.26 cft**
	Net Quantity of masonry above plinth up to slab:					
	729 – 52.14 – 20.26					**656.6 cft**
8	**Masonry for parapet:**					
	Long wall:	2	26'	4.5"	2'6"	48.76 cft
	Short wall:	2	14'6"	4.5"	2'6"	27.18 cft

	Total:					**75.94 cft**
9	**RCC lintel beams:**					
	Long Walls:	2	26’	9”	4”	13 cft
	Short Walls:	2	14’6”	9”	4”	7.26 cft
	Total:					**20.26 cft**
10	**RCC Chajja:**					
	Front Side	1	26’	2’6”	4”	21.67 cft
	Window	2	3’4”	1’6”	4”	3.34 cft
	Total:					**25.01 cft**
11	**RCC Slab**	1	26’	16’	4.5”	**156 cft**
12	**Smooth plaster inside rooms and ceiling:**					
	Plaster for walls:					
	Long Walls	2	24’6”		12’	588 sqft
	Short Walls	2	14’6”		12’	348 sqft
	Ceiling Plaster:	1	24’6”	14’6”		355.25 sqft
	Total:					**1291.25 sqft**
	Deduction for doors/ windows:					
	D1	1/2	4’		8’	16 sqft
	W	3/2	2’6”		8’	30 sqft
	Total Deduction (-)					**46 sqft**
	Net Quantity:					
	1291.25 – 46					**1245.25 sqft**
13	**Exterior Plaster:**					
	Long Walls:	2	26’		13’9”	715 sqft
	Short Walls:	2	16’		13’9”	440 sqft
	Total:					**1155 sqft**
	Deduction for doors and windows: (-)					

	D1	1/2	4’		8’	16 sqft
	W	3/2	2’6”		5’	18.75 sqft
	Total:					**34.75 sqft**
	Net Quantity:					
	1155 – 34.75					**1120.25 sqft**
14	**Earth filling from G.L. to P.L.:**	1	24’6”	14’6”	1’4”	**468.93 cft**
15	**Earth filling up to G.L.:**					
	Total excavation – PCC in foundation – Masonry in foundation = 972 – 60.76 – 434.84					**476.4 cft**

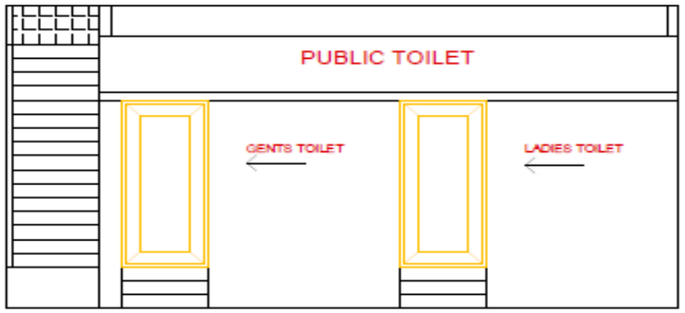
Table 8 Estimated Costing of Public Library

Sr. No.	Description of Item	Quantity	Unit	Rate	Per	Estimated Cost
1	Excavation for foundation	972	Cft	5	Cft	4860
2	PCC in foundation	60.76	Cft	40	cft	2430
3	Brick Masonry upto Plinth	434.84	cft	150	cft	65226
4	Earth filling	476.4	Cft	10	Cft	4764
5	Earth filling upto plinth	468.93	cft	10	cft	4690
6	BBCC at Plinth	148.02	Cft	30	Cft	4441
7	Brick Masonry above Plinth	732.54	Cft	150	cft	`109881
8	RCC Work	226.59	Cft	450	Cft	101966
9	Plaster Work	2400.25	Sqft	35	Sqft	84009
10	Colouring	2005	Sqft	10	Sqft	20050
11	Flooring	416	Sqft	80	Sqft	33280
		Total materials and labour cost				435597
		1.5 % Water Charges				6533.95
		10% Contractor Profit				43559.7

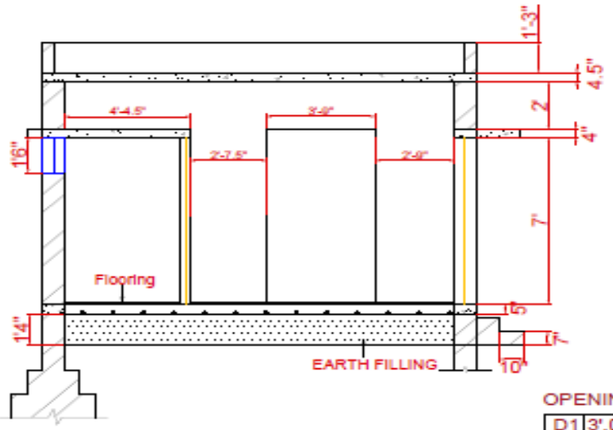
		Total Estimation	485690.65
		Say Total	Rs. 4,85,691/-

8.1.2 Design Proposal of Public Toilet (With Plan, Elevation, Section and Costing)

In our village the public toilet is in very bad and dirty condition, which cannot be used. And public toilet is an important thing any village should have. So, we decided to design a public toilet. The estimated cost of the public toilet is **INR 4,91,100 /-.**



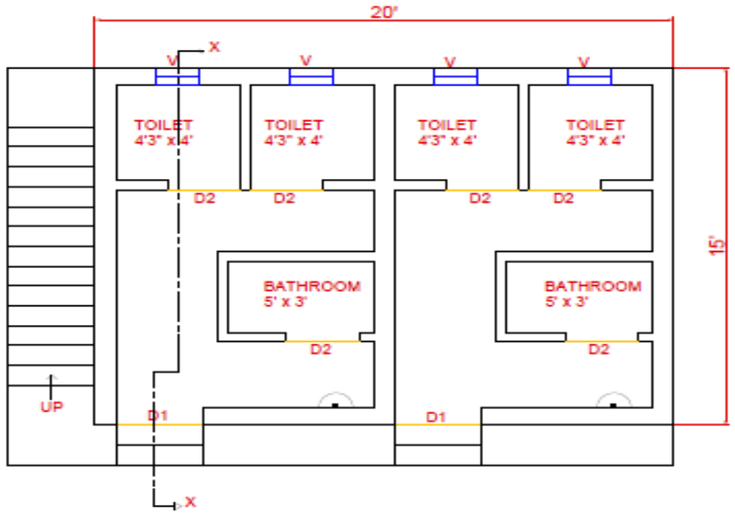
ELEVATION



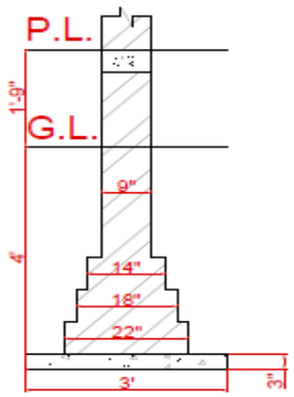
SECTION X-X

OPENING TABLE

D1	3'.0" X 7'.0"
D2	2'.6" X 7'.0"
V	1'-6" X 1'-6"



PLAN
PUBLIC TOILET



FOUND. DETAILS

NOTES :-

1) DO NOT SCALE THE DRG.ONLY WRITTEN DIMENSION SHALL BE FOLLOWED.
2) UNLESS OTHERWISE SPECIFIED ALL THE CONCRETE SHOULD BE MIXED IN PROPORTION OF M-20 GRADE.
3) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	PUBLIC LIBRARY
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KRUNAL N. PATEL (161350106008)
	ZEEL D. SOLANKI (161353106004)

Figure 31 Plan, Elevation and Section of Public Toilet

Table 9 Measurement Sheet of Public Toilet

Item No.	Description of item	No.	L (feet inches)	B (feet inches)	H (feet inches)	Quantity
1	**Excavation in foundation**					
	Long Walls:					
	L = 19’3” + 3’ = 22’3”					
	H = 4’	2	22’3”	3’	4’	534 cft
	Short Wall:					
	L = 14’3” – 3’ = 11’3”					
	H = 4’	3	11’3”	3’	4’	405 cft
	Total:					**939 cft**
2	**PCC in foundation**					
	Long wall:	2	22’3”	3’	3”	33.38 cft
	Short wall:	3	11’3”	3’	3”	25.32 cft
	Total:					**58.70 cft**
3	**Brick Masonry up to plinth level**					
	Long Walls:					
	First Step: L= 22’3” – 14” = 21’1”	2	21’1”	22”	7”	45.1 cft
	Second Step: L= 21’1” – 4” = 20’9”	2	20’9”	18”	7”	36.32 cft
	Third Step: L= 20’9” – 4” = 20’5”	2	20’5”	14”	7”	27.78 cft
	Fourth Step: L=20’5” – 5” = 20’					
	H = 5’9” – (21” + 8”) = 3’4”	2	20’	9”	3’4”	100 cft
	Short walls:					
	First step: L= 11’3” + 14” = 12’5”	3	12’5”	22”	7”	39.84 cft

	Second Step: L= 12'5" + 4" = 12'9"	3	12'9"	18"	7"	33.48 cft
	Third Step L = 12'9" + 4" = 13'1"	3	13'1"	14"	7"	26.7 cft
	Fourth Step L = 13'1" + 5" = 13'6"	3	13'6"	9"	3'4"	101.25 cft
	Total:					**410.47 cft**
4	**RCC Plinth Beam:**					
	Long Wall:	2	20'	9"	5"	12.5 cft
	Short Wall:	3	13'6"	9"	5"	12.66 cft
	Partition Wall:					
	L= (4'9" x 4) + (4'5" x 2) + (5'4.5" x 4) + (3' x 2) = 55.36'	1	55.36'	4.5"	5"	8.56 cft
	Total:					**33.72 cft**
5	**BBCC at Plinth Level:**					
	Toilet	4	4'3"	4'	5"	28.32 cft
	Bathroom	2	5'	3'	5"	12.5 cft
	Passage 1	4	8'10.5"	2'8 ¼"	5"	39.76 cft
	Passage 2	2	3'6"	3'9"	5"	10.94 cft
	Total:					**91.25 cft**
5	**Steps of brickwork:**					
	1st step:	2	3'	10"	7"	2.92 cft
	2nd step:	2	3'	10"	14"	5.84 cft
	Total:					**8.76 cft**
6	**Brick Masonry above plinth up to slab:**					
	Long Wall:	2	20'	9"	9'4"	280 cft
	Short Wall:	3	13'6"	9"	9'4"	283.5 cft
	Partition Walls:	1	55.36'	4.5"	7'	145.32 cft
	Total:					**708.82 cft**
a)	**Deduction for doors and ventilation:**					
	D1	2	3'	9"	7'	31.5 cft

	D2	6	2’6”	4.5”	7’	39.36 cft
	V	4	1’6”	9”	1’6”	6.76 cft
	Total Deduction (-)					**77.62 cft**
b)	**Deduction for lintels:**					
	Long Walls:	2	20’	9”	4”	10 cft
	Short Walls:	3	13’6”	9”	4”	10.14 cft
	Partition Walls:	1	55.36’	4.5”	4”	8.56 cft
	Total Deduction (-)					**28.7 cft**
	Net Quantity of masonry above plinth up to slab:					
	708.2 – 77.62 – 28.7					**601.88 cft**
7	**Masonry for parapet:**					
	Long wall:	2	20’	4.5”	1’3”	18.76 cft
	Short wall:	2	13’6”	4.5”	1’3”	12.66 cft
	Total:					**31.42 cft**
8	**RCC lintel beams:**					
	Long Walls:	2	20’	9”	4”	10 cft
	Short Walls:	3	13’6”	9”	4”	10.14 cft
	Partition Walls:	1	55.36’	4.5”	4”	8.56 cft
	Total:					**28.7 cft**
9	**RCC Chajja:**					
	Front Side	1	20’	1’6”	4”	10 cft
	Ventilation	4	2’4”	6”	4”	1.56 cft
	Total:					**11.56 cft**
10	**RCC Slab**	1	20’	15’	4.5”	**112.5 cft**
11	**Smooth plaster inside rooms and ceiling:**					
	Plaster for walls:					
	Toilet	8	4’3”		7’	238 sqft
		8	4’		7’	224 sqft
	Bathroom	4	5’		7’	140 sqft

		4	3’		7’	84 sqft
	Outside of Partition	2	23’4.5”		7’	327.26 sqft
	Main wall	2	14’6”		9’4”	270.66 sqft
	Ceiling Plaster:					
	Toilet	4	4’3”	4’		68 sqft
	Bathroom	2	5’	3’		30 sqft
	Remaining	2	8’10.5”	13’6”		239.62 sqft
	Total:					**1621.54 sqft**
	Deduction for doors/ ventilation:					
	D1	2/2	3’		7’	21 sqft
	D2	8/2	2’6”		7’	70 sqft
	Total Deduction (-)					**91 sqft**
	Net Quantity:					
	1689.54 – 91					**1598.54 sqft**
12	**Exterior Plaster:**					
	Long Walls:	2	20’		11’1”	443.34 sqft
	Short Walls:	2	15’		11’1”	332.5 sqft
	Total:					**775.84 sqft**
	Deduction for doors: (-)	2/2	3’		7’	**21 sqft**
	Net Quantity:					
	775.84 – 21					**754.84 sqft**
13	**Earth filling from G.L. to P.L.:**	1	18’6”	13’6”	1’4”	**333 cft**
14	**Earth filling up to G.L.:**					
	Total excavation – PCC in foundation – Masonry in					**469.83 cft**

	foundation = 939 – 58.70 – 410.47					

Table 10 Estimated Costing of Public Toilet

Sr. No.	Description of Item	Quantity	Unit	Rate	Per	Estimated Cost
1	Excavation for foundation	939	Cft	5	Cft	4695
2	PCC in foundation	58.70	Cft	40	cft	2348
3	Brick Masonry upto Plinth	410.47	cft	150	cft	61500
4	Earth filling	469.83	Cft	10	Cft	4698.3
5	Earth filling upto plinth	333	cft	10	cft	3330
6	BBCC at Plinth	91.25	Cft	30	Cft	27377.5
7	Brick Masonry above Plinth	642.06	Cft	150	cft	96309
8	RCC Work	186.48	Cft	450	Cft	83916
9	Plaster Work	2353.38	Sqft	35	Sqft	82368.3
10	Colouring	2353.38	Sqft	10	Sqft	23533.8
11	Flooring	219.66	Sqft	80	Sqft	17572.8
12	Sanitation item (with fitting)	6	Nos.	2500	Nos.	15000
13	Water tank (1000 Litres)	1	Nos.	9800	Nos.	9800
14	M.S. Stair	1	Nos.	8000	Nos.	8000
		Total materials and labour cost				440448.7
		1.5 % Water Charges				6606.7
		10% Contractor Profit				44044.9
		Total Estimation				491100.3
		Say Total				Rs. 4,91,100/-

8.1.3 Design Proposal of WBM Road

There is a road in our village of about 1 km length which is broken and damaged. All other roads in the village are in well condition. So, we decided to design that 1 km length WBM road. The approximate cost for the construction of the road is **INR 11,62,000 /-.**

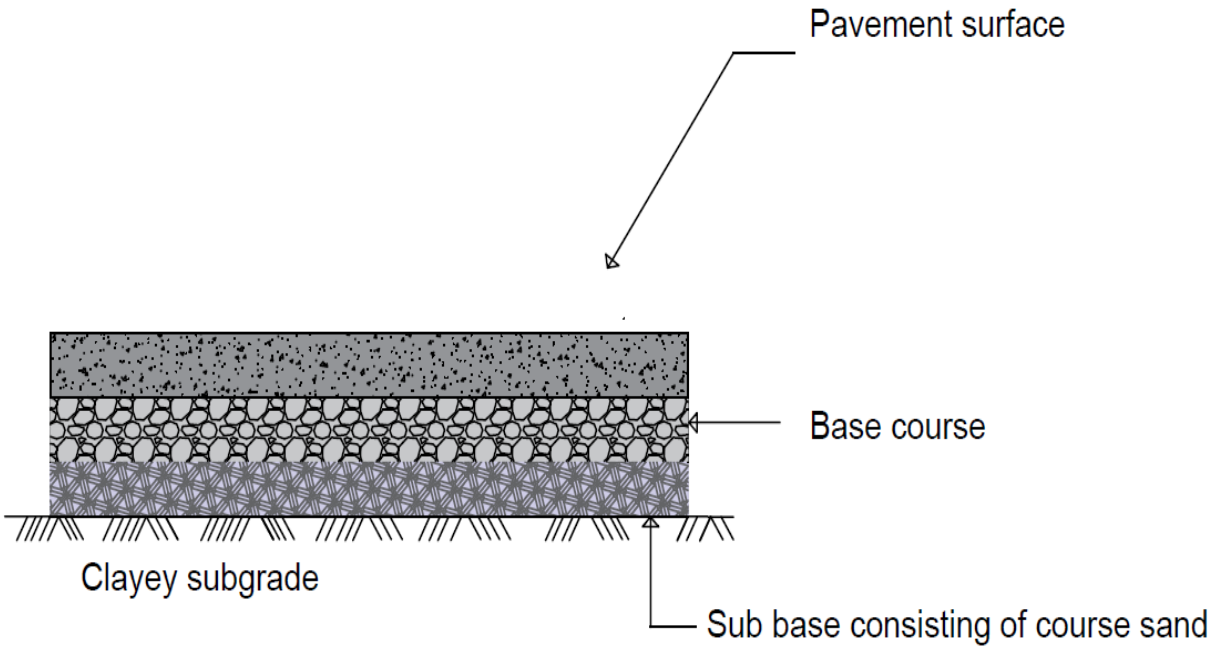


Figure 32 C/S of WBM Road

Table 11 Measurement Sheet of WBM Road

Sr. No.	Description	Nos.	L(m)	B(m)	H(m)	Quantity
1.	Preparing sub grade	1	1000	4.5	0.01	45
2.	Preparing base course	1	1000	4.2	0.135	567
3.	Preparing wearing course	1	1000	3.9	0.115	448

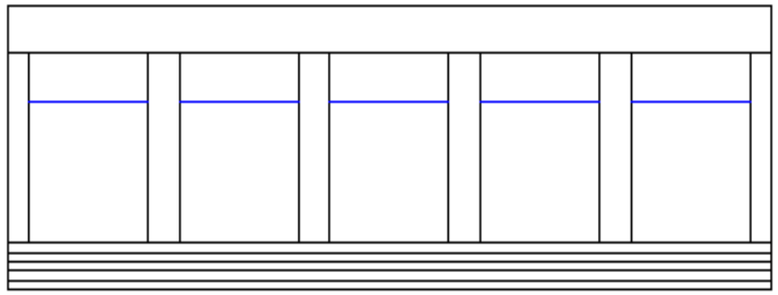
Table 12 Estimated Costing of WBM Road

Sr. No.	Description	Quantity	Rate (Rs.)	Per	Estimated Cost (Rs.)
1	Preparing Sub Grade	45	1000	m^3	45000
2	Preparing Base Course	567	850	m^3	481950
3	Preparing Wearing Course	448	1150	m^3	515200
		Total Materials and Labours Cost			1042150

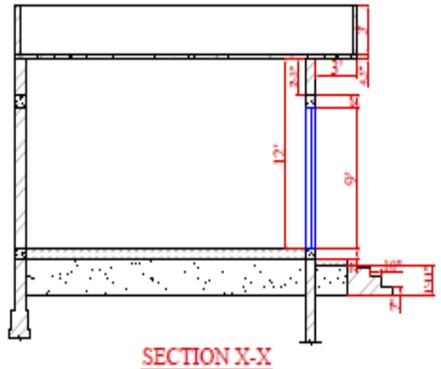
		1.5% Water Charges	15632.25
		10% Contractor's Profit	104215
		Total Estimated Cost	1161997.25
		Say Total	Rs. 11,62,000 /-

8.1.4 Design Proposal of Market Yard (With Plan, Elevation, Section and Costing)

There is no market yard in our allocated village Dahemi, for the purpose of business. So, many shopkeepers have made temporary shops on a panchayat's land. Therefore, Sarpanch requested us to design a market yard building there so that panchayat can earn revenue from rent and tax and also, shopkeepers can do their business properly. The approximate cost for the construction of the market yard is **INR 13,96,774/-.**



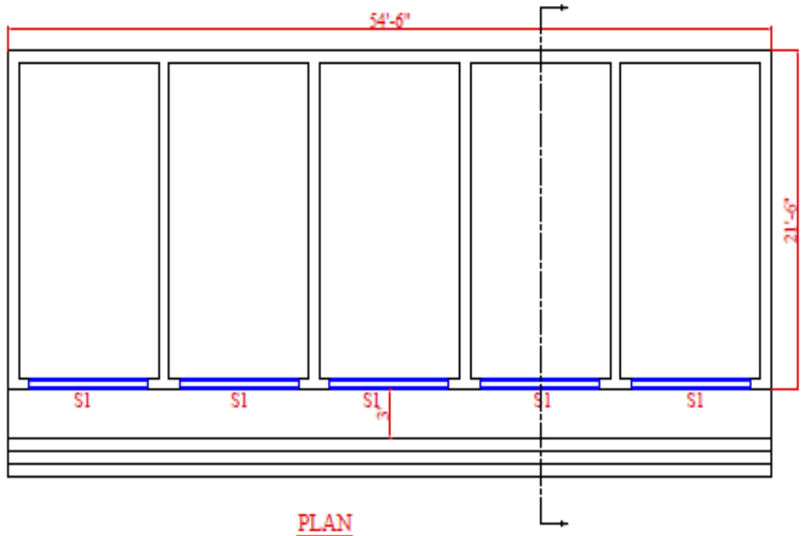
ELEVATION



SECTION X-X

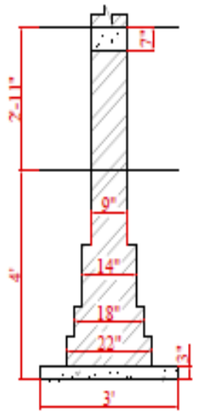
OPENING TABLE

S1	8'-6" X 9'.0"



PLAN

MARKET YARD



FOND. DETAILS

NOTES :-

1) DO NOT SCALE THE DRG.ONLY WRITTEN DIMENSION SHALL BE FOLLOWED.
2) UNLESS OTHERWISE SPECIFIED ALL THE CONCRETE SHOULD BE MIXED IN PROPORTION OF M-20 GRADE.
3) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	MARKET YARD
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KRUNAL N. PATEL (161350106008)
	ZEEL D. SOLANKI (181353106004)

Figure 33 Plan, Elevation and Section of Market Yard

Table 13 Measurement Sheet of Market Yard

Item No.	Description of item	No.	L (feet inches)	B (feet inches)	H (feet inches)	Quantity
1	**Excavation in foundation**					
	Long Walls:					
	L = 53’9” + 3’ = 56’9”					
	H = 4’	2	56’9”	3’	4’	1362 cft
	Short Wall:					
	L = 20’9” – 3’ = 17’9”					
	H = 4’	6	17’9”	3’	4’	1278 cft
	Total:					**2640 cft**
2	**PCC in foundation**					
	Long wall:	2	56’9”	3’	3”	85.13 cft
	Short wall:	6	17’9”	3’	3”	79.88 cft
	Total:					**165.01 cft**
3	**Brick Masonry up to plinth level**					
	Long Walls:					
	First Step: L= 56’9” – 14” = 55’7”	2	55’7”	22”	7”	118.88 cft
	Second Step: L= 55’7” – 4” = 55’3”	2	55’3”	18”	7”	96.68 cft
	Third Step: L= 55’3” – 4” = 54’11”	2	54’11”	14”	14”	149.5 cft
	Fourth Step: L=54’11” – 5” = 54’6”					
	H = 6’11” – (28” + 10”) = 3’9”	2	54’6”	9”	3’9”	306.56 cft
	Short walls:					
	First step: L= 17’9” + 14” = 18’11”	6	18’11”	22”	7”	121.38 cft
	Second Step: L= 18’11” + 4” = 19’3”	6	19’3”	18”	7”	101.04 cft

	Third Step L = 19'3" + 4" = 19'7"	6	19'7"	14"	14"	159.96 cft
	Fourth Step L = 19'7" + 5" = 20'	6	20'	9"	3'9"	337.5 cft
	Total:					**1391.5 cft**
4	**RCC Plinth Beam:**					
	Long Wall:	2	54'6"	9"	7"	47.42 cft
	Short Wall:	6	20'	9"	7"	52.2 cft
	Total:					**99.62 cft**
5	**Steps of brickwork:**					
	1st step:	1	54'6"	10"	7"	26.49 cft
	2nd step:	1	54'6"	10"	14"	52.99cft
	3rd step:	1	54'6"	10"	21"	79.48 cft
	4th step:	1	54'6"	10"	28"	105.97 cft
	Total:					**264.93 cft**
6	**Brick Masonry above plinth up to slab:**					
	Long Wall:	2	54'6"	9"	12'	981 cft
	Short Wall:	6	20'	9"	12'	1080 cft
	Total:					**2061 cft**
a)	**Deduction for shutters:**					
	S1	5	8'6"	9"	9'	286.88 cft
	Total Deduction (-)					**286.88 cft**
b)	**Deduction for lintels:**					
	Long Walls:	2	54'6"	9"	9"	61.31 cft
	Short Walls:	6	20'	9"	9"	67.5 cft
	Total Deduction (-)					**128.81 cft**

c)	**Deduction for cantilever beams:**					
	B1	6	4’6”	9”	9”	15.19 cft
	Total Deduction (-)					**15.19 cft**
	Net Quantity of masonry above plinth up to slab:					
	2061 – 286.88 – 128.81 – 15.19=					**1630.12 cft**
7	**Masonry for parapet:**					
	Long wall:	2	54’6”	4.5”	3’	122.62 cft
	Short wall:	2	23’9”	4.5”	3’	53.44 cft
	Total:					**176.06 cft**
8	**RCC lintel beams:**					
	Long Walls:	2	54’6”	9”	9”	61.31 cft
	Short Walls:	6	20’	9”	9”	67.5 cft
	Total:					**128.81 cft**
10	**RCC Slab**	1	54’6”	24’6”’	4.5”	**500.72 cft**
11	**Smooth plaster inside rooms and ceiling:**					
	Plaster for walls:					
	X-axis Walls	10	10’		12’	1200 sqft
	Y-axis Walls	10	20’		12’	2400 sqft
	Ceiling Plaster:					
	Shop	5	10’	20’		1000 sqft
	Total:					**4600 sqft**
	Deduction for Shutters:					
	S1	5/2	8’6”		9’	191.25 sqft

	Total Deduction (-)					**191.25 sqft**
	Net Quantity:					
	4600 – 191.25					**4408.75 sqft**
12	**Exterior Plaster:**					
	Long Walls:	2	54’6”		18’3.5”	443.34 sqft
	Short Walls:	2	21’6”		18’3.5”	332.5 sqft
	Cantilever portion	2	54’6”	3’		327 sqft
	Total:					**1102.84 sqft**
	Deduction for Shutters: (-)	5/2	8’6”		9’	**191.25 sqft**
	Net Quantity:					
	1102.84 – 191.25					**911.59 sqft**
13	**BBCC in shops:**	5	10’	20’	7”	583.35 cft
	BBCC on step:	1	54’6”	2’3”	7”	71.53 cft
	Total:					**654.88 cft**
14	**Earth filling from G.L. to P.L.(Shops):**	5	10’	20’	2’4”	2333.35 cft
	Earth filling from G.L. to P.L.(Outside):	1	54’6”	2’3”	1’11”	235.03 cft
	Total:					**2568.38 cft**
15	**Earth filling up to G.L.:**					
	Total excavation – PCC in foundation – Masonry in					**1083.49 cft**

	foundation = 2640 – 165.01 – 1391.5					

Table 14 Estimated Costing of Market Yard

Sr. No.	Description of Item	Quantity	Unit	Rate	Per	Estimated Cost
1	Excavation for foundation	2640	Cft	5	Cft	13200
2	PCC in foundation	165.01	Cft	40	cft	6600
3	Brick Masonry upto Plinth	1391.5	cft	150	cft	208725
4	Earth filling	1083.49	Cft	10	Cft	10835
5	Earth filling upto plinth	2568.38	cft	10	cft	25684
6	BBCC at Plinth	654.88	Cft	30	Cft	19646
7	Brick Masonry above Plinth	2071.2	Cft	150	cft	310680
8	RCC Work	729.15	Cft	450	Cft	328118
9	Plaster Work	5320.34	Sqft	35	Sqft	186212
10	Colouring	5320.34	Sqft	10	Sqft	53203
11	Flooring	1122.63	Sqft	80	Sqft	89810
		Total materials and labour cost				1252713
		1.5 % Water Charges				18790
		10% Contractor Profit				125271.3
		Total Estimation				1396774.3
		Say Total				Rs. 13,96,774/-

8.1.5 Design Proposal of Rain Water Harvesting System

Rainwater harvesting is the storing of rainwater during the monsoon season for the purpose of using it during periods of water scarcity. Generally speaking, it is a process used for collecting and storing rainwater for human use. Rainwater harvesting is best described as the technique by which rain water is accumulated and stored with the intention of reusing it during the dry season or when there is a drought. Rainwater harvesting is an easy and economical way to deal with this crisis.

Harvesting rainwater is a climate adaptation strategy that has been used in many ancient and modern societies. The antiquated rainwater harvesting techniques of the past were attempts to cope with severe climate conditions by storing the water as it fell, allowing populations to drink the water or prevent oversaturation of the land during extreme precipitation. Modern rainwater harvesting is fundamentally the same in theory, but advancements in science and

engineering have introduced sophisticated filtration and raincapturing technologies that boost the efficiency of the process.

By capturing water directly, we can significantly reduce our reliance on water storage dams. This places less stress on these dams and can potentially reduce the need to expand these dams or build new ones. By capturing water, the flow of storm water is also reduced and this minimizes the likelihood of overloading the storm water systems in our neighbourhoods.

In our allocated village Dahemi, there are many bores for water, but there is no rain water harvesting system for collection and reuse of rain water. So, we decided to provide a rain water harvesting system in proposed library building. The approximate cost for rain water harvesting system is **INR 43,100 /-.**

Calculation of Rain Water:

Average Annual Rainfall: 832 mm

Catchment Area: 46.45 sqm

Runoff Co efficient: 1 (Concrete Roof)

Annual Water Harvesting Potential:

= 0.832*46.45*1

=38.65 cum

=38650 litres

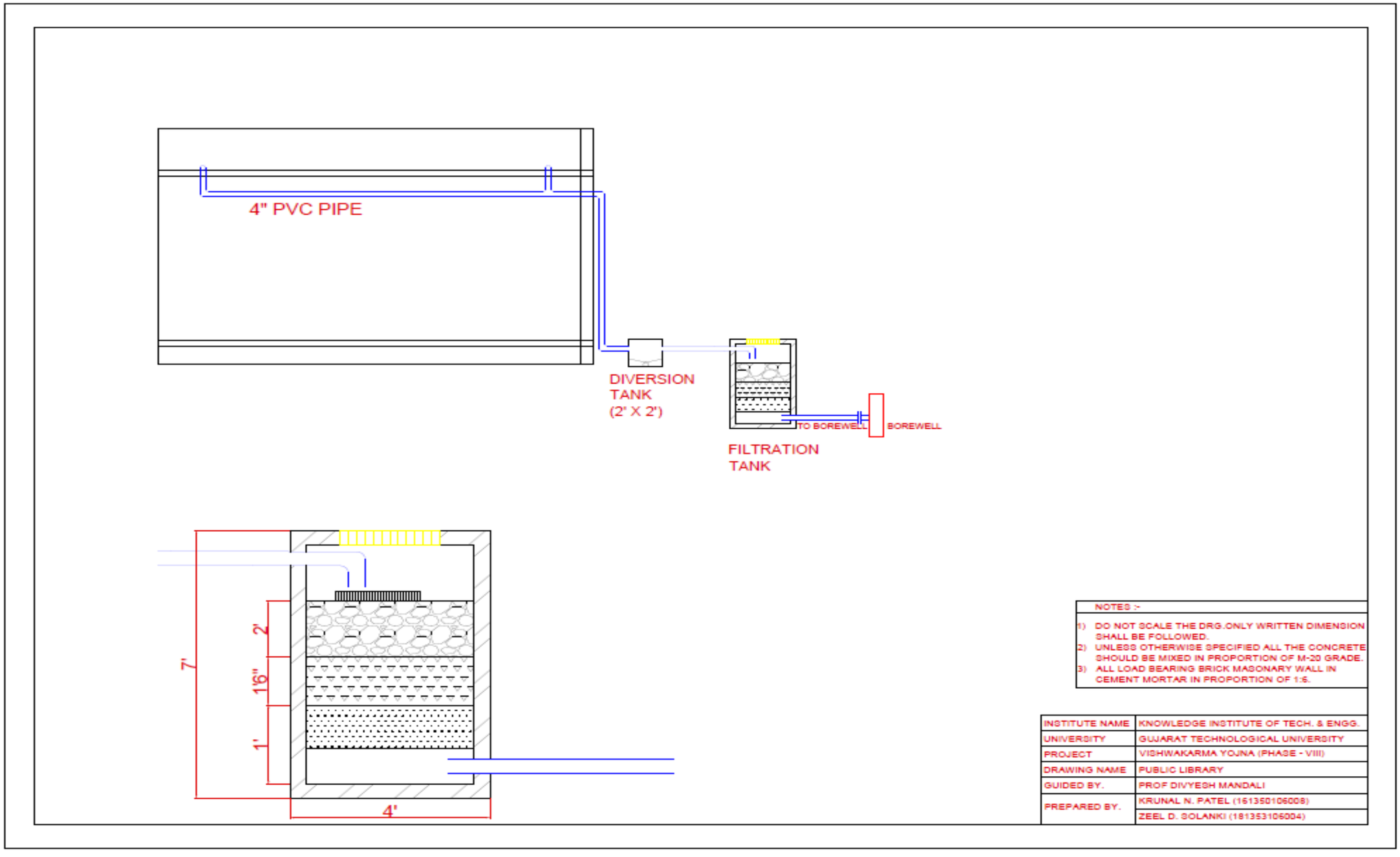


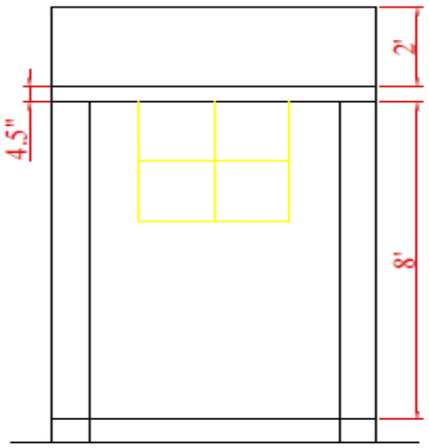
Figure 34 Rain Water Harvesting System

Table 15 Estimated Costing for Rain Water Harvesting System

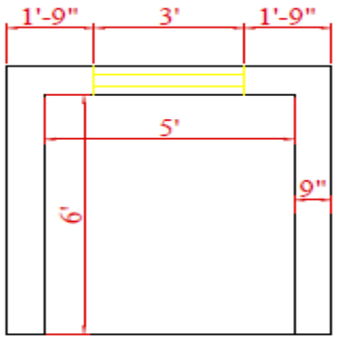
Sr. No.	Description of Item	Quantity	Unit	Rate	Per	Estimated Cost
1	Filtration Tank	1	Nos.	15000	Nos.	15000
2	Diversion Tank	1	Nos.	2000	Nos.	2000
3	4” PVC Pipe	10	Nos.	1400	Nos.	14000
4	Valve	2	Nos.	700	Nos.	1400
5	Elbow, T & Coupling	15	Nos.	350	Nos.	5250
6	Solution	10	Nos.	100	Nos.	1000
		Total Materials & Labour Cost				38650
		1.5% Water Charges				579.75
		10% Contractor Profit				3865
		Total Estimated Cost				43094.75
		Say Total				Rs. 43,100/-

8.1.6 Design Proposal of Drinking Water Point

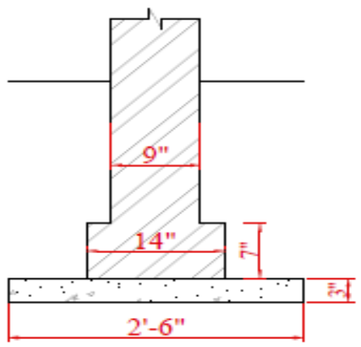
In our allocated village there is no any public place where villagers can drink clean and hygienic water. So, we decided to design a drinking water point in the village. The estimated cost of the proposed drinking water point is **INR 70,450/-.**



ELEVATION



PLAN
DRINKING WATER POINT



FOUND. DETAILS

NOTES :-

1) DO NOT SCALE THE DRG.ONLY WRITTEN DIMENSION SHALL BE FOLLOWED.
2) UNLESS OTHERWISE SPECIFIED ALL THE CONCRETE SHOULD BE MIXED IN PROPORTION OF M-20 GRADE.
3) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	DRINKING WATER POINT
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KRUNAL N. PATEL (161350106008)
	ZEEL D. SOLANKI (181353106004)

Figure 35 Plan and Elevation of Drinking Water Point

Table 16 Estimated Costing of Drinking Water Point

Sr. No.	Description of Item	Quantity	Unit	Rate	Per	Estimated Cost
1	Excavation for foundation	104.06	Cft	5	Cft	520.3
2	PCC in foundation	11.56	Cft	40	cft	462.4
3	Brick Masonry in Foundation	35.71	cft	150	cft	5356.5
4	Earth filling	56.79	Cft	10	Cft	567.9
5	Superstructure Masonry	121.88	Cft	150	cft	18282
6	RCC Work	24.55	Cft	450	Cft	11047
7	Plaster Work	441	Sqft	35	Sqft	15435
8	Colouring	441	Sqft	10	Sqft	4410
9	Flooring	30	Sqft	80	Sqft	2400
10	Water tank (500 Litres)	1	Nos.	4700	Nos.	4700
		Total materials and labour cost				63181.1
		1.5 % Water Charges				947.7
		10% Contractor Profit				6318.1
		Total Estimation				70446.9
		Say Total				Rs. 70,450/-

8.2 Reason for Students Recommending this Design

1) Public Library: -

The public library is an important thing any place should have as it helps people gain more knowledge by reading books. The village which is been allocated to us is mostly depended on agriculture for their income i.e., 70% population of the village. Most of them use traditional way of farming due to lack of knowledge of modern techniques for farming. So, if we will provide library in that village, the farmers can read books on new and modern techniques for farming which they can implement in their farms. And when we visited the school of the village, the principal requested us to utilise space of the school campus and design a public library, so that students as well as villagers can gain more and more knowledge from there by reading books.

2) Public Toilet: -

When it comes to hygiene, it is very important that each and every person in village uses toilet. But, in our allocated village Dahemi still there are not toilets in many houses so

they go in open. And there is one public toilet but it is so much damaged and in dirty situation which is not possible for anyone to use and also is not in condition for renovation or maintenance. So, we decided to design a public toilet so that no one in the village has to go in open.

3) WBM Road: -

In our allocated village most of the roads are in proper condition. But there is a road of about 1km which is broken and in damaged condition. So, we decided to design a WBM road as it is cheaper than other types of roads and also can carry load of 700 tons per day which is perfect for a village road.

4) Market Yard: -

There is one land of panchayat on which some villagers have made temporary shops from last many years. And their source of income is that shops, due to which panchayat don't want to remove them rather they want to construct a market yard building. They will then give shops on rent by which panchayat can earn monthly revenue by collecting rent and tax from these shopkeepers. So, we decided to design a market yard building on the request of panchayat members.

5) Rain Water Harvesting: -

In our allocated village, there is no rain water harvesting system from which they can store rain water and reuse it whenever needed. So, we decided to provide them with rain water harvesting system on the proposed library building.

6) Drinking Water Point: -

The drinking water point is an important facility any village should have. But in our allocated village Dahemi there is no drinking water point. So, we decided to design a drinking water point so that people can drink clean water in public place in village for free.

8.3 About Design Suggestions / Benefits of Villagers

- Public Library can be used for gaining and increasing knowledge.
- Public toilet is useful for maintaining hygiene in village.
- WBM road is for facility of villagers so that they do not face any problems due to damaged road.
- Market yard will be helpful to shopkeepers as it will provide them permanent place and also will helpful to panchayat as it will increase monthly revenue of panchayat.
- Rain water harvesting system will be useful in collecting rain water and reuse it whenever needed.
- Drinking water point will provide villagers clean water for free of cost.

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

After completion of visit and data collection, we done the gap analysis and, on that basis, we designed many facilities for the village namely, Public toilet, Public Library, Market Yard, Rain Water Harvesting System, Drinking Water Point and WBM Road.

The village still lacks in maintenance of the building and various structures. Taking this into consideration the estimation of its rehabilitation with other necessary amenities will be designed in the next semester.

- We are proposing following designs for the future development of the village for part II,

1) Redesigning Primary School as it is very dangerous condition for the students to study in it.

2) Aanganwadi, as the Aanganwadi in the village in not in good condition and it needs to be redeveloped.

3) Solid Waste Collection System, because there is no waste collection system in the village and people just throw their garbage in their farms.

4) Public Garden, as there is no recreation centre in the village and also no playground for children to play.

5) Community Hall, as it is in such type of condition that can fall at any time and can't be used for any purpose right now.

6) Retaining Wall around Pond / Lake, as there is no retaining wall around the lake of the village.

7) Renovation of Gram Panchayat Building, it needs renovation because it is bit old and needs new plaster and colour work.

8) Gober Gas Plant, as the most of the villagers have cows and buffaloes in their farm and they just heap up the dung so we can use that dung to generate gas which would help reducing gas bills of the villagers.

9) ATM, so that villagers can withdraw cash at their convenience.

Chapter. 10 Conclusion of the Entire Village Activities of the Report

After this project we have learned that the villages are the backbone of our country and they are lacking from basic amenities which are required to fulfill the basic of people to increase their living standard. Villages are part of country which directly and indirectly affects the development of the country. If villages are smart enough and with sufficient development and facilities than the villagers will not migrate from villages to cities. So, the congestions and urban pressure can be eliminated and overall balanced growth of country becomes possible.

At that time the economic consideration and feasibility of those infrastructure facilities should be considered. Providing facilities are not the only solution of migration but proper harmony and environment of growth and development should be there. The living standard of the people should be increased. The main purpose if this project is to reduce migration of people from rural to urban areas due to lack of facilities and opportunities and reduce urban pressure by balancing both urban and rural area.

After carrying out physical survey and comparing the existing facilities of village with the basic amenities needed by a village based on population norms given by government of India and personal interface many of the villagers of Dahemi and meeting with sarpanch we finalize the remaining amenities required fulfil basic need of this village based on the priority requirement some of the facilities are designed and complete estimate is prepared.

We have designed public library for the overall wellbeing of the villagers, public toilet for good hygiene of the villagers, rain water harvesting system, drinking water point to provide villagers with clean drinking water, road for proper movement within village and market yard for providing permanent building for shops.

All designed are carried out the overall development of the village which over physical infrastructure facilities, social infrastructure and socio-cultural infrastructure facilities. A point is considered while designing all amenities.

We have also provided some of the suggestions for the future development of the village and we will be designing some facilities from them in the next part of the project.

Chapter. 11 References Referred for this Project

1) Ideal Village Survey Form PHASE-VII

2) Smart Village Survey Form PHASE-VII

3) Allocated Village Survey Form PHASE-VII

4) Census Data, Ministry of Home Affairs, Govt. of India, www.censusindia.gov.in

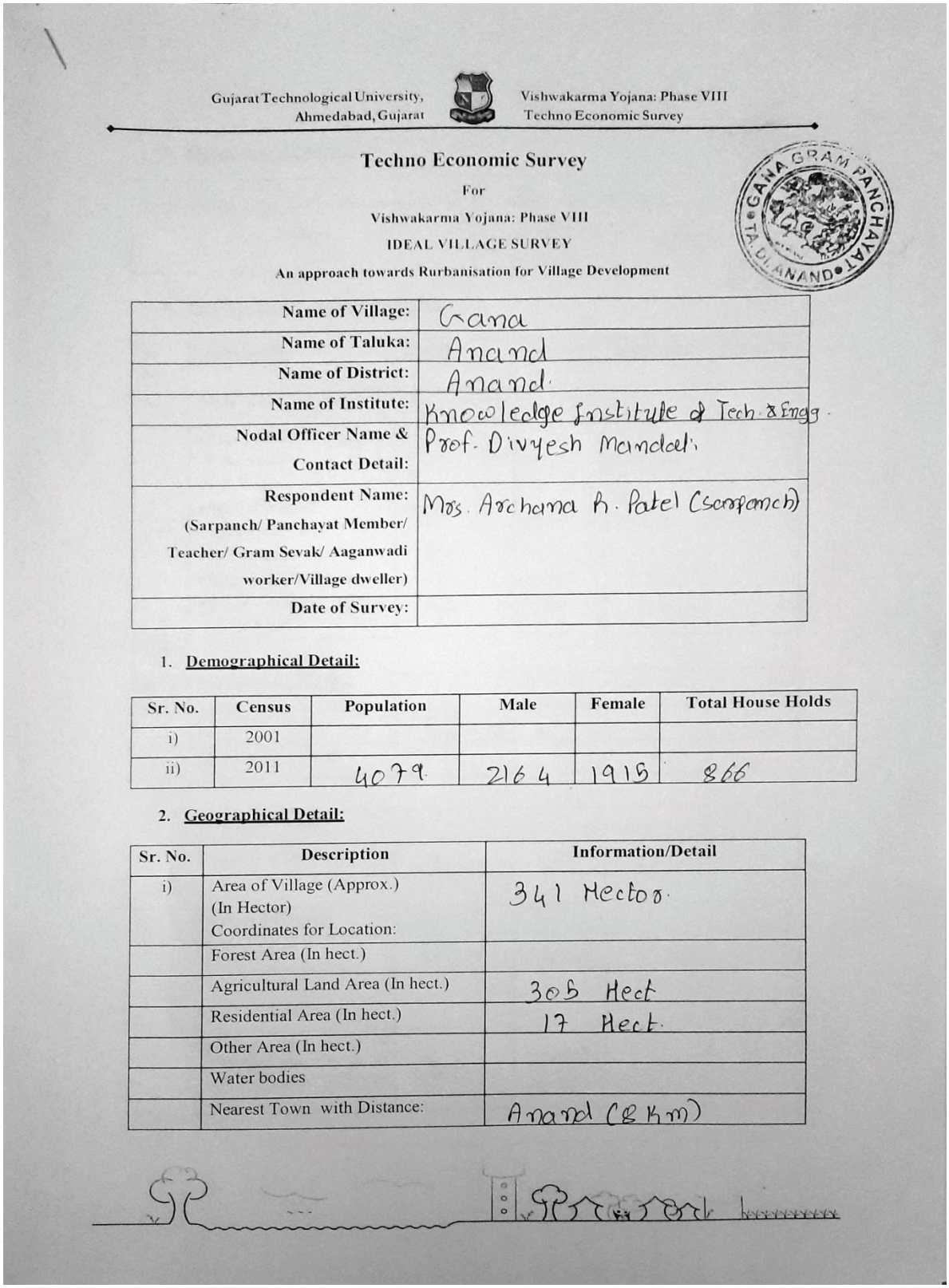
5) UDPFI Guidelines, Ministry of Urban Development

6) Rural development scheme of Govt. of Gujarat

7) Dr. R.P. Rethaliya, Professional Practice and Valuation, Third Edition (2018), Atul Prakashan

Chapter. 12 Annexure Attachment

12.1 Survey form of Ideal Village



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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

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For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

GANA GRAM PANCHAYAT TA. U. ANAND

Name of Village:	Gana
Name of Taluka:	Anand
Name of District:	Anand
Name of Institute:	Knowledge Institute of Tech. & Engg.
Nodal Officer Name & Contact Detail:	Prof. Divyesh Mandali
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Mrs. Archana R. Patel (Sarpanch)
Date of Survey:	

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001				
ii)	2011	4079	2164	1915	866

2. **Geographical Detail:**

Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	341 Hector.
	Forest Area (In hect.)	
	Agricultural Land Area (In hect.)	305 Hect
	Residential Area (In hect.)	17 Hect.
	Other Area (In hect.)	
	Water bodies	
	Nearest Town with Distance:	Anand (8 Km)

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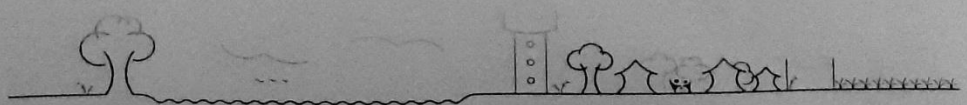
3. Occupational Details:

Name of Three Major Occupation groups in Village	1. Agriculture 2. Business 3. Service.

4. Physical Infrastructure Facilities:

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



F.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Yes.	✓		
	Main road	Yes	✓		
	Internal streets	Yes.	✓		
	Nearest NH SH MDR/ODR Dist. in kms.	Yes	✓		NH (8 Km)
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No.			Borsad. (12.5 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.			MGVCL.
	Power supply for Agricultural Use	Yes			
	Power supply for Commercial Use	Yes			
	Road/ Street Lights	Yes			

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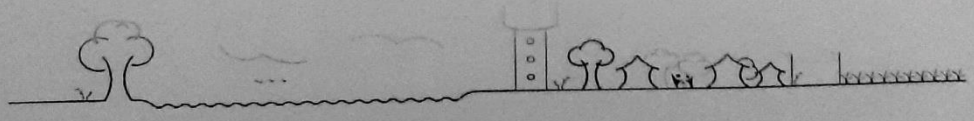
	Electrification in Government Buildings/ Schools/ Hospitals	Yes			
	Renewable Energy Source Facilities (Y/ N)	Yes			
	LED Facilities	Yes			
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes			2 nos.
	Location Condition	Good. Good.			
	Community Toilet (With bath/ without bath facilities)	Yes	✓		
	Solid & liquid waste Disposal system available	Yes	✓		
	Any facility for Waste collection from road	Yes	✓		Tempo
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	Tubewell	✓		
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	10% Kuccha.			

5. **Social Infrastructural Facilities:**

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks



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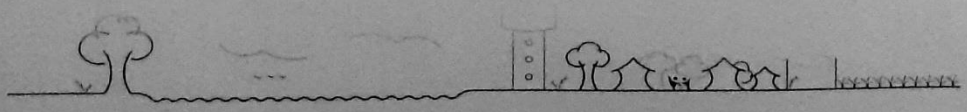
K.	**Health Facilities:**				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:	Sub-PHC.	✓		1 nos.
	Private Clinic/Private Hospital/ Nursing Home	Yes	✓		2 nos
	If any of the above Facility is not available in village than approx. distance from village: ..8....kms.				
Suggestions if any:					
L.	**Education Facilities:**				
	Aaganwadi/ Play group	Yes	✓		3 nos.
	Primary School	Yes	✓		2 nos.
	Secondary school	Yes	✓		
	Higher sec. School	Yes	✓		
	ITI college/ vocational Training Center				
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	Medical	✓		1 no.
	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 (with TV)			



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	Condition:	Good			
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	No			
	Public Garden Location: Condition:	Yes Good Good			
	Village Pond Location: Condition:	Yes Good Good			
	Recreation Center Location: Condition:	Yes Good			Gym
	Cinema/ Video Hall Location: Condition:	-			
	Assembly Polling Station Location: Condition:	Yes Good Good			3 nos.
	Birth & Death Registration Office Location: Condition:	Yes Good Good			Panchayat 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	Yes		✓	

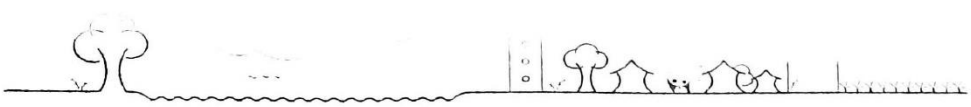
	General Market	No.			
	Shops (Public Distribution System)	Yes	✓		
	Panchayat Building	Yes	✓		
	Pharmacy/Medical Shop	Yes	✓		
	Bank & ATM Facility	Yes	✓		
	Agriculture Co-operative Society	NO			
	Milk Co-operative Soc.	Yes.	✓		
	Small Scale Industries	Yes	✓		
	Internet Cafes/ Common Service Center/Wi Fi	NO.			
	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.~~ Yes.			
P.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	Yes NO NO			
Q.	Any Other	NO.			

7. **Data Collection From Village**

Village Base Map Available: Hard Copy/Soft Copy	Yes Soft copy



Recent Projects going on for Development of Village	NO
Any NGO working for village development	NO

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)	Pond, Main drainage system	
2.	Additional Information/ Requirement		

9. **Smart Village Proposal Design**

Sr. No.	Descriptions	Information/ Detail	Remarks
1.			

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

Sarpanch
Gram Panchayat Gana
Ta. & Di. Anand.

12.2 Survey form of Smart Village

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Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

SMART VILLAGE SURVEY

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

Name of District:	Anand
Name of Taluka:	Petlad
Name of Village:	Dharmaj
Name of Institute:	Knowledge Institute of Tech. & Engg.
Nodal Officer Name & Contact Detail:	Prof. Divyesh Mandali
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Deputy Sarpanch. Tusharbhai B. Patel.
Date of Survey:	8/9/2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001				
2.	2011	10429.	5380	5049	2232.

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	1444 Hect.
2.	Forest Area (In hect.)	13 Hect
3.	Agricultural Land Area (In hect.)	1275 Hect.
4.	Residential Area (In hect.)	154.11 Hect.
5.	Other Area (In hect.)	
6.	Distance to the nearest railway station (in kilometers):	In village

7.	Name of Nearest Town with Distance:	Petlad (12 KM)
8.	Distance to the nearest bus station (in kilometers):	In village.
9.	Whether village is connected to all road for the any facility or town or City?	

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1.	Self - employed.
	2.	Job.
	3.	Agricultural.

Major crops grown in the village:	1.	Tobacco
	2.	Wheat
	3.	Rice.

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

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

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Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity:	✓		3 nos. of 1 lakh litres
	Underground Sump	Capacity:	✓		
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A UNDERGROUND DRAINAGE 1 Closed 2 Open B OPEN WITH OUTLET C OPEN WITHOUT OUTLET	Closed =	✓ ✓		Good.
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Bitumen	✓		
	Main road	R.C.C.	✓		
	Internal streets	R.C.C.	✓		
	Nearest NH/SH/MDR/ODR Dist. in kms.	MDR ½ km	✓		
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	Yes	✓		
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Yes	✓		
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	✓		
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Govt.	✓		24 hrs.

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	Power supply for Domestic Use	24 hrs.	✓		
	Power supply for Agricultural Use	8 hrs.	✓		
	Power supply for Commercial Use	24 hrs	✓		
	Road/ Street Lights	Yes	✓		LED lights.
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	✓		
	Renewable Energy Source Facilities (Y/ N)	Yes	✓		Solar Panel.
	LED Facilities	Yes.	✓		
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes	✓		1 nos.
	Location Condition	Good.			
	Community Toilet (With bath/ without bath facilities)	NO			
	Solid & liquid waste Disposal system available	Yes	✓		
	Any facility for Waste collection from road	Yes	✓		
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL OTHER (SPECIFY)	Tubewell	✓		
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Total: 4123	✓		Kutchha- 1200

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)		✓		5 nos.
	Sub-Centre				
	PHC	Nearest (Dawol).			
	BLOCK PHC				
	CHC/RH				
	District/ Govt. Hospital				
	Govt. Dispensary				
	Private Clinic	Yes.	✓		3 nos.
	Private Hospital/				
	Nursing Home				
	AYUSH Health Facility				Nearest (Dedarda)
	sonography /ultrasound facility				
	If any of the above Facility is not available in village than approx. distance from village: ..0....kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group	Y	✓		5 nos.
	Primary School	Y		✓	
	Secondary school	Y	✓		
	Higher sec. School	Y	✓		Private.
	ITI college/ vocational Training Center	N			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	N			
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				

5

Gujarat Technological University, Ahmedabad, Gujarat

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Suggestions if any:

L.	Socio- Culture Facilities	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)	Good	Good	✓(4)	
	Public Library (With daily newspaper supply: Y/N)	Good	Good	✓	
	Public Garden	Good	Good	✓	
	Village Pond	Good	Good	✓	
	Recreation Center	Good	Good	✓	Water Park
	Cinema Video Hall	Good	Good	✓	
	Assembly Polling Station	Good	Good	✓	
	Birth & Death Registration	Good	Good	✓	Gram Panchayat

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	Good	✓	
	Telecommunication Network/ STD booth	–			✓
	General Market	Good	Good	✓	
	Shops (Public Distribution System)	Good	Good	✓	
	Panchayat Building	Good	Good	✓	
	Pharmacy/Medical Shop	Good	Good	✓	
	Bank & ATM Facility	Good	Good	✓	
	Agriculture Co-operative Society				✓
	Milk Co-operative Soc.	Good	Good	✓	
	Small Scale Industries	Good	Good	✓	
	Internet Cafes/ Common Service Center/Wi Fi				✓
	Youth Club			✓	
	Mahila Mandal				✓

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	Credit Cooperative Society Agricultural Cooperative Society Milk Cooperative Society Fishermen's Cooperative Society Computer Kiosk/ e-chaupal / Mills / Small Scale Industries	Good	Good	✓	
	Other Facility				✓

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		✓	
	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)	Good		✓	
	12. Rajiv Gandhi National Drinking Water Mission 13. Swarnjayanti Gram Swarozgar Yojana	Good		✓	
	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)	Good		✓	
	20. Samagra Awas Yojana (SAY) 21. Sanjay Gandhi Niradhar Yojana (SGNY) 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	25% Solar	✓		
2.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	Yes Yes	✓ ✓		
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	Yes	✓		Soft
2.	Recent Projects going on for Development of Village	Yes	✓		
3.	Any NGO working for village development				
4.	Any natural calamity in the village during the last one year: EARTHQUAKES FLOODS CYCLONE DROUGHT LANDSLIDES AVALANCHE OTHER (SPECIFY)	No			

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks

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1.	Repair & Maintenance of Existing Public Infrastructure facilities, School Building Health Center Panchayat Building Public Toilets & any other	Renovation	
2.	Additional Information/ Requirement		
3.	During the last six months how many times CLEANING .....daily..... FOGGING.....daily..... Drive was undertaken in the village?	waste collection from D2D	Covid-19, Mosquito

IX. Smart Village / Heritage Details

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

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

Village Panchayat Dharmaj Ta. Petlad

Vice - Sarpanch
Village Panchayat, Dharmaj

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12.3 Survey from of Allocated Village

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ALLOCATED VILLAGE SURVEY

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

Name of District:	~~Baroda~~ Anand
Name of Taluka:	~~Padra~~ Borsad
Name of Village:	Dahemi
Name of Institute:	Knowledge Institute of Tech. & Engg.
Nodal Officer Name & Contact Detail:	Prof. Divyesh Mandali
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Jayaben Parmar (Sarpanch)
Date of Survey:	

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001				
2.	2011	5018	2585	2427	

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	
2.	Forest Area (In hect.)	
3.	Agricultural Land Area (In hect.)	
4.	Residential Area (In hect.)	
5.	Other Area (In hect.)	
6.	Distance to the nearest railway station (in kilometers):	

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

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1. Agriculture. 2. Self-employed 3. Service.

Major crops grown in the village:	1. Tobacco 2. Banana. 3. Wheat.

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
1.	**PIPED WATER**				
	Piped Into Dwelling	4	✓		
	Piped To Yard/Plot	4	✓		
	Public Tap/Standpipe	W			
	Tube Well Or Bore Well	4	✓		2 Govt.
2.	**DUG WELL**				
	Protected Well	–			
	Un Protected Well				
3.	**WATER FROM SPRING**				
	Protected Spring	–			
	Unprotected Spring	–			
	Rainwater	–			
	Tanker Truck	–			
	Cart With Small Tank	–			
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/**				
	Irrigation Channel	4	✓		Borewell
	Bottled Water				3 nos.
	Hand Pump	4	✓		

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	Other(Specify)**Lake/ Pond**	4	✓		1 nos.
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity: 30000	✓		2 nos.
	Underground Sump	Capacity:			
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1	Yes	✓		1/4 M closed.
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Yes	✓		Bitumen
	Main road	Yes	✓		RCC.
	Internal streets	Yes	✓		RCC/Pavers.
	Nearest NH/SH/MDR/ODR Dist. in kms.	Yes	✓		NHS.
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	N.			
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Y.	✓		
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Y	✓		All
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Y	✓		More than 6 hrs.

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	Power supply for Domestic Use	Yes	✓		
	Power supply for Agricultural Use	Yes	✓		8 hrs.
	Power supply for Commercial Use	Yes	✓		
	Road/ Street Lights	Yes	✓		
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	✓		
	Renewable Energy Source Facilities (Y/ N)	NO			
	LED Facilities	Yes	✓		
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Y		✓	Damaged.
	Location Condition				Bad.
	Community Toilet (With bath/ without bath facilities)	N			
	Solid & liquid waste Disposal system available	N			
	Any facility for Waste collection from road	N			
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND	Y	✓		
	STREAM/RIVER	N			
	CANAL	N			
	WELL	N			
	TUBE WELL.	Y	✓		
	OTHER (SPECIFY)	–			
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	Kutchha 20:1			

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V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	Yes	✓		5 nos.
	Sub-Centre				
	PHC	Yes	✓		1. no.
	BLOCK PHC				
	CHC/RH				
	District/ Govt. Hospital				
	Govt. Dispensary				
	Private Clinic	Yes	✓		2 nos.
	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	✓		5 nos.
	Primary School	Yes	✓		Damaged.
	Secondary school	Yes	✓		Private.
	Higher sec. School	No.			
	ITI college/ vocational Training Center				
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	Yes	✓		1 (Private)

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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)				✓
	Public Library (With daily newspaper supply: Y/N)				✓
	Public Garden				✓
	Village Pond			✓	
	Recreation Center				✓
	Cinema/ Video Hall				✓
	Assembly Polling Station	Good	Good	✓	
	Birth & Death Registration Office	Good	Good	✓	

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	Good	✓	
	Telecommunication Network/ STD booth				✓
	General Market				✓
	Shops (Public Distribution System)	Bad	Good	✓	
	Panchayat Building	Good	Good	✓	
	Pharmacy/Medical Shop				
	Bank & ATM Facility	Good	Bad	✓	
	Agriculture Co-operative Society				
	Milk Co-operative Soc.	Good	Good	✓	
	Small Scale Industries				✓
	Internet Cafes/ Common Service Center/Wi Fi				✓
	Youth Club				✓
	Mahila Mandal				

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	Credit Cooperative Society Agricultural Cooperative Society Milk Cooperative Society Fishermen's Cooperative Society Computer Kiosk/ e-chaupal / Mills / Small Scale Industries				✓
	Other Facility				✓

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) 22. Jawahar Gram Samridhi Yojana (JGSY) 23. Other (SPI CIFY)	Good Good		✓ ✓	

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				

VII. DATA COLLECTION FROM VILLAGE

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Village Base Map Available: Hard Copy/Soft Copy	Yes			Soft
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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Techno Economic Survey

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	Yes. Yes.	
2.	Additional Information/ Requirement		
3.	During the last six months how many times CLEANING .....6-7..... FOGGING.....6..... Drive was undertaken in the village?	Cleaning on festivals	Fogging for covid-19.

IX. Smart Village / Heritage Details

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

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

સરપંચશ્રી,
દહેમી ગ્રામ પંચાયત
તા.બોરસદ, જી.આણંદ

ગ્રામ પંચાયત, દહેમી
તા.બોરસદ, જી.આણંદ

12.4 Gap Analysis of Allocated Village

Table 17 Gap Analysis of Allocated Village

VILLAGE GAP Analysis					
Village Facilities	**Planning Commission/U DPFI Norms**	**Village Name:**	Dahemi		
		Population:			5015
		Existing	**Required as per Norms**	**Smart Village / Cities / Heritage Future Projection Design**	**Gap**
Social Infrastructure Facilities					
Education					
Anganwadi	Each or Per 2500 population	5	2	2	-3
Primary School	Each Per 2500 population	1	1	1	0
Secondary School	Per 7,500 population	1	1	1	0
Higher Secondary School	Per 15,000 Population	0	0	1	1
College	Per 125,000 Population	1	0	0	
Tech. Training Institute	Per 100000 Population	0	0	1	1
Agriculture Research Centre	Per 100000 Population	0	0	0	0
Skill Development Center	Per 100000 Population	0	0	0	0
Health Facility					
Govt/Panchyat Dispensary or Sub PHC or Health Centre	Each Village	0	1	1	1
Primary Health & Child Health Center	Per 20,000 population	1	1	1	0
Child Welfare and Maternity Home	Per 10,000 population	0	0	0	0
Multispeciality Hospital	Per 100000 Population	0	0	0	0
Public Latrines	1 for 50 families (if toilet is not there in home, specially for slum pockets & kutcha house)	0	1	1	1

Physical Infrastructure Facilities					
Transportation	**Adequate / Inadequate**				Adequate
Pucca Village Approach Road	Each village				Adequate
Bus/Auto Stand provision	All Villages connected by PT (ST Bus or Auto)				Inadequate
Drinking Water (Minimum 70 lpcd)		**Adequate / Inadequate**			Adequate
Over Head Tank	1/3 of Total Demand				Adequate
U/G Sump	2/3 of Total Demand				
Drainage Network - Open		**Adequate / Inadequate**			Adequate
Drainage Network - Cover					
Waste Management System		**Adequate / Inadequate**			Inadequate
Socio- Cultural Infrastructure Facilities					
Community Hall	Per 10000 Population	1	1	1	1
community hall and Public Library	Per 15000 Population	0	0	0	0
Cremation Ground	Per 20,000 population	0	0	0	0
Post Office	Per 10,000 population	1	1	1	0
Gram Panchayat Building	Each individual/group panchayat	1	1	1	0
APMC	Per 100000 Population	0	0	0	0
Fire Station	Per 100000 Population	0	1	1	1
Public Garden	Per village	0	0	0	0
Police post	Per 40,000Population	0	1	1	1
Shopping Mall					
Electrical Design					
Electricity Network		**Adequate / Inadequate**			
		Adequate			
Any Smart Village Facility					
Technology	NO				
		ESR cap	0		
		Sump cap	0		
		Lat	0		

12.5 Summary Details of All Village Design

Table 18 Summary of All Village Details

Public Library	In our allocated village there is no single library where villagers can read books and gain knowledge so we have provided library of 26’ x 16’ with estimated cost of Rs. 4,85,691/-
Public Toilet	There is a public toilet in our allocated village which is in very bad condition and can’t be used at all. So, we redesigned a new public toilet of 20’ x 15’having 4 toilets (2 for each i.e., gents and ladies) and 2 bathrooms (1 for each) with the estimated cost of Rs. 4,91,100/-.
WBM Road	In our allocated village there is a road which is in broken condition so we designed a WBM road with the approximate cost of Rs. 11,62,000 /-.
Market Yard	In our allocated village there is no market yard and villagers are using panchayat land for their kuccha shops. So, we designed a market yard on that land to replace kuccha shops with proper shops of 54’-6” x 21’-6” having 5 shops. Its estimated construction cost is Rs. 13,96,774/-.
Rain Water Harvesting System	For collection of rain water and decrease the surface run off of the rain we have designed a rain water harvesting system at an approximate cost of Rs. 43,100/-.

Drinking Water Point	We have provided design of drinking water point for our allocated village so that villagers can drink good water when outside the house. Its approximate cost is Rs. 70,450/-
Pamol Village	
Anganwadi	In our allocated village there are two Anganwadi but it was far away. So the little children had trouble in going. The space provided was less than the number of children present there. So we decided to build an Anganwadi. Plan of Anganwadi is 9.75m x 3.81m (32'x12'6") and its approximate cost of public latrine block cost is about 2,36,000 INR.
Public Health Center	Pamol village doesn't have any type of health or medical facility. In emergency case the villagers don't have option of medical treatment. Villagers go to Borsad or Anand for all type of medical treatment. So, we decide to give design proposal of public health center, for basic medical treatment. Public health center having area 11.13m x 10.3m and its approximate cost of the P.H.C. center is 5,14,800 INR.
Public Garden	In our village, there is no re-creational area. So, we decided to give design of public garden for where public spend their peaceful time with family. A public garden is an institution that maintains collections of plants for the purposes of public education and enjoyment, in addition to research, conservation, and higher learning. Approximate cost of public garden is 10,92,700 INR.

Public Toilet	In our village there is Public toilet is not in good condition, so we decided to give proposal of new Public toilet in our village. If bus and truck drivers on timed schedules have difficulty in accessing toilets, this puts them at risk of bladder and digestive health problems. Furthermore, if the concentration of a driver in urgent need is compromised, it becomes a broader public safety concern. Plan of public toilet is 4.34m x 4.45m (14'3" x 14'7") and its approximate cost of public toilet cost is about 1,54,500 INR.
Road	In our allocated village the internal streets are Stone roads and external roads are made up of Bitumen. In the rainy season roads gets clogged and people have to face very difficult for transporting from one place to another in the village. So, we decided to give a WBM road design. Approximate cost of Road of 1.2km is 13,57,000 INR.
Community Hall	In our village, Community hall is very old and it is in critical condition. So, villagers don't use the community hall. So, we decided to plan new design proposal of community hall. Approximate cost of new community hall is about 5,63,400 INR.
Kasumbad Village	
Public Library	A public library is a library that is accessible by the general public and is usually funded from public sources, such as taxes. It is operated by librarians and library paraprofessionals, who are also civil servants. Public library is not available in our allocated village. So, we design public library for the readers who are fond of reading & wants to improve their knowledge also for students. The libraries provide information and services that are essential

	for learning and progress. In library, we provide a large reading hall, number of book shelves and also a computer room for reading e-books. Here, we give AutoCAD design of Public library. The cost of the library is approx. 4.83 lakhs. Libraries provide information and services that are essential for learning and progress.
Public Toilet	A public toilet is a room or small building with toilets (or urinals) and sinks that does not belong to a particular household. Public toilets play a role in community health and individual well-being. Where toilets are available, people can enjoy outings and physical activities in their communities. There is no public toilet in our village. every village must require at least one public toilet. For provide hygiene and reducing the risk of spread of diseases we design a public toilet. Here, we give the AutoCAD design of public toilet. The cost of the toilet is approx. 5.08 lakhs.
Paver Block	Roads are designed and built for primary use by vehicular and pedestrian traffic. The village has an interior road of R.C.C. but there is no street road is constructed. In the rainy season the road becomes muddy and the villagers who lives there are face difficulty to walk or passing with vehicle. So, we decided to construct a paver block road. we give the AutoCAD design of the road. The total length of road is 316m. The overall cost of this road is 5.21 lakh.
Primary School	In the village, there is a primary school which is in not good condition. Due to its condition the students and teachers are facing many problems so, we decided to reconstruct that school. We design the school with AutoCAD plan. In this design we

	provide classes with the capacity of 40 students. Also provide 5 large classrooms, principal's office, staff room, computer room, library etc. the school is design according to the Indian standard code IS:8827-1978. The approx. cost of school is 23 lakhs.
Public Garden	In our village, there is no re-creational area. So, we decided to give design of public garden for where villagers spend their peaceful time with family. Also, for a function like annual function of schools, family function. etc. The garden has children's play area, seating arrangement, drinking water, waterfall and large area of loan. Approximate cost of public garden is 5.70 lakhs.
Borewell Recharging	Rainwater harvesting is the storing of rainwater during the monsoon season for the purpose of using it during periods of water scarcity. So, we decided to give a design proposal for rain water recharge for the borewell. Approximate cost of rainwater recharging is about **35,000** Rs.

12.6 Summary of Good Photographs

Sr. No.	**Picture**	**Sr. No.**	**Picture**
1		2	

	Gram Panchayat, Dahemi		Entrance Gate, Dahemi
3		4	
	Water Tank in Dahemi		Interaction with Dahemi Sarpanch
5		6	
	Milk Co-Operative Society, Dahemi		Gram Panchayat, Gana

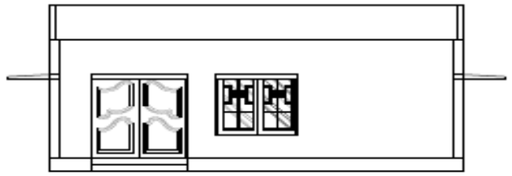
7		**8**	
	V.N. Patel Multipurpose School, Dharmaj		V.N. Vyayam Mandir, Dharmaj

Chapter. 13 From the Chapter 9 future designs of the aspects (Feasibility, Construction, Operation and maintenance of various design options in Rural Areas along with the cost with AutoCAD designs / planning with any software)

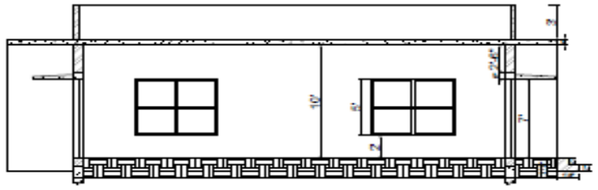
13.1 Design Proposals

13.1.1 Design Proposal of Aanganwadi

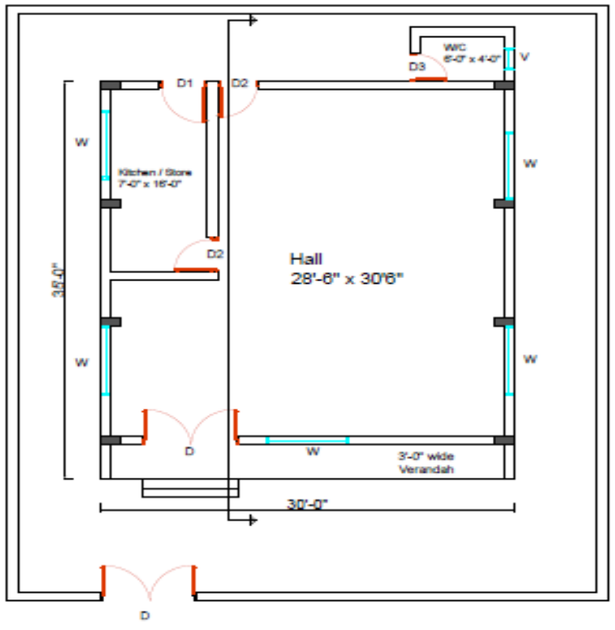
In our allocated village there are many different Aanganwadi located at different location and all are in little bit damaged position. So, when we talked to villagers and Aanganwadi workers about the same they said that there should be a single Aanganwadi which should be spacious with proper kitchen facilities. We also felt the same so we decided to design the Aanganwadi for our allocated village i.e., Dahemi. Here, we have designed Aanganwadi of 30’ x 35’. The main hall of Aanganwadi is of 28’6” x 30’6”. The kitchen is of 7’ x 16’. We have also provided a toilet of 6’ x 4’. The estimated cost for Aanganwadi is Rs. 8,63,900/-



Elevation



Section



Anganwadi Plan

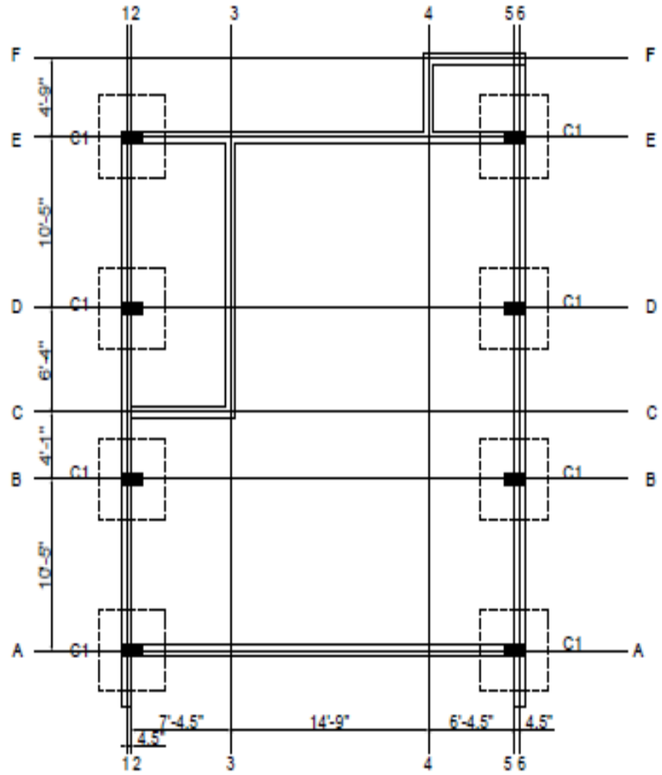
Opening Schedule	
D	7'-0" x 7'-0"
D1	3'-6" x 7'-0"
D2	3'-0" x 7'-0"
D3	2'-6" x 7'-0"
W	6'-0" x 5'-0"
V	2'-0" x 2'-0"

NOTES :-

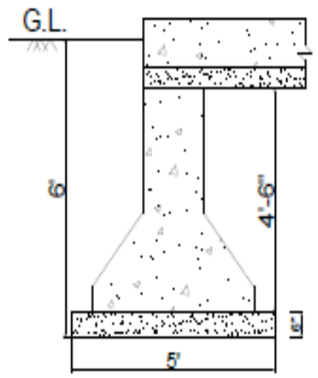
1) DO NOT SCALE THE DRG.ONLY WRITTEN DIMENSION SHALL BE FOLLOWED.
2) UNLESS OTHERWISE SPECIFIED ALL THE CONCRETE SHOULD BE MIXED IN PROPORTION OF M-20 GRADE.
3) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	Anganwadi
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KRUNAL N. PATEL (161350106008)
	ZEEL D. SOLANKI (181353106004)

Figure 36 Plan, Elevation and Section of Aanganwadi



Setting Out Work Layout



Foundation Details

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	Anganwadi (Foundation Details)
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KRUNAL N. PATEL (161350106008)
	ZEEL D. SOLANKI (181353106004)

Figure 37 Centerline Plan of Aanganwadi

Table 19 Measurement Sheet of Aanganwadi

Item No.	Description of Item	No.	L (feet inches)	B (feet inches)	H (feet inches)	Quantity
1	**Excavation for foundation**					
	For Column	8	5’	5’	6’	1200 cft
	For Trenches					
	Long Wall:	2	35’	9”	1’	52.5 cft
	Deduction for columns	4	18”	9”	1’	4.52 cft
		4	9”	9”	1’	2.24 cft
	Short Wall 1	2	28’6”	9”	1’	42.75 cft
	Deduction for columns	4	9”	9”	1’	2.25 cft
	Short Wall 2	1	16’	9”	1’	13 cft
	Short Wall 3	1	7’	9”	1’	5.25 cft
	Net Excavation for trenches:					104.5 cft
	Total					**1304.5 cft**
2	**PCC in foundation**					
	For Columns	8	5’	5’	6”	100 cft
	For Trenches	1	138’	9”	5”	43.13 cft
	Total					**143.13 cft**
3	**RCC Columns**	1				**177.04 cft**
4	**RCC Ground Beam**	1	138’	9”	1’	**103.5 cft**
5	**Earth Filling: 1304.5 – 143.13 – 177.04 – 51.75 =**					**932.58 cft**

6	**Masonry Up to Plinth**	1	138’	9”	3.5”	**30.02 cft**
7	**RCC Plinth**	1	138’	9”	4.5”	**39.33 cft**
8	**BBCC up to Plinth**					**960.94 cft**
9	**Masonry up to lintel**	1	138’	9”	7’	**724.5 cft**
	Deduction for doors and Windows:					
	D	1	7’	9”	7’	36.75 cft
	D1	1	3’6”	9”	7’	18.38 cft
	D2	2	3’	9”	7’	31.5 cft
	D3	1	2’6”	9”	7’	13.13 cft
	W	5	6’	9”	5’	112.5 cft
	Total Deduction					**212.26 cft**
	Net Quantity for masonry up to lintel: 724.5 – 212.26 =					**512.24 cft**
10	**RCC Lintel**	1	138’	9”	6”	**51.75 cft**
11	**Masonry up to Slab**	1	138’	9”	2’6”	**258.75 cft**
	Deduction for beam	8	9”	9”	2’	**9 cft**
	Net Quantity for masonry up to slab: 258.75 – 9 =					**249.75 cft**
12	**RCC Beam**	4	30’	9”	2’6”	**225 cft**
13	**RCC Slab**	1	30’	35’	6”	**525 cft**
	Deduction for beam	4	30’	9”	6”	**45 cft**
	Net Quantity for RCC Slab: 525 – 45 =					**480 cft**

14	**Parapet Wall**					
	Long Wall:	2	35’	4.5”	3’	**79.8 cft**
	Short Wall:	2	28’6”	4.5”	3’	**64.98 cft**
	Total					**144.78 cft**
15	**Plaster (Interior)**	2	82’11”		10’	**1658.34 sqft**
	Deduction for door and windows					
	D	½	7’		7’	24.5 sqft
	D1	½	3’6”		7’	12.25 sqft
	D2	3/2	3’		7’	31.5 sqft
	D3	½	2’6”		7’	8.75 sqft
	W	5/2	6’		5’	75 sqft
	Total Deduction					**152 sqft**
	Net Quantity for interior plaster: 1658.34 – 152 =					**1506.34 sqft**
16	**Plaster (Outside)**	2	65’		11’2”	**1451.66 sqft**
	Deduction for door and windows					
	D	½	7’		7’	24.5 sqft
	D1	½	3’6”		7’	12.25 sqft
	D2	½	3’		7’	10.5 sqft
	D3	½	2’6”		7’	8.75 sqft
	W	5/2	6’		5’	75 sqft
	Total Deduction					**131 sqft**
	Net Quantity for outside plaster: 1451.66 – 131 =					**1320.66 sqft**

Table 20 Abstract Sheet of Aanganwadi

Sr. No.	Description of Item	Quantity	Unit	Rate	Per	Estimated Cost
1	Excavation for foundation	1304.5	Cft	5	Cft	6522.5

2	PCC (1:4:8) in foundation	143.13	Cft	40	cft	5725.2
3	Earth filling	932.58	Cft	10	Cft	9325.8
4	BBCC	960.94	Cft	30	Cft	28828.2
5	Brick Masonry	937.79	Cft	150	cft	140518.5
6	RCC Work	1076.62	Cft	450	Cft	484479
7	Plaster Work	2827	Sqft	35	Sqft	98945
		Total materials and labour cost				7,74,344.2
		1.5 % Water Charges				11,615.16
		10% Contractor Profit				77,434.42
		Total Estimation				8,63,393.78
		Say Total				Rs. 8,63,390

13.1.2 Design Proposal of Public Garden

Any village whether it is small or big it must have a recreational centre for the villagers. But our allocated village does not have any recreational centre like park, garden, gym, indoor games centre, etc. When we talked to some children playing in the streets about having a garden or park in the village, they sadly said that they want one but there is none. Also, some villagers wanted a place for their leisure time to sit or for morning or evening walk. So, we decided to design a public garden for Dahemi village so that they can have a space designated for recreational purpose. We have designed a public garden for the village of 58’ x 58’. We have provided a walking lane of 4’ width on all four sides of the garden and in the middle. We have provided children playing area of 18’3” x 40’6” with playing instruments. We also provided sitting area with bench of 18’3” x 40’6”. We have given the plan of public garden below. We have also given 3D design along with the abstract sheet and measurement sheet. The estimated cost for the proposed construction of public garden is **Rs. 5,31,216.**

Figure 38 3D view of Public Garden

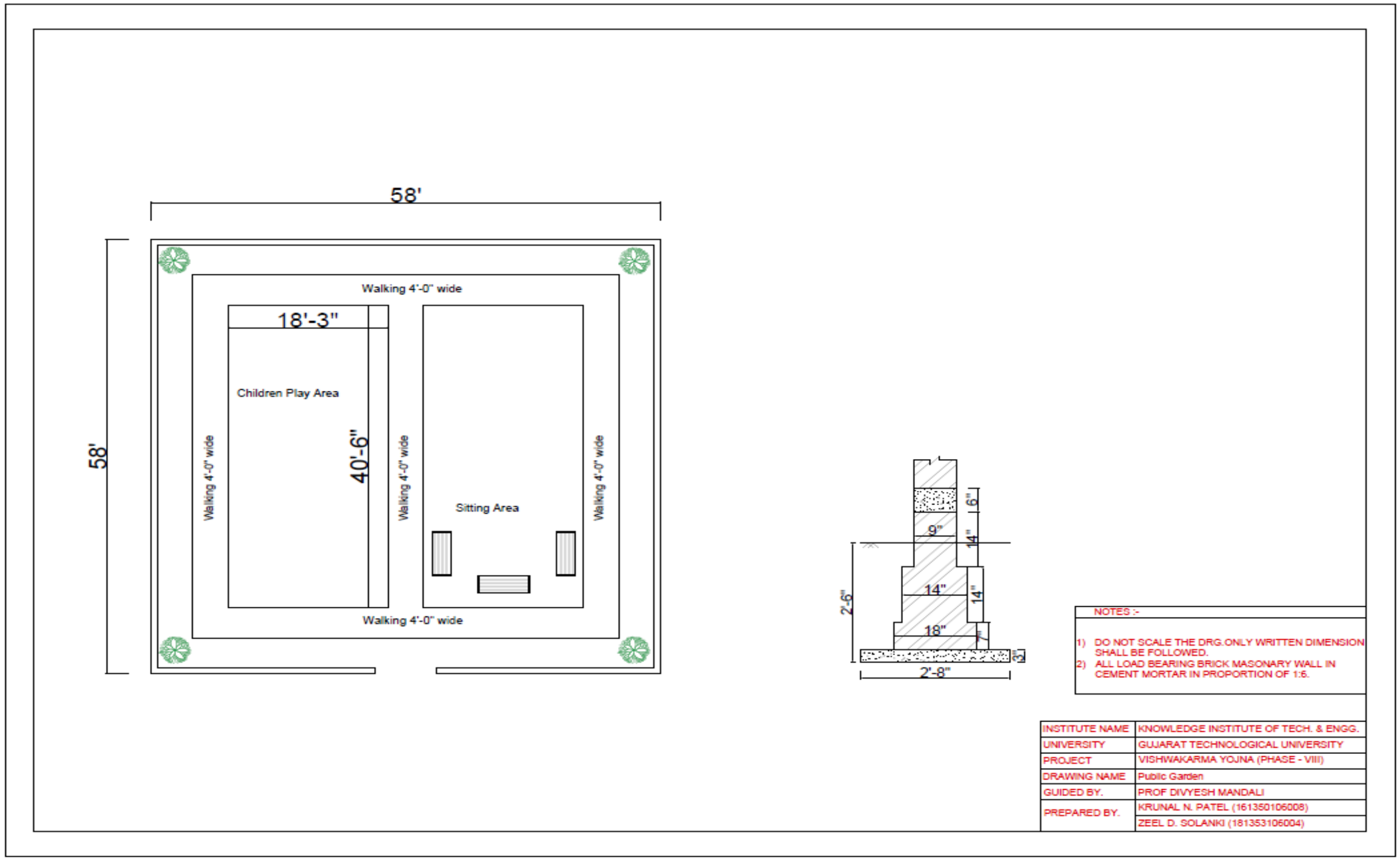


Figure 39 AutoCAD plan for Public Garden

Table 21 Measurement Sheet of Public Garden

Item No.	Description of Item	No.	L (feet inches)	B (feet inches)	H (feet inches)	Quantity
1	**Excavation for foundation**					
	Long Wall:					
	L = 57’3” + 2’8” = 59’11”					
	H = 2’6”	2	59’11”	2’8”	2’6”	798.89 cft
	Short Walls:					
	L = 57’3” – 2’8” = 54’7”	2	54’7”	2’8”	2’6”	727.78 cft
	Total:					**1526.67 cft**
2	**PCC in foundation**					
	Long Wall:	2	59’11”	2’8”	3”	79.89 cft
	Short Wall:	2	54’7”	2’8”	3”	72.78 cft
	Total:					**152.67 cft**
3	**Brick Masonry in foundation:**					
	Long Walls:					
	First Step: L = 59’11” – 14” = 58’9”	2	58’9”	18”	7”	102.23 cft
	Second Step: L = 58’9” – 4” = 58’5”	2	58’5”	14”	14”	159.94 cft
	Short Walls:					
	First Step: L = 54’7” + 14” = 55’9”	2	55’9”	18”	7”	97.56 cft
	Second Step: L = 55’9” + 4” = 56’1”	2	56’1”	14”	14”	152.67 cft
	Total:					**512.4 cft**

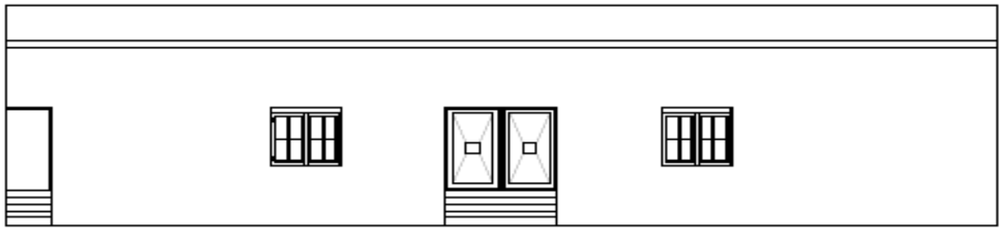
4	**Brick Masonry Upto Coping:**					
	Long Walls:					
	L = 58'5" – 5" = 58'	2	58'	9"	14"	101.5 cft
	Short Walls:					
	L = 56'1" + 5" = 56'6"	2	56'6"	9"	14"	98.88 cft
	Total:					**200.38 cft**
5	**RCC Coping:**					
	Long Wall:	2	58'	9"	6"	43.5 cft
	Short Wall:	2	56'6"	9"	6"	42.38 cft
	Total:					**85.88 cft**
6	**Brick Masonry above Coping:**					
	Long Wall:	2	58'	9"	2'10"	246.5 cft
	Short Wall:	2	56'6"	9"	2'10"	240.13 cft
	Total:					**486.63 cft**
a)	**Deduction for Main Gate:**					
	G	1	7'	9"	4'	**21 cft**
	Net Quantity:					
	486.63 – 21 =					**465.63 cft**
7	**Plaster:**	8	56'6"		4'	1808 sqft
	Deduction for gate:	2	7'		4'	56 sqft
	Net Quantity: 1808 – 56 =					**1752 sqft**
8	**Earth Filling:**					
	1526.67 – 152.67 – 512.4 =					**861.6 cft**

Table 22 Abstract Sheet of Public Garden

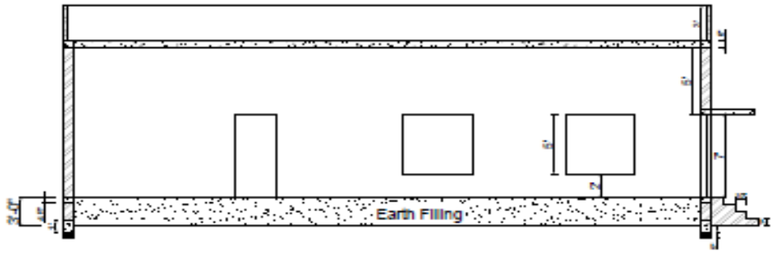
Sr. No.	Description of Item	Quantity	Unit	Rate	Per	Estimated Cost
1	Excavation for foundation	1526.67	Cft	5	Cft	7633.35
2	PCC (1:4:8) in foundation	152.67	Cft	40	Cft	6106.8
3	Earth filling	861.6	Cft	10	Cft	8616
4	Brick Masonry	1199.41	Cft	150	Cft	179911.5
5	Paver Concrete Block	874	Sqft	50	Sqft	43700
6	Plaster Work	1752	Sqft	35	Sqft	61320
7	Tree Plantation	4	Nos.	60	Nos.	240
8	Bench	3	Nos.	5300	Nos.	15900
9	Slide	1	Nos.	18000	Nos.	18000
10	See-Saw	1	Nos.	10000	Nos.	10000
11	Swings	2	Nos.	50000	Nos.	100000
12	Trampoline	1	Nos.	25000	Nos.	25000
		Total materials and labour cost				4,76,427.65
		1.5 % Water Charges				7146
		10% Contractor Profit				47,643
		Total Estimation				5,31,216.65
		Say Total				Rs. 5,31,216

13.1.3 Design Proposal of Community Hall

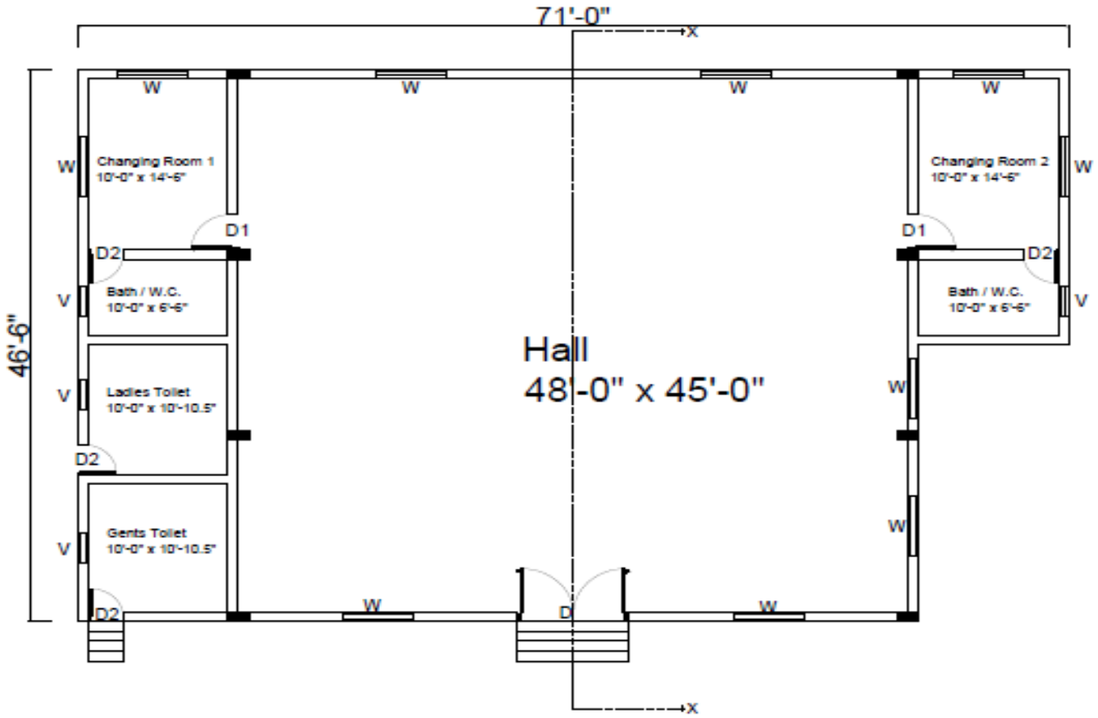
For any village having a community hall is a very important facility for organizing any event or function. In our allocated village there is a community hall but it is in very dangerous condition and can't be used. Apart from damage in plaster and walls there is also damage in foundation. So, we decided to design a new community hall for the village. We decided to design a community hall with all basic facilities like changing room and toilet. We have designed community hall of 71' x 46'6". Here we have provided main hall of 48' x 45'. We have also provided two changing for gents and ladies separately with attach toilet/bath of 10' x 14'6" having toilet/bath of 10' x 6'6". We have also provided toilets for the guests of 10' x 10'10.5" each. We have given plan, elevation and section for the community hall along with foundation plan. We have also given measurement sheet and abstract sheet for proposed construction of community hall. The estimated cost for the construction of community hall is **Rs. 24,08,360.**



Elevation



Section X-X



Community Hall Plan

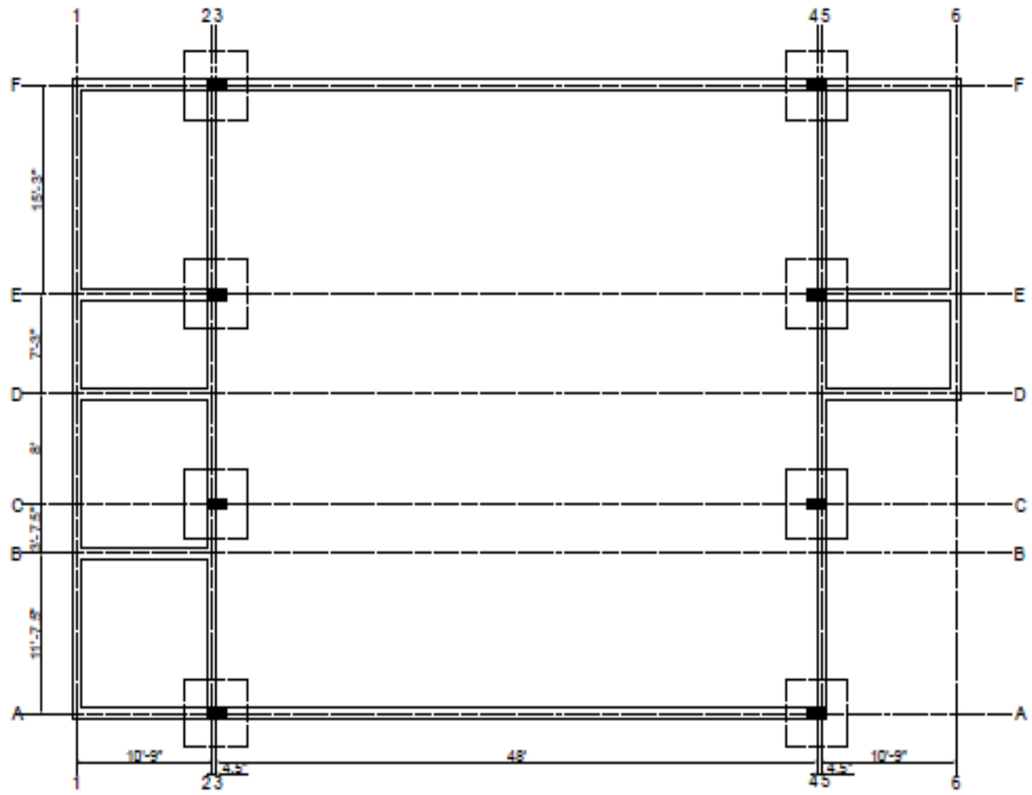
Opening Schedule	
D	8'-0" x 7'-0"
D1	3'-0" x 7'-0"
D2	2'-6" x 7'-0"
W	5'-0" x 5'-0"
V	2'-6" x 2'-6"

NOTES :-

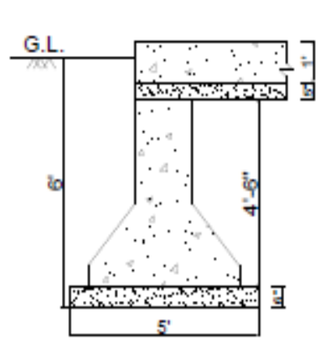
1) DO NOT SCALE THE DRG.ONLY WRITTEN DIMENSION SHALL BE FOLLOWED.
2) UNLESS OTHERWISE SPECIFIED ALL THE CONCRETE SHOULD BE MIXED IN PROPORTION OF M-20 GRADE.
3) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	Community Hall
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KRUNAL N. PATEL (161350106008)
	ZEEL D. SOLANKI (161353106004)

Figure 40 Plan, Elevation and Section of Community Hall



Setting Out Work Layout



Foundation Details

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	Community Hall (Foundation Details)
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KRUNAL N. PATEL (161350106008)
	ZEEL D. SOLANKI (181353106004)

Figure 41 Centerline Plan of Community Hall

Table 23 Measurement Sheet of Community Hall

Item No.	Description of Item	No.	L (feet inches)	B (feet inches)	H (feet inches)	Quantity
1	**Excavation for foundation**					
	For Columns	8	5’	5’	6’	1200 cft
	For Trenches					
	LW	3	46’6”	9”	1’	104.63 cft
	SW1	2	48’	9”	1’	73.13 cft
	SW2	8	10’	9”	1’	60 cft
	SW3	1	21’9”	9”	1’	16.31 cft
						254.07 cft
	Deduction for Columns					
	LW	4	9”	9”	1’	2.25 cft
	SW	4	9”	18”	1’	4.5 cft
						6.75 cft
	Net Excavation for Trenches					247.32 cft
	Total					**1447.32 cft**
2	**PCC in Foundation**					
	For columns	8	5’	5’	6”	100 cft
	For trenches	1	332’9”	9”	5”	103.98 cft
	Total					**203.98 cft**
3	**RCC Columns**	1				**177.04 cft**

4	**RCC Ground Beam**	1	332’9”	9”	1’	**249.56 cft**
5	**Earth Filling: 1447.32 – 203.98 – 177.04- 249.56 =**					**816.74 cft**
6	**Masonry up to plinth**	1	332’9”	9”	2’6”	**623.91 cft**
7	**RCC Plinth**	1	332’9”	9”	4.5”	**93.59 cft**
8	**Masonry up to lintel**	1	332’9”	9”	7’	1746.94 cft
	Deduction for doors and windows					
	D	1	8’	9”	7’	42 cft
	D1	2	3’	9”	7’	31.5 cft
	D2	4	2’6”	9”	7’	52.5 cft
	W	10	5’	9”	5’	187.5 cft
	V	4	2’6”	9”	2’6”	18.75 cft
	Total Deduction					332.25 cft
	Net Quantity for Masonry up to lintel: 1746.94 – 332.25 =					**1414.69 cft**
9	**RCC Lintel**	1	332’9”	9”	6”	**124.78 cft**
10	**Masonry up to slab**	1	332’9”	9”	4’6”	1123.03 cft
	Deduction for beam	8	9”	9”	2’	9 cft

	Net Quantity for Masonry up to slab: 1123.03 – 9 =					**1114.03 cft**
11	**RCC Beam**	4	49’6”	9”	2’6”	**371.25 cft**
12	**RCC Slab**					
	S1	1	60’3”	46’6”	6”	1400.81 cft
	S2	1	10’9”	23’3”	6”	124.97 cft
	Total					**1525.78 cft**
	Deduction for beam	4	49’6”	9”	6”	**74.25 cft**
	Net Quantity for slab: 1525.78 – 74.25 =					**1451.53 cft**
13	**Parapet Wall**					
	LW	2	60’3”	4.5”	3’	135.56 cft
	SW1	1	46’6”	4.5”	3’	52.31 cft
	SW2	2	10’9”	4.5”	3’	24.19 cft
	SW3	1	21’9”	4.5”	3’	24.47 cft
	SW4	1	22’6”	4.5”	3’	25.31 cft
	Total					**261.84 cft**
14	**Plaster (Interior)**					
	Hall (LW)	2	48’		12’	1152 sqft
	Hall (SW)	2	45’		12’	1080 sqft
	Changing Room (LW)	4	14’6”		12’	696 sqft
	Changing Room (SW)	4	10’		12’	480 sqft

	Bath (LW)	4	10’		12’	480 sqft
	Bath (SW)	4	6’6”		12’	312 sqft
	Toilet (LW)	4	10’10.5”		12’	522 sqft
	Toilet (SW)	4	10’		12’	480 sqft
	Total					5202 sqft
	Deduction for doors and Windows					
	D	½	8’		7’	28 sqft
	D1	2	3’		7’	42 sqft
	D2	3	2’6”		7’	52.5 sqft
	W	5	5’		5’	125 sqft
	V	2	2’6”		2’6”	12.5 sqft
	Total Deduction					260 sqft
	Net Quantity of interior plaster: 5202 – 260 =					**4942 sqft**
15	**Plaster (Exterior)**					
	LW	2	60’3”		15’	1807.5 sqft
	SW1	1	46’6”		15’	697.5 sqft
	SW2	2	23’3”		15’	697.5 sqft
	SW3	2	10’9”		15’	322.5 sqft
	Total					3525 sqft
	Deduction for doors and windows					
	D	½	8’		7’	28 sqft
	D3	1	2’6”		7’	17.5 sqft
	W	5	5’		5’	125 sqft
	V	2	2’6”		2’6”	12.5 sqft
	Total Deduction					183 sqft

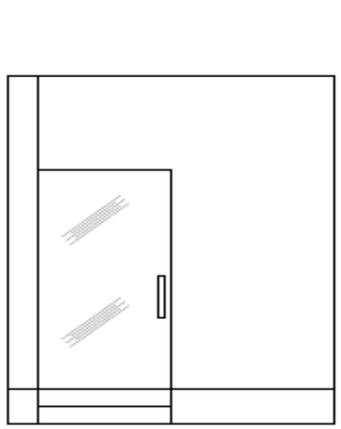
	Net Quantity of exterior plaster: 3525 – 183 =					**3342 sqft**
16	**Flooring**					
	Hall	1	48’	45’		2160 sqft
	Changing Room	2	10’	14’6”		290 sqft
	Bath	2	10’	6’6”		130 sqft
	Toilet	2	10’	10’10.5”		217.5 sqft
	Net Quantity:					**2797.5 sqft**

Table 24 Abstract Sheet of Community Hall

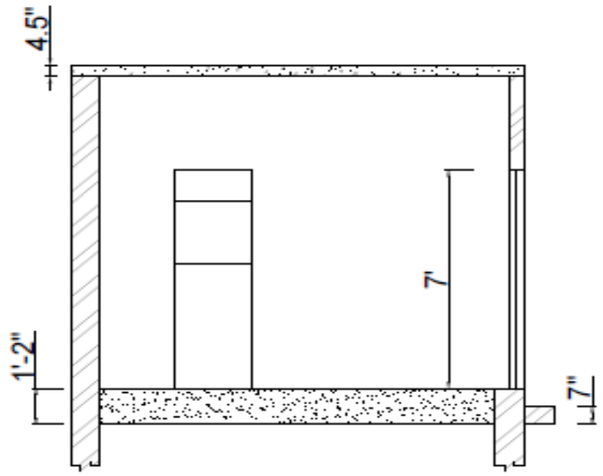
Sr. No.	Description of Item	Quantity	Unit	Rate	Per	Estimated Cost
1	Excavation for foundation	1447.32	Cft	5	Cft	7236.6
2	PCC (1:4:8) in foundation	203.98	Cft	40	Cft	8159.2
3	Earth filling	816.74	Cft	10	Cft	8167.4
4	Brick Masonry	3414.47	Cft	150	Cft	512170
5	RCC Work	2467.75	Cft	450	Cft	1110487
6	Plaster Work	8284	Sqft	35	Sqft	289940
7	Flooring	2797.5	Sqft	80	Sqft	223800
		Total materials and labour cost				21,59,960.2
		1.5 % Water Charges				32,399.4
		10% Contractor Profit				2,15,996.02
		Total Estimation				24,08,355.62
		Say Total				Rs. 24,08,360

13.1.4 Design Proposal for ATM Space

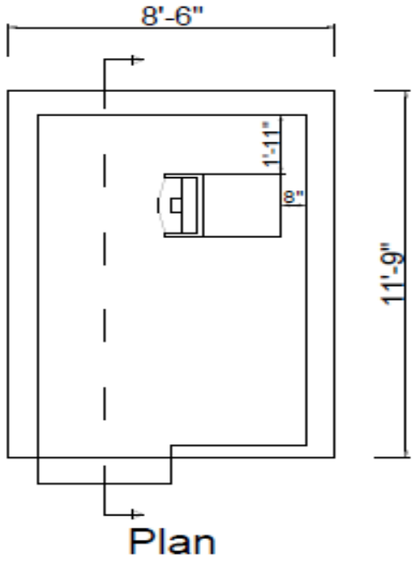
In our allocated village there is no facility from where villagers can withdraw cash. To withdraw cash, they either go to bank or ATM in Borsad city which is 9km away from village Dahemi. So, we decided to provide an ATM space facility for the village Dahemi for their convenience. We have provided the space for ATM of 8'6" x 11'9". We have given AutoCAD design for the same and also measurement sheet as well as abstract sheet. The estimated cost for the construction of ATM Space is about **Rs. 96,000.**



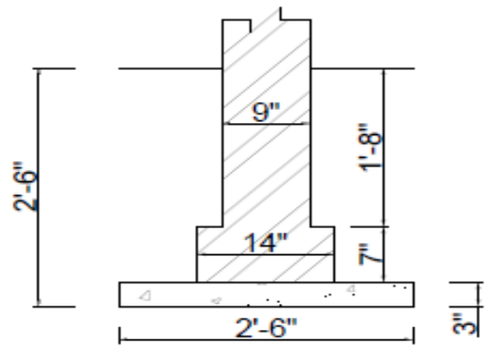
Elevation



Section



Plan



Foundation Detail

NOTES :-

1) DO NOT SCALE THE DRG.ONLY WRITTEN DIMENSION SHALL BE FOLLOWED.
2) UNLESS OTHERWISE SPECIFIED ALL THE CONCRETE SHOULD BE MIXED IN PROPORTION OF M-20 GRADE.
3) ALL LOAD BEARING BRICK MASONARY WALL IN CEMENT MORTAR IN PROPORTION OF 1:6.

INSTITUTE NAME	KNOWLEDGE INSTITUTE OF TECH. & ENGG.
UNIVERSITY	GUJARAT TECHNOLOGICAL UNIVERSITY
PROJECT	VISHWAKARMA YOJNA (PHASE - VIII)
DRAWING NAME	ATM
GUIDED BY.	PROF DIVYESH MANDALI
PREPARED BY.	KRUNAL N. PATEL (161350106008)
	ZEEL D. SOLANKI (181353106004)

Figure 42 Plan, Elevation and Section of ATM Space

Table 25 Measurement Sheet of ATM Space

Item No.	Description of item	No.	L (feet inches)	B (feet inches)	H (feet inches)	Quantity
1	**Excavation for foundation**					
	Long Walls:					
	L = 11’ + 2’6” = 13’6”	2	13’6”	2’6”	2’6”	168.75 cft
	H = 2’6”					
	Short Walls:					
	L = 7’9” – 2’6” = 5’3”	2	5’3”	2’6”	2’6”	65.63 cft
	H = 2’6”					
	Total:					**234.38 cft**
2	**PCC in Foundation**					
	Long Wall:	2	13’6”	2’6”	3”	16.88 cft
	Short Wall:	2	5’3”	2’6”	3”	6.56 cft
	Total:					**23.44 cft**
3	**Brick Masonry upto plinth level**					
	Long Wall:					
	First Step: L = 13’6” – 1’4” = 12’2”	2	12’2”	14”	7”	16.56 cft
	Second Step: L = 12’2” – 5” = 11’9”					
	H = 1’8” + 1’2” = 2’10”	2	11’9”	9”	2’10”	49.94 cft
	Short Wall:					
	First Step: L = 5’3” + 1’4” = 6’7”	2	6’7”	14”	7”	8.96 cft
	Second Step: L = 6’7” + 5” = 7’	2	7’	9”	2’10”	29.75 cft
	Total					**105.21 cft**

4	**Earth filling: 234.38 – 23.44 – 105.21 =**					**105.73 cft**
5	**Brick Masonry above plinth upto slab:**					
	Long Wall:	2	11’9”	9”	10’	176.25 cft
	Short Wall	1	7’	9”	10’	52.5 cft
	Total:					**228.75 cft**
6	**RCC Slab**	1	8’6”	11’9”	4.5”	**37.45 cft**
7	**Plaster**					
	Long Wall:	2	10’8”		10’	213.14 sqft
	Short Wall:	1	7’		10’	70 sqft
	Total:					**283.14 sqft**
8	**Flooring**	1	7’		10’8”	**74.69 sqft**

Table 26 Abstract Sheet for ATM Space

Sr. No.	Description of Item	Quantity	Unit	Rate	Per	Estimated Cost
1	Excavation for foundation	234.38	Cft	5	Cft	1171.9
2	PCC (1:4:8) in foundation	23.44	Cft	40	Cft	937.6
3	Earth filling	105.73	Cft	10	Cft	1057.3
4	Brick Masonry	333.96	Cft	150	Cft	50094
5	RCC Work	37.45	Cft	450	Cft	16852.5
6	Plaster Work	283.14	Sqft	35	Sqft	9909.9
7	Flooring	74.69	Sqft	80	Sqft	5975.5
		Total materials and labour cost				85,998.4
		1.5 % Water Charges				1,289.7
		10% Contractor Profit				8600
		Total Estimation				95,888.37

		Say Total	Rs. 96,000

13.1.5 Design Proposal of Primary School

Having a primary school for any village is very important. In our allocated village there is a primary school but it is in very bad condition. Students ae afraid of studying in the school and also teachers are afraid due to the bad condition as school is too old. Talking with the principal of the school we came to know that the school is very old and in very bad condition which cannot be renovated. So, we decided to design a new primary school for our allocated village. We have designed only school building because the toilets and boundary wall of the school is recently constructed. We have designed primary school of 144’ x 60’9”. We have designed the3 school of G+1 floor. We have provided total 8 classes for the school of 24’ x 20’ each. We have provided separate staff rooms for male and female staff of 15’ x 15’ each. We have provided principal office of 15’ x 15’. We also have given a store room of 15’ x 15’. We have provided kitchen for the mid-day meal of 15’ x 15’ having its separate store room of 15’ x 12’. We have also provided separate common rooms for boys and girls of 15’ x 20’ each. As per the requirement of the staff we also have provided a multipurpose practical lab of 21’ 31’9”. We have given the AutoCAD design and measurement sheet as well as abstract sheet for the proposed construction of the school building. The estimated cost of construction of school is about **Rs. 65,68,340.**

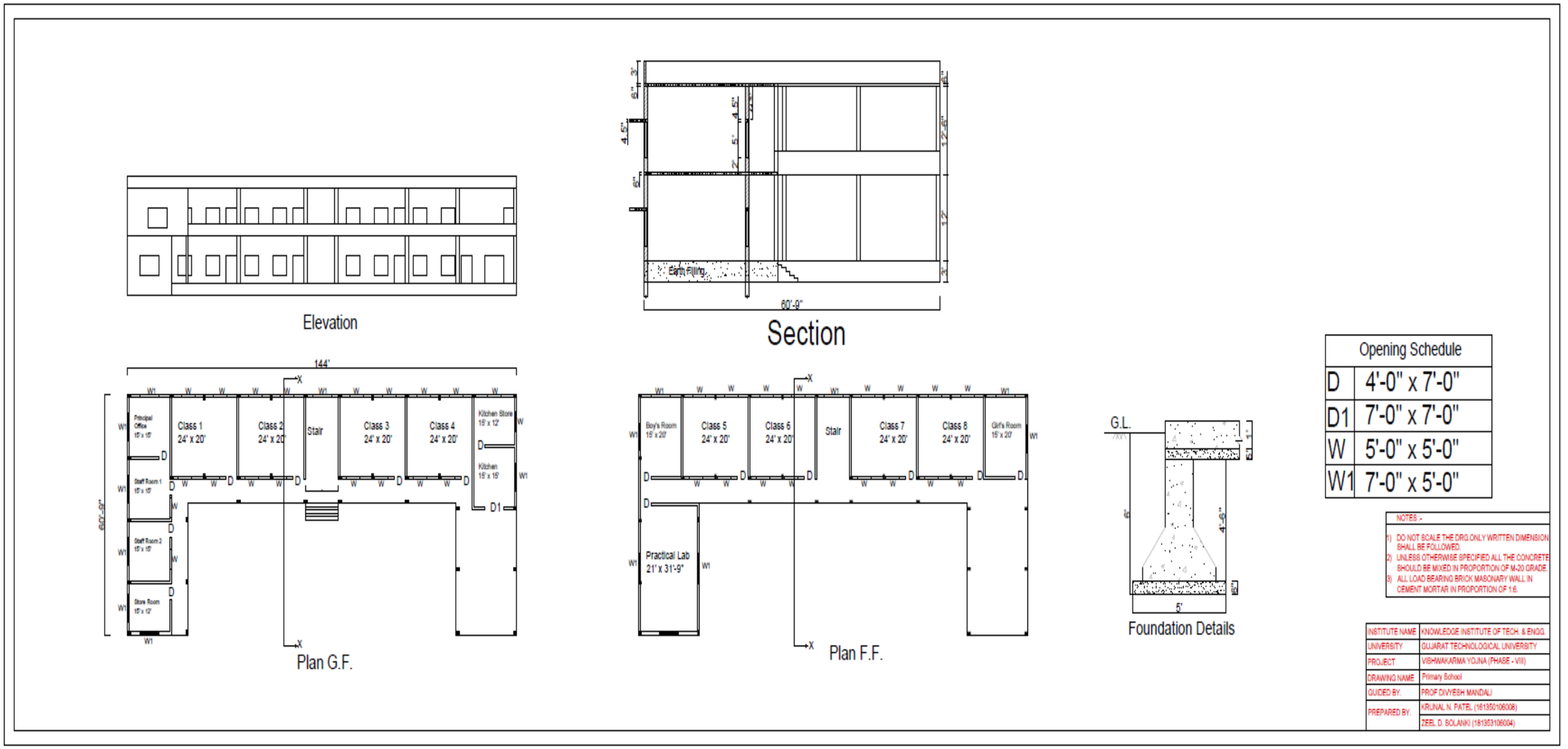


Figure 43 Plan, Elevation and Section of Primary School

Table 27 Measurement Sheet of Primary School

Item No.	Description of Item	No.	L (feet inches)	B (feet inches)	H (feet inches)	Quantity
1	**Excavation for foundation**					
	For Columns	36	5’	5’	6’	5400 cft
	For Trenches					
	LW	1	144’	9”	1’	108 cft
	SW1	3	60’	9”	1’	135 cft
	SW2	2	33’3”	9”	1’	49.88 cft
	SW3	1	99’	9”	1’	74.25 cft
	SW4	4	20’	9”	1’	60 cft
	SW5	1	110’6”	9”	1’	82.88 cft
	SW6	1	27’9”	9”	1’	20.81 cft
	SW7	6	15’	9”	1’	67.5 cft
	SW8	1	27’9”	9”	1’	20.81 cft
	Deduction for columns	36	9”	15”	1’	33.75 cft
	Net Excavation for Trenches					585.38 cft
	Total					**5985.38 cft**
2	**PCC in Foundation**					
	For columns	36	5’	5’	6”	450 cft
	For trenches	1	825’6”	9”	5”	257.97 cft
	Total					**707.97 cft**

3	**RCC Column upto GL**	1				**833.76 cft**
4	**RCC Ground Beam**	1	825’6”	9”	1’	**620 cft**
5	**Earth Filling: 5985.38 – 707.97 – 833.76 – 620 =**					**3823.65 cft**
6	**Masonry upto plinth**	1	825’6”	9”	2’6”	**1547.8 cft**
7	**RCC Plinth**	1	825’6”	9”	4.5”	**232.17 cft**
8	**RCC Column**	36	9”	15”	25’	**843.75 cft**
9	**Masonry upto lintel**	1	589’3”	9”	7’	3093.56 cft
	Deduction for doors and windows					
	D	1	7’	9”	7’	36.75 cft
	D1	9	4’	9”	7’	189 cft
	W	20	5’	9”	5’	375 cft
	W1	8	7’	9”	5’	210 cft
	Total Deduction					810.75 cft
	Net Quantity for masonry upto lintel: 3093.56 – 810.75 =					**2282.81 cft**
10	**RCC Lintel**	1	589’3”	9”	6”	**220.97 cft**
11	**Masonry upto slab**	1	589’3”	9”	4’6”	**1988.72 cft**

12	**RCC Slab**					
	S1	2	60’9”	22’6”	6”	1366.88 cft
	S2	1	26’9”	99’	6”	1324.13 cft
	Total					**2691.01 cft**
13	**Masonry above slab upto lintel**	1	519’9”	9”	7’	2728.69 cft
	Deduction for doors and windows					
	D	7	4’	9”	7’	147 cft
	W	16	5’	9”	5’	300 cft
	W1	7	7’	9”	5’	183.75 cft
	Total Deduction					630.75 cft
	Net Quantity: 2728.69 – 630.75 =					**2097.94 cft**
14	**RCC Lintel**	1	519’9”	9”	6”	**194.9 cft**
15	**Masonry upto slab**	1	519’9”	9”	4’6”	**1754.16 cft**
16	**Parapet Masonry for First Floor**	1	194’3”	4.5”	3’	**218.53 cft**
17	**RCC Slab**					**2691.01 cft**
18	**Parapet Wall**					
	LW	1	144’	4.5”	3’	164.16 cft

	SW1	2	60’	4.5”	3’	136.8 cft
	SW2	1	99’	4.5”	3’	112.86 cft
	SW3	2	33’3”	4.5”	3’	75.81 cft
	SW4	2	21’	4.5”	3’	47.88 cft
	Total					**537.51 cft**
19	**Plaster**					
	Class (L)	16	20’		12’	3840 sqft
	Class (B)	16	24’		12’	4608 sqft
	Offices& Kitchen(L)	8	15’		12’	1440 sqft
	Office& Kitchen (B)	8	15’		12’	1440 sqft
	Store(L)	4	12’		12’	576 sqft
	Store(B)	4	15’		12’	720 sqft
	Common Room(L)	4	20’		12’	960 sqft
	Common Room(B)	4	15’		12’	720 sqft
	Lab(L)	2	31’9”		12’	762 sqft
	Lab(R)	2	21’		12’	504 sqft
	Total					**15750 sqft**
	Deduction for door and window					
	D	½	7’		7’	24.5 sqft
	D1	18	4’		7’	504 sqft
	W	15	7’		5’	525 sqft
	W1	36	5’		5’	900 sqft
	Total Deduction					**1953.5 sqft**
	Net Quantity of plaster: 15750 – 1953.5 =					**13796.5 sqft**

Table 28 Abstract Sheet of Primary School

Sr. No.	Description of Item	Quantity	Unit	Rate	Per	Estimated Cost
1	Excavation for foundation	5985.38	Cft	5	Cft	29926.9
2	PCC (1:4:8) in foundation	707.97	Cft	40	Cft	28318.8
3	Earth filling	3823.65	Cft	10	Cft	38236.5
4	Brick Masonry	10427.47	Cft	150	Cft	1564120.5
5	RCC Work	8327.57	Cft	450	Cft	3747406.5
6	Plaster Work	13796.5	Sqft	35	Sqft	482877.5
		Total materials and labour cost				58,90,886.7
		1.5 % Water Charges				88.363.3
		10% Contractor Profit				5,89,088.6
		Total Estimation				65,68,338.67
		Say Total				Rs. 65,68,340

13.1.6 Design Proposal of Biogas plant

The use of renewable energy resources is a very good thing and it can help saving natural resources. But in our allocated village no one is using such resources. So, we decided to provided biogas plant in the village to encourage the villagers. We have designed by taking in account one of the villagers who has 20 cattle. The estimated cost for construction of single bio gas plant is Rs. 55,000 /-

Design Calculation: -

As per survey, Number of animals to one of the villagers, = 20

As per standard data, per day dung of an animal = 10 Kg

So, total per day dung = 200 Kg/day

Calculation,

Assume retention period (R_T) = 60 days

Assume mixing proportion of solid and water is 1:1

Now total amount of slurry per day (S_d) = Total per day dung + Water amount

= 200 + 200

= 400 kg/day

= 400 lit/day

= 0.4 m^3/day

Digester Volume (V_d) = S_d x R_T

= 0.4 x 60

= 24 m^3

Assume cylinder shaped bio gas plant. So, digester volume becomes for one unit

Total digester volume (V_d) = πr^2h

24 = πr^2 x 2.4 (Assume h = 2.4m)

So, R = 1.784 m

So, dimensions of digestor are h = 2.4 m and R = 1.8 m

Design of Gas Holder:

Assume digester temperature = 26 – 28 °C

Now find G_d by taking R_T = 60 days

Specific Gas production G_d = 34 lit/kg/day

Daily gas production G = G_d x feed volume

= 34 x 300

= 10200 lit

= 10.20 m^3

Now assume gas holder capacity = 60%

Gas holder volume = Daily gas production x Capacity of holder

= 10.20 x 0.60

= 6.12 m^3

So, take gas holder volume = 6.2 m^3

Provide cylinder shaped holder So,

Volume = πr^2h

6.20 = π x r^2 x 0.5 (Assume h = 0.5 m)

r = 1.98 m

Design of inlet & outlet:

Total volume of slurry mixes per unit = 0.4 m^3/day

Assume single time filling operation in plant

So, take total volume of slurry = 0.4 m^3/day

Provide rectangular tank So,

Total volume for one time mixing of slurry = L x B x H

0.30 = L x B x H (take H = 0.5 m)

Assume rectangular chamber with proportion width: length = 1:1.5

So, 0.30 = 1.5B x B x 0.5

B = 0.88

Provide B = 0.90

Hence L = 1.0

Dimension of inlet are L = 1.0 m

B = 0.9 m

H = 0.5 m

Here 0.4 m^3/day required < 0.45 m^3/day provided.

Provide same size for outlet tank also.

Table 29 Measurement Sheet of Biogas Plant

Item No.	Description of Item	No.	L(m)	B(m)	H (m)	Quantity
1	**Excavation for foundation**					
	Inlet chamber	1	0.9	1.2	0.25	0.270

		1	0.7	0.7	0.25	0.122
		1	0.7	0.7	0.75	0.367
	Digester chamber	1				27.202
	Outlet chamber	1	0.9	1.00	1.0	0.9
	For Inlet and Outlet Pipe	2	0.9	0.3	0.8	0.432
	Total:					**29.2936 m^3**
2	**PCC in foundation**					
	Inlet chamber	1	0.9	1.2	0.1	0.108
		1	0.7	0.7	0.1	0.049
		1	0.7	0.7	0.1	0.047
	Digester Chamber	1.1				1.286
	Outlet Chamber	1	0.9	1.0	0.1	0.09
	Total:					**1.585 m^3**
3	**Cement Concrete for foundation**					
	Inlet Chamber	1	0.9	1.2	0.23	0.248
		1	0.7	0.7	0.23	0.112
		1	0.7	0.7	0.23	0.112
	Digester Chamber	1.1				2.960
	Outlet Chamber	1	0.9	1.00	0.23	0.207
	Total:					**3.639** m^3

4	**Masonry Work**					
	Inlet Chamber	1	4.8	0.1	0.5	0.240
		1	1.4	0.1	0.7	0.098
		1	12.12	0.23	1.77	4.934
	Digester Chamber	1	12.12	0.23	1.77	4.934
		1	17.34	0.10	0.45	0.780
	Outlet Chamber	1	3.80	0.10	0.85	0.323
	Total:					**6.375 m^3**
5	**Plastering double coat water proof**					
	Inlet chamber	1	3.4		0.5	1.7
		1	2.8		1.15	3.22
	Digester Chamber	1	21.36		1.77	37.807
		1	23.00		1.00	23.00
	Outlet Chamber	1	3.4		0.85	2.890
	Total:					**68.617 m^2**
6	**200 mm dia. Pipe required**	1				**2.33 m**
7	**Mechanical mixing unit**	1				**1 unit**

Table 30 Abstract Sheet of Biogas Plant

Sr. No.	Description of Item	Quantity	Unit	Rate	Per	Estimated Cost
1	Excavation for foundation	29.293	Cum	93.20	Cum	2730.1
2	PCC in foundation	1.582	Cum	1898	Cum	3002.63
3	Cement Concrete Work	3.639	Cum	3327	Cum	12106.95
4	Masonry Work	6.375	Cum	3242	Cum	20667.75
5	Plaster Work	68.617	Sqm	137	Sqm	9400.53
6	RCC Heavy duty Pipe	2.33	Rmt	250	Rmt	582.5
		Total materials and labour cost				48,490.46
		1.5 % Water Charges				727.35
		10% Contractor Profit				4,849.04
		Total Estimation				54,066.85
		Say Total				Rs. 55,000

13.2 Reasons for Students Recommending this Design

1) Aanganwadi: -

In our allocated village there are many Aanganwadi. But all are in bad condition and does not have proper facilities for toilet, kitchen and playing area for the children. We also interviewed some villagers and staff of Aanganwadi regarding the same. Then we came to conclusion that we should design an Aanganwadi for the village with all the required facilities like kitchen, toilet, etc.

2) Public Garden: -

As we know that for any village having a recreational centre is very important thing. But, in our allocated village there is no recreational centre like park, garden, gym, etc. So, villagers do not have any facility for their leisure time. Children do not have any park to play and elders do not have any place for evening or morning walk or for their leisure time. So, we decided to design a public garden for the village.

3) Community Hall: -

Our allocated village Dahemi have a community hall when we enter the village. But the community hall is in very bad condition. The hall is damaged from everywhere. There are cracks in walls, ceilings. The plaster is also coming down. But the most dangerous thing due to which it can't be used is damage in its foundation pillar. So we decided to design a community hall for the village.

4) ATM Space: -

Having a cash withdrawal facility in village is important for the convenience of the villagers. But there is no such facility in our allocated villagers. The villagers living in Dahemi village have to go to Borsad city which is 9km away for the purpose of cash withdrawal. So, we decided to provide the ATM space for the convenience of the villagers.

5) Primary School: -

In our allocated village there is government primary school. But the school is in very bad condition. The school is too old and there is no renovation work done from many years. So, the school is in very bad and dangerous condition. The school was in not the condition which can be renovated. So, we decided to design a new primary school for the village.

6) Biogas Plant: -

Nowadays it is very important to use natural resources for daily needs like using solar plant, biogas plant, etc. But in our allocated village no one is using such technology. So, we decided to spread awareness for using such technology in our allocated village. For the same we decided to design a biogas plant.

13.3 About designs Suggestions / Benefit of the villagers

- Aanganwadi will help toddlers learn and grow up at a safe and sound place.
- Public garden will be like a gift for all the villagers as it will provide space for the children to play and to elder for morning or evening walk and also place for leisure activities.
- Community will provide villagers a place for organizing their events and functions.
- Having ATM in the village will help people withdraw cash at their convenience.
- Redesigning a primary school will provide safe and new school to the students and a better place to study.
- Biogas plant will encourage the villagers to use natural resource for their need of gas or electricity.

Chapter. 14 Technical Options with Case Studies

14.1 Civil Engineering

14.1.1 Advanced Earthquake Resistant Techniques

Earthquakes are known to have tremendous potential in causing a devastating impact on the built environment and human life. India has witnessed over 9 severe earthquakes in the last two decades between 1990 and 2010 and reports claim the death rate to be around 30000. Although certain parts of the country are more prone to earthquakes (seismic zone V of IS 1893(Part 1)- 2016) than the rest, no region can be considered as free from earthquakes. In the Indian scenario, multiple microearthquakes are reported near the subduction zone (Himalayan belt) on a daily basis, whereas in the intraplate region (Deccan plateau) few major earthquakes have been witnessed over the years. The performance of the built environment during the past earthquakes has demonstrated its fragile nature and has created an urge among the engineers and architects to move towards seismically efficient buildings.

The majority of the Indian landmass (about 60%), is susceptible to moderate to very severe earthquakes. A great earthquake in an uninhabited area may produce minimal damage when compared to a moderate earthquake in a densely populated area. All the field survey studies conducted after a major earthquake implied that the maximum casualties reported were caused by building collapse. The lack of earthquake knowledge and its incorporation in the building design and execution leads to failure of buildings. A large part of the rural and urban dwellings are low rise non engineered buildings and these suffer maximum damage.

During an earthquake, the seismic waves propagate in all directions. However, among the various components, the horizontal vibration is considered to be most predominant in causing structural failure. The seismic waves tend to move the foundation of a building inducing inertial forces is various structural elements. The seismic performance of a structure during an earthquake depends on its overall shape, size, geometry and the nature of load path. The seismic design philosophy aims to ensure safety to structural components and human life. It states that the load-bearing structural elements must suffer no damage in the event of a (frequent) minor shaking, sustain reparable damage in the event of (occasional) moderate shaking and sustain severe damage without collapse under (rare) strong shaking.

The present paper outlines the building typologies encountered in the Indian subcontinent and their performance during earlier earthquakes. A glance through the current earthquake-safe construction practices has been attempted. Further, a brief description of the future trends in making buildings more resilient to earthquakes has been provided. Overall, in addition to effective and efficient seismic design philosophies, it is necessary to ensure strict code-compliant structural design and construction practices.

According to the census of India, there are over 330 million housing units in the country, with 2/3rd of these being rural houses. The Geological survey of India has classified the country into four seismic zones with varying seismic potential.

Different Earthquake resistant Construction Techniques

Earthquake resistant construction Practices for Masonry Structure:

To ensure good seismic performance, the following conditions must be applied:

a) Walls are the weaker components and when loaded in its weaker direction can lead to failure. In order to prevent this type of failure, it is necessary to ensure that a good bond exists between adjacent walls so that loaded in their weak direction can take advantage of the good lateral resistance offered by walls loaded in their strong direction. In addition, the tendency of a wall to topple when pushed in the weak direction can be reduced by limiting its length-to-thickness and height to thickness ratios.

b) The window and door openings serve as a weak spot in masonry walls and hence, the size of the openings must be restricted to a minimum value. Steel bars must be provided in the wall all around the openings to restrict the initiation and propagation of cracks.

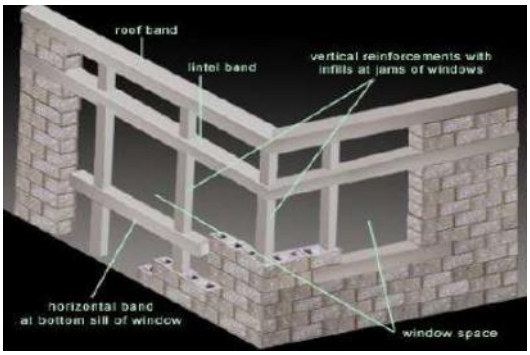
c) The vulnerability of the junction can be improved by ensuring good interlocking of the masonry courses.

d) Low porosity bricks must be used and they have to be pre-soaked before use to minimize the amount of water drawn from the mortar.

e) The strength of the mortar binding the bricks is also one of the crucial contributing factors. In this regard, cement-sand mortar with lime is the most preferred mixture as this mortar mix provides excellent workability for laying bricks, stretches without crumbling at low earthquake shaking and bonds well with bricks.

f) During Bhuj earthquake, building configuration similar to that of a box type structure performed well with minimal damages. This box action is possible only when the walls are tied to the roof and foundation to preserve their overall integrity.

g) To ensure box type action, horizontal seismic bands are provided and these bands tie all the walls together. There are four types of bands in typical masonry building, namely gable band, roof band, lintel band and plinth band as shown in below figure. The IS:4326-2016 and IS:13828 (1993) provide sizes and details of the bands.



h) The vertical reinforcement bars are embedded in the edges of the wall piers and anchored to the foundation at the bottom and in the roof band at the top.

i) Most of construction practices involve, erecting columns and beams, followed by the stacking up masonry. This method leads to diagonal tension in the infill walls and leads to spalling to the material. Hence, an alternate way to ensure earthquake resistance of RC frames with brick infill is Confined masonry. This construction technique is exactly opposite of the conventional method. The walls are built first and the concrete is poured into the tie columns and beams. This produces a structure of optimal capacity and it is also safe to build multistorey building in seismic prone

areas. A typical example of confined masonry is the faculty quarters and student's hostel in IIT Gandhinagar.

j) With the advancement of our knowledge and technology, more innovative products are being introduced into the market. The patented Porotherm seismic clay block is a brick specially designed for seismic applications. It has a unique shape vertical mortar pocket with a window that provides a tooth-like the connection between the block and the mortar in the butt joint. This creates an excellent bond between the mortar and increases mechanical strength. Buildings built using these blocks can withstand the horizontal displacements resulting due to ground motion.

k) Another invention contributing to the improved seismic resistance of masonry buildings is SISBRICK. This is a special type of brick specifically designed for partition walls. This brick can withstand lateral forces up to three times the usual brick and act as an isolator by arresting the transfer of forces from the partition wall to the main wall. The product has been patented and hence, not much information about the material that goes into making these is available. It possesses certain orthotropic properties, enabling it to resist loads in the desired direction. With this absorption of movements and presenting less rigidity than the brick partition and the structure of the building, it hinders the formation of diagonal compression rods that cause damage to the heads and bases of the pillars, and damage to the partition. These bricks arranged in a specific manner leads to a smaller number of required bricks to achieve seismic isolation.

Earthquake resistant construction practices for RC buildings

The modern construction has been replacing the traditional masonry building units with RC buildings. Concrete can be poured into any mould of desirable shape and the steel imparts the necessary tensile strength to the structure. As a result, RC buildings find wide applications and are commonly adopted in towns and cities. The RC frame is the major lateral load resisting unit in a structure. The inertial forces induced by earthquakes are proportional to the mass and these forces are transferred from one building component to another and get accumulated near the base of the building. Hence, the columns and walls at lower storeys experience higher earthquake-induced forces. The amount and location of steel in an RC member should be such that the failure of the member is by steel reaching its strength in tension before concrete reaches its strength in compression. This type of failure is a ductile failure and hence is preferred over a failure where concrete fails first in compression. The structures require additional ductile detailing in order to ensure good seismic performance. These provisions are put together in the form of a special seismic design code, IS13920- 1993 for RC structures.

There are various types of RC structure as follows: Designed for gravity loads only, Designed with seismic features, Frame with unreinforced masonry infill walls, Flat slab structure, Precast Frame Structure, Frame with concrete shear walls, open ground storey structure, walls cast-in situ, precast wall panel structure, with a load-bearing masonry, with composite steel and with timber, bamboo or others.

In order to ensure the good seismic performance of the RC structures during an earthquake, the following structural criteria must be satisfied.

a) The failure of a column leads to the overall failure of the structure (global failure) whereas the failure of a beam tends to have localized damage. Therefore, it is preferred to make the beams weaker than the columns so that the failure of beams precedes column failure providing sufficient warning for evacuation of the building. Also, repair and retrofitting of beams is much easier than columns.

b) The beam column joint is one of the potential weak zones causing immense damage to the entire structure. Hence, an effective ductile reinforcement detailing is required for this region. Diagonal cracking & crushing of concrete in the joints should be prevented. Providing large column dimensions is effective in achieving good seismic performance. In addition, closely spaced closed-loop steel ties are required around column bars to hold together concrete in joint region and to resist shear forces (Murty CVR (2005). IS:13920- 1993 recommends continuing the transverse loops around the column bars through the joint region. In practice, this is achieved by preparing the cage of the reinforcement (both longitudinal bars and stirrups) of all beams at a floor level to be prepared on top of the beam formwork of that level and lowered into the cage.

c) The building plan must be simple and regular in shape. Any form of horizontal and vertical irregularity as illustrated in IS: 1893 (2016) must be avoided.

d) The grade of concrete and steel as specified in the code must be adopted for construction.

e) Strict adherence to prescribed standards of construction materials and construction processes is essential in assuring an earthquake resistant building.

Modern Construction Techniques for earthquake resistant buildings

a) Prestressed Concrete Members in earthquake resistant construction: This ensures proper connection between various components of a structure. Further, this technology has been widely adopted in New Zealand.

b) Shape Memory Alloys: Exhibit unique characteristics desirable in an earthquake resistant building. They have the ability to dissipate significant energy without significant degradation or permanent deformation. The most common shape memory alloys are made of metal mixtures containing copper-zinc-aluminium-nickel, copper-aluminium-nickel or nickel titanium. This specific smart material is being widely researched to explore its extensive applications.

c) Base Isolations: One of the widely accepted and adopted approaches for protecting the building from seismic forces. It is a collection of structural elements responsible for decoupling superstructure from the substructure. When the ground supporting the foundation of the building shakes, this component undergoes lateral displacement while keeping the structure intact. There is considerable interest now in base-isolated systems among earthquake engineers – especially in countries like Japan, USA and New Zealand – with an eye towards developing cheaper systems with broader applications.

d) Seismic Dampers: Diagonal braces in a moment resisting frame were used as an effective lateral load resisting system. However, recent developments in the area of structural seismic response control have led to the replacement of these bracings with seismic dampers. These dampers act like the hydraulic shock absorbers in cars – much of the sudden jerks are absorbed in the hydraulic fluids and only little is transmitted above to the chassis of the car. When seismic energy is transmitted through them, dampers absorb part of it and reduce the magnitude of the force acting on a structure. Commonly used types of seismic dampers include viscous dampers (energy is absorbed by silicone-based fluid passing between piston-cylinder arrangement), friction dampers (energy is absorbed by surfaces with friction between them rubbing against each other), and yielding dampers (energy is absorbed by metallic components that yield). In India, friction dampers have been provided in an18-story RC frame structure in Gurgaon.

e) Steel Plate Shear Walls: Shear walls are considered as an essential component of a lateral load resisting systems and steel is well known for its ductile behaviour. Combining these two desirable properties, an effective load resisting system was developed and has found wide applications in Japan and North America. These walls are designed in such a way that they bend instead of buckling under the action of lateral loads. These walls are significantly thinner and lighter, thereby reducing the building weight. Further, these walls need not be cured and hence, speeding up the construction process.

f) Carbon Fibre: The tensile characteristics and the stable nature of a spider web was studied by various researchers in Japan. An Earthquake-Resistant Building Made with Carbon Fabric - resembling a giant spider web has been constructed in Nomi City of Ishikawa Prefecture in Japan. This is the world's first seismic reinforcement structure made of carbon fibre material.

Future Trends

a) Blue Mussels: They can be found clinging to rocks and sea decks all along the coast of New England. They are anchored in place by a stringy outcrop of cabling that emerges from between their twin shells. Usually, even the most vicious of high tides can't pry them loose. To stay attached to their precarious perches, mussels secrete sticky fibres known as byssal threads. Some of these threads are stiff and rigid, while others are flexible and elastic. Researchers are trying to incorporate this particular feature into structures in order to make the building withstand earthquakes.

b) Rocking Frames: A team at Blume Earthquake Engineering Centre, USA, led by Deierlein are working on an innovative technology known as the rocking frame, which consists of three basic components -- steel frames, steel cables, and steel fuses. During a seismic event, energy-dissipation is allocated to a fuse while the post-tensioning (PT) cables restore the frame to its initial configuration. When an earthquake strikes, the steel frames rock up and down. All of the energy gets directed downward to a fitting that houses several teeth like fuses. The teeth of the fuses gnash together and may even fail, but the frame itself remains intact. Once the shaking has stopped, the steel cables in the frame pull the building back into an

upright position. Workers then inspect the fuses and replace any that are damaged. The advantage is that the building can be reoccupied quickly after an earthquake.

c) Seismic Invisibility Cloak: A series of the borehole is dug around the periphery of the structure that needs to be protected. These boreholes appear to work as a seismic cloak that could hide a building or perhaps an entire city from an earthquake's deadly waves. This makes the use of isolators, dampers, and other vibration response control devices obsolete.

d) Levitating House: A Japanese company has developed an idea where a house in stable condition rests on a deflated airbag. When the sensors detect a vibration, they switch on the compressor which turns pumps the air into this bag. This airbag lifts the house by 3cm from its foundation. The structure will hover for the duration of the quake and then the airbag deflates and the structure settles to its original condition. This technique can be fitted to new homes of appropriate weight and also, can be used to retrofit the existing house.

e) Eco-friendly Ductile cementitious Composite (EDCC) Spray: A research team from the University of British Columbia (Vancouver, Canada) has developed a new radical approach to make the buildings resist earthquakes. EDCDC combines cement with polymer-based fibres, fly ash, and other additives in making it eco-friendly and has been engineered at a molecular level to be strong and malleable at the same time. This material when applied as a thin coating (10mm), was found to have improved seismic resistance of the structure by withstanding an earthquake of intensity 9 to 9.1 on Richter scale (Tohoku earthquake, Japan, 2011). At present, this technique has been suggested for retrofitting of the existing structures such as an elementary school building in Vancouver.

14.1.2 Seismic Retrofitting of Buildings

Seismic Retrofitting Techniques are required for concrete constructions which are vulnerable to damage and failures by seismic forces. In the past thirty years, moderate to severe earthquakes occurs around the world every year. Such events lead to damage to the concrete structures as well as failures. Thus, the aim is to Focus on a few specific procedures which may improve the practice for the evaluation of seismic vulnerability of existing reinforced concrete buildings of more importance and for their seismic retrofitting by means of various innovative techniques such as base isolation and mass reduction. So Seismic Retrofitting is a collection of mitigation technique for Earthquake engineering. It is of utmost importance for historic monuments, areas prone to severe earthquakes and tall or expensive structures.

Seismic Retrofitting 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.

Objectives of retrofitting are:

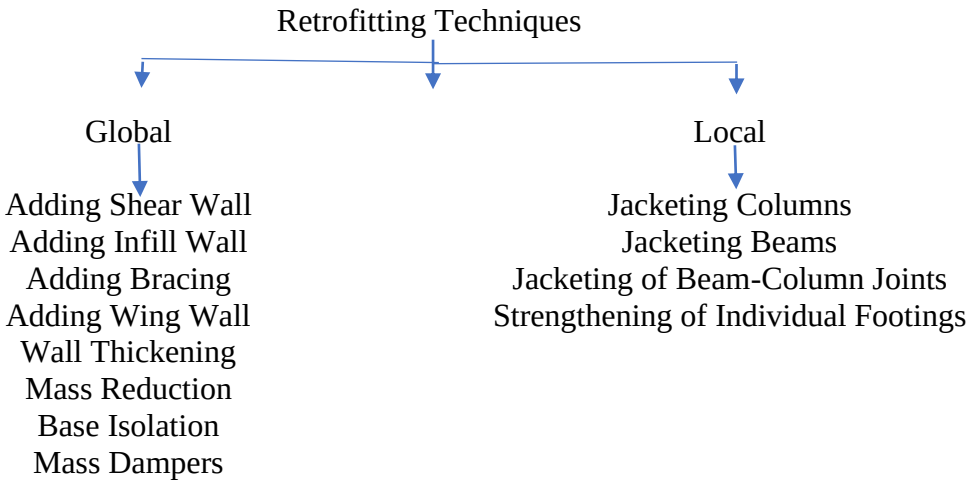
a) Increasing the lateral strength in one or both the directions, by reinforcement or by increasing wall areas or number of walls and columns.

b) Giving unity to the structure by providing a proper connection between its resisting elements.

c) Eliminating features that are sources of weakness. Asymmetrically plan distribution of resisting members, abrupt changes of stiffness from one floor to the other, concentration of large masses, large openings in wall are the examples of defect of this kind.

d) Avoiding the possibility of brittle modes of failure by proper reinforcement and connection of resisting members.

Classification of Retrofitting Techniques



RCC Jacketing

Jacketing of RCC members increases its size significantly. This has an advantage of increasing the member stiffness and is useful where deformations are to be controlled. Jacketing of slender RCC columns in a building provides a better solution for avoiding buckling problems.

Design for strengthening is based on composite action between the old and new work. Strain compatibility calculations may have to be carried out carefully giving due account to factors such as creep. As a new jacket is to behave compositely with the parent member, the new jacket can take additional load only with the increase in the stresses and strains in the old concrete. It is also necessary to ensure perfect bond between the old and new concrete by providing shear keys and effective bond coat with the use of epoxy or polymer modified cement slurry.

Column Jacketing

Column Jacketing is done to improve the load carrying capacity of column. The procedure followed is:

a) Open the footing of the existing column by excavating soil around it.

b) Remove plaster from the surface of the column.

c) Make the surface of column concrete rough by sand blasting.

d) Remove the corroded bars by cutting them. Add new bars from footing to the slab as per the instructions of the engineer.

e) Apply bonding agent on the old concrete for proper bonding between old and new concrete.

f) Erect necessary shuttering around column.

g) Pour minimum M-25 grade concrete, vibrate and cure it.

Beam Jacketing

Before taking up the strengthening of a beam, load acting on it should be reduced by removing floor tiles and bed mortar from the slab. Props are erected to support the slab. After clipping off of the existing plaster on the beam, additional longitudinal bars at the bottom of the beam together with new stirrups are provided. Stirrups are inserted by making holes from the slab. The longitudinal bars are passed through the supporting columns through holes of appropriate diameter drilled in the columns. The spaces between the bars and surrounding holes are filled with epoxy grout to ensure a good bond.

The surface of old concrete is cleaned by air jetting. Expanded wire mesh is fixed on the two sides and bottom of the beam. To ensure a good bond between old concrete and new polymer modified concrete, an epoxy bond coat is applied to old concrete surface. The polymer modified mortar is applied, while the bond coat is still fresh. Sometimes, 2 to 3 coats of polymer modified mortar are applied to achieve desired thickness. The mortar is cured for appropriate period in water. Epoxy resin grout is injected in the cracks along top of beams.

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

Pervious concrete is a very special type of concrete with high porosity used for flat work application basically that's allow water from precipitation and other sources to pass directly through thereby reducing the runoff from the site and allowing ground water recharge. And in this concrete porosity is attain by a highly interconnected void content. Also, in permeable or pervious concrete has no fine aggregate particles while preserving the interconnectivity of the voids. Permeable or pervious concrete is traditionally used in parking area with low traffic, walkways in park and garden residential, green house, basketball court, volleyball house.

Main Objective of pervious concrete:

- To help restore ground water supply
- Reduce pollution of coastal
- To pave parking
- Recharge ground water table

- Reduce runoff water
- Reduces risk of flooding and topsoil wash away

Benefits of Pervious Concrete:

- It reduces the storm water runoff
- Allow more efficient land development
- Prevent water from entering into the stream and also prevents it from being polluted

Basic Principle

In pervious concrete the most important and basic principle which turns out to be different from other types of concrete like PCC and RCC because, it has no fine aggregates in it. Pervious Concrete also has interconnected voids and because of that water will percolate and spread in all direction which is not possible if those joints are not interconnected.

Experiment

Material Properties

Aggregates: In pervious concrete generally singular size of coarse aggregates are used. For design of pervious concrete, we used 16 mm of coarse aggregates as per IS code 10262:2009 for mix design and also if coarse aggregate size decreases compressive strength increases.

Cementitious Material: We used Portland Pozzolana cement of O.P.C. grade-53 as per the IS code 1489:1991.

Admixture: Water reducing agent for the pervious concrete generally styrinebutadien is used as a water reducing agent in pervious concrete.

Formation of cubes and cylinders

Volume of cylinder = 300 x 150 x 150 x 3.14
No. of cylinder = 9
Total volume of all cylinder = 0.3817 cubic meter
Volume of cubes = 150 x 150 x 150
No. of cubes = 6
Total volume of all cubes = 0.02025 cubic meter
Total volume of cube and cylinder = 0.40195

Mix Design

For design of pervious concrete, we concluded IS code method:
Water: cement: fine aggregate: coarse aggregate = 0.36: 1: 0: 4 (as per the IS code 10262:2009)

Experimentation

Sieve Analysis Test: For the design of pervious concrete, we tested the 3 different size of aggregate.

- 10 mm to 12.5 mm
- 12.5 mm to 16 mm
- 16 mm to 20 mm

After the testing of cubes for above aggregate sizes, we extracted that higher compressive strength gain on 12.5 to 16 mm size of aggregates.

Compressive Test: Compressive strength is dependent on size of coarse aggregate, void ratio, bond between mortar and coarse aggregate. In 7 days, cubes of permeable concrete gain 30% of its strength, in 21 days of permeable concrete gain 70% of its strength, and for 28 days it gains 95% strength.

Tensile Strength: In this project we conducted the split tensile test for cylinder. In pervious concrete tensile strength vary from 1 to 3.5 Mpa.

Permeability Test: Permeability of the pervious concrete is determined by special arrangement of cylindrical shape bucket or specific container which should be open from both the side and has to arranged in such a way so that one side could be used for pouring of water and other resting on pervious concrete.

Formula use,
I=(KM)/(D^2×T)
I- Infiltration rate
M- mass of water
K- constant
D- diameter
T- time

Final Result:

- 12.5 to 16 mm aggregates have much higher compressive strength
- Compressive strength: 26.89 mm
- Split Tensile Test: 1.56 Mpa
- Permeability: 6.9 mm/sec

Future Scope

- Pervious concrete can be used in building for rainwater harvesting as well as for cooling purpose by providing permeable wall.
- In the presence of clayey soil, water can be percolated through providing borehole at every 1-2km with the help of drainage system.
- Flaky aggregate can be used to provide easy passes of water without any extra drainage system provided. (flaky aggregate have more strength).
- Water can be filtered and stored as fresh water below the ground.
- We can also give direction to water specifically according to need. By providing certain angle to the flaky aggregate water which gets drained will make its way to the slope going down towards the sewer line or any other drainage arrangement. This could be useful where soil strata have less water absorption capacity.

Maintenance

- Prevent the surface from becoming clogged which reduce permeability. most site function well without regular maintenance if protected from sand.
- Pressure washing has shown to improve permeability of clogged pavement to 80% to 90% of the original permeability.
- The chance of clogging is highest during and just after construction and the site must be protected by an erosion control until vegetation has been established on the adjacent ground.
- However pervious concrete work good in little or no maintenance but the main reason being debris and residue lodging on top of void structure maintenance is required.
- Maintenance requirement cannot be determined because it changes with conditions and place to place and also on traffic condition.
- Landscaping material such as mulch, sand, and topsoil should not be on the concrete, even temporarily.
- One of the important aspects of pervious concrete is that in case of logging of any kind of cementing material or weathered rock could be extremely hard to remove.
- Pressure washing pervious concrete 1-2 time a year would be necessary.

Conclusion

- Compressive strength of pervious concrete depends upon the porosity of concrete, age, binder material (type of cement), test specimen shape and size, showed huge influence on the strength of pervious concrete.
- Compressive strength is inversely proportional to porosity hence, when compressive strength increases porosity decreases.
- We also concluded that Reduction in the aggregate size decreases the porosity because of it inter relation with no fine aggregate property.
- Porous concrete is unsuitable for heavy duty roads.
- Extra amount of water exceeding the specific requirement make the wet cement settle at the bottom because due to porosity wet cement makes its way to the bottom.
- More the required tamping decreases porosity.
- Vibrations also decreases pervious concrete porosity.
- Permeability of porous concrete is influence by the porosity.
- Friction is more on pervious concrete than other material roads.

14.1.4 Engineering Aspects of Soil Mechanics – Environmental Impact Assessment

The main objective of the Environmental Impact Assessment (EIA) is to evaluate the Project likely impacts on the environment. One of the key objectives of the ESIA is to assist in ensuring environmentally and socially sound management of the Project during its entire lifecycle. The description of the existing conditions of the local environment provides a comprehensive data collection and analysis of the baseline conditions at the Project site. The baseline data permits the identification of the main socio-environmental factors that might be associated with the Project activities. The interaction between the Project activities and the environmental and social baseline conditions of the ecosystem at the Project site is at the core of the ESIA.

The ESIA is designed to forecast the positive and negative effects that may occur to the receiving environment. The early identification of impacts that may occur in the area leads to a reduction of the risk of future adverse environmental effects, and permits the proposal of mitigation guidelines/measures to avoid, reduce or remediate significant adverse effects. The ESIA also acknowledges potential socio-economic impacts, and predicts the effect on people and communities occurring as a result of the Project.

Valued Ecosystem Components (VECs) are ecosystem components that are considered to be important or valuable and that merit detailed consideration in the EIA process (Treweek, 1999). The concept of VECs has been used in EIAs as a tool to highlight important receptors (individuals or groups) which could be affected (positively or negatively) by the different aspects of a project under evaluation.

The VECs are selected depending on the identification of pathways linking important environmental components with the totality of the project's activities, and as such, VECs are fundamental to the EIA process.

The environmental resources can be divided into their key characteristics or categories from which the VECs can be selected. Below table presents a list of each environmental and social importance in the context of this project. Each of these VECs have been evaluated in terms of the construction and operational aspects of the project and relevant migration measures will be recommended to ensure that all negative impacts ae mitigated.

Table 31 Valued Ecosystem Components

Environmental Resources	**Valued Ecosystems Component**	**Importance of the Valued Ecosystem Component**
Air and Climate	Air Quality	• Effects on air for local residents • Health implications for all users • Effects on the ecosystem
	Climate	• Contribution to global warming
Land	Geomorphology and Landscape	• Changes in land morphology • Use of non-renewable resources • Importance to local community • Effects on waste disposal methods
Water	Ground Water Quality	• Sustainability Issue • Effects on local use
	Surface Water Quality	• Sustainability issue • Effects on local use • Health implications for all users
	River Water Quality	• Effects on local use • Health implication for all users
Ecology and Biodiversity	Terrestrial Ecology and Biodiversity	• Importance to biodiversity value • Importance to ecosystem well-being and proper functioning • Use of community
	Marine Ecology and Biodiversity	• Importance to the well being of all biological content of the ecosystem

		• High biological value • Economic use to community
Human Environment	Socio-Economic Activities	• Employment opportunities • Community welfare
	Community Health and Safety	• Operations impact on community safety • Reduction of gas flaring
	Noise Pollution	• Nuisance to local community • Influence on biodiversity
	Agriculture	• Socio-economic importance • National and community value creation
	Light Pollution	• Nuisance to local community and ecosystem

Environmental Aspects:

The environmental aspects are defined as the elements of an operation or project's activities, products or services that can or does interact with the environment. The key environmental aspects associated with the project are presented in below table.

Table 32 Environmental Aspects

Project Component	Environmental Aspects
Construction Activities- Site Preparation	• Soil clearing and land levelling • Transport and equipment use • Purchase and delivery of construction materials and services • Staffing
Construction Activities – Civil Works and Mechanical Erection	• Worker's temporary construction • Excavation and earthworks for plant foundation and buildings • Transport and use of vehicles and construction equipment • Construction of infrastructure OSBL including freshwater intake pipeline • Plant equipment testing and startup commissioning • Waste disposal
Operation Activities	• Operation of ammonia and urea plant process • Operation of fresh water intake pipeline • Traffic operation for ingress and egress from plant site • Traffic operation for transport of urea product ex plant site • Waste disposal
Accidental Events	• Fire and explosion • Spills and leaks

14.1.5 Water Supply – Sewerage System – Waste Water – Sustainable development techniques

Water Challenges in Gujarat:

Gujarat has just 2.28% of India's water resources and 6.39% of country's geographical area. This is again constrained by imbalances in intra-state distribution. The State has an average annual rainfall of 80 cm with a high coefficient of variance over time and space and as a result drought have been frequent. Out of 185 rivers, the State has only eight perennial rivers and all of them are located in southern part. Around 80% of the State's surface water resources are concentrated in central and southern Gujarat, whereas the remaining three-quarters of the State has only 20%. On average, three years in a cycle of 10 years have been drought years. Since Indian independence in 1947, the drought years of Gujarat have been as follows: 1951, 1952, 1955, 1956, 1957, 1962, 1963, 1965, 1968, 1969, 1972, 1974, 1980, 1985, 1986, 1987, 1991, 1999, 2000 and 2003 (Gupta, 2004).

Before the year 2001, drinking water scarcity posed a serious threat to human and cattle populations in Gujarat. Governments had to spend billions of rupees on temporary measures to supply drinking water by road tankers and sometimes even through special water trains. The State, which generally had a track record of peace and harmonious social ethos, even witnessed 'water riots' due to severe water scarcity compounded by poor water resources management.

Over drafting of ground water (as compared to annual recharge) caused serious water quality problems due to excessive fluoride, nitrate and salinity. The number of fluoride affected habitations increased from 2,826 in the year 1992 to 4,187 by the year 2003. The fluoride concentration in these villages ranged from 1.5 mg/litre to as high as 18.90 mg/litre. Fluoride has been the cause of extensive health damages in many parts of Gujarat. Dental fluorosis causes permanent pigmentation of teeth in children and bone deformities are caused by skeletal fluorosis even in adults. Other serious problems experienced due to high concentration of fluoride have been anaemia, loss of appetite, nausea and thyroid malfunction which sometimes results in brain impairment of children and adverse impact on foetus, in some cases causing abortion or stillbirth in expectant mothers.

The water problem also led to intra-state migration from drought prone regions like Saurashtra and Kutch (Western & South Western Gujarat) to the Central and South regions of the State. Often this migration of people was accompanied by the migration of livestock population and also caused the shift of prime workforce of hundreds of thousands of people, dislocating them economically, socially and culturally. Therefore, the regional imbalances in Gujarat were accentuated because of increasing water scarcity (Gupta, 2003).

Earlier most of the drinking water supply was based on ground water for which deep tube wells with high-capacity pumping machinery were being utilised in the State, leading to tremendous electricity consumption and high carbon footprints of water supply.

Technological initiative for drought proofing:

During last one decade the State drew up an ambitious strategy for creating a 'State Wide Drinking Water Grid' for bulk water transmission from sustainable surface water resources to water scarce and poor water quality habitations. Large scale infrastructure has been created which includes 1,987 km of bulk pipelines and more than 115,058 km of

distribution pipelines. 10,781 hydraulic structures like elevated storage reservoirs with a total capacity of 1,164 million litres and 10,683 storage sumps and high ground level reservoirs with a capacity of 2,504.80 million litres have also been constructed in the State. Along with this 151-water filtration and treatment plants with a total capacity of 2,750 million litres per day (MLD) have been constructed. About 2,250 MLD of treated water is delivered to more than 10501 villages and 127 towns in the State, ensuring safe and assured water supply to about 65% of State's population in draught prone and water quality affected areas through the water supply grid.

Evaluation of the technical initiative for drought proofing:

This major technological initiative has not only largely solved the drinking water problem but has also made a significant impact on water quality problems faced earlier.

Reduction in fluoride

All these efforts have resulted in considerable relief from the problem of excessive fluoride contamination. As per a recent survey, only 987 habitations have been found to be affected and the range of fluoride content has also been reduced considerably.

Table 33 Status of Fluoride Affected habitations

District	No. of Total Habitations	As per 2003 survey	As per recent survey	Maximum Fluoride level (PPM)
Ahmedabad	727	120	20	7.20
Gandhinagar	424	132	2	6.27
Patan	651	246	43	13.25
Mehsana	851	176	2	4.40
Sabarkantha	2438	531	9	6.93
Banaskantha	1736	521	20	5.75
Surendranagar	696	205	72	8.75
Rajkot	871	126	120	5.40
Jamnagar	756	52	5	2.00
Junagadh	925	76	48	2.80
Porbandar	184	46	0	3.70
Bhavnagar	804	108	66	6.40
Amreli	650	49	146	3.20

Kutch	1126	34	6	3.20
Vadodara	2187	438	189	5.81
Narmada	722	49	0	2.60
Kheda	2101	406	52	10.03
Anand	920	96	17	5.896
Panchmahal	2531	401	86	6.40
Dahod	3168	286	0	12.50
Surat	3258	44	29	2.20
Bharuch	790	21	30	4.00
Valsad	3923	2	25	1.79
Navsari	2080	22	0	-
Dang	326	0	0	-
Total	34845	4187	987	

Less Expenditure

This has also resulted in sharp decline in expenditure on tanker water supply in the State from 2003-04 onwards which is another indicator of creation of water security in the State.

Table 34 Annual Expenditure on tanker supply from 1990 to 2009

Year	Village	Cost (Rs. in Million)
1990-91	896	23.40
1991-92	1943	92.90
1992-93	700	14.00
1993-94	1803	83.00
1994-95	724	24.96
1995-96	1619	96.30
1996-97	1642	123.95
1997-98	1447	62.19

1998-99	1215	41.02
1999-2000	2987	346.20
2000-2001	4054	436.94
2001-2002	2959	348.11
2002-2003	3961	475.36
Sub-Total		2168.06
2003-2004	600	47.38
2004-2005	869	92.32
2005-2006	398	77.06
2006-2007	207	17.08
2007-2008	188	14.17
2008-2009	326	13.94
Sub-Total		261.95
Total		**2430.01**

Reduction in carbon footprints in water supply

In several villages, the borewells are now utilised as a dual source and the operational hours have been reduced. Based on a random survey, it has been observed that a significant saving has been achieved in electricity consumption that is now available for alternative uses, proving to be an eco-friendly achievement. Solar pumps have also been commissioned in 260 villages in the State and about 200 more solar pumping systems will be installed in the near future. In various parts of the State, including coastal and tribal areas, roof top rainwater harvesting structures have also been taken up in public buildings, schools and individual household level, which is also resulting in substantial electricity savings. Comprehensive energy audits for various group water supply schemes have also resulted in energy savings.

Table 35 Emission savings in drinking water supply

Sr. No.	Particulars	Energy Saving MWh per annum	Equivalent Carbon Dioxide Emission per annum in tones
1.	Piped water supply to villages and towns	65905	14696.82
2.	Savings due to energy audit	5184.78	1156.21

3.	Solar based pumping systems	611.16	136.29
4.	Rooftop rain water harvesting	386.74	86.24
	Total	72087.68	16076.14

Paradigm shift

With a paradigm shift from dependence on drinking water supply by tankers, trains and deep bore wells to safe surface water, much of the fluoride affected habitation have been covered by piped water supply.

Technological interventions like defluorination through reverse osmosis have also been taken up in some villages. In the remaining villages safe water sources have been identified or created and are being used for drinking water purpose. Thus, a 'vicious circle' has been transformed into a 'virtuous cycle' with a win-win situation for water, energy, environment and health sectors and with considerable economic benefits. In short, this is Gujarat's technology-oriented response to the existing and future water stress and insecurity due to climate change.

New water governance model

The creation of the Water and Sanitation Management Organisation (WASMO) was a significant shift in the role of governance from provider to facilitator by empowering village level institutions through extensive capacity building and pro-active facilitation. Since its inception, WASMO has brought about effective citizens' engagement through its innovative governance model for facilitating the successful community led water supply programme throughout the State of Gujarat. Now more than 16,740 Village Water and Sanitation Committees have been formed in the State and are ready to take the responsibility for managing of service delivery and water resources at the decentralised level. More than 6,500 villages have already commissioned the infrastructure and water conservation projects in a demand driven mode. Another 4,547 villages are presently implementing the decentralised community managed rural water supply programme in their villages with a strong sense of ownership.

WASMO's strength lies in its organisational professionalism, innovations in governance, and strong partnerships with about 48 civil society organisations. The rural community is the central focus of WASMO's decentralised approach. Its innovation has led to the scaling up of reform processes to cover the entire State. Its professionals have created an enabling environment which has resulted in the community being fully empowered to take ownership of their water service delivery wherein operation and maintenance is done through tariff mechanism devised by consensus in the village assembly. It has also been able to institutionalise the rural water quality monitoring and surveillance programme. The majority of villages are now able to monitor their water quality teams which are duly trained. WASMO's innovation by Gujarat has emerged as a model for learning and exchange, influencing policy initiatives in the water sector at the country level. WASMO has also been given the United Nations Public Service Award in the category of fostering participation in policy-making decisions through innovative mechanisms (Modi, 2010).

Inter-basin water transfer through Sardar Sarovar Project

The Sardar Sarovar Project on river Narmada is a multi-State, multi-purpose river valley Project, borne out of deliberations of a constitutional body, following the principles of 'Equality of Right' and 'Equitable Utilisation' of the whole course of an Inter-State River. This unique project will irrigate 1.905 M ha of land, increase the agricultural production by 8.7 million tons per annum (worth US $ 430 million), generate environment friendly hydropower with installed capacity of 1,450 MW, supply drinking water to 8,215 villages and 135 urban centres of Gujarat (around 20 million population), generate 1 million jobs (mostly in rural areas), and prevent rapid processes of desertification, salinity ingress and rural to urban migration being experienced in many parts of Gujarat. The command area and drinking water supply areas of the project are exactly the worst water scarcity-hit areas of the State (Gupta, 2003).

Increased dam height and storage

With a concerted strategy and satisfactory compliance of the project obligations in terms of rehabilitation of project affected persons and environmental measures, the dam height was raised to 100m in 2003, 110.64m in 2004 and 121.92m in 2006. This facilitated a much higher increase in storage of Narmada waters.

Raising the dam height and the corresponding increase in the storage capacity have significantly improved the water supply. The real benefits of the project which were awaited for almost 15 years have now started flowing. Diversion of Narmada water to the main canal of the project (world's largest lined irrigation canal) was just 705 MCM in the year 2001, but it spectacularly increased to 5,195 in 2003 and to 6,194 MCM in 2004. Although the water flow has been decreased in subsequent years due to consecutive good monsoons, it remained to the extent of 4,201 MCM in 2005, 4,292 MCM in 2008 and 5,870 MCM in 2008 and 5,870 MCM in 2009. The construction of the main canal was also completed in the year 2008 and water supplies to neighbouring State – Rajasthan – were initiated in March 2008, fulfilling real objective of this project as an Inter-State River Project.

Not only this, with the command area being covered to the extent of around 500,000 ha, significant interlinking has been achieved in many rivers by the inter basin transfer of Narmada waters using the Sardar Sarovar Canal Network.

Hydro Power

Another long pending issue was that of operationalising the 250 MW Canal Head Power House (for want of required water head in the reservoir). We operationalised this power house in August 2004, and thereafter a river bed power house of 1,200 MW capacity was also put into operation in a phased manner starting from February 2005 to June 2006. The hydropower generation that commenced in the Sardar Sarovar Project since August 2004 has resulted in the generation of 15,070 million kWh of electricity up until March 2010.

Micro Water Harvesting

The miseries of millions of small and marginal farmers due to vagaries of nature and difficult terrains have been reduced through rainwater harvesting by micro irrigation structures implemented through people's participation.

Sardar Patel Participatory Conservation Project (SPPWCP)

This scheme stipulated that check dams and village tanks/ponds could be taken up for construction by a beneficiary group or any Non-Governmental Organisation (NGO) with technical and financial assistance from the District Panchayat (local representative body). They were initially required to contribute 40% of the estimated costs (later reduced to 10%) and the rest was to be funded by the Government depending upon the progress of the work. In 2007 they were also given the option of contributing their 10% by way of physical labour and, therefore, increasing their sense of belonging to the project by 'the gospel of dirty hands'. Six prototype designs were circulated with a maximum cost of Rs. 1,000,000.

However, the beneficiary groups were also given the latitude to take up the work as per their own design if necessary and feasible. The technical scrutiny and work supervision would be done by the engineers of local body. The entire responsibility of the quality of construction of work, however, would rest with the beneficiary group/NGO under continuous guidance and technical inputs from the Government technical staff. Maintenance works for these micro water harvesting structures would be carried out by the beneficiary group at their own expense. A total of 353,937 check dams and village ponds/tanks have been created in the last eight years providing direct benefit to over 13 million people in rural Gujarat.

Chapter. 15 Smart and / or sustainable features of Chapter 8 & 13 designs, Impact on society, (For allocated village development, villagers happiness, comfortable and for enhancement of the village) (With Smart Village development Concept As per your idea and village visit, modern technology with innovation) with doing small changes, period, amount expenditure and benefit: a) Immediately b) Within 1 year c) Long term (3-5 years) along with cost estimation d) If possible, list the sources of the funding available with the village gram panchayat

Sr. No	Design name	Period	Expenditure Amount (INR)	Benefit
1.	Public Library	Within 1 year	4,57,600	Will help increase knowledge of villagers and students. It will provide different books to students and villagers to read for free.
2.	Public Toilet	Within 1 year	3,98,400	It will help in providing better hygiene to village by eliminating open toilet. It will also provide toilet when out of house.
3.	WBM Road	Within 3 months	11,62,000	It will help people moving within village easy and safe during monsoon.

4.	Rain Water Harvesting	Immediately	43,100	Reduce waste of water due to runoff.
5.	Market Yard	Within 1 year	13,96,774	It will help villagers have better place for shop and generate revenue for panchayat.
6.	Drinking Water Point	Immediately	70,450	It will help people have clean water in village while out of their house.
7.	Aanganwadi	Within 1 year	8,63,390	It will provide better space for toddlers for Aanganwadi.
8.	Public Garden	Within 1 year	5,31,216	It will provide recreational space to villagers.
9.	Community Hall	Within 1 year	24,08,360	It will provide proper space for events to the villagers.
10.	Primary School	Within 2 years	65,68,340	It will replace the existing school which is dangerous condition.
11.	ATM Space	Immediately	96,000	It will provide cash withdrawal facility to villagers within village.
12.	Biogas Plant	Immediately	55,000	It will encourage villagers to use natural resources.

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?	Y	Agriculture.
2	What are the chances of employment in village?	Y	Many.
3	What are the special technical facilities in village?	N	-
4	Is any debt on village dwellers?	Y	Some households.
5	Are village people getting agricultural help?	Y	From 1-seva kendra.
6	Is women health awareness Program organized in village?	N	-
7	Are women having opportunity to work and income?	Y	Woman works in farm.
8	Child girl education is appreciated in village?	Y	Girls are studying.
9	Facility of vaccination to child is available in village?	Y	-
10	Are village people aware about child vaccination and done to each and every child as per norms?	Y	-
11	Women help line number information is provided to village people?	N	-
12	Is water scarcity in village? How many days per year?	N	-
13	Is village under any debt?	N	-
14	Is any serious issue due to debt from bank or any person happened in village?	N	-
15	Is any suicide like incident observed in village due to government policy, debt or threatening?	N	-
16	Is any death of patient occurred due to unavailability of medical facility in village?	N	-
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.	Y	15
18	Is village improvement is observed in comparative scenario from past to present?	Y	-
19	Is any unavoidable difficulty village people are facing? Any natural calamity is there?	N	-
20	Life Living standard of girls and women is appreciated and uplifted in village?	Y	Woman have equal rights as that of men.

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

જી.પંચા.ઈ.૫૨૫૨

સરપંચશ્રી,
દહેમી ગ્રામ પંચાયત
તા.બોરસદ, જી.આણંદ

Chapter. 17 Irrigation / Agriculture Activities and Agro Industry, Alternate Techniques and Solutions

In our allocated village i.e., Dahemi occupation of most of the villagers is farming and animal husbandry. The villagers residing in the village Dahemi are mainly depended upon farming for their livelihood. They use farming techniques like flood irrigation, drip irrigation, farming using fertilizers, pesticides, etc. But while talking with Sarpanch and other farmers of the village we came to know that no one is using green house agriculture technique for farming. So, we explained them about it and we have given about green house agriculture in detail below.

A Greenhouse is a framed structure covered with a transparent material to grow crops under partial or fully controlled environmental erects to get optimum growth. Greenhouse agriculture in India is the method of providing favourable environmental conditions to the plants.

Greenhouse structures can make an adequate growing temperature in summer and winter alike. They often are used for growing plants and trees that need strictly regulated climatic conditions. While these structures differ in terms of size and purpose, commercial greenhouses can be significantly larger and boast high-tech equipment designed to boost lighting, cooling, heating, and different types of screening installations. The purpose of having a Greenhouse structure is to shield different crops from excess cold or heat and unwanted pests and diseases. A greenhouse makes it possible to grow definite types of crops year-round, and fruits, vegetables, and flowers are what a greenhouse most normally grows.

Components of Greenhouse

- Roof- It is the transparent overhead cover of greenhouse farming.
- Gable- The wall of the greenhouse is known as gable which is transparent.
- Gutters- They collect and drain out the snow and rainwater that is gathered between the spans.
- Columns- Column is a vertical structure that carries the greenhouse.
- Ridge- Ridge is the horizontal section on top of the roof.
- Arches- These are the structures that support the covering materials.
- Foundation Pipe- These pipes connect the structure to the ground.

Advantages of Greenhouse Agriculture

- For example, crops grown under such controlled conditions give a yield that is 7 to 12 times higher than crops grown in the open. Besides the fact that the number of products can be better estimated, it provides for year-round and off-season production.
- Greenhouse agriculture also aids in the efficient use of chemicals and pesticides to control pests and diseases.
- Most useful in monitoring and controlling the instability of the different ecological systems.
- Modern techniques of Hydroponic (Soil less culture), Aeroponics and Nutrient film techniques are possible only under Greenhouse agriculture cultivation.
- The greenhouse crop yield can be 10 to 12 times higher than that of outdoor cultivation depending upon the kind of Greenhouse, type of crop, environmental

facilities.

- Reliability of crop increases under greenhouse technology.
- Greenhouse technology ideally suited for vegetables and flower crops.
- In Greenhouse, year-round production of floricultural crops.
- Disease-free and genetically superior transplants can be produced continuously in Greenhouse.
- Water requirement of crops limited and easy to control.
- Greenhouse cultivation helps to create favourable microclimates where the production of all vegetables and flowers is made possible throughout the year or part of the year as per the requirement.
- The greenhouse not only creates a suitable environment for the plants but also encourages accurate growth and fruiting as compared to open field cultivation.
- The Greenhouse has tremendous scope in the horticultural sector, particularly for the production of hybrid seeds, high-value vegetable plants, ornamental plants, medicinal plants, cut flowers, and fruits.

Crop Suitable for Greenhouse Agriculture

To star Greenhouse farming required high investment hence though the crop is having high commercial value and sustainable market demand this crop cultivated in the Greenhouse. Floriculture crop like all cut flower and vegetable is mostly grown in the greenhouse.

The demand for crop cut flowers such as Gerbera, Dutch rose, carnation, lily, and vegetables like colour capsicum, tomato, cucumber, exotic vegetables increasing day by day so there is a bright future for Greenhouse. Some of the important vegetables and fruits suitable for Greenhouse farming are Ginseng, Mushrooms, Bamboo, Leafy Greens, Spinach, Cucumbers, Peppers, Tomatoes, Swiss chard, Squash, Lemons, Oranges, Grapes, Cilantro.

A Greenhouse structure reduces the rate at which thermal energy flows out of its structure, and it does this by impeding heat that has been absorbed from leaving its confines through convection. The material for agriculture Greenhouse construction is typically glass or plastic so that sunlight can passthrough it. This sunlight is integral to the Greenhouse becoming warm since it heats the ground inside the Greenhouse structure. In turn, the warm ground then warms up the air in the Greenhouse structure, which keeps on heating the plants inside since it is confined within the structure of the Greenhouse.

Types of Greenhouse Agriculture

Wooden framed Greenhouse Structure: In general, for the Greenhouses with a span less than 6 m, wooden framed structures are used. Side posts and columns are constructed of wood without the use of a truss is commonly used as it is inexpensive and possesses the required strength. Timber locally obtainable, with good strength, durability can be used for the construction.

Lean-to type Greenhouse: A lean-to type design is used when a greenhouse is placed against the side of an existing building. It is built against a building, using the existing construction for one or more of its sides. It is generally attached to a house but may be attached to other buildings.

Pipe Framed Structures: Pipes are used for the construction of these Greenhouses when the clear span is around 12m. In common, the side posts, columns, cross ties, and purlins are constructed using pipes. In this type, of Greenhouses, the trusses are not used.

Even Span Type Greenhouse: The even-span is the standard form and full-size structure; the two roof slopes are of equal pitch and width. This type of design is used for the Greenhouse of small size, and itis constructed on level ground. It is attached to a house at one gable end.

Polyhouse: The polyhouse is a type of greenhouse across the globe. It is prepared of the frame (usually metal) of the desired size and covered with polyethylene film. Unlike glasshouses; polyethylene will be used as the glazing material. The polyhouse is not recommended at all in hilly regions because of poor temperature retention, low crop yield, and high installation cost.

Greenhouse Agriculture Farming loan and subsidies

- Bank provides loans with 12% – 14% interest, for the 5-to-7-year period and mostly many banks offer EMI (equated monthly instalment) options quarterly or every 6 months.
- For the Greenhouse subsidy, purpose takes the loan from a national bank, district bank and this is precondition government stated in subsidy norm.
- Our Indian government is promoting Greenhouse farming they offered a subsidy for Greenhouse through the horticulture department.
- The Indian government gives subsidy from 50%-60% to the project cost of the Greenhouse and subsidy percentage varies with the state to state.

Disadvantages of Greenhouse Farming

- Greenhouse requires high upfront and operating expenses.
- Greenhouse requires careful precautions to eliminate any pest or diseases to make sure that consecutive crop production does not get affected.
- Poor pollination takes place in the Greenhouse structure and there is a lack of awareness among farmers which requires training.
- Migration birds may be affected due to the greenhouse and it requires regular periodic inspection.

Chapter. 18 Social Activities – Any Activities Planned By Students e.g., Teaching Learning Activities, Awareness Camp, Business Idea for self-help Group or any other

In our allocated village, there is no any group working for spreading any type of awareness in the village to villagers. When we visited the village, we saw there that there is no cleanliness in the village. While talking with the Sarpanch and the villagers, we came to know that the village is not being cleaned daily. They clean whole the village only during festivals like Navaratri or Diwali. Also, there is no facility in the village for garbage collection. No one is appointed there for the waste collection or cleaning the village daily. So, we thought that the villagers have less awareness about the cleanliness of the village. Therefore, we decided to spread awareness about the cleanliness to the villagers. We decided to do these as we feel that there should be proper cleanliness in the village. For the same, we run a cleanliness drive in the village for one day where we visited the villagers and explained them about the importance of hygiene and cleanliness. When we did this drive the villagers were really motivated and also, they gave us promise that they will keep their village clean. And they try their best not to keep village dirty. Under this we did Swachhta Abhiyan and covid awareness. We also spread masks to the villagers to spread covid awareness. Under this drive we also designed a public toilet for the village. ss

Chapter. 19 Dahemi SAGY Questionaries Form with Sarpanch Signature

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: Dahemi Gram Panchayat: Dahemi Ward No. 1

Block: Anklav. District: Anand.

State: Gujarat L S Constituency: Anand.

1. Family Identity and Size

Name of Head of Household	Pratapsinh Harisinh Rathod							Male/ Female	M.
SECC Survey ID:		Family Size	4	Over 18	4	6 to 18	–	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	Yes / No~~o~~
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	N.
PDS (If NFSA is not implemented)		Annapurna	Antyodaya	BPL ✓	APL	Is any woman in the family member of an SHG? Yes / No	
PDS (If NFSA is implemented)		Annapurna	Antyodaya	Priority	Other		

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]
Mamtaben P. Rathod.	40	F	N	Married		Y	–	–
Rafik bhai P. Rathod	21	M	N	Non	7th	Y	Y	–
Rajjak bhai P. Rathod	20	M	N	Non	9th	Y	Y	–

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
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–

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
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–

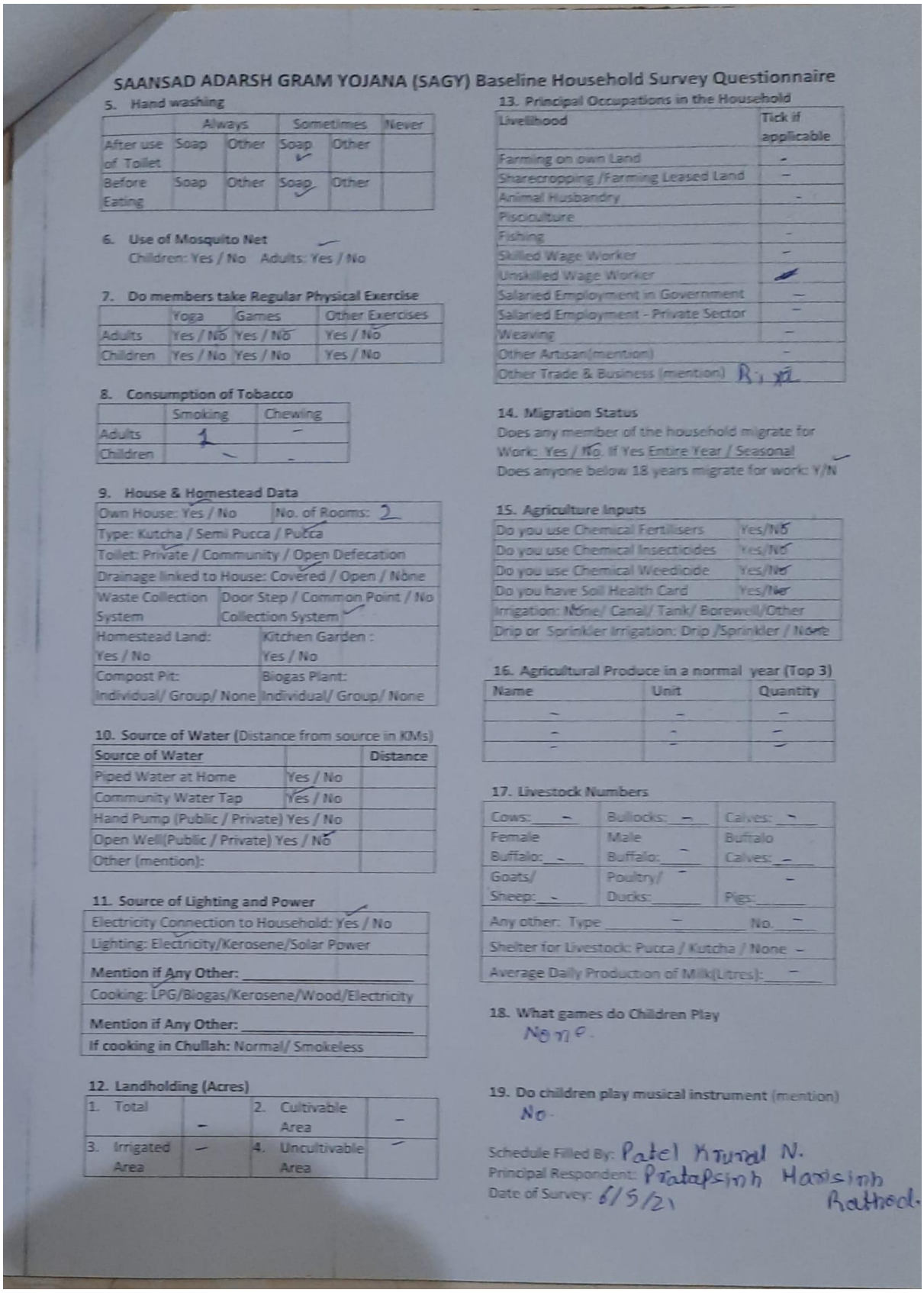
[1] Scheduled Caste 1, Scheduled Tribe 2, Other Backward Castes 3, Other 4

[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	1	-
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):		

11. Source of Lighting and Power

Electricity Connection to Household: Yes / No
Lighting: Electricity/Kerosene/Solar Power
Mention if Any Other: _____
Cooking: LPG/Biogas/Kerosene/Wood/Electricity
Mention if Any Other: _____
If cooking in Chullah: Normal/ Smokeless

12. Landholding (Acres)

1. Total	-	2. Cultivable Area	-
3. Irrigated Area	-	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)	R. xz.

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
-	-	-
-	-	-
-	-	-

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
None.

19. Do children play musical instrument (mention)
No.

Schedule Filled By: Patel Krunal N.
Principal Respondent: Pratapsinh Harisinh Rathod.
Date of Survey: 6/5/21

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: Dahemi
b. Block: Anklav
c. District: Anand
d. State: Gujarat
e. Lok Sabha Constituency: Anand
f. Number of Wards in the Gram Panchayat: 10
g. Number of Villages in the Gram Panchayat: 1

h. Names of Villages:
Dahemi

Demographic Information

Number of Households 1055 Total Population 5015 Male 2588 Female 2427

SC HHs _____ ST HHs _____ OBC HHs _____ Other HHs _____

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	Y	
b.	Nearest Primary Health Centre (PHC)	Y	N (Davoi)
c.	Nearest Community Health Centre (CHC)		N.
d.	Nearest Post Office	Y	
e.	Nearest Bank Branch (Any)		N (Pamoi)
f.	Nearest Bank with CBS Facility		
g.	Nearest ATM		N (Borsad)
h.	Nearest Primary School	Y	
i.	Nearest Middle School	Y	
j.	Nearest Secondary School	Y	
k.	Nearest Higher Secondary School / +2 College		N (Pamoi)
l.	Nearest Graduate College	Y	
m	Nearest ITI / Polytechnic Centre		N
n	Kisan Seva Kendra		N.

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		N
p	Nearest Agro Service Centre		N.
p	MSP based Government Procurement Centre		N.
q	Milk Cooperative /Collection Centre	Y	
r	Veterinary Care Centre		NCBorsad)
s	Ayurveda Centre		N
t	E – Seva Kendra	Y	
u	Bus Stop	Y	
v	Railway Station		N.
w	Library		N
x	Common Service Centre		N.

IV. Sports Facilities in the Gram Panchayat

a. Number of Play Grounds in the GP: Total 0 Public - Private -

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

V. Education, ICDS

a. Number of Angan Wadi Centres: 5.

b. Number of villages without Angan Wadi Centres -

Names of such villages: -

c. Schools (Number)

Primary Private: 1 Primary Govt.: 3.

Middle Private: - Middle Govt.: -

Secondary Private: 1 Secondary Govt.: -

Higher Secondary Private: - Higher Secondary Govt: -

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)			✓				
b.	Kerosene			✓				
c.	Other (mention)							

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	Dahemi.	
b.	Hand Pump Coverage in Villages:	Covered / Not Covered ✓		
c.	Coverage under Covered Drains:	Covered / Not Covered ✓		
d.	Coverage under Open Drains:	Covered ✓ / Not Covered	Dahemi.	
e.	Villages with Household Electricity Connection (Numbers)	Connected ✓ / Not Connected	Dahemi	

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	427.05	d.	Pasture / Grazing Land	-	g.	Check Dam	-
b.	Irrigated Land	427.05	e.	Forests/ Plantations	-	h.	Wells/Bore Wells	35
c.	Un-irrigated Land	-	f.	Other Common Land	1.23	i	Tanks /Ponds	5

[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)	450
b)	Number of Households receiving pension (old age, widow, disability)	450
c)	Number of eligible Households who are not receiving pension	
d)	Number of Households eligible for Ration Card	930
e)	Number of eligible HHs having ration cards	930
f)	Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana)	1000
g)	Number of HHs covered under AABY (Aam Aadmi Bima Yojana)	500
h)	Number of active Job Card holders under MGNREGA	80
i)	Number of Job Card holders who completed 100 days of work during 2013-14	70
j)	Number of shops selling alcohol	–
k)	Number of BPL families	600
l)	Number of landless households	150
m)	Number of IAY beneficiaries	–
n)	Number of FRA[2] beneficiaries	–
o)	Number of Community Sanitary Complexes	–
p)	Number of Households headed by single women	50
q)	Number of Households headed by physically handicapped persons	2
r)	Total number of Persons with Disability in the village	15
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'

K.N Patel. Patel Kaumal N. Surveyor	Jayaben V. Parmar PRI Respondent (Preferably Gram Panchayat Chairperson)	V.G. Raval Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	06/05/21. 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]

I. Basic Information

a. Village: Dahemi
b. Ward Number: 7
c. Gram Panchayat: Dahemi
d. Block: Anklav
e. District: Anand.
f. State: Gujarat
g. Lok Sabha Constituency: Anand.
h. Number of Habitations / Hamlets in the Gram Panchayat: 5
i. Names of Habitations / Hamlets:
Laxmipura, Hirapura, Pajiyatalavali, Khatitalavdi, Vissviga.

Demographic Information

Number of Households 300 Total Population 900. Male _____ Female _____

SC HHs _____ ST HHs _____ OBC HHs _____ Other HHs _____

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	Y	.
b.	Nearest Middle School	Y	
c.	Nearest Secondary School	Y	
d.	Kisan Seva Kendra		N.
e.	Milk Cooperative /Collection Centre	Y	
g.	Health Sub Centre		N.
h.	Bank		N
i.	ATM		N
j.	Bus Stop	Y	
k.	Railway Station		N

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

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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		N
m	Common Service Centre		N
n	Veterinary Care Centre		N

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: _____

iii. Drinking Water Facilities

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

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

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

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

b. Coverage under Open Drains: _____(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: _____

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: _____

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

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

vi. Sports Facilities in the Village

a.Number of Play Grounds in the Village (minimum size 200 square meters): N

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

vii. Education, ICDS

a. Number of Anganwadi Centres: 2

c. Schools (Number)

Primary Private: - Primary Govt.: -

Middle Private: - Middle Govt.: -

Secondary Private: - Secondary Govt.: -

Higher Secondary Private: - Higher Secondary Govt: -

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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	-	d.	Pasture / Grazing Land	-	g.	Check Dam	-
b.	Irrigated Land	-	e.	Forests/ Plnatations	-	h.	Wells/Bore Wells	-
c.	Un-irrigated Land	-	f.	Other Common Land	-	I	Tanks /Ponds	-

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

Name and Signature of Surveyor and Respondent'

K.N Patel Patel Krunal N	Rathod Dharmendrasinh Chandrasinh.	V.G. Raval.	06/05/21
Surveyor	PRI Respondent (Preferably a ward member from a ward that is fully or partially covered under the Village)	Official Respondent (Preferably seniormost Government official in the Gram Panchayat)	Date of Survey

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Chapter. 20 TDO-DDO-Collector email sending soft copy attachment in the report

Gmail Krunal Patel <kp738188@gmail.com>

Existing and development scenario of "Dahemi" village, Anand
1 message

Divyesh Mandali <dgm1993@gmail.com> 13 May 2021 at 10:29
To: mam-anand@gujarat.gov.in, ddo-and@gujarat.gov.in
Cc: Vishwakarma Yojana <rurban@gtu.edu.in>, principal kite <principal@kitetech.ac.in>, 16CE08 Kite Krunal <kp738188@gmail.com>, zeel Solanki <szeel161999@gmail.com>

Respected Sir/Madam,

We are the students of Knowledge Institute of Technology and Engineering, Bakrol, Anand affiliated to Gujarat Technological University – GTU. GTU has been assigned to Vishwakarma Yojana - VY in which students survey various villages and design various amenities to deliver it to them making it ideal for living better life as per requirements and village problem statements.

As a part of Vishwakarma Yojana guidelines we have been asked to inform all the respected officers about our project in which we will shortly notify about Dahemi village profile of issues for development and our design work for them which is as below.

Village: - Dahemi		Population – 5015 (as of census 2011)
Key Issues	Remark	Design Given
Road	There is a problem with the main road of the village especially in the rainy season.	WBM Road
Toilet	There is no public toilet in the village which is an important thing.	Public Toilet
Recreational Area	Currently the village does not have any recreational center.	Public Garden
Meeting Problem	The current situation of the existing community hall is very dangerous.	Community Hall
Use of Natural Resources	In Dahemi village no one is using any type of natural resources as they are not aware about it.	Biogas plant

Sr. No	Design name	Period	Expenditure Amount (INR)	Benefit
1.	Public Library	Within 1 year	4,57,600	Will help increase knowledge of villagers and students.
2.	Public Toilet	Within 1 year	3,98,400	It will help in providing better hygiene to village by eliminating open toilet.
3.	WBM Road	Within 3 months	11,62,000	It will help people moving within village easy and safe during monsoon.
4.	Rain Water Harvesting	Immediately	43,100	Reduce waste of water due to runoff.
5.	Market Yard	Within 1 year	13,96,774	It will help villagers have better place for shop and generate revenue for panchayat.
6.	Drinking Water Point	Immediately	70,450	It will help people have clean water in village while out of their house.
7.	Aanganwadi	Within 1 year	8,63,390	It will provide better space for toddlers for Aanganwadi.
8.	Public Garden	Within 1 year	5,31,216	It will provide recreational space to villagers.
9.	Community Hall	Within 1 year	24,08,360	It will provide proper space for events to the villagers.
10.	Primary School	Within 2 years	65,68,340	It will replace the existing school which is dangerous condition.
11.	ATM Space	Immediately	96,000	It will provide cash withdrawal facility to villagers within village.
12.	Biogas Plant	Immediately	55,000	It will encourage villagers

				to use natural resources.

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Prof. Divyesh G. Mandali
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Head Of the Department,
Assistant Professor ,
Civil Engineering Department,
Knowledge Institute of Technology & Engineering (KITE)-135,
Knowledge Campus, Bakrol- Vadtal road, Bakrol-388315

यदि आवश्यक नहीं हो तो कृपया इस परिपत्र को मुद्रित नहीं करे – पर्यावरण संरक्षण में अपना योगदान दें ।

2 attachments

DDO - report.docx
17K

Vishwakarma Yojana, Dahemi Village, Anand District, Phase VIII, Part 2.pdf
12288K

Chapter. 21 Comprehensive report for the entire village

For the Vishwakarma Yojana Phase 8 project we were allocated Dahemi village. We were used to visit the ideal, smart and allocated village. We have selected Gana as ideal village and Dharmaj as smart village. In our ideal village Gana we have seen many facilities like gym, community hall, primary school etc

In our smart village i.e., Dharmaj we seen many facilities like garden, banks, primary school, etc.

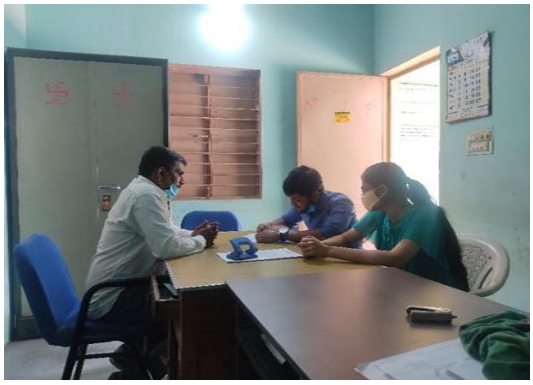
After visiting both these villages we visited our allocated village Dahemi and seen the facilities of Dahemi village like water tank, milk cooperative society, etc. But there were also many lacking facilities which we decided to design.

We visited all the villages and made a list of lacking basic facilities in our allocated village i.e., Dahemi. We were supposed to design 6 facilities for the Part 1 of this project and 6 facilities for the Part 2 of this project. So, in total we were supposed to design 12 designs for the Vishwakarma Yojana Project. We have given AutoCAD plans, elevation and sections for the designs suggested by us. We have also provided measurement sheet and the abstract sheet for the given designs. We have given the estimated cost for construction of the facilities which we have suggested. The design with estimated cost we have suggested for the betterment of the village Dahemi are as follows:

Part 1	**Part 2**
1) Public Library: Rs. 4,57,600/-	1) Aanganwadi: Rs. 8,63,390/-
2) Public Toilet: Rs. 3,98,400/-	2) Public Garden: Rs. 5,31,216/-
3) WBM Road: Rs. 11,62,000/-	3) Community Hall: Rs. 24,08,360/-
4) Rain Water Harvesting: Rs. 43,100/-	4) Primary School: Rs. 65,68,340/-

5) Market Yard: Rs. 13,96,774/- 6) Drinking Water Point: Rs. 70,450/-	5) ATM Space: Rs. 96,000/- 6)Biogas Plant: Rs. 55,000/-

We have done different activities in our allocated village like surveying the village, swachta Abhiyan, Covid-19 awareness program, etc. Some of the photographs of our activities are given below:



For detailed information about our swacchta Abhiyan and covid awareness program refer Chapter. 6 and Chapter. 7.